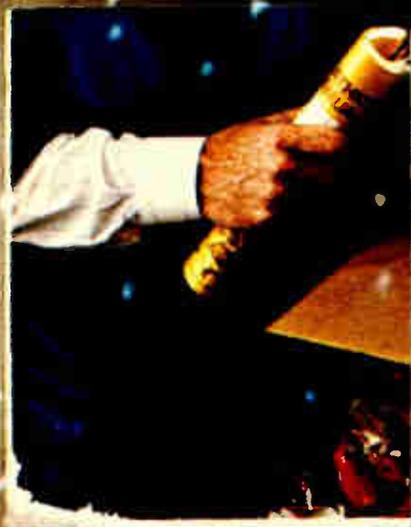


Heathkit®



**Christmas,
1982 –
great gift
ideas.**

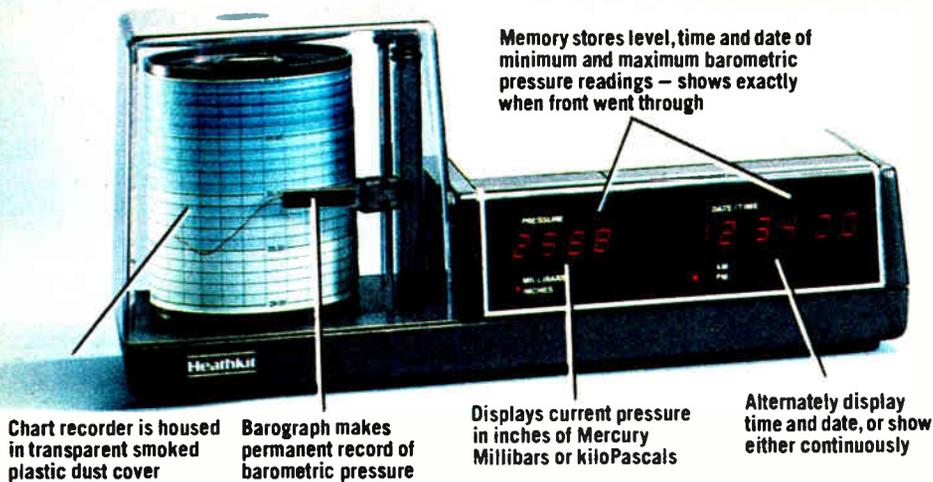
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the perfect
gift for that
“special
someone”
from the
over 450
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**Mail Order
Catalog No. 859**



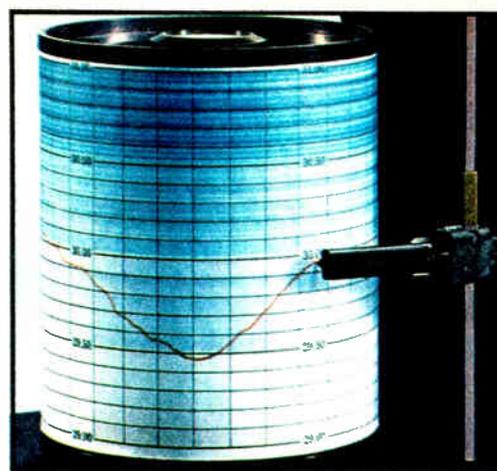
Memory stores level, time and date of minimum and maximum barometric pressure readings — shows exactly when front went through

Chart recorder is housed in transparent smoked plastic dust cover

Barograph makes permanent record of barometric pressure

Displays current pressure in inches of Mercury Millibars or kiloPascals

Alternately display time and date, or show either continuously



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

\$199⁹⁵
Kit

- Most important parameter which influences the weather is barometric pressure change. Digital barograph charts changes so you can see rate and date of fluctuation
- Microprocessor-based instrument displays current pressure and time; remembers dates, times and levels of maximum and minimum atmospheric pressure
- **SAVE \$96 on the kit; \$146 on assembled version**

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 or business 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 true 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.

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.

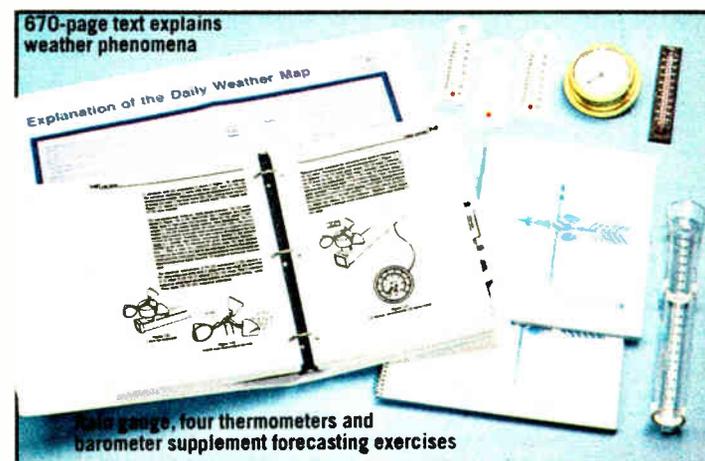
Kit ID-2090, Shpg. 25. 11 lbs. **WAS \$295.95, NOW ONLY 199.95**

IDW-2090, Assembled and tested, 10 lbs., **WAS \$395.95, NDW 249.95**

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 24- or 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.

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Rain gauge, four thermometers and barometer supplement forecasting exercises

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

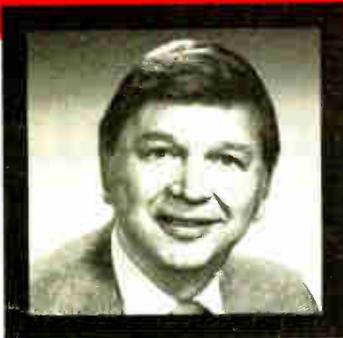
Earn 2 CEUs — score 70% on the optional final exam. (Also see our Electronics (pgs. 30-43), Automotive (pg. 24) and Computer Courses (pgs. 78-80).)

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



A Special Limited Time Offer
from the Ham's "Perfect Partner"

Heathkit®



Dear Friend:

Because you're a person who obviously enjoys your Ham Radio hobby, I want you to have a personal copy of the new Heathkit Catalog. If you're new to Heath, please look through this latest catalog and become acquainted with our exciting line of over 450 different products. Pay particular attention to our Amateur Radio section. It contains something very NEW.

The SS-9000 Deluxe HF Synthesized Transceiver.

If you look ahead, it's easy to see that microcomputer-enhanced hamshacks are the wave of Amateur Radio's future. Anticipating the need for a Transceiver that could be computer-controlled, the Hams at Heath designed this advanced model based on the microprocessor. To match it, they produced the PS-9000 Power Supply with in-cabinet speaker and dual digital clocks. Together, we expect them to bridge the interface gap and put new technology, new benefits and new applications in sight of the seriously innovative Amateur.

To insure that this exciting new future arrives a little sooner for you, I've authorized a **special Introductory Price Discount on SSG-9000**. It's the system pair you see below. And you can find it fully described on pages 8 and 9 of this catalog.

This is a limited time offer! For just 90 days, you can purchase the SS-9000 and PS-9000 together for only \$2495.00 (regularly \$3,090 when purchased separately) and be one to lead the challenge in a promising new era of opportunity for hams.

Sincerely,

William E. Johnson,
President

P.S. Remember, the System 9000 offer expires in early 1983 - so don't delay. Order now and get a head start on the future!

**TAKE ADVANTAGE
OF EXCEPTIONAL
SAVINGS IN OUR
SPECIAL
INTRODUCTORY
OFFER
AND SAVE UP TO
\$595
ON THE SS-9000!**

The Transceiver of the Decade has:

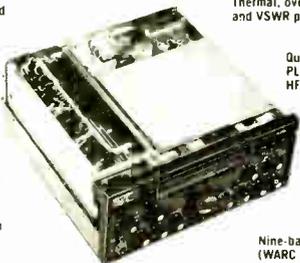
Microprocessor-based operation, which can be controlled by an RS-232 terminal

Terminal interface for RS-232 control

Extended memory for storage of any three frequencies per band

Memory preservation with battery backup

Six modes including CW, wide, medium and narrow built-in



Thermal, over-current and VSWR protection

Quartz-reference, PLL-synthesized HFO, BFO & VFO

Adjustable RF speech processor

Nine-band operation (WARC and WWV)

Pushbutton up/down 16-rate band scan

Unique dual digital display for greater T/R versatility



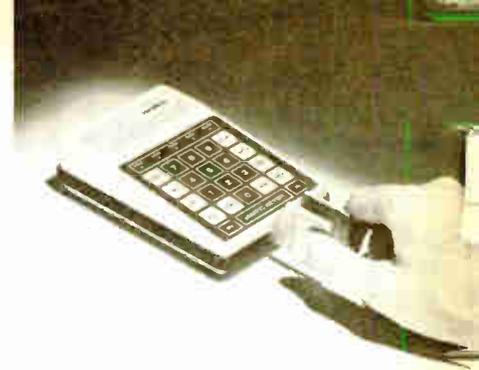
WP-342

There's More for the Ham at Heath

HEATH and HAMS

"Perfect Partners..."

BECAUSE WHEN YOU
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Do you know someone who's eager to become a newly-licensed operator? More than 45,000 individuals have earned their Novice, Technician or General Class licenses using the proven instructor techniques in our Amateur Radio License Courses. We've just introduced an Advanced Class Licensing Course for self-study, too. They're written to motivate, and each one carries our exclusive money-back-if-you-fail guarantee of success! Looking to upgrade? See page 15. Or add an exciting new dimension to a friend's knowledge and experience - see our Novice License Course on page 14.

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

- Obtain rainfall readings to within $\pm 3\%$, without getting soaked
- Tracks both short- and long-term rainfall with separate LED digital displays, housed in an attractive walnut-trimmed cabinet

The Heathkit ID-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 ID-1790 gives the accurate measurements you need. The weather resistant outdoor collector is housed in a 14½" H x 10" W x 10" 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 ID-1790's indoor digital display takes the guesswork out of rainfall readings. Two sets of red ½" high LED digits on a glareless flat black 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 5¾" H x 12½" W x 4¾" D and comes housed in a handsome 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-or-get-wet" out of measuring rainfall – order your Heathkit Automatic Rain Gauge today.

Kit ID-1790, Shpg. wt. 14 lbs. 149.95
 IDW-1790, Assembled and tested, Shpg. wt. 12 lbs. 199.95

ID-1790 SPECIFICATIONS: Displays: Short Term Display: 3 digits up to 9.99. Long Term Display: 3 digits, up to 9.99 or 99.9 – depending on wiring. Units of Measurement: Inches or centimeters of rainfall, depending on wiring. Repeatability: ± 2.0 percent for ½ inch per hour rate of rainfall. Operating Temperatures: Rain Collection Unit, 32 degrees F to 120 degrees F (0 degrees C to 50 degrees C); Digital Readout Unit, 32 degrees F to 120 degrees F (0 degrees C to 50 degrees C).

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 hours, 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 ° F (-40 to 70 ° C)



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

- Easier to read than conventional dial and needle wind speed indicators
- Displays the instantaneous or average wind velocity; recalls speed, day and time of peak wind gust; has accurate 12/24-hour clock with 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-point compass dial, also marked in radial degrees. Inside the compass face, two ½" LEDs tell you wind speed in mph, kph or knots. Built-in, 6-digit logging chronometer alternately displays time, then date or can be set to hold on one function. The included windvane and anemometer are similar to those described for the ID-4001 (next page). Requires 120/240 VAC. Includes memory retention/recall feature.

Kit ID-1890, Shpg. wt. 10 lbs. 149.95
 IDA-1290-1, 50' 8-wire cable for ID-1890, Shpg. wt. 2 lbs. 9.95
 IDA-1290-2, 100' 8-wire cable for ID-1890, Shpg. wt. 4 lbs. 16.95
 IDA-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
- SAVE \$75 on the kit; \$65 on assembled
- Bright red ½" high LED readout
- Three unit scales: inches and millibars or kiloPascals



Barometrists – SAVE!

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 precisely 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-1900, Shpg. wt. 10 lbs. WAS \$174.95, NOW 199.95
 IDW-1990, Assembled and tested, 8 lbs. WAS \$194.95, NOW 129.95

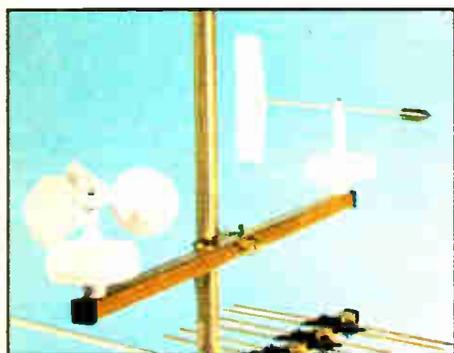
ID-1990 SPECIFICATIONS: Barometer: Displays: 4-digit readout. Separate indicators show whether the pressure is rising or falling, and whether the display is in inches of mercury, millibars or kiloPascals. Pressure Ranges: 28.00 to 32.00 inches Hg (inches of mercury), 981 to 1050 millibars or 98.1 to 105 kiloPascals. Accuracy of Reading: 29.00 to 31.00 inches Hg ± 0.03 in. Hg 15°-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 (F or C) temperatures, wind speed & direction and barometric pressure (rising or falling)
- Microprocessor accuracy and memory stores past weather data so you can see trends
- Instantly recalls past weather statistics at the push of a button; Clear feature erases memory
- Professional-looking solid walnut cabinet with brushed-aluminum trim panels
- Remote windcup-and-weathervane transmitter assembly mounts on a 1" to 1½" mast for years of dependable, trouble-free service
- Styled to match any decor, it offers instant access to more comprehensive atmospheric data than was ever available before to the layman with a serious interest in weather phenomena and forecasting



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



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

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

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

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

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

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

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

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

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

Kit ID-4001. Shpg. wt. 15 lbs. **399.95**
Assembled and Tested ID-4001, including 100' cable.
IDW-4001. Shpg. wt. 22 lbs. **589.95**

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

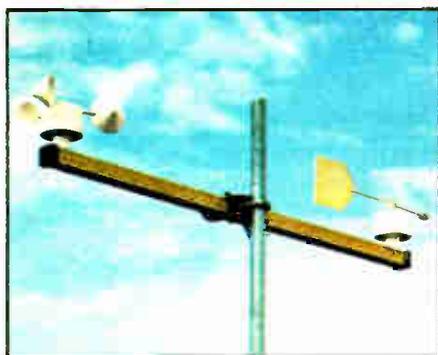
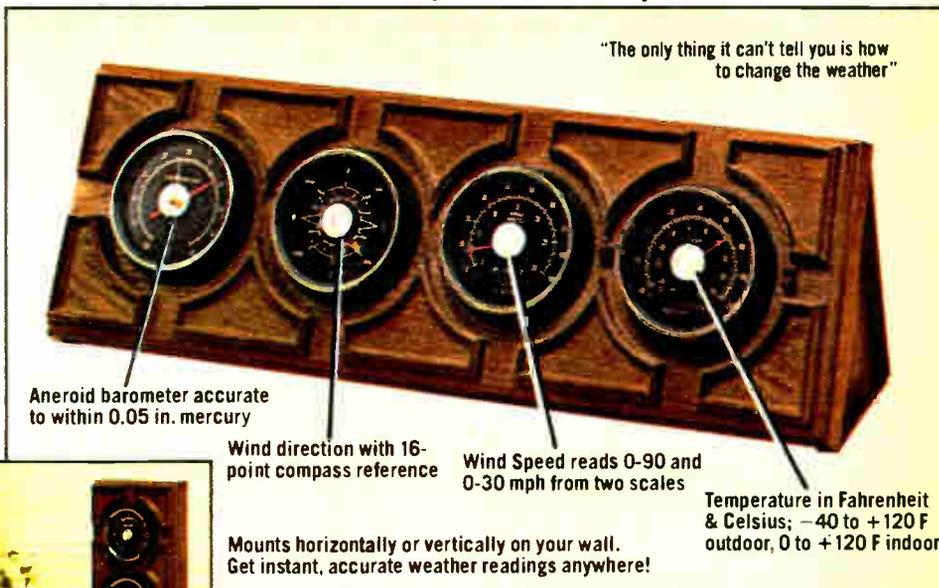
IDA-1290-1, 50' cable, Shpg. wt. 2 lbs. **9.95**
IDA-1290-2, 100' cable, Shpg. wt. 4 lbs. **16.95**
IDA-1290-3, 150' cable, Shpg. wt. 6 lbs. **23.95**

ID-4001 SPECIFICATIONS: DIGITAL CLOCK 4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. **WIND VECTOR:** Accuracy: ± 5% or better. **Direction Display:** Accuracy: ± 11.26% degrees. **THERMOMETER:** Temperature Range: -40° to 70°C (-40° to 158° F. Accuracy: ± 1° on Celsius readings ± 2° on Fahrenheit readings. **BAROMETER:** Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury); 981.9 to 1050 millibars. Accuracy: ± 0.075 in. Hg plus ± 0.01 in. Hg/°C. **Operating Temperatures:** Outdoor assemblies: -40°C to +70°C (-40°F to 158°F). Unit: 10° to 35°C (59° to 95°F). **Power Requirement:** 120 240VAC. Provision for external battery connection for memory backup during power failures. **Dimensions:** 7½" H x 16" W x 6" D



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

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



For the price, you can't beat the features or the accuracy of the ID-1290. It contains professional-grade instruments plus a quality, non-corroding remote transmitter assembly – 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.

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

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

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

Accurate Digital Wind Speed/Direction Indicator

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



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

Practical Digital Indoor/Outdoor Thermometer

When you compare the advantages this Digital Indoor/Outdoor Thermometer has over a conventional, mercury bulb sun-or-snow thermometer, you'll wonder how you did without one for so long. The big, red ½" display digits can be seen easily in broad daylight, or at night. No guesswork! The ID-1390B accurately monitors two temperatures with two sensors for indoor/outdoor readings, displayed within two degrees. Select Fahrenheit or Celsius temperatures, with continuous readings of one, or alternate readings of both. The 10' indoor and 75' outdoor cables (included) let you place the sensors anywhere (freezer, sauna, basement, pool, solar panel, etc.). Ranges from -30°F to 120°F outdoors and 20°F to 120°F in. Step-by-step instructions make it easy to assemble, and a practical kit that gives year-round value. Same size (2.5" H x 7" W x 5" D) and styling, with black Cyclocal™ 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

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

ONLY
\$49⁹⁵



**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 outages caused by storms or generator failures.

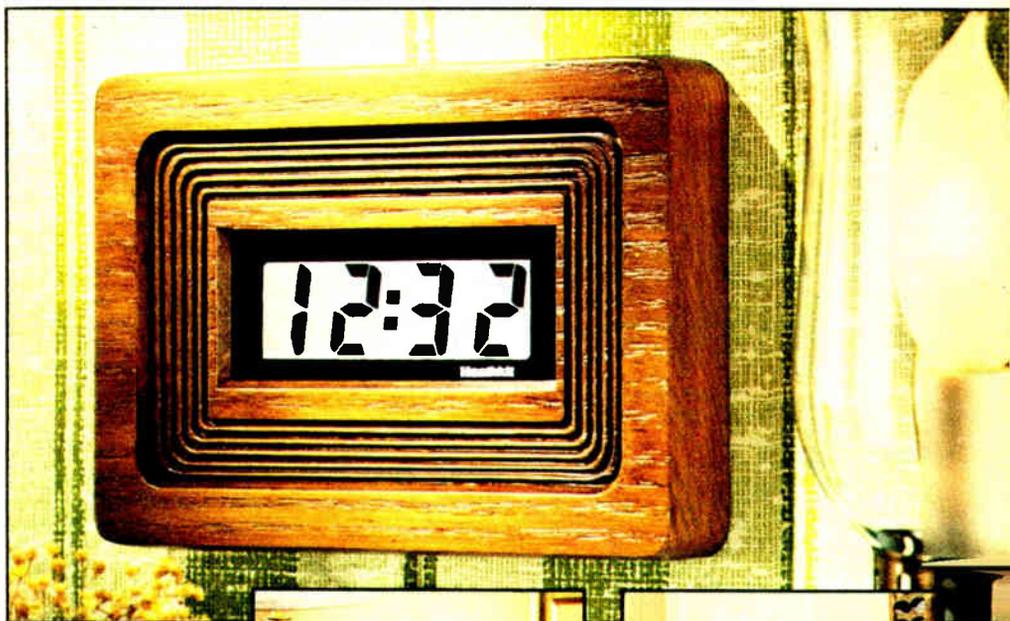
Big one-inch-high digits make the Digital Wall Clock easy to see from 30 feet away. It's the ideal timepiece for kitchen, recreation room, or any other large area where you need to know the exact time, and don't want to see a power cord dangling in view.

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 start kit, be sure to see our line of selected kitbuilding tools on page 50.

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



Perfect in den, living room



Or use in kitchen

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



Digital Floor Clock is a lustrous, modern-looking timepiece

- 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 ¼"-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. 58 lbs. 219.95

Shelf version of Digital 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. 18 lbs. 119.95

Add these Westminster Chimes

Sounds 4 notes on ¼-hour, 8 notes on ½-hour, 16-note passage and hour on hour. Volume, pitch and sound delay controls; built-in tick-tock and speaker. Builds into GC-1195 or GC-1197.

Kit GCA-1195-1, Shpg. wt. 3 lbs. 94.95



6/CLOCKS



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

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 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 one 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



- Disperses much more light than narrow-beam flashlights
- Rechargeable — just plug into AC outlet; no batteries to buy

Indoors or outdoors, the GD-1246A gives you more light where you need it. Charge it from 120 VAC outlet (charger included) or car cigarette lighter with optional 12-volt adapter. Safer to use than kerosene lamps or candles. Metal case with handle is 10.6" H x 3.1" W x 5" D. **EXTRA VALUE** — Optional 12-volt charger now included FREE — was \$5.95!

You get extra savings and full portability.

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

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. 3 1/2" H x 2 11/16" W x 2 11/16" 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



- 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 with delay button, plus other space-age conveniences hard to find at this low price. It's a perfect beginner's kit, and ever-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 a power interruption.

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 Alarm Delay 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



You can take your music along too, with this AM Portable Radio



FAST. EASY 1-EVENING KIT

- 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.

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 120 VAC Battery Eliminator (page 61). 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 found in all our manuals 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. 18.95



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

STARTER KITS/7

NEW

Introducing a breakthrough for Amateur Radio — the Heath SS-9000 Deluxe Synthesized

For years, Amateur Radio has awaited the advent of computer-aided communications. Today, there's a new generation of contact beginning as the era of 'micro' enhanced hamshacks arrives... ushered in by the SS-9000. It is one Transceiver against which all future gear must be compared.

- This is the Cadillac of transceivers: Fully microprocessor-based, entirely solid-state, broadbanded in design — delivers 100 watts to a 50 ohm load
- Microprocessor circuitry controls the entire operation of the SS-9000
- A built-in Terminal Interface with an RS-232 I/O port allows instant and direct control of operating parameters via ASCII terminal, modem or computer
- Nine-band operability, including the newly-allocated 10, 18 and 24 MHz WARC bands and WWV at 15 MHz
- An idea whose time has come — unlike anything that has preceded it, the SS-9000 challenges every previous resource of skill and imagination

Readers of the many amateur-oriented magazines such as *QST*, *ham radio*, *CQ*, *World Radio* and '73 have been quick to grasp the future potential of computers in application to their worldly hobby. More than any other single station accessory, the microcomputer can add a wealth of powerful capability and fast organization to an operator's air practice. With the assistance of a terminal, and a Transceiver that can be thoroughly governed by keyboard commands, an experienced Amateur could have greater control over all phases of contact, reams of important data at his fingertips and enviable advantage on the air. The speed and performance characteristics of such a combination would put new meaning in the overused words 'state-of-the-art'.

No better time than the present: The promise of this vision has evolved into an American design that surpasses all expectation. Anticipating the evolution of Amateur Radio, the hams at Heath engineered the SS-9000 and PS-9000.

Designed as a tool for development and discovery: No one else offers capability to compare with the SS-9000 Deluxe Synthesized HF Transceiver. The magnitude of its manageability gives the pacesetter ham an opportunity to break new ground, and promote the applications of computer technology.

Completely synthesized for absolute accuracy: A 10 MHz crystal-controlled master oscillator produces a reference frequency that is clock-divided to phase-lock the IFO, HFO and BFO. This action affords superlative stability and repeatability during long hours of operation. A single precise VFO is tied to each display through the 256 bytes of CMOS Random Access Memory. For the operator who is accustomed to several nets, DX hot spots, favorite call channels or listening points and more than one scheduled band rendezvous, this extra storage capacity accepts three separate inputs per band, for a total of 27 frequencies to recall and work at will.

Two displays are better than one: The most outstanding feature of the SS-9000 front panel is its unique dual frequency readout. Smart contesters and DX hunters know that it's more than a cosmetic frill. Dual readouts let you transmit on one frequency and receive on another, or maintain one frequency while scanning for a better one. Transceive on either the left or right display. Toggle their function from T to R. Copy from either display to memory, or exchange either with the frequency stored in memory. Place it under terminal control, and enjoy a versatility in QSO capture that shatters all precedent.

A receiver to be reckoned with: The SS-9000's advanced front end is highlighted by twelve poles of distributed SSB filters for optimal selectivity, 0.3 μ V sensitivity and a phenomenally high third order intercept point. Audio gain is typically 30 or better, with one result: Typically fantastic results! Three switchable filters provide extra selectivity for the critical CW operator.

A controller circuit forms the "intelligent" heart of the SS-9000. This device acts as a serial interface between external requests, via front panel controls and

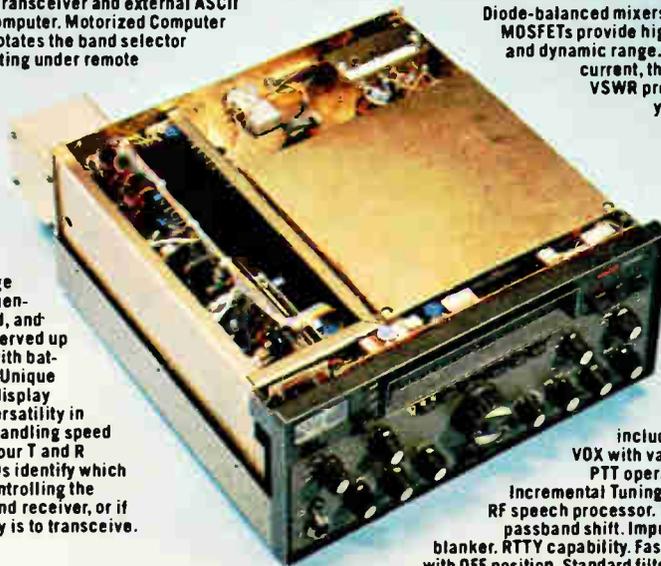
A Transceiver so feature-conscious, it has no options!

RS-232 Terminal Interface offers communication between the Transceiver and external ASCII terminal or computer. Motorized Computer Bandswitch rotates the band selector to desired setting under remote control.

Extended memory allows storage of three frequencies per band, and memory preserved up to one year with battery backup. Unique dual digital display offers new versatility in frequency - handling speed and agility. Four T and R indicator LEDs identify which display is controlling the transmitter and receiver, or if either display is to transceive.

Front panel and main circuit boards are hinged for easy access. Main tuning knob has optically-encoded shaft for smooth, linkage-free control and zero backlash.

Diode-balanced mixers and dual-gate MOSFETs provide higher sensitivity and dynamic range. Superior over-current, thermal and high VSWR protection means you can operate worry-free.



Durable, die-cast zinc front panel gives precise signal control, and includes: selectable VOX with variable delay or PTT operation. Receiver Incremental Tuning. An adjustable RF speech processor. Plus and minus passband shift. Impulse-type noise blanker. RTTY capability. Fast and Slow AGC with OFF position. Standard filters for CW-wide and CW-narrow selectivity. Pushbutton up and down band scanning in 16 selectable rates with 100 Hz resolution. A four-function meter which indicates received signal strength, ALC, relative power and compression level.

terminal interface, and the internal circuits on the synthesizer, T/R and audio circuit boards. The controller consists of a CPU, a peripheral interface adapter (PIA), a static memory interface, a read only memory (ROM, for the program sequence) and 256 bytes of CMOS random access memory (RAM).

The Terminal Interface Package (EIA standard RS-232C) installed within the SS-9000 allows you to control and monitor the Transceiver from a video terminal (such as the H-19 on pg. 71), hard-copy teletype terminal, or computer (such as the All-In-One Model H/Z-89 on pg. 68). Remote Transceiver control is also possible over telephone lines with a modem. Commands built-in to the Transceiver controller allow you to select, display and change the band, mode, up to 27 operating and memory frequencies, passband shift, band scan and baud rates. You can also place the Transceiver in transmit or receive mode, toggle the dual readout for T/R/Tr operation plus exchange the one memory and two displayed frequencies at will. The SS-9000 will respond to unacceptable requests at the terminal, with a numeric error code. When the available commands are combined in a program or sequence, many more useful functions may be implemented at high speed.

You can interface the SS-9000 to a personal computer using a standard RS-232 cable if it has a port configured as DTE (Data Terminal Equipment). The software package supplied with every SS-9000 is written for connection to port 3300 (octal), on an H/Z-89 with 48 kilobytes of RAM operating under HDOS and the MBASIC language. This 5 1/4" floppy diskette demonstrates only one of the many ways of providing communication between a computer and the Transceiver, using animated graphics and video text to thoroughly introduce an owner to System 9000 and its amazing control capabilities.

An SS-9000 can be connected to the Heathkit SA-1480 Remote Coax Switch. When changing bands (either manually or via remote control, using the built-in Motorized Band Switch) the proper antenna is selected automatically.

Data flow speed-customized for any terminal: Baud rate is initialized upon power-up. With an 8-position dip switch on the front panel circuit board, you can select any of 15 different baud rates between 50 and 9600 bits per second. Half of this same switch is used to control the rate at which readout



HF Transceiver. It's microprocessor-based, computer-controllable... and ready to take on tomorrow



frequencies change when the up/down band-scanning buttons are pushed.

Commands are provided to control and monitor all functions of the Transceiver that are under microprocessor direction. The same commands that set a parameter to a particular value can also be used to examine a current value.

Commands are also available to Lock and release one or all switches to their terminal-controlled or physical states, print the switch settings (with appropriate "L" indication), print the frequencies in memory for all bands, print the memory frequencies for a particular band with receive and transmit assignments flagged by T and/or R, toggle the T and R indicators for the current or any particular band, plus set the Receive and Transmit mode. These displays may be limited to a particular frequency register or switch setting by following the command with one of several symbols, operators, constants and band specifiers. The special manual which arrives with System 9000 gives complete details on operation, installation and configuration.

The PS-9000 Power Supply/Speaker is a perfectly matched component for the SS-9000, providing 13.8 VDC for base operation with high temperature, short circuit and current surge protection. Each digital clock has independent 12- or 24-hour capability and fast/slow set buttons for local/UTC timekeeping.

This is the HF Transceiver the world has been waiting for. There is no other, no better system than the SS/PS-9000 team. See it at your nearby Heathkit Electronic Center. Try out the demonstration disk. Listen to what others say about its performance advantages. Then put it to the ultimate test in your club or QTH. *You'll discover there is no limit to its capability...*

Take advantage of our special Introductory Price Discount on SSG-9000, and save a one-time-only total of \$595.00 off the regular system price. For 90 DAYS, you can purchase the SS-9000 Deluxe Synthesized HF Transceiver and PS-9000 Power Supply/Speaker and Dual Digital Clock together for just \$2495.00! Order now and take part in pioneering the future of radio.

SS-9000, Assembled and tested, Shpg. wt. 35 lbs. **2795.00**
 PS-9000, Assembled and tested, Shpg. wt. 33 lbs. **295.00**
 SSG-9000, Assembled and tested, Shpg. wt. 74 lbs. **NOW ONLY 2495.00**

PS-9000 SPECIFICATIONS - GENERAL: Output Voltage: 13.8 VDC regulated (adjustable) Maximum Output Current: 25 amperes intermittent (50%, 10 minutes on-off) and 15 amperes continuous. Power Requirements: 110 to 130 VAC at 6 amperes or 220 to 260 VAC at 3 amperes 50/60 Hz Regulation: Less than 4% from no load to 25 amperes Ripple: Less than 2% at 25 amperes Circuit Breaker: 20 amperes for 110 to 130 VAC primary, 10 amperes for 220 to 260 VAC primary. Current Limiting: Over current protected (set typically for 28 amperes) Thermal Protection: Automatic shutdown with over-temperature on the heat sink DUAL CLOCK: Display: Two independent readouts with four digits and a colon. Clock Format: 12- or 24-hour display. Accuracy: Determined by the line frequency (no cumulative error) Power Requirements: 120 or 240 VAC, 50 or 60 Hz, 3.5 watts Cabinet Dimensions: 6 1/4" H x 9 3/4" W x 13 3/4" D (15.6 x 24.4 x 34.9 cm) Weight: 33 lbs (15 kg) Specifications apply when the Power Supply is used with the SS-9000

SS-9000 SPECIFICATIONS - GENERAL: Tuning: 100 Hz per step, 5 kHz per knob rotation with pushbutton up and down scan (rate is internally adjustable) Operation: Split transmit/receive or transceiver from either readout Synthesized Lock Indicators: Visual indication when synthesizer is unlocked (transmitter is disabled) Frequency Coverage (MHz): 1.8-2.0, 3.5-4.0, 7.0-7.3, 10.1-10.15, 14.0-14.350, 18.068-18.168, 21.0-21.450, 24.890-24.990, 28.0-29.7, WWV @ 15.0 (*Extended Frequency Coverage) Frequency Stability: Less than 3 ppm from turn-on for first 15 minutes. Less than 3 ppm/hour drift after 15 minutes warmup. Less than 20 ppm drift from 0°C to +40°C (single crystal-controlled 10 MHz frequency standard) Modes of Operation: LSB, USB, CW-Wide, CW-Medium, CW-Narrow, RTTY Operating Temperature: 0°C to +40°C Power Requirements: 11 to 16 VDC with a nominal current maximum of 25 amps at 100 watts CW output Receiver current is 2 amps nominal (*All specifications are referenced to 13.8 VDC at 25°C ambient) Rear Panel Connectors & Control: Antenna (SO-239); Linear ALC In; Linear ALC Adjust; Low Power Enable; Spares (5); DC Power Input; CW Key Jack; External Transmit Audio In (2) Speaker Out; External Receiver Audio; T/R In; T/R Out; Mute; Mute (inverted); External Relay (lineari) and RS-232 Interface TRANSMITTER: RF Power Output: SSB = 100 watts PEP minimum CW & RTTY = 100 watts minimum Load Impedance: 50 ohms VSWR: stable at any VSWR and load impedance; Cutback circuitry guarantees at least 80% of rated power at any VSWR less than 2:1 and a minimum of 15 watts at any VSWR Carrier Suppression: 50 dB down from a 100 watt single-tone (1000 Hz) output Harmonic Radiation: 50 dB down below 50 MHz; 65 dB down above 50 MHz Spurious Radiation: 50 dB down, except at 17 meters (40 dB down) Third Order Distortion: 30 dB down from a 100 watt PEP two-tone output Unwanted Sideband Suppression: 50 dB down from 100 watt PEP two-tone output T/R Operation: SSB = PTT or VOK CW = semi break-in CW sidetone: 750 Hz tone, adjustable level Microphone Input: High impedance (25k ohm) with -55 dBm rating RECEIVER: Sensitivity: 0.3 µV for 10 dB (S-N) SSB on the 40 through 10 meter bands, 0.5 µV on the 160 and 80 meter bands Selectivity: 2.1 kHz at 6 dB down 5 kHz at 60 dB down CW filters, CWM = 400 Hz at 6 dB down and 1.5 kHz at 60 dB down CWN = 200 Hz at 6 dB down and 1 kHz at 60 dB down Overall Gain: Less than 1 microvolt for a 0.25 watt audio output Audio Output: 1.5 watts into 4 ohms at less than 10% THD AGC: Fast-attack with switch selectable Off Fast and Slow decay Intermodulation Distortion (20 kHz spacing): -70 dB Image Rejection: -80 dB (except -65 dB on the 17 and 12 meter bands) Second IF Rejection: -90 dB First IF Rejection: -80 dB (except -60 dB on the 40 and 30 meter bands) Internally Generated Spurious Signals: All below 1 µV equivalent RIT: ±250 Hz Available Accessories: PS-9000 AC Power Supply Speaker with built-in dual 12/24 hour clock and Customer Service Manual Cabinet Dimensions: 6 1/4" H x 14" W x 13 3/4" D (15.6 x 35.6 x 34.9 cm) Weight: 35 lbs (15.9 kg)



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

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 pre-selector filters for each band. That, along with balanced first and second mixers, gives you sensitivity of less than $0.5 \mu\text{V}$ for SSB operation.

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.

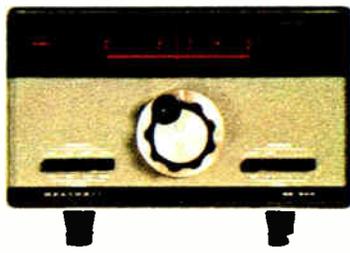
Kit SBA-104-1, Noise Blanker, 1 lb. **WAS \$32.95, NOW ONLY 24.95**
 Kit SBA-104-3, 400 Hz Crystal Filter, 1 lb. **WAS \$52.95, NOW ONLY 39.95**

Frequency Coverage: 3.5 MHz through 29.7 MHz Amateur bands (80 through 10 meters); 15 MHz WWV receive only. Frequency Stability: Less than 100 Hz 30 min. drift after 30-min. warmup, less than 100 Hz drift for $\pm 10\%$ change in primary voltage. Readout Accuracy: Within ± 200 Hz = 1 count. TRANSMITTER: RF Power Output: High Power (50-ohm non-reactive load): SSB: 100 watts PEP ± 1 dB; CW: 100 watts ± 1 dB. Low Power SSB: 1 watt PEP (minimum); CW: 1 watt (min.). Output Impedance: 50 ohms, less than 2:1 SWR. Carrier Suppression and Unwanted Sideband Suppression: -50 dB down from 100 watt single-tone output at 1000 Hz reference. RECEIVER: Sensitivity: 0.5 for 10 dB S-N for SSB. Selectivity: 2 kHz minimum at -6 dB, 5 kHz max. at -60 dB (2:1 nominal shape factor). CW Selectivity: (with accessory CW filter) Selectable 2 kHz, 400 Hz. IM Distortion: -65 dB min., -57 dB typ. with noise blanker. Image Rejection: -60 dB min. Dimensions: 7 $\frac{1}{4}$ " H x 14 $\frac{15}{32}$ " W x 13 $\frac{1}{8}$ " D.

Matching SB-104A accessories give you more operating convenience



1 Matching Speaker



2 Remote VFO – SAVE \$55!



3 Station Monitor



4 Station Console – SAVE \$95!

1 Speaker and Power Supply

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

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

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

Kit PS-1144, 27 lbs. **WAS \$129.95, NOW ONLY 69.95**

2 Remote VFO for added capability

Provides split transmit/receive capability for DX, net

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

Kit SB-644A, 10 lbs. **WAS \$134.95, NOW ONLY 79.95**

3 Station Monitor shows signals

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

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

HDZ-63-3, 3-ft. Coax. w/conn's. 1 lb. **4.95**

4 NEW SAVINGS on Station Console.

You can save \$95.00! Five-function Console features 24-hour, 6-digit clock; 10-minute ID timer w/auto reset; RF watt-meter 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.

Kit SB-634, 13 lbs. **WAS \$194.95, NOW 99.95**

HDZ-63-3, 3-ft. Coax. w/conn's. 1 lb. **4.95**





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

\$459⁹⁵

- 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 SSB 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 of 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 widely separated. Image and IF rejection of better than 50 dB help bring you world-wide reception that's clean, clear and crisp. And when you add the optional 400 Hz narrow CW Crystal Filter to your HW-101, your code copy will be arm chair all the way. Crystal filtering cuts through the QRM.

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, with an ALC exciter input for linear amplification.

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. A crystal heterodyne oscillator assures stable mixing.

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 pages 18 and 19 for the Microphone, Wattmeter/SWR Bridge and coaxial cable to complete your HW-101 station.

Kit HW-101, Shpg. wt. 22 lbs.	459.95
SBA-301-2, 400 Hz CW Crystal Filter, Shpg. wt. 1 lb.	39.95
Fixed Station AC Power Supply (described below)	
Kit PS-23, Shpg. wt. 17 lbs.	84.95
Kit HS-1661, Matching Speaker. Shpg. wt. 5 lbs.	34.95

HW-101 SPECIFICATIONS: RECEIVER: Sensitivity: <0.35 μ V for 10 dB S+N N for SSB operation. **SSB Selectivity:** 2.1 kHz min. @ 6 dB down, 7 kHz min. @ 60 dB down. **CW Selectivity:** (optional SBA-301-2 CW filter): 400 Hz min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. **Spurious Response:** Image and IF rejection > 50 dB. **TRANSMITTER: DC Power Input:** SSB 180 W PEP (normal voice, cont. duty cycle). CW 170 W (50% duty cycle). **RF Power Output:** 100 W on 80 thru 15 M; 80 W on 10 M (50% non-reactive load). **Output Imped.:** 50 to 75 Ω with <2:1 SWR. **Harmonic Radiation:** 40 dB below rated output. **Mike Input:** High impedance. **Carrier Suppression:** 45 dB down from single-tone output. **Unwanted Sideband Suppression:** 45 dB. **Third Order Distortion:** 30 dB from two-tone output. **GENERAL: Frequency Coverage:** 80-10 M amateur bands. **Frequency Stability:** <100 Hz per hour drift after 45 minutes warmup from normal ambient conditions. <100 Hz for \pm 10% line voltage variations. **Modes of Op:** USB, LSB, CW, tune. **Dial Calibration:** 5 kHz. **Calibration:** 100 kHz crystal. **Power Requirements:** 700 to 850 V at 250 mA with 1% maximum ripple; 300 V at 150 mA with 0.05% maximum ripple; - 115 V at 10 mA with 0.5% maximum ripple; 12 V AC/DC at 4.76 amps. (See PS-23 Power Supply below.) **Dimensions:** 6 $\frac{1}{16}$ " H x 14 $\frac{1}{16}$ " W x 13 $\frac{3}{16}$ " 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. Provides fixed bias and 12.6 filament voltage. Excellent bias supply filtering and very low ripple. Overload protected. 120/240 VAC, 60/50 Hz, 350 watts max. 6 $\frac{3}{16}$ " H x 4 $\frac{3}{16}$ " W x 9" D.
Kit PS-23, Shpg. wt. 17 lbs. 84.95

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

\$34⁹⁵

- 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 13, as well as many other Heathkit transceivers and receivers. It features a big 5" x 7" oval speaker with a 3.16 Ω magnet offering 300 to 3000 Hz frequency response for best SSB and CW reception. The green spatter-finish cabinet is constructed of rugged, lightweight aluminum, and measures 6 $\frac{3}{16}$ " H x 9" W x 5 $\frac{1}{16}$ " D.

Kit HS-1661, Shpg. wt. 5 lbs.	34.95
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Packed with power and features, the SB-221 2kW Linear has a QSO-commanding voice

\$639⁹⁵

- Lowest price-per-watt in 2 kW Linear Amplifiers
- Heavy duty power supply for reliable operation
- You can wire it easily for 120 or 240 VAC line

More of what you're paying for: The Heathkit SB-221 2kW Linear Amplifier is the hottest performing, lowest cost amp available. It has the rugged dependability and superior design you need for the professional operating proof you seek. Like more QSO's across the spectrum. More DX recognition when the going gets tough. QSL's from every country, continent or contest you try...

More savings from the start: When you build it, you save money for other gear and reap years of lasting pride from the kit experience. In 2kW Linears, Heath has absolutely the lowest cost-per-watt against all competition. At only \$.33 per watt, SB-221 is the clear price/performance leader.

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

Kit SB-221, Shpg. wt. 66 lbs. **639.95**
 HDZ-63-3, 3 ft. RG-8/U Jumper with PL-259 Connectors, 1 lb. **4.95**

Deluxe Antenna Tuner with dual wattmeter/SWR bridge matches 1.1:1 on antennas and loads

\$269⁹⁵

- Covers 160 through 10 meters with continuous tuning
- Built-in wattmeter/SWR bridges makes tuning a snap
- A single switch selects either one of two connected antennas, balanced or unbalanced, and bypass load

If you need a rugged tuner to handle full legal power, our Deluxe Antenna Tuner can make the difference. It will put the clean, twin kilowatt thunderbolt of the SB-221 Linear (or its 1kW brother) to most efficient use by radiating every last watt of their capability from your antenna system.

By clearly indicating power out and f/r SWR with $\pm 5\%$ forward accuracy, this 2kW tuner exactly matches your antenna to any frequency in the 160-10 meter spectrum. You're in complete control with a continuously variable inductor for an infinite number of impedance settings; bypass switch for tri-band beam or dummy load; versatile, built-in 4:1 balun and inductor turns counter. A special Heathkit manual shows typical high-, mid- and low-range settings on individual antennas. The wattmeters have a range of 200 and 2000 watts (fwd) and 50/500W (ref), with accuracies of $\pm 5\%$ (avg). Don't be caught on the edge of DX activity ... waste not a watt of precious QSO-grabbing power – build the Super Tuner and join thousands of radio amateurs who are extracting the last possible measure of performance from their gear!

12/AMATEUR RADIO



The winning favorite among thrifty hams, SB-201 puts a 1200W kick in your SSB signal

\$479⁹⁵

- A rugged pair of 572B finals need 100-watt exciter
- The SB-201's forced-air cooling is ideal for contesting
- Switchable multi-function metering puts you in control

You can call all day during a pile up but if your signal doesn't get out, that rare DX won't hear you. So put the Heathkit SB-201 1kW Linear Amplifier to work in your station. You'll never sit on the sidelines again.

100 watts is all it takes to drive the 201 to a full 1200W PEP input on phone and 1000 watts input on CW across the 80, 40, 20 and 15 meter bands. A built-in solid-state power supply features full circuit breaker protection, and the switchable multifunction panel meter shows SWR, grid current, plate current, relative power and plate voltage. Like the SB-221, an antenna relay will automatically switch the antenna to exciter input when the SB-201 is off, and an ALC output provides overdrive control. And a broadband pre-tuned pi-input yields maximum efficiency with extremely low distortion over the 80-15 meter spectrum. The heavy-duty finals are fan-cooled for maximum tube life and completely shielded for excellent TVI protection. A prealigned cathode-input tank circuit provides maximum efficiency maintaining a third order distortion of -30 dB or better.

Kit SB-201, Shpg. wt. 47 lbs. **479.95**
 HDZ-63-3, 3-ft. RG-8/U Jumper with PL-259 Connectors, 1 lb. **4.95**



Ideal for MARS, CAP and WARC operation

Kit SA-2060, Shpg. wt. 20 lbs. **269.95**
 HDZ-63-3, 3-ft. RG-8/U Jumper with PL-259 Connectors, 1 lb. **4.95**



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



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

\$174⁹⁵

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

The world's most popular CW Transceiver has a worthy reputation. The HW-8 provides you with maximum convenience in covering the Transceiver's 3.5-3.75; 7.0-7.25; 14-14.25; and 21-21.25 MHz operating ranges. This hot little rig features an RF and AF gain control, solid-state band switching, pushbutton band selection, a tunable preselector and direct conversion with RF amplification. Crystal controlled heterodyne circuitry insures accurate frequency mixing. 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 on 15. Operate your transceiver on a campout, backpacking, or on a business trip; power it from your motorcycle battery, car lighter socket, go 'solar QRP' or tune it up at home on 120/240 VAC with the HWA-7-1 Power Supply. The Heathkit HW-8 is a great performer that's going to give you hours of pure fun – order yours now and join the growing fraternity of QRP-powered QSL-hunters. Requires headphones (see below). Accept the challenge. Keep in mind – *one watt works a lot!*

Kit HW-8, Shpg. wt. 6 lbs. 174.95
 Kit HWA-7-1, AC Supply operates HW-8 on 120/240 VAC, 4 lbs. 27.95
 GD-396, Superex Headphones, Assembled, Shpg. wt. 1 lb. 9.95

Gain more operating bandwidth from dipoles and long wires with 80- to 10-meter Antenna Tuner

\$169⁹⁵

- Handles up to 2000 watts PEP on SSB or 1000 watts CW
- Continuously variable inductor assures a perfect match every time, with any feedline or configuration
- Erasable logging scale for band settings on front panel
- Ideal for MARS operation and newly-allocated WARC bands

Frustrated by a dipole that lacks sufficient bandwidth or an antenna that only covers one or two bands? Then the low cost SA-2040 Antenna Tuner is for you. Designed with a low-as-possible price that can't be beat, it still includes the same type of heavy-duty capacitors and almost every other feature of its big brother (at left) – but without the 160 meter coverage and built-in wattmeter/SWR bridges. That way, you get the right amount of tuner you need without paying for station accessories you already own.

Silver plated straps and roller contact assembly on the SA-2040 minimize RF loss at high frequencies and its large feed through insulators are designed to withstand high voltage RF. SO-239 connectors mate with your 50 Ω system. After tightening the cover, personalize your front panel with adhesive letters and numerals we've included. Compare this Tuner with all the competitors – match power limits, features and price – you'll see our engineering quality and total performance value stand out. Heath has more for the active ham!

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



HR-1680 SSB/CW Receiver is an outstanding performer in your shack or on the road

\$239⁹⁵

- Excellent sensitivity lets you hear very weak signals
- Stable operation for drift-free SSB and CW reception
- Dual conversion front end receives 80 thru 10 meters
- Built-in AC supply, or external battery operation
- Easy kit assembly with no-instrument alignment

Heath's HR-1680 is top quality choice for your first receiver. Look at the facts: it covers 80, 40, 20 and 15 and the lower 1 MHz of the 10 meter band, with a preselector tuned dual-conversion MOSFET front end. Less than 0.5 μ V in gives you a 10 dB signal to noise ratio. A 4-pole crystal filter and MOSFET amplifier gives the IF section excellent selectivity and gain. Both the RF and IF stages are AGC controlled to prevent signal of varying strengths to be received without fading and blasting. The HR-1680 also features individual crystal heterodyne oscillators for excellent stability, solid-state diode band-switching, built-in 100 KHz reference for precise calibration/alignment and switchable wide/narrow active audio circuitry to precisely tailor your 1680's SSB or CW response. Operates from 11.5-15.3 VDC or internal 120/240 VAC supply. By combining high performance and low cost for serious listeners, the HR-1680 is ideal for a station operator who wants quiet, razor-sharp reception.

Kit HR-1680, Shpg. wt. 14 lbs. 239.95
 Kit HS-1661, Matching Speaker, Shpg. wt. 5 lbs. 34.95



An enjoyable, easy-to-build two-evening kit

Kit SA-2040, Shpg. wt. 15 lbs. 169.95
 HQZ-63-3, 3-ft. RG-8/U Jumper with PL-259 Connectors, wt. 1 lb. 4.95



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

AMATEUR RADIO/13

Novice Class License Course helps you discover the pride and potential of Amateur Radio



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



\$39⁹⁵

**Achievement
Guaranteed**

- Communicate with nearly a million other hams around the world ... right from your own home or car ... using CW on a variety of frequencies
- Take the Novice FCC test and ride the airwaves! You can't fail – Heath guarantees that you will pass! – or we'll refund the purchase price

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

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

This deluxe learning tool now contains 48 new pages of text material to prepare you for the latest FCC Novice License examination. Our update includes study of call sign groups (with prefix, zone and suffix types), many "Q" and alphanumeric abbreviations, RST signal reporting and Universal Coordinated Time (UTC) with a global conversion table provided. Also, coverage of basic circuit conditions, fusing, quarter-wave vertical and dipole antennas, proper calculation of their length for different bands, antenna installation and basic precautions, standing wave ratio problems and causes, station ground, block diagrams of functional novice stations, audible backwave, ripple and hum, zero-beating, and the mature operating practices and responsibilities of station control.

The Course is organized in nine separate modules corresponding to the subject areas you'll find covered in the Novice exam. Each subject is presented in a clear, step-by-step manner for progress at your own pace.

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

The Course includes two audio cassette tapes full of important knowledge. The first is an introduction to Amateur Radio, and explanation of the RST signal reporting system, a review of electronic circuit components, and a study of practical circuits. The second tape will teach you the International Morse Code in letter groups quickly and effectively, and then help boost your send and copy speeds to 5 words per minute for the CW test.

Upon completion of the entire Course, you'll be able to accurately send and

receive code at five words per minute, and pass a 20-question multiple-choice written test from the Federal Communications Commission.

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

We are so sure that this Course will help you get your first license, that if you fail to pass the new FCC Novice exam after completing the enclosed final practice exam, we will refund your money in full. Simply return the Course materials, along with your receipt and a copy of your rejection notice from the FCC. No better guarantee exists. You'll soon be on the air!

You can explore the wonders of this fascinating hobby in a unique way with performance-proven Heath equipment. Our kits are world-famous. They're easy fun to build, and they expand your understanding of practical electronics by giving you hands-on experience and 'tech-knowledgey'.

There's an indescribable thrill which comes from airing a QRP (low power) or legal-limit rig that you've just built with your own two hands! It's a feeling that harks back to the early days of our hobby (some call it a passion) when almost every piece of gear was 'home-brew' and every contact or call you made reflected the hard won know-how, loving care and electronic construction skills you had learned and applied to succeed. You're going to save money over comparable assembled units, plus save more by being able to perform your own service and maintenance, should it ever become necessary. And you can say with pride, "I built it myself!"

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

ER-3701, Shpg. wt. 7 lbs. **39.95**
Kit HO-1416, Oscillator (see below), Shpg. wt. 2 lbs. **16.95**

Build up your code speed fast with this handy CW kit

\$16⁹⁵



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

The key furnished with the kit is the only external item you require to form audible code characters. The manual includes sections on Operation, Application and Learning the Code. Once you get your license, the HO-1416 can serve as a sidetone oscillator for any transmitter using negative grid-block keying. Two-tone emerald cabinet is 2 5/8" H x 4 1/8" W x 4 3/8" D. Operates on one long-life 9V battery (not included).

Kit HO-1416, Shpg. wt. 2 lbs. **16.95**

SAVE \$11⁹⁵

Why delay? This is the ideal package – study the Course and get 'hands-on' Code practice!

We'll help you get started in Amateur Radio with a big 21% savings on the ER-3701 Novice License Course and HO-1416 Code Oscillator when you purchase the pair together. So you can save even more money, this offer includes a certificate good for 10% off your purchase of up to \$100 of Heathkit Amateur equipment. If purchased separately, they'd cost \$56.90.

ERS-3701, Shpg. wt. 23 lbs. **44.95**





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

Prepared with the General Class license holder in mind, ER-3703 is the first completely up-to-date compilation of the technical and examination material required to help you achieve Advanced Class status. It assumes you possess a General license or have the equivalent skills and background knowledge to do so.

\$49⁹⁵

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

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

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

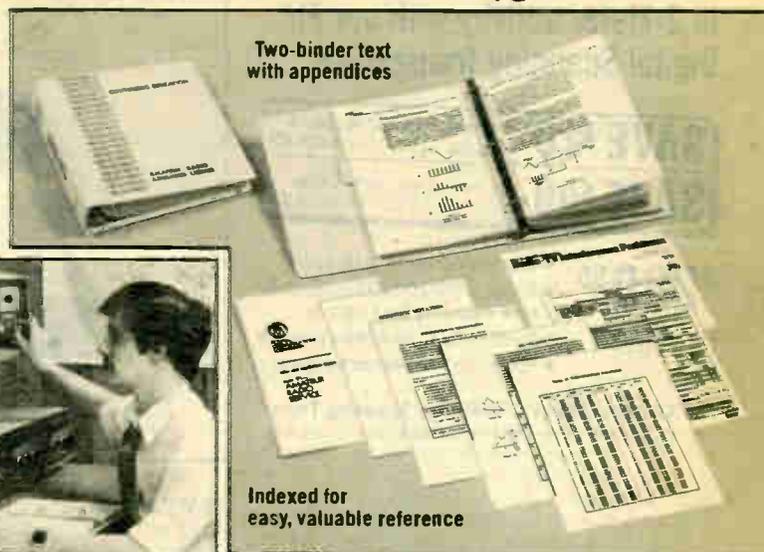
The FCC Element 4(a) written examination deals with the following subjects: Rules and Regulations, Radio Phenomena, Operating Procedures, Emission Characteristics, Electrical Principles, Practical Circuits, Circuit Components, Antennas and Transmission Lines, and Radio Communication Practices. ER-3703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

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

The Advanced License Course is arranged in 8 learning units:

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

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



Two-binder text with appendices

Indexed for easy, valuable reference



Designed in the modular style proven most effective by educators, the Advanced License Course includes self-test reviews after each chapter to assure greater retention of the material. This format also makes it easy to identify problem areas *before* the FCC test. The self-instructional nature of the Course allows you to progress at your own pace and backtrack to review any subject.

Fully one-fifth of the 80-15 meter HF spectrum in four specific subbands (3800-3890, 7150-7225, 14200-14275 and 21270-21350 kHz) is allocated to the Advanced and Extra Class license holders. Why be left out? These are the choicest kilocycles, with more DX hot spots and experienced amateurs. Demonstrate your desire for self-improvement and upgrade your ticket with the Heathkit/Zenith Advanced Class License Course. Send us a copy of your new license or FCC notification of passing to receive 4.0 Continuing Education Units and a personalized Certificate of Achievement. Don't delay — start by ordering your guaranteed Course today!

ER-3703, Shpg. wt. 9 lbs. 49.95

General License Course promotes Novice to voice communication

\$49⁹⁵

- Leave the CB or Novice bands behind and progress to the full range of Amateur Radio experiences. Send your words and images around the world!

Move up to the General Class and get all the added privileges — more frequencies to operate on, plus voice transmission, radio teletype, slow-scan TV, facsimile, satellite activity — an impressive list of incentives that add up to more QSOs, QSLs and thousands of new friends gained via these modes.

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

An informative text takes you through the subjects covered on the new FCC written test. Its in-depth coverage will give you a wealth of concentrated information — more than enough to pass either the Technician or General Class written examinations. Later, keep it handy as a valuable reference.

The Course provides extra code practice to bring your send and copy speeds up to 15 words per minute. Since the FCC requires only 13 wpm to pass the General exam, the extra "two-word edge"

gives you more confidence to pass the code test comfortably. We won't let you fail!

Four simulated FCC written tests give you test-taking experience, and allow you to review problem areas so you'll be better prepared for the actual exam. Once you pass your General exam, send us a copy of your new license or FCC notice of passing to receive 5.0 CEU's and a Certificate of Achievement.

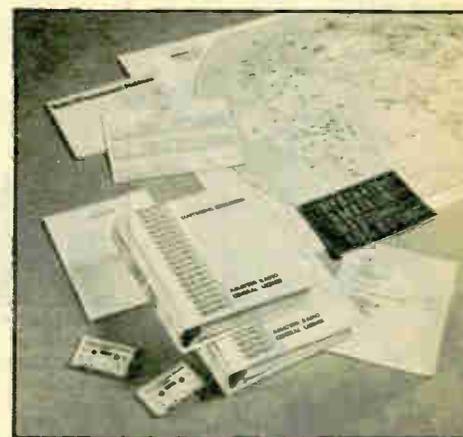
The General Course is arranged in 11 units:

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

Your General License Course includes:

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

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



tee of passing the General Class exam — or we'll refund your money for the program materials when you return them with a copy of your FCC rejection notice. It's a claim exclusive to Heath.

You have nothing to lose — order the best today!
ER-3702, Shpg. wt. 24 lbs. 49.95



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

NEW SAVINGS BRING NEW FUN in 2-Meter activity with our FM Digital Scanning Transceiver

SAVE \$20

On Transceiver and Micoder II
Was \$359.95. NOW \$339.95!

SAVE \$40

On Transceiver and PTT Mike
Was \$339.95. NOW \$299.95!

\$299⁹⁵

with
PTT Mike

- Adjustable 10-15 watt output
- Variable 70-200 Hz sub-audible tone encoding built right in
- Synthesized full-band coverage
- Power-up on favorite frequency

The VF-7401 2-Meter FM Digital Scanning Transceiver finds all the activity for you, scanning the band in 1 MHz segments. 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. Mode-select simplex, ± 600 kHz, AUX and 1 MHz offsets. Will accommodate most 2-meter offset combinations, even MARS and CAP.

Solid state and narrow-banded, the VF-7401 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™ II Microphone/Auto Patch Encoder (p. 18), draws power directly from VF-7401. Includes gimbal mount bracket for mobile installation. External speaker jack. Requires a 13.8VDC, 3-amp continuous, 4-amp intermittent source such as a charging auto electrical system, or VFA-7401-1 AC Power Supply, right.

Kit VFS-7401-1, Transceiver and Micoder II,
Shpg. wt. 12 lbs. **339.95**

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

LED indicates 5 kHz position.

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

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

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

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

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

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

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

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

Kit VFS-7401-2, Transceiver and PTT Microphone,
Shpg. wt. 12 lbs. **299.95**

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 $^\circ$ (resistive) load at 25 $^\circ$ 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: $\pm .0015\%$. Operating Temperature Range: -15° F to $+125^\circ$ F (-10° C to $+50^\circ$ 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 $\frac{3}{4}$ " H \times 7 $\frac{1}{4}$ " W \times 10 $\frac{1}{4}$ " D (7.0 \times 18.4 \times 26.0 cm).

13.8V DC Power Supply gives you double duty on VF-7401 and other rigs

\$47⁹⁵



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 $\frac{1}{16}$ " H \times 7 $\frac{1}{4}$ " W \times 9 $\frac{7}{8}$ " D.

Kit VFA-7401-1, Shpg. wt. 7 lbs. 47.95

Easy to access top controls and BNC connector



Carrying case and external mike are handy accessories

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

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

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

\$199⁹⁵

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

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

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

VFA-2031-2, Fitted Holster-style Carrying Case, Shpg. wt. 1 lb. 18.95

VFA-2031-3, Auto-Patch Encoder to make phone calls through repeaters with auto-patch inputs, Shpg. wt. 1 lb. 19.95

VFA-2031-5, Continuous Tone Encoder to access most repeaters using your VF-2031, Shpg. wt. 1 lb. 9.95

Kit VFA-2031-6, External PTT Microphone with coiled cord which plugs into VF-2031 so you can transmit without removing unit from holster, 1 lb. 29.95

Kit HA-201A, 10-Watt Amplifier (described on next page), 2 lbs. 47.95



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

\$274⁹⁵

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

If your 2-meter transceiver has a hot receiver like the one on the VF-7401 (on page 16), you probably hear stations who can't hear you. The new Heathkit VL-2280 All-mode Base Amplifier will permanently bridge that communication gap, 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, RTTY, 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 19. 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

\$59⁹⁵

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. 59.95
HDZ-63-3, 3 ft. Coax. w/conns., 1 lb. 4.95



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



Kit VL-2280, Shpg. wt. 32 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

\$137⁹⁵

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

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

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

The VL-1180 Mobile Amplifier, like the VL-2280 described left, has been engineered to operate in all modes — single sideband, FM or CW — across the entire 144 to 148 MHz 2-meter band. Power output is stable across the entire band, thanks to broad-band circuitry. And you get a 50% duty cycle for more "on" time because extra-large heat sinks provide more than adequate cooling. Insertion loss is less than 0.6 dB, and the VL-1180 boasts excellent harmonic rejection, plus RF sensed or remote keying. The Amplifier's rugged design means you can install it in your car's trunk or other out-of-the-way location without worry. The easy-to-build VL-1180 is a two-evening kit, and alignment is simple, too, requiring only an exciter and a dual wattmeter like the one on page 19. 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: (at 10 watts drive) 2.0:1 or less. Power Output: 75 watts (typical). @ 10 watts drive. Duty Cycle: 50%. 10 minutes on, 10 minutes off. Insertion Loss: (Antenna to Receiver) less than 0.6 dB. IM Distortion: -24 dB. Power Requirement: 13.6 VDC (operates 11.5 to 16 VDC) @ 11 amperes. Dimensions: 2½" H x 4¾" W x 10½" D (6 3 x 11 8 x 26.7 cm).

AC Supply for your 2-Meter transceiver/amp combo

\$84⁹⁵

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 approximately 12 and 14.5 VDC. Output current is 10 amps intermittent (10 minutes maximum), 5 amps continuous. Darlington circuit gives exceptionally high gain for excellent regulation. Fused for over-load protection. Comes with 3-wire line cord. Size: 5¼" H x 6¾" W x 11" D. As with all our kits, this one even includes solder.

Kit PS-1175, Shpg. wt. 15 lbs. 84.95



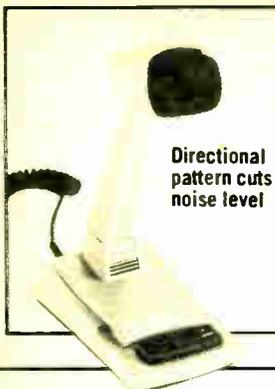
10-Watt Amplifier gives your hand-held clout

\$47⁹⁵

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

Kit HA-201A, Shpg. wt. 2 lbs. 47.95





Directional pattern cuts noise level

Cut annoying background noise with improved, lower-priced Cardioid Desk Mike

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 Cyclolac case measures 7.43" H x 4.34" W x 5.84" D.

HDP-242, Assembled, Shpg. wt. 2 lbs. 54.95



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). Microphone and Encoder measures 3.75" H x 2.63" W x 1.75" D.

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

2 Dummy Load Cantenna 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. Transformer oil specified; not supplied.

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

HDZ-63-3, 3' coax w/PL-259 conns., 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. Portable or permanent, for 120 VAC, 60 Hz power.

Kit HD-1274, Shpg. wt. 4 lbs. 22.95

4 Phone Patch links to land line

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. 49.95

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 144-146 MHz. Boom length, 144"; longest element, 40"; turning radius, 81". Assembly required.

HDP-1470, Shpg. wt. 6 lbs. 39.95

6 Cushcraft AV5 for long 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. 109.95

7 Dual-Speed Rotator for beams

Couple the heavy-duty Alliance HD73 with your beam to achieve real DX success. For antenna with up to 10.7 sq. ft. wind load area. Has positive no-slip drive, automatic brake action. 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. 16.95

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. 19.95

10 Low-Pass Filter reduces TVI

70 dB attenuation reduces TVI. Insertion loss, <0.3 dB. 160-10 meters. 50Ω. Full legal power.

HDP-3700, Shpg. wt. 2 lbs. 32.95

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

11 Change antennas in seconds with a convenient Remote Coax Switch

Saves money - replaces five expensive coax feed lines with just one. LED shows which antenna is connected. Erasable front panel. 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 8-wire cable listed below.

Kit SA-1480, Shpg. wt. 8 lbs. 119.95

IDA-1290-3, 150-ft. 8-cond. cable, 6 lbs. 23.95

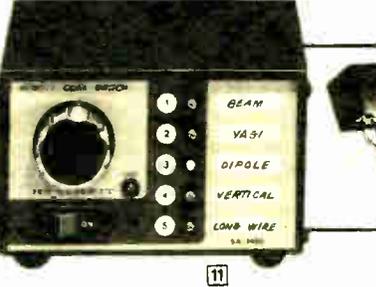
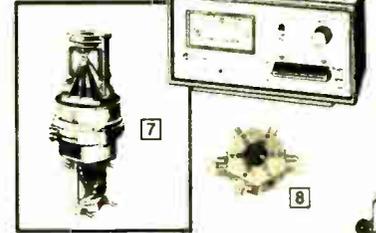
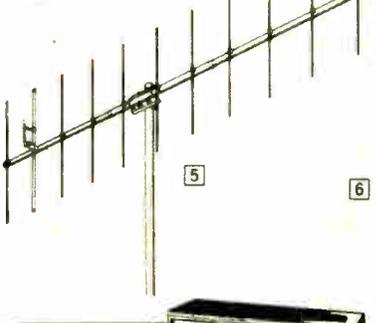
IDA-1290-2, 100-ft. 8-cond. cable, 4 lbs. 16.95

IDA-1290-1, 50-ft. 8-cond. cable, 2 lbs. 9.95

Low-loss Zenith Coax Cables

HDZ-63-3, 3' w/PL-259 conns., 1 lb. 4.95

HDZ-63-10, 100' w/PL-259 conns., 10 lbs. 29.95



Dual HF Wattmeter will measure 2000W PEP to $\pm 5\%$

\$94⁹⁵

- Reads PEP or average power between 1.8 and 30 MHz
- Has a factory assembled and calibrated sensor
- Measures transmissions up to 200 and 2000 watts PEP forward and to 500 watts reflected
- Tune your transmitter for its optimum output with at least $\pm 5\%$ forward power accuracy

The **HM-2140 Dual HF Wattmeter** is going to increase your Amateur station's efficiency by helping you operate more effectively in the low bands.

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 for the Amateur Radio bands within the high-frequency ranges on the 160, 80, 40, 20, 15 and 10 meter bands, the HM-2140 can also be used for other services which may lie in between the Amateur bands.

It will help you tune your transmitter for optimum output power, adjust your antenna and antenna tuner for minimum standing wave ratios (VSWR) and provide you with an accurate power measurement when you use a good 50-ohm dummy load or a 1:1 (or less) VSWR antenna.

The **Hams at Heath** have designed the HM-2140 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 reading

power, boasting $\pm 5\%$ forward power accuracy to give you precision measurements.

Pushbutton-switched high and low power ranges plus a factory-assembled and calibrated sensor insure accurate readings every time. Another switch enables you to read PEP and Average power from the same meters. A scale labeled BATT on the forward meter, when used with the front panel Sensitivity control, lets you observe the life condition of the battery. An additional scale on the reflected meter reads SWR directly from 1:1 to 3:1.

For complete portability in the field, this valuable instrument can be operated on a 9-volt battery (not included). Where AC power is available, you can use the PS-2350 Battery Eliminator below.

The Wattmeter is housed in a rugged aluminum cabinet which is styled in two-tone emerald to complement your other Amateur Radio gear. For added convenience of operation, the remote sensor can be mounted into the cabinet or up to four feet away from the meters and nearer to the transmitter's output cables.

The easy-to-follow assembly manual will guide you step-by-step from unpacking your kit through a short series of tests and adjustments (for which we provide all requisite tools). The manual also includes a section on operation, illustrations of several types of Amateur station setups using the Dual HF Wattmeter, a complete circuit description and detailed schematic.



You'll spend an enjoyable evening or two building this handy device for your modern station. Heathkit quality engineering assures you of an accurate HF Wattmeter that will provide you many years of reliable service.

- Kit HM-2140**, Shpg. wt. 3 lbs. **94.95**
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), $\pm 5\%$; 50 W (REF), $\pm 7.5\%$. Power requirement: 9 volts DC (Battery NEDA Type #1604) or optional PS-2350 AC Adapter. Dimensions: 4 $\frac{1}{2}$ " H x 7 $\frac{1}{2}$ " W x 6 $\frac{3}{4}$ " D (10.48 x 19.05 x 16.19 cm)



VHF Dual Wattmeter reads power & SWR on 6- and 2-meters

\$94⁹⁵

- Measures your average forward power with a $\pm 7.5\%$ scale accuracy up to 300 watts

The **Heathkit HM-2141 VHF Dual Wattmeter** gives you instant power readings on a variety of transmitters in the 50-175 MHz spectrum.

With it, you can measure forward and reflected average power and PEP with an insertion VSWR less than 1.05:1. Full-scale average forward power accuracy is $\pm 7.5\%$. Simultaneous readings of transmitted output up to 30/300 watts forward and 10/100 watts reflected power make antenna tuning a snap, with noticeable results.

Standing wave ratio can be read directly from 1:1 to 3:1. Like its brother above, all functions are push-button easy and a factory-assembled and calibrated sensor guarantee performance to specification. Operates on 9V battery (not included) or on 120 VAC with optional power cube below.

- Kit HM-2141**, Shpg. wt. 5 lbs. **94.95**
PS-2350, AC Battery Eliminator, 1 lb. **7.95**
HDZ-63-3, 3-ft. Coax w/connectors, 1 lb. **4.95**

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

Three of the very best base and mobile antennas

1 Cushcraft's **ARX-2B 134-164 MHz Ringo Ranger II** antenna has more gain, less wind load and more mechanical integrity. Features three $\frac{3}{8}$ -wave sections for 7.0 dBi gain, stainless steel hardware, low loss ABS insulator, seamless aluminum tubing, built-in coaxial lightning arrester and compact decoupling radials. Rated for 1000 watts; 14 feet long; 2:1 VSWR Bandwidth is >3 MHz. Eliminate noise, and access more repeaters with the highest-gain 2-meter Omni!

HDP-1475, Assembly required, Shpg. wt. 3 lbs. **39.95**

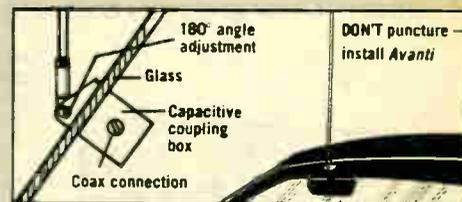
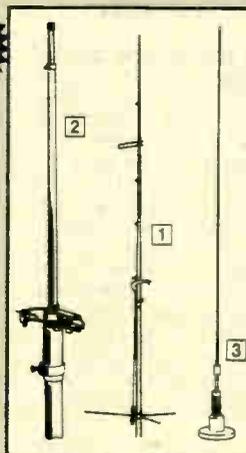
2 Cushcraft's **AR-2 135-175 MHz Ringo Standard Gain Antenna** is a popular $\frac{1}{2}$ -wave with 3.75 dB gain. Low angle of radiation gets out to fringe DX. Features lightning protection, low 1.1:1 SWR, 52 Ω feed with PL-259 (coax not included). Rated 1000 watts. Enjoy more 2-meter activity!

HWA-202-11, Assembled, Shpg. wt. 2 lbs. **27.95**

3 Cushcraft's **Magnetic-mount Mobile Antenna** with grip-tight magnet in chrome-plated base makes it easy to air a signal in many vehicles — even your boat. Stainless steel whip needs no cutting. This $\frac{3}{8}$ -wave boasts 3 dB gain over 144-174 MHz. Includes PL-259 connector and coax.

HDP-1472, Assembled, Shpg. wt. 3 lbs. **32.95**

NEW



Mobile $\frac{1}{2}$ - λ Antenna mounts on glass

Avanti's 144-174 MHz 2-meter Antenna couples T/R signals right through the window of your car or RV, attaching easily with duo-bond foam tape. Hi-QV tuning unit is C-coupled through the glass to 33" outside whip. Patented end-fed design provides 3 dB gain in high-profile Omni pattern. Has 1.1:1 SWR; handles 150W. Includes instructions for clean removal from vehicle, and 15' of coax.

HOP-2402, Shpg. wt. 2 lbs. **32.95**



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

The Heathkit SA-5010 μ Matic™ Memory Keyer — best buy of its type in ham radio — has features that will improve the way you handle CW!



FAST, EASY
2-EVENING KIT

\$99.95

- Brings more fun and results to your CW activity
- Includes removable capacitive-touch iambic paddles
- Up to 10 buffers are available for the storage of text or "command strings" so you can sequence alterations
- Highly flexible speed range of 1 to 99 words per minute
- Four-level random practice mode allows 6,400 different and repeatable 3000-character training sessions
- Rear panel jack lets you connect to your favorite keyer

The latest generation of Heathkit ham gear includes the most useful and feature-inclusive CW aid our hams could imagine — the μ Matic Memory Keyer. Ask anybody that uses one. It can revolutionize your operating practices, ease your hand fatigue, multiply QSOs — and incoming QSLs.

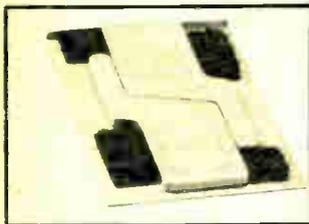
The compact, modern styling is made possible by our use of a custom microprocessor. It provides up to 10 variable-length buffers for storing up to 240 characters of text or commands, thus eliminating wasted memory space.

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

Use the audible-feedback, 22-position keypad to select character formation speeds and spacing, any of 11 weight settings, pause, repeat count (up to 10 times), buffer number and mode with ease. Enter text at whatever speed and weight are comfortable for you, and send it with any other settings you wish. Then sit back, monitor the activity and collect contacts...

The easy-to-use capacitive paddles unplug and store inside the Keyer when not in use. Their removable compartment cover is silk-screened with the Morse Code for easy reference. Left handed? These paddles are reversible!

To boost copy, our unique Practice mode sends code groups of random length and selectable types (alpha, alphanumeric, and alphanumeric plus common or all punctuation). And, of course, you can choose any speed between 1 and 99 wpm, and any weight setting to sharpen your ear-to-the-airwave skills.



Text may be manually added into a buffer message being sent. Storing a Pause in text or command strings will cause the Keyer to rest automatically for insertion of serial numbers, special greetings or station RST reports.

A CMOS memory with battery backup retains the buffer contents, last-selected speed, spacing, weight and repeat count whenever the Keyer is turned off or unplugged. Built-in diag-

Electronic Keyer gives you dual-range word speeds



120 VAC or 12 VDC, and features adjustable volume and sidetone frequency, a built-in speaker, weighted cabinet, removable line cord, tune-up 'hold' switch, headphone jack, provision for connection to a hand keyer, and more. Measures just 3" H x 5" W x 7 $\frac{3}{8}$ " D.

Kit HD-1410, Shpg. wt. 4 lbs. **64.95**

Your CW transmission can be 100% copy when this solid-state Electronic Code Keyer joins your base or portable station. You select between two ranges as the kit goes together: 10 to 35 or 10 to 60 wpm (continuously variable between each limit). Travel and tension of the paddles are adjustable. True iambic operation forms most characters with reduced wrist/fist movement. HD-1410 operates on



nostics check the microprocessor each time the μ Matic Memory Keyer is turned on, and tests buffer memory whenever it is reset.

Other deluxe features include a built-in sidetone oscillator and speaker with volume/pitch controls, phonejack and earphone, entry error alarm, positive or negative keying, LED mode indication and a money-saving autoshutoff utility should you forget. The μ Matic's die-cast zinc base is evenly weighted to reduce movement during keying. Requires only the 120 VAC power transformer cube below for full operation with a transmitter. Go ahead — order one today and discover the newest phase of CW fun!

Kit SA-5010, Shpg. wt. 3 lbs. **99.95**
PS-5012, 120 VAC Power Supply, Assembly, Shpg. wt. 1 lb. **15.95**

SA-5010 SPECIFICATIONS: Speed Range: 1 to 99 WPM. Character/Word Spacing: Less than or equal to speed setting. Number of Buffers: 1 to 10. May be used to store text or commands. Buffer Size: 240 characters plus commands, total. Weighting: Normal plus 5 light and 5 heavy settings. Auto Message Repeat: 0 to 9 (sent to 1 to 10 times). Keyer Output: Solid state: -250 volts @100 mA; -40 mA (separate, protected output jacks). Memory Backup: 3 watch batteries (supplied) — 1 year typical life. (No battery drain unless the Keyer is removed from AC power source). Sidetone: Approximately 300 to 1500 Hz, adjustable. Power Requirement: External pluggable transformer (optional) or 11 to 16 volts DC @200 mA. Dimensions (excluding paddles): 1 $\frac{3}{8}$ " H x 4 $\frac{1}{2}$ " W x 6" D.

Value-packed Dip Meter covers 1.6 to 250 MHz



This solid-state Dip Meter can determine the approximate resonant or operating frequency of energized or de-energized circuits and help you adjust traps, detect parasitics or function as a signal generator. A MOSFET paraphase amplifier and hot-carrier diodes provide more sensitivity and a better dip. It uses a Q-multiplier for greater detector sensitivity and a responsive 150 μ A meter movement for positive marking. Operates on one

9V battery (not included) and goes anywhere you do. Once built, the rugged aluminum Meter and its accessories store handily in a molded gray carrying case. Assembly manual has detailed section on operation.

Kit HO-1250, Shpg. wt. 4 lbs. **74.95**



Heath/Dana Speed Control increases driving comfort, reduces fatigue on long car trips

\$99⁹⁵

- 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-'82 Honda CVCC or '77-'82 Honda Accord. Shpg. wt. 2 lbs. **18.95**

CSA-2048-3 Installation Kit. For '75-'82 Corollas, Shpg. wt. 2 lbs. **18.95**

CSA-2048-4 Installation Kit. For '73-'82 Toyota Corona, Celica, Crown, and Mark II, '75-'78 Toyota Pickup, '75-'77 Datsun 610 710, '77-'82 Datsun 810, '75-'82 Datsun 280-Z, ZX, '81-'82 Datsun Pickup. Shpg. wt. 1 lb. **8.95**

CSA-2048-5 Installation Kit. For the following fuel-injected cars: '76-'82 Volkswagen Rabbit, Dasher, Scirocco; '76-'82 Audi Fox. Shpg. wt. 2 lbs. **18.95**

CSA-2048-6 Installation Kit. For '75-'82 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 it.



Vacuum Servo attaches to throttle



Electronic control

Siren/PA system for emergency service 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 or yelp 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 the 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 amplifier 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. **89.95**

GDA-18-1, Exterior horn, assembled, Shpg. wt. 10 lbs. **99.95**

Kit GDA-18-2, Concealed horn, Shpg. wt. 10 lbs. **99.95**

Includes versatile gimbal-bracket mount



Concealed grille horn

Exterior mount horn

SAVE \$20⁰⁰

On these Siren/PA systems! If purchased separately, \$189.90

GD-18A, (Kit GD-18 & Exterior horn) Shpg. wt. 27 lbs. **169.90**

GD-18B (Kit GD-18 & Concealed horn) Shpg. wt. 28 lbs. **169.90**

Exhaust Analyzer checks efficiency of your car



You'll add great diagnostic capabilities to your automotive test equipment with the Heathkit CI-1080 Exhaust Analyzer. An 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. **114.95**

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

Perform auto tune-ups professionally with the Deluxe Solid-State Ignition Analyzer

ONLY
\$554⁹⁵

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

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

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

Cylinder selection buttons can be pushed in multiple numbers so that banks of cylinders can be shorted out for power balance checks with the built-in tachometer, and for electrical display of one or more cylinders. Front panel switches allow both parade and superimposed displays of primary and secondary waveforms with 10:1 and 2:1 trace expansion.

High-temperature, oil- and gas-resistant neoprene insulated cables provide easy, positive connections to engine. Includes adaptor for GM HEI ignition systems. For use with 4, 6 or 8-cylinder (4-cycle), or 2-rotor Wankel engines and standard, transistorized or C-D ignitions. Use it with the optional timing light below for a complete, economical home tune-up center.

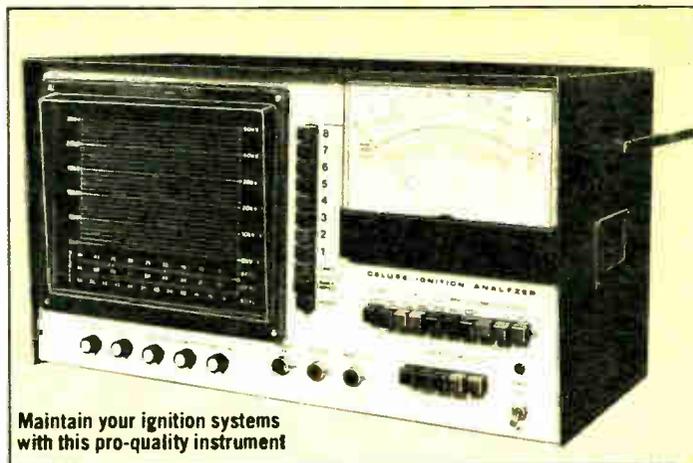
The CO-2600 pays for itself in SAVINGS! Whether you use it at home or in your auto repair shop, it pays off in big savings of time and money. Save when you build it yourself, save when you keep your cars running at peak performance and efficiency! It's your key to fast, accurate ignition maintenance.

Kit CO-2600, Shpg. wt. 83 lbs. 554.95

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

Kit COA-2600-4, Shpg. wt. 3 lbs. 59.95

Alternator Test Adaptor for CO-2600 Ignition Analyzer.
COA-2600-2, Shpg. wt. 1 lb. 13.95



Maintain your ignition systems with this pro-quality instrument

CO-2600 SPECIFICATIONS: CRT Size: 12 inches (diagonal) Meter Size: 8 inches. Signal Pickup: Direct for primary, inductive for parade trigger and capacitive for secondary. Tachometer Ranges: 1000, 3000 and 6000 RPM. Voltmeter Ranges: 2, 20 VDC. Tachometer/Voltmeter Accuracy: $\pm 3\%$ 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.



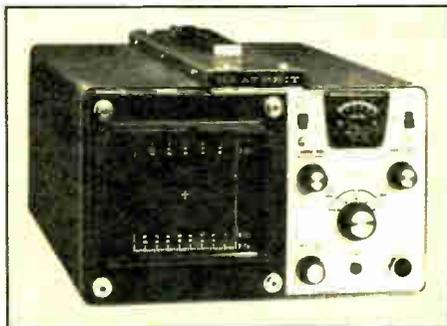
Deluxe Scope Cart aids viewing and mobility

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

COA-2600-3, Shpg. wt. 25 lbs. 44.95

Solid-State Ignition Analyzer tunes for less

- Ideal test instrument for garage mechanics, service stations and automotive hobbyists
- Clamp-on, inductive pulse pickup method
- Built-in tachometer
- One of the most useful car care tools to own
- Check or troubleshoot the operation of an ignition system fast
- Reduce the spiraling cost of maintenance



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

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

Use it with any standard, transistorized or C-D ignition on 3, 4, 6 or 8-cylinder engines with distributors. Includes adaptor for GM HEI systems. Optional 12V inverter mounts to unit's rear panel for portable or 'on the road' tests. Handbook shows detailed cause/effect waveforms. 120/240 VAC operation.

Kit CO-1015, Shpg. wt. 22 lbs. 249.95

12 VDC Inverter for lighter-socket operation.
Kit COA-1015-1, Shpg. wt. 3 lbs. 37.95

Portable Engine Analyzer has digital accuracy

- Measures dwell, engine speed, plus DC voltage, resistance and current
- Battery-operated power gives full portability
- Meets GM specs for use with 1981 and later models with Computer Command Control
- Valuable, money-saving diagnostic instrument which conserves your money and auto care time, all at once
- 3-evening assembly



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

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

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

Kit CM-1551, Shpg. wt. 5 lbs. 122.95

CMA-1550-1, 400-Ampere Shunt Accessory, Shpg. wt. 1 lb. 14.95





Quiet, dependable Screw-Drive Garage Door Opener ends strain and struggle

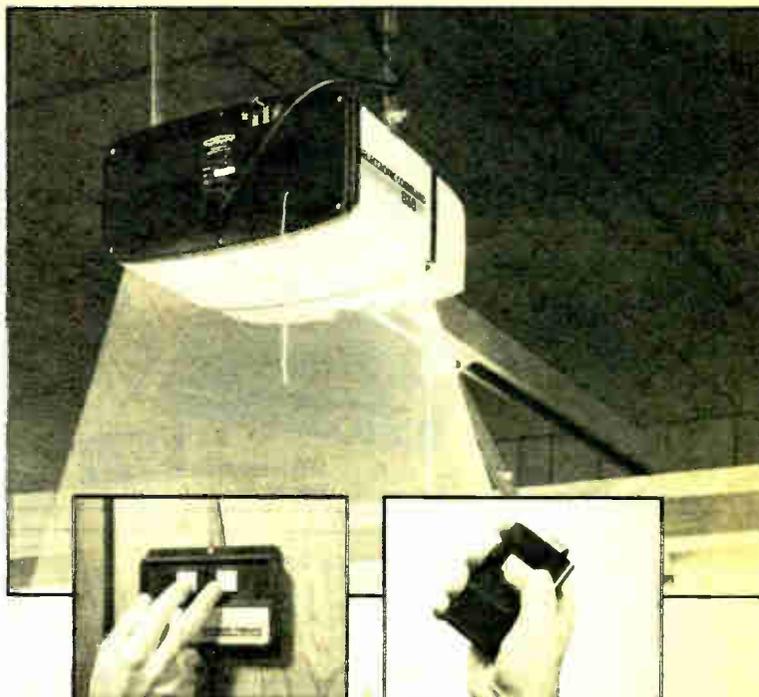
- The easiest-to-install screw-drive system available
- Door re-opens instantly if obstructed during closing
- All necessary materials for solid suspension supplied

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

No garage door is too big or too small. The powerful 1/2 hp motor opens even the heaviest doors up to 18 feet wide. A spring shock absorber cushions vibrations and allows for up to 2 inches of ice build-ups, driveway gravel and other impediments. Up-limit, down-limit and obstruction pressures are adjustable.

Transmitters and receiver are all solid-state and digitally encoded with 256 different signal combinations so you can set and change your own anytime. The Electronic Command Garage Door Opener System installs in a day, with do-it-yourself ease and no special tools. Operator housing requires 120 VAC/60 Hz. UL listed. Provide added welfare for your family, plus extra safety and value to your home – order today and say 'open sesame' by touch control!

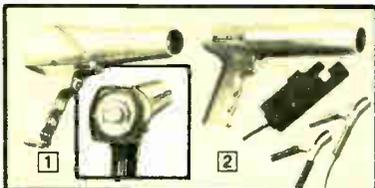
- Transmitter, Receiver, Dual Switch and Screw-Drive Door Opener Mechanism.**
 GD-3509, Shpg. wt. 45 lbs., Motor Freight 189.95
- Transmitter, Receiver, Single Switch and Chain Drive Door Opener Mechanism.**
 GD-3409, Shpg. wt. 35 lbs. 149.95
- GDP-3309-A, Transmitter only, Shpg. wt. 1 lb. 29.95**
- GDP-3319-A, One Transmitter, one Receiver for 3-wire system, 1 lb. 59.95**
- GDP-3329-A, Two Transmitters, one Receiver for 3-wire system, 2 lbs. 89.95**
- Power Transformer for adapting 2-wire Opener to 3-wire system.**
 GDA-3309-3, Shpg. wt. 1 lb. 9.95



Inside Wall Switch and Hand Transmitter activate the microprocessor electronics

Heathkit Timing Lights pulse brighter than daylight

1 **Deluxe Timing Light** has built-in Advance Meter and Tach for 2- or 4-cycle and rotary engines. Measures mechanical/vacuum advance to 60° from 1500-4500 rpm. Tachs engine to 4500. Inductive pickup clips around #1 spark plug wire. Polarity protected; powered by 12 VDC. Includes all cables, pickup, clips.



Kit CI-1096, Shpg. wt. 4 lbs. 79.95

2 **Value-priced Timing Light** has same features, minus Advance/Tach Meters.

Kit CI-1040, Shpg. wt. 3 lbs. 37.95

Protect your valuables in car, van or boat ultrasonically

Invisible waves guard against theft in any enclosed vehicle, sensing movement to trigger a 50 second alarm using horn. Automatic reset resumes protection. Has entry and exit delays. Fast, 4-wire hookup.



Kit GO-1568, 2 lbs. 59.95

GDA-1568-1, Pin Switches for hood and trunk, 1 lb. 6.95

GDA-1558-1, Horn Relay Switch for autos w/o relay, 1 lb. 4.95

Install a Digital Quartz Clock/Timer



Displays 4-digit time in 12-hour format; switches freely to 24-hour Trip Timer or 10-minute stopwatch without disturbing setting or accuracy. Highly dependable! Measures 1 7/8" H x 4 3/8" W x 3 1/2" D.

Kit GC-1415, Clock with Trip Timer, 2 lbs. 39.95

Matching Speedometer/Tachometer



Illuminated display registers with ±1 mph accuracy to 199, with functions for mph, kph and x100 rpm. 1 7/8" H x 4 3/8" W x 3 1/2" D.

Kit CI-1265-1, 3 lbs. 59.95

Kit CI-1265-2, for cars w/CS-2048, 3 lbs. 49.95

Kit CSA-2048-1, for front wheel drive, 1 lb. 8.95

Build a Wiper Delay for safer driving



Annoyed by fog and drizzle? End wiper switch fumbling! Solid-state circuitry lets you delay sweeps up to 30 seconds during drizzle, or 0.5 secs for downpours. Fits most single and 2-speed electric wiper systems.

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

Three-in-one Tune-Up Meter saves on engine repair

This kit enables you to make simple dwell, engine speed and battery voltage tests you normally pay a mechanic to do. Combines a distributor cam dwell meter (scale for 3, 4, 6 and 8 cylinders), an electronic tachometer (0-4500 rpm) and a 0-20V DC voltmeter in a single, compact meter. For 6/12-volt pos/neg ground systems, and solid-state or high-energy ignitions. Power is obtained from engine. Complete with leads, instructions and the opportunity to keep your autos in top shape for less, any season of the year.



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

Professional-grade Engine Analyzer pinpoints trouble

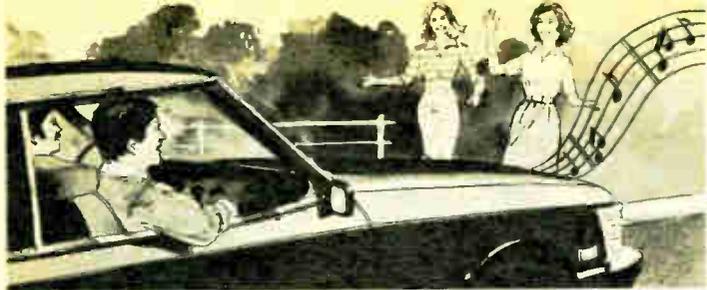
Locate problems in alternator or generator, voltage regulator, distributor, condenser, plugs, starter, battery and electrical accessories. Tests conventional, magneto, transistorized and most capacitive discharge systems with pos or neg ground and 4, 6 or 8 cylinders. Color-coded 6" meter. Requires three 'C' cells (not included). Accessories and Handbook supplied.



Kit CM-1050, Shpg. wt. 8 lbs. 114.95



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



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

\$49⁹⁵

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

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

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

A full keyboard inside the main unit – 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 column or instrument panel, lets you select any of three different tunes. Two of the tunes can be pre-programmed selections. Or choose two of your own tunes and one pre-programmed tune. Programming guide included.

A weatherproof, 4-ohm, 4-watt speaker (included) mounts behind your vehicle's grille – or at any other convenient outside location.

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. **49.95**



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!

CH-1276 SPECIFICATIONS: Tones: 13, with frequencies from 261 to 522 Hz, ±1%. Voicing: Trumpet (approx.). Sound Pressure Level: 96 dBA at 1 Meter. Power Requirement: 10-17 VDC. Idle Current: Less than 95 mA at 13.2 VDC with ignition off. Cabinet Dimensions: 1.50" H x 7.75" W x 4.88" D.

Use Electrical Systems Course to repair your car at home

\$39⁹⁵
for EAC-1

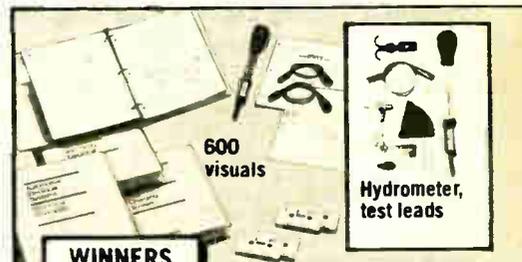
- Covers starting, charging, accessory/body electrical systems
- Features hands-on experiments to show repair procedures

Effective audio-visual teaching method covers major sections of the auto electrical system. Four modules give you an education in automotive electrical systems – complete with hands-on projects. Learn about auto electrical principles, charging systems, starting systems, accessory and body electrical circuits. Earn 4 Continuing Education Units – score at least 70% on the final exam.

SAVE \$19.85 on all Modules. EAC-1, 23 lbs. 39.95

EA-11, Module 1/Elect. Principles, 5 lbs.	14.95
EA-12, Mod. 2/Starting System, 5 lbs.	14.95
EA-13, Mod. 3/Charging System, 5 lbs.	14.95
EA-14, Mod. 4/Acc. & Body Elec. Sys., 5 lbs.	14.95

These courses can also prepare you for NIASE exams. Write NIASE, 1825 K St. NW, Wash., DC 20006.



600
visuals

Hydrometer,
test leads

WINNERS

Awards from the
Society for
Technical
Communications

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

\$49⁹⁵

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

Audio-visual course teaches ignition principles, theory of electronic and computer-controlled ignitions and how to dismantle/change/reassemble ignition components. Earn 4 CEUs – score 70% on final exam. Projects require engine and ignition analyzers, timing light, compression tester and vacuum pressure gauge. EA-2000, 12 lbs. **49.95**

Compression tester, vacuum pressure gauge and "T" fitting. EAC-2-1, 1 lb. **14.95**

SAVE \$14.90! Order EAC-1, EAC-2000 and EAC-2-1. \$104.85 separately. EAS-2000, 32 lbs. 89.95

These courses can prepare you for NIASE exams. If you pass final exam and fail NIASE exam, return Course materials and receipt for refund of full purchase price.



With Champion
tune-up chart

188 color flip charts

Ignition test
components

1 Reliable Electronic Ignition Tester

\$19⁹⁵

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

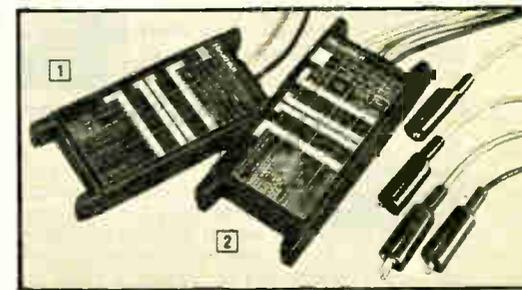
Tests battery condition, function of reluctor and pickup coil, switching of primary coil and location of faulty component in primary ignition circuit. 0.75" H x 2.50" W x 5.50" L. Requires some ignition knowledge. Pickup coil test won't work on '78 and newer Omnis, Horizons, K-cars with Hall-effect ignitions. Kit CI-2055, Shpg. wt. 2 lbs. **19.95**

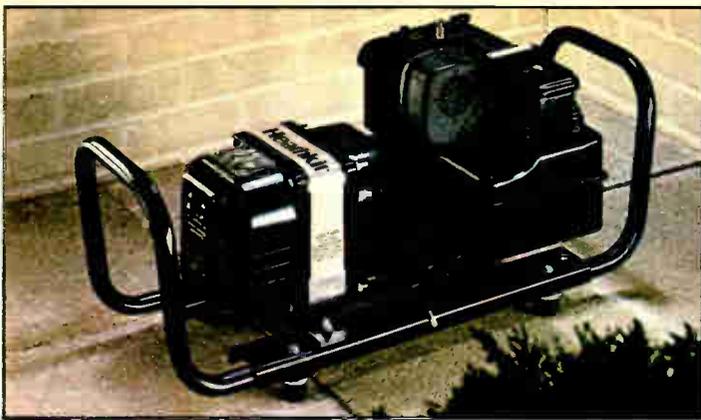
2 Low-cost Charging System Tester

\$19⁹⁵

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

Three quick tests tell you if battery is sufficiently charged, if alternator is charging battery, if voltage regulator is faulty and if alternator is functioning. Keep one in your car to save labor for road emergencies. For 12 VDC, negative ground systems. Enclosed in 0.75" H x 2.50" W x 5.50" L case. Kit CI-2065, Shpg. wt. 2 lbs. **19.95**





AC power for emergencies or convenience



FAST, EASY
1-EVENING KIT

\$479⁹⁵

- Emergency power for any use
- Offers convenience in the out-of-doors
- Provides nearly two hours of regulated electrical power, anywhere
- Features economical operation

Never be without electrical power: The Heathkit Portable Power System provides you with the power you need for virtually any use! Power for fire departments and rescue squads to illuminate the darkness at fire and accident scenes. Power for amateur radio operators to operate Ham radios and other communications equipment during a natural disaster, or any time commercial electrical transmission lines are down and out. Power for the homeowner to save expensive meat and foods stored in freezers and refrigerators – no hunting for dry ice to keep things cold when the power goes out after a storm. Power to enjoy your favorite entertainers on television or radio while in the out-of-doors. Works great where an extension cord just won't reach. Operate pumps, motors and other electrical equipment where there is no electricity.

Dependable and economical power is yours: Commercial electrical service can be interrupted at any time for a variety of reasons. The GU-1820 provides the power you need while you wait for repairs. The GU-1820's 120 VAC, 60 Hz alternator supplies you with up to 2200 powerful watts of electricity for your emergency and convenience needs at a duplex, three-prong, 20-amp circuit breaker-protected circuit. It's a fast and convenient way to supply electricity wherever and whenever you need it. The Heathkit Portable Power System is economical too! The 5 HP Briggs and Stratton engine runs on regular gasoline, unleaded gasoline or gasohol. The system provides you with a steady source of electricity for up to 1 3/4 hours, at half-load.

As always, the Heathkit name means quality and accuracy with ± 5 percent voltage regulation tolerance limits and only 4 Hz frequency variation from no load to full load at 3600 rpm. A resistive spark plug eliminates annoying radio frequency interference. Noise is reduced by a low-tone muffler for the comfort of those around you. Optional Spark-Arresting Muffler, GUA-1820-1, reduces fire danger (required in California; below). 16" H x 15" W x 31" L.

Kit GU-1820, Shpg. wt. 112 lbs. **479.95**
GUA-1820-1, Optional Spark Arresting Muffler, 1 lb. **3.95**

Power Inverter creates AC from 6 or 12 VDC



Lightweight and convenient power anywhere: The easy-to-build MP-10 power inverter converts a 6 or 12 VDC source to 120 VAC square wave power, at up to 80% efficiency at a normal work load. That means you can enjoy the comforts of the home wherever you have DC power – in the car, in your camper or on your boat. A continuous power rating of up to 175 watts means you can operate radios, televisions, lamps, electric shavers – just about any small appliance. Protected by a 20 amp fuse. Two standard receptacles provided for convenience.

For high starting current motors, use GU-1820 above. The MP-10 measures 4.75" H x 5.13" W x 7.38" L. (12.07 x 13.03 x 18.75 cm).

Kit MP-10, Shpg. wt. 8 lbs. **54.95**

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



Save your time and money – and your back too – with the low-cost Heathkit Log Splitter

\$549⁹⁵



FAST, EASY
1-EVENING KIT

- Simple one evening assembly means you can start splitting logs quickly
- Fast and easy log splitting means no more back breaking and dangerous work
- 10 tons of splitting force behind a triangle steel wedge makes quick work of most any log
- Enjoy your fireplace for a change, while you beat the energy crisis

Saves time and energy: The Heathkit Log Splitter is easy-to-build and will save you countless hours of back-breaking work on the woodpile. Imagine, now you can really enjoy your fireplace or woodstove without all the hard work that used to go along with it. One evening assembly means you can be splitting wood – and enjoying it – the next day.

Split logs the easy, Heathkit way. Unique tubular frame holds logs up to 21" in length while you watch. No more dangerous steadying of the log with your hand! A twenty-four second automatic handle return frees you to stack wood just split and ready another log for splitting. It's ready when you are! No more tiring work with an ax. Just place your log in place, press the lever and watch the steel wedge turn your logs into chunks ready for cold winter nights and the fireplace. Stack it up, put the next log in place and the Heathkit GU-1810 Log Splitter is ready to go once again. It never gets tired.

Splitting force when and where you need it: The Heathkit GU-1810's high-torque, four-cycle, five horsepower Tecumseh gasoline engine drives a 4.5 gpm hydraulic pump that is pressure relief-protected. The Heathkit Log Splitter's engine and pump generate up to 1550 pounds per square inch of force that drives a six-inch, triple-angle wedge with up to a massive ten tons of splitting force. Powerful enough to split most logs with ease.

Burn wood and save money: Tired of paying out dollar after dollar for expensive fuel oil? Ready to have it out with the local utility over ever-increasing natural gas heating bills? Reduce your dependence upon those heating methods by burning wood. It is the natural way to heat your home, and nothing is more relaxing than a blazing fire in your fireplace on a cool winter's night. You'll rest easy knowing that your hard earned dollars are staying right in your pocket. Remember, easy-to-build one evening assembly, a powerful ten tons of splitting force, strong enough to split most woods with ease, comfort and convenience instead of back-breaking work, and of course, the quality and value you've come to expect from Heathkit products. Start enjoying your winter woodpile chores instead of dreading them – the easy Heathkit way! Priced at much less than other comparable units. 31" H x 31.5" W x 52.75" D.

Kit GU-1810, Shpg. wt. 210 lbs., Motor Freight. **549.95**

Electronic Air Cleaner removes dust and dirt automatically from the air you and your family breathe

\$149⁹⁵

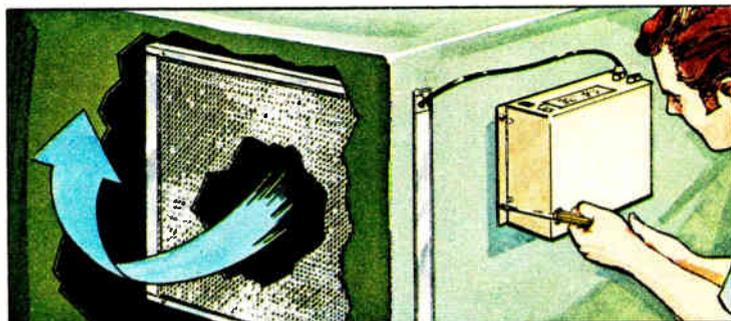
- Easy-to-build and install the Heathkit way – no metalworking or special wiring required
- Automatic – works when your furnace or cooling system is in operation
- Leaves air clean and fresh by removing airborne contaminants with each cycle

Remove smoke and dust from the air you breathe. Clean air is better for you and with the Heathkit GD-2196 Electronic Air Cleaner, you can have fresh, clean air all the year round. The GD-2196 is easy to install on most any heating or cooling system and removes dust, dirt, allergens and smoke from cigars, cigarettes, pipes and even cooking, leaving you fresh air throughout your home. Breathe deeply and enjoy air without smoke and contaminants.

Upkeep is a breeze: Easily removable filters are easy to clean whenever required. They replace your current furnace filters. For heavy duty cleaning jobs, you can operate two filters with one power supply. The Heathkit Electronic Air Cleaner also assists in keeping your home clean. Unattractive dust and dirt particles are trapped inside the filter and don't show up on your furniture and belongings.

Completely automatic, no-bother, no-worry operation: A special pneumatic device inside the Heathkit Electronic Air Cleaner automatically senses the air flow created when your furnace or cooling system is running. It then activates the electronic air cleaning system to rid your air of unsightly and unhealthy dust, dirt, smoke and other impurities. It efficiently removes impurities, as they pass through the one-inch thick filters. Airborne contaminants are removed from the air with each cycle. The GD-296 system is ideal for allergy sufferers, or for anyone who wants cleaner, fresher air.

Easy to build and install: As always, complete and concise Heathkit instructions guide you each step of the way. You'll be enjoying cleaner air before you know it. No special metalworking or wiring skills required for installation. 120 VAC, 60 Hz Power Supply, 8" H x 12" W x 4" D. Power Supply and at least one filter required for operation. Kits differ in filter size, check furnace filter size and capacity before ordering.



Efficiently cleans air throughout your home



No metal work or special wiring required to install

Electronic Air Cleaner Power Supply.

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

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

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

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

Portable Electronic Air Cleaner for any room

- Clean the air in any room in your home for pennies a day – great for renters
- Easy-to-build, no soldering required – One evening to build
- Three-speed fan for a variety of air cleaning jobs



Keep room air clean and fresh:

Move the Heathkit GD-1297 Portable Electronic Air Cleaner from room to room to keep the air in your home fresh and clean. Perfect for renters! Keep it in the living room to combat dust and smoke in the air. Ideal at parties. Keep it in the bedroom of allergy sufferers to remove allergens and ensure a quiet night's sleep.

Use it year-round: In winter avoid that stale feeling, in summer remove dust and dirt that seep in from open windows. Great for large gatherings of people where smoke from pipes, cigars and cigarettes fills the air.

Casters allow for easy movement: Four GDA-1297-1 Deluxe Casters (a \$13.95 value) are included at no extra cost. They make moving the Heathkit Portable Electronic Air Cleaner a snap. Just roll it wherever you need it and plug it in. The GD-1297 works efficiently in any room up to 25' x 30'. Equipped with a three-speed fan for any cleaning job. Up to 250 CFM for removing smoke from cooking, down to 10 CFM just to freshen the air, or during sleep.

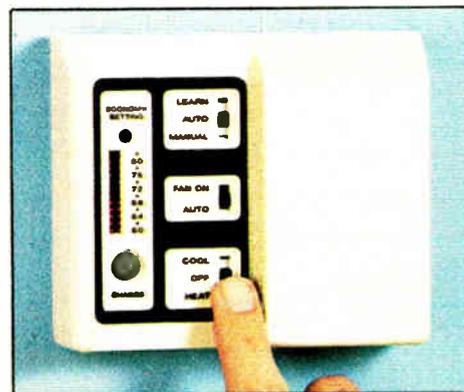
Easy-to-build, beautiful to use: No soldering is required, power supply, variable speed fan control and filter are pre-built. Southern Pecan Vinyl Finish. 120 VAC, 60 Hz. 26.5" H x 17.25" W x 13.5" D.

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

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

Intelligent Thermostat saves energy and money

- Don't heat or cool your home when you're not there
- Seven-Day Intelligent Thermostat now available in kit form for the first time
- Save money and stay comfortable with this patented thermostat system



The NE-1210 saves money, and keeps you comfortable:

It's an Intelligent Seven-Day Thermostat you program to save money and energy. In the winter it allows your home to cool off while you are warm in bed, then heats the surrounding air so you are comfortable when you awake. It will cool off the home while you are away at work, then warm it once again before you arrive. In the summer, program it to cool off the home before you arrive. Use one pushbutton to program heating and cooling cycles.

Versatile and convenient: Program up to six different temperature settings each day and a total of seven daily programs. Slow-Cycle increases efficiency even more by allowing you to use the longest on-off cycle while keeping room temperature within 2°F or your most comfortable setting. Econo-Save allows you to reduce room temperature to 54°F while you are away for extended periods of time, maximizing energy savings. It then automatically returns the temperature to comfortable levels just before your arrival, allowing you to enter your home at a pleasant and refreshing temperature.

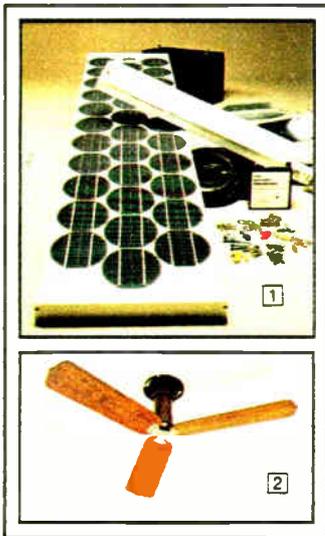
Now available in kit form: Save even more the Heathkit way! Uses present 2, 4 or 5 wire, 24 VAC power. Not for dual-stage heat pumps. 4.5" H x 5.5" W x 1.5" D.

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

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



Space-age ARCO HomElectric Power Kit creates electricity from the sun!



- May qualify for Federal, state tax credits (p. 29)
- Non-polluting energy source as dependable as the sun

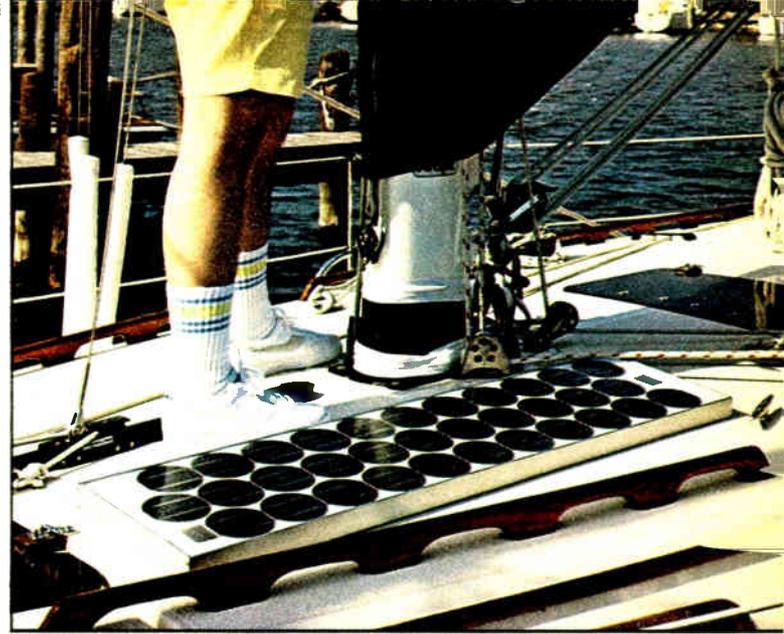
1 Power whenever you need it: Up to 2.6 Amps of 13.5 VDC electricity are supplied by the ARCO HomElectric Power Kit – wherever and whenever you want it. What could be cheaper than free electricity from the sun?

Affordable solar energy: In addition to the low purchase price, you may qualify for a 40% Federal tax credit – which reduces the \$599.95 HomElectric Kit price to just \$359.97, and the \$499.95 NSA-1212-1 Solar Panel price to just \$299.97! State tax credits may also apply – see page 29 and check with the IRS and state tax department, tax instructions or tax preparer for more details on available incentives.

Convenient and practical: Size allows for placement anywhere around your home or shop, on boats or RVs, even

in the wilderness miles away from civilization!

Lightweight, compact (12 x 48 x 1½") solar module: Converts solar energy to electricity efficiently. Battery protector controls charge to 12 VDC battery (required; not included). The 20-Watt fluorescent light fixture produces 1500 lumens of light output – more than a 75-Watt incandescent bulb.



Kit NS-1212, Complete ARCO HomElectric Solar Electricity Kit includes Solar Panel, Battery Protector (Can be used with multi-panel solar arrays, battery not included), a 20-Watt fluorescent light and tube, mounting hardware, Shpg. wt. 27 lbs., Motor Freight Collect **599.95**

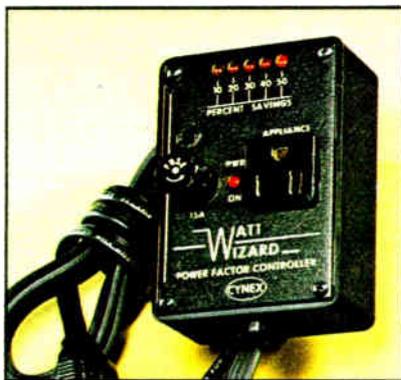
Kit NSA-1212-1, Solar Panel and Mtg. Hdwe., 40 lbs., Mtr. Frt. **499.95**

2 Ceiling Fan: No battery needed – operates on 12 VDC power from solar panel. Saves energy – the 44" (tip-to-tip) blades circulate air through room. **NSA-1212-2, Assembled, Shpg. wt. 8 lbs.** **119.95**

The Watt Wizard saves energy and money

- May qualify for a 15% Federal Tax credit
- Uses NASA technology to save up to 60% of the cost of operating motorized electrical equipment

Save big three ways: First, you may qualify for a 15% Federal tax credit (consult IRS, tax instructions and/or a tax preparer) for details and qualifications. Second, save up to 60% of the cost of operating motorized home and shop electrical equipment. Third, save by increasing the life of those devices.



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

Motors operate at optimum voltage and speed: The Watt Wizard Power Factor Controller saves both energy and money. It also prolongs equipment life, since the motor operates at the optimum voltage – in some cases only 60 to 80 VAC.

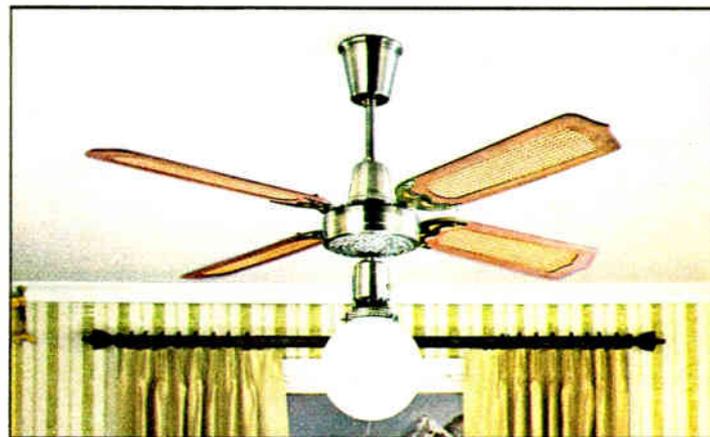
You know how well your Watt Wizard works: LEDs tell you exactly how well the Watt Wizard is working. Order one unit now – and move it throughout the house. Then buy more units later, when their performance is known.

Has manufacturer's one-year limited warranty: 120 VAC, 50 Hz, 15 amps (fused). Measures 4½" H x 2⅞" W x 1½" D (10.16 x 7.32 x 3.81 cm).

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



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



Three-speed Ceiling Fan saves energy beautifully

- Install in your favorite room – reversible blades have solid wood appearance or wicker/cane inserts
- Reversible three-speed fan saves valuable energy
- Decorative light illuminates dark areas of room

Energy-saver or conversation piece: The 48" (tip-to-tip) blades circulate air in the heat of summer and keeps you cool and relaxed in the warmest of weather for only pennies a day. Includes \$16.95 decorative light kit, a \$16.95 value. Use this nostalgically-styled energy-saver in the bedroom, den, dining room, family room or living room – most anywhere in the home!

Build this partially assembled kit in as little as an hour! Includes manufacturer's three-year limited warranty. UL approved. 120 VAC, 60 Hz. Not recommended for use on ceilings less than eight feet tall.

Kit GD-133B, Shpg. wt. 25 lbs. **ONLY 149.95**



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 percent of your water heating costs.

Fight soaring energy costs — install the NS-1100 Solar Water Heater yourself, using Heath quality, Heath expertise and the thorough, step-by-step Heathkit manual!

As low as
\$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

- Save up to 40% over a comparable dealer-installed system
- Top quality components are carefully matched to work together
- The Heathkit NS-1100-3 Manual Set answers all your questions about location, installation and operation

Fight back against soaring energy bills: Hot water makes up a significant part of the average home energy bill. And now, you can cut those energy costs — with the Heathkit Solar Water Heater. This closed-loop system, is designed to save from 50% to 80% of the hot water bill for a typical home.

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

City: Omaha, NE. Family Size: Four persons.

A properly-sized NS-1100 system will satisfy 71% of this family's hot water needs.

Purchase price of two-collector Heathkit Solar Water Heater System \$2289.75
 Less 40% Fed., 20% State tax credits \$1373.85
 Net investment in system \$915.90
 Estimated 1st-yr. energy savings \$314.99

City: Columbus, OH. Family Size: Four persons.

A properly-sized NS-1100 system will satisfy 83% of this family's hot water needs.

Purchase price of three-collector Heathkit Solar Water Heater System \$2839.70
 Less 40% Fed., 10% State tax credits \$1419.85
 Net investment in system \$1419.85
 Estimated 1st-yr. energy savings \$368.23

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



Considering active and passive solar space heating, solar electricity, solar domestic water heaters and wind-generated electricity, the Heathkit Solar Water Heater is the most energy-conscious product for the 80's. As the cost of fossil fuels continues to rise, all forms of alternative energy will become even more promising. A good economic case can be made for the Heathkit Solar Water Heater anywhere in the United States, as available tax credits make payback on the system reasonably short.

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

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

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

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

Preheats cold water: The NS-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.

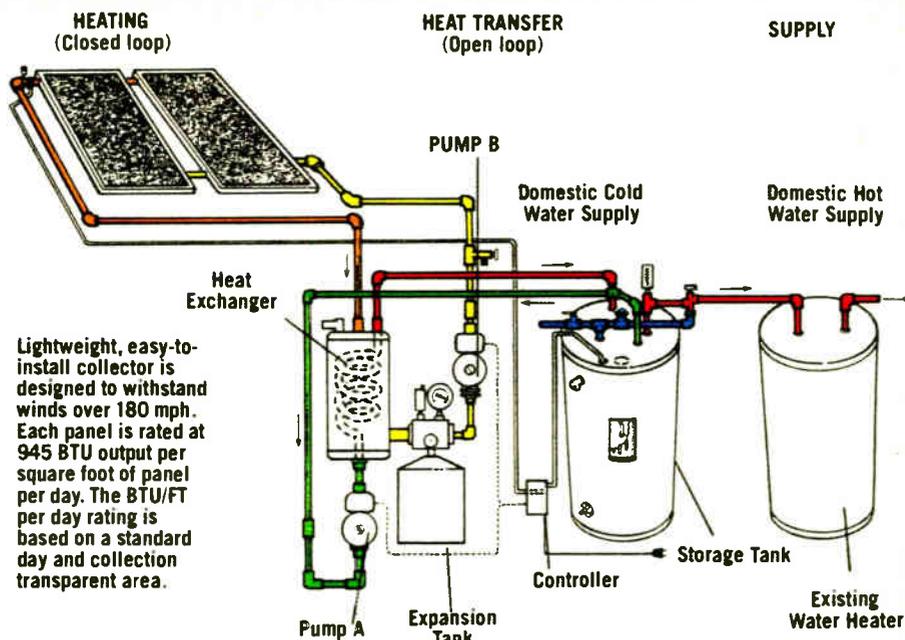


Your Heathkit Solar Water Heater System will soon pay for itself

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 will become an even better bargain.

A closed-loop system: This lets the NS-1100 Solar Water Heater 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 nearby Heathkit Electronic Center (units of Veritechnology Electronics Corporation). Turn to page 57 for store locations and phone numbers – or purchase the NS-1100-3 Manual Set (below, right) for more information.



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

Designed for maximum water heating efficiency: In the NS-1100's custom-designed heat exchanger, both fluids (water and the heating fluid) are moved through the exchanger by separate pumps. The active flow of both fluids increases the system's water heating efficiency.

The Heathkit NS-1100 Solar Water Heater includes the components you need for kitbuilding and installation – except ¾" copper pipe, insulation and solar fluid: The illustrated Heathkit manual lets you build the NS-1100 system in an easy-to-follow, step-by-step manner. The kit even permits you to practice soldering copper pipe, to help you gain confidence – even if you've never worked with copper pipe before.

This is a carefully integrated system, designed by the kit experts – not just a collection of components from many different sources. All of the NS-1100's components are among the best in performing and quality offered by the solar energy industry. They're engineered for easy installation and designed to work together for many years of trouble-free service.

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

1. International Association of Plumbing and Mechanical Officials
2. California Energy Commission
3. Southern building codes
4. Dade and Broward Counties, FL 180 mph Live Wind Load Requirement
5. The Florida Solar Energy Center

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

The manual tells you everything you need to know to accomplish kitbuilding and installation of the NS-1100 Solar Water Heater System, including plumbing – which enables you to build and install it in as little as three weekends. Even if you've never worked with copper pipe before, you'll master the soldering of copper elbows and pipe in no time – with the help of the Heathkit manual's clear, concise instructions.

Technical consultants are available to answer questions: Our unique personal consultation service (available at your Heathkit Electronic Center, by telephone or by mail), plus the thorough, detailed kitbuilding and installation manual, assure you of the Heathkit pledge – "We won't let you fail."

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

Heathkit Solar Water Heater Components

Manual Set: Written for people with little or no previous experience. Has everything you need to know to install a customized Heathkit NS-1100 Solar Water Heater System – including complete site evaluation, installation and operation information. Solar shade finder (included with the Manual Set) helps you find a site where no trees, buildings, etc. will block your solar panel from full sunlight. The price of this Manual Set is deductible from the system price when you purchase a Heathkit NS-1100 Solar Water Heater System.

NS-1100-3, Shpg. wt. 3 lbs.	25.00
NS-1100-1, Plumbing Hardware Pack, 65 lbs., Motor Freight	589.95
NSC-1100-2, California-Certified Solar Panel and Mounting Hardware, Shpg. wt. 131 Lbs., Shipped Motor Freight Collect	569.95
NS-1100-2, Standard Solar Panel and Mounting Hardware, Shpg. wt. 115 lbs., Shipped Motor Freight Collect	549.95
NS-1100-4, 80-Gallon Capacity Holding Tank, Shpg. wt. 350 lbs., Shipped Motor Freight Collect	429.95
NS-1100-5, 120-Gallon Capacity Holding Tank, Shpg. wt. 447 lbs., Shipped Motor Freight Collect	599.95
NS-1100-6, 5 Sq. Ft. Heat Exchanger, Shpg. wt. 18 lbs.	169.95
NS-1100-7, 8 Sq. Ft. Heat Exchanger, Shpg. wt. 20 lbs.	189.95
NS-1100-8, 8 Sq. Ft. Double-Walled Heat Exchanger (required in Los Angeles and Memphis areas), Shpg. wt. 24 lbs.	239.95

Tax credits can help pay for your NS-1100 system

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



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

Heathkit/Zenith Educational Systems Courses: the low-cost, effective self-instruction way to learn

Courses help you teach yourself: Heathkit/Zenith Educational Systems Courses help you teach yourself the latest technology, or refresh your knowledge, on subjects ranging from basic and advanced electronics to digital techniques and microprocessors – while saving you time and money.

You save time and money: Save time because each subject is presented in an easy-to-follow format. Save money by paying far less than a comparable adult education or vocational course. With Heathkit/Zenith Educational Systems Courses, you receive top-quality, up-to-date training at a fraction of the cost you would pay elsewhere.

Programmed-learning texts make our Courses more effective: Learn at your own pace in easy-to-understand segments. Audio and visual aids (with most courses) speed learning. And experiments, using Heathkit/Zenith trainers and parts, give you hands-on experience with circuitry.

Our line of self-instruction courses includes: The Exploratory Electronics Series – covering electricity, electronics and printed circuits; the Electronics Fundamentals Series, a foundation in basic electronics; five Advanced Electronics Courses; basic and CMOS Digital Techniques Courses; the Microprocessor Technology Series – with basic Microprocessors, Advanced Microprocessors and Microprocessor Interfacing Courses; a series of Computer-Related Courses; three Ham Radio License Courses; two Automotive Servicing Courses; and several Math Courses.

Earn Continuing Education Units: Score 70% or better on the optional final examinations. Some of our courses prepare you for professional examinations and for the College Level Examination Program (CLEP), where you can earn college credit for self-study, on-the-job training and experience.

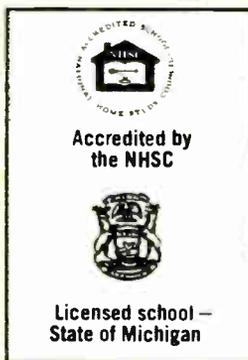
Earn college credit: Check with your college – if it follows American Council on Education recommendations for a Heathkit/Zenith course – and you've passed the final exam – order a College Credit Exam (see page 31).

Possible tax deduction: Treasury Regulation 162-5 permits an income tax deduction for educational expenses undertaken to: (1) maintain or improve skills required in your employment or other trade or business, or (2) meet express requirements of an employer or a law imposed as a condition to retention of employment, job status or rate of pay.

MONEY-BACK GUARANTEE: If you're dissatisfied with the course, return all materials (less trainer) and your receipt for a refund of the purchase price.



Professionally-written texts work with optional hands-on experiments (with most courses) to help you gain – and retain – important knowledge



Heathkit/Zenith educational courses are the fast, cost-efficient way to learn state-of-the-art technology

Effective: Each subject area is presented step-by-step, so you build upon the knowledge you acquire as you progress through a Heathkit/Zenith course. Self-test reviews throughout most courses check your progress as you go along, ensuring a more complete understanding of the subject matter.

Most courses use latest multi-media techniques: Learn at your own pace in easy-to-understand, step-by-step segments when you use Heathkit/Zenith educational courses. No facet of the subject material is omitted from the course, and nothing is assumed.

Wide variety of courses available: Heathkit/Zenith Educational Systems has courses in many areas of electronics and computers – as well as automotive servicing, amateur radio license courses and weather. See the index at right to find the Heathkit/Zenith educational courses you're interested in.

Exploratory Courses



Stimulate high-technology appetites. We offer introductions to Electricity, Electronics, Microprocessors, Printed Circuit Boards and Weather. See pages 2, 31, 41 and 42.

Advanced Electronics



Seven effective courses cover Op-Amps, Active Filters, IC Timers, Phase-Locked Loops and Optoelectronics, Linear and TTL/CMOS Circuits. See pages 40-41.

Fundamental Electronics



Complete core curriculum – DC and AC Electronics, Semiconductor Devices, Electronic Circuits/Communications and Test Instruments Courses. See pages 32-34 for details.

Digital Techniques

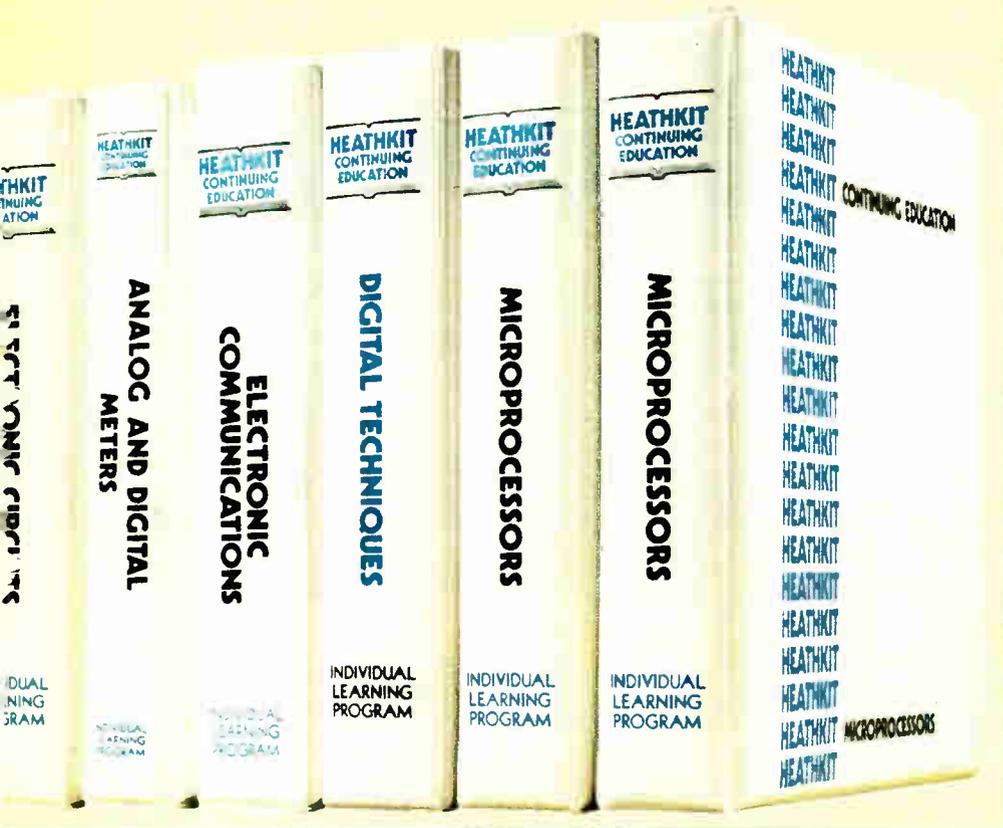


Includes theory and practical applications. Basic and CMOS Digital Techniques Courses, and a hands-on digital techniques trainer, are available. See page 35.



important subjects

Learn electronics, digital techniques, microprocessors, computer programming, automotive servicing, amateur radio and weather in the effective Heathkit/Zenith way — for far less (in most cases) than equivalent college or technical school courses



- Includes audio-visual learning aids

\$24⁹⁵

- Award-winning, informative presentation of subject

Basic concepts of electricity — made easy to learn

No technical background is required: This course is a simple, easy-to-follow introduction to electricity. Audio-visual presentations, reinforced with programmed reviews, ease you into Ohm's Law, series and parallel circuits, electromagnetism, direct and alternating current, generators, motors and basic meter operation.

And you'll get this information at far below the cost of an equivalent college or technical school course — in the comfort of your home or office.

Each concept is introduced with a pleasant audio-visual presentation, interweaved between sections of easy-to-follow programmed-instruction text. And the text, housed in a durable vinyl binder, will serve as a handy reference for years to come.

Use the Concepts of Electricity Course as a foundation for expanding your electronics skills through the Basic Electronics Series (EE-3101 through -3105, outlined on pages 32-34). Or use it as an introduction to an exciting electronics hobby, such as computers or ham radio. You can also earn 1 Continuing Education Unit for your accomplishment — pass the optional final examination with a 70% score.

EE-3100, Shpg. wt. 5 lbs. 24.95

Microprocessor Technology



Four courses (including NEW Advanced Microprocessors Course) cover advanced microprocessors, microcomputers, interfacing and programming. See pages 36-39.

Automotive Servicing



Two courses teach automotive ignition and electrical systems — as well as the professional techniques required to service today's cars. Turn to page 24 for details.

Computer Programming



Programming courses teach the CP/M-80 Operating System and these languages — Assembly, BASIC, Microsoft BASIC, Pascal, FORTRAN and COBOL. See pages 78-80.

Amateur Radio Courses



Our Novice, General and NEW Advanced License Courses help you pass the FCC's written tests and operate a successful amateur radio station. See pages 14-15.



Earn college credit for our courses

Check with your college before ordering — The American Council on Education recommends that member colleges grant credit for several Heathkit/Zenith courses. If your college participates, and you have successfully completed the course's final examination, order the Heathkit/Zenith College Credit Program Exam by changing the course prefix to ECC; for example, the college credit exam for EE-3101 would be ordered as ECC-3101.



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

EDUCATION/31

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

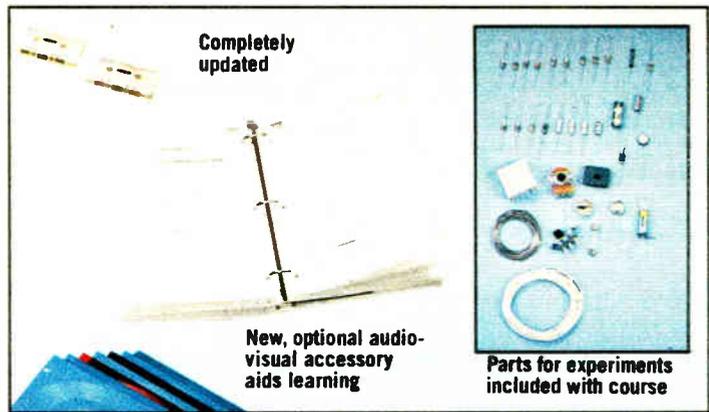
\$49⁹⁵

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

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

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

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



The DC Electronics Course includes: Your comprehensive text in a durable vinyl binder and all electronic components needed for the valuable hands-on experiments. To complete the experiments, you need the ET-3100B Experimenter/Trainer (below) and a VOM like the IM-5217 (p. 51). The optional Audio-Visual Accessory enhances your understanding of DC Electronics, and expands on material presented in the course.

- EE-3101A, Shpg. wt. 6 lbs. **49.95**
- SAVE \$10!** EES-3101B, includes EE-3101A and ET-3100B Kit Trainer, Shpg. wt. 13 lbs. **124.90**
- EEA-3101A, Audio-Visual Accessory (two tapes and illustration book enhance DC Electronics Course), Shpg. wt. 1 lb. **19.95**
- EE-3101S, Spanish-Language DC Electronics Course (less EB-6101-30 Parts for experiments, see page 43), Shpg. wt. 7 lbs. **54.95**

Experimenter/Trainer adds to your knowledge

Used for seven Heathkit/Zenith electronics courses

Improved dual-variable power supplies

Solderless bread-boarding sockets simplify circuit construction



Two-range variable sine and square wave signal generator

1K and 100K linear potentiometers

\$84⁹⁵
Kit

- Develop practical electronics experience as you learn with the Heathkit/Zenith Electronics Courses
- After you've completed your training, use the ET-3100B for breadboarding your own circuits

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

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

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

Kit ET-3100B, Heathkit/Zenith Electronic Experimenter/Trainer, Shpg. wt. 6 lbs. ... **84.95**

ETW-3100B, Assembled Trainer, Shpg. wt. 6 lbs. **149.95**

MONEY BACK GUARANTEE:

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

Electronics Dictionary



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

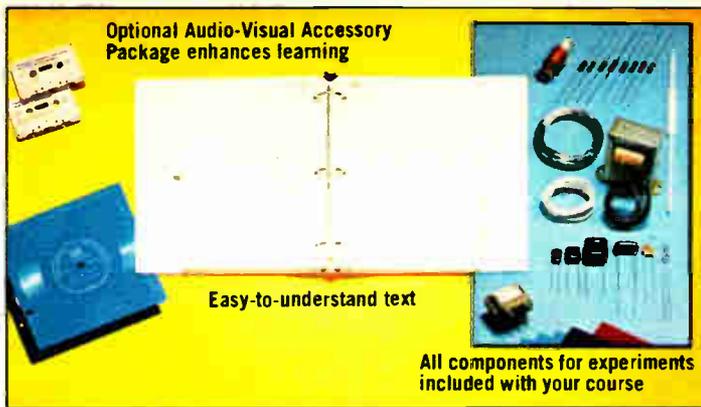
EB-1010, Shpg. wt. 3 lbs. **14.95**

Buy several courses for BIG SAVINGS!

Includes five course; DC Electronics, AC Electronics, Semiconductor Devices, Electronic Circuits and Electronic Test Equipment — along with the ET-3100B Experimenter/Trainer Kit. If purchased separately, \$374.70.

SAVE \$50! EES-3115B, Shpg. wt. 56 lbs. **ONLY 324.70**





AC Course expands your electronics education

\$54⁹⁵

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

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

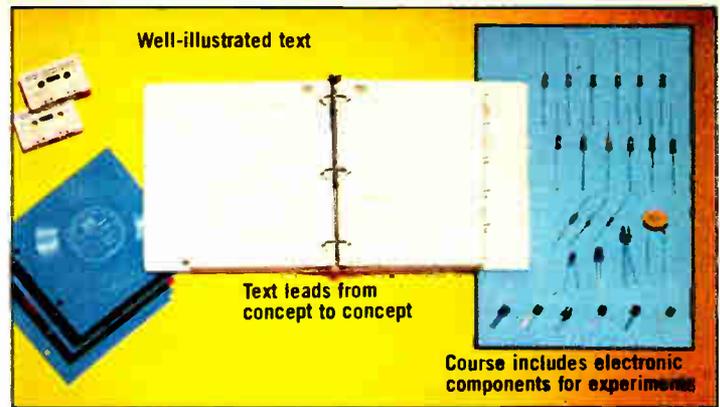
Programmed learning makes it easy: As with all the other Heathkit/Zenith self-instruction courses, you begin with basic theory and you continue adding to your store of information until you are ready for the next concept. You work at your own pace, then complete reviews to measure your progress. The concepts you study will come to life as you conduct nine experiments that turn theory into practical experience.

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

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

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

EE-3102A, Shpg. wt. 7 lbs. **54.95**
 EEA-3102A, Optional Audio-Visual Accessory Package, Shpg. wt. 1 lb. ... **19.95**



Semiconductor Devices Course – the third step

\$54⁹⁵

- Up-to-date, recent information from the fast-moving world of solid-state electronics
- More hands-on experiments for practical experience
- Continues your electronics studies with complete coverage of solid-state devices

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

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

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

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

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

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

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

EE-3103, Shpg. wt. 6 lbs. **54.95**
 EEA-3103, Optional Audio-Visual Accessory Package, Wt. 1 lb. **12.95**

SAVE \$10! EES-3102B, EE-3102A and ET-3100B Kit Trainer, Shpg. wt. 13 lbs. **129.90**

SAVE \$10! EES-3103A, EE-3103A and ET-3100B Kit Trainer, Shpg. wt. 11 lbs. **129.90**

Spanish Language AC Electronics Course, Less EB-6102-30 Parts for experiments, see page 43.

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

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

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



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

Electronic Circuits – from theory to practice

\$64⁹⁵

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

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

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

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

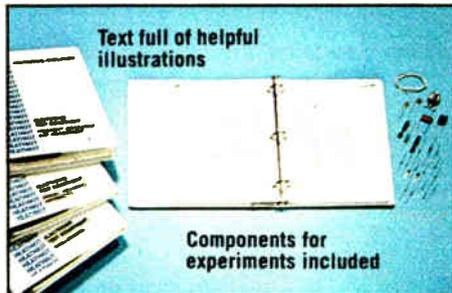
The Electronic Circuits Course will teach you how to identify power supply rectifiers, filters and regulation circuits – and explain how they work. You'll develop an understanding of amplitude and frequency modulation along with the heterodyne principle and modulation and detection circuits. You will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

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

Test Equipment Course covers applications

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

\$64⁹⁵

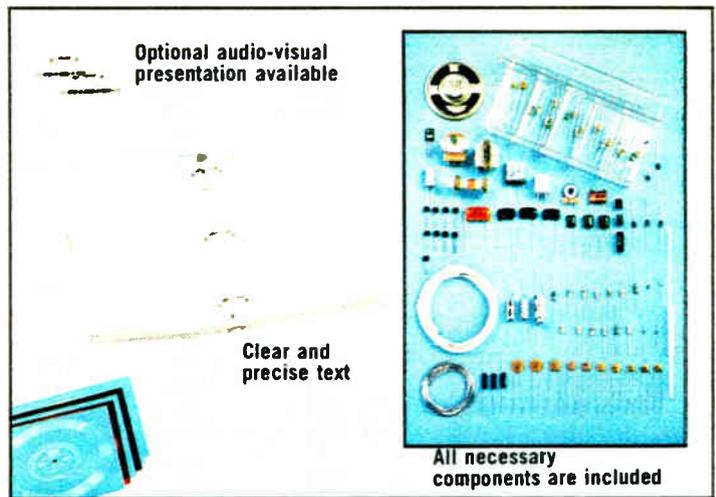


This course gives you the knowledge you need to make measurements with digital and analog meters; explain the operation of, and use, the oscilloscope in electronic testing and servicing. You'll also learn to use frequency generators and frequency counters. A section on special measuring instruments covers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

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

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

- EE-3105A, Shpg. wt. 18 lbs. **64.95**
 EES-3105B, EE-3105A and ET-3100B Kit Trainer, 24 lbs. **139.90**
 EEA-3105A, Audio-Visual Accessory Package, 2 lbs. **19.95**



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

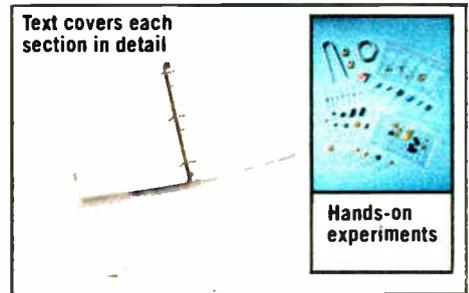
Earn 4 Continuing Education Units (CEUs) and a Certificate of Achievement from Heathkit/Zenith Educational Systems: Pass the optional final exam with a 70% or better score.

- EE-3104A, Shpg. wt. 7 lbs. **64.95**
 SAVE \$10! EES-3104B, EE-3104A and ET-3100B Kit Trainer, 13 lbs. **139.90**
 EEA-3104A, Audio-Visual Accessory Package, Shpg. wt. 1 lb. **19.95**

Electronic Communications Course

- Develop expertise in electronic communications techniques
- Components for seven experiments are included

\$59⁹⁵



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

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

Seven hands-on experiments will add to your understanding. Build an AM transmitter, a balanced modulator, FM transmitter, receiver, pulse modulator, time division multiplex transmitter and a data communications modem. Parts are included, ET-3100B Trainer is required.

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

- EE-3106, Shpg. wt. 7 lbs. **59.95**
 Kit ET-3100B, Trainer, 6 lbs. **84.95**

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 COURSES
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 EE-3101B
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 EE-3102B
 EE-3103A
 EE-3103B
 EE-3104A
 EE-3104B
 EE-3105A
 EE-3105B
 EE-3201
 ET-3100B
 EEA-3101A
 EEA-3101B
 EEA-3102A
 EEA-3102B
 EEA-3103A
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Credit Card Orders Call TOLL-FREE: 800-253-0570

Prepare for microprocessors with the Heathkit/Zenith Digital Techniques Course

\$79⁹⁵

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

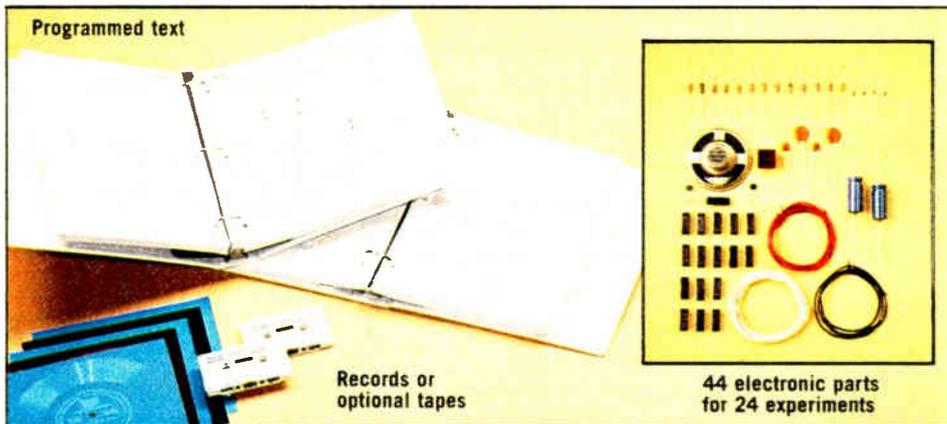
Study what you want, when you want: The course begins with fundamentals and theory of digital techniques, and familiarizes you with digital logic circuits, Boolean algebra, flip-flops and

registers, sequential logic circuits, combinational logic circuitry and digital design — a wealth of knowledge at a low price. After completing the course, you'll know how to design digital circuitry for virtually any modern electronic application.

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

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

The Course includes text in two heavy-duty vinyl binders, records (or



optional cassettes) and 44 electronic components for performing 24 useful experiments. A prior knowledge of electronics is assumed (Heathkit/Zenith DC, AC, Semiconductors and Electronics Circuits Courses on page 32-34 of this catalog, or equivalent). The ET-3200A Trainer is required for experiments; recommended instruments are a multimeter like the IM-5284 (page 56) and a single-trace oscilloscope like the IO-4105 (page 65).

Earn 4.0 Continuing Education Units with a grade of 70 percent or above on the final examination, and receive a Certificate of Achievement.

EE-3201, Shpg. wt. 9 lbs. **79.95**

SAVE \$15.00 — buy the Digital Techniques Course and the ET-3200A Trainer Kit together. \$174.90 if purchased separately.

EES-3201A, Shpg. wt. 14 lbs. **159.90**

EEA-3201, Optional Cassettes, Shpg. wt. 1 lb. **12.95**

Trainer ensures easy mastery of digital techniques

\$94⁹⁵
Kit

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

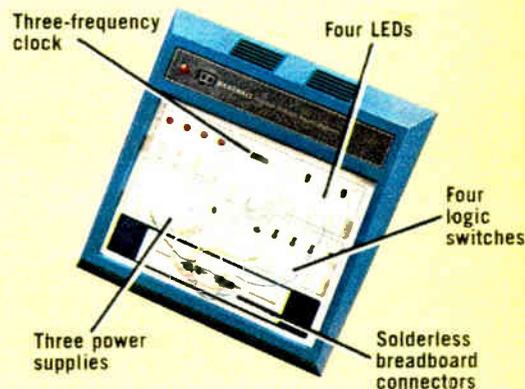
Put your digital knowledge to work with the high-quality ET-3200A Electronic Trainer. Designed for the experiments in both the Digital Techniques and CMOS Digital Techniques programs, the ET-3200A Trainer is a useful tool which speeds comprehension and practical application of course material. This versatile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

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

Built-in regulated power supplies furnish +12 VDC at 500 mA, -12 VDC at 100 mA and +5 VDC at 500 mA. The Trainer is compatible with RTL, TTL, CMOS, ECL, NMOS, PMOS and Linear. 120/240 VAC. Build it yourself and save \$75 over our assembled price.

Kit ET-3200A, Shpg. wt. 6 lbs. **94.95**

Factory Assembled and Tested Trainer.
ETW-3200A, Shpg. wt. 6 lbs. **169.95.**



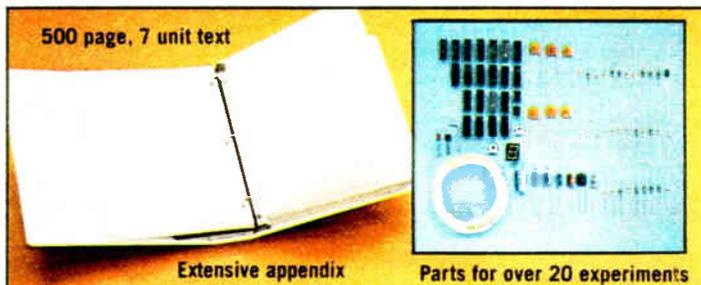
CMOS Course brings you up-to-date

\$79⁹⁵

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

Practicality makes CMOS (complementary metal-oxide-semiconductor) devices highly desirable: our practical CMOS Digital Techniques Course presents this technology in a learn-by-doing approach, with experiments that illustrate course topics — components included.

Basic CMOS concepts through advanced applications are covered, including interfacing, logic blocks, multivibrators, counters and registers, and analog applications. EE-3201 or equivalent knowledge a prerequisite. The ET-3200A Trainer (described above) is required to perform the experiments; we also suggest using an oscilloscope like the IO-4105 (page 56), and a multimeter like the IM-5284 (page 56). Earn 3 CEUs.



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

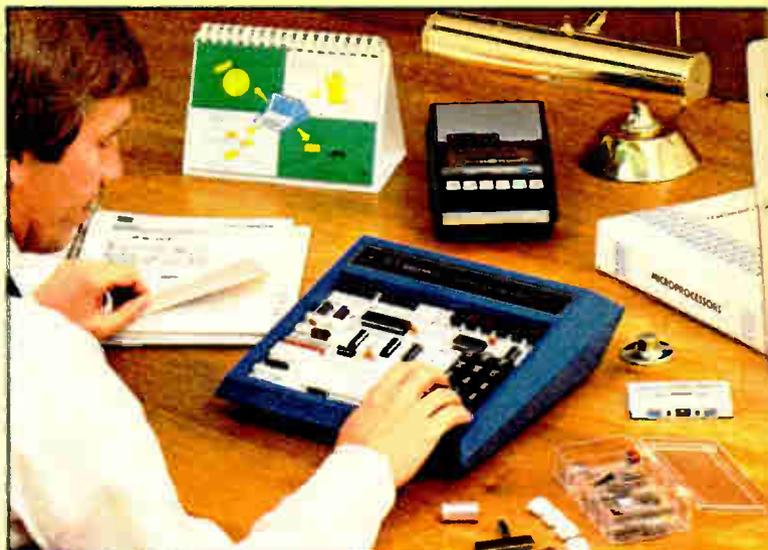


Alaska, Hawaii and Michigan Residents: Call 616-982-3411

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

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

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

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

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

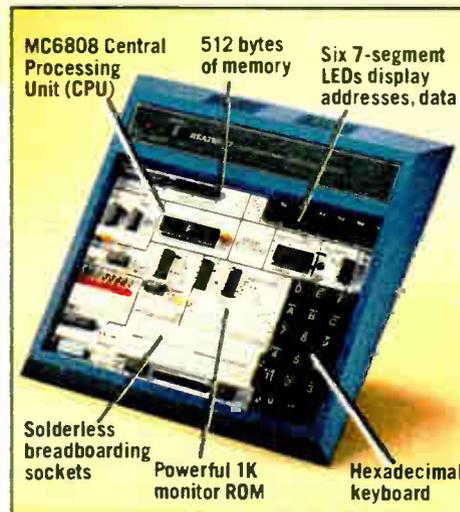
The ET-3400A has 512 bytes of Random Access Memory (RAM) built-in. It also features 8 buffered binary Light-Emitting Diodes (LEDs) for display of breadboard logic states, 8 SPST DIP switches for binary input to breadboarding circuits, and a breadboarding socket for prototyping, memory and

interfacing circuits.

All microprocessor address, control and data busses are terminated on the front panel for ease of connection to prototyped circuits. There's also provision for a 40-pin external connector to expand memory and I/O capacity. Built-in -5, -12 and -12 VDC power supplies provide internal power needs. The ET-3400A requires 120 VAC, 60 Hz power. Draws 30 watts. Dimensions of the Heathkit ET-3400A Microprocessor Trainer are 3.5" H x 12.2" W x 11.75" D (8.89 x 30.99 x 29.85 cm), without the ETA-3400 Trainer Accessory.

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

SAVE \$25 Order EE-3401 Course and ET-3400A Trainer together. If purchased separately, \$329.90. ET-3400A, Shpg. wt. 19 lbs. . . **ONLY 304.90**



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

Kit ET-3400A, Shpg. wt. 7 lbs. **229.95**

ETW-3400A, Assembled, 6 lbs. **329.95**

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



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

Includes 62 components for experiments.

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

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

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

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

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

Passing the optional final exam, with a 70% or better score, will earn you a full 8.0 CEUs. A classroom version of this course is available on page 83.

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

To continue your microprocessor education after completing this course, take the EE-3402 Microprocessor Interfacing Course on page 78. It picks up where this course leaves off – and uses the same ET-3400A Trainer.

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

Optional Film Slides duplicate the audio-visual flip charts.

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

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

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

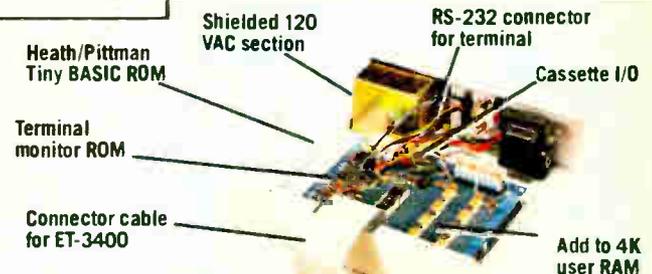
SAVE \$70 Order EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together. \$554.85 separately.
ETS-3401A, Shpg. wt. 28 lbs. **ONLY 484.85**

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

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

A serial interface with EIA and 20 mA loop formats in the Accessory allows you to hook up a video terminal, such as the H-19 on 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 ET-3400A Trainer by means of a 40-pin ribbon cable (supplied). Parts required to modify the trainer are included. Since this modification changes the clock frequency of the Trainer, experiments in the EE-3401 and EE-3402 courses which use timing loops will be changed. It is recommended that all EE-3401 and EE-3402 experiments be completed before adding this Accessory. An H-19 Video Terminal is required to use BASIC and monitor software features of the ETA-3400.



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

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

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

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

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



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

NEW
\$99.95

Advanced Microprocessor Course: Program and interface the 6809 family

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

Advanced — and effective — learning: Progress to programming and interfacing the advanced 6809

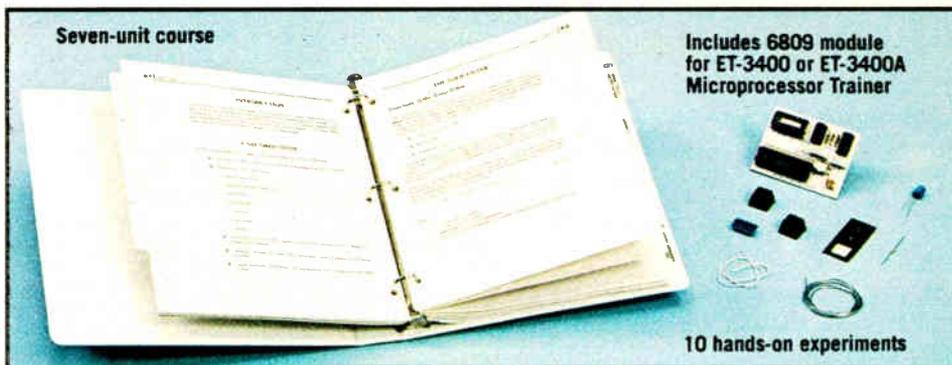
microprocessor with the new Heathkit/Zenith EE-3404 Advanced Microprocessor Course.

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

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

Adapter module for trainer included: The course includes a special adapter module which converts the ET-3400 or ET-3400A Microprocessor Trainer into a 6809-based microprocessor trainer. This assembled module includes a handy debugging routine, contained in the 2 KB ROM monitor program.

Four appendices are included with the text: They include listings for the 6809/6809E Instruction Set and the 6820/6821 Peripheral Interface Adapter (PIA), specification sheets for the MC6809/MC68A09/MC68B09, MC6809E/MC68A09E/MC68B09E, MC6829, MC6839, MC6842,



MEK6809AC, MED6809D4 and MEK68KPD Microprocessors, and a summary of the MC6809 instruction set.

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

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

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

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

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

Complete Voice Synthesis Course explains the latest fundamentals and techniques

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

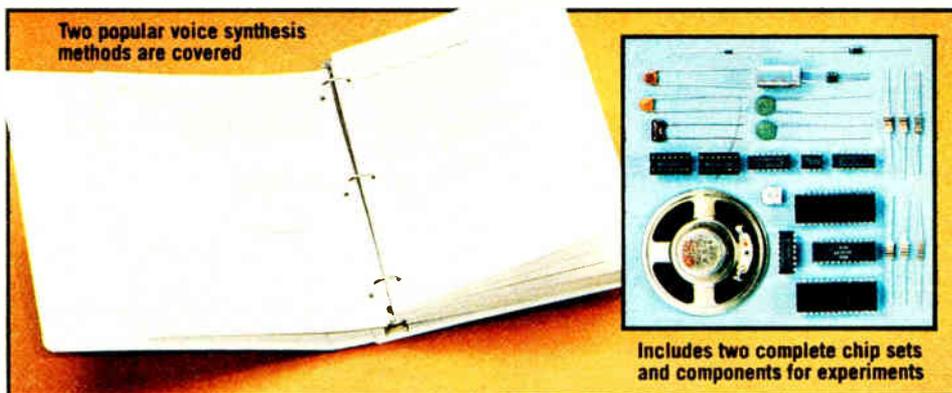
Get on speaking terms with your computer: The Heathkit/Zenith EE-3403 Voice Synthesis Course teaches you this state-of-the-art technique in an easy-to-follow format with hands-on experiments that will have your ET-3400 or ET-3400A Microprocessor Trainer talking to you in no time. This five-unit course consists of a 250-page text filled with experiments in voice synthesis, along with the chip sets and other electronic components necessary to complete the experiments.

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

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

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

1. The digitized chip set contains both a ROM chip and a synthesizer chip — featuring a vocabulary totaling more than 200 words.
 2. The phoneme synthesizer is self-contained on a single chip.
- If purchased separately, the chip sets alone would cost over \$150.



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

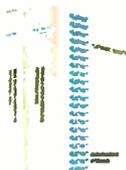
When you complete this course, you'll be able to make your Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer (necessary for the course — see page 36) talk. Prerequisites for Voice Synthesis are the EC-6800 Introduction to Microprocessors Course (page 42) and the EE-3401 Introduction to Microprocessors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

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

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



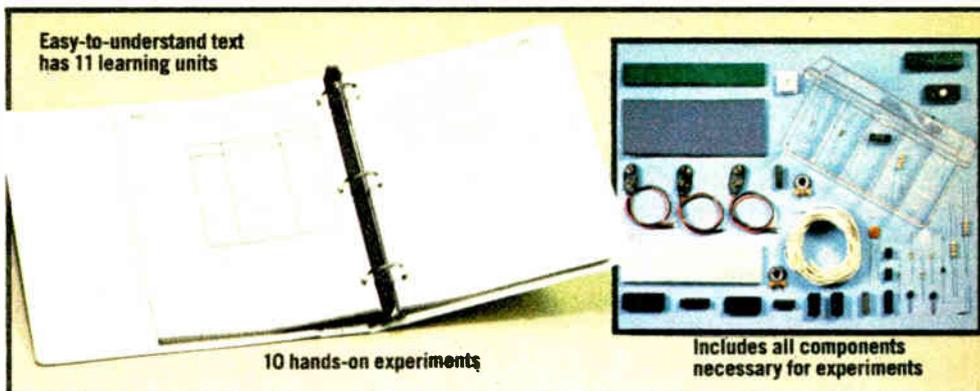
Learn more about interfacing microprocessors — and about advanced microprocessors



- The first low-cost course which deals with microprocessor interfacing concepts and techniques
- Advance your education after completing EE-3401 successfully (or gaining equivalent knowledge)
- 750-page text has 10 all-new hands-on interfacing experiments; all components necessary for experiments included

\$99⁹⁵

Heathkit/Zenith Educational Systems now offers three effective courses in the microprocessor field with the Microprocessor Interfacing Course offering more advanced knowledge.



The first low-cost educational course in its field: Now you can afford to add to your knowledge of microprocessors and interfacing, with the EE3402 Microprocessor Interfacing Course from Heathkit/Zenith Educational Systems.

Picks up where the EE-3401 Microprocessor ends: Designed for people who have a working knowledge of microprocessor fundamentals and desire to gain additional knowledge about microprocessor interfacing techniques and more advanced microprocessors, the EE-3402 Microprocessor Interfacing Course is the natural starting point to expand knowledge after completing EE-3401.

Course materials: This Heathkit/Zenith educational course consists of a 750-page text, divided into 11 learning units, with 10 experiments to provide hands-on experience in microprocessor interfacing — as well as all the components necessary to perform those experiments.

The text, contained in two attractive vinyl binders, concentrates on teaching additional microprocessor interfacing techniques: However, it also provides in-depth coverage of the 6800 family of microprocessors — and introduces the student to the powerful 6809 and 68000 microprocessors.

Unit 1, Advanced PIA Interfacing and Analog Conversion, discusses fundamental concepts of the Peripheral Interface Adapter (PIA), PIA addressing, PIA initialization, I/O control techniques (using the PIA), digital-to-analog converters and analog-to-digital converters. Serial data formats and standards, asynchronous/synchronous transmission and ASCII coding, parallel-to-serial conversion and the Asynchronous Communications Interface Adapter (ACIA) are covered in **Serial Data Communications, Unit 2.**

Unit 3, Peripheral Devices, teaches the fundamentals of standard serial conversion (TTL/RS-232C, TTL/20 mA current loop, RS-232C/20 mA current loop, TTL/KCS and modems), peripheral I/O devices (the teletypewriter, printer, CRT terminal and TV receiver output) and mass storage peripheral devices (audio cassette and floppy disk systems).

Memory Devices, Unit 4, discusses dynamic random access memory (RAM) and read-only memory (ROM) — as well as bubble, charge-coupled (CCD) and Josephson junction memory devices. Dynamic versus static RAM, the MCM4116 dynamic RAM, mask-programmed ROM, programmable ROM (PROM), electrical erasable ROM (EEPROM) and the 2708 EPROM are explored.

Unit 5 discusses Programmable Timers — including general concepts of programmable timers, addressing, initializing and operating the 6840 programmable timer module (PTM), timer output mode tasks and timer input mode tasks. **The 6800 Family of Microprocessors** (including the 6808, 6802, 6801, 6803 and 6805) and their development are covered in **Unit 6.**

Unit 7 discusses the 6809 Advanced Microprocessor in depth. Among the areas covered are the register structure and instruction set, addressing modes (including inherent, immediate, direct, extended, register, indexed, indirect and relative addressing) and interface lines.

The 68000 Advanced Microprocessor is introduced in three parts — Units 8, 9 and 10. Addressing modes, the instruction set, interface lines, process states and exception processing and other areas are covered.

Additional text material included: Appendices to the course text include data sheets and a summary of the 6800 family of microprocessors.

Check your progress as you go: Unit examinations, included with each unit of the course, help you check your progress through the course material.

The courses's 10 hands-on experiments are in Unit 11 of the text:

- Experiment 1: Display Multiplexing, using the PIA
- 2: I/O Control and Handshaking, using the PIA
- 3: Analog-to-Digital (A/D) Conversion and ADC Interfacing
- 4: Parallel-to-Serial Conversion, using the 6850 ACIA
- 5: Serial Standard Conversion
- 6: 2708 EPROM Programming
- 7: ROM/EPROM Interfacing
- 8: 6840 PTM Output
- 9: 6840 PTM Input
- 10: 6809 Software Operation

A multitude of components are included with the course: These components help you perform the experiments. They include a 6821 PIA, a 6850 ACIA, a 2708 EPROM, a 6840 PTM, an analog-to-digital (A/D) converter, an RS-232C Serial Interface Driver and Receiver, an optoisolator and other TTL chips.

Continuing Education Units (CEUs) available: Passing the optional final examination, with a grade of 70% or better, will earn 7.0 Continuing Education Units and a Certificate of Achievement.

Prerequisite: The EE-3401 Microprocessor Course (pages 36 and 37) should be successfully completed before starting this course.

Required accessory: The Heathkit ET-3400 or ET-3400A Microprocessor Trainer (p. 36) is necessary to perform the experiments in this course.

Money-back guarantee: As with all Heathkit/Zenith courses, the Microprocessor Interfacing Course carries a money-back guarantee. If you're not satisfied, return the course materials for a refund (not applicable to trainer).

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

SAVE \$30.00 on complete microprocessor education

Save by purchasing the complete package: Heathkit/Zenith Educational Systems offers a complete microprocessor education package, at a lower cost than if you purchased all of the components separately.

Includes two courses and trainer: Both the popular EE-3401 Microprocessor Course and the EE-3402 Microprocessor Interfacing Course are included in the EES-3402 package. You also get the versatile Heathkit/Zenith ET-3400A Microprocessor Trainer, necessary to perform the experiments in both courses.

If you purchased these items separately, your cost would be \$429.85.

SAVE \$30.00! EES-3402, Shpg. wt. 49 lbs. ONLY 399.85

Includes EE-3401 and EE-3402 courses



Trainer also included



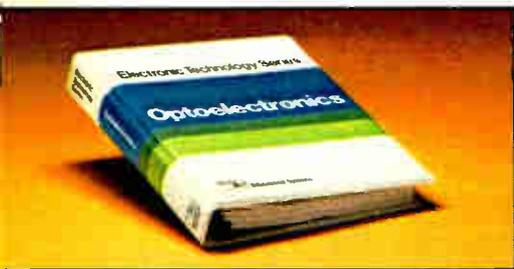
Alaska, Hawaii and Michigan Residents: Call 616-982-3411



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

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

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



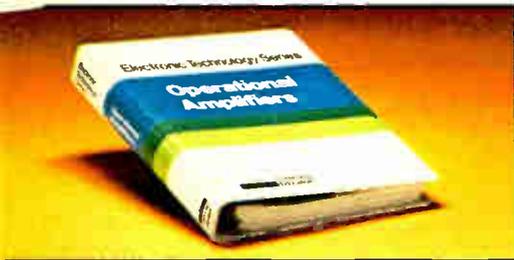
Get the latest on Optoelectronics with this thorough course

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

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

ammeter and voltmeter – or a VTVM like the IM-5218 (p. 51) and a scope like the IO-4105 (p. 65). Prerequisites: DC and AC (EE-3101A and -3102A, pgs. 32-33) or equivalent; some experience in optics or electronics. 3 CEUs.

EE-105, Shpg. wt. 5 lbs. 59.95
Kit ET-3300A, Breadboard, 6 lbs. 99.95
ETW-3300A, Assem. Breadboard, 6 lbs. 169.95
SAVE \$10.00 – Buy Course and Breadboard Kit.
EES-105A, Shpg. wt. 11 lbs. 149.90



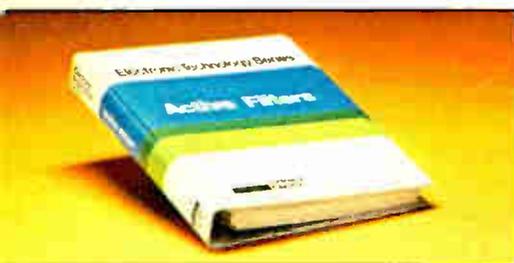
Gain know-how of Active Filters at a reasonable price

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

ET-3300A or **ET-3100B** Breadboards required for experiments (NOTE: ET-3100B, p.32, cannot be used with other courses in Advanced Series). An oscilloscope like the IO-4105 (p. 65) and a

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

EE-102, Shpg. wt. 5 lbs. 34.95
Kit ET-3300A, Breadboard, 6 lbs. 99.95
ETW-3300A, Assembled Breadboard, Shpg. wt. 6 lbs. 169.95
SAVE \$10.00 – Buy Course and Breadboard Kit.
EES-102A, Shpg. wt. 11 lbs. 124.90



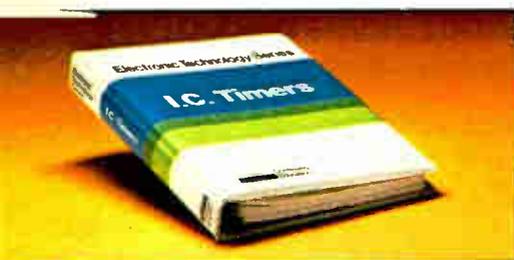
Understanding and using the versatile IC Timer

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

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

scope (p. 65), IM-2260 Multimeter (p. 56) or similar. Prerequisite: EE-3201 Digital Techniques Course (p. 35) or equivalent knowledge. 3 CEUs.

EE-103, Shpg. wt. 5 lbs. 39.95
Kit ET-3300A, Breadboard, 6 lbs. 99.95
ETW-3300A, Assem. Breadboard, 6 lbs. 169.95
SAVE \$10.00 – Buy Course and Breadboard Kit.
EES-103A, Shpg. wt. 11 lbs. 129.90



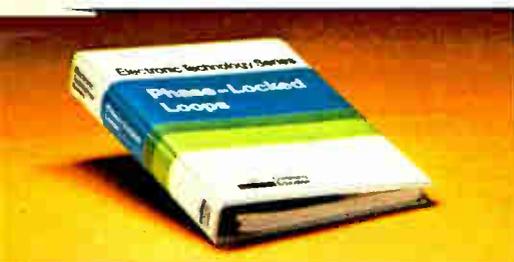
Learn about Phase-Locked Loops – and how to build them

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

Components for experiments included. ET-3300A Trainer required for experiments. We also suggest a DC voltmeter like the IM-5284 (p. 56) and

a single-trace oscilloscope like the IO-4105 (p. 65). To learn more efficiently, use an oscilloscope like the IO-4205 (p. 65) and an audio signal generator like the IG-5218 (p. 52).

EE-104, Shpg. wt. 5 lbs. 49.95
Kit ET-3300A, Breadboard, 6 lbs. 99.95
ETW-3300A, Assem. Breadboard, 6 lbs. 169.95
SAVE \$10.00 – Buy Course and Breadboard Kit.
EES-104A, Shpg. wt. 13 lbs. 139.90



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

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

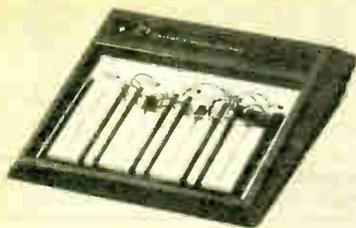
Components for experiments included; ET-3300A required for experiments. Recommended: an oscilloscope like IO-4105 (p. 65), a multimeter

like IM-2260 (p. 56), and a frequency generator like IG-1271 (p. 56). Prerequisite: Basic Electronics (EE-3101A through 3104A, pgs. 31-34) or equivalent knowledge. 3 CEUs.

EE-101, Shpg. wt. 5 lbs. 39.95
Kit ET-3300A, Breadboard, 6 lbs. 99.95
ETW-3300A, Assem. Breadboard, 6 lbs. 169.95
SAVE \$10.00 – Buy Course and Breadboard Kit.
EES-101A, Shpg. wt. 11 lbs. 129.90



Breadboard for advanced experiments, circuit design



\$99⁹⁵
Kit

- Solderless sockets save time
- Hefty built-in power supply
- Current limiting for short circuit protection
- Build this Trainer yourself and save \$70

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

Suggested to complete experiments: Use the ET-3300A Laboratory Electronic Breadboard to complete the experiments in the following Heathkit/Zenith Advanced Electronics Courses: the EE-101 Op-Amps Course, the EE-103 IC Timers Course, the EE-104 Phase-Locked Loops Course and the EE-105 Optoelectronics Course. The Breadboard can also be used with the EE-102 Active Filters Course.

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

Build the versatile ET-3300A Laboratory Electronic Breadboard yourself – and save a big \$70: Or purchase the completely assembled and tested ETW-3300A Laboratory Breadboard. Requires 120 VAC, 60 Hz power. Listed by Underwriters' Laboratories. Overall dimensions of the ET-3300 are 3½" H x 12" W x 12" D (8.89 x 30.48 x 30.48 cm).

Kit ET-3300A, Shpg. wt. 6 lbs. 99.95
ETW-3300A, Assembled, Shpg. wt. 6 lbs. 169.95

SAVE \$55 on skills package

Discount offer on Heathkit/Zenith Advanced Electronic Series and ET-3300A Laboratory Circuit Breadboard Kit (EE-101 Op Amps Course, EE-102 Active Filters Course, EE-103 IC Timers Course, EE-104 Phase-Locked Loops Course and EE-105 Optoelectronics Course). Purchased separately, \$324.70. Order this system now, and start expanding your electronics skills.

EES-1015A, 34 lbs. 269.70

Learn Linear Circuits the hands-on way

\$49⁹⁵

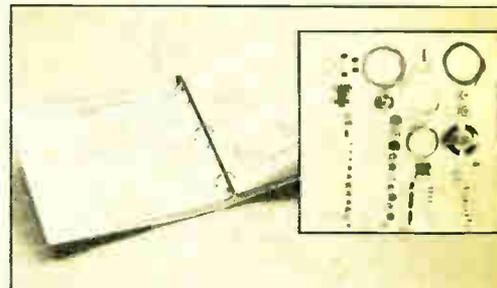
- Build each circuit as you learn
- Deals with basic circuits and modifications
- Includes 86 parts (worth over \$45) for building over 30 linear circuits



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

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

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



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

We recommend using our ET-3300A Trainer, but all circuits can be constructed and tested on your own breadboards. To observe circuit operation, you'll need a voltmeter like the IM-5218 (page 51) and an oscilloscope like the IO-4205 (page 65). DC and AC Electronics, and Semiconductor Devices Courses (EE-3101A to -3103A, pgs. 32-33) or equivalent knowledge is a prerequisite.

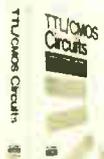
Earn 4.0 Continuing Education Units with a 70% grade on the optional final exam.

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

Learn TTL and CMOS circuits by doing

\$59⁹⁵

- Circuit "file" format
- Components provided worth over \$70
- Uses the natural learn-by-doing approach.

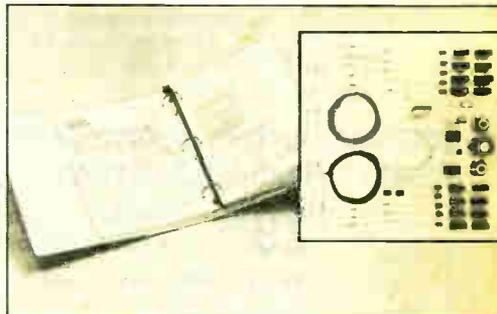


You'll be building circuits right away: Simply study the concise text and diagrams, then begin constructing circuits yourself.

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

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

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



tion, you'll need a voltmeter like the IM-5218 (p. 51) or equivalent, and an oscilloscope like the IO-4205 (p. 65). Courses in AC and DC Electronics, and Semiconductor Devices (or other experience) are prerequisites – EE-3101A through -3103A on pages 32-33.

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

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

SAVE \$30! Purchase the EH-701 Linear Circuits and EH-702 TTL/CMOS Circuits Courses together. If purchased separately, \$109.90.

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

Practical, fun soldering course

\$17⁹⁵

- Equipment hints provided
- Useful for amateur or pro

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

EI-3133, Shpg. wt. 1 lb. 17.95



"It's twelve-thirty AM"



"One hour thirty-five minutes elapsed"

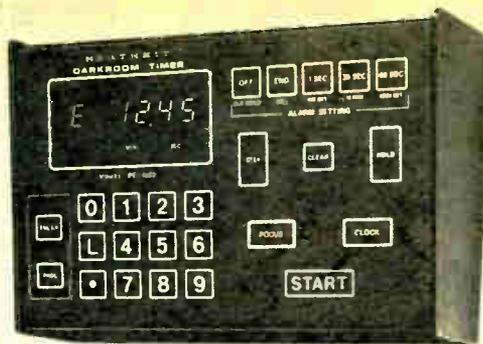
Talking Digital Clock has alarm, timer, stopwatch

\$79⁹⁵

- Fits in a shirt pocket; accurate to ± 5 sec/month
- Amateur radio clubs! – add time to your repeater IOs

Speech synthesis technology makes possible the clock that talks. On your desk or on the go, Talking Time will keep you apace of any schedule. It's a fully digital alarm clock with multi-function liquid crystal display – and ten hour elapsed timer that can tell *the time* in a natural 'voice' when you press a button, or at preset 1, 5 or 30 minute intervals. Quartz accurate time is displayed continuously. As a stopwatch, it records accumulated time and speaks lap time at preset intervals. Use it to time sports, speeches, travel time, darkroom work and many other events that require precise feedback. A soft voice and music will wake you with time, melody and "Please hurry!" reminders 5 and 10 minutes after alarm setting. Includes chime and Boccherini's Minuet, variable volume. 2 AA cells, tiltstand and handstrap.

GOP-1660, Assembled, Shpg. wt. 1 lb. **79.95**



Start getting consistent film developing quality

- Programmable memory recalls up to 10 steps; auto-step sequencing and microprocessor accuracy offers more versatility than dial timers

Great photos will result with the Programmable Darkroom Timer! It features a 4-digit, 12-hour LED clock to time developing and enlarging steps. Alarm settings are marked at 1, 30 or 60 second intervals in any combination, or once at the end of a cycle. Ten second end-of-cycle alarm tells you when to begin pouring from the tank. Enlarger and safelight outlets toggled so one turns on when the other goes off. Optional Auxiliary Outlet turns on external device (such as color drum) during countdowns in Process mode. Optional foot switches make operation even easier. Metal case. 120/240 VAC.

Kit PT-1500, Shpg. wt. 5 lbs. **129.95**

PTA-1500-3, Optional Auxiliary Outlet, Shpg. wt. 1 lb. **14.95**

PTA-1500-1, Optional Single Foot Switch, Shpg. wt. 1 lb. **10.95**

PTA-1500-2, Optional Dual Foot Switch, Shpg. wt. 3 lbs. **26.95**



FM Wireless Intercom System keeps you in touch

- Phased-locked loop circuit provides quiet, clear voice transmissions
- No bothersome hookups – operates through your present house wiring
- Pleasant call tone with variable volume alerts all other units

Here's a wireless intercom you can use anywhere indoors – from baby's room to laundry, from garage to kitchen – as long as the units are on the same AC power feed. Simply plug each unit into an outlet and you're ready to keep in touch. Lightweight and portable, they move from room to room with you. Order as many as you need for complete communications.

Each intercom unit is an FM transceiver with solid-state circuitry that consumes so little power you can even leave them on all the time at very low cost. A Dictate switch locks the intercom in the Talk mode for hands-free operation or continuous monitoring of baby's room.

Your voice is transmitted over the wiring in your home, which also supplies the operating voltage for each unit. A large 3" speaker and up to 3/4 watts of audio power broadcast your voice clearly. Sturdy, high impact cabinet has a simulated woodgrain look measures 8.6" H x 3" W x 5.75" D and may be wall-mounted for convenience. At least two stations (sold separately) required.

Kit GO-1114, Shpg. wt. 3 lbs. **each station 49.95**



Cleans delicate items safely

Gentle, yet effective

Ultra-efficient Ultrasonic Cleaner purges dirt



**FAST, EASY
2-EVENING KIT**

- Handles those almost-impossible special cleaning chores
- Cleans and sanitizes any precious items that might be damaged by abrasive scrubbing or harsh cleaning agents
- Flatter yourself with brighter, more eye-catching jewelry

This scientific method is the fastest, most effective way to deep clean dirt, stains and undissolved solids from watch parts, glass, coins, components, dentures, paint brushes, etc. *Fine jewelry sparkles like new!*

Simply fill the stainless steel tank with a safe cleaning solution, place dirtied objects in the tank, set the timer – and the efficient Ultrasonic Cleaner does the rest! You'll be amazed how quickly and easily your possessions come clean. *How does it work?* The 41 kiloHertz mechanical motion of the tank creates microscopic bubbles within the contaminants. These grow and collapse rapidly, forcing cleaning solution through the impurities so they can be completely dissolved and rinsed away. 4.6" H x 5.8" W x 11" D. 120 VAC.

Professional artists, jewelers and watchmakers have used the ultrasonic method for years; now this low-cost kit lets you take advantage of the process.

Kit GO-1151, Shpg. wt. 5 lbs. **117.95**



Listen to thousands of stations from all over the earth with a Zenith *Trans-Oceanic*™ Radio

- Receives AM, FM, 40 channel CB, international SW, 160-10 meter Amateur Radio CW/SSB, time and navigation stations, Longwave, Marine and VHF Weather, Ship-to-ship, VHF aircraft traffic control, Fire, Police and Public Services on 12 scaled bands

The *Trans-Oceanic* is a superior, multi-band world receiver with many advanced engineering and control features formerly found only on commercial and military radios. It offers a wider variety of listening adventure via its comprehensive frequency coverage and special signal-capturing functions.

Integrated circuit technology gives you higher performance — improved sensitivity/selectivity, clear reception and easier operating convenience.

It's also a radio direction finder to supplement primary navigation equipment. This is particularly useful to yachting enthusiasts when out of sight of land. Use the built-in Azimuth Dial to home-in on a known station and guide your craft to shore — or determine your position by finding two separate station signals and triangulating their vectors on a chart.

Reliable, solid-state communications technology provides excellent results in any climate. Quartz-crystal filters allow precise signal separation and eliminate interference from adjacent stations. A stable, gear-driven vernier/belt tuning mechanism yields more exact tuning of single sideband and other closely-spaced broadcasts. Dual gate MOSFET RF amplifier circuitry reduces strong signal overload. Has a built-in Wavemagnet™ ferrite rod antenna plus a telescoping antenna, and connection provisions for three others.

Other features include: a station logging scale, world time zone map and time adjustment dial, station marker, headphone jack and Operating Guide. Dual voltage 120/240 VAC, 50/60 Hz capability for world-wide operation. Meets UL and CSA standards for fire and electrical shock.

The Zenith *Trans-Oceanic* is your best choice in a quality all-band radio.

SWZ-7000, Assembled, Shpg. wt. 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, 26.8-27.5 MHz (electronically spread to allow increased tuning range for the 40 CB channels); FM Broadcast Band, 88-108 MHz; VHF/Aircraft Band, 108-136 MHz; VHF High Band, 144-174 MHz; **RF Amp Circuits:** Dual-gate MOSFET, **BFD and SSB Product Detector:** Crystal-controlled. **Spurious Signal Rejection:** Provided by double-balanced integrated circuit (IC) mixers. **Meters:** FM Tuning & Signal Strength Battery Level. **Controls:** Volume, Tone, RF Gain, Squelch, Tuning & Fine Tuning. **Switches:** AFC ANL, Bandwidth Selector, AM SSB, Dial Light & Power On Off. **Power Requirements:** Eight 1.5 V "D" cells (not included) or 120/240 VAC, 50/60 Hz. Detachable AC power cord included which stores inside pack panel. **Dimensions:** 9.4" H x 14" W x 5.5" D (23.8 x 35.7 x 16.7 cm), with handle fold-down. **Net Weight:** 13.75 lbs.

Electronic Metronome aids practice precision



**FAST, EASY
1-EVENING
KIT**

- Variable beats per minute for more efficient tempo-teaching
- No springs; operates on two 9V batteries for long performance
- Handsome cherry-finish birch cabinet with non-marring feet

When you spend many careful hours practicing music craft, it makes great sense to invest the same amount of commitment in your instruments and tools to achieve professional results. The Heathkit Electronic Metronome was designed with exactly that purpose in mind. Both music students and teachers alike will appreciate its fine appearance and precise accuracy. Whatever your instrument, the Electronic Metronome will maintain a steady beat so you can practice at the correct tempo. A finely-scaled front panel knob turns the unit on and is continuously variable

between 40 and 210 beats per minute. A rear panel control adjusts the volume from a soft tapping to a loud, conventional "tick-tock" rhythm.

The Electronic Metronome even includes a handy chart label that the builder can affix to the bottom of the cabinet so the musician can relate the number of beats per minute to tempos in different time signatures.

It's the practical and efficient way to practice any music and achieve the desired results. The kit can be assembled in an hour or two. Most parts are mounted on a single circuit board. The only tools needed are a soldering iron, scissors, screw-driver, wire cutters, and a pair of pliers. A short series of simple test and calibration adjustments insures that the rate of control is marking perfect tempo. Powered by two long life 9V batteries (not included). Dimensions: 6.75" H x 3.75" W x 4" D. Treat yourself or the musician in your life and order one today — surprise someone with a Christmas-wrapped kit!

Kit TD-1257, Shg. wt. 2 lbs. 24.95



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



Digital Thermometer fulfills all temperature needs

\$49⁹⁵

- Highly accurate and super reliable — ideal for medical, photography and many other applications
- Hospitals prefer the non-poisonous safety of digital

Got a cold? Developing pictures? Fixing a baby's bath? The safe and dependable Digital Thermometer will deliver perfect readings in the darkroom, kitchen, nursery, or on the road — wherever you need accurate temperatures in a hurry. The highly visible red display never needs calibration or a mercury "shake-down." Senses from 32° to 230°F (0° to 110°C) with ±0.2°F (±0.1°C) biomedical accuracy and 0.5% overall accuracy with 0.1° F or C resolution.

No more squinting or guessing! Solid-state circuitry assures precise, easy-to-read 4-digit temperature in as little as 10 seconds. A flashing decimal warns of low battery condition. This micro-marvel weighs only 5.5 ounces and fits comfortably in your hand. It's protected by an attractive high-impact case and operates on one 9VDC battery (not included) up to a year under normal use. When speed and accuracy count, trust and rely on *electro-therm!*

GD-1226, Assembled and tested, Shpg. wt. 2 lbs. 49.95

HOME PRODUCTS/45

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

\$129⁹⁵

- Keeps track of your boat's speed and distance with $\pm 5\%$ accuracy, updated 30 times per minute
- Designed to be used on all types of hulls
- 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 the flip of a switch, it will readout speed in mph (or knots), from .1 to 40 mph; or tell you distance traveled from 0 to 99 miles (or nautical miles).

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

It's available in two models: you can order the MI-2958 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 Kit MI-2958, Sailboat Speedometer/Trip Log, Shpg. wt. 4 lbs. **129.95**

Automatic, dual-range Digital Depth Sounder has five selectable alarm depths for added safety

\$174⁹⁵

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

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

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

Kit MI-2916-1, Depth Sounder with Thru-Hull Transducer, 8 lbs. **174.95**

Kit MI-2916-2, Depth Sounder with Transom-Mount Transducer, 7 lbs. **164.95**

Kit MI-2916-3, 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. Dimensions: 2½" H x 7.0" W x 5½" D. (6.4 x 17.8 x 14.0 cm)

③ SAVE! on these Digital Remote repeater stations

Works off the MI-2916 above. Features same display, sealed cabinet, independent alarm settings, keel-offset capability; includes 25-ft connector cable. **SAVE \$50.00!** Was \$119.95, now reduced to \$69.95. Same overall dimensions as MI-2916, with tilt-view mount bracket.

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

④ SAVE! on Flush-mount Digital Readout for Sailboats

5" diameter, operates like MI-2917. **SAVE \$28.00!** Requires MI-2916.

Kit MI-2918, Remote with visual warning only, Wt. 4 lbs. **89.95**

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

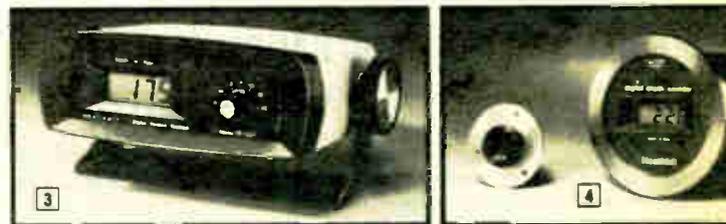


Alaska, Hawaii and Michigan Residents: Call 616-982-3411



- ② Kit MI-2956, Powerboat Speedometer/Trip Log, Shpg. wt. 4 lbs. **129.95**
 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-2956 & MI-2956 SPECIFICATIONS: Speed Range: 0.1 to 45 mph or knots. Log Range: 0 to 99.9 miles or nautical miles, auto reset @ 100. Speed and log accuracy: 15%. Display: 3 digit LCD, non-blinking with automatic backlighting. Display Update: 2 seconds. Power Req: 11 to 16 VDC (from boat's system or 2-6 VDC lantern batteries), reverse polarity protected. Dim: MI-2956: 5" diam. by 4½" deep. Requires a 4½" hole for mounting. MI-2956: 2½" H x 7.0" W x 5½" D



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 (min. purchase \$500) or Visa or MasterCard credit cards (min. purchase \$10). Call toll-free between 8:00 A.M. and 8:00 P.M. Eastern Time Monday through Friday, Alaska, Hawaii and Michigan orders, or after 8:00 P.M. and weekends, call 616-982-3411. For quick handling and prompt service, please fill out the order form at 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 49.

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 about your order.

- For UPS deliveries to rural route or P.O. Box addresses, please give complete delivery information.
- When you fill out the form, include: 1) quantity, 2) model number, 3) description, 4) price, and 5) shipping weight. Figure out and write down the shipping and handling charges for each item from the rate chart at right.
- Please use separate sheet to order parts, manuals or for any correspondence.

TERMS:

- **Heath Revolving Charge Plan.** No money down. Up to two years to pay. Minimum order required to open or add-on to account, \$500. 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. Sorry, we cannot accept HRC orders for replacement parts. Use credit cards below.
- **MasterCard and Visa credit plans.** 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 and sign the order form. NOTE: We now accept credit card orders for replacement parts.
- **Commercial Accounts.** Net 30-day terms available to companies with rated credit.

- **Educational Accounts.** Net 30-day terms available to Patterson-listed educational institutions. Authorized purchase order is required.
- Note: All credit orders subject to Heath Credit Department approval.

Commercial, Educational, and Industrial Sales:

- For quotations or quantity discount information on any Heath product, kit or wired, write or call Marketing Services Department, 616-982-3454. For quantities of 250 or more of any Heath product, kit or wired, write or call Contract Sales Department, 616-982-3519. Private labeling, custom packaging, or design modifications can be made to meet your specific needs.
- Note: Quantity discounts apply to single models only, not combination orders, special 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

Shpg Wt lb	Zone								AIR SERVICE CHARGE	
	Zone 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone A	Zone B	Zone C
1	\$1.47	\$1.49	\$1.54	\$1.60	\$1.68	\$1.75	\$1.91	\$2.77	\$4.53	\$4.60
2	1.55	1.61	1.70	1.83	1.99	2.15	2.47	3.74	5.71	5.73
3	1.63	1.73	1.86	2.06	2.30	2.55	3.05	4.71	6.89	6.86
4	1.71	1.84	2.00	2.29	2.63	3.05	3.81	5.66	8.07	7.99
5	1.79	1.96	2.18	2.57	3.02	3.52	4.50	6.62	9.25	9.12
6	1.87	2.05	2.33	2.74	3.14	3.64	4.54	7.62	10.43	10.25
7	1.95	2.15	2.49	2.96	3.36	3.95	4.85	8.99	11.61	11.38
8	2.03	2.25	2.64	3.16	3.56	4.25	5.15	10.48	12.79	12.51
9	2.11	2.35	2.75	3.35	3.83	4.63	5.63	10.53	13.97	13.64
10	2.19	2.46	2.87	3.46	4.22	5.00	6.62	11.50	15.15	14.77
11	2.28	2.60	3.00	3.68	4.51	5.38	7.15	12.48	16.33	15.90
12	2.36	2.76	3.20	3.89	4.81	5.78	7.69	13.45	17.51	17.03
13	2.41	2.86	3.30	4.02	4.96	5.95	8.05	14.42	18.69	18.16
14	2.46	2.93	3.37	4.12	5.12	6.12	8.27	15.36	19.87	19.29
15	2.51	2.99	3.47	4.22	5.26	6.32	8.48	16.36	21.05	20.42
16	2.58	3.05	3.53	4.31	5.40	6.43	8.72	17.33	22.25	21.58
17	2.64	3.12	3.60	4.41	5.53	6.65	9.04	18.30	23.41	22.68
18	2.71	3.19	3.67	4.51	5.67	6.88	9.35	19.27	24.59	23.81
19	2.78	3.26	3.74	4.61	5.80	7.15	9.66	20.24	25.77	24.94
20	2.85	3.32	3.81	4.71	5.96	7.42	10.00	21.21	26.95	26.07
21	2.92	3.39	3.88	4.81	6.10	7.76	10.35	22.19	28.13	27.20
22	2.99	3.44	3.95	4.91	6.24	8.09	10.71	23.16	29.31	28.33
23	3.06	3.50	4.02	5.01	6.38	8.43	11.07	24.13	30.49	29.46
24	3.13	3.56	4.09	5.11	6.52	8.77	11.43	25.10	31.67	30.59
25	3.20	3.62	4.16	5.21	6.66	9.10	11.79	26.07	32.85	31.72
26	3.27	3.68	4.23	5.31	6.80	9.45	12.15	27.04	34.03	32.85
27	3.34	3.74	4.30	5.41	6.94	9.80	12.51	28.01	35.21	33.98
28	3.41	3.80	4.37	5.51	7.08	10.15	12.87	28.98	36.39	35.11
29	3.48	3.87	4.44	5.61	7.22	10.50	13.23	29.95	37.57	36.24
30	3.55	3.93	4.51	5.71	7.36	10.85	13.59	30.92	38.75	37.37
31	3.62	4.00	4.58	5.81	7.50	11.20	13.95	31.90	39.93	38.50
32	3.69	4.06	4.65	5.91	7.64	11.55	14.31	32.87	41.11	39.63
33	3.76	4.13	4.72	6.01	7.78	11.90	14.67	33.84	42.29	40.76
34	3.83	4.20	4.79	6.11	7.92	12.25	15.03	34.81	43.47	41.89
35	3.90	4.26	4.86	6.21	8.06	12.60	15.39	35.78	44.65	43.02
36	3.97	4.33	4.93	6.31	8.20	12.95	15.75	36.75	45.83	44.15
37	4.04	4.40	5.00	6.41	8.34	13.30	16.11	37.72	47.01	45.28
38	4.11	4.47	5.07	6.51	8.48	13.65	16.47	38.69	48.19	46.41
39	4.18	4.54	5.14	6.61	8.62	14.00	16.83	39.66	49.37	47.54
40	4.25	4.61	5.21	6.71	8.76	14.35	17.19	40.63	50.55	48.67
41	4.32	4.68	5.28	6.81	8.90	14.70	17.55	41.61	51.73	49.80
42	4.39	4.75	5.35	6.91	9.04	15.05	17.91	42.58	52.91	50.93
43	4.46	4.82	5.42	7.01	9.18	15.40	18.27	43.56	54.09	52.06
44	4.53	4.89	5.49	7.11	9.32	15.75	18.63	44.53	55.27	53.19
45	4.60	4.96	5.56	7.21	9.46	16.10	18.99	45.51	56.45	54.32
46	4.67	5.03	5.63	7.31	9.60	16.45	19.35	46.48	57.63	55.45
47	4.74	5.10	5.70	7.41	9.74	16.80	19.71	47.46	58.81	56.58
48	4.81	5.17	5.77	7.51	9.88	17.15	20.07	48.43	59.99	57.71
49	4.88	5.24	5.84	7.61	10.02	17.50	20.43	49.41	61.17	58.84
50	4.95	5.31	5.91	7.71	10.16	17.85	20.79	50.38	62.35	59.97
Adpt	09	10	15	19	25	31	36	97	118	113
lbs	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb

ZONE CHART

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

IMPORTANT: Shipping weights listed for model numbers snipped in more than one carton, or of excessive length, have been adjusted to provide correct postage.

Zip Code Prefixes	Zone								
006-009	8	286-293	4	423	3	541-546	3	800-803	5
010-069	5	294-295	5	424-426	4	547-548	4	804-805	6
070-089	4	296-297	4	427-432	3	549	4	806-807	5
090-099	5	298-299	5	433-436	2	550-566	4	808-816	6
				437-457	3	567	5	820-822	5
100-108	5	300-303	4	458	2	570-572	4	823-826	6
109	4	304	5	460-462	3	573-588	5	827	7
110-119	5	305-307	4	463-464	2	590-597	6	828-832	6
120-123	4	308-329	5	465-466	1	598-599	7	833	7
124-126	5	330-334	4	467-469	2			834	6
127-128	4	335-338	5	470-472	3	600-609	2	835-838	7
129	5	339	6	473	2	610-619	3	840-847	6
130-152	4	340	6	474-475	3	620-623	4	850-864	7
153	3	350-352	4	476-477	4	624-628	3	865-867	6
154-160	4	354	5	478	3	629-668	3	890-898	7
161	3	355-359	4	479-489	2	669-679	5		9
162-163	4	360-361	5	490-491	1	680-687	4	900-921	8
164-165	3	362	4	492	1	688-693	5	922-928	7
166-199	4	363-369	5	493-495	1			930-934	8
		370-386	4	496-499	3	700-722	5	935	7
200-232	4	387	5			723-727	4	936-960	8
233-237	5	388	4	500-516	4	728-758	5	961	7
238-259	4	389-397	5	520-524	3	769	6	962-976	8
260-261	3			525	4	770-778	5	977-979	7
262-278	4	400-406	3	526-528	3	779-789	6	980-987	8
279	5	407-409	4	530-534	2	790-792	5	988-994	7
280-283	4	410-412	3	535-539	3	793-799	6	995-999	8
284-285	5	413-422	4	540	1				

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-89. Manuals for HCM-817-1, HCM-837-1 and HCM-847-1 are \$20 each. Manuals not available for Educational Courses. Add 10% shipping/handling for each manual. Write Heath Co., 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 (8 AM - 4:30 PM, ET, Weekdays): 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: Positions are available for qualified engineers, technicians, technical consultants and technical writers with expertise in computer hardware/software, instrumentation or communications. If you're interested in a career with us, 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 warranty for any consumer product in this catalog costing more than \$15 may be obtained free of charge by writing the Manager of Marketing Services, Heath Company, Benton Harbor, MI 49022.



The President's Corner

Dear Friends:

One of the unique things about our business here at Heath is the level of direct communications we have with so many of you. We talk with hundreds of you on the phone every day. And you're prolific letter-writers too - all of which get a personal reply. Hundreds more of you visit Heathkit Electronic Centers* every day - and in addition, we attend many shows, exhibits, con-

ferences and HUG meetings across the country.

In each case, we can exchange ideas, suggestions, thoughts and opinions on a one-to-one basis. Most manufacturers can't do that. It's a big advantage for us, because we get first-hand information telling us what you want (and equally important, what you don't want) from Heath.

We try to be very good listeners, because we're in a very personalized business. I've often said, "We make products by the thousands - but we sell them one at a time." It's true. Each sale is a personal choice - a choice that is yours alone to make.

We live in a world which seems to become more impersonal every day. Friendliness, courtesy and personalized service are all too often lost in the fast pace of business which assigns numbers to people, delivers recorded messages, prints form letters, issues computer printouts and talks to you day and night via radio, TV or other mass media.

While we're in the high-technology business (yes, we do use computers), we're also committed to making your Heathkit purchase a personal and rewarding experience. Every time you buy a Heathkit product, we become partners with you. If the partnership is to succeed, we must both make contributions. It's you and us - a computer can't do it!

During 1982 we've introduced more than 50 new Heathkit products. They're all included in this new catalog... along with 350 other quality kit products for your selection. Many are great family projects. Some are just neat to own personally. Others make great gifts. And all of them carry our personal pledge that "We won't let you fail!"

Happy Heathkit Holiday Shopping -

President

*Units of Veritechnology Electronics Corporation

P.S. to GR-2001 TV owners: See page 92 for a special cabinet offer.

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

IN CASE OF ERRORS OR INQUIRIES ABOUT YOUR BILL

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

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

- a. Do not write on the bill. On a separate sheet of paper write (you may telephone your inquiry but doing so will not preserve your rights under this law) the following:
 - i. Your name and account number (if any).
 - ii. A description of the error and an explanation (to the extent you can explain) why you believe it is in error.

If you only need more information, explain the item you are not sure about and, if you wish, ask for evidence of the charge such as a copy of the charge slip. Do not send in your copy of a sales slip or other document unless you have a duplicate copy for your records.

 - iii. The dollar amount of the suspected error.
 - iv. Any other information (such as your address) which you think will help the creditor to identify you or the reason for your complaint or inquiry.

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

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

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

3. After the creditor has been notified, neither the creditor nor an attorney nor a collection agency

may send you collection letters or take other collection action with respect to the amount in dispute; but periodic statements may be sent to you, and the disputed amount can be applied against your credit limit. You cannot be threatened with damage to your credit rating or sued for the amount in question, nor can the disputed amount be reported to a credit bureau or to other creditors as delinquent until the creditor has answered your inquiry. However, you remain obligated to pay the parts of your bill not in dispute.

4. If it is determined that the creditor has made a mistake on your bill, you will not have to pay any FINANCE CHARGES on any disputed amount. If it turns out that the creditor has not made an error, you may have to pay FINANCE CHARGES on the amount in dispute, and you will have to make up any missed minimum or required payments on the disputed amount. Unless you have agreed that your bill was correct, the creditor must send you a written notification of what you owe; and if it is determined that the creditor did make a mistake in billing the disputed amount, you must be given the time to pay which you normally are given to pay undisputed amounts before any more FINANCE CHARGES or late payment charges on the disputed amount can be charged to you.
5. If the creditor's explanation does not satisfy you and you notify the creditor in writing within 10 days after you receive his explanation that you still refuse to pay the disputed amount, the creditor may report you to credit bureaus and other creditors and may pursue regular collection procedures, but the creditor must also report that you think you do not owe the money, and the creditor must let you know to whom such reports were made. Once the matter has been settled between you and the creditor, the creditor must notify those to whom the creditor reported you as delinquent of the subsequent resolution.
6. If the creditor does not follow these rules, the creditor is not allowed to collect the first \$50 of the disputed amount and FINANCE CHARGES, even if the bill turns out to be correct.
7. If you have a problem with property or services purchased with a credit card, you may have the right not to pay the remaining amount due on them, if you first try in good faith to return them or give the merchant a chance to correct the problem. There are two limitations on this right:
 - a. You must have bought them in your home state or if not within your home state within 100 miles of your current mailing address; and
 - b. The purchase price must have been more than \$50.

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

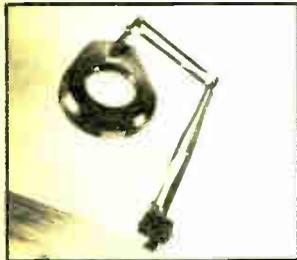
Around home...or for your next kit project...choose from these helpful, trouble-saving aids



Magnifier Lamp enlarges your fun

The multi-purpose Magna-Lux offers the functional flexibility and illumination you need to work hands-free with clear, amplified vision. A 39" lock-jointed arm supports a 3 $\frac{3}{4}$ " diameter, 3-diopter lens which magnifies 175% for ease of viewing. The pivotal, 2-axis lamphead houses one 40W appliance bulb (included). Black only. 120 VAC. It will bring your brightest ideas to light!

GDP-208, Shpg. wt. 4 lbs. **29.95**



Larger-view Magnifier lamp

Easy-on-the-eyes fluorescent lighting and 5" distortion-free glass lens with 2 to 1 magnification combine to take the strain out of close-up work. Energy-singing 22-watt circle tube (included) provides glare-free lighting. Features black enamel housing, safety diffuser and 45" steel arm. Clamps to horizontal surface. UL listed. 120 VAC.

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



3-D Binocular Magnifiers

Three finely-ground lenses enlarge detailed circuitry 2 $\frac{1}{2}$ times for easy viewing, keeping hands free to position and solder components. Headband adjusts to fit all hat sizes. Cushioned forehead. Focus viewpoint at 8". Washable frame is lightweight and durable. A real visual aid.

GDP-201, Assembled, 1 lb. ... **18.95**

Extension Lamp directs more light

This eye-saving Lamp is fully mobile, and features a conical shade to direct ample light right where you need it most. Steel extension arm with spring expansion reaches 32", swings 360° to illuminate workspace. Uses incandescent bulb (not included). Quickly portable; 4-way mounting bracket clamps horizontally or vertically. 120 VAC.

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

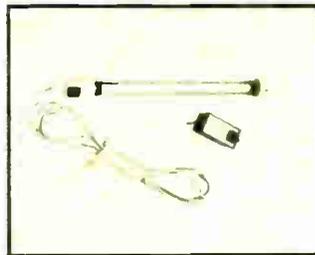


SAVE
\$7.00

Handy Fluorescent Trouble Light

This safe, 15-watt protected lamp throws a more illuminating light — without the usual eye-straining glare and shadows of incandescent bulbs. Long-reaching 25-ft. line cord allows greater freedom of movement; fully-shielded tube (included) is less likely to cause breakage accidents. Size: 26" L x 2.5" W x 2.5" D. 120 VAC.

GDP-206, Shpg. wt. 4 lbs. **19.95**



Complete kitbuilder's Tool Set

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 10.75" W x 10" D carrying case. An ideal starter set for the active hobbyist!

GHP-1270, Shpg. wt. 3 lbs. ... **39.95**



Soldering equipment to meet your kitbuilding needs

1 Weller WTCPN Soldering Station features a temperature-controlled 60-watt element in a pencil iron. Ideal for soldering heat- and voltage-sensitive components where a precision touch is essential. Exclusive transformer-powered, closed loop system automatically controls output and iron temperature to keep $\frac{1}{16}$ " screwdriver tip consistently hot. Low-voltage design provides maximum safety and longer tip life. Balanced handle design has cool grip for sure comfort. Station includes lightweight plug-in soldering iron, heat-shielded holder on sturdy base (transformer inside), 700°F tip, 6' power cord, tip storage tray and removable tip-cleaning sponge. 120 VAC. Assembled and ready to help build kits!

GDP-1108, Shpg. wt. 5 lbs. **69.95**

Set of five 700°F assorted tips for above.

GDP-1109, Shpg. wt. 1 lb. **15.95**

2 Three-Heat Soldering Station Kit features secure stand with metal heatshield to protect both you and iron from burns or breakage. High, medium and low heat settings provide temperatures to meet all requirements. Has 6-volt, 25W element with $\frac{3}{16}$ " chisel tip and 6' power cord. 120 VAC.

Kit GH-17A, Shpg. wt. 5 lbs. **39.95**

3 Weller's 860°F, 25-Watt Soldering Iron has a slim, iron-clad $\frac{3}{8}$ " chisel tip for close point-to-point wiring and integrated circuit work. Our best-selling iron — one that's perfect for all your kits and projects! 120 VAC.

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

PanaVise System lends a hand

4 PC Board Holder grips and holds almost any size circuit board super-steady for soldering. Tilts 220°. Spring-loaded; fits vacuum or standard-height base.

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

5 Vacuum Base attaches securely for temporary mounting on smooth surfaces. Powerful rubber suction pad holds without marring. Accepts GDP-1253, -1254 and -1255 heads.

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

6 Vertical Vise Jaw Head with nylon pads opens 2 $\frac{1}{4}$ " to grip parts without marring.

GDP-1253, Shpg. wt. 2 lbs. **16.95**

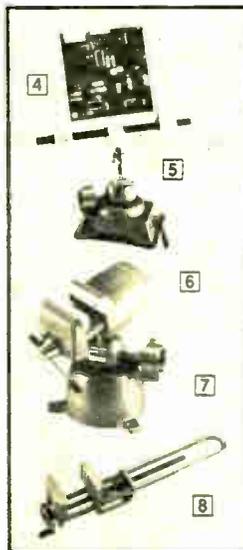
7 Standard Height Base installs semi-permanently for GDP-1251, -1254 and -1255.

GDP-1251, Shpg. wt. 2 lbs. **13.95**

8 Vertical Vise Head with padded jaws will open fully 6 $\frac{1}{2}$ " to hold bulkier items.

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

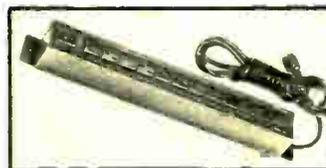
See Heathkit/Zenith Soldering Course on pg. 41



12-Socket Multiple Outlet Box

A real handyman's problem solver! Has 11 switched outlets, plus one unswitched outlet for clock or memory save. Fused for full protection. 10A maximum load. 12' cord. 120 VAC.

Kit HD-1274, Shpg. wt. 4 lbs. **22.95**



Accuracy and economy are yours with easy-to-build Heathkit Test Instruments

1 Portable, versatile VOM

Single test probe makes all measurements quickly: The extremely versatile Heathkit IM-5218 VTVM features seven DC voltage, rms and peak-to-peak AC voltage and resistance ranges. Ideal for use with solid-state and digital equipment.

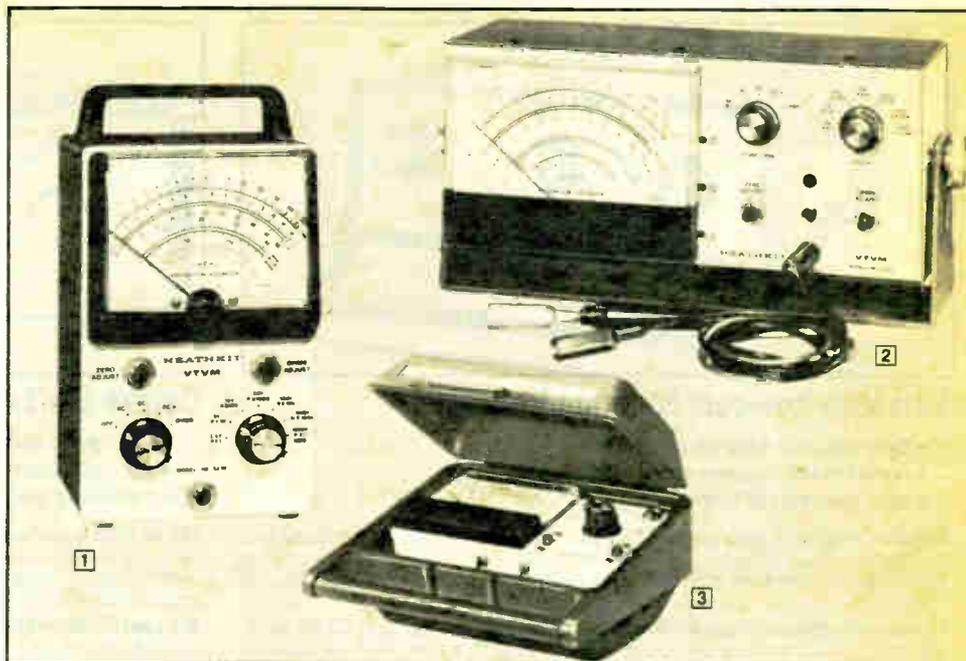
You can measure: 0-1500 volts DC and rms volts AC, 0.4 to 4000 peak-to-peak volts AC and 1 ohm to 100 megohms of resistance. Offers $\pm 3\%$ DC accuracy and $\pm 5\%$ AC accuracy; precision network resistors (with 1% accuracy) for reliable, precise resistance measurements.

Wide 25 Hz to 1 MHz, ± 1 dB frequency response: Allows you to conduct a wide variety of AC measurements. A large, 4.5" color-coded 200 μ A meter movement and scale makes delicate readings a snap.

In addition to its practicality, you save by building it yourself the easy Heathkit way! The step-by-step manual shows you how. Uses 120/240 VAC, 50/60 Hz power and one 1.5 VDC "C" cell (not included). Measures $7\frac{3}{8}$ " H x $4\frac{11}{16}$ " W x $4\frac{1}{4}$ " D (18.75 x 11.91 x 10.8 cm).

Kit IM-5218, Shpg. wt. 5 lbs. 77.95

IM-5218 SPECIFICATIONS: Meter Scales: DC and AC (rms) Voltage: 0-1.5, 15, 50, 150, 500, 1500 V full scale. AC (p-p) Voltage: 0.4, 14, 40, 140, 1400, 4000 V full scale. Resistance: 10 ohm center scale x1, x10, x100, x1000, x10k, x1 Meg. Input Resistance: 11 megohms, 1 megohm in probe.



2 Bench-type VTVM for the shop or the lab

Always ready for service: The IM-5228 is a professional locking, bench-type version of the popular IM-5218 VTVM. In addition to features found on the IM-5218, the IM-5228 also ensures ease of use with all calibration controls centrally located on the front panel. You can measure 0-1500 rms VAC/VDC and 0.1 ohm to 1000 megohms. $\pm 3\%$ DC voltage accuracy, $\pm 5\%$ AC voltage accuracy. Requires one 1.5 VDC "C" cell, not supplied. Operates on 120/240 VAC, 50-60 Hz. Rugged, handsome cabinet measures a compact 5" H x $12\frac{1}{16}$ " W x $4\frac{3}{4}$ " D (12.7 x 33.23 x 12.07 cm).

Kit IM-5228, Shpg. wt. 6 lbs. 77.95

PKW-4, Wired Replacement Probe for IM-5218 or IM-5228 VTVMs, Shpg. wt. 1 lb. 14.95

IM-5228 SPECIFICATIONS: DC Voltage: Input Resistance: 11 Megohms (1 Megohm in probe) on all ranges. Circuit: Balanced bridge (push-pull) using twin triodes. AC Voltage: Frequency Response: 25 Hz - 1 MHz, ± 1 dB (800 ohm source, referred to 60 Hz). Input Resistance and Capacitance: 1 megohm shunted by 40 pF, measured at input terminals 1200 pF at probe tip).

Wide-range Heathkit Portable FM Deviation Meter

\$149⁹⁵

- Check operation of FM transmitters and signal generators
- Two front panel jacks for easy oscilloscope hook-up
- Uses battery or AC power

Easy-to use: All controls and jacks on the Heathkit IM-4180 are located right on the front panel for easy access. You can select from four deviation modulation ranges just by pressing a pushbutton. Ranges available for use are from 2 to 75 Hz. Lock in UHF FM signals with the convenient coarse and fine tuning controls. Measures peak FM deviation between 25 and 1000 MHz. An 8 ohm jack allows you to connect a speaker or a pair of headphones. Controls are provided to allow you to select the appropriate de-emphasis for audio signals. Easy to read meter. 5" H x 10.31" W x 7.19" D. Requires ten 1.5 VDC "AA" cells (carbon-zinc, alkaline or nickel-cadmium - not included) or the optional IMA-4180-1 Battery Charger-Eliminator below.

Kit IM-4180, Shpg. wt. 7 lbs. 149.95

Kit IMA-4180-1, Battery Charger-Eliminator for IM-4180, Shpg. wt. 2 lbs. 29.95

Swiveling Telescopic Antenna. Monitor transmitter/generator performance without physical connection to the IM-4180.

SMA-2400-1, Assembled, Shpg. wt. 1 lb. 9.95

3 Portable IM-5217 VOM for use anywhere

Perfect for in-field use by car buffs, campers, boaters, others: Four voltage and resistance ranges make the Heathkit IM-5217 Portable VOM ideal for making all common measurements. It's easy to build and easy to use. Measures 0-500 Volts AC or DC (function switch allows measurement of AC and DC without changing test lead connections) and 1 ohm-1 megohm. High input impedance avoids circuit loading. Wide frequency response for audio measurements. Checking semiconductors is a breeze with a special 1.5 Volt ohmmeter. Requires two 9 VDC cells and one 1.5 VDC "C" cell (not included). Attractive, durable carry-along cabinet measures $5\frac{3}{8}$ " H x $9\frac{3}{8}$ " W x 9" D (13.67 x 23.83 x 22.86 cm).

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

IM-5217 SPECIFICATIONS: DC Voltage Ranges: 1.5, 15, 150, 500 Volts full scale. Accuracy: $\pm 3\%$ full scale. Input Resistance: 10 Megohms on all ranges. AC Voltage: Ranges: 1.7, 15, 150 and 500 volts full scale. Input Resistance: 1 Megohm on all ranges. Input Capacitance: Approximately 100 pF (50 pF on 500 Volt range). Frequency Response: 10 Hz-1MHz, ± 1 dB. Ohmmeter: Rx1, Rx100, Rx10k, Rx10M (10 ohms center scale).



IM-4180 SPECIFICATIONS: Carrier Freq. Ranges: Fundamental, 25 to 50 MHz Deviation Ranges: 0-2, 0-7.5, 0-20 & 0-75 kHz. Accuracy: $\pm 3\%$, 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

Instrumental gifts for the hobbyist or service technician on your Christmas list



Versatile low-cost Function Generator

- Generates sine, square & triangle waves
- Features wide frequency range, compact size
- Neat, compact and easy-to-use

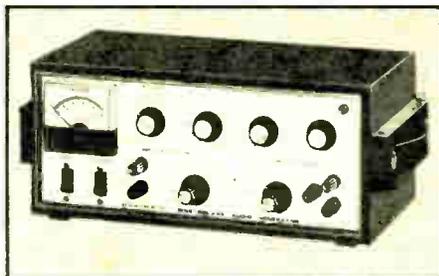
Provides frequency settings from 1Hz to 1MHz for a multitude of testing and calibration applications. Just select waveform desired, set frequency multiplier and fine tune to frequency desired. Accuracy is better than 3%, full scale.

Exceptional attenuation capabilities: You can step attenuate up to 50 dB in 10 dB steps, and fine-tune an additional 20 dB with a continuously variable control. Output is short-circuit protected and provides up to 10V (p-p) signal into a 50-ohm load. For 120/240 VAC, 50/60 Hz power. Draws 15 Watts. Neat, compact cabinet measures just 3" H x 7.25" W x 8.88" D (7.62 x 18.42 x 22.56 cm). The sturdy case has a convenient carrying handle that also serves as a bail to tilt case to proper angle for best viewing.

Kit IG-1271, Shpg. wt. 7 lbs. 157.95
 SG-1271, Assembled/Calibrated, 6 lbs. 195.00

Sine/Square Wave Audio Generator

- Simplifies audio amplifier testing
- Wide freq. range, low distortion
- Easy kit assembly

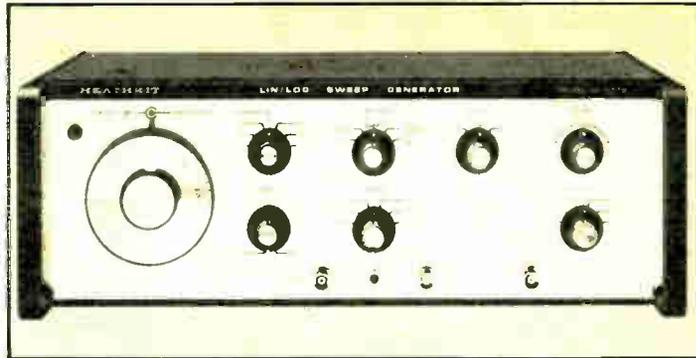


A time-saving, low-cost addition to any audio test bench: The IG-5218 provides both sine and square wave signals for gain & frequency response measurements, Harmonic Distortion checks and other amplifier tests. The square wave output with a risetime of 50 nanoseconds is ideal for audio response testing or as a trigger for digital circuit testing.

Both outputs available simultaneously for added flexibility: Sine wave output from 1 Hz to 100 kHz features less than 0.1% distortion from 10 Hz to 20 kHz. Eight switch-selected output voltage ranges provide 0.003 to 10 V when operating into a high impedance external load (10k min.), six ranges from 0.003 to 1 V into internal or external 600 ohm load. A panel meter monitors output and is calibrated in both volts and db. Square wave output from 5 Hz to 100 kHz provides peak-to-peak output levels of 0-0.1, 0-1 and 0-10 V into 2000 ohm load or greater.

Frequency is quickly and accurately selected with multiplier switches and a continuously variable vernier control. For 120/240 VAC, 50/60 Hz power. Draws just six watts. Measures 5.13" H x 13.25" W x 7" D (13.03 x 33.66 x 17.78 cm). Order one for your test bench for faster, easier testing.

Kit IG-5218, Shpg. wt. 10 lbs. 124.95
 SG-5218, Assembled, 10 lbs. 195.00



Deluxe Lin/Log Swept-Function Generator

- Sine, square and triangle outputs
- CW, burst, linear and log sweeps
- Variable symmetry, variable offset, VCG input

The IG-1275 is a precision lab-grade function generator offering top performance at a low kit price. Provides sine, square and triangle waveforms PLUS swept-function waveforms for convenient frequency response tests. Also has pen lift and chart control signals for use with Heath chart recorders and others.

Six operational modes provide exceptional versatility for extensive test and service procedures. Continuous output (CW); gated CW; a burst mode that completes a variable integral number of output cycles; linear and log sweeps over a 1000:1 sweep range. Stop and start frequencies are set independently; sweep modes can also be triggered externally providing one sweep for each trigger, and stop for an integral number of cycles.

Other convenient features include: A 50 dB switch attenuator variable between ranges; adjustable symmetry from 5% to 95%; variable offset; analog, sweep and sweep gate outputs for convenient system control; VCG input for external control of main generator.

A function generator with all the capability and accuracy you demand: Designed for use with 120/240 VAC, 50/60 Hz power, the IG-1275 draws just 20 Watts. It measures 5.38" H x 15" W x 11.88" D (13.67 x 38.1 x 30.18 cm).

Kit IG-1275, Shpg. wt. 15 lbs. 349.95

IG-1275 SPECIFICATIONS: Output: 50-ohm source, short-circuit protected and ± 20 V open circuit protected ± 10 V open circuit ± 10 V into 50 ohms. **Output Flatness:** ± 0.1 dB to 300 kHz, 0.5 dB-3MHz. **Frequency Range:** 0.003 Hz-3MHz in 6 steps on each primary decade. **Sine Distortion:** Less than 1% ($\times 10$), less than 0.5% ($\times 10^2$, $\times 10^3$, $\times 10^4$), less than 0.75% ($\times 10^5$). Harmonics, 30 dB down ($\times 10^6$). **Triangle Linearity:** No greater than 1% deviation to 300 kHz, (top decade for each range only). **Square Wave Rise/Fall:** Less than 60 nS. **Power Requirement:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5.38" H x 15" W x 11.88" D.

Test Accessories for a variety of uses

Test Lead Set: Includes two fully-assembled 1.5 meter cables (one black and one red), each terminated by two 4 mm shrouded plugs. Also has red sprung hook, red prod and black shielded crcc clip.

PKW-200, Assembled and tested, Shpg. wt. 1 lb. 15.95

RF Probe: For use with DC voltmeters in testing of RF circuits.

Kit PK-3-A, Shpg. wt. 1 lb. 12.95

30 kV DC Probe for meters with 10 Megohm input: Provides multiplication factor of 100 on the DC ranges of any 10 Megohm meter. 1000 Megohm input for measuring voltages as low as 1V in high-impedance circuits.

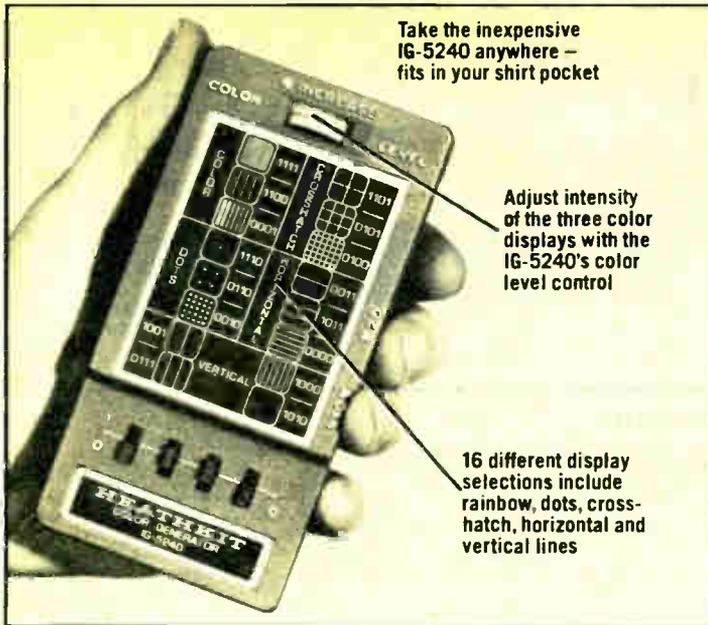
Kit IMA-100-10, with banana plug, Shpg. wt. 1 lb. 13.95

SMA-100-10, Assembled with phone plug, Shpg. wt. 1 lb. 19.95

30 kV DC Probe for meters with 11 Megohm input: Provides X100 measurement capability for meters with 11-megohm input impedance. Phone plug connector with alligator ground clip.

Kit IMA-100-11, Shpg. wt. 1 lb. 13.95

These low-priced Heathkit test instruments speed TV servicing work



Take the inexpensive IG-5240 anywhere — fits in your shirt pocket

Adjust intensity of the three color displays with the IG-5240's color level control

16 different display selections include rainbow, dots, cross-hatch, horizontal and vertical lines

Hand-Held Color Alignment Generator aids television field servicing

\$72⁹⁵

- Outstanding performance, shirt-pocket size
- 16 different displays, including three in color
- Battery-operated for portable in-the-field use

Real precision, accuracy and stability: The IG-5240 Color Alignment Generator features a crystal-controlled carrier and color oscillator. Its size makes it convenient to take along for in-the-field service.

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 available displays. A color level control adjusts the intensity of the three color displays. A battery saver circuit turns the display off automatically after it's been on for a minimum of five minutes. This feature conserves battery power, letting you get the most efficient operation and longest possible life from your batteries.

Light and portable: Two 9 VDC transistor cells (not included) provide eight or more hours of continuous operation. 5.4" H x 2.75" W x 1.15" D.

Kit IG-5240, Shpg. wt. 2 lbs. **72.95**

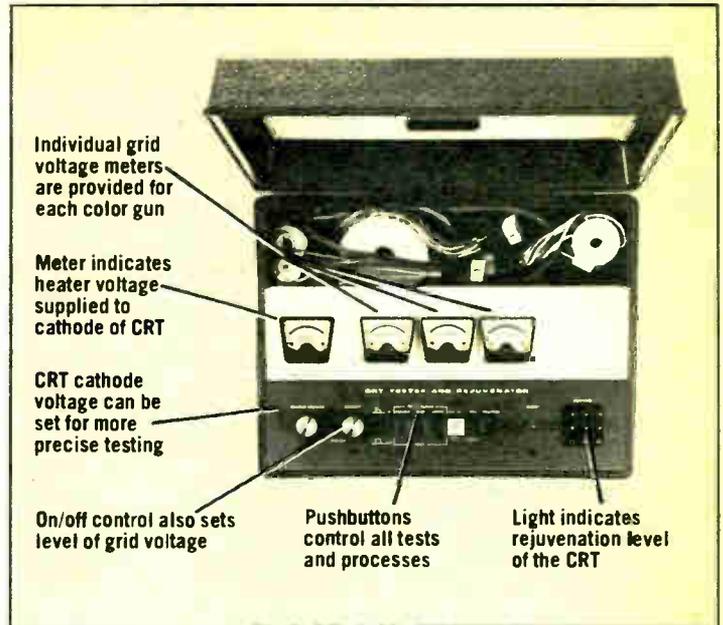
IG/SG-5240 SPECIFICATIONS: Display Patterns: Raster, blank, Horizontal Lines, 1-7-15, Vertical Lines, 1-11-21, Crosshatch or dots, 1 x 1.7 x 11 or 15 x 21 matrices, Rainbow, no luminance, Grated Rainbow, 3 or 10 bars with luminance. Chroma Carrier: 3563.795 MHz $\pm 0.005\%$, crystal-controlled. Master Timer: 377.616 MHz $\pm 0.005\%$, crystal-controlled. RF Output: 5000 μ V minimum, into 300 ohms. Video Modulation: Approximately 50%.

Yoke/Flyback tester for TV service technicians



Checks windings of yokes, flybacks, coils and general mid-frequency (10 to 100 kHz) coils. Good/bad ring test with ± 1 ring accuracy at 10 mark on highest range. Measure drive signals, focus and anode voltage with IMA-100-10 below. For 120/240 VAC, 50/60 Hz power. Measures 6.88" H x 5.75" W x 10.75" D (17.47 x 14.61 x 27.31 cm).

Kit IT-5235, Shpg. wt. 8 lbs. **94.95**
 ST-5235, Assembled, Shpg. wt. 7 lbs. **140.00**
 Kit IMA-100-10, 30 kV Probe, 1 lb. **13.95**
 SMA-100-10, Assembled Probe, 1 lb. **19.95**



Individual grid voltage meters are provided for each color gun

Meter indicates heater voltage supplied to cathode of CRT

CRT cathode voltage can be set for more precise testing

On/off control also sets level of grid voltage

Pushbuttons control all tests and processes

Light indicates rejuvenation level of the CRT

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

\$134⁹⁵

- Use on almost all current cathode-ray tubes (CRTs) — even 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, color and black-and-white: Positive-action pushbuttons control all tests and processes for easier operation. Individual color guns can be cleaned, tested and rejuvenated by using the front panel pushbuttons. 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.

Easy to build: Step-by-step Heathkit manual shows you how. Includes 4' heavy-duty test cable. For 120/240 VAC, 5.12" H x 13.5" W x 10" D.

Kit IT-5230, Shpg. wt. 9 lbs. **134.95**

IT-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.

Lightweight, easy-to-build 40 kV Probe Meter

40 kV Probe Meter makes TV tube voltage measurements faster and more convenient.

Just attach the ground clip to the TV chassis; place the probe against the tube's high-voltage connector. On-off switch conveniently mounted on handle. Features $\pm 3\%$ accuracy. You can finish this easy-to-build Heathkit product in just one evening. The IM-5210 measures 1.5" H x 1.88" W x 15" L (3.81 x 4.78 x 38.1 cm).

Kit IM-5210, Shpg. wt. 2 lbs. **27.95**



For the designer's or experimenter's workbench — the Heathkit DC Tri-Output Power Supply

\$99⁹⁵
Kit

- Versatile — use it for designing digital circuits
- One fixed 5 VDC output, 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 @ 1.5A; A & B: 0-20 VDC @ 0.5A 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: 4³/₈" H x 10³/₈" W x 9" D



Handy Heavy-Duty Power Supply/Battery Eliminator

\$164⁹⁵

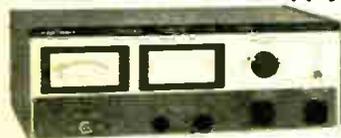
- Provides variable 9-15 VDC capable of 12 amps continuous, 20 amps intermittent

For DC applications where high-current capability is necessary. Provides continuous variable voltage from 9-15 V with fixed output regardless of load. Extra-large transformer for low ripple operation. 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. 164.95

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: 5¹/₂" H x 11" W x 11" D (13.3 x 27.9 x 27.9 cm)

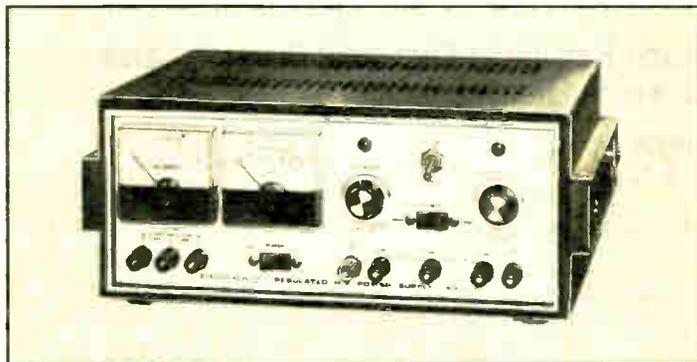
Variable Isolated AC Supply adds more service versatility



360 volt-amps, AC, continuous output. Switch selected. Fused at 1A & 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. 154.95

SP-5220, Assembled, 26 lbs. 190.00



Improved, low-cost Heathkit 0-400 VDC Power Supply

\$179⁹⁵
Kit

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

New solid-state control circuitry for improved performance: 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-2717A, Shpg. wt. 19 lbs. 179.95

Factory assembled and tested IP-2717A.

SP-2717A, Shpg. wt. 20 lbs. 239.95

IP/SP-2717A 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: 5¹/₂" H x 13¹/₂" W x 11" D

Continuously variable 1-15 VDC Regulated Power Supply

The IP-2728 Power Supply helps in servicing, testing or designing low-voltage solid-state equipment. Features a continuously adjustable 1-15 VDC at 500 mA output, with a 500 mV line, 50 mV load regulation, and fully adjustable limiting current. AC or DC programming. 120/240 VAC. 4³/₈" H x 5¹/₂" W x 5³/₄" D.

Kit IP-2728, Shpg. wt. 5 lbs. 37.95



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

- Less than 0.5% error, full scale
- Digital chart drive for 10 speeds
- English or metric measurements
- Rear panel connector for total control from a remote location
- Built-in switchable input filter

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

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

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

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

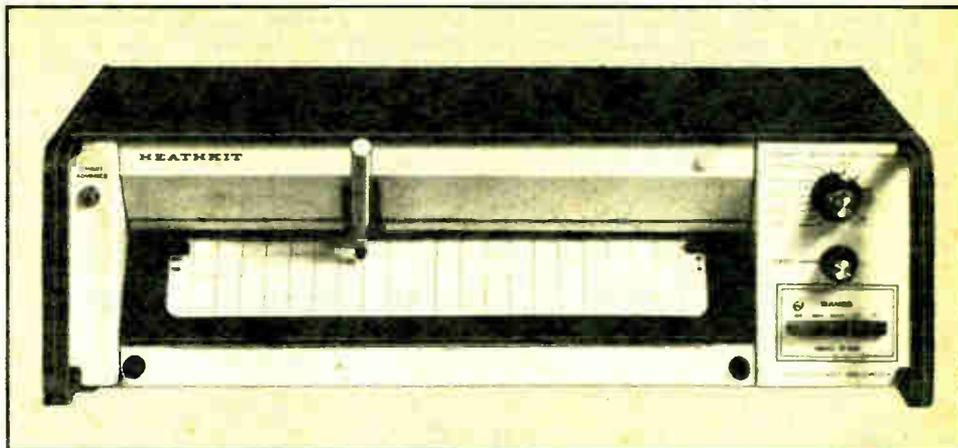
Many noise problems are eliminated by a built-in switchable input filter: When switched into the circuit, both normal and common mode rejection are increased by 20 dB. Noise rejection is even greater at higher frequencies.

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

Pushbutton chart advance is standard: As are external chart drive input capability, electric pen lift with disposable nylon-tipped pens, metric conversion, built-in rack handles and the necessary hardware for rack mounting. 120/240 VAC, 50/60 Hz. Measures 5.34" H x 17.41" W x 12.31" D.

Kit IR-5204, Shpg. wt. 22 lbs. **339.95**
SR-204, Assembled and tested Strip Chart Recorder, 22 lbs. **495.00**

IR-5204/SR-204 SPECIFICATIONS: Chart Width: 10 inches (25 cm with optional metric drive). Chart Speeds: 10, 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01 inches/minute (cm/min. with metric conversion installed). Balance Time: 0.5 second for full scale (filter out). Overshoot: Less than 1% of full scale.



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

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

Chart Paper for IR-5204/SR-204/SR-205 Chart Recorders: All 120' long

Inch-calibrated: Has 0.1" divisions. 0-100 right-to-left.
SU-445-17, Shpg. wt. 2 lbs. **6.95**
Centimeter-calibrated: Offset 4 cm on right, 0-100 right-to-left.
SU-445-18, Shpg. wt. 2 lbs. **6.95**

Disposable Nylon Pens for IR-5207/SR-207/SR-206 Chart Recorders:

Pens for chart recording speeds under 1 inch per minute:
SU-205-3, Long Red Pen, Shpg. wt. 1 lb. **3.95**
SU-205-6, Short Red Pen, Shpg. wt. 1 lb. **3.95**
SU-205-4, Long Blue Pen, Shpg. wt. 1 lb. **3.95**

Pens for chart recording speeds over 1 inch per minute:
SU-205-5, Long Red Pen, Shpg. wt. 1 lb. **3.95**
SU-205-7, Short Blue Pen, Shpg. wt. 1 lb. **3.95**

Laboratory-type Decade Resistance Box

Invaluable as a variable multiplier or shunt, a variable substitution resistor, or as a leg for AC and DC bridges: The IN-3117 helps solve complex resistance problems, where a large range of measurement values is necessary. Covers 1 ohm to 999,999 ohms in 1-ohm steps. 0.5% tolerance, 1 Watt resistors. Features rugged case and binding posts for easy test set-ups. 5" H x 7.5" W x 6.63" D (12.7 x 19.05 x 16.84 cm).

Kit IN-3117, Shpg. wt. 3 lbs. **57.95**



Complete Test Lead Set has a wide variety of uses

2000/ VRMS, 20A max.: Two 1.5 meter cables, 4 mm shrouded plugs, red sprung hook, red prod, black shielded croc clip.
PKW-200, Shpg. wt. 1 lb. **15.95**



50-Ohm Termination for counters and oscilloscopes

Helps eliminate measurements errors in counters, scopes: Covers DC to 1 GHz range. Power rating, 1 Watt. VSWR: at 250 MHz, 1.2:1; at 600 MHz, 2:1.
SU-511-50, Shpg. wt. 1 lb. **14.95**



Distortion Analyzer for amplifiers and receivers

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 wide frequency range of the IM-5258 allows you to check and service audio amplifiers and receivers which claim the finest specifications.

Residual distortion in the IM-5258 is a very low 0.03% or less: The front panel meter is accurate to within 0.5% of full scale.

Features auto-null control: Simply rough-tune the analyzer and flip the auto mode switch. The analyzer automatically balances the incoming signal, eliminating the need for delicate and time-consuming manual fine tuning.

Also functions as a 1 mV to 300 VAC voltmeter: Features ±5% accuracy in this function as well. Maximum input impedance is one megohm, shunted by 70 pF. Not for use in strong RF fields. For 120/240 VAC, 50/60 Hz power. Attractive, sturdy case measures 5.38" H x 15" W x 11.5" D (13.67 x 38.1 x 29.21 cm).

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



IM-5258 SPECIFICATIONS: Frequency Range: 5 Hz to 100 kHz in five ranges: 5-10 Hz, 10-100 Hz, 100-1000 Hz, 1-10 kHz, 10-100 kHz. Distortion Measurement Ranges: 0.3 to 100%, full scale, in six ranges with a 1-3-10 sequence. Residual Distortion: 0.03% or less. Input Impedance: 1 megohm, shunted by 70 pF maximum. Required Input Level: 316 mV RMS for distortion measurements.

The 5280-Series – The basics for the beginner

No matter if you're a seasoned electronics pro or if you're just starting out, the 5280-Series of test equipment from Heathkit provides you with a dollar-saving way to equip your own test

bench. Each of the high-quality test instruments is priced at only \$47.95 so you don't have to spend a lot of money. And, they represent the Heathkit quality you've come to expect.

1 Four-function Multimeter

Versatile: The IM-5284 High-Performance, Solid-State Multimeter allows you to quickly measure volts, ohms and DC current. A large, easy-to-read panel meter makes measurements a snap. Measures AC/DC Voltage to 1000 volts with 3% DC and 5% AC accuracy. Measure DC current to 1000 mA, with 4% accuracy. A total of four resistance ranges up to X1 megohm. Includes needed test probes. Requires one "C" cell, and two 9 VDC cells or IPA-5280-1 Power Supply, below right. Measures $5\frac{3}{4}$ " H x 11" W x $7\frac{3}{4}$ " D (14.61 x 27.94 x 19.69 cm).

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

IM-5284 SPECIFICATIONS: DC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: $\pm 3\%$ of full scale. AC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: $\pm 5\%$ of full scale. DC Milliammeter: Ranges: 0-1, 0-10, 0-100, 0-1000 mA full scale. Accuracy: 4% of full scale. DC Input Resistance: 10 megohms. AC Input Resistance: 1 megohm.

2 RF Oscillator for alignment of radio, TV equipment

A necessary service aid: The IG-5280 RF Oscillator is ideal for use in aligning tuned stages of AM, FM, and television receivers. Provides output in five separate bands: 310 kHz to 110 MHz and up to 220 MHz on harmonics. A 1 kHz audio output, available at a front panel jack, can be used to isolate circuit defects in receiver audio stages. The IG-5280 is supplied with all required probes and test leads. It requires two 9 VDC cells or the IPA-5280-1 Power Supply, below right. Measures $5\frac{3}{4}$ " H x 11" W x $7\frac{3}{4}$ " D (14.61 x 27.94 x 19.69 cm).

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

IG-5280 SPECIFICATIONS: RF Output: Frequency Range: 310 to 110 MHz, in five bands; 100 MHz to 220 MHz on harmonics. Output Voltage: Approx. 100 mV. Internal Modulation: 1 kHz. Audio-Frequency Output: Frequency: 1 kHz. Output Voltage: 2.0 volts rms, open circuit.

3 Versatile, wide-range Sine/Square Wave Audio Oscillator

Multi-function versatility: You'll wonder how you managed to get along without the IG-5282 Sine/Square Wave Audio Oscillator. It counts as necessary equipment in a wide variety of audio testing situations. Since all components mount on a single circuit board, kit-building time is greatly reduced. Provides frequency output in four ranges – from 10 to 100 kHz, in both sine and square wave modes. During signal tracing, you can use the IG-5282 as an audio signal source. With the necessary additional equipment, you can use the sine wave output for audio stage gain and distortion analysis. The square wave output, along with appropriate associated equipment, can be used to determine frequency response. Requires two 9 VDC cells or the IPA-5280-1 Power Supply shown below right. Measures $5\frac{3}{4}$ " H x 11" W x $7\frac{3}{4}$ " D (14.61 x 27.94 x 19.69 cm).

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

IG-5282 SPECIFICATIONS: Frequency Output: 10 Hz to 100 kHz in four ranges. Sine Wave Output Voltage: 0-3 volts rms. Square Wave Output Voltage: 0-3 volts peak. Power Requirements: two nine volt batteries or the optional IPA-5280-1 Power Supply.

4 RCL Bridge for design, testing

A low-price Heathkit value: The IB-5281 RCL Bridge is the answer to your needs in testing and design. With the IB-5281, you can easily determine unknown values of capacitance, inductance and resistance. You are provided with the versatility of three separate ranges in each function. Indicates capacitance from 10 pF to 10 μ F, inductance from 10 μ H to 10H and resistance from 10 ohms to 10 megohms. As always, the Heathkit name means easy-to-build so you'll quickly be able to start using the IB-5281 RCL Bridge in your shop. Only one circuit board needed. Provided with a molded, rugged cabinet and component clips. Measures $5\frac{3}{4}$ " H x 11" W x $7\frac{3}{4}$ " D (14.61 x 27.94 x 19.69 cm).

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

IB-5281 SPECIFICATIONS: Resistance Ranges: 10 ohms to 10 megohms, in three ranges. Inductance ranges: 10 microhenries to 10 henries, in three ranges. Capacitance ranges: 10 picofarads to 10 microfarads, in three ranges. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1:1 to 10:1.

5 Audio circuit Signal Tracer

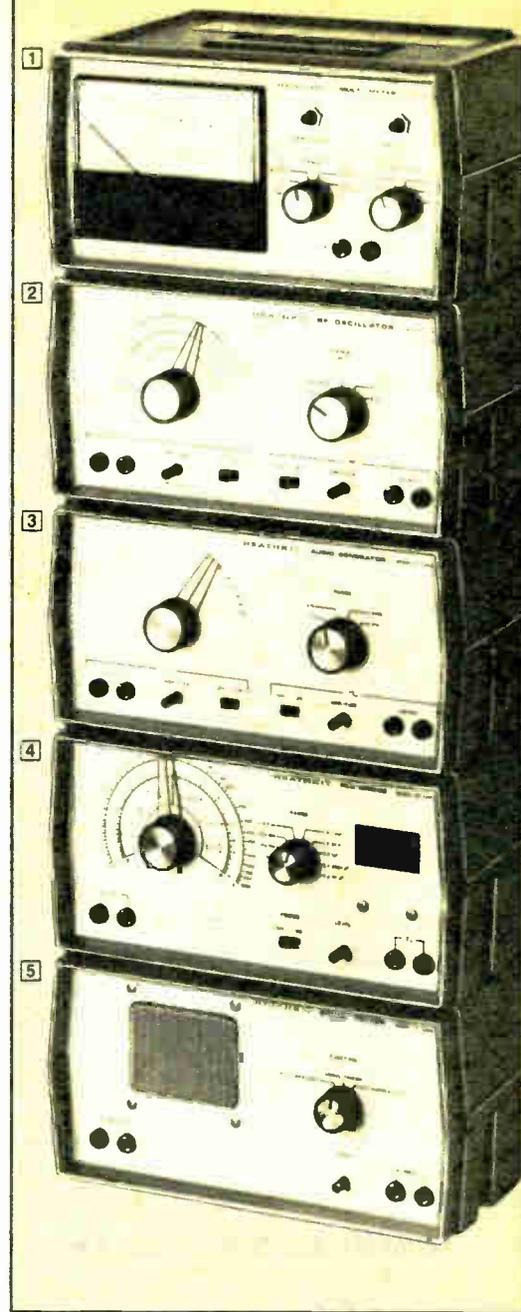
Track down problem circuits: A diode-equipped RF probe pinpoints failing components and stages. The IT-5283 Signal Tracer will be welcome on your bench when it's time to troubleshoot defective equipment. By using the straight-through DC position you can use the IT-5283 to track down and identify failing audio components and systems. In the audible mode, the IT-5283 Signal Tracer emits a tone which changes in frequency, dependent upon the test point voltage or resistance. That allows you to quickly and simply isolate problems by tracing signal flow through logic circuits. Requires two 9 volt DC cells, or the IPA-5280-1 Power Supply, optional. Measures $5\frac{3}{4}$ " H x 11" W x $7\frac{3}{4}$ " D.

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

IT-5283 SPECIFICATIONS: Functions: Speaker substitution (16 ohms impedance), audio or RF signal tracing, audible VOM (volt ohmmeter). Speaker: 3" permanent magnet type, 16 ohms impedance. Power Requirement: Two 9 VDC transistor-type batteries (not included) or IPA-5280-1 Power Supply below. Overall Dimensions: $5\frac{3}{4}$ " H x 11" W x $7\frac{3}{4}$ " D (14.61 x 27.94 x 19.69 cm). Net Weight: 3 lbs. (1.4 kg).

120/240 VAC Power Supply features added convenience

Power for the 5280-series: The Heathkit name stands for value – and the IPA-5280 Power Supply provides it. Powers all five instruments at the



same time. Will provide 120 or 240 VAC power without rewiring. Features include half-wave rectification, capacitor filtering and dual-integrated circuits. For 120/240 VAC, 50/60 Hz power. Draws 7 Watts maximum. Measures 6" H x $3\frac{3}{4}$ " W x 3" D (15.24 x 9.53 x 7.62 cm).

Kit IPA-5280-1, Shpg. wt. 3 lbs. 28.95

IPA-5280-1 SPECIFICATIONS: Output Voltage: -9 and +9 VDC. $\pm 9\%$. Maximum Output Current: 100 millamps. Fuse: 1 $\frac{1}{2}$ -Amp. 3 AG. Slow-blow type.



Hand-held Digital Capacitance Meter features auto-ranging, leakage detection



Optional carrying case

Leakage switches, nomogram let you measure leakage from capacitors

3½-digit LCD has ½" tall digits

\$157⁹⁵

- Measures up to 199.9 mF with +D.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
- Large 3½-digit Liquid Crystal Display (LCD)
- Hand-held meter uses standard 9 VDC battery

The compact IT-2250 measures capacitance from 0 pF to 199.9 mF. Measuring all types of capacitors (mica, glass, paper, polystyrene, mylar, electrolytic, air-gap, ceramic and others), an auto-ranging feature automatically selects the correct range of measurement from a choice of ten ranges. The capacitance measurement is then shown on its 3½-digit LCD. Four LEDs indicate unit of measurement (pF, nF, μF or mF).

"Kelvin" terminal design 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 electrolytic and other capacitors with a low operating voltage, the IT-2250 supplies a low test voltage (superimposed on a low bias voltage). A remote cable lets you test capacitors that can't be connected directly.

Another key feature of the IT-2250 is its ability to detect a leaky capacitor. A nomogram is provided so you can translate the readings you obtain, using the two separate 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.

Uses 9 VDC battery, or 120 VAC line current with optional PS-2350 (below).

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, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. 7.95

IT-2250 SPECIFICATIONS: Ranges: 199.9 pF, 1999 pF, 19.99 nF, 199.9 nF, 1.999 μF, 19.99 μF, 199.9 μF, 19.99 mF, 199.9 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 1999 pF, 19.99 nF, 199.9 nF ranges, ±(0.2% of reading + 1 count + 0.5 pF); 1.999 μF, 19.99 μF, 199.9 μF, 199.9 μF, 19.99 mF, 199.9 mF ranges, ±(5% of reading + 1 count). Using Heath-Supplied Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges, ±(0.75% of reading + 1 count + 0.5 pF); 1.999 μF, 19.99 μF, 199.9 μF, 199.9 μF, 19.99 mF and 199.9 mF ranges, ±(6% of reading + 1 count). NOTE: The accuracy of the Heathkit IT-2250 Capacitance Meter depends on whether you calibrate with the Heath-supplied standards or laboratory standards. Specifications are listed above for both methods of calibration. Accuracy specifications apply for a temperature range of 67 to 77 degrees F (19 to 25 degrees C). Conversion and Display Rate: For values up to 1999 μF, less than 1.5 seconds; For values up to 199.9 mF, less than 10 seconds. Display: 3½ digit (maximum count, 1999) liquid crystal. Testing Voltage: 2.00 VDC maximum; typically varying from 0.6 to 1.4 VDC. Operating Temperature Range: 32 to 104 degrees F (0 to 40 degrees C). Storage Temperature Range: -4 to +140 degrees F (-20 to +60 degrees C). 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 (5.06 x 8.26 x 19.05 cm). Net Weight: 16 ounces (450 grams), including battery.

Four LEDs show correct unit of measurement

Includes standard capacitors for accurate calibration

"Kelvin" terminals for more accurate measurements

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

Parts and service available. Retail prices on some items may be slightly higher.

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Tucson, 85710
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33C E. Ball Rd. 714-776-9420

Campano, 95008
2350 S. Gascom Ave. 408-377-8920

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

La Mesa, 92041
8363 Center Dr. 714-461-0110

Los Angeles, 90007
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HAWAII - Honolulu (Pearl City), 96782
98-1254 Kaahumanu St. 808-487-0029

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2112 E. 62nd St. 317-257-4321

KANSAS - Mission, 66202
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KENTUCKY - Louisville, 40243
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5050 FM 1960

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★ Heathkit Satellite Earth Stations on display at these stores.



Metal case for added durability, better RFI shielding

Large, easy-to-read LED display has 8 digits for higher resolution

Measure frequency of signals to 512 MHz, period of signal, ratio of two signals

Two ranges for added versatility: 50 MHz range and 512 MHz range

50-ohm input for high-frequency signals

1 Megohm input for low-frequency signals

Trigger level control for stable, more accurate counting of most any signal

Standby mode for maximum accuracy – the minute you turn the counter on

Low-priced Heathkit Portable 512 MHz Frequency Counter gives you digital measuring accuracy!

\$259⁹⁵
Kit

- Extra-wide frequency range to accommodate maintenance of both UHF and VHF radios and transceivers
- Crystal-controlled time base assures you of excellent long-term measuring stability and accuracy

- Features four gate times and eight-digit resolution to give you more precise readings
- Provides you with two separate inputs and an adjustable trigger level control for more versatility

UHF capability up to 512 MHz, low-frequency capacity down to 5 Hz and a budget-pleasing price are all yours when you choose the Heathkit IM-2420 Portable Digital Frequency Counter. Service technicians and do-it-yourselfers will find its extended frequency range ideal for servicing UHF two-way radios now used by many police and fire departments – as well as most other radio communications equipment.

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

Make more accurate measurements: A standby power switch can keep the crystal oven warm, giving you maximum frequency measuring accuracy as soon as the IM-2420 is turned on. Proportionally-controlled crystal oven keeps the internal time base extremely accurate – within 0.1 part per million (ppm) – over a wide ambient temperature range. And the external time base jack allows the use of an external time base signal.

Four gate times and a large, 0.43" (1.09 cm) high, eight-digit LED display provide the resolution you need to measure UHF signals. The pivoting stand places the IM-2420 at a comfortable, convenient viewing angle.

The IM-2420's excellent 4-15 mV typical sensitivity, over the entire 5 Hz-512 MHz range, allows counting of weak signals. Trigger level control assures stable counting when noise is present, and provides more accurate measurement of complicated waveforms. Effective limiting circuits at both inputs (5 Hz-50 MHz and 40 MHz-512 MHz) make sure counting is stable, even when the input signal level varies by as much as 60 dB.

Measure signals with a direct connection – or, for frequency counts without direct connection, order the SMA-2400-1 Telescopic Antenna (right).

Extra Protection is built into the IM-2420: Its rugged, compact metal cabinet provides improved shielding from radio-frequency interference (RFI). Full voltage protection assures worry-free counting.

Kitbuilding is easy: The IM-2420 takes as little as four evenings to build, with a fully detailed Heathkit manual to guide you along the way, step-by-step. ICs are standard and easily available, for faster servicing. For 120/240 VAC, 50/60 Hz. 4.25" H x 10" W x 12.5" D (10.8 x 25.4 x 31.8 cm).

Kit IM-2420, Shpg. wt. 9 lbs. 259.95

Assembled Portable 512 MHz Frequency Counter.

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

Swiveling Telescopic Antenna for IM-2400, IM-2410, IM-2420 Frequency Counters: Also use on many two-meter transceivers. Chrome-plated brass antenna provides significant performance improvements over similar antennas. Enhance counter sensitivity by tuning to the proper frequency – by extending or retracting the telescoping sections. Right angle version. Includes BNC connector for easy hookup to frequency counter.

SMA-2400-1 Assembled and tested, Shpg. wt. 1 lb. 9.95

IM/SM-2400 SPECIFICATIONS: Inputs: Frequency Ranges: 5 Hz to 50 MHz and 40 MHz to 512 MHz. Sensitivity: 25 mV rms guaranteed, 4 to 15 mV rms typical. Input Impedance: 5 Hz to 50 MHz range, 1 Megohm shunted by less than 25 pF; 40 MHz to 512 MHz range, 50 ohms nominal. Input Protection: 5 Hz to 50 MHz range, 250 V rms to 100 kHz (derating to 25 V rms at 50 MHz); 40 MHz to 512 MHz range, 5 V rms. Period Measurement Mode: Input: 5 Hz to 50 MHz only. Range: 5 Hz to 10 MHz. Sensitivity: 25 mV rms guaranteed, 4 to 15 mV rms typical. Display Resolution (Least Significant Digit): 100 nS to 0.1 mS, in decade steps. Ratio B/A Measurement Mode: Input Frequency Limits: 5 Hz to 25 MHz and 40 MHz to 512 MHz. Effective Measurement Range: From 1.5 to 1.024 x 10(B), guaranteed. Sensitivity: 25 mV rms guaranteed, 4 to 15 mV rms typical. Time Base: Frequency: 10 MHz. Setability: To within 0.2 part per million (ppm). Temperature Stability: 0.2 ppm from 32° F to 104° F (0° C to 40° C). Crystal Aging Rate: Less than 1 ppm per year. Oven Operating Temperature: ±67° F, ±9° F (75° C ±5° C). Warm-up Time From Cold Oven (unplugged) Start: 10 minutes to within 1.0 ppm, 20 minutes to within 0.1 ppm. External Input: TTL or 2.5 V rms from 50 ohm source (10 MHz). Input Protection: Any voltage with peak-to-peak limits between -3.5 and +10 Volts. Output: Will drive two standard TTL (i.e., 7400) loads. Short circuit protected. General Gate Times: 0.01 second, 0.1 second, 1 second and 10 seconds (switch-selectable). Sampling Rate: Every 0.1 second, 0.33 second, 1 second or 10 seconds. LED Display: Eight digits.

Measure with the low-cost, high-accuracy IM-2410 Digital Frequency Counter

\$124⁹⁵
Kit

- Switchable 10 Hz-50 MHz and 20 MHz-225 MHz ranges for high-resolution frequency readouts
- Excellent 10 mV sensitivity
- Big, easy-to-read eight-digit LED display with automatic decimal point placement

If you're looking for an inexpensive, yet highly accurate frequency counter for your bench, then check out the easy-to-build Heathkit IM-2410 Digital Frequency Counter.

Accuracy and stability unmatched at its low price: The IM-2410 features two frequency ranges – from 10 Hz to 50 MHz, and from 20 MHz to 225 MHz – for increased accuracy and better resolution. A single input covers the entire frequency range, making the IM-2410 more convenient to use.

Two-position time gate: You can choose either 0.1 second or 1.0 second gate times for even better resolution. And the crystal-controlled time base gives you the good long-term stability and accuracy you would expect to find on more expensive counters: ± 1 ppm.

Front panel operation for easy bench use: All of the IM-2410's controls are on the easy-to-reach front panel. One BNC input is provided for fast, direct frequency counts. For non-direct counts, you can attach the optional SMA-2400-1 Swiveling Telescopic Antenna (described below).

Easy-to-read display: The eight-digit LED display shows all frequencies in MHz for higher resolution (as fine as 1 Hz at 50 MHz, 10 Hz at 225 MHz). A cabinet stand props the IM-2410's display at a comfortable viewing angle.

Interference-free cabinet construction: The IM-2410's housing is made of metal for greater durability and better radio-frequency interference (RFI) shielding. 120/240 VAC. 3.38" H x 7.25" W x 9.5" D.



Kit IM-2410, Shpg. wt. 6 lbs. 124.95
Assembled and tested Digital Frequency Counter.
SM-2410, Assembled, Shpg. wt. 6 lbs. 170.00

IM-2410 SPECIFICATIONS: Display: Eight-digit LED display. Frequency Ranges: 10 Hz to 50 MHz, and 20 MHz to 225 MHz. Sensitivity: 10 Hz-50 MHz range, 25 mV RMS maximum, 10 mV typical from 10 Hz-30 MHz; 50 mV RMS maximum from 30-50 MHz; 20 MHz-225 MHz range, 25 mV RMS maximum, 10 mV typical from 20-150 MHz; 50 mV RMS maximum from 150-225 MHz. Input Impedance: 1 megohm, shunted by less than 24 pF. Input Protection: 150 VAC, up to 100 kHz – derating to 5 VAC from 160 MHz to 225 MHz. Time Base Frequency: 3.58 MHz. Stability: ± 1 ppm. Temperature Stability: -10 ppm, from 0 to 40 degrees C. Gate Times: 0.1 or 1.0 second, switch-selectable. Frequency Resolution: 10 Hz to 50 MHz range, ± 1 Hz with gate time set at 1.0 second and ± 10 Hz with gate time set at 0.1 second; 20 MHz to 225 MHz range, ± 10 Hz with gate time set at 1.0 second; ± 100 Hz with gate time set at 0.1 second. Power Requirement: 120/240 VAC, 50/60 Hz, 25 Watts maximum. Dimensions: 3.8" H x 7.25" W x 9.5" D (8.59 x 18.42 x 24.13 cm).

Save \$5.00 – test and align anywhere with the IM-2400!

\$139⁹⁵
Kit

- Battery-operated for in-field frequency testing
- Batteries mount internally for true portability
- Two frequency ranges and time bases

Now you can accurately test and align anywhere: Test mobile radio equipment in cars, trucks, aircraft, boats – anywhere you want, with the IM-2400. Technicians and amateur radio enthusiasts will find it ideal for servicing mobile gear.

Using rechargeable batteries, this compact counter measures just 1.63" H x 3.38" W x 8.38" D.

The IM-2400 features a 10 MHz crystal oscillator that insures stable and accurate frequency monitoring through both the 50 Hz-50 MHz and 40 MHz-512 MHz ranges. With a typical sensitivity of 10 millivolts RMS and a guaranteed sensitivity of 25 millivolts RMS, the IM-2400 lets you measure weak signals.

The big seven-digit LED display has automatic decimal point placement to help ensure mistake-free readings.

Completely portable: The IM-2400 has rechargeable nickel-cadmium batteries that provide hours of measurements on a single charge – and the batteries can be recharged hundreds of times to save on battery replacement cost. The batteries are located inside the instrument to eliminate awkward external battery packs.

Also for bench use: A pivoting stand (included) supports the IM-2400 at a convenient viewing angle for work at your test bench. Add the optional PS-2404 120 VAC Battery Eliminator/Charger to operate the IM-2400 directly from line current.

Take testing and alignment convenience with you anywhere, when you buy the IM-2400. Uses five rechargeable 1.2 VDC nickel-cadmium "AA" cells (included) or 120 VAC, 60 Hz power with the optional PS-2404 Battery Eliminator/Charger. Measures 1.63" H x 3.38" W x 8.38" D (14.14 x 8.58 x 21.29 cm).

Kit IM-2400,
Shpg. wt. 3 lbs. Was \$144.95, NOW ONLY 139.95

Assembled and tested Hand-Held Counter.
SM-2400, Assembled, Shpg. wt. 2 lbs. . . 190.00

Swiveling Telescopic Antenna for the IM-2400 and IM-2410 Frequency Counters. Can also be used on two-meter amateur radio transceivers. This chrome-plated brass antenna, with its right-angle design and telescoping capability, gives you improved performance and better sensitivity. 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

240 VAC Battery Eliminator/Charger for IM-2400.
PS-2405, Shpg. wt. 1 lb. 12.95

IM-2400 SPECIFICATIONS: Input Impedance: 50 Hz to 50 MHz range, 1 megohm shunted by less than 20 pF; 40 MHz to 512 MHz range, 50 ohms. Input Protection: 50 Hz to 50 MHz range, 150 Volts RMS to 100 kHz, derating to 10 Volts RMS at 50 MHz; 40 MHz to 512 MHz range, 5 Volts RMS. Stability: ± 1 ppm. Temperature Stability: ± 10 ppm from 0 to 40 degrees C. Gate Time: 0.1 or 1.0 second, switchable. Resolution: 50 Hz to 50 MHz range, ± 10 Hz with time base set at 0.1 second; ± 100 Hz with time base set at 1.0 second; 40 MHz to 512 MHz range, ± 100 Hz with time base set at 0.1 second; ± 1 kHz with time base set at 1.0 second. Power Requirement: Five 1.5 VDC rechargeable nickel-cadmium cells (included), or 120 VAC, 60 Hz line current with optional PS-2404 Battery Eliminator/Charger (above). Dimensions: 1.63" H x 3.38" W x 8.38" D (4.14 x 8.58 x 21.29 cm).



FAST, EASY
2-EVENING KIT



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

The Heathkit Digital Multimeter line features advanced capabilities and attractive styling



IM-2262: full-function versatility, accuracy

\$189⁹⁵

- Features attractive styling in low-profile cabinet
- Offers expanded measurement ranges and improved performance with state-of-the-art circuitry
- True RMS capability provides accurate AC readings from both sine wave and non-sine wave inputs

Step up from low-cost meters: The IM-2262 Portable Digital Multimeter provides more measurement ranges and better performance for the serious hobbyist, service technician or design laboratory – at a competitive price.

Attractively styled: The IM-2262 is not only functional, it's attractive. Our designers invested unprecedented time and effort in styling this compact, low-profile instrument. Measuring 3" H x 8.5" W x 11" D (7.62 x 21.59 x 27.94 cm) with handle folded, the cabinet features a special color-coded front panel with pushbutton switches – for additional convenience and ease of use.

Measurement ranges: The IM-2262 measures voltage from 200 mV (full scale) up to 1000 VDC and 750 VAC, DC and AC current from 200 μ A (full scale) up to 10 Amps, resistance from 200 ohms to 20 Megohms (full scale). The resistance function includes a low (0.2 Volt) test voltage, up to the 2000 kilohm range, to allow in-circuit measurement of semiconductors. A diode test allows checking of semiconductor functions.

Uses extremely accurate, stable state-of-the-art technology: One MOS/LSI integrated circuit contains all the dual-slope, analog-to-digital conversion circuitry – including the automatic polarity indication and automatic decimal point placement functions. The IM-2262 features a laboratory full scale accuracy of 0.25% DC, 0.5% AC (with frequency response specified up to 20 kHz). Built-in references, which allow fast and easy calibration in the field, provide full scale accuracies of 0.5% DC, 1% AC (up to 10 kHz).

Input protection is provided on all measurement functions: Fully-isolated circuitry allows floating measurements up to 500 Volts (peak) from earth ground.

Uses battery or AC power: The IM-2262 operates on six 1.5 VDC carbon-zinc, alkaline or nickel-cadmium cells (not included) for portable in-field use. It can also use 120 VAC, 60 Hz power, with the optional Heathkit PS-2404 Battery Eliminator (see page 59). A battery test circuit allows a direct check of battery condition, with a LO-BAT indicator lighting automatically when battery voltage reaches a low level. And a built-in circuit recharges nickel-cadmium batteries in as little as 24 hours, with the unit turned off.

Kit IM-2262, Shpg. wt. 5 lbs. 189.95

IM-2262 SPECIFICATIONS: Maximum Allowable Input: Voltage: 1000 VDC or VDC plus peak AC (On AC voltage, 750 VAC or 1000 VDC plus peak AC, limited to 10(6) V-Hz), except 350 VDC or DC plus peak AC momentary (On AC voltage, 250 VAC or 350 VDC or DC plus peak AC momentary) on 200 mV and 2 V ranges; Current: 2 A on 200 μ A-2000 mA ranges; 10 A (20 A for 30 sec.) on 10 A range; Resistance: 350 VDC plus peak AC or 250 VAC. Diode Test: Forward and reverse conduction.

Top-of-the-line IM-2264: full set of features

\$239⁹⁵

- Auxiliary analog peak/nuH meter allows measurement trends to be easily determined
- Switch-enabled alarm is useful in circuit tracing
- Crest warn indicator alerts user to possible measurement error for non-sine wave inputs

Has all features of the IM-2262 DMM at left – and more: The IM-2264 offers full-function versatility, highly accurate readings and special operator convenience features – all at a surprisingly affordable price.

Measurement capabilities: Voltage from 200 mV to 1000 VDC/750 VAC, current from 200 μ A to 10 Amps and resistance from 200 ohms to 20 Megohms. In addition, semiconductor functions can be checked.

True RMS capability: This feature allows the IM-2264 to provide accurate AC measurements from both sine wave and non-sine wave inputs.

Additional features make operation even more convenient: A flashing crest warn LED alerts the operator when the crest factor of AC inputs is excessive – which could lead to possible measurement error for non-sine wave inputs.

A switch-enabled alarm function allows quick testing of voltage and continuity, without having to view the display. The audible alarm sounds for voltage or current displays above 200 counts on any range, and for resistance measurements when the input is less than 200 counts on any range. An auto-polarity analog meter reflects 0 to full scale measurements to supplement the digital display – making nulls, peaks and measurement trends easier to follow.

Outstanding protective circuitry: All measurement functions have input protection. DC and AC current ranges (except the 10 Amp range) are protected by diode, circuit breaker and fuse circuits – with an easily accessible fuse.

The resettable rear panel circuit breaker, unique to the IM-2264, provides protection on current measurements from 200 μ A to 2000 mA, making fuse replacement for moderate overloads necessary. Resistance ranges are electrically protected to 350 Volts (peak). Floating measurements up to 500 Volts (peak) from earth ground can be made with the fully-isolated circuitry.

Use in-field or on your test bench: Operates on six carbon-zinc, alkaline or nickel-cadmium batteries (not included) – or on 120 VAC, 60 Hz power with the optional Heathkit PS-2404 Battery Eliminator (see page 59). Has test circuit, LO-BAT indicator and circuit to recharge nickel-cadmium batteries.

Kit IM-2264, Shpg. wt. 7 lbs. 239.95

IM-2264 SPECIFICATIONS: Crest Warn: Operation: Front panel LED flashes for excessive crest factor condition on AC voltage and current, or excessive normal mode signal on DC voltage and current. On 200 mVAC range, function may be used to indicate digital logic pulses. Alarm: Operation: Audible tone (switch-enabled) sounds on voltage and current functions for input levels greater than 200 counts on range selected; on resistance function, for input levels less than 200 counts on range selected. Meter: Operation: Continuously monitors input levels.





IM-2260 for excellent low-priced performance

\$124⁹⁵

- Compact, lightweight, 3½-digit multimeter features good performance over many ranges
- Measures 1 mV to 1000 VDC (750 VAC), 1 mA to 10 Amps and 1 ohm to 20 Megohms, also performs diode test
- Attractively-styled, low-profile cabinet

Many capabilities at a low price: The IM-2260 Portable Digital Multimeter is one of the best bargains available on the market. This versatile instrument tests DC voltage (in four ranges up to 1000 Volts). AC voltage (in four ranges up to 750 Volts). DC and AC current (in five ranges up to 10 Amps) and resistance (in five ranges up to 20 Megohms).

Special measuring features: Checks of forward conducting voltage and reverse leakage resistance help determine whether a semiconductor is good or bad. Low 0.2 Volt resistance test voltage (2K-2000K ranges) allows accurate in-circuit resistance checks.

Features state-of-the-art LSI measuring circuitry: A special MOS/LSI (metal oxide semiconductor/large scale integration) integrated circuit contains all of the IM-2260's measuring and display circuits. This advanced, reliable circuitry helps ensure more accurate and stable readings.

Also has automatic polarity indication and automatic decimal point placement: Pushbutton switching and a special color-coded front panel add convenience. Built-in references ensure accurate calibration.

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

Features attractive styling: The cabinet has a carrying handle which doubles as a stand which can position the LED display at a convenient viewing angle.

Available in money-saving kit form, or fully assembled: The easy-to-build IM-2260, as well as the factory assembled and tested SM-2260, uses six 1.5 VDC carbon-zinc, alkaline or nickel-cadmium "C" cells (not included). Both versions can also run on 120 VAC with optional PS-2404 Battery Eliminator (see page 59). Battery test function helps ensure more accurate measurements by monitoring internal battery voltage. A built-in circuit charges nickel cadmium batteries. This Heathkit product measures 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 Amps. Accuracy: DC: $\pm 1.5\%$, ± 1 count (except $\pm 3.5\%$ on 10 Amp range); AC: $\pm 2.0\%$, ± 1 count (except $\pm 4.0\%$ on 10 Amp range). 40 Hz to 1 kHz. Resistance: Ranges: 2 kilohms, 200 kilohms, 2000 kilohms, 20 Megohms. Accuracy: $\pm 0.25\%$, ± 1 count, except $\pm 0.5\%$ on 20 Megohm range.

3½-digit LCD for easy reading in any light

Lightweight — just 14 ounces with battery

Separate voltage and current inputs protect unit under test

Pushbutton range and function switches



Use built-in or external references to maintain high accuracy

Accurate, affordable IM-2215 Hand-Held DMM

\$97⁹⁵
Kit

- Measures AC and DC voltage, current, resistance
- Has built-in references for in-field calibration
- Large, easy-to-read 3½-digit LCD display

Here's the hand-held portable digital multimeter you need — at a great low price!

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 polarity indication and automatic decimal point placement for fast measurements.

State-of-the-art measuring circuitry: High-sophisticated dual-slope, analog-to-digital conversion circuitry is contained in one MOS/LSI integrated circuit. This circuitry provides 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.

Use long-lasting battery power or line current: Special low current drain design allows up to 200 hours of operation on one 9 VDC cell (not included). Battery condition is continuously monitored, with a "Lo-Bat" warning displayed during the last 20% of battery life. Also operates on 120 VAC with optional PS-2350 Battery Eliminator (below). Includes pivoting stand; places the display at a convenient angle for bench use. 2" H x 3.5" W x 7.5" L.

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, 1 lb. 14.95
PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. 7.95

IM/SM-2215 SPECIFICATIONS: Voltage: Ranges: DC, 200 mV, 2 V, 20 V, 200 V, 1000 V; AC, 200 mV, 2 V, 20 V, 200 V, 750 V (rms). Accuracy: Lab Standards: DC: $\pm 0.25\%$ of reading -1 count (SM-2215 $\pm 0.1\%$); AC: $\pm 0.5\%$ of reading $+3$ counts. Built-in Standards: DC: $\pm 0.35\%$ of reading -1 count, AC: $\pm 0.6\%$ of reading $+3$ counts. Input Impedance: 10 megohms (shunted on AC by approximately 100 pF). Frequency Response for AC Measurements (25 deg. C. -10 deg. C.): On 200 mV, 20 V and 200 V ranges, 40 Hz-1 kHz ($\pm 1\%$ of reading $+3$ counts); on 2 V and 750 V ranges, 40 Hz-400 Hz ($\pm 1.5\%$ of reading $+3$ counts). Current Ranges: DC, 2 mA, 20 mA, 200 mA, AC, 2 mA, 20 mA, 200 mA, 2000 mA. Accuracy: DC: $\pm 0.75\%$ of reading -1 count (SM-2215, $\pm 0.35\%$); AC, 2 mA range, $\pm 1.5\%$ of reading $+3$ counts, 40-200 Hz; other AC ranges, $\pm 1.5\%$ of reading $+3$ counts, 40 Hz-1 kHz. Resistance: Ranges: 200, 2K, 20K, 200K, 2M, 20M. $\pm 0.25\%$ of reading -1 count (SM-2215, 2K-2M $\pm 0.15\%$) 20 Megohms range, $\pm 2\%$ of reading -1 count



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

INSTRUMENTS/61

This dual-trace, portable 20 MHz Oscilloscope features many extra-value capabilities!

The IO-3220 fits under an airplane seat, yet has many bench scope features



The first portable Heathkit oscilloscope features dual-trace capability, wide bandwidth, algebraic add, up to 5X sweep magnification, invert display function and a bright CRT

- Very sensitive vertical input accepts signals as low as 2 mV
- Measures a signal's leading edge in as fast as 18 nS
- Z-axis input to apply timing marks on a displayed waveform
- Lightweight — weighs only 16 lbs. (less optional battery pack)
- Includes cover to protect front panel controls from dust, easy-grip carrying handle for maximum portability

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

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

Full X-Y operation for making phase and frequency measurements: The signal from the Y2 input can be applied to the horizontal amplifier.

Algebraic add displays the sums of both traces as a single trace: This function of the IO-3220 allows you to make differential measurements.

Wide bandwidth: The IO-3220 can measure signals from DC to 20 MHz.

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

Easy-to-read CRT: The 3-inch (diagonal), 8 x 10-division CRT screen has an extra-bright trace that can even be read in high ambient light conditions.

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

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

Use anywhere — runs on external or internal power: For 120/240 VAC, 50/60 Hz power. Also runs on optional IOA-3220-2 Rechargeable Battery Pack (not included), or on 11-24 VDC (user-selectable) at approximately 34 VA. Includes cover to protect front panel from dust contamination. The compact, rugged cabinet measures 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 65). 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 for IO/SO-3220 Portable Oscilloscope: Includes two PKW-105 X1/X10 Oscilloscope Probes with two-position multiplier for X1 and X10 probe tip and 4.5-foot cable. **59.95**

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

Rechargeable Nickel-Cadmium Battery Pack for IO/SO-3220 Portable Oscilloscope: Provides minimum of two hours continuous operation on full charge. Recharged by IO/SO-3220 when oscilloscope is in charging mode. **44.95**

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

IO/SO-3220 SPECIFICATIONS: Vertical: Frequency: DC, DC to 20 MHz (-3 dB), AC: 3 Hz to 20 MHz (-3 dB). Rise Time: Less than or equal to 18 nS. Overshoot: Less than or equal to 5%. Deflection Factor: 2 mV division to 10 V division in 12 calibrated steps, 1-2-5 sequence. Variable between steps. Vertical Windows: Two minimum (16 divisions). Input Impedance: One Megohm shunted by approximately 35 pF. Maximum Input Voltage: 400 Volts (DC plus peak AC). Display Modes: Y1, Y2, Dual (TB selected), Add. Accuracy: 3% (20-30° C), 5% (10-40° C) (Variable in cal. position). Horizontal: Time Base: 0.1 sec. division to 100 nS division in 19 steps, 1-2-5 sequence. Variable between steps. X5 magnifier increases sweep speed to 20 nS division. Accuracy: 3% (20-30° C), 5% (10-40° C) — except X5 within 5% (20-30° C), 7% (10-40° C) (Variable in cal. position). X-Y: X Channel: Same performance as vertical. Y Channel: Same performance as vertical, but with limited response of 2 MHz. Phase Shift: Less than 3° at 100 kHz. Triggering: Source: Internal A or B (\pm), External (\pm), Line (\pm). Modes: AC, DC, Low-Frequency Reject, High-Frequency Reject (Automatic baseline in absence of trigger when in auto mode). Sensitivity: Automatic, adjustable over 10 divisions, Normal, Adjustable over 10 divisions; External, Adjustable over 0.8 Volt in either auto or normal mode. Input Impedance (External): 1 Megohm shunted by approximately 100 pF. Z Input: Full On to Full Off: 0 to 5 Volts. Maximum Input: 50 Volts peak

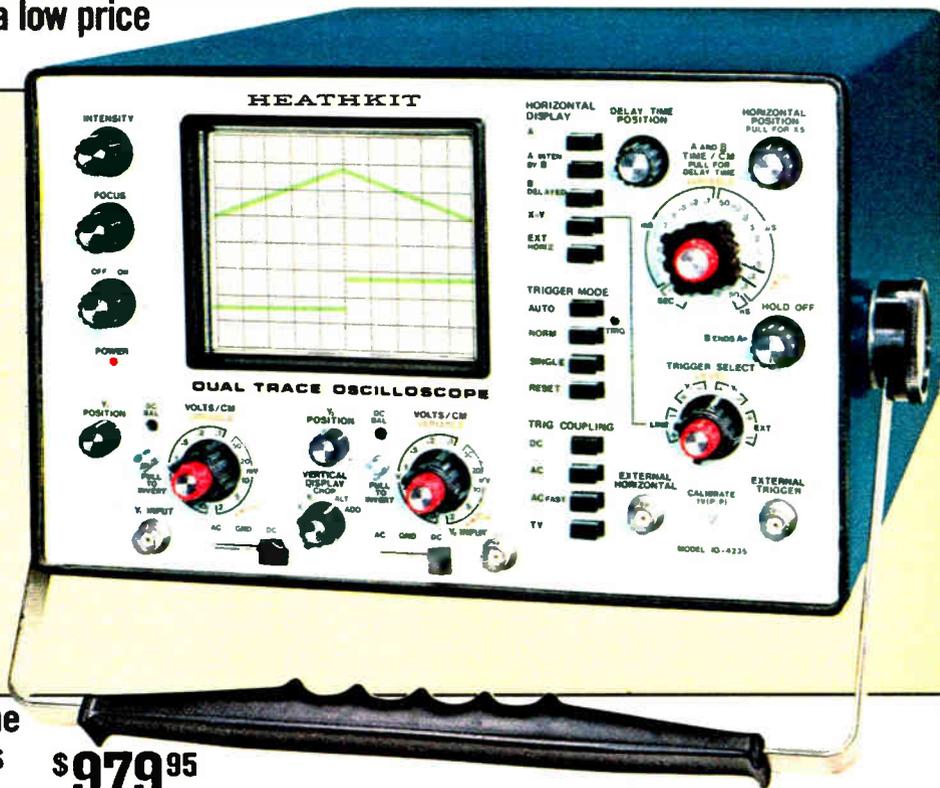


Carrying handle makes the lightweight IO-3220 highly portable



Here's the finest Heathkit Oscilloscope — featuring a wide frequency range, dual-trace capability, versatility — adding features and a low price

- Dual-trace capability lets you monitor two input signals simultaneously
- Also has delayed-sweep capability
- Capable of triggering to two times the specified vertical bandwidth
- Vertical delay lines let you observe leading edges of input signals
- Rise time of less than 10 nS handles complex, fast-rising input signals
- Sweep speeds from 50 nS/cm to 0.2 Seconds/cm, plus up to 5X expansion, for an effective sweep speed of 10 nS/cm
- Smooth rolloff lets you observe input signals above 50 MHz
- Algebraic add inverts either channel to observe differential signals
- Unique TV coupling feature triggers alternate fields for VITS display
- 8 x 10 cm mesh CRT, with internal graticule, helps assure parallax-free measurements
- 10 kV post acceleration voltage for fast writing and bright, easy-to-read display
- Easy to assemble, using the step-by-step Heathkit assembly and operation manual



The deluxe Heathkit IO-4235 is one of the most versatile oscilloscopes available anywhere!

\$979⁹⁵

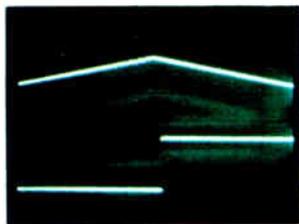
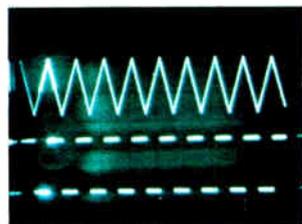
The IO-4235, with its DC-35 MHz range, is the most advanced oscilloscope our engineers have ever developed! Compare this top-of-the-line Heathkit oscilloscope with others in its price range. You'll find that the IO-4235 is unmatched in performance, features and quality. Compare the sophistication and versatility of the IO-4235 with other scopes costing hundreds more.

This laboratory-quality oscilloscope is a perfect addition to anyone's service bench, at an affordable price. The IO-4235 fulfills the requirement of the service technician, electronics designer and serious hobbyist.

The IO-4235, which has a wide DC to 35 MHz bandwidth, features a delayed-sweep circuit which uses a separate time base to display a selected portion of the normal waveform for closer, more accurate examination. The start and length of the delayed sweep are user-controlled, so any given portion of the normal waveform can be displayed at a much higher rate.

An 8 x 10 cm mesh CRT has 10 kV post acceleration voltage — 2½ times greater than any scope we've ever offered — for faster writing speeds and brighter displays. An internal graticule offers parallax-free readings.

The IO-4235 also features fully regulated power supplies for reliable and stable readings, the capability to operate accurately on low line voltages, a 1 Volt square wave signal output available at the front panel for easier probe compensation, a variable hold off control and a special Z axis function for additional versatility.



The delayed sweep takes the user-selected portion of the desired waveform (intensified portion in left photo) and magnifies it the desired number of times, to allow for closer examination (as seen in photo at right).

An attractively-styled, functional cabinet houses the IO-4235. It features a convenient, easy-to-grip carrying handle. For 120/240 VAC, 50/60 Hz power. Draws just 85 Watts (at 120 VAC). This scope measures 7.75" H x 13.75" W x 24" D, with handle folded.

Calibration of the IO-4235 requires a precise source of square waves (such as the IG-4505 Deluxe Oscilloscope Calibrator on page 65), and a DC voltmeter.

Top-of-the-line Heathkit IO-4235 35 MHz Oscilloscope.

Kit IO-4235, Shpg. wt. 52 lbs. **979.95**

Factory assembled and tested version of IO-4235.

SO-4235, Assembled and tested, Shpg. wt. 38 lbs. **1370.00**

IO/SO-4235 SPECIFICATIONS: VERTICAL: Sensitivity: 2 mV/cm to 10 V/cm. Positions: 12 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 30 V/cm. Accuracy: Within 3% (20 to 30 degrees C); Within 5% (10 to 40 degrees C), referred to 1 V/cm. Vertical Response: DC Coupling: DC to 35 MHz (-3 dB). AC Coupling: 1 Hz to 35 MHz. Rise Time: 10 nS. Overshoot: Less than 3%. Delay Line: Allows display of at least 20 nS of pre-triggered waveform. Vertical Input: Impedance: 1 megohm, shunted by 30 pF (Capacitance depends on probe used for calibration). Maximum Input: 400 Volts peak, combined AC and DC. Connector: BNC. Vertical Modes: Y1, Y2, Y1 and Y2 chopped, Y1 and Y2 alternate, algebraically add ($\pm Y1$ plus $\pm Y2$). HORIZONTAL: Time Bases: Ranges: 0.2 S/cm to 50 nS/cm. Positions: 21 steps in 1-2-5 sequence. Variable: Continuous between ranges to approximately 600 mS/cm. Accuracy: Within 3% (20 to 30 degrees C); 5% (10 to 40 degrees C), referenced to 1 mS/cm. Magnifier: X5 (Accurate to within 5%, 20 to 30 degrees C; Within 7%, 10 to 40 degrees C). External Horizontal: Sensitivity: Approximately 0.1 V/cm. Impedance: 1 megohm. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to greater than 2 MHz (-3 dB). Connector: BNC. X-Y: Y Channel: Same as vertical. X Channel: Same as vertical, except response is limited to 2 MHz and has no delay line. Phase Shift: Less than 8 degrees at 100 kHz. TRIGGER: Source: Y1, Y2, External or Line. Coupling: AC, DC, AC Fast, TV. Modes: Automatic baseline, normal, single sweep. Hold Off: Variable, including a "B ends A" position. Sensitivity/Bandwidth: 0.5 cm Mode: DC, DC to greater than 50 MHz; AC, 15 Hz to greater than 50 MHz; AC Fast, 40 kHz to greater than 50 MHz; TV, 40 Hz to 1.5 kHz, 1 and 1.5 cm Modes: DC, DC to greater than 70 MHz; AC, Less than 1 Hz to greater than 70 MHz; AC Fast, 30 kHz to greater than 70 MHz; TV, 20 Hz to 3 kHz. (NOTE: In TV Coupling, the Oscilloscope triggers on alternate frames for steady display.) External Trigger: Sensitivity: 100 mV at 50 MHz. Input Impedance: 1 megohm, shunted by 30 pF. GENERAL: CRT: Type: 8 x 10 cm mesh with internal graticule. Phosphor: P31. CRT Acceleration Potential: 10 kV, regulated. Z Axis: Full On to Full Off: 0 to 5 Volts. Positive Input Impedance: 5 kilohms. Operating Temperature Range: 50 to 104 degrees F (10 to 40 degrees C). Power Supplies: Fully regulated. Power Requirement: 120/240 VAC, 50/60 Hz, 85 Watts (at 120 VAC). Overall Dimensions: 7.75" H x 13.75" W x 24" D (19.69 x 34.93 x 50.17 cm), with handle folded. Net Weight: 30 lbs. (13.6 kg).



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



Introducing Heath/Zenith's newest, most powerful computer — The Z-100 Series

As low as

\$3999⁰⁰

for low-profile model
with Color Video RAM

This complete 16-bit/8-bit desktop computer includes two sophisticated microprocessors, super-high memory capacity, industry-standard S-100 expansion bus, two 320 KB disk drives, easy-touch keyboard and low-maintenance design — all in a durable earthtone-color cabinet!

Look at everything the Z-100 Series offers:

- Runs both 16-bit software and 8-bit software, at very fast speeds
- Expanded memory capacity — up to an incredible 768K bytes of RAM!
- Both serial and parallel I/O ports for telecommunications extendability
- Color, monochrome video capabilities
- Add optional 8" floppy disk drives — or an internal Winchester disk drive (to be available in early 1983)
- Two soft-sectored 5.25" floppy disk drives, each with 320 KB capacity, built-in
- High-efficiency power supply saves energy, helps computer run cooler for added life

Offers outstanding performance for everyone:

Those with little or no computer experience will appreciate the Z-100's ease of operation and the time-saving, money-saving advantages it provides. Those with programming experience and the need to use more advanced languages will enjoy our newest, most capable computer's power and versatility.

Dual microprocessors to run more advanced software: To run today's higher-speed, higher-performance 16-bit software programs, you need a Z-100 Series Computer. Its advanced 8088 microprocessor makes a significant difference by processing information in great detail with astonishing speed.

Most existing programs won't become obsolete, either, because the Z-100 also handles 8-bit software programs with an 8085 microprocessor — including many current Heath/Zenith software programs.

Many software programs now available from Heath/Zenith: You can obtain both 16-bit and 8-bit software programs to run on your Z-100 Series Computer. The 16-bit programs, including the Z-DOS Operating System, Z-BASIC Color Language and Microsoft Multiplan Electronic Spreadsheet, are shown on page 67. Software for the Z-100's 8-bit side is described on pages 67 and 74-77.

Has 128K bytes of Random Access Memory to handle larger software programs: With the Z-100 Series Computers, you get real power to answer those bigger, more comprehensive questions. Its standard 128K RAM complement is expandable to over three-fourths of a megabyte (768K bytes) — compared to a 64K RAM standard for many desktop computers.

Supports video graphics for beautiful presentations: The Z-100 gives you everything needed to support the high-impact graphics capability that many business presentations demand. On the Z-100's 640 x 225 pixel video screen you can create extensive charts, graphs and symbols for reports and other documents.

Designed to grow as your computing needs grow: There are card slots available internally in the Z-100, allowing the system to support memory expansion and additional peripheral devices as your needs change. This allows your investment to grow, decreases the chance of obsolescence and increases future upgradability of the system.

Three input/output ports for total communications flexibility: The Z-100 lets you access a world of information. Two RS-232C Serial ports and one parallel interface port provide almost limitless communications capabilities. You can plug in dot matrix and letter-quality printers; using a modem and a tele-

66/COMPUTERS



1

phone, you can communicate with other computers, word processors, bulletin boards, data banks, industry standard printers and a host of other data communications devices.

Dual high capacity disk drives: Two 5.25" floppy disk drives, each with 320K bytes of data storage capacity, eliminate the need for an external disk drive. You get faster access speed and real portability.

Add most any optional 8-inch floppy disk drive: The Z-100 Series Computers' standard disk controller can also address 8" floppy disk drives using soft-sectored disks in the IBM 3740 format.

Optional Winchester disk drive (available early 1983) provides built-in big job capacity: Replacing one of the Z-100's 5.25" floppy disk drives, the optional Winchester drive provides the multi-megabyte data storage capacity needed for large accounting, inventory or technical jobs that used to require an expensive minicomputer system.

High-efficiency power supply saves energy: With cooler and quieter operation, lower power usage makes the Z-100 more expandable, because more capability can be added within the same compact cabinet.

The quality goes in before the name goes on: Designed and built with the same quality that distinguishes all Heath/Zenith products, the Z-100 will give years of time-saving, money-saving service to your business.

All-In-One Z-100 Series Computer: Features 16-bit (8088) and 8-bit (8085) microprocessors to run both new 16-bit and most existing 8-bit Heath/Zenith software programs, a five-slot IEEE-696 (S-100) expansion chassis (disk controller occupies one slot), two built-in soft-sectored 5.25-inch disk drives for 640K on-line bytes of data storage, built-in high-resolution 12" diagonal monochrome video display, monochrome graphics with 144,000 dots, and professional keyboard — in a single housing!

Add Z-219-1 Color Video RAM (page 67) and ZVM-134 High-Resolution Color Monitor (p. 72) for color graphics capability. 120/240 VAC, 50/60 Hz, 400 Watts. 13.5" H x 19.5" W x 19.5" D (34.29 x 49.53 x 49.53 cm). Net Wt., 50 lbs.

ZF-120-22, Assembled and tested. Shpg. wt. 68 lbs. 4099.00



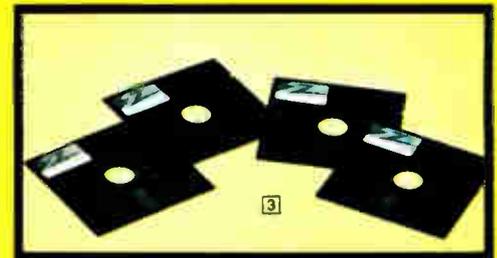
Credit Card Orders Call TOLL-FREE: 800-253-0570



2 (Shown with optional ZVM-121 High-Resolution Monochrome Video Display)



Can also be used with optional High-Resolution Color Video Display (p. 72)



3

Low-profile Z-100 Series Computer

Compact, yet powerful: Has 16-bit (8088) and 8-bit (8085) microprocessors, five industry-standard IEEE-696 (S-100) card slots, built-in 5.25-inch disk drive and more — all in a single housing under 8 inches high!

Optional accessories: Add optional ZVM-134 Color Video Display (p. 72). And for big savings on software, choose one of the two Z-100 Software Starter Packages (at right). For 120/240 VAC, 50/60 Hz power. Draws 400 Watts. Measures 7 $\frac{1}{4}$ " H x 19" W x 19 $\frac{1}{2}$ " D (18.1 x 48.26 x 49.53 cm). Net wt., 40 lbs.

2 **ZF-110-22**, Assembled Low-Profile Computer with color graphics capability (includes two Z-219-1 Video RAM Sets below), 128K bytes of user RAM (expandable to 768K bytes) and two 5.25" floppy disk drives for 640K on-line bytes of data storage, Shpg. wt. 62 lbs. **3999.00**

Z-205-1, Memory Upgrade Kit (upgrades Z-100 Series Computers from 128K bytes to 192K bytes of RAM, Shpg. wt. 1 lb. **180.00**

Z-219-1, Color Video RAM Chip Set (two sets needed to provide ZF-100 and ZF-120 Computers with color capability), Shpg. wt 1 lb. **160.00**

Z-100 SERIES SPECIFICATIONS: DATA STORAGE: Disk Controller: Standard Z-207 Controller, supporting both 5.25" and 8" drives simultaneously. Two 320 KB 5.25" floppy disk drives standard; 8" floppy disk drives optional; optional 5 megabyte Winchester disk drive available in early 1983. **EXPANSION:** Five IEEE-696 (S-100) standard card slots available for expansion. Disk controller occupies one S-100 slot. **DISPLAY: Display Format:** 24 lines x 80 characters, plus 25th line for user information. 225 lines of 640 dots in graphics mode. **Character Set:** 128-character ASCII set, upper and lower case. **Character Type:** 8 x 9 dot character block (0.2" H x 0.1" W), definable to other values using software. **Color:** Red, green, blue, white, black, cyan, magenta and yellow. Color memory RAM standard in Z-110, optional in Z-120. **Cursor:** Blinking underline or reverse video. **Cursor Addressing:** Relative and direct. **Tab:** Eight columns, software-addressable. **Video:** Normal or reverse video, by character. **Video Output:** Z-110, RGB; Z-120, monochrome std. **KEYBOARD: General:** Sculptured, typewriter-style keyboard with 108 keys. **Numeric Keypad:** 18 keys (including cursor control keys). **Special Function Keys:** 13. **INPUT/OUTPUT PORTS: Serial I/O:** Two EIA RS-232C serial interface ports, at 110 to 38,400 baud. Accessible from rear of unit. **Modes:** Asynchronous full- or half-duplex; synchronous. **Parallel I/O:** Centronics-compatible printer port with a 25-pin D connector.

3 Software for the Z-100 Series Computers

Z-100 software is supplied in soft-sectored 5.25" floppy diskette form, with operating manual included.

Z-100 16-Bit and 8-Bit Starter Package: Z-DOS and CP/M-85 Operating Systems, Microsoft BASIC/Z-BASIC Languages and Multiplan Spreadsheet.

ZSS-100-1, 26 lbs. **\$900.00 separately, ONLY 500.00**

Z-100 16-Bit Starter Package: Includes Z-DOS 16-Bit Disk Operating System, Z-BASIC Language and Multiplan Electronic Spreadsheet.

ZSS-100-2, 18 lbs. **\$575.00 separately, ONLY 350.00**

you run advanced programs (like Multiplan, Microsoft BASIC and Z-BASIC) on the Z-100. Has device-independent I/O, advanced error recovery, variable-length records, full program relocatability.

OS-63-4, Shpg. wt. 5 lbs. **150.00**

CP/M-85 8 Bit Operating System: Use of CP/M-85 on the Z-100 makes use of many current 8-bit software programs possible. Has capabilities of CP/M-80 (page 74), and features fast running speed.

OS-53-2, Shpg. wt. 5 lbs. **150.00**

Microsoft BASIC Interpreter: See page 76 for full details on this powerful programming language. Requires CP/M-85 Operating System above.

MS-253-1, Shpg. wt. 3 lbs. **175.00**

Z-BASIC Color Language: An extended version of the Microsoft BASIC Language Interpreter above. Requires Z-DOS Operating System above.

MS-463-1, Shpg. wt. 5 lbs. **175.00**

See many more Z-100-compatible software programs, including the Microsoft Multiplan 16-Bit Electronic Spreadsheet, on pages 74-77.

The Z-100 Series Computers are FCC Class A Certified for commercial use. Use of the Z-100 in residential areas may require the user to correct objectionable radio and television interference.



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

Choose an H-89 All-In-One Computer to fit your needs — and save \$496!

A complete microcomputer system in one convenient package, the H-89 All-In-One Computer includes two powerful microprocessors, a professional video terminal, a built-in 5.25-inch floppy disk drive for convenient data storage and three RS-232C Serial Interface Ports for telecommunications extensibility!

NOW AS LOW AS
\$1399⁰⁰
Kit

- 48K bytes of Random Access Memory (RAM) power standard — expandable to 64K bytes
- CP/M-capable — without modifications
- Choose from anti-glare or standard CRT screens

Two separate Z-80 microprocessors are built into the H-89: Separate microprocessors for the computer and video terminal mean they never have to share processing power — enabling the computer to process information at higher speeds.

Three RS-232C Serial Interface Ports are standard: The built-in EIA Standard Three-Port Serial Interface lets you add more peripherals (such as printers and modems) to your All-In-One Computer.

Optional disk controller increases storage capacity: The H-89's built-in 5.25-inch floppy disk drive can store up to 100K bytes of data on a single disk. With the optional Z-89-37 Soft-Sector Disk Controller Board (page 69), you can expand the built-in storage capacity to 160K bytes per disk.

If you need more storage, buy the external disk system that fits your needs:

The H-77 Floppy Disk System (shown on page 69) can provide up to 200K bytes of on-line data storage, using the H-89's standard hard-sectored disk controller board (up to 320K bytes, using the Z-89-37 Disk Controller Board). Depending on the controller board used, the H-77 can use hard- or soft-sectored disks.

The H-37 Floppy Disk System (also shown on page 69), which uses the Z-89-37 Disk Controller Board and soft-sectored 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).

Use the All-In-One as a professional video terminal (with appropriate software): It has all display functions of the H-19 Smart Video Terminal (shown on page 72). Up to twenty-four 80-character lines can be displayed on the 12" diagonal CRT screen, as well as a software-controlled 25th line.

Typewriter-format professional keyboard: Controls all terminal functions. The keyboard can display the entire ASCII character set, both upper and lower case — along with 33 graphics symbols.

Select baud rates up to 9600 through the keyboard: Control 32 functions from keyboard or computer. Direct cursor addressing lets you insert or delete characters anywhere. Use reverse video to add emphasis by reversing white on black.

H-89A SPECIFICATIONS: CPU AND MEMORY: Clock: 2.048 MHz. Memory: 8K bytes used by system for ROM and RAM; 8K reserved. **VIDEO TERMINAL: CRT:** Display Size: 6½" H x 8½" W (16.51 x 21.59 cm). Character Size: Approximately 1" s' H x 1" 10' 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. **GENERAL: Operating Temperature Range:** 50-95 F (10-35 C). **Power Requirements:** 120 240 VAC, 50 60 Hz, 90 Watts. **Dimensions:** 13" H x 17" W x 20" D (33.02 x 43.18 x 50.8 cm)

Kit and assembled products are available



Kit computer products are sold under the Heathkit name, and meet Federal Communications Commission requirements for use in residential areas.



Most of the fully assembled and tested computer products shown in the pages of this catalog are offered to you under the Zenith Data Systems name.



Calculator-format 12-key numeric pad: Makes entering arithmetic programs faster. Shifted functions give you control to make insertions or deletions.

Save when you buy the H-89 All-In-One Computer: And if you plan to use the computer for business purposes, ask your tax advisor about possible tax credits which could provide additional savings.

SAVE \$496 on H-89 Computer Kits: With 48K RAM, 100 KB disk drive, single-density disk controller and up to \$690 in software at no extra charge (see below).

- Heathkit Kit HS-89-2, w/anti-glare green CRT,**
Shpg. wt. 96 lbs. **Was \$1925.00, NOW ONLY 1429.00**
- Heathkit Kit HS-89-3, w/standard white CRT,**
Shpg. wt. 96 lbs. **Was \$1895.00, NOW ONLY 1399.00**

Get software at no extra charge!

Choose three of these programs when you buy an H-89: HDOS or CP/M; Microsoft BASIC Interpreter; Compiler; FORTRAN; COBOL; Magic Wand; SuperCalc. (Applies only to single-quantity purchases.)

Accessories for H/Z-89 and Z-90 Computers

- Assembled 64K RAM Expansion Kit:** Expands 48K H/Z-89s to 64K. **WH-88-16, Assembled, Shpg. wt. 1 lb. 115.00**
- 16K RAM Expansion Kit:** Expand converted H-19 Terminals, older H/Z-89 Computers in 16K increments — up to 48K bytes of RAM. **H-88-2, Shpg. wt. 1 lb. 29.00**
- Three-Port RS-232C Serial Interface:** For older H/Z-89s. **HA-88-3, Shpg. wt. 2 lbs. 150.00**
- H-88-5, Cassette Interface, 2 lbs. 49.00**
- Wire Wrapping Board w/bus connectors:** Make custom circuits. Takes 48# 16-pin sockets (54# 14-pin, others). Uses HCA-6, HCA-7 below. **Kit H-88-10, Shpg. wt. 1 lb. 30.00**
- Wire Wrapping Kit:** Wire wrapping tool, 50' wire, 200 pre-cut, pre-stripped wires (50 each in 1", 2", 3" and 4" lengths). **Kit HCA-6, Shpg. wt. 1 lb. 13.95**
- Wire Wrapping Socket Kit:** 36# 3-level sockets (14- to 40-pin). **Kit HCA-7, Shpg. wt. 1 lb. 29.95**
- Dust Cover:** Protects H/Z-89s, H/Z-19s from airborne contaminants. **HCA-5-89, Shpg. wt. 1 lb. 14.00**



Increase the disk storage capacity of your H/Z-89 or Z-90 Computer

Add up to 1.28 megabytes of on-line disk storage: Designed especially for use with the H/Z-89 and Z-90 Computers, these external floppy disk systems give you even more flexibility in configuring the amount of disk storage you need for your computer system applications.

Your choice of data storage capacity: The H-37 provides up to 1.28 megabytes of additional data storage 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 H/Z-89 or Z-90, you have room for up to three 5.25-inch disk drives on a single controller board. With multiple drives, you can mount operating system and program disks at the same time. And because these peripherals work with the H/Z-89 and Z-90, your system will work harmoniously.

Space-saving design: Each 5.25" floppy disk drive installs vertically into the durable metal cabinet, so the H-37 and H-77 systems take up less space than units with horizontally-mounted disk drives.

The H-37 features high-capacity disk drives: Its double-sided 96 tpi disk drives provide up to 6.4 times the storage capacity of our single-sided 5.25-inch drive: Store up to 640K bytes per drive – for a total capacity of up to 1.28 megabytes! For easier kitbuilding, the disk drives are assembled and tested.

Enhanced software capabilities: With the double-sided H-37's ability to store a much greater amount of data on each disk (double the capacity of single-sided 5.25-inch disk drives), you can more fully utilize most of our software programs. And many of those software packages are available on soft-sectored 5.25-inch floppy disks, compatible with the H-37. See pages 74-77 for more details on Heath Zenith soft-sectored software.

Field-proven H-77 available: Using single-sided 5.25" disk drives, this reliable data storage system is available with one or two drives – to provide up to 200K bytes of data storage (up to 320K bytes of data storage when the Z-89-37 Soft-Sectored Disk Controller Board is used).

Compatible disk controller boards: The H-77 Floppy Disk System can be run from either the H-88-1 Single-Density Controller Board (standard with H/Z-89 Computers) or the Z-89-37 Double-Density Disk Controller Board (standard with Z-90 Computers; with H/Z-89s, see below). The H-37 Floppy Disk System requires the Z-89-37 Double-Density Disk Controller Board.



Use single-sided 5.25" disk drives

Or higher-capacity double-sided drives

Designed to complement the H/Z-89, Z-90 Computers

Easy ordering method: Use the configuration and ordering charts (below, right) to order the H-37 or H-77 Floppy Disk System that's right for your H/Z-89 or Z-90 Computer System. For 120/240 VAC, 50/60 Hz power. The H-37 and H-77 Floppy Disk Systems measure 8⁵/₈" H x 8⁷/₈" W x 15" D (21.92 x 22.56 x 38.1 cm).

Disk storage accessories

Soft-Sectored Disk Controller Board for H/Z-89 Computers: Increases data storage capacity of disk drives below.

Z-89-37, Assem., 4 lbs. 299.00

Hard-Sectored Disk Controller Board for H/Z-89 Computers: Use only with H-17-1 Single-Sided Floppy Disk Drives below.

H-88-1, Assem., 3 lbs. 150.00

Double-Sided Floppy Disk Drive for H/Z-37 Disk Systems: Stores up to 640K bytes on a compatible disk. Requires Z-89-37 above.

H-17-4, Assem., 5 lbs. 550.00

Single-Sided Floppy Disk Drive for H-77/Z-87 Disk Systems: Stores up to 160K bytes per disk when used with Z-89-37, 100K when used with H-88-1 Controller Board. Also for H-88, H/Z-89 and Z-90 Computers.

H-17-1, Assem., 5 lbs. 295.00

Dust Cover: Protects H/Z-37 and H-77 Z-87 Disk Systems from airborne contaminants.

HCA-5-77, Shpg. wt. 1 lb. 14.00

Software compatibility:

Heath/Zenith software programs are available in 5.25-inch hard-sectored, 5.25-inch soft-sectored floppy disk or 8-inch soft-sectored floppy disk formats – for use with most Heath/Zenith disk systems.

H/Z-89 Computer/5.25" Disk System Configuration Chart

System Components	Hard-Sectored Disk Storage	Soft-Sectored Disk Storage	Total Disk Storage Capacity
H Z-89 (Note 1)	One 100 KB internal drive	—	100 KB
H/Z-89 (Note 1) H-77 (Note 2)	One 100 KB internal drive, one or two 100 KB external drives	—	200 or 300 KB
H Z-89 (Note 1) Z-89-37	—	One 160 KB, single-density internal drive	160 KB
H Z-89 (Note 1) Z-89-37 H-77 (Notes 2, 3)	One 100 KB internal drive	One or two 160 KB, single-density external drive	260 or 420 KB
H/Z-89 (Note 1) Z-89-37 H-37 (Notes 2,3)	One 100 KB internal drive	One or two 640 KB double-density external drives	740 KB or 1.38 MB

NOTES: (1) When ordering an HS-89, use -2 or -3 for desired CRT. (2) When ordering an HS-77 or HS-37 use -1 or -2 for desired number of drives. (3) H-37's require Z-89-37 Disk Controller.

How to order external 5.25" disk storage for H/Z-89s, Z-90s

All disk systems below require either H-88-1 Hard-Sectored Disk Controller (included with H/Z-89 or Z-89-37 Soft-Sectored Disk Controller (included with Z-90), as listed (order from right).

Drives	Storage Capacity		Order Model	Shpg. wt.	Price
	With H-88-1	With Z-89-37			
One H-17-1 Single-Sided	100K bytes	160K bytes	Kit HS-77-1	34 lbs	\$525.00
Two H-17-1 Single-Sided	200K bytes	320K bytes	Kit HS-77-2	47 lbs	\$795.00
One H-17-4 Double-Sided	—	640K bytes	Kit HS-37-1	34 lbs	\$795.00
Two H-17-4 Double-Sided	—	1.28 megabytes	Kit HS-37-2	47 lbs	\$1295.00



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COMPUTERS 69

1 H-8 Computer: Immediate plug-in flexibility at a budget-pleasing price

\$350⁰⁰

- 8080A CPU standard — powerful Z-80 CPU available separately
- Fully-buffered bus with seven plug-in positions, heavy-duty power supply
- Large software selection available

Meets today's needs — and tomorrow's, too: Put together almost any combination of plug-in memory, interfacing and accessory modules in the H-8's seven module positions. And choose from an expanding selection of peripherals and software for exceptional flexibility.

8080A CPU Card is pre-assembled for faster and easier kitbuilding: Includes 8080A micro-processor, clock, systems controller and ROM monitor. Exclusive fifty-pin fully-buffered bus provides room for memory and interfacing. Front panel keyboard for octal data entry. Nine-digit front panel readout monitors activity. Built-in speaker provides audible feedback and special effects. Efficient convection cooling allows quieter operation.

Requires 16K RAM and operating system software for normal operation.

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

Z-80 CPU Card: Includes a powerful H/Z-89-type Z-80 Central Processing Unit and all features of HA-8-B Extended Configuration Option below. NOTE: Not interchangeable with 8080A CPU Card; trade-ins not accepted.

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

HA-8-B, Extended Configuration Option with single-button boot-up (to run CP/M and/or H/Z-47 in H-8s without HA-8-6 Z-80 CPU Card). 1 lb. 29.00

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 Interrupts: Seven priority-vectorized Chassis Capacity: Seven locations on the mother circuit board for memory or interfacing cards Four memory cards, one bus expansion maximum Power Requirement: 120 240 VAC 50 60 Hz 150 Watts Overall Dimensions: 6 5 H x 16 25 W x 17 D



2 Get high data storage capacity with H-17 5.25" Floppy Disk System

\$595⁰⁰

- Up to 300k bytes of on-line data storage (using additional drives and modification kit)
- Take advantage of the hundreds of disk-based software programs available for the H-8

Includes one 100KB drive and one-blank hard-sectored 5.25-inch floppy disk. Requires H-8 with 48K RAM and operating system software (page 75).

Kit H-17, with one drive, Shpg. wt 28 lbs. 595.00

Three-Drive Modification Kit for H-17: New sheet metal and cable, fan and power supply. Requires H/WH-H-17, operating system. Drives not included.

Kit H-17-3, Shpg. wt. 10 lbs. 49.00

H-17-1, Optional Second or Third 100 KB Disk Drive, 5 lbs. 295.00

Get software at no extra charge! Choose three of these programs when you buy an H-8: HDOS or CP/M; Microsoft BASIC Interpreter, Compiler; FORTRAN; COBOL; Magic Wand; SuperCalc. (Applies only to single-quantity purchases.)

SAVE \$962 on H-8 Hobbyist/Word Processing System

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, WH-8-64 32K Memory Board, HA-8-16 16K-byte RAM expansion set, the H-8-4 Four-Port Serial Interface, the HA-8-B Extended Configuration Option, the 100K-byte H-17 Floppy Disk System and the H-19 Professional Video Terminal

SAVE ON SOFTWARE! Select three programs, from the list above, for no extra charge! Specify model numbers when ordering

HKS-85, Shpg. wt 146 lbs. 2257.00 separately. NOW ONLY 1295.00

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 Wire Wrapping Kit and HCA-7 Wire Wrapping Socket Kit 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

H-8 memory, interfacing and accessories

64K Wired Memory Board: Uses less room and power — so you can add other interfacing and accessories to your H-8 system. Has 32K RAM; expand to 48K or 64K RAM with one or two WH-8-16 Expansion Sets below.

WH-8-64, Assembled, Shpg. wt. 2 lbs. 398.00

HA-8-16, 16K Byte RAM Chip Expansion Set, Shpg. wt. 1 lb. 55.00

PAMGO ROM: Allows 1- or 3-button boot-up, instead of 10.

H-8-9, Shpg. wt. 1 lb. 7.00

Four-Port RS-232C Serial Interface: Connects H-8 to serial devices (such as printers, modems, others). One port is switch-programmable for 20 mA current loop. Software programmable baud rate. Includes modem controls, DCE/DTE mode connector and WH-8-41 Adapter Cable.

Kit H-8-4, Shpg. wt. 2 lbs. 195.00

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 Printer.

Kit H-8-5, Shpg. wt. 3 lbs. 69.00

WH-8-51, Adapter Cable, Shpg. wt. 1 lb. 15.00

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

Music Synthesizer System: Connects to stereo with two shielded cables (included). True D/A converter provides excellent 27.5-3300 Hz frequency response, up to nine harmonics. Four-part harmony (voices) in stereo. Enter any song from sheet music — even if you've never read music before. Software on hard-sectored 5.25" disk. Requires 24K RAM, H-17 and terminal.

HA-8-2, Assembled, Shpg. wt. 3 lbs. 79.00



Choose standard or anti-glare CRTs with the H-19A Smart Video Terminal

\$595⁰⁰

Kit
with standard
white CRT

- Available with anti-glare green or standard white CRT screens
- Z-80 microprocessor for fast data handling
- Heavy-duty typewriter-style keyboard with separate 12-key numeric pad
- Interfaces with most standard systems; also DEC VT-52 software-compatible

Exceptional capabilities for its price: Compatible with systems using the DEC VT-52 Terminal and with other systems using an RS-232C Serial Interface, the H-19A Professional Video Terminal gives you outstanding performance. It has microprocessor intelligence for complete screen control – and it's filled with features to operate at optimum speed and efficiency.

Configure the H-19A from the keyboard – from an outside computer – or from special interior switches: 32 functions can be controlled from keyboard or computer. A 12-key numeric pad, in calculator format, makes math program entry faster and easier. Displays the entire ASCII character set, upper and lower case. Thirty-three graphics characters and eight user-function keys are also available for extra flexibility.

High-resolution video display screen: The H-19A shows 24 80-character lines (plus software-controlled 25th line). Make corrections or edit – anywhere on the screen – using direct or relative cursor addressing.

The H-19's ROM listing is available below: It helps you understand how this powerful, versatile video terminal operates – or to help you alter its personality and cursor control protocols to match those of other terminals.

Using only 45 watts of 120/240 VAC, 50/60 Hz power, the H-19A Professional Video Terminal measures 13" H x 17" W x 20" D (33.02 x 43.18 x 50.80 cm).

Professional Video Terminal with anti-glare green CRT.

Kit HS-19-2, Shpg. wt. 52 lbs. **625.00**

Professional Video Terminal with standard white CRT.

Kit HS-19-3, Shpg. wt. 52 lbs. **595.00**

Source Listings for ROM of H-19 and H-19A Video Terminals.

H-19-1, Shpg. wt. 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**



H-19A SPECIFICATIONS: Microprocessor: Zilog Z-80. 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 Controls: Up, down, left, right, home, CR, LF, back space and tab. Cursor Addressing: Relative and direct. Tab: Standard eight-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 Rate: 110 to 9600. Communications Mode: Full- or half-duplex. Parity: Even, odd and none. Compatibility: ANSI and DEC VT-52. 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.

An assembled commercial product of this type is also available. For a full description of the Zenith Data Systems Z-19 Video Terminal, send for the new Heath/Zenith Computer Catalog (see page 74 for coupon).

Low-Cost Personal Terminal for instant information in home or office



Easy to use with many no-cost features, the ZT-1 from Zenith Data Systems lets you "talk" with time-sharing services and other devices over standard telephone lines.

- Has Bell 103-compatible modem, monochrome video display
- Can also be used as an electronic typewriter – or get data printouts – with optional printer (at extra cost)

Access a world of information: Use the ZT-1 to communicate with information services or data banks, another ZT-1 or any data terminal that has a Bell 103-compatible modem. Choose from news, sports, weather, business and financial news, to catalog shopping, education and career planning, science, technology and access to powerful mainframe computer systems, such as CompuServe and the Source (at possible extra cost).

Easy to use: Built-in cues and prompts make it easy to communicate, even for a person without typing skills or computer training.

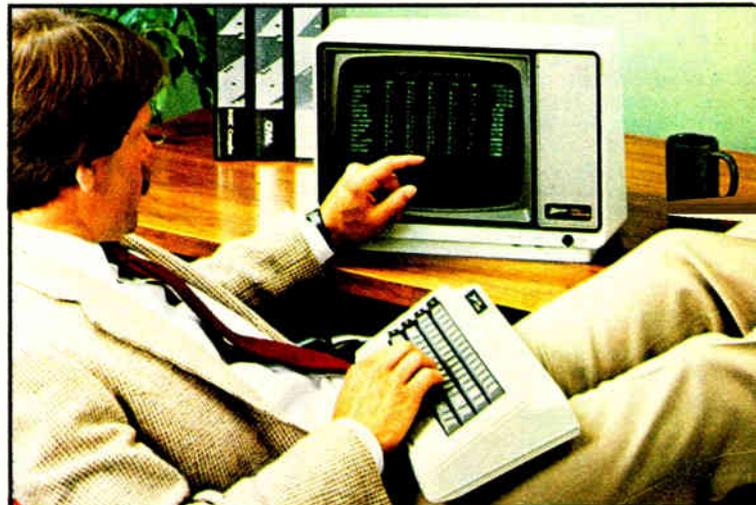
Direct-connect modem built-in: The ZT-1's Bell 103-compatible modem can automatically dial telephone numbers or answer the phone line in data mode. In voice mode, it can also act as your personal automatic telephone dialer. Its directory can store up to 26 frequently-used telephone numbers, each of which can be dialed with a single keystroke.

A 24-hour clock runs when the ZT-1 is turned on: Keep track of real time, or the elapsed time of calls to time-sharing services and/or long-distance numbers.

High-resolution Monochrome Video Display also included: The ZVM-121 displays 25 80-character lines on a bright, easy-on-the-eyes 12" diagonal green CRT.

Typewriter-style, 73-key data entry keyboard: The ZT-1's keyboard allows simple, positive entry of commands. Types a 108-character ASCII set. 120 VAC, 60 Hz. 11.75" H x 16.25" W x 12" D, not including monitor.

Order No. ZT-1, with one-button access to CompuServe, 32 lbs. **699.00**



Order No. ZT-1A, with one-button access to the Source, 32 lbs. **699.00**

ZTA-1-1, Parallel Cable to connect ZT-1 Series Terminals to Centronics-style printers (like the MX-80A), Shpg. wt. 2 lbs. **25.00**

The assembled and tested ZT-1 Information Terminal meets FCC Class B radio-frequency interference (RFI) requirements for use in homes or businesses.

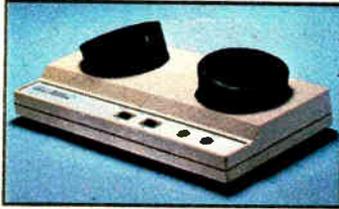


Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Use one of these high-quality modems to communicate with other computers

Versatile Acoustic Modem is ideal for any phone

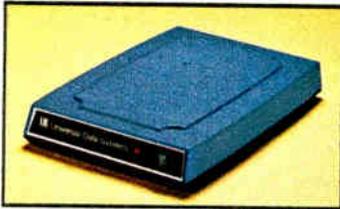
Many practical and useful applications: The economical, fully assembled Lexicon Lex-11 Acoustic Modem lets your computer talk to other computers over standard telephone lines. This stand-alone FSK (frequency shift keying) modem has selectable originate and answer modes. Operates in half-duplex or full-duplex modes. Compatible with Bell 103 modems. Two self-testing modes verify the Lex-11's capabilities. RS-232C Serial Interface included. Requires HCA-11 Cable. Powered from 120 VAC, 60 Hz line by UL- and CSA-listed AC Adapter (included). Measures 2.4" H x 10" W x 5.5" W (6.09 x 25.4 x 13.97 cm).



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

Direct-Connect Modem offers excellent quality

Offers higher data transfer quality than acoustic modems: The WH-33 Modem from Universal Data Systems uses direct connection to eliminate loss and distortion of data associated with acoustic modems. Selectable originate and answer modes. Full duplex communication to 300 baud. RS-232C Serial and TTY interfaces. Two modular phone jacks; connects to standard telephone line. Includes phone-to-modem cable. Requires HCA-11 Modem-Computer Cable and a standard single-line telephone with modular connectors. Powered by telephone line. Measures 1.13" H x 9.5" W x 6.13" L (2.87 x 24.13 x 15.57 cm).



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

Auto-dial/auto-answer Hayes Stack Smartmodem

Our best and most versatile modem: The WH-43 can automatically dial and communicate with other computer systems – or automatically answer incoming calls. Program-controlled in any language by ASCII strings. Accepts commands issued from a terminal keyboard – or under program control. Half- or full-duplex operation to 300 baud. Compatible with Bell 103 modems. Includes phone-to-modem cable. Requires HCA-11 Cable and a single-line telephone for use with terminals; for computers, serial I/O and CPS (p. 77) also required. For 120 VAC, 60 Hz power; AC adapter included. 2" H x 5.46" W x 9.53" L (5.08 x 13.86 x 24.2 cm).



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

Hayes Stack Chronograph for time-keeping

Perfect for time-sharing electronic mail and home security applications: Keep any RS-232C-compatible computer system up-to-date. Provides for timed-access, dated messages and recording elapsed on-line access time. Use with Hayes Stack Smartmodem above to send electronic mail at night, when phone rates are lowest. Quartz crystal control for precise timekeeping. 120 VAC, 60 Hz. Three 1.5 VDC "AA" cells (not included) provide battery backup during power failures. 2.6" H x 5.5" W x 9.6" D. **NOTE:** Not recommended for novice users; software interfacing not currently available from Heath/Zenith.



WH-42, Assembled and tested, Shpg. wt. 4 lbs. 249.00

Add video, color or sound to your system with these high-quality accessories

High-resolution ZVM-121 Monochrome Video Display

Use with Z-100, most popular computers: Accepts direct EIA monochrome video, gives performance comparable with higher-priced units. Green 25 x 80 CRT display is easy on the eyes, has excellent character definition. Select 40- or 80-character lines. 120 VAC. 11.75" H x 16.25" W x 12" D.



ZVM-121, Assembled in Orchard Tan, Shpg. wt. 18 lbs. 139.95

ZVM-121-Z, Assembled in Z-100 earthtone colors, 18 lbs. 139.95

Type-'N-Talk Text-to-Speech Synthesizer

Has many computers talking: Unlimited vocabulary. Built-in microprocessor has 750-character memory. Has 1-Watt, 8 ohm amplifier; speaker not included. Uses one RS-232 port at 75-9600 baud. For 120 VAC, 60 Hz power. Measures 3.1" H x 7.7" W x 5.2" D (7.87 x 19.56 x 13.21 cm). **NOTE:** Not recommended for novices at this time; needs HCA-13 Cable (see Computer Catalog) and a modified print driver.



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

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

High-resolution ZVM-134 Color Video Display

Outstanding 640 (H) x 250 (V) pixel resolution: Ideal for most systems demanding high-resolution performance, including Z-100 systems. Accepts direct RGB video inputs; displays twenty-five 80-character lines. Has 20 MHz bandwidth and 20 nS rise time for improved definition. Modular chassis uses LSI ICs extensively. Use in home or office – has UL, and CSA approvals. For 120 VAC, 60 Hz power. The ZVM-134 Color Display Measures 13.5" H x 20" W x 15" D (34.29 x 50.8 x 38.1 cm).



ZVM-134, Assembled and tested, Shpg. wt. 36 lbs., Avail. Dec. 699.00

Color Video Display for computers, VCRs, cameras

Accepts direct NTSC composite video: Modulation interference is eliminated. This 13" diagonal display uses fully automatic color processing for a stable picture. An audio amplifier and speaker are built-in. Has 75-ohm RCA-type phone jack for video input, miniature phone jack for Hi-Z audio input. UL and CSA listed; meets requirements of 21 CFR, Subchapter J for X-radiation. For 120 VAC, 60 Hz power. Measures 14" H x 20.25" W x 14.75" D (35.56 x 51.44 x 37.47 cm).



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

The Heath/Zenith 25 Dot Matrix Line Printer Features uncommon speed and quiet — available in colors to match H/Z-89 or Z-100 Computers

\$899⁰⁰
Kit

- Our fastest printer — over 150 characters/second
- 33 graphics characters — compatible with most Heath/Zenith computers and terminals

We've packed the latest state-of-the-art features into the 25: You get faster speed, versatile paper handling facilities, quiet operation and rugged construction — all at an affordable cost. This bi-directional printer can output over 150 characters per second — translating into up to 300 lines per minute (with 10-column lines), or 65 lines per minute (with 132-column lines).

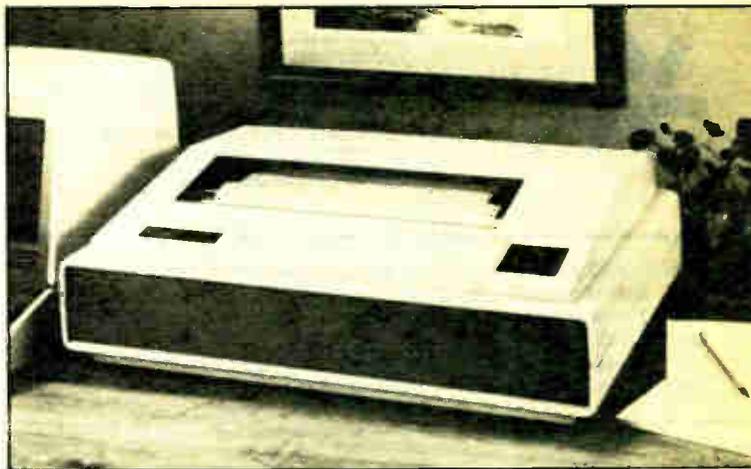
Quiet printing: A specially-designed cabinet completely encloses the 25's printing mechanisms, reducing home or office sound levels.

Full printing capability: The 25 can print the full 96-character ASCII set (upper and lower case, with descenders and underlining). It can also print the block graphics characters (except reverse video) provided with most Heath/Zenith computers and terminals.

Has quad tractor feeds with adjustable width: This allows the printer to handle standard edge-punched, single or multiple forms (up to six parts thick) fan-fold paper. The 25's extended-life ribbon cartridges "plug in" for fast and easy no-mess replacement.

Features variable pitch (10, 12, 13.2, or 16.5 characters per inch): This allows the 25 to print up to 222 characters per line (at 16.5 cpi on a 13.5-inch wide line). Six or eight lines per inch vertical spacing is available. Horizontal and vertical tabs are adjustable.

Interfaces to most computers and terminals: Communication occurs via an RS-232C Serial Interface or a 20 mA current loop, with handshaking adjustable by reverse channel and busy control signals. Communication speeds are adjustable from 110 to 9600 baud.



More extra-value features! A "paper out" indicator, "jammed" indicator and self-testing capabilities are included. For 120/240 VAC, 50/60 Hz power. Measures 8.25" H x 26.5" W x 18.5" D.

Kit H-25, Printer in H/Z-89 colors, Shpg. wt. 85 lbs. 899.00

Z-25, Assembled Printer in H/Z-89 colors, 82 lbs. 1499.00

Z-125, Assembled Printer in Z-100 colors, 82 lbs. 1499.00



Affordable MX-80A Dot Matrix Printer with graphics

Bi-directional printer has advanced features for maximized throughput

Now printing an expanded cast of graphics characters: Including subscripts, superscripts, italics, underlining and 64 other block graphics characters. The MX-80A, which outperforms many printers costing a lot more, can also reproduce the full 96-character ASCII set.

Throughputs a fast 46 lines per minute (using 80-character lines): Choose from 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.

Includes paper tray, one ribbon: Communicates with Heath/Zenith computers via MX-80-3 Interface below (needs HCA-10 Cable, see computer catalog), or the Z-89-11 I/O Board (p. 69; needs HCA-14 Cable, see computer catalog). Centronics-style 8-bit parallel interface for use with ZT-1 Terminal (HCA-14 needed). 120 VAC. 4.2" H x 14.7" W x 12" D.

MX-80A, Assembled Printer, Shpg. wt. 17 lbs. 545.00

MX-80-3, Buffered RS-232C Serial Interface, 1 lb. 135.00

MX-80-4, ROM Set to add extended graphics set to MX-80s (not for use with MX-80-2), Shpg. wt. 2 lbs. 60.00

Diablo Printer for word processing systems

Ideal for applications requiring letter-quality printing: The WH-54 combines the latest in microelectronic technology (eliminating most field adjustments) with a field-proven daisy wheel printing mechanism.

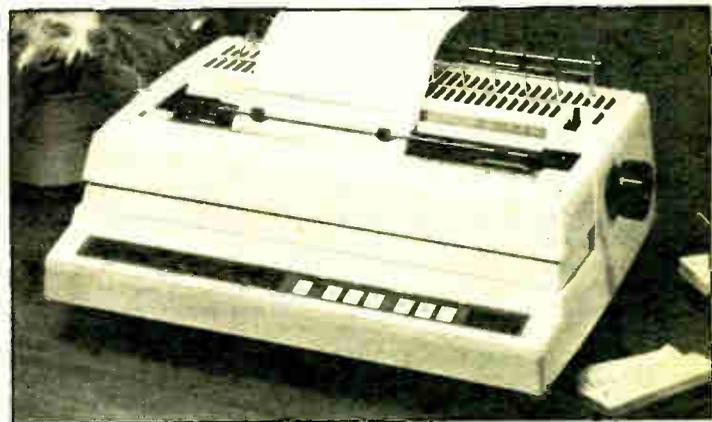
Uses metal and plastic Diablo print wheels, with complete interchangeability: This allows use of durable metal print wheels in high-production applications.

Uses efficient bi-directional printing: Prints up to 35-40 characters per second. RS-232C Serial interface (compatible with Bell 102, 113, 212 and equivalent modems) and 768-byte print buffer run at 110-1200 baud.

Versatile: Prints entire 96-character ASCII set (upper and lower case) on forms up to 15.5 inches (39.3 cm) wide. Forms up to 27/1000 inch (0.0686 cm) thick can be accommodated with a single adjustment.

Includes: Friction platen, power supply, operator control panel, HCS-22 Print Wheel (Elite 12 with unslashed zero) and HCS-51 Film Ribbon. For 120/240 VAC, 50/60 Hz power. 9.25" H x 23.5" W x 15.75" D (23.49 x 59.69 x 40 cm).

WH-54, Assembled Printer, Shpg. wt. 70 lbs., Motor Freight 2295.00



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HUG makes your Heath/Zenith computer even more powerful with its 700-program software library



- Access to the HUG Software Library's over 700 low-cost programs
- A one-year subscription to HUG's information-packed REMark magazine
- Participate in REMark's interactive forum with other HUG members
- On-line bulletin board available

Send to: HUG Membership, Hilltop Road, St. Joseph, MI 49085.

Yes, I want to become a member of HUG and keep up to date on the latest Heath/Zenith microcomputer developments, while I increase my utility and applications software library.

I've enclosed \$ _____ (U.S. Funds only) to cover the cost of my membership. NOTE: No charge orders or billings are accepted.

Name _____

Address _____

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Signature _____

- 1. Access to the HUG Software Library:** A constantly updated and expanded collection of programs, subroutines and procedures written by members.
- 2. The HUG Software Library Catalog:** Listing each program by name, description, language, version, hardware and software required.
- 3. A one-year subscription to REMark Magazine (mailed monthly):** This exclusive periodical contains reviews of new Heath/Zenith computer products – and also serves as an open forum, where members of HUG can share new hardware modifications, software enhancements, applications programs and other ideas.
- 4. One of the top users' group bulletin boards in the world:** The HUG Bulletin Board has the latest news on Heath/Zenith computers and HUG activities. All you need is a HUG membership, a modem program and a MicroNet time-sharing membership.
- 5. A vinyl-covered, three-ring HUG binder:** Contains the HUG Handbook, with hints on how to make the most of your membership (some local users' groups have been formed to increase membership benefits). Use this binder to store software documentation, REMark and other materials.
- 6. The official HUG Identification Card:** Your ticket to HUG benefits.

You'll find a HUG application enclosed with each Heath computer; Z-89 computers come with a one-year HUG membership at no extra charge! If you don't own a Heath/Zenith computer, fill out and return the form below.

	HUG Membership Rates (per year, in U.S. Funds)		
	U.S.	Canada/Mexico	International
New Members:	\$18	\$20	\$28
Renewal:	\$15	\$17	\$22

HEATH/ZENITH COMPUTER CATALOG COUPON!

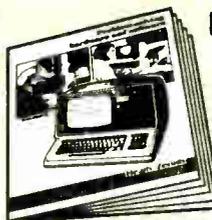
MAIL TO: Heath Company, Dept. 300-859
Benton Harbor, MI 49022

FREE

Name _____

Address _____ Apt. No. _____

City _____ State _____ Zip _____



36 full-color, full-size pages

New Heath/Zenith Computer Catalog!

The complete line of computer products from your strong partner: Our complete line of reliable, low-cost 8- and 16-bit microcomputers is led by the new Z Machine! And an outstanding selection of easy-to-use, problem-solving software solutions is available.

Get your copy today: The free Heath/Zenith Computer Catalog is available at your nearby Heathkit Electronic Center (see the store list on pages 52-53 and 57) – or mail the coupon at left.

SOFTWARE SUBLICENSE GRANT FOR MICROSOFT AND PEACHTREE PRODUCTS

(Check all boxes which apply, sign and return to HEATH COMPANY (HEATH). Another Sublicense Grant form must be used with each future SOFTWARE order.)

- | | |
|--|---|
| <input type="checkbox"/> Microsoft Z-DOS Operating System | <input type="checkbox"/> Peachtree General Ledger |
| <input type="checkbox"/> Microsoft Z-BASIC Color Interpreter | <input type="checkbox"/> Peachtree Accounts Payable |
| <input type="checkbox"/> Microsoft BASIC Compiler | <input type="checkbox"/> Peachtree Accounts Receivable |
| <input type="checkbox"/> Microsoft BASIC Interpreter | <input type="checkbox"/> Peachtree Inventory Management |
| <input type="checkbox"/> Microsoft COBOL | <input type="checkbox"/> Peachtree Sales Invoicing |
| <input type="checkbox"/> Microsoft FORTRAN | <input type="checkbox"/> Peachtree Property Management |
| <input type="checkbox"/> Microsoft MACRO-80 | <input type="checkbox"/> Peachtree CPA General Ledger |

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CP/M SERIAL NUMBER _____

(If you are purchasing CP/M on this order, HEATH will enter the serial number.)

HEATH COMPANY
BY _____ *Jay H. Janett*

ACCEPTED AND AGREED:
CUSTOMER'S SIGNATURE _____ DATE _____



Heath/Zenith has easy-to-use software solutions for your business and home needs

Heath/Zenith offers quality software: Everyone promises to fill your needs — but you know to be certain things are right, you have to be involved. No one knows your needs as well as you. And no one else truly understands your problems. That's why Heath/Zenith, your strong partner, offers many software packages — versatile, easy-to-use solutions.

For greatest ease of use, many of these solutions are menu-driven — and utilize easy-to-understand English-like commands.

A wide variety of software solutions are listed here — including operating systems, programming languages, utility and applications programs, and the Heath User's Group software library. For an even greater selection of problem-solving, fill out the coupon on page 74 and send for the FREE Heath/Zenith computer catalog.



OPERATING SYSTEMS SOFTWARE

Industry standard CP/M Operating System

- Over 200,000 microcomputer owners use CP/M
- Provides common hardware interface with flexibility

Features: 8-bit industry standard CP/M. Version 2.2, opens the door to more languages, utilities and applications software programs than any other 8-bit microcomputer disk operating system. This transportable system frees the user from having to understand the details of hardware.

File and disk management: CP/M has fully dynamic named-file allocation, program and peripheral output control and random or sequential data access. Distinct programs can be stored in both source and machine-executable form. The Basic Input/Output System (BIOS) provides operations to access disk drives and interface peripherals. BDOS minimizes head movement and wear when accessing a file. Console Command Processor (CCP) has five commands which control input and output of programs.

Utilities: Has two-pass assembler, general-purpose editor, advanced 8080 debugger, file dump and copy between devices, system generation/relocation and file size/disk usage displays.

Support, requirements: Requires H-8/H-19, H/Z-89 or Z-90 with 48K RAM and one disk drive (two disk drives are highly recommended). H-8 systems also require HA-8-8 Extended Configuration Option or HA-8-6 Z-80 CPU Card.

Related educational course: EC-1120 CP/M Course on page 78.

H0S-8917-2, on hard-sectored 5.25" disk, 5 lbs. 150.00
H0S-8937-2, on soft-sectored 5.25" disk, 5 lbs. 150.00

HDOS has many functions of larger systems

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

Provides complete operating environment: The Heath Disk Operating System (HDOS), Version 2.0, is a sophisticated library of programs and utilities which allows program writing, editing and storage.

Built-in languages: Extended Benton Harbor BASIC (Ver. 6.0) is a conversational programming languages using simple English statements and familiar math equations to perform operations and solve problems. ASM 8080 Assembly Language is a two-pass absolute assembler with a cross-reference feature which assembles source programs into listings and object programs, in executable binary format.

Built-in utilities: HDOS includes 17 versatile commands which list content, manipulate disks and files; run programs, select device driver options, display status reports and more. Facilities test disk drives and media; initialize disks and generate system images onto disks; copy programs on systems with a single disk drive; allow you to debug programs and edit text.

Hardware and software requirements: Supports all disk systems except Z-67. Requires H-8/H-19 or H/Z-89 with 48K RAM and one disk drive. Two drives are recommended, and may be required to use some other software.

H0S-817-1, on hard-sectored 5.25" disk. Shpg. wt. 9 lbs. 150.00

PLANNING/MODELING SOFTWARE

Outstanding Multiplan 16-Bit Electronic Spreadsheet



- Helps you do corporate budgeting, make product planning and sales decisions, plan investments, formulate a family budget...and more

An aid for both business and personal needs: Multiplan is one of the most powerful modeling and planning tools ever invented.

Easy to learn: You'll be surprised at how quickly and efficiently you'll accomplish various tasks with Multiplan. The two-volume manual consists of a tutorial, giving an overview of the system's features — and a detailed reference guide to those features. Working together with an on-line "Help" key, they'll teach you Multiplan's concepts and uses.

Versatile capabilities: With Multiplan, you can formulate worksheets up to 63 columns wide by 255 rows deep. Cells, rows and columns can be inserted, deleted or moved to another location on the spreadsheet. Enter numbers, formulas or text — numbers from 0.1 x 10(-63) to 9.999999999999999 x 10(-62), and text up to 150 characters per cell, with the ability to concatenate and use percentages.

To help answer those "what if?" and "now what?" questions, Multiplan displays proposed responses to commands and formulas you enter — you decide whether to proceed. Data can also be sorted by column or row — handy when you want to arrange figures from highest to lowest, or in alphabetical order.

You get full file management capabilities: You can even make one or several spreadsheets dependent on a master spreadsheet — perfect for corporate/departmental budgets. And with Multiplan's unique Symbolic Link File Format, you can exchange information between spreadsheets and other applications programs.

Minimum hardware and software requirements: Multiplan requires a Z-100 series computer, a video display and the Z-DOS (MS-DOS) Operating System (page 67).

MS-463-7, on soft-sectored 5.25" floppy disk. Shpg. wt. 6 lbs. 250.00

Turn your computer into a versatile electronic spreadsheet with SuperCalc

- Helps planners make better use of time and energy
- Easy-to-read, easy-to-use spreadsheet format

Pencils, paper and a calculator have been replaced: Use SuperCalc to help answer those "what if?" and "now what?" questions. More versatile than many similar packages, you can examine and alter numbers and text within a 63-column by 254-row matrix. Requires H-8/H-19 or H/Z-89 with 48K bytes of RAM, one disk drive and CP/M. If printouts are desired, a printer is also required.

HSC-817-1, on hard-sectored 5.25" floppy disk. Shpg. wt. 2 lbs. 295.00

HSC-837-1, on soft-sectored 5.25" floppy disk. Shpg. wt. 2 lbs. 295.00



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



PROGRAMMING LANGUAGES

Available on both hard-sectored and soft-sectored floppy disks, these programming languages allow you to write computer programs with surprising ease. And the easy-to-read documentation supplied with each programming language makes writing and running programs even easier.

Popular, powerful Microsoft BASIC Interpreter

- This enhanced BASIC is one of the most versatile general-purpose programming languages available for microcomputers

Scores of practical utility and applications program available: MBASIC features and IF-THEN-ELSE control structure, which provides highly-structured programming capabilities. Also has direct access to CPU ports and memory locations, string and numeric constants, a full range of logical and mathematical capabilities, extended commands/statements and more.

Extensive program editing facilities: EDIT command and edit mode subcommands provide for insertion, deletion, character change and more.

All models require an H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive, HDOS or CP/M (as indicated below) and the Sublicense Grant on page 74.

H-8-21, Ver. 4.82 on hard-sectored 5.25" disk for HDOS, 4 lbs. ... 150.00

HMS-817-1, Ver. 5.21 on hard-sectored 5.25" disk for CP/M, 5 lbs. ... 175.00

HMS-837-1, Ver. 5.21 on soft-sectored 5.25" disk for CP/M, 4 lbs. ... 175.00

Microsoft FORTRAN for science and engineering

- The many extended features of this system make it comparable to FORTRAN compilers used on large mainframes, minicomputers

Write and execute powerful scientific and engineering programs: This enhanced programming system includes all features of ANSI FORTRAN X3.9-1966, except for the COMPLEX data type. Compiles up to 1200 lines per minute, in a single pass. Has routines for 32- and 64-bit floating point math. MACRO-80 Assembler to generate relocatable object modules for LINK-80, LINK-80 Linkage Editor. CREF Cross-Reference Generator for MACRO-80, LIB-80 Library Manager (CP/M versions only) to build your own libraries of relocatable modules, and two function libraries.

All models below require an H-8/H-19 or H/Z-89 system with 48K RAM, two disk drives, HDOS or CP/M (as indicated below) and the Sublicense Grant on page 74.

H-8-20, Ver. 3.35 on hard-sectored 5.25" disk for HDOS, 4 lbs. ... 175.00

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

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

MBASIC Compiler speeds general programming

Eliminate time-consuming interpretation: This single-pass compiler converts the program into machine code, the language your computer understands best — and runs fastest. Includes Microsoft BASIC's run-time library, MACRO-80 Assembler, LINK-80 Editor, CREF Cross-Reference Generator and LIB-80 Library Manager.

All models below require an H-8/H-19 or H/Z-89 system with 48K RAM, two disk drives, HDOS or CP/M (as indicated below) and the Sublicense Grant on page 74.

HMS-817-41, Ver. 5.23 on hard-sectored 5.25" disk for HDOS, 5 lbs. ... 250.00

HMS-837-41, Ver. 5.23 on soft-sectored 5.25" disk for HDOS, 5 lbs. ... 250.00

HMS-817-4, Ver. 5.23 on hard-sectored 5.25" disk for CP/M, 4 lbs. ... 250.00

HMS-837-4, Ver. 5.23 on soft-sectored 5.25" disk for CP/M, 4 lbs. ... 250.00

Program faster with MACRO-80 Assembly Language

Designed for use by sophisticated Assembly Language programmers: You get most "big computer" assembler features without sacrificing speed or memory space. Includes LINK-80 Linkage Editor, CREF Cross-Reference Generator and LIB-80 Library Manager.

All models below require an H-8/H-19 or H/Z-89 system with 48K RAM, one disk drive (two drives recommended), HDOS or CP/M and the Sublicense Grant on page 74.

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

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

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

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

Run powerful, business-oriented COBOL-80

Ideal for processing large disk files and data bases: Exceeds minimum ANSI-74 COBOL specifications, with many advanced features and modules which add power and convenience. Has specially-implemented Nucleus module — as well as Debugging, Sequential I/O, Relative I/O and Table Handling modules.

Utility programs: The MACRO-80 Relocating Assembler, LINK-80 Linkage Editor, LIB-80 Library Manager, a Microsoft COBOL Library with many special routines and useful run-time software are included.

All models below require an H-8/H-19 or H/Z-89 with 48K RAM, two disk drives, HDOS or CP/M and the Sublicense Grant on page 74. 64K RM and the H/Z-37 or commercial Z-67 Disk Systems recommended for applications involving large disk files.

HMS-817-31, Ver. 4.0 on hard-sectored 5.25" disk for HDOS, 4 lbs. ... 395.00

HMS-837-31, Ver. 4.0 on soft-sectored 5.25" disk for HDOS, 4 lbs. ... 395.00

HMS-817-3, Ver. 4.0 on hard-sectored 5.25" disk for CP/M, 5 lbs. ... 395.00

HMS-837-3, Ver. 4.0 on soft-sectored 5.25" disk for CP/M, 4 lbs. ... 395.00



WORD PROCESSING SOFTWARE

Word processing makes creation of documents faster and easier, in your home or at the office. Heath/Zenith offers two word processors — the popular and CP/M-compatible WordStar and Magic Wand packages. An automatic proofreader for Magic Wand is also available. All are now available in versions especially designed for use on the new Z-100 Series Computers!

WordStar Word Processing Software features exceptional power, CP/M compatibility

A CP/M-compatible, screen-oriented word processor with integrated printing capabilities: supports full on-screen text formatting (with automatic margination, justification and centering available on command).

Helpful hyphenation speeds 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 are automatically deleted.

Advanced capabilities supported: The WordStar program supports automatic page numbering, printing enhancements (underlining, double striking, boldfacing, strikeouts, subscripting and superscripting, 1/48" line spacing and 1/120" character pitch) and several other operator-chosen options, on printers with appropriate capabilities.

Also features print spooling: For greater efficiency (in systems with 64K RAM), you can print one file while working on a second file.

WordStar's unique "Help" system can be used during editing: Four levels of user-selectable prompting eliminates the need to refer to a manual.

Includes two versions: A pre-installed version for immediate, hassle-free use on the H/Z-89 or Z-100 with a Diablo 630 or 1640 printer — and "plain vanilla" version for customer installation with most computers and printers. A detailed operating manual is included.

Minimum hardware and software requirements: WordStar requires an H-8/H-19 or H/Z-89 with 48K RAM or a Z-100, two disk drives, a printer and CP/M or Z-DOS (see below). We recommend the WH-54 Letter-Quality Printer on page 40.

HMP-817-2, Version 2.26 on hard-sectored 5.25" disk for H-8 or H/Z-89 with CP/M-80, 2 lbs. ... 395.00

HMP-837-2, Version 2.26 on soft-sectored 5.25" disk for H/Z-89 with CP/M-80, 4 lbs. ... 395.00

MP-463-7, soft-sectored 5.25" disk for Z-100 with Z-DOS, 5 lbs. ... 395.00

Add mailing list and file merging capabilities to WordStar with MailMerge software

By adding MailMerge to WordStar, you can create personalized form letters — or store and print an entire list of mailing labels: Combine a names/addresses file with a letter text file, inserting data where variables are specified — even in mid-paragraph — to create personalized form letters with a specified salutation and closing. With MailMerge, you can use the same data file to produce both form letters and mailing labels.



MailMerge features: This program can merge data from one file to another (inserting data into text at user-designated places), print multiple copies of the same file, automatically chain-print of several files on a common disk, print a file "nesting" in another file (eight levels of nesting can be accommodated), and print raw data in an easy-to-read form.

Paragraphs are reformed automatically: This feature allows you to produce form letters that look as though each received special attention.

Minimum hardware and software requirements: MailMerge requires H-8/H-19 or H/Z-89 with 48K RAM or a Z-100, two disk drives, CP/M-80 or Z-DOS (see below), WordStar and a printer (we recommend the WH-54 Letter-Quality Printer on page 40).

HMP-817-3, HS 5.25" disk for H-8 or H/Z-89 with CP/M-80, 4 lbs. **135.00**

HMP-837-3, soft-sectored 5.25" disk for H/Z-89 CP/M-80, 4 lbs. **135.00**

MP-463-8, soft-sectored 5.25" disk for Z-100 with Z-DOS, 4 lbs. **135.00**

Magic Wand Word Processing Software combines ease of use, versatility and power

Now even more powerful and versatile: When you team Magic Wand Word Processing Software with the Magic Spell Automatic Proofreader, you get the ultimate in word processing convenience and accuracy.

This powerful word processor has sample learning exercises: Featuring EDIT and PRINT modes, Magic Wand puts excellent versatility, ease of use, power and CP/M compatibility at your fingertips.

EDIT mode features full scrolling, insertion by character or full insertion, full deletion, search/replace commands, block moves and copying of blocks, and the ability to include all or part of any pure ASCII file into the text you're editing (without leaving EDIT or affecting any of the text).

PRINT mode features printing in background (print spooling) which lets you print one file while working on another, direct command entry or the ability to imbed commands in a text file, underscoring, boldfacing, subscripting and superscripting, automatic hyphenation, proportional spacing and mail list merging, 1/20" horizontal and 1/48" vertical spacing (on capable printers).

Minimum hardware and software requirements: Magic Wand requires an H-8, H-19 or H/Z-89 with 48K RAM or a Z-100, one disk drive, CP/M-80 or Z-DOS (see below) and a printer (we recommend the WH-54 Letter-Quality Printer on page 40).

HRS-817-9, HS 5.25" disk for H-8 or H/Z-89 with CP/M-80, 3 lbs. **295.00**

HRS-837-9, soft-sectored 5.25" disk for H/Z-89 with CP/M-80, 4 lbs. **295.00**

RS-463-9, soft-sectored 5.25" disk for Z-100 with Z-DOS, 4 lbs. **295.00**

Magic Spell automatically proofreads your Magic Wand-produced documents

An automated proofreading system: Magic Spell helps you isolate spelling and typographical errors in documents produced by Magic Wand. Automated proofreading verifies the correct spelling of words in a document. Magic Spell compares each word to an internal dictionary. Magic Spell takes only seconds to check each page, and inform you of any words that don't match similar words in its dictionary – or of any words not in the dictionary.

Has distinct advantages over other proofreading systems: Magic Spell is easy to learn – even for the first-time user. Three self-instructional lessons, with many detailed exercises and examples, help you learn how to use this program. A menu-driven design lets you request all features from a single menu. You may call special "Help" displays to the screen whenever you need quick assistance.

Amazingly fast: A typical Heath/Zenith microcomputer system using double-density floppy disks can check 20 pages of text in under a minute.

Extensive dictionary capabilities: Magic Spell comes with a 20,000 word standard usage English dictionary, to which you may add a number of additional words. In addition, Magic Spell can contain multiple dictionaries. You can add or subtract dictionaries or customize a particular dictionary to meet special needs (data processing, engineering, foreign terms, insurance, legal, medical, proper names, scientific and others).

Minimum hardware, software requirements: An H/Z-89 with 32K RAM or a Z-100, one or more disk drives, CP/M-80 or Z-DOS (as listed below), Magic Wand and a printer. The H/WH-14, WH-24, H/Z-25, WH-36, WH-44 or WH-54 printers will work with Magic Spell; we recommend the letter-quality WH-54 on page 40.

HIS-837-1, soft-sectored 5.25" disk for H/Z-89 with CP/M-80, 4 lbs. **295.00**

IS-463-1, soft-sectored 5.25" disk for Z-100 with Z-DOS, 4 lbs. **295.00**



SOFTSTUFF Affordable Software Tools

SOFTSTUFF products are supplied on hard-sectored 5.25" floppy disk (unless otherwise indicated), and are shipped postpaid. Please specify operating system (HDOS or CP/M) when ordering.

NEW! Periodic Table: Helps chemistry students. Teaches the 103 basic chemical elements. Two modes – study each element in detail, or take a quiz. Needs H-8/H-19 or H/Z-89 with 48K RAM and one disk drive.

SF-9021, on bootable, hard-sectored 5.25" HDOS disk. Postpaid **40.00**

NEW! Typing Tutor: Helps you learn fast, efficient touch typing. Needs H-8/H-19 or H/Z-89 with 48K RAM and one disk drive.

SF-9018, on bootable, hard-sectored 5.25" HDOS disk. Postpaid **40.00**

NEW! Vocabulary Builder: Library helps students learn English words. Needs H-8/H-19 or H/Z-89 with 48K RAM and one disk drive.

SF-9019, on bootable, hard-sectored 5.25" HDOS. Postpaid **40.00**

NEW! U.S. Presidents' Game: Learn about the men who have led the U.S. Needs H-8/H-19 or H/Z-89 with 48K RAM and one disk drive.

SF-9020, on bootable, hard-sectored 5.25" disk for HDOS. Postpaid **40.00**

Full Screen Editor: Type changes anywhere on screen; use search, block move, scroll functions. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and either HDOS or CP/M.

SF-9200, on hard-sectored 5.25" disk for HDOS and CP/M. Postpaid **50.00**

Text Formatter: Performs errorless fill and justification (straight right margin) functions on editor-prepared text. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and 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**

General Ledger II: Keeps your books up-to-date. Requires H-8/H-19 or H/Z-89 with 48K RAM, two disk drives, the HDOS Operating System and Microsoft MBASIC Interpreter (see page 45).

SF-9004, on hard-sectored 5.25" disk for HDOS. Postpaid **125.00**

Small Business Inventory Package: Helps facilitate analysis of a business' inventory. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, HDOS or CP/M Operating System Software (as listed below) and MBASIC Interpreter (page 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 Package: Stores/retrieves mailing lists, other information. Random access files. Sort and retrieve on any field. Needs H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, HDOS or CP/M (as indicated below) and MBASIC Interpreter (SF-9109 needs 64K RAM, but not MBASIC Interpreter).

SF-9009, on hard-sectored 5.25" disk for HDOS. Postpaid **40.00**

SF-9109, on hard-sectored 5.25" disk for CP/M. Postpaid **40.00**

File Converter: Transfer HDOS files to CP/M disks – and vice versa. Requires H-8/H-19 or H/Z-89 with 48K RAM and two disk drives.

SF-8512, on hard-sectored 5.25" disk for HDOS and CP/M. Postpaid **30.00**

Computerized Phone System (CPS): Allows H-8, H/Z-89 and Z-100 to communicate with other computers and time-sharing systems such as MicroNet or the Source. Requires H-8/H-19, H/Z-89 with 48K RAM or Z-100 with one disk drive and HDOS, CP/M-80 or -85 (see below).

SF-9503, HS 5.25" disk for H/Z-89 w/HDOS, CP/M-80, Ppd. **40.00**

SFS-9103, on soft-sectored 5.25" disk for H/Z-89 with CP/M-80. Postpaid **40.00**

C8-253-7, on soft-sectored 5.25" disk for Z-100 with CP/M-85. Postpaid **40.00**

RTTY Communications Processor: Adds more fun to Ham radio. Send, receive data at same time. ASCII or Baudot operation. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive, RTTY hardware interface and HDOS.

SF9006, on hard-sectored 5.25" disk for HDOS. Postpaid **100.00**

RS-89 Ancestral Genealogy Software: Helps track your roots. Computes relationships, shows anniversaries. Has genealogy course. Needs H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and HDOS or CP/M (see below).

SF-9008, on hard-sectored 5.25" disk for HDOS. Postpaid **125.00**

SF-9108, on hard-sectored 5.25" disk for CP/M. Postpaid **125.00**

Mychess Computer Chess Game: Provides hours of challenging competition. Consistently beats Sargon. Nine skill levels. Requires H-8/HA-8-6/H-19 or H/Z-89 with 48K RAM, one disk drive and HDOS or CP/M.

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**

Air Traffic Controller Game: Control traffic around your own airport. Requires H-8/H-19 or H/Z-89 with 48K RAM, one disk drive and HDOS or CP/M.

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

COMPUTERS 77

Learn the industry-standard disk operating system – CP/M-80



- Use with an H-8 or H/Z-89 – or with any 8080 or Z-80 microcomputer which runs CP/M
- Self-instructional course covers all aspects of the CP/M-80 operating system in complete detail – no prior background or knowledge of Assembly Language is assumed or required
- Effective audio-visual teaching method
- Earn valuable Continuing Education Units

CP/M-80 is the industry standard disk operating system, and now, with the Heathkit/Zenith CP/M-80 Course, even first-time computer users can quickly and easily learn it.

With the CP/M-80 Course, you learn at your own pace. You start with the basics, and then build upon fact-after-fact until you are an expert. You'll think you have your very own tutor right in the room with you.

The Heathkit/Zenith CP/M-80 Course consists of a 500 page self-instructional text and five audio cassettes. In ten units, it covers CP/M-80 2.2, and earlier versions, including built-in and transient commands.

You begin with an Introduction to the CP/M-80 Operating System. Unit 1. In Unit 2, Typing CP/M commands, you'll cover the writing of basic CP/M commands – using CP/M's major control functions – and diagnosing problems from CP/M error messages. In Unit 3 you learn Built-In Commands, in Unit 4, CP/M's, Transient Programs. STAT and CONFIGUR Commands are discussed in Unit 5. Other topics include using PIP, Introduction to ED, Editing Existing Files, Advanced ED Functions and Submitting Command Files.

When you're done, you'll be able to operate CP/M-80 based applications programs and use the CP/M-80 editor to create and manipulate text files.

Learn the business language – COBOL



- Learn quickly and easily with Heathkit/Zenith's audio-tutorial method
- Covers both ANS-74 and ANS-68 versions of COBOL

COBOL is the language of business today and in the future. Because of its efficiency in manipulating large structural data files and greater productivity, it's used in accounting, inventory and other applications.

With audio-tutorial instructional methods, you'll learn COBOL quickly. Your self-instructional text is full of diagrams, tables, programs and unit tests. A set of nine audio cassettes reinforces each concept as you learn it. You'll cover the basics of encoding, input characteristics, program hierarchy, identification, environment, data and procedure divisions. Both ANS-74 and ANS-68 versions of COBOL are presented in the text.

In addition, six practice COBOL programs are included in the workbook. You can do them at specified points in the course to help expand your understanding, or wait until you've completed the entire course.

Your COBOL Course from Heathkit/Zenith also details 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.

Learn the language of business. To receive the greatest possible benefit from the Heathkit/Zenith COBOL Course, we suggest 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 CEU's. Pass the optional final exam with a 70% score.

EC-1105, Shpg. wt. 7 lbs. 149.95



NEW

Learn faster, retain more with the ECP-3803 Variable Speed Cassette Recorder

\$199.95

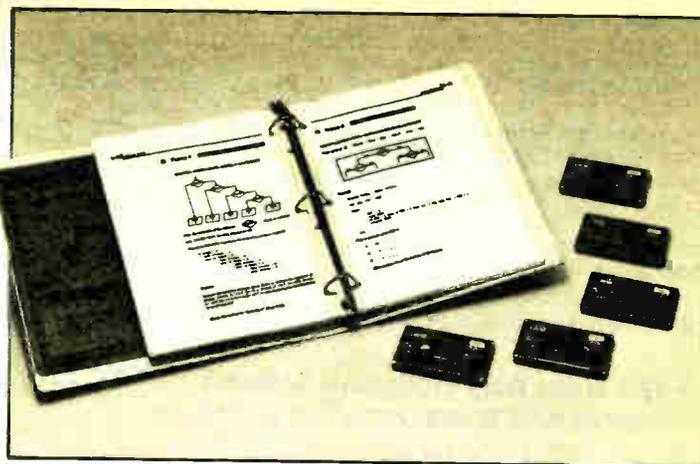
- Brings you increased concentration – leading to better comprehension and retention

Now you can truly "learn at your own pace!" Most people talk at about 150 words-per-minute, but you can listen, and understand, up to 350-words-per-minute! When you're trying to learn a complex subject, that can lead to boredom – you miss out on important ideas.

With the ECP-3803, you can listen to tapes at up to twice their normal speed – without pitch distortion!

Perfect for students. Since the voice you're listening to keeps up with your brain, you don't become bored. Because you pay better attention, you learn more. Your comprehension increases, as does your retention of what you've learned. Ideal for use with Heathkit/Zenith Audio-Tutorial courses. Dimensions, 1.88" H x 6" W x 10.5" D.

ECP-3803, Shpg. wt. 4 lbs. 199.95



The course is designed for use with an H-8/H-19 or H/Z-89 computer system with 48K bytes of RAM and the CP/M-80 Operating system. To gain full benefit from the course, we also recommend a printer.

Earn 2.5 CEU's: Pass the optional final exam with a 70% 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 BASIC – the easy-to-use language



- Learn one of the most popular programming languages – BASIC
- Heathkit/Zenith Self-Instructional Courses make it easy to learn
- Write your own programs for home or business
- Earn valuable Continuing Educational Units

Because it's so easy to use, BASIC is one of the most popular programming languages. Now through Heathkit/Zenith self-instruction, you can learn this popular language.

As always, you proceed at your own pace, step-by-step until you're familiar with all aspects of the subject at hand. You'll learn the standardized words and commands of BASIC, along with the tools of the language – numbers, statements, functions, loops, lists, arrays and strings. You'll learn to define and plan a program, format it and write it, and also adapt programs to suit your needs. You'll also undertake experiments to give you hands-on experience in writing and running BASIC programs.

In addition to your programmed instruction text and workbook, you'll receive handy reference cards with Benton Harbor BASIC statements, ASCII number codes, BASIC direct command statements and a reference chart for math and Boolean algebra operations. When you're done, you'll be able to write BASIC language programs.

Earn 3.0 CEUs: Pass the final exam with a 70% score.

See the classroom version of this course on page 43.

EC-1100, Shpg. wt. 7 lbs. 44.95

College-Level Examination. See page 31 for more information.

ECC-1100, Shpg. wt. 1 lb. 25.00



Microsoft BASIC Programming Course teaches how to write powerful, effective programs



- Learn to write and modify computer programs, using this popular version of BASIC
- Audio-tutorial course uses experiments to give you hands-on programming experience

Microsoft BASIC is one of the most versatile languages available for microcomputers. If you use MBASIC on your H-8, H/Z-89, TRS-80 or Apple computer, this 800-page course will show you how to get the most from this language.

The 12-unit course covers every aspect of Microsoft BASIC programming:

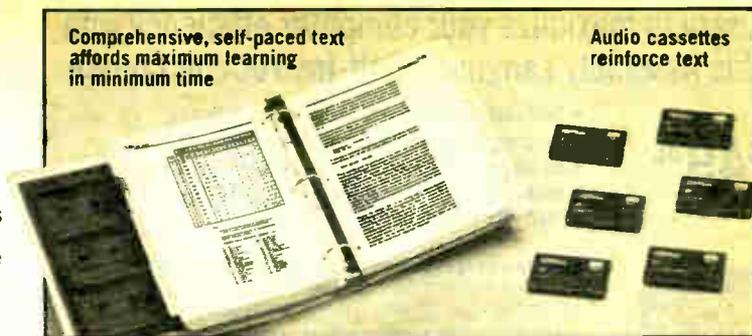
Unit 1 is an Introduction to Computers and Programming — covering computers, programs, data, the computer system and programming languages. **Immediate Mode, Unit 2**, discusses arithmetic in BASIC, numeric variables, intrinsic functions and strings. Sequences, branching and loops are covered in **Unit 3, Program Structures. Unit 4 has More about Decisions and Loops** — including relational operators, counter-driven loops and nested loops.

Data Structures — including one-dimensional arrays, N-dimensional loops and strings records — are taught in **Unit 5**. User-defined functions and subroutines are covered in **Unit 6, Subprograms. Unit 7 discusses Complex Structures** — such as logical operators, multiple branching and structured programming.

The last five units cover operations and extensions available on disk versions of MBASIC. **Major Language Extensions, Unit 8**, teaches program editing; data type extensions; extended functions, operators and statements. **Sequential Disk Operations, Unit 9**, covers program storage, program retrieval and sequential data files. **Unit 10, Random Access Disk Operation**, covers random access buffers and fields — as well as storage and retrieval of numeric data. **Error Trapping and**

Comprehensive, self-paced text affords maximum learning in minimum time

Audio cassettes reinforce text



Memory Conservation are the topics of **Unit 11. Optimization and Machine Interfacing** are covered in the final unit.

This audio-tutorial course utilizes a specially-written text and three audio cassettes, which work together for effective learning and greater retention. Experiments provide extensive hands-on programming practice.

Self-test reviews let you check progress at specified points in the course.

The features of the **Microsoft BASIC Interpreter** (described on page 76) are included, except for the TRON/TROFF debugging utility.

Upon completion, you will be able to write MBASIC programs that instruct a computer to perform specific tasks (sorting, organizing and more).

For full benefit from the course, you must have access to a computer.

To earn 5 CEUs, pass the optional final exam with a 70% or better score.

EC-1110, Shpg. wt. 7 lbs. 99.95

Learn to program in 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 five audio cassettes that work together for an integrated, effective learning experience.

When you complete this course, you'll be able to write modular Pascal programs that instruct a computer to perform specific directed tasks.

Earn 4 CEUs — pass the optional final exam with a 70% or better score.

EC-1111, Shpg. wt. 7 lbs. 99.95

FORTRAN Course teaches science/math language



- Interested in FORTRAN programming? Learn the economical, effective Heathkit/Zenith way
- Audio-tutorial presentation, hands-on programming experiments reinforce learning three ways

FORTRAN Language simplifies complicated scientific and mathematical problem-solving. Using this Heathkit/Zenith course, you'll learn FORTRAN programming fundamentals.

The 11-unit text includes a special **Introduction to Computers.**

Unit 1, Getting Started, shows you how to analyze a FORTRAN program, introduces you to statement types, elements and the character set. **Unit 2** covers **Arithmetic Operations. Elementary Input/Output (I/O)** is discussed in **Unit 3. Unit 4** covers **Library Functions. Other Control Statements** are taught in **Unit 5. Unit 6** introduces you to **Arrays. Programming Practices** are taught in **Unit 7. Unit 8** teaches other **Variables. Unit 9** teaches **Advanced Input/Output (I/O). Unit 10** covers **Subprograms. Special Input/Output (I/O)** is discussed in **Unit 11.**

This course uses the effective audio-tutorial teaching method, with a 500-page text and six cassettes working together to provide more complete learning.

Interactive hands-on experiments give you actual experience in writing FORTRAN programs — coding forms are included. The text also offers extensive practice in writing FORTRAN programs and using the character set. Self-test reviews let you check your progress at specified points throughout the course.

When you complete this course, you'll be able to write FORTRAN programs that instruct a computer to perform specific tasks.

To get the most from the course, we recommend an H-8 or H/Z-89 with 48K RAM and two disk drives. HDOS or Heath/Zenith CP/M (see page 75) and the Microsoft FORTRAN Programming System (page 76) are also recommended.

Earn 5 CEUs — pass the optional final exam with a 70% or better score.

EC-1101, Shpg. wt. 7 lbs. 99.95

Computer Dictionary is a complete reference source of computer terminology

Need a dictionary to understand computer terms? Here's a handy reference book for hobbyists, technicians, engineers, programmers and other professionals who deal with computer-related terms. The EB-1020 Computer Dictionary, from Heathkit/Zenith Educational Systems, is a complete sourcebook of computer terms.

Thousands of definitions: This dictionary contains thousands of com-

puter-related words and phrases, along with complete definitions. Definitions are made clear and explicit throughout the text.

Full of information: Browse through this dictionary and you can learn significant details about the products, procedures, problems and proliferating applications of the microcomputer revolution.

EB-1020, Shpg. wt. 2 lbs. 14.95



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

COMPUTER EDUCATION/79

Learn to maximize your computer efficiency with this Assembly Language Self-Instruction Course

\$49⁹⁵

- Self-instruction format for effective learning
- Programming exercises reinforce concepts
- Do more in less memory space than BASIC 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, 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

\$49⁹⁵

- Learn how to determine data processing requirements for your small business
- Uses field-proven self-instruction techniques
- Audio cassettes let you see and hear each concept

Thinking of buying a computer for your small business? This Course will help you select the system that fits your needs.

When you consider making a computer investment that can run into thousands of dollars, you need to know as much about computers as possible – before making the investment. The Heathkit/Zenith Computer Concepts Course is designed to give you the knowledge you need to evaluate the usefulness of a computer in your business.

Proven self-instruction methods – using an effective text and three audio cassettes – teach you how to evaluate the benefits that a computer offers your business. Three appendices to the text reinforce course material.

The course is divided into four concise, easy-to-understand units – which present computer concepts in business terms. **Unit 1 – The Computer and How It Works** – covers different types of memory, input/output devices, capabilities of different types of storage media and applications software. It explains what a computer can do in a small business environment.

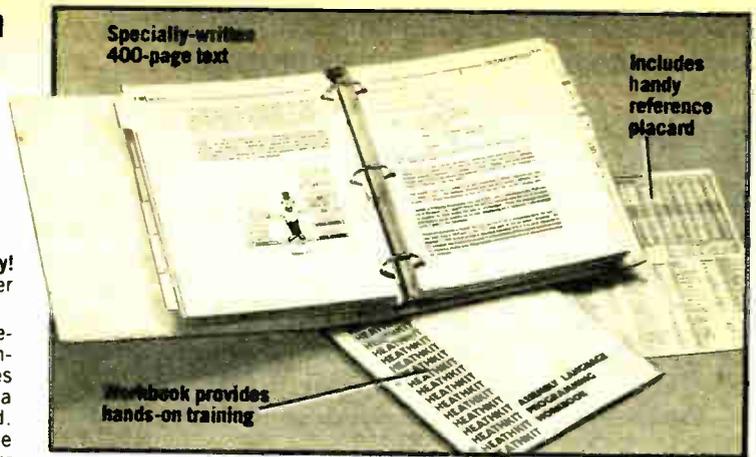
The Data Processing Department and Personnel, Unit 2, teaches you how to organize a data processing (DP) department. It explains the roles of the DP manager, data processing engineer, systems analyst, operator and other personnel. **The third unit of this Course, Alternatives in Computer Services,** compares the advantages of owning your own computer system – versus a time-sharing arrangement or using a computer service bureau.

How to Select a Computer, the fourth and final unit, shows you how to define and fulfill your data processing requirements.

A passing score of 70 percent or better on the optional final examination will earn you 1 Continuing Education Unit (CEU) and a Certificate of Achievement from Heathkit/Zenith Educational Systems.

EC-103, Shpg. wt. 5 lbs. 49.95

COMPUTER EDUCATION



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/Zenith H-8, H-88, H/Z-89, Z-90 and Z-100 computers. (The H-88, H/Z-89 and Z-90 Computers use the 8080 subset of the Z-80 microprocessor.)

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.

Credit: Earn 6.0 Continuing 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 – Assembly Language.

EC-1108, Shpg. wt. 7 lbs. 49.95

Microcomputing Course explains computers

\$39⁹⁵

- Learn how a computer can help you
- Explains computers in everyday terms, so little technical knowledge is required
- Self-instruction text, cassettes for effective learning

Here's your chance to learn the basics of microcomputers and BASIC Language programming – even if you have no prior technical background. The award-winning Heathkit/Zenith 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



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



Fast and smart — a Heathkit *Demon Dialer*™ takes the toil out of telephoning

- Remembers phone numbers for you
- Wastes no time — redials busy and unanswered numbers until you get through



\$99⁹⁵

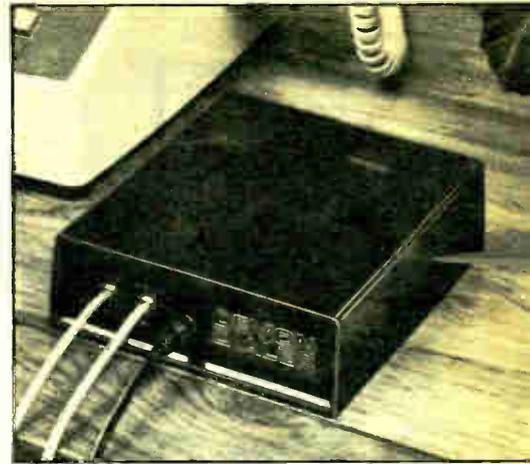
- Instantly dials MCI, Sprint and others

The *Demon Dialer* is an amazing telephonic tool with a 93-number memory that connects you faster than any other method available. Computer-controlled by an on-board CPU, it will instantly and automatically dial numbers of up to 32 digits stored under 2- to 6-digit codes you design, such as TOM, WORK, DOC, POLICE, 33, etc.

As a redial device, it has no equal. *Demon* will silently dial a busy number again and again, 10 times in the first minute, then once every two minutes for ten minutes. Incoming calls are not affected. A 'success signal' alerts you when the other party answers. If they're out, *Demon* will redial every ten minutes for up to ten hours!

The micro-computer 'directory' can be expanded quickly with one Memory Accessory to accept 176 numbers. Best of all, we provide a unique series jack which grants *Demon* power to all extensions of a single line phone. Rotary extension phones can also make use of the tone-stored code system. For metropolitan and business users, where long-distance systems such as MCI, Sprint or ITT are offered, the *Demon* will improve dialing speed and reliability by actually *detecting* access tones instead of pausing. With built-in battery backup, directory memory is good for up to a year if unplugged from AC. Constructed on a single circuit board, *Demon Dialer* is housed in a smoked-gray case you can set on your desk, hide in a drawer or wall-mount with its own self-stick bracket. This kit includes AC power cube, battery, two cables with modular plugs, an in-depth manual and a Dial Guide/List. To communicate faster, have your telephone take on a *Demon*!

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



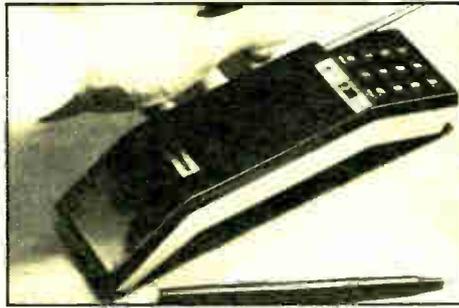
Two-way Telephone Amplifier speaks clearly for itself

\$54⁹⁵

- Answer without lifting a receiver, to save time and keep hands free
- Converse clearly with callers; be heard from up to 10 ft. away

Same time! Press the Power button to answer the phone; press it again to hang up. Voice activated circuitry instantly switches from talk to listen. A slide control adjusts listening volume and a sensitive microphone transmits clear-voiced responses. Listen button lets you monitor the line and talk privately. Requires external phone, and 9V battery. Includes 6-ft. of 4-conductor cable.

Kit GD-1112, Shpg. wt. 3 lbs. 54.95
PS-2350, AC Battery Eliminator, 1 lb. 7.95



Mura Cordless Extension Phone goes with you to make and take calls

\$139⁹⁵

- Handset works up to 750' from base unit without interference
- With owner's manual, battery charger and AC adapter

Cordless and portable, the MuraPhone 600/601 is perfect for long-range contact with full duplex conventional audio quality. Hide-away 120 VAC base unit has modular plug, RF gain control and dial-out security switch. Comfortable handset has off/standby/talk switch, low battery LED, reset and last number recall buttons, antenna and battery recharge jack. AC adapter cube keeps handset fully charged. Keeps you from missing important calls without being "glued" to the phone!

GDP-1239, Assembled, Shpg. wt. 5 lbs. ... 139.95



Pleasant Phone Ringer puts the bell out of business

\$29⁹⁵

- Two 'C' cells (not included) power it up to one year
- Styled to match any decor



Replace the harsh ring of your telephone with this unique little device and notice what a difference it makes to hear a tuneful call come in. The pre-programmed IC in this one-evening kit gives you four choices in place of the bell: a beeping signal, a four-note chime, 10 seconds of Beethoven's *Für Elise* or 20 seconds of *Romance*. Includes phone plug, 6-ft cord and remote speaker terminals. Put a tune in your telephone!

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

Turn on lights and small appliances with just a fingertip touch

\$19⁹⁵

- Sensor plate mounts anywhere for instant on/off control

Tap the sensor plate, and our Touch Control Switch turns appliances or lights on or off instantly. Takes one evening to assemble and install. No extra wall boxes or rewiring necessary — simply plug lamp or appliance into control unit, then plug unit into an AC outlet. Touch plate mounts anywhere and connects to control by easily-concealed wire. Twenty feet of wire included, or use your own for longer runs. Two



FAST, EASY
1-EVENING KIT

touchplates included with each kit — or use any ungrounded metal like door knobs or railing as sensor. Touch Control Light Switch has half-brightness feature for longer bulb life. Install them throughout your home for space-age luxury and convenience. 300 watts maximum load per unit; 150 watts per individual lamp. Convenience at your fingertips, without the expense of added wall outlets or switch wiring!

Touch Switch for TVs to 225W, fans to 18W, lamps and heaters to 300W max. Not for AM radios.

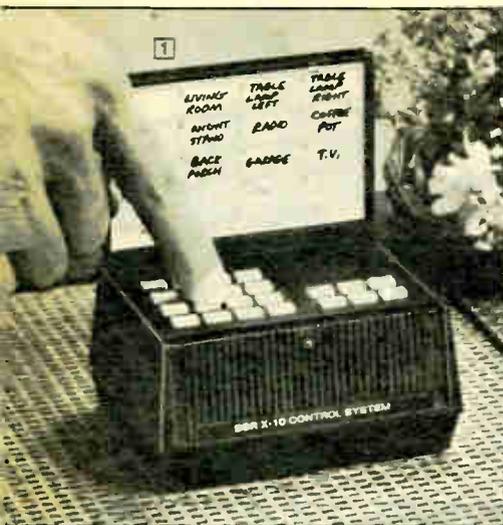
Kit GD-1287, Shpg. wt. 2 lbs. 19.95



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

HOME PRO

It's science, not fiction — pushbutton or timed control of home electronics is now a reality



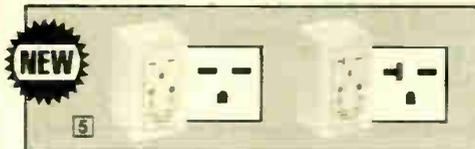
- Control 16 groups of lights or appliances
- It's easy to design your own system — extra modules add the household control you need

1 The **Controller Command Console** is simply the ultimate in home convenience! With a fingertip touch, you're in complete control by remote control, from beside the bed or wherever you plug it in. Console signals are transmitted over existing house wiring to the module of your choice. Just plug lights and appliances into the appropriate module. Use as many modules on the same code as you wish. Dim or brighten lights. Two "all lights on" and "system off" buttons provide security and savings, respectively. Very helpful to handicapped or bedridden people, too, by automating some household functions, and making others fingertip easy!

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

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

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



3 **Telephone Responder Console** is the remotest control of all. It lets you enjoy the freedom of calling from anywhere to control up to 8 groups of 120 VAC items. Includes modular phone jack.

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

4 The **Timer Command Console runs everything on time**. Automatically! Used with the modules, your home can run like clockwork, setting lights and appliances to go on and off up to twice a day, according to your family's needs and lifestyle. The possibilities are virtually unlimited! Away for the weekend? The Timer is on guard. It gives 24-hour control with a lived-in look and sound when you're gone (even simulates your movement from room to room), so nobody knows that nobody's home. Features digital clock with two levels of display brightness; Fast and Slow keys for accurate time setting; Daily, Once, and a random Security setting; Clear to erase a setting; All Lights On and All Lights Off for immediate security and control. No dimming feature. Requires 120 VAC.

GDP-1520, Assembled, Shpg. wt. 2 lbs. **64.95**



5 **NEW! Air Conditioner Module** is sold in two different 240 VAC receptacle configurations (both line cord plug-ends pictured). Order according to your type and within conditioner wattage rating. Standard plug module (left) rated for 15 A load.

GDP-1517-A, Assembled, Shpg. wt. 1 lb. **29.95**

Perpendicular-pronged module rated for 20 A load.

GDP-1517-B, Assembled, Shpg. wt. 1 lb. **29.95**

6 **Lamp Module** receives signals to turn On, Off, Dim or Brighten incandescent lamps; 300W total.

GDP-1512, Assembled, Shpg. wt. 1 lb. **15.95**

7 **Appliance Module** controls TV, stereo, coffee maker, fans, etc. Can operate lights, including self-starting fluorescents (no dimming feature). Max ratings: 15 amp resistive load; 1/2 HP motor; 500 watt lighting load; 400 watt TV/stereo load.

GDP-1514, Assembled, Shpg. wt. 1 lb. **15.95**

8 **Wall Switch Module** replaces existing switch. Operates inside or outside lights; dims them if operated by GDP-1510. 500 W maximum load.

GDP-1513, Assembled, Shpg. wt. 1 lb. **16.95**

9 **Three-Way Wall Switch Module and Companion** with independent on/off buttons controls 3-way up/downstairs switches. 500 W maximum load.

GDP-1516, Assembled, Shpg. wt. 1 lb. **21.95**

10 **Sprinkler Control Valve**; requires GDP-1514.

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

The Informer™ Ultrasonic Intrusion Alarm protects a room from trespassers

\$64.95



**FAST EASY
2-EVENING KIT**



- Book design conceals unit
- "Sees" intruders 25 feet away
- Built-in deactivation time delay

Disguised to look like a fine hardcover book, this device will protect any room in your home. Ultrasonic sound waves detect intruders up to 25 feet away, activating both a light and/or audible alarm when the field of coverage is broken. Built-in 10-second entry/exit with 30 second triggering delay can be socket-selected to provide safety lighting only, or lighting and alarm protection. Use for security purposes, or as an automatic light switch for garage, basement or attic. Solid-state circuitry. 120 VAC operation.

Shpg. wt. 5 lbs. **64.95**

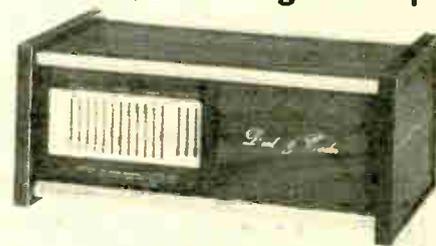
120 VAC Alarm Bell, Shpg. wt. 5 lbs. **32.95**

Automatic Telephone Dialer/Coder rings for help

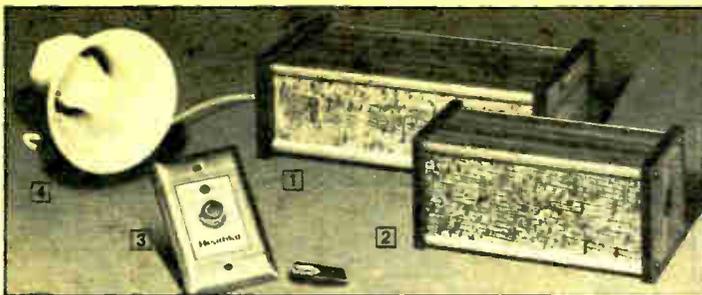
Perfect for vacation homes, warehouse areas and remote locations left unattended.

Automatically dials any number you program — police, neighbors, relatives, fire, ambulance, maintenance or answering service, etc., when triggered. Can be used with intrusion alarms, panic buttons, smoke heat detectors, or the GD-1800 Minuteman II security system. Dials any number up to 12 digits — enough for access, area code and number, anywhere in the world — and keeps dialing until it gets through! Programmable 3-digit location beep signal repeats for two minutes to let them know exactly where call originates. Separate microphone tied to phone line (with sensitivity control) monitors the area around Dialer for accessory information. Sliding front panel conceals coding switches. Includes four 9V batteries. Check with phone company for installation requirements, if any. 4.75" H x 11" W x 6" D.

Kit GD-1156, Shpg. wt. 7 lbs. **184.95**



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



Minuteman II Security System protects your home or business, day or night

- Component design offers total user flexibility to match security needs
- This famous system – now in kit form – moves with you from home to home

Protect yourself, your loved ones and your property effectively by using Delta's Minuteman II Ultrasonic Security System. It acts as a master control for expandable options, includes entry/exit delays, backup for interrupted line current and self-testing circuitry for ever-reliable operation.

① **The Ultrasonic Master Control Unit/Detector** protects up to 300 square feet with a blanket of harmless ultrasonic sound waves. When an intruder disturbs the silent reception pattern, an immediate alarm signal is activated. You can add up to three Minuteman Sentinel Detectors – along with indoor/outdoor siren speakers, key-operated on/off switches, magnetic door contacts, window foil or any other closed circuit switch. Includes plug-in power transformer. Test switch checks operating status. 120 VAC, 60 Hz. Dimensions, 3.75" H x 11" W x 6" D.

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

② **The Minuteman Remote Sentinel** offers extended protection by acting as a vigilant, ultrasonic slave to the Master Control Unit. Identical detection circuitry covers an additional 300 square feet of area. Any disruption relays the impulse instantly to Master Control for alarm activation. Doesn't require positioning near AC source. Requires GD-1800 for power and control. Order bracket below. Includes 50 feet of 4-conductor wire for connection.

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

③ **Key Switch Accessory** provides remote on/off control for Minuteman II Alarm System. Includes loop-secure LED to positively indicate armed status, along with a special pick-proof key and lock set. Requires GD-1800 for power. Professional tamper-proof feature sounds alarm if intruder attempts removal of Key Switch. Includes two keys for double security.

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

④ **Indoor-Outdoor All-Weather Alarm Speaker** produces up to 108 dB of siren noise (measured at 10'). Includes 50 feet of easily-concealed wire for connection to GD-1800 Master Control Unit/Detector. 8 ohms impedance.

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

NEW FROM HEATH! Versatile Bracket Accessory for mounting the GDA-1800-1 Minuteman II Sentinel Ultrasonic Detector/Slave Unit.

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

Eye-Spy™ Photobeam Alarm Relay detects all

For those in search of low-priced, linear security, this is a versatile, multi-purpose system. The relay circuit activates when a reflected beam is broken, to alert all concerned. Uses a narrow, incandescent beam of light to catch intruders instantly, activating 120 VAC warning devices up to 300 watts.

The Relay's intense beam is reflected back into the cabinet by a small mirror. Unit is sensitive only to its own light source. Works up to 25 feet from reflecting mirror, so relay can be inconspicuously placed in one corner and mirror placed in the other – to serve as your silent sentry. **Businessmen!** – use it to activate an intrusion alarm, signal the entrance of persons into a shop or room, or count objects passing a given point. This inexpensively convenient kit includes relay light source (shown), mirror, mounting brackets and all hardware.

Kit GD-1021, Shpg. wt. 3 lbs. **18.95**



Infra-Red Security Light Control deters criminal intruders with surprise

- Makes homes safer at night by "seeing" invisible infra-red waves and motion

This year, one out of twenty homes will be robbed, and even more will be invaded with intruders turned away before completing an actual crime. Now you can have peace of mind with the strongest outdoor safeguard against crime yet devised.

The faithful Security Lighting Control uses a passive infra-red sensor that will react instantly to body heat and movement – activating up to 500 watts of inside/outside alarm lighting to destroy the cover of darkness – before an intruder gets near your home. Six infra-red elements monitor an 875-square-foot area near your dwelling and keep it safe from dangerous intrusion.

When an illegal intruder is detected, the unit immediately shocks him with the most powerful deterrent to crime – LIGHT. The unexpected surprise will make a thief think he has been observed, and scare him to flee.

How does this revolutionary device work? Infrared light is invisible to our eyes. But its presence can be detected as heat, in the form of radiated waves of energy. The Light Control is intensely sensitive to heat energy and looks for changes in temperature with movement in a 35 foot by 25 foot field. When a warm-bodied object moves through the pattern, a relay suddenly turns on lights, or a light/alarm combination, up to 500 total watts. Lights remain on until four minutes after all movement has ceased, then go off and unit resumes silent protection. No timers, no switches, and no expensive all-night floodlights. A manual sensitivity control will adjust the temperature differential range so pets and small animals will not trigger accidental alarms.

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. There's no part-time protection at night!

Wire it yourself, or consult an electrician when connecting it to your 120 VAC, 60 Hz lighting system. It's a simple process for any do-it-yourselfer and a rewarding kit that offers high security value. 8.1" H x 5.25" W x 3" D. UL listed Assembled unit advertised elsewhere for \$199.

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

Night Sentry Timer puts timed lighting on the wall

Home security experts agree that a time-lit house is your best protection against predatory thieves. This amazing Timer actually memorizes your pattern of light use in the first 24 hours, and repeats it daily thereafter! Re-program it manually for up to 48 on/off settings per 24-hour period with built-in variability. It's also a conventional touch switch and daily use won't override a preset program. Ten minute memory for power outages. Absolutely silent – no motors or gears. Uses existing wallplate. Installs in minutes with just a screwdriver. Solid-state, microprocessor reliability, with 'soft start' feature to triple normal bulb life. 500 watt maximum load.

GDP-1236, Assembled & UL listed, Shpg. wt. 1 lb. **19.95**



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



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

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

The Groundtrack — sensitivity in any soil type

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

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

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

Kit GD-1290, Shpg. wt. 5 lbs. 217.95
 GDA-1190-1, Rechargeable Battery Pack, Shpg. wt. 2 lbs. 24.95
 GDA-1190-2, Superex Headphones, 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. 149.95
 GDA-1190-2, Superex Headphones, Shpg. wt. 2 lbs. 12.95

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

Built-in speaker lets you operate without headphones

Toggle switch for selecting Discrimination or Ground Balance modes

Headphone Jack

Pushbutton tuning and ON OFF volume control (top)

Easy-Grip handle for fatigue-free use

Fully adjustable Discrimination and Ground Balance controls

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

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

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

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

Use a Digital Scale to accurately monitor weight loss and progress to a more compelling figure

\$99⁹⁵

- Battery operated for accuracy and safety anywhere
- No-wear electronic strain-gauge mechanism sensitive to weight change as small as 1/10 of a pound or kg.

The Heathkit Digital Scale is a multi-purpose balance that offers far more accuracy than mechanical scales. Dieters and fitness enthusiasts can closely watch their weight improve, and everyone will enjoy a precision readout on items requiring accurate measurement. An electronic transducer element eliminates the springs and weights that wear out in conventional scales.

Four bright, easy-to-read 1/2" digits display the weight. You decide whether to wire the kit to read in pounds or kilograms. Features both manual and automatic modes; in manual, the display is on constantly and can measure weights as small as 2 ounces, to a 300-lb. capacity. On automatic, it conserves power by remaining off until weight is placed on the platform.

A manual zero adjustment makes it easy to weigh small items. This special offset feature means you can weigh the baby without weighing the blanket. Safe to use after the shower. Requires 6 'C' cell batteries (not included).

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

GDW-1186, Assembled and tested with non-detachable readout wired to display in pounds only, Shpg. wt. 9 lbs. **149.95**

Guests love the Programmable Musical Doorbell

\$49⁹⁵

- Program it to play up to 16 beats of your favorite tunes
- Easily programmed for your mood or any special occasion
- Includes song book with over 50 programmable melodies

Bring a little music into your everyday life with the touch of a button. Greet your friends with a tune by building this Electronic Doorbell for your home. It's a versatile and ingenious replacement for the conventional doorbell, buzzer or simple chime. Imagine the pleasant reaction and smiles on visitor's faces when they're greeted with a friendly song you've selected to fit any circumstance! It's a very uniquely warm way to say "welcome!"

Changing tunes is easy, by rearranging wire leads on a one-octave 'keyboard' behind the front panel. The songbook includes 15 college songs, 7 seasonal songs plus 9 Christmas songs, 5 to commemorate special occasions — and many more to celebrate your mood. The assembly manual has programming instructions for a variety of tunes, or compose your own. Controls for adjusting volume, tone, speed and decay characteristics add synthesized variety to any tune. Attaches easily to existing doorbell transformer. And extra speakers may be wired on to spread the music around your home. You'll even know which door to answer, as the back door button will activate only a portion of the tune you select. Extend a musical hello — and own the neighborhood's most unique chimes! Give it as a gift this Christmas and greet every caller this New Year with a new kind of musical merriment...

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

3-Tune Doorbell greets with beautiful music

\$19⁹⁵

- Can be built and easily installed in a single night
- Adjustable volume carries tune throughout your home
- The low-cost way to put a difference in your doorbell

If you want to replace your ho-hum doorbell with one that plays a tune or two, the Electronic Doorbell is a kit you'll be proud to install new, or switch with your old-fashioned ringer. The TD-2089 plays three diverse selections: an upbeat 4-note ring, a short tune (Beethoven's *Für Elise*) and a long tune (*Romance*). Each tune is reproduced polyphonically by an IC synthesizer.

Quickly select different tunes for front and back door by jumping wires to small sockets. Assembly requires almost no hardware, as the circuit board snaps firmly into the attractive case and spring clips hold the speaker. For extra sound, remote speakers can be added to extend music throughout your home. Hidden connections are made through plug-in jacks and a 10-foot extension ribbon lets you change tunes or service the unit at table level rather than on the wall. Two "C" cell batteries (not included) power the low-drain electronics while your present 10 to 16 volt doorbell transformer supplies your pushbutton circuits. Case size is 5.9" H x 4.75" W x 1.25" D. Spread the joy of music by putting a warm and classical spirit of welcome in your home...and open the door to a friendly smile every time!

Kit TD-2089, Shpg. wt. 1 lb. **WAS \$24.95, NDW ONLY 19.95**



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



Four bright 1/2" LEDs display your weight accurately year after year

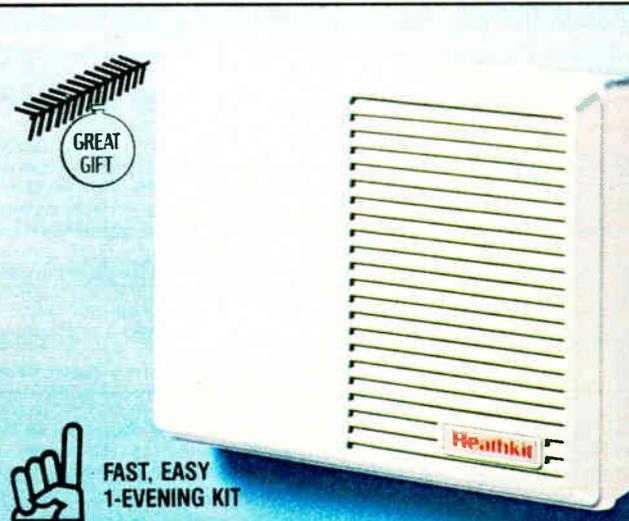
Sturdy die-cast aluminum base holds scale rock-steady

Water-resistant platform of burled-grain vinyl stands up to hard daily use

GREAT GIFT!



FAST, EASY 2-EVENING KIT



FAST, EASY 1-EVENING KIT

HOME PRODUCT

Hear *all* the audio in your collection with this unparalleled Four-Way Speaker System



- Capable of reproducing the extended dynamic range of today's very best recordings; true subwoofer module with response down to 20 Hz.
- One of the finest systems available to the purist; complementary driver characteristics produce coloration-free audio across the spectrum

If you want to enjoy the full impact of digitally-mastered and direct-to-disk recording breakthroughs, Heath's nerve-tingling 4-Way Speaker Combination System will give you the highest quality sound reproduction and the utmost in listening pleasure for your money. The System consists of two parts:

1 The AS-1321 3-Way Speaker Module features a 6.5" polypropylene mid-bass in a special subenclosure, a 2" soft dome Ferro-Fluid™ midrange and a leaf tweeter having excellent high frequency linearity. A computer-optimized 4th order crossover in the Module produces a silky smooth, natural response. Has bi-amplification provisions and automatic circuit breaker protection.

Kit AS-1321, Three-Way Speaker Module, Shpg. wt. 31 lbs. **289.95**
SAVE \$20.00! Kit AS-1324, 4-Way Speaker System, 208 lbs., Mtr. Frt. . . **569.00**
SAVE \$90.00! Purchase a pair of AS-1324 Systems. \$1179.80 separately.
 Kit AS-1324-2, Shpg. wt. 416 lbs., Motor Freight Collect **1089.80**

AS-1321 SPECIFICATIONS: 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: Special 4th Order.

2 The AS-1320 Subwoofer can be used singly or in pairs – and the cabinet can be expanded to a crowd-pleasing 4-Way System with the AS-1321 3-Way Module above. Heath's Subwoofer vastly extends the low frequency range of your system, eliminates muddy bass and kicks out a thunderous level of bonequivering bass energy. Its big 15" long-throw driver has a 2" aluminum voice coil to maintain an extended, *ultralow* linear response. Requires AS-1320-1 Passive Crossover for optimum response without a separate amplifier or AD-1702 Electronic Crossover with separate amp (pg. 86).

AS-1320, Shpg. wt. 177 lbs., Motor Freight Collect **299.95**
 AS-1320-1, Passive Crossover, Shpg. wt. 6 lbs. **44.95**
 AD-1702, Electronic Crossover, Shpg. wt. 15 lbs. **194.95**

A 3-Way System to please the most critical ear



Surround yourself with superlative sound.

- Careful design delivers superb source accuracy and wide dynamic range

Compare the specs, and price of this outstanding floor/shelf system with any other – you'll see why this is our best-selling pair. Designed for use with the best audio components, the 10" woofer provides gutsy, well-defined bass response, with a 500 Hz woofer/mid-range crossover frequency to insure smoothness and minimize IM distortion. The 4.5" midrange driver has a polyester-damped sub-enclosure to prevent woofer reflections. A 1" dome tweeter exhibits excellent power handling and definition, with full 120° horizontal dispersion at 12 kHz. Flush-mounted drivers create a sharply-focused sound image. For best stereo imaging, you can install the tweeter directly above the midrange whether you position the speakers upright or lying on their sides – a Heath exclusive! Driven to sensational sound by as little as 10 watts, a high-powered amplifier like the AA-1800 or AA-1600 (pg. 87) reveals their awesome dynamic range and three-dimensional clarity. Music takes on new meaning. Two frequency controls optimize response for your listening area. Individual driver fuses provide full overload protection. Fully assembled walnut-finish veneer cabinet.

Kit AS-1373, Shpg. wt. 68 lbs. **199.95**
Buy two! SAVE \$20.00. Kit AS-1373-2, Shpg. wt. 134 lbs. **pair 379.90**

AS-1373 SPECIFICATIONS: Frequency Response: ± 3 dB, 40 Hz to 20 kHz. Max. Amp. Power: 250 W. Crossover: 500 Hz (12 dB/octave) and 3000 Hz (12 dB/octave). Controls: 3 kHz shelf/flat; 10 kHz roll-off/flat. Dimensions: 26" H x 14½" W x 11¾" D.

Efficient, mid-priced 2-Way Bookshelf Speakers

Now you can get maximum stereo pleasure and uncommonly good sound reproduction at a modest price! Our 2-Way Reflex Speakers provide extremely high fidelity musical reproduction, yet require a comparatively low-powered amplifier for efficient response. They're ideal for small audio systems because as little as five watts of power per channel – or as much as 25 watts – will drive them to life-like clarity and sound detail. Very affordably priced, this medium-sized speaker uses an 8" woofer and 2" x 6" horn-type tweeter that can be mounted horizontally or vertically for position placement flexibility. A continuous tweeter level control lets you adjust the horn output to balance listening room acoustics. A 12 dB/octave crossover at 2500 Hz minimizes distortion and insures smooth response. With factory assembled walnut-finish cabinet and 3-dimensional grille cloth. Buy the perfect complement to your lower-power system today and discover a new meaning to stereo high fidelity!



Kit AS-1342, Shpg. wt. 32 lbs. **89.95**
SAVE \$9.95 on two! Kit AS-1342-2, Shpg. wt. 78 lbs. **pair 169.95**

AS-1342 SPECIFICATIONS: Frequency Response: ± 3 dB, 60 Hz to 14 kHz. Amplifier Power: 5 watts min. to 25 watts. Crossover: 2500 Hz (12 dB/octave). Dimensions: 22¼" H x 12" W x 10½" D.

AS-1320 SPECIFICATIONS: Freq. Response (± 3 dB): 22-500 Hz. Impedance: 8Ω. Min. Amp. Power: 30 W. Max. Amp. Power: 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.

68/174



Versatile Mono Amplifier



3.25 WATTS, MINIMUM RMS INTO 8 OHMS WITH 1.5% THD FROM 40-20,000 HZ

This solid-state kit takes a minimum 250 mV signal from source (ceramic phono, mono AM or FM tuner, tape player, microphone, etc.) and amplifies it cleanly for fuller sound. Features rear speaker terminals and input jack; front panel has volume, tone control and headphone jack. Fuse-protected 120/240 VAC @ 50/60 Hz. 8Ω match. Kit AA-18, Shpg. wt. 4 lbs. **37.95**

Dual U.L.M. turntables

- Exclusive Ultra Low Mass tonearms
- ACP-1258 has fully automatic single play/multiple play Vario-belt drive



Dual 1258 has $\pm 0.05\%$ wow/flutter, >68 dB rumble with strobe, damped-spring suspension system. ACP-1258, Assembled, Shpg. wt. 6 lbs. ... **149.95**
Dual 708Q with quartz PLL direct drive is their finest semi-automatic. Flawless with Dynavector! ACP-1708, Assembled, Shpg. wt. 20 lbs. ... **329.95**
SAVE! Dual 708Q and Dynavector Cartridge (pg. 87). Buy this advanced pair together and pocket \$40.00. Every record sounds better with ULM!
ACS-1708, Shpg. wt. 29 lbs. **599.95**

Highly-refined cartridges

New Dynavector Ruby moving-coil cartridge is acknowledged as one of the world's very finest with wide 20-50,000 Hz response and superior tracking ability. Has 0.2 mV output, >20 dB separation at 1 kHz. **SAVE** - buy this cartridge with Dual 708Q turntable described above and shown on page 87.
ADP-1370, Shpg. wt. 1 lb. **310.00**

NEW! Shure V-15 Type V with Dynamic Stabilizer has 10-28,000 Hz response, 3.2 mV output, >25 dB separation and 1.0-1.25 gm tracking force on a hyperelliptical diamond. Mfr's price: \$250.
ADP-1261, 1 lb. **199.95/with turntable 179.95**

Shure M95HE has 20-20,000 Hz response, 4.7 mV output, >25 dB separation and 0.75-1.25 gm tracking force on a hyperelliptical nude diamond. A superb cartridge. Mfr's price: \$114.
ADP-1298, 1 lb. **69.95/with turntable 59.95**



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

Home/Remote Video Recording System makes you the director

Producing the professional look and feel of high-quality home movies has never been so easy. With a Color Video Sound Camera, you can personalize your TV viewing by making video tapes with audio added simultaneously. Record on reusable cassettes that require no processing time or money. See what you're shooting by monitoring TV or the electronic viewfinder. If you don't like what you see, rewind the tape and try it again!

This compact, easy-to-use format gives faithful color reproduction and extremely high resolution. Automatic exposure and gain controls yield stable operation over a wide lighting range. Low power consumption prolongs battery life when used with a portable VCR. Includes multi-function electronic viewfinder, lens cap, earphone, input for external mic and 15-pin cable.

GRZ-1600, 9 lbs. WAS \$975.00, NOW ONLY 849.95

AC Power Supply Adapter provides 12 VDC to camera if not used with GDZ-9800. 33-ft. cable.

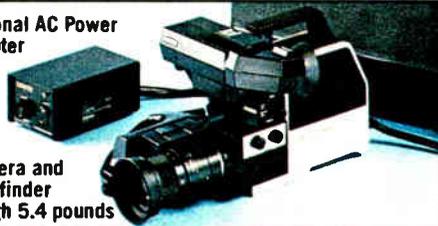
GRZ-1600-1, Shpg. wt. 8 lbs. 99.95

Carrying Case for Camera protects the investment.

GRZ-1600-2, Shpg. wt. 7 lbs. 49.95

Optional AC Power Adapter

Camera and viewfinder weigh 5.4 pounds



BIG SAVINGS!

Sensitive condenser microphone

Auto/manual iris control

Has f1.4, 11 to 70 mm 6:1 power/manual zoom and macro-focus lens

Connects directly to GDZ-9800 Portable VCR

Zenith's Beta VCR System gives you expanded technology to explore the new art of video at far-into-the-future price and performance values!

GREAT GIFT

Dual-purpose Portable Video Director frees you to create at will



- The most compact work of video technology we've ever created
- With GRZ-1600 Camera, home/remote Recorder captures your action both indoors and out
- Matching Tuner/Timer converts portable to full-featured, state-of-the-art home unit
- Infra-red Video Action Remote Control operates all record and playback functions wirelessly

Zenith's brilliant new portable VCR system is rated 'one of the very best' by several independent testing laboratories. At 11.5 pounds, including cassette and optional battery pack, the recording deck will travel anywhere you can to deliver flawless and fatigue-free Beta performance.

CLEAR frame-by-frame and multi-speed playback features let you study every aspect of a professional golfer's swing or the nuances of acting expression, virtually interference-free in Beta III.

Teamed with the optional Tuner/Timer, it will automatically record from TV and put a multitude of exciting special effects for playback and editing at your fingertips. A 14-day, 4-event programmer gathers your favorite shows for later viewing. Tuner/Timer powers the GDZ-9800 at home and

will charge the Battery Pack, OR use the 9852 to power your 9800 and recharge the batteries.

GDZ-9800, 13 lbs. WAS \$989.95, NOW ONLY 959.95
GDZ-9850, AC Tuner/Timer and wireless Remote, (needed if not purchasing GDZ-9852).
Shpg. wt. 10 lbs. **299.95**

GDZ-9851, NiCad Battery Pack, 2 lbs. 49.95

GDZ-9852, AC Power Supply, (needed if not purchasing GDZ-9850), Shpg. wt. 7 lbs. **139.95**

Zenith Video tapes

Videotapes	Beta II	Beta III	Wt.	Price
GDZ-9700-5 (L-830)	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

VIDEO AND STEREO HIGH FIDELITY/91

The telephone in a TV – a System 3 exclusive with quality 25" family-sized color picture

- Custom-installable, or with your choice of three beautifully styled cabinets. Best savings on kit/cabinet systems, like the Large Classic, at right.

A lot of your friends will buy color TV sets this year. You can build one! The outstanding value of this easy-to-build kit can be yours in as little as five fun evenings. It's a beautifully-rewarded project that will have you working with your mind while you're working with your hands.

Maximum picture sharpness is yours with a Peak Resolution Picture circuit that achieves 25% greater detail by reproducing up to 330 lines of broadcast resolution. This comb filter removes spurious, dancing color and makes picture detail 'pop out' sharp and clear. The 100% modular design means outstanding dependability and fewer interconnections, with all modules 100% pre-tested and aligned before shipping.

Like a chromatic control center in your TV set, the sophisticated *Color Sentry* combines 8 automatic picture and color sub-systems for magnificent viewing pleasure. It maintains accurate color level, tint and contrast – even adjusts the picture brightness as light changes. One button does it all for you...scene to scene, channel to channel...automatically!

A sharpness control lets you adjust the GR-2501's picture for optimum clarity. Advanced digital circuits scan and lock the broadcast signal, eliminating vertical and horizontal hold controls. No-wear, quartz electronic tuning system seeks out and fine tunes the exact frequency. Solid-state automatic fringe-lock circuitry provides superb picture stability on fringe area reception, while a phase-locked AFC Switch 'pulls in' off-frequency signals from cable or master antenna systems.

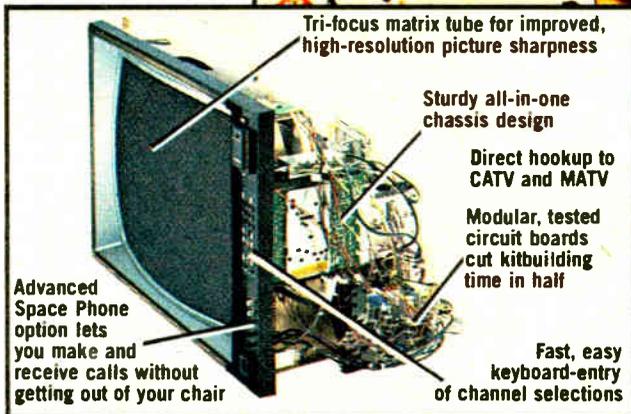
Your GR-2501 comes with Computer Space Command 3000 Remote Control for scanned or random channel selection, on/off and variable volume, display of channel with current time, plus setting the Time Programmer and using Advanced Space Phone. An easy-to-read, on-screen channel/time display appears briefly when channels are changed, or keyed from set or remote control. Expanded 112-channel capability lets you select cable stations as easily as VHF or UHF, except scrambled premium services.

Advanced Space Phone is one option worth its price in convenience alone. With it, you can take or make calls anywhere in the world. A dialed number is displayed on the TV screen, and you can program it to re-dial automatically. The set itself works like a speaker phone, so the whole family may participate in conversation, and if you don't want the caller to hear what's said in the room, there's even a Mute/Privacy button you can push.

Two 9" oval woofers and two 2½" tweeters provide rich, four-speaker FM sound to every channel, with vibrant binaural audio surrounding the picture. An output jack with tone control interfaces the TV soundtrack to your personal stereo system for the most realistic experience. Put the GR-2501's custom-installable chassis in the wall, your own cabinet, or save when purchasing your kit with one of the fine furniture cabinets below.

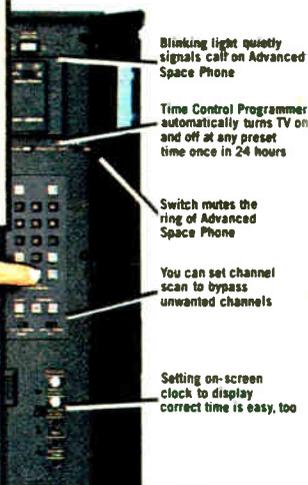
Kit GR-2501, Shpg. wt. 113 lbs. 639.95
 GRA-2501-1, Advanced Space Phone, Shpg. wt. 2 lbs. 44.95

As low as
\$679⁹⁰
 GRS-2501-1
 System only



Simulated TV pictures

Easy-to-use control panel gives you the ultimate in TV viewing convenience



NOTICE TO GR-2000 & GR-2001 OWNERS:

On December 1, 1982 Heath Company will be placing a final order for the GRA-602-25 Contemporary Cabinet. If you own a GR-2000 or GR-2001 and have not yet ordered a cabinet for it, this will be your last opportunity. For further reference, it was pictured and described on page 101 of the Fall 1982 Heathkit Catalog (#858) and in earlier editions. We will only build enough cabinets to cover orders received before December 1, 1982 so hurry to take advantage of our offer!
 GRA-602-25, 66 lbs., Motor Freight 249.95

Transitional Corner/Wall Cabinet

For the GR-2501 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. 31" H x 48" W x 17.5" D.



GRA-702-25, 114 lbs., Mtr. Frt. 189.95
 SAVE \$100.00. Cabinet with GR-2501 TV Kit.
 GRS-2501-3, 227 lbs., Mtr. Frt. 729.90

Captivating, Large Classic Cabinet

For the GR-2501 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-2501 TV Kit.
 GRS-2501-2, 249 lbs., Mtr. Frt. 729.90

Compact Classic Cabinet a value

For the GR-2501 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-2501 TV Kit.
 GRS-2501-1, 225 lbs., Mtr. Frt. 679.90



NEW

By popular demand — System 3 video realism in a 19" dia. Color Television kit

\$499⁹⁵

- The true quality difference in TV — System 3 engineering yields sharper, more detailed color imagery and a new standard in viewer convenience
- Astonishing picture fidelity heightens television appreciation



Improve TV? Yes. Expand the sense of reality you experience and enjoy it more. This space-saving tabletop model unites 19" size and spectacular new System 3 technology in a meticulous kit design you'll take great pleasure in building. *And watching!* It's the perfect TV to dramatize any room where color lovers gather to watch the world of video unfold in rainbow shades of realism.

Inside the GR-1901, you'll find circuit developments that offer enviable advantages over other color TVs. First, the Triple-Plus Chassis. Cool-running and 100% modular in design, it consists of a clean, uncluttered arrangement of modules with a minimum of interconnections. Every "complete system" module is 100% pre-tested and aligned for outstanding reliability.

Our Tri-Focus Picture Tube attracts the eye with exceptional sharpness and detail. It uses an ultra-high-resolution EFL Electron Gun with three extended focusing actions to concentrate the beam and produce a smaller spot than is possible in one-gun sets. This precise horizontal alignment brings you an increased image crispness, better highlight definition and crystalline resolution, with proper levels of color purity, tint and contrast.

A new, advanced Color Sentry corrects the picture 30 times a second. Eight essential picture and color sub-systems work together to deliver critically sharp and vivid color reproduction every time. . . . automatically!

For extra depth and presence, the amazing detail-adding PRP (Peak Resolution Picture) Circuit achieves maximum optical resolution by reproducing all 330 lines of detail being transmitted. The result: on every broadcast, the pictures come alive as never before.

GR-1901 gives you 112 UHF/VHF/CATV channel capability without an external converter (except for scrambled programs). Connect cable directly to the set, and you're in touch with 42 easily-selected cable channels.

No fine tuning needed — ever! A computer selector instantly locks on each exact frequency to keep the picture sharp and clear.

The infra-red remote unit provides direct access or channel scanning, volume up/down, muted sound, recall of on-screen channel/time display, check or activation of the pre-set Time Control Programmer and power on/off control.

The beautifully finished pedestal cabinet measures 17 $\frac{3}{8}$ " H x 26 $\frac{3}{8}$ " W x 17 $\frac{3}{8}$ " D and comes with detachable, telescoping dipole and clip-on bow-tie an-



Computer Space Command 3000 gives you full-featured control from anywhere in the room



Time Control Programmer turns set ON and OFF automatically, once within a 24-hour period



Simulated reception



Modular chassis design allows economical self-serviceability

tennas. Provisions for external UHF/VHF and matched CATV/MATV hookup are provided with switchable Normal/Special AFC

To match the performance of what you hear to the clearly superior picture you see, a 1.5 watt amplifier and an acoustically-optimized 5" speaker send richly-toned sound into every corner. For truly room-filling response, an Audio Output jack allows auxiliary connection to your hi-fidelity system. Includes earphone with 15' cord for disturbance-free listening. Heath provides the quality difference — in features, in value, in PERFORMANCE!

Put a GR-1901 together. Savor the hours of leisure achievement. Turn it on. Behold the overwhelming clarity and real-as-life image it shows off. Touch the remote control. Then settle back for improved visual entertainment . . .

Kit GR-1901, Shpg. wt. 107 lbs. **499.95**
 GRA-1901-1, Mobile TV Cart has full top and bottom shelves, solid wood rails for strength and safety. Finished in rich Walnut tone overall. Casters provide easy mobility 17 $\frac{1}{2}$ " H x 27" W x 13 $\frac{3}{8}$ " D, Shpg. wt. 10 lbs. **24.95**

NEW

\$99⁹⁵



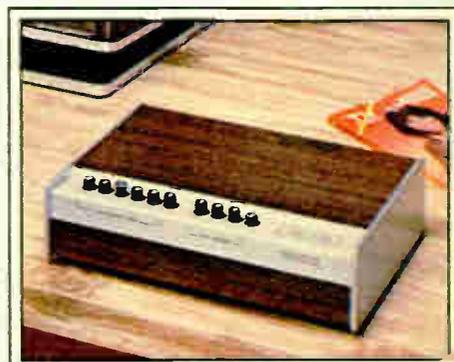
Electronic Home Video Organizer offers all-in-one convenience

- It's the versatile 'control center' for your complete home video entertainment system
- Now switch from one program source to another without ever changing cable connections

Tired of tangling with all those cables behind your TV set? Don't touch that connection — Zenith's Video Organizer ends the juggling forever! Separate input and output jacks allow complete connection of your TV and VHF or Cable antenna, pay TV decoder, VCR, disc player, game unit and home computer or auxiliary video equipment.

Ten front panel buttons permit instant selection of any one of six different program sources for immediate viewing, and any one of three sources for simultaneous recording. *You can even view one source while recording any other.* The Organizer has better than 60 dB isolation and 3.5 dB max insertion loss, excellent RF shielding to eliminate electromagnetic interference and maintain picture clarity plus pewter side panels and a walnut-grain top. Includes three 75 Ω 48' coax cables with F-type connectors, one 75 Ω VHF/300 Ω UHF Band Separator, one 75 Ω F-type barrel coupler and AC Power Adapter. Order one for more hours of uninterrupted video enjoyment!

GSZ-4500, Shpg. wt. 8 lbs. **99.95**



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

TELEVISION

Now in kit form! The Explorer™ 5" B/W TV with AM/FM radio-alarm clock is a portable playmate



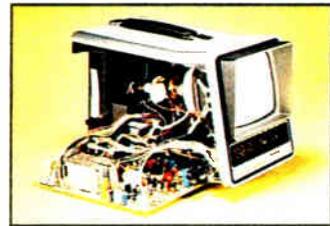
Indoors or out, this mini-marvel can provide fun for one and all — because it operates on 4 types of power: AC house current, 12-volt negative ground battery systems, six alkaline "D" cells or an optional rechargeable battery pack.

If you're the active type who spends ample time traveling with the family or just 'on the go' with friends — you'll appreciate the compact convenience and all-in-one capability of the Explorer. After an exciting two nights spent building this uncomplicated kit, it'll prove itself a versatile investment by entertaining on campouts, cartrips and in every room of the house. That's the best feature — you're not tied to one power source or a single media mode — this multiple goes wherever you go and tunes it all!

This go anywhere, do-anything portable offers everything you need to stay thoroughly entertained and informed. It features famous Zenith quality and reliability with Heathkit fun and do-it-yourself savings. You get performance and portability.

Simple, rugged and reliable ... the completely solid-state MICROMAX™ chassis provides high performance with extremely low energy usage, and consistent picture quality on every station.

All 82 VHF and UHF TV channels are at your fingertips, plus the entire AM and FM (with AFC) broadcast spectrum. A no-wear, electronic tuner and calibrated cylinder dial permit easy selection without annoying drift. The quick-on Sunshine Picture Tube brings you a full, bright picture in seconds without continuous energy drain. New narrow-neck design with high-speed electron beam produces sharp picture detail and fine highlight brightness. The built-on sunhood cuts glare and reduces reflection in strong light.



Pre-aligned modular circuit boards reduce assembly time and effort

A telescopic UHF/VHF/FM swivel aerial and internal Wavemagnet™ AM rod antenna pull in primary signals for clear, AGC audio and video reception.

The LCD quartz digital clock on the front panel is your 24-hour programmable wake-up call. Switches set the correct AM or PM time and pre-set the automatic Alarm so you can wake to pleasant electronic tone, auto-on TV or music.

One alkaline AA battery (not supplied) powers the clock for up to two years.



Available in December

Gently lull yourself into slumber with the Sleep Switch/Auto-off control which programs the set to turn itself off after 59 minutes of operation. When you awake to the 12-minute alarm, a front panel Snooze button will delay each reminder by 10 minutes for any number of naps. Accessories included with the Explorer are a detachable AC adapter unit, private listening earphone to enjoy TV or radio without disturbing other people, and a DC Car Cord for use in any car, truck or RV with 12-volt negative ground electrical systems.

Extra features include a dial light, 3 1/2" hi-fidelity speaker, provision for 300-ohm external antenna, a built-on carrying handle and durable, dent-resistant cabinet with satin silver finish. The 7.25" H x 6" W x 11" D case weighs just 6 pounds without the optional batteries — small enough to store or carry almost anywhere, yet you can enjoy its crisp, brilliant picture from several feet away. This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.

GR-5005, Shpg. wt. 12 lbs. 149.95

GRZ-5005, Assembled and tested, Shpg. wt. 9 lbs. 179.95

Rechargeable Nickel Cadmium Battery Pack, for up to 4 hrs. of TV or 40 hrs. of radio; recharges on AC in 18 hours. Built-in overcharge protection.

GRZ-5005-1, Assembled, Shpg. wt. 3 lbs. 19.95

Zenith System3 quality in a 13" color portable



Now the best Zenith ever ... is portable! This slim-line System 3 color TV features Tri-Focus Picture Tube for the sharpest image in Zenith history. Triple-Plus Chassis has modular design, fewer interconnections and is cooler-running for longer life. Color Sentry corrects the picture 30 times per second — automatically! Perma-Set fine tuning locks your adjustment for

clear picture on every UHF VHF channel thereafter. Electronic Power Sentry voltage regulator and other power-saving features conserve 25% more energy than previous model. Full-featured Space Command™ 800 Remote Control allows cross-the-room operation. Balanced color level and contrast control. Multiple electronic tuners provide positive signal reception every time. Channel numbers. Telescoping dipole VHF and clip-on bowtie antenna provided. Foldaway carrying handle for easy room-to-room transport. Satin silver finish cabinet. 120V, 60 Hz: 13.75" H x 20.1" W x 14.9" D. Assembled and tested, Shpg. wt. 44 lbs. 449.95

Zenith 9" B/W portable plays on AC/DC/Battery



Simulated pictures

New technology in this lightweight portable provides energy savings and extra versatility. An efficient, 100% solid-state chassis/picture tube combination consumes a mere 28 watts. Watch it indoors or out using AC line, 12VDC auto battery or optional battery pack (below). Quick-on Sunshine picture tube gives a full, bright image in seconds without continuous energy drain. Transistorized, 82-channel tuning provides tack-sharp picture

and highlight details with Perma-Set VHF fine tuning. Earphone, 12VDC auto adapter cord and detachable sunshield included.

GRZ-93, Assembled and tested, Shpg. wt. 14 lbs. 109.95

Rechargeable 12V Battery Pack mounts under set, recharges on house current to provide up to 4 hours playing time. Built-in overcharge safety circuit.

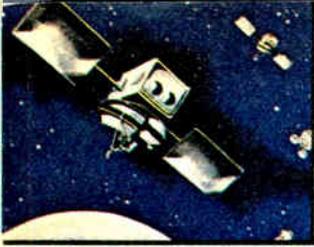
GRZ-93-1, Assembled, Shpg. wt. 9 lbs. 39.95

SAVE \$4.95! GRZ-93-S, TV and Battery Pack, Shpg. wt. 33 lbs. 144.95



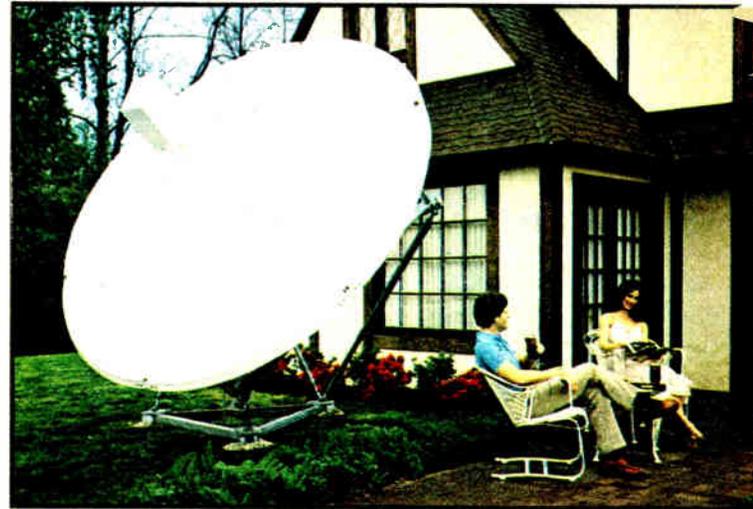
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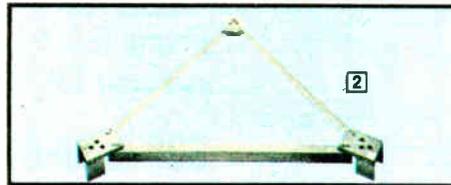
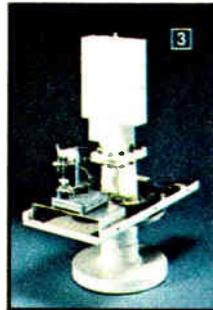
Reach for the stars — at big savings — with the Heathkit Satellite Earth Station

The complete Heathkit SRS-8100 Earth Station comes with our trademark of quality and reliability. Comparable in quality to professionally-installed earth station systems costing up to \$15,000, the SRS-8100 Earth Station System costs less than a third of that much.



Here's what sets our earth station apart from the rest:

- Put 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, specials, nightclub acts, concerts, plays and more!*
- A specially-prepared Site Survey Kit helps you determine the correct location for a satellite antenna; easy-to-follow assembly manuals and technical assistance make our earth station easy to install
- Integrated Low-Noise Amplifier/Down-Converter, Three-Meter Satellite Antenna and receiver electronics are made by Scientific-Atlanta, one of the foremost manufacturers of satellite communications equipment
- Satellite Receiver features drift-free reception, special Zenith Space Command Remote Control (a satellite TV first) and built-in LNA/Down-Converter security circuit (alarm not included)



Has built-in 12-hour (AM/PM) digital clock

Designed for clear pictures at low signal levels

Well-designed, fits in with your home's decor



Operate receiver with special remote control

Digital, stable reception of 24 satellite channels

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 Three-Meter Satellite Antenna, by Scientific-Atlanta: Made by one of the most experienced names in satellite communications, this precision-contoured dish antenna provides the gain needed for a sharp, clear picture. This heavy-duty, adjustable-mount antenna will give long, reliable performance. A rotatable feed assembly automatically rotates to the proper polarization for each channel — receive up to 24 channels from one satellite, with one feed.

2 The SRA-8100-6 Earth Foundation Kit: This enables you to anchor the 3-meter antenna in the ground, firmly enough to withstand 100 mph winds.

3 The SRA-8100-2 Integrated Low-Noise Amplifier (LNA/Down-Converter) by Scientific-Atlanta: This device 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 delivered to the satellite receiver via standard, inexpensive coaxial cable.

4 The Heathkit SRA-8100-3 Satellite Receiver Kit: This attractively-styled device has 24-channel electronic tuning for drift-free reception, a built-in memory, 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 Site Survey Kit will help you determine if your site is acceptable for installation of a Heathkit Earth Station. Or if you would like a brochure with more information, call 800-253-0570 TOLL-FREE -- or write to Heath Company.

Save on these complete Heathkit Earth Station Systems:

SAVE \$3495! SRS-8100, 120° Earth Station for most U.S. areas (has SRA-8100-2 120 LNA/Down-Converter), 866 lbs., Mtr. Frt. Was \$6995.00, NOW 3500.00

SAVE \$4145! SRS-8200, 90° Earth Station for fringe reception areas (has SRA-8100-4 LNA/Down-Converter), 866 lbs., Mtr. Frt. Was \$7995.00, NOW ONLY 3850.00

SAVE \$695! SRA-8100-5, Extender Panels for improved reception in fringe areas, 188 lbs., Mtr. Frt. Was \$795.00, NOW ONLY 100.00

The first step: the SRA-8100-10 Site Survey Kit

Helps determine whether an earth station can be installed at your site: Has computerized look angle printout for your address, compass, inclinometer and a manual explaining satellite TV and how to order our Earth Station. Available at Heathkit Electronic Centers; deduct cost of kit when you purchase a Heathkit Earth Station. Be sure to bring the address, city, state and Zip Code of your site when you come in.

Kit SRA-8100-10, Shpg. wt. 3 lbs. 14.95

*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 when 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. Local, state and foreign laws may now or in the future limit the use of this device. The customer is responsible for all applicable laws and regulations.



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HEATH CRAFT WOODWORKS

WHY WE ARE YOUR PERFECT PARTNER

For more than half a century, Heath Company has designed kits for people who want build-it-yourself quality. Every year, thousands of satisfied customers buy and build products from every line in our catalog, knowing that they are purchasing their gear from a company who will stand behind them.

For over three decades, our unique line of Amateur Radio products has created a strong partnership between Hams and Heath, the world leader in high-technology kit-form electronics. Amateurs have come to expect Heath gear to be the very finest money can buy. *It's true because our products are built by Hams. For Hams.* We're dedicated to designing equipment and accessories that can withstand the test of time. The reasons have a history we build tomorrow upon.



A LONG JOURNEY FORWARD

Looking back, the end of World War II produced more than a surplus of electronic components. It returned to civilian life a huge corps of radio-oriented veterans, many of whom joined the legions of Amateur Radio operators who had been denied use of the airwaves during the war. Because ham radio enthusiasts comprised a large part of the Heath customer base, the company soon came out with a grid dip meter, which was followed by the enormously popular AT-1 CW Transmitter kit.

The support of the Ham community led to the introduction of a wide array of Heathkit Amateur Radio products. Each new piece of gear improved on existing technology, and our trademark became synonymous with the best and most desired features in any station of operation.

A PHILOSOPHY FOR THE FUTURE

A simple philosophy echoes through the headquarters of Heath Company, located near Benton Harbor, Michigan. And it all has to do with you. It started with our founder, Edward Bayard Heath, back in the aviation era of the 1920's. A philosophy that says anyone, regardless of technical knowledge or experience, given the necessary parts and properly prepared instructions, can build a kit.

Ed Heath took that philosophy and sparked the imaginations of people like him. People like you, who appreciate doing things for yourself, and put a large share of personal care and quality into everything handcrafted. The employees at Heath who design, test, package, and promote build-it-yourself kits nurture that same philosophy. Why? Because kit-building is a happy hobby for everyone. Whether you're in business, retired, a housewife, or a youngster — you can probably build any one of our kits... even if you've never had any experience in electronics before. How can we be so certain? Because each kit has been specially designed for hobby construction, with an illustrated, easy-to-use assembly manual that leaves nothing to chance.

"WE WON'T LET YOU FAIL"

This quote is our company motto, and is supported by engineers, manual writers, customer service people — in short, everyone who works at Heath company. Heath employees care about the products they design, the manuals they write, the services they provide and, most of all — the people whose needs they fulfill. We're never satisfied until you are. There is no compromising Quality.

PROOF IN THE PERFORMANCE

Who builds the best Amateur Radio gear around? *YOU DO!* Thousands of Hams attest to the reliable performance, unsurpassable specifications and long-term dependability of Heathkit equipment. Get on the air today and you'll hear some of Heath's old workhorses from the fifties and sixties still capturing QSO after QSO, even though they may have visited many a Hamfest flea market since leaving the original builder's hands.

So, if you're anticipating the fun for the first time, be assured that it will be an enjoyable, satisfying experience that can easily be shared.

And one thing more — there's that indescribable thrill which comes from airing a QRP or legal-limit rig that you've just built with your own two hands! It's a feeling that harks back to the early days of our hobby (some call it a passion) when almost every rig was "home-brew" and every contact or call you made reflected the hard-won know-how, loving care and electronic construction skill you had learned and applied to succeed. It's this same do-it-yourself ideology of self-accomplishment that Heath seeks to promote.

Pride naturally follows achievement. And this kind seems to last forever.

THE INTEREST KEEPS GROWING

This unique partnership, and the build-it-yourself philosophy that has given the Heath Company its impetus since 1926, have encouraged many an individual to explore the world-wide wonders of Amateur Radio.

Of course the interests of Amateur Radio enthusiasts aren't confined to that section of the Heathkit Catalog. Many pacesetter Hams are exploring the newest area of technology — computers. They're using them to design antennas, plot beam headings, track and transpond with OSCAR (Orbiting Satellite Carrying Amateur Radio), refine data on Earth-Moon-Earth bounce contacts and to transmit RTTY.

Heath and the Ham, once again are perfect partners in this new adventure. Hundreds of future-minded Amateur Radio buffs have built their own H-19 and H-89 Computers, and many are using our RTTY program, or the Ham Radio programs available to members of HUG — the Heath User's Group.

EXPLORING THE LEADING EDGE

Heath has always produced state-of-the-art radio gear for sophisticated operators, backed by unprecedented quality guarantees. Some of our most innovative new designs incorporate microprocessor technology. Like the custom chip in our Micro-Matic Memory Keyer, shown on the inside front cover of this wrap and described on page 20 of the catalog. It represents a fusion of dedicated engineering teamwork, edge-of-technology research and a commitment to supplying you with the very best examples of reliability, capability and adaptability.

As we move further into the '80's, Heath will continue to design, manufacture and sell products to satisfy the needs of tomorrow's applications. Our aim is to provide you with the most efficient, effective and inexpensive methods for making the world an even smaller (and faster) place in which to communicate.

Now, with the arrival of the SS-9000, every trailblazer is freed to open the frontier of computer-enhanced hamshacks. In concert with the combined imaginations of all who learn to command one, this superTransceiver should help transform the state of amateur telecommunications in the coming decade. The SS-9000 signals a new era in operating convenience. An era full of exciting promise. Challenge. And opportunity...

Why not purchase a Heathkit product today? This catalog is full of over 450 useful kits designed to give you measurable savings over comparable assembled products, an extra-desirable 'difference' that makes it unique to own one and an immeasurable sense of pride from constructing it yourself. Also, you'll gain confidence by seeing how easily electronics can be understood, through kits that give you 'hands-on' experience and 'tech-knowledge.'

Now, more than ever before, Heath offers you more. Like we say...

There's more for the Ham at
Heath[®]

