

Heathkit®



MAIL ORDER CATALOG 856 WINTER, 1981-82

Watch for Heathkit Earth Station demonstrations at most Heathkit Electronic Centers! See page 87 for locations.



ORDER TOLL-FREE!
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In Alaska, Hawaii and Michigan call 616-982-3411

NEW

Exciting electronics for a winter of value-packed kitbuilding!



New high-quality, value-packed FM Tuner (p. 93)



New high-performance, feature-filled Integrated Amp (p. 93)



New low-cost, high-performance Digital Multimeter (p. 14)



New compact, portable dual-trace 20 MHz oscilloscope (p. 10)



New energy-saving, assembled Intelligent Seven-Day Thermostat (p. 25)



New self-instruction course in the CP/M Operating System (p. 54)

PLUS over 400 other easy-to-build electronic kits — including a complete line of computer hardware and software, a satellite earth station, a solar water heater and more!

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

ONLY
\$49.95



FAST, EASY
1-EVENING KIT

- 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 a brightly-lit 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. Features reliable, "set it and forget it" convenience.

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 83.

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

12:32



Perfect in den, living room

Or use in kitchen

GC-1720 SPECIFICATIONS: 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.

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49.95

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 $1\frac{1}{4}$ "-thick smoked glass shelves are great places to put books, plants or knick-knacks. The bright

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. 5.8 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. 1.8 lbs. 119.95

Add these Westminster Chimes

Sounds 4 notes on $\frac{1}{4}$ -hour, 8 notes on $\frac{1}{2}$ -hour, 16-note passage and hour on hour. Volume, pitch and sound delay controls; built-in tick-tack and speaker. Builds into GC-1195 or GC-1197.

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



The Heathkit® Pledge

Our instruction manuals are written with you, the builder, 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 the Heath Technical Consultants for prompt answers to any special questions. All this because our ever-growing popularity is based on this simple pledge: "We won't let you fail."



Easy one-evening kits

The kits on this page are practical, fun introductions to the growing world of kitbuilding. Average building time is just one evening. Perfect for birthdays, holidays or family indoor get-togethers.

Rechargeable Portable Light travels with you anywhere to illuminate



3.1" W x 5" D. Built to take the outdoors!

Kit GD-1246A, Shpg. wt. 6 lbs. 37.95

Kit GDA-1246-1, 12-Volt charger, 1 lb. 5.95

Stop break-ins with Photo Switch

Reduce the chances of night burglaries with this light sensitive switch. Turns on lamps (up to 150 W) at night, off at dawn. 3½" H x 2⅓/16" W x 2⅓/16" D.

Kit GD-600, 2 lbs. 9.95



Build the Heathkit Digital Alarm Clock in an evening — it's an ideal starter kit to try yourself or give as a timely gift



- Has a 9-minute Snooze Alarm for extra winks
- Displays time in either 12- or 24-hour formats
- Flashing display alerts you to power failures
- With handsome simulated wood-grain cabinet

Our budget-priced Digital Alarm Clock has a 24-hour alarm and snooze button, plus other space-age conveniences hard to find at this low price. A perfect beginner's kit, and reliable timepiece. A four-digit blue-green fluorescent readout displays the correct time. Automatic dimming adjusts the display brightness to light conditions, and alerts you by flashing if the clock has been shut off during an electrical power interruption. Time can be

displayed in 12 or 24 hour format.

It sounds a pleasant electronic tone to start your day out right. If you aren't quite ready to take on the world, press the Snooze Alarm for 9 more minutes of pleasant dreams, up to 1 hour total.

What makes it tick? You'll know when you finish this one-evening-to-build, years-to-enjoy alarm clock. Attractive modern styling, small size and solid-state dependability make it ideally suited for use in home, office or cottage — anywhere you need accurate time or a reliable, pleasing wake-up. 120/240 VAC. Dimensions: 2.25" H x 7" W x 4.75" D. Get started in kitbuilding today!

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



FAST, EASY
1-EVENING KIT

Take your music along too, with this AM Portable Radio

- We've made this popular Heathkit product even easier to build!
- Improved circuitry for increased battery life — up to 60 hours
- Earphone for private listening
- High-gain ferrite rod antenna for excellent AM band reception

Especially designed for the first-time kit builder, your Heathkit GR-1009 Portable AM Radio will give you pleasure in many different ways, from the fun of kitbuilding to the pride of accomplishment, and the enjoyment of a fine product for years to come. News, weather, sports and the musical variety of AM radio can now be yours at home or on the go!

Excellent AM sensitivity gives you great audio reproduction of music and voice with clear, even tone. An 8-transistor, 7-diode superheterodyne circuit gives the quality performance you expect from a Heathkit product. Power is supplied by an inexpensive 9-volt battery (not included), or PS-2350 12 VAC Battery Eliminator (page 67).

Trim, high-impact cabinet looks sharp, cleans



easily. Measures 3.25" H x 6.3" W x 1.25" D.

A fun, practical way to begin kitbuilding, the GR-1009 requires only a soldering iron, screwdriver, pliers and wire cutters. And remember: "We won't let you fail!" Troubleshooting instructions are included in the assembly manual for convenience.

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

Adjust lights with Tabletop Dimmer



Control brightness of table lamps and floor lamps for reading, dining, watching TV or personal moments. It eliminates unnecessary brightness in 3-way bulbs whose low-watt filaments are burned out, and helps bulbs last longer. Insulated plastic case with non-marring feet is 3.75" H x W x D.

Kit GD-1018, Shpg. wt. 2 lbs. 9.95



Freezer Alarm prevents food loss

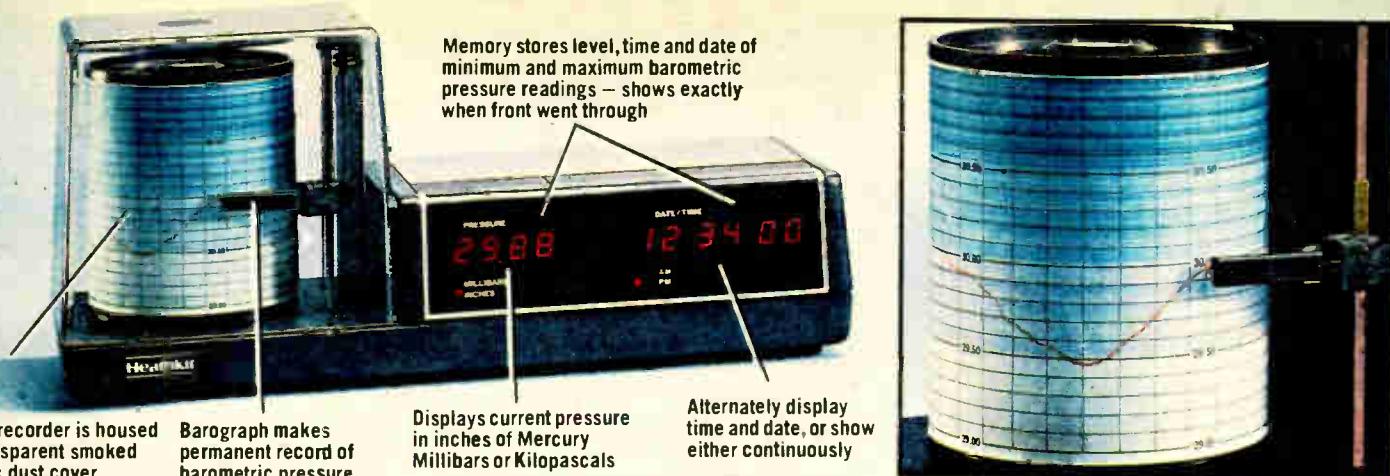
Insure your meats and other frozen foods from spoilage by installing an alarm that warns of a failure in your freezer's cooling system or door left ajar. Alarm beeps and flashes a red light if inside freezer temperature rises above +20 F. Requires 2 "C" batteries. Includes 20-ft cable.

Kit GD-1183, Shpg. wt. 2 lbs. 16.95



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





Get a permanent record of barometric pressure changes — and current reading on three scales

\$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 science and how to predict changes 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 are they 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 and determine global climate.

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. 10 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

Explanation of the Daily Weather Map

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. 71-82), Automotive (p. 90) and Computer Courses (p. 54-56). EW-4100, Shpg. wt. 10 lbs. 79.95





The Heathkit Automatic Rain Gauge precisely measures rainfall in inches or centimeters

- Rainfall readings to within $\pm 3\%$, inches or centimeters
- Tracks both short- and long-term rainfall with separate LED digital displays, housed in an attractive cabinet

The Heathkit 10-1790 Automatic Rain Gauge lets you measure short and long term rainfall quickly and accurately. It features an indoor display unit and an outdoor collector that automatically brings you up-to-date, precise rainfall measurements in inches or centimeters.

You don't have to go outdoors to read the rainfall! The collector catches and measures it for you. A 100-ft. watertight cable is included for sending all readings to the indoor display. You stay warm and dry, and get instantly-updated accumulations during thunderstorm or drizzle.

The 10-1790 gives the accurate measurements you need. The weather resistant outdoor collector is housed in a $14\frac{1}{2}$ " H x $10\frac{1}{2}$ " W x $10\frac{1}{2}$ " D assembly that can be installed on a fence post, patio, or any open area for accurate readings. A screen over the plastic measuring bucket keeps out dirt, leaves and other natural debris that can cause reading errors, or clog the tip-bucket mechanism. The bucket tips automatically when full, so you don't have to go outside during or after heavy downpours to empty the collector.

The 101790's indoor digital display takes the guesswork out of rainfall readings. Two sets of red $\frac{1}{2}$ " high LED digits on a glareless flat back background constantly tell you the short- and long-term rainfall amounts. The first set of digits 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 Heathkit weather instruments. It measures $5\frac{3}{8}$ " H x $12\frac{1}{2}$ " W x $4\frac{3}{4}$ " D and comes housed in a handsome plastic case with a walnut-grain front panel and runs on 120/240 VAC house current. A 9-volt backup battery (not included) keeps the unit's memory and measuring circuits operating during power failures. Take the "guess-and-get-wet" out of measuring rainfall — order your Heathkit Automatic Rain Gauge today.

Kit 10-1790, Shpg. wt. 14 lbs. 149.95
IDW-1790, Assembled Automatic Rain Gauge, Shpg. wt. 12 lbs. 199.95

10-1790 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 $\frac{1}{2}$ 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).

ID-1890 SPECIFICATIONS: Digital Clock/4-Year Calendar: 6-digit time readout. Rear Panel Controls: Clock Start/Stop, Hours/Month Advance, Minutes/Days Advance, 10 Minutes Advance, Time/Date Hold, 12/24-Hour Time Format. Wind Speed Display: 2 significant digits. Separate indicators show whether display in miles per hour, knots or kilometers per hour. Memory: Date, time and magnitude of maximum gust. Accuracy: $\pm 5\%$ or better. Directional Display Accuracy: ± 11.25 deg. Operating Temperatures: -40° to $+158^{\circ}$ F (-40° to 70° C).



The Heathkit Digital Wind Instrument gives you wind speed, direction and gust information

- Easier to read than older, dial and needle wind speed indicators
- Displays the instantaneous or average wind velocity; recalls day and time of peak wind gust; has accurate clock/calendar

Here's a wind speed/direction indicator with computer-age capabilities for those who demand accurate wind readings. The ID-1890 Digital Wind Computer is a precision, microprocessor-based meteorological instrument that displays instantaneous or average wind statistics, plus time and date. Lighted indicator bars show wind direction on a 16-page compass dial. Inside the compass face, two $\frac{1}{2}$ " LEDs tell you wind speed in mph, kph or knots. The included windvane and anemometer are similar to those described for the ID-4001 (next page). Requires 120/240 VAC. Memory retention feature. Same dimensions as ID-1790. Assembled IDW-1890 includes 99-foot cable.

Kit 10-1890, Shpg. wt. 10 lbs.	164.95
IOW-1890, Assembled Digital Wind Instrument, Wt. 14 lbs.	194.95
IOA-1290-1, 50' 8-wire cable for ID-1890, Shpg. wt. 2 lbs.	9.95
IOA-1290-2, 100' 8-wire cable for ID-1890, Shpg. wt. 4 lbs.	16.95
IOA-1290-3, 150' 8-wire cable for ID-1890, Shpg. wt. 6 lbs.	23.95



Computerized Barometer alerts you to storms

- Monitors pressure, rate and direction of change, 12/24-hour time & date
- Data control at your fingertips
- Bright red $\frac{1}{2}$ " high LEO readout
- Three unit scales: inches and millibars or kiloPascals



The vital barometric pressure information you need to predict severe or pleasant weather is at hand with the ID-1990 Computerized Barometer. Its internal microprocessor reveals past data and monitors the present.

You get current pressure, rate of change, direction of change, maximum and minimum pressures from memory, and the exact time and date when they occurred. In addition to being an accurate barometer, it's a clock/calendar with switchable 12/24 hour format for local and official reporting. Registers hours, minutes, seconds, month and day. All pressure data is sent by a unique, accurate electronic transducer — not an aneroid diaphragm! 120/240 VAC.

Kit ID-1990, Shpg. wt. 10 lbs. 174.95
IDW-1990, Assembled Computerized Barometer, Shpg. wt. 8 lbs. 194.95

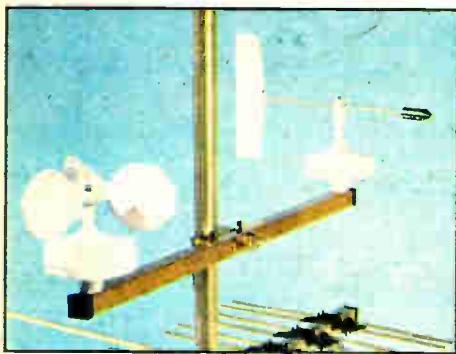
10-1990 SPECIFICATIONS: Barometer: Displays: 4-digit readout. Separate Indicators show whether the pressure is rising or falling, and whether the display is in inches of Mercury, millibars or KiloPascals. Pressure Ranges: 28.00 to 32.00 inches Hg. (inches of Mercury), 981 to 1050 Millibars or 98.1 to 105 kiloPascals. Accuracy of Reading: 29.00 to 31.00 inches Hg ± 0.03 in Hg (15° to 35° C).



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

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

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



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

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

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

Weather information at the touch of a button: Compare the ID-4001 desktop weather station to higher priced units (if you can find one that does all this): Ours gives you the time in AM/PM or 24-hour format, plus the date for exact log entries; both the indoor and outdoor temperature, whether it's above zero or below, in Fahrenheit or Celsius scales; outdoor wind chill factor, plus the indoor/outdoor minimum and maximum temperatures since last memory clearance; instantaneous wind velocity with digital accuracy and 16-point compass resolution, in mph, kph or knots; the average wind speed and direction, and peak gust since last cleared; barometric pressure with four-digit accuracy, in inches or millibars, and if it is rising or falling. Last but not least, you can use the minimum and maximum barometric pressure readings to determine the passage of weather fronts.

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

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



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

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

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

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

Kit ID-4001, Shpg. wt. 15 lbs. 399.95

Assembled and Tested ID-4001, including 100' cable. 569.95

IDW-4001, Shpg. wt. 22 lbs. 569.95

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

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

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

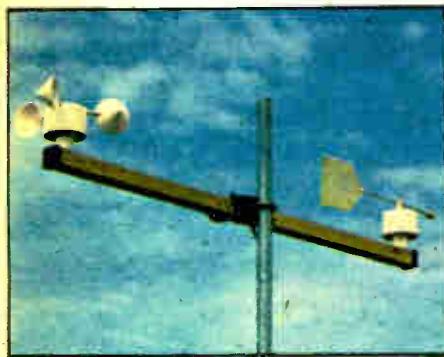
IDA-1290-3, 150' cable, Shpg. wt. 6 lbs. 23.95

ID-4001 SPECIFICATIONS: DIGITAL CLOCK/4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. **WIND VECTOR:** Accuracy: $\pm 5\%$ or better. Direction Display: Accuracy: $\pm 11.26\%$ degrees. **THERMOMETER:** Temperature Range: -40° to 70°C ; -40° to 158°F . Accuracy: $\pm 1^\circ$ on Celsius readings; $\pm 2^\circ$ on Fahrenheit readings. **BAROMETER:** Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury), 981.9 to 1050 millibars. Accuracy: ± 0.075 in. Hg plus ± 0.01 in. Hg/ $^\circ\text{C}$. Operating Temperatures: Outdoor assemblies, -40°C to $+70^\circ\text{C}$ (-40°F to 158°F). Unit, 1G to 35°C (59° to 95°F). Power Requirement: 120/240 VAC. Provision for external battery connection for memory backup during power failures. Dimensions: 7½" H x 16" W x 6" D.



Low-cost, five-function weather station gives accurate atmospheric and temperature information

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



Aneroid barometer accurate to within 0.05 in. mercury

Wind direction with 16-point compass reference

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

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

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

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

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

Accurate Digital Wind Speed/Direction Indicator

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

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



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

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

Kit ID-1290, Shpg. wt. 8 lbs. 139.95

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

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

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

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

ID-1290 SPECIFICATIONS: Wind Speed: 0-30 mph, ±2 mph; 0-90 mph, ±5 mph. Direction: 8-point readout over 360°. Temperature: 0° to +120°F, ±2°F (typ. INDOOR); -40° to -120°F, ±2°F (typ. OUTDOOR). Barometric Pressure: 29-31 inches of mercury within .05 inches, accurate up to altitudes of 10,000 ft. Operating Temperature: Receiver, -32° to 100°F; Transmitter, -40° to -120°F. Wind Direction: 16-point resolution by lighting two adjacent lights.

Practical Digital Indoor/Outdoor Thermometer

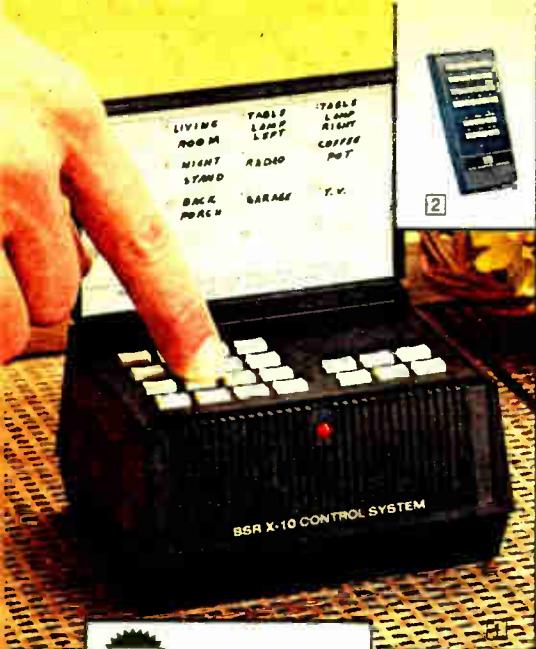
When you compare the advantages this Digital Indoor/Outdoor Thermometer has over a conventional, mercury bulb sun-or-snow thermometer, you'll wonder how you did without one for so long. The big, red ½" display digits can be seen easily in broad daylight, or at night. No guesswork! The ID-1390B accurately

monitors two temperatures with two sensors for indoor/outdoor readings, displayed within two degrees. Select Fahrenheit or Celsius temperatures, with continuous readings of one, or alternate readings of both. The 10' indoor and 75' outdoor cables (included) let you place the sensors anywhere (freezer, sauna, basement, pool, solar panel, etc.) Ranges from -30°F to 120°F outdoors and 20°F to 120°F in. Step-by-step instructions make it easy to assemble, and a practical kit that gives year-round value. Same size (2.5" H x 7" W x 5" D) and styling, with black Cyclocac™ cabinet and teakwood trim, as ID-1590. Displayed together, a great set!

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



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



NEW!

BSR System X-10 Command Console lets you control the entire house

Telephone Responder lets you control lights when you're away

Timer Command Console runs your lights automatically

BSR X-10 CONTROL SYSTEM



Low-cost, reliable security with Informer Ultrasonic Alarm

Ultrasonic sound waves "see" intruders up to 25 ft. away, activating bell or lights when field is broken. Turns on device when it detects motion; turns off after delay and resets. Built-in delay lets you enter room without alarm. Use it to alert you when a child gets out of bed or to operate entry lights automatically. Boot cover design conceals unit. 120 or 240 VAC. NOTE: May interfere with ultrasonic TV remote control.

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

GDA-39-1, Indoor Buzzer Alarm, 1 lb. 10.95

GDA-39-2, 120 VAC Alarm Bell, 5 lbs. 29.95

Control your lights and appliances from one central location!

- Adds convenience, saves both energy and money by regulating power use
- Controls up to 16 groups of lights and appliances by modular command
- Can ward off intruders — push one button to light up the entire house
- Requires no special house wiring

1 The Standard Command Console is the ultimate home convenience: light the hall, turn on the news and start the morning coffee from the comfort of your bed! Save energy by turning off or dimming lights, stopping appliances. Simply plug Command Console modules into 120 VAC outlets, then plug items in as usual. Sixteen codes control lamp, switch or appliance modules. The modules receive signals via existing AC house wiring. Use as many modules on the same code as you wish. Use GDP-1511 Cordless Controller (shown above, left) to run 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. Operates Standard Command Console remotely, 30' limit.

GDP-1511, Assembled, UL listed, 1 lb. 19.95

3 NEW! Telephone Responder Command Console with remote keyboard lets you enjoy the freedom and convenience of controlling appliances and lights in your home from any telephone! Call home when you're away, operate up to eight groups of 120 VAC items. Telephone Responder includes modular telephone plug and jack.

GDP-1515, Assembled, UL listed, 6 lbs. 89.95

4 Timer Command Console runs everything on time. Creates "lived-in" look when you're away, and can even simulate movement from room to room! It turns up to eight groups of 120 VAC items on/off up to twice daily. Power failure clears memory, prevents accidental cycles. No dimming feature.

GDP-1520, Assembled, UL listed, 2 lbs. 64.95



Zenith Video Sentinel gives clear view and voice of persons at door

Use the Zenith Video Sentinel to answer the door, view a front or back door caller and talk safely — or closely monitor indoor/outdoor locations. The system includes a 12" diagonal black and white VHF/UHF television set, small and discreet video camera with stand, a doorbell button that attaches to your present doorbell, an intercom, 60-foot camera-to-TV cable and a 25-foot intercom-to-TV cable. A bargain price for a sophisticated surveillance system with potential applications for security coverage that are virtually unlimited, and effectiveness measured in terms of positive detection and identification. TV dimensions: 11.38" H x 16.25" W x 12" D. This system allows standard TV reception, also.

GDZ-620, Assembled and tested, 28 lbs. 349.95



5 NEW! Sprinkler Control Valve Accessory connects between faucet and garden hose to make an automatic lawn watering system. Requires GDP-1514 Appliance Module.

GDP-1518, Shpg. wt. 3 lbs. 59.95

6 Three-Way Wall Switch Module controls 3-way upstairs/downstairs switches with independent on/off buttons. 120 VAC, 500 Watts, maximum.

GDP-1516, Assembled, UL listed, 1 lb. 21.95

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 Lamp Module turns on/off and/or dim with GDP-1510. 120 VAC incandescent lamps. 300 W.

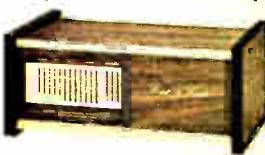
GDP-1512, Assembled, UL listed, 1 lb. 15.95

9 Appliance Module for most 120 VAC devices including fans, coffee pot, TVs, radios, lights, etc. (no dim). For 15 A resistive or $\frac{1}{3}$ hp motors.

GDP-1514, Assembled, UL listed, 1 lb. 15.95

Telephone Security Dialer calls help

When an intruder trips an alarm, or you haven't time to dial a complete number, this device will automatically call a friend, relative, neighbor or the police. Hook it up to your security system and program any number easily with a 3-digit location code. Automatic redial if line is busy. Separate microphone monitors secured area. Kit **GD-1156**, Shpg. wt. 7 lbs. 179.95



Eye Spy Photobeam Alarm detects all

This model uses an incandescent beam of light to catch intruders instantly, activating a 120 VAC warning device of your choice, up to 300 watts. Includes light source, mirror and photo cell relay.

GD-1021, Shpg. wt. 3 lbs. 17.95



Night Sentry Timed Switch

For 120 VAC incandescent lights. Accepts 48 on/off settings daily. Randomness for lived-in look. Assembled.

GDP-1236, UL, 1 lb. 19.95





Infra-red Security Light Control detects movement invisibly, deters criminal intruders, and lights your way safely into house

- Makes home safer at night by "seeing" invisible infra-red waves and motion
- Automatically turns on lights (up to 500 W) if movement is detected

Heath brings you the strongest outdoor safeguard to intruders yet, sensing within 875 square feet!

The GO-3510 Security Lighting Control uses a passive infra-red sensor to turn on lights at night, when heat and motion are detected. Six infra-red elements monitor an 875-square-foot area near your home or garage, and keep it safe from intrusion by activating lights or an alarm.

When an intruder is detected, the unit quickly surprises him with the most recognized deterrent to crime — LIGHT. The unexpected lighting makes the intruder think that he has been observed, and causes him to flee.

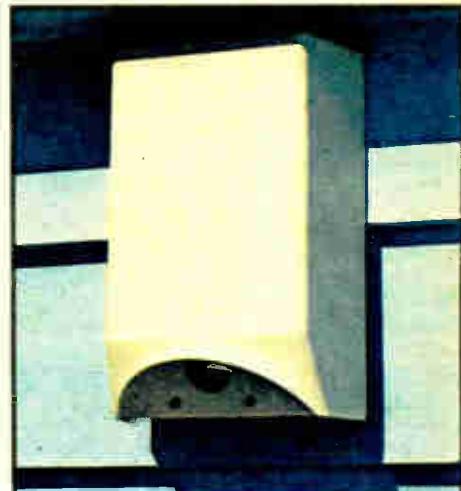
How does this revolutionary device work? Infra-red light (just below red light in the spectrum) is invisible to our eyes. But its presence can be detected as heat, in the form of radiated waves of energy. The passive infra-red sensor is highly sensitive to heat and looks for changes in tempera-

ture with movement within the protected 35-ft by 25-ft field. When a warm-bodied object moves through the field a relay instantly turns on a light or even a security alarm, up to 500 total watts. The unit automatically shuts itself off 4 minutes after all movement has ceased. A manual sensitivity control lets you determine optimum size of the object to be detected, so pets and small animals will not accidentally set it off.

A built-in phototransistor will deactivate the device during daylight hours. When surrounding light dims, it will sense darkness approaching and turn on the detection circuit again. The Security Lighting Control effectively deters crime without upsetting your neighbors!

The fact that an object must be moving can be used to great advantage. The lighting control can provide switching to illuminate stairways, walkways and driveways safely. In addition, it greets you when returning home after dark, and will automatically light the way for friends and neighbors when they come to visit.

Wire it yourself, or consult an electrician when connecting it to your 120 VAC, 60 Hz lighting



system. It's a rewarding kit that offers high security value. Rugged, weatherproof plastic case measures: 8.06" H x 5.25" W x 3" D. Assembled unit advertised elsewhere for \$199.

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

Minuteman II Alarm System protects your home and family

- Component design offers total user flexibility to match security needs
- This famous system, now a kit, offers portable protection when you move

No house, apartment or business is immune to burglary or vandalism. Protect yourself, your loved ones and your property by using Delta's Minuteman II Ultrasonic Alarm System. It also acts as a master control for expandable options, includes entry/exit delays, backup for severed line current and self-testing circuitry for ever-reliable operation.

① Master Control Unit/Detector protects up to 300 sq. ft. with harmless ultrasonic sound. Controls on/off functions, entry-exit delays, alarm timer, test circuits. Powers GD-1800-3 speaker (3); includes plug-in power transformer and provisions for hard-wired perimeter or closed circuit security. 120 VAC, 60 Hz. May interfere with other ultrasonic equipment in the area.

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

② Arm or disarm your Minuteman II Alarm System with this professional-looking key switch accessory. Includes loop-secure LED to positively indicate secure status, along with a special pick-resistant key and lock set. Requires GD-1800 Master Control Unit/Detector for power. Includes two disarming keys for added security.

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

③ All-Weather Loudspeaker produces up to 108 dB of high/low siren noise (measured at 10') when used with the GD-1800. Suitable indoors or out, it includes 50' of wire. Use up to two speakers with GD-1800. Impedance: 8 ohms.

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

④ Minuteman Sentinel Ultrasonic Detector/Slave protects up to 300 sq. ft. and includes 50' of 4-conductor wire. Requires GD-1800 unit, or use alone with 12 VDC from RV, van or boat. Hook up to horn relay. Order bracket at right.

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



NEW FROM HEATH! Bracket Accessory for mounting the GDA-1800-1 Minuteman Sentinel Ultrasonic Detector/Slave unit remotely to inside or outside wall, ceiling, recreational vehicle, etc.

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



NEW

Top-quality Portable 20 MHz Oscilloscope features extra-value capabilities!

The IO-3220, the first portable Heathkit oscilloscope, represents outstanding value in its class. Compact enough to fit under an airplane seat, it features dual-trace capability, a bright CRT trace, wide DC-20 MHz bandwidth and an invert display function.

- X-Y inputs let you feed two separate input signals to measure Lissajous patterns, perform other measurements
- Algebraic add lends versatility
- Very sensitive vertical input accepts signals as low as 2 mV
- Lightweight — weighs only 16 pounds (without optional rechargeable battery pack)
- Small, durable cabinet has convenient carrying handle; optional Probe Pouch can be attached to cabinet
- Includes cover to protect front panel controls from dust

The first portable Heathkit oscilloscope: Smaller than regular bench oscilloscopes, the Heathkit IO-3220 20 MHz Portable Oscilloscope is designed for field service troubleshooters who need a light, portable, battery-operated scope for use in remote areas where AC power is not available. It measures and displays time as a product of frequency, displays complex waveforms, measures DC and AC voltages, and performs other measurement functions.

Dual-trace versatility: The IO-3220 allows you to compare two different signals, simultaneously — to make input/output comparisons, check phase relationships and accomplish other complex measurements. Its invert display function enables you to compare two waveforms that are nearly 180 degrees out of phase — by inverting one of the waveforms.

X-Y inputs provided for Lissajous measurements: With these X-Y inputs, you can feed two separate input signals to the IO-3220.

Algebraic add is provided, so you can make differential measurements.

Wide bandwidth: The IO-3220 can measure a very wide range of input signals.

Outstanding sensitivity: Vertical signals as low as 2 millivolts can be accurately measured by the very sensitive IO-3220. Accuracy is as high as 3 percent (from 20-30 deg. C), on both vertical and horizontal measurements.

Easy-to-read CRT: The IO-3220's CRT, which is divided into 8 x 10 divisions, features P31 phosphor for an extra-bright trace that's easier to read, even in high ambient light conditions.

Easy scope compensation: A 1 Volt peak-to-peak square wave compensation signal is provided at the IO-3220's front panel.

Easy kit assembly. The IO-3220 comes with a comprehensive, easy-to-follow Heathkit manual that guides you through the kitbuilding process.

Use anywhere — runs on external or internal power: For 120/240 VAC, 50/60 Hz power. Also runs on optional IOA-3220-2 Rechargeable Battery Pack (not included), or on 11-24 VDC (user-selectable) at approximately 34 VA. Includes cover to protect front panel from dust contamination. The compact, rugged cabinet measures 5.5" H x 13" W x 18" D. Calibration requires a precise source of square waves, such as the IG-4505 (page 14). To add to the IO-3220's versatility, use the IOA-3220-1 Probe Set with Pouch below.

Kit IO-3220, Shpg. wt. 24 lbs. 689.95

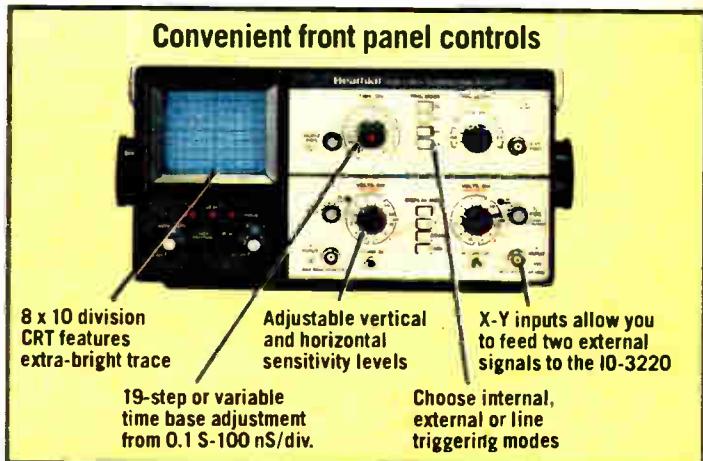
SO-3220, Assembled, tested and calibrated, Shpg. wt. 22 lbs. 995.00

Probe Set with Pouch. Includes two PKW-105 X1/X10 Scope Probes with two-position multiplier for X1 and X10 probe tip and 4.5-foot cable.

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



Carrying handle makes the lightweight IO-3220 highly portable



Rechargeable Nickel-Cadmium Battery Pack for IO/SO-3220. Provides minimum of two hours continuous operation on full charge. Recharged by IO/SO-3220 when oscilloscope is in charging mode.

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

IO/SO-3220 SPECIFICATIONS: Vertical: Frequency: DC, DC to 20 MHz (-3 dB); AC, 3 Hz to 20 MHz (-3 dB). Rise Time: Less than or equal to 18 nS. Overshoot: Less than or equal to 5%. Deflection Factor: 2 mV/division to 10 V/division in 12 calibrated steps, 1-2-5 sequence. Variable between steps. Vertical Windows: Two minimum (16 divisions). Input Impedance: One megohm shunted by approximately 35 pF. Maximum Input Voltage: 400 Volts (DC plus peak AC). Display Modes: Y1, Y2, Dual (TB selected), Add, Subtract. Accuracy: 3% (20-30 deg. C), 5% (70-40 deg. C) (Variable in cal. position). Horizontal: Time Base: 0.1 sec./division to 100-nS/division in 19 steps, 1-2-5 sequence. Variable between steps. X5 magnifier increases sweep speed to 20 nS/division. Accuracy: 3% (20-30 deg. C), 5% (10-40 deg. C) — except X5 within 5% (20-30 deg. C), 7% (10-40 deg. C) (Variable in cal. position). X-Y X Channel: Same as vertical. Y Channel: Same as vertical with limited response of 2 MHz. Phase Shift: Less than 3 deg. at 100 kHz. Triggering: Source: Internal A or B (+ or -), External (+ or -), Line (+ or -). Mode: AC, DC. Low-Frequency Reject, High-Frequency Reject (Automatic baseline in absence of trigger when in auto mode). Sensitivity: Automatic, Adjustable over 10 divisions; Normal, Adjustable over 10 divisions; External, Adjustable over 0.8 Volt in either auto or normal mode. Input Impedance (External): 1 megohm shunted by approximately 100 pF. Z Input: Full On to Full Off: 0 to 5 Volts. Maximum Input: 50 Volts peak. Input Impedance: Approximately 5 kilohms. Square Wave Compensation Signal Voltage: One Volt, peak-to-peak. Accuracy: 3%. General: CRT: 8 x 10 divisions, P31 phosphor with internal graticule. Connectors: Coaxial BNC on front and rear panels, plus banana connectors for external DC input. Temperature Ranges: Operating, 10-40 deg. C; Storage, -40 to +70 deg. C. Dimensions: 5.5" H x 13" W x 18" D (13.97 x 33.02 x 45.72 cm), with handle in carrying position.



Get dual-trace capability, extra-value features at an economical price with the Heathkit IO-4205

- Compare two signals simultaneously for added versatility
- Outstanding 10 mV/cm vertical sensitivity for most applications
- Stable triggering circuit for solid waveform displays
- Extra stability from a fully-regulated power supply
- Seven switchable, calibrated time bases (200 mS/cm to 0.2 μS/cm)

Dual-trace capabilities at a single-trace price: Put the dual-trace DC to 5 MHz IO-4205 Oscilloscope to work for you, handling the sophisticated needs of today's electronic technician! This versatile Heathkit oscilloscope lets you compare two signals simultaneously for input-output comparisons, checking phase relationships and many other functions.

Versatile triggering capabilities: You can select an external time base, or one of seven calibrated internal time bases from 200 milliseconds/centimeter to 0.2 microseconds/centimeter. A special TV position on the trigger selector control allows low frequencies to pass – while high frequencies are rejected, so the IO-4205 can easily trigger on the vertical component of a complex television signal. A stable triggering circuit (not the recurrent-type sweep usually found on other oscilloscopes in this price range) contributes to the IO-4205's solid waveform displays.

Vertical input sensitivity is an excellent 10 mV/cm. And 11 calibrated attenuator positions, up to 20 V/cm, will accommodate a wide range of inputs.

High-quality, easy-to-read CRT: Accurate measurements can be easily made on the bright, 8 x 10 cm CRT screen.

Extra-value features provide stable measurements: The IO-4205's fully-regulated power supply provides voltage and current – even under varying line and load conditions. Partial mu-metal shielding helps eliminate possible display errors caused by stray magnetic fields and other interference.

Easy-to-build, easy-to-use: The IO-4205's easy-to-operate controls and front panel inputs make it one of the most versatile oscilloscopes you'll find anywhere. And when you build it yourself, you get the economy of kit value, too. To calibrate the kit version of this Heathkit oscilloscope, the IG-4505 Deluxe Oscilloscope Calibrator (offered below) is required. Both the kit and assembled versions of the IO-4205 Oscilloscope operate on 120/240 VAC, 50/60 Hz line current – drawing just 50 Watts of power.

Low-priced, professional DC-5 MHz Oscilloscope

- External or seven internal time bases
- 10 mV/cm vertical input sensitivity – ideal for most applications
- Regulated low-voltage power supply, mu-metal shielding provide stability
- Extra-bright 8 x 10 cm CRT screen

Ideal for single-trace scope applications: Here's your chance to put a professional DC-5 MHz single-trace oscilloscope on your test bench at traditional Heathkit savings.

Easy triggering, solid waveforms: The IO-4105's triggering circuit and fully-regulated low-voltage power supply help provide stable waveform displays. And it can trigger on the vertical component of a complex television signal, thanks to a special

feature of the trigger selector control that allows low frequencies to pass – while high frequencies are rejected.

Use internal or external time bases: Internal time bases can either be variable, or in one of seven steps ranging from 200 mS/cm to 0.2 μS/cm. External inputs from DC to 1 MHz are accepted by the horizontal amplifier.

Excellent vertical input sensitivity: Rated at 1 mV/cm. Combined with attenuation up to 20 V/cm, the IO-4105 accepts a wide range of inputs.

Calibration required; use the IG-4505 Deluxe Oscilloscope Calibrator below, right. For 120/240 VAC. 8" H x 13" W x 17" D.

Kit IO-4105, Shpg. wt. 31 lbs. 249.95

Useful X1/X10 Scope Probe



Covers DC to 15 megahertz (X1) and DC to 80 megahertz (X10) bandwidths. X10 rise time, 4.0 nanoseconds. Has two-position multiplier for X1 and X10 probe tip. Compensation range of 15 to 50 picofarads. Includes 4.5-foot cable and probe with three-position slide switch.

PKW-105, Assembled and tested, Shpg. wt. 1 lb. 29.95

Handy oscilloscope accessories



Low-Capacitance Probe for direct or X10 operation. 3.3 or 1 megohm input resistance. Banana plug/BNC wiring.

Kit PK-1, Shpg. wt. 1 lb. 11.95



Demodulator Probe: Use to check RF, IF distortion. Maximum input: 500 VDC, 30 VAC rms. Banana plug/BNC wiring.

Kit 337-C, Shpg. wt. 1 lb. 8.95

Deluxe Oscilloscope Calibrator



A practical oscilloscope calibrator at a sensible price. Provides all 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 with this accurate source of square waves.

Kit IG-4505, Shpg. wt. 4 lbs. 52.95



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

The IO-4550 Dual-Trace DC to 10 MHz Oscilloscope is ideal for your servicing and design work



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. 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 assembly easy. The complete Heathkit manual guides you through the steps of kitbuilding.

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

The Heathkit IO-4550 – a value-packed dual-trace oscilloscope with a full set of performance features

- Dual-trace oscilloscope is ideal for electronic servicing, experimentation and design
- Features brighter trace for easier reading in high ambient light, faster writing speed
- 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 200 nS/cm to 0.2 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, level control allow precise triggering at any point on the positive or negative slopes of the trigger signal
- A calibrated 1 Volt peak-to-peak square wave signal is available at the front panel for easier probe compensation
- Mu-metal shield eliminates errors caused by electromagnetic interference
- Fully-regulated high-voltage power supply provides more reliable, repeatable reading
- Just four printed circuit boards mean faster, easier kit assembly

for either 120 or 240 VAC. Calibration of the IO-4550 requires a precise source of square waves, such as the IG-4505 Oscilloscope Calibrator (available on page 11). To add to this oscilloscope's versatility, see the assembled PKW-105 X1/X10 Scope Probe (also available on page 11).

Kit IO-4550, Shpg. wt. 27 lbs. 439.95
IO-4550, Assembled and calibrated, Shpg. wt. 25 lbs. 670.00

IO/SO-4550 SPECIFICATIONS: VERTICAL: Deflection Factor: Sensitivity: 10 mV/cm-20 V/cm, 11 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 60 V/cm. Accuracy: 3%. Vertical Response: DC Coupling: DC-10 MHz. AC Coupling: 2 Hz-10 MHz. Rise Time: 35 nS. Overshoot: Less than 5%. Attenuator: Vertical Input: Impedance: 1 megohm, shunted by 38 pF. Maximum Input: 400 Volts peak, combined AC and DC. Connector: BNC. Modes: Single, Y1 or Y2 selected by position control; Dual, Chopped (200 kHz) or alternate automatically selected by time/cm switch. HORIZONTAL: Time Base: Ramp: 200 nS/cm to 0.2 S/cm, 19 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 0.6 S/cm. Accuracy: 3%. Magnifier: X5 (adds additional 2% to sweep accuracy). EXTERNAL: Sensitivity: Approximately 0.1 V/cm. Impedance: Approximately 100 kilohms. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to 1 MHz. Connector: BNC. TRIGGER: Internal: Automatic: Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Slope Selection: + or -. Impedance: 1 megohm, shunted by 40 pF. Connector: BNC. X-Y: 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 Requirements: 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 Heathkit Vacuum Tube Checker



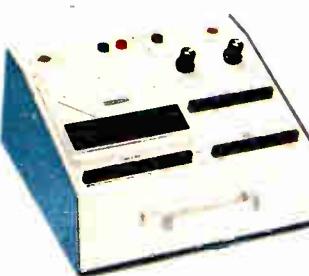
Test vacuum tubes on basis of total emission – for shorts, leakage, open elements and filament continuity.

The easy-to-use IT-3117 also has a good/bad indicator to show relative quality, and a neon bulb indicator for detection of filament continuity and leakage or shorts between elements of the tube.

Housed in rugged, attractive metal cabinet. 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, 12 lbs. 179.95

High-accuracy Heathkit Diode/Transistor/FET Tester



Tests conventional (bi-polar) transistors, diodes, field-effect transistors (FET's), SCRs, triacs and unijunction transistors.

Test in-circuit with color-coded leads supplied, or out-of-circuit with built-in sockets. Shows gain (DC beta), trans-conductance (Gm), leakage current on an easy-to-read front panel meter.

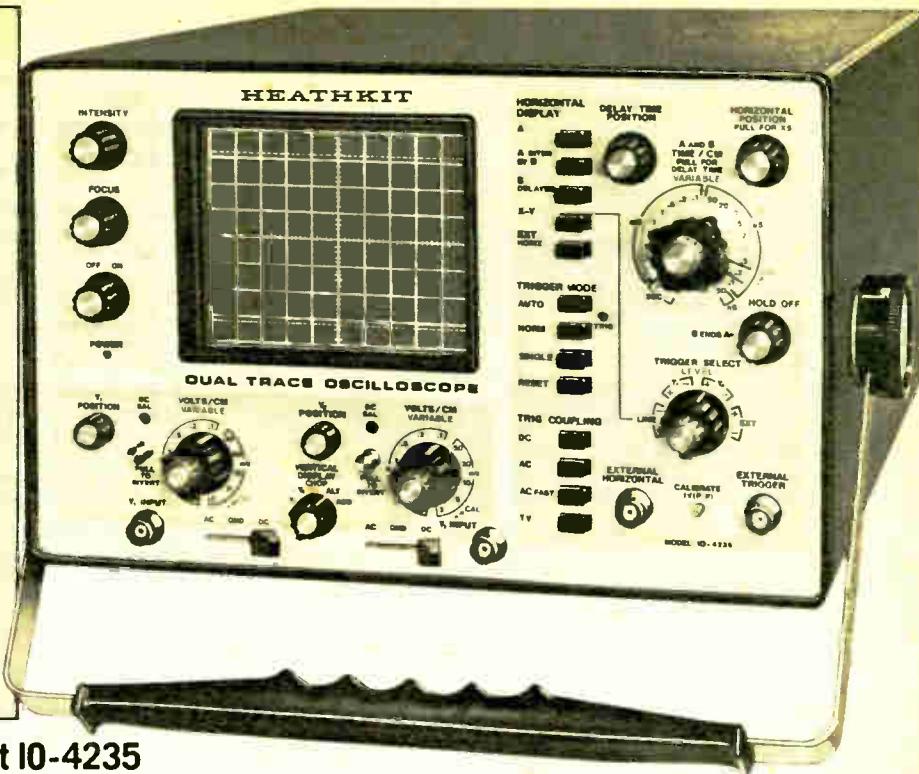
Sturdy metal case. Uses two 1.5 VDC D-size cells (not supplied). 5" H x 9.44" W x 8.13" D.

Kit IT-3120, 5 lbs. 74.95



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!

\$969.95
Kit

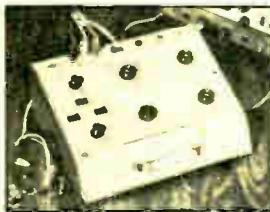
- Perfect for measuring virtually any waveform, from simple sine wave signals of stereo components and TV to highly complex waveforms of state-of-the-art devices

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 OC-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

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



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

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

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.

S0-4235, 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: DC Coupling: DC to 35 MHz (-3 dB). AC Coupling: 1 Hz to 35 MHz. Rise Time: 10 nS. overshoot: Less than 3%. Delay Line: Allows display of at least 20 nS of pre-triggered waveform. Vertical Input: Impedance: 1 megohm, shunted by 30 pF. 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 5.0 ms. 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), referenced to 1 ms/cm. External Horizontal: Sensitivity: approx. 0.1V/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 8 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 a "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. 85 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 folded. Net Weight: 30 lbs. (13.6 kg).

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



NEW

Portable Digital Multimeter features state-of-the-art, budget-priced performance



Special color-coded front panel makes the IM-2260 more convenient to use than other multimeters

ONLY
\$124.95
Kit

- Compact, lightweight 3½-digit Multimeter features excellent performance, many ranges
- Measures 1 mV to 1000 VDC (750 VAC), 1 mA to 10 Amps, and 1Ω – 20 MΩ; also tests diodes
- Attractively styled, low-profile cabinet

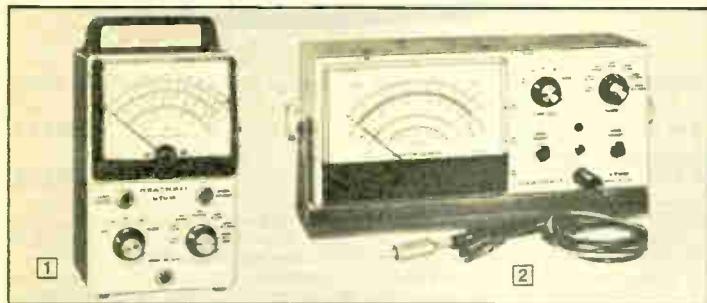
Many capabilities at a low price: The IM-2260 tests voltage, current, resistance and semiconductors! Features reliable state-of-the-art LSI (large scale integration) measuring circuitry, automatic polarity indication, automatic decimal point placement. Pushbutton switching for added convenience. Built-in references for accurate calibration. Large 3½-digit LED display.

Well-protected: Input protection provided on all functions. Voltage ranges protected to 1000 V. Current functions (except 10 A range) protected by diode and fuse circuits. Resistance ranges protected to 350 V. Fully isolated circuitry allows floating measurements up to 500 V (peak) from earth ground.

Features attractive styling: The cabinet has a carrying handle that can position the display at a convenient viewing angle. Uses six 1.5 VDC carbon-zinc, alkaline or nickel-cadmium "C" cells (not included). Has battery test, circuit to recharge nickel-cadmium batteries. Can also run on 120 VAC, with optional PS-2404 Battery Eliminator (page 19). 3" H x 8.5" W x 11" D.

Kit IM-2260, Shpg. wt. 5 lbs.	124.95
SM-2260, Assembled and tested, Shpg. wt. 4 lbs.	179.95

IM/SM-2260 SPECIFICATIONS: **Voltage Ranges:** 2, 20, 200 and 1000 VDC; 2, 20, 200 and 750 VAC. **Accuracy:** DC, $\pm 0.5\%$ ± 1 count; AC (50 and 60 Hz), $\pm 1.0\%$ ± 1 count (referenced to 60 Hz reading). **Frequency Response:** 40 Hz to 1 kHz, $\pm 0.5\%$. **Input Impedance:** 10 megohms (for AC, shunted by approximately 100 pF). **Current Ranges:** 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. **Accuracy:** DC, $\pm 1.5\%$ ± 1 count, except $\pm 3.5\%$ on 10 A range; AC, $\pm 2.0\%$ ± 1 count, except $\pm 4.0\%$ on 10 A range (40 Hz to 1 kHz). **Resistance Ranges:** 2 kilohms, 20 kilohms, 200 kilohms, 2000 kilohms, 20 Megohms. **Accuracy:** $\pm 0.25\%$ ± 1 count, except $\pm 0.5\%$ on 20 Megohm range.



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

PKW-4, Wired Replacement Probe for IM-5218 or IM-5228 VTVMs, 1 lb. 10.95

IMA-18-1, Solid-State/Instant-On Conversion for IM-5218/5228, 1 lb. 19.95

Versatile Test Lead Set



2000 VRMS, 20A maximum. Two 1.5 meter cables with 4 mm shielded plugs; sprung hook; prod; shielded croc clip. PKW-200, 1 lbs. 15.95

50Ω Termination, DC-1 GHz. SU-511-50, 1 lb. 14.95

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. 0.5% tolerance. 1-watt resistors. Housed in rugged metal case. Dimensions, 5" H x 7.5" W x 6.63" D.

Kit IN-3117, Shpg. wt. 3 lbs. 52.95



Use Portable VOM for fast checks

Solid-state VOM is ideal for in-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). 5.38" H x 9.38" W x 9" D.

Kit IM-5217, Shpg. wt. 4 lbs. 39.95



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

Accurate, affordable Heathkit Hand-Held DMM

- Accurately measures AC and DC voltage, current and resistance
- Has built-in references for easy in-the-field calibration
- Large, easy-to-read 3½-digit liquid crystal display (LCD)
- Double protection against damaging overloads, transients
- Low current drain design provides 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.

Designed to test semiconductors: 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: Pushbutton switching and built-in calibration references make the IM-2215 ideal for in-the-field use. The 3½-digit liquid crystal display (LCD) features large, easy-to-read digits — automatic decimal point placement — and automatic polarity indication for fast measurements.

State-of-the-art measurement circuitry: Highly-sophisticated dual-slope, analog-to-digital conversion circuitry is contained in one MOS/LSI (metal oxide semiconductor/large-scale integration) integrated circuit. This circuitry provides extremely accurate and stable performance in all modes.

Double protection for the IM-2215 and your circuits: All measurement functions are protected by fuse and diode against overloads and transients. Voltage and current inputs are separated to provide extra protection to the instrument and the circuitry being tested.

Includes bench stand: A pivoting stand is included with the IM-2215, to place the display at a convenient angle for bench use.

Enjoyable, easy-to-build kit: The low-cost Heathkit IM-2215 Digital Multimeter goes together in just one evening, and will give you many years of versatile, reliable service in a convenient, portable package.

Use long-lasting battery power or line current: A special low current drain design allows the IM-2215 to operate for up to 200 hours on a single NEDA 1604 9 VDC alkaline cell (not included). Battery condition is continuously monitored and a "Lo-Bat" warning is displayed during the last 20 percent of battery life. The IM-2215 can also operate on 120 VAC, 60 Hz power (with optional PS-2350 Battery Eliminator, sold at right).

Compact: 2" H x 3.50" W x 7.50" L (5.08 x 8.89 x 19.05 cm).

IM-2215 SPECIFICATIONS: **DC VOLTAGE:** Ranges: ±200 mV, ±2V, ±20V, ±200V, ±1000V. Accuracy: Lab standards ±(2.5% of reading plus 1 count). Built-in standards: ±(3.5% of reading plus 1 count). Input impedance: 10 megohms on all DC voltage ranges. Overvoltage Protection: 1000 VDC, 750 VAC on all DC ranges. **AC VOLTAGE:** Ranges: 200 mV, 2V, 20V, 200V, 750 VRMS. Accuracy (50 and 60 Hz): Lab standards: ±(1.5% of reading plus 3 counts). Built-in standards: ±(6% of reading plus 3 counts). Frequency Response (25 C ±10 C): 200 mV, 2V, 20V, 200V ranges ±(1% of reading plus 3 counts). 40 Hz to 1 kHz, 750 V range, ±(1% of reading plus 3 counts). 40 to 450 Hz. Input Impedance: 10 megohms shunted by approx 100 pF on all AC ranges. Overvoltage Protection: 2V, 20V, 200V, 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: ±(7.5% 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. **RESISTANCE:** 200 ohms, 2 kilohms, 20,000 ohms, 200 kilohms, 2 megohms, 20 megohms. Accuracy: 200 ohms range, ±(3% of reading plus 3 counts), 2 kilohms, 20 kilohms, 200 kilohms, 2000 kilohms ranges, ±(2.5% of reading plus 1 count), 20 megohms range, ±(2% of reading plus 1 count). Voltage at max. display: 200 ohms, 20 kilohms, 2000 kilohms ranges, less than .25 VDC (low-test voltage), 2 kilohms, 200 kilohms and 2000 kilohms ranges, greater than .7 VDC (high-test voltage). Overvoltage Protection: 300 volts DC or AC on all ranges. **POWER REQUIREMENT:** 9-volt battery or battery eliminator. **Polarity Indication:** Automatic negative, implied positive.



Kit IM-2215, Shpg. wt. 2 lbs.	97.95
SM-2215, Assembled and tested, Shpg. wt. 2 lbs.	129.95
IMA-2215-1, Rugged Leather Carrying Case with belt loop, Shpg. wt. 1 lb.	14.95
PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb.	7.95

Accurate Heathkit Chart Recorders

1 mV-100 V Strip Chart Recorder: Digital chart drive for 10 chart speeds, electric pen lift, remote capability, switchable input filter. 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

Dual-Pen Lab-Quality Chart Recorder: Uses ONLY pens listed with IR-5207 Recorder (at right).

SR-206, Assembled, Shpg. wt. 39 lbs. 1495.00

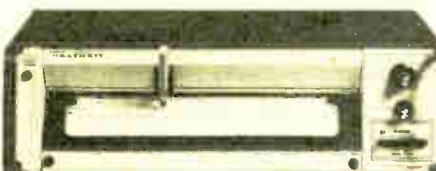
Nylon-Tip Pens for IR-5204/SR-204 Recorder:

SU-406-92, Red Pen, Shpg. wt. 1 lb. 3.95
SU-406-93, Blue Pen, Shpg. wt. 1 lb. 3.95

Chart Paper for IR-5204/SR-204/SR-205: 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: 0.5% accuracy, 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"/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"/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



Outstanding sensitivity and bandwidth: The IM-5258 measures total harmonic distortion (THD) down to 0.03% from 5 Hz to 100 kHz, with +5% accuracy. Six ranges cover 0.03 to 100% harmonic distortion. The IM-5258 can also function as an 1 mV to 300 V AC voltmeter with +5% accuracy. Max. input impedance is 1 megohm shunted by 70 pF. Not for use in strong RF fields. 120/240 VAC, 50/60 Hz, 5.38" H x 15" W x 11.5" D.

Kit IM-5258, Shpg. wt. 17 lbs. 234.95



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

Start your test bench with the economical 5280-Series

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 described below is priced at just \$47.95. For that kind of money, we don't think you'll find a better test instrument value than the 5280 Series.

1 Four-function Multimeter

Versatile: Measures AC/DC voltage to 1000 Volts (with 3% DC, 5% AC accuracy), and DC current up to 1000 mA (with 4% accuracy). Four resistance ranges, from X1 ohm to X1 megohm. Includes test probes. Requires one "C" cell plus two 9 VDC cells, or IPA-5280-1 Power Supply (below, right). 5.75" H x 11" W x 7.75" D.

Kit IM-5284, Shpg. wt. 5 lbs. 47.95

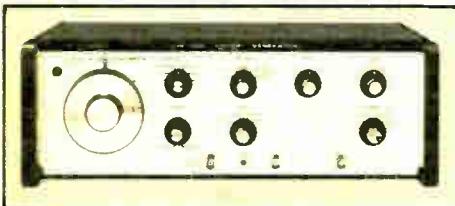
2 RF Oscillator for alignment

Service aid: For aligning tuned stages of AM, FM and TV receivers. Features 310 kHz-110 MHz RF output (to 220 MHz on harmonics), plus a 1 kHz audio output for tracing circuit defects. Includes probes, test leads. Requires two 9 VDC cells or the IPA-5280-1 Power Supply for operation. 5.75" H x 11" W x 7.75" D.

Kit IG-5280, Shpg. wt. 5 lbs. 47.95

3 Sine/Square Wave Oscillator

Troubleshoot and test audio circuits: Four output frequency ranges from 10 Hz to 100 kHz, with both sine and square wave modes. Use as an audio signal source for signal tracing. Or, with the right equipment, the sine wave mode can be used for



Lin/Log Swept Function Generator produces three types of waves

- Generates sine, square, triangle waves
- Features CW, burst, linear/log sweeps
- Front-panel control for easy operation

Versatile: The IG-1275 can produce swept-function waveforms to test frequency response—as well as sine, square and triangle waveforms. Its six operational modes include continuous output (CW), gated CW, a burst mode that completes a variable integral number of output cycles, plus linear log sweeps for wide 1000/1 sweep range.

Extra-value features: Trigger start/stop frequencies can be triggered from the front panel or externally—and stopped at any given integral number of cycles. Also included are a 50 dB attenuator, a 5-95% symmetry control, variable offset, sync output for time-saving system control and a VCG input for outside control of the main generator. Output impedance is 50 ohms.

Pen lift, chart control signals: These features allow use of chart recorder (like IR-5207, IR-5204). 120/240 VAC. 5.38" H x 15" W x 11" D.

Kit IG-1275, Shpg. wt. 15 lbs. 334.95

analyzing audio stage gain and distortion—while the square wave mode can be used for determining frequency response. Requires two 9 VDC cells or IPA-5280-1 Power Supply. Measures 5.75" H x 11" W x 7.75" D.

Kit IG-5282, Shpg. wt. 5 lbs. 47.95

4 RCL Bridge for design work

Find unknown values: Solid-state circuitry helps you find unknown amounts of resistance (10 ohms–10 megohms), inductance (10 uH to 10 H) and capacitance (10 pF–10 uF). Includes clips. Requires two 9 VDC cells or IPA-5280-1 Power Supply. 5.75" H x 11" W x 7.75" D.

Kit I8-5281, Shpg. wt. 5 lbs. 47.95

5 Signal Tracer for troubleshooting

Trace receiver and transmitter circuits: Diode-equipped RF probe helps pinpoint failing components and stages. DC position allows you to identify defective audio components and systems. Features audible tone that lets you easily trace signal flow through logic circuits and isolate problems. Requires two 9 VDC cells or IPA-5280-1 Power Supply. 5.75" H x 11" W x 7.75" D.

Kit IT-5283, Shpg. wt. 5 lbs. 47.95

120/240 VAC Power Supply

Powers all five 5280 Series instruments: No rewiring needed. Full wave rectification, capacitor, filtering and dual IC regulators to insure correct voltage output. 6" H x 3.75" W x 3" D. Not shown.

Kit IPA-5280-1, Shpg. wt. 3 lbs. 26.95



Low-cost Function Generator for accurate 1 Hz-1 MHz signals

- More capability, more quality than most others in its price range
- Generates sine, square, triangle waves

Simple-to-set frequency generation: Set the six-position control to the desired functions, and then precisely tune the exact frequency you want. The amplifier will supply the 50 ohm BNC output with a 1 Volt peak-to-peak signal.

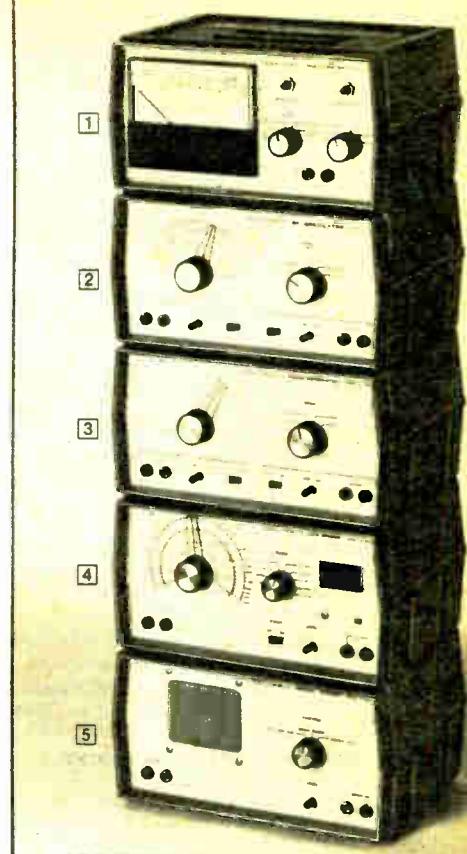
Exceptional attenuation capabilities: You can step-attenuate up to 50 dB. You can also fine-tune up to 20 dB of attenuation, giving you a total attenuation of 70 dB! This is considerably more than you'll find on comparable function generators in the IG-1271's price range.

A precise signal for accurate testing: Frequency accuracy is 3%. Attenuation accuracy is ± 1 dB.

Easy to build: Most components mount on a single circuit board. 120/240 VAC. 3" H x 7.25" W x 8.8" D. Triggered oscilloscope necessary for accurate calibration (see pages 10-12).

Kit IG-1271, Shpg. wt. 7 lbs. 147.95

SG-1271, Assembled/calibrated, 7 lbs. 195.00



Sine/Square Wave Generator

Measure frequency response, harmonic distortion: Or use as external modulator for RF generators. Low-distortion 1 Hz-100 kHz sine wave output. 5 Hz-100 kHz square wave output with fast rise time—great for response testing. Convenient front panel meter. 120/240 VAC. 5.13" H x 13.25" W x 7" D.

Kit IG-5218, Shpg. wt. 10 lbs. 119.95

SG-5218, Assembled. 10 lbs. 195.00



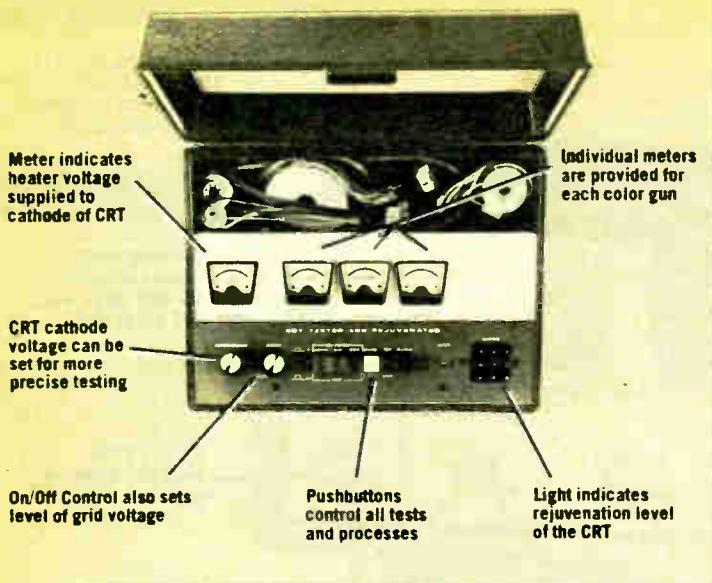
Sine-Wave Audio Generator

Variable <5 Hz-100 kHz freq. range: Low-noise, buffered BNC outputs. For 120/240 VAC. 5.5" H x 11" W x 12.5" D.

Kit IG-1272, Shpg. wt. 11 lbs. 169.95

Test Lead Set: 1.5 meter black/red cables with 4mm shielded plugs, red spring hook, red prod. black shielded clip	15.95
PKW-200, Shpg. wt. 1 lb	9.95
RF Probe: for DC voltmeters Kit PK-3A, 1 lb	1.00
30 kV DC Probe for meters with 10 megohm input: Multiplies by 1000 megohm input	12.95
Kit IMA-100-10, with banana plug, 1 lb	19.95
SGMA-100-10, Assembled with phone plug, 1 lb	19.95
30 kV DC Probe for meters with 11 megohm input: Multiplies by 1000 megohm input	12.95
Kit IMA-100-11, Shpg. wt. 1 lb	19.95

Credit Card Orders Call TOLL-FREE: 900-253-0570



Give your old, worn TV picture tubes new life with this low-cost Heathkit CRT Checker/Rejuvenator

\$124.95
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.

Hand-Held Color Alignment Generator for TV field servicing

\$72.95

- 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, 1x1, 7x11 or 15x15 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 shutdown. 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).

High-accuracy Heathkit Yoke/Flyback Tester for TV service technicians

\$94.95
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

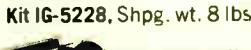
SMA-100-10, Assembled Probe, 1 lb. 19.95

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. 120/240 VAC. 5.25" H x 13.5" W x 8" D.
Kit IG-5228, Shpg. wt. 8 lbs. 147.95



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

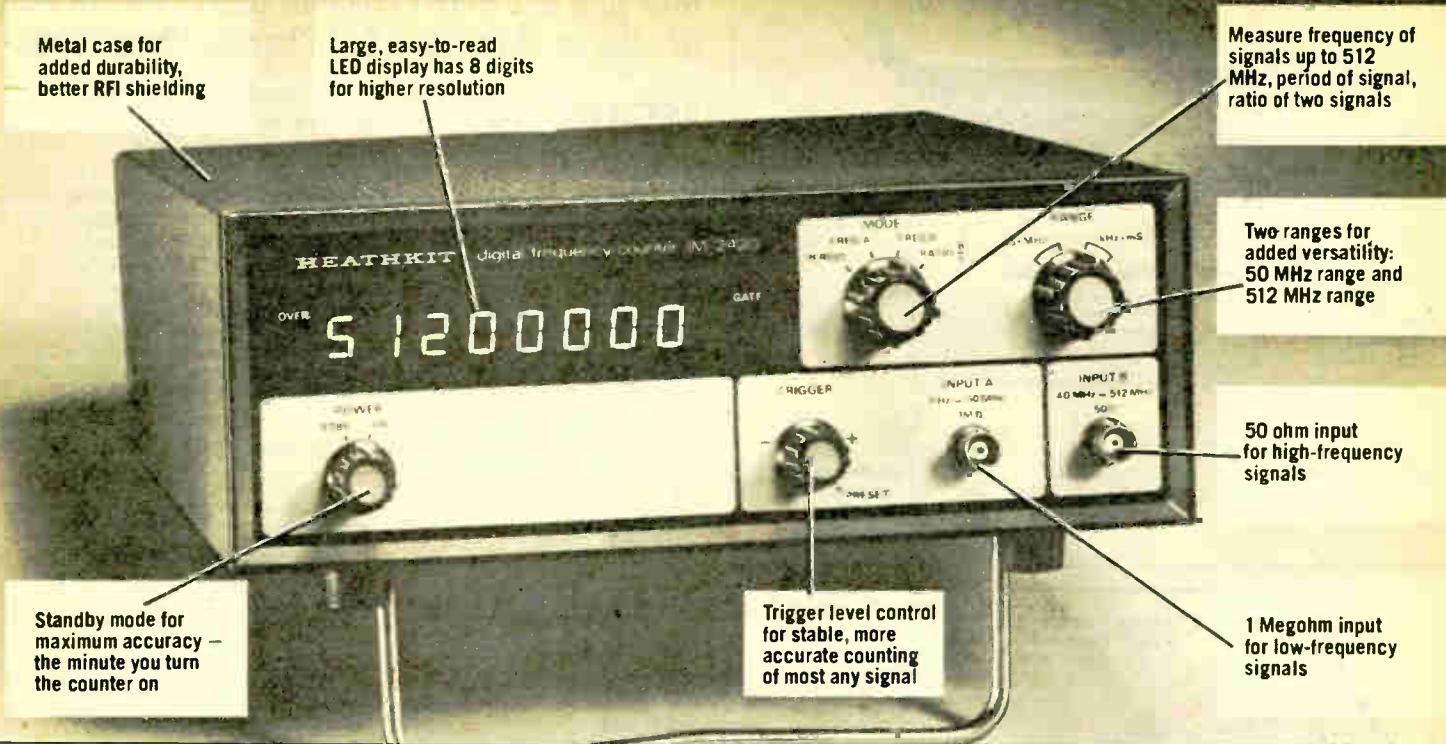
Post Marker/Sweep Generator

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. 120 VAC. 5.5" H x 13.38" W x 12" D.
Kit IG-5257, Shpg. wt. 16 lbs. 254.95

Kit IM-5210, Shpg. wt. 2 lbs. 24.95

Lightweight 40 kV Probe Meter

40 kV Probe Meter makes TV tube voltage measurements 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



This low-priced Heathkit Portable 512 MHz Frequency Counter gives you digital accuracy!

\$249.95
Kit

- Extra-wide frequency range to accommodate maintenance of both UHF and VHF radios
- 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 many police and fire departments — as well as most other radio communications equipment.

Our engineers have designed more features and added capabilities into this laboratory quality Heathkit instrument. For example, the IM-2420 can do more than measure the frequencies of input signals — its period function can give cycle time in seconds, while the frequency ratio function provides the ratio between two input frequencies.

Make more accurate measurements: A standby power switch can keep the crystal oven warm, giving you maximum frequency 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

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 for easy hookup to counter.

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 1000 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 1.024×10^8 , guaranteed. Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical. Time Base: Frequency: 10 MHz. Stability: 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. (75 deg. C ± 5 deg. C). Warm-Up Time From Cold Oven (unplugged): Start: 10 minutes to within 0.1 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 +10 volts. Output: Will drive 2 standard TTL (i.e., 7400) loads. Short circuit protected. General Gate Times: 0.01 second, 0.1 second, 1 second and 10 seconds (switch-selectable). Sampling Rate: Every 0.1 second, 0.33 second, 1 second or 10 seconds. LED Display: Eight digits. 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!

\$144.95
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 – 150 volts RMS to 100 kHz, derating to 10 volts RMS at 50 MHz; 40 MHz to 512 MHz range – 5 volts RMS. Setability: +1 ppm. Temperature Stability: +10 parts ppm from 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 – ±100Hz 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

\$124.95
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 frequency display can be 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—derating 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

\$149.95

- 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; course 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.

IMA-4180-1, Shpg. wt. 2 lbs. 29.95

Swiveling Telescopic 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: Fundamental, 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: 13 mV/kHz peak.



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

Hand-Held Heathkit Capacitance Meter uses automatic range selection and 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

\$157.95

- 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). Measuring all types of capacitors (mica, glass, paper, polystyrene, mylar, electrolytic, air-gap, ceramic, etc.), an auto-ranging feature automatically selects the correct range of measurement from choice often. The capacitance measurement is then shown on its 3½ digit liquid crystal (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 the optional Heathkit Battery Eliminator (Model PS-2350 for 120 VAC operation), listed below.

Buildable 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: 19.9 pF, 199.9 pF, 19.9 nF, 199.9 nF, 1.999 μF, 19.99 μF, 199.9 μF, 199.9 mF, 19.99 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 199.9 nF and 199.9 mF ranges, $\pm(0.2\% \text{ of reading} + 1 \text{ count} + 0.5 \text{ pF})$; 1.999 μF, 19.99 μF, 19.99 μF, 19.99 mF and 199.9 mF ranges, $\pm(5\% \text{ of reading} + 1 \text{ count})$. Using Heath-Supplied Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges, $\pm(0.5\% \text{ of reading} + 1 \text{ count} + 0.5 \text{ pF})$; 1.999 μF, 19.99 μF, 199.9 μF, 199.9 μF, 19.99 μF, 19.99 mF and 199.9 mF ranges, $\pm(5\% \text{ of reading} + 1 \text{ count})$. 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: 2.000 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

\$99.95
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.

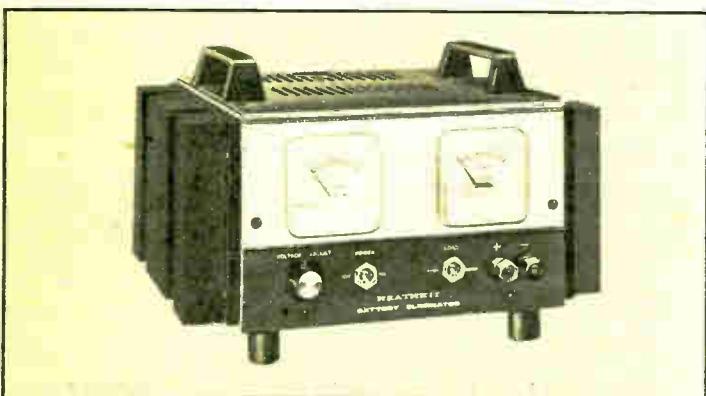


Kit IP-2718, Shpg. wt. 12 lbs. **99.95**

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

\$154.95

- 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).



Versatile low-cost Heathkit 0-400 VDC Power Supply

\$164.95
Kit

- Insulated binding posts for positive and negative high voltage & bias operation

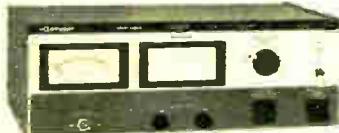
Budget priced Power Supply provides 0-400 VDC output at 0-100 mA continuous, 125 mA intermittent. Line and load regulation is less than 1% from no load to full load. Ripple is less than 10 mV from DC to 1 MHz. Features two meters: two scale voltmeter measures from 0-400 or 0-150 volts; and an ammeter 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.

Variable Isolated AC Supply adds more service versatility



360 volt-amps, AC, continuous output. Switch selected. Fused at 1A & 3 A 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**



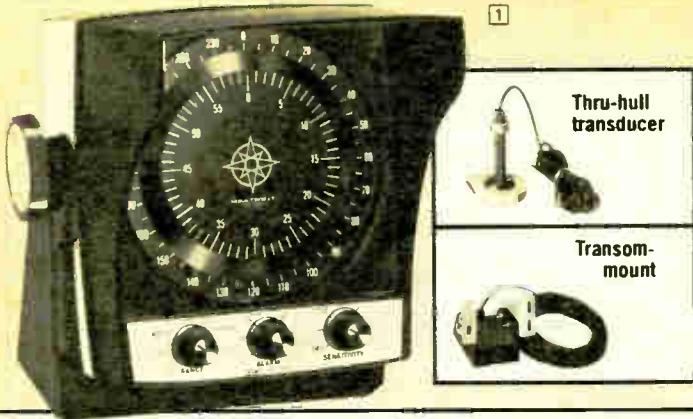
Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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**





Marine kits for the skipper on your gift list

① Dual Range Depth Sounder doubles as fish finder

\$114.95

- 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 Cyclocase 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

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 TL-Spotter™

Thermo-Spotter™

down to 100' dish. Features rugged take-it anywhere design.

Kit MI-104, Shpg. wt. 8 lbs. 49.95

NO LONGER AVAILABLE

-Spotter™

water temperature
ur favorite aquatic
ble enclosed in a
requires one 1.5V
D.

49.95

Brass name plate adds prestige to your kit



Just **\$2.00** for one

\$1.60 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 GPD-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 GPD-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

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

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

\$147.95

- 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 and readouts. These circuits, which include 3 active filters, constantly compute and update your average speed every 2 seconds with $\pm 5\%$ accuracy. In addition, the circuits and filters also keep track of distance traveled with the same accuracy. And, you get this accuracy no matter what type of boat hull you have, because the Speedometer/Trip Log also features a special adjustment control that enables you to fine-tune the circuits to the shape of your hull.

It features an easy-to-read display that shows speed and distance: Our Speedometer/Trip Log's readout is an automatic backlit display with three, 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 MIA-2950 thru-hull transducer or the MIA-2950-2 transom-mount transducer.

① MI-2958, Sailboat Speedometer/Trip Log, Shpg. wt. 4 lbs. 147.95

Heathkit Digital Depth Sounder prevents costly hull repairs, avoids passenger injury

\$174.95

- 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 SAVE! on these Digital Remote repeater stations

Works off the MI-2916 above. Features same display, sealed cabinet, independent alarm settings, keel-offset capability; includes 25-ft connector cable. **SAVE \$22.00!** Was \$119.95, now reduced to \$97.95. Same overall dimensions as MI-2916, with tilt-view mount bracket.

Kit MI-2917, Shpg. wt. 4 lbs. 97.95

④ SAVE! on Flush-mount Digital Readout for Sailboats

5" diameter, operates like MI-2917. **SAVE \$27.00!** Requires MI-2916.

Kit MI-2918, Remote with visual warning only, Wt. 4 lbs. 117.95

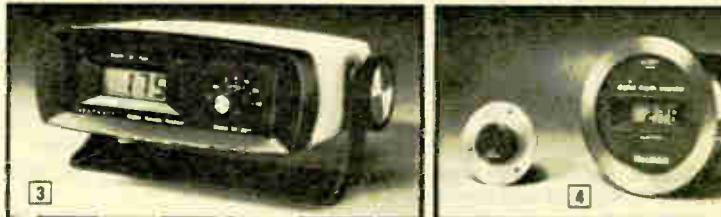
Kit MIA-2918-1, Audio warning alarm for MI-2918, Wt. 1 lb. 19.95

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



② MI-2958, 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: 0.1 to 45 mph or knots. Log Range: 0 to 99.9 miles or nautical miles. auto reset @ 100. Speed and log accuracy: 15%. Display: 3 digit LCD, non-blinking with automatic backlighting. Display Update: 2 seconds. Power Req: 11 to 16 VDC (from boat's system or 2-6 VDC lantern batteries). reverse polarity protected. Dim: MI-2958: 5" diam. by 4½" deep. Requires a 4½" hole for mounting. MI-2956: 2½" H x 7.0" W x 5½" D.



Thru-Hull Transducer	Flush-Mount Transducer	Transom-Mount Transducer
		MARINE/23





Beat the energy crisis — split wood quickly with low-cost, easy-to-build Heathkit Log Splitter

\$539.95

- 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).

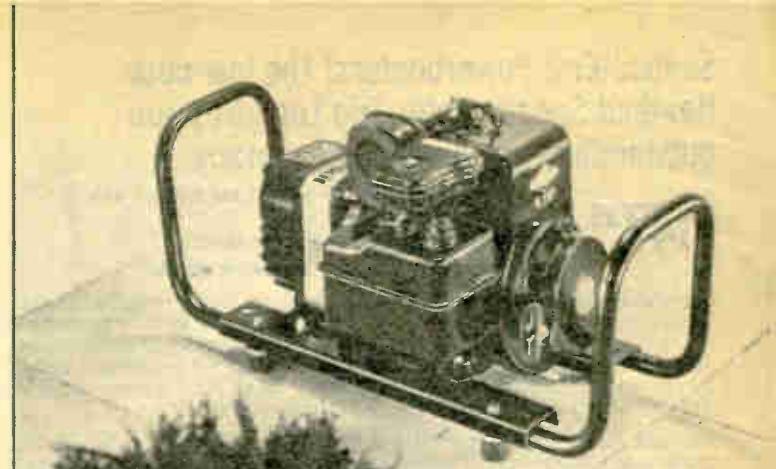
Weight-balanced design allows the Heathkit Log Splitter to be wheeled right to your worksite. Steel-base threaded stand unscrews for easy transportation to worksite (not road towable). Fits in car trunk, station wagon or pickup truck. One-gallon tank holds enough regular or unleaded gas for hour of splitting.

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

\$479.95

- 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 1/4 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 $4\frac{3}{4}$ " H x $5\frac{1}{8}$ " W x $7\frac{3}{8}$ " 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**



NEW

Save energy and money in three ways with the Watt Wizard Power Factor Controller

- Developed by NASA to reduce electrical power used by inductive motors on solar cell-powered space vehicles
- May qualify for 15% Federal tax credit
- Has LED readout showing % savings

Three-way savings: Gain a Federal tax credit amounting to 15 percent of the purchase price (if you qualify) – save up to 60 percent of the cost of running motorized electrical devices (such as drill presses, power saws, grinders and other devices in home or shop) – and prolong the life of those devices with the Watt Wizard!

DEVICE	EXPECTED SAVINGS
Most power tools	More than 50%
Refrigerator/freezers	10-20%
Garbage disposer	40-50%
Pumps	20-40%
Dishwashers and vacuum cleaners	10-30%

Most electrical motors are oversized for the tasks they perform: Oversizing not only wastes electricity and money – the wasted power produces an excess amount of heat within the motor, thus reducing its life and efficiency.

Allows motors to run efficiently: The Watt Wizard enables a device to run on as little as 60-80 VAC instead of 120 VAC – by sensing the power factor of the motor, and applying the exact voltage required to keep the motor running at a constant, energy-saving speed. This allows motorized electrical devices to operate at optimum voltage – saving money and prolonging device life.

Bright LEDs tell you how well the Watt Wizard is working on a particular device. Order one unit now – and move it throughout the house. Then buy as many units as you wish later, when their performance is known.

May qualify for 15% Federal energy tax credit: Use same form to claim credit as NS-1100 Solar Water Heater (see pages 26-27).



The Watt Wizard Power Factor Controller comes with the manufacturer's full one-year limited warranty. For 120 VAC, 60 Hz power. Overall dimensions of the Watt Wizard are 4" H x 2.88" W x 1.5" D (10.16 x 7.32 x 3.81 cm).

NEW-1662. Assembled and tested.

Shpg. wt 1 lb. 39.95

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

- Defend yourself from smokers, at home or in the office
- Removable charcoal filter and easy-clean electrostatic filter assure fresh, pollen-free air
- Low-cost – runs for just pennies a day
- Saves money by helping cut cleaning costs

Keeps room air fresh and clean: 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.



Reduces cleaning costs: The clean air provided by this Electrostatic Air Cleaner reduces the need for cleaning, painting and redecorating caused by airborne pollution that stains and soils your home and its furnishings.

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.

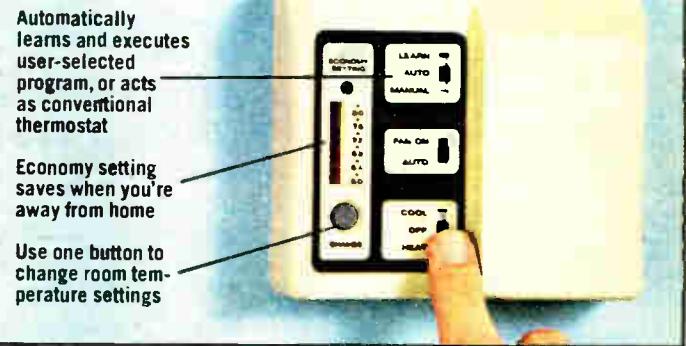
Quick-clean a room: The three-speed squirrel-cage fan can quick-clean a room by moving 250 cubic feet of air per minute. Or it can maintain a constant supply of fresh air at as little as 10 cfm. A removable charcoal filter (below) permits periodic replacement to maintain top efficiency. And the electrostatic filter cleans easily in your dishwasher or bathtub.

Simplified assembly: Build our Electronic Air Cleaner in one evening. No soldering required – power supply, variable-speed fan control and filter are pre-built. Finished in beautiful Southern Pecan vinyl.

Now includes casters, at no extra cost: Easily roll the GD-1297 from room to room – using four GDA-1297-1 Deluxe Casters (a \$13.95 value) – now included at no extra cost! 120 VAC, 60 Hz. 26.50" H x 17.25" W x 13.50" D.

Kit GD-1297. Shpg. wt. 59 lbs. 229.95

GDA-1297-2, Replacement Charcoal Filter for GD-1247/1297. 2 lbs. 6.95



Control heating, air conditioning with intelligent Seven-Day Thermostat

- Patented features help save more energy than other thermostats
- Awarded two U.S. patents for innovative design
- Installs directly in place of your present thermostat

First truly intelligent setback thermostat: This device lets you use one push-button to program significantly more energy savings than other thermostats.

Awarded two U.S. patents (others pending): Cold-Weather Compensator makes sure room temperature reaches your desired setting – exactly at the time you select. It monitors the rate of temperature change, turning on your furnace earlier in the morning if it was colder the evening before. Cycle-Match allows up to six different temperature settings per day, with up to seven different daily programs.

More energy-saving features: Permits up to six setbacks of different temperatures/day, and 7 different days per week. Slow-Cycle increases efficiency by slowing down the heating system's on-off cycling to the longest cycle that will maintain temperature within 1.5 degrees F of desired setting. Econo-Save allows you to reduce temperature to as low as 54 degrees F when you're away from home, and still have the home warm when you return.

This intelligent thermostat uses present 2, 4 or 5-wire, 24 VAC power. Not for use with dual-stage heat pumps. Measures 4.5" H x 5.5" W x 1.5" D.

NEW-1210. Assembled, Shpg. wt. 1 lb. 99.95



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



The highest quality solar components — designed to provide efficient solar water heating, while saving you up to 40% in purchase price — and from 50 to 80% of your water heating costs.

NEW

Fight soaring energy costs — install a Solar Water Heater using Heath quality, Heath expertise and the thorough, step-by-step Heathkit manual!

As low as
\$2289⁷⁵
for 2-collector system
(before tax credits)

- 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

Fight back against soaring energy bills: Hot water makes up about 15% of the average home energy bill. And now, you can cut those 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.

Solar energy, made economical: Here are two typical examples of how the NS-1100 can save money and energy for you:

City: Los Angeles. Family Size: Four persons.

A properly sized Heathkit Solar Water Heater, with double-wall heat exchanger, will satisfy 76% of this family's hot water needs.

Purchase price of two-collector Heathkit Solar Water Heater \$2359.75

Less 40% Fed., 15% State tax credits \$1297.86

Net investment in system ONLY \$1061.89

Estimated 1st-yr. energy savings \$319.17

City: Indianapolis. Family Size: Six persons.

A properly sized NS-1100 system will satisfy 64% of this family's hot water needs.

Purchase price of three-collector Heathkit Solar Water Heater System \$2839.70

Less 40% Fed., 25% State tax credits \$1845.81

Net investment in system ONLY \$993.79

Estimated 1st-yr. energy savings \$412.75

(Consult the IRS, your state tax department and/or an informed tax preparer to learn about

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

tax credits applicable in your state.)

Designed as a complement to your existing water heating system: The NS-1100 is designed for use with your conventional water heater.

Customized for your home: Each Heathkit Solar Water Heater can be properly sized for your climate, home size, family size and hot water requirements — by a computer program run at your nearby Heathkit Electronic Center (also available by calling Heath's Marketing Services Dept. at 616-982-3411).

We offer the highest quality solar 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.

Quality, priced to save you money: Because we've selected the best components, you probably cannot hire a contractor to install a system as good. In addition, when you choose the NS-1100 for installation in your home, you can save up to 40% in purchase price over the cost of a comparable dealer-installed system.

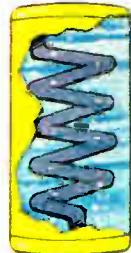
Preheats cold water: The NS-1100 preheats water going to your conventional water heater — so instead of cold water, the conventional system receives solar-heated water.

Solar preheating dramatically lowers the energy requirement of the conventional water heater, allowing it to become a holding tank to keep water at the desired temperature. The conventional system also serves as a back-up to the solar system during long periods of minimum sunshine.

Designed for maximum water heating efficiency: The Heathkit NS-1100's custom-designed heat exchanger mounts outside the tank. This increases the efficiency of the Solar Water Heater, while reducing the storage tank's weight.



Solar Panel
weighs just 87 lbs.



Custom Heat
Exchanger



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

You'll save money by using the NS-1100. 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 for energy continues to spiral higher, your purchase of the NS-1100 will become an even better bargain.

A closed-loop system allows the NS-1100 to continue working as long as the sun is shining, even when the outside temperature is below freezing. 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 system requirements, purchase price, tax credit amounts and payback is on display at your nearest Heathkit Electronic Center (units of Veritechnology Electronics Corporation). See the list on pg. 87 for the store locations and phone numbers – or buy the NS-1100-3 Manual Set for more information.



Thorough instructions guide you step-by-step



Even includes procedure for practice soldering

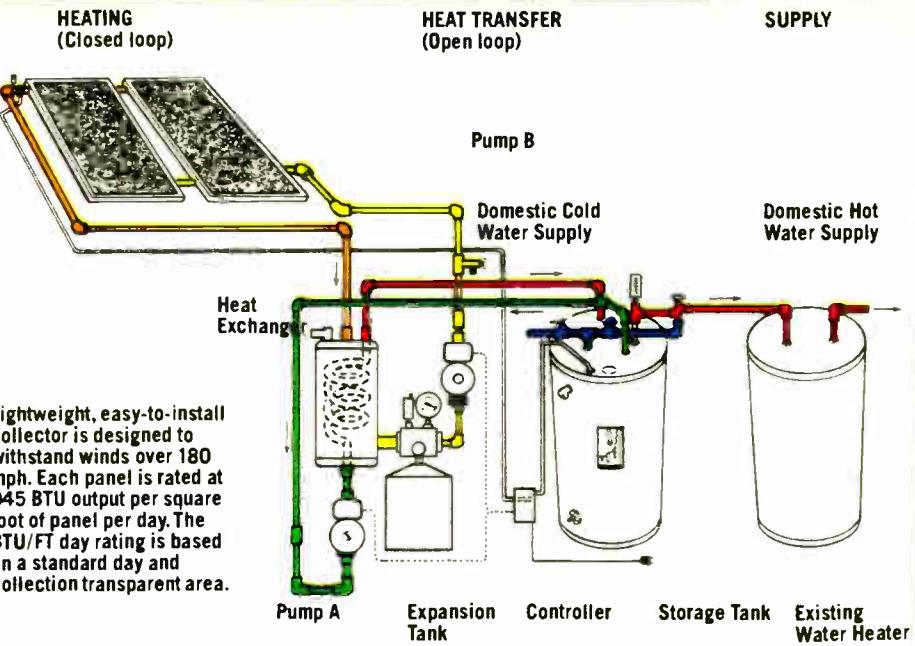
The complete, step-by-step Heathkit installation manual allows you to plan the kitbuilding and installation of the NS-1100 Solar Water Heater ahead of time. Only common carpentry and plumbing tools are required to build and install the NS-1100 in your home.

Even if you've never worked with copper pipe before, you'll master the soldering of copper elbows and pipe in no time – with the help of the Heathkit manual's clear, concise instructions.

The manual tells you everything you need to know to accomplish kitbuilding and installation of the system, including plumbing. 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!"

Declare your energy independence: Your first step is to order the NS-1100-3 Manual Set at right, and contact a Heathkit Electronic Center (or Heath Company at 616-982-3411) for the price of a system sized just for you. The manual clearly shows how easy it is to install the NS-1100, and our computer program will show available tax incentives and payback.



Lightweight, easy-to-install collector is designed to withstand winds over 180 mph. Each panel is rated at 945 BTU output per square foot of panel per day. The BTU/FT day rating is based on a standard day and collection transparent area.

Tax credits can help pay for your NS-1100 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 Pub. 903 (Rev. Nov. 1980) – included with 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. And you may expect the solar unit to add marketability and resale value to your home;
3. And 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 is to install your own Heathkit Solar Hot Water Heater System

\$25.00

- 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 customized Heathkit NS-1100 Solar Water Heater 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 Manual Set price is deductible from the system price when you purchase your Heathkit NS-1100 Solar Hot Water Heater System.

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



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

SOLAR ENERGY/27

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 48K bytes of RAM standard — expandable to 64K bytes
- CP/M capable — without modifications
- Now can store up to 160K bytes of data internally (with optional Z-89-37 Double-Density Controller Board)

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 power than before! The All-In-One Computer now comes with 48K bytes of Random Access Memory (RAM) — three times the previous standard RAM complement of 16K bytes. And built-in diagnostics are provided.

Expand the All-In-One Computer's memory capacity to 64K bytes of RAM with the WH-88-16 64K RAM Expansion Set (offered on page 29), 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 the Heath Zenith CP/M Operating System 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 100K bytes of data. With the optional Z-89-37 Double-Density Disk Controller Board (p. 31), you can expand the built-in drive's storage capacity to 160K 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 31) can provide 200K bytes of data storage (100K bytes per disk drive — using one standard H-17-1 disk drive and one optional disk drive). It stores data on hard-sectorized, single-density, single-sided 5.25-inch floppy disks.

- Stores up to 12.16 megabytes 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

The new H-37 Floppy Disk System (page 31), which uses the new Z-89-37 Disk Controller Board and new soft-sectorized, double-density disks, can provide significantly more data storage — up to 1.28 megabytes (640K bytes per drive — using one standard H-17-4 Drive and one optional drive).

For even more data storage — over 2.5 megabytes on two 8-inch floppy disk drives, select the Z-47 Commercial Floppy Disk System (shown on page 39; requires WH-88-47 Interface).

For maximum data storage in commercial applications — almost 11 megabytes — choose the Z-67 Winchester Disk System (shown on page 40; 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 Video Terminal (shown on page 35). Up to twenty-four 80-character lines can be displayed, as well as a software-controlled 25th line.

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 All-In-One Computer Systems — including computer and peripherals — are being introduced. There's a system for word processing entry-level programmers, one for small businesses and active programmers, and a third for medium business use. See page 30 for full details.

Now there are more reasons than ever to choose a Heath computer system

NEW

- 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. 40) provides 10.782 megabytes of disk storage for the commercial Z-89 Computer (p. 39).

New, versatile peripherals: Two printers, a new modem and more. See pages 35-42.

More new software programs: Educational software — IBM terminal emulator — business programs — and more! See pages 43-51.

An easier way to order: We've packaged four complete systems — including computer, peripherals and accessories — to meet your needs. See page 30.

Choose from our expanding selection of software: Operating systems: Most Heath/Zenith software runs under CP/M. Both the Heath Disk Operating System (HDOS 2.0) and the UCSD P-System with Pascal are also available. See page 44.

Utility and applications programs: New Spellstar and Spellguard educational software — WordStar, Magic Wand and Zenith Electronic Typing Word Processors — new Peachtree business software — new IBM terminal emulator board and software — new Pearl applications generator — new Micropro utilities — SOFTSTUFF tools — and the Heath Users' Group's over 500 programs (pgs. 43-51).

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 used 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: 8 x 10 dot matrix. **Keyboard:** 84 keys. 60 alphanumeric keys and 12 function control keys — plus a 12-key numeric control pad. **Cursor:** Blinking, non-destructive underline or block. **Cursor Controls:** Up, down, left, right, home, CR, LF, back space and tab. **Cursor Addressing:** Relative and direct. Tab: Standard eight-column tab. **Refresh Rate:** 60 Hz at 60 Hz line frequency. 50 Hz at 50 Hz line frequency. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase line or page from beginning of line or page to end of line or page. **Bell:** Audible alarm on receipt of ASCII BEL. **Video:** Normal and reverse by character. **ACCESSORIES:** Interfacing: Three EIA Standard RS-232C Serial Interface Ports are provided. **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 MICROPROCESSORS?	PROFESSIONAL SCREEN SIZE?	COMPLETE KEYBOARD?	BUILT-IN VIDEO DISPLAY?	ALL-IN-ONE CONSTRUCTION?	BUILT-IN FLOPPY?	STANDARD CP/M AVAILABLE?	3 SERIAL I/O PORTS?	64K MEMORY CAPACITY?	PRICE*
Heath H-89	YES Two Z-80s	YES 25 lines x 60 char	YES 60 keys upper and lower cases, includes 12 key numeric pad	YES High resolution non-glare CRT	YES	YES*** 100K bytes	YES	YES	YES 48K standard	\$2045 KIT
Apple II Plus	NO Single Z-80	NO 24 lines x 40 char	NO 48 keys, 8 lines x 24 char	NO External monitor	NO 8 lines x 40 char	NO External monitor	NO	NO	YES over \$500 language card	\$2490
Apple III	NO Single 6502A	YES 24 lines x 80 char	YES 72 keys, upper and lower cases, includes 12 key numeric pad	NO External monitor	NO 8 lines x 40 char	YES 128K bytes	NO	NO	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	YES Medium resolution CRT	YES 8 lines x 40 char	YES 128K bytes	NO	NO	ND 48K	\$2210

*For systems with B/W video display, one 5.25" floppy disk drive, 48K RAM, except 26K in Apple III. General D standard DOS BASIC as in Z-80B.

**Apple III system A3P0001 includes 96K RAM and \$250 Visicalc software in minimum configuration.

***60K bytes





New H-37 High-Capacity
Floppy Disk System (p. 31)

H-89 All-In-One Computer

New H-25 Printer (p. 37)

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 12.16 megabytes 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. 96 lbs. 1925.00

Kit HS-89-2, with anti-glare green CRT,
Shpg. wt. 96 lbs. 1925.00

Kit HS-89-3, with standard white CRT,
Shpg. wt. 96 lbs. 1895.00

An assembled commercial version of this product is available. See the Z-89 on page 39.

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 30 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-Sectorized Storage	Double-Density, Soft-Sectorized 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 150 KB internal drive	160 KB
HS-89 (Note 1) Z-89-37 HS-77 (Note 2)	One 100 KB internal drive	One (or two) 150 KB external drive(s)	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

16K Random Access Memory (RAM) Expansion Set. Retrofit your H/Z-89 All-In-One Computer up to 32K or 48K bytes of RAM with one or two of these memory expansion sets.

H-88-2, Shpg. wt. 1 lb. 39.00

64K Random Access Memory (RAM) Expansion Kit expands the RAM capacity of your All-In-One Computer to 64K bytes. Requires 48K bytes of RAM; also requires 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-One Computers.

HA-88-3, Shpg. wt. 2 lbs. 150.00

Cassette Interface for All-In-One Computer.
H-88-5, Shpg. wt. 2 lbs. 100.00

Wire Wrapping Board with bus connectors. Design custom circuits for the H/Z-89 All-In-One Computer. This board accepts forty-eight 16-pin sockets (also fifty-four 14-pin sockets or other combinations). Uses HCA-6 Wire Wrapping Kit and HCA-7 Wire Wrapping Socket Kit (see page 33 for details on these accessories).

H-88-10, Shpg. wt. 1 lb. 30.00

Black Fabric Anti-Glare CRT Filter. Use this high-quality filter on H/Z-89 All-In-One Computers not equipped with non-glare CRTs.

HCA-4, Shpg. wt. 1 lb. 19.95

Dust Cover for the H/Z-89 All-In-One Computer and the H/Z-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 44), and these HDOS languages:

H-8-20 Microsoft BASIC Interpreter (page 45);

H-8-21 Microsoft FORTRAN (page 45)

HOS-817-2 CP/M (page 44) — and these CP/M languages, utility and applications programs:

HMS-817-1 Microsoft BASIC Interpreter (described on page 45);

HMS-817-2 Microsoft FORTRAN (page 45);

HMS-817-3 Microsoft COBOL (page 46);

HMS-817-4 Microsoft BASIC Compiler (page 45);

HRS-817-9 Magic Wand Word Processor (page 50)

HSC-817-1 SuperCalc Electronic Spreadsheet

Program (described on page 48)

Please specify model numbers when ordering.



H-8 Hobbyist/Word Processing System

SAVE UP TO
\$1327⁰⁰

This H-8 system has 48K bytes of Random Access Memory (RAM), 100K 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 100K-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 48K bytes of Random Access Memory (RAM), three EIA Standard RS-232C Serial Interface ports and 200K bytes of floppy disk storage on three 5.25-inch drives.

Order an H-89 All-in-One Computer (page 29) — now with 48K bytes of RAM and three serial I/O ports; and the HS-77-1 Floppy Disk System (described on page 31).

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 64K bytes of Random Access Memory (RAM), 1.38 megabytes 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 29) — now with three serial I/O ports; one WH-88-16 64K Wired Memory Expansion Board (page 29); the Z-89-37 Soft-Sected Disk Controller Board (page 29); and the new, high-capacity HS-37-2 Floppy Disk System (page 31).

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 64K bytes of Random Access Memory (RAM), three EIA Standard RS-232C serial ports and 10.882 megabytes of disk storage.

Order the H-89 (page 29) — now with three serial I/O ports; a WH-88-16 64K Wired Memory Expansion Board (page 29); the Zenith Data Systems Z-67 Commercial Winchester Disk System (page 40); 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. Please remember to 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 1.28 megabytes of additional data storage capacity – while the H-77 provides up to 320K 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 640K bytes per drive – for a total data storage capacity of up to 1.28 megabytes! 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-sector 5.25-inch floppy disks, written especially for the H-37. Software packages available on soft-sector 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 200K bytes of storage (up to 320K bytes when the new Z-89-37 Double-Density Controller Board is used).

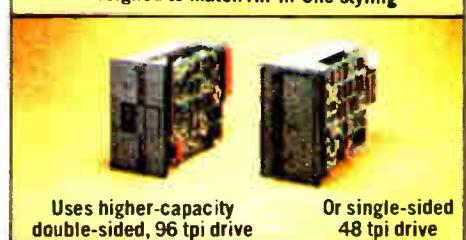
New, easier ordering method: Our ordering chart fully explains the different H-37/H-77 systems available. Data storage options range from 100K bytes to 1.28 megabytes. Order your H-37 or H-77 Disk System from the chart below.

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)	100K bytes	160K bytes	HS-77-1	34 lbs.	\$625.00
Two H-17-1 (Single-Sided, 48 tpi)	200K bytes	320K bytes	HS-77-2	47 lbs.	\$895.00
One H-17-4 (Double-Sided, 96 tpi)	—	640K bytes	HS-37-1	34 lbs.	\$850.00
Two H-17-4 (Double-Sided, 96 tpi)	—	1.28 megabytes	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 100K to 160K bytes.

2. Add the H-77 Floppy Disk System for up to 200K bytes (100K bytes per drive) of additional storage.

3. Replace your present controller with the Z-89-37; add the H-77 for up to 320K bytes (160K 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 1.28 megabytes (up to 640K bytes per double-sided, 96 tpi drive).

5. Add the commercial Z-67 Winchester Disk System's 10.782 megabytes of data storage capacity to your system (requires Z-89-67 Interface on page 78).

NOTES: Soft-sectorized (Z-89-37-compatible) and hard-sectorized (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/31

1 Bus-oriented Heath H-8 Computer offers plug-in flexibility and immediate programming versatility — at a budget-pleasing price

ONLY
\$350⁰⁰

- 8080A CPU standard — Z-80 CPU available separately
- Fully-buffered bus (with 7 plug-in positions) and heavy-duty power supply can handle up to 64K bytes of RAM and a full complement of input/output (I/O) devices
- Capabilities enhanced by expanding software line
- Save up to \$1327 on a system (see p. 30)

Configure the H-8 Computer to meet today's needs — and tomorrow's needs, too: Put together almost any combination of plug-in memory, interfacing and accessory modules in its seven module positions. And an expanding selection of peripherals and software provides exceptional flexibility.

Novices can use the H-8 as a computer trainer: The 16-key front panel keyboard provides octal data entry, direct access to registers/memory, one-button program load/dump and input/output keys to communicate directly with any port. Monitor program activity with the nine-digit front panel readout.

The H-8's newly-enhanced features add extra value: Its Random Access Memory (RAM) capacity of 64K bytes is now available on a single plug-in card (see page 33)! The CPU card — including the 8080A chip, clock, systems controller and ROM monitor — is assembled and tested for easier kit assembly and faster system setup. And quiet convection cooling is designed into the H-8.

Exclusive 50-pin fully-buffered bus: The H-8's special bus provides ample room for memory and interfacing. A built-in speaker gives audible feedback and special effects. Front panel lights keep you updated on status. With these features and more, the H-8 can serve as the heart of your computer system.

You can now equip your Heath H-8 Computer with the powerful Z-80 microprocessor — the same CPU used in the popular Heath H-89/Zenith Z-89 All-In-One Computer! Learn more about the Heath HA-8-6 Z-80 CPU Board at right.

Heath disk systems, sold separately, provide greater data storage capacity: The H-17 Floppy Disk System (page 33) provides 100K bytes of data storage. Add a second drive to expand storage capacity to 200K bytes. With the H-17-3 Modification Kit, you can expand storage capacity to 300K bytes.

For over 2.5 megabytes of data storage in commercial applications, choose the Z-47 Floppy Disk System (page 39). This double-density, double-sided, 8-inch floppy disk system is compatible with the H-17. It features much faster access time, accurate access to data and special read/write protection.

Design a complete H-8 system to meet your specific needs — and save a big 20%! Save up to a maximum limit of \$500 (see below). Choose from an expanding selection of peripherals and accessories — including additional memory and data storage, a video terminal, color graphics, printers, a music synthesizer system and two modems. See full details of this exceptional offer below.

Choose from an expanding software library: We support the H-8 with the Heath Disk Operating System (HDOS), CP/M and the UCSD P-System with Pascal. Languages include a Microsoft BASIC Interpreter, MBASIC Compiler, C BASIC, FORTRAN and COBOL. See pages 44-46 for more information.

Many new applications programs are being introduced — including problem-solvers for home, hobby and business. And the Heath Users' Group maintains over 500 programs — from business accounting and personal budgeting to computer-aided instruction, exciting games — even weather forecasting! Turn to pages 43-51 for details on these programs.

SAVE 20% on complete H-8 Systems

Buy these products on the same order form: An H-8, two or more WH-8-16 Memory Boards or the WH-8-64 Memory Board, the H-8-4 Serial or H-8-5 Serial/Cassette Interface, the H-17 Disk System or H-8-5 Interface, the H-19 Video Terminal or WH-34 DECwriter IV — and any other computer peripherals or accessories of your choice. Save 20% up to a maximum limit of \$500. Choose an H-8 system including the components above plus other hardware of your choice. Then deduct 20% from the total price of the system (excluding shipping and handling; one discount per customer).



1 Bus-oriented Heath H-8 Computer

Get added flexibility — at a budget-pleasing price: The Heath H-8 Computer requires 16K bytes of Random Access Memory (RAM — see opposite page) and operating system software (Heath Disk Operating System/HDOS, the Heath/Zenith CP/M Operating System, the UCSD P-System with Pascal, H-8-18 Cassette Software or similar operating system — see p. 83 and check minimum memory requirements of each operating system) for normal operation.

Kit H-8, Shpg. wt. 30 lbs. 350.00

NEW! Z-80 CPU Card for H-8. Includes a powerful Z-80 Central Processing Unit (similar to the Z-80 CPU used in the H-8-89), plus all features of HA-8-8 Extended Configuration Option below (at no extra cost) — which you'll need to use Z-47 and CP/M with your H-8. NOTE: The Z-80 CPU Card is not exchangeable with the H-8's standard 8080A CPU Card; trade-ins not accepted.

HA-8-6, Assembled, Shpg. wt. 5 lbs. 199.00

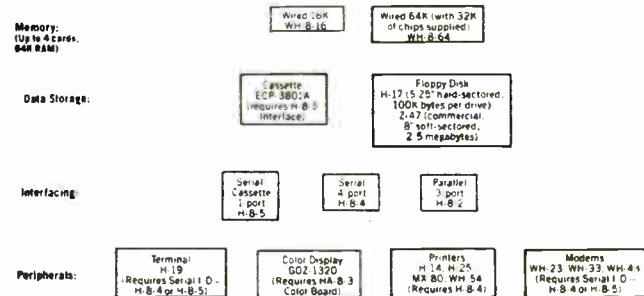
Extended Configuration Option. Required to use Z-47 and CP/M in H-8s without HA-8-6 Z-80. CPU Card. Includes new front panel ROM chip with single-button boot-up.

HA-8-8, Shpg. wt. 1 lb. 65.00

Oust Cover for H-8. Protects computer from contamination when not in use. HCA-5-8, Dust Cover for H-8, Shpg. wt. 1 lb. 14.00

H-8 SPECIFICATIONS: Microprocessor: 8080A. Monitor: In on-board 1K x 8 ROM. Octal addresses, data input and display from the front panel. Monitor Functions: Memory display and alter, register display and alter, memory load and dump, single instruction execution, program execution, port input and output. Clock: 2.048 MHz. Interrupts: Seven, priority vectored. Power Supplies: -8 VDC at 10 amperes maximum, regulated to -5 VDC on each circuit board; +18 VDC at 500 millamps, regulated to +12 VDC and -5 VDC on the CPU circuit board. Chassis Capacity: Seven locations on the mother circuit board for memory or interfacing cards. Four memory cards maximum. One bus expansion maximum. Operating Temperature Range: 32 to 104°F (0 to 40°C). Power Requirement: 120/240 VAC, 50/60 Hz, 150 Watts. Dimensions: 6.50" H x 16.25" W x 17" D. Net Weight: 21 lbs.

How to configure a Heath H-8 Computer System



② H-17 5.25" Floppy Disk System
(shown with three-drive modification
and two additional drives installed)



H/WH-17 SPECIFICATIONS. Data Storage Media: 5.25-inch single-density, single-sided, hard-sectored floppy diskette. Number of Tracks per Floppy Diskette: 40. Number of Sectors per Track: 10. Number of Formatted Bytes per Sector: 256. Drive Type: Siemens Model 82. Track Seek Time: 30 milliseconds. Random Sector Access Time: Less than 250 milliseconds. Spindle Motor Start Time: 1 second. Spindle Motor Speed: 300 rpm. -1 percent. Data Transfer Rate: 128 kilobits per second. Operating Temperature Range: 33 to 104 degrees F. (-1 to 40 degrees C). Power Requirement: 120/240 VAC 50/60 Hz. Power Consumption: 75 Watts. Overall Dimensions: 6.25" H x 13.50" W x 13.50" D. (15.89" x 34.29" x 34.29 cm). Net Weight: 25.25 pounds (11.45 kilograms).

SAVE UP TO \$495 ON SOFTWARE STARTER PACKAGE! Buy any two of 10 selected programs on the same order with a 20%-off H-8 system or the HKS-85 system on page 30, and pay only \$195. See page 30 for details on this offer!

H-8 memory, interfacing and accessories

64K Wired Memory Board lets you put the H-8's 64K-byte RAM capacity on a single board, using less room and less power — so you can add other interfacing and accessories. Comes with 32K bytes of RAM; expand to 48K or 64K RAM with one or two HA-8-16 Expansion Sets below.

WH-8-64, Assembled, Shpg. wt. 2 lbs. 449.00
HA-8-16, 16K Byte RAM Chip Extension Set for WH-8-64, 1 lb. 55.00
WH-8-16, 16K Wired Memory Board for H-8, 2 lbs. 299.00

Wired H-8 to Z-47 Disk Interface, with two RS-232C Serial Ports. Selects the correct drive for a write or read operation, properly handling data flow to/from drives. Includes ROM which operates system, and RAM buffer memory. All data and address changes between interface and computer buffered.

WH-8-47, Assembled and tested, Shpg. wt. 2 lbs. 235.00

Four-Port RS-232C Serial Interface connects H-8 to serial devices (such as printers, modems, others). Includes modem controls, WH-8-41 Cable.

Kit H-8-4, Shpg. wt. 2 lbs. 195.00
WH-8-4, Assembled, Shpg. wt. 3 lbs. 250.00
WH-8-41, Adapter Cable, Shpg. wt. 1 lb. 15.00

1200 Baud Serial/Cassette Interface. Includes one serial port for console terminal. NOTE: Not to connect H-8 to H-14.

Kit H-8-5, Shpg. wt. 3 lbs. 125.00
WH-8-5, Assembled, Shpg. wt. 2 lbs. 145.00
WH-8-51, Adapter Cable, Shpg. wt. 1 lb. 15.00

Three-Port Parallel Interface. 8 bits of I/O per port. Universal handshaking.

Kit H-8-2, Shpg. wt. 3 lbs. 150.00

Reusable Circuit Design Breadboard Card allows you to custom design digital and analog circuits. Includes 5 VDC power supply.

Kit H-8-7, Shpg. wt. 2 lbs. 79.00

② Get high data storage capacity, fast access by adding the H-17 Floppy Disk System to the H-8

\$625⁰⁰

- Provides up to 300K bytes of on-line data storage (using additional drives, accessory)
- Take advantage of hundreds of disk-based software programs available for the H-8 and H/Z-89
- Easy to build — takes as little as two evenings
- Assembled and tested disk drive system

The H-17 Floppy Disk System gives your H-8 Computer new versatility. It stores dozens of programs on a single disk. And you can rapidly access any one of those programs, anytime you need it.

The H-17 provides 100K bytes of on-line data storage (expandable to 300K bytes — see below). Data is stored on 5.25-inch, single-sided, hard-sectored floppy disks — which are easier to handle, and load, than paper tapes or cassettes.

This peripheral includes one disk drive, an interface/controller circuit board which plugs directly into the H-8's mainframe, and a built-in power supply.

For more data storage capacity, add the optional H-17-1 Second Drive and make your H-17 a more versatile dual-drive floppy disk system. With two drives, you'll have up to 200K bytes of program and data storage area. You'll be able to run operating system and program disks at the same time.

If you need even more on-line data storage, buy the new H-17-3 Three-Drive Modification Kit and another H-17-1 Drive. Add this kit to your H-17 in as little as one evening — and expand on-line storage capacity to 300K bytes.

To use the H-17 effectively, you need an H-8 with at least 48K bytes of RAM, as well as a Heath disk-based operating system (sold on page 83).

Your choice of operating systems includes the Heath Disk Operating System (HDOS), which many of the 500 utility and applications programs in the Heath Users' Group software library (p. 82) are based on; Heath/Zenith CP/M, with hundreds of existing programs available; and the UCSD P-System with Pascal, a modular system with a large library of utility and applications programs.

Kit includes one blank 5.25-inch single-sided, hard-sectored floppy diskette. Kit H-17, with one drive. Shpg. wt. 28 lbs. 625.00

WH-17, Assembled, with one drive. Shpg. wt. 28 lbs. 695.00

Three-Drive Modification Kit for the H-17. Increases capacity to three 5.25-inch floppy disk drives, instead of two. Enjoy even more programming flexibility and versatility. The H-17-3 Modification Kit includes new sheet metal, fan and power supply components, three-drive cable. Easy kit assembly — takes as little as one evening. Requires H-17 or WH-17. Order one or two H-17-1 Drives separately (below). Operating system not included.

Kit H-17-3, Shpg. wt. 8 lbs. 85.00

Optional Second or Third Drive adds 100K on-line bytes to your H-17. H-17-1, Assembled, Shpg. wt. 5 lbs. 325.00

HCA-5-17, Dust Cover for H-17 Floppy Disk System, 1 lb. 14.00

Extender Board allows easier access to components for servicing, prototyping and debugging purposes.

HA-8-1, Shpg. wt. 1 lb. 40.00

Music Synthesizer System. Board connects to stereo system with two shielded cables (included). True D/A converter provides excellent 27.5-3,300 Hz frequency response, up to 9 harmonics. Four-part harmony (voices) in stereo. Enter any song right from conventional sheet music — even if you've never read music before. Documentation shows how to get maximum enjoyment. Software on hard-sectored 5.25" floppy disk. Requires 24K RAM, H-17 and terminal.

HA-8-2, Assembled, Shpg. wt. 3 lbs. 159.00

Design and build your own custom H-8 circuits

Wire Wrapping Board accepts eighty 16-pin sockets, three 50-pin flat cable connectors. Includes bus connectors, heat sink, 5V regulator and miscellaneous hardware. Uses HCA-6 and HCA-7 below.

Kit H-8-10, Shpg. wt. 1 lb. 29.95

Wire Wrapping Kit. Includes wire wrapping tool, 50 feet of wire and 200 pre-cut, pre-stripped wires (50 each in 1", 2", 3" and 4" lengths).

Kit HCA-6, Shpg. wt. 1 lb. 13.95

Wire Wrapping Socket Kit. Includes 36 three-level wire wrapping sockets (ranging from 14-pin to 40-pin).

Kit HCA-7, Shpg. wt. 1 lb. 29.95



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

Save a big \$2,335 — and get a complete, DEC-compatible educational/science computer system

ONLY
\$2995⁰⁰

Complete System
less Terminal

You can save over \$2,300 — and get DEC-compatible 16-bit power, with flexibility you need to run DEC programs and real-time laboratory applications. It uses the same microprocessor, memory, interfacing and operating system as the DEC LSI-11, and runs all DEC PDP-11/03 software.

① H-11A Computer has 16-bit power: Your choice of a 16-bit or 8-bit computer depends upon your needs. If you're a professional who needs full DEC compatibility, the 16-bit H-11A is your choice. It has adequate computing power, even for the more complex jobs that you will tackle later.

Smaller, yet powerful microprocessor: A KD11-HA (half-size LSI-11/2) microprocessor — makes the H-11A identical to the DEC PDP-11/03, at a fraction of the cost. The KD11-HA features PDP-11/34 instruction set, 380 ns microcycle time, resident firmware debugging (ODT), ASCII console routines, single and double operand instructions. With no on-board memory, you get more flexibility to match ROM, RAM and interfacing to your particular needs. Seven plug-in slots: handle up to 56K bytes of memory and interfacing. You can even combine LSI-11 and LSI-11/2 components.

The easy-to-build Heath H-11A Computer includes cabinet, heavy-duty power supply, backplane with bus and assembled CPU board.

In this special system configuration, the H-11A also comes with two WHA-11-16-32K Byte Memory Expansion Modules to provide the computer with its maximum memory capacity — and H-11-5 Serial Interface Kit to communicate with peripherals via either RS-232C Serial Interfacing or a 20 mA current loop — and a WH-11-51 Cable for the Serial Interface.

② The H-27 Dual-Drive Floppy Disk System, included in the HKS-11 system, provides up to 500K bytes of on-line data storage — enough for most of your needs. It stores data on 8-inch disks, compatible with the IBM 3740 format.

You get fast access to data — The H-27's Z-80 microprocessor-based disk controller provides an average data access time of 250 milliseconds.

Full compatibility: The H-27 is compatible with DEC RX01 (PDP-11/03) and RXV11 (PDP-11/03) hardware and software — so you can use the hundreds of applications programs written for the DEC PDP-11 microcomputer.

Extra-value features: Single-board bootstrap/interface circuit takes just one

- System features full compatibility with DEC PDP-11/03 — at a very substantial savings!
- Includes 56K bytes of memory and 500K bytes of on-line data storage (in IBM 3740 format)
- Powerful 16-bit computer system features a half-size KD11-HA (DEC LSI-11/2) microprocessor



H-11A backplane slot. Built-in diagnostics, mechanical interlock and write-protect function guard important programs.

Start programming right away — because this system includes both the HT-11 Disk Operating System and HT-11-1 FORTRAN (below).

Complete H-11A 16-Bit Microcomputer System. Includes H-11A Computer, two WHA-11-16 Memory Expansion Modules, H-11-5 Serial Interface, WH-11-51 Adapter Cable, H-27 Dual-Drive 8" Floppy Disk System, HT-11 Disk Operating System and HT-11-1 FORTRAN Language. This system would cost \$5330.00 if its components were purchased separately.

Kit HKS-11, Shpg. wt. 176 lbs., Motor Freight **ONLY 2995.00**

Kit H-11A, DEC-compatible 16-Bit Computer, Shpg. wt. 43 lbs. **1395.00**

Kit H-27, 8" Disk System Kit with 2 drives, 93 lbs., Mtr. Frt. **2195.00**

WH-27, Assembled H-27 with 2 drives, 69 lbs., Mtr. Frt. **2595.00**

Line Time Clock Switch Modification Kit (shown above right) places the LTC switch on the front panel for easier access. Includes new front panel.

Kit 830-35, Postpaid **35.50**

Look at the Manuals before you buy. Manuals for H-11A Computer, H-11-5 Serial Interface, H-11-2 Parallel Interface and H-19 Video Terminal. Purchase price refunded when you buy an H-11A Computer. **HM-1100**, 12 lbs. **30.00**

H-11A/WH-11-UL SPECIFICATIONS: Memory: 64K bytes total, RAM: ROM Addressed-0 to 56K; I/O Addressed-56 to 64K. Backplane: Eight 2-wide module slots. Power Requirement: 120/240 VAC, 50/60 Hz, 200 Watts. Dimensions: 6.5" H x 19" W x 17" D.

H/WH-27 SPECIFICATIONS: Data Transfer Rate: Average Access Time: 250 mS. Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 7.75" H x 18" W x 20" D.

Add flexibility to your H-11A with these accessories and interfaces

32K Byte (16K Word) Memory Expansion Module provides additional RAM. On-board refresh, 570 nS cycle time, 250 nS access time. Maximum H-11A memory capacity, 56K bytes (28K words).

WHA-11-16, Assembled and tested, 2 lbs. **495.00**

Extended Arithmetic Chip saves memory space, adds fixed point multiplication, division and extended shifts. Full floating point functions.

H-11-6, Shpg. wt. 1 lb. **190.00**

Serial Interface provides RS-232C or 20 mA loop interfaces, 50-9600 baud rates. Compatible with PDP-11/03, other LSI-11 computers. Plugs directly into the LSI-11 backplane. Includes mating connectors. To interface printers to H-11A, order WHA-11-5 (right).

Kit H-11-5, Shpg. wt. 2 lbs. **135.00**

WH-11-5, Assembled and tested, 1 lb. **150.00**

Adapter Cable for H-11-5 Serial Interface.

WH-11-51, Assembled and tested, 1 lb. **15.00**

Printer-to-H-11A Serial Interface Board.

WHA-11-5, Shpg. wt. 1 lb. **150.00**

Parallel Interface. 32 latched I/O lines, 16-bit word transfers and LSI-11 interface — as well as control logic for interrupt processing and vectored addressing. Drives cable up to 25' long. Compatible with TTL, DTL devices.

Kit H-11-2, Shpg. wt. 2 lbs. **125.00**

WH-11-2, Assembled and Tested, 1 lb. **150.00**

Wire Wrapping Board for designing custom circuits is punched, etched to accept 32 16-pin IC sockets (38 14-pin, other combinations). With card extractor, hardware. Uses HCA-6, HCA-7 (p. 71).

H-11-10, Shpg. wt. 1 lb. **35.00**

Program your H-11A more efficiently with Operating System Software and FORTRAN Language

EXPAND applies user's or library's definition whenever source program references macro. **ASEMBL** Assembly Language outputs single relocatable binary object file, can also produce assembly listing with symbol table. **CREF** Cross-Reference appends index of symbol usage to assembly listing when specified as part of assembly output. All 3 programs support PDP-11 instruction set.

EDIT text editor creates, modifies ASCII source files

for input to other system programs. **LINKER** converts assembler or FORTRAN object modules into run-time format for loading, execution. Relocates code, links global references, creates runnable program file for system. **LIBRARIAN** creates, maintains subroutine libraries for linker.

PIP transfers, merges, moves, copies, renames and deletes files; lists, zeros and compresses device directories. **ODT** (On-line Debugging Technique) provides commands to display, alter the state of a running program.

BASIC INTERPRETER offers access to HT-11's I/O system and file structure through BASIC. Variable-

length strings, sequential files, virtual memory arrays, chaining, overlays. Calculator mode performs calculations, aids in debugging.

Requires H-11A/H-27 system with 32K bytes (16K words) RAM, H-19 (p. 73) and H-11-5 (above).

HT-11 (Requires Sublicense Grant on page 81), Shpg. wt. 12 lbs. **350.00**

FORTRAN Language for H-11A. Binary software features complete ANSI Standard 1966 FORTRAN IV with extensions for increased speed. Requires H-11A/H-27 system with HT-11 O/S above.

HT-11-1 (Requires Sublicense Grant on page 81), Shpg. wt. 9 lbs. **250.00**

New, optional easy-on-the-eyes CRTs available with Heath H-19A Video Terminal

As low as

\$695⁰⁰

Kit
with standard
white CRT

- Now available with anti-glare green, anti-glare white or standard white CRTs
- Z-80 microprocessor for fast data handling
- Heavy-duty typewriter-format keyboard with separate 12-key numeric keypad
- DEC VT-52 software-compatible
- Expandable to an All-In-One Computer

With exceptional capabilities for its price, the H-19A can be used with any computer system using an RS-232C Serial Interface. 32 functions can be controlled from keyboard or computer. The H-19A displays the entire ASCII character set, upper and lower case. Thirty-three graphics characters and 8 user-function keys are also available for extra flexibility.

The H-19's high-resolution video display screen shows 24 80-character lines (with software-controlled 25th line). Make corrections or edit — anywhere on the screen — using direct or relative cursor addressing.

Now you can upgrade your H-19A into an H-88A All-In-One Computer, with the new H-19-3 Conversion Kit (offered below). For 120/240 VAC, 50/60 Hz power. Draws 45 Watts. 13" H x 17" W x 20" D (33.02 x 43.18 x 50.80 cm).

Kit HS-19-1, H-19A with anti-glare white CRT, Shpg. wt. 52 lbs. **725.00**

Kit HS-19-2, H-19A with anti-glare green CRT, Shpg. wt. 52 lbs. **725.00**

Kit HS-19-3, H-19A with standard white CRT, Shpg. wt. 52 lbs. **695.00**

H-19-1, Source Listings for ROM of H-19 and H-19A, 1 lb. **25.00**

HCA-4, Black Fabric Anti-Glare CRT Filter for H-19/H-19A, 1 lb. **19.95**

HCA-5-89, Dust Cover for H-19 and H-19A, Shpg. wt. 1 lb. **14.00**

Convert the H-19 or H-19A into an H-88 All-In-One Computer with 16K RAM, without giving up your video terminal! Includes manual and parts. Add disk drive and controller board from p. 31, and expand to a full-fledged H-88!

SAVE \$200! Kit H-19-2, H-19 to H-88, 19 lbs. **Was \$695.00, NOW 495.00**

NEW! Kit H-19-3, H-19A to H-88, Shpg. wt. 19 lbs. **495.00**

Versatile Acoustic Modem is ideal for any phone

- Assembled modem allows your computer to exchange data with other computer systems
- Includes RS-232C Interface



The economical, fully assembled Lexicon Lex-11 Acoustic Modem has many practical and useful applications. It lets your computer talk to other computers over standard telephone lines. This stand-alone, acoustically-coupled FSK (frequency shift keying) modem has selectable answer and originate modes. Operates in full duplex or half duplex modes. Compatible with Bell 103 modems. Two self-testing modes verify the Lex-11's capabilities. RS-232C Serial Interface is included with the Lexicon Lex-11 Acoustic Modem. Powered from 120 VAC, 60 Hz line by UL- and CSA-listed AC Adapter (included). Overall Dimensions of the Lexicon Lex-11 Acoustic Modem are 2.40" H x 10" W x 5.50" L (6.09 x 25.40 x 13.97 cm).

WH-23, Assembled and tested, Shpg. wt. 3 lbs. **159.00**

Direct-Connect Modem offers excellent quality

- UDS Direct-Connect Modem offers higher data transfer quality than acoustic modems
- Includes RS-232C Interface



The WH-33 UDS Direct-Connect Modem offers more reliable, higher-quality data communications than acoustic modems — because direct connection eliminates loss and distortion of data associated with acoustic couplers. Full duplex communication at 300 baud. Originate/answer modes. Compatible with Bell 103 modems. RS-232C Serial and TTY interfaces. Two modular phone jacks. Connects to standard phone line. Includes phone-modem cable. Requires standard single-line phone with modular connectors. Powered by phone line. 1.13" H x 9.50" W x 6.13" L.

WH-33, Assembled and tested, Shpg. wt. 2 lbs. **195.00**



H-19A SPECIFICATIONS: 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 (0.508 x 0.254 cm). Character Set: 128 (95 ASCII, 33 graphic). Character Type: 5 x 7 dot matrix (upper and lower case) and 5 x 9 dot matrix (lower case with descenders). Keyboard: 84 keys (60 alphanumeric, 12 function), 12-key numeric 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 8-column tab. Refresh Rate: Same as AC line frequency. Edit Functions: Insert and delete character or line. Erase: Page or line — or to end of line, end of page, beginning of line or beginning of page. Scroll: Automatic scrolling, line page freeze. Video Modes: Normal and reverse, by character. Bell: On receipt of control G. Communications: Interfacing: EIA Standard RS-232C Serial Interfacing. Baud Rates: 110 to 9600. Communications Mode: Full or half-duplex. Parity: Even, odd, and none. Handshaking: Software. Control S — control Q: all RS-232 Serial lines tied high internally. Buffered terminal is capable of keeping up with most operations and normal scrolling text output, at 9600 baud or less. Operating Temperature Range: 32-104 degrees F (0-40 degrees C). Net Weight: 45 lbs. (20.4 kg).

An assembled commercial product of this type is also available. See the Zenith Data Systems Z-19 Professional Video Terminal on page 39.

NEW

Move up to auto-dial, auto-answer convenience with Hayes Smartmodem

- Our best and most versatile modem
- Can auto-dial and communicate with other systems — or auto-answer incoming calls
- Compatible with dial, Touch-Tone phones using modular connectors
- Built-in audio monitor system



Here's our best data communications modem — the direct-connect WH-43 Hayes Stack Smartmodem, a complete high-performance auto-dialing/auto-answering system for RS-232C-compatible microcomputers. It analyzes and executes commands and in response sends result codes — which can be English words or decimal digits. The WH-43 can also communicate data to a local computer or terminal, when not on line.

Program-controlled in any language by ASCII strings, the WH-43 accepts commands issued from a terminal keyboard — or under program control. You can change operational parameters — like dialing speed, how long to wait for a dial tone before dialing, and number of rings to answer on.

Connect this auto-answer modem to a computer or terminal — or use as a receive-only device. Full or half-duplex operation, from 0-300 baud.

Compatible with Bell 103 modems. Includes phone cable, power pack. Requires single-line phone; not for party lines, pay phones. Powered by wall-mounted transformer (included). 2" H x 5.46" W x 9.53" H.

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



**NEW****\$159.95**

Save \$20 on high-resolution Video Display

- Styled to match "orchard grown" microcomputers
- Compatible with many popular microcomputers – including Apple II, Apple III and Texas Instruments
- 25 x 80 CRT display

Now you can add a high-quality, 12" B/W (diagonal) video monitor to your computer system – and get performance comparable with higher-priced units! Zenith's unsurpassed video engineering and manufacturing skills make this unusual combination of features, performance and reliability – the ZVM-121 – possible.

Designed to interface with most popular microcomputer systems, the ZVM-121 Video Monitor accepts NTSC composite video signals.

**NEW****\$375.00**

Type-'N-Talk has every computer talking

- Easy-to-program text-to-speech synthesizer has unlimited vocabulary
- Built-in microprocessor has 750-character memory
- Uses RS-232C Interface

Now your computer can talk to you, with an unlimited vocabulary – using the assembled WH-12 Type-'N-Talk Speech Synthesizer by Votrax. Type-'N-Talk can tell students when they're right or wrong – even praise a correct answer.

One of the easiest-to-program speech synthesizers available. Type-'N-Talk uses the least amount of memory, and gives the most flexible vocabulary.

Color Video Display complements computer, VCR, camera

\$399.95

- Assembled unit features 13" (diag.) color picture
- Accepts composite NTSC color video from computers, VCRs, cameras

The GDZ-1320 is designed for use with computers, VCRs and color TV cameras which produce an NTSC composite video signal – or with the HA-8-3 Color Graphics Board below. Its many features make it an outstanding value in its field.

With the GDZ-1320 and HA-8-3, you can take advantage of the color software offered by the Heath Users' Group (HUG) for the H-8 Computer.

A direct NTSC composite video signal feed assures a higher-quality picture – a better picture than that

produced by an RF modulator, because direct reception eliminates interference caused during modulation and demodulation of the signal. A 75-ohm RCA-type phono jack is provided to accept NTSC composite video input.

The GDZ-1320 also accepts a Hi-Z audio input, via a miniature phone jack.

Fully automatic color processing assures a consistently better all-around color picture. The picture stays so rock-steady that vertical and horizontal hold controls have been eliminated. A built-in audio amplifier and speaker faithfully reproduce each sound.

For 120 VAC, 60 Hz, 82 Watts. UL, CSA listed. Conforms to technical requirements of 21 CFR, Subchap. J. for X-radiation. High-impact styrene

Super-sharp, high-resolution video display: The ZVM-121's special premium deflection system and green phosphor CRT provide a display of twenty-five 80-character lines that's remarkably easy on the eyes – and easy to read.

Improved character definition: Designed with a bandwidth greater than 15 MHz, the ZVM-121 has a rise time of 50 nanoseconds – which results in excellent character definition.

Conveniently-located operator controls include power, black level, contrast, horizontal and vertical adjustment, vertical size adjustment and a switch that allows you to select either 40-character or 80-character lines.

For 120 VAC, 60 Hz. Draws 26 Watts. 11.75" H x 16.25" W x 12" D. Was \$179.95.

ZVM-121, Assembled, Shpg. wt. 18 lbs. 159.95

Just enter English text and hear electronic speech through a 1-Watt, 8-Ohm speaker (amplifier included; external speaker not included).

Uses one RS-232 port at 75-9,600 baud; additional peripherals can be connected to Type-'N-Talk, eliminating the need for additional ports. Data switching capability allows for on-line usage.

Includes complete instructions. Requires HCA-13 below. 120 VAC, 60 Hz. 3.1" H x 7.7" W x 5.2" D. NOTE: Needs modified print driver routine. Although not difficult to implement, product is not recommended for novices at this time.

WH-12, Assembled, Shpg. wt. 5 lbs. 375.00

HCA-13, Custom RS-232 Cable to connect WH-12 to H-8 or H/Z-89, Shpg. wt. 1 lb. 20.00



cabinet measures 14" H x 20.25" W x 14.75" D.

GDZ-1320, Assembled, Shpg. wt. 42 lbs. 399.95

Add colorful capabilities to your H-8 with the HA-8-3 Color Graphics Board

\$495.00

- Advanced TI-9918 Color Video Display Generator with 256 x 192 pixel resolution, 3 color display modes
- Includes AY-3-8910 Programmable Sound Generator
- Board can accept four X-Y joystick consoles and the AMD-9511 Arithmetic Processing Chip (both optional)
- Fully assembled and tested for easy installation

Add color to your H-8 Computer system. Connects to GDZ-1320 above (preferred), or to other devices which accept NTSC composite video. Advanced video generator produces pictures for color, B/W displays. Programmable sound generator makes nearly any sound desired.

Eight A/D conversion channels (each with 4 bits of parallel I/O for LEDs, switches) accept four X-Y joystick consoles (not included). AMD-9511 Arithmetic Processor Chip (not supplied) permits extremely rapid floating point, trigonometric and transcendental computations – as well as hardware multiplication and division of both integer and floating point numbers.

Demonstration software supplied on 5.25" disk; additional software now available from HUG. Proper operation guaranteed only when used with Heath memory boards – or other memory boards which use fully static single-supply RAMs.

HA-8-3, Assembled and tested, Shpg. wt. 3 lbs. 495.00





Heath printers reach new heights of versatility, speed and quiet with the H-25

\$1095⁰⁰

- Our fastest printer — prints bi-directional at speeds in excess of 150 characters per second
- 33 graphics characters, compatible with the H/Z-19, H-88 and H/Z-89
- Completely enclosed cabinet reduces the H-25's sound level
- State-of-the-art, heavy-duty design provides more features, assures longer periods of continuous operation
- Self-testing capabilities make checking the H-25's printing capabilities easier

Now you can get all the features you've been looking for in a high-quality, high-speed dot matrix printer — for only \$1095 kit! The state-of-the-art Heath/Zenith H-25 combines fast printing speed, versatile paper handling facilities and rugged construction.

Heath's fastest printer: The bi-directional H-25's maximum printing speed is over 150 characters per second — which means it can print up to 300 lines per minute when printing 10-column lines, and 65 132-column lines per minute.

Especially designed to use the full capabilities of most Heath/Zenith computers and terminals: The H-25 generates and prints a full 96-character ASCII character set (both upper and lower case, with descenders and underlining), using a 9 x 9 dot matrix print head. It also prints the 33 block graphic characters provided with the H/Z-19 Professional Video Terminal, as well as the H-88 and H/Z-89 All-In-One Computers.

The H-25's quad tractor-feed features adjustable width — which gives this Heath printer the capability to handle standard edge-punched, single or multiple forms (up to six parts thick) or fan-fold paper.

"No-mess" ribbon replacement — when you need to change a ribbon, just remove the old ribbon cartridge and "plug in" a new extended-life ribbon cartridge.

An enclosed cabinet makes the H-25 the quietest Heath/Zenith printer ever.

User-selectable variable pitch (10, 12, 13.2 or 16.5 characters/inch) allows the H-25 to print up to 222 characters per line (at 16.5 cpi pitch on a 13.5"-wide line). Vertical line spacing can be either 6 or 8 lines/inch — selectable by hardware or software. Horizontal and vertical tabs are adjustable.

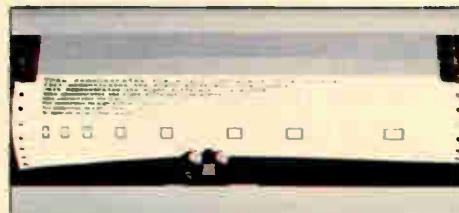
"Paper out" and "jammed" detectors help prevent loss of data. Self-testing capabilities are also included with the H-25.

The H-25 interfaces to most computers and terminals, using an RS-232C Serial Interface — or a 20 mA current loop — with handshaking control signals (reverse channel or busy signal). Baud rates, ranging between 110 and 9600, are user-selectable.

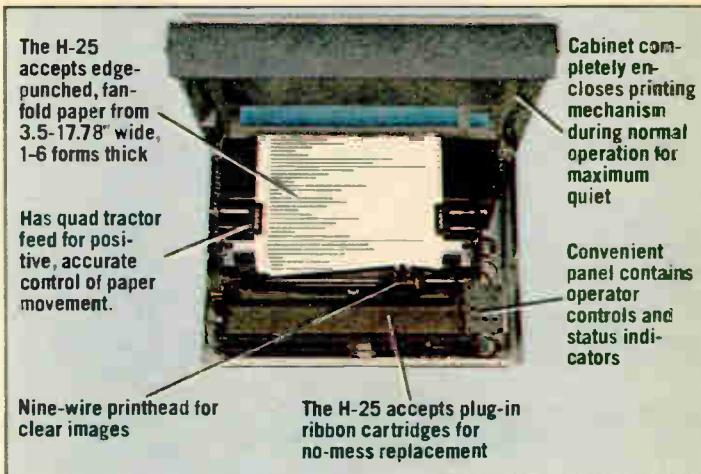
Kit H-25, Shpg. wt. 85 lbs. **1095.00**

An assembled commercial product of this type is also available. See the Zenith Data Systems Z-25 Printer on page 41.

H-25 SPECIFICATIONS: Printing: Throughput at 10 cpi pitch: 65 lines/minute (132 characters/line). Motion: Bi-directional. Pitch: Pitch selection by either hardware or software. Character Width: Variable, depending upon pitch. Paper Handling: Paper Types: Up to 6 forms (0.018") forms thick, fan-fold, 3.5"-17.78" wide. Form Lengths: 3-14 in. Communications: Data Format: Asynchronous bit serial, with 2 stop bits on 110 baud and 1 stop bit on all others. Line Buffering: 256 characters. Parity: Odd, even or none. Physical: Operating Temperature Range: 50-104 deg. F. Power Requirement: 120/240 VAC. Dimensions (without paper tray): 8.25" H x 26.50" W x 18.50" D.



The Heath H-25 Line Printer's variable pitch, variable character width and 33 special graphics characters add extra versatility to your Heath or Zenith computer.



Sturdy desk-level Printer Stand

Here's a desk-level stand that will hold your new H/Z-25 Printer — as well as complement your other components. Especially designed to fit the H/Z-25, this stand has a special top channel which measures 1" L x 16.75" W x 1" D. It supports the printer at a level convenient for seated or standing persons. Ample platform with Formica top is strongly supported by two steel legs with floor supports. The wire basket (included), which hooks onto the stand, keeps your hard copy output organized. This printer stand is partially assembled; not a kit.

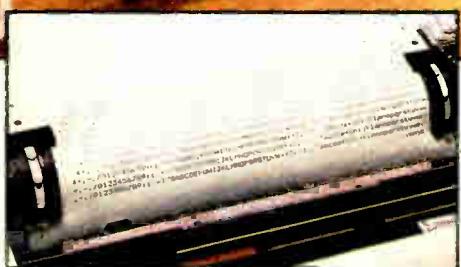
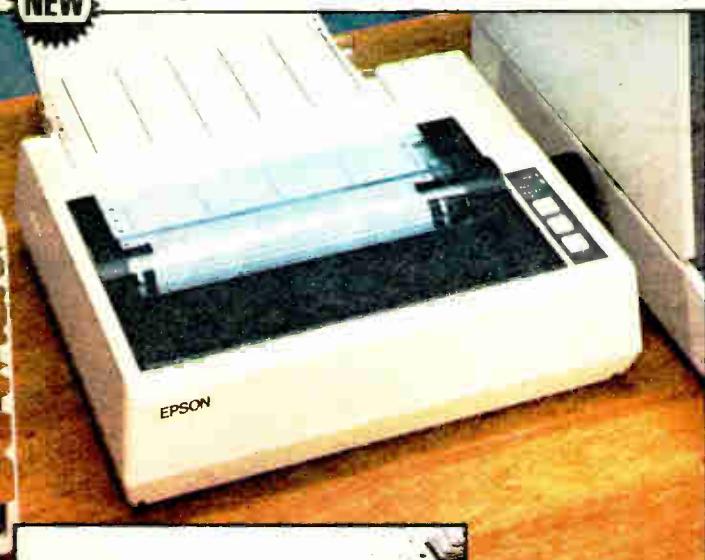
HCA-9, Shpg. wt. 21 lbs. **99.00**



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

NEW

Get good performance and extra-value features, at a price you can afford, with the MX-80



Has advanced features for maximized throughput

Prints 96 ASCII characters in a tack-sharp 9 x 9 matrix

\$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. 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), or the Z-89-11 I/O Board on page 39. A Centronics-style 8-bit parallel interface is included with the MX-80 as standard equipment.

Includes paper tray and one ribbon. Requires HCA-10 Cable (p. 42) for connection to computer. For 120 VAC, 60 Hz power. 4.2" H x 14.7" W x 12" D. **MX-80, Assembled, Shpg. wt. 15 lbs. 545.00**

MX-80-2, RS-232C Serial Interface for MX-80, 1 lb. 65.00

HCA-5-80, Dust Cover for MX-80, 1 lb. 14.00

MX-80 SPECIFICATIONS: Printhead: 9-pin, replaceable. Printing Method: Serial impact dot matrix. Print Rate: 80 cps. Print Direction: Bidirectional. Line Spacing: $\frac{1}{6}$ ", $\frac{1}{6}$ ", $\frac{7}{12}$ " — plus programmable. Character Set: Full 96-character ASCII set with descenders. Graphics Characters: 64 block characters. Printing Modes: Standard, double (advance paper $\frac{1}{20}$ th 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.



Priced at big \$100 savings, the H-14 is one of the lowest-cost dot matrix line printers of its type available on the market 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 Operating System for H/Z-89; H-88-18 Operating System 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.



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

Get \$490 in software and newly-enhanced capabilities with Z-89 Desktop Genius!

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 data storage capacity to over 12 megabytes.

High-resolution video display, using a non-glare green CRT, can show up to 2,000 characters. Typewriter-style keyboard has 33 graphics characters for business presentations. Three RS-232 Serial Ports for printer/telecommunications extendability. 120/240 VAC. 13" H x 17" W x 20" D.

Three models: One model has 48K RAM and 100K bytes of disk storage; a second model has 64K RAM and the new Z-89-37 Double-Density Disk Controller Board to accommodate the new Z-37 Floppy Disk System; and a third model has 64K RAM, the Z-89-37 Board and 160K bytes of disk storage.

Z-89-81, Assembled with 48K bytes of RAM, built-in floppy disk drive 100K bytes of data storage and three serial I/O ports, 60 lbs. **2895.00**

NEW! Z-90-80, Assembled with 64K bytes of RAM, Z-89-37 Double-Density Disk Controller Board, no internal disk storage (use Z-37 below for external storage) and three serial I/O ports, 50 lbs. **2895.00**

NEW! Z-90-82, Assembled with 64K bytes of RAM, the Z-89-37 Controller Board, built-in floppy disk drive for 160K bytes of data storage (use Z-87 for additional storage if needed) and three serial I/O ports, 60 lbs. **3195.00**

NEW! Z-89-11, Multi-Mode Interface Card (Centronics-style parallel interface allows H/Z-89 to directly interface with MX-80 Printer on p. 38 — or use with HWI-8917-1/8937-1/8947-1 software on p. 46 to enable H/Z-89 to emulate various IBM terminals — Available in March), 2 lbs. **150.00**

ZENITH

data systems

Assembled commercial computer products for business applications



Zenith Data Systems are designed for commercial use. Operation in residential areas may cause unacceptable interference to radio and TV reception — requiring the operator, pursuant to FCC regulations, to take the necessary steps to correct the interference.



① Add up to 1.28 megabytes of data storage with Z-37 Disk System

\$1995.00

- Includes two high-capacity disk drives
- Plug-in adaptability to H/Z-89 computer systems

5.25" floppy disk drives mount vertically to take less space. Extremely accurate access to data. For 120/240 VAC, 50/60 Hz power. Dimensions, 8.625" H x 8.875" W x 15" D.

NEW! Z-37, Assembled Dual-Sided Disk System with two drives for 1.28 megabytes of data storage (requires Z-89-37 below for use with Z-89), Shpg. wt. 28 lbs. **1995.00**

NEW! Z-89-37, Double-Density Disk Controller Board, Shpg. wt. 4 lbs. **395.00**

Z-87, Assembled Single-Sided Disk System with two drives for up to 320K bytes of data storage, Shpg. wt. 28 lbs. **1195.00**

② Z-47 Disk System provides over 2.5 megabytes of data storage

\$3500.00

- Compatible with H-8 and H/Z-89 computers
- Features fast 191 ms average data access time

The dual-drive Z-47 provides enough on-line data storage for extended accounting, inventory and mathematical functions — up to over 2.5 megabytes. It accepts 8" IBM 3740 floppy diskettes.

For 120/240 VAC, 50/60 Hz power. 10.2" H x 18.9" W x 18" D (25.9 x 48 x 45.72 cm). Requires HA-8-8 Extended Configuration Option or HA-8-6 Z-80 CPU Card for use with H-8 Computer.

Z-47-BA, 66 lbs., Motor Freight **3500.00**

H/Z-89 to Z-47 Interface. **195.00**

Z-89-47, Assembled, 2 lbs. **195.00**

H-8 to Z-47 Interface. **235.00**

WH-8-47, Assembled, 2 lbs. **235.00**



Z-19 Professional Video Terminal has extra-value features

**NOW ONLY
\$895.00**

- Interfaces with most standard computer systems
- Compatible with ANSI, DEC VT-52 terminals

Zilog Z-80 microprocessor allows complete screen control for easier data entry. High-resolution video display (with non-glare green CRT) shows twenty-five 80-character lines (2,000 characters). High-performance typewriter-style keyboard has 72 keys, 12 special user-function keys (eight of which are user-programmable), and a separate 12-key numeric pad. 33 special graphics characters.

Edit by character or line. RS-232C Interface runs at 110-9600 baud. All features controllable from keyboard, computer or interior switches. 120/240 VAC. 13" H x 17" W x 20" D. Was \$995.00.

Z-19, Assembled, Shpg. wt. 43 lbs. **895.00**



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!**

\$5800 00

- 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

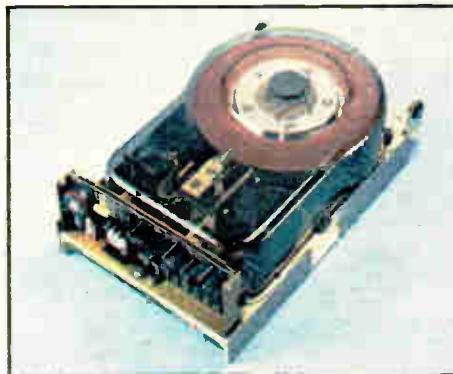
Do you need maximum on-line capacity to store large data bases? Or do you want the vastly better performance of a Winchester disk drive? The Z-67 Winchester Disk System will fill your needs. It represents another "quantum leap" in disk storage capacity — 12.961 megabytes unformatted/10.782 megabytes 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, x 4 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 43-51).

Z-67, Assembled, Shpg. wt. 87 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, 9.76 megabytes; Floppy Disk, 1.022 megabytes (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: 120VAC, 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).



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



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.

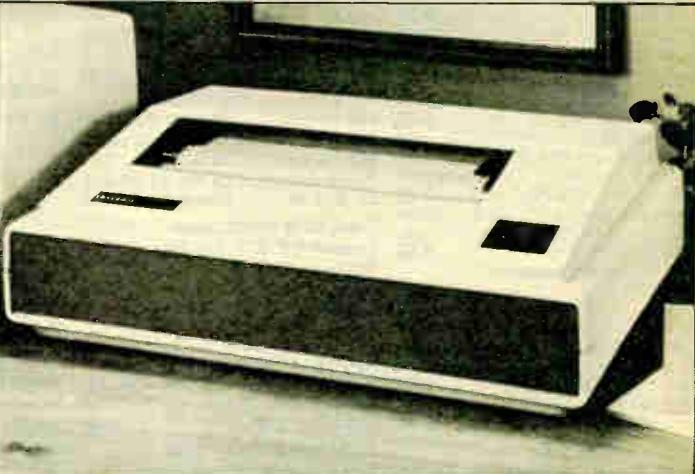
Interfaces to most computers, terminals via RS-232C Serial Interface or 20 mA current loop at 110-9600 baud. Self-testing capabilities included. 120/240 VAC. 8.25" H x 26.50" W x 18.50" D (without paper tray).

Z-25, Assembled and tested, Shpg. wt. 82 lbs. 1595.00
HCA-9, Stand and Paper Tray for Z-25, Shpg. wt. 21 lbs. 99.00

ZENITH

data systems

Assembled commercial computer products for business applications



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.

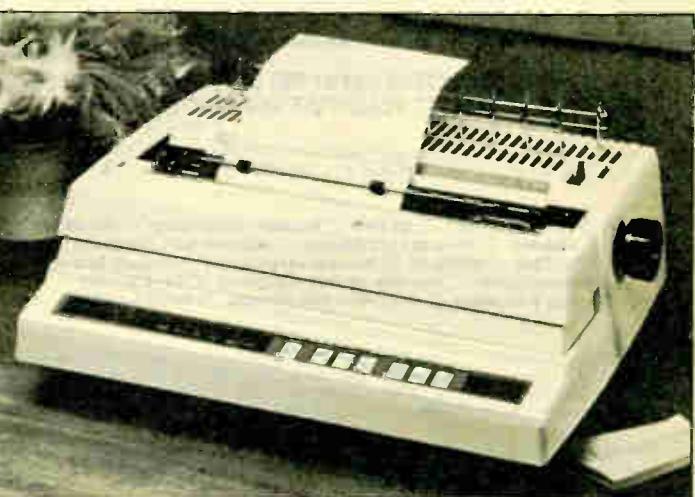
Uses both metal and plastic print wheels for maximum printing flexibility. Prints full 96-character ASCII set, upper and lower case, at up to 35-40 cps. RS-232C Interface and 256-byte print buffer run at 110-1200 baud. Includes friction platen, power supply, operator control panel, HCS-22 Print Wheel (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 42 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 42.

WH-34, Assembled, 47 lbs. 1095.00

WHA-34-2, Tractor Feed, Shpg. wt. 3 lbs. 179.00



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



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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

Courier 10 (Diablo 38100). Pica with slashed zero. **HCS-20**, 1 lb. **8.00**
Courier 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 Computer Language.
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/Z-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/Z-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.
HCS-56, 3 lbs. **Package of 10, 55.00**

Stores up to 100K bytes.

HCS-61, 1 lb. **Package of 5, 20.00**

Single-Density, Single-Sided 8" Disks. IBM 3740 format for H-27, H-47, Z-67, other systems. 77 tracks. Stores up to 250K bytes.

HCS-62, 2 lbs. **Package of 5, 25.00**

Double-Density, Single-Sided 8" Disks for H-47, Z-67. 77 tracks. Stores up to 500K bytes.

HCS-64, 2 lbs. **Package of 10, 60.00**

Double-Density, Double-Sided 8" Disks. IBM 3740 format for H-47, Z-67, other systems. 77 tracks. Stores up to 1 megabyte.

HCS-65, 2 lbs. **Package of 10, 70.00**

NEW! Soft-sectored 5.25" disks

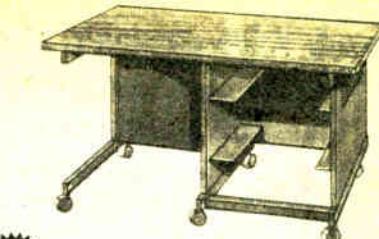
Require new Z-89-37 Controller.

Double-Density, Single-Sided, 48 TPI Disks. For H-17-1 and H-17-4 Drives. Stores up to 160K 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 640K bytes.

HCS-68, 1 lb. **Package of 10, 55.00**



NEW

\$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**

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(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 MACRO-80 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 *Jay H. Jarrett*
 By _____

ACCEPTED AND AGREED:
 CUSTOMER'S SIGNATURE _____

DATE

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(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 _____

Jay H. Jarrett

ACCEPTED AND AGREED:
 CUSTOMER'S SIGNATURE _____

DATE



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

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, subroutines 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;

A new, optional benefit: Now new HUG members can enjoy the full benefits of REMark Magazine — by starting with a complete REMark library! All back issues are now available in bound form (Issues 1-13, together; later issues, in annual installments). Contact HUG for more information.

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
- Editors
- 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

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.



- Stock and Tax Programs
- Time Management
- Home Budget Maintenance
- Checkbook Programs
- Credit Card Management
- Investments
- Annuities
- 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
- Business Analysis
- Payroll
- Inventory Package
- Expense Report
- Plotting
- Educational Programs
- Electronic Formulas
- Solar Domes
- Music
- Morse Code
- Antenna Design Programs
- 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 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: _____



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

OPERATING SYSTEMS

Heath Disk Operating System (HDOS) offers many functions of larger commercial systems

- Sophisticated library of programs controls your H-8 or H/Z-89
- Designed for efficient use of memory and disk space

Structure: HDOS provides a complete environment for program construction, editing and storage – with assembly and checkout facilities.

Built-in languages: Extended Benton Harbor BASIC, Ver. 6.0, uses English statements and math equations to help solve problems. ASM Assembly Language is a two-pass absolute 8080 assembler which assembles source programs into listings and object programs, in executable binary format.

Built-in utilities: 17 commands list content, dismount and reboot disks; copy, rename and delete files; run programs, set dates, select device options, execute PIP, display status reports and more. Transient commands allow INITialization of new disks, TESTS of disk drives and media, SYStem GENERation, ONECOPYing, DEBUGging of programs and EDITing of text.

Hardware support: HDOS 3.0 (for H/Z-89 only) supports all disk systems – including H/Z-37 and Z-67; HDOS 2.0 (for H-8 and H/Z-89) supports all disk systems except Z-67 (up to three 5.25-inch and two 8-inch drives).

Support and updates: Updates supplied free for one year from date of purchase, when registration card enclosed with software is signed and returned.

Hardware requirements: An H-8/H-19 (Ver. 2.0 only) or H/Z-89 (Vers. 2.0 or 3.0) system with 48K RAM and one disk drive. Two drives are highly recommended, and may be required to use some other software products with HDOS.

Heath Disk Operating System (HDOS), Ver. 3.0, H/Z-89 Computer only:

HOS-8917-1, (Avail. Mar. 1982), hard-sectored 5.25" disk 6 lbs. 150.00

HOS-8937-1, (Avail. Mar. 1982), soft-sectored 5.25" disk, 6 lbs. 150.00

HOS-8967-1, (Avail. Mar. 1982), soft-sectored 8" disk, 6 lbs. 150.00

Heath Disk Operating System (HDOS), Ver. 2.0, for H-8 and H/Z-89 computers:

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

HOS-847-1, on soft-sectored 8" disk, Shpg. wt. 5 lbs. 150.00

UCSD P-System with Pascal promotes high-level modular programming

- Easy-to-master system responds quickly to changing needs
- Runs on any microcomputer with a resident interpreter

Structure: UCSD P-System with Pascal, Level-II, is a complete environment for program development and execution in microcomputers. It includes text editors, file management utilities, a Pascal compiler, run-time support, block I/O service routines, assemblers and a linkage editor for code modules.

File and disk management: Disk files can be randomly accessed, modules separately compiled and Assembly programs linked with Pascal routines.

Built-in language: Modular structure allows one large task to be divided into smaller tasks. Result – one programmer can follow another's program and easily modify it when it needs change. While many languages have only two primitive data types, Pascal has four: real, Boolean, integer and character.

Built-in utilities: A Pascal compiler to produce universal P-code; an efficient P-code interpreter; screen-oriented and character-oriented editors for programs and text; a filer for rapid file manipulation; a macro-assembler which produces code to be linked with Pascal programs; a linker for editing object and assembly code modules; and a system library of frequently used utilities.

Hardware and software support: UCSD P-System programs can be executed on any microcomputer with a resident interpreter – up to ten times faster than comparable (interpreted) programs in BASIC.

Support and updates: Support (and updates, at a nominal charge) can be obtained from Softech Microsystems, San Diego, California.

Hardware requirements: An H-8/H-19, H-11A or H/Z-89 system (as indicated below) with 48K bytes of RAM and two disk drives (HOS-817-3 requires and supports only two hard-sectored 5.25-inch disk drives).

Related educational course: EC-1111 Pascal Programming Course on page 54.

HOS-817-3, hard-sectored 5.25" disk for H-8/H-19 and H/Z-89, 8 lbs. 295.00

HOS-1127-3, soft-sectored 8" disk for H-11A/H-19/H-27, 8 lbs. 295.00

CP/M – the industry standard DOS with a vast variety of compatible software

- Over 200,000 computer owners, vendors and distributors use CP/M
- Provides common hardware interface with flexible capabilities

Structure: Heath/Zenith CP/M provides a common hardware interface for any microcomputer system with an Intel 8080 or Zilog Z-80 CPU – freeing the user from having to understand the details of underlying hardware. CP/M allows fully dynamic named-file allocation, program and peripheral output control, and random or sequential access to data.

File and disk management: Using CP/M file systems, distinct programs can be stored in both source and machine executable form. A unique LIST command can provide hard copy listings of disk files without writing programs.

Built-in utilities: A two-page assembler, general-purpose editor, advanced 8080 debugger with traced execution and disassembly, file dump and copy between devices, system generation/relocation and file size/disk usage displays.

Hardware and software support: 100% compatible with standard CP/M programs. Ver. 2.2.03 (for H/Z-89 only) supports H/WH-17, H/Z-37, H/Z-47, H/Z-67 and H-77/Z-82 Disk Systems; Ver. 2.2.02 (for H-8 and H/Z-89 supports H-WH-17, H/Z-47 and H-77/Z-87).

Support and updates: Updates supplied free for one year from date of purchase, when registration card enclosed with software is signed and returned.

Hardware requirements: An H-8/H-19 or H/Z-89 system with 48K bytes of RAM and one to five disk drives (three 5.25" and two 8" drives). H-8 systems also require HA-8-8 Extended Configuration Option.

Related educational course: EC-1120 CP/M Course on page 54.

Heath/Zenith CP/M, Ver. 2.2.03, for H/Z-89 Computer only:

HOS-8917-2 (Needs Sublicense, p. 42), hard-sectored 5.25" disk, 5 lbs. 150.00

HOS-8937-2, (Needs Sublicense, p. 42), soft-sectored 5.25" disk, 5 lbs. 150.00

HOS-8967-2, (Needs Sublicense, p. 42), soft-sectored 8" disk, 5 lbs. 150.00

Heath/Zenith CP/M, Version 2.2.02, for H-8 and H/Z-89 computers:

HOS-817-2 (Needs Sublicense, p. 42), hard-sectored 5.25" disk, 5 lbs. 150.00

HOS-847-2 (Needs Sublicense, p. 42), soft-sectored 8" disk, 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

Begin programming your H-8 or H-88 Computer quickly and easily: The Heath Cassette Operating System has convenience features (such as 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) which make it easier to use and more practical than similar systems.

Built-in language: Extended Benton Harbor BASIC, Version 6.0, is an enhanced Dartmouth BASIC which includes strings and files. You get faster operation, convenient commands, math functions, dynamic storage allocation, expanded error messages and recovery ability. It also has numeric data with over six digits of accuracy, Boolean values for logical operation, free format programs, math functions, enhanced expression and conditional statement facilities.

HASL-8 Assembly Language is a two-pass absolute 8080 assembler that lets you create source programs using letters, numbers and symbols to generate efficient machine language code.

Built-in utilities: The TED-8 Text Editor can be used for generating and editing text. It prepares the source code for HASL-8 Assembly Language – and may also be used to prepare reports, write letters and edit manuscripts.

The versatile BUG-8 Console Debugger is used to enter and debug user machine language programs, via an external terminal. It features single and multiple stepping, insertion of breakpoints, and loading/dumping of user programs to or from tape storage.

Hardware requirements: Requires an H-8 or H-88 system with 16K bytes of RAM and the ECP-3801 Cassette Recorder/Player (page 78). H-8 systems also require H-8-5 Interface (p. 33). Cassette Interfacing is standard with H-88 and H-89; H-88-5 (p. 29) is required for use with HS-89, WH-89 and Z-89.

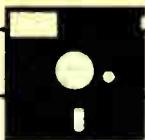
H-8-18, for H-8 Computer, Shpg. wt. 11 lbs. 30.00

H-88-18, for H-88 Computer, Shpg. wt. 5 lbs. 30.00

For more complete descriptions of software, send for our new, FREE Software Catalog. Mail your request to Heath Company, Dept. 815-001, Benton Harbor, MI 49022.



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



PROGRAMMING LANGUAGES

Now available on both hard- and soft-sectored disks, these languages let you write programs with surprising ease. And we'll supply updates, at no additional charge, for one year — when you sign and return the registration card enclosed with each language.

Popular, powerful Microsoft BASIC Interpreter

- This enhanced BASIC is one of the most versatile general-purpose programming languages available for use with microcomputers
- Scores of practical utility and applications programs available

Commands and statements: MBASIC features an IF-THEN-ELSE control structure, which allows highly-structured programming. You get direct access to CPU ports and memory locations. String and numeric constants — along with integer, string, single- and double-precision variables — can be used. A full range of logical and mathematical operators is also provided.

Many frequently-used intrinsic functions are provided — and with the DEF statements, you can also employ user-defined functions not listed as intrinsic functions. Functions may be referenced to mathematical function notation.

The order of program execution may be changed with the use of MBASIC's branches, loops and subroutines.

This BASIC also has extended commands and statements which are not available in most other BASICs. They include ERASE (to remove arrays), LINE INPUT (to add lines to string variables without delimiters), SWAP (to exchange the values of two variables), and the TRON/TROFF debugging aids (to help trace execution of program instructions).

Powerful string processing functions are provided — including LEFT, RIGHT, MID, ASC, CHR and concatenation.

Most error messages are self-explanatory. And a full set of MBASIC error codes and error messages is provided.

Editing capabilities: Extensive program editing facilities are included with MBASIC, via its EDIT command and edit mode subcommands. These facilities provided for insertion, deletion, character change and search capabilities. And you can even perform editing functions during programming.

Mathematical capabilities: Double-precision floating point number (up to 16 digits) and double-precision math capabilities are included — as well as the ability to perform algebraic and trigonometric functions.

Output capabilities: Printing capabilities are provided — including a WIDTH command (to set the width of the terminal printing line).

Minimum hardware and software requirements: The MBASIC Interpreter requires an H-8/H-19 or H/Z-89 system with 48K bytes of RAM. HDOS or the Heath/Zenith CP/M Operating System is also required, as indicated below.

MBASIC Interpreter, Ver. 4.82, on hard-sectored 5.25" disk for HDOS.

H-8-21 (Requires Sublicense Grant, p. 42), Shpg. wt. 3 lbs. 150.00

MBASIC Interpreter, Ver. 5.21, on hard-sectored 5.25" disk for CP/M.

HMS-817-1 (Requires Sublicense Grant, p. 42), Shpg. wt. 5 lbs. 175.00

MBASIC Interpreter, Ver. 5.21, on soft-sectored 5.25" disk for CP/M.

HMS-837-1 (Requires Sublicense Grant, p. 42), Shpg. wt. 4 lbs. 175.00

M8ASIC Interpreter, Ver. 5.21, on soft-sectored 8" disk for CP/M.

HMS-847-1 (Requires Sublicense Grant, p. 42), Shpg. wt. 5 lbs. 175.00

MBASIC Compiler speeds general programming

How to use: Compile programs with the single-pass MBASIC Compiler, Ver. 5.23. Compilation speeds execution — by eliminating time-consuming interpretation.

Utility programs: MBASIC's run-time library, MACRO-80 Assembler, LINK-80 Editor, CREF Cross-Reference Generator and LIB-80 Library Manager.

Minimum hardware and software requirements: An H-8/H-19 or H/Z-89 system with 48K bytes of RAM, two disk drives and either HDOS or the Heath/Zenith CP/M Operating System.

All MBASIC Compiler models below require Sublicense Grant on page 42.

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

HMS-837-41, on soft-sectored 5.25" disk for HDOS, 4 lbs. 250.00

HMS-847-41, on soft-sectored 8" disk for HDOS, 4 lbs. 250.00

HMS-817-4, on hard-sectored 5.25" disk for CP/M, 5 lbs. 250.00

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

HMS-847-4, on soft-sectored 8" disk for CP/M, 5 lbs. 250.00

Microsoft FORTRAN for science and engineering

- Write and execute powerful scientific and engineering programs
- The many extended features of this system make it comparable to FORTRAN compilers used on large mainframes and minicomputers.

Commands and statements: With Microsoft FORTRAN, you can take immediate advantage of many available FORTRAN applications programs. It includes all features of ANSI FORTRAN X3.9-1966, except for the COMPLEX data type. Many enhancements are also provided with this system:

1. LOGICAL variables for use as integer quantities from +127 to -128.
2. LOGICAL DO loops for faster execution of small valued integer loops.
3. Hexadecimal constants.
4. The allowance of Literals and Holleriths in expressions.
5. Logical operations on integer data (.AND., .OR., .NOT and .XOR) can be used for 8- or 16-bit Boolean operations.
6. READ/WRITE End of File or Error Condition transfer (END=n and ERR=n, where n is the statement number, can be included in READ or WRITE statements — to transfer control to the specified statement on detection of error or end of condition).
7. ENCODE/DECODE (for FORMAT operations to memory).
8. IMPLICIT Command (to change default variable types).

Microsoft FORTRAN compiles up to 1200 lines per minute, in a single pass. The compiler optimizes the generated object code by eliminating common subexpressions, peephole/branch optimizations and constant folding.

The compiler generates a fully symbolic listing of the machine language generated — with error and address summaries.

Mathematical capabilities: The Microsoft FORTRAN Library has routines for 32- and 64-bit floating point addition, subtraction, multiplication and division. These are among the fastest routines available for 8080 and Z-80 microcomputers. Microsoft FORTRAN can also perform mixed mode arithmetic.

Utility programs: The MACRO-80 Relocating Assembler has full macro development facilities. Generating relocatable object modules for use with the LINK-80 Editor, MACRO-80 accepts Intel 8080 and Zilog Z-80 mnemonics — and features conditional assembly capabilities. The CREF Cross-Reference Generator, for use with MACRO-80, generates a sorted cross-reference listing. LINK-80 converts relocatable libraries or modules into runnable load modules for direct execution or disk storage. The LIB-80 Library Manager Utility Program allows you to build your own libraries of relocatable modules. Microsoft FORTRAN has a library of single- and double-precision scientific functions — as well as the other standard FORTRAN utility programs.

Minimum hardware and software requirements: An H-8/H-19 or H/Z-89 system with 48K bytes of RAM, two disk drives and either HDOS or the Heath/Zenith CP/M Operating System (as indicated below).

H-8-20 (Requires Sublicense Grant on page 42), Version 3.35 on hard-sectored 5.25" disk for HDOS, Shpg. wt. 4 lbs. 175.00

HMS-817-2 (Requires Sublicense Grant on page 42), Version 3.40 on hard-sectored 5.25" disk for CP/M, Shpg. wt. 5 lbs. 195.00

HMS-837-2 (Requires Sublicense Grant on page 42), Version 3.40 on soft-sectored 5.25" disk for CP/M, Shpg. wt. 4 lbs. 195.00

HMS-847-2 (Requires Sublicense Grant on page 42), Version 3.40 on soft-sectored 8" disk for CP/M, Shpg. wt. 5 lbs. 195.00

C BASIC gives you more programming flexibility

Structure: Version 2.0 of the C BASIC Programming Language includes a pseudo-code compiler and run-time interpreter.

Statements and commands: Expressions available include string constants, integers and real numbers, identifiers, variables and assignment statements.

C BASIC has many extended features, including the IF...THEN...ELSE and WHILE constructs, integer variables, multiple line functions, chaining with common variables, additional pre-defined functions and a cross-reference listing generator.

Output capabilities: Disk file accessing facilities are extremely versatile — providing for many different file organizations and accessing methods.

Minimum hardware and software requirements: An H-8/H-19 or H/Z-89 system with 48K bytes of RAM, one disk drive and Heath/Zenith CP/M.

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

HCM-837-1, on soft-sectored 5.25-inch disk, Shpg. wt. 1 lbs. 115.00

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



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

COMPUTERS/45

PROGRAMMING LANGUAGES

Write programs faster with Microsoft MACRO-80

- Designed for use by sophisticated Assembly Language programmers
- Includes many extra-value features previously found only on programming systems for large computer mainframes

Statements and commands: You get most "big computer" assembler features, without sacrificing speed or memory space. Accepting 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; conditionals (up to 255 levels) can be nested. Conditional assembly is enhanced by pseudo-operators which include testing of assembly pass, symbol definition and parameters to macros. Code is assembled, at over 1000 lines per minute, in relocatable modules that are manipulated by the LINK-80 Editor.

Built-in utilities: The LINK-80 Linkage Editor converts relocatable libraries or modules into runnable load modules for direct execution or disk storage.

The CREF Cross-Reference Generator generates a sorted cross-reference listing, when used with MACRO-80.

The LIB-80 Library Manager, included in CP/M versions of this system, lets you build your own libraries of relocatable modules.

Min. hardware, software reqmts: An H-8/H-19 or H/Z-89 system with 48K RAM and one disk drive (two drives recommended), HDOS or CP/M.

Microsoft MACRO-80 Programming Package, for HDOS systems:

HMS-817-51 (Needs Sublicense, p. 42), hard-sectored 5.25" disk, 2 lbs. 65.00

HMS-837-51 (Needs Sublicense, p. 42), soft-sectored 5.25" disk, 4 lbs. 65.00

HMS-847-51 (Needs Sublicense, p. 42), soft-sectored 8" disk, 4 lbs. 65.00

Microsoft MACRO-80 Programming Package, for CP/M systems:

HMS-817-52 (Needs Sublicense, p. 42), hard-sectored 5.25" disk, 2 lbs. 65.00

HMS-837-52 (Needs Sublicense, p. 42), soft-sectored 5.25" disk, 3 lbs. 65.00

HMS-847-52 (Needs Sublicense, p. 42), soft-sectored 8" disk, 4 lbs. 65.00

Run powerful, business-oriented COBOL-80

- Ideal for processing large disk files and data bases
- Many advanced features and modules add power and convenience

Commands, statements: Exceeds minimum ANSI-74 COBOL specifications.

Specially-implemented modules: Level-I Nucleus has 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 subjects, or subject and relation, in relational conditions; sign test; nested IF statements; parentheses in conditions. Verbs: Extensions to ACCEPT, DISPLAY for formatted screen handling; ACCEPTance of data from DATE/DAY/TIME; STRING/UNSTRUNG; 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).

Extended debugging module provides for convenient trace-style debugging.

Level-I module with most Level-II features: Sequential I/O.

Level-I modules with some Level-II features: Table Handling, Relative I/O.

Not included: Communications, Report Writer, Sort/Merge.

Built-in utilities: The MACRO-80 Relocating Assembler generates relocatable object modules for the LINK-80 Editor. The LINK-80 Linkage Editor converts relocatable libraries or modules into runnable load modules for direct execution or disk storage. The LIB-80 Library Manager allows you to build your own libraries of relocatable modules. The Microsoft COBOL Library has many special routines. And run-time software makes this system even more useful.

Min. hardware, software reqmts: An H-8/H-19 or H/Z-89 system with 48K RAM, two disk drives and HDOS or CP/M. 64K RAM and the H/Z-37 or commercial Z-67 Disk Systems are recommended for uses involving large disk files.

Microsoft COBOL-80 Programming System, for HDOS systems:

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-80 Programming System, for CP/M systems:

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

COMMUNICATIONS PROGRAMS

Remote Batch Terminal Emulator to communicate with IBM, other mainframes

- Allows H/Z-89 to emulate IBM 3780, 2780, 3741, 2770

The Remote Batch Terminal Emulator (RBTE) Program allows the H/Z-89 to emulate various IBM terminals (including the IBM 3780, IBM 2780, IBM 3741 and IBM 2770) – so that it can communicate with most major mainframes, using IBM- and industry-standard binary synchronous protocol.

Features: RBTE runs unattached – no operator interaction is necessary, once the program has been initialized. Both binary and ASCII data can be transmitted or received.

RBTE performs its own on-line diagnosis of communication problems. An off-line diagnostic verifies the operation of the serial port when connected to a modem in loop-back test mode.

Hardware reqmts: H/Z-89 w/48K RAM, one disk drive and Z-89-11 Multi-Mode I/O Board (p. 39).

HWI-8917-1, (Avail. Mar.), on hard-sectored 5.25" disk, Shpg. wt. 5 lbs. 895.00

HWI-8937-1, (Avail. Mar.), on soft-sectored 5.25" disk, Shpg. wt. 5 lbs. 895.00

HWI-8947-1, (Avail. Mar.), on soft-sectored 8" disk, 5 lbs. 895.00

CPS gives your computer access to more information

- Allows data transfer between your Heath/Zenith computer and CompuServe MicroNet
- Access MicroNet's time-sharing mainframe

Features: Time-sharing allows you to write and edit programs and data files, and store them on the CompuServe system. You can also run your own programs – and access data files or programs in the MicroNet library of information.

This system has automatic log-in, mail check and on-screen elapsed time clock. It permits access to other computer systems, via modem.

Software compatibility: For HDOS users, a perfect complement to CPS is the SF-8512 CP/M to HDOS File Converter (described on page 51), which allows the translation of MicroNet files and data freely – onto compatible media.

Minimum hardware and software requirements: CPS requires an H-8/H-19 or H/Z-89 computer system with 48K bytes of RAM, a modem and one disk drive. The HDOS or Heath/Zenith CP/M Operating System is also required, as indicated below.

SF-9003, on hard-sectored 5.25" floppy disk for HDOS systems, Postpaid 40.00

SF-9103, on hard-sectored 5.25" floppy disk for CP/M systems, Postpaid 40.00

Using these programs, your Heath/Zenith computer can communicate with the outside world. One program lets your H/Z-89 emulate certain IBM terminals. CPS gives you access to CompuServe's time-sharing MicroNet. Use the RTTY Communications Processor to communicate with other Hams via computer.

RTTY Communications Processor adds fun to your Ham Radio hobby

- Use your Heath/Zenith computer to communicate with other Hams
- Send, receive data at the same time

High-technology meets Amateur Radio: The SOFTSTUFF RTTY Communications Processor combines the high technology of Heath/Zenith computers with your exciting Ham Radio hobby.

This utility program makes it possible to send and receive messages almost simultaneously, with amateur radio operators all around the world.

Features: A special split-screen display on your H-19 or H/Z-89's CRT screen allows you to copy incoming messages and edit outgoing messages at the same time, side-by-side. A complete statement of your system's status (which shows time, CW identification and your choice of ASCII or Baudot operation) is displayed on your CRT screen.

Minimum hardware and software requirements: The SOFTSTUFF RTTY Communications Processor requires an H-8/H-19 or H/Z-89 computer system – equipped with 48K bytes of Random Access Memory (RAM) and one floppy disk drive. The Heath Disk Operating System (HDOS) is also required to use this product.

SF-9006, on hard-sectored 5.25" floppy disk for HDOS systems, Postpaid 100.00



UTILITY PROGRAMS

PEARL Level 3 generates programs to solve your applications problems

NEW

- Interactive program – you define the application, and PEARL Level 3 generates the solution
- Can generate both simple and complex applications

Greatly reduces development time: PEARL Level 3 is an application generator designed for use by most microcomputer owners. Developed for professional programmers and systems development teams, PEARL Level 3 supports the development of complex applications. You can use PEARL Level 3 to generate a very simple application – such as an address list – or you can develop a very complex application which would normally require the skills of a professional programming team.

Structure: You and PEARL Level 3 interact. You define the specifications of your application (such as complex financial and business applications, multiple file accounting systems and others). PEARL Level 3 will generate much or all of the program code needed to implement the application you have defined.

Features: PEARL Level 3 is menu-driven. Just define the application and PEARL Level 3 provides the software solution – in many cases, ready-to-use.

Our broad line of utility tools extends the capability of your Heath/Zenith computer system in many different ways. Each utility program includes a manual with complete documentation, and a master copy of the program. And with each program, you get famous Heath/Zenith support and technical consultation.

PEARL Level 3 can generate the following applications programs: Menu Selection, File Update and Edit, Report, Edit Control System Data, File Reorganization (using indexed files only) and a General Report Writer. These useful PEARL-generated programs will enable you to define and cross-index data elements between multiple files, within a single system.

Using PEARL Level 3's capabilities, you can define reports (using data from multiple files), extend the standard program menu and define the interrelationships between different data elements in different files. You can also post journal files to a master file, provide extended generation reports and supply multiple index keys for a file.

Software compatibility: Running under Heath/Zenith CP/M, PEARL Level 3 uses the CRUN2.COM program from C BASIC (p. 45).

Minimum hardware and software requirements: The PEARL Application Generator, Level 3, requires an H-8/H-19 computer system (with the HA-8-8 Extended Configuration Option) – or an H/Z-89 computer system – with 64K bytes of RAM and two high-capacity disk drives (use either the H/Z-37 or H/Z-47 Disk Systems). The Heath/Zenith CP/M Operating System (p. 44) and C BASIC (p. 45) are also required.

HCP-837-1, on soft-sectorized 5.25" floppy disk, Shpg. wt. 4 lbs. 649.00

HCP-847-1, on soft-sectorized 8" floppy disk, Shpg. wt. 4 lbs. 649.00

WordMaster provides the tools you need for program development – and more

Get the tools you need, without wasting memory space: WordMaster, Version 1.07, has what you need to develop programs – and more – without using most of your memory or disk space. It's only 20% as large as WordStar (without printer interface or formatting functions) – and much faster.

Structure: Video Mode speeds editing and reduces mistakes. It 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, scroll forward or backward through text, insert and delete characters, words and lines.

Command Mode allows you to do everything that you can do in Video Mode – but changes are displayed only on your command. It permits search, global replacements, text moves and other functions – as well as making available most of the familiar command and editing functions of CP/M's ED Text Editor. You can also combine and/or separate text from/to separate files on your disks. Insert Mode is used to enter original text, and for large insertions of text.

Enhancements include automatic disk I/O for files too large to edit in RAM, a scratchpad memory to move text and store command strings, the ability to read/write text to/from files other than the file being edited – facilitating use of source libraries (and splitting/merging files), nestable loops in command strings, pattern matching, 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: WordMaster requires an H-8/H-19 or H/Z-89 computer system with 48K bytes of RAM and one disk drive. The Heath/Zenith CP/M Operating System is also required.

HMP-817-5 (Requires Sublicense Grant on page 42), on hard-sectorized 5.25" disk, Shpg. wt. 4 lbs. 99.00

HMP-837-5 (Requires Sublicense Grant on page 42), on soft-sectorized 5.25" disk, Shpg. wt. 4 lbs. 99.00

HMP-847-5 (Requires Sublicense Grant on page 42), on soft-sectorized 8" disk, Shpg. wt. 4 lbs. 99.00

Source listings for selected Heath products

Complete Listings for Heath H-8-18 and H-88-18 Cassette Operating Software. Includes these source listings: H-8-52, H-8-53, H-8-54 and H-8-60. This package would cost \$100.00 if purchased separately.

HKS-50, Shpg. wt. 8 lbs. 65.00

Source Listing for Heath Disk Operating System (HOOS), 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

Make large sorting tasks faster and easier with the SuperSort Sort Utility Program

Makes sorting so simple, it's in a class by itself: SuperSort 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 fast rate of 560 records per minute.

Structure: Don't waste time and money translating your records for the computer. SuperSort accepts nearly 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 or variable length records and fields – and a different number of fields in each record.

You can specify up to 32 sorting criteria with SuperSort – such as between, not between, equal to, less than or greater than, and others.

Output capabilities: Keys-Only Output permits building an index to a file – extracting fields to print a summary, or rearranging (positional) fields to form a new data base. Record Number Output allows you to build multiple indices into a file, ordered on various keys, without duplicating the data – so another program can retrieve the records, using direct access by relative record number. Pointer Output provides another method of building indices, so 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: SuperSort requires an H-8/H-19 or H/Z-89 system with 48K bytes of RAM and one disk drive. The Heath/Zenith CP/M Operating System is also required.

HMP-817-1 (Requires Sublicense Grant on page 42), on hard-sectorized 5.25" disk, Shpg. wt. 4 lbs. 195.00

HMP-837-1 (Requires Sublicense Grant on page 42), on soft-sectorized 5.25" disk, Shpg. wt. 4 lbs. 195.00

HMP-847-1 (Requires Sublicense Grant on page 42), on soft-sectorized 8" disk, Shpg. wt. 4 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 listing for HOOS are available for a nominal charge, as described at above left.



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

UTILITY/APPLICATIONS PROGRAMS

These products add new capabilities to the Heath/Zenith CP/M Operating System (page 44). 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. 29, 30, 39)

Pencils, paper and a calculator have been replaced. The SuperCalc Electronic Spreadsheet Program 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.

Enhanced capabilities: "If," "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. Down in the lower right corner of your computer system's CRT 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.

Min. hardware, software requirements: An H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive and CP/M. A printer is required if printouts are desired.

HSC-817-1 (Requires Sublicense Grant on page 42), on hard-sectorized 5.25" floppy disk, Shpg. wt. 2 lbs. 295.00

HSC-837-1 (Requires Sublicense Grant on page 42), on soft-sectorized 5.25" floppy disk, Shpg. wt. 2 lbs. 295.00

HSC-847-1 (Requires Sublicense Grant on page 42), on soft-sectorized 8" floppy disk, Shpg. wt. 2 lbs. 295.00

Condor Data Base Management System simplifies information processing

NEW

- Develop data bases without a programmer's assistance
- Use for inventory control, accounting functions, personnel reporting and many other applications

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: Condor DBMS Level II offers 12 more commands than Level I, and a new built-in command line interpreter. Level II is upward compatible with Level I. All applications designed with Level I commands and data bases will work under Level II.

Condor is transaction processing-oriented – providing efficient transaction to a master data base with audit trail. Batch operation includes conditional execution, repetition, user-defined messages and restart capability. The DEFINE command permits creation of a new data base in minutes.

New, and powerful relational and set operations (JOIN, PROJECT, COMBINE) permit explicit manipulation of datasets (relations).

Built-in language: Condor's English-type language makes programming easier.

Hardware and software requirements: An H-8/HA-8-6 system or H/Z-89 with 64K RAM, two disk drives, Heath/Zenith CP/M and a printer.

HCD-8937-1, on soft-sectorized, double-density, double-sided 5.25" disk (requires H-37 Floppy Disk System), Shpg. wt. 4 lbs. 899.00

HCD-8947-1, on soft-sectorized 8" disk, Shpg. wt. 4 lbs. 899.00

Compatible MAC Macro-Assembler is advanced, easy-to-use

- Has Intel-compatible macro definitions
- Compatible with ASM Assembly Language
- Can generate a SID-compatible symbol table file for use in debugging

Commands: Many features are designed for the sophisticated Assembly programmer – such as additional conditional Assembly operators, title and page pseudo-operands, full Intel-compatible macro definitions (including recursive macro calls and disk macro libraries).

Materials included: The 168-page manual is practically a macro-assembler textbook. The diskette contains a variety of useful macro libraries for performing disk I/O, assembling Z-80 op codes and performing other useful tasks.

Min. hardware, software requirements: An H-8/H-19 or H/Z-89 with one disk drive and CP/M.

HDR-817-1 (Requires Sublicense Grant, p. 42), on hard-sectorized 5.25" disk, 2 lbs. 85.00

HDR-837-1 (Requires Sublicense Grant, p. 42), on soft-sectorized 5.25" disk, 2 lbs. 85.00

HDR-847-1 (Requires Sublicense Grant, p. 42), on 8" disk, 2 lbs. 85.00

DESPOOL Print Spooler provides simultaneous printer operation

- Allows you to perform two tasks, at the same time, on your computer
- Print one file while working on another file
- Quick to set-up, easy to use

Wait no more! Have you ever had work to finish – but had to wait, because your computer was sending a file to your printer? DESPOOL gives your system maximum efficiency – by allowing it to print one program while you continue to use the assembler, BASIC or an application program.

Easy to use: To use DESPOOL, just load into memory, type control-F, wait for the spooler prompt and type the file name. Your terminal will instantly return to the previous program, while sending the specified file to your printer.

Min. hardware, software requirements: An H-8/H-19 or H/Z-89 with 1 disk drive and CP/M.

HDR-817-3 (Requires Sublicense Grant, p. 42), on hard-sectorized 5.25" disk, 2 lbs. 50.00

HDR-837-3 (Requires Sublicense Grant, p. 42), on soft-sectorized 5.25" disk, 4 lbs. 50.00

HDR-847-3 (Requires Sublicense Grant, p. 42), on 8" disk, 2 lbs. 50.00

Upgrade the CP/M DDT Debugger with compatible SID/ZSID

- Get both 8080-compatible SID and Z-80-compatible ZSID in one package – save substantially over separate prices
- Allows easy program modification

Commands: Allows use of source-level names – instead of addresses – in dumping/modifying memory, setting breakpoints and patching with Assembly Language instead of numeric values.

SID/ZSID can also draw histograms of programs and subroutine execution frequencies, maintain pass counts and providing a trace-back of the execution path to selected breakpoints.

Software compatibility: SID/ZSID is fully functional in DDT-type mode without symbol file.

Min. hardware, software reqmts: An H-8/H-19 or H/Z-89 with one disk drive, CP/M and MAC (above), LINK-80 or D.R. Linkage Editor.

HDR-817-2 (Requires Sublicense Grant, p. 42), on hard-sectorized 5.25" disk, 2 lbs. 125.00

HDR-837-2 (Requires Sublicense Grant, p. 42), on soft-sectorized 5.25" disk, 4 lbs. 125.00

HDR-847-2 (Requires Sublicense Grant, p. 42), on soft-sectorized 8" disk, 2 lbs. 125.00





Peachtree system saves time, helps you manage effectively

Enhanced for increased capability, ease of installation, capacity and security in business transactions.
Programs include sample data for practicing, CP/M Operating System with Microsoft BASIC (where needed) and utilities to provide backup disks. These programs include an H-8/H-19 or H/Z-89 computer system with 64K RAM — as well as an H/Z-37, H/Z-47 or commercial Z-67 disk system.

To enjoy the full benefits of the Peachtree Series 5 Business Applications Software Programs offered by Heath/Zenith, 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 your new business accounting system, using these Peachtree applications programs.

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 system accounting period.

Features include sample data for training; interactive menu-driven programs; daily transaction processing and reporting; transaction deletions; master record protection; account status queries; generation of trial balances, balance sheets, income statements, departmental income statements; and end-of-period processing (which updates monthly/year-to-date accounts and readies system for the beginning of the new month).

HRS-837-1 (Requires Sublicense Grant, p. 42), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 4 lbs. 395.00

HRS-847-1 (Requires Sublicense Grant, p. 42), on soft-sectored 8" disk for H/Z-47 Floppy Disk System, 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

Operates with General Ledger System, or as stand-alone. Provides detail posting and automatic monthly journal entries. Maintains customer files — with data stored including account type, balance, tax rate and other information.

Opens item or forwards balance; consolidates for greater capacity; prints statements/invoicing (with sales or dun messages); checks credit limits; keeps tax records; has flexible open credit reconciliation; provides summary detail aging reports; automatically backs up files at end of month.

HRS-837-2 (Requires Sublicense Grant, p. 42), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 3 lbs. 395.00

HRS-847-2 (Requires Sublicense Grant, p. 42), on soft-sectored 8" disk for H/Z-47 Floppy Disk System, Shpg. wt. 4 lbs. 395.00

Compatible Accounts Payable Package

- Keeps track of both current and aged accounts payable
- Maintains separate records for each of your vendors
- Automatically pays vendors (on command), maintains register

Helps determine which vouchers to pay — automatically prints checks and a check register. Interfaces with General Ledger System, or stands alone.

Processes vouchers — selects vouchers for payment (by due/discount date, by specific user selection or within certain cash requirements). Processes payments, credits and adjustments. Reports cash requirements, open voucher reporting; and aging reports.

Includes sample data for training, interactive menu-driven programs, facilities for maintenance of vendor files and protection of master records.

HRS-837-3 (Requires Sublicense Grant, p. 42), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 4 lbs. 395.00

HRS-847-3 (Requires Sublicense Grant, p. 42), on soft-sectored 8" disk for H/Z-47 Floppy Disk System, Shpg. wt. 2 lbs. 395.00

Effectively manage your inventory

- Provides better control of merchandise on hand
- Allows more efficient operation, reduced inventory investment
- Improves customer service and response time

Keeps information on each inventory item — including part number, description, unit of measure, vendor and reorder data, activity, and complete information on current item costs/pricing/sales. Apply transactions at any time to insure accurate data. Features include departmentalizing of items; multiple pricing levels; comprehensive reporting (with eight different reports).

HRS-837-5 (Requires Sublicense Grant, p. 42), supplied on soft-sectored, double-density, double-sided 5.25-inch floppy diskette (to handle approximately 4,000 items), Shpg. wt. 3 lbs. 495.00

HRS-847-5 (Requires Sublicense Grant, p. 42), supplied on soft-sectored 8-inch floppy diskette for use with H/Z-47 Floppy Disk System (to handle approximately 5,800 items), 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

Interacts with General Ledger, Accounts Receivable and Inventory. Accommodates up to 36 different accounts; prints invoices; can update customer/inventory files during invoicing; mixes taxable and non-taxable items on an invoice; provides for credit sales; and maintains tax files.

Major reports of the Sales Invoicing System include invoice register, inventory activity, inventory backorder and sales activity reports.

Includes sample data for training and easy-to-follow, menu-driven programs.

HRS-837-6 (Requires Sublicense Grant, p. 42), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 3 lbs. 295.00

HRS-847-6 (Requires Sublicense Grant, p. 42), on soft-sectored 8" disk for H/Z-47 Floppy Disk System, 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 Peachtree CPA General Ledger System below

Do you own multiple rental properties (such as apartments, duplexes, homes and/or offices)? Do you want immediate on-line control of your holdings?

This system helps you keep track of properties, leases and renters — even multiple leases per renter (examples — apartment, garage and maintenance agreements). Generates action reports (upcoming move-ins, move-outs and lease expirations). Prints statements/invoices — and maintains accounts receivable, showing which renters have paid up to date — and which have not.

HRS-837-7 (Requires Sublicense Grant, p. 42), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 4 lbs. 995.00

HRS-847-7 (Requires Sublicense Grant, p. 42), on soft-sectored 8" disk for H/Z-47 Floppy Disk System, Shpg. wt. 4 lbs. 995.00

Multiple General Ledger System for CPAs, others

- Same features as Peachtree General Ledger System above — with added features which enhance its capabilities
- Keeps unlimited number of general ledgers (up to 3 per disk)

This work-saving system is designed for CPAs, service bureaus and businesses which perform large amounts of accounting work. It stores up to 2,000 accounts per ledger — and up to 9,000 accounts per ledger are allowed per month.

You can generate a wide range of financial reports faster and at a lower cost — by eliminating time-consuming data entry and recalculations by hand.

Has the useful features of General Ledger System (above, left) — plus cash flow reports, statements of changes in financial position and more added features.

HRS-837-8 (Requires Sublicense Grant, p. 42), on soft-sectored, double-density, double-sided 5.25" disk, Shpg. wt. 4 lbs. 995.00

HRS-847-8 (Requires Sublicense Grant, p. 42), on soft-sectored 8" disk for H/Z-47 Floppy Disk System, Shpg. wt. 5 lbs. 995.00

WordStar Word Processing Software features exceptional power, CP/M compatibility

The Micropro WordStar Word Processing System 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 made by WordStar 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.

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 41). 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

Mail/Merge Software adds mailing list and file merging 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,

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. 41).

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

Zenith Electronic Typing – our low-cost, easy-to-use word processing system

Control the cost of paperwork: 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, contained on a floppy disk, shows you how to use the system – 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.

Output capabilities: 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.

Materials provided: The complete Zenith Electronic Typing word processing software system includes a detailed set-up and operating manual, an easy-to-use self-instruction training disk and master disk.

Hardware and software requirements: Zenith Electronic Typing requires an H-8 Computer/H-19 Video Terminal system, or an H/Z-89 All-In-One Computer system – equipped with 48K bytes of Random Access Memory (RAM), one floppy disk drive and a printer. Any Heath-offered printer will work; we recommend the WH-54 Letter-Quality Printer (see page 41).

H-8-40, on hard-sectored 5.25" disk, Shpg. wt. 6 lbs. 195.00

Magic Wand Word Processing Software combines ease of use, versatility, 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 41.

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

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

HRS-847-9, on soft-sectored 8" disk, Shpg. wt. 3 lbs. 295.00



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.

Use our Full Screen Editor to program more efficiently. This efficient editor offers an easy and effective way to incorporate changes or improvements into a program or text material.

Features: 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 or copy single or multiple lines, and scrolling of text in the window.

Requires H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive and either HDOS or CP/M (as listed below).

SF-9000, on hard-sectored 5.25" disk for HDOS, Postpaid 50.00
SF-9100, on hard-sectored 5.25" disk for CP/M, Postpaid 50.00

Use the SOFTSTUFF Text Formatter with your Text Editor.

Features: Performs error-less 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 48K RAM, one disk drive and either HDOS or CP/M (as listed below).

SF-9001, on hard-sectored 5.25" disk for HDOS, Postpaid 55.00
SF-9101, on hard-sectored 5.25" disk for CP/M, Postpaid 55.00

Keep your books up-to-date with SOFTSTUFF's General Ledger II Small Business Accounting Software Package.

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.

Listings and sample printouts are included.

Software compatibility: Compatible with the **SOFTSTUFF** Small Business Inventory Programs and the Mailpro Mailing List Program.

Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, HDOS or CP/M (as listed below) and Microsoft BASIC Interpreter (p. 45).

SF-9004, on hard-sectored 5.25" disk for HDOS, Postpaid 125.00
SF-9104, on hard-sectored 5.25" disk for CP/M, Postpaid 125.00

General Ledger Software Manual. Purchase price of manual refunded when complete General Ledger system is purchased.

595-2500, Postpaid 15.00

Keep track with our Small Business Inventory package. Designed to facilitate a complete analysis of a business' inventory, in any form.

Features: Accepts alpha-numeric part numbers up to 12 characters long; descriptions of individual parts can be as long as 18 characters. Can 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 part number/description/price and reorder list.

Software compatibility: Compatible with **SOFTSTUFF** General Ledger and Mailpro Mailing List Program (both on this page).

Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, HDOS or CP/M (as listed below) and Microsoft BASIC Interpreter (p. 45).

SF-9005, on hard-sectored 5.25" disk for HDOS, Postpaid 90.00
SF-9105, on hard-sectored 5.25" disk for CP/M, Postpaid 90.00

Mailpro 127.1 Mailing List Software Package. For use as a mailing list system, although most any information may be sorted and retrieved.

Features: Menu-driven, so it's not necessary to remember complicated sets of instructions. Random Access Files permit you to add, change or delete any name or address without having to read the entire file. User-selected fields let you decide the number of discrete items (up to 12), names and lengths of fields (256 characters per person) that you wish to record. Sort and retrieve on any field – such as by name, address, Zip Code, or others. Pattern rows, columns, labels or field data on the printout – anywhere you specify.

Selective printing lets you print all names and addresses on the mailing list or only selected ones, which may be sorted on any field before printing. Error trapping routines catch common errors.

Min. hdwe., software reqmts.: An H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, either HDOS or CP/M (as listed below) and the Microsoft BASIC Interpreter (page 45).

SF-9009, on hard-sectored 5.25" disk for HDOS, Postpaid 40.00
NEW! SF-9109, on hard-sectored 5.25" disk for CP/M, Postpaid 40.00

Roots-89 Ancestral Genealogy Software helps you track your roots. It can store, retrieve and display thousands of facts about your family.

Features: Records data on all members of your family, displays and prints family group sheets and pedigree charts, computes relationships and shows important anniversaries for each day of the year. Includes 100-page illustrated course in genealogy and operation of the package.

Min. hdwe., software reqmts.: An H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive and either HDOS or CP/M (as listed below).

SF-9008, on hard-sectored 5.25" disk for HDOS, Postpaid 125.00
NEW! SF-9108, on hard-sectored 5.25" disk for CP/M, Postpaid 125.00

Our unique HDOS-CP/M File Converter effectively doubles the information-handling ability of your computer.

Features: This file conversion utility lets you translate HDOS files to CP/M files – and vice versa.

Min. hdwe., software reqmts.: An H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive and both HDOS and CP/M.

SF-8512, on hard-sectored 5.25" disk, Postpaid 30.00

Sharpen your chess-playing skills by taking on Mychess. This computer chess game will provide hours of challenging competition. Winner at the 1980 West Coast Computer Faire, Mychess consistently beats Sargon.

Features: Play Mychess at nine skill levels; variable skill levels are obtained by altering the number of half-moves the program looks ahead to. Play games from the beginning, white or black (with full graphics), or set up a position and proceed. The program allows you to switch sides with the computer at any time – and record all moves on a printer.

Min. hdwe., software reqmts.: An H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and either HDOS or CP/M (as listed below).

SF-9010, on hard-sectored 5.25" disk for HDOS, Postpaid 40.00
SF-9110, on hard-sectored 5.25" disk for CP/M, Postpaid 40.00

SOFTSTUFF's Air Traffic Controller Game never goes on strike! This realistic game tests your confidence and decision-making ability.

Features: You control all air traffic around your own airport – with planes taking off, in the air and landing. "Radar" screen maps planes along air lanes, and game length is adjustable for added challenge. Safety rules and operator intelligence will ensure a safe and thrilling flight.

Min. hdwe., software reqmts.: An H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive and either HDOS or CP/M (as listed below).

SF-9014, on hard-sectored 5.25" disk for HDOS, Postpaid 30.00
SF-9114, on hard-sectored 5.25" disk for CP/M, Postpaid 30.00



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

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
charg-a-kit**
VISA
MasterCard
- 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,
mailed 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,
NM, NV, OR, TX, UT,
WA, WY. Zone C covers: HI (Honolulu).
Zone D covers: AK (Anchorage).

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 49.97 48.42

41 4.91 5.95 7.37 8.92 11.19 13.61 16.38 41.22 51.15 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 55.40 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 8.60 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 12 15 18 25 30 37 47 57 1.17 1.13

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 weight, have been adjusted to provide correct postage.

Zip Code Prefixes	Zone										
006-009	8	260-261	3	363-369	5	478-477	4	598-599	7	820-822	5
010-069	5	262-278	4	370-385	4	478	2	600-620	2	823-826	5
070-089	4	279	5	387	5	479-489	2	610-619	2	827	5
090-099	5	280-283	4	388	4	480-491	1	820-822	2	828-832	5
		284-285	5	389-397	5	492	2	624-628	4	833	7
100-108	5	286-293	4	398	4	493-495	3	629-648	3	834-838	6
109	4	294-295	5	400-406	3	496-499	3	669-679	5	840-847	6
110-119	5	296-297	4	407-409	4	500-502	4	680-687	4	850-864	7
120-123	5	298-299	5	410-412	3	500-518	3	779-789	6	895-894	6
124-126	4	413-422	4	520-524	4	520-524	3	790-792	5	935-960	8
127-128	4	300-303	5	525-532	5	525-532	3	793-799	6	945-955	7
129	5	304	4	424-426	4	526-528	3	723-727	4	890-898	7
130-152	4	305-307	4	427-432	3	530-534	2	728-758	5	900-921	8
153	3	308-329	5	433-435	2	535-539	3	769	6	922-928	7
154-160	4	330-334	6	437-457	3	540	4	770-778	5	930-934	8
161	3	335-338	5	458	2	541-546	3	779-789	6	935-945	7
162-163	4	339	6	460-462	3	547-548	4	790-792	5	935-960	8
164-185	3	340	6	463-465	2	549	3	793-799	6	945-960	7
166-199	4	350-352	4	465-466	5	555-566	5	800-803	5	977-979	8
		353-354	5	466-469	4	567-572	4	804-805	6	980-987	6
200-232	4	355-359	4	470-472	5	570-572	4	805-807	5	985-994	7
233-237	5	360-361	5	473	5	572-588	6	808-816	6	995-999	6
238-259	4	362	4	474-475	3	590-597	6				

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: Operating Systems, Languages, Utilities	616-982-3860
Applications Programs	616-982-3884
8 AM-Noon and 1-4:30 PM, 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 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.

- 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.
 - 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.

- 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.
- After the creditor has been notified, neither the creditor nor an attorney nor a collection agency



The President's Corner

Dear Friend,

We've experienced an exciting year together — with scores of exciting new products introduced to the Heathkit line in 1981:

In the microcomputer field, we listened to you — and developed the hardware and software products you wanted. We've increased the Random Access Memory capacity of both the H-8 and H/Z-89 to 64K bytes. You asked for additional mass data storage capacity. And we responded with two new high-capacity mass storage products — the H/Z-37 Floppy Disk System (p. 31, 39) and the commercial Z-67 Winchester Disk System (p. 40). Our mass data storage capacity has increased more than 40-fold, from 300K bytes to 12.16 megabytes.

Over 40 new software programs were introduced in the past year — including Peachtree Series 5 Business Applications Programs, two more word processors and others. So many, in fact, that we've put them all in our new, complete Software Catalog. To find out how to obtain a copy, see page 44.

Reaching into new areas for Heath during 1981, we developed an energy-saving Solar Water Heater, and a money-saving Earth Station which opens up an entirely new form of entertainment to the kitbuilder.

Four major new Heathkit products debut in this catalog: the IO-3220 Portable 20 Hz Oscilloscope (p. 10), the IM-2260 Portable Digital Multimeter (p. 14), the AA-1205 Integrated Amplifier and the AJ-1200 AM/FM Tuner (both on p. 93).

We look forward to meeting your computer, electronic and energy needs in 1982.
Sincerely yours,

William F. Johnson

*Units of Veritechology Electronics Corporation

President, Heath Company

FREE New Heath Craft Woodworks Catalog

Now with many new kits, Name _____
all easy to build and priced
to save you money. For your
free copy, write:

Heath Co., Dept. 404-856,
Benton Harbor, MI 49022
City _____ State _____
Zip _____

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.

- 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.
- 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.
- 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.
- If you have a problem with property or services purchased with a credit card, you may have the right not to pay the remaining amount due on them, if you first try in good faith to return them or give the merchant a chance to correct the problem. There are two limitations on this right:
 - You must have bought them in your home state or if not within your home state within 100 miles of your current mailing address; and
 - The purchase price must have been more than \$50.

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

NEW

CP/M Course makes the industry standard operating system easy to use



- Use with an H-8 or H/Z-89 — or with any 8080 or Z-80 microcomputer which runs CP/M
- Covers CP/M 2.2 and earlier versions, teaching both built-in and transient commands
- Audio-tutorial teaching method reinforces important concepts before they are forgotten
- Hands-on computer exercises give you experience, using this versatile operating system

Now first-time computer users can learn how to use CP/M, the industry standard microcomputer operating system. This Heathkit/Zenith self-instruction course covers all aspects of the CP/M Operating System.

No previous background in CP/M is necessary to take this Heathkit/Zenith educational course, and knowledge of Assembly Language is not required.

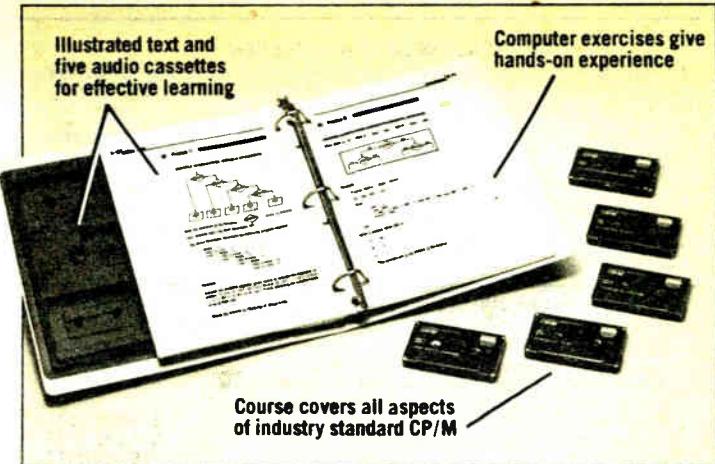
The 500-page self-instruction text and five audio cassettes cover CP/M 2.2 and earlier versions, including built-in and transient commands, in ten units:

Unit 1 is an Introduction to the CP/M Operating System. **Typing CP/M Commands**, Unit 2, covers writing basic CP/M commands — using CP/M's major control functions — and diagnosing causes for errors from CP/M error messages. **Built-In Commands** of the Console Command Processor (CCP), are discussed in **Unit 3**. **CP/M's Transient Programs** are covered in **Unit 4**. **Unit 5** teaches you how to use the **STAT** and **CONFIGUR** Commands.

Unit 6, Using PIP shows you how to transfer files from one disk to another. **Unit 7** is an Introduction to ED, CP/M's text editor. **Unit 8, Editing Existing Files**, shows you how to use ED to change current files. **Advanced ED Functions**, including the creation and use of combined commands, macros and libraries, are discussed in **Unit 9**. **Unit 10, Submitting Command Files**, covers the use of CP/M's XSUB and SUBMIT commands.

This course's effective audio-tutorial teaching method is like having a tutor in your home — the text presents the basic concepts, and the narrator expands upon the facts. And to assure greater comprehension and retention, each unit has self-test reviews.

Hands-on computer exercises reinforce concepts taught in the text, and give you



valuable experience with CP/M.

Upon completion, you'll know how to get the most from the CP/M Operating System. You'll also be able to operate CP/M-based applications programs, and use the CP/M editor to create and manipulate text files.

This course is designed for use with an H-8/H-19 or H/Z-89 system with 48K bytes of RAM and the Heath/Zenith CP/M Operating System. It can also be used with any 8080, 8086 or Z-80-based microcomputer which runs CP/M. To get full benefit from the course, we recommend the use of a printer.

Earn 2.5 Continuing Education Units (CEUs) and a Certificate of Achievement — pass the optional final examination with a 70 percent or better score.

EC-1120, Shpg. wt. 6 lbs.

99.95

MONEY-BACK GUARANTEE: If you're not satisfied with any Heathkit/Zenith Educational Systems course, return the course materials and your proof of purchase for a refund of the purchase price.

Learn COBOL, the business computer language



- Field-proven, audio-tutorial techniques make learning COBOL Language easier than before
- Practice programs provide hands-on experience

COBOL Language is used in accounting functions, inventory control and other business applications — because it's more efficient than BASIC Language in manipulating large, structural data files — and offers greater productivity than Assembly Language.

Learn the language of business computers — COBOL — with this Heathkit/Zenith course. 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 this course.

The Heathkit/Zenith COBOL Programming Course uses the effective audio-tutorial learning method. You get a clearly written self-instruction text full of diagrams, tables, illustrative programs and unit tests.

A set of nine audio cassettes complements the text, allowing you both to see and hear each concept as it is presented.

The course 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 much more.

A set of six practice COBOL programs is included 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.

Learn the programming language that thousands of businesses use world-wide. Order the effective Heathkit/Zenith COBOL Programming Course today. To get the most benefit from this course, we recommend an H-8 Computer/H-19 Video Terminal system — or an H/Z-89 Computer system — equipped with two floppy disk drives, CP/M and the Microsoft COBOL Programming System.

Earn 3.0 Continuing Education Units (CEUs) and a Certificate of Achievement — pass the optional final examination with a 70% or better score.

EC-1105, Shpg. wt. 7 lbs. 149.95

Learn to program in popular BASIC Language



- BASIC is an easy-to-use computer language
- Heathkit/Zenith makes BASIC easy to learn with this effective self-instruction course
- Programming experiments reinforce concepts
- Use with any BASIC-programmable computer

Learn to write programs in popular BASIC Language, with this effective course. It covers many versions, formats, commands, statements and procedures of BASIC — plus special problem-solving tips you can use while writing your own programs.

This Heathkit/Zenith 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 in 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 text, 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.

When you complete this course, you'll be able to write BASIC Language programs that instruct a computer to perform specific directed tasks.

Earn 3 CEUs — pass the optional final exam with a 70% or better score.

See the classroom version of this Heathkit/Zenith course on page 82.

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

College-Level Examination. See page 71 for more information.

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



Microsoft BASIC Programming Course teaches how to write powerful, effective programs



- Learn to write and modify computer programs, using this popular version of BASIC
- Audio-tutorial course uses experiments to give you hands-on programming experience

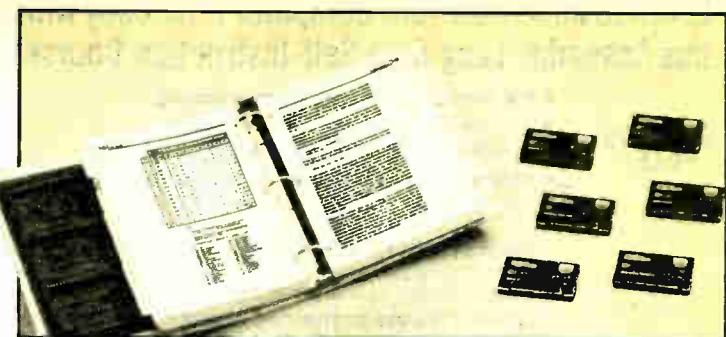
Microsoft BASIC is one of the most versatile languages available for microcomputers. If you use MBASIC on your H-8, H/Z-89, TRS-80 or Apple computer, this 800-page course will show you how to get the most from this language.

The 12-unit course covers every aspect of Microsoft BASIC programming:

Unit 1 is an Introduction to Computers and Programming – covering computers, programs, data, the computer system and programming languages. **Immediate Mode**, **Unit 2**, discusses arithmetic in BASIC, numeric variables, intrinsic functions and strings. Sequences, branching and loops are covered in **Unit 3**. **Program Structures**, **Unit 4** has More about Decisions and Loops – including relational operators, counter-driven loops and nested loops.

Data Structures – including one-dimensional arrays, N-dimensional loops and strings records – are taught in **Unit 5**. User-defined functions and subroutines are covered in **Unit 6**, **Subprograms**. **Unit 7** discusses **Complex Structures** – such as logical operators, multiple branching and structured programming.

The last five units cover operations and extensions available on disk versions of MBASIC. **Major Language Extensions**, **Unit 8**, teaches program editing; data type extensions; extended functions, operators and statements. **Sequential Disk Operations**, **Unit 9**, covers program storage, program retrieval and sequential data files. **Unit 10**, **Random Access Disk Operation**, covers random access buffers and fields – as well as storage and retrieval of numeric data. **Error Trapping** and



Memory Conservation are the topics of **Unit 11**. **Optimization and Machine Interfacing** are covered in the final unit.

This audio-tutorial course utilizes a specially-written text and three audio cassettes, which work together for effective learning and greater retention. Experiments provide extensive hands-on programming practice.

Self-test reviews let you check progress at specified points in the course.

The features of the **Microsoft BASIC Interpreter** (described on page 45) are included, except for the TRON/TROFF debugging utility.

Upon completion, you will be able to write MBASIC programs that instruct a computer to perform specific tasks (sorting, organizing and more).

For full benefit from the course, you must have access to a computer.

To earn 5 CEUs, pass the optional final exam with a 70% or better score.

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

Learn to program in Pascal Language



- Pascal is the ideal language for both beginning and experienced program writers
- Our audio-tutorial format shows you how to program in this powerful, modular language

If you've been around programming languages – or even if you're new to computers – you can learn how to write programs in popular Pascal Language.

The 11-unit self-instruction text completely covers Pascal:

The introduction shows how to identify and write simple Pascal programs, Unit 2 covers identifying and writing **Self-Contained Procedures**. Unit 3, **Making Decisions**, teaches how and when to incorporate IF...THEN...ELSE and CASE statements in Pascal programs, and how to use Boolean variables. Unit 4 covers REPEAT...UNTIL, WHILE...DO and FOR loops.

Unit 5 discusses **Pascal Data Types** and teaches you how to declare your own data types. Unit 6, **Arrays and Character Strings**, shows how to use arrays in solving problems. **More About Procedures**, Unit 7, covers the writing of complete Pascal procedures to perform desired tasks. **Records and Sets** are covered in **Unit 8**, **Unit 9**, **Pointers**, covers the difference between pointers, linked lists, stacks, queues, binary trees and statements. The last unit covers **sequential files and standard Pascal files**, showing how to store Pascal data files on floppy diskettes.

This effective audio-tutorial course uses a professionally-written, 500-page self-instruction text and audio cassettes, working together for an integrated, effective learning experience.

When you complete this course, you'll be able to write modular Pascal programs that instruct a computer to perform specific directed tasks.

Earn 4 CEUs – pass the optional final exam with a 70% or better score.

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

FORTRAN Course teaches science/math language



- Interested in FORTRAN programming? Learn the economical, effective Heathkit/Zenith way
- Audio-tutorial presentation, hands-on programming experiments reinforce learning three ways

FORTRAN Language simplifies complicated scientific and mathematical problem-solving. Using this Heathkit/Zenith course, you'll learn FORTRAN programming fundamentals.

The 11-unit text includes a special **Introduction to Computers**, **Unit 1**, **Getting Started**, shows you how to analyze a FORTRAN program, introduce you to statement types, elements and the character set. **Unit 2** covers **Arithmetic Operations**. **Elementary Input/Output (I/O)** is discussed in **Unit 3**. **Unit 4** covers **Library Functions**. **Other Control Statements** are taught in **Unit 5**. **Unit 6** introduces you to **Arrays**. **Programming Practices** are taught in **Unit 7**. **Unit 8** teaches other **Variables**. **Unit 9** teaches **Advanced Input/Output (I/O)**. **Unit 10** covers **Subprograms**. **Special Input/Output (I/O)** is discussed in **Unit 11**.

This course uses the effective audio-tutorial teaching method, with a 500-page text and six cassettes working together to provide more complete learning.

Interactive hands-on experiments give you actual experience in writing FORTRAN programs – coding forms are included. The text also offers extensive practice in writing FORTRAN programs and using the character set. Self-test reviews let you check your progress at specified points throughout the course.

When you complete this course, you'll be able to write FORTRAN programs that instruct a computer to perform specific tasks.

To get the most from the course, we recommend an H-8 or H/Z-89 with 48K RAM and two disk drives. HDOS or Heath/Zenith CP/M (see page 44) and the Microsoft FORTRAN Programming System (page 45) are also recommended.

Earn 5 CEUs – pass the optional final exam with a 70% or better score.

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

Computer Dictionary is a complete reference source of computer terms

Need a dictionary to understand computer terms? Here's a handy reference book for hobbyists, technicians, engineers, programmers and other professionals who deal with computer-related terms. The EB-1020 Computer Dictionary, from Heathkit/Zenith Educational Systems, is a complete sourcebook of computer terms.

Thousands of definitions: This dictionary contains thousands of com-

puter-related words and phrases, along with complete definitions. Definitions are made clear and explicit throughout the text.

Full of information: Browse through this dictionary and you can learn significant details about the products, procedures, problems and proliferating applications of the microcomputer revolution.

EB-1020, Shpg. wt. 2 lbs. 14.95



Learn to maximize your computer efficiency with this Assembly Language Self-Instruction Course

\$49.95

- Self-instruction format for effective learning
- Programming exercises reinforce concepts
- Do more in less memory space than BASIC Language
- 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.

Objective: When you complete this unique self-instruction course, you'll be able to program your computer in Assembly Language.

Content: You'll learn flowcharting, device polling, code conversions, masking, subroutines, 8080 instruction set, I/O routines, multi-precision math and more.

Teaching method: The Assembly Language Course's programmed-instruction text and workbook work together, reinforcing textbook learning with interesting visual illustrations and hands-on programming experience.

Learning aids: The workbook provides hands-on experience in Assembly Language programming. It has programming experiments you can perform on your computer.

In addition to the workbook experiments, the course includes a special

"Computer Concepts" aids business decisions

\$49.95

- 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.

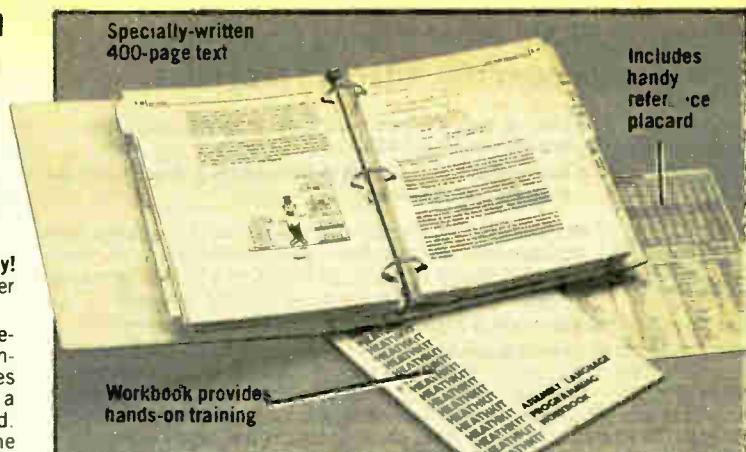
The course is divided into four concise, easy-to-understand units — which present computer concepts in business terms. **Unit 1 — The Computer and How It Works** — covers different types of memory, input/output devices, capabilities of different types of storage media and applications software. It explains 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



Reference Card which lists all 244 Assembly Language instructions — as well as a complete ASCII code chart.

Hardware compatibility: The Heathkit/Zenith Assembly Language Course is specifically designed for 8080/8085-based microcomputers 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 Data Systems Z-89 Microcomputers. (The H-88, H-89 and Z-89 Microcomputers use the 8080 subset of the Z-80 microprocessor.)

Hardware recommendations: 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).

Credit: Earn 6.0 Continuous Education Units (CEUs) and a Certificate of Achievement from Heathkit/Zenith Educational Systems — Pass the optional final examination with a 70 percent or higher score.

Now is the time to learn the computer language that puts you in command of your computer's full potential. Start the effective Heathkit/Zenith Assembly Language Self-Instruction Course today.

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

Microcomputing Course explains computers

\$39.95

- 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 Microcomputing 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 Microcomputing 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





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.

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

\$39.95

- 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 RE-FUND 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

Build up your code speed with this handy kit

\$14.95



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 5/8" H x 4 1/8" W x 4 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
\$9.95**

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

\$49.95

- 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 4, 54-56, 71-82 and 90.



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

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

\$339⁹⁵

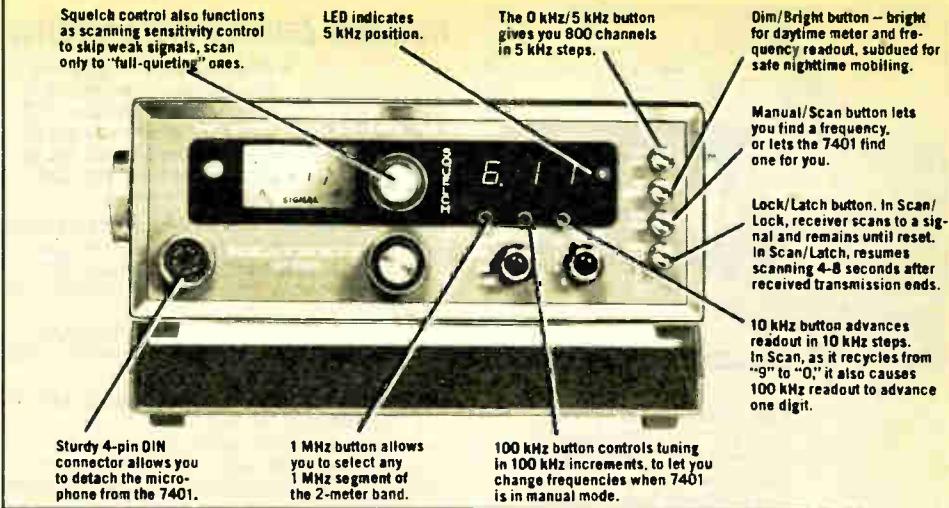
with
PTT mike

- 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 65), draws power directly from the VF-7401. Includes gimbal-mount bracket for mobile installation. Requires a 13.8 VDC, 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



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 <0° (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: \pm 0.015%. 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 1/4" 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 1/4" H x 7 1/4" W x 9 1/4" 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 \pm 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 1/4" H x 3 9/16" W x 1 7/8" D.

Kit VF-2031, Shpg. wt. 1 lb. 199.95

VFA-2031-2, Fitted Holster-style Carrying Case, Shpg. wt. 1 lb. 18.95

VFA-2031-4, Crystal Certificates (Specify frequency, return to mfr. – crystal returned postpaid; order one for each crystal needed), Postpaid 6.95

VFA-2031-3, Auto-Patch Encoder to make phone calls through repeaters with auto-patch inputs, Shpg. wt. 1 lb. 24.95

VFA-2031-5, Continuous Tone Encoder to access most repeaters using your VF-2031, Shpg. wt. 1 lb. 14.95

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

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



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

\$274.95

- 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 6.25" H x 13.5" W x 12.25" D. Alignment requires only an exciter such as the VF-7401, and a wattmeter that reads forward and reflected power, like the HM-2141 on page 67. 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

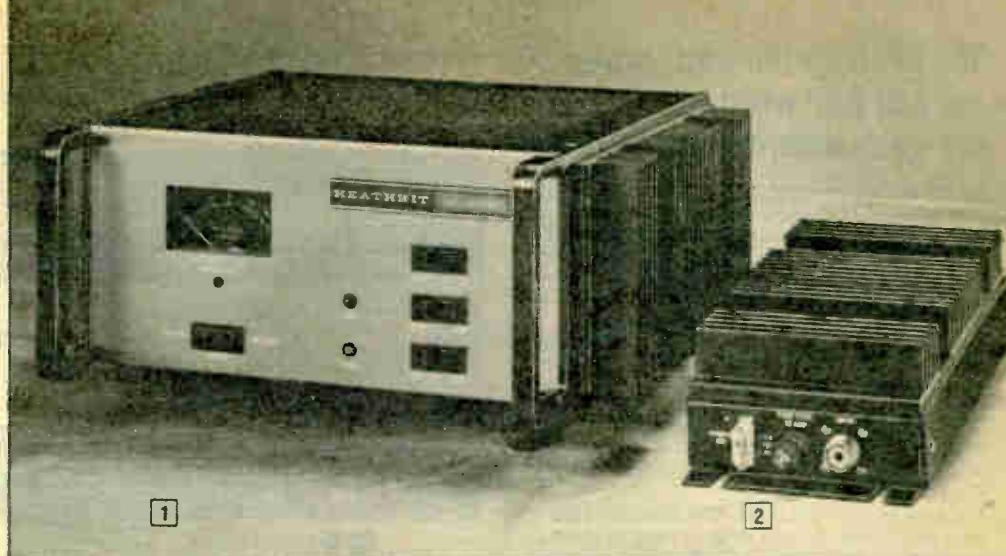
\$57.95



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: 6.25" H x 13.5" W x 12.25" D.

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

\$137.95

- 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-

AC Supply for your 2-Meter transceiver/amp combo

\$79.95



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. 5 11/16" H x 6 3/16" W x 11" D. As with all our kits, this one even includes solder.

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

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. Input/Output Impedance: 50Ω. Input VSWR: (@ 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: 13.6 VDC (operates 11.5 to 16 VDC) @ 11 amperes. Dimensions: 2 1/2" H x 4 3/4" W x 10 1/2" D (6.3 x 11.8 x 26.7 cm).

10-Watt Amplifier gives your hand-held clout!

\$42.95



The HA-201A 2-Meter Amp will get your favorite repeater full-quieting every time, delivering up to 10 watts for a mere 1 1/2-watt in. Or 8 watts out for just 1-watt in. Great with the VF-2031, p. 58. 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. 2 3/4" H x 5 5/8" W x 5 1/8" D.

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



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

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 Blanker. 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 Blanker, 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). SS8: 100 watts PEP ± 1 dB; CW: 100 watts ± 1 dB. Low Power SS8: 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 blanker. **Image Rejection:** -60 dB min. **Dimensions:** $5\frac{1}{4}''$ H \times $14\frac{1}{2}''$ W \times $13\frac{1}{4}''$ 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. $7\frac{1}{4}''$ H \times $10\frac{1}{8}''$ W \times $14''$ 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 \times $10\frac{1}{8}''$ W \times $15\frac{1}{4}''$ 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 \times $10\frac{1}{8}''$ W \times $15\frac{1}{4}''$ 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 \times $10\frac{1}{8}''$ W \times $15\frac{1}{4}''$ 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 65 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 Ω 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 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 $\frac{5}{8}$ " H x 14 $\frac{1}{8}$ " W x 13 $\frac{3}{8}$ " 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 $\frac{3}{4}$ " 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 $\frac{3}{4}$ " 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

\$164.95

- 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.

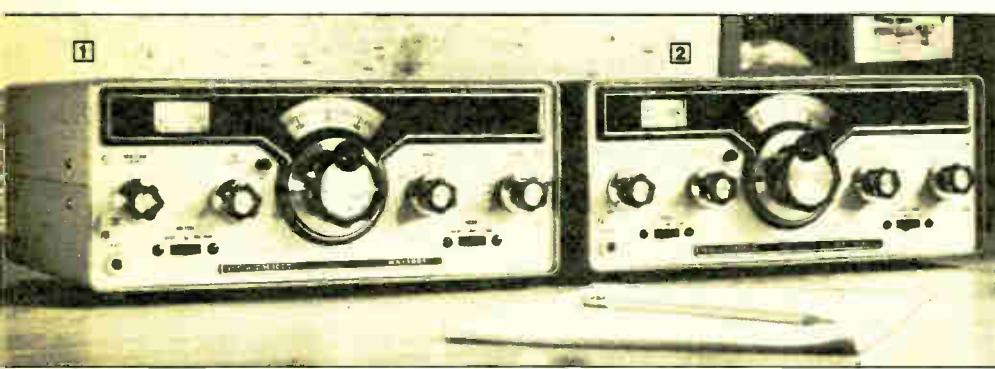
The HW-8 is an easy and enjoyable kit to build, too, with most parts mounting on a single printed circuit board. There's a minimum of point-to-point wiring. And, of course, the thorough Heathkit assembly manual guides you every step of the way. The manual for the HW-8, incidentally, even includes hints 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 Superex 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
GD-396, Superex 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. 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), 7.7-25 MHz (40 meters); 14-14.25 MHz (20 meters); 21-21.25 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 $\frac{1}{4}$ " H x 9 $\frac{1}{4}$ " 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

\$199.95

- 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 61. 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

\$224.95

- 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 $\frac{1}{4}$ " 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





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' 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 required: 100 W. Duty cycle: SSB, continuous voice modulation; CW, continuous (max. key-down time 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 Inv. 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 1/8" 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, 3' RG8/U Jumper with PL-259 Connectors, Shpg. 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 Ω unbalanced; variable pi-output circuit. SWR not to exceed 2:1. Input impedance: 52 Ω 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 1/4" H x 14 1/8" W x 13 1/8" D.



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

AMATEUR RADIO/63

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

\$254.95

- 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 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{1}{8}$ " 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' 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 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{1}{8}$ " 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

\$154.95

- 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

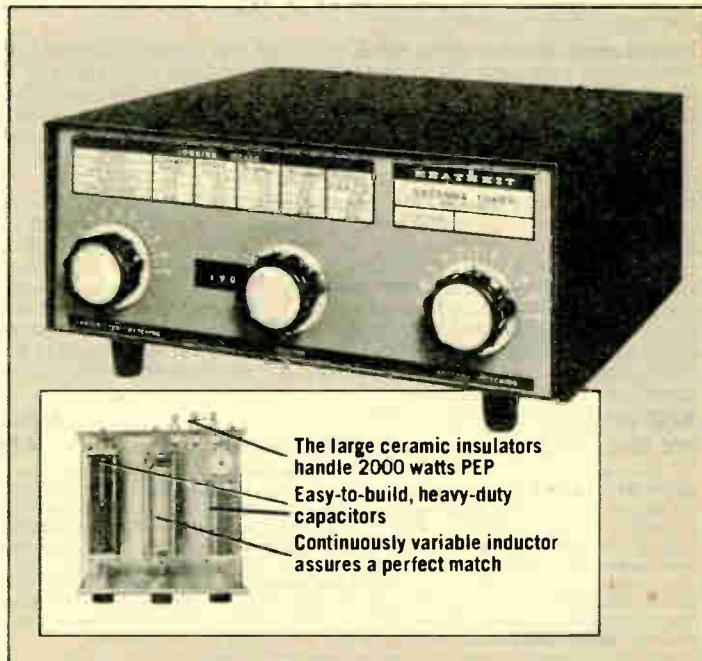
Frustrated by a dipole that lacks sufficient bandwidth? Stymied by an antenna that only covers one or two bands? Then the SA-2040 Antenna Tuner is the one for you. With a continuously variable inductor to give you a perfect match every time — 80 through 10 meters — the SA-2040 can be used for MARS operation 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 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{1}{8}$ " D.

Kit SA-2040, Shpg. wt. 15 lbs. 154.95

HDZ-63-3, 3' 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. Overall Cabinet Dimensions: 5 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{1}{8}$ " 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

Cut annoying background noise with improved, lower-priced Cardioid Desk Mike

**Directional
pattern cuts
noise level**

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. Also has switch-selectable VOX or PTT. 6' cord. Beige Cycolac case measures 7.43" H x 4.34" W x 5.84" D.

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



1 Autopatch with Micoder™ II

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 to access repeaters, make phone calls. Includes 6' coiled cord, hanger clip. Uses 9 VDC cell (not included). 3.75" H x 2.63" W x 1.75" 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. Excellent VSWRs of less than 1.5:1 up to 300 MHz, and less than 2:1 up to 400 MHz. 50 ohms impedance. Oil-filled (oil not included).

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

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

3 Instant power at your fingertips

Provides extra 120 VAC outlets for your station, workshop, basement, garage. Max. load, 10 Amps. Has 11 switched three-hole outlets for killing power to equipment, 1 unswitched for clock or memory preservation. Includes fuse holder, fuse, 12' cord. For 120 VAC, 60 Hz power.

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

4 Phone Patch adds versatility

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 ohm speakers, hi-Z or 600-ohm inputs. PTT operation. 2.63" H x 9.25" W x 3.63" D.

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

5 Yagi Beam gives 2-Meter reach

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. Boom length, 144", longest element, 40", turning radius, 72". Assembly required.

HDP-1470, Shpg. wt. 6 lbs. 39.95

6 Cushcraft ATV-5 for DX reach

A vertically-polarized, omni-directional antenna designed to provide complete CW and SSB coverage from 80-10 meters. SWR is 1.5:1 or less at

resonance. Use with any transmitter or transceiver using 50-ohm output. Full legal power. Built-in coax connector takes PL-259. Assembly required.

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

7 Dual-Speed Rotator for beams

Couple the Alliance HD73 with your beam to achieve real DX success. For antenna with up to 10.7 sq. ft. wind load area. For 1 3/8-2 1/2" OD masts. 120 VAC, 60 Hz. Uses 6-conductor or 8-conductor 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

8 Coax Switch changes antennas

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

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

9 "W2AU" Balun gives better match

Reduces TVI, balances antenna current distribution for maximum gain. Protects equipment from lightning. Use with dipole, vees, quads, yagis. Impedance ratio of 1:1. Rated for full legal power.

HDP-3615, Assembled, 1 lb. 17.95

10 Low-Pass Filter reduces TVI

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

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

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

11 Change antennas in seconds with the SA-1480 Remote Coax Switch

Saves money – replaces five expensive coax feed lines with just one. LED shows which antenna is connected. Accepts signals to 150 MHz, rated for full power. 50-70 ohm impedance. Includes U-bolt mounting assy. Control Box, 3.38" H x 5.18" W x 5.25" D; Remote, 8.25" H x 4.63" W x 7.5" 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

Low-loss Zenith Coax Cables

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

HDZ-63-10, 100' w/PL259 conn., 10 lbs. 29.95



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

The Heathkit SA-5010 μMatic™ Memory Keyer — best buy of its type in ham radio — has features so unique we've applied for a patent!



FAST, EASY
2-EVENING KIT

\$97.95

The Hams at Heath proudly present the exciting SA-5010 μMatic (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 μMatic Keyer — made possible by the use of a custom microprocessor. It 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 the use of command strings — which 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 those messages. This unique feature makes the SA-5010 so versatile that we've applied for a patent on it.

A special editing feature of the SA-5010 allows you to easily recover from any errors you make when loading a message buffer.

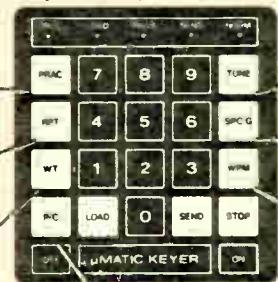
Use the SA-5010's thin, 20-position keypad to select character formation speed,

The μMatic 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



"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 μMatic 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 μMatic 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 μMatic 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 1/8" H x 4 1/8" W x 6 D (4.13 x 10.48 x 15.24 cm).





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

\$89.95

- $\pm 5\%$ 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



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

\$89.95

- 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: $4\frac{1}{8}$ " H x $7\frac{1}{2}$ " W x $6\frac{3}{8}$ " D.

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: $4\frac{1}{8}$ " 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 $7\frac{1}{2}$ " 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 $150 \mu\text{A}$ 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 $2\frac{1}{8}$ " W x $5\frac{1}{8}$ " L. The manual includes section on operation.

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



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

AMATEUR RADIO / 67

Listen to broadcasts from around the world – build this low-priced 4-Band Shortwave Receiver

- Lets you cover 550 kHz through 30 MHz in four bands
- Built-in AM antenna; connection for external antenna
- Built-in speaker plus headphone/external speaker jack
- The perfect, practical introduction to kit building

If you're looking for a great first-time electronic kit – or simply a low-priced shortwave receiver – the Heathkit SW-717 is your best buy. From the moment you tighten the final screw and turn this amazing 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 and domestic broadcasts from all over the planet – amateur CW (Morse Code) and SSB (single sideband) transmissions, CB radio, local and marine weather reports, ships at sea, plus the standard AM nationwide broadcast band.

This attractive receiver is loaded with features that will help you snare the rare DX (distant) stations – 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 an external speaker or headphones.

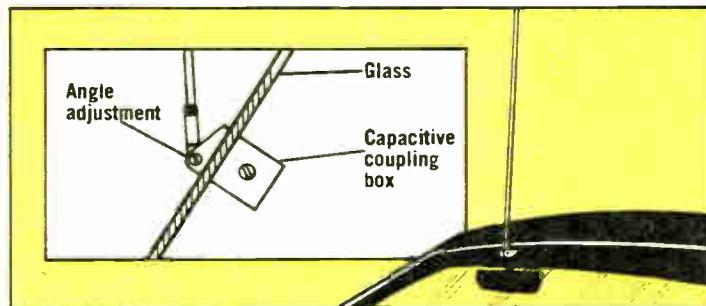
The SW-717 also features switchable automatic noise limiting, a relative signal strength tuning meter, built-in AM rod antenna plus a connection for attaching an external shortwave listening antenna (GRA-72, right).

Up-to-date, completely solid-state circuitry is used throughout this fine Receiver. Most components mount on a single printed circuit board for ease of assembly and reliability of operation. 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 construction is over, you can align your SW-717 without the need for instruments. However, the thoroughly-detailed assembly manual includes full instructions for performing instrument-aided alignment, should you prefer.

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

As soon as you turn on your SW-717, you'll be in for a barrel of fun and excitement in the increasingly-popular hobby of shortwave listening. Did you know there are many SWL clubs you can join to enhance your enjoyment? Your new receiver will soon impart a fresh perspective on foreign lands, languages and cultural differences as you enter the SWL world.

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, and it's not necessary to run 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 antenna attaches easily with a new duo-bond foam tape method. 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. No ground plane is needed, so it 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 driveway, the Avanti also includes instructions for removal when you sell the car. Comes complete with 15½" of coaxial feedline.

HDP-2402, Shpg. wt. 2 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 57. For 120/240 VAC, 50/60 Hz power. 5.33" H x 14.5" W x 8" D.

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

Long-wire SWL Antenna. Really helps you pull in the most 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 radio listener. 7.95

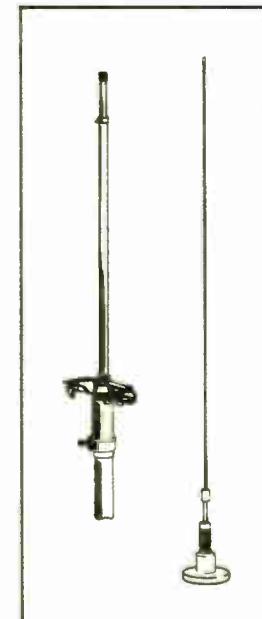
GRA-72, Shpg. wt. 2 lbs. 7.95

Superex Headphones. Ideal for use with the SW-717 and other shortwave receivers, as well as the HW-8 Transceiver on page 62. Shown in the photo above, the Superex Headphones feature dual coils for excellent sensitivity and a wide headband for comfortable listening. 600 ohms impedance. 7.95

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, 50/60 Hz. 3 watts. Dimensions: 5½" H x 14½" W x 8" D

Fixed and mobile, 2-Meter assembled antennas



① The Cushcraft AR-2 Ringo Standard Gain Fixed Antenna

This popular fixed-location antenna covers 135-175 MHz with 3.75 dB gain (over a ¼ wave whip) in an omnidirectional pattern. It features wide operating bandwidth with a low 1.1:1 SWR, and has direct grounding provisions for lightning protection. Low angle of radiation for DX. The AR-2 Ringo has a 52 Ω feed with PL-259. Coax feedline not included. Install the widely-acclaimed Ringo vertical antenna at your QTH now so you can start getting more range... and more enjoyment from your 2-meter activity. Rated for 1000 watts.

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

② Cushcraft 2-Meter Mobile

The HDP-1472 Magnetic-Mount Antenna makes it easy to go mobile in several vehicles. The 5/8-wave antenna boasts 3 dB gain covering 144-174 MHz, with no cutting of the stainless steel whip. Wind-tested in excess of 90 mph, the HDP-1472 includes PL-259 connector and cable. Preassembled, ready to use.

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

Programmable Doorbell greets your visitors

\$49.95

- 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 5 3/4" H x 8 5/8" W x 2 5/8" D. Attaches easily to your existing doorbell transformer. For more fun, see our new Programmable Auto Horn featured on page 90.

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

You can build an accurate, precise Digital Scale

\$99.95

- Electronic mechanism delivers weights accurate to 2/10 pound
- Battery-operated-weight with space-age digital accuracy anywhere, displayed by 4 1/2" 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 1/2" 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: $\pm 1\%$ or ± 1 count whichever is greater. Repeatability: $\pm 5\%$ 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: 15" H x 11 1/2" W x 11 1/2" L Cabinet dimensions: 1 1/2" H x 3 1/2" W x 6 1/2" D

This space-age Digital Thermometer fills all your home needs

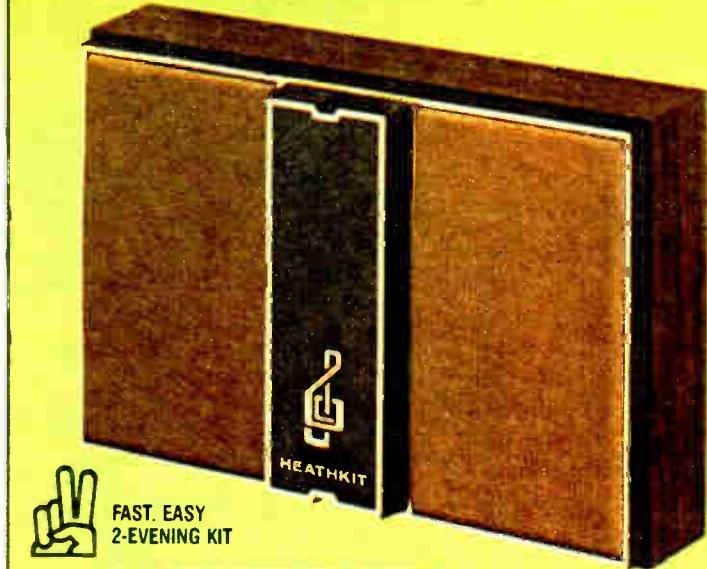
\$49.95

- 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 $\pm 0.2^\circ\text{F}$ ($\pm 0.1^\circ\text{C}$) 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



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

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



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

- GD-1290 detects objects even in highly mineralized soil where conventional locators are useless
- Has on/off volume, meter, speaker, phone jack, discrimination, ground balance, tuning controls
- Meter deflects up for valuables, down for junk
- Our finest model, with VLF Ground Balance Mode

The Groundtrack — sensitivity in any soil type

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

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

Use the Groundtrack anywhere. It's lightweight (3.5 lbs) and portable, with a telescoping shaft that collapses for storage. Runs on 6 AA cells (not included) or optional Nickel-Cadmium battery pack, which recharges from home current or in-the-field from car cigarette lighter socket.

Kit GD-1290, Shpg. wt. 5 lbs.	199.95
GOA-1190-1, Rechargeable battery pack, Shpg. wt. 2 lbs.	21.95
GDA-1190-2, Headphones accessory, Shpg. wt. 2 lbs.	12.95

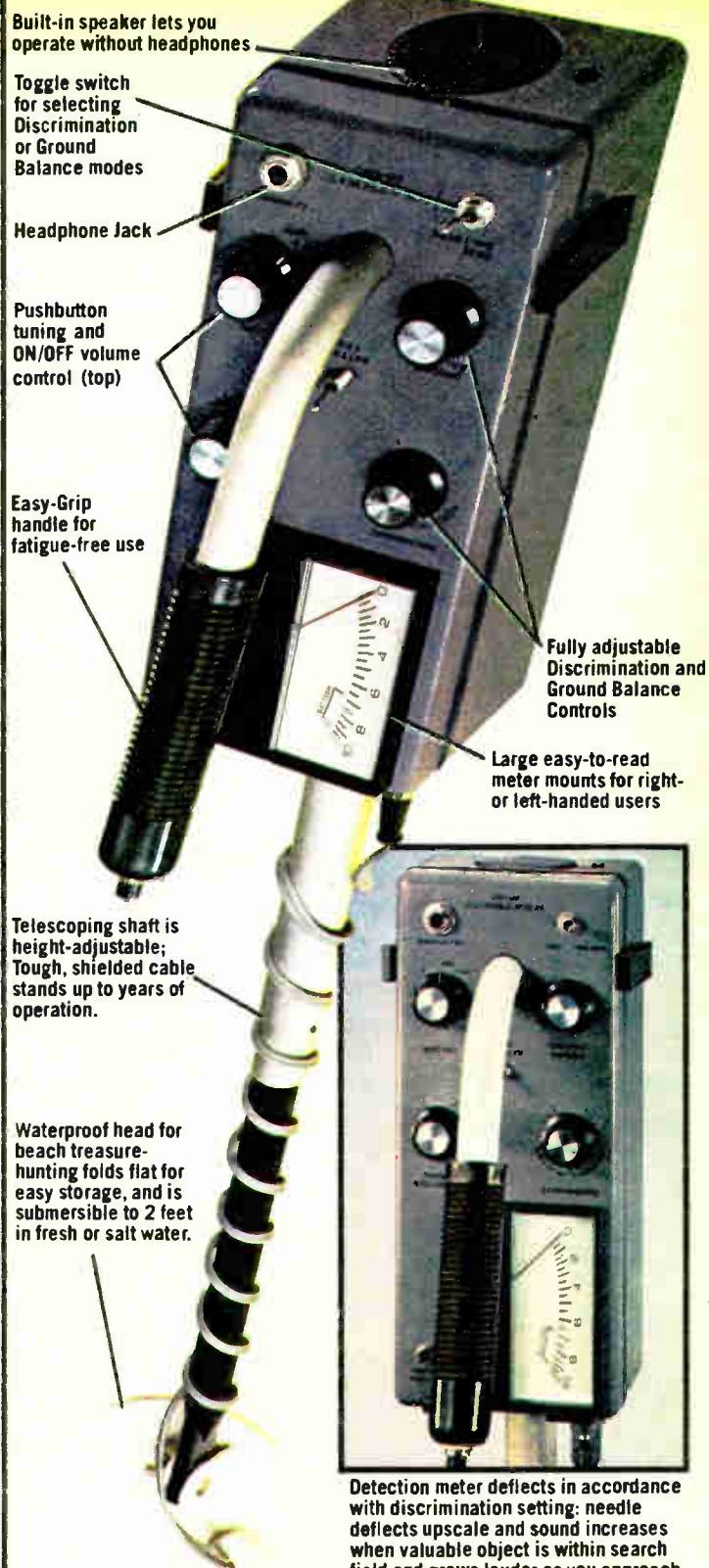
GD-1290 SPECIFICATIONS: Sensitivity: Locates dime at 4" to 6" typical, may be less depending on soil conditions, mode of operation and amount of discrimination selected. Method of Detection: Induction-balance circuit. Detector Output: Meter, speaker, phone jack. Dimensions: Search Coil: 6" diameter. Extended Height: 45½". Collapsed height: 22½". Power Requirement: Six AA dry cells or alkaline, or rechargeable Nickel-Cadmium Battery Pack (GDA-1190-1). Net Weight: 3.4 lbs.

Cointrack Metal Locator highly sensitive to coins

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

Kit GD-1190, Shpg. wt. 5 lbs.	129.95
GD-396, 600-ohm Superex headphones, Shpg. wt. 2 lbs.	7.95

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

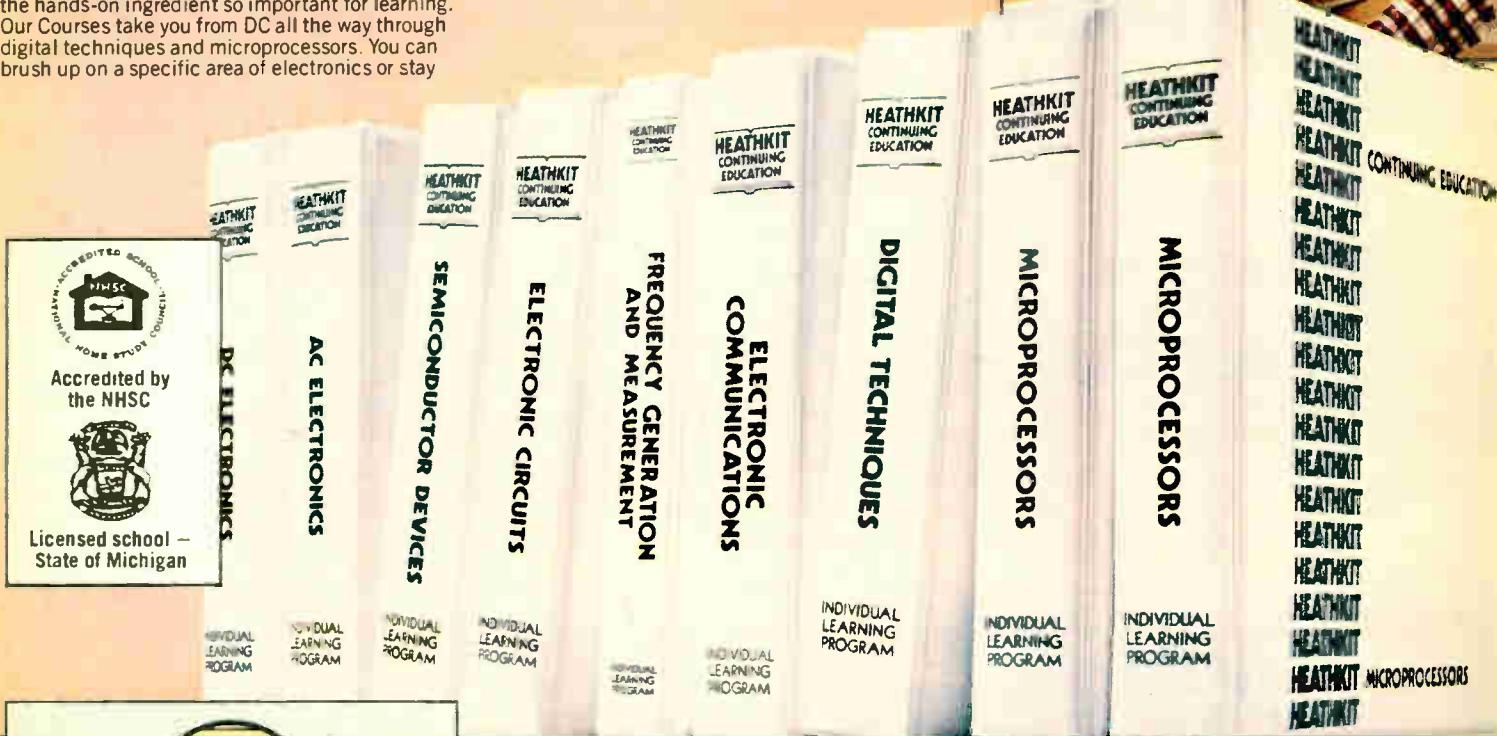


Detection meter deflects in accordance with discrimination setting: needle deflects upscale and sound increases when valuable object is within search field and grows louder as you approach center of buried item.

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.



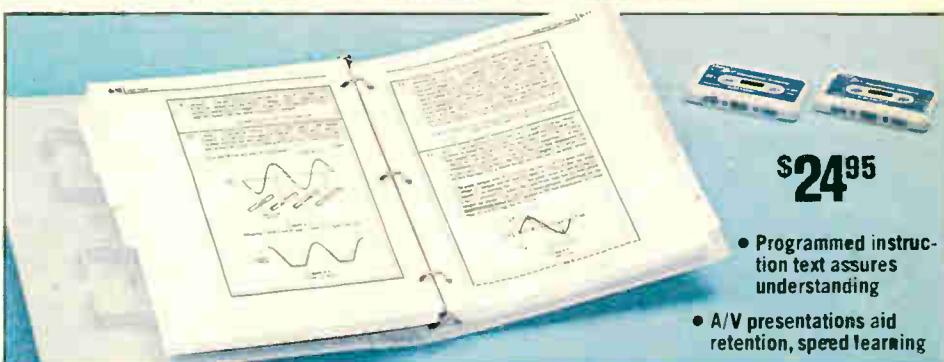
Earn College Credit for taking many Heathkit/Zenith courses

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



Award-winning, 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 71 through 74).

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, Shpg. wt. 5 lbs. 24.95



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

DC Electronics Course — your starting point in learning electronics



\$49.95

- 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. 82 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



Experimenter/Trainer augments electronics courses

\$79.95

- 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 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.

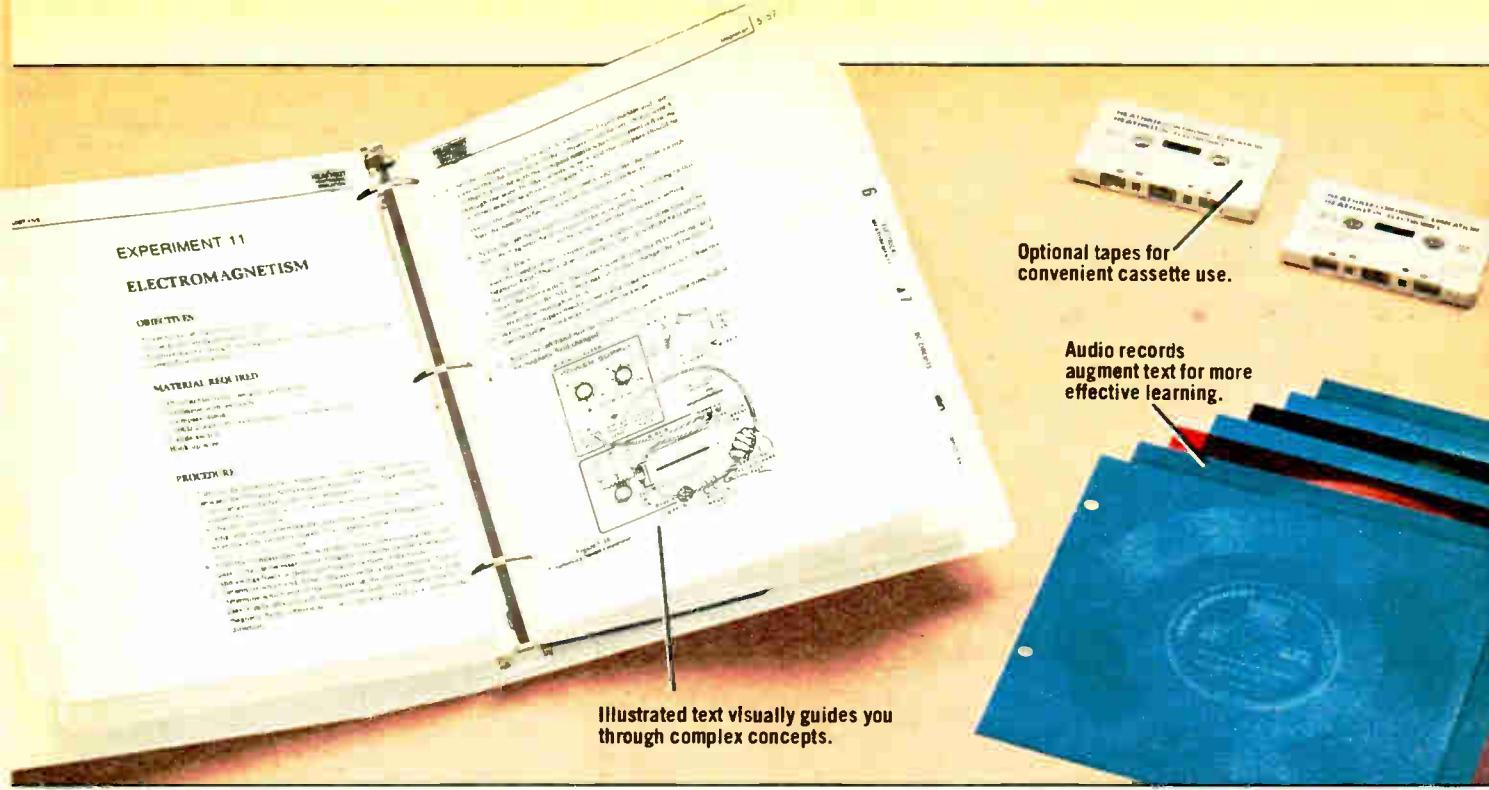
Heathkit/Zenith ET-3100A Experimenter/Trainer.

Kit ET-3100A, Shpg. wt. 6 lbs. 79.95

Kit ET-3100AS, ET-3100 with Spanish manual, Shpg. wt. 6 lbs. 99.95

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





AC Electronics Course enhances understanding

\$54.95

- 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 for 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 82). EE-3102-S, Shpg. wt. 7 lbs. 54.95

Semiconductor Devices — a solid-state course

\$54.95

- 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 this famous course. (Less EB-6103-30 Parts for experiments. See page 82.)

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

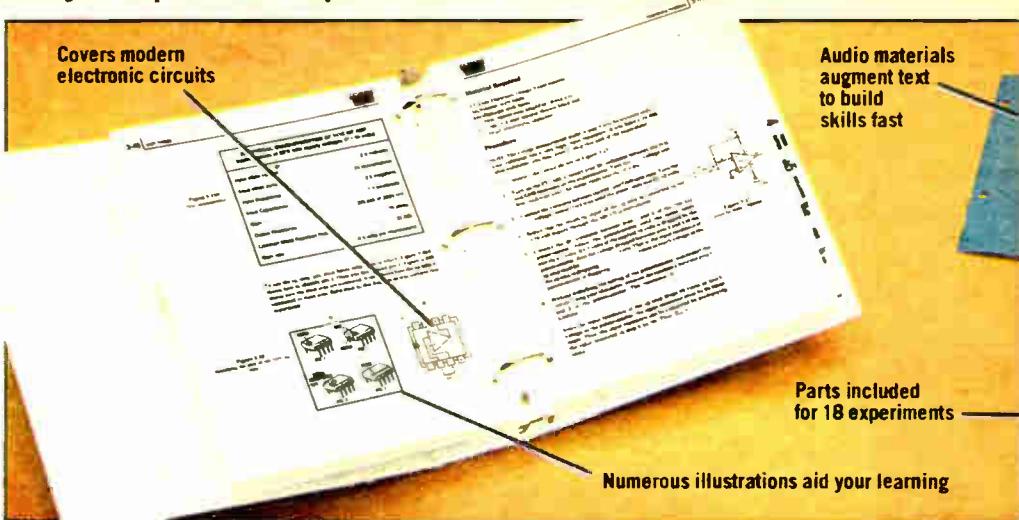


Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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



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 clampers. **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 11, a VOM and the ET-3100A Trainer on page 72.

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 72) 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



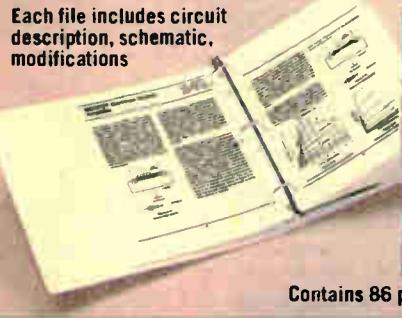
Two solid-state circuit courses give hands-on experience

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
- Course material concentrates on practical ideas, using linear circuits



Each file includes circuit description, schematic, modifications



Contains 86 parts for building over 30 circuits

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 14, and an oscilloscope such as the IO-4205 on page 11. Prerequisites are DC and AC Electronics, and Semiconductor Devices (EE-3101 - 3103, see pgs. 72-73) 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

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



Soldering Course is fun, easy

\$16.95

- 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.

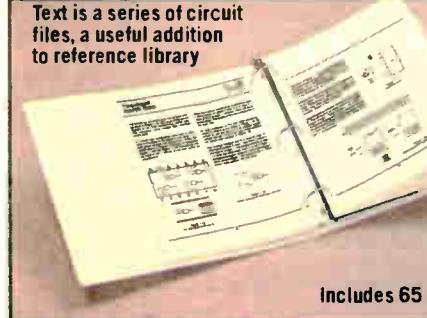
Requires a soldering iron and small hand tools (see page 83).

EI-3133, Shpg. wt. 2 lbs. 16.95

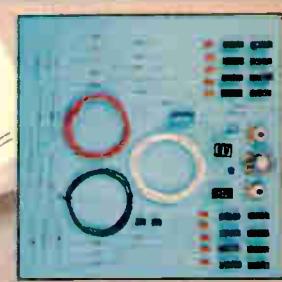
TTL and CMOS Circuits instructs in basic logic circuits



- 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

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 14, and a scope like the IO-4205 on page 11. Courses EE-3101 - 3103 (pgs. 72-73) 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. 3 lbs. 59.95



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

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

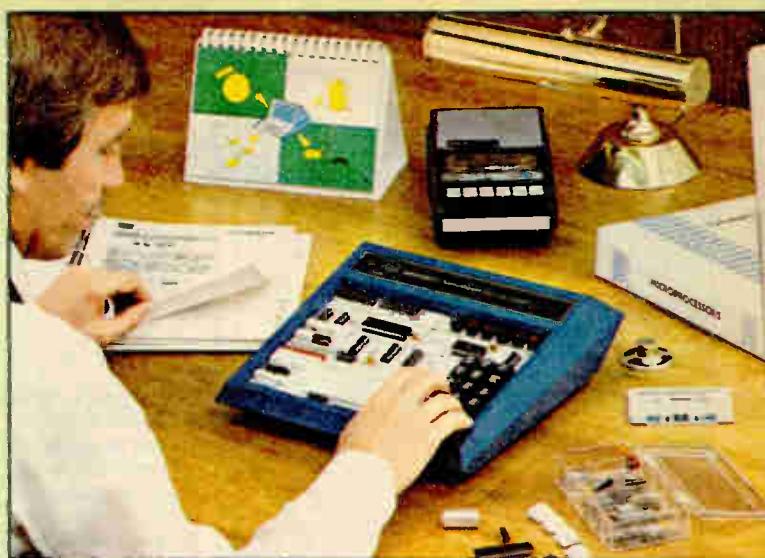


- **COMPLETE:** Covers all the basics of microprocessors, microcomputers and programming – even includes hands-on hardware/memory interfacing and programming experiments
- **EFFICIENT:** Programmed-learning design and audio visual aids, combined with 19 hands-on experiments, mean you learn about microprocessors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

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

No previous background? The Heathkit/Zenith Microprocessor Course has adopted the finest models of successful self-instruction technique. Concise, steady-paced textbooks, colorful audio-visual presentations and hardware experiments make important microprocessor theory, application and design easier for you to understand.

You start by learning or reviewing the basics of computer number systems and codes. Next, you apply that knowledge as our prize-winning Microprocessor Course takes you step-by-step through



computer arithmetic, programming, examination of popular microprocessors, interfacing and input/output operations you can put to use immediately.

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

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

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

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

SAVE \$25 Order EE-3401 Course and ET-3400A Trainer together. If purchased separately, \$324.90. ETS-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 readouts, and monitoring internal logic states.

The **17-key hexadecimal keyboard** permits you to access memory location to examine contents, then step forward or backward to examine other memory locations, change the contents of memory locations, examine and/or alter any of the 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 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 ETA-3400A requires 120 VAC, 60 Hz power. Draws 30 watts. Dimensions of the Heathkit ET-3400A Microprocessor Trainer are 3.5" H x 12.2" W x 11.75" D without Trainer Accessory.

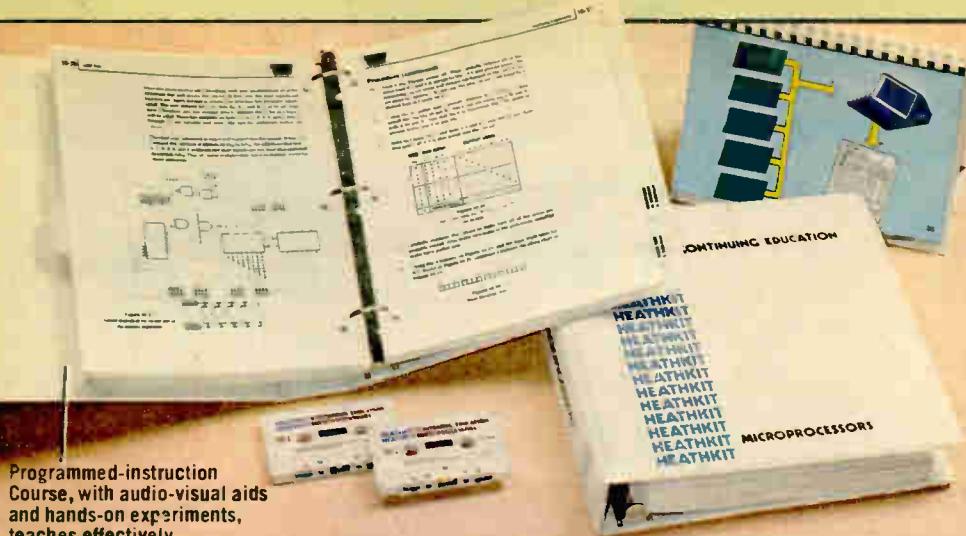
The **programming and interfacing experiments** supplied with the EE-3401 Microprocessor Self-Instruction Course are implemented on the ET-3400A Trainer. While designed for use with ET-3401, the Trainer is a flexible, general purpose training unit and microprocessor breadboard. Use it in other applications 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 Microprocessor Trainer Accessory (opposite page) for



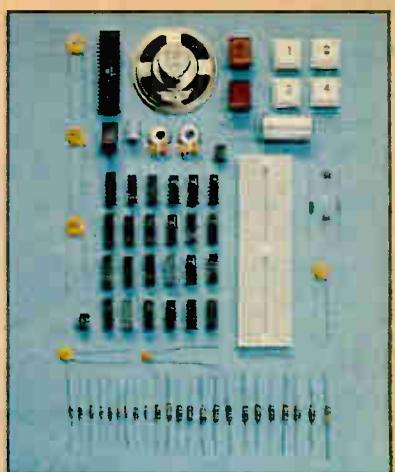
increased personal microcomputing power and versatility. For serious students, they are a superior pair of educational tools.

Kit ET-3400A, Shpg. wt. 7 lbs.	224.95
ETW-3400A, Assembled, 6 lbs.	329.95
ET-3400-AE, 220 V, 50 Hz; 6 lbs.	244.95
ETW-3400-AE, Assembled, 220 V, 6 lbs.	349.95

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



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).

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**

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.

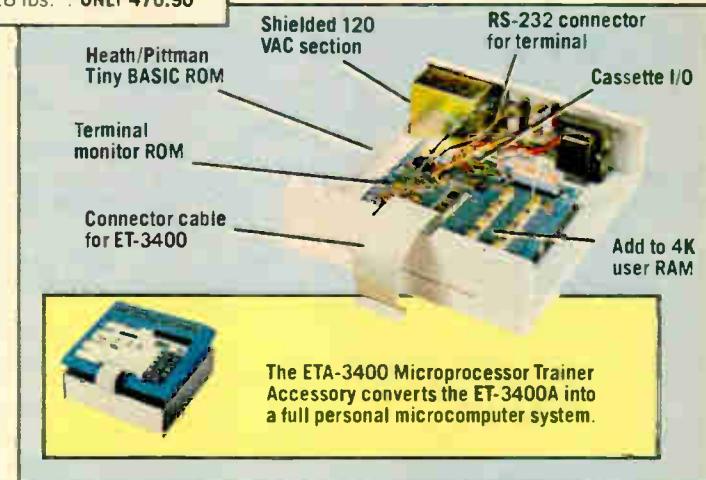
If you choose to take the optional final examination, scoring a passing grade of 70 percent or better will earn you a full 8.0 Continuing Education Units (CEUs) and a Certificate of Achievement. A classroom version of this popular Course is also available — (see page 42).

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**



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**

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.



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

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

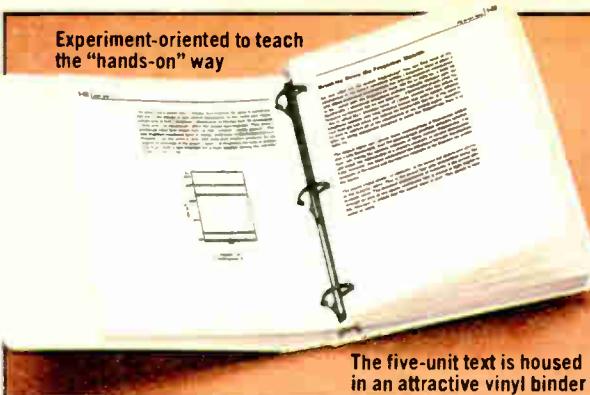
Get on speaking terms with your computer — our new **Voice Synthesis Course** teaches you this state-of-the-art technique in an easy-to-follow format with hands-on experiments that will have your computer talking to you in no time. This five-unit Heathkit/Zenith Course consists of a 250-page text filled 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.

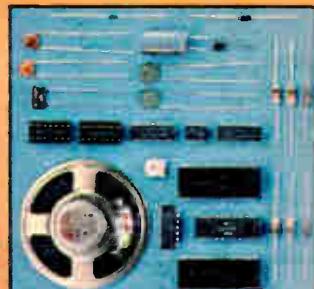
The Voice Synthesis Course includes complete chip sets for both digitized and phoneme voice synthesis:

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

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

(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 76).

When you complete this Course you will be able to make your ET-3400 or ET-3400A Trainer (necessary for the course — see page 76) talk. Prerequisites for taking EE-3403 are EC-6800 (Introduction to Microprocessors Course — see page 80) or EE-3401 (Microprocessor Self-Instruction Course — see page 77) 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 these Heathkit/Zenith audio-tutorial courses



Algebra Fundamentals Course Text and 7 cassettes cover subject. Pass optional final exam for 2.5 CEUs.

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Algebra Course with text, 10 cassettes covers polynominal arithmetic, factoring, functions, exponents, etc. 3.0 CEUs.

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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.

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SAVE \$10. Order all three Algebra Courses. \$104.85 separately.

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SAVE \$10. Order EM-7 and EM-8 together. Reg. \$109.90.

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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



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. 14.95

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 16) and single-trace oscilloscope like the IO-4105 (page 11). 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.

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

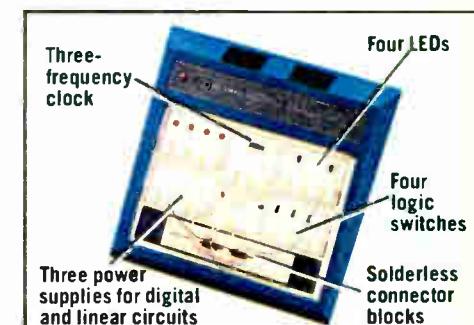
Programmed text
Records or optional tapes supplement text
44 electronic parts for 24 experiments

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



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 11) and a multimeter like the IM-5284 (page 16).

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



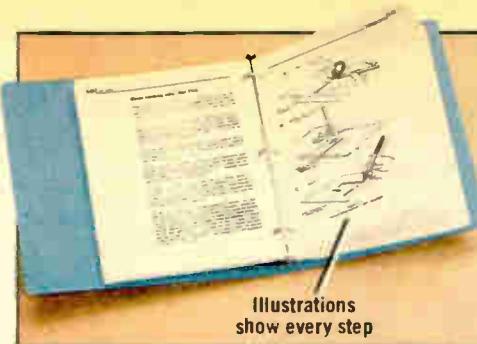
Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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



\$64.95

- 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,

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.

EI-3134, Shpg. wt. 7 lbs.

64.95

Electronics for Hobbyists – made simple for you



\$59.95

- 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



components for 26 experiments – which use the ET-3100A Trainer (page 72), a multimeter (like IM-5284, page 16) and an oscilloscope (like the IO-4105 on page 11).

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



\$29.95

- 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.

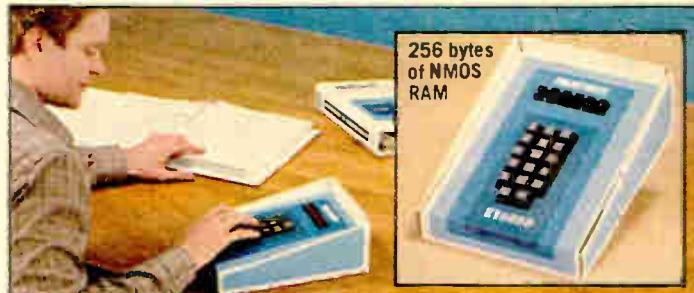
EC-6800, Shpg. wt. 9 lbs.

29.95

Save \$10.00! Buy Course and ET-6800 Kit Trainer together.

ETS-6800, Shpg. wt. 29 lbs.

119.90



Hands-on machine-language programming

Everything you need to perform the programming experiments in the EC-6800 Course (left). A 17-key hexidecimal 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. 82.

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, phototransistors, 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. 14), and a scope like the IO-4105 (p. 11). Prerequisites: DC and AC (EE-3101 and EE-3102, pgs. 72-73) 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. 99.95

ETW-3300A, Assembled Breadboard, 6 lbs. 159.95

SAVE \$10.00! Buy Course and Breadboard Kit.

EES-105A, Shpg. wt. 11 lbs. 149.90

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. 11), a multimeter like the IM-5225 (p. 14) and a frequency generator like the IG-1271 (p. 16). Prerequisite: Basic Electronics (EE-3101 through EE-3104, pgs. 72-74) or equivalent knowledge. 3 CEUs.

EE-101, Shpg. wt. 5 lbs. 39.95

Kit ET-3300A, Breadboard, 6 lbs. 99.95

ETW-3300A, Assembled Breadboard, 6 lbs. 159.95

SAVE \$10.00! Buy Course and Breadboard Kit.

EES-101A, Shpg. wt. 11 lbs. 129.90

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. 74) required for experiments. (NOTE: ET-3100A cannot be used with other Advanced Electronics Courses.)

An oscilloscope like the IO-4105 (p. 11) and a frequency generator like the IG-1271 (p. 16) 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. 99.95

ETW-3300A, Assembled Breadboard, 6 lbs. 159.95

SAVE \$10.00! Buy Course and Breadboard Kit.

EES-102A, Shpg. wt. 11 lbs. 124.90

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. 11) and a multimeter like the IM-1210 (p. 14). Prerequisite: EE-3201 Digital Techniques (p. 79) or equivalent knowledge. 3 CEUs.

EE-103, Shpg. wt. 5 lbs. 39.95

Kit ET-3300A, Breadboard, 6 lbs. 99.95

ETW-3300A, Assembled Breadboard, 6 lbs. 159.95

SAVE \$10.00! Buy Course and Breadboard Kit.

EES-103A, Shpg. wt. 11 lbs. 129.90

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. 16) and a single-trace oscilloscope like the IO-4105 (p. 11). To get more from the

Course, use a dual-trace oscilloscope like the IO-4205 (p. 11) and an audio signal generator like the IG-5218 (p. 16). 3 CEUs.

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

Kit ET-3300A, Breadboard, 6 lbs. 99.95

ETW-3300A, Assembled Breadboard, 6 lbs. 159.95

SAVE \$10.00! Buy Course and Breadboard Kit.

EES-104A, Shpg. wt. 13 lbs. 139.90

SAVE \$55.00 on your education!

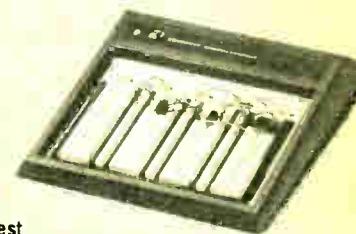
Order the Heathkit/Zenith Advanced Electronics Series (EE-101 Op Amps, EE-102 Active Filters, EE-103 IC Timers, EE-104 Phase-Locked Loops and EE-105 Optoelectronics) together with the Heathkit/Zenith ET-3300A Laboratory Circuit Breadboard Kit. If purchased separately \$324.70.

EES-1015A, Shpg. wt. 34 lbs. 269.70

This Lab Breadboard makes advanced electronics easier

\$99.95
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. 99.95

ETW-3300A, Assembled and tested.
6 lbs. 159.95



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

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
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Semiconductor Devices
Electronic Circuits
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- **Advanced Electronics Series** — Operational Amplifiers
Active Filters
IC (Integrated Circuit) Timers
Phase-Locked Loops
Optoelectronics
- **Digital Techniques**
- **Microprocessor Technology**
- **Computer Programming Series** — BASIC Programming
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- **Automotive Courses** — Automotive Tune-Up
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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. 72) is necessary. The Advanced Electronics Series experiments require the ETW-3300A Trainer on page 81. Experiments for the Digital Techniques Course require the assembled and factory tested ETW-3200A Trainer (p. 79). Page 76 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. 76-77), Auto Tune-Up and Auto Electrical Courses (p. 90). 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
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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 (1 lb.)	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 (1 lb.)	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 (1 lb.)	9.95	EB-6106-50	8.95	ETW-3100A	139.95	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	
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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
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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 Veritechology 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 Veritechology Electronics Corporation — see p. 87 for locations) for more information on our Classroom Courses.

Alabama	205-822-1326	Kansas	913-722-4713	North Dakota	612-533-0000
Alaska	907-456-1872	Kentucky	205-822-1326	Ohio	419-435-6517
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Idaho	503-640-1729	New Hampshire	617-285-9028	Washington	503-640-1729
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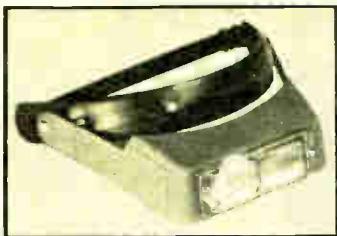


Around home...or for your next kit project...choose one or more of these handy aids

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 foreband. Focus viewing point: normally 8". Durable, washable plastic headframe.

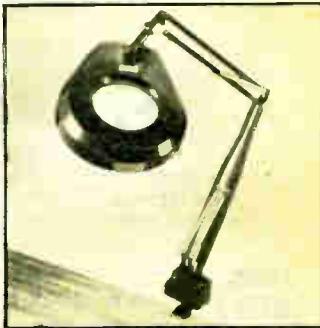
GDP-201, Assembled, wt. 1 lb. 18.95



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



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 32" 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.

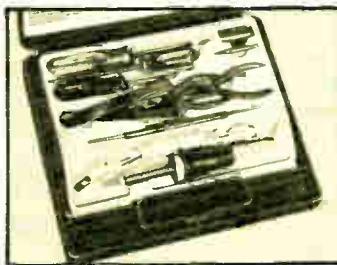
GDP-202, 4 lbs. Was \$26.95, NOW ONLY 19.95



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 $\frac{1}{8}$ " blade screwdriver, a Phillips screwdriver, a $\frac{1}{4}$ " 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 10 $\frac{3}{4}$ " W x 10" D carrying case.

GHP-1270, Shpg. wt. 3 lbs. 37.95



Kitbuilder's soldering tools

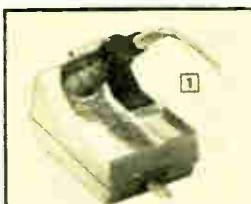
① Heat-controlled solder station

Seen elsewhere for \$30.00 more. Features transformer-powered, closed loop control to keep $\frac{1}{16}$ " tip consistently hot. Has heat shield to safely hold iron, 700°F tip, indicator light, sponge. Thermostatically controlled heat protection. Assembled.

GDP-1108, Shpg. wt. 5 lbs. 69.95

Set of four 700°F replacement tips

GDP-1109, Shpg. wt. 1 lb. 15.95



② 3-heat soldering iron kit

Secure stand with metal shield/case protects iron, has 3 heat settings (h, m, l) for most soldering requirements. 6-volt, 25-watt element with $\frac{3}{16}$ " chisel tip. Six-foot power cord. 120 VAC.

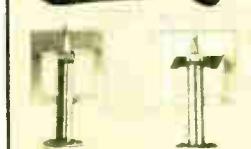
Kit GH-17A, Shpg. wt. 5 lbs. 39.95



③ 25-watt soldering iron

Weller pencil iron has slim $\frac{1}{8}$ " chisel tip for close point-to-point wiring. 860°F heat. Our best selling, perfect-for-kits iron! 120 VAC.

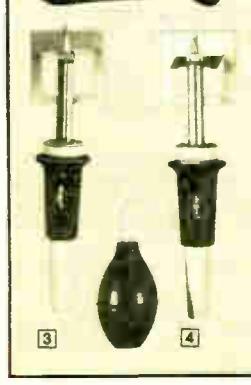
GDP-207, Shpg. wt. 1 lb. 14.95



④ Weller solder/de-solder set

Includes the Weller soldering iron described above, plus de-soldering bulb for quick suction and removal of hot solder, so parts may be removed easily from circuit boards.

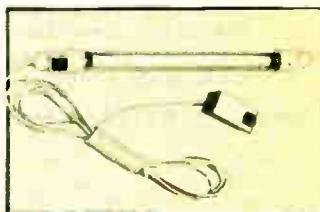
GDP-1009, Shpg. wt. 1 lb. 18.95



Handy plug-in Trouble Light goes almost anywhere

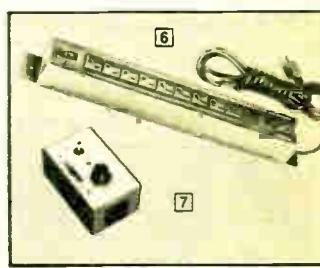
The GDP-206's 25-watt fluorescent tube throws a more illuminating light – without the usual eye-straining shadows of incandescent bulbs. It lets you move around more freely because it comes with a long-reaching 25' line cord. 26" L x 2.5" W x 2.5" D. Includes fluorescent tube. 120 VAC. Assembled.

GDP-206, Shpg. wt. 4 lbs. 19.95



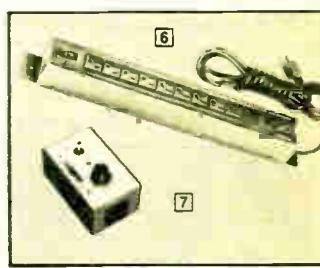
⑥ Twelve-Socket Multiple Outlet Box has 11 switched outlets, plus one unswitched outlet for clock or memory save. Fused for full protection. 10 A maximum load. 12' cord. 120 VAC. Easy-to-build kit is a great addition to workbench or Ham station.

Kit HD-1274, Shpg. 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.

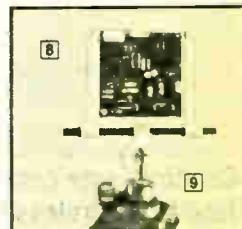
Kit GD-973A, Shpg. wt. 2 lbs. 29.95



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, Shpg. wt. 2 lbs. 19.95



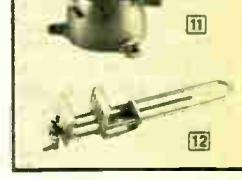
⑨ PanaVise Vacuum Base. For temporary mounting on smooth surfaces. Attaches securely. Powerful rubber suction pad holds without marring tabletop. For GDP-1253, -1254, -1255 Vise Heads. 3 $\frac{3}{16}$ " H x 5" W x 4 $\frac{1}{4}$ " D.

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



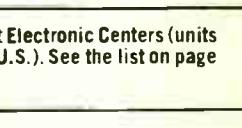
⑩ PanaVise Vertical Jaw Vise Head. Ideal for most hobby applications. Nylon jaws open to 2 $\frac{1}{4}$ " to grip parts without marring or scratching.

GDP-1253, Shpg. 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, Shpg. wt. 2 lbs. 13.95



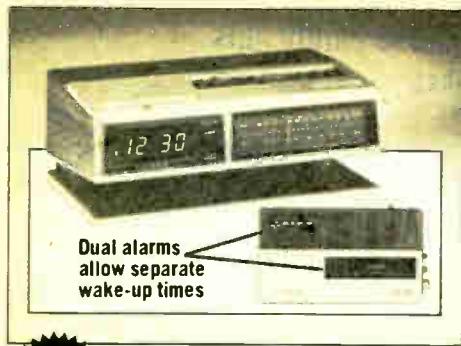
⑫ PanaVise Vertical Vise Head. For holding bulkier items. Padded jaws open up to 6 $\frac{1}{2}$ ".

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



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

Additional tools and aids are available at Heathkit Electronic Centers (units of Veritech Electronics Corporation in the U.S.). See the list on page 25 for the address of the Center nearest you.



NEW FM/AM Clock Radio has 2 alarms, power reserve

- Set separate husband/wife wake-up times – or set one wake-up time for weekdays and a later wake-up time for weekends.
- Power Reserve battery keeps unit on for up to four hours after blackout.

Precise Zenith R-476 Clock Radio has two 24-hr. alarms. Use Touch n' Snooze to take 9-min. catnaps 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. 74.95



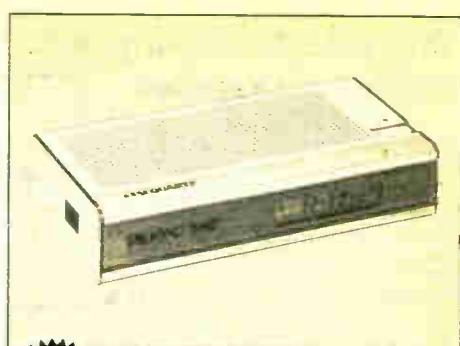
Enjoy good FM/AM sound from this Zenith AC/DC Portable Radio

- 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. 1 lb. 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, reliable 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, easy-to-build Heathkit 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

84/HOME PRODUCTS



- Keeps tempo from 40-210 beats/minute



FAST, EASY
1-EVENING KIT

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 pulsate 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



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

Save \$80 — listen to stations around the world with the Zenith Trans-Oceanic Radio

- Receives 12 bands — AM, FM, CB, SW, LW, Aircraft, Public Service
- Use as a radio direction finder when out at sea
- Designed with state-of-the-art electronic components
- Operates on battery power, 120 VAC or 240 VAC house current

A superior multi-band portable receiver: The Zenith R7000 Trans-Oceanic Radio offers a wide variety of radio listening adventure on its 12 bands. Besides the standard AM and FM broadcast bands, the Trans-Oceanic also provides coverage of Citizen's Band (CB) frequencies, shortwave bands (both normal and single-sideband transmissions) which are used by both commercial radio stations and amateur radio operators around the world, longwave AM, VHF aircraft communications and public service bands.

Use as a radio direction finder: The Zenith Trans-Oceanic Radio can 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 for superior performance: The latest communications technology helps provide excellent reception, sensitivity and selectivity. Sophisticated tuning circuitry offers easier, more precise tuning of SSB and other closely-spaced signals. Dual-gate MOSFET RF amplifier circuitry helps eliminate distortion from nearby stations. Up-conversion mixing techniques offer superior image rejection. Double-balanced IC mixers keep undesired stations locked out. Uses built-in or external antennas.

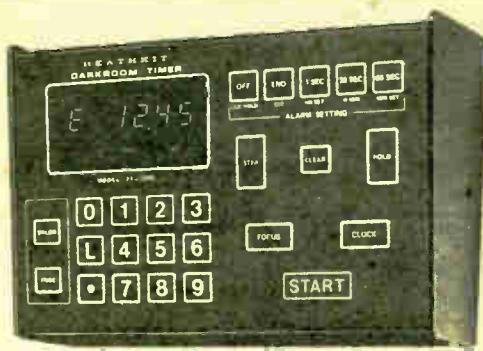
Operates on world-wide house current: Requires eight 1.5 VDC "D" cells (not included) or 120/240 VAC, 50/60 Hz house current. Meets UL and CSA standard for fire and electrical shock.

The Zenith Trans-Oceanic is your best choice in a quality all-purpose radio.

SWZ-7000, Assembled, 13 lbs. Was \$379.95, NOW ONLY 299.95



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, 2.6-27.5 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 MOSFET. BFO and SSB Product Detector: Crystal-controlled. Power Requirement: Eight 1.5 VDC "D" cells (not included) or 120/240 VAC, 50/60 Hz. 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).



The Heathkit Programmable Darkroom Timer gives you consistent developing quality

- Process with microprocessor timed accuracy
- Program up to 10 steps
- Auto-step sequencing

Features four-digit LED clock to time developing and enlarging steps. Memory holds up to nine processing steps and 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 one, 30 or 60-second intervals (any combination), or once at the end. 10-second end-of-cycle alarm tells you when to begin to pour from the tank.

The optional PTA-1500-3 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.

Darkroom chemicals won't hurt the backlit Litetouch™ front keyboard. 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, 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



SAVE \$40!

SAVE \$100!

① Sensory Chess Challenger has error-free entry

Sharpen your chess skills: Play an opponent that matches your skill level with 8 levels of play. Random moves mean it won't always react to the same move in the same way. Easy entry system. Special sensory board automatically "sees" your move and tells the computer. Computer shows its countermove with easy-to-follow LEDs. Uses four 1.5 VDC alkaline "C" cells (not included), or 120 VAC (adapter included). 2.5" H x 10.5" W x 11.25" D.

GOP-4410, Assembled, 4 lbs. Was \$139.95 in Cat. 852, NOW ONLY 99.95

② Talking Chess Challenger lets you play the masters

Amazing 50-word vocabulary: This Talking Chess Challenger not only tells you the move you've just made, but also announces its countermove.

Want to learn chess from the Masters? This computer-controlled marvel knows 64 of the world's best games, move by move...and can teach them to you. It can even teach 100 winning opening moves.

Great for beginner or veteran: Nine programmed levels of play include a special, super-tough, no random, "best move only" level of play.

We've evaluated many — and believe this is the best and most convenient-to-play chess game on the market today. 120 VAC. 3.75" H x 11.63" W x 13.13" D.

GOP-4411, Assembled, 10 lbs. Was \$349.95 in Cat. 852, NOW ONLY 249.95



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

HOME PRODUCTS/85

Versatile Heathkit Pack-17™ R/C System will grow along with your Radio Control hobby

As your interest and ability in radio control modeling grows, the unique, patented Heathkit Pack-17 R/C system will too, giving you a choice of 17 different transmit and receive frequency modules for no-wait capability. You get the performance and reliability every RC'er wants for serious R/C fun and competition, plus build-it-yourself kit value. Rechargeable nickel-cadmium batteries are included with each transmitter and receiver to save you money, and Pack-17 R/C can be used with every kind of model plane, boat, car, robot or other application. So if you're just getting started — or are upgrading — you'd be wise to put your money on a system that offers real versatility and can adapt to your expanding requirements. Pack-17.



Subminiature Servos Miniature Servos Receiver with Module Receiver Battery Pack Battery Charger

① Greatest versatility when you choose our top-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 R/C Transmitter. Two control sticks and a retractable landing gear switch provide control of five servos. Three auxiliary controls allow use of three more servos. Four trim tabs let you make fine adjustments to the first four channels, without changing stick position. Leading the way in innovations, Heathkit Pack-17 was the first system of its kind to put eight channels in a single, convenient radio control unit.

When you buy the GDA-1205-0G Radio Control Transmitter, indicate your choice of one plug-in transmit frequency module (at no extra charge) from the 17 available transmit frequencies listed below. Specify it when you order — no model number needed — and be ready to transmit right away.

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 from the opposite page. This easy-to-build kit comes with a complete Heathkit instruction manual and solder. Order the GDA-1205-0G for real versatility in this exciting hobby.

Kit GDA-1205-0G, Shpg. wt. 5 lbs. 154.95

② Put this versatile 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 radio control transmitter for operating planes, cars, boats, etc.

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 and 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 while running your models. 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 desired from the list on this 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 savings, 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. The comprehensive Heathkit instruction manual assures easy kit-building and do-it-yourself service, to save you more.

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

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, 52.300, 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 \$3475

Save — buy 3 Transmit and 3 Receive Modules of your choice. \$134.70 separately.

Shpg. wt. 2 lbs. ONLY 99.95

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 (HxWxL)*	1½" x 1½" x 2¾" 32"	1" x 1½" x 2½" 32"	1½" x 1½" x 2¾" 32"
Net Weight	1.75 oz.	1.25 oz.	1.75 oz.

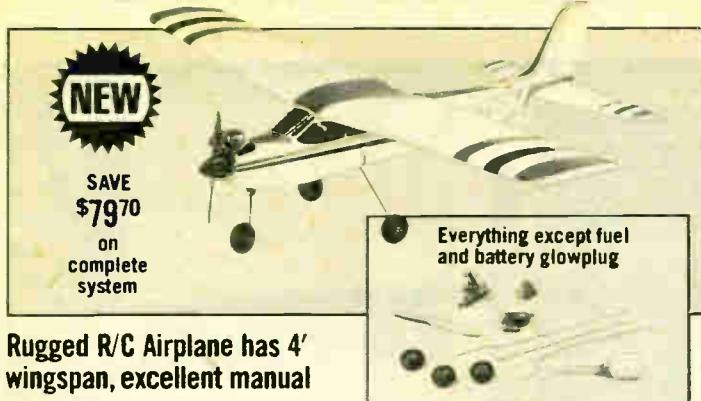
SERVOS: Position Accuracy: 1%. Backlash: <0.002". Input Signal: Pulse. 1-2 mS. 4 V P-P Output: 1 rotary arm or 1 rotary wheel. Temperature Range: 0-160 deg. F. Power Requirement: 4.8 VDC. *H includes outputs. L includes mounting ears.

GDA-1919-1 AND GDA-1205-0G 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, 8 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 (-17.77 to 71.1°C). Power Requirement: Internal 9.6 VDC, 500 MAH 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-1205-0G, 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: 5 microvolts or better. Selectivity: 6 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 (GDA-1205-3, included), 10 mA drain. Controls: On/off switch. Operating Temperature Range: 0 to 160°F (-17.77 to -71.1°C). Overall Dimensions: 0.63" H x 1.75" W x 1.75" D (1.60 x 4.45 x 4.45 cm). Net Weight: 2 ounces.



Complete Pack-17 Systems – your best value



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

Strong foam Airplane with MRC .15 TV engine. Easy to build. Durable, too.

Kit RP-1173, Shpg. wt. 17 lbs. 99.95

Complete R/C Trainer System has GDA-1919-1 transmitter, receiver/battery pack, plug-in transmit/receive modules, 3 servos, \$399.65 separately.

RPS-1173, Shpg. wt. 21 lbs. 319.95

SAVE \$89.70 5-Channel R/C System has GDA-1919-1, rcvr/btry pack, plug-in modules, four servos. GDS-1919, Shpg. wt. 9 lbs. 239.95

SAVE \$69.70 8-Channel Stick R/C System has GDA-1205-0G transmitter, rcvr/btry pack, plug-in modules, four servos. GDS-1205-0G, 11 lbs. 279.95

High-Quality Heathkit Servos, Receiver and Battery

Subminiature Servo for Heathkit Flight Pack-17 R/C Systems.

Kit GDA-1205-5, Shpg. wt. 1 lb. 29.95

Miniature Servo for Heathkit Flight Pack-17 R/C Systems.

Kit GDA-1205-4, Shpg. wt. 1 lb. 29.95

High-Torque Servo for Heathkit Flight 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).

GDA-1205-2, Shpg. wt. 1 lb. 59.95

Kit GDA-1205-3, Receiver Battery Pack, Shpg. wt. 1 lb. 14.95

Be power-sure with a Battery Monitor

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

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



1 Aircraft Navigation Computer saves time and fuel

- Built-in clock and elapsed timer for time-related computations
- Accepts preflight data for up to 9 legs; night-flying red display

The **Heathkit Air Navigation Computer** has the power and versatility of an expensive on-board navigation computer! One keystroke action instantly computes your magnetic heading, ground speed, true air speed, next time to checkpoint/destination, and ETA. Automatically computes in-flight wind, then updates all subsequent data including distances, times and ETAs. The scientific calculator functions for even more versatility. Includes color-coded keyboard areas, 3 microprocessors and real-time clock, 14-digit multi-function display, fuel warning indicator, rechargeable batteries.

Kit OC-1401, Shpg. wt. 3 lbs. 99.95

OCW-1401, Factory assembled and tested version, wt. 4 lbs. 149.95

2 Carrying case for Air Navigation Computer (inset) provides additional power supply for OC-1401; 15-hour recharge time. Pocket for instruction guide.

Kit OCA-1401-1, Shpg. wt. 5 lbs. 29.95

OCW-1401-1, Factory assembled and tested case. Wt. 5 lbs. 49.95

Leatherette Carrying Case for OC-1401 Air Navigation Computer. OCA-1401-2, Shpg. wt. 1 lb. 3.95

3 High-accuracy, low-priced Aircraft Clock/Timer

- Rugged case fits standard 3 1/4" aircraft panel mount
- Function selector with LED 'moving-dot' indicator

Features two 4-digit time displays with red LED numerics for easy night viewing. Top display shows GMT/Zulu time, while lower shows local time and acts as 24 minute timer, 24-hr. trip timer and has alarm function for fuel management and checkpoint notification. 14 or 28 VDC, draws 0.5 A. Meets FAA Reg. No. DO-160. Kit must be returned for DMIR inspection.

Kit OI-1154, Shpg. wt. 3 lbs. 79.95

All our kits are displayed at Heathkit Electronic Centers – Units of Veritechology Electronics Corporation

Parts and service available. (Retail prices on some items may be slightly higher.)

• New Store openings

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El Cerrito, 94530

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Los Angeles, 90007

2309 S. Flower St. 213-749-0261

Pomona, 91767

1555 N. Orange Grove Ave. 714-623-3543

• Redwood City, 94063

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Sacramento, 95825

1860 Fulton Ave. 916-486-1575

San Diego (La Mesa, 92041)

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San Jose (Campbell, 95008)

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Woodland Hills, 91364

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Chicago (Downers Grove, 60515)

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INDIANA – Indianapolis, 46220

2112 E. 62nd St. 317-257-4321

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* **LOUISIANA – New Orleans (Kenner, 70062)**

1900 Veterans Memorial Hwy. 504-467-6321

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630 Lancaster Pike (Rte. 30) 215-647-5555

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* Vancouver, 98664

516 SE Chaklo Dr. 206-254-4441

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5215 W. Fond du Lac, 414-873-8250

★ Watch for Satellite Earth Station displays planned for these stores.



Perform auto tune-ups professionally with the Heathkit Pro-Quality Ignition Analyzer

\$514.95

- 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.

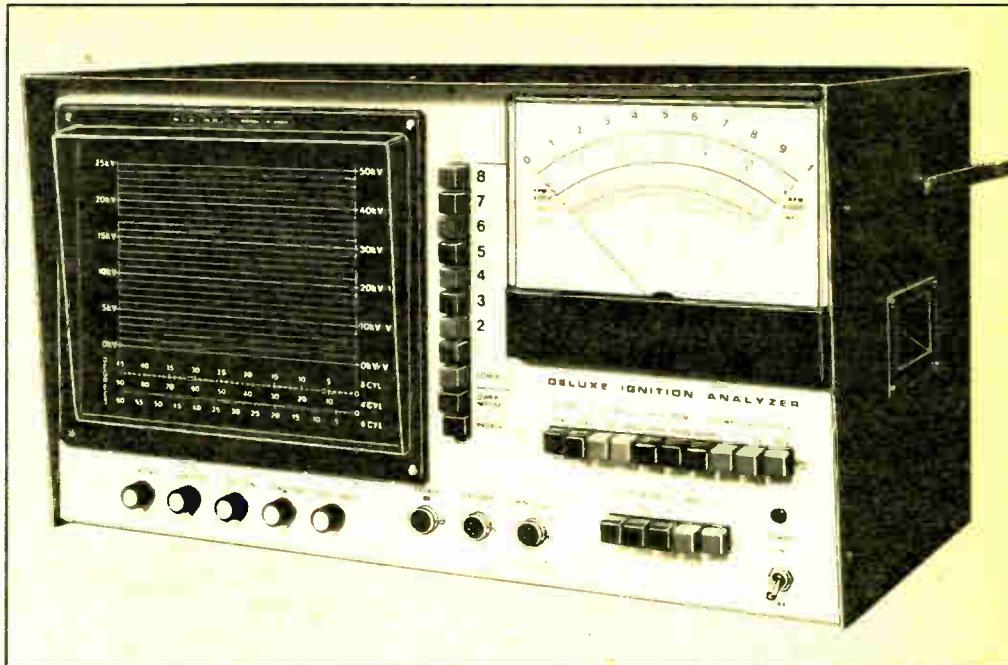
Compare with the others. Then you'll see why the Heathkit CO-2600 is your best choice in a professional-quality Ignition Analyzer.

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 VOC. 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 88 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.

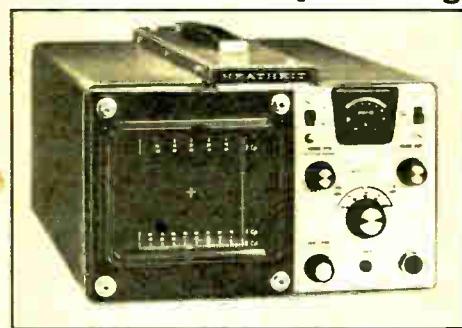
Deluxe, pro-quality Scope Cart



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



\$229.95

- 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**



\$57.95

- 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**

Portable Engine Analyzer has digital accuracy

- Measures dwell, RPMs, DC voltage, resistance and direct current
- Battery-operated portable power means fewer clumsy wires under the hood
- Meets GM specs for use with '81 Computer Command Control



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 ±5% accuracy. Power is supplied by a 9-volt transistor battery (not included), so there are fewer test leads under the hood. Thermal-quality wiring resists heat. One circuit board makes assembly easy in two or three evenings.

Kit CM-1551, Shpg. wt. 5 lbs. 117.95
CMA-1550-1, Shunt Accessory, Shpg. wt. 1 lb. 14.95

Protect your valuables in car, van or boat ultrasonically

Harmless and invisible ultrasonic waves will guard against theft in any enclosed vehicle, sensing a movement and triggering a 50-second alarm using car horn or other accessory. Automatically resets to resume protection. Ten-second exit and six-second entry delays. Pin switches guard contents of hood or trunk.

GD-1568, Shpg. wt. 2 lbs. 57.95
GDA-1568-1, Pin switches, 1 lb. 6.95
GDA-1558-1, Horn relay switch (for cars without horn relay), 1 lb. 4.95



Three-in-one Tune-up Meter saves on repair

This one-evening kit enables you to do simple dwell, engine speed and battery voltage tests you normally pay a professional mechanic to do. A three-function meter in one, this portable package has: 1) a dwell meter scaled for 8, 4, and 3 6 cylinder engines, 2) a tachometer with two rpm ranges, and 3) a 0-20 unit voltmeter. For 6- and 12-volt pos neg gnd systems.

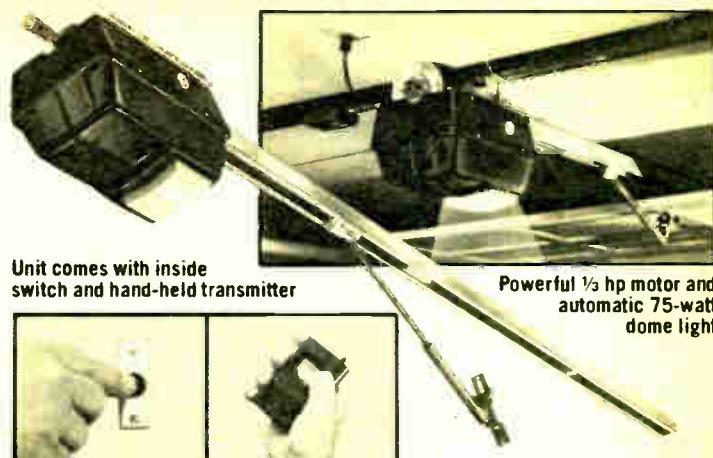
Kit CM-1D73, Shpg. wt. 4 lbs. 47.95



Windshield Wiper Delay for most single or 2-speed electric wiper systems. Solid-state circuitry lets you delay sweeps from 0.5 to 30 seconds.
CH-1068, Shpg. wt. 2 lbs. 19.95



Tachometer/Speedometer registers up to 199, with switchable function for mph, kph and x 100 rpm.
CI-1265-1, for cars w/o CS-2048, wt. 3 lbs. 59.95
CI-1265-2, for cars w/CS-2048, wt. 3 lbs. 49.95
CSA-2048-1, for front-whl drive, wt. 1 lb. 8.95
Digital Quartz Clock/Timer has 24-hour stopwatch.
GC-1415, Clock w/Trip Timer, wt. 2 lbs. 39.95
GC-1406, Clock w/o Trip Timer, 1 lb. 24.95



Unit comes with inside switch and hand-held transmitter

Powerful 1/3 hp motor and automatic 75-watt dome light

Automatic Garage Door Opener opens remotely, provides security and lights your entry

In the dark or in a storm, your garage door will open automatically at the touch of a button, and greet you with an illuminating 75-watt dome light as the car rolls into safety and dry shelter. An inside garage switch securely closes the door and turns off the light after you enter. Extra security, with 256 programmable codes.

Transmitter, Receiver and Door-Opener Mechanism.

Kit GD-3309C, Shpg. wt. 45 lbs., Mtr. Frt. 184.95

Two Transmitters, Receiver and Door-Opener Mechanism.

Kit GD-3309D, Shpg. wt. 46 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



Timing Light with advance meter and built-in tach

Measures mechanical or vacuum advance to 60° from 1500 to 4500 rpm.

Kit CI-1D96, Shpg. wt. 4 lbs. 79.95

Xenon Timing Light makes daylight reading easy

Handy inductive pickup attaches and detaches for quick setup. 12 VDC.

Kit CI-1040, Shpg. wt. 3 lbs. 34.95

Professional-grade Engine Analyzer finds trouble

This professional-grade instrument tests conventional, magneto, transistorized and most capacitive-discharge ignitions – both pos and neg ground; 4, 6 or 8 cylinders. You can pinpoint troubles in alternator or generator, voltage regulator, distributor, condenser, plugs, starter, battery and auto accessories. Color-coded 6" meter.

Kit CM-1D50, Shpg. wt. 8 lbs. 107.95



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



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

\$77.95

- 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 "Suwanee 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

Pre-programmed Musical Car Horn tunes:

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

...you can also program your own tunes!

Use Electrical Systems Course to repair your car at home

\$79.95

- Covers starting, charging, accessory/body electrical systems

- Features hands-on experiments to show repair procedures

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

\$79.95

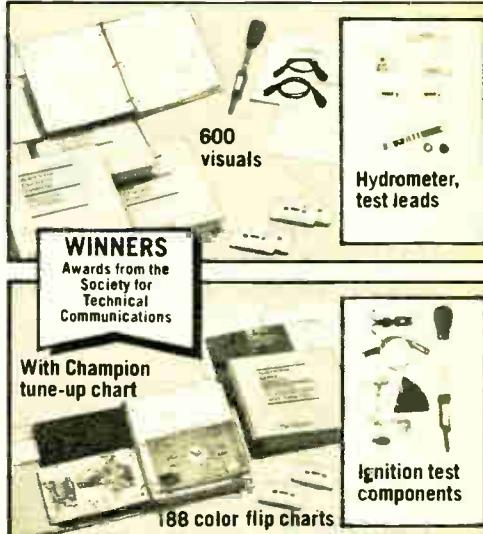
- Learn to tune Chrysler/Ford/GM std. and electronic ignitions

- Detect problems early to save costly, time-consuming repairs

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

\$19.95

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

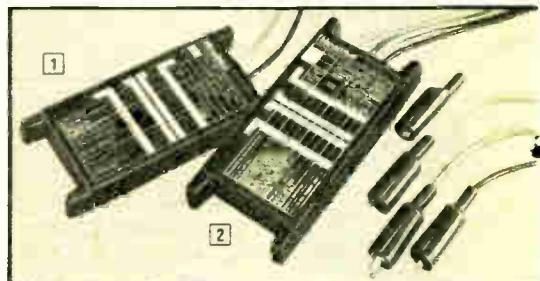
Tests battery condition, function of reluctor and pickup coil, switching of primary coil and location of faulty component in primary ignition circuit. 0.75" H x 2.50" W x 5.50" L. Requires some ignition knowledge. Pickup coil test won't work on '78 and newer Omnis, Horizons, K-cars with Hall-effect ignitions. Kit CI-2055, Shpg. wt. 2 lbs. 19.95

2 Charging System Tester

\$19.95

- 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



Heath/Dana Speed Control increases driving comfort, reduces fatigue on long car trips

\$99.95

- Maintains preset speed on uphill, downhill, and 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**

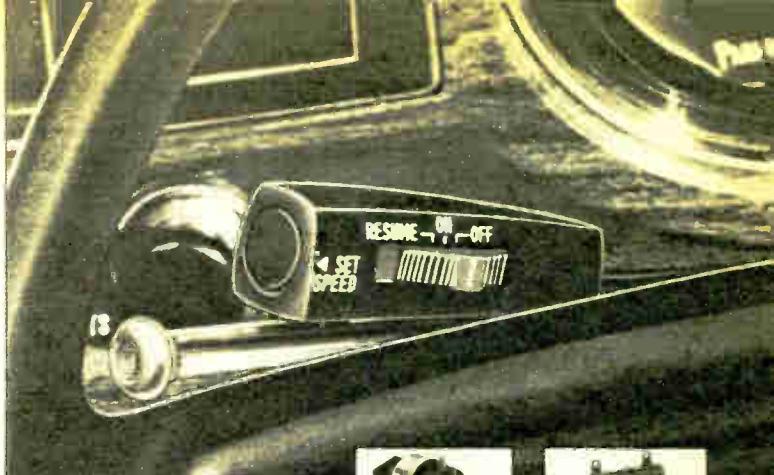
CSA-2048-2 Installation Kit. For '73-'75 Honda Civic, '75-'81 Honda CVCC or '77-'81 Honda Accord. Shpg. wt. 2 lbs. **18.95**

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



**SAVE
\$20.00**

On these Siren/PA systems! If purchased separately, \$179.90

GD-18A (Kit GD-18 & Exterior horn) Shpg. wt. 21 lbs. **159.90**

GD-18B (Kit GD-18 & Concealed horn) Shpg. wt. 21 lbs. **159.90**

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**

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**

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.

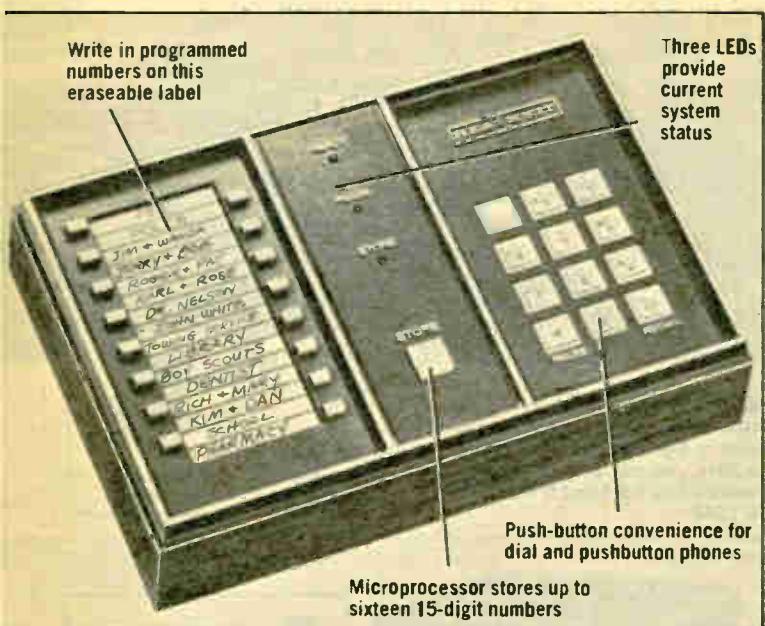
The CP-1060 is designed for conventional distributor ignition systems. It comes with our famous step-by-step instructions for assembly and installation.

Kit CP-1060, Shpg. wt. 3 lbs. **57.95**



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

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



- Microprocessor-based unit stores up to 16 numbers for one-button contact and re-dial if line is busy
- Converts standard dial phones to pushbutton convenience
- Helps you respond fast in emergency situations

A fire or other emergency is no time to be looking for the fire department or police phone number. The Heathkit One-Button Phone Dialer comes to the rescue by dialing a vital number with the push of ONE button. And if the number is busy, the automatic redial feature lets you ring again right away. The One-Button Phone Dialer stores up to 16 full 15-digit phone numbers (enough for all access or area codes). You can program several emergency numbers and still have plenty of space available to encode the numbers of frequently-called neighbors, businesses, friends and relatives. Ideal at the office as an aid to dialing commonly-used extensions.

Easy programming lets you change telephone numbers on your Dialer quickly. A special memory-save circuit maintains stored numbers if your electrical power should be interrupted (9V battery not included). The GT-1217 converts any telephone into a pushbutton model compatible with standard rotary dial and pushbutton service. Connection to any modular phone jack is easy, and complies with all FCC interconnect regulations, too. It cannot, however, be used on party lines or pay telephones.

Assembly is easy, and so is operation. Housed in an attractive 2" H x 8.75" W x 5.75" D case, the One-Button Phone Dialer features a convenient two-color, heavy-duty label that allows you to write in the numbers you have entered. Want to change numbers? The label is cleanly erasable. Three LEDs provide current system status. Designed for 120 VAC operation; uses a low 2 watts power.

The famous **Heathkit assembly manual** will guide you step-by-step from sorting the components, through the entire assembly process to final plug-in.

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

79.95



Two-Way Telephone Amplifier lets you talk, listen with hands free

- Answer the phone by pressing a button, without lifting receiver, saving time and handiwork
- Talk and be heard from up to ten feet away

Save time! Our Phone Amp lets you work with both hands free and talk at the same time. Press the power button to answer the phone; press it again to hang up. Ideal for conference calls at the office or family calls at home, the GD-1112 amplifies a telephone conversation to room-filling volume. Voice-activated circuitry instantly switches from talk to listen. A firm slide control adjusts the listening volume, and the built-in microphone

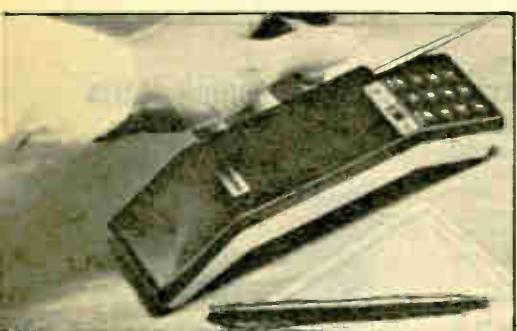
maintains clear conversation from up to 10 feet away. Pressing the Listen button disables the mike but still lets you monitor the line. To return your phone to normal, just turn the amplifier off. Automatic squelch and phase-locked loop circuitry provide quiet, clear-voiced operation. Requires an external phone and includes a 1 1/4" square four-pin phone plug for easy installation. Operates on one 9-volt battery (not supplied) and comes with six feet of 4-conductor cable. Unit may be used on a desk or wall-mounted firmly.

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

49.95

PS-2350, 120 VAC Converter, 1 lb.

7.95



Mura Cordless Extension Phone can answer and initiate calls

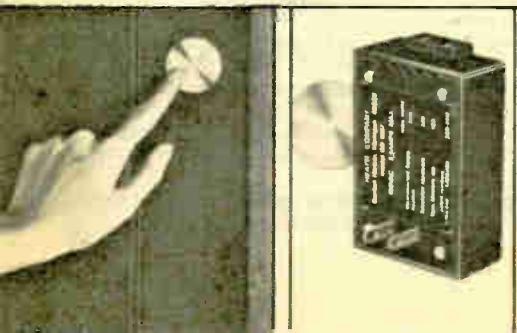
- Cordless handset works up to 600' away from base unit without interference
- Includes AC power supply adapter, battery charger, owner's manual

With the MuraPhone Model 600/601 you can initiate or receive telephone call up to 600' away from your phone — with no wiring to get in the way! Heath evaluated many units and found this one offered the best combination of features at this price. Small enough to carry with you from room to room, the cordless extension phone's full duplex circuitry lets you talk and listen simultaneously, with con-

ventional phone audio quality. Its 12-button dial pad includes one which remembers the last number dialed. Base unit has telephone line cord with modular plug, dial function switch, antenna, RF gain control and a power input socket. The comfortable handset has an off/standby/talk function switch, low battery indicator, reset and last number recall keys, antenna, dialpad and battery recharge jack. Base, 7" x 8" x 2" with 23.5" telescoping antenna. Handset, 2" x 2.38" x 8.63". Includes 4.5' phone cord. FCC approved. Not for use with party lines or pay phones.

GDP-1239, Assembled, 5 lbs.

179.95



\$18.95

Tap the touch plate, and our Remote Control Kit turns appliances or lights on or off instantly. Place the touch plate right where you want it — in any location, at any height. Takes just one evening to assemble and install. No bother and expense of extra outlets, wall boxes or rewiring. The main unit plugs between an outlet and a lamp or appliance

cord. Features half-brightness position for longer bulb life. With 20' wire. Static protected.

Remote Kit for incandescent lamps to 150 watts. Kit GD-1187, Shpg. wt. 1 lb.

18.95

Appliance Remote for TVs to 225 W, fans to 180 W. Kit GD-1287, 2 lbs.

19.95



FAST, EASY
1-EVENING KIT

NEW

A medium-power Integrated Amplifier with state-of-the-art features and versatility

- Possibly the most adaptable amplifier available in its power class, with features of a high-power amp at a mid-power price
- No need to sacrifice important audio features and performance if you want less than the highest power and price
- All the features of a high-power amp at a mid-power price

30 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.009% THD FROM 20 TO 20,000 Hz

This is the **Integrated Amplifier** of the future. Into our era of energy consciousness comes a smaller, more efficient amplifier with advanced preamp features – for audiophiles who want the best in sound and the most in features. Heath has engineered this phenomenal integration and endowed it with an ultra-low distortion power amp by incorporating the latest amplifier design technologies. Dynamically-biased outputs are the answer.

Extreme versatility is the key to the medium-power AA-1205 Amplifier. It features inputs for tuner, two phono, two tape decks and two auxiliary inputs. An adapter loop lets you insert an equalizer, audio processor or other accessory into your system without having to constantly rewire or use one of the tape monitors. A peak-power, 10-segment bar graph indicates a 45 dB total range from -42 dB to +3 dB for each channel. A continuously variable loudness control can enhance the frequencies below midrange at low listening levels.

Front panel push buttons activate 20 Hz or 50 Hz low filters and 6 kHz or 12 kHz high filters. The tone controls feature switchable 250 Hz or 500 Hz bass turnover points, and 2.5 kHz or 5 kHz treble turnover points. The AA-1205 includes tone flat, mono, record mode, source and speaker select switches, a balance control and tape monitoring facilities so you can choose the source you want to listen to while recording another source.

Back panel jacks allow you to disconnect the amplifier from the preamp to insert an electronic crossover and separate the bass for a subwoofer such as the AS-1320 on page 97. Two outlets (one switched, one unswitched) handle a total of 200 watts. Quick-connect speaker clips for left and right channels make connection to your speaker system simple and efficient. A front panel headphone jack lets you listen to your favorite music in private, for a more personal audio experience. In combination with the AJ-1200 Tuner below, you



can enjoy the versatility of an amplifier/preamp/tuner system in two units, with considerable savings and a noticeable improvement in audio quality.

AA-1205, Shpg. wt. 18 lbs.

289.95

AA-1205 SPECIFICATIONS: Preamp THD: 0.009%. Frequency Response: 20-20,000 Hz, ± 3 dB, high level; 20-20,000 Hz, ± .5 dB, phono. A-Weighted S/N: 85 dB hi-level, 75 dB phono. Input Sensitivity: (.5 V out) 1.25 mV phono; 100 mV high level. Separation: 60 dB. Amplifier TIM (DIM 100): < 0.02%. S/N Ratio: 90 dB. Intermodulation Distortion: 0.012%. Dimensions: 14.9" H x 4.6" W x 13.75" D.

NEW

Matching Digital FM Stereo Tuner has expandable AM reception and Dolby NR capabilities

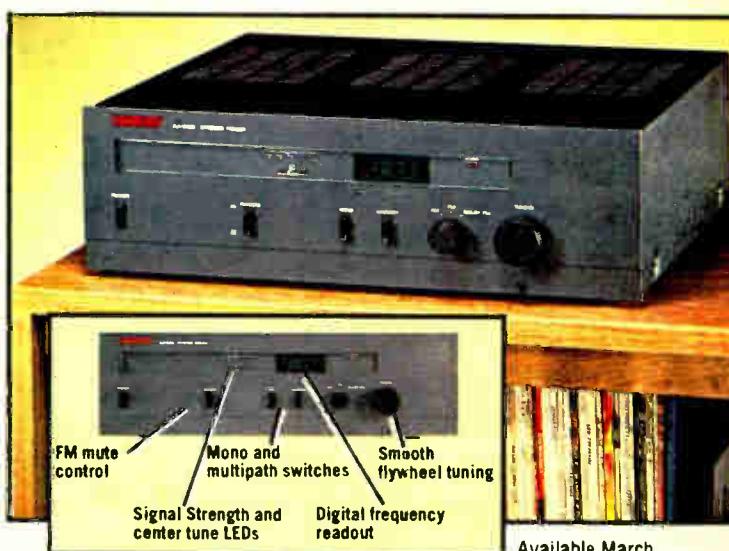
- Designed by Pro-Series engineers at Heath for quality and value
- Highly sensitive, selective circuitry for dependable reception
- Easy construction takes only a few enjoyable evenings

Critical listeners agree that Heath's line of Pro-Series Audio Components consists of some of the finest pieces of high fidelity equipment you can buy, and major independent testing laboratories substantiate this claim. Introduced to dramatically improve your world of music, the AJ-1200 Tuner follows in the footsteps of the Pro-Series components! We've refined our expert engineering knowledge into a unit with every essential spec, arriving at a Digital FM Stereo Tuner that represents true state-of-the-art in audio reproduction.

Designed to match the AA-1205 Integrated Amplifier, above, you get only the amount of tuner that you want. An accessory AM Module and a Dolby Module are available for listeners who wish to add these features to their system. A front panel tuning knob provides smooth flywheel action and quick band transition without the annoying backlash that can ease stations off-frequency.

This is the Digital Age, the wave of the future. Each frequency you tune is displayed on an easy-to-read, light green digital display while three LEDs indicate out-of-tune and center tune conditions. A single LED indicates stereo reception and a five-LED bargraph shows signal strength. AFC-actuated muting makes tuning crisp and controlled. A single rotary switch selects AM, FM or Dolby FM reception if the options are installed. Additional front panel pushbutton switches are provided for muting, monaural and multipath indication. The multipath switch lets you monitor the multipath signal audibly which allows you to adjust the antenna for best reception in your area.

The FM tuning unit is **preassembled and prealigned** for maximum performance. Stereo signals are demodulated with an integrated circuit, while selectivity is provided by two ceramic filter elements. The matched black aluminum styling of the AA-1205 Integrated Amplifier and AJ-1200 Digital FM Tuner make an attractive addition to any decor. Let Heath expand your aural horizons to new heights of musical appreciation. Test-listen to our new line of mid-cost audio components at a Heathkit Electronic Center, and hear the difference.



AJ-1200, Shpg. wt. 14 lbs.

239.95

AJA-1600-2, Dolby FM Module, Shpg. wt. 1 lb.

49.95

AJA-1200-2, AM Module, Shpg. wt. 1 lb.

39.95

AJ-1200 SPECIFICATIONS: FM Section: Mono/Stereo; Usable Sensitivity: 1.9 uV (10.8 dBf). 50 dB Sensitivity: 3.5 (16.1)/38 (36.8) uV(dBf). S/N: 70 dB Mono/65 dB. Frequency Response: 30 Hz to 15 kHz, ± 1.5 dB. Selectivity: 52 dB. Harmonic Distortion: 0.3%. Hum and Noise: 65 dB. Same dimensions as described for AA-1205, with a matched-finish cabinet.



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

Pro-Series High-Fidelity Components — American innovations in audio technology from Heath

The Pro-Series is Heath's finest audio line, with quality design features unheard of in systems at this price. State-of-the-art electronics and our 'listening awareness' ingenuity deliver rich, authentic sound that can turn your room into a concert hall, and reflects your quest for excellence in sound reproduction. Near the ultimate in stereo high fidelity, the pride of building these audio kits and the pleasure of listening to them will last a lifetime.

① Get lower distortion with this Digital AM/FM Tuner

Designed for use with the AA-1600 Stereo Amplifier (next page) and AP-1800 Preamplifier (below) as the 'heart' of a truly sophisticated stereo music system, the AJ-1600 AM/FM Stereo Tuner has truly outstanding specifications and performance characteristics. For cleaner reception, it features a digital frequency display that allows exact station tuning and selectable wide/narrow IF bandwidth for extremely low distortion in normal and congested areas. An antenna input attenuator reduces cross modulation, while a switchable signal-strength/multipath meter assures precise antenna orientation and maximum signal reception.

The Tuner's significant specifications include: a sensitivity of 1.8 μ V (mono) and 3.5 μ V (stereo) for clean, crisp reception of weak or distant stations; signal-to-noise ratio of 83 dB (mono) and 75 dB (stereo) for noise-free enjoyment on stronger stations; harmonic distortion levels below 0.1% on both mono and stereo; and stereo channel separation of more than 45 dB at mid-frequencies for full, expressive stereo listening. Even the AM section provides remarkable reception that approaches 'hi-fi' quality.

Two critical boards are factory assembled and tested to assure optimum performance, and the Dolby Noise Reduction Module option noticeably increases dynamic range on stations which broadcast Dolbyized material.

Kit AJ-1600, Digital AM/FM Tuner, Shpg. wt. 25 lbs. 439.95
AJA-1600-2, Dolby FM Noise Reduction Module, wt. 1 lb. 49.95
AEA-1800-2, Oak-Finish Cabinet, wt. 6 lbs. 33.95

② Preamplifier provides complete audio signal control

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

Quality design and exclusive features make this an extraordinary value. The extremely versatile Heathkit AP-1800 was designed for use with the Heathkit series of rack-mounted audio components, and gives you complete control of multi-source signals without the introduction of audible distortion or coloration. Has one moving-coil preamp, plus two moving-magnet cartridge inputs with triple sensitivity and capacitance selection to match any turntable cartridge; tape monitoring for two decks, plus deck-to-deck dubbing and the ability to listen to any source while recording deck-to-deck; separate bass and treble controls for each channel, with two turnover points for precise tone adjustment and tone bypass. A built-in infra-sonic filter reduces rumble and low-frequency noise from your records, and the independent loudness control is based on the latest psychoacoustical data.

Kit AP-1800, Stereo Preamplifier, Shpg. wt. 27 lbs. 369.95
AEA-1800-2, Oak finish Cabinet, wt. 6 lbs. 33.95

SAVE \$25 on this turntable and cartridge

Buy this pair of audio products together and really save! System includes Dual 608 Direct-Drive Semi-Automatic Turntable with ULM tonearm, pitch control, 3 speeds. -75 dB rumble (DIN-B), 0.03% WRMS wow and flutter, plus Dynavector Ruby Cartridge (see below and page 98 for specs.).

ACS-1608, Shpg. wt. 29 lbs. 564.95

Acknowledged as one of the world's finest audio pickup devices, this Dynavector Ruby Moving Coil Cartridge has a square 2.5mm ruby cantilever for maximum rigidity and unsurpassed groove-to-coil signal transmission. Requires AP-1800-type Preamp (above). Weight-engineered to match the Ultra Low Mass tonearms of today's finest turntables. Possesses an extremely high tracking capability.

ADP-1260, (requires AP-1600 type preamp), wt. 1 lb. 290.00



③ Ten Band Equalizer tailors acoustic response

Engineer records, tapes and FM broadcasts to your creative tastes using the AD-1703 Ten Band Octave Equalizer. It's the only add-on with features that can dramatically improve your existing sound — from cartridge to speakers — without the enormous expense of buying a whole new system!

Ten ISO centered frequency-band slide controls for each channel give you octave-by-octave adjustments over the entire audio spectrum. They let you eliminate 'live' and 'dead' room spots for smooth, flat-graph response. The controls also improve your components by enriching cartridge response, cutting harmful subsonics and enhancing woofer, midrange and tweeter performance. A sophisticated switching circuit allows equalizing before or after recording w/out rearranging wires. Left and right channel LED clipping indicators warn of peak overload conditions. Harmonic distortion is a state-of-the-art spec: 0.001% from 20-20,000 Hz at rated output.

Kit AD-1703, Ten Band Equalizer, Shpg. wt. 17 lbs. 259.95

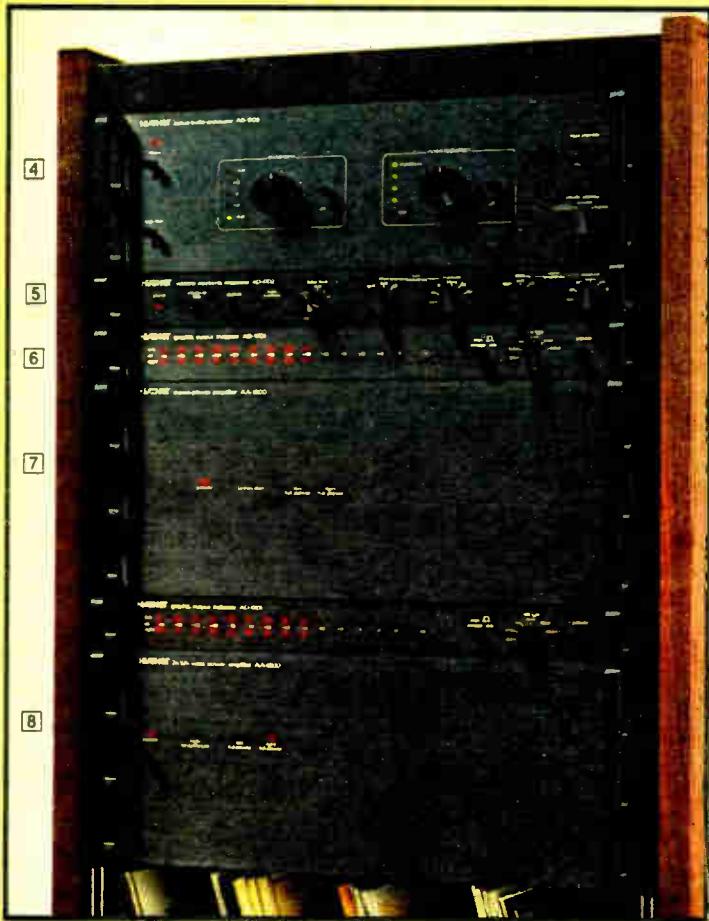
Pro-Series Rack combines beauty and convenience

Bring all your Heathkit Pro-Series equipment together in one, portable space-saving rack. Compatible with Standard EIA panels of any height, all components are within easy reach for adjustment or inspection. Comes with dividers for storing records and top shelf for a turntable. Locking swivel casters make for quick changes in listening room setups. Handsome walnut veneer side panels will add contemporary taste to your music room and a unified look to a series of components that mirror your exceptional taste. Dimensions: 43 $\frac{1}{2}$ " H x 21 $\frac{1}{2}$ " W x 18" D.

Kit AE-1705, Wt. 74 lbs. 264.95



Designed for audio enthusiasts who demand the finest, studio-quality sound reproduction



④ Boost your dynamic range, get less noise and tape hiss with the Pro-Series Active Audio Processor

Dynamic range is to music what perspective is to a painting or photograph. It gives music depth and feeling. Some of the dynamic range in most music is lost in the recording or broadcast process, but the expander circuit in the AD-1706 can restore up to 7 dB of this loss. Your music comes through with added realism, better definition and lower background noise, while maintaining full frequency response and low distortion — even at high volume levels. The AD-1706 also contains a noise-reduction circuit that sifts out up to 10 dB of noise from records and hiss from tapes, which effectively increases your system's total dynamic range by up to 17 dB.

Front panel LEDs indicate both relative noise reduction and dynamic range more precisely. The AD-1706 connects between the tape output and tape monitor jacks of your preamplifier, integrated amplifier or receiver. And expanded capabilities of the built-in tape monitor mean you can apply processing before OR after recording. With rugged construction and dependable solid-state circuitry, the Active Audio Processor can greatly improve the listening quality of any stereo system for many years to come.

Kit AD-1706, Active Audio Processor, Shpg. wt. 18 lbs. 254.95
AEA-1800-2, Oak-Finish Cabinet, Shpg. wt. 6 lbs. 33.95

Optional oak-finish wood cabinets for Heathkit Pro-Series Audio Components (except AA-1800) are listed and sold separately for each unit.

⑤ Electronic Crossover expands bass response

Used with a subwoofer such as the AS-1320 (p. 97), the Variable Electronic Crossover dramatically expands bass response. The AD-1702 allows you to multi-amp your stereo system, giving more accurate crossover alignments for lower distortion and better response. Six selectable crossover points at 40, 60, 80, 100, 125 and 150 Hz can be frequency scaled up to 6 kHz. Outputs for stereo, monaural and bridged hookup let you connect another amplifier and subwoofer to your system. Switchable 6 dB/octave and 18 dB/octave slopes give you a flat response at crossover points. Better control of drivers is possible in biamp and triamp applications, so you can play music at live performance levels with lower distortion.

Kit AD-1702, Variable Electronic Crossover, 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 Graphic Output Indicator monitors peak power levels

Accurate monitoring of peak power output is critical to avoiding overloads and speaker damage. The AD-1701, one of the finest output indicators on the market, gives you a visual readout of your amplifier or preamp output. Two rows of 15 LEDs (one row for each channel) warn you of dangerous peak loads that could harm your stereo system or blow your tweeters. Accurately monitors your system output with a 50 dB dynamic range. Six-position range switch offers wide sensitivity, and 50 dB dynamic range covers almost any source material. A peak hold/average button allows you to supplement your tape deck's restricted meters, thus assuring more precise, low-distortion recordings. All Pro-Series components fit standard 19" racks.

Kit AD-1701A, Graphic Output Indicator, Shpg. wt. 15 lbs. 164.95
AEA-1800-3, Solid Oak End Panels, Shpg. wt. 2 lbs. 14.95

⑦ Pro-Series AA-1800 High-Power Amplifier has the power to prevent clipping on wide dynamic range sources

250 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.025% TOTAL HARMONIC DISTORTION FROM 20-20,000 Hz.

The wider dynamic range achieved by new recording techniques requires more power and headroom to faithfully reproduce the full sound spectrum. Without that power, musical peaks get clipped, which results in the dynamic range being chopped. Less power, less music. The AA-1800 provides a full 250 watts per channel and expanded 2.5 dB dynamic headroom, without introducing noise into your music. Hum and noise is a full -85 dB down, with a Transient Intermodulation Distortion of less than 0.03%.

A patent-pending protection system safeguards your speakers from damaging input signals, and thermal circuit breakers defend against excessive heat. LEDs for each channel indicate full power output. Heath's dedication to quality engineering is evident in the AA-1800 Amplifier. People who listen to it find accurate, clearly-defined music — at a wallet-pleasing price.

Kit AA-1800, 250-watt Amplifier, Shpg. wt. 75 lbs. 584.95

⑧ A proven performer — The AA-1600 Stereo Amplifier

125 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.05% TOTAL HARMONIC DISTORTION FROM 20 to 20,000 Hz.

If you're planning to move up to a medium-power amplifier, then the AA-1600 is one you should consider. It has the power, the clean amplification and the safety features that smart audiophiles demand — at an affordable price. It packs a mighty 125 watts of power per channel with 2.0 dB dynamic headroom to reduce clipping and operate your speakers at their maximum dynamic range. All sources including tapes, records and broadcasts are amplified with extreme clarity and inaudible distortion. Hum and noise are a full 90 dB down, so music springs from a background of total silence. Transient intermodulation distortion is less than 0.05%. Complete speaker and circuit protection includes 8-second turn-on delay and a thermal circuit breaker.

The amplifier and power supply circuit boards come fully assembled, tested and adjusted. Looks handsome in our optional oak-finish cabinet. This beautifully designed power amp deserves to be part of your stereo system.

Kit AA-1600, 125-watt Amplifier, Shpg. wt. 51 lbs. 349.95
AEA-1800-1, Oak-Finish Cabinet, Shpg. wt. 5 lbs. 33.95



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

STEREO HIGH FIDELITY/95

The finest Heathkit Stereo Receiver puts you in total control of your favorite music sources

125 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.05% TOTAL HARMONIC DISTORTION FROM 20 TO 20,000 Hz.

- Your choice of front panels, either silver or black-anodized aluminum
- 1.8 μ V sensitivity for clear FM reception with 80 dB FM s/n ratio
- 125 watts of purely-defined sound

Clean FM reception: a 1.8 μ V sensitivity pulls in your favorite stations loud and clear. The special narrow band switch and five-gang FM tuning capacitor rejects unwanted signals for best FM reception, minimal interference.

Precise, on-the-spot tuning: Flywheel tuning knob and blue fluorescent 4-digit display lets you hit the exact AM or FM station frequency. Center tune and signal strength meters quickly indicate optimum reception with the greatest stereo separation and lowest distortion.

Complete audio control: Adjust your music to an ultrafine degree with the bass, midrange and treble controls, high or low filter switches, or tone flat switch.

A receiver you can build on: With a -90 dB hum and noise rating, the AR-1650 Stereo Receiver delivers more music and less noise from audio sources. You can plug in two turntables, auxiliaries and tape decks.

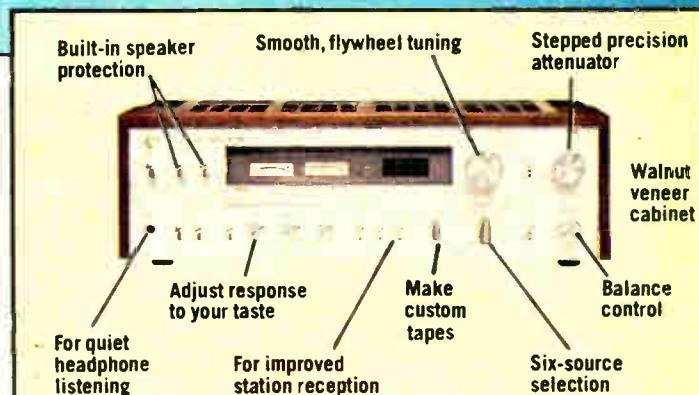
Other deluxe features: Built-in speaker protection; Turn-on delay and thermal-circuit breakers; headphone jack; tone flat, mute, loudness and speaker select switches; Precision Tuning System; walnut cabinet.

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: 1/1%. Freq. Resp: 20 Hz to 15 kHz, \pm 0.5 dB. Selectivity: Wide, 40 dB. Narrow, 80 dB. AM Section: 30 μ V Ext. Ant./Radiated Sensitivity: 250 μ V. S/N: 50/40 dB. Amp. Section: Input Sensitivity: 0.67 mV phono, 67 mV Aux. Maximum Input Signal: 150 mV phono, 10 V Aux. Freq. Resp: 20 Hz to 20 kHz \pm 0, -0.2 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).



The AR-1650 is the finest Heathkit Stereo Receiver ever! You get new versatility, including capabilities to accept more sources, drive two separate sets of speaker systems — and a unique monitoring system. It takes about ten evenings to assemble from kit.

SAVE \$50

on this superb-sounding receiver

A Stereo Receiver with high style and power at a pleasing low price

\$249.95

- FM/Phase-Locked Loop stereo demodulation circuitry
- Ceramic filters ensure excellent AM and FM selectivity
- 1.8 μ V sensitivity; 40dB stereo separation; -65dB hum and noise; complementary-symmetry power amplifier

Here's a medium-power stereo receiver with specs you'll find only on units costing a great deal more. It provides enough low-distortion power for almost any listening area, and fingertip controls that enhance performance.

The AR-1429 has many of the same features that give the higher power, more expensive receivers their clean, rich sound. A complementary-symmetry amp accounts for the very low 0.1% distortion even at high power levels, and a PLL circuit will provide outstanding stereo reception at all times.

Big receiver versatility and advanced design, with two low-level inputs for magnetic cartridge turntables and three high-level inputs for aux, tape decks and monitor. Output jacks for two sets of speakers. Complete controls include bass, treble and balance; FM mute and blend, loudness and tape flat switches so you can custom-tailor any music.

The planetary drive tuner smoothly moves a lighted pointer across an easy-to-read log scale that "blacks out" when power is off. Signal and tuning meters make station peaking easy and accurate. For private listening, a headphone jack is provided and you may build and install the optional Dolby NR module for increased dynamic range and reduced noise on Dolby broadcasts.

Kit AR-1429, Shpg. wt. 32 lbs. WAS \$299.95, NOW ONLY 249.95

Kit AD-1504, Optional Dolby NR Module, Shpg. wt. 1 lb. 49.95

35 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.1% TOTAL HARMONIC DISTORTION FROM 20 - 20,000 Hz.

AR-1429 SPECIFICATIONS: Amplifier: Frequency Response: -1 dB, 5 Hz to 45 kHz. Damping Factor: >60. Input Sensitivity: Phono, 2 mV; Aux, Tape and Tape Mon., 200 mV. Hum and Noise: Aux., Tape and Tape Mon., -80 dB; Phono, -65 dB (-79 dB for 10 mV). FM Section: Sensitivity: 1.8 μ V (10.3 dBf) usable, 4.0 μ V (17 dBf @ 50 dB signal to noise). Selectivity: 65 dB. Capture Ratio: 40 dB. AM Suppression: 48 dB. Image Rejection: 90 dB. FM Stereo Separation: 40 dB, typ. at 1 kHz. Frequency Response: \pm 1 dB from 20-15,000 Hz. AM Section: Sensitivity: 10 μ V. Selectivity: 20 dB at 10 kHz.



Use this Module with your AS-1320 Subwoofer — for an outstanding 4-way speaker system

For AS-1320 owners, audiophiles and experimenters who want one of the finest speaker systems available

- New fourth order crossover design produces more natural sound
- Advanced-technology drivers produce clean, uncolored audio
- Driven by 30 Watts/channel — handles up to 250 Watts/channel

Here's a state-of-the-art three-way speaker module, with performance comparable to the best components available. The AS-1321, for use with the AS-1320 Subwoofer or with your low-frequency driver, delivers beautiful sound with a frequency response of 100-20,000 Hz (± 3 dB).

The well-damped 6.5" polypropylene mid-bass speaker features much smoother response than conventional paper cones. The 2" impregnated textile dome midrange speaker has excellent transient response for exceptional instrument reproduction. The advanced-design leaf tweeter maintains horizontal dispersion over a very wide frequency range.

A new crossover design utilizes the natural low-frequency rolloff of the individual drivers and a matched second order LC filter to minimize errors and make phase shifts more gradual — for natural sound in the crossover region.

This Three-Way Speaker Module Kit assembles in as little as two evenings.



The Heathkit AS-1320 Subwoofer provides the bass notes you've been missing

- 15-750 Hz frequency range, 22-500 Hz (± 3 dB) frequency response
- Can be combined with AS-1321 Three-Way Speaker Module above to produce an outstanding four-way, full-range speaker system

Here's an efficient subwoofer that gives you all the benefits of today's recording breakthroughs — including direct-to-disk and digital. Heath engineers found that many smaller subwoofers have bass response no better than a good bookshelf system. So they designed one of the largest, most efficient subwoofers on the market — the Heathkit AS-1320.

Designed to add bass to a small system — the AS-1320 can even enhance some 12" systems. It extends the low frequency range of your system, and reduces bass distortion that occurs when the wing speakers try to reproduce low bass notes. A ported cabinet alignment uses computer-aided design techniques to

Kit AS-1321, Three-Way Speaker Module, Shpg. wt. 31 lbs.	289.95
SAVE \$20.00! Buy AS-1320 Subwoofer and AS-1321 Three-Way Speaker Module together — for the ultimate 4-way speaker system! These components would cost \$589.90 if purchased separately.	
Kit AS-1324, Shpg. wt. 208 lbs., Motor Freight Collect	569.90
SAVE \$90.00! Purchase a pair of AS-1324 4-Way Systems. \$1179.80 if purchased separately.	
Kit AS-1324-2, Shpg. wt. 416 lbs., Motor Freight Collect	1089.80

AS-1321 SPECIFICATIONS: Frequency Range (-10 dB): 70 Hz to beyond 25,000 Hz. With AS-1320, 15 Hz to beyond 25,000 Hz. Frequency Response (± 3 dB): 100-20,000 Hz. With AS-1320, 22-20,000 Hz. Impedance: 6 ohms (4 ohms minimum). Recommended Amplifier Power: 30-250 Watts per channel. Crossover Frequencies (-6 dB): 100, 600 and 4,000 Hz. Crossover Type: Acoustic 4th Order.



NEW
The AS-1321 Three-Way Speaker Module fits inside the AS-1320 cabinet to produce a great-sounding 4-way speaker system. Its polypropylene mid-bass speaker can reproduce un-colored lower midrange frequencies. The midrange speaker has great power handling properties. And a leaf tweeter provides crisp, clear high-frequency sound. The speakers are thermally protected, using a circuit breaker (not a fuse), from excessive power input. The Speaker Module's rear panel features two terminal strips to allow wiring the speakers for either full range or bi-amplified operation.



The non-directional Heathkit AS-1320 Subwoofer can be placed in any convenient location — even away from your mid- and high-range systems. It can be used singly, as well as in pairs — and can even be expanded to a four-way system with the AS-1321 Three-Way Speaker Module above — or with a module of your own design.

The AS-1320's 15-inch long-throw driver features a 2" four-layer voice coil in a vented box alignment for optimum transient response, extended bandwidth. The black cabinet — with walnut-stained decorative ash rails — uses high-density materials to prevent coloration of bass notes.

maintain an extended, flat low frequency response. A 6" tuned vent is loaded into the floor for even better response. The driver is mounted near the floor so the first boundary cancellation is above the frequency limits of the Subwoofer.

The Subwoofer requires the ASA-1320-1 Passive Crossover or AD-1702 Electronic Crossover (below). The Passive Crossover provides improved bass response, without a separate bass amp. For optimum performance, we recommend the Electronic Crossover to provide a nearly perfect response with virtually any wing speakers (Crossover requires a second amplifier for use with the Subwoofer).

A removable panel allows for expansion of this one-evening kitbuilding project to a full-range system, using the AS-1321 Three-Way Speaker Module above.

Kit AS-1320, Shpg. wt. 177 lbs., Motor Freight Collect	299.95
Kit ASA-1320-1, Passive Crossover, Shpg. wt. 6 lbs.	44.95
Kit AD-1702, Electronic Crossover (see p. 94 for description), 15 lbs. ...	194.95

AS-1320 SPECIFICATIONS: Freq. Range (-10 dB anechoic): 15-750 Hz. Freq. Response (± 3 dB): 22-500 Hz. Impedance: 8 Ω . Min. Amp. Power: 30 W. Max. Amp. Power on Normal Music: 250 W. Speaker Fuse: 2 A. Driver: 15" long-throw design. 2" four-layer voice coil. Cabinet Type: Ported box, tuned to 22 Hz. Dimensions: 64.5" H x 21.5" W x 17" D



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

STEREO HIGH FIDELITY/97

The 3-Way speaker with superlative sound



- Place upright or horizontally
- Two controls modify tweeter response

Our best-selling three-way, 8-ohm speaker delivers a $\pm 3\text{dB}$, 40-20,000 Hz frequency response, features a 10" woofer for ultra-deep bass, a 4.5" enclosed midrange for natural reproduction, and a 1" dome tweeter for 120° flat-response dispersion of frequencies from 3 kHz to 20 kHz. Features flush-mounted drivers, tweeter controls, walnut-veneer cabinet.

Kit AS-1373, wt. 68 lbs. each 199.95
Save \$20.00 buying a pair!
Kit AS-1373-2, wt. 141 lbs. 379.90



Dual 844 two-speed, 3-head Cassette Deck



- Metal-capable, with Dolby B and C NR systems; 1½ and 3¾ ips tape speeds

Leaving the competition far behind, the Dual 844 features a Direct Load and Lock system, three tape heads, tape/source monitoring, a 6-position tape-type selector, peak level display and VU meters, fade/edit, automatic repeat and microcomputer-controlled operation.

ATP-1844, Assembled, Shpg. wt. 22 lbs. 699.95

Low cost Stereo Amp



**15 WATTS MIN.
RMS, INTO 8
OHMS WITH
LESS THAN .5%
THD FROM
20-20,000 HZ**

Has dual-channel treble, bass and volume controls, plus balance control. Phono, tape, tuner and aux inputs for music sources. Tape output jacks.

Kit AA-1219, Shpg. wt. 15 lbs. 154.95

Sensitive, selective AM/FM Tuner



- 2 μV sensitivity, 40 dB separation
- Matches AA-1219 amplifier above

Features pre-assembled and aligned FM front end, with fine performance. Lighted dial, built-in AM antenna, FM antenna input, walnut veneer panels.

Kit AJ-1219, Shpg. wt. 12 lbs. 154.95

Solid-state Mono Amplifier



**3.25 WATTS,
MIN. RMS, INTO
8 OHMS WITH
1.5% THD FROM
40-20,000 HZ**

This fun kit takes a minimum 250 μV signal from any source and cleanly amplifies it. Features volume, tone controls, walnut-colored metal case. Kit AA-18, Shpg. wt. 4 lbs. 37.95

Extremely efficient high-fidelity at a low price



- 5-watt minimum driving power
- Impressive 60-14,000 Hz response

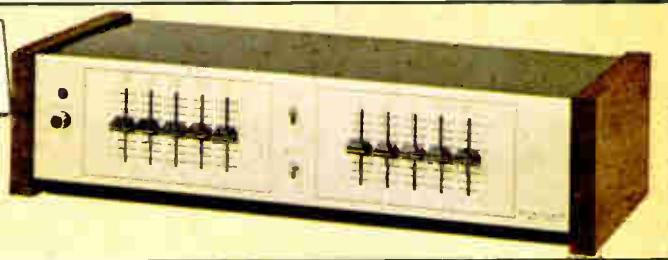
This remarkable fused speaker features an 8" woofer in a ported cabinet and a 2" x 6" horn tweeter with output control to shape high frequencies to room acoustics. Has excellent music reproduction, yet requires a comparatively low-power amp to efficiently drive it – as little as 5 or as much as 25 watts per channel.

Kit AS-1342, wt. 32 lbs., UPS each 89.95
Save \$9.95 buying a pair!
Kit AS-1342-2, wt. 78 lbs. 169.95

SAVE \$45
was \$144.95 in Cat. 854

\$99.95

- Control the entire frequency spectrum for beautiful sound



5-Band Audio Equalizer gives you absolute tone control

Made for the budget-minded audio enthusiast, the AD-1305 offers complete tone adjustment with five slide controls for each stereo channel. Designed for use with any receiver or amplifier having a pre-amp output and power amp input or tape monitor, it provides precise corrections. The equalizer's controls let you boost or reduce frequency response by 12 dB, from 30 Hz to 32 kHz. A

tone flat switch lets you record with or without equalization. Compensate for acoustics, differences in cartridge or speakers, even deficiencies in sources. Can also be used with tape recorders to filter scratchy records. S/N ratio: 90 dB below 1.5 volts. One switched, one unswitched, AC outlet. Walnut side panels, brushed aluminum front.

Kit AD-1305, Shpg. wt. 11 lbs. 99.95



Dual 1258 multiple play turntable

- Has exclusive Ultra Low Mass tonearm
- Single/multiple play Vario-belt drive

High-technology, automatic 3-speed strobbed turntable features pitch control, damped cue, single or multiple play spindle system (up to 6 records), wow and flutter $\pm 0.05\%$ WRMS, rumble (DIN-B) > 68 dB.

ACP-1258, Assembled, Shpg. wt. 6 lbs. 149.95

Semi-auto, 3-spd direct drive Dual turntable has $\pm 0.03\%$ wow/flutter, > 75dB rumble. Mfr.'s price, \$329.95.

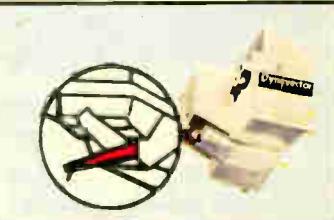
ACP-1608, Assembled, 20 lbs. 299.95



World-renowned Dynavector Ruby

This moving coil cartridge is acknowledged as one of the world's finest, with a wide 20-50,000 Hz response. Its synthetic ruby cantilever is only 2.5 mm long for maximum rigidity of the diamond stylus, and excellent tracking ability. Requires a preamp such as the Heathkit AP-1800 (p. 94). Has 0.2 mV output, > 20 dB separation. SAVE – buy your Dynavector with ACP-1608 Turntable (p. 94).

ADP-1260, Assembled, Shpg. wt. 1 lb. 290.00



Get the best response out of your records with these cartridges

MODEL	Response (Hz)	Output	Separation	Stylus	Tracking Force	Mfr.'s Price	Heath Price	With Turntable
Shure V-15 Type IV ADP-1259, 1 lb.	10-25,000	4.0 mV	25 dB	Hyperelliptical Nude Diamond.	0.75 to 1.5 gm.	\$191.00	179.95	159.95
Shure M95HE ADP-1298, 1 lb.	20-20,000	4.7 mV	25 dB	Hyperelliptical Nude Diamond.	0.75 to 1.5 gm.	\$113.50	69.95	59.95
Empire 2000E/III ADP-1147, 1 lb.	20-20,000	4.5 mV	28 dB	Elliptical 0.2 x 0.7	0.5 to 1.5 gm.	\$85.00	59.95	49.95



Reach for the stars! This home earth station comes with the Heathkit trademark of quality and reliability you can trust

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 Heathkit SRS-8100 Earth Station costs less than half as much — just \$6,995!

With the SRS-8100 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, news, musical specials, nightclub acts, concerts, Broadway plays and more!

Comprehensive manuals show you how to install the SRS-8100 Earth Station, from selecting a site to viewing your first satellite program. And technical help is available, by mail or phone, to answer your questions.

Based on a design used by commercial systems, the SRS-8100 Earth Station gives you uncommon performance and convenience in its price range. You get:

1. The SRA-8100-1 3-Meter Satellite Receiving Antenna, by Scientific-Atlanta: Made by one of the most experienced names in satellite communications, this adjustable-mount antenna can receive signals from 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. The SRA-8100-6 Earth Foundation Kit, which enables you to anchor the 3-meter satellite antenna in the ground — firmly enough to withstand 100 mph winds.

3. The SRA-8100-9 Rotatable Feed Assembly, which sends signals to the LNA/Down-Converter below. It automatically rotates to the proper polarization for each channel — receive up to 24 channels from one satellite, with one feed.

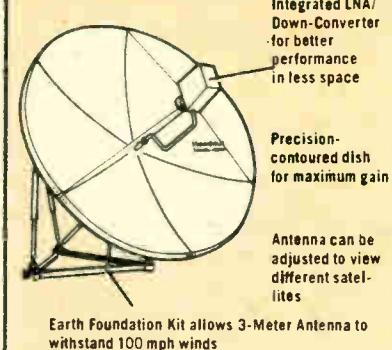
4. The SRA-8100-2 Integrated Low-Noise Amplifier (LNA)/Down-Converter by Scientific-Atlanta, which amplifies satellite signals and minimizes noise for a strong, clear picture. The signal is converted from 4 GHz down to the 500 MHz band — so it can be sent to the receiver via regular coaxial cable.

5. The Heathkit SRA-8100-3 Satellite Receiver Kit, with a special Zenith Space Command Remote Control. It features 24-channel electronic tuning for drift-free reception — a built-in memory for instant switching between two pre-selected channels — the ability to turn itself on, for viewing or recording, at times you select — and a built-in security circuit which allows connection of an alarm (not included) to alert you to any attempt to remove the LNA-Down-Converter.

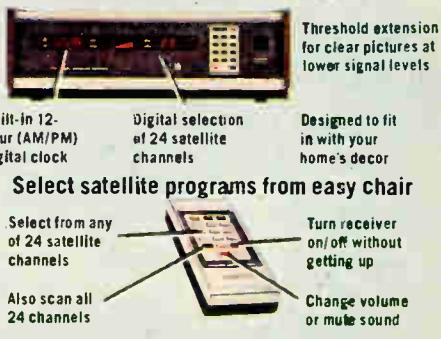
The special Zenith Space Command Remote Control — a satellite TV first — lets you turn the receiver on/off, enter channels directly, scan channels, change volume and mute sound — from your easy chair.



High-performance 3-Meter Antenna



Satellite Receiver has extra-value features



The Site Survey Kit will help determine if your site is acceptable for installation of the SRS-8100 Earth Station. Or if you would like a brochure with more information, call 800-253-0578 TOLL-FREE — or write to Heath Company.

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

*Federal Communications Commission equipment authorization relating to the sale of the Heathkit Earth Station requires the following disclosure: Use of this device may violate Section 605 of the Communications Act of 1934, as amended, through the unauthorized interception and divulgence of radio communications; or, the use of radio communications for one's own benefit where there is no entitlement to its receipt. Viewing of some satellite TV channels may require the customer to obtain permission from or make payments to, the programming company. Some programmers may not grant permission. Some local, state and foreign laws may now or in the future limit the use of this device. The customer is responsible for compliance with all applicable laws and regulations.



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



The Screen Star Color TV Projection Unit is mounted on easy-rolling casters so you can move it from room to room to suit your personal viewing habits.



All projection controls are easy to find: illuminated indicators instantly tell you which of the 82 UHF and VHF channels you're tuned to (Simulated TV picture).

Final opportunity to let your whole family enjoy the Heathkit Screen Star Projection TV System!

\$1499⁰⁰

while supplies last

- Absolutely the lowest priced quality projection TV system available on the video market today
- Specifically designed and engineered to meet the exacting requirements of projection television

Limited quantities left on the Heathkit Screen Star Projection TV System that can bring the theatre-like realism of sporting events, movies, news broadcasts, videotaped material and entertainment specials into your living room in large-as-life color. The GR-4000's picture quality rivals the definition and color of comparable units costing \$3000.00 or more. This system has been specifically designed to meet the exacting picture fidelity required by projection TV. It features not one, but three tubes with precision 127 mm f1.0 lenses for a brighter, more vivid color picture and wider viewing angle.

The Screen Star's outstanding color picture is projected on a 6-foot diagonal viewing screen designed to provide high reflectivity and minimum color shift. Durable and washable, the screen can be mounted on any wall you choose with the brackets provided. Smooth-rolling casters let you move the projector anywhere, or store it out of the way when not in use.

Reliable, solid-state electronics will provide a lifelike image for years to come. Automatic Fine Tuning (AFT) and an exclusive Heath LC filter keep your picture in tune from channel to channel. In fact, the IF amplifier will never need realignment! Special black-level clamping circuits help reproduce each scene faithfully by maintaining accurate brightness levels. Bridge-type power supplies and a ferro-resonant power transformer ensure superior performance and picture size - even during voltage brownouts. The Screen Star is our easiest-to-build color TV and the projection tubes, yoke, lens unit, high voltage supply and tuners are factory assembled and adjusted for faster kitbuilding. Plug-in circuit boards allow you to remove and service a single stage for component replacement or substitution.

100/TELEVISION

- Features state-of-the-art three-tube projection system using the finest f1.0 lenses available
- Delivers crisp, bigger-than-life 6' diagonal picture

A single antenna connection assures you of clearer reception with less interference. An internal UHF/VHF splitter and complete shielding of the tuners make the GR-4000 ideally suited for interfacing cable TV. A special input/output panel, with auxiliary 120 VAC outlet, lets you directly connect a video cassette recorder like the Zenith Video Director (page 103). And the Screen Star's audio system produces a full 5 watts of sound - as beautiful, rich, clear and distortion-free as the picture - through the large 6" x 9" speaker. Or connect your stereo to the external speaker jack or the VCR audio output jack for even better sound reproduction.

Spend less on service bills. A complete self-servicing manual enables you to perform the periodic convergence adjustments that all color TV sets require, with a built-in crosshatch generator and test meter supplied to make maintenance or repair fast and simple. Complete technical support is always available. Due to the GR-4000's popularity, please allow 8-12 weeks for delivery.

Kit GR-4000, Shpg. wt. 190 lbs., Mtr. Frt. While they last, 1499.00

GR-4000 SPECIFICATIONS: Antenna Impedance: 75 ohms coaxial, with internal UHF/VHF splitter. Tuning Range: UHF Channels 14 through 83, VHF Channels 2 through 13. AFT Pull-In Range: 0.7 to -1.8 mHz. Audio Output: 5 Watts at speaker and external 8 ohm speaker jack. Total Harmonic Distortion: Less than 0.5%. Videc IF Bandwidth: 4.08 mHz at 6 dB down. Video Cassette Recorder Facilities: 1 Volt composite video in/out at 75 ohms, 0.75 VRMS audio in/out at 600 ohms. Projector Distance from Screen: Approximately 98 inches (249 cm). Power Requirement: 120 VAC, 60 Hz, 150 watts. Projector Dimensions: 28" H x 16.25" W x 32" D (71.12 x 41.28 x 81.28 cm). Screen Dimensions: 45" H x 60" W (114.3 x 152.4 cm).



Credit Card Orders Call TOLL-FREE: 808-253-0570

NEW

This easy-to-build, 25" Color 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) color set (see system prices at bottom of page).

\$679⁹⁰

GRS-2500-1
System only

- Great low system price when you buy kit and cabinet
- Just 15 hours average build time for this exceptional 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 FM sound to every channel

The outstanding value of this easy-to-build Heathkit GR-2500 TV can be yours in as little as five evenings. It features internal automatic control of eight different television picture and color sub-systems for outstanding performance.

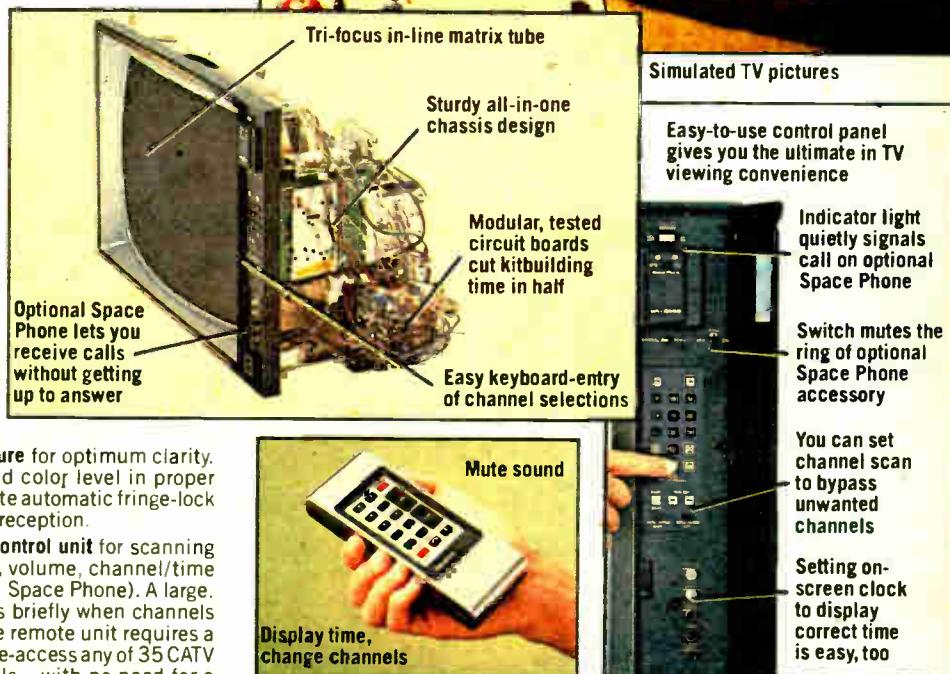
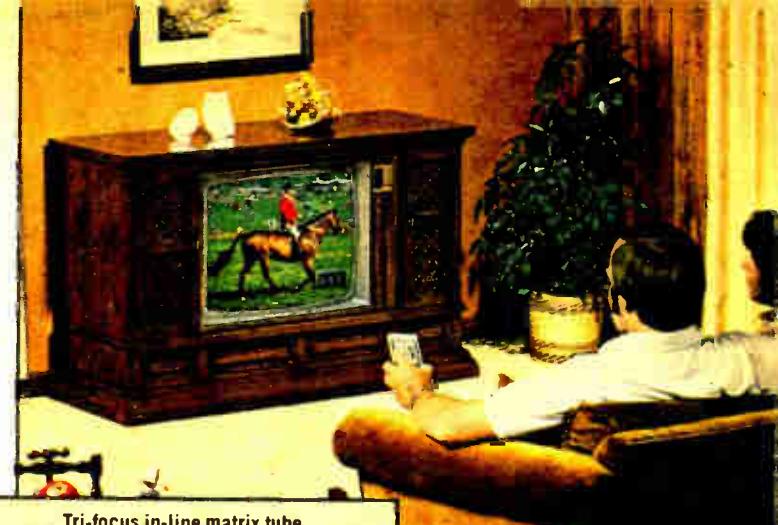
Maximum picture sharpness is yours with a comb filter circuit that reproduces up to 330 lines of resolution, greatly reducing spurious color in the black and white parts of a picture. An advanced electronic PLL Varactor tuning system eliminates noise and contact wear, for greater accuracy, fewer service calls, reliability and ease of operation.

Your GR-2500 needs no channel-to-channel fine-tuning adjustments; 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. Advanced digital circuits scan the broadcast signal and lock the picture in, eliminating the need for vertical and horizontal hold controls.

A sharpness control lets you adjust the GR-2500's picture for optimum clarity. 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 on fringe area reception.

Your Heathkit GR-2500 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 channels are changed, or keyed from set or remote control. The remote unit requires a standard 9V battery (not included). You can even remote-access any of 35 CATV service channels – and the 82 standard TV channels – with no need for a separate selection/converter box if you have cable TV, except for scrambled premium channels.

Optional Space Phone lets you receive phone calls and have phone conversations from your easy chair. Mute button on the Remote Control unit lets you have a private conversation in the room without the telephone caller being able to hear. An indicator light shows when the phone is ringing, and you hear it via the TV's speaker system. Or you can mute the phone ringer so it does not disturb your viewing, and you'll still be alerted to phone calls by the indicator light. Easy connection to any phone line (notify phone company prior to installation).



FCC regulations prohibit connection of this device to party lines or coin-operated telephones.

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 a crosshatch generator for alignment.

GR-2500, Shpg. wt. 113 lbs. Motor Freight 639.95
GR-2500-1, Space Phone, Shpg. wt. 2 lbs. 44.95

NEW

Transitional Corner/Wall Cabinet



For the GR-2500 TV (above). New corner concept fits in where others cannot. Oak veneer top and edges. Basket-weave pattern over speaker grilles. Antique oak distress finish.

GRA-702-25, 120 lbs., Mtr. Frt. 189.95
SAVE \$100.00. Cabinet with GR-2500 TV Kit.
GRS-2500-3, 233 lbs., Mtr. Frt. 729.90

Large Classic Cabinet



For the GR-2500 TV (above). Oak veneer parquet top with brass-finished hinges, door pulls, metal lattice-work. Antique Oak finish. 32.25" H x 50.5" W x 20" D including casters, cap.

GRA-714-25, 136 lbs., Mtr. Frt. 189.95
SAVE \$100.00. Cabinet with GR-2500 TV Kit.
GRS-2500-2, 249 lbs., Mtr. Frt. 729.90

Compact Classic Cabinet



For the 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 and tube cap.

GRA-704-25, 112 lbs., Mtr. Frt. 139.95
SAVE \$100.00. Cabinet with GR-2500 TV Kit.
GRS-2500-1, 225 lbs., Mtr. Frt. 679.90





Simulated TV picture

Optional GO-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: ± dB, 50 Hz to 15 kHz. Output Voltage: Greater than 1.0 VRMS. Audio Output: 4 Ω or 8 Ω, 2 watts. Tuning Range: TV channels 2 through 83. Power: 120 VAC, 60 Hz. 200 W.



Custom-mount this great looking 21" diagonal Color TV

\$549.95

- 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. It has the quality technical design and excellent performance Heathkit Color TVs 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, no-drift 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 (Present any 16). High-Fidelity Output: Impedance: 2000 ohms. Frequency Response: ± 1 dB, 50 Hz to 15 kHz. Harmonic Distortion: Less than 1% at 1 kHz. Output Voltage: Greater than 1.0 VRMS. Audio Output: Impedance: 4 or 8 ohms. Power Req.: 120 VAC, 60 Hz.

• Optional computerized programmer lets you preselect an entire evening's viewing...then relax and enjoy

• Audio circuitry makes a difference you can hear in the wide-range speaker...or play it through your stereo

Join the avant-garde of TV fanciers — 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 maintains 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.

SAVE \$70.00 on the custom-installable TV with a magnificent picture.

Kit GR-2001, Shpg. wt. 146 lbs., Mtr. Frt. **WAS \$769.95, NOW ONLY 699.95**

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

GO-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

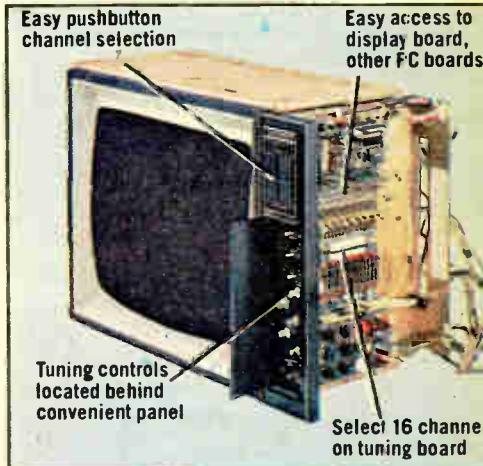
GRA-2000-7 Second speaker for GR-2001, Shpg. wt. 2 lbs. 9.95

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 \$70.00 on this never-before-offered **Color Television System!** Includes GR-2001 Color TV (one of the finest and most advanced sets you can buy anywhere, with a brilliantly pure and lifelike picture quality) and the GRA-2001-6 Handheld Remote Control for convenient fingertip operation of all functions. If purchased separately, they would cost \$799.90.

GRS-2003, Shpg. wt. 150 lbs., Motor Freight 729.90



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.

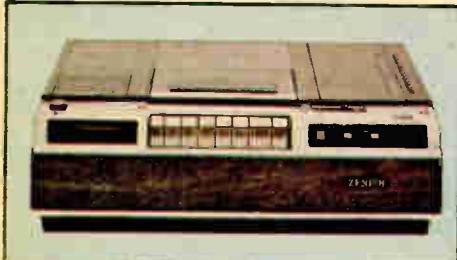
GRA-2000-7,
Shpg. wt. 2 lbs. 9.95



Simulated TV picture



Programmable Zenith Video Director is picture-perfect



- 14-position VHF-UHF Touch-Command Electronic Tuning
- Remote Video Action Control for recording and playback
- AM/PM Electronic Digital Clock

Increase your viewing pleasure with the improved, more exciting Zenith Video Director. This versatile Video Cassette Recorder will record a favorite TV show while you're away, one you're watching — or record one show while you're viewing another!

Clear frame-by-frame advance and variable speed slow motion let you study every aspect of a golfer's swing or the nuances of acting expression, virtually without interference in Beta III. Edit unwanted scenes or commercials with Remote Video Action Control. Speed search finds scenes at 10X normal rate, or view at 3X normal (Beta III), plus freeze-action and instant replay.

Program the Zenith Video Director to record up to 4 different shows over a 14-day period! Record or play back up to 5 hours on one tape in Beta III mode. Add music and/or narration later with the Audio Dub feature.

Remote Video Control has regular speed and variable slow motion replay, precisely detailed frame-by-frame advance and stop action features with brilliant color reproduction and crystal clear picture quality. Forward/reverse Speed Search (x10) and Triple Speed let you skim through recorded material with full picture detail. Video Director includes transformers, cables and an auxiliary 120 VAC, 60 Hz outlet. Runs on 120 VAC.

GDZ-9750, 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)	3 hrs.	4½ hrs.	1 lb.	14.00
GDZ-9700-3 (L-500)	2 hrs.	3 hrs.	1 lb.	12.00

Zenith Color Portable with Remote



Assembled 13" (d) TV features Tri-Focus Picture Tube for sharpest picture in Zenith history. Color Sentry automatically corrects the picture 30 times per second.

Electronic Power Sentry voltage regulation and other energy-saving features combine for 25% less average energy use than previous model. Space Command 800 Remote Control allows use from across the room. Modular chassis design. Cooler-running for longer life. 120 VAC. **GRZ-1325**, Assembled, wt. 44 lbs. 459.95

Portable Video Director records action anywhere



- Lightweight, portable Video Director records all the best action indoors or out
- Matching tuner/timer converts portable into full-feature home video system
- Enter the Video Age with true state-of-the-art home/remote performance

We're proud to introduce Zenith's smallest, lightest, most versatile video cassette recorder...the VR-9800 Portable Video Director. A superlight 11.5 pounds, including cassette and optional battery pack, makes recording indoors or out easy with the accessory shoulder strap included. The rechargeable nickel-cadmium battery provides up to one full hour of Beta performance.

Beta is better. From the beginning, the Beta format set the standard for VCR performance, and continues to improve frequency response over that provided by other systems. Greater frequency response means superior picture clarity and accurate color reproduction regardless of the recording speed. Multi-speed playback features include Picture Speed Search (sound muted) at 15X normal speed in Beta III and 10X in Beta II, Pause, Frame-by-Frame normal speed and Slow Motion at 1/10 normal in forward or reverse, and Double Speed forward play with Tape Speed Indicator.

Automatic Clean Edit Control assures smooth picture transition between separate recorded scenes. Audio Dub lets you add sound to previously-recorded tapes. A battery "Caution" Indicator warns of low battery. Includes provision for direct connection to GRZ-1600 Color Camera at right.

GDZ-9800, Shpg. wt. 13 lbs. 1065.00

GDZ-9850, Tuner/Timer and Remote Control, Shpg. wt. 11 lbs. 359.00

GDZ-9851, NiCad Battery Pack, 2 lbs. 49.95

GDZ-9852, AC Power Supply, 7 lbs. 149.95

12/120 V Zenith B/W Portable



New technology makes this assembled 9" (d) B/W Portable a real power-saver. And it goes anywhere; plays on 120 VAC for home viewing, 12 VDC in car,

camper or RV, or optional 12 VDC rechargeable battery pack for picnics or beach. Includes 12 VDC car cord adapter, sunshield and earphone. **GRZ-93**, Assembled, Shpg. wt. 14 lbs. 109.95

Rechargeable Battery Pack for Zenith GRZ-93.

GRZ-93-1, Shpg. wt. 9 lbs. 44.95

GRZ-93-S, TV and Battery Pack, 33 lbs. 149.95

Color Video Camera makes you the director



Optional Power Supply Adapter

Camera and viewfinder weigh just 6.45 lbs., built-in mic

Record hours of family fun, school or sports or vacation activities, document your work, even videotape the valuables in your home for insurance purposes — all on reusable video cassettes — with the new GDZ-1600 Color Video Sound Camera.

Lightweight, compact, easy-to-use format gives faithful color reproduction and high resolution. Combined 6:1 power/manual zoom lens (f1.4 with 11 to 70mm focal length) and macro focus lens are provided with camera. Wave Form and color balance can be performed and verified through B/W viewfinder for excellent pictures every time.

Also features a built-in condenser microphone for simultaneous sound/picture recording, input jack for external mic, earphone jack for record/playback monitoring, focus peaking switch, automatic exposure and gain controls. Includes electronic viewfinder, lens cap and earphone. 15-pin cable fits Adapter (below), or GDZ-9800 VCR (above).

GRZ-1600, Camera, Shpg. wt. 9 lbs. 1050.00

Power Supply Adapter. Adapts 15-pin cable from Camera to standard VCR video, sound, pause inputs. Includes 33' cable for extra mobility.

GRZ-1600-1, Shpg. wt. 8 lbs. 99.95

Case for Camera. Protect your investment.

GRZ-1600-2, Shpg. wt. 7 lbs. 49.95

TV/AM-FM Radio/Alarm Clock



Assembled Zenith EXPLORER Clock-Radio/TV has 5" (d) screen, earphone, 12 VDC car cord, telescopic antenna. Runs on 120 VAC, optional rechargeable battery pack (below) or six alkaline "D" cells. Programmable Digital Clock lets you wake to any function.

GRZ-5005, Assembled, Shpg. wt. 9 lbs. 199.95

GRZ-5005-1, Rechargeable Battery Pack for above. Up to 4 hrs. of TV or 40 hrs. of radio, 3 lbs. 24.95



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

NEW

Top-quality Portable 20 MHz Oscilloscope features extra-value capabilities!

- Compact enough to fit under an airplane seat — includes convenient carrying handle
- Wide DC-20 MHz bandwidth, dual-trace capability enable you to make a variety of measurements

Smaller in size, but big in value: Smaller than regular bench oscilloscopes, the IO-3220 Portable Oscilloscope represents outstanding value in its class. Designed for field troubleshooters who need a light, portable, battery-operated scope — the IO-3220 features an extra-wide bandwidth, exceptional sensitivity and dual-trace capability and invert display function.

Compare two signals simultaneously: The IO-3220's dual-trace capability allows you to make input/output comparisons, check phase relationships and accomplish other complex measurements. Its invert display function enables you to compare two waveforms that are nearly 180 degrees out of phase — by inverting one of the waveforms.

X-Y inputs provided for Lissajous measurements: With these X-Y inputs, you can feed two separate input signals to the IO-3220 — driving its deflection amplifier plates externally.

Algebraic add is also provided, for additional versatility.

Outstanding sensitivity: Vertical signals as low as 2 millivolts can be accurately measured by the very sensitive IO-3220. Accuracy is as high as 3 percent (from 20-30 deg. C), on both vertical and horizontal measurements.

Extra-bright trace: The IO-3220's CRT features P31 phosphor for an easy-to-read trace that's easier to read, even in high ambient light conditions.

Scope compensation signal included: A 1 Volt peak-to-peak square wave compensation signal is provided at the IO-3220's front panel.

Includes comprehensive Heathkit assembly and operation manual: Using the easy-to-follow manual, the IO-3220 is easy to build and operate. The manual takes you step-by-step through kitbuilding and operation.

Use anywhere — runs on external or internal power: The IO-3220 runs on 120/240 VAC, 50/60 Hz line current. It can also run on the optional IOA-3220-2 Rechargeable Battery Pack (not included), or on 11-24 VDC (user selectable) at approximately 34 VA. This oscilloscope includes a cover to protect front panel from dust contamination. The compact, rugged cabinet measures 5.5" H x 13" W x 18" D. Calibration of the IO-3220 requires a precise source of square waves, such as the IG-4505 (page 14). An X1/X10 Oscilloscope Probe Set with Pouch (IOA-3220-1) is available on page 10.

For more information on the IO-3220 Portable Oscilloscope, see page 10.



Use the lightweight, portable IO-3220 DC-20 MHz Oscilloscope for all of your electronic measurement and comparison needs.

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WEATHER: computerized weather station,

barometer, barograph, thermometer, rain gauge, wind computer, weather course 4-7

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