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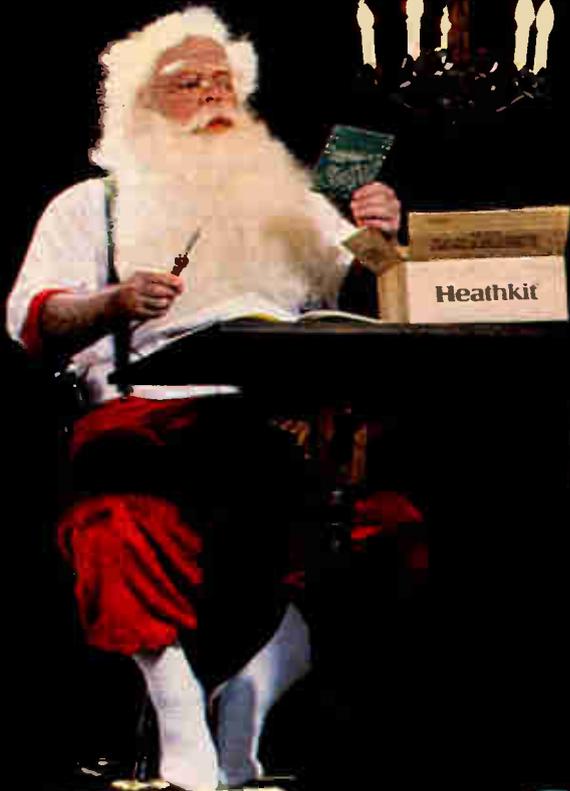
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Say "Merry Christmas" with the perfect gift of a kit from Heath for that someone special. Choose from over 400 products in more than a dozen categories. Browse through our special **New Products** section on pages 2 through 8 for the latest in innovative Heathkit products.

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NEW ham VLF Converter, Noise Bridge, SWL Antenna

NEW Touch Tone Decoder for amateur radio operators

NEW Keyless Doorlock and home products

Heathkit

Helping you make things better

Wrap up some excitement – tie your Christmas ribbons around these new Heathkit products

1 Team up the SMARTHOME I Controller with your computer for sophisticated home control and security

\$299⁹⁵

- Awaken to fresh coffee, a warm house and the morning news every day – and turn in at night knowing appliances are off and your home is being monitored by the GD-3800
- Have a computer controlled home without monopolizing your computer – the GD-3800 runs your home by itself once it has been programmed and plugged into an AC outlet
- Convenient handheld transmitter also provides remote appliance and lighting control from your easychair

Your home can run better than clockwork with the GD-3800 SMARTHOME Controller. The SMARTHOME system allows control of home lighting, appliances, heating, air conditioning, and a wide variety of electronic devices. You program the GD-3800 to turn lights and appliances on and off or to dim lights at specific times through powerful software and your home computer. The GD-3800 controls lamps and appliances by using the existing house wiring – just plug BSR lamp and appliance modules (see page 24) into wall sockets and then plug your lamps or appliances into the modules.

The SMARTHOME I Controller also has a built-in receiver which will receive signals from an included handheld transmitter or from optional Heath GDA-2800 series RF transmitters (see page 26). This means that your home is controlled not only by the programmed unit but also remotely by transmissions from your handheld unit or a sensor. You can touch a button on the handheld transmitter to dim a light or turn on the stereo, or a transmitter can sense your entry into a room and turn on a light for you. Place sensors around the house to monitor a variety of conditions such as window/door open or closed, smoke present, and movement in a room or hall. When a sensor notes a change it transmits a signal to the control unit. The control unit then responds by sending the appropriate command to the modules in that area of the house.

Easy to use software lets you draw your floorplan on your monitor and use icons to install actual lights and appliances in the correct locations. You can enter up to six floor plans and can even include outdoor fixtures such as pool or driveway lighting. The Controller can then be easily programmed to activate appliances or brighter/dim selected lamps at specified times. All the programming information is stored in the Controller's memory so that the unit may be disconnected from your computer. You can create a number of programs and save them on a separate disk. This allows you to change your household's routine for weekends or vacations by simply transferring the information to the Controller via a computer link.

Use the SMARTHOME I Controller, software and BSR modules for preprogrammed and remote control of your home, add sensors or a whole security system from the GDA-2800 series to have both preprogrammed control and a home in which appliances and lights respond to events the sensors detect. For even more protection add the GD-3880 Alarm Center below. The GD-3800 requires one of the software packages listed below.

Kit GD-3800, SMARTHOME I Controller and Remote Control Unit, Shpg. wt. 6 lbs. (Available in November) 299.95

Order the required software for your home computer:

GDA-3800-1, Software for all Heathkit Personal Computer compatibles and the IBM PC, Shpg. wt. 1 lb. 99.95

GDA-3800-2, Software for the H-100 Desktop Computer, 1 lb. 99.95

GDA-3800-3, Software for Apple II, II+, IIe, IIc, Shpg. wt. 1 lb. 99.95

GDA-3800-4, Software for MacIntosh, Shpg. wt. 1 lb. 99.95

This device has not been approved by the Federal Communications Commission. It is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.

2 Alarm Center alerts you and keeps intruders away

Four distinct alarms respond to different emergencies so that you know what is wrong. You determine what type of emergency each of the four alarms will indicate. A priority system selects the most important alarm to be sounded should more than one emergency be detected. The invaluable SMARTHOME I Alarm Center may be used with the GD-3800 Controller or used alone. Each input can be activated by an external normally-open switch such as a mat switch or light-beam-controlled relay contact. The Alarm operates on an included power cube which is plugged into a regular AC line. A 12 volt storage battery (included) supplies backup power for up to 10 hours in case of a power failure. The Alarm Center measures 17" W x 8½" H x 8½" D and includes a 25' cable for connection to the SMARTHOME I Controller.

Kit GD-3880, Alarm Center, Shpg. wt. 16 lbs. 299.95

3 NEW! Smart Outlet Box with increased protection

- Convenient single switch control of up to seven electrical devices
- UL approved with new, superior surge protection and noise filtering

Faster response and better suppression of power line surges and voltage spikes, the GD-1495 adds these features to the handy Smart Outlet Box. It has eight AC (3-prong type) outlets, one of which is unswitched for devices such as clocks that you do not wish to turn off. A control socket senses current flow in a device plugged into this socket, and automatically turns on equipment connected to the remaining six switched sockets. This allows you to power up a number of devices using the power switch of a single conveniently located device. The control socket even allows a small amount of current to pass through it for equipment containing digital clocks. The Smart Outlet Box has dimensions of 14¼" x 2¼" x 2¼" (36.2 x 5.7 x 6.9 cm) and weighs 2.8 lbs. (1.3 kg).

Kit GD-1495, Smart Outlet Box, Shpg. wt. 5 lbs. 59.95

4 Precisely measure rainfall with the new Heathkit Digital Rain Gauge

\$99⁹⁵

- Displays amount of rainfall up to 99.9 inches
- Records amount in either inches or centimeters
- You select display for either 1/100th of an inch or 1/10th of an inch
- Battery backup ensures that Rain Gauge will continue to record the amount of precipitation – even during a power failure

Never again wonder whether or not it's time to water your lawn or garden, just check the indoor LED display of your Heathkit Digital Rain Gauge. You will know instantly if you got as much rain as they recorded at the TV weather station or if you need to water the flowers. This economical and accurate weather instrument will prove a valuable aid in maintaining your yard or growing your favorite fruits and vegetables.

Red LED's display easy-to-see readings in either centimeters or inches. Place the attractive display indoors and mount the outdoor measuring device on a roof, fence post or antenna tower. Rainfall is recorded in 1/100th's of an inch up to 9.99" or in 1/10th of an inch up to 99.9". A 9 volt backup battery (not included) powers the display during a power outage. The display measures 7" W x 5" D x 2½" H. Sensor unit measures 9" in diameter x 9¾" H. Includes 60' cable and power cube. Operates on 120 VAC.

Kit ID-1795, Digital Rain Gauge, Shpg. wt. 7 lbs. 99.95

5 Improved Electrostatic Furnace Air Cleaner

\$149⁹⁵

- Removes pollen, cigarette smoke and dust – purifying air for allergy sufferers and protecting computers from harmful airborne particles
- New power supply now designed with high speed switching
- Red LED indicates proper operation – if it goes off the filter needs cleaning
- Four sizes of 1" thick filters make installation a breeze

Today's well-insulated homes need the Heathkit Furnace Air Cleaner. With each cycle, it removes almost all airborne contaminants. The Furnace Air Cleaner works with your central heating or air conditioning system to automatically bring you cleaned and refreshed air you'll enjoy.

An improved high-speed, high voltage switching supply ensures that you get air which is thoroughly cleaned – something the allergy sufferer or computer owner will really appreciate. The power supply mounts on a cold air duct and automatically turns the filter on when the blower is running. The power supply will operate one filter and runs on 120 VAC, 60 Hz. Filters are available in four sizes and are required for use with the Air Cleaner.

Kit GD-3196, Furnace Air Cleaner, Shpg. wt. 9 lbs. 149.95

GDA-3196-1, Filter Accessory, 16" x 20"; Shpg. wt. 5 lbs. 99.95

GDA-3196-2, Filter Accessory, 16" x 25"; Shpg. wt. 6 lbs. 99.95

GDA-3196-3, Filter Accessory, 20" x 20"; Shpg. wt. 6 lbs. 99.95

GDA-3196-4, Filter Accessory, 20" x 25"; Shpg. wt. 7 lbs. 99.95

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NEW

The SMARTHOME I
Controller and Alarm
Center bring intelligent
control and security to
the home.



Program the Controller to set your
home lights and appliances

Alarm Center has four different warning signals



Emergency Alarm/Transmitter



Infrared Motion Detector



WINDOW BURGLAR Sensors
and take-off contacts



NEW

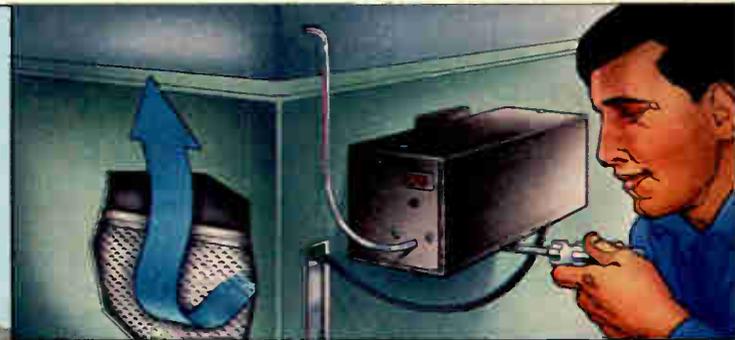


3

Power up and protect your equipment

NEW

Put some freshness into
stale house air and
remove dust and pollen



Easy-to-install filter
available in four sizes



5

Power supply automatically
turns on filter when needed

NEW

4



Digital Rain Gauge takes the guesswork
out of lawn and garden care

More new Heathkit gift ideas to put some extra sparkle under your Christmas tree this year

1 New Heathkit electronic Keyless Doorlock

\$99⁹⁵

- Simply enter four preselected numbers and push the door
- Door automatically locks behind you when it closes
- Easy enough for a child to operate
- Replaces door frame strike plate; keep your lock and key

Free yourself from carrying cumbersome keys as you go jogging or work in the back yard. The GD-3830 Keyless Doorlock lets you back in the house as you enter a simple four digit number of your choice. Never again send a house key to school with your child or stay up late waiting for teenagers who forget their house key. Give the number code to a neighbor while you're on vacation and easily change it when you return. With 11,880 possible number combinations, the code sequence can be changed as often as desired.

This innovative door lock system works with all conventional residential locks (except deadbolt locks). A keypad mounts outside near the door knob and a solenoid-operated strike mechanism replaces your present strike-plate. You program a four-number code, the amount of time to enter the correct code, and the time (up to 45 seconds) that the door remains unlocked after opening.

In case of a power loss, your key works as it always did, or connect a +12 VDC backup battery (not included) for operation under all conditions. The Keyless Doorlock operates on 110 VAC using an included power cube or optionally, from a +12 VDC source. Keypad, 4.5" H x 2.7" W x 1.5" D. Control module, 4.4" H x 3" W x 1.3" D. Strike mechanism, 5.7" H x 1.3" W x 1.3" D. Professional installation may be needed on metal frame door jams.

Kit GD-3830, Shpg. wt. 5 lbs. 99.95

2 Easy capacitance and inductance measurements

\$269⁹⁵

- Designed for fast, easy checking of inductors and capacitors
- All measurements are displayed on a high-brightness 3½ digit LED readout with automatic decimal point placement

The versatile IT-2240 Digital LC Bridge is a laboratory-accurate instrument that measures capacitance and inductance, and their associated dissipation (loss) factor. On 8 ranges, this compact unit measures inductance from less than 1 μ H to 2000 H and capacitance from less than 1 pF to 2000 μ F with a basic accuracy of $\pm 0.5\%$. The dissipation factor of the component under test can be measured from 0.000 to 1.999 with a basic accuracy of $\pm 3.0\%$.

Front panel slotted inputs provide a 4-point Kelvin connection to eliminate the variable effects of testing components with large diameter leads and long lead lengths. Large or remote components are easily checked using a supplied accessory cable. Stray capacitance on lower ranges is adjusted out using a front panel null control. A separate rear panel output connector supplies a voltage for batch testing capacitors and inductors as well as driving a plotter for charting capacitance/voltage curves. All inputs and connectors are over-voltage protected. It is powered by 120 VAC at 60 Hz, 15 watts maximum, 3¾" H x 10" W x 12½" D.

Kit IT-2240, Shpg. wt. 11 lbs. 269.95

3 Dual Trace Oscilloscope with built-in tester

\$499⁹⁵

- Wide DC to 25 MHz bandwidth with 5 mV/cm sensitivity
- Extremely stable triggering with delayed sweep
- Full X-Y operation plus sync preparation for TV signal viewing
- Built-in component tester checks diodes and transistors
- Can be used with optional IOA-4200 Time-Voltage Module

This laboratory-grade test instrument is ideal for the wide range of measurements made in general electronics shops, development laboratories, and scientific research facilities. And, it is priced so that hobbyists can take advantage of this indispensable troubleshooting and alignment tool.

Select from 11 calibrated ranges on both vertical input channels from 5 mV/cm to 10 V/cm with variable control between ranges. Several signal display modes are obtained by using the Vertical Mode and Time Base switches with either or both channels displayed as a function of time or in an X-Y mode.

The time base ranges from 0.1 s/cm to 0.1 μ s/cm in 19 calibrated steps. Each step is continuously variable and can be expanded 5 times. A delayed sweep allows you to select the exact portion of a waveform for critical viewing. An external horizontal input can be applied at a front panel BNC connector.

Precise triggering is controlled by four Select switches and the Level control. Trigger at any positive or negative point on a waveform using various trigger signals

4/NEW PRODUCTS

and coupling modes. For stable TV signal viewing, switch in an active TV filter that separates vertical and horizontal sync pulses from complex video signals. Display a baseline with or without a trigger signal. This scope can also be externally triggered.

Waveforms are displayed on a high-brightness 8 x 10 cm CRT with internal graticule. A special test function displays the I-V curve of transistors, diodes, etc. showing a characteristic curve to enable quick checks of suspect components. And, you can add on the IOA-4200 Time-Voltage Module (page 42).

Kit IO-4225, Shpg. wt. 28 lbs. 499.95

IO-4225 SPECIFICATIONS: VERTICAL: Display Modes: Y1, Y2, Dual, Alt/Chop (Chop frequency, approx. 200 kHz). Channels Y1 and Y2: Accuracy: Within 3%. Rise Time: 16 ns or less. Overshoot: less than 5%. HORIZONTAL: Modes: A, AxB, B, X-Y. Ext. Horiz. A and B Time Base Accuracy: Within 3%. External Sensitivity: 0.1 V/cm. TRIGGER: Source: Y1, Y2, EXT. Line. Coupling: AC, DC, TV-V, TV-H. Modes: Automatic baseline. Normal. GENERAL: 1-volt P-P CAL Accuracy: $\pm 5\%$. CRT Phosphor: P31. Power Requirements: 110/220 VAC. 50/60 Hz. Dimensions: 6" H x 18" L x 10" W. Weight: 19.5 lbs.

4 Low cost and highly sensitive radiation monitor

- Broad spectrum detection of Alpha, Beta, Gamma, and X-rays
- Flashing count light and beeper indicate detected radiation

This precision shirt pocket-sized instrument is ideal for many industrial, medical, educational, and commercial applications. Ideal for use even around the house. Radiation level is displayed on a large, easy-to-read meter and measured on three selectable ranges from 0 to 50 milliRoentgens per hour (mR/h). Calibration is traceable to the National Bureau of Standards Cesium 137 Gamma source. (\$35.00 for certified calibration service, refer to manual.) Uses sensitive, industry standard Geiger-Mueller tube found in all geiger counters and many scientific instruments. Includes a 9 VDC battery. 5.7" H x 2.8" W x 1.5" D.

Kit RM-4, Shpg. wt. 2 lbs. 149.95

5 Be alerted to damaging AC line variations

- Monitor measures and displays AC line voltages between 90 and 135 VAC with a basic accuracy of $\pm 1.5\%$
- Large, easy-to-read LEDs display all AC voltages
- Fault indicator reveals low line voltage or voltage dropout

The IM-2203 Line Voltage Monitor lets you know when brownout conditions occur on the AC line so you can safely shut down voltage sensitive equipment. This accurate instrument is extremely useful in displaying the line voltage of minicomputer, medical, or communications systems. A manually reset Fault indicator can be set to light any time the AC drops below a user-adjusted voltage between 90 and 120 VAC. Compact 3.7" H x 5.5" W x 1.6" D case.

Kit IM-2203, Shpg. wt. 3 lbs. 59.95

6 Quickly isolate computer interface problems

- Easily test all EIA standard RS-232C lines interconnecting computers, line printers, modems, terminals, and plotters

Take the guesswork out of isolating computer system problems. The PMK-130 Breakout Box enables access to all 25 cable lines running between two computer system components. Use it to test and modify interconnections to see where a possible problem may exist. It also provides switch disabling of 23 lines for isolation or cross-connections. LEDs monitor key signals. Has two flat cables with "D" type connectors, DTE and DCE on each end. Needs two "AA" batteries.

Kit PMK-130, Shpg. wt. 2 lbs. 89.95

7 Versatile Byte Probe speeds troubleshooting

- Quickly and easily check the highs and lows of logic circuitry

Use this unique eight channel Byte Probe to test the logic states (up to 10 MHz) of address lines, data lines and any other general TTL or CMOS circuitry that operates from a +5 VDC power supply. Each channel is switch-selectable, low-"don't care"-high, with highs indicated by a red LED. When input signals match switch settings the Probe sends out a trigger signal to a scope for in-depth real time waveform analysis. Observe actual data on a scope in real time, pulse stretch, or latch mode. Powered by either a 9-volt transistor battery or an optional PS-2350 Battery Eliminator (page 46).

Kit ID-4804, Shpg. wt. 2 lbs. 69.95



Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.

NEW



NEW

Digital LC Bridge easily and accurately measures inductance and capacitance



NEW

Dual Trace Oscilloscope with 25 MHz bandwidth and built-in tester

NEW



NEW

Improve your station's performance with these new Heathkit Amateur Radio products

1 Antenna Noise Bridge helps tune antennas

\$49⁹⁵

- Reveals cause of mismatch between transmitter and antenna
- Can also be used to preset antenna tuners, tune a quarter-wave transmission line and measure the value of unknown capacitors and inductors

A useful antenna tuning tool, the Antenna Noise Bridge is for the shortwave listener or Amateur Radio operator who demands maximum performance from his antenna system. It reveals the cause of any mismatch between the station transmitter and antenna so you can trim each antenna for the most effective transmission. It can also be used to preset an antenna tuner for faster tune-up, to tune a quarter-wave transmission line, and to measure the value of unknown capacitors and inductors. Front panel controls give a direct readout of the resistive and reactive characteristics of the antenna being tested. Has external power jack, and SO259 coaxial sockets. Portable unit operates on a 9-V battery (not included) or optional PS-2350 AC Power Supply (p. 46). Measures 2¼" H x 5½" W x 5" D.

Kit HD-1422, Shpg. wt. 2 lbs. 49.95

2 Tune 10 to 500 kHz band with VLF Converter

\$49⁹⁵

- Receive the frequencies below the standard AM band
- Hear the U.S. Submarine Fleet, European broadcasts and more

The Very Low Frequency Converter installs in your receiver antenna line to let you listen to the 10 to 500 kHz band between 3.5 MHz and 4.0 MHz on your CW receiver. The converter's local oscillator generates a 3.5 MHz signal that, when mixed with the incoming VLF frequencies on your antenna, produces an RF signal that can be heard on any CW receiver capable of tuning 3.510 to 4.010 MHz. With the Converter, almost any length wire antenna will provide good reception. When not in use, the converter bypasses the incoming signals to the receiver. Powered by a 9-volt battery, (not included) external Power Supply PS-2350 on p. 46, or any DC power source, 8.5 to 14 volts. Measures 5½" H x 5½" W x 2¼" D.

Kit HD-1420, Shpg. wt. 2 lbs. 49.95

3 Active SWL Antenna for 300 kHz to 30 MHz

\$49⁹⁵

- Perfect for portable use or locations where an outside antenna is not available
- Also acts as an antenna preselector or as a preamplifier when used with an external 50-ohm antenna

The Active SWL Antenna allows you to receive radio signals between 30 kHz to 30 MHz. These bands cover all of the international broadcast bands, high-frequency amateur bands and many other services. The versatile Active Antenna also acts as a high frequency preamplifier when used with an external 50 ohm antenna. In addition, you can use it as a preselector for indoor and outdoor antennas.

The HD-1424 is ideal for the apartment dwelling shortwave listener or for portable operations. It has a built-in collapsible antenna and provisions for a 50 ohm antenna. The unit operates on a 9-volt battery (not included) or external 6 to 14 volt DC source such as the PS-2350 (p. 46). It measures 2¼" H x 5½" W x 5" D.

Kit HD-1424, Shpg. wt. 5 lbs. 49.95

4 Remotely control receiver, autopatch, repeater

\$79⁹⁵

- Touch Tone Decoder lets you hear only the messages meant for you — eliminating extraneous monitor racket
- Also use HD-1530 to control repeater or autopatch DN/DF

Connect the Touch Tone Decoder in a series with your receiver or scanner speaker. Turn it on and it mutes the receiver speaker until it detects the unique DTMF code which you have programmed in. In addition, use the HD-1530 for operation of single functions in the control of a repeater, or as a secondary control link for autopatch. Create the code from any three or four different characters found on a standard 12- or 16-character touch tone keypad. Sending the wrong code or taking longer than the selectable 3 to 26 second entry time causes the Decoder to reset. Set the unit to open the line for any time length between 25 seconds and 8 minutes, or the user can enter a two-digit code to open and close the line at will.

Kit HD-1530, Shpg. wt. 2 lbs. 79.95

New Heath/Zenith Computer Systems plus monitors, printers, and accessories

Heath/Zenith, two respected names in electronics, adds five new personal computers to a complete selection of computer system components designed to meet the needs of most professional and personal applications. The full range of system components include applications software, and a full range of system add-ons including memory, disk drives, and I/O boards and computer peripherals.

The new HS-148 Compact and new Z-138 Compact Transportable Personal Computers are perfect home or office PCs at very low prices. Both give complete PC capabilities and IBM PC compatibility, plus the features and flexibility to keep up with your needs. The Z-138 Transportable puts all this in a portable package with a 7" amber CRT that allows you to act on important business decisions as they occur, when they occur. See pages 84 and 88 for details.

The new HS-158 Expandable Personal Computer adds advanced features to IBM PC compatibility for a desktop system that will grow with your wants and demands. Dual 4.77 MHz and 8 MHz operating speeds, six open expansion slots, 256K minimum user memory expandable to 640K, high-capacity floppy disk and Winchester disk storage, and a built-in serial port and a parallel port make the HS-158 PC one of the most powerful and versatile personal computers available. Turn to page 84 for more information about the Expandable PC.

The new Z-171 Portable Personal Computer has IBM PC compatibility, complete portability, and important features that make it one of the most powerful and versatile portables on the market. Turn to page 88 to find out about features like 256K RAM standard; two 5.25" disk drives; and an internal, adjustable, 25-line by 80-character, backlit LCD display.

The new Z-200 Advanced Personal Computer features power. With IBM PC-AT compatibility, 512K RAM standard, 64K ROM, a serial and a parallel port, six expansion slots, and a 1.2 MB floppy disk drive and Winchester drives, the Z-200 PC delivers performance for the demanding professional. Learn more about the personal computer that offers not only enhanced stand alone processing power but business-oriented multi-user and networking capability on page 86.

The Advanced H-100 Desktop Computer is also on page 86. Its dual microprocessors enable easy access to both sophisticated 16-bit software, and extensive business and other 8-bit software. Flexible and expandable, the H-100 Computer features 8 MHz operation, minimum 256K RAM, high-resolution graphics, single or dual high-capacity disk drives, five industry standard S-100 expansion slots, and IBM PC software compatibility with optional emulators.

For true portability, there's the Heath/Zenith ZP-150 Laptop Personal Computer with six built-in Microsoft programs. The Laptop is battery powered for people who find themselves working where AC power is not readily available. And they have all their business tools at hand with a word processor, a spreadsheet, data base manager, telecommunications, calendar, and a subset of BASIC all stored in ROM for use at the touch of a key. See page 89 for further information about this outstanding application of computers to real world situations.

Software, from operating systems to applications programs, is found on pages 90 through 93. This well-rounded variety of software includes familiar products from established companies along with programs specifically developed for Heath/Zenith computers. A new chart format makes it easy to pick out and order the software you need.

Eight color and monochrome monitors, five of them new, are located on page 95. This exceptional and full line of monitors offers a choice of full color, green, or amber display of graphics and text. They can be used with a wide variety of popular computers and there's one to fit your budget. Other choices include 25", 13", or 12" diagonal screens; audio capability; and composite or RGB inputs.

Pick a printer from the fine selection on page 97 and with one simple connection print out sharp graphics or text. Choose from daisy wheel or dot matrix printers in a price range that best satisfies your needs. Also on this page is a high-resolution plotter and five external-connected modems.

Low-cost and top-performing terminals are located on pages 102 and 103. From the six Heath/Zenith terminals detailed on these pages you're sure to find one with the features and the capabilities you need. Choose from features like built-in modems; on-screen programming setup; Lear Siegler, Hazeltine, and DEC compatibility; and built-in self-test diagnostics.

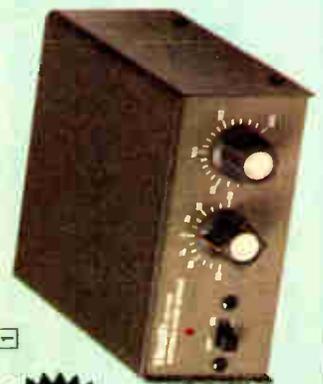
Rounding out the Heath/Zenith computer line are accessories and peripherals on pages 98 through 100 to protect your computer and make it easier and more fun to use. And attractive computer furniture on page 94 accommodates your computer and peripherals in a minimum amount of space. Plus programming courses and applications tutorials on pages 80 to 83 to help you learn more about your computer and how to effectively use some popular software.

This wide range of computer systems, software, and system components allows you to choose the hardware and software combinations which will best meet both your present and future needs.



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NEW



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NEW



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NEW



NEW



Give your family a gift of superior sight and sound entertainment with new stereo TVs

1 Have the newest technology for a low price with this 27" Advanced System 3 stereo TV kit

\$749⁹⁵

- Built-in stereo decoder, stereo control center and sound system with power amplifier
- Flashback button lets you alternate between your two favorite shows at the touch of a button
- Includes Computer Space Command Remote Control
- Use it with your video camera, video disc player or VCR
- Takes only 10 hours to build – all but one circuit board preassembled

The latest television technology is affordable when you're considering the GR-2700. Superior stereo sound surrounds a 325-line-resolution 27" picture. You control both picture and stereo completely with the Computer Space Command Remote Control as well as with the sophisticated control console hidden under a panel on the set. You also have control over channels you don't want your children to watch. Only you may access these channels with the special code you have programmed in – even unplugging the set won't disturb your privacy setting. Cable-ready and with direct audio/video input/output capabilities, this television gives you the latest features you've been hearing about – plus the dependable quality of the Advanced System 3 television.

The unique 27" flat, square picture has 25 square inches more picture area than a 25" TV. Dark glass absorbs ambient room light to provide a picture with exceptional contrast and color fidelity. A black matrix surrounds each phosphor element with black to produce deep, rich colors. The color picture is automatically corrected 30 times a second by the Advanced Color Sentry so you always have life-like flesh-tones, and accurate color and contrast. Automatic CRT tracking ensures that colors remain vivid and true year after year. You get an incredibly sharp, realistic picture with the Advanced System 3's Chromacolor Contrast picture tube and peak resolution picture circuit which provides up to 25% greater resolution than many other sets.

The built-in stereo audio system includes a stereo decoder which processes stereo telecasts, simultaneously telecast second audio programs, or mono telecast programs. The five-watt RMS per channel stereo amplifier has frequency response from 100 Hz to 10,000 Hz into 8 ohms with 2% or less total harmonic distortion. Separate bass, treble and balance controls are provided plus an Extended Stereo switch for enhanced stereo effect. Two speakers and video/audio input/output jacks are also provided.

The Parental Control Provision allows you to lock out any channels for a 12 hour period. During this time these channels may be accessed only by a code which you create. A special Flashback Button lets you alternately switch between two programs whenever you touch it. Great for watching two sporting events at once! Select all UHF/VHF and 122 cable channels (except scrambled premium services) with quartz electronic tuning. The computer selector locks on to the exact frequency for precise tuning. An on-screen display shows you the channel you are watching and the time. The powerful Computer Space Command Control lets you turn the TV on/off, select channels, scan programmed favorite channels, adjust volume, mute sound, recall channel and time on the screen, select TV stereo, monaural or 2nd audio program operating modes, and operate Zenith VHS recorders. To assemble the GR-2700 one of the cabinets listed below is required.

The famous Heathkit manual guides you step-by-step through every phase of kitbuilding with clear directions and illustrations. With all but one circuit board preassembled, this television is easy to build and provides an enjoyable project for anyone. For a TV packed with value and offering the latest stereo television technology choose the GR-2700. And enjoy the additional benefits of economy and reliability which are found in every Heathkit product.

The GR-2700 must be assembled with the included cabinet.

Kit GRS-2700-2, 27" TV with Mediterranean Cabinet. Cabinet has simulated pecan finish. Includes concealed casters, two 5" x 7" speakers. The Mediterranean Cabinet measures 33" H x 47½" W x 18½" D.

Shpg. wt. 104 lbs. Motor Freight **749.95**

2 Kit GRS-2700-1, 27" TV with Modern Cabinet. Cabinet features walnut finished veneer. Includes concealed casters and two 3" x 6½" speakers. The Modern Cabinet measures 29¾" H x 41" W x 18½" D.

Shpg. wt. 104 lbs. Motor Freight **799.95**

Remotely switch between up to four program sources

Conveniently switch between program sources with your remote control or front panel control. Provides immediate, simple access to as many as four different antenna or RF input sources.

GSZ-4600, Assembled Antenna Switch Accessory, Shpg. wt. 4 lbs. 29.95

8/TELEVISION

3 Rear projection TV/Monitor gives you big picture and big stereo sound in a compact, space saving cabinet

\$1895⁰⁰

- 45" screen and complete stereo system with 5-watt stereo amplifier and four speakers put you right in the action
- New Black Matrix screen reduces glare for easier viewing
- Parental Control feature lets you decide what shows your children do not watch
- Use it as a video monitor for your VCR or video camera
- Includes Computer Space Command remote control

Enjoy the realism of a 325-line-resolution 45" screen and powerful stereo sound without crowding your living room. The compact GR-4500 takes up a floor space only 27¼" deep by 41" wide – no more than a console TV. You can more easily view the special Black Matrix screen from angles. And the attractive pecan finished wood veneer cabinet will be a welcome addition to your decor. Heath's GR-4500 gives you all the benefits of large screen television plus quality and practicality in this compact, stylish set.

A big sound system matches the big picture. The innovative Multichannel Stereo Sound System processes multi-channel television sound into exciting stereo. It also processes simultaneously telecast second audio programs or mono telecasts. The stereo power amplifier has an output of 5-watts RMS per channel with a frequency response from 100 Hz to 10,000 Hz into 8 ohms with 2% or less total harmonic distortion. You also get Bass, Treble and Balance controls. 6½" round woofers and 2½" tweeters provide dramatic sound. Audio input/output jacks allow you to run the sound through your own hifi system or to run other audio equipment through the television's stereo amplifier.

The remote control features Parental Control, Flashback and VCR functions. You can program the remote to make selected channels accessible only by inputting a secret code. Touch a button to alternate viewing between two football games, and use the remote to operate Zenith VHS recorders. Channel number and the time are displayed on the screen at the touch of a button. Scan favorite programmed channels with the Channel Up/Channel Down buttons.

Quartz-controlled electronic tuning ends the need for fine-tuning adjustments and locks on to up to 178 channels (except scrambled premium services). The Black Matrix screen enhances picture contrast and absorbs room light to reduce glare and annoying reflections. Liquid-cooled CRT's and optically-coupled lenses provide exceptional picture contrast and brightness. You can even use the set as a monitor for your VCR, video camera or video disc player.

Three times the viewing area of a standard 25" TV, big stereo sound and the latest TV technology are yours with Heath's GR-4500. This attractive rear-projection TV can be built in just 14 hours. You are guided through the kit-building process step-by-step with a well illustrated and written manual. All circuit boards except one are preassembled and the cabinet is included.

Kit GR-4500, Shpg. wt. 256 lbs., Motor Freight **1895.00**

4 Advanced System 3 19" TV is excellent performer

\$399⁹⁵
Kit

- CRT tracking system keeps picture looking new
- Quartz-controlled tuning and infrared remote control
- Built-in VHF/UHF antennas; earphone included

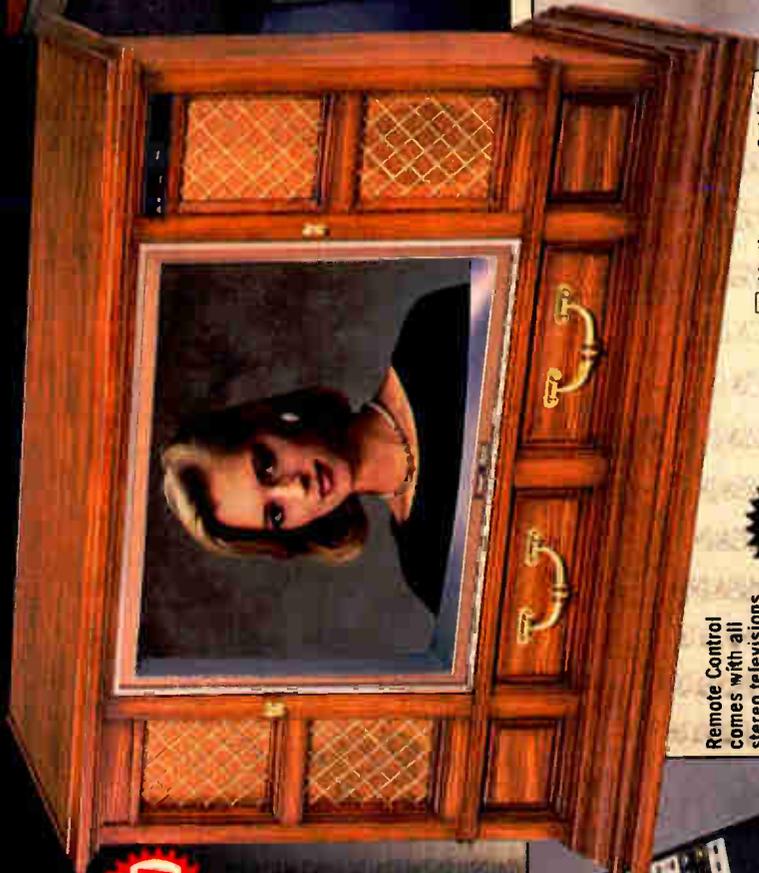
A space-saving 19" size is united with spectacular System 3 technology in a kit design you will enjoy building. The chassis consists of a clean, uncluttered arrangement of modules. Each one pre-tested and aligned for outstanding reliability. The Tri-Focus Picture Tube has almost three-dimensional sharpness and detail. It features an ultra-high resolution EFL Electron Gun and precise horizontal alignment for increased image crispness, better highlight definition and crystal clear resolving power, with proper levels of color intensity, tint and contrast. An advanced Color Sentry corrects the picture 30 times a second. Eight essential hue and picture sub-systems work together to deliver critically sharp and vivid color reproduction every time... automatically! The Peak Resolution Picture comb filter circuit reproduces all 330 lines of transmitted detail. Cable ready, the GR-1902 offers 178 channel capability without a converter (except for scrambled programs). It has a 1.5-watt amplifier, two 3" x 5" speakers and an Audio Output jack for connection to a high-fidelity system. Includes earphone with 15' cord, remote control and telescoping dipole and clip-on bowtie antennas. Provides for external UHF/VHF and matched cable-ready CATV/MATV, with switchable Normal/Special AFC. 17¾" H x 26¾" W x 17½" D.

Kit GR-1902, Shpg. wt. 101 lbs., Was **\$449.95** Now Only **399.95**

5 GRA-1901-1, Mobile TV Cart (shown), Shpg. wt. 10 lbs. **29.95**



Use your Visa or MasterCard credit cards to purchase your kit!



1 Mediterranean Cabinet



2 Modern Cabinet



Remote Control comes with all stereo televisions

NEW

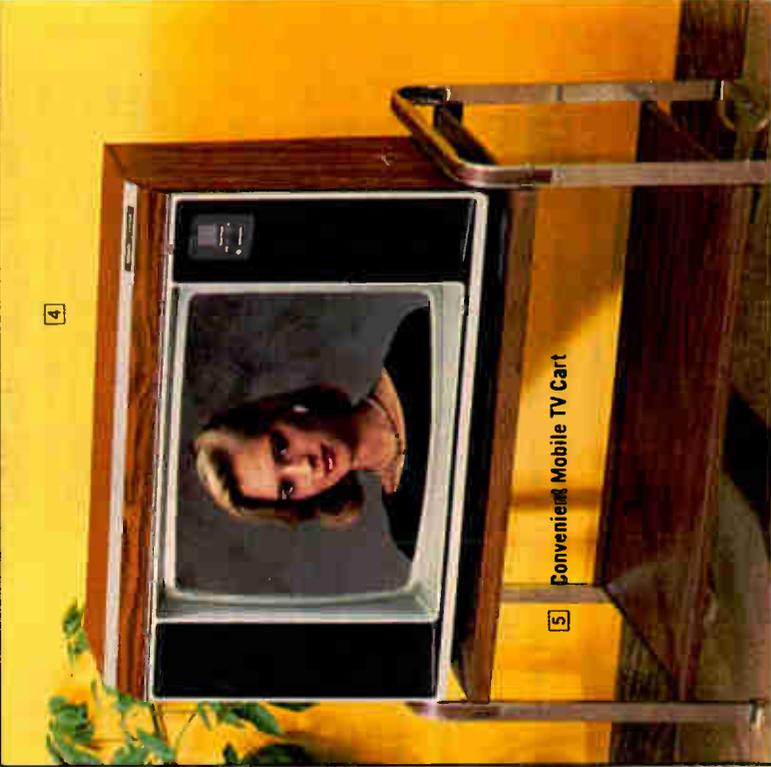


NEW



3

Simulated TV pictures



4

5 Convenient Mobile TV Cart

Christmas favorites – from TV's you can stuff in a stocking to a camera for filming holiday fun

1 Video Organizer puts order into your video system

\$49.95

- A versatile "control center" for your home video system
- Allows you to connect up to six program sources to your TV

Heath's Video Organizer eliminates the confusing mess of cables that accumulate behind your TV when you use multiple inputs. Eight input and output jacks allow complete RF connection to your set: UHF/VHF antennas, community cable service, subscription TV, video disc player, video games, computer and other equipment such as a satellite receiver, video camera or security monitor. Select any of six different program sources for immediate viewing without changing cable connections. Choose up to three sources for recording on your VCR. You can even view one source while recording another. The Organizer has better than 60 dB isolation, less than 3.5 dB insertion loss and excellent RF shielding for pure picture quality. Kit does not require soldering.

Kit GS-4500, Shpg. wt. 7 lbs. 49.95

2 Hear stereo broadcasts with TV Stereo Adaptor

Stereo broadcast signals are rapidly becoming available from local TV stations. The GDZ-524 is the TV industry standard for decoding and playing broadcast stereo. It also decodes second audio programming and can be set for auxiliary stereo, extended stereo and mono audio. Works with either TV speakers or your audio system. Has bass, treble and balance controls. Use with Heath GR-2502, or Zenith TV's with an "IF tap output." Add-on kits (below) available for other Heath TV's. Uses 120 VAC. 2 1/4" H x 16 3/4" W x 13 3/8" D.

GDZ-524, Assembled and tested, Shpg. wt. 12 lbs. 189.95

GDA-524-1, Cable Adapter Kit allows use of the GDZ-524 with Heath GR-1901, GR-1902, GR-2501, and GR-3000 TV's, Shpg. wt. 1 lb. 9.95

GDA-524-2, Cable Adapter Kit allows use of the GDZ-524 with Heath GR-300, GR-400, GR-500, GR-2000, GR-2001, GR-2050 TV's, 1 lb. 9.95

3 Reduced \$30 for Christmas – CASIO TV-1000

Take this color TV along on family outings. The tiny CASIO TV-1000 has a large 2.6" high-resolution LCD screen and speaker so the whole family can watch together. Features electronic scan tuning; brightness; tint; color and volume controls; channel display; backlight and audio-video jack. Includes earphone. 3 1/4" H x 6 3/8" W x 1 3/8" D.

GVP-3413, Assembled, Shpg. wt. 3 lbs. Was \$299.95 Now Only 269.95

4 Save \$10 on pocket-size CASIO TV-21

Perfect for the businessman or sports fan. 2" diagonal black and white screen provides sharp, clear images. Touch the up or down key and it scans to the nearest UHF or VHF station with a strong signal. Has channel display, tuning indicator, volume and brightness controls. Includes earphone. Optional backlight enhances night-time or dim light viewing. 2 1/2" H x 4 5/8" W x 1 3/8" D.

GVP-3412, Assembled, Shpg. wt. 4 lbs. Was \$99.95 Now Only 89.95

GVA-3412-1, Backlight Accessory, Shpg. wt. 1 lb. 14.95

5 Personal 13" diagonal color TV with remote control

- Has quartz PLL tuning, electronic tuner and other quality features

This bedroom, kitchen or camper sized TV has everything including remote control. A quality television, it features an electronic tuner that eliminates many of the problems that plague mechanical tuners. It also has quartz PLL tuning for accurate tuning of 157 channels. Other features include a tri-focus picture tube, American Walnut finish with polished nickel-gold color trim, pedestal base, foldaway carrying handle and much more.

GRZ-1319, Assembled and tested, Shpg. wt. 36 lbs. 359.95

6 Compact TV with radio entertains you anytime

\$159.95

- Covers all VHF/UHF channels plus AM/FM radio bands
- Operates on AC, DC, or rechargeable battery pack

Tune into your favorite radio and television stations anytime. The GRZ-5010 combines a 5" diagonal black and white TV and an AM/FM radio in a compact unit that weighs just 6 pounds without batteries. A no-wear electronic tuner and calibrated cylinder dial permit easy channel or station selection without drift.

Adaptable to various power supplies, the GRZ-5010 includes a detachable 120 VAC power cube, DC car cigarette-lighter adapter and cable. Has built-in omnidirectional collapsing antenna and 300-ohm external antenna input terminals. Measures 7 1/4" H x 6" W x 11 1/8" D.

GRZ-5010, Assembled and tested, Shpg. wt. 9 lbs. 159.95

GRZ-5005-1, Rechargeable Battery Pack, Shpg. wt. 3 lbs. 19.95

FREE Kit Digital Alarm Clock with these VCRs

A \$29.95 value, the handy GC-1107 alarm clock kit has snooze alarm, 12- or 24-hour format, AM/PM indicators, and automatically adjusts to ambient light. Order a VCR and receive the clock free.

7 Six-head VHS recorder loaded with features

- Stereo decoder, VHS HiFi, dolby stereo and remote control unit

Superb reproduction from four video and two audio heads plus direct quartz tuning to 178 channels. A 14-day programmable auto-timer lets you select and record up to eight events with eight hours of recording and playback at SP (LP available for playback). Other features include: front self-loading; automatic rewind; two-way picture speed search; still picture; frame by frame advance; time remaining indicator; remote programming and slow and fast motion video action in forward and reverse. Cable ready. Includes remote control.

GDZ-4100, Assembled, 23 lbs. (Available in November) 999.95

8 Four-head VHS recorder with remote, 5 T-120 tapes

- 14-day, four-event programmable auto record timer

A Christmas special that provides everything you need to enjoy VCR entertainment – at one low price. The GDS-2100 includes an infrared TV/VCR remote control and five Zenith T-120 video tapes. It features: four-head rotary scanning with SP or EP recording and SP, EP or LP playback, automatic rewind at tape end; selectable tape counter/lap-time indicator and 157 channel quartz electronic tuning with direct access and two speed up/down channel selection.

GDS-2100, Shpg. wt. 21 lbs. 499.95

9 Economy VHS recorder fits into your budget

- 14-day, one-event programmable auto record timer; remote control

This VHS recorder features SP or EP speed for up to eight hours of recording and automatically switches to the correct speed for SP, LP or EP playback. Also has automatic front self-loading, instant record for up to eight hours, automatic rewind, 2-way speed search, still picture, time elapsed indicator and 82 channel quartz electronic tuning with two-speed up/down channel scan.

GDZ-1801, Assembled and tested, Shpg. wt. 21 lbs. 399.95

10 Deluxe six-head VHS recorder with MTS Sound

- Decoder for stereo, second audio programs plus 1 hour power backup

Rotary six-head scanning system plus Multi-Channel Stereo Sound make this the ultimate VHS stereo recorder. Features decoder for stereo sound and second audio program signals; front self-loading; 178 channel quartz electronic tuning; speed search and low noise continuous picture advance in SP and EP; 14-day, eight event programmable auto record. Includes remote control unit.

GDZ-3200, Shpg. wt. 23 lbs. 749.95

11 Add realistic sound with Stereo Synthesizer

Turn your monaural sound into stereo sound with the Stereo Synthesizer. Simply add it to your TV or VCR to enjoy high-quality, realistic stereo sound with your favorite shows and movies. The ADP-1501 uses the same technique as professional studios to transform a monaural source into realistic stereo.

ADP-1501, Assembled and tested, Shpg. wt. 3 lbs. 99.95

Finest quality Zenith VHS video tapes

GDZ-2000-2, T-60, Shpg. wt. 1 lb. 7.95

GDZ-2000-3, T-120, Shpg. wt. 1 lb. 8.95

GDZ-2000-4, T-160, Shpg. wt. 1 lb. 14.95

GDZ-2000-5, T-120 SHG, for optimum quality, Shpg. wt. 1 lb. 12.95





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NEW

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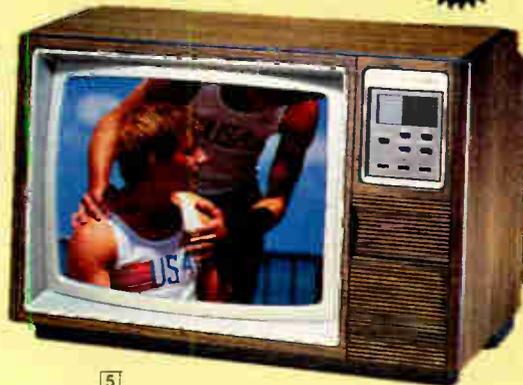
4

NEW



6

Gift Ideas



5

Simulated TV pictures



7

Great hi-fi sound to go with great VHS recordings

NEW



8

Get remote control and five tapes with this affordable VCR

NEW



9

Quality VHS video within everyone's price range

NEW

12 Mini-cassette Video Movie Camera/Recorder

See your movies immediately when you use this versatile and complete cassette-loaded video camera. Exposure is automatic and electronically monitored to deliver outstanding recordings. You can replay recordings through the viewfinder or through your TV and VCR. You get an entire video system in a camera. The 4.7 lb. GDZ-6100 features a high performance 6X auto-zoom lens, electronic autofocus viewfinder, auto white balance, iris control, five alarm indicators, nine mode indicators and more.

- GDZ-6100, Assembled and tested, Shpg. wt. 12 lbs. 1449.95
- GDZ-6100-1, Soft Carrying Case, Shpg. wt. 3 lbs. 29.95
- GDZ-6000-2, Compact Video Cassette, Shpg. wt. 1 lb. 7.99
- GDZ-6000-3, AC Power Supply/Battery Charger, Shpg. wt. 4 lbs. 129.95
- GDZ-6000-4, High Capacity Rechargeable Battery, Shpg. wt. 1 lb. 44.95
- GDZ-6000-5, Shoulder Mount and Strap, Shpg. wt. 1 lb. 39.95

FREE Kit Smart Outlet Box with the GDZ-6100

A \$59.95 value, the GD-1495 kit powers six other (3-prong) sockets when a device plugged into the control socket is turned on. Eighth socket is unswitched for clocks. Protects equipment from line surges.



11



10

NEW

Gift Idea



12

A system in itself, a compact video movie camera/recorder using mini-cassettes

Add a new personality to the family with the HERO® JR. personal robot

\$200 OFF Christmas special on complete HERO JR. RTR-1-3 and RTR-1-4 kit packages. See HERO JR. SAVER offers.

Now Only **\$399⁹⁵**

- Has a dynamic personality consisting of six traits
- Sings songs, tells nursery rhymes, plays games
- Guards your home and challenges intruders
- Wakes you up on time and announces special dates

Meet the first affordable, personal robot with a dynamic personality... HERO JR. A friendly robot, HERO JR. will fit right in with your family and into your home. It sings songs, plays games, tells nursery rhymes, recites poems, guards your home and can even wake you in the morning and guide you through an exercise routine. HERO JR. explores its surroundings and seeks to remain near human companions. HERO JR.'s personality is preprogrammed and doesn't require computer programming skills to operate. If you do wish to program HERO JR., you can with a home computer and optional RS-232 Accessory and BASIC Cartridge.

The traits comprising HERO JR.'s personality include: singing songs like "Daisy" and "America"; saying preprogrammed phrases; exploring and moving about, using sensors to avoid obstacles and seek out humans; playing games; telling nursery rhymes; and gabbing in "Roblish." All routines are stored in 32K ROM. Add more functions with optional plug-in cartridges. In addition to these six traits, HERO JR. has an internal clock with a 100-year calendar that can even compensate for Daylight Savings Time. With this time-keeping ability, HERO JR. can act as an alarm clock and awaken you at a specified time. After your wake-up call, it listens to be sure you are awake or permits two ten minute snoozes if you desire. It can also be made to announce the week day, date and time at predetermined intervals or just at one important time and date. With 2K of RAM, HERO JR. can store and remind you of events such as birthdays and anniversaries — up to 16 dates per year.

A DEMO feature activates a built-in "Robot Variety Show" which demonstrates the Robot's ability to see, hear, speak, tell time and move. You can even participate in the show. To see, hear, speak, and to move about, HERO JR. uses a light sensor, ultrasonic sonar, sound detector, speech synthesizer and an internal clock which are controlled by an on-board computer using a Motorola 6808 microprocessor. The sonar is accurate from 4½" to 13". An optional infrared sensor adds superior heat/motion detection. HERO JR. duplicates all English sounds using its Votrax SC-01 phoneme synthesizer. This permits the Robot to say just about anything. Volume and pitch adjustments tailor the Robot's voice to your liking. All of HERO JR.'s vocabulary is preprogrammed.

HERO JR. can guard your home against intruders and can be used with the GDA-2800 Security System (page 26). The Robot gives a verbal warning and asks for a password when its sensors detect a presence. The wrong or no response causes HERO JR. to activate the security system. HERO JR. normally speaks, sings and performs tasks between moving randomly about, however, an optional wireless remote unit allows the Robot to be manually driven from place to place. It will speak while under remote control. Remote operates at 75 MHz up to 100'.

HERO JR. is powered by two six-volt rechargeable batteries and plug-in wall charger (included). It operates about 4 hours, with a normal amount of exploring and will randomly enter a SLEEP mode which conserves battery power by keeping only critical circuits energized. You can also make HERO JR. enter or leave this mode.

See Halley's Comet and explore the universe with this Cometron Reflector Telescope

\$499⁹⁵

- View Halley's Comet for almost a year with the TL-400
- Use your camera with the optional Drive Motor and Camera Mounts to photograph the heavens
- Super 4.5" Reflector attractively priced from Celestron
- Has two eyepieces and all optics are coated

This is the year of Halley's Comet and the year to buy a telescope to view this phenomenon as well as dozens of other planetary and deep space objects.

With this high quality Cometron Reflector Telescope from Celestron, you can view the rings of Saturn, Mars, the phases of Venus and four of Jupiter's moons! Show your children the Great Nebula, Andromeda Galaxy, and dozens of other celestial objects. You can even throw a "Comet Party" or two for you and your friends.

The TL-400 gathers 265 times the light of the human eye and all optics are coated. The Telescope features a German made precision equatorial mount with setting circles to help you locate new objects. Two eyepieces are provided: 25 mm for 40 power and 10 mm for 111 power. The TL-400 also includes a 6 x 24 Finderscope, accessory tray, dew shield and lens cap.

12/ROBOT/TELESCOPE

HERO JR. can carry your favorite beverage (up to 10 lbs.) in a 94 cubic inch compartment. It has a 17-key keypad which lets you modify its personality to initiate a task. The keypad has clearly marked functions keys including Sing, Play, Poet, Gab, Alarm, Guard, Help, Plan, Setup, and Enter. Eight LED's flash in time with speech. HERO JR. is 19" tall and is easily assembled in about 20 hours.

Kit RT-1, HERO JR., Shpg. wt. 32 lbs. Was \$599.95 Now Only 399.95

SAVER! Save \$200.00 on Kit RTR-1-3. HERO JR. with Infrared Motion Detector, Remote Control and Cartridge Adapter accessories. Plus the Songs, Phrases and Rhymes #1 and Special Occasions cartridges. Shpg. wt. 56 lbs. Was \$749.95 Now Only 549.95

SAVER! Save \$200.00 on Kit RTR-1-4, HERO JR. with Cartridge Adapter Accessory and seven cartridges: Songs, Phrases and Rhymes #1; Animals, Blackjack and Tic Tac Toe; Special Occasions; Math Master; Riddle Robot/Tongue Twister; Program Language; and Musical Chairs. Shpg. wt. 47 lbs. Was \$649.95 Now Only 449.95

Accessory kits for HERO JR.:

RTA-1-1, Infrared Motion Detector Accessory detects rapid changes in temperature within a zoned range of approximately 35' long x 20' wide. Includes two window stickers that read "Warning, This Area Protected By A Security Robot." Shpg. wt. 1 lb. 119.95

RTA-1-2, Remote Control Accessory offers manual, wireless control of HERO JR.'s movements up to 100 feet away, operates at 75 MHz, Shpg. wt. 2 lbs. . . 179.95

RTA-1-3, RS-232 Accessory allows you to program HERO JR. in BASIC (RTC-1-8) from a terminal, or computer (requires HCA-10 or HCA-11 RS-232 cable on page 101 and terminal emulation software), Shpg. wt. 1 lb. 49.95

RTA-1-4, Two extra batteries, Shpg. wt. 5 lbs. 59.95

RTA-1-5, Cartridge Adapter, permits use of optional plug-in cartridges that increase HERO JR.'s capabilities. Includes additional 8K RAM, 1 lb. 49.95

Plug-in cartridges for HERO JR. (all require installed RTA-1-5):

RTC-1-2, Songs, phrases and Rhymes #1 Cartridge increases HERO JR.'s vocal routines and automatically adds to the Robot's personality, 1 lb. 19.95

RTC-1-3, Animals, Blackjack and Tic Tac Toe Cartridge enables you to play these additional games with HERO JR., Shpg. wt. 1 lb. 39.95

RTC-1-4, Special Occasions Cartridge adds songs for special occasions, includes two versions of Happy Birthday (one using master's name), Jingle Bells and Auld Lang Syne, Shpg. wt. 1 lb. 19.95

RTC-1-5, Math Master Cartridge, a timed math game, Shpg. wt. 1 lb. 24.95

RTC-1-6, Riddle Robot/Tongue Twister Cartridge, Shpg. wt. 1 lb. 24.95

RTC-1-8, HERO JR. BASIC Cartridge contains special enhancements for speech, movement, sensors and integer math; and allows the owner to write programs using a video terminal or home computer running a terminal emulation program, requires RTA-1-3 RS-232 port, Shpg. wt. 1 lb. 49.95

NEW! RTC-1-9, HEROBICS Exercise Cartridge offers 4 levels of difficulty and 10 exercises the whole family can benefit from, Shpg. wt. 1 lb. 29.95

RTC-1-10, HERO JR. Program Language Cartridge, allows you to program the Robot through its keyboard, Shpg. wt. 1 lb. 39.95

RTC-1-11, Musical Chairs Cartridge, play titled game plus Acey-Ducey and Robot Mind Reader with HERO JR., Shpg. wt. 1 lb. 34.95

Photograph the heavens with your camera and the TL-400. Just order the optional Pulse Motor Drive and the appropriate Photography Set for your camera and enjoy an exciting evening of capturing the night sky on film.

Don't miss Halley's Comet — it won't be visible again for 76 years. See it and enjoy many years of educational and pleasurable stargazing with the Cometron Reflector Telescope.

TL-400, (Some Assembly Required), Shpg. wt. 35 lbs. 499.95

TLA-400-1 Pulse Motor Drive for easy viewing and photography, compensates for rotation of earth to track objects, Shpg. wt. 2 lbs. 119.95

TLS-400 Telescope T-mount Adapter and Camera Ring Set for your 35mm SLR, TLS-400-C, -M, -N, or -P (Specify for Canon, Minolta, Nikon or Pentax by using appropriate suffix such as TLS-400-N for Nikon), 1 lb. 29.95

SAVER! Save \$49.90 on the telescope with photography accessories when you order them as a system. The TLS-400-1 includes the Cometron Reflector Telescope, Pulse Motor Drive and Telescope T-mount Adapter and Camera Ring Set.

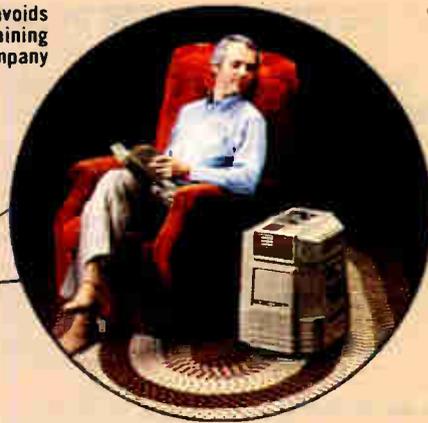
TLS-400-1 (Specify camera on order), Shpg. wt. 38 lbs. 599.95

Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.



Alter HERO JR's "personality" using simple 17-key keypad

Moves about and avoids obstacles while remaining in your company



Discover the fun and enjoyment of owning your own personal robot...HERO JR., as he entertains you, your family and friends



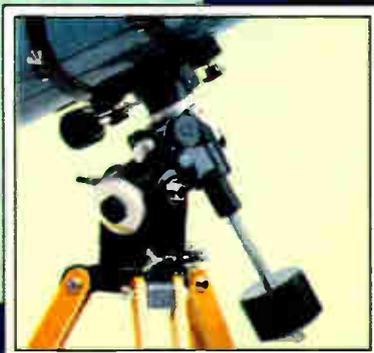
Guards specific area of your home against intruders with sensitive detectors



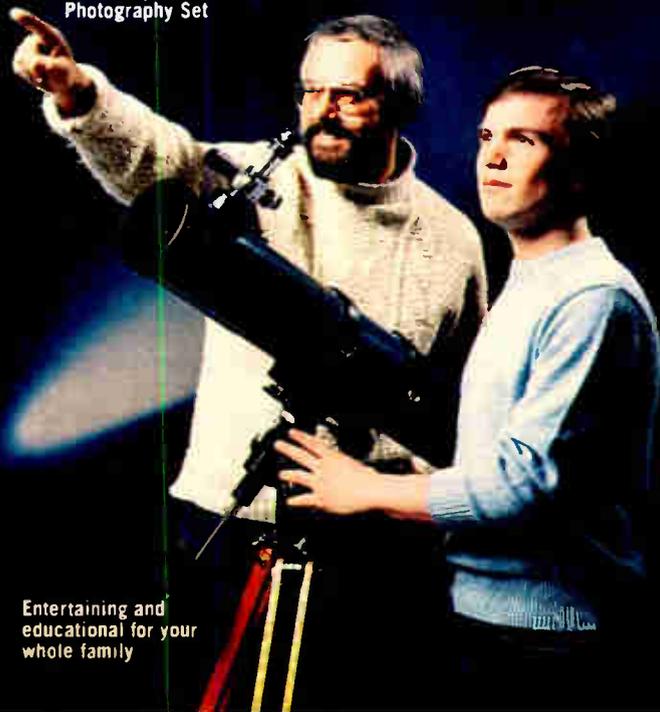
Wakes you at the time you select, even allows you two 10-minute snoozes



Cometron Reflector Telescope



Photograph the heavens with Photography Set



Entertaining and educational for your whole family

For the outdoor person or weather expert on your shopping list – Heath weather instruments

1 Heath's most advanced computerized weather station gives complete meteorological data instantly

Kit Only
\$399⁹⁵

- Displays time and date, indoor and outdoor temperatures in F or C, wind speed and direction, and barometric pressure – whether rising or falling and rate of change
- Microprocessor accuracy with memory storage of past weather data so that you can see weather trends
- Remote windcup – and weathervane transmitter

Keep in tune with the elements with the Heathkit Digital Weather Computer. It uses a microprocessor to instantly give you accurate past and present weather data to aid in forecasting future activities. The most complete Heath weather station, the ID-4001 is ideal for professional weather watchers, farmers, boaters, science teachers – for anyone going outdoors.

The Digital Weather Computer gives you the time in AM/PM or 24-hour format, and the date for log entries; both indoor and outdoor temperatures, whether above zero or below, in Fahrenheit or Celsius; 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 selectable inches or millibars, and whether rising or falling.

Heath's electronic almanac has more memories to store data: It records high and low temperatures, minimum and maximum barometric pressures, peak wind speed and, most importantly, the time and date each occurred. The data is stored in memory until you choose to clear it. Even the rate of barometric change is calculated – so you know when a major storm is about to develop. Connection to an external battery will hold memory contents in case of power failure.

The anemometer, weathervane and remote transmitter were designed using an aerospace wind tunnel to ensure reliable operation under adverse weather conditions. A compact boom assembly relays data to the computerized console indoors. The transmitter has solid-state infrared sensors and optical encoding transmission technology to provide a higher degree of accuracy than is possible with conventional, friction-sensing mechanical devices.

In addition, barometer readings are derived from a newly-developed piezo-resistive silicon bridge transducer that senses the most minute changes in atmospheric pressure. The four-digit readout has separate indicators to show whether the pressure is rising or falling.

A beautifully styled, solid oiled-walnut cabinet houses the Digital Weather Computer in both the easy-to-build kit or assembled version. IDW-4001 includes 100' of 8-wire cable. Order 8-wire cable (below) for kit ID-4001.

Kit ID-4001, Shpg. wt. 15 lbs. 399.95
Computerized Weather Station factory assembled and tested.
IDW-4001, Shpg. wt. 25 lbs. 699.95

ID-4001 SPECIFICATIONS: DIGITAL CLOCK/4-YEAR CALENDAR: Time Accuracy: Determined by accuracy of AC line. No accumulative error. WIND VECTOR: Accuracy: $\pm 5\%$ or better. Direction Display: Accuracy: ± 11.25 degrees. THERMOMETER: Temperature Range: -40° to 70° C; (-40° to 158° F). Accuracy: $\pm 1^{\circ}$ on Celsius readings; $\pm 2^{\circ}$ on Fahrenheit readings. BAROMETER: Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury), 981.9 to 1050 millibars. Accuracy: ± 0.075 in. Hg. ± 0.01 in. HG/°C. Operating Temperature: Outdoor assemblies, -40° to $+70^{\circ}$ C (-40° to 158° F). Unit, 15° to 35° C (59° to 95° F). Power Requirements: 120/240 VAC. Provision for external battery connection for memory backup during power failures. Dimensions: 7 1/4" H x 16" W x 6" D. Weight: 9 lbs.

2 Five-function weather station provides accurate data

\$169⁹⁵

- Monitors barometric pressure, indoor/outdoor temperatures, wind speed and direction
- Temperature-compensated-barometer can be used to an altitude of 10,000 feet

For the price you can't beat the features or the accuracy of the ID-1290 Weather Station. Designed for quality and reliability, it contains professional-grade sensors; all solid-state circuitry which operates from 120 VAC with minimum power consumption for maximum component life; and a non-corroding remote transmitter assembly that ensures years of trouble-free service.

Instant and accurate weather information: True indoor/outdoor temperatures are displayed in Fahrenheit and Celsius with a switch to select indoor or outdoor readings. A sensitive barometer helps you keep on top of the most significant changing atmospheric pressure conditions. Wind speeds can be read in two ranges: from 0 to 30 mph or from 0 to 90 mph. Eight wind direction indicators

provide a 16-point compass resolution. The anemometer/weathervane mounts on any standard 1" to 1 1/2" mast. The ID-1290 is a four-evening kit which may be wall-mounted or used as a desk set with the included stand.

Kit ID-1290, Shpg. wt. 8 lbs. 169.95

ID-1290 SPECIFICATIONS: Wind Speed: 0-30 mph, ± 2 mph; 0-90 mph, ± 5 mph. Direction: 8-point readout over 360°. Temperature: 0° to $\pm 120^{\circ}$ F. $\pm 2^{\circ}$ F (typ. INDOOR); -40° to $+120^{\circ}$ F (typ. OUTDOOR). Barometric Pressure: 28-31 inches of mercury within 0.5 inches, accurate up to altitudes of 10,000 ft. Operating Temperature: Receiver, 32° to 100° F; Transmitter, -40° to $+120^{\circ}$ F. Wind Direction: 16-point resolution by lighting two adjacent lights. Dimensions: Wall mounted, 20 1/2" L x 7" W x 2" D. Desk mounted, 6 3/4" D. Weight: 7 lbs.

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

IDA-1290-1, 50' cable, Shpg. wt. 2 lbs. 11.95
IDA-1290-2, 100' cable, Shpg. wt. 4 lbs. 19.95
IDA-1290-3, 150' cable, Shpg. wt. 6 lbs. 26.95

3 Convenient Digital Indoor and Outdoor Thermometer

\$89⁹⁵ • Digital display of indoor and outdoor temperatures
• Continuous or alternating Fahrenheit or Celsius display

Eliminate the guesswork in getting accurate temperature readings. The large, red display digits can be easily seen from across the room, at night and in bright daylight. When you compare the advantages the 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.

Monitors temperature readings from two sensors for accurate indoor/outdoor readings. Measures temperatures from -30° F to 120° F with an accuracy of $\pm 1^{\circ}$ from 20° F to 120° F, $\pm 2^{\circ}$ from -40° F to 120° F. The 2 1/2 digit display indicates above- and below-zero temperature readings. Select Fahrenheit or Celsius scales, with a continuous reading of indoor or outdoor temperatures or alternate readings of both. 10' indoor and 75' outdoor cables are included. Easy to assemble and calibrate, the ID-1390B is a gift that gives year-round value. Operates at 120 VAC, 60 Hz (order ID-1390BE for 240 VAC, 50/60 Hz operation).

Kit ID-1390B, Shpg. wt. 4 lbs. 89.95

4 Accurate Digital Wind Speed/Direction Indicator

\$99⁹⁵ • Check wind speed and direction with electronic accuracy
• Read wind speeds in mph, kph or knots, from 0 to 99
• Non-corroding outdoor transmitter for years of service

The Digital Wind Indicator skimps on price but not on accuracy or reliability. The transmitting unit is designed to give you precise wind speed and direction year after year. The anemometer and weather vane are constructed of non-corroding waterproof materials for errorless readings under any conditions.

The indoor console features an easy-to-read display and can be wired to report in two of three scales: mph, kph and knots from 0 to 99. Incandescent bulbs provide 16-point compass resolution by temporarily lighting two adjacent bulbs simultaneously. In only three evenings you can have the ID-1590 working and calibrated for true north or magnetic north. Only two simple adjustments are required for operation. Requires 8-wire cable. Operates on 120 VAC.

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

5 Relative Humidity Indicator monitors air moisture

\$99⁹⁵ • Improve your environment and reduce heating/cooling costs
• Costs half as much as comparable units and offers more

The Relative Humidity Indicator uses two electronic sensors to let you know the relative humidity indoors and outdoors. Save time and dollars when you know if it's dry enough outside to paint in the summer or time to turn on the humidifier in the winter to save on your heating bill.

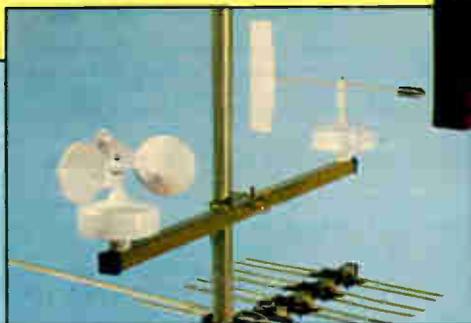
Electronic sensors provide accuracy and reliability: Unlike most barometers, which use animal membrane or hair, Heath's barometer uses a conductive film covered with a layer of gold for greater reliability – and electronic sensors allow accurate readings in remote locations. With both sensors connected, the console displays alternate readings, or can be switched to display one reading constantly. Bright, 1/2" digits display the humidity by percentage, from 0 to 99 percent. A 100' transmission cable is included. Two or three evening kit.

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

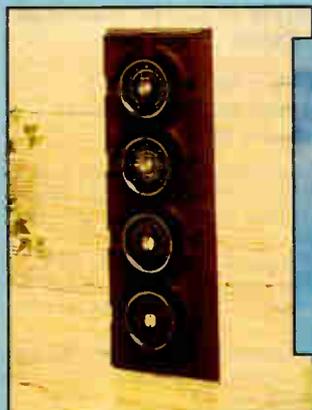


1 Heath's most advanced weather station

A microprocessor-based meteorological unit, the 10-4001 offers instant access to more comprehensive atmospheric data than was ever available to the layman with a serious interest in the weather. The remote transmitter (shown below) attaches firmly and easily to a TV antenna mast. Lead-in cable for the 10-4001 must be ordered separately in the length required.



Digital Weather Computer provides current and past data on all the weather



2 Low cost station

Displays barometric pressure, wind direction and speed and temperature



3

Indoor/Outdoor Thermometer provides easy-to-see readings in Fahrenheit or Celsius



4

Wind Speed/Direction Indicator features superior transmitting unit

5

Save on heating bills – Relative Humidity Indicator shows you when it's time to turn on the humidifier



These accurate, elegant timepieces will be treasured gifts for many years

A Heath clock is always a welcome gift. And, when you give a kit clock you are giving two gifts: a precise, attractive timepiece — and an experience in the pride and satisfaction of “building it yourself!”

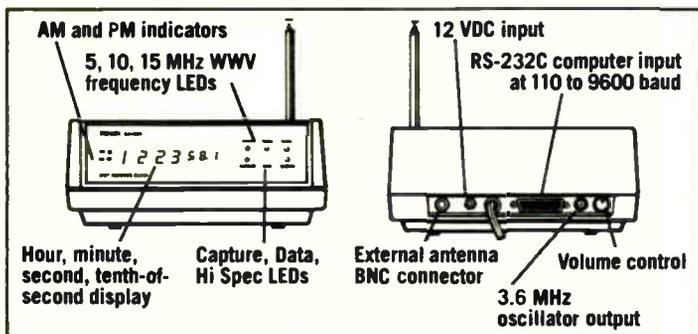
1 Have the ultimate in timekeeping accuracy with Heath's NBS atomic synchronized clock

\$249⁹⁵

- Synchronize with the NBS cesium atomic clock
- An accuracy of ± 10 ms when Hi Spec LED lights
- An ASCII computer output provided by RS-232 Accessory
- Audio monitor allows you to listen to WWV broadcasts
- Operates on 120 VAC/60 Hz or 12 VDC battery power for use on land, sea, or in the air.

The National Bureau of Standards (NBS) provides the definitive time standard for the United States. You can lock onto this standard with the GC-1000 Most Accurate Clock for unparalleled accuracy. The GC-1000 sets itself to the correct time when it locks onto WWV, the NBS radio station. The Most Accurate Clock will reset itself to the correct time even after a power failure.

It's the first affordable, microprocessor-based time machine with a “Hi Spec” accuracy of ± 10 milliseconds. The NBS radio station transmits a one-minute stream of time-code data containing day of year, hour and minute data in Universal Coordinated Time (UTC) with a correction factor for UTC1 time, which compensates for the earth's rotational wobble.



An RF receiver scans the 5, 10 and 15 MHz frequencies of WWV and locks onto the strongest signal. A selectable audio monitor permits you to listen to the audio broadcast on these frequencies. To improve reception of WWV frequencies, an external antenna is recommended but may not be required in your area.

Ultimate accuracy: The front panel provides a bright digital readout in hours, minutes, seconds and tenths-of-seconds. An RS-232C Accessory allows this data, along with the date, to be fed to your computer.

LED's show which WWV frequency is being received, when 'capture' of the time-encoded NBS carrier occurs, when data is being received and when the Clock is at “Hi Spec” accuracy. Simple switch changes permit setting the Clock for any of the world's standard twenty-four time zones. During noisy reception conditions, the GC-1000 keeps time with its own crystal oscillator.

The RF receiver circuit board is preassembled for you and factory aligned for accuracy. Propagation delay can be set for up to 18.75 milliseconds, a distance of 3600 miles from WWV. Internal 3.6 MHz oscillator signal is available at the Clock's rear panel.

The GC-1000 Most Accurate Clock comes with a connector and seven feet of cable for connection to an external antenna. The Most Accurate Clock can be powered with standard home 120 VAC or by 12 VDC power supplies, such as marine or aviation storage batteries.

- Kit GC-1000, Shpg. wt. 7 lbs. 249.95
 GCA-1000-1, RS-232C Output Accessory, Shpg. wt. 1 lb. 49.95
 GCW-1000, Assembled and tested Most Accurate Clock with RS-232C Output. Shpg. wt. 6 lbs. 425.00

GC/GCW-1000 SPECIFICATIONS: Receiver: AM super heterodyne, single conversion with tuned RF amplifier. Sensitivity: $1 \mu\text{V}$ or less for 10 dB S = N/N. Audio Output: 250 VmW into 8 ohms. Clock Accuracy: Within ± 10 ms when Hi Spec LED is on. Internal Oscillator Output: 3.6 MHz. Power Requirements: 120/240 ± 15 VAC, 50/60 Hz @ 100 mA or 11-16 VDC @ 750 mA (150 mA with display turned off). Dimensions: 37/8" H x 9" W x 61/4" D (9.8 x 22.9 x 15.9 cm) less antenna.

2 This modern digital floor clock is a stylish and useful timekeeper for any home

\$249⁹⁵

- Bright digital display adjusts to ambient room light
- Handsome cabinet makes this a valued furnishing
- Smoked glass shelves display books, knick-knacks
- Excellent kit for the first-time builder

Add elegance to any room in your home with this distinctive Digital Floor Clock. The GC-1195 is housed in five feet of handsome simulated walnut-veneer cabinet with anodized corner pieces. The bright, 3 1/4"-high digital readout adjusts to surrounding light for a subtle gold-toned display. The display will flash when there has been a power disruption.

An attractive piece of furniture as well as a timekeeper, the Floor Clock will fit in with almost any decor. The clock features four smoked glass shelves. These 1/4" thick shelves are perfect for showing off your knick-knacks, plants or books.

An excellent first-kit project, the GC-1195 Digital Floor Clock displays hours and minutes with the center colon pulsing once each second. The clock may be set to the correct time with two easy-to-use advance switches on the bottom of the clock chassis. Operates on 120/240 VAC, 50/60 Hz. 60 1/2" H x 14" W x 9 1/2" D.

Kit GC-1195, Shpg. wt. 58 lbs. 249.95

3 Enjoy Heath accuracy and style in the economical and fun-to-build Digital Alarm Clock

\$29⁹⁵

- Displays time in 12- or 24-hour format
- Snooze alarm, flashing display with power disruption
- Display automatically adjusts to ambient light

The four-digit blue-green fluorescent display automatically adjusts to ambient light conditions. The GC-1107 displays hours and minutes in either 12-hour or 24-hour time (with AM/PM indicators in the 12-hour mode). A flashing display lets you know there's been a power disruption.

Space-age accuracy is provided by a metal-oxide semiconductor (MOS) integrated circuit. Fast and slow setting switches make it easy to accurately set the time. And rear panel switches make it easy to turn off the alarm or set the alarm for an extra 9 minutes of sleep.

Get started in kitbuilding today — and add a new pleasure to your life! Our easy-to-build Digital Alarm Clock kit includes a handsome simulated wood-grain cabinet, built-in speaker and an easy-to-follow assembly manual.

This practical Alarm Clock operates on 120 or 240 VAC, 50/60 Hz. Overall dimensions: 2 1/4" H x 7" W x 4 3/4" D.

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

4 Heath's Digital Wall Clock fits anywhere

\$49⁹⁵

- Quartz-crystal accuracy of ± 1 minute per year
- Runs up to two years on a single 1.5 "A" alkaline cell
- 1" high LCD digits provide a clear, legible display
- Displays time in 12- or 24-hour format

Have the accuracy you'd expect from an expensive quartz watch with the GC-1720 Digital Wall Clock. A crystal oscillator and integrated circuit ensure the clock's split-second precision and reliability. The Wall Clock is easy to set when changing to or from daylight savings time, moving the clock or changing the batteries.

Battery powered operation eliminates worries about power outages and accidental disconnection. Put a GC-1720 Wall Clock in a cabin, RV, boat or just about any place since the case measures a slim 7 1/8" wide by 5 1/2" high by 1 1/2" deep.

This attractive Wall Clock blends with almost any decor since it is housed in a simulated wood-grain finish oak cabinet. The cabinet is also sturdy and lightweight, making it ideal for the boat or cabin.

The GC-1720 Digital Wall Clock is an easy-to-build beginner's kit that takes just one evening to assemble.

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

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



1 The GC-1000 supplies the most accurate time available at an affordable price. Lock-in on the Bureau of Standards atomic clock to have the ultimate time standard in your home or office.



The Heathkit® Pledge

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

"We won't let you fail!"

1 Rechargeable Portable Light makes it easy to see

\$49⁹⁵

- Provides more light over a wider area than conventional, harsh flashlights
- Operates for hours on a charge – recharges overnight on 120 VAC or 12 VDC

Indoors or out, the GD-1246A will bathe your working area with a bright, yet soft-on-the-eyes fluorescent light. Helps you see a wider area without sharp, eye-straining shadows. Safer to use than candles and kerosene lamps in a power outage or while camping. And it saves you money by recharging over and over for just pennies. "Soft start" feature extends tube life. 120 VAC and car lighter socket chargers included. A single charge lasts several hours.

Kit GD-1246A, Shpg. wt. 6 lbs. 49.95

2 Electronic Metronome gives you a perfect beat

\$29⁹⁵

- Variable between 40 and 210 beats per minute
- Reliable performance in cherry-finish birch enclosure

Whatever instrument you play, the Heathkit Electronic Metronome will maintain a steady beat so you can practice confidently at the correct tempo. Uses a sound board and solenoid to produce an authentic metronome sound.

Front panel control lets you set the tempo you need. A rear panel control lets you adjust the volume from soft to a loud, conventional "tick-tock" rhythm. Includes a handy label so a student can relate the number of beats per minute to tempos in different time signatures.

Kit TD-1257, Shpg. wt. 2 lbs. 29.95

3 This AM Portable Radio is an easy kit to build

\$19⁹⁵

- Designed for the first-time kit builder
- Optimum AM reception, almost anywhere
- Improved circuitry for extended battery life

A perfect kit that will thrill any youngster! Excellent AM sensitivity gives sensational reproduction of voice and music with a clear, even tone. Take this great little performer with you anywhere for extra fun. High-gain ferrite rod antenna delivers long-distance reception. Uses 9V battery (not included) or PS-2350 Battery Eliminator on page 46. Includes earphone for private listening.

Kit GR-1009, Shpg. wt. 2 lbs. 19.95

4 Fisher Technik Robotic Experimenter Kit

\$179⁹⁵

- Build and program 10 projects, including a plotter, robot, machine tool and solar cell tracker
- Includes everything you need to interface each project with your personal computer
- Expand electronics, robotics and programming knowledge

Use one set of components to build 10 useful and entertaining robotic devices. The Robotic Experimenter Kit lets you build intriguing, computer controlled devices such as a robotic arm which plays "Tower of Hanoi," a materials lift, machine tool, teaching robot, traffic light, plotter, graphic panel, antenna rotor, measuring and sorting system, and computing demo device. Then use the included software and interface to program your computer to control these devices.

GDP-1620-1 for Heath/Zenith Z-150 and IBM compatible computers, Shpg. wt. 3 lbs. Regularly \$199.95 **Introductory Special 179.95**

GDP-1620-2, for Apple II, II+, IIc computers, Shpg. wt. 3 lbs. Regularly \$199.95 **Introductory Special 179.95**

GDP-1620-3 for Commodore 64 and VIC 20 computers, Shpg. wt. 3 lbs. Regularly \$199.95 **Introductory Special 179.95**

5 Heath's Ultrasonic Cleaner for delicate items

\$99⁹⁵

- For those almost-impossible special cleaning chores
- Cleans and sanitizes most precious items that might be damaged by abrasive scrubbing or harsh cleansers

This scientific method is the fastest, most effective way to clean dirt, stains and undissolved solids from hard-to-clean jewelry, watch parts, glass, coins, components, dentures, paint brushes, etc. Cleaned objects sparkle like new! All delicate items, except pearls and turquoise, are safely cleaned without abrasion.

The GD-1151 Ultrasonic Cleaner is efficient, with a maximum power consumption of only 100 watts. Use a standard laundry detergent or softener at any temperature between 32° and 122°F. Filling the 6" L x 4" W x 2½" D tank with one inch of cleaning solution only requires about 1¾ cups.

Professional artisans, jewelers and watchmakers have used the ultrasonic method for years. This low-cost kit is easy to build, in two evenings – and it lets you take advantage of this safe and efficient cleaning process. Operates on 120 VAC.

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

6 Photoelectric Light Switch to protect your home

Great low-cost insurance against break-ins: Turns lights on in the evening, off at dawn – automatically. Gives your home a "lived-in" look to discourage unauthorized entry while you're away. Plug it into any outlet, adjust sensitivity and it controls lamps or other AC-operated devices up to 150 watts. Practical and beneficial security kit, 3½" H x 2½" W.

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

7 Photobeam Alarm Relay detects intruders

Multi-purpose system. Consists of mirror assembly and light source/photocell relay. Uses a narrow, reflected beam to catch intruders instantly, activating lights or any 120 VAC warning devices you have plugged in up to 300 watts total. It is sensitive to its own light source up to 25 feet away from its reflecting mirror. The electronics package has dimensions of 5½" H x 4¾" W x 5¼" D.

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

8 Battery Life Tester saves on replacements

\$16⁹⁵

- Ideal for users of portable instruments and equipment
- Check usable life of 1.2V to 9V batteries

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

Kit GD-1703, Shpg. wt. 1 lb. 16.95

9 Inexpensive, easy-to-build Freezer Alarm

\$19⁹⁵

- Prevent costly food loss from freezer failure
- Be alerted to a freezer door left open

Protect your meats and other frozen foods from spoilage by installing an instant alarm that warns of a failure in your freezer's cooling system or a door left ajar. Two-speed alarm beeps and red LED flashes at a slow rate if inside temperature rises above +20°F; faster if door stays open too long. Requires 2 "C" batteries (not supplied). Slide switch shuts off alarm. Includes 20' of thin hook-up wire, plus mechanical, temperature and water sensors – with application ideas.

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

10 Flood Alarm detects water, sounds loud warning

\$24⁹⁵

- Easy to install – monitors 24 hours a day
- Helps prevent costly water damage

Don't take chances! Avoid expensive, messy water hazards in your home, office, boat, basement, RV, factory, garage – anywhere excess moisture threatens! The reliable Flood Alarm will detect water when it first appears, giving you time for corrective action before it can do major damage. The water sensor sticks anywhere. When water touches it the Alarm produces a loud, insistent beeping in time with a flashing red LED to get fast attention!

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



Easy, one-evening kits make practical, enjoyable gifts



For a Christmas present they will both enjoy and use, give them a Heathkit product. From a portable radio for your daughter or son, to a light for dad, or a metronome for the musician — you can't go wrong when it's a quality Heathkit product.



1



2



3



5



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Ten unique Christmas presents that will please the "hard-to-shop-for" relative or friend

① Improve your game year-round with Golf Trainer

\$199⁹⁵

- Immediately analyzes six important aspects of your swing
- Practice indoors or at the driving range with real balls

A few minutes of practice on the Golf Trainer can be worth hours on the course. The microprocessor-controlled Golf Trainer from Mitsubishi uses electronic accuracy to analyze and provide a readout of your swing. For each stroke it shows you: Head Speed so you can achieve a longer carry, Carry for determining loft in confined spaces, Ball Direction, Head Angle to improve body position, Duffing, and Out of Bounds to indicate an excessive offline shot. Includes 2 tees, magnetic sheets for woods, adhesive seals and 3 plastic balls.

GDP-1433, Assembled, Shpg. wt. 3 lbs. 199.95

② Program your doorbell to suit the season

\$49⁹⁵

- Program it to play up to 16 beats of your favorite tunes
- Comes with song book containing over 50 programmable melodies, including nine Christmas songs

Changing tunes is easy, by arranging wire leads on a one-octave "keyboard" behind the front panel. The songbook includes 15 college songs, 7 seasonal songs plus 9 Christmas songs, 5 to commemorate special occasions—and many more to celebrate your mood. The assembly manual has programming instructions for a variety of tunes, or compose your own. Controls for adjusting volume, tone, speed and delay characteristics add synthesized variety to any tune. Attaches easily to existing doorbell transformer. Extra speakers may be wired on to spread the music around your home. Back door button activates a portion of the tune.

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

③ Use this Digital Scale to accurately monitor weight

\$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 kilogram

This multi-purpose scale 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 as small as 2 ounces and up to 300 lbs. There are no springs and weights to wear out and an automatic mode conserves power.

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

④ 3-Tune Doorbell greets guests with beautiful music

\$24⁹⁵

- 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

Replace your ho-hum doorbell. This one plays three selections: an upbeat 4-note ring, Beethoven's *Für Elise*, and *Romance*. Runs on two "C" batteries and your present 10 to 16 volt doorbell transformer. For unlit doorbells.

Kit TD-2089, Shpg. wt. 1 lb. 24.95

⑤ Digital Thermometer for accurate measurements

\$59⁹⁵

- Accurately measure the temperature of liquids or air
- Weighs only 5.5 ounces and gives easy-to-read 4-digit temperatures in less than 10 seconds

This battery powered electronic thermometer delivers reliable readings every time. The Digital Thermometer's wand senses from 32° to 230°F (0° to 110°C) with ± 0.2°F (± 0.1°) biomedical accuracy and 0.5% overall accuracy with 0.1°F or C resolution. Red LED's display the temperature of liquids or air.

GD-1226, Assembled and tested, Shpg. wt. 2 lbs. 59.95

⑥ Electronic Digital Blood Pressure/Pulse Monitor

Eliminate troublesome trips to the doctor's office or clinic. Now you can take those blood pressure and pulse-rate measurements at home. Easy to use and easy to read, this Monitor is ideally suited for the office or home. Just put the cuff in place and inflate. Electronic metering does the rest. Batteries included.

GXP-2120, Assembled, Shpg. wt. 2 lbs. 59.95

20/HOME, HOBBY, HEALTH

⑦ Get consistent darkroom processing

\$139⁹⁵

- Programmable memory recalls up to 10 steps; precise auto-step sequencing and microprocessor control provide more accuracy than dial timers
- Waterproof front panel has selectable backlighting

Have the precise timing required for quality color or black and white prints, and program the timing sequence you need for developing prints and films. Use memory for absolutely consistent exposures when making multiple prints, or make one-time Timer settings. The Programmable Darkroom Timer features a 4-digit timer and a 12-hour LED clock to synchronize printing and developing steps. Audible alarm settings are available at 1, 30 or 60 second intervals in any combination, or once at the end of a programmed cycle. A 10-second, end-of-cycle alarm tells you when to begin pouring from the tank.

Kit PT-1500, Shpg. wt. 5 lbs. Last Call 139.95

PTA-1500-1, Optional Single Foot Switch, Shpg. wt. 1 lb. 12.95

PTA-1500-2, Optional Dual Foot Switch, Shpg. wt. 3 lbs. 29.95

PTA-1500-3, Optional Auxiliary Outlet, Shpg. wt. 1 lb. 15.95

⑧ Reliable thermometer with digital precision

\$13⁹⁵

- Be sure of temperature readings with accurate GXP-2121
- Tells you when the display reading is ready
- Easy enough for the babysitter to use

Eliminate the annoying squinting and guessing that's required when using a conventional mercury-bulb thermometer. This thermometer provides easy-to-read accuracy from 89.6° to 107°F. And within 60 seconds! You always know when you have the correct reading—the F symbol stops blinking when the peak temperature is displayed on the digital readout. For your convenience, ten sanitary probe covers and a battery are included with the GXP-2121. More sanitary probe covers may be ordered.

GXP-2121, Assembled, Shpg. wt. 1 lb. Only 13.95

⑨ Keep track of your goals with the Bicycle Computer

\$49⁹⁵

- Displays cycling distance, time, speed and calories used
- Has useful built-in quartz clock and stopwatch
- Use it with a standard bicycle or spoked-wheel exercise bike

If losing weight or exercising, this Bicycle Computer can help. Just enter the constant data into the computer memory banks: tire size, your weight, how far you want to ride and time of day. Then the Computer takes over! Large LCD numerals give you your cycling distance in miles and kilometers, actual cycling time, speed (both average and peak) and the number of calories consumed. A built-in quartz clock and stop watch monitor speed—a two-speed audible beeper helps you monitor your pace. For use with standard bicycle or spoked-wheel exercise bicycles. Installs in about 20 minutes. Uses two AA batteries (not included).

GXP-2105, Assembled, Shpg. wt. 2 lbs. 49.95

⑩ Find buried valuables with Heathkit's Metal Locator

\$249⁹⁵

- Find valuable objects where most locators are useless
- Easy-to-read meter installs for left- or right-hand users.
- Balanced for easy fatigue-free use

Fully adjustable discrimination circuit filters background signals—screening out pulltabs, metal foil, bottle caps, ferrous and alloyed items. Have the sensitive pushbutton tuning of our best metal locator at a price far below the competition. A ground balance mode pinpoints treasures even in high-mineral soil. A Very-Low-Frequency induction balance system provides silent operation until that coin or artifact enters the 6-inch diameter search head field of detection. Then a clear tone sounds that grows louder as you approach vertical center.

Use the Groundtrack anywhere. It's lightweight and portable, with a telescoping shaft that collapses for storage. Operates on 6 AA cells (not included) or the optional Rechargeable Battery Pack, which includes AC outlet and DC lighter socket chargers for use at home or in-the-field.

Kit GD-1290, Shpg. wt. 5 lbs. 249.95

GDA-1190-1, AC/DC Rechargeable Battery Pack, Shpg. wt. 2 lbs. 29.95

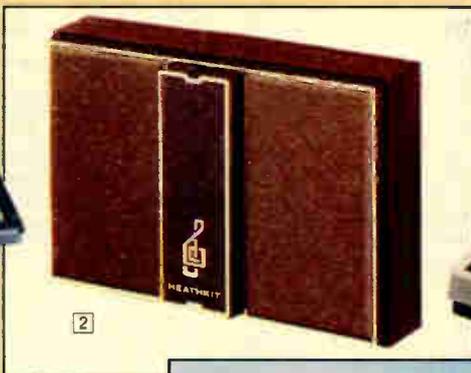
HDP-1396, Headphones, Shpg. wt. 2 lbs. 14.95

Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.

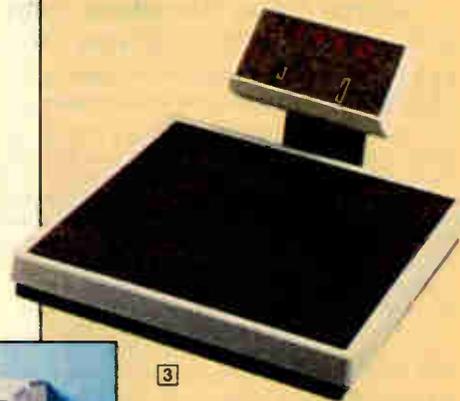




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1 Infrared Stereo Headphone System gives you cordless headphone listening

\$89.95

- Enjoy private stereo listening — without confining cords
- System works with any audio source

The freedom of cordless hi-fi listening can be yours with the Infrared Stereo Headphone System by Nady. Listen to your stereo or TV without disturbing others and without being tied to a bothersome cord. This affordable system uses infrared technology to convert sound into invisible infrared light waves. The waves are received by a sensor in your headphone and converted back into high quality stereo sound. The Infrared Stereo Headphone System is also an excellent aid to the hard-of-hearing.

Anyone wearing a headphone in the area can listen to the system. You can even set up more than one listening channel in the room by correct positioning of an additional transmitter for each channel. The transmitter covers a conical range extending up to 35 feet in front of the transmitter. Transmissions will not penetrate walls to disturb others using a system in an adjacent room.

The transmitter easily plugs into the phone plug type earphone or headphone jack of any equipment. An AC power adapter comes with the Stereo Headphone System. The adjustable-size headphone has a volume control, on/off switch, battery compartment for the required DC 9V battery, and auxiliary jack so that it may also be used as a standard headphone.

GDP-1432, Assembled Infrared Stereo Headphone System, includes Transmitter and Headphone, Shpg. wt. 3 lbs. **89.95**

2 Audiophile quality in a medium-powered 30-Watt Stereo Receiver from Heath

\$299.95

Last Call

- A multitude of versatile features, size and price make this the perfect unit for the apartment dweller or college student
- An array of exceptional specifications and more performance for your dollar with our high 2.5 dB (53 watt) dynamic headroom
- All-in-one audio quality — designed for highest fidelity first, then for high styling
- A four-evening kit of uncompromising value

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

The AR-1250 Digital FM Stereo Receiver is ideal for the college student, apartment dweller or budget-minded audiophile who wants a high-quality, medium power stereo system. This 30-watt Stereo Receiver fuses the best in audio technology with versatile features.

Heath's award-winning engineers designed the AR-1250 to meet the highest standards of accurate audio reproduction — just check the Receiver's outstanding specifications. Excellent FM sensitivity and very low distortion allows you to enjoy clear FM reception at an extraordinarily low price.

Ease-of-use and versatility are part of the design with a bright green digital frequency display, a bar graph display of instantaneous signal strength and power output level, and exact LED center-tune and stereo locking indicators. Select A or B speaker systems, or both. A pre-amp-out/power-amp-in adapter loop makes adding an equalizer, audio processor or electronic crossover very easy. Three source switches route the audio signal with full monitor or dub from one tape deck to another, or listen to any source while recording from another source.

Connect up to two tape decks, headphones, power amp, or auxiliary sources like a TV, turntable, etc. And shape the amplifier response with bass, treble, flat and loudness controls. In addition, switch-in low and high frequency filters for selective noise rejection of frequencies below 30 Hz and above 7 kHz.

Easily build the Digital Stereo Receiver in just four evenings with the famous Heathkit manual and enjoy this high-performance low-priced receiver that gives you more of what you listen for.

Kit AR-1250, Shpg. wt. 23 lbs. Last Call **299.95**

SPECIFICATIONS: FM SECTION: Mono/Stereo. Usable Sensitivity: 1.9 μ V (10.8 dBf)/3.5 μ V (16.1 dBf). 50 dB Sensitivity: 3.5 μ V (16.1 dBf)/38 μ V (36.8 dBf). S/N Ratio: 70/65 dB. Hum and Noise: 65 dB. Harmonic Distortion: 0.15%/0.3%. Frequency Response: 30-15,000 Hz @ \pm 1.5 dB. **PREAMPLIFIER:** Frequency Response: 20-20,000 Hz @ \pm 0.5 dB. Phono, 20-20,000 Hz @ \pm 0.3 dB. Aux. THD and IMD (2 V out): 0.009%. Input Sensitivity (0.5 V out): 1.25 mV. Phono, 100 mV. Aux. Input Overload: 150 mV. Phono, 10 V. Aux. S/N: 75 dB. Phono, 85 dB. Aux. **AMPLIFIER IMD:** 0.012%. **TIM:** < 0.02%. Frequency Response: 20-20,000 Hz @ \pm 0.2 dB. 1 kHz Separation: 50 dB. A-Weighted S/N: 95 dB. Power: 120 VAC/60 Hz. Antenna Connections: 300 & 75 ohm. Convenience Outlets: 1 switched, 1 unswitched (200 W max). Dimensions: 4 1/2" H x 17" W x 15 1/4" D.

3 Lab-grade Portable Real-Time Spectrum Analyzer

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

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

Sound you can see: The AD-1308 displays line input or acoustic-pickup spectral response and sound pressure level, making it possible to optimize your entire audio system. The AD-1308 features 1 or 3 dB scaling for accurate setups.

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

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

Kit AD-1308, Shpg. wt. 5 lbs. **299.95**

SAVER! ADS-1308, Save \$69.90 on this system which includes AD-1308 Spectrum Analyzer, ADA-1308-1 Power Supply/Rack Mount Accessory and AD-1309 Pink/White Noise Generator, 27 lbs. Separately \$469.85 **System Price 399.95**

AD-1308 SPECIFICATIONS: SPL and Spectrum Analyzer Display Range: 23-126 dB SPL. SPL Accuracy: \pm 1 dB A-weighted. Microphone Self-Noise Level: < 36 dB SPL. A and C Weighting Filters per ANSI: SI. 4-1971 (Rev. 1976). Fast and Slow SPL Response per ANSI: SI. 4-1971 (Rev. 1976). Flatness on Direct Input: \pm 1 dB. Input Impedance: > 10k ohms. Input Sensitivity, 90 dB SPL Range: 0 dB = 350 mV RMS \pm 10%. Power Requirements: 10.5 V. \pm 10% @ 425 mA. Low Battery indications: 6 V \pm 5%.

4 Power Supply/Rack Mount Accessory

Affords the best way to install and power your AD-1308 in Heath rack mount cabinets, charge the batteries when using nickel-cadmium batteries for portable power, and couple your system's audio signals to the Analyzer. Sturdy 9-pin D-connector permits unit to "snap" in and out easily. Has paralleled phono jacks for each channel. Left, Right, L + R or L - R signals can be selected and displayed. Ample space to store small accessories, microphone and AD-1309 is provided behind a hinged, swing-up front panel.

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

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

5 Accurate Pink/White Noise Generator

The AD-1309 supplies audio energy with the precise frequency characteristics to properly make measurements with real-time or swept-filter spectrum analyzer — at a fraction of the cost of comparable generators. It features front panel phono plug outputs and rotary power level control. The Pink/White Noise Generator operates on one 9 VDC battery.

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

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

6 Multi-purpose AA-18 Solid-State Mono Amplifier

3.25 WATTS, MINIMUM RMS, INTO 8 OHMS WITH LESS THAN 1.5% TOTAL HARMONIC DISTORTION FROM 40-20,000 HZ

This solid-state kit takes a minimum 250 mV signal from a source (ceramic phono cartridge, monophonic AM or FM receiver, tape player, TV, etc.) and amplifies it cleanly. Drives 8-ohm speakers to surprising sound levels — also can be used as a good headphone amplifier. The AA-18 is an ideal beginner kit that goes together in just a couple of evenings.

The AA-18 Mono Amplifier features rear panel speaker terminals and input jack. On the front panel are located a headphone jack, power switch with 'on' lamp, and volume and tone controls. The all-metal housing has dimensions of 2 3/8" H x 7 3/4" W x 5 1/2" D. It is fuse protected and operates on 120/240 VAC, 50/60 Hz at 5 watts maximum.

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

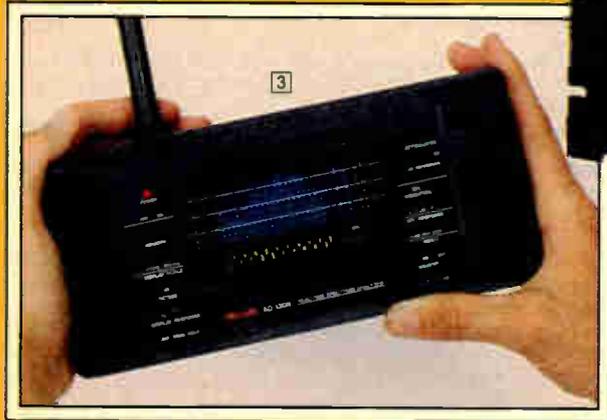




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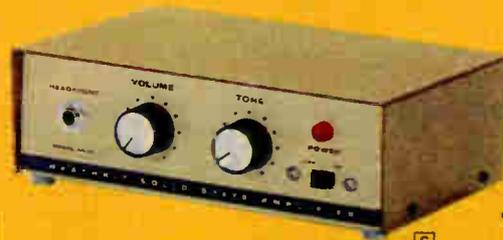
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7 Hands-Free Telephone Headset and Amplifier Adapter

\$39⁹⁵

- Comfortable headset is lightweight and adjustable, with replaceable, foam-padded on-the-ear speaker
- Easily flip a switch on the amplifier to switch-over from the headset to your regular handset

Your hands can work while you talk with the convenient Hands-Free Telephone Headset and Amplifier by Nady. Just plug the amplifier into the modular jack on any standard business or home phone. Both the headset and your regular handset plug into the amplifier.

Flip an easy-to-reach switch on the top of the amplifier to switch between the headset and handset. Or, get up and move around without taking the trouble to remove the headset — a tug on the lightweight cord quickly disconnects you from the Amplifier. The cord clips to your clothing and out of your way. An LED shows when the headset is in use. A volume control on the Amplifier allows you to adjust the volume for up to 6 dB louder than conventional telephones! A Mute switch lets you turn off the sound through the Amplifier for private conversations.

The Amplifier operates off phone line voltage so no batteries are needed. The built-in condenser mic has high definition for clear, clean sound. Surge voltage circuitry protects the unit from line surges.

GDP-1343, Assembled Hand-Free Headset, Shpg. wt. 1 lb. 39.95



Control your home with advanced monitoring, control and security systems and devices

BSR X-10 Home Control System commands up to eight groups of lights and appliances from one location

Design your own electronic home control system with BSR X-10 components. Control lamps and appliances with a single timer, by remote control, and by computer using the Heath Interface Kit. You can even turn on the air conditioner or the lights by phone. The wide variety of combinations and applications allow you to put together a system which will fit your own unique needs. Decide what types of control you want, order the components of your custom electronic control system and start creating!

1 The Mini Controller Console is one of the most ingenious and useful home conveniences ever devised! Now, with a fingertip touch, you're in complete control by remote control, from beside the bed or wherever you plug the Mini Controller in. Console signals are transmitted over existing house wiring to the module of your choice. Just plug lights and appliances into the appropriate module.

Control up to eight groups of modules with as many modules as you wish in each group. Lamps and appliances in a group will go on and off together. Dim and brighten lights by holding a key down until lights are at the desired level. Single buttons allow you to instantly turn all lights on, or to instantly turn all lights and appliances off. Lights and appliances plugged into a module may still be turned on or off with their own switches.

Control lights, fans, TVs and stereos anywhere in and around your house from a single location. Or, place other Mini Controllers in different rooms for easy access to complete home control at all times. Since all commands are carried through the AC wiring of your home, your control can even extend to unattached garages, barns, sheds, and pool, porch or yard lights.

The Mini Controller acknowledges each command with a flashing red LED on the top of the unit. The console is housed in an attractive and compact case which may be hand-held or easily mounted on a wall.

GDP-1550, Assembled, Shpg. wt. 2 lbs. 21.95

2 Timer Command Console runs everything on time. *Automatically!* Used with the modules, your home can run like clockwork, setting lights and appliances to your family's needs and lifestyle. The possibilities are virtually unlimited! Away for the weekend? The Timer is on guard, giving 24-hour control with a lived-in look and sound when you're gone — even simulates movement from room to room — so nobody knows that nobody's home. Features digital clock with two levels of display brightness. Fast and Slow set keys for easy setting and programming. Daily, Once, and a random Security code; Clear to erase a setting; All Lights On and Now for immediate security and control. No dimming feature. Now has full battery backup (four AA cells, not included) in case of power failure.

GDP-1520A, Assembled, Shpg. wt. 3 lbs. 69.95

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. Give your home a lived-in look by activating a TV or a radio to discourage prowlers. Or, give your home a call to turn on most 120 VAC electric heaters, furnace, or window air conditioners and fans depending on the weather. Includes modular phone cable. Control center measures 2¼" H x 5¾" W x 5½" D. Remote Responder measures 1¼" H x 2¼" W x 5¼" D and requires one 9 volt battery.

GDP-1515, Assembled, Shpg. wt. 6 lbs. 99.95

4 The dream of a computer-operated home or office is now a reality thanks to Heath's new 'universal' RS-232/C to BSR X-10 Interface kit! Connected between your present Heath or other computer and existing electrical wiring, it enables you to control up to 256 groups of modules with unlimited timing patterns.

The GD-1530 can be used with any terminal or computer system equipped with an RS-232C Serial Interface Port, no protocol is required or available. This port must be capable of a baud rate between 110 and 2400 baud to work correctly.

Programming syntax and simple MBASIC program samples, under H-DOS and CP/M operating systems, are included in the Appendix of the assembly manual. The command syntax for program control with the GD-1530 Interface is defined by the BSR format and is simple to learn and to use.

The GD-1530 Interface is a fast one-evening kit that can be assembled in about two hours. It has a red LED that flashes when a valid keyboard entry is being transmitted over the AC line. The GD-1530 operates on 120 VAC, 60 Hz and .3 watts. It measures 3" high x 6¾" wide x 6¾" deep (7.6 x 16.2 x 16.2 cm).

Kit GD-1530, Shpg. wt. 3 lbs. 99.95

5 Lamp Module receives signals from any of the consoles or from the GD-1530 Interface. Lamp modules can be used to turn incandescent lamps on and off and to dim and brighten lamps through 16 individual levels. The Lamp Module can

handle a maximum of 300 watts.

GDP-1512, Shpg. wt. 1 lb. 16.95

6 Appliance Module controls most other devices such as televisions, stereos, radios, coffee makers, fans, heaters and more. The Appliance Module also operates lights and self-starting fluorescents but only to turn them on and off. This module has maximum ratings of a 15 amp resistive load, ½ hp motor, 500 watt lighting load and a 40 watt TV/stereo load.

GDP-1514, Assembled, Shpg. wt. 1 lb. 16.95

7 Burglar Alarm Interface Module increases the effectiveness of your existing security system by controlling other BSR modules on your circuit. The Burglar Alarm Interface Module has low-voltage or contact closure trigger inputs. If an alarm is triggered, the module can turn on selected lights and appliances (such as a siren), or selected lights can flash on and off, or only selected lights can turn on.

GDP-1519, Assembled, Shpg. wt. 1 lb. 44.95

8 Wall Switch Module replaces existing standard wall switches. The GDP-1513 operates inside and outside lights by remote or local control. It responds to signals from any BSR console controller or the GD-1530 Interface. This module also brightens and dims lights in 16 steps through remote control. It can handle a maximum load of 500 watts.

GDP-1513, Assembled, Shpg. wt. 1 lb. 17.95

9 Three-Way Wall Switch Module and Companion with on/off control independent of control consoles. This module replaces hallway and upstairs/downstairs 3-way switches. Responds like a lamp module but also allows regular wall switch control of lighting. Handles a maximum load of 500 watts.

GDP-1516, Assembled, Shpg. wt. 1 lb. 24.95

10 Air Conditioner Module is a standard 240 VAC receptacle for air conditioners that is rated for a 15 amp load. See the GDP-1517B below for alternate perpendicular-pronged type plug arrangement.

GDP-1517A, Assembled, Shpg. wt. 1 lb. 39.95

11 Perpendicular-Pronged Air Conditioner Module is also a 240 VAC receptacle for air conditioners, but this module accepts perpendicular-pronged AC plugs and is rated for a higher 20 amp load. See the GDP-1517B above for the standard-type plug arrangement.

GDP-1517B, Assembled, Shpg. wt. 1 lb. 39.95

Thermostat Control Set allows control of existing heating and air conditioning thermostats. Set includes one Temperature Regulator and one Low-Voltage Adapter. The Low-Voltage Adapter plugs into a wall or appliance module controlled by the GDP-1520A Timer or GDP-1515 Telephone Responder.

GDP-1521, Assembled, Shpg. wt. 1 lb. 49.95

12 Invisibly detect movement or provide light when needed with the Passive Infrared Security Light Control

- The GD-3511 turns on lights to make an intruder believe he has been seen — scaring him off without disturbing your neighbors
- Passive heat sensor detects movement and activates security lighting before intruders have a chance to damage your property
- Replace expensive, all-night floodlights with automatic security lighting with the GD-3511 and your own lights or the GDA-3511-1 Floodlight Accessory

Light is the most efficient deterrent to crime, and the Heathkit GD-3511 turns on up to 500 watts of light when security lighting is needed. The system is especially effective because lights are activated only when an intruder is present. Prowlers believe they have been seen if lights suddenly go on when they enter a protected area. Sensor controlled lighting also saves you money since lights are on only when you need them.

A passive heat sensor detects body heat (infrared energy) when an intruder enters the covered area. The Control then activates security lights — even an interior/exterior alarm can be sounded. An adjustable timing circuit automatically turns off lights after motion has stopped. A built-in photo-transistor deactivates the GD-3511 during daylight hours to save you money and maintain the belief that the lights are turned on by yourself, not a sensor.

Sensitivity, coverage pattern and lighting time are adjustable. You decide if you want the alarm to detect stray cats and dogs or just intruders and larger heat-emitting objects. The sensor unit is gimbal mounted so that you can also control





FAST, EASY
2-EVENING KIT

the size and shape of the coverage area. The GD-3511 has a typical operating range of 35', with a coverage width of 35'. Lights remain on from ten seconds to more than fifteen minutes once motion stops in the protected area.

Use your existing floodlights or doorlights or use the GDA-3511-1 Dual Floodlight Accessory which attaches to the Lighting Control. The wall-mount unit houses two adjustable aim floodlights. Both Control and Accessory are weather resistant and are inconspicuous in appearance. The GD-3511 connects to a standard 120 VAC, 60 Hz power line and consumes only one watt when operating but not activated.

Kit GD-3511, Shpg. wt. 4 lbs. 149.95

GDA-3511-1, Dual Floodlight Accessory, Shpg. wt. 5 lbs. 29.95

13 Have 24-hour protection – verbal commands and up to eight floodlights protect your home

- Effective infrared sensors detect intruders and activate system
- Commanding digitized male voice warns intruders – day or night
- Adjust the coverage area pattern and size to fit your needs
- Voice-Off feature lets you deactivate the verbal warning while unit continues to light the way for family members and guests

Security Sentinel uses both light and sound to deter intruders, for maximum 24-hour-a-day security. Intruders believe they have been seen when the GD-3810 responds to their approach with a commanding verbal warning and, at night, activation of up to 1200 watts of lighting equivalent to eight 150 watt floodlights.

Infrared sensors detect body heat within the coverage area, and activate the verbal message which is a man's voice that has been digitized for realistic reproduction. The message is: "Warning. You are entering a secured area. Please exit immediately." During darkness, security lighting can also be activated. Peripheral lighting is deactivated during the day. A Voice-Off feature deactivates the verbal warning for up to eight minutes while the unit still lights the way for a family or guests. If more guests approach before the light goes off the unit automatically deactivates the verbal warning for an additional time period of the same length. Your family or guests never again have to approach the house in darkness.

Even the area underneath the unit is covered, providing complete coverage of an area of up to 40' by 40'. You can adjust the coverage area size and pattern to suit your needs. You can also set the sensitivity level of the sensors to detect stray animals or only intruders and larger heat-emitting objects. Connects to a 120 VAC, 60 Hz household power line and works with the GDA-3511-1 Dual Floodlight Accessory. 12½" D x 5¾" W x 3½" H.

Kit GD-3810, Shpg. wt. 6 lbs. 199.95

An array of dependable security systems to cover your unique security needs

RF Security System gives total home protection

A professional-quality security system, the GDA-2800, provides thorough, 24-hour coverage of your home. The system installs in a day to protect doors, windows, interior zones and high risk areas. Your family can enter and exit without triggering alarms simply by entering a secret code on the 12-Button Digital Keypad Controller mounted near your door.

- One of the most advanced microprocessor-controlled systems available
- RF control eliminates the hassle of wiring
- A variety of sensors and transmitters monitor your home and alert the control unit of intruders or emergencies
- Key lets you lock the system on or off

[1] RF Security Receiver/Processor Kit processes all incoming signals from the various transmitters and provides appropriate alarm warning action. The Receiver and transmitters are set to a unique house code which you select — eliminating false alarms from other radio frequency transmissions. Three modes (Off, Home, and Away) control the entire system operation. 'Home' monitors doors and windows while you're inside. 'Away' provides complete security by additionally arming indoor motion detectors. Five coded channels give separate alarms for door, windows, indoor motion, fire and emergency situations. When the Receiver is set on the Off mode, two emergency alarm channels — 'Auxiliary' and 'Panic' remain active and alert you to special concerns like fire, breach of computer room, safe or gun cabinet.

The kit includes an indoor/outdoor alarm horn and indoor annunciator speaker. The receiver has two sirens with one reserved for high priority ('Panic') alarms. The annunciator sounds a two-note signal to indicate a protected door being opened when the Security System is in the OFF mode, it also indicates selection of a new mode when the system is on.

The Receiver may be set for instant or time delayed exit and entry alarms. This allows family members easy access when using the wall-mounted Keypad Controller. You may also lock the System power on or off with a key switch on the back of the Receiver. Other sophisticated features include: four output triggering options for automatic dialing devices, power to drive two alarm horns, an internal 12-hour stand-by battery, highly visible security warning labels for house exterior, and a system test mode. The system permits security to be extended to nearby buildings, shed or garage within a 150' receiving range. All Receiver mode operations are remotely controlled by the handheld GDA-2800-4 Command Transmitter or the GDA-2800-9 12-Button Digital Keypad Controller (at least one is required).

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

[2] Passive Infrared Motion Detector/Transmitter offers 25 x 35 foot indoor space protection without interference to TV remotes. Requires 9V battery.

GDA-2800-2, Assembled, Shpg. wt. 1 lb. **149.95**

[3] Wired-Circuit Transmitter protects doors and windows against entry, includes one magnet/reed switch. Also connects to GD-1701 Flood Alarm (page 18).

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

[4] Command Transmitter remotely controls entire System within 200' range.

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

[5] Smoke Detector/Transmitter sounds internal 85 dB alarm as well as GDA-2800 Security System alarm.

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

[6] WINDOW BUG Sensors and take-off contacts. Package of four. Used with GDA-2800-3 Transmitter, each sensor protects up to 32 sq. ft. of glass surface.

GDA-2800-6, Shpg. wt. 1 lb. **49.95**

[7] Magnetic/Reed Switch Set. Package of four (one set shown) for single or parallel connection to GDA-2800-3 Transmitter and its applications.

GDA-2800-7, Shpg. wt. 1 lb. **24.95**

[8] Passive Infrared Motion Detector for hard wired security systems. Requires 6-18 VDC. (Not for use with GDA-2800 or GD-3800 security systems.)

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

[9] 12-Button Digital Keypad Controller operates in addition to or in place of the GDA-2800-4 Command Transmitter. Mounts near door for instant entry/exit control. Operates identically to the Command unit after entry of user access code.

GDA-2800-9, Assembled, Shpg. wt. 2 lbs. **119.95**

GDA-1800-3, Additional Outdoor Alarm Horn (like shown), 2 lbs. **24.95**

SAVER! GDS-2800-1 Starter Security System consists of one GDA-2800-1 Receiver kit, one GDA-2800-2 Infrared Motion Detector/Transmitter, one GDA-2800-3 Wired-Circuit Transmitter and one GDA-2800-4 Command Transmitter, Shpg. wt. 43 lbs. **499.95**

26/SECURITY

[10] Vacation/Home Sentry ends homeowner worries

\$299.95

- Device detects low in-house temperatures — add more sensors to detect water, freezer door ajar, etc.
- A quick phone call to your home activates the Vacation Home Sentry and alerts you if something is amiss
- Prevents expensive damage to your home
- Easy-to-build kit with detailed instruction manual

Now you can leave for your vacation or your seasonal home care-free when you have the Vacation/Home Sentry watching over your home. This low-priced electronic sentinel performs an invaluable service while you are away. It watches over your home and turns your telephone into a home information line.

You or a neighbor simply call your home phone number to find out if all is well. The Vacation/Home Sentry monitors the house temperature with its built-in sensor. If the temperature drops below 45°F you will hear a steady 5 to 10 second tone, if the temperature is normal you hear silence.

Add optional exterior sensors to detect a wide variety of problems such as flooding, opened doors or windows, and freezer failure. The number of applications of this useful unit make it an exceptional value. The Vacation/Home Sentry can save you large sums of money should a potentially costly incident, like a flood, or heating or power failure, occur. The Vacation/Home Sentry is an easy and enjoyable kit to build and install. It is powered by two 9 volt batteries (not included) which draw current only when the unit is responding to a call.

Kit GD-1702, Shpg. wt. 2 lbs. **299.95**

[11] Protect your home from theft and damage with the ever vigilant SENSAPHONE Home Monitoring System — it calls and tells you when something is wrong

- Lets you know about trouble in your home the moment it happens
- Automatically dials designated numbers and warns of problem in English
- Reports status of unattended home or office when you telephone or audibly at your command
- Use as an automatic dialer that stores up to eight phone numbers
- Use it with the GDA-2800 System to monitor a wide variety of conditions
- Batteries operate the unit for up to 15 hours during a power failure

Become the owner of a unique home monitoring system that informs you of conditions in your unattended home or office. SENSAPHONE continuously checks for power outages, excessively high or low temperatures and for unusual sounds or disturbances like a smoke alarm going off. At the sound of an intruder or alarm, the SENSAPHONE calls you and reports the problem in English. It then switches on a sensitive, built-in microphone so that you can hear what's happening.

Add more monitoring functions by attaching additional sensors to the unit. You can have the SENSAPHONE respond to doors or windows ajar, flooding and a number of other situations.

Connected to your phone, SENSAPHONE reacts to an alarm condition by automatically dialing up to four pre-selected telephone numbers in sequence. It continues to call until the warning message is received and acknowledged. SENSAPHONE talks to the receiving party by identifying itself, giving the time, stating the problem and switching on its built-in microphone.

Listen in on your house while you are away. Just call home. After a preprogrammed number of rings, the unit answers and reports on all monitored conditions. Then it lets you listen to room sounds for yourself. Reassured, you can return to work or to enjoying your vacation.

SENSAPHONE keeps working even though there's a power failure. It automatically switches to its battery power, six "D" cell alkaline batteries (not included), and calls to warn of a loss of electricity. It will also call out when its batteries are running low. Batteries last up to 15 hours when AC power is lost and the unit is in the ON mode and operational.

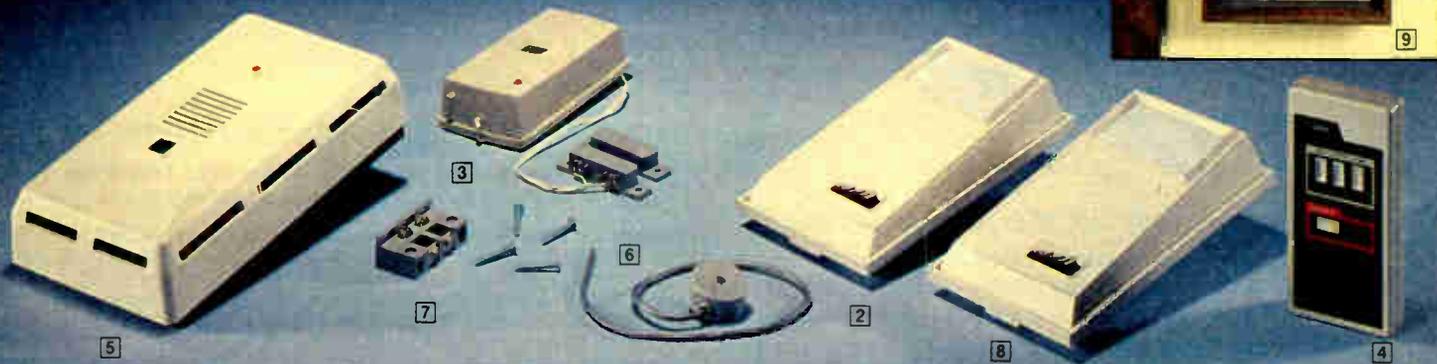
As an extra to your small investment, SENSAPHONE can be used as an automatic dialer. It stores up to eight of your most frequently called numbers and dials them for you when you press a one-key code. SENSAPHONE also gives the time and any monitored condition audibly at your command.

SENSAPHONE easily installs in a few seconds on any telephone line using a standard telephone modular jack. It can be used with or without a telephone. It measures 7¾" wide x 2" high x 8⅝" deep and weighs 2 pounds.

GDP-2156, Assembled and tested, Shpg. wt. 3 lbs. **199.95**



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska and Michigan Residents Call: 616-982-3411.



12 The Informer® Ultrasonic Intrusion Alarm keeps a watchful eye in your home

\$79⁹⁵

- "Sees" up to 25 feet away from unit
- Time delay lets you deactivate the alarm
- Two sockets included for connection of a lamp and alarm
- Disguised to look like a fine hardcover book

No one but you will ever know it's there. Disguised to look like a fine hardcover book, the Heathkit GD-49 Ultrasonic Intrusion Alarm sits quietly on the bookshelf or table... until something or someone invades its field of surveillance. Then the Informer can activate indoor buzzer alarms, outdoor bells, table or floor lamps to alert you to an unfamiliar presence in your home.

Easy operation: Simply flip a hidden, back panel switch to activate the Informer Alarm system. A soundless signal is transmitted throughout the room or area, bounced off the walls and returned to the receiver. Any movement that interrupts the transmitted signal is perceived by the receiver. Ten seconds after the movement is first detected, the lamp outlet is triggered, turning on a table or floor lamp. Approximately 30 seconds later, the alarm outlet is triggered, activating alarms.

The built-in time delay between light and alarm activation allows you to enter the room and deactivate the Informer with a switch before the audible alarm is triggered. A second switch on the back of the unit lets you set the lamp and alarm for automatic reset after the alarm has sounded for 25 seconds. This switch also has a normal position so the alarm sounds until manually reset.

Versatile applications: The Informer makes a convenient automatic light switch in dark hallways, stairwells or garages. It can also be used to alert parents that a child has left its bed.

An adjustable control sets the sensitivity of the Informer to movements and therefore its operating range. The Informer is simple to build and its solid-state circuitry ensures years of trouble-free service. It requires 120/240 VAC. The unit measures 2³/₈" W x 10¹/₈" H x 7¹/₂" D.

Kit GD-49, Shpg. wt. 5 lbs. 79.95

GD-49 SPECIFICATIONS - **Operating range:** Varies with installation. Typical maximum range is 25 ft. **Operating times:** Turn-on delay: approximately 10 sec. Alarm delay: 20 to 30 sec. (lamp-on time). Automatic reset delay: 20 to 30 sec. (alarm-on time). **Ultrasonic frequency:** Approximately 41 kHz. **Power outlets:** Two AC sockets: One for Lamp, one for Alarm. **Power outlet current:** Three amperes total for both. **Power requirements:** 120/240 VAC, 50/60 Hz, 1 1/2 watts. **Dimensions:** Chassis only, 2" W x 9 1/4" H x 7" D (approximately). In book-style cover, 2 3/8" W x 10 1/8" H x 7 1/2" D (approximately).

Products to make your home more energy-efficient, convenient and healthy

① Substantially reduce your heating and cooling costs

\$59⁹⁵

- Allows seven different daily programs of up to six temperature changes per day
- House is heated or cooled by the time you select

Keep your home within 2° of the temperature you desire. Program your furnace and air conditioner for a weekly cycle of temperatures between 60°-82°F. (Not for two stage systems). Manually override programmed settings. Econo-Save feature allows thermostat setback to 54° during the day. NE-1211 includes isolation relay.

Kit NE-1211, Shpg. wt. 1 lb. 59.95
NEP-1210, Assembled, Shpg. wt. 1 lb. 79.95

② Heath's GD-1298 Office Air Cleaner

\$124⁹⁵

- Removes pollutants and pollen, dust and odors
- Portable and efficient, with quiet operation

Remove irritating pollen, dust, mold spores and smoke particles, some as small as .01 microns (less than one-half millionth of an inch) in diameter. Three filters improve your working or living environment: a washable, prefilter removes large particles; the permanent electrostatic filter removes small particles; and a replaceable, activated charcoal filter absorbs odors. One evening kit.

Kit GD-1298, Shpg. wt. 20 lbs. 124.95
GDA-1298-1, Replaceable charcoal filter, Shpg. wt. 2 lbs. 7.95

③ Quickly remove dust, dirt, allergens and smoke

\$269⁹⁵

- Filters out 99% of pollen and 94% of harmful particles
- Three filters purify the air and remove unpleasant odors
- Efficient, three-speed fan makes air-cleaning jobs easy

The Heathkit Portable Electronic Air Cleaner takes on your toughest air-cleaning problems. Efficiently removes dust, dirt, smoke and other pollutants from 6,000 cubic feet — that's a 25' by 30' room with an 8' ceiling. Three speeds tackle a variety of jobs and three filters work together to keep your air clean and fresh. And this kit is simple to build — the power supply, variable speed fan control and filter are preassembled. Uses 120 VAC, 60 Hz. 26½" H x 17¼" W x 13½" D.

Kit GD-1297, Shpg. wt. 59 lbs. 269.95
GDA-1297-2, Replacement Charcoal Filter for GD-1247/1297, 2 lbs. 9.95

④ Economize with the Heat Sniffer

\$24⁹⁵

- Locate those heat loss areas in your home
- Beeping alarm and flashing LED alert you to heat leaks
- Easy to build and easy to use

Just turn the Heat Sniffer on and adjust it for silence. Move it along areas where heating/cooling losses may occur. Temperature changes set off a beeping alarm and flashing LED. Detects changes within a 59°-95°F range. Needs 9 V battery. Kit NE-2112, Shpg. wt. 2 lbs. 24.95

⑤ Sound-Activated Switch turns on lights for you

\$19⁹⁵

- Turns lights on when it hears you, off when it doesn't
- Improves home security

Provide extra safety in halls and on stairways. The Sound-Activated Switch turns on lights for you when you enter the area, and saves lots of money by turning them off after you've gone. Solves the problem of children leaving lights on. Operates up to 300 watts of 120 VAC lights. Only two controls — sensitivity adjustment sets the sound-triggering level, and a timing adjustment sets turn-off delay.

GDP-1270, Assembled, Shpg. wt. 1 lb. 19.95

⑥ Convenient Fingertip on/off control of lights

\$21⁹⁵

- Can also be used for small appliances, TVs and fans
- Put the touch plate anywhere for remote control

Instantly and remotely control TV's, lamps or appliances with the GD-1289. Plug your lamp or appliance into the control unit which is plugged into an AC outlet, then connect the touch plate with an easily concealed wire. Place the touch plate anywhere for convenient ON/OFF control at your fingertips. Maximum 300 watt load per unit; 150 watts per lamp. Use with TVs to 225 watts, fans to 180 watts and stereo, heaters, etc. to 300 watts maximum.

Kit GD-1287, Shpg. wt. 2 lbs. 21.95

⑦ Use the Watt Wizard to save energy dollars

Save part of the cost of running some motorized electrical devices by reducing their power use. And prolong the life expectancy of appliances. Just plug it in and start saving. The Watt Wizard Power Factor Controller is proven efficient!

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

Make your telephones more versatile and easier to use at home or in the office

⑧ Cordless portable telephone provides freedom

\$119⁹⁵

- Security system protects your line from unauthorized use
- Select either pulse or tone dialing

Take the handset of the Freedom Phone 750 and use it up to 1000 feet away from the base unit. Use pulse or tone dialing to access custom calling services. Other features include one-button automatic redial; separate mute button; digitally encoded security system; high/low volume control switch; and clear button. It operates on easily recharged nickel-cadmium batteries (included).

GDP-1342, Assembled, Shpg. wt. 3 lbs. 119.95

California law requires the following statement: FCC-approved Freedom Phone 750 will be serviced under provisions outlined in the manufacturer's warranty.

⑨ Save time and money with the Demon Dialer

\$79⁹⁵

- Automatically redial busy and unanswered numbers
- Accurately dial lengthy Alternate Long Distance numbers
- Expansion lets you store up to 176 seven digit numbers

The memory stores 93 7-digit numbers, 60 11-digit numbers or 55 23-digit numbers and this is nearly doubled with the Memory Expansion Accessory. Controlled by an on-board CPU, the Dialer instantly and automatically dials numbers of up to 32 digits stored under easy-to-remember 2- to 6-digit letter/number codes you devise. Two-key sequences will redial or 'Demon Dial' after the first try. The Dialer will silently dial a busy number 10 times in the 1st minute, once every 2 minutes for 10 minutes and once every 10 minutes for up to 2 hours. While it 'Demon Dials' incoming calls can still be received, and a success signal alerts you when the party being called answers. Operates with any telephone and extension

28/HOME/TELEPHONES

phones with touch-tone service. Includes AC power cube, 3-volt backup battery, two cables with modular plugs, and series jack. 1½" H x 5⅞" D x 5⅞" W.

Kit GT-2217, Shpg. wt. 3 lbs. Was \$89.95 Now Only 79.95
GTA-2217-1, Memory Expansion Accessory, Shpg. wt. 1 lb. 19.95

⑩ Instant one-number access dialer for any situation

\$49⁹⁵

- Stop dialing lengthy 13-digit phone and billing numbers
- Dial an emergency number by picking up the phone

The HOTSHOT is a unique one-number telephone dialer that quickly dials any number up to 31 digits. End the aggravation of dialing a 23-digit number to access Alternate Long Distance service. The Dialer is great for credit card checking, automatic prefix dialing, WATS line entry, security, hotline applications, and instant dialing of emergency numbers. The easy-to-program memory doesn't require battery backup since it's mechanically programmed. Plugs into any standard touchtone modular phone jack with Y-adaptor (included in kit).

Kit GT-2218, Shpg. wt. 2 lbs. Was \$69.95 Now Only 49.95

⑪ Replace phone bells with a Pleasant Phone Ringer

\$29⁹⁵

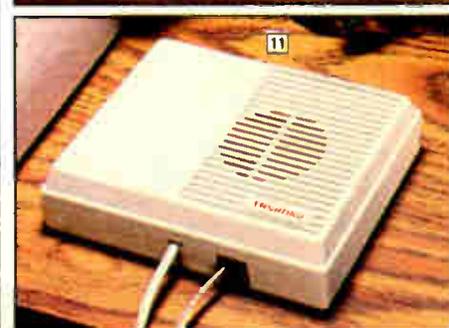
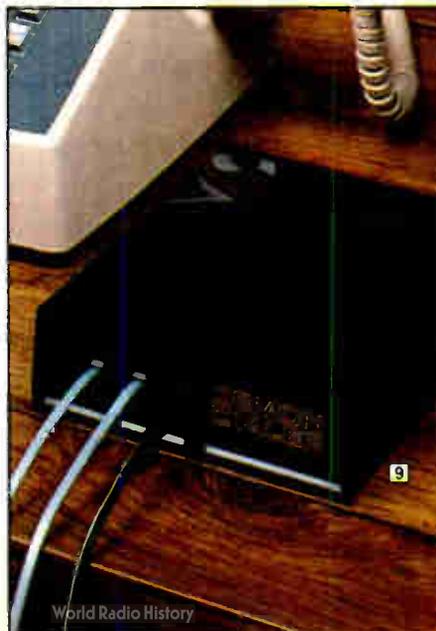
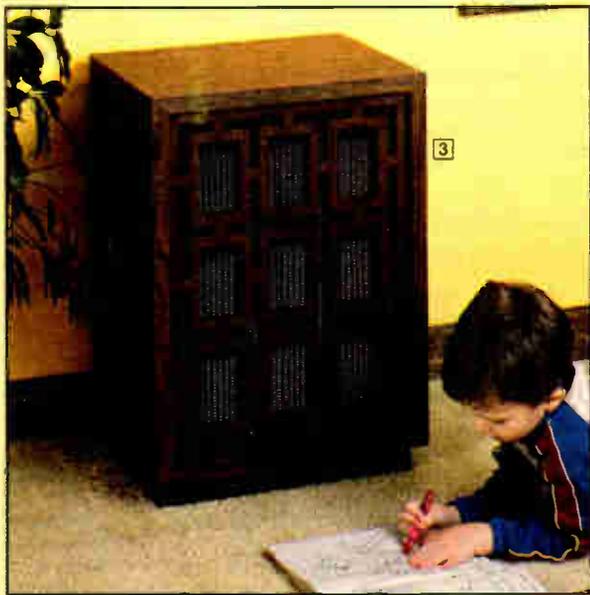
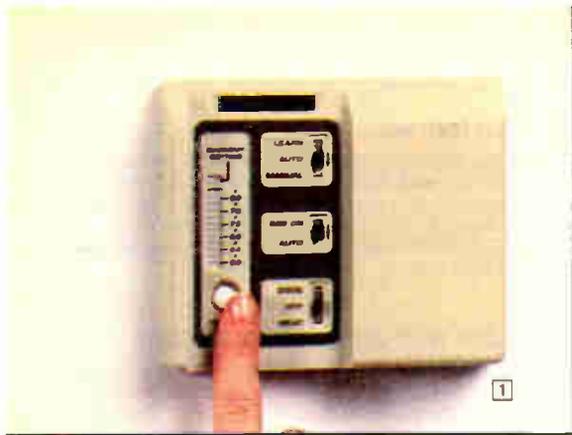
- Adjustable volume, connections for external speakers
- Easily installs between the phone and outlet

Replace the boring ring-ring-ring of your phone. A musical IC in this one-evening kit offers four delightful alternatives: a beeping signal, an upbeat four-note chime, 10 seconds of Beethoven's "Für Elise" or 20 seconds of "Romance."

Kit GT-1218, Shpg. wt. 1 lb. 29.95

Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.





Hide these gifts well – or they'll appear on your kitbuilder's workbench long before Christmas



The right tool makes any job go easier. This can be especially true during kitbuilding, where the proper tool or utility can make a difference in the quality success of the finished product. That's why these tools and accessories are the gifts most appreciated by kitbuilders. They provide greater convenience and reliability every time a new project is tackled.

1 Handy 25-watt soldering iron

With its 860-degree F 1/8-inch screwdriver tip, this professional pencil iron makes close soldering jobs cleaner and easier. Lightweight with rugged stainless steel barrel and long-life soldering tips. 120 VAC. (Color other than pictured.)

GDP-207, Shpg. wt. 1 lb. 16.95

2 Weller soldering station

Automatically controls iron tip temperature at 700 degrees F. Comes with heat-shielded holder on a sturdy stand, pilot light and switch, 3-wire cord set, 6 foot power cord, 700-degree tip, tip storage tray and removable sponge.

GDP-1108, Assembled, Shpg. wt. 5 lbs. 89.95

GDP-1109, Set of five 700 degree F assorted tips for above, 1 lb. 17.95

3 See better, clearer, easier

Illuminated magnifier, provides bright, cool light with an energy-conserving 22-watt circular fluorescent. Eye-strain is relieved by a distortion-free 2 to 1 magnifier with a 5" polished lens. Has enamel housing and 45" long-reach arm on 360° base. Clamps on any horizontal surface up to 2 1/2" thick. UL listed. Color may vary.

GDP-200, Assembled, Shpg. wt. 7 lbs. 89.95

4 Flexible extension lamp

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

GDP-202, Shpg. wt. 4 lbs. 24.95

5 PanaVise circuit board holder

Holds steady circuit boards up to 12" wide. Boards mount in spring-loaded arms that tilt 220 degrees and rotate 360 degrees. Does not include base.

GDP-1254, Shpg. wt. 2 lbs. 21.95

6 PanaVise vacuum base

Holds firmly to surfaces. Rubber suction pad doesn't scratch mounting surface.

GDP-1252, Shpg. wt. 2 lbs. 21.95

7 PanaVise standard vise head

If you've ever needed a third hand when assembling a circuit board or working on an electronics project, the GDP-1253 could be your answer. Nylon jaws open to a full 2 1/2". This vise firmly grips even larger and heavier items.

GDP-1253, Shpg. wt. 2 lbs. 19.95

8 PanaVise standard adapter base

Permanently mount this base on your workbench and use it with any standard (3/8" shaft) PanaVise fixture. An adjustable, special ball-joint permits positioning that board or chassis at the exact angle you need for ease and precision in your work.

GDP-1251, Shpg. wt. 2 lbs. 16.95

9 PanaVise wide-opening holder

Make working on larger components easier. This vertical-opening vise will position and hold those items up to 9" in thickness, such as a chassis or cabinet. The Holder is easily mountable (if you prefer) and has replaceable jaw pads to ensure against possible damage to bulkier items.

GDP-1255, Shpg. wt. 2 lbs. Only 9.95

10 Magnify small detailed circuits

This magnifier fits comfortably on your head, freeing both hands for work, while it magnifies by 2 1/2 times. Finely ground shatter- and scratch-resistant lenses. Lens holder flips out of the way and works well with eyeglasses. Focus view area is 8" to 14" below the optical-quality acrylic lens. Adjustable cushioned headband.

GDP-201, Assembled, Shpg. wt. 1 lb. 24.95

11 Low-cost kitbuilder's tool set

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

GHP-1270, Shpg. wt. 2 lbs. 42.95

12 New! Smart Outlet Box with increased protection

Faster response and better suppression of power line surges and voltage spikes are added to the handy Smart Outlet Box. Power to six other (3-prong) sockets is switched on when a device plugged into the control socket is turned on. An eighth socket is unswitched for devices such as clocks. Control all equipment with one conveniently located switch. Control socket even allows a small amount of current to pass through it for equipment with digital clocks.

Kit GD-1495, Shpg. wt. 5 lbs. 59.95

GDW-1495, Assembled and tested (UL Approved) Shpg. wt. 4 lbs. 99.95

13 Multiple outlet junction box

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

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

14 Dependable Deluxe Garage Door Opener ends strain and daily struggle with garage doors

- The easiest-to-install screw drive system available
- Door re-opens instantly if obstructed while closing
- Exclusive triple-thread drive system beats chain or belt-driven openers in long-life durability tests
- Security light comes on when garage door is opened

\$199⁹⁵

Convenience and security are primary concerns for home-owners, Moore-O-Matic Garage Door Openers address both concerns – at a low price. Eliminate the need to fumble with a key-locked garage door and keep dry on your way to work and home – a security light sees you safely into the home.

The Electronic Command Garage Door Opener pays for itself in convenience and security. Touch the button on the remote transmitter and the door opens – 80 watts illuminate your garage. Touch the button again, the door closes and positively locks to prevent anyone from opening it from outside by hand (on the GD-3509, the light blinks when the door is closing). The security-timed light will remain on for about five minutes to let you get safely inside the house.

Designed for garage doors up to 18 feet wide and 7 feet high, the powerful 1/2 horsepower motor opens garage doors effortlessly. A shock absorber cushions vibrations and allows for up to two inches of ice buildup or other impediments. Up-limit, down-limit and obstruction pressures are adjustable. In case of difficulty, the quick-release trolley disengages with a simple string tug. A second tug resets the trolley.

Solid-state transmitters and receivers use digitally encoded signals. You have 256 possible code combinations which you can set and change at any time to eliminate interference from neighboring units. The electrical control circuits are contained on one removable circuit board, run by an on-board microprocessor.

Electronic Command Opener System can usually be installed in a single day, with do-it-yourself ease and no special tools. Requires 120 VAC, 60 Hz. Very little assembly is required.

Transmitter, Receiver, Dual Switch and Screw-Drive Door Opener Mechanism.

GD-3509, Shpg. wt. 41 lbs., Motor Freight 199.95

Economical Chain-Drive Door Opener model includes Transmitter, Receiver and Single-button Wall Switch; has light, but without security-timing delay.

GD-3409, Shpg. wt. 47 lbs. (UPS shippable) 149.95

Use these to replace your remote control.

GDP-3309-A, Transmitter only, Shpg. wt. 1 lb. 29.95

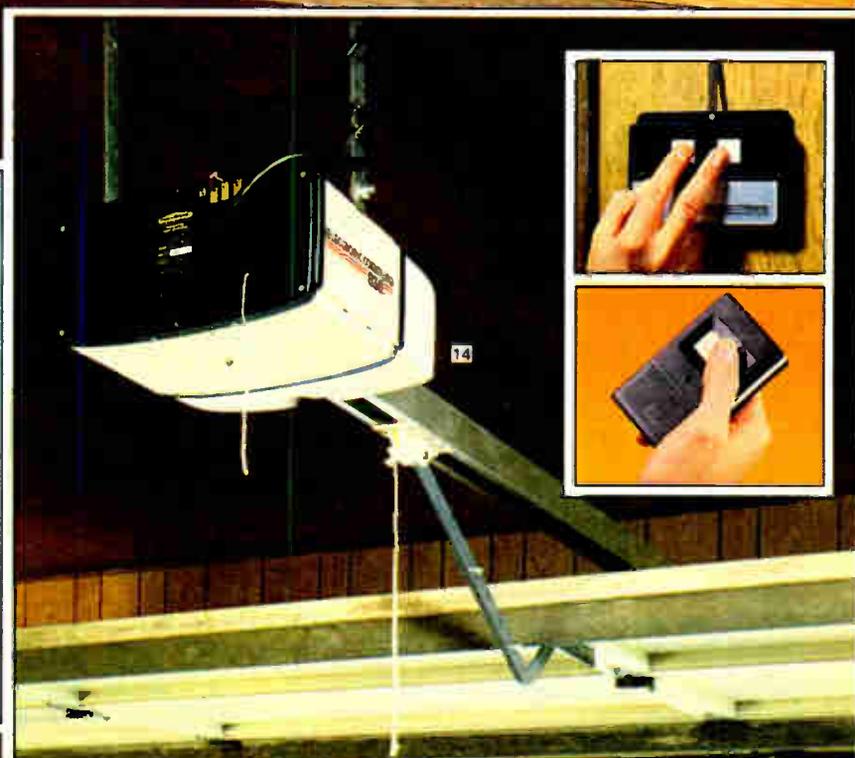
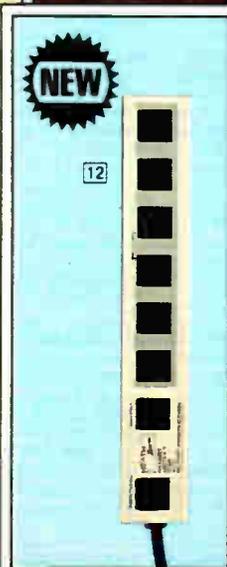
GDP-3319-A, One Transmitter, one Receiver for 3-wire system, 1 lb. 59.95

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.

GA-3309-3, Shpg. wt. 1 lb. 12.95





1 Be part of exciting packet radio with Heath's HD-4040

\$249⁹⁵

We bring you the HD-4040 Terminal Node Controller, representing the newest frontier of Amateur Radio: terminal control and packet transmission. It opens your station up to error-free, high speed communication with almost no interference from others on the channel. And greatly increases your range by allowing relay of transmissions through up to eight stations. You get the best in packet radio equipment with the Heath TNC, which features a digipeater, automatic beacon and more. You also get the only RFI approved, FCC certified terminal node controller available.

The Heath TNC combines computer technology with Amateur Radio to open up the world of packet radio with its countless applications. Converse with a friend by satellite link, remotely program computers or receive computer programs over the air, and do it all quickly and without errors. The HD-4040 and packet radio make it all possible. Simply hook-up the TNC and a terminal or a computer with terminal emulation software to your existing transceiver.

Error-free communication even under adverse band conditions, is yours with the HD-4040. This packet radio interface provides terminal control of your existing equipment and allows data to be sent and received as packets of digital information. This not only greatly speeds the transfer of data but insures error-free transfer. Each burst of information, or packet, is automatically checked by the HD-4040 and will not be accepted until it is correctly received. When sending, the TNC repeats the transmission until it is acknowledged as correctly received. All this is done automatically by the HD-4040, you just type in your messages with the keyboard. The TNC acts as a teletypewriter so all communication is printed on your monitor. The HD-4040 and packet radio free you to concentrate on communicating, instead of worrying about QRM or missing information.

Most packet radio operates at 1200 baud and can run much faster. Since packet radio operates in bursts many users can operate on the same frequency at the same time. And you can use the same frequency for both calling and working channels. Packet radio also helps eliminate channel interference and preserves spectrum. The HD-4040 automatically monitors the channel and relays information only when the channel is open. You notice only a slight delay on heavily loaded channels. Three modes of operation: A conversation mode lets you converse with another operator; a command mode configures the TNC and allows use of a variety of operating commands; a transparent mode is used in computer file transfer. The HD-4040 uses AX.25 and VADCG protocols.

Automatic beacon and digital repeater add unique capabilities to Amateur Radio. The automatic beacon transmits your call letters and a message at the time intervals you set. The automatic digital repeater lets you relay transmissions from one operator to another — greatly extending the range of your equipment by relaying through up to eight intermediate stations. As long as power is supplied to the TNC it will act as a beacon and digital repeater — even if you are conversing with another operator or have turned off your computer or terminal. The TNC can store up to 2K of activity in memory, so you can receive messages while not at your station. You can also set the TNC to recognize only the calls you wish to receive.

A 6809 processor, a 32K ROM and 8K RAM are featured. The RAM or ROM can be expanded by adding up to 16K. Operating commands are stored in a two-band non-volatile RAM which does not require battery backup.

A built-in modem interfaces the TNC to your transceiver. This modem is capable of baud rates up to 1200 and filters input prior to demodulation. Filter constants are hardware selectable. Plug in an external modem and achieve baud rates up to 19,600 (with selectable clock) on UHF. Baud rate for either internal or external modem is adjustable through the keyboard. A header kit for 1200 baud operation is included. Ports include serial port for RS-232C terminal or computer interface for baud rates from 50 to 4,800 (optionally to 19,200), and parallel port for TNC status, command channel and diagnostic signal.

No programming knowledge required. You need only the HD-4040, a terminal (p. 102-103) or computer with terminal emulation software (p. 92-93) and RS-232C cable. Technician or above licensing required.

Kit HDS-4040-2, HD-4040 and free HDA-4040-2, 7 lbs. 249.95

Kit HDA-4040-1, TNC Status Indicator, 2 lbs. 24.95

Kit HDA-4040-2, Flat Filter Option, 1 lb. 9.95

SAVER! Save \$29.00 with kit HDS-4040-T, includes HD-4040, HTX-10 terminal less monitor and modem, and interface cable, 17 lbs. 499.95

SAVER! Save \$49.00 with kit HDS-4040-TM, includes HD-4040, HTX-10 terminal with ZVM-122A monitor less modem, and interface cable, 17 lbs. ... 599.95

HD-4040 SPECIFICATIONS: Processor: 6809. Clocks: 7.3728 MHz crystal oscillator for UART, switched capacitor filter, and E & Q systems. Memory: ROM, 32K (expandable to 48K); RAM, 8K (expandable to 24K). Serial Port: RS-232C interface to terminal or computer. Baud rates 50 to 1200 (optional to 4800). Parallel Port: Controller status and command channel and diagnostic signal port. Non-volatile RAM: 128 4-bit locations. Protocols: AX.25, VADCG. Power: 120V, 15 watts. Dimensions: 13 3/8" x 7 3/4" D x 2 3/8" H.

SUPER SAVER \$50 OFF! Buy both the HD-4040 and any listed ICOM transceiver, then subtract \$50 from the total.

144, 220 and 440 MHz ICOM Mobile Transceivers

These 25-watt mobiles are the smallest available. And they are completely self-contained with an internal speaker. Features include microphone with DTMF Keypad with up/down scan and memory scan, and internally adjustable transmit power. 32 PL frequencies may be selected by turning the main tuning knob. These frequencies may be stored into memory with other memory channel information for easy access. The nine memories store the receive frequency, transmit offset, offset direction and PL tone and are backed up with a lithium battery. Channel numbers appear on the display which correspond to PL tones actually being generated. Four scanning systems: memory scan, band scan, program scan and priority scan are featured with adjustable scanning speed. Measures only 5 1/2" W x 1 1/2" H x 7" to 9" D and comes with mount.

2 144 MHz ICOM IC-27A Mobile Transceiver

HWP-6420, Assembled, Shpg. wt. 6 lbs. 344.95

3 220 MHz ICOM IC-37A Mobile Transceiver

HWP-6422, Assembled, Shpg. wt. 6 lbs. 379.95

4 440 MHz ICOM IC-47A Mobile Transceiver

HWP-6450, Assembled, Shpg. wt. 6 lbs. 439.95

5 140 MHz 2-meter Handheld Transceiver

• ICOM IC-02AT covers 144 to 147.995 MHz frequencies

The HWP-6402 features 10 memories, 32 PL tones and autopatch capability. Plus band or memory scan and priority channel, LCD S/R/F meter, night display light and selectable repeater offsets. Produces 3.0 or .5 watts output. Includes nickel-cadmium battery pack, flexible antenna, AC wall charger and ear plug.

HWP-6402, Assembled, Shpg. wt. 3 lbs. 319.95

6 SW-7800 Shortwave Synthesized Receiver

\$299⁹⁵

Reduced \$50

- Five-digit LED display provides 1 kHz frequency accuracy
- Lower Sideband, Upper Sideband, CW and AM (wide and narrow) modes of operation
- Excellent sensitivity and selectivity for clean signals

The SW-7800 covers 150 kHz through 30 MHz continuously in 30 over-lapping, 1 MHz bands. Broadband front-end circuits eliminate the need to tune circuits within a band. The design of the wide-band front-end stages eliminates the need for the customary RF amplifier. This results in a receiver that can properly handle incoming signals within a wide dynamic range. An up-converting, double-conversion mixing design provides excellent image rejection.

Plus other features you'll appreciate: AGC time-constant switch. Muting provision to allow operation with a transmitter. Local/DX switch to protect against overload from very strong local stations. Front panel jack for taping received material — unaffected by volume control setting. Telescoping whip antenna for local reception and portable operation. Mobile operation is possible using any 11 to 15 volt DC source at 3/4 amp. Only a VTVM is required for receiver alignment.

Kit SW-7800, Shpg. wt. 12 lbs. Was \$349.95 Now Only 299.95

High-performance trapped dipole antenna for use with any general coverage or shortwave receiver. Eight high-Q parallel-tuned traps reduce length and isolate various segments of the antenna for full coverage of the 11, 13, 16, 19, 25, 31, 41, 49 and 60 meter bands.

HDP-7800, Shpg. wt. 3 lbs. 64.95

SW-7800 SPECIFICATIONS: GENERAL: Frequency Coverage: 150 kHz to 30 MHz in thirty 1 MHz ranges. Readout Accuracy: Nearest 1 kHz. Frequency Control: Synthesized (PLL and LC VFO). Modes: USB, LSB, CW and AM (wide or narrow). Sensitivity: SSB/CW, less than 0.35 μV for 10 dB (S + N)/N; AM, less than 2.5 μV for 10 dB (S + N)/N. Selectivity: SSB/CW, 2.5 kHz min. at 6 dB; AM, 5.5 kHz min. at 6 dB. Selectivity Shape Factor: 1.5 at 6/50 dB. Image Rejection: 55 dB min. OTHER: Antenna: Built-in telescoping whip. Connection for 50 ohm, unbalanced, external antenna (S0239) and high-impedance wire. Audio Output: Internal speaker, jack for headphone or external speaker. Muting: External jack for use with transmitter. Recorder Output: Miniature phone jack. Power Requirements: 120 VAC, internally; 13.8 VDC at 3/4-ampere, externally. Dimensions: 11 1/2" W x 10 1/2" D x 4 5/8" H.



ICOM Portable Transceivers



2

3

4



1

Completely self-contained these compact transceivers are packed with power and quality features



5



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7



9

7 The HW-9 Deluxe QRP CW Transceiver gives you the performance of a more expensive model

Save \$5000
\$199.95

- Covers CW in 80, 40, 20 and 15 meter bands – expandable to 30, 17, 12 and 10 meter bands
- Front panel relative signal/power strength meter
- Continuously variable RF output, up to 4 watts
- Receiver Incremental Tuning for more versatility

Superior design of the transmitter and receiver sections sets this transceiver apart from other low-priced transceivers. The HW-9's state-of-the-art performance will be appreciated by avid QRP operators, newcomers and old timers alike. Micro-electronic circuits reduce transceiver weight, while providing a level of performance and features unexpected at this price. Among these features are: broadband design, wide dynamic range, AGC, single conversion, product detector, active audio filter and RIT.

Broadband design eliminates the need to tune circuits within a band. The wide-band front-end uses a double balanced mixer and 4-pole crystal filter to handle wide dynamic range signals with ease. This eliminates the need for the customary RF amplifier in the receiver section. You also get superior performance through the use of AGC circuits.

A single conversion in the main signal path reduces annoying spurious responses and maintains high-quality image rejection. Signals are pulled through the sensitive front-end with ease.

A balanced product detector followed by an active audio filter provides excellent performance. RIT (receiver incremental tuning) permits you to tune the receiver 1 kHz above or below the transmit frequency.

Full break-in operation is permitted by solid-state transmit/receive switching. Other features of the HW-9 include continuously variable RF power output, and a front panel meter that indicates signal strength in receive and relative output in transmit.

Expand the transmission and reception capabilities from four to eight bands with the HWA-9 Accessory Band Pack. It allows the HW-9 to cover the 30, 17, and 12 meter WARC bands and the lower 250 kHz of the 10 meter band. This gives you full coverage on all the amateur bands from 80 through 10 meters.

Rugged and lightweight, the HW-9 is ideal for portable operation. The Transceiver can be powered from batteries, a lighter socket, solar photovoltaic array or by 120 VAC 50/60 Hz with the PSA-9 Power Supply below.

Kit HW-9, Shpg. wt. 8 lbs. Was \$249.95 Now Only 199.95

Kit HWA-9, Accessory Band Pack, Shpg. wt. 1 lb. Now 29.95

Kit PSA-9, Accessory Power Supply, Shpg. wt. 4 lbs. Now 19.95

HW-9 SPECIFICATIONS: TRANSMITTER: RF Output Power: 4 watts, except 3 watts or 10 meters. Transmitter Frequency Offset: App. 700 Hz. Antenna Load Impedance: At least 90% of rated power with less than 2:1 SWR. Protected against high SWR. Harmonic & Spurious Radiation: -35 dB & -40 dB minimum, at rated output. T/R Operation: CW, full break-in. RECEIVER: Sensitivity: 0.2 μ V for readable signal; 0.5 μ V or less for 10 dB S + N/N. Selectivity: Wide, 1 kHz max. @ 6 dB; Narrow, 250 Hz @ 6 dB. Dynamic Range: 85 dB. Image & IF Rejection: 60 dB, min. Audio Hum Noise: -60 dB. Audio Output: 1 watt into 8 Ω . GENERAL: Frequency Stability: Less than 150 Hz/hour drift after 30-minute warmup. Power Requirement: 11-16 VDC, 12.6 specified. Dimensions: 4 1/4" H x 9 1/4" W x 8 1/2" D.

Matching Wattmeter and Antenna Tuner

8 HF/VHF Wattmeter with 3:1 SWR bridge

- Wire for three different frequency ranges
- Two power ranges, 0-5 and 0-50 watts

Put your best signal on the air with confidence and keep your low-watt HF or UHF station at peak power efficiency with the responsive HM-9 Wattmeter. It simplifies continuous metering of exciter or amplified output level and gives you a quick, exact SWR readout to fine-tune your antenna system.

An exclusive Heathkit option lets you wire the HM-9 for monitoring in three different ranges: 1.8-30, 50-54 or 144-148, MHz. QRP fans will love it. Active hams on the 2- and 6-meter VHF bands can use it to measure output of their barefoot and boosted HTs, mobile or base transceivers.

Kit HM-9, Shpg. wt. 3 lbs. Only 39.95

9 50-Watt Antenna Tuner with 4:1 balun

- 100% transmatch to a wide range of output impedance and almost unlimited matching capability between 1.8 and 30 MHz

The HFT-9 provides an exact, 100% transmatch to a wide range of output impedances, with a built-in 4:1 ferrite balun. Connectors for coaxial feed, balanced line and long-wire antennas. A large 12-tap, air-wound inductor with silver-plated wire and tap switch gives you an almost unlimited matching capability between 1.8 and 30 MHz. Continuously variable transmitter/antenna controls make optimum adjustments easy.

Kit HFT-9, Shpg. wt. 3 lbs. Only 49.95

SAVER!

Save by buying a system. The matching wattmeter and antenna tuner system work together to improve your power efficiency, QRP signal and transmatch.

Kit QRS-9, HM-9 HF/VHF Wattmeter and the HFT-9 50-watt Antenna Tuner, Shpg. wt. 14 lbs. Only 84.95

① 40-Channel Aircraft/Marine/Public Service Scanning Radio finds the action

\$249⁹⁵

- The GR-740 scans 40 programmable channels across seven bands, at the touch of one or two buttons
- Microprocessor control and direct keyboard tuning in all seven VHF/UHF bands
- Covers aircraft, marine and public service bands

Seven band UHF/VHF coverage puts a wide variety of radio services at your fingertips. Receive hams, police, government, U.S. weather bureau, press, fire, aircraft, marine, industrial communications, hospitals, highway and special emergencies, disaster relief, riot/narcotic squads, remote paging and more (if these services are used in your area). Scan 40 preselected frequencies or search between two frequencies on a band. Automatic squelch is factory-set for optimum reception; includes operator override.

A versatile 24-key keyboard is divided into program and operation sections for rapid and easy use. Program any frequency within the seven bands into the two banks of 20 channels each. Operate by setting and controlling automatic scan and manual select, bank select, direct channel access, service search, search and scan speeds, search start/hold, priority channel, upper/lower frequency search limits and program and delay or lockout of any frequency. Direct channel access permits instant tuning of a channel without stepping through interim channels. Or press one button to step through an entire 20-channel bank.

Microprocessor control also adds priority channel sampling every two seconds, with interrupt when a signal is detected; patented track tuning, for automatic, optimum reception across the band without adjustment; full-featured display; scan delay, for channels where replies are expected; and much more.

Kit GR-740, Shpg. wt. 8 lbs. 249.95

GR-740 SPECIFICATIONS: Frequency Coverage: Low band (30-50 MHz), aircraft (118-136 MHz), 2-meter Amateur (144-148 MHz), High band (148-174 MHz), 70 cm Amateur (421-450 MHz), UHF band (450-470 MHz), UHF-T band (470.0125-512.45 MHz). RF Sensitivity: 0.4 μ V (30-50, 144-174 MHz) and 0.8 μ V (421-512 MHz), \pm 5 kHz deviation 12 dB SINAD; Aircraft, 1 μ V for 10 dB S/N, 60% modulation. IF Selectivity: - 55 dB @ 25 kHz. Scan/Search Speed: 5- or 15-channels per second. Audio Output: 0.75 watt RMS into 8-ohm load, 10% THD. Front Panel: Volume (on/off), squelch, display, keyboard, speaker, position A/B. Rear Panel: 13.8 VDC input, antenna connector, speaker connector, 120 VAC receptacle. Antenna: Telescoping, 50- to 70-ohm external connector. Power Requirement: 120 VAC, 50/60 Hz @ 20 watts; or 13.8 VDC @ 9 watts. Dimensions: 3 1/2" H x 10 5/8" W x 8" D.

② HD-1418 multi-mode SSB/CW/TTY Active Audio Filter makes the tough ones easy to copy

Twelve total poles of filtering can be combined to work as SSB & Notch, CW, CW2, SSB & Peak, RTTY and fixed configurations with razor-sharp skirts. Solve such problems as partially overlapped sideband signals, overmodulation splatter, close-packed CW stations, full RTTY reception through heavy interference, heterodyne whistle and noise. Versatile power requirements make this Filter usable almost anywhere. Just supply 7-13.5 volts AC or 9-18 volts DC.

Kit HD-1418, Shpg. wt. 3 lbs. 99.95

PS-5012 Power Cube, For 120 VAC operation, 1 lb. 15.95

③ HD-1986 Microlizer tailors your microphone for optimum voice clarity and maximum talk-power on SSB

- Obtain maximum SB output with clearer sounding signal
- Variable high and low response and audio gain adjust for microphone and transmitter differences
- Tailor your voice for maximum clarity when transmitting

One of the greatest needs in amateur radio is to improve the quality of transmitted speech. In the shack, a poor microphone or just the pitch of a speaker's voice can make SSB transmissions difficult to understand. And in mobile operation, peaks at the lower end of the voice range are common and frequently obscure clarity.

The Heathkit HD-1986 Microlizer lets you optimize the clarity of your voice transmissions and get a better match between your microphone and transceiver. Make sure you're heard - clearly. This microphone equalizer fits in series using a standard 4-pin microphone jack and 1/4" phone output jack. Continuously variable high and low frequency controls provide a 12 dB boost or cut at 490 Hz and 2800 Hz. Increase or decrease over-all gain of the microphone signal you feed to your transceiver for more efficient and cleaner operation.

Battery power eliminates the need of another AC outlet. When the Microlizer is on, the front panel LED will light briefly to let you know the battery is still good. Turn the power switch to off, and the Microlizer is bypassed to provide a direct connection

between microphone and transceiver. Requires 9-volt battery.

Kit HD-1986, Shpg. wt. 2 lbs. 44.95

HD-1986 SPECIFICATIONS: Adjustable Microphone Gain: Low Frequency Response: \pm 12 dB at 490 Hz; High Frequency Response: \pm 12 dB at 2800. Input Impedance: 100 k nominal. Maximum Input Level: 500 mV RMS. Frequency Response: 200 Hz to 10 kHz. Distortion: 0.5% or less. Power Requirement: 9-volt transistor battery. Dimensions: 5 3/4" W x 2" H x 4 1/4" D.

④ SA-2060A Deluxe Antenna Tuner with dual wattmeter/SWR bridge matches 1.8-30 MHz

- Covers 160 through 10 meter bands with continuous tuning
- Eliminates the loss of precious, mismatched power
- Select coaxial antenna, long-wire feed or bypass
- Constructed to minimize RF loss at high frequencies

Touchy solid-state finals can rob you of precious bandwidth. The SA-2060A Deluxe Antenna Tuner can solve that problem. The built-in wattmeter/SWR bridge has an accuracy of \pm 5% forward accuracy. Bypass for your tri-band beam or dummy load, or select either of two coax outputs. Connect unbalanced feedlines or long wire antennas - a built-in 4:1 balun lets you use balanced feedlines. A convenient front panel counter permits quickly setting the continuously-variable inductor to previously calibrated frequencies. The SA-2060A tuner will match your antenna to any frequency in the 160-10 meter HF spectrum, including MARS frequencies and the recently approved new band allocations.

Dual wattmeters read forward and reflected power simultaneously for more efficient low band operation. Wattmeter section installs directly into transmission line to measure power on all frequencies between 1.8 and 30 MHz. Measures output up to 200/2000 watts in the forward direction and up to 50/500 watts reflected. Silver-plated straps and roller contact assembly minimize RF loss at high frequency operation. Large feed-through insulators withstand high-voltage RF. Handles power inputs up to 200 watts PEP on SSB and 1000 watts CW.

Kit SA-2060A, Shpg. wt. 20 lbs. 269.95

SA-2060A SPECIFICATIONS: Frequency Coverage: Continuous coverage, 1.8 to 30 MHz. Input Impedance: 50 at match. Impedance Transformation: 4:1 balun. Output Impedance: Wide range. Insertion SWR: Less than 1.1:1. Power Input Capacity: Full legal limit. Dimensions: 5 3/4" H x 14 1/2" W x 13 7/8" D.

⑤ HL-2200 2 kW Linear Amplifier combines Heath's trusted reputation with many convenience features

- Low-price per watt in a 2 kilowatt Linear Amplifier
- Designed to use with exciters that deliver 100 watts or less

More of what you want, including rugged dependability, engineering sophistication and features, and cost-effective performance, are provided by Heath's HL-2200 2 kW Linear Amplifier.

More power in the pile-ups: A pair of world-famous 3-500Z's run at 2000 watts input of QRM-bursting PEP on sideband and load to 1 kW input for CW and RTTY. The 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 the Amplifier to full output - with the kind of signal that catches the new DX, gets priority traffic through and your call sign heard clearly, year after year.

Kit HL-2200, Shpg. wt. 68 lbs. 699.95

HL-2200 SPECIFICATIONS: Band Coverage: 80, 40, 20 & 15 meters. Max. power input: SSB, 2000 W PEP; CW, 1000 W; RTTY, 1000 W. Driving power: 100 W. Duty cycle: SSB, continuous voice modulation; CW, continuous (max. key-down 10 min.); RTTY, 50% (max. transmit time 10 min.) Third order distortion: - 30 dB or better. Dimensions: 8 1/4" H x 14 7/8" W x 14 1/2" D.

⑥ Save \$100 on Heathkit's SA-2500, Automatic Antenna Tuner with 18 inductor presets

- Continuously variable inductor optimizes efficiency
- Preset the roller induction for two frequencies on each of nine bands, from 160 to 10-meters

Preset the roller inductor for 18 different frequencies - a high and low on each of the nine bands. In the Auto mode, just select the band and the high or low position; the Auto-Tune Antenna Tuner will set the roller inductor to the pre-selected value and adjust the transmitter and antenna capacitors.

Remote operation lets you automatically tune selected frequencies using only transmitter band switches if your transmitter's equipped for remote operation.





Manual tuning is made easy with three front panel lever switches and dual wattmeters. The wattmeters read forward and reflected average power and SWR in two ranges. An auto-range circuit automatically switches the wattmeters.

Effectively tune and match unbalanced feed lines and single-wire antennas at the full legal power limit of your station. Add the 4:1 Balun Accessory for use with balanced ladder line antennas. Use the front panel coax switch to easily select from three different, permanently connected antennas and bypass.

Heath's Auto-Tune Antenna Tuner installs directly into the transmission line to measure power on all frequencies between 1.8 and 30 MHz-200/2000 watts in the forward direction and 50/500 watts reflected. SWR readings on the reflected meter provide direct readings from 1:1 to 3:1. Silver-plated straps and roller contact assembly minimize losses at high frequencies. Large feed-through insulators withstand high-voltage RF. Front panel indicators let you know complete Tuner status, including when the tuned SWR exceeds the selected ratio.

Kit SA-2500, Shpg. wt. 26 lbs. Was \$499.95 Now Only 399.95
 Kit SA-2500-1, 4:1 Balun Accessory, 2 lbs. 39.95

SA-2500 SPECIFICATIONS: Frequency Range: 1.8 to 30 MHz. Input Power Capability: 2000 watts, SSB; 1000 watts, CW. Input Impedance: 50Ω. Output Impedance: Wide range. Impedance Transformation: Optional 4:1 Balun. Meter Functions: Forward, reflected, average power, SWR. Meter Ranges: Forward, 200/2000 watts; reflected, 50/500 watts and 1:1 to 3:1 SWR. Wattmeter accuracy: 200, 2000 watts forward, 500 watts reflected, ± 5% average; 50 watts reflected, ± 7, 5% average. Autorange Wattmeter: User selected. Insertion SWR: Less than 1.1:1. Automatic Tune: Cycle time, about 15 seconds; input power, 20 watts min. for SWR Set; VWSR, user selected. Power: 120 VAC 50/60 Hz @ .25 amps max., internal; 12 VDC at 1 amp. max., external. Dimensions: 14½" W x 20" D x 6¾" H.

7 μMatic Memory Keyer started a revolution in CW

- Adds programmable excellence to all your CW
- Ten variable length buffers for 240 characters of text
- Four-level random practice mode has 6,400 different 3,000-character code copy training sessions

Patented "command strings" let you store text in the buffers, select the speed, weight, spacing or message repeat count for each one, and link them together in any sequence you desire. A special editing feature lets you recover from errors. Enter text at whatever speed and weight are comfortable to you, and send them with any other setting you wish. Text can be added into a buffer message being sent. CMOS memory with battery backup retains the buffer contents, last-selected speed, spacing, weight and repeat count when the Keyer is without power.

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

SA-5010 SPECIFICATIONS: Speed Range: 1 to 99 wpm. Character/Word Spacing: Less than or equal to speed setting. Number of Buffers: 1 to 10. May be used to store text or commands. Buffer Size: 240 characters plus commands, total. Weighting: Normal plus 5 light and 5 heavy settings. Auto Message Repeat: 0 to 9 (sent 1 to 10 times). Keyer Output: Solid state: + 250 volts @ 100 mA; - 200 volts @ 40 mA. Memory Backup: Three 1.5-volt alkaline batteries (included) - 1 year typical life. (No battery drain unless Keyer is removed from AC power source). Sidetone: Approximately 300 to 1500 Hz, adjustable. Power Requirements: External transformer (optional) or 11 to 16 VDC @ 200 mA. Dimensions (excluding paddles): 15½" H x 4½" W x 5" D.

Heathkit's reliable, economical accessories give you improved station performance

1 New! Smart Outlet Box for Amateur Radio systems

\$59⁹⁵
Kit

- Turn on one piece of equipment to power up six others
- Faster response, superior surge protection and noise filtering
- Build it, or purchase UL approved assembled version

Power up six other units by turning on a device plugged into the control socket. One socket unswitched for devices with internal clocks. See p. 30 for details.

Kit GD-1495, Shpg. wt. 5 lbs. 59.95
GDW-1495, Assembled and tested (UL Approved), Shpg. wt. 4 lbs. 99.95

2 Low-cost quieting 8-ohm headphones

Wide 40 to 15,000 Hz frequency range, 2 1/4" speakers, individual volume controls, and isolating ear cups. Includes 10' coiled cord with plug.

HDP-1396, Assembled, Shpg. wt. 2 lbs. 14.95

3 Lightweight ProCom 300 headset frees hands

High-quality performance in a featherweight headset with exceptional audio performance. Receiver has a 100 to 3500 Hz frequency response while the microphone has a frequency response of 100 to 8000 Hz. Includes ON/OFF VOX. Aviation-style single-side earpiece receiver.

HDP-1497, Assembled, Shpg. wt. 1 lb. 99.95

4 Low-noise professional ProCom 200 headset

Fully adjustable Telex headset for the amateur and professional offers almost hands-free operation. Boom-mounted, pivotal electret microphone has selectable high or low impedance. Both receiver and microphone have a frequency response of 100 to 8000 Hz. Phone cord has in-line ON/OFF VOX control.

HDP-1496, Assembled, Shpg. wt. 2 lbs. 99.95

5 Heath 'Cantenna' dummy load

Handles 1 kW of RF with VSWR's less than 1.5:1 for frequencies up to 450 Hz. Eliminates unnecessary QRM during tune-up and minimizes mistakes while performing 'hot' gear maintenance or alignment.

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

6 Highly accurate Dip Meter covers 1.6 to 250 MHz

The multi-purpose HD-1250 has dozens of practical uses in your lab and hamshack. It can aid in finding the approximate resonant and operating frequency of either energized or de-energized circuits and help you adjust traps, detect parasitic oscillations and harmonics, measure unknown Q/L/C values, locate sources and frequencies of RF energy, or functions as a signal generator, relative field strength meter, or receiver alignment tool. In the balanced Colpitts RF oscillator, silver mica coupling capacitors improve frequency stability. A broadband MOSFET amplifier, hot-carrier diodes and a Q-multiplier improve sensitivity and dip action. A responsive 150 μ A meter movement yields sharper resonance indications. Includes a headphone jack for positive modulation monitoring. Requires 9-volt battery (not included).

Kit HD-1250, Shpg. wt. 4 lbs. 89.95

HD-1250 SPECIFICATIONS: Frequency Range: 1.6 to 250 MHz. Controls: Tuning capacitor, oscillator level control, and ON/OFF switch. Meter Movement: 150 microamperes. Solid-State Circuits: 1 NPN transistor oscillator, 1 dual-gate MOSFET amplifier and two diffused silicon hot carrier diode detectors. Power Source: 9-volt NEDA type 1604 battery. Net Weight: 2 lbs. Dimensions: 2" H x 2 1/4" W x 5 7/8" D.

7 CONTROLLED MAGNETIC Fixed Station Microphone

Designed by Shure with Amateur Radio features. Dual selectable output impedance and frequency response tailored for intelligibility. Select Normal or VOX operation. Push-to-talk switch bar for momentary or locked operation.

HDP-444, Assembled, Shpg. wt. 3 lbs. 59.95

8 End your TVI problems with this low-pass filter

Solve emissive RF interference problems with this fine low-pass Barker & Williamson filter designed for use in the 160 to 10 meter frequency range. It provides a minimum of 70 dB of attenuation. Cut-off frequency is 34 MHz and has less than a 0.3 dB insertion loss. It has a 50 ohm impedance and is rated for legal power.

HDP-3700, Assembled, Shpg. wt. 2 lbs. 34.95

9 Twelve-socket power Outlet Strip has many uses

Handy HD-1274 Outlet Strip multiplies convenience by providing extra electrical outlets for your equipment in a hamshack, workshop, office, basement or garage. It has eleven fused 3-hole outlets that can be switched on and off. It also has one unswitched outlet that can be used for a clock or equipment equipped with memory saver circuits. The Outlet Strip is rated at a 10-amp maximum load and has a 12-foot cord. The HD-1274 is an excellent way to extend 120 VAC to a large group of equipment in one location.

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

10 Dual HF Wattmeter measures up to 2000W PEP

\$99⁹⁵

- Reads PEP or average power from 1.8 to 30 MHz
- Has factory assembled and calibrated sensor

Installed in your transmission line, the HM-2140A monitors both forward and reflected power simultaneously. A second scale on the reflected meter reads SWR directly from 1:1 to 3:1 for fast easy measurement of your outgoing signal.

Measure your transmitter's output up to 200/2000 watts PEP (\pm 5%) in the forward direction and up to 50/500 watts reflected. Pushbutton-switched high and low power ranges plus a factory-tested sensor ensure precise readings every time. Another dual-position switch enables you to read PEP or Average power.

The HM-2140A can be operated on a 9-volt battery (not included) or use 120 VAC with the PS-2350 Battery Eliminator. A special switching circuit permits you to observe the battery condition at any time. The precision RF sensor can be mounted in the cabinet or used up to four feet away.

Kit HM-2140A, Shpg. wt. 5 lbs. 99.95

PS-2350 120 VAC Battery Eliminator, Shpg. wt. 1 lb. 7.95

11 Coaxial Switch for routing up to 4 antennas

The HD-1234 is designed to switch one RF source or receiver to any one of four antennas, or RF loads while grounding the unused connectors. It has a power handling capability of 1000 watts (2 kW PEP) with a maximum 1.1:1 SWR to 250 MHz. A mounting bracket is included that allows you to conveniently hang the Switch on the side of an equipment enclosure, onto a desk, or on any wall.

HD-1234, Shpg. wt. 1 lb. 22.95

12 Heathkit HD-1481 Remote Coax Switch

\$99⁹⁵

- No need to run a control line – the HD-1481 sends signals on your existing coax feed

Conveniently control the switching of antennas from inside your station. Two units, a remote and indoor control unit, interconnect through your existing coaxial cable to eliminate the need for any multiconductor control cable. The remote, a tower- or mast-mounted RF remote coaxial switch, can operate up to four antennas. It is rain tight and mounts with a single clamp.

The control unit contains the power supply and provides the switching signals to the remote. A front-panel switch selects the desired antenna. Handles 2000 watts PEP and has a VSWR of 1.15:1 or less. Frequency range from 1.8 to 54 MHz with impedance of 50 to 70 ohms and a loss at 54 MHz of less than 0.2 dB. Operates from 120 VAC at 50/60 Hz and measures 2 5/8" H x 5 1/2" x 7 1/2" D. Remote is 7 3/8" H x 8 3/8" W x 4 1/2" D.

Kit HD-1481, Shpg. wt. 5 lbs. 99.95

13 Innovative Phone Patch utilizes new design

\$49⁹⁵

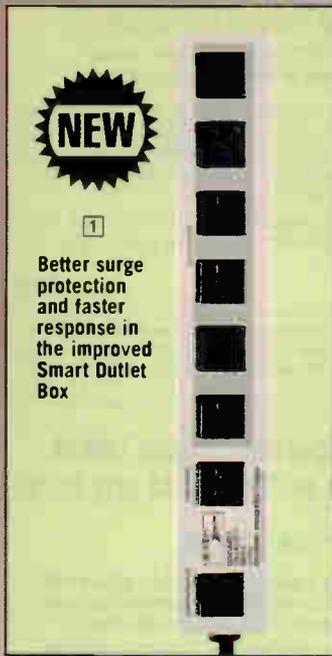
- New design and circuitry eliminate bulky hybrid transformers
- FCC registered as a protective device
- Filtering provides high degree of electrical isolation

New design and special integrated active speech and transmission circuits make this Phone Patch a breakthrough for transfer of audio signals between a telephone line and two-way radio equipment.

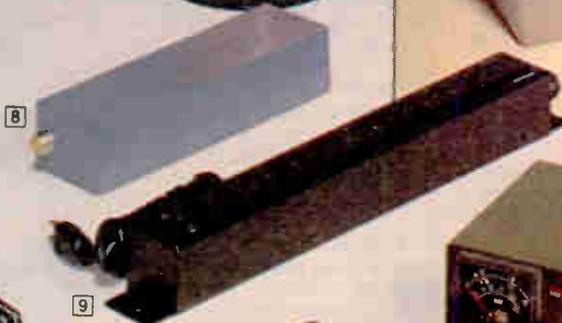
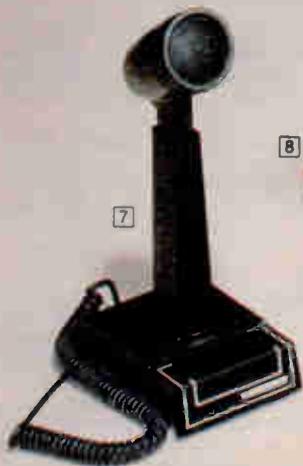
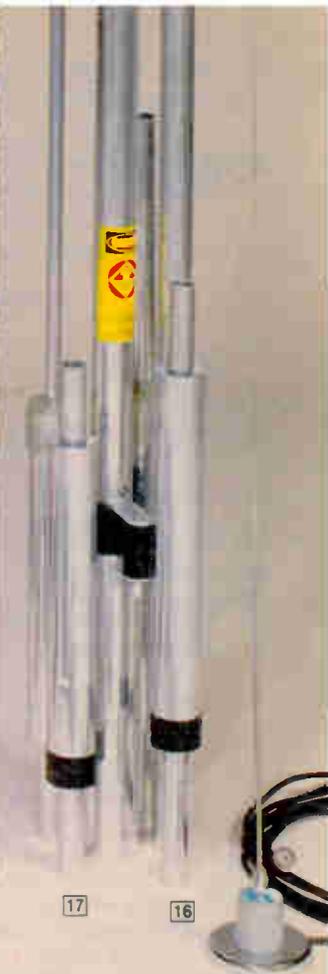
Runs on phone line voltage, with battery assistance in very low voltage conditions (battery not included). Ideal for voice-operated installations, the Phone Patch provides a high degree of electrical isolation from your radio equipment. And you can monitor your transmissions on the phone line. A built-in detector circuit allows adjustment with a VTVM or VOM for optimum separation between transmit and receive. The HD-1515 is an easy one-evening kit.

Kit HD-1515, Shpg. wt. 2 lbs. 49.95





1
Better surge protection and faster response in the improved Smart Outlet Box



14 Specially designed short wave listening antenna

Completely assembled and ready to use, the heavy 14-gauge HDP-7800 antenna covers 60-49-41-31-25-19-13-11 meters. A high-performance trapped dipole with an overall length less than 43 feet.

HOP-7800, Shpg. wt. 3 lbs. **64.95**

15 Long-wire SWL Antenna for the serious listener

This 75-foot SWL antenna really helps you pull in distant stations. Copper line antenna has a 30' lead-in with all insulators and hardware for easy setup.

GRA-72, Shpg. wt. 2 lbs. **14.95**

16 Mobile Antenna for the 146 to 148 MHz range

Cushcraft CS147M 5/8-wave 2-meter mount with 90 lb. grip-tight magnet. Boasts 3 dB gain for more range. Stainless steel whip with thumb-lock adjustment and chrome-plated base. Includes PL-259 connector and coax.

HOP-1472, Assembled, Shpg. wt. 3 lbs. **29.95**

17 80 to 10 meter Cushcraft AV5 has long DX reach

Vertically polarized 25 ft. high omni-directional antenna provides complete CW and SSB coverage on 80-40-20-15-10 meters. Handles 2000 watts PEP.

HOP-1473, Shpg. wt. 10 lbs. **119.95**

1 Get in on the fun of the RTTY revolution with the HD-3030 RTTY Terminal Interface

\$249⁹⁵

- A "universal" terminal interface – works with most popular personal and home computers
- Built-in supply for noncomputer 20/60 mA TTY operation
- Six poles of active, preselect filtering

The features you need most for enjoyable copy: Weak or distorted signals are no problem. Six poles of active preselect filtering deliver strong, readable tones that print clearly, even in a crowded band. Optional filters for 425 and 850 Hz audio shifts enable even more performance. It features separate RTTY and CW demodulator boards, 170 Hz standard shift, crystal-controlled AFSK generator, capability for full FSK with equipped transmitters, true mark/space detection, oscilloscope tuning outputs, front panel LED bargraph tuning, data and status indicators.

The HD-3030 Terminal Interface has no equal in quality or function for the price. TTL and RS-232C I/O compatibility, plus a built-in loop supply make it a great buy and regardless of the rig or printer you prefer!

Kit HD-3030, Shpg. wt. 8 lbs. 249.95

Universal 425/850 Hz Filter Circuit Board Accessory. Provides frequency shift of 425 or 850 Hz (builder's option). Plugs directly into HD-3030 motherboard.

Kit HOA-3030-2, Shpg. wt. 1 lb. 14.95

170 Hz Preselector Filter Circuit Board Accessory. Dramatically improves performance of standard shift tones by removing strong adjacent channel signals.

Kit HOA-3030-4, Shpg. wt. 1 lb. 19.95

HD-3030 SPECIFICATIONS: Displays: LEDs for Power, Send, RDA, Mark, Space. Ten-segment bargraph tuning indicator. PUSHBUTTONS: Power, Operate/Standby, Send/Receive, CW/RTTY, Send/Receive (Reverse Shift). Preselect/Bypass, and 170 Hz, 425 Hz, 850 Hz (independent and interlockable audio frequency shifts). REAR PANEL: Loop jack input (100 VDC @ 20 or 60 mA); 25-pin DB-25 I/O connector for TTL and RS-232 computers, terminals or printers; 120 VAC/340 W auxiliary power outlet; groundpost; line cord. CW DEMODULATOR: Center Frequency: 750 Hz. – 3 dB Bandwidth: 70 Hz. – 20 dB Bandwidth: 240 Hz. Dimensions: 3" H x 7 1/2" W x 10" D (7.6 x 19 x 25.4 cm)

SUPER CW Software for Heath H-8 and H/Z-89 computers. Has auto CW-ID, user-configurable parameters, type-ahead buffer. Requires H-DOS 1.5 or above.

HDP-1010, Shpg. wt. 2 lbs. 29.95

SUPER RTTY Software for Heath H-8 and H/Z-89 computers. ASCII/Baudot systems use full disk/graphics capabilities. Requires H-DOS 1.5 and 24K memory.

HDP-1020, Shpg. wt. 2 lbs. 29.95

2 UltraPro CW Keyboard sends letter-perfect code and offers the versatility of easy programming

\$149⁹⁵

- The most intelligent microprocessor-based CW keyboard, with more functions and user-flexibility than any other
- Four-level random practice mode allows 1000 different and repeatable, 3000-character training sessions with unique 'copy' mode to teach typewriter proficiency "hands on"

The HD-8999 UltraPro CW Keyboard represents the long-awaited third generation of code computers. It contains a host of specialized prompting features and a simplified operating system that minimize key errors and increase the ease and accuracy of high-speed sending.

Exclusive component-level diagnostic capability and two-key rollover (to keep up with proficient typists) make it the most advanced and first truly 'friendly' keyer. It uses a customized microprocessor and the latest in comfortable, 'human engineered' keyboard designs as a foundation for the most productive CW operating aid you can own. Status indicators, a non-volatile CMOS RAM (batteries included) and power-up diagnostics combine in what 73 Magazine called "a compact gem of a keyboard."

Kit HD-8999, Shpg. wt. 7 lbs. 149.95

HD-8999 SPECIFICATIONS: Key Nomenclature: 1 through 0 and A through Z in a standard QWERTY format. SET, WPM, PRAC/SPC'G, PROT/WT, PREV, SN, LOAD, STOP, TONE/CLICK, TUNE, DELETE WORD/DELETE, HOLD, SHIFT (two), AR, SK, BT, ES, KN, AS BK, DE and CQ. Punctuation: ?/"/-/!/: comma and period. Speed Range: 1-99 WPM. Spacing: less than or equal to speed. Weighting: Normal plus five 'light' and five 'heavy' settings. Serial Number: 1-9999, automatically generated. Text Buffers: 495 characters, total capacity. Individual buffers may be protected. Keyer Output: ~ 25 V @ 100 mA; 200 V @ 40 mA. Memory Backup: Three mini-cells (included) with typical 1 year life. Sidetone: 300-1500 Hz adjustable. Indicators: 4-digit display plus SET, MSG, LOAD, PRAC and type-ahead buffer status LEDs. Operating Range: 32-140 F (0-40 C). Power Requirements: 7.5 to 11 VAC or 11 to 16 VDC, 450 mA max Input for PS-5012 120 VAC Adaptor (on page 36). Dimensions: 27" H x 15 1/2" W x 8" D.

3 Heathkit's HD-3006 Crossfire Tuning Indicator

\$49⁹⁵

- Quick and easy tuning of RTTY transmissions, without the need of an oscilloscope or costly equipment

The Heathkit HD-3006 Crossfire is a visual tuning indicator for radioteletype (RTTY) communication. Sixteen LEDs make up the display. Eight vertical LEDs identify mark signal strength; eight horizontal LEDs do the same for space signal strength. Just tune your receiver for maximum vertical and horizontal display – you'll get a strong signal for your computer or printer.

The Crossfire has a wide voltage range and is compatible with almost any interface/terminal unit that has oscilloscope outputs for tuning. Put your scope back on the workbench.

Kit HD-3006, Shpg. wt. 3 lbs. 49.95

HD-3006 SPECIFICATIONS: Display: Two 8-LED bars. Each bar requires approximately 14 dB no-signal-to-signal voltage ratio (5:1) for full use of the bars. Input Level: Threshold, 0.3 volts RMS on AC and 0.5 volts DC. Maximum, 15 volts RMS on AC and 15 volts DC. Power Supply: 8-16 volts AC/DC power cube (included with kit). Dimensions: 3 1/4" H x 5" W x 4" D.

Up-to-date Amateur Radio Courses reflect latest licensing needs – to put you on the air at any level

4 New! Completely revised Novice Course

\$44⁹⁵

- Communicate with nearly a million other hams all around the world – right from your own home by transmitting and receiving Morse code signals from your own station
- Heath guarantees that you will pass the Novice test or we will refund the full purchase price of the course

Join the exciting world of Amateur Radio. It is a unique way to communicate one-on-one with a diverse group of people from all professions and in all countries. You'll be able to participate in Novice field day competitions, take part in Novice traffic nets to relay third-party messages and, in case of an emergency, you can provide an important public service.

This new, updated course comes from the long-time leader in Amateur Radio. Heath has prepared a self-instruction program that not only reflects the latest licensing requirements but that is guaranteed to help you earn a Novice ticket. Everything you need to get your license is in this comprehensive, well organized study package, including information on how you apply to take the latest exam. It also provides helpful guidelines for setting up and operating a good station when your license and personal call sign arrive.

Nine learning modules correspond to the subject areas covered in the Novice Exam. Each subject is presented in a clear, step-by-step manner so that you may progress through the course at your own rate. Check your progress with multiple choice questions at the end of each module. Three practice exams and a final which is styled after most often used Novice exams, give you the experience and confidence you want to pass the first time with flying colors. Two cassette tapes explain the RST signal reporting system, review electronic circuit components, and cover practical circuits. You will also learn the International Morse Code in letter groups and then improve your copy speeds to 5 words per minute.

ER-3701A, Shpg. wt. 7 lbs. 44.95

Kit HD-1416A, Code Oscillator (see below), Shpg. wt. 2 lbs. 19.95

5 Build up your speed code with this handy kit

\$19⁹⁵

- Sturdy telegraph key with adjustable rebound, built-in speaker with volume and tone controls

Use this CW Code Oscillator to get your code speed up and pass your exam in a simple and inexpensive way. This handy Practice Oscillator features a telegraph key with adjustable rebound, built-in speaker, volume and tone controls, plus a headphone jack for private listening. And once you get your license, it can serve as a side tone oscillator for any transmitter using negative-grid block keying. 2 1/2" H x 4 1/2" W x 4 3/8" D. Operates on 9V battery (not included).

Kit HD-1416A, Shpg. wt. 2 lbs. 19.95

We'll help you get started in Amateur Radio

Save 23% by purchasing the ER-3701A Novice Course and HD-1416A CW Oscillator together. Includes 10% certificate good for up to \$10 off Heathkit equipment.

SAVER! ERS-3701, Shpg. wt. 9 lbs. 49.90





This CW keyboard lets you send letter-perfect code every time

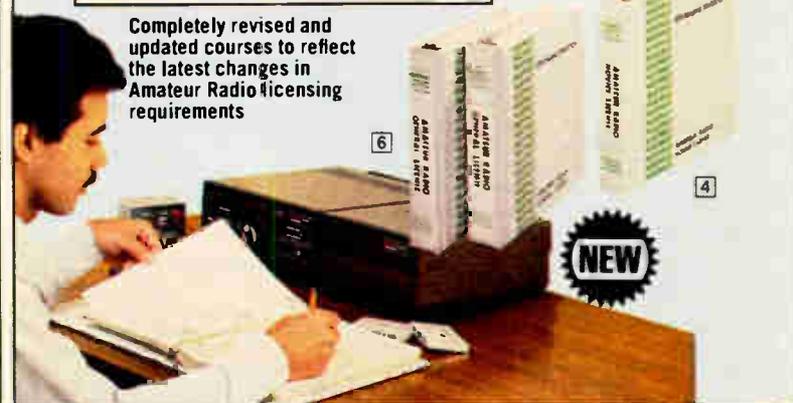
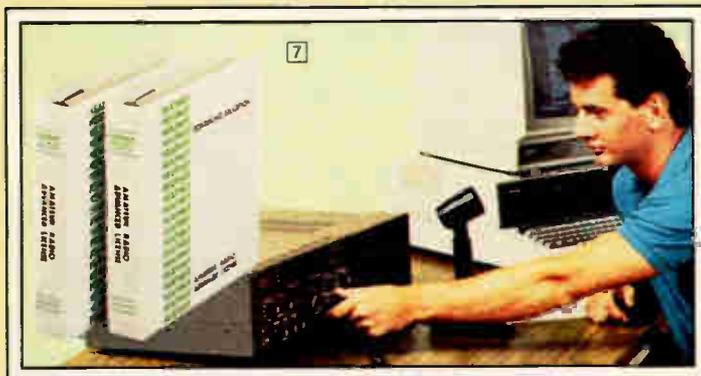


FAST, EASY
3-EVENING KIT

Use the HD-3006 to fine-tune RTTY — put your scope back on the bench



Completely revised and updated courses to reflect the latest changes in Amateur Radio licensing requirements



6 New! Completely revised General License Course

\$64⁹⁵

- 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.

An informative text takes you through the subjects covered on the 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 copy speeds up to 15 words per minute. Since only 13 wpm is required to pass the General exam, the extra "two-word edge" gives you more confidence to pass the code test.

Four simulated 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 notice of passing to receive 5.0 CEU's and a Certificate of Achievement.

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

ER-3702A, Shpg. wt. 21 lbs. 64.95

7 Upgrade with the Advanced Class Amateur Radio License Course to achieve Advanced Class status

\$54⁹⁵

- Well-organized to make the most efficient use of your time
- We guarantee you'll pass the Advanced Class exam the first time — if you don't we'll refund the cost of the program

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 have a General license or have the equivalent skills and background knowledge.

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 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 (3750-3850, 7150-7225, 14150-14225 and 21200-21300 kHz) is allocated to the Advanced and Extra Class license holders. Why be left out? These are the choicest frequencies 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 notification of passing to receive 4.0 Continuing Education Units and a personalized Certificate of Achievement.

ER-3703, Shpg. wt. 9 lbs. 54.95

Versatile oscilloscopes for troubleshooting and a calibrator to maintain their performance

1 Triple Trace 60 MHz Oscilloscope available with optional autoranging digital display

\$999⁹⁵

A high-performance oscilloscope, the IO-4360 offers triple trace capability with a low input sensitivity up to 60 MHz. And with the optional IOA-4360 Time-Voltage Module, a powerful combination is brought together to increase your troubleshooting effectiveness and cut the time spent on alignments.

Multi-trace oscilloscope: Two channels use an attenuator network of 12 calibrated ranges from 2 millivolts/cm to 10 volts/cm. Accuracy of signal measurements in this range is within 3% using either AC or DC coupling. The third trace is available at the external input and can be viewed by pressing the IO-4360's front panel TRIPLE trace button. To add to its versatility, the Channel 2 input of the IO-4360 Oscilloscope can be inverted and "added" to the input of Channel 1 for making differential measurements.

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

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

Complete trigger system: The IO-4360 can be triggered from either of the two vertical input channels, from the line voltage, or from an external trigger which is also the input for the third viewable trace. A filter network allows a choice of the AC, DDC, low or high frequency component of a signal to be used in triggering the scope. This filter network can also reject either the horizontal or vertical sync pulses of TV signals when using them to trigger video waveforms. Fine trigger adjusting is done with a precise level control. When a trigger signal isn't used, the baseline can be automatically displayed by using the scope's automatic mode.

Kit IO-4360, Shpg. wt. 41 lbs. **999.95**

SAVER! Save \$50.00 with a purchase of an IO-4360 and IOA-4200 Module.

IOA-4200, Shpg. wt. 53 lbs. **1299.90**

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

2 Optional Time-Voltage Accessory Module

- Adds frequency counter and DC voltmeter capabilities to IO-4360

Automatically analyze any waveform displayed on the IO-4360 Scope. Specifically designed for the Triple Trace Oscilloscope, the Time-Voltage Module displays time, frequency or ± DC voltages at whatever point the scope probe is placed. Just select the desired function on the module and press a button. The autoranging module then indicates the reading in a bright 3 1/2 digit display.

Measure time intervals from 1.0 s to less than 20 ns and waveform frequencies from 1 Hz to 19.99 MHz. Read ± DC voltages from a low 0.1 mV to 199.9 V with an accuracy of 0.75%. Separate, isolated inputs enable the IOA-4200 to measure voltages up to a higher ±1000 volts. Features automatic placement of the decimal point, plus time and frequency unit indicators.

Mark any portion of a waveform displayed on the IO-4360 Oscilloscope with

42/INSTRUMENTS



Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska and Michigan Residents Call: 616-982-3411.

variable scope reference and measurement cursors and easily obtain an instant readout of its period, frequency or pulse width. Just as easily, measure and display risetimes, burst or ringing frequencies, and the time difference between pulses.

Polarity and overrange indicators provide even more measuring convenience for the user of this low-profile accessory to the IO-4360 60 MHz Oscilloscope.

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

IOA-4200 SPECIFICATIONS: TIME: Ranges: ±10 s to ±2.0 μs (1, 2, 5 fullscale sequence). Basic Accuracy: ±2% of reading, ±1 count. **FREQ:** Ranges: ±1.0 Hz to ±0.5 MHz (1, 2, 5 fullscale sequence). Maximum Display: 19.99 Hz on 100 ms to 19.99 MHz on 0.2 μs. Accuracy: ±3%, ±1 cm. **VDC (internal):** Ranges: ±2 V, 2V on 2 mV to 50 mV; 2 V, 20 V on 100 mV to 0.5 V; ±20 V, 200 V on 1 V to 10 V; autoranging. Accuracy: ±1.0% (±0.75%); ±2 cnts. **EXT VDC:** Ranges: 2 V to 2000 V; autoranging. Basic Accuracy: ±0.5% (±0.25%), ±1 cnt. **GENERAL:** Display: 3 1/2 digit. LED, automatic minus for negative, positive implied. Dimensions: 1 1/2" H x 10 3/4" W x 9 3/4" D. *Accuracy specs are for built-in calibration. Numbers in () are for laboratory standards calibration.

3 5 MHz Dual and Single Trace Oscilloscopes

- Excellent 10 mV/cm input sensitivity with variable attenuation
- Triggered horizontal sweep stabilizes nearly all types of waveforms
- Special TV trigger coupling function allows easier TV signal triggering

An outstanding value, the IO-4205 Dual Trace Oscilloscope is a welcome addition to the laboratory, service shop, or home work shop. It is a compact, versatile and easy-to-build test instrument that lets you study waveforms in many different types of electronic circuits. Its many features provide the accuracy and capability found only in higher-priced oscilloscopes.

The dual trace capability of the IO-4205 enables you to directly compare two signals, as well as, check phase and other timing functions. And the 10 mV/cm input sensitivity and DC to 5 MHz bandwidth of the IO-4205, allows you to use it in many fast, low-level waveform applications.

Seven calibrated time bases, from 200 ms/cm to 0.2 μs/cm, is another feature of this value-packed oscilloscope. In addition, each range is variable controlled for added accuracy and user convenience. With the IO-4205, you can even display X-Y signals by applying an external horizontal signal.

A stable triggering circuit, a feature found on more expensive scopes, brings the advantages of triggered sweep with automatic sync to the IO-4205. This scope also has a special TV setting in the triggering network which allows low frequencies to pass while rejecting high frequencies.

Other features include an 8 x 10 cm graticule and a bright CRT that allows the user to make quick and accurate waveform measurements without eye strain. A precise source of square waves like those provided by the IG-4505 (page 46) or the IG-4244 Calibrator (page 43) is needed to calibrate the IO-4205 Oscilloscope.

Kit IO-4205, Shpg. wt. 25 lbs. **349.95**

The IO-4105 Oscilloscope is an excellent, low-priced alternative to situations where only a single trace oscilloscope is needed. It has all the features and performance of the IO-4205 Dual Trace Oscilloscope with only one vertical input channel. Also requires IG-4505 or IG-4244 for calibration.

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

IO-4205/IO-4105 SPECIFICATIONS: Bandwidth: DC to 5 MHz, ±3 dB. Sensitivity: 10 millivolts/centimeter. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 nanoseconds. Overshoot: Less than or equal to 5 percent at 1 kilohertz. Impedance: 1 megohm, shunted by 38 picofarads. **SWEEP:** Type: Triggered. Range: 200 milliseconds to 0.2 microseconds in seven steps, plus variable. Trigger Source: Y1, Y2, External, Line. Trigger Modes: AC, DC or TV; plus or minus slope; automatic or normal. **HORIZONTAL:** Sensitivity: 0.1 volt/centimeter. Bandwidth: DC to 1 megahertz. Impedance: 1 megohm, shunted by 50 picofarads. External Horizontal Input: X1 and X10 attenuator, as well as variable. **GENERAL:** CRT: 5DEP31F, 8 x 10 centimeters viewing area, blue-green medium-persistence phosphor, 5-inch round flat-face tube. Accelerating Potential: Approximately 1.6 kilovolts. Graticule: Screened, 8 x 10 centimeters. Power Requirements: 120/240 VAC, 50/60 Hz. Overall Dimensions: 8" H x 13" W x 17" D.

4 Dual Trace 10 MHz Oscilloscope offers a wide range of measurement capability in a lab-grade instrument

\$449⁹⁵

- Precise performance with a DC to 10 MHz response and a 35 ns rise time to accurately display high-speed square waves
- Two vertical input channels with eleven calibrated ranges from 10 mV/cm to 20 V/cm including variable control
- Calibrated time base ranges from 0.2 s/cm to 0.2 μs/cm

Combining excellent sensitivity, stability and versatility with most desired features; Heath engineers have developed a laboratory-grade oscilloscope that is



2 Optional Time-Voltage Module to IO-4360

Accessory module increases your troubleshooting effectiveness by adding frequency counter and DC voltmeter capabilities to the IO-4360 Triple Trace Oscilloscope.



5 Precision Oscilloscope Calibrator helps maintain scopes at their peak performance level and accuracy

• Provides accurate time and amplitude signals for calibrating most scopes

A laboratory-precise calibrator, the IG-4244 provides a source of accurate time and amplitude signals for making critical oscilloscope adjustments and calibrations. With its range of outputs and accuracy, this quality instrument is exceptionally equipped for calibrating scopes with bandwidths over 100 MHz.

Two crystal oscillators supply twenty-four square wave signals with very accurate times from 0.5 seconds (2 Hz) to 10 nanoseconds (100 MHz) through a 1-2-5 sequenced range switch. The rise time of these signals is less than 1 nanosecond (with less than 2% or 10 mV aberrations) making them very well suited for use in high frequency compensation adjustments on oscilloscope vertical amplifiers. Time accuracy is held to a critical 0.015%.

Sixteen precise square wave voltages, at about 1 kHz, are available for scope vertical calibration and attenuator compensation networks. These voltages range from 1 mV to 100 V peak through a 1-2-5 sequenced switch. Also available is a sine wave signal output of approximately 1 kHz at 1 volt peak-to-peak. This signal is especially useful in adjusting scope trigger circuits.

In addition to its scope calibrator functions, the IG-4244 can be used as a bench standard for calibrating other test equipment. Or, this precise calibrator can be used as a signal source for testing equipment or other experimental projects. The IG-4244 is easily assembled in about 8 hours and uses 120/240 VAC (50/60 Hz). Its dimensions are 3" H x 7 1/4" W x 9 1/2" D (7.6 x 18.4 x 24.1 cm).

Kit IG-4244, Shpg. wt. 6 lbs. 149.95
 SG-4244, Assembled and tested, Shpg. wt. 6 lbs. 299.95

IG/SG-4244 SPECIFICATIONS: TIME: Range: 0.5 s to 10 ns. Amplitude: 0.5 s to 20 ns, 100 mV to 1V peak; 10 ns, 100 mV to 0.5 V peak. Rise Time: <1 ns. Leading Edge Aberrations: <2% of peak-to-peak amplitude or 10 mV, whichever is greater. Output Impedance: 50 ohms, nominal. VOLTAGE: Range: 1 mV to 100 V peak in a 1-2-5 sequence. Accuracy: ±1%. Rise Time: <5 μs. Frequency: 1 kHz. Sine Wave Frequency: Approximately 1 kHz. Amplitude: Approximately 1 V P-P. Power Requirements: 120/240 VAC, 50/60 Hz, 25 watts maximum. Dimensions: 3" H x 7 1/4" W x 9 1/2" D.

ideal for the wide range of measurements encountered in electronics, developmental laboratories and scientific research. And it is in the price range of the service technician as well as the part time hobbyist.

Select several methods of displaying a signal on the 8 x 10 cm rectangular viewing area. Either or both channels can be displayed as a function of time or of each other. At lower speeds both channels are displayed in a chopped mode to avoid flickering while at higher speeds both signals are displayed alternately. Front panel X-Y operation uses the scope's matched vertical amps.

A complete trigger system features various trigger signals including the choice of sampling either channel, an externally applied trigger signal or using part of the line voltage. To control the trigger input bandpass, a tri-level mode switch is provided. A special active TV filter cuts off unwanted high frequency signals for easier triggering on TV vertical signals.

Calibrating the IO-4210 requires an accurate source of square waves such as the IG-4505 on page 46 or the IG-4244 Precision Calibrator on this page. A calibrated 1V P-P square wave signal is provided by the scope for checking scope probes. A component tester, included with the scope, allows you to check in-circuit and out-of-circuit electronic components. Use it to check out the IO-4210 during assembly and as a handy tester when the scope is completed.

Kit IO-4210, Shpg. wt. 28 lbs. 449.95

IO-4210 SPECIFICATIONS: VERTICAL: Deflection Factor: Sensitivity: 10 mV/cm to 20 V/cm. 11 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 60 V/cm. Accuracy: 3%. Vertical Response: DC Coupling: DC to 10 MHz. AC Coupling: 2 Hz to 10 MHz. Rise Time: 35 ns. Overshoot: Less than 5%. Attenuator: Vertical Input: Impedance: 1 megohm, shunted by 38 pF. Maximum Input: 400 volts peak, combined AC and DC. Connector: BNC. Modes: Signal, Y1 or Y2 selected by position control. Dual, Chopped (200 kHz) or alternate automatically selected by time/cm switch. HORIZONTAL: Time Base, Ramp: 200 ns/cm to 0.2 s/cm, 19 steps in 1-2-5 sequence. Variable: Continuous between steps to approximately 0.6 s/cm. Accuracy: 3%. Magnifier: X5 (adds additional 2% to sweep accuracy). INTERNAL: Sensitivity: Approximately 0.1 V/cm. Impedance: 1 megohm. Polarity: Positive input causes right-hand deflection. Frequency Response: DC to 1 MHz. Connector: BNC. Trigger: Internal: Automatic; Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Slope Selection: + or - Impedance: 1 megohm, shunted by 40 pF. Connector: BNC. X-Y: Y-Channel: Same as vertical. X-Channel: Same as vertical, except response limited to 1 MHz. GENERAL: Operating Temperature Range: 50-104 degrees F (10-40 degrees C). Power Requirements: 120 VAC, 60 Hz, 70 watts. Overall Dimensions: 6 7/8" H x 12 7/8" W x 19 1/4" D (17.6 x 32.7 x 48.9 cm).

Quality Heathkit test equipment for use in the shop, on your workbench or in the field

1 Versatile IT-2232 Component Tracer effectively increases your troubleshooting efficiency

\$249⁹⁵

- Test unpowered circuit boards and components
- Quickly identifies defective circuit boards
- Displays comparisons between boards or components

An extremely helpful troubleshooting tool, the IT-2232 enables a user to check digital and analog circuits that have no power applied to them. In either of its two channels, the Tracer can display the unique E/I characteristic curve of components or circuits on its 3-inch CRT. In the superimposed mode, two components or circuit boards can be easily compared as one channel uses a dotted line display made possible by a new patent-pending circuit. Two ranges, 5 and 50 volts, are provided for testing low and high voltage capacity devices.

Kit IT-2232, Shpg. wt. 15 lbs. 249.95

IT-2232 SPECIFICATIONS: Display Modes: Channel A; Channel B; Dual. Channel A: Solid line trace. Channel B: Dotted line trace. Test Voltages: 5 volts and 50 volts peak-to-peak. Current Limits: 5 volts peak-to-peak at 5 milliamperes; 50 volts peak-to-peak at 0.5 milliamperes. Operational Controls: Focus, Intensity, Vertical and Horizontal Position. Cathode Ray Tube (CRT): 3RP1A, round 3-inch flat face. Accelerating Potential: Approximately 1.1 kilovolts. Operating Temperature Range: 50 degrees F to 104 degrees F (10 degrees C to 40 degrees C). Power Requirements: 120/240 VAC, 50/60 Hz, 22 watts. Dimensions: 4" H x 10" W x 12 1/2" D (10.2 x 25.4 x 31.5 centimeters). Weight: 8.4 lbs. (3.8 kg.).

3 Accurate IM-2264 True RMS Digital Multimeter

\$249⁹⁵

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

True RMS reading digital meter: Capabilities include: five DC and AC voltage ranges extending from 0.1 mV to 1000 VDC and 750 VAC, six DC and AC current ranges from 0.1 μ A to 10 A, and six resistance ranges from 0.1 ohm to 20 megohms. The IM-2264 also uses a special circuit that electronically converts all AC signals into true RMS values for accurate measurements of complex waveforms.

Additional features: An auto-polarity analog meter complements the LCD digital display making nulls, peaks and trends easier to follow. A switch-enabled alarm function allows quick testing of voltage and continuity. A flashing crest warn LED alerts the operator of possible erroneous readings of AC signals due to an excessive crest factor. Battery or AC operated with PS-2404 (p. 44).

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

IM-2264 SPECIFICATIONS: Voltage Ranges: 200 mV, 2 V, 20 V, 200 V, and 1000 VDC (750 VAC). Basic Accuracy: DC: \pm (0.5% of reading + 1 count). AC: \pm (0.75% of reading + 2 counts). DC and AC Current Ranges: 200 μ A, 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Basic Accuracy: DC: \pm (0.5% of reading + 1 count). AC: \pm (0.75% of reading + 2 counts). Resistance Ranges: 200, 2 k, 20 k, 200 k, 2000 k and 20 M. Basic Accuracy: \pm (0.5% of reading + 1 count). Special Features: Crest Warn Indicator, Audible Alarm, Analog Meter. Dimensions: 3" H x 8 1/2" W x 11" D.

5 Five-function IM-2260 features economy

\$129⁹⁵

- Convenient autozero, autodecimal and autopolarity
- Special test function checks diodes and transistors

Excellent performer: Bright, easy-to-read LEDs in a 3 1/2 digit display show DC and AC voltages in four ranges up to 1000 VDC and 750 VAC. Pushbutton switches select all functions including DC and AC current in five ranges up to 10 amps and resistance in five ranges to 20 megohms. Input protection is provided.

Special features: To help determine the condition of a diode or transistor, the IM-2260 measures forward conducting voltage and reverse leakage resistance. DC or AC operation is possible with either six "C" size batteries (not included) or a PS-2404 battery eliminator (p. 44). A built-in battery charger keeps nickel-cadmium batteries (if used) recharged.

Kit IM-2260, Shpg. wt. 5 lbs. 129.95

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

IM-2260 SPECIFICATIONS: Voltage: 2 V, 20 V, 200 V, and 1000 VDC (750 VAC). Basic Accuracy: DC: \pm (0.5% of reading + 1 count). AC: \pm (1.0% of reading + 3 counts). Frequency Response: 40 to 1 kHz, \pm 0.5%. Input Impedance: 10 megohms. Current: Ranges: 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. Basic Accuracy: DC: \pm (1.5% of reading + 1 count). AC: \pm (2.0% of reading + 1 count). Ohms: Ranges: 2 k, 20 k, 200 k, 2000 k, and 20 M. Basic Accuracy: \pm (0.25% of reading + 1 count). Dimensions: 3" H x 8 1/2" W x 11" D. Net Weight: 2 3/4 lbs. (excluding batteries).

2 Handheld IM-2400 Frequency Counter

\$149⁹⁵

- High sensitivity allows very low signal pickup
- Crystal oscillator maintains excellent accuracy
- Includes rechargeable batteries for true portability

Measures frequencies in two ranges from 50 Hz to 512 MHz with a guaranteed sensitivity 25 mV RMS (typically 10 mV RMS). Seven digit LED display gives an excellent 10/100 Hz resolutions in low/high ranges. Uses five rechargeable 1.2 VDC nickel-cadmium batteries (included). Housed in rugged, compact case.

Kit IM-2400, Shpg. wt. 3 lbs. 149.95

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

PS-2404, 120 VAC Battery Eliminator/Charger, Shpg. wt. 1 lb. 7.95

PS-2405, 240 VAC Battery Eliminator/Charger, Shpg. wt. 1 lb. 12.95

IM-2400 SPECIFICATIONS: Frequency Range: 50 Hz to 50 MHz and 40 MHz to 512 MHz. Input Impedance: 50 Hz to 50 MHz range, 1 megohm shunted by less than 24 pF. 40 MHz to 512 MHz range, 50 ohms. Input Protection: 50 Hz to 50 MHz range, 150 volts RMS to 100 kHz derating to 10 volts RMS at 50 MHz. 40 MHz to 512 MHz range, 5 volts RMS. Time Base: Frequency: 10 MHz. Setability: \pm 1 part per million (PPM). Temperature Stability: \pm 10 PPM from 0 degrees C to 40 degrees C. General: Gate Time: 1.0 second or 0.1 second, switch selectable. Resolution: 50 Hz to 50 MHz, 10 Hz with time base set at 1.0 second. 40 MHz to 512 MHz range, 100 Hz with time base set at 1.0 second.

4 IM-2215 DMM provides bench meter features

\$89⁹⁵

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

The IM-2215 supplies all the advantages of a DMM: a large and easily readable display, high accuracy and resolution, and superior overload protection. Other features include autozero, autopolarity and automatic decimal point placement. Maintains a high 10 megohm input resistance on DC/AC volts ranges. Large 3 1/2 digit LCD display has overload and low battery status indicators. Powered by ordinary 9-volt transistor battery (NEDA #1604, not supplied) or from AC line voltage using the optional PS-2350 120 VAC converter.

Kit IM-2215, Shpg. wt. 2 lbs. 89.95

IMA-2215-1, Rugged leather Carrying Case, Shpg. wt. 1 lb. 14.95

PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. 7.95

IM-2215 SPECIFICATIONS: DC Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V, 1000 V. Accuracy: Lab Standards: \pm 0.25% of reading + 1 count (SM-2215, \pm 0.1%). Built-in Standards: \pm 0.35% of reading + 1 count. AC Voltage: Ranges: 200 mV, 2 V, 20 V, 200 V, 750 V. Accuracy: Lab Standards: \pm 0.5% of reading + 3 counts. Built-in Standards: \pm 0.6% of reading + 3 counts. DC and AC Current: Ranges: 2 mA, 20 mA, 200 mA, 2000 mA. Basic Current Accuracy: 0.75% (DC), 1.5% (AC). Resistance: Ranges: 200, 2 k, 20 k, 200 k, 20 M. Basic Accuracy: 0.25%. Dimensions: 2" H x 3 3/4" W x 7 1/2" L.

6 Deluxe handheld SM-77 multimeter features dual digital and analog measurement display

\$119⁹⁵

- Manual and autoranging display with 0.3% DC accuracy
- "Touch-Hold" function locks in stable meter readings
- Auto self-test checks all critical functions

This easy-to-use 3 1/2 digit multimeter combines the precision of a digital meter with an analog bar-graph display. Get all the advantages of a DMM: autozero, autopolarity, and autoranging with accuracy and high resolution. Each time you turn the meter on you activate a 2-second diagnostic self-test of critical functions and the battery. The "Touch-Hold" function holds the value of a stable reading in the display even when the probes are removed. A quality meter from FLUKE.

SM-77, Assembled and tested, 3 lbs. 119.95

SMA-77-1, Soft Carrying Case, Shpg. wt. 1 lb. 9.95

SMA-77-2, Holster Case, Shpg. wt. 1 lb. 5.95

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



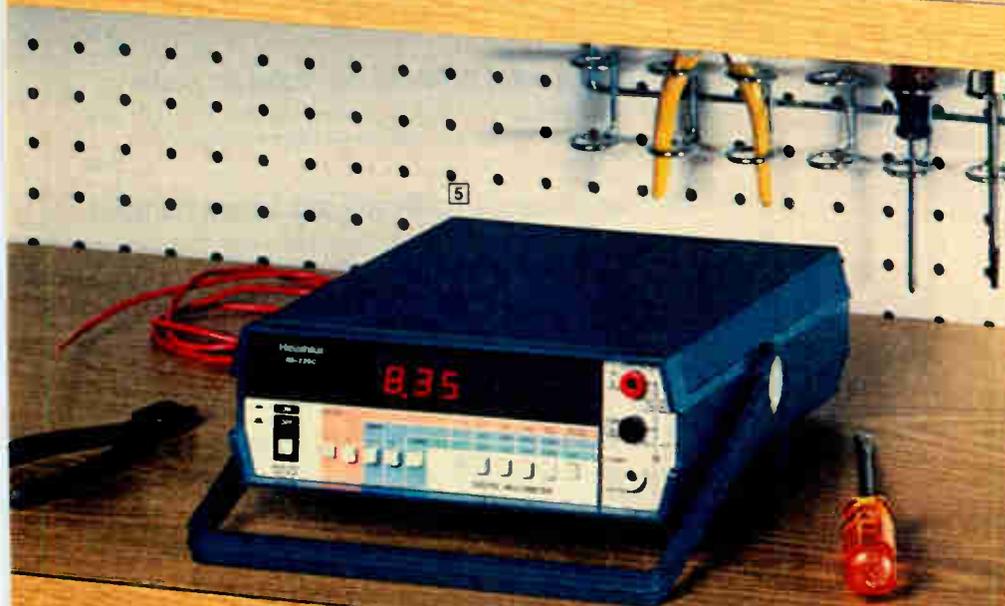


2
IM-2400
Frequency
Counter has 50 Hz
to 512 MHz range


FAST, EASY
2-EVENING KIT



4
IM-2215 DMM
had 3½ digit
display and full
measuring capability



6
SM-77 with
LCD digital
display and
analog bar graph

Laboratory-quality instruments and accessories for use in all areas of electronics

① IT-2250 Capacitance Meter features hand-held convenience and an auto-ranging digital display

\$159⁹⁵

- Measures capacitors to 199.9 mF with $\pm 0.2\%$ accuracy
- Zero offset control compensates for stray capacitance and ensures repeatable display accuracy
- Special built-in circuitry detects leaky capacitors

To measure the capacitance of any type of capacitor in any work environment, use the versatile IT-2250 Auto-Ranging Digital Capacitance Meter. It quickly and accurately measures the value of any capacitor within a range from 0 pF to 199.9 mF. Automatically, this instrument will select the correct range and display the units of capacitance on its large 3½ digit liquid-crystal display. Light-emitting diodes indicate the correct units: pF, nF, μ F or mF.

Key features include a Kelvin (4-terminal) error-reducing connector, current protected input, zero compensation control and the ability to detect a leaky capacitor. Other advantages: a low test voltage, a remote extension cable, and either battery (9-volt transistor battery) or AC (PS-2350) operation.

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

IMA-2215-1, Leather Carrying Case, Shpg. wt. 1 lb. **14.95**

PS-2350, 120 VAC Battery Eliminator, Shpg. wt. 1 lb. **7.95**

IT-2250 SPECIFICATIONS: Ranges: 199.9 pF, 1999 pF, 19.99 nF, 1.999 μ F, 19.99 μ F, 199.9 μ F, 1999 μ F, 19.99 mF, 199.9 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges $\pm (0.2\%$ of reading + count + 0.5 pF); 1.999 μ F, 19.99 μ F, 199.9 μ F, 1999 μ F, 19.99 mF and 199.9 mF ranges $\pm (5\%$ of reading + 1 count); Using Health Supplied Standards: 199.9 pF, 1999 pF, 19.99 nF, and 199.9 nF ranges $\pm (0.75\%$ of reading + 1 count + 0.5 pF); 1.999 μ F, 19.99 μ F, 199.9 μ F, 1999 μ F, 19.99 mF and 199.9 mF ranges $\pm (6\%$ of reading + 1 count). **NDTE:** The accuracy of the Heathkit IT-2250 Capacitance Meter depends on whether you calibrate with the Heath-supplied standards or laboratory standards. Specifications are listed above for both methods of calibration. Accuracy specifications apply to a temperature range of 67 to 77 degrees F (19 to 25 degrees C). Conversion and Display Rate: For values up to 1999 μ F, less than 1.5 seconds; For values up to 199.9 mF, less than 10 seconds. Display: 3½ digit (maximum count, 1999) liquid crystal. Testing Voltage: 2.00 VDC maximum; typically varying from 0.6 to 1.4 VDC. Operating Temperature Range: 32 to 104 degrees F (0 to 40 degrees C). Storage Temperature Range: -4 to +140 degrees F (-20 to +60 degrees C). Battery Life: Approximately four to ten hours, in continuous operation. Battery Indicator: Displays "LO BAT" warning when battery is down to approximately 5 VDC. Overall Dimensions: 2" H x 3¼" W x 7¼" L.

② IM-2420 Frequency Counter for accurately measuring frequencies into the UHF range

\$289⁹⁵

- Extra-wide 5 Hz to 512 MHz range for measuring frequency, period and ratios between frequencies
- Proportionally-controlled crystal oven for greater frequency measuring stability and accuracy

A multi-function counter, the IM-2420 provides the versatility and reliability required for a broad spectrum of applications. Measure frequencies from 5 Hz to 512 MHz in two ranges with a resolution of as low as 0.1 Hz. With a typical sensitivity of 15 mV, 25 mV guaranteed, low-level signals are measured as easily as high-level frequencies. Measure the period of a signal between 5 Hz and 10 MHz with a display resolution as low as 100 ns. For ratio measurements, an effective range of 1.6 to 1.024 x 10⁸ is guaranteed.

Other outstanding features include: an internal time base accuracy to within 0.2 PPM, standby mode, over-voltage protection, adjustable trigger and more.

Kit IM-2420, Shipping wt. 9 lbs. **289.95**

SM-2420, Assembled and tested, Shpg. wt. 9 lbs. **350.00**

SMA-2400-1, Assembled Telescopic Antenna, Shpg. wt. 1 lb. **9.95**

IM/SM-2420 SPECIFICATIONS: INPUTS: Frequency Ranges: 5 Hz to 50 MHz and 40 MHz to 512 MHz. Sensitivity: 25 mV RMS guaranteed, 4 to 15 mV RMS typical. Input Impedance: 5 Hz to 50 MHz range, 1 megohm shunted by less than 25 pF; 40 MHz to 512 MHz range, 50 ohms nominal. Input Protection: 5 Hz to 50 MHz range, 250 V RMS to 100 kHz (derating to 25 V RMS at 50 MHz); 40 MHz to 512 MHz, 5 V RMS. Period Measurement Mode: Input: 5 Hz to 50 MHz only. Range: 5 Hz to 10 MHz. Display Resolution (Least Significant Digit): 100 ns to 0.1 ms, in decade steps. Ratio B/A Measurement Mode: Input Frequency Limits: 5 Hz to 25 MHz and 40 MHz to 512 MHz. Effective Measurement Range: From 1.6 to 1.024 x 10⁸ guaranteed. Time Base: Frequency: 10 MHz. Setability: To within 0.2 parts per million (PPM). Temperature Stability: 0.2 PPM from 32°F to 104°F (0°C to 40°C). Crystal Aging Rate: Less than 1 PPM per year. Oven Operating Temperature: 167°F, $\pm 9^\circ$ F (75°C $\pm 5^\circ$ C). Warm-up Time From Cold Oven (unplugged) Start: 10 minutes to within 1.0 PPM, 20 minutes to within 0.1 PPM. External Input: TTL or 2.5 V RMS from 50 ohm source (10 MHz). Input Protection: Any voltage with peak-to-peak limits between -3.5 and +10 volts. Output: Will drive one standard TTL (i.e. 7400) load. Short circuit protected. General Gate Time: 0.01 second, 0.1 second, 1 second, and 10 seconds (switch selectable). Sampling Rate: Every 0.1 second, 0.33 second, 1 second or 10 seconds.

③ IM-2410 Frequency Counter provides economy and accuracy for measurements into the VHF range

\$139⁹⁵

- Precise frequency measurements from 10 Hz to 225 MHz
- Dual gate times provide decimal point positioning

The IM-2410 is an easy-to-use counter that supplies full frequency measurement capability at an economical price. The crystal-controlled time base provides an excellent ± 10 parts-per-million (PPM) long-term accuracy. Eight, large LEDs display the frequency reading directly in MHz providing a high 10 Hz resolution at 225 MHz. A dual gate switch sets the decimal point at the desired location. Complete voltage protection is also provided. The IM-2410 can be assembled to operate either on 120 VAC or 240 VAC at 50 Hz or 60 Hz.

A low 25 mV input sensitivity permits the use of the optional SMA-2400-1 telescopic antenna (this page) for indirect frequency measurements.

Kit IM-2410, Shpg. wt. 6 lbs. **139.95**

IM-2410 SPECIFICATIONS: Sensitivity: 10 Hz to 50 MHz range, 25 mV RMS maximum, 10 mV typical from 10 Hz to 30 MHz, 50 mV RMS maximum from 30 to 50 MHz; 20 MHz to 225 MHz range, 25 mV RMS maximum, 10 mV typical from 20 to 150 MHz, 50 mV RMS maximum from 150 to 225 MHz. Input Impedance: 1 megohm, shunted by less than 24 pF. Input Protection: 150 VAC, up to 100 kHz — derating to 5 VAC from 160 to 225 MHz. Time Base Frequency: 3.58 MHz. Setability: ± 1 PPM. Temperature Stability: ± 10 PPM, from 0 to 40 degrees C. Gate Time: 0.1 or 1.0 second, switch selectable. Frequency Resolution: 10 Hz to 50 MHz range, ± 1 Hz with gate time set at 1.0 second and ± 10 Hz with gate time set at 0.1 second; 20 MHz to 225 MHz range, ± 10 Hz with gate time set at 1.0 second; ± 100 Hz with gate time set at 0.1 second. Display: Eight-digit LED display. Overall Dimensions: 3¾" H x 7¼" W x 9¼" D. (8.6 x 18.4 x 24.1 cm). Net Weight: 5 lbs. (2.3 kg).

④ Deluxe PKW-105 combination 10:1/direct probe

This versatile probe is ideal for all frequency counter and scope uses from DC to 15 MHz when used in the X1 position and from DC to 80 MHz when in the X10 position. Has a 4 ns rise time in X10 and a compensation range of 15-50 pF.

PKW-105, Assembled, Shpg. wt. 1 lb. **34.95**

IOA-3220-1, Pouch and 2 probes, Shpg. wt. 1 lb. **64.95**

⑤ PK-1 low-capacitance isolation scope probe

Two-position probe offers direct and X10 operation for minimal loading of low bandwidth oscilloscopes. Features 10 megohm impedance and BNC coaxial connector with separate alligator-clip ground connector.

Kit PK-1, Shpg. wt. 1 lb. **16.95**

⑥ PK-3A RF test probe for use with DC voltmeters

Provides RF voltage measurement capability for DC voltmeters with 10 and 11 megohm input impedances. For use up to 100 MHz.

Kit PK-3A, Shpg. wt. 1 lb. **14.95**

⑦ Scope and voltmeter demodulator/detector probe

For use in IF/RF measurements, this versatile probe can be used in circuits up to 500 VDC or 30 VRMS. Has banana plug and coaxial cable with ground clip.

Kit 337-C, Shpg. wt. 1 lb. **12.95**

⑧ IG-4505 Oscilloscope Calibrator and bench standard

For use with most oscilloscopes, the IG-4505 supplies crystal-controlled time signals from 0.5 s to 1 μ s for use in adjusting sweep speeds, delay line terminations and high frequency compensation networks. The square-wave output has a fast rise time of less than 4 ns. Accurate voltage signals from 1 mV to 100 V are also available for use in calibrating scope vertical inputs and attenuator compensation adjustments. This calibrator serves equally well as a bench standard for other equipment or as a signal source for test circuits.

Kit IG-4505, Shpg. wt. 4 lbs. **59.95**

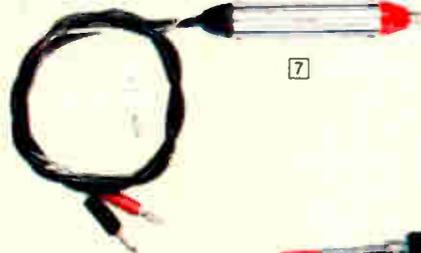
⑨ 30 kV DC Probe for meters with 10 megohm input

Extend the measurement capability of DC voltmeters with input impedances of 10 megohms. This X100 accessory probe features a phone plug connector, alligator ground clip and molded housing.

Kit IMA-100-10, For 10 megohm input meters, Shpg. wt. 1 lb. **16.95**

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

Kit IMA-100-11, For 11 megohm input meters, Shpg. wt. 1 lb. **16.95**



Power supplies and economical test equipment for work bench and experimental projects

1 IP-2760 Heavy Duty Battery Eliminator

\$179⁹⁵

- Output variable from approximately 9 to 15 volts
- Continuous 12A current output or 20A intermittent
- Front panel meters monitor voltage and current

For any high-current usage between 9 and 15 volts DC, such as for Ham and CB radio servicing, the IP-2760 reliably supplies all your required power. When a lot of current is required, the Battery Eliminator maintains less than a 2% output change under varying load conditions. Effective filtering removes AC for less than a 1% output ripple at full load. Double heatsinks allow the IP-2760 to run cooler while its four power transistors are fused at 20 amps to protect it against overloads. Front panel meters show output voltage and current.

Kit IP-2760, Shpg. wt. 31 lbs. 179.95

IP-2760 SPECIFICATIONS: Output Voltage: Variable from 9-15 VDC. Output Current: 12A continuous, 20A 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, 3AG slow-blow primary; 20A, 3AG output. Power Requirement: 120/240 VAC, 50/60 Hz, 840 watts. Dimensions: 5¼" H x 11" W x 11" D.

2 IP-2718 Tri-Power Supply has three outputs

\$119⁹⁵

- Features a 5 VDC output at 1.5 amps plus two separate adjustable 20 VDC outputs at 0.5 amps
- Current limiting protects outputs from short circuits
- All outputs are independent but can be gang connected

Ideal for design or experimentation, the IP-2718 supplies the voltages and currents needed for most digital devices. A constant 5 VDC output is rated at 1.5 amps which is capable of powering most any experimental digital circuit. The two variable 20 VDC outputs provide 0.5 amps each and feature a special "tracking" mode. In this mode, a preset voltage difference can be maintained between the power supplies. This feature is ideal for providing + and - voltages in operational amplifier circuits. All three outputs can be operated independently from each other with either floating or referenced grounds. Or, the three supplies can be connected in series to provide up to 45 VDC or connected in parallel to supply higher current to a load. All outputs and controls are easily accessible.

Kit IP-2718, Shpg. wt. 12 lbs. 119.95

SP-2718, Assembled and tested, Shpg. wt. 12 lbs. 200.00

IP/SP-2718 SPECIFICATIONS: Outputs: 5 VDC at 1.5A; Two outputs at 0-20 VDC at 0.5A. Regulation: No Load to Full Load: <0.1% variation on 20V supplies; <3% variation on 5V supply. For 10V Line Voltage Change: <0.2% variation on 20V supplies; <0.2% variation on 5V supply. Ripple and Noise: <5.0 mV RMS. Power Requirement: 120/240 VAC, 50/60 Hz, 100 watts full load. Dimensions: 4½" H x 10¾" W x 9" D (11.4 x 27.3 x 22.9 cm). Weight: 10 lbs. (3.7 kg).

3 IP-2717A Regulated High Voltage Power Supply

\$189⁹⁵

- Separate 0 to 400 VDC, 100 mA high voltage output and 0 to -100 VDC, 1 mA bias voltage output
- With separate 6.3 VAC and 12.6 VAC filament outputs

For higher voltage and tube circuits, the IP-2717A Power Supply is a convenient source of regulated power. The high voltage output provides an adjustable 0 to 400 VDC at a continuous 100 mA or an intermittent 125 mA with less than 10 mV RMS ripple and varies less than 1% from a no load to a full load condition. The bias output supplies from 0 to -100 VDC up to 1 mA.

Separate tube filament voltages of 6.3 and 12.6 VAC are also available for use as vacuum tube heater voltages or as an AC source for low voltage power supply circuits. These two outputs are rated at 2 amps and may be used at the same time if a combined power of 25 volt-amperes isn't exceeded. For the user's convenience, a separate transformer is used for the filament voltages allowing tubes to be left on while the high voltage is removed by a front panel switch.

A front panel meter monitors either high voltage or bias voltage as determined by the setting of a meter selection switch. High voltage DC current is also monitored by a 0 to 150 mA meter. The IP-2717A measures 13¾" W x 11¼" D x 5½" H and is housed in a rugged cabinet which features insulated output binding posts.

Kit IP-2717A, Shpg. wt. 19 lbs. 189.95

SP-2717A, Assembled and tested, Shpg. wt. 20 lbs. 250.00

IP/SP-2717A SPECIFICATIONS: Outputs: High Voltage: 0 to 400 VDC. Bias Voltage: 0 to -100 VDC. Filament Voltages: 6.3 VAC and 12.6 VAC. Regulation: Less than 1% from no load to full load for output of 100 to 400 VDC. Ripple: Less than 10 mV RMS. Output Impedance: Less than 10 ohms from DC to 1 MHz (per manual impedance curve). Power Requirements: 120/240 VAC, 50/60 Hz.

4 IP-2728 Regulated Low-Voltage DC Power Supply

An ideal low-voltage supply, the IP-2728 furnishes a regulated 1 to 15 volts DC up to 500 milliamps. It has a continuously variable output with less than 5 mV ripple and noise. This convenient power source has fully adjustable current limiting from 10 mA to over 500 mA. A three-terminal floating output enables either positive or negative voltage outputs. Programming terminals on the rear panel allow AC or DC voltage control of the IP-2728's voltage output.

Kit IP-2728, Shpg. wt. 5 lbs. 49.95

5 AD-1309 Portable Pink/White Noise Generator

The AD-1309 is designed for use with the AD-1308 Spectrum Analyzer but it can be used with any real-time or swept-filter spectrum analyzer to check out audio systems. See page 22 for further details about this portable generator.

6 AD-1308 Portable Real-Time Spectrum Analyzer

A professional audio test instrument, the AD-1308 provides microprocessor control of audio spectrum analysis and sound pressure level measurement. See page 22 for more information about this analyzer and its rack mount accessory.

Heathkit 5280 Series Test Equipment features bench instruments at an economical price

Designed for the beginning hobbyist, service person or student, the 5280 Series comprises a versatile set of work bench test instruments. Each of these high-quality kits is priced under \$60 so that a complete troubleshooting and test work station can be easily and economically assembled. Whatever your need, the 5280 Series represents a real value.

For less than
\$60⁰⁰
each

7 IG-5282 Sine and Square Wave Audio Generator

- Sine and square wave outputs from 10 Hz to 100 kHz at 0 to 3V RMS
- Separate outputs may be used simultaneously or independently

Useful in many audio applications, the IG-5282 Audio Oscillator provides sine and square wave frequencies from 10 Hz to 100 kHz in four ranges. This frequency range makes the IG-5282 ideal as a signal source for harmonic distortion measurements of audio amplifiers. The square wave output can also be used to trigger instruments such as frequency counters and oscilloscopes. The sine and square wave levels are independently adjustable from 0 to 3 volts.

Single circuit board construction makes this versatile audio oscillator easy and quick to assemble. The rugged cabinet can be stacked with its companion test instruments and features a handy storage compartment. The IG-5282 Audio Oscillator requires two 9-volt batteries for portable use or the IPA-5280-1 Power Supply on page 49 for AC operation.

Kit IG-5282, Shpg. wt. 5 lbs. 59.95

IG-5282 SPECIFICATIONS: Frequency Output: 10 Hz to 100 kHz in four ranges. Sine Wave Output Voltage: 0 to 3 volts RMS. Square Wave Output Voltage: 0 to 3 volts peak. Dimensions: 11" H x 5¾" W x 7¾" D. Weight: 3¼ lbs.

8 IB-5281 RLC Bridge for field or bench work

- Directly read unknown values of resistance, capacitance and inductance
- Front panel meter accurately shows balanced measuring-bridge condition

A very useful general-purpose instrument, the RLC Bridge lets you easily determine unknown values of resistors, inductors and capacitors. With the IB-5281, you can clean up that pile of unknown components that always accumulates on a test bench. It has a resistance range of 10 ohms to 10 megohms, an inductance range of 10 µH to 10 H, and a capacitance range from 10 pF to 10 µF. Terminals are provided for the use of an external standard.

A rugged cabinet houses a single and easily assembled circuit board. A snap-tight compartment in the cabinet stores test leads and component clip accessories. Two 9-volt transistor batteries power the IB-5281 for portable operation or the IPA-5280-1 Power Supply on page 49 for AC use on a bench.

Kit IB-5281, Shpg. wt. 5 lbs. 59.95

IB-5281 SPECIFICATIONS: Resistance Ranges: 10 ohms to 10 megohms. Inductance Ranges: 10 µH to 10 H. Capacitance Ranges: 10 pF to 10 µF. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1:1 to 10:1. Cabinet Dimensions: 11" W x 5¾" H x 7¾" D. Weight: 3½ lbs.





4 IP-2728 Regulated DC Power Supply



AD-1309 Noise Generator 5



6 AD-1308 Spectrum Analyzer



9 IG-5280 RF Oscillator for radio/TV aligning

- Five bands provide a wide 310 kHz to 110 MHz range of frequencies

The portable IG-5280 provides an accurate source of amplitude modulated and unmodulated RF signals for aligning tuned stages in AM, FM and television receivers. The RF Oscillator's output is divided into five overlapping bands covering AM, FM, TV, longwave and shortwave broadcasting. Use of calibrated harmonics allows the usefulness of the IG-5280 to be extended up to 220 MHz. A built-in 1 kHz oscillator provides modulation for the RF signal and serves as a convenient audio signal source. Operates on two 9 V batteries or IPA-5280-1.

Kit IG-5280, Shpg. wt. 5 lbs. 59.95

IG-5280 SPECIFICATIONS: RF Output: Frequency Range: 310 kHz to 110 MHz in five bands. 100 to 220 MHz on harmonics. Output Voltage: 100 mV approx. Internal Modulation: 1000 Hz. AF Output: Frequency: 1000 Hz Voltage: 2.0 volts RMS (open circuit).

10 IT-5283 Signal Tracer checks radio/TV circuits

- Audible ohmmeter/voltmeter function works as a useful logic tracer

Simple, yet effective. The IT-5283 Signal Tracer is ideal for troubleshooting radio and TV circuits. Track down problems in all types of audio circuits. Check out logic circuits. Operates on two 9-volt transistor batteries or from IPA-5280-1.

Kit IT-5283, Shpg. wt. 5 lbs. 59.95

IT-5283 SPECIFICATIONS: Functions: Substitute speaker, AF signal tracing, RF signal tracing. Audible volt/ohmmeter. Speaker: 3" permanent magnet. Dimensions: 11" W x 5 3/4" H x 7 3/4" D.

AC Power Supply for all 5280 Series Instruments

The IPA-5280-1 Power Supply simultaneously supplies a regulated + and - 9 volts DC to all the 5280 Series instruments from a selectable 120 or 240 VAC.

Kit IPA-5280-1, Shpg. wt. 3 lbs. 39.95

Precision instruments to increase your testing, troubleshooting and servicing capability

1 Handy tester quickly locates phone problems

ONLY

\$19⁹⁵

- Eliminates unnecessary telephone company service calls
- Verifies basic telephone functions and phone line polarity, plus ring and line voltage levels
- Checks condition of telephone line cord
- Phone-line powered; no batteries to replace

Check your home phone lines at your convenience with this handy Telephone Line Analyzer. It is easy to operate and can save you the cost of an unnecessary and expensive telephone company service call. It simply plugs into any modular phone jack and provides a fast indication of telephone line parameters that affect the operation of any phone.

With this handy tester, check your home telephone line for defective devices or too many phone products that could be loading down the phone line. After putting in a new extension line, check your do-it-yourself wiring for improper loading or shorts. You can even verify the condition of the phone line from the central office to the phone jack in your home.

Uncover other problems with the Analyzer such as reversed polarity which can cause polarity-sensitive telephone equipment to operate improperly. Even check a phone's detachable coiled cord to make certain that it is working properly. The Line Analyzer accepts all RJ-11 type plugs.

The Telephone Line Analyzer is a phone-line powered tester that needs no batteries or external power. It is completely safe to use on your telephone line. And its compact size, 2¾" H x 5" W x 1½" D (7 x 12.7 x 3.8 cm), allows you to store it most anywhere. The Analyzer weighs only 7½ ounces (0.2 kg).

ST-2204, Assembled and tested, Shpg. wt. 1 lb. 19.95

2 Precise pulse signals from 1 Hz up to 5 MHz

\$149⁹⁵

- Generates a range of pulses at three separate outputs
- Independent control over pulse period, width and delay
- Indicator warns of overlapping width and period settings

An essential instrument for digital and pulse applications, the IG-1277 Pulse Generator produces pulse repetition periods from 200 ns to 1 s (5 MHz to 1 Hz) with identical pulse width and delay ranges from 100 ns to 1 s in seven decade ranges. All ranges are continuously variable using a 1-decade vernier range control. The pulse width is fully adjustable to 100% duty cycle.

Three separate outputs, with fast rise/fall times. The 50-ohm output offers an adjustable DC offset with an open circuit range from 0.2 to 20 volts P-P including a rise/fall time that is less than 15 ns for a 5 volt level change. The TTL output drives loads using a fixed level for a logic "0" of less than 0.4 V and a logic "1" of greater than 2.4 V with a rise/fall time less than 25 ns. The third output can be used either to trigger oscilloscopes or to drive up to 3 TTL loads using the same logic levels as the TTL output.

Additional features include a manual trigger pushbutton switch. It allows you to generate a single pulse through a circuit to observe its operation at a slow rate. An overlap indicator is also provided to warn you that a selected pulse width is longer in time than the pulse period setting.

The Pulse Generator is a versatile and easy-to-use instrument with clearly labeled front panel switches and controls. Its overall dimensions are 3¾" H x 10" W x 12½" D (8.5 x 25.4 x 31.8 cm) and weighs 7 lbs. (3.2 kg). It operates on 120 VAC at 60 Hz and requires 30 watts of power.

Kit IG-1277, Shpg. wt. 9 lbs. Was \$179.95 Now Only 149.95

3 Sine and square wave signals up to 100 kHz

- Generates high quality signals for testing audio amplifiers and digital instruments, modulating RF generators, and more

Designed for service and testing, the IG-5218 generates sine waves from 1 Hz to 100 kHz and square waves from 5 Hz to 100 kHz. The sine wave output, with less than 0.1% distortion, is adjustable through eight ranges from 0.003 to 10 volts and is monitored by a front panel meter. The separate square wave output has a 50 ns rise time and is available in three ranges up to 10 V peak-to-peak.

The Sine/Square Wave Audio Generator has a switch-selected 600 ohm internal load and features highly reliable solid-state circuitry. It has dimensions of 5¾" H x 13¾" W x 7" D (12.8 x 33.1 x 17.5 cm) and weighs 7 lbs. (3.3 kg). Power requirements are 105-125 VAC or 210-250 VAC, 50/60 Hz, 6 watts.

Kit IG-5218, Shpg. wt. 10 lbs. 149.95

4 Deviation Meter accurately shows FM output

- Measures the FM output of transmitters and signal generators
- Checks peak FM deviation of signals between 25 MHz to 1000 MHz

Measure the peak deviation (frequency modulation) of transmitters and signal generators whose carrier frequencies are between 25 and 1000 MHz with the IM-4180 FM Deviation Meter. Four pushbutton switches select modulation ranges from 2 to 75 kHz with coarse and fine tuning controls for locking in difficult UHF FM signals. Monitor a line directly or use an optional antenna.

Added features include selection of correct de-emphasis for audio signals and a switch-enabled internal battery level check. Connect an 8-ohm speaker or headphones for audio monitoring. Front panel oscilloscope jacks enable you to observe signal waveshapes. Level controls are provided for adjusting meter sensitivity and audio output. Power is supplied by ten AA batteries or the optional Battery Eliminator for AC operation. Dimensions are 5½" H x 10¾" W x 4¼" D (12.7 x 26.2 x 18.3 cm). It weighs 4¼ lbs. (1.9 kg).

Kit IM-4180, Shpg. wt. 7 lbs. 179.95

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

SMA-2400-1, Swiveling Telescopic Antenna, Shpg. wt. 1 lb. 9.95

5 Function Generator supplies three basic waveforms

- Sine, square and triangle waveforms from 0.1 Hz to 1 MHz
- Compact and lightweight for easy transporting and bench use

This versatile instrument supplies the basic sine, square and triangular waveforms needed for servicing electronic equipment or for driving experimental projects. These waveforms are produced over a frequency range from 0.1 Hz to 1 MHz. This wide range is divided into six frequency range segments through a front panel multiplier switch. Each smaller range is variably controlled by a front panel dial that adjusts the output frequency over a 100 to 1 ratio.

A front-panel BNC-type output jack supplies a 10 volt peak-to-peak signal into a low impedance 50-ohm load (20 volts peak-to-peak into an open circuit). A calibrated attenuator, adjustable in 10 dB steps from 0 to 50 dB, decreases the output of the generator in six steps. A variable attenuator provides a 0 to 20 dB of additional attenuation of the output signal. The variable attenuator also acts as the power on/off switch.

Compact and lightweight, this function generator takes up very little room on your workbench and can be easily carried to wherever you'd want to use it. With its handle removed, the generator measures 8¾" D x 7¼" W x 3" H (22.2 x 18.1 x 7.5 cm) and weighs 4¼ lbs. (1.9 kg). It uses 105-130 VAC or 210-260 VAC at 50/60 Hz, 15 watts maximum.

Kit IG-1271, Shpg. wt. 7 lbs. 169.95

SG-1271, Assembled and tested, Shpg. wt. 6 lbs. 250.00

6 Rugged, accurate bench-type VTVM for the shop

- Accurately measures + DC, - DC and AC voltages and resistances
- Make all measurements using a single probe

The IM-5228 Vacuum Tube Voltmeter is designed for use by servicemen, engineers, maintenance people and by the hobbyist. It is simple, rugged and accurately measures ± DC and AC voltages, and resistances with the reliability required of a dependable high-use voltmeter. It measures ± DC voltages in seven ranges from as low as 1.5 volts to 1500 volts with a full scale accuracy of ± 3%. With an accuracy of ± 5%, you can measure AC voltages also in seven ranges from a low 0 to 1.5 volts RMS range up to the highest scale of 1500 volts RMS. Resistances are measured from 0.1 ohm to 1000 megohms, also in seven ranges.

The IM-5228 eliminates the confusing tangle of multiple test leads by using a single probe for all measurements. This combination AC-OHMS-DC switching test probe plugs into a single front panel jack and also includes the ground lead. The VTVM's high 11 megohm input impedance doesn't significantly load circuits under test. A convenient center scale is provided for use in making null adjustments. A handy dB scale is also provided for use with audio equipment.

The IM-5228 VTVM's gimbal bracket enables you to mount the meter almost anywhere. The meter requires one "C" size battery, as well as 110 or 220 VAC, 50/60 Hz at 10 watts. Dimensions are 5" H x 12¾" W x 4¾" D and weighs 5 lbs.

Kit IM-5228, Shpg. wt. 6 lbs. 89.95

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



REVOLVING CHARGE SECURITY AGREEMENT
TO: Heath Company, Benton Harbor, Michigan 49022

I hereby purchase the total amount of merchandise listed on the reverse side plus shipping charges and tax, if any, less down payment, if any, plus the **FINANCE CHARGE** which, in lieu of being added to this contract in total as of the date hereof will be added monthly to the previous month's ending balance of my account before deducting payments and credits or adding purchases made during the current billing period. **FINANCE CHARGE** will be assessed on the balance according to the following schedule or in accordance with the laws of the State of my residence whichever is the lesser.

Account Balance Amount: ALL BALANCES. Periodic Percentage Rate: 1½%.

ANNUAL PERCENTAGE RATE: 18%

The minimum **FINANCE CHARGE** assessed will be 50¢ on any small balances. If within 30 days from my billing date I pay the full outstanding balance shown on my statement, no **FINANCE CHARGE** on such balance, will be charged on any subsequent statement. The highest level of my balance reflected by the payment chart will govern my monthly payment, beginning 30 days from the cycle closing date shown on the statement, until such time as the total unpaid balance of each purchase is fully paid (minimum \$10). Regular or Extended Terms are the two plans available for my use. To use the extended plan, the balance of my account must be at least \$500.00. The amount of my monthly installment is determined from charts below.

CHECK PLAN DESIRED

REGULAR REVOLVING CHARGE

Charge up to:	\$150	200	250	300	350	400	450	500
Pay Monthly:	\$10	15	20	25	30	35	40	45

Add \$5 per month for every \$50 or fraction thereof over \$500.

EXTENDED REVOLVING CHARGE

Charge up to:	\$600	700	800	900	1000	1100	1200	1300	1400	1500
Pay Monthly:	\$30	35	40	45	50	55	60	65	70	75

Add \$5 per month for every \$100 or fraction thereof over last amount.

I hereby grant to the above named creditor a security interest in all goods purchased until the purchase price and **FINANCE CHARGE** have been paid in full. I will not sell, transfer possession of, remove or encumber the property without your written consent. The account may be declared in default and the matters regarding default, right to cure (if any) and acceleration of account balances will be governed by the consumer protection laws of the state of my residence. My installments shall be applied as follows. In case of items purchased on different dates, the first purchase shall be deemed first paid for. In case of items purchased on the same date, the lowest price shall be deemed first paid for. We intend to obtain a consumer report in connection with the processing of your credit application. Upon request you will be informed of the name and address of the consumer reporting agency that furnished the report. You may inspect your report by contacting the reporting agency that made it. Subsequently consumer reports may be obtained from time to time in connection with the maintenance of your account.

By signature below I hereby certify that I am of legal age and am allowed to contract by law.

NOTICE TO BUYER: 1 Do not sign this agreement before you read it or if it contains blank spaces. You are entitled to a copy of the agreement you sign. **2** The other side of this page is part of this contract. Notice: See accompanying statement for important information regarding your rights to dispute billing errors.

3. NOTICE: ANY HOLDER OF THIS CONSUMER CREDIT CONTRACT IS SUBJECT TO ALL CLAIMS AND DEFENSES WHICH THE DEBTOR COULD ASSERT AGAINST THE SELLER OF GOODS OR SERVICES OBTAINED PURSUANT HERETO OR WITH THE PROCEEDS HEREOF. RECOVERY HEREUNDER BY THE DEBTOR SHALL NOT EXCEED AMOUNTS PAID BY THE DEBTOR HEREUNDER.

Sign here _____ Date _____

Sign here _____ Date _____

Joint account Spouse's signature if joint account Individual account

CREDIT APPLICATION TO:
Heath Company, Benton Harbor, MI 49022

IMPORTANT: Please fill in completely if you are a new account or if your old account has been inactive for 12 months or more.

Birth: Mo Day Year Social Security Number

Account to be in the name of:
 First Initial Last

Present address _____ How long?
 yrs.
 mos.

City _____ State _____ Zip _____

Former address _____ How long?
 yrs.
 mos.

City _____ State _____ Zip _____

Rent Monthly rent Married No. of
 Own or mortgage Single dependent
 Board Separated children

Area code & phone no. _____ Former account no. _____

COMPLETE FOR PERSON REQUESTING ACCOUNT

Employer's name _____ How long?
 yrs.
 mos.

Address: street, city, state, zip _____

Position _____ Salary mo. _____ Area code & phone no. _____

Former employer _____

Address: street, city, state, zip _____ How long?
 yrs.
 mos.

(Child support, alimony and separate maintenance optional) Other income source(s) & amount(s)

Bank branch: name & address _____ check
 loan savings

(1) Credit reference name & address (merchants, lenders, etc.) _____

(2) Credit reference name & address _____

(3) Credit reference name & address _____

Nearest relative name & address _____

COMPLETE FOR SPOUSE IF JOINT ACCOUNT

Spouse's name _____ Social security no. _____

Employer's name & address _____ Salary: mo. _____

Bank branch name & address _____ check
 loan sav'gs

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Heath Company, Benton Harbor, MI 49022

PLEASE DO NOT WRITE IN THIS SPACE

NOTE: When using Revolving Charge, please write current account number here to speed processing. Be sure to date and sign the agreement on back.

*

PLEASE PRINT

1 BILLING ADDRESS (Always use same name)

Name _____
 Apt./Lot/Bldg. _____
 Street Address _____
 City _____ State _____ Zip _____

2 SHIPPING ADDRESS (If different from above)

Name _____
 Apt./Lot/Bldg. _____
 Street Address _____
 City _____ State _____ Zip _____

3 ADDRESS CHANGED SINCE LAST ORDER?
 Please indicate old address.

Name _____
 Street Address _____
 City _____ State _____ Zip _____

101000

4 METHOD OF SHIPPING

Mailable Items. We ship UPS for fastest delivery.
 Include Zone from Zone Chart.

Indicate other Preference _____

Please indicate UPS 2nd Day Air Service if desired (Zone A or D).

Motor Freight Items. Shipped transportation charges collect. If a single item is Motor Freight, all items will be shipped Motor Freight.

5 If merchandise is ordered from another catalog, please indicate catalog no. from cover _____

6 Please give daytime phone number.

(Area) (Number)

7 My Heathkit Master Builder Program membership number is:

8 QUAN.	MODEL NO.	KIT DESCRIPTION	UNIT PRICE	TOTAL PRICE	SHPG. WT.	SHPG. CHARGES†

9 METHOD OF PAYMENT (check one)

Cash – Check or money order only.
 Card No. _____ Exp. Date _____

Heath Revolving Charge – New Account, fill out reverse and include a down payment of at least 10%. New accounts may be opened with purchases as small as \$100 with 10% down. "Add-ons" to your account require no minimum at all. Use cash or credit card for parts orders. Be sure to sign charge agreement.

*Previous and current customers please list account number at top of form.

C.O.D. Minimum order, \$10. Send 20% deposit, check or money order. Pay balance and C.O.D. fees by cash, money order or certified check on delivery.

Total Order \$ _____
Down payment \$ _____
Amount Charged \$ _____

Total Order \$ _____
 20% enclosed \$ _____
 80% due C.O.D. \$ _____

TOTAL

Less allowance if any -

Merchandise **TOTAL**

Add 4% sales tax for all Michigan deliveries +

+Shpg. Charges from above +

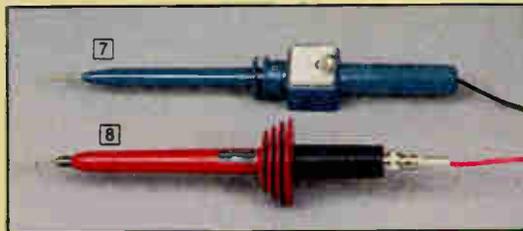
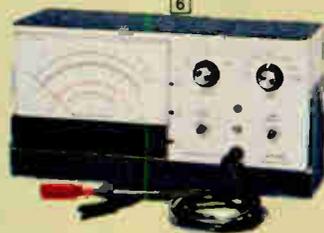
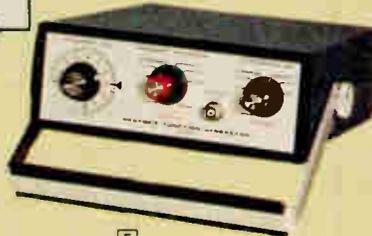
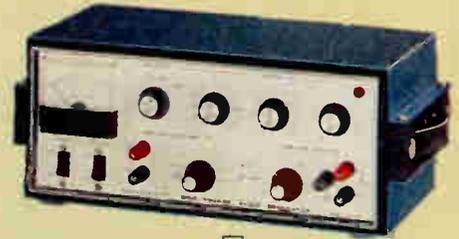
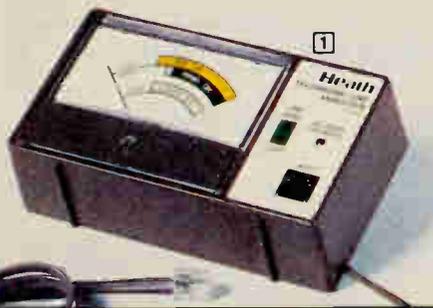
Plus amount due from previous order invoice # _____ +

TOTAL AMOUNT OF ORDER

TOTAL SHPG. CHARGES

†Shipping Charges are for mailable items only. Figure charges for each item individually. See Rate Chart on page 53.

Signature _____ (necessary for all charges)



7 40 kV high-voltage probe with built-in meter

- Convenient probe for fast and easy high-voltage checks

Self-contained probe measures extremely high positive voltages up to 40,000 volts (negative ground) with a full-scale accuracy of $\pm 3\%$. Directly read all voltage measurements on the built-in meter for fast and easy operation. Probe body is molded of high-impact plastic to last for years of active field service and bench work while offering maximum insulation and lightest weight. This easy-to-assemble kit can be put together in one evening. Its dimensions are $1\frac{1}{2}''$ H x $1\frac{1}{8}''$ W x $15''$ L and weighs only 8 ounces.

Kit IM-5215, Shpg. wt. 2 lbs. 34.95

8 Add kilovolt measuring capability to your meter

Use this accessory probe to extend the DC voltage measuring range of any 10-megohm input digital multimeter up to 30,000 volts. This high voltage probe multiplies DC ranges by a factor of 100. A red molded case with black molded handle houses a precision 2% resistor. Probe uses banana plug connector.

Kit IMA-100-10, Shpg. wt. 1 lb. 16.95
SMA-100-10, Assembled and tested, Shpg. wt. 1 lb. 19.95

9 Compact, battery-powered utility voltmeter

- Features accuracy and simplicity in a general purpose meter

An ideal first project for the beginner in electronics. This solid-state utility voltmeter takes only one or two evenings to assemble, is easy to operate, and can be used on hundreds of other projects, as well as around the home. It features four \pm DC and AC voltage ranges from 1.7 volts up to 500 volts (DC accuracy is $\pm 3\%$ of full scale, AC accuracy is $\pm 5\%$ of full scale), and four ohmmeter ranges up to x1 megohm. In addition, the wide-band frequency response on the AC ranges covers the full audio frequency range and beyond. A low voltage on the ohmmeter ranges allows safe semiconductor checking.

Test leads are built into the meter's case which has overall dimensions of $9\frac{3}{8}''$ W x $5\frac{3}{8}''$ H x $9''$ D (23.8 x 13.7 x 22.9 cm). It weighs 2 lbs. (0.9 kg). Requires two 9-volt transistor batteries and one 1.5 volt "C" cell.

Kit IM-5217, Shpg. wt. 4 lbs. 49.95

10 Versatile 5-range clamp-on AC ammeter also measures AC voltages and resistances

\$49⁹⁵

- A rugged electrician's tool for testing electrical and lighting circuits, as well as balancing power circuits
- A homeowner's aid for checking appliance current usage and testing of AC circuits, motors and more
- Pointer lock switch lets you freeze meter reading before removing the meter from the conductor being checked
- Includes a set of test leads and a carrying case

Really easy to operate, the SM-2206 Clamp-On Meter measures 50 and 60 Hz current flow in circuits or appliances by simply clamping its inductive pickup around a conducting AC wire. You don't need to break the line you are checking. Five current ranges of 6A, 15A, 60A, 150A and 300A allow monitoring of almost any AC circuit. For checking AC voltages, the meter has three ranges of 150V, 300V and 600V. A resistance range of 0 to 5 kilohms is also available for such uses as circuit continuity checks, and other home and shop resistance measurements.

A handy finger-operated pointer lock switch enables you to easily make hard to reach one-handed current measurements. Just snap the meter's inductive pickup around the wire you want to check, press the pointer lock switch with your finger, then remove the meter from the circuit — all with one hand. The AC current flow in the circuit can now be read, safely and accurately, directly from the clearly marked scales while the pointer is still locked into position. Press the lock switch again and the pointer is released, ready to take another measurement.

A rugged shock-resistant housing enables this meter to perform reliably through the constant use of an electrician on the job or after banging around in a collectables drawer of a homeowner waiting to be used. The meter's movement is also protected by the pointer lock-down switch. Single-switch operation also makes the meter more reliable with less parts to malfunction and easier to operate with less chance of incorrect function selection.

The SM-2206 Clamp-On Meter comes ready to use. It is assembled and tested so you can use it as soon as you take it out of the box. It comes with a set of test leads, a 1.5 V "AA" battery, a handstrap to prevent accidental drops, a spare resistance range fuse and carrying case. This is one meter that is sure to get a lot of use around the house.

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

The Heathkit Online Catalog



The Heathkit Online Catalog is now available through CompuServe.® Just type in GO HTH at any "I" or "OK" prompt. Use the menu-driven system to browse through 17 major product categories that make up the over 400 kits in the Heathkit line. While not intended to replace the printed catalog you're holding, you have instant electronic access to bargains, specials and new products without waiting on the postman. You can even place your order online using your Visa, MasterCard or Heath Revolving Charge. The Heathkit Online Catalog brings American high-tech home. It's like your own direct line to Benton Harbor!

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- Project Manager (Disk Drives)
- Power Supply Engineers
- ATE Engineers

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An Equal Opportunity Employer M/F/H/V

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ORDER TOLL-FREE: 800-253-0570, using your Heath Revolving Charge or Visa or MasterCard credit cards (min. purchase \$10). Call toll-free between 8:00 A.M. and 6:00 P.M. Eastern Time Monday through Friday. Alaska and Michigan orders, or after 6:00 P.M. and weekends, call 616-982-3411. For quick handling and prompt service, please fill out the order form at the right before calling. Have credit card handy.

For parts orders, please call Customer Service, 616-982-3571. For technical service, consult the phone directory below.



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

- Use the handy order form at the right.
- Write your name exactly the same way, each time you order.
- Give your complete address with full details. Include your ZIP Code and daytime phone number in case we have to call you about your order.
- For UPS deliveries to rural route or P.O. Box addresses, please give complete delivery information.
- When you fill out the form, include: 1) quantity, 2) model number, 3) description, 4) price, and 5) shipping weight. Figure out and write down the shipping and handling charges for each item from the rate chart on page 53.
- Please use separate sheet to order parts, manuals or for any correspondence.

TERMS:

- Heath Revolving Charge Plan. New accounts may be opened with purchases as small as \$100 with 10% down. Write to Heath Company for Heath Revolving Charge application. "Add-ons" to your account (except parts orders—see credit card plans below) require no minimum at all. Be sure to sign the charge agreement. Use credit cards for parts orders.
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- Note:** All credit orders subject to Heath Credit Department approval.



COMMERCIAL, EDUCATIONAL, AND INDUSTRIAL SALES:

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

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

MONEY-BACK HEATHKIT MANUAL PREVIEW

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

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

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

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

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

HOW TO FIGURE YOUR SHIPPING AND HANDLING CHARGES

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

ZONE CHART

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

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

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 agreed payments on the disputed amount. Unless you have agreed that your bill was correct, the creditor must send you a written notification of what you owe; and if it is determined that the creditor did make a mistake in billing the disputed amount, you must be given the time to pay which you normally are given to pay undisputed amounts before any more FINANCE CHARGES or late payment charges on the disputed amount can be charged to you.

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

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

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

- 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.

RATE CHART

Head Shipping and Handling Charges, mailable items only. See special shipping and handling information for Motor Freight items.

Your shipping and handling charges are indicated in the zone column across from the shipping weight.

NOTE: UPS 2nd Day Air Service covers continental U.S. Zone D Covers HI (Hawaii).

IMPORTANT: Shipping weights listed for model numbers shipped in more than one carton, or of excessive length, have been adjusted to provide correct postage.

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

Shpg. wt.	Zone 1 & 2		Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	UPS 2nd DAY AIR SERVICE	
	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	Zone G	Zone H	Zone A	Zone D
1	\$1.23	\$1.32	\$1.46	\$1.52	\$1.59	\$1.67	\$1.74	\$1.81	\$3.00	\$4.53
2	1.24	1.34	1.63	1.73	1.87	2.01	2.16	2.36	4.00	5.71
3	1.32	1.48	1.80	1.95	2.15	2.36	2.57	2.86	5.00	6.89
4	1.40	1.61	1.97	2.16	2.43	2.70	2.99	3.34	6.00	8.07
5	1.49	1.76	2.13	2.37	2.70	3.05	3.40	3.80	6.50	9.25
6	1.57	1.89	2.30	2.59	2.96	3.39	3.82	4.30	7.50	10.43
7	1.65	2.02	2.47	2.80	3.26	3.74	4.24	4.80	8.50	11.61
8	1.73	2.14	2.64	3.02	3.54	4.08	4.65	5.27	9.50	12.79
9	1.82	2.27	2.81	3.23	3.82	4.43	5.07	5.76	10.50	13.97
10	1.90	2.39	2.97	3.44	4.09	4.77	5.48	6.25	11.50	15.15
11	1.98	2.52	3.14	3.66	4.37	5.12	5.90	6.75	12.50	16.33
12	2.06	2.65	3.31	3.87	4.65	5.46	6.32	7.25	13.50	17.51
13	2.15	2.77	3.48	4.09	4.93	5.81	6.73	7.75	14.50	18.69
14	2.23	2.90	3.65	4.30	5.21	6.15	7.15	8.25	15.50	19.87
15	2.31	3.02	3.81	4.51	5.48	6.50	7.56	8.75	16.50	21.05
16	2.39	3.15	3.98	4.73	5.76	6.84	7.98	9.25	17.50	22.23
17	2.48	3.28	4.15	4.94	6.04	7.19	8.40	9.75	18.50	23.41
18	2.56	3.40	4.32	5.16	6.32	7.53	8.81	10.25	19.50	24.59
19	2.64	3.53	4.49	5.37	6.60	7.88	9.23	10.75	20.50	25.77
20	2.72	3.65	4.65	5.58	6.87	8.22	9.64	11.25	21.50	26.95
21	2.81	3.76	4.82	5.80	7.15	8.57	10.06	11.75	22.00	28.13
22	2.89	3.91	4.99	6.01	7.43	8.91	10.48	12.25	23.00	29.31
23	2.97	4.03	5.16	6.23	7.71	9.26	10.89	12.75	24.00	30.49
24	3.05	4.16	5.33	6.44	7.99	9.60	11.31	13.25	25.00	31.67
25	3.14	4.28	5.49	6.65	8.26	9.85	11.72	13.75	26.00	32.85
26	3.22	4.41	5.66	6.87	8.54	10.29	12.14	14.25	27.00	34.03
27	3.30	4.54	5.83	7.08	8.82	10.64	12.56	14.75	28.00	35.21
28	3.38	4.66	6.00	7.30	9.10	10.98	12.97	15.25	29.00	36.39
29	3.47	4.79	6.17	7.51	9.38	11.33	13.39	15.75	30.00	37.57
30	3.55	4.91	6.33	7.72	9.65	11.67	13.80	16.25	31.00	38.75
31	3.63	5.04	6.50	7.94	9.93	12.02	14.22	16.75	32.00	39.93
32	3.71	5.17	6.67	8.15	10.21	12.36	14.64	17.25	33.00	41.11
33	3.80	5.29	6.84	8.37	10.48	12.71	15.05	17.75	34.00	42.29
34	3.88	5.42	7.01	8.58	10.77	13.05	15.47	18.25	35.00	43.47
35	3.96	5.54	7.17	8.79	11.04	13.40	15.88	18.75	36.00	44.65
36	4.04	5.67	7.34	9.01	11.32	13.74	16.30	19.25	37.00	45.83
37	4.13	5.80	7.51	9.22	11.60	14.09	16.72	19.75	38.00	47.01
38	4.21	5.92	7.68	9.44	11.88	14.43	17.13	20.25	39.00	48.19
39	4.29	6.05	7.85	9.65	12.16	14.78	17.55	20.75	40.00	49.37
40	4.37	6.17	8.01	9.86	12.43	15.12	17.96	21.25	41.00	50.55
41	4.45	6.30	8.18	10.08	12.71	15.47	18.38	21.75	42.00	51.73
42	4.54	6.43	8.35	10.29	12.99	15.81	18.80	22.25	43.00	52.91
43	4.62	6.55	8.52	10.51	13.27	16.16	19.21	22.75	44.00	54.09
44	4.70	6.68	8.69	10.72	13.55	16.50	19.63	23.25	45.00	55.27
45	4.79	6.80	8.85	10.93	13.82	16.85	20.04	23.75	46.00	56.45
46	4.87	6.93	9.02	11.15	14.10	17.19	20.46	24.25	47.00	57.63
47	4.95	7.06	9.19	11.36	14.38	17.54	20.88	24.75	48.00	58.81
48	5.03	7.18	9.36	11.56	14.66	17.89	21.29	25.25	49.00	59.99
49	5.12	7.31	9.53	11.79	14.94	18.23	21.71	25.75	50.00	61.17
50	5.20	7.43	9.69	12.00	15.21	18.57	22.12	26.25	51.00	62.35
Add'l lbs	08	12	16	21	27	34	41	1.00	1.18	
	lb	lb	lb	lb	lb	lb	lb	lb	lb	

SPECIAL SHIPPING AND HANDLING:

- **MOTOR FREIGHT ITEMS** — Items indicated Motor Freight exceed weight or size limitations of UPS or Parcel Post. Examples are TVs, 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.
- **AP0/FPO Shipments** — Use the following Zones to estimate costs: West Coast — Zone 8; East — Zone 5; Miami — Zone 6. PAL (Airlift Military) carries packages by air transport for a fee of \$1.00 per package plus postage. Parcel must weigh less than 30 lbs. and not exceed 60" in length and girth.
- **SAM** — Parcel must weigh less than 15 lbs. and not exceed 60" in length and girth. Check with your local postmaster for exceptions to certain APO or FPO numbers.

Increase your testing and servicing capabilities with these economical Heathkit instruments

② Portable FET/Transistor Tester does accurate checks

- A quality instrument for checking semiconductor devices
- Large easy-to-read meter clearly shows tested values

This highly accurate instrument tests transistors, diodes, FETs, SCRs, triacs and UJTs in- and out-of-circuit. Easy-to-read meter clearly shows the actual operating characteristics of a device (gain, transconductance and leakage current), not merely a "good/bad" rating. This tester features pushbutton control plus an internal battery check. Use color-coded test leads or built-in sockets. Powered by two 1.5 VDC "D" cells (not included). Dimensions are 5¼" H x 8½" W x 8⅝" D (13.1 x 21.2 x 21 cm) and weighs 3½ lbs. (1.6 kg).

Kit IT-3120, Shpg. wt. 5 lbs. 99.95

③ Laboratory-grade 6-switch Decade Resistance Box

- Has a wide range of values for all types of work
- Rugged housing holds up to heavy bench use

Versatile substitution box provides resistance values from 1 ohm to 999,999 ohms in 1 ohm steps. All resistors are precision 1 watt, 0.5% tolerance type. Zero setting bypasses resistor box. The rugged 5" H x 7½" W x 6⅝" D (12.5 x 18.8 x 16 cm) metal case features two binding posts for easy test setups. The Decade Resistance Box weighs 2½ lbs. (1.1 kg).

Kit IN-3117, Shpg. wt. 3 lbs. 69.95

④ Logic Probe indicates HIs/LOs in TTL/CMOS circuits

\$39⁹⁵ • Separate indicator lights show logic "1" and "0" levels
• Memory function detects and indicates a change in levels

Quickly and easily check any TTL or CMOS circuit. This handy probe detects and indicates high and low logic levels in 5 VDC TTL circuits up to 100 MHz and 15 VDC CMOS circuits up to 80 MHz. The probe will also indicate intermediate or "bad" logic levels. The presence and polarity of single pulses as short as 10 nsec duration will also be indicated. A memory LED turns on whenever a change takes place in the state of either logic level.

Two indicator lights are located at the tip of the probe for a clear view of what is happening without removing your eyes from the test point. Power is provided to the logic probe from the circuit under test through 34" leads with built-in strain relief and color-coded mini-clips. Detachable ground clip included.

The logic probe is insulated and features probe tip protection to a momentary +175 VDC and power lead protection to a continuous -25 VDC or +25 VDC (17 VAC) for one minute. The probe is a compact 9¼" long x 1" diameter (23.1 x 2.5 cm) and is a lightweight 2½ ounces (71 g).

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

IT-7410 SPECIFICATIONS: DC THRESHOLD LEVELS: TTL Logic ZERO: 0.8 ± 0.15 @ 5VDC. TTL Logic ONE: 2.1 ± 0.25 @ 5 VDC. CMOS Logic ZERO: 30 ± 10 V of supply voltage. CMOS Logic ONE: 70 ± 10 V of supply voltage. INPUT IMPEDANCE: 400 kohms in parallel with 10 pF. RESPONSE LIMIT: 10 ns of single pulse or train for TTL and CMOS.

Move with Heathkit into the growing and interesting field of programming and reusing EPROMs

⑤ EPROM Programmer lets you delve deeper into computer programming techniques and procedures



- Program, duplicate, verify and simulate EPROMs quickly and inexpensively with microprocessor control
- Accommodates 2500 and 2700 series EPROMs
- Transmit to or receive data from a computer

The versatile ID-4801 EPROM Programmer provides computer enthusiasts and advanced electronics hobbyists with an inexpensive instrument to further their knowledge and work in programming applications. The ID-4801 Programmer can be used to program, duplicate, verify, and simulate EPROMs that use a single power supply. These include popular 2500 and 2700 series EPROMs and other compatible devices up to 16K bytes. This easy-to-assemble programmer kit also provides engineers with a cost-effective method of quickly programming EPROMs for design purposes.

Ten distinct functions can be selected using the EPROM Programmer's 4 x 4 HEX keypad and six control keys. With the functions provided you can select a RAM memory location, enter or examine data, and increase or decrease the displayed memory address by one. You can also repeat data being entered by duplicating entire blocks of data without the tiresome entry of repetitive keystrokes. After your data is entered into the programmer's RAM memory you transfer it to a selected device using the Program EPROM Mode.

Save development time and avoid the need to program test ROMs. The ID-4801's Simulate Mode allows you to use the programmer's RAM to simulate ROMs in external devices. Connect an appropriately wired cable between the ID-4801's program socket and the socket of the ROM that is to be simulated. Test-run and modify your program until it is ready for error-free operation. Then load an EPROM with your fault-free program and place it into the external device.

Built-in editing features make this programmer an effective debugging tool. From the keypad, two separate modes let you insert and delete data from the displayed memory address. And a one- or two-byte Search Mode can be used to locate data bytes in RAM and then display both the data and the memory address.

EPROMs are prechecked before being programmed in the Program Mode. Before programming, the ID-4801 automatically tests the EPROM to make sure the selected address range is blank. If any address contains data, the Program Mode is exited. When all addresses are found to be blank, the user can then program the EPROM with data that is currently stored in RAM. As data is entered in each address it is also compared to the same RAM address for error-free programming.

Data can also be loaded from an existing EPROM into the Programmer's RAM memory using the EPROM to RAM Mode. After each data byte is transferred into RAM it is compared to the same EPROM address to check for a valid data entry.

Then use the programmer's editing functions to revise data as desired. You can also use the Verify Mode to load a program into the programmer's RAM and then compare it to one or more EPROMs. This mode produces an identifying checksum signature that is unique to every program.

Transmit or receive data between the Programmer and most computers, micro-processor development systems, and other compatible instruments through an RS-232C port. This port is a 25-pin D connector and allows the transfer of data in an INTEL HEX format at a rate of 9600 baud.

Specific personality modules, wired by the user, are required for use in some modes for different EPROM configurations. Two blank personality modules are supplied with the programmer kit along with commonly used wiring diagrams. Extra modules are available as an accessory.

The ID-4801 EPROM Programmer is equipped with a 4K x 8 system ROM, and a 2K x 8 system RAM that can be expanded up to 16K with optional expansion accessories. Six LEDs indicate function selections while six 7-segment LEDs display addresses, data, and operation prompts. The programmer has dimensions of 15¼" W x 10¾" D x 4¾" H (39.6 x 27.3 x 12.1 cm). It weighs 6 lbs. (2.7 kg), and uses 120 VAC at 60 Hz, 16 watts maximum.

Kit ID-4801, Shpg. wt. 11 lbs. 369.95

IDA-4801-1, Personality Module Accessory, contains five personality modules plus labels, Shpg. wt. 1 lb. 19.95

IDA-4801-2, 8K RAM Expansion Accessory, contains additional RAM to expand the Programmer's memory up to 8K bytes, Shpg. wt. 1 lb. 19.95

IDA-4801-3, 16K RAM Expansion Accessory, contains additional RAM to expand the programmer's memory up to 16K bytes, requires previous installation of IDA-4801-2 Accessory, Shpg. wt. 1 lb. 39.95

⑥ Save dollars, erase EPROMs to use again and again

- Erase all ultraviolet erasable integrated devices
- Has tray interlock system for increased safety
- Fast and easy one-evening project; simple to use

Cut your EPROM costs with the Heathkit ID-4803 EPROM Eraser. It will erase 24-, 28-, and 40-pin, ultraviolet erasable read only memory devices and other ultraviolet erasable integrated devices for you to use over and over again. This inexpensive eraser is a money saver for all computer or electronics hobbyists interested in EPROM programming. Place EPROMs into the locking tray and wait for them to be erased. A safety interlock system prevents accidental exposure to ultraviolet rays whenever the tray is opened.

Compact eraser has dimensions of 2½" H x 3¼" W x 13¼" L (6.4 x 8.1 x 33.8 cm) and weighs 3½ lbs. (1.5 kg). Uses 110 volts AC, 60 Hz at 10 watts.

Kit ID-4803, Shpg. wt. 4 lbs. 59.95



Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center

INSTRUMENTS/55



1



2



5



Transom-Mount Transducer



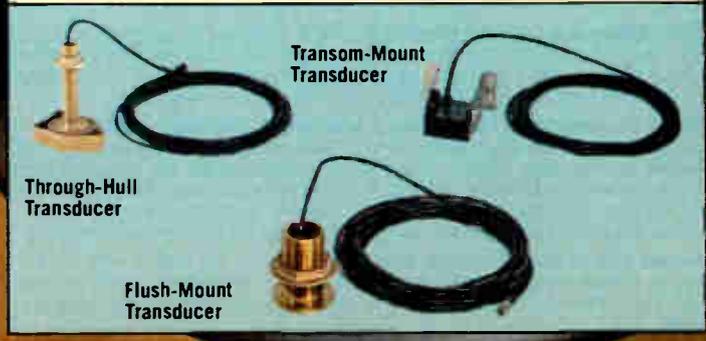
Through-Hull Transducer



3



4



Transom-Mount Transducer

Through-Hull Transducer

Flush-Mount Transducer



6



Provide your boater or fisherman with some summer fun by giving Heath marine instruments

1 Gain an edge in commercial and sport fishing with an advanced Video Fish Recorder

- See below your boat down to 480 feet using eight ranges
- Designed for simple and easy installation
- Alerts you to a strong fish echo or a rising bottom

Make your fishing ventures a lot more enjoyable and successful with the sophisticated MIP-2915 Video Fish Recorder. On its 5½" high-contrast, anti-glare screen appears a vast amount of information besides a picture of the bottom and any fish in between. A range scale divides the display with dashed lines into one of eight selected depth regions: 0-30', 30-60', 0-60', 60-120', 0-120', 120-240', 0-240', or 240-480'. Depth selection can be easily determined through the use of two range switches.

Also displayed on the screen are movable bar indicators that show the position of both the bottom and surface alarms. You select the maximum and minimum depth levels to warn you of a rising bottom or a strong fish echo. Four distinct shades of gray illustrate bottom conditions as well as the presence of fish. A brightness control adjusts the screen for varying light conditions.

The MIP-2915 also features an adjustable sweep speed for a broader or a more condensed image while a freeze position holds the image for analysis. A gain control adjusts the Video Recorder's sensitivity where needed. The MIP-2915 comes with a transom-mount transducer with 25' cable and bracket. Its five pound weight and compact 6" H x 7½" W x 7¼" D size enable the Recorder to be placed almost anywhere. Operates on +12 VDC and comes with a power cable. Manufactured for Heath Company by IMPULSE.

MIP-2915, Assembled, with Transom-Mount Transducer, 8 lbs. 499.00
MIP-2914, Assembled with Through-Hull Transducer, 8 lbs. 549.00

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

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

Pays for itself if it sounds the alarm just once! The dual-range Digital Depth Sounder is a great aid for coastal navigation. This unit features self-adjusting range selection that monitors the water's depth from 2 to 499 feet. The Digital Depth Sounder also has a self-adjusting gain for accurate depth readings in either fresh or salt water.

Big, easy-to-read LCD display with automatic night light shows depths in 0.1' increments to 9.9' and in 1' intervals from 10' to 499'. A crystal oscillator updates depth readings every 0.9 seconds.

The Depth Sounder has five alarm settings at 2', 4', 10', 20', and 40'. A built-in keel offset automatically subtracts displacement hull depths for exact depth readings. The MI-2916 is made from weather-resistant materials. It operates on 12 volts DC. Cabinet measures 7" wide x 2½" high x 5½" deep without its gimbal mount bracket.

Kit MI-2916-1, Depth Sounder with Through-Hull Transducer, 8 lbs. 189.95
Kit MI-2916-2, Depth Sounder with Transom-Mount Transducer, 7 lbs. ... 179.95
Kit MI-2916-3, Depth Sounder with Flush-Mount Transducer, 8 lbs. 199.95

3 Digital Remote Depth Sounder repeater station

- Independent alarms and depth settings
- Same type of display and accurate calibrations as the dual-range Digital Depth Sounder

Place the Digital Remote Depth Sounder unit in your boat's cabin, flying bridge, or any other location on board. It provides an additional depth reading station that audibly and visually warns you of unexpected changes in depth. A 25-foot connecting cable carries power and depth sounder signals from the MI-2916 Digital Depth Sounder (above) to the remote unit for accurate depth readings and easy placement anywhere.

This remote has the same depth display characteristics, alarm settings, keel-offset control, and all weather construction as the MI-2916 described above. It differs in that the alarm and depth setting on this remote can be set independently for the depth warning and keel setting on the MI-2916. The Digital Remote Depth Sounder measures 2½" H x 7" W x 5½" D.

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

4 Flush-mount Digital Remote Readout for sailboats

\$89⁹⁵

- Works off the MI-2916 Digital Depth Sounder
- Adjustable keel offset for safe sailing in shallows

Slip this rugged, water-tight, flush-mount remote into your bulkhead, and it will warn you of unexpected changes in depth through all kinds of sailing weather. The MI-2918 Flush-mount Digital Remote Readout works off the MI-2916 and features a red warning light that flashes when the depth gets below the preset MI-2916 warning levels.

Like the MI-2916, this unit has a backlit LCD digital display for easy reading day or night. It features an independent, adjustable keel offset (up to 7 feet). The remote also has a diecast zinc 5" bezel to match standard bulkhead instrument panels. It easily slips into a 4½" hole. The Flush-mount Digital Remote Readout measures 5" in diameter x 4½" deep.

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

5 Deluxe Dual-Range Depth Sounder

\$119⁹⁵

- Navigate safely and protect your hull from damage with the Dual-Range Depth Sounder
- High pitched alarm warns you – there's no need to continuously monitor the readings
- Two ranges let you monitor depths to 60' or 240'

Whether you're fishing, cruising or scuba diving, this Dual-Range Depth Sounder adds an extra measure of safety to boating season pleasure. When selected, a high-pitched beeping alarm alerts you to shoals or submerged objects projecting above any preset depth from 5 to 240 feet, thus eliminating the need for continuous visual monitoring.

Two ranges, one for depths to 60 feet, and one for depths to 240 feet, provide extremely accurate readings instantly. Underwater objects located above a preset depth trigger a bright neon flash alongside the perceived depth from the object on one of two circular scales.

In addition to the Depth Sounder's use as a fine navigational instrument, a sensitivity control aids in discriminating between bottom readings and those returned by single or schools of fish.

The unit is housed in a water-resistant, black and white Cyclocac case which has a glare-free bezel with sun shield and super bright neon indicator to make depth reading easy day or night. Gimbal mount and quick disconnect power and transducer leads allow for easy removal when your boat is not in use. Powered by your boat's 12 VDC battery.

Depth Sounder with through hull transducer and 25 feet of connector cable.
Kit MI-1031-1, Shpg. wt. 8 lbs. 119.95
Depth Sounder with transom-mount transducer and 25 feet of connector cable.
Kit MI-1031-2, Shpg. wt. 8 lbs. 119.95

6 Sensitive Deluxe Fish Recorder always delivers professional results and fishing pleasure

Only
\$139⁹⁵

- Increase your fishing enjoyment and success with this quality Heathkit marine instrument
- Two instruments in one – acts as depth sounder in addition to dual-range fish spotter
- Sensitivity adjustment and two depth ranges let you set it to detect the size and type of fish you want

A Heathkit Deluxe Fish Spotter should be standard tackle for any serious angler. This dependable instrument can help increase the size and weight of your catches by detecting fish swimming between the surface and any preset depth to 60 or 120 feet.

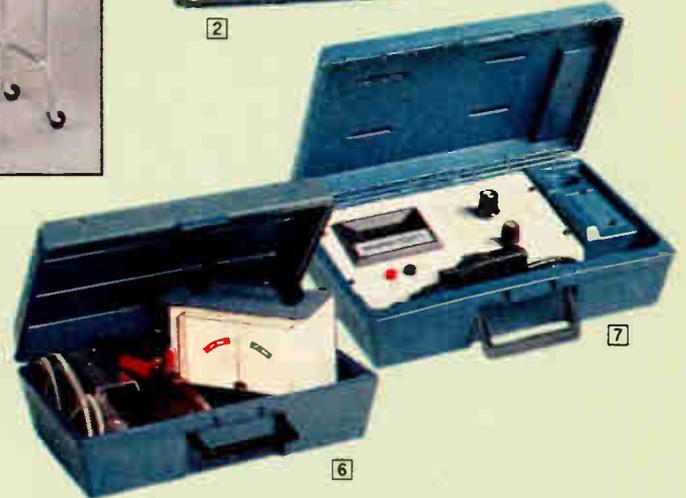
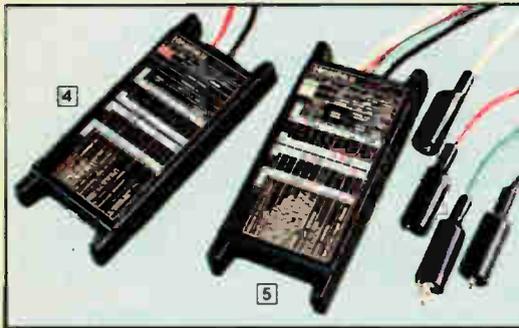
Two ranges, 0-60 or 0-240 feet, ensure the high accuracy and definition so important in an instrument of this type. Fish entering the transducer's ultrasonic range will trigger a bright neon indicator which shows the exact depth. Relatively small variations in fish location can be observed while your boat is in motion.

Two precision instruments in one portable package: The Deluxe Fish Spotter will stand duty as a dependable depth sounder for navigation through unknown waters, and search underwater areas to help you determine the best fishing spots. The MI-2901 has sensitivity control, corrosion resistant aluminum case, sun-shield dial and watertight ceramic transducer element with suction cup mount. It is powered by two 6-volt lantern batteries (not included).

Kit MI-2901A, Shpg. wt. 9 lbs. 139.95



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**FAST, EASY
1-EVENING KIT**



Highly efficient
exterior horn

Concealed
grille horn



8 Siren/PA for mobile public services

\$109⁹⁵ • Includes new hi-lo siren circuit and provision for multi-mode emergency lighting control
• For positive-or negative ground electrical systems

This compact, 55-watt siren has automatic or manual wail, hi-lo emergency tone and yelp to accommodate different traffic situations. A 20-watt public address circuit amplifies your voice for outside announcement and incoming radio calls to monitor while away from the vehicle. Low-noise, push-to-talk microphone will instantly go from any siren to clear audio-PA mode.

Kit GO-1810, Shpg. wt. 6 lbs.	109.95
GOA-18-1, Weatherproof Exterior Horn Speaker, assembled, 10 lbs.	109.95
Kit GOA-18-2, Concealed Grille Speaker, Shpg. wt. 10 lbs.	109.95
Kit GOA-1558-1, Emergency Lighting Relay, Shpg. wt. 1 lb.	4.95

9 Radar Detector keeps you aware of road conditions

\$149⁹⁵ • Edits out false alarm signals for more accurate detection
• Signal strength meter tells you strength of radar signals
• Has super-heterodyne self-contained antenna

You get reliable long range detection without deceiving false alarms with the Bandit 55 by Uniden. A unique Electronic Data Interference Terminator edits out extraneous signals from sources such as burglar alarms or garage door openers. A signal strength meter helps you determine the strength of the detected signals providing you with useful information about the road ahead.

Many features are packed into this compact unit including an adjustable volume audio alert and bright/dim warning light. A highway/city filter switch provides maximum flexibility. Easily installs on dash or sun visor.

CRP-1402, Assembled, Shpg. wt. 2 lbs. 149.95

Automotive test equipment for the amateur, semi-professional or professional mechanic

1 Professional tune-ups in your own garage

\$599⁹⁵

- Accurately displays primary and secondary waveforms
- Measures RPM, dwell angle and ignition voltage
- Includes illustrated, 75-page Operation Handbook

Designed for the auto hobbyist yet perfect for a professional garage operation, Heathkit's top-of-the-line Ignition Analyzer enables you to perform precision auto tune-ups every time. Rock-steady CRT parade and superimposed patterns are made possible by the latest design in induction pickup circuitry. Select 4, 6 or 8 cylinder operation from front panel pushbuttons. Dwell, RPM and voltage measurements are easily read on a large 8-inch meter.

Cylinder select buttons short out cylinders for performing power balance checks and for electrical displays 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. Four simple connections enable all tests. Analyzer includes adapter for GM HEI systems as well as all necessary cables, clamps and inductive pickup for full operation.

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

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

Timing Light with Advance Meter plugs directly into the CO-2600 Analyzer and provides a bright timing flash that registers clearly at up to two feet, even in daylight. Built-in RPM/Advance scales measure RPM from 1500 to 4500 and distributor advance from 0 to 60 degrees, includes 10' cable with connector.

Kit CDA-2600-4, Timing Light, Shpg. wt. 3 lbs. 69.95

Analyzer Scope Cart stands at the right height for viewing the CO-2600 while working under the hood. This easy-to-build cart rolls smoothly on durable casters.

Kit CDA-2600-3, Shpg. wt. 25 lbs. 59.95

CO-2600 SPECIFICATIONS: For Use With: Standard, transistorized or C-D ignition systems on 4, 6 or 8 cylinder (4-cycle) or 2-rotor Wankel engines. Front Panel Controls: Scope, Intensity, Vertical Position, Vertical Gain, Horizontal Position, Trace Length, 25 kV and 50 kV Secondary Volts, 50 V and 500 V Primary Volts, Parade, Superimpose and eight Power Balance/Single Cylinder pushbuttons plus Cancel, Tachometer: 1000 RPM, 3000 RPM, 6000 RPM. Voltmeter: 2 VDC, 20 VDC. Signal Pickup: Direct for primary, inductive for parade trigger and capacitive for secondary. Tachometer and Voltmeter Accuracy: $\pm 3\%$ of full scale on any range. Meter Size: 8 inches. Scope Vertical Expand: Minimum 2 to 1. CRT Size: 12 inch diagonal. Operating Temperature Range: 32°F to 104°F (0°C to 50°C). Power Requirements: 110/130 or 220/260 VAC, 50/60 Hz. Net Weight: 53 lbs. (24 kg). Dimensions: 12 $\frac{7}{8}$ " high x 25 $\frac{1}{4}$ " wide x 14 $\frac{1}{8}$ " deep (32.7 x 64.1 x 35.9 cm).

2 Portable Ignition Analyzer

\$279⁹⁵

- Displays primary and secondary waveforms
- Uses clamp-on, inductive pulse pickup method
- Built-in dual range tachometer

Diagnose and resolve most ignition problems fast with this handy Ignition Analyzer. Quickly detect difficult to pinpoint ignition problems.

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

Use it with any standard, transistorized or C-D ignition on 3, 4, 6, or 8-cylinder engines with distributors. Includes adapter for GM HEI systems. Optional 12-volt inverter allows portable operation. Accompanying handbook illustrates dozens of detailed cause-and-effect waveforms. Operates on 120/240 VAC.

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

Kit CDA-1015-1, 12 VDC lighter-socket Power Inverter, Shpg. wt. 3 lbs. 39.95

SAVER! Save \$39.95 on a CO-1015 Analyzer and a Power Inverter.

CDS-1015, Shpg. wt. 25 lbs. 279.95

3 Wiper Delay makes driving safer

\$19⁹⁵

- Normal and delay modes
- Variable wiper sweeps, from 30 to .5 seconds

The inexpensive CH-1068 is an easy, one evening project that keeps your view clear on the highway. Kit includes test lamp with special instructions to locate and identify hookup leads in your auto wiring system. Designed to fit most single and 2-speed wipers. Incompatible with motor-reversing hidden wipers; contact your auto dealer for specifics. Unit mounts quickly and easily using gimbal bracket or double-sided tape strip from kit.

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

Use your Visa or MasterCard credit cards to purchase your kit!

4 Reliable Electronic Ignition Tester saves time

- Quick and easy to use — takes the guesswork out of pinpointing defective components in modern electronic ignitions
- Inexpensive, and small enough to pack in a pocket or purse

Performs four tests that quickly tell you: if your battery is sufficiently charged, if the reluctor and pickup coil are providing an input to the ignition module, if the ignition module is properly switching the coil primary, and the location of a faulty component in the ignition primary circuit. Requires some ignition knowledge; pickup coil test won't work on new Hall-effect ignitions. Keep one handy in every family vehicle for troubleshooting unexpected breakdowns on the road.

Kit CI-2055, Shpg. wt. 2 lbs. 24.95

5 Low-cost Charging System Tester finds trouble

- Portable and reliable — lets you diagnose faulty components in your vehicle's charging system with foolproof ease
- A 'natural' for any good auto mechanic's tool collection

Two-wire setup and three quick tests tell you: if the battery has sufficient charge to reliably start the engine, if the battery is being charged by the alternator, if the voltage regulator is at fault (causing the battery to become overcharged), and if the alternator stator windings, and rectifier diodes are functioning properly. Lightweight and portable like the Ignition Tester, it also uses digital ICs to evaluate performance characteristics and cause LEDs indicative of the problem to light. No external power or battery required. Measures 3/4" H x 2 3/4" W x 5 1/2" L. Be prepared in case of trouble — don't be stranded without the help these Testers provide!

Kit CI-2065, Shpg. wt. 2 lbs. 24.95

6 Exhaust Gas Analyzer for tune-up evaluations

\$129⁹⁵

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

Perhaps the best way to guarantee your engine is running at maximum potential and emitting as few pollutants as possible is by testing it with the Heathkit Exhaust Gas Analyzer. A CI-1080 can monitor for minimum pollution, review the emission control system and indicate positive diagnosis.

By measuring thermal conductivity of your exhaust gases, it can show the air-fuel ratio, overall combustion efficiency and percentage of carbon monoxide present. From these you can determine if an auto's fuel mixture is unnecessarily too rich or lean for best economy. It's essential when tuning up engines to meet a specific rating for clean air standards in many states. Not intended for use with Chrysler "lean burn" engines.

To facilitate setup, the easy-to-read, 4 1/2" color-coded meter is designed to hang on a partly open window or stand upright without marring paint finishes. The removable sensor/probe assembly uses a flexible stainless steel tube for safe routing of all gaseous material. The CI-1080 is housed in a rugged polyduralene case with foldaway handle for easy portability and storage. Powered by 6 or 12-volt battery in auto under test. All accessories included.

Kit CI-1080, Shpg. wt. 6 lbs. 129.95

7 Portable digital Engine Analyzer

\$139⁹⁵

- Measures dwell angle, engine speed, DC voltage, resistance and current
- 3 1/2 digit LCD display is easily readable even in bright sunlight

Versatility at an affordable price, that's the CM-1551. With this self-powered portable digital analyzer, you can make critical tune-up measurements to help determine if your vehicle is operating at peak performance. Check dwell on 4, 5, 6 and 8-cylinder engines from 0 to 90° within $\pm 0.2\%$. Check idle speed in two tachometer ranges up to 10,000 RPM with an accuracy of $\pm 0.1\%$. Measure DC voltage in two ranges up to 200 volts at $\pm 1.5\%$, current to 20 amps with $\pm 3\%$ accuracy and resistance to 2 megohms at $\pm 1.5\%$.

Using the optional Shunt Accessory (below), the CM-1551 can measure starting current and battery charge/discharge currents. Power is supplied by a 9-volt battery (not included). Analyzer displays circuit polarity, low battery and over-ranges. Measures 12 1/4" W x 8" D x 3 5/8" H.

Kit CM-1551, Shpg. wt. 5 lbs. 139.95

CMA-1550-1, 400-Ampere Shunt, 1 lb. 15.95

AUTOMOTIVE/59



Heath/Zenith Education Courses are carefully designed to provide maximum efficiency and



Now you can apply famous Heathkit/Zenith learning courses to meet your special training needs. Success-oriented with just the right amount of technical theory and a maximum emphasis on real-world applications, Heathkit/Zenith Self-Study and Classroom Courses incorporate the very latest learning methods and materials that are available. Specify Heathkit/Zenith courses with confidence, because our pledge prevails:

"We won't let you fail!"

Self-study courses provide effective training for those who can't be taken off the job for group class training, or who wish to enhance their electronics knowledge and skills. Individualized study courses are a convenient and effective means to update or enhance anyone's skills.

Each self-study course is designed to guide the user through important concepts. And audio-visual aids, available with many courses, help teach difficult concepts. Self-test reviews monitor and help ensure understanding of course material while experiments, using parts included with the course, provide needed experience.

Self-instruction courses include comprehensive final examinations. Several courses can even be applied for college credit (see Course Offerings chart).

Heathkit/Zenith Classroom Courses are the complete answer for all types of industries, government agencies, and forward-thinking schools who want to teach technical subjects with maximum efficiency at a minimum cost.

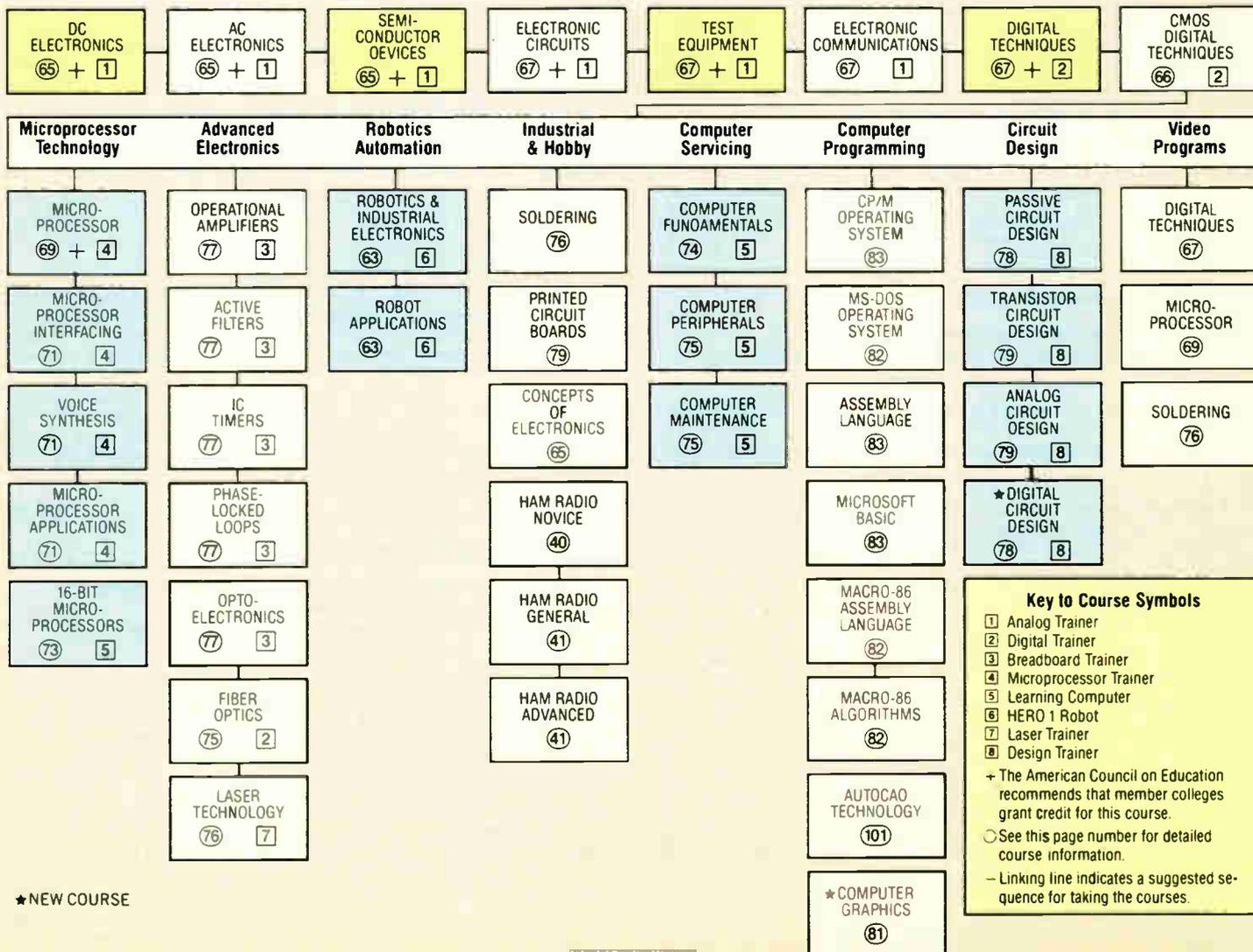
Courses start at the entry level of electronics with the Basic Electronics Series. After completing these courses the student can move into new state-of-the-art technology, branch into the use of instruments or learn about computers from hardware to programming. All of these multimedia courses employ the latest learning enhancement techniques. Text material is presented in concise, fast-paced units of study, with major topic areas highlighted in modular subsections. "Hands-on" experiments provide positive reinforcement through interactivity. Illustrations are used profusely for fast, thorough mastery by students of all ages and different levels of technical experience.



Courses are organized in three separate publications: text, workbook and instructor's

Choose a single course or a series to fit your educational need

Basic Electronics Series



★NEW COURSE

economy in either self-paced personal study or classroom and industrial training programs

guide. The student text is the core of the learning material, written in a logical learning sequence that first explains concepts and then builds upon them for a thorough understanding of each topic. Texts are supported by a workbook with exams and experiments keyed to the text presentation. The instructor's guide includes suggestions for making the course more effective but is versatile enough to allow the teacher to add his or her own parameters for challenge and guidance—providing each student with a fully rounded learning experience...at a fraction of the cost of institutional options.

Course trainers offer exciting experience with concepts students have just studied in either classroom or self-study situations. Hands-on learning is provided on well-designed quality experimenters. Course trainers utilize the latest technology and include such innovative equipment as a laser, robot, and a learning computer that can be upgraded to a powerful 16-bit machine.

Quality components and parts are provided in separate parts packs for each student or group of students. These contain all the electrical and accessory components necessary for implementing experiments contained in the workbooks.

Continuing Education Units, (CEU's) a nationally-used method of recognizing achievement in non-credit adult education, may be earned in self-study courses by passing the included optional final examination with a 70% or higher score. Students and employees may earn CEU's for classroom courses by passing a CEU final examination (ordered separately) with a score of 70% or higher.

CEU Exams for Classroom Courses:

EB-6101-80, DC Electronics, 2 lbs.	100.00
EB-6102-80, AC Electronics, 2 lbs.	100.00
EB-6103-80, Semiconductors, 2 lbs.	100.00
EB-6104-80, Electronic Circuits, 2 lbs.	100.00
EB-6201-80, Digital Techniques, 2 lbs.	100.00
EB-6401-80, Microprocessors, 2 lbs.	100.00

If rapid advances in technology are leaving your employees or students behind, they can catch up quickly and comprehensively. Review the extensive list of courses below, and contact us for more information regarding your needs.

Video Courses from Heathkit's Video Training Series provide a complete, convenient, effective and economical approach to learning. Through video animation techniques, students actually see how electronic processes work for better understanding and a higher retention factor. Get across complicated concepts and principles more quickly, vividly and economically than any other method of communication. Courses available include: Microprocessors, Digital Techniques and Soldering.

Write for complete details: Heath Company, Dept. 518-000, Benton Harbor, MI 49022. Or call TOLL-FREE: 800-253-0570.

Classroom Course Ordering Information

	Course	Text Shpg. wt. 2 lbs.	Price	Workbook Shpg. wt. 2 lbs.	Price	Instructor's Guide Shpg. wt. 1 lb.	Price	Assembled Trainer Wt. 6 lbs.	Price	Parts Shpg. wt. 1 lb.	Price	Cassettes Shpg. wt. 2 lbs.	Price
Introductory	Concepts of Electronics	EB-6140 (3 lbs.)	24 95	EB-6140-40 (1 lb.)	10 95	EB-6140-50	9 95	ETW-3100B	179 95	EB-6140-30	29 95	NOT USED	
	Basic Electronics												
	DC Electronics	EB-6101	19 95	EB-6101-40	10 95	EB-6101-50	9 95	ETW-3100B	179 95	EB-6101-30	24 95	EEA-3101A	19 95
	AC Electronics	EB-6102	19 95	EB-6102-40	10 95	EB-6102-50	9 95	ETW-3100B	179 95	EB-6102-30	19 95	EEA-3102A	19 95
	Semiconductor Devices	EB-6103 (3 lbs.)	19 95	EB-6103-40	10 95	EB-6103-50	9 95	ETW-3100B	179 95	EB-6103-30	19 95	EEA-3103A	19 95
	Electronic Circuits	EB-6104A	19 95	EB-6104-41	10 95	EB-6104-51	9 95	ETW-3100B	179 95	EB-6104-31	34 95	EEA-3104A	19 95
	Test Instruments	EB-6105 (4 lbs.)	19 95	EB-6105-40	10 95	EB-6105-50	9 95	ETW-3100B	179 95	EB-6105-30	29 95	EEA-3105A	19 95
	Electronic Communications	EB-6106	19 95	EB-6106-40 (1 lb.)	10 95	EB-6106-50	9 95	ETW-3100B	179 95	EB-6106-30	34 95	EEA-3106A	19 95
	Digital Techniques	EB-6201 (3 lbs.)	24 95	EB-6201-40	11 95	EB-6201-50	9 95	ETW-3200B	179 95	EB-6201-30	34 95	EEA-3201A	19 95
Microprocessor Technology	Microprocessors	EB-6401 (4 lbs.)	24 95	EB-6401-40 (1 lb.)	11 95	EB-6401-50	9 95	ETW-3400A	359 95	EB-6401-30	64 95	NOT USED	
	Microprocessor Interfacing	EB-6402 (5 lbs.)	24 95	EB-6402-40 (1 lb.)	10 95	EB-6402-50	9 95	ETW-3400A	359 95	EB-6402-30	64 95	NOT USED	
	Microprocessor Applications	EB-6405 (3 lbs.)	24 95	EB-6405-40	10 95	EB-6405-50	9 95	ETW-3400A	359 95	EB-6405-30 (2 lbs.)	54 95	NOT USED	
	Advanced 16-bit Microprocessors	EB-8088 (5 lbs.)	24 95	EB-8088-40	11 95	EB-8088-50	9 95	ETW-100 (33 lbs.)	1095 00	EB-8088-30	59 95	NOT USED	
Advanced Electronics	Operational Amplifiers	EB-601	19 95	EXPERIMENTS IN TEXT		EB-601-50	9 95	ETW-3300B	189 95	EB-601-30	24 95	NOT USED	
	Active Filters	EB-602	19 95	EXPERIMENTS IN TEXT		EB-602-50	9 95	ETW-3300B	189 95	EB-602-30	14 95	NOT USED	
	IC Timers	EB-603	19 95	EXPERIMENTS IN TEXT		EB-603-50	9 95	ETW-3300B	189 95	EB-603-30	29 95	NOT USED	
	Phase-Locked Loops	EB-604	19 95	EXPERIMENTS IN TEXT		EB-604-50	9 95	ETW-3300B	189 95	EB-604-30	29 95	NOT USED	
	Optoelectronics	EB-605	17 95	EB-605-40 (1 lb.)	9 95	EB-605-50	9 95	ETW-3300B	189 95	EB-605-30	29 95	NOT USED	
	Laser Technology	EB-610	19 95	EB-610-40 (1 lb.)	10 95	EB-610-50	9 95	ET-4200 (4 lbs.) ETA-4200 (2 lbs.)	239 95 44 95	EB-610-30 (3 lbs.)	39 95	NOT USED	
Robotics and Automation	Robotics & Ind. Electronics	EB-1801 (4 lbs.)	29 95	EB-1801-40	14 95	EB-1801-50	9 95	EWS-18 (68 lbs.)	2149 90	EB-1801-30 (2 lbs.)	44 95	NOT USED	
	Robot Applications	EB-1812	19 95	EB-1812-40 (1 lb.)	10 95	EB-1812-50	9 95	EWS-18 (68 lbs.)	2149 90	EB-1812-30	49 95	NOT USED	
	Hero 1 Advanced Experiments	EB-1802 (1 lb.)	24 95	NOT USED				EWS-18 (68 lbs.)	2149 90	NOT USED			
Computer Servicing	Computer Fundamentals	EB-2001 (3 lbs.)	19 95	EB-2001-40	10 95	EB-2001-50	9 95	ETW-100 (33 lbs.)	1095 00	EB-2001-30	39 95	NOT USED	
	Computer Peripherals	EB-2002	19 95	EB-2002-40 (1 lb.)	10 95	EB-2002-50	9 95	ETW-100 (33 lbs.)	1095 00	EB-2002-30	39 95	NOT USED	
	Computer Maintenance	EB-2003	19 95	EB-2003-40 (1 lb.)	10 95	EB-2003-50	9 95	ETW-100 (33 lbs.)	1095 00	EB-2003-30	29 95	NOT USED	
Circuit Design	Passive Circuit Design	EB-6001 (3 lbs.)	17 95	EB-6001-40	10 95	EB-6001-50	9 95	ETW-1000 (13 lbs.)	369 95	EB-6001-30	10 95	NOT USED	
	Transistor Circuit Design	EB-6002 (3 lbs.)	19 95	EB-6002-40	10 95	EB-6002-50	9 95	ETW-1000 (13 lbs.)	369 95	EB-6002-30	19 95	NOT USED	
	Analog Circuit Design	EB-6003 (4 lbs.)	19 95	EB-6003-40	10 95	EB-6003-50	9 95	ETW-1000 (13 lbs.)	369 95	EB-6003-30	19 95	NOT USED	
Computer Programming	BASIC Programming	EB-6100 (4 lbs.)	21 95	EB-6100-40	10 95	EB-6100-50	9 95	NOT USED		PARTS, CASSETTES NOT USED			



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HERO 1® and accompanying courses provide a complete high-tech robotics training system

Bring the concepts of robotics to life with the completely equipped robot trainer, HERO 1, and its companion courses and hands-on experiments. Take command of the ideal teaching robot and control all the basic systems found on modern and increasingly sophisticated factory robots and automated machines. And learn

about the major principles relating to robotics and industrial electronics from easy-to-read self-instruction courses. Then complete exciting experiments, using HERO 1, that demonstrate major robotic concepts while providing valuable training and familiarity with circuitry and components.

1 Explore the world of robotics with HERO 1

An ideal teaching tool, HERO 1 acts as your guide through the fascinating world of robotics and industrial electronics. This computer-controlled, electromechanical device allows you to explore and work with fundamental components and circuitry associated with robot technology.

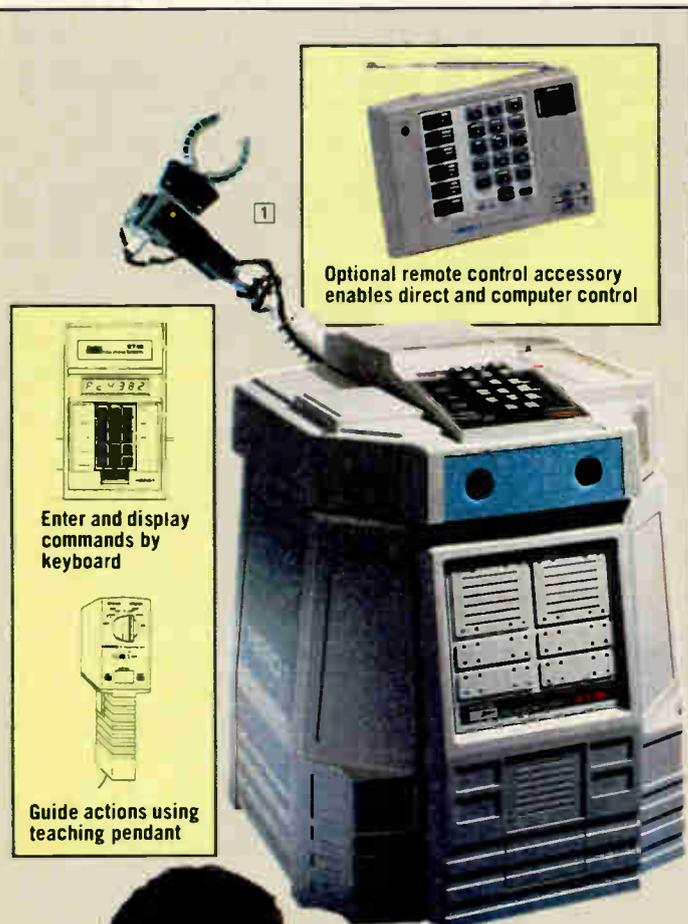
Completely self-contained, HERO 1 is capable of interacting with you and its environment. It detects sound, light, motion, and obstacles in its path; and it can travel over a predetermined course. With its optional arm, the robot can be programmed to pick up small objects with its manipulator. And, its optional voice synthesizer allows the robot to speak in complete sentences.

An intelligent robot, HERO 1 has a computer "brain" consisting of an on-board 8-bit 6808 microprocessor. Following programmed instructions, this microprocessor can guide the robot through complex maneuvers, activate and monitor sensors, and modify the robot's actions as a result of sensor or real-time clock inputs. Memory consists of 8K of ROM, and 4K of RAM which can be increased up to 56K with the addition of an optional memory expansion board. Preprogrammed ROMs that allow HERO 1 to demonstrate its many capabilities are also available for installation on this board.

Command HERO 1 using several different methods. From the top-mounted 17-key hex keyboard you can easily enter, verify, and modify programs as well as select any of the seven separate operating modes. Also access any of the microprocessor's registers through the keyboard. An attachable Teaching Pendant lets you manually control all motor and arm movements, or store them for later duplication. A rear-panel serial port enables programs stored in memory to be transferred to a cassette tape for later reloading and use.

Control HERO 1 using two other methods. One is a remote, radio frequency-controlled transmitter available in two models, each operating at a different frequency. The remote controls all keyboard and Teaching Pendant operations from up to 100 feet away. An RS-232 connector on this accessory permits a computer to remotely operate the robot. A self-contained rechargeable battery supplies the remote with power for up to five hours. The other control method is provided by an optional RS-232 Interface that plugs into the top experimental breadboard of the robot for a direct link to a host computer.

HERO 1 can see and hear through on-board light, sound, and motion detectors plus a sonar ranging system. The sound detector hears over a 300 to 5000 Hz fre-



1

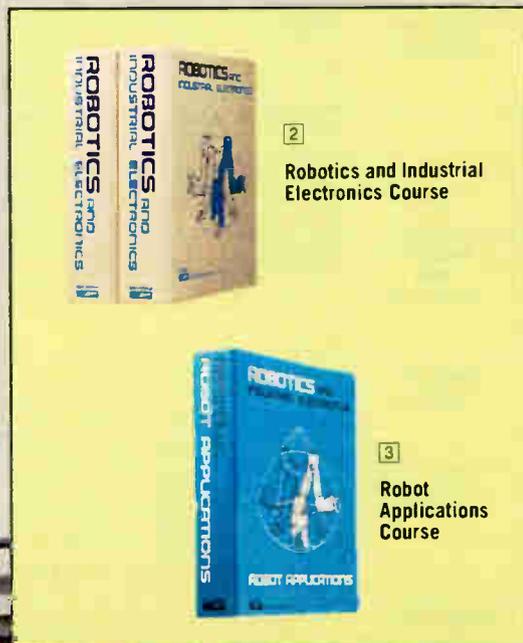
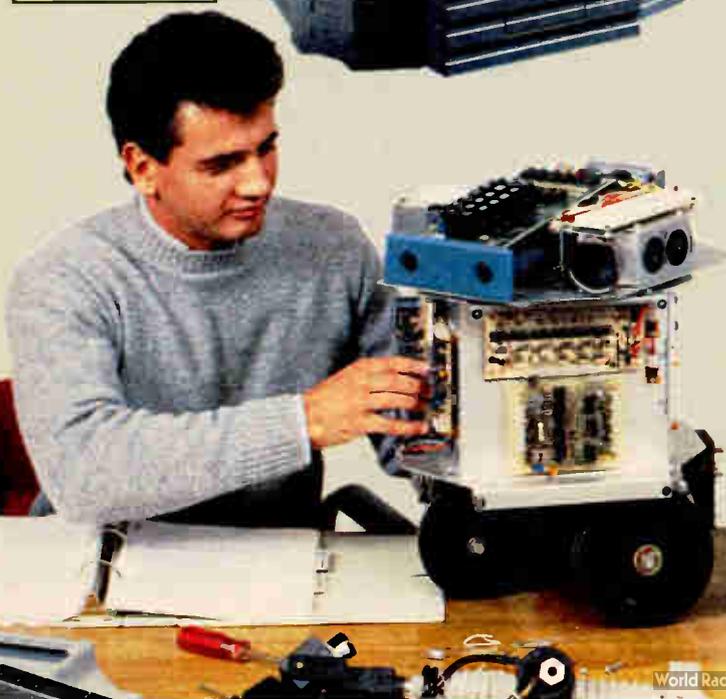
Optional remote control accessory enables direct and computer control



Enter and display commands by keyboard



Guide actions using teaching pendant



2

Robotics and Industrial Electronics Course

3

Robot Applications Course

quency range while the light detector sees over the entire visible spectrum and into the infrared range. The motion detector senses movement up to a distance of 15 feet and the sonar system determines the range between objects and the robot.

Perform experiments on HERO 1's top-mounted breadboard. Conduct course experiments or interface your own circuitry to the robot's CPU. Direct access is available to an I/O port, a user-defined interrupt, CPU control lines, and +12 volt and +5 volt DC power terminals.

Optional Arm with Gripper and Speech Synthesizer gives HERO 1 the ability to grasp and manipulate objects, and to simulate human speech. The arm moves through five axes and can lift 16 ounces when retracted. The phoneme-based synthesizer system generates 64 sounds for speech or sound effects.

Kit ET-18A, Basic HERO 1 Robot (less arm, voice), 66 lbs. **799.95**

Kit ET-18-1, HERO 1's Arm (Arm and Gripper Mechanism), 6 lbs. **349.95**

ETW-18-1, Assembled HERO 1 Arm, Shpg. wt. 5 lbs. **549.95**

Kit ET-18-2, HERO 1's Voice (Phoneme Speech Synthesizer), 1 lb. **99.95**

ETW-18WA, Assembled HERO 1 without arm accessory, 65 lbs. **1699.95**

SAVER! EWS-18, Save over \$400.00 on an assembled and tested HERO 1 with arm and voice accessories already installed, Shpg. wt. 68 lbs. **2149.90**

SAVE \$500.00! HERO 1 Robot kit including arm with gripper mechanism for manipulating objects and phoneme-based voice synthesizer for producing speech with full sentences or unique sound effects.

Kit ETS-18, Shpg. wt. 91 lbs. **1199.85**

Kit ET-18-35, Remote Control Accessory for HERO 1, operates at 75.43 MHz, Shpg. wt. 5 lbs. **249.95**

ETW-18-35, Assembled Remote Control Accessory, 5 lbs. **399.95**

Kit ET-18-36, Remote Control Accessory for HERO 1, operates at 75.67 MHz, Shpg. wt. 5 lbs. **249.95**

ETW-18-36, Assembled Remote Control Accessory, 5 lbs. **399.95**

Special \$100.00 Discount Offer!

Save \$100.00 when you purchase a kit or fully assembled HERO 1 Robot along with kit or fully assembled Remote Control Accessory. On your order, specify the model number of the remote which operates at the frequency you desire and then deduct \$100.00 from your order.

ET-18-4, Demo ROM, a plug-in ROM containing several routines demonstrating all of HERO 1's motor and sense circuits, and voice, 1 lb. **49.95**

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

ET-18-6, Memory Expansion Board, an add-on circuit board to HERO 1's CPU board for the addition of up to six extra memory devices, 2 lbs. **49.95**

ETA-18-6, Memory Expansion RAM, an 8K x 8 random access memory chip that installs onto the ET-18-6 memory board, Shpg. wt. 1 lb. **24.95**

ET-18-7, Automatic Mode ROM, a plug-in ROM that enables HERO 1 to move independently around a room while avoiding obstacles, 1 lb. **29.95**

ET-18-9, HERO 1 BASIC, a plug-in ROM that allows you to program HERO 1 in a simple integer BASIC with modifications that enable you to use the Robot's voice synthesizer and its various motors and sensors. To use HERO 1 BASIC you'll need: an ET/ETW-18 Robot, an ET-18-6 Memory Expansion Accessory, one or more ETA-18-6 Memory Expansion RAM, an ETW-18-10 RS-232 Interface Accessory, a terminal or computer with a terminal emulation program, and serial interface cable such as the HCA-10 or HCA-11 on page 101. Shpg. wt. 1 lb. **49.95**

SAVER! Purchase the ETS-18-9 Expansion System and get everything you need to expand HERO 1 for use with HERO 1 BASIC. The System includes an ET-18-9 HERO 1 BASIC ROM, an ETW-18-10 RS-232 Interface, an ET-18-6 Memory Expansion Board, and one ETA-18-6 Memory Expansion RAM.

ETS-18-9, Shpg. wt. 6 lbs. **179.80**

ETW-18-10, RS-232 Interface, allows serial communications between HERO 1 and a terminal or host computer, requires an ET-18-6 Memory Expansion Board, Shpg. wt. 1 lb. **59.95**

ET-18-11, HERO 1 Demo Cassette, programs on cassette tape demonstrating HERO 1's sensors and voice plus arm and body movements, 1 lb. **14.95**

Advanced Programming Experiments for HERO 1

Unlock the power of HERO 1's Robot Language Interpreter and learn about the subroutines in the robot's monitor ROM. Sixty-one programming experiments provide a wide range of examples designed to teach general programming principles. Learn how to make HERO 1 really perform with these experiments.

EB-1802, Shpg. wt. 1 lb. **24.95**

2 Robotics and Industrial Electronics Course

\$99.95

- Covers the entire field of robotics in a two-volume set filled with illustrative charts and diagrams
- Includes hands-on experiments using HERO 1 to gain experience and mechanical familiarity with robots

A comprehensive course in robot technology, the Robotics and Industrial Electronics Course is the perfect start for your journey into the world of robotics with an A to Z look at how robots work. This course reviews elementary electronic principles used in the robotics field and introduces new concepts associated with robots and automated machines.

In this self-instruction course, the mechanics of robots as well as computer control are completely covered. You master each principle before proceeding to the next in this challenging course. Begin with an introduction to low, medium, and high-technology robots and progress at your own speed to master their different power systems. Become acquainted with the operation of various AC and DC motors and generators, industrial hydraulic and pneumatic systems, and DC stepper motors.

Computer applications are then linked with mechanical principles for complete robotics system coverage. Microprocessors are introduced and you are shown how to write robot control programs. Sensing systems are covered along with how a robot can be made to talk using voice synthesis. Also covered are the skills needed to make a robot perform useful tasks.

Optional hands-on experiments, using the unique teaching robot HERO 1, are also included with this stimulating course. They provide you with a tremendous opportunity to learn, practice, and apply the basic principles of: industrial electronics, computers, automated equipment, sensors, servos, stepper motors, controllers, and other components of industrial robots.

Pass the optional final examination with a 70% or higher score and earn 8 Continuing Education Units plus receive a handsome Certificate of Achievement.

To better understand the material in this course, you should complete the following subjects or have the knowledge contained in the: EE-3101A DC Electronics (page 65), EE-3102A AC Electronics (page 65), EE-3201A Digital Techniques (page 67), and EE-3401 Basic Microprocessors (page 69) courses.

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

3 Extend your robotics and industrial electronics knowledge with the Robot Applications Course

\$99.95

- Briefly review robot basics and build upon your knowledge base with new concepts and new insights
- Perform many more exciting experiments using HERO 1 including the construction and use of an EPROM burner

Expand your knowledge of robotics with the Robot Applications Course and learn about the technologies that make advanced industrial robots a reality. See how tasks, payback, reliability, quality, and other factors govern the selection of an industrial robot. Learn about the process of signal conditioning that gets the signal from a sensor to the microprocessor controller. Covered in detail are different types of vision, tactile, and environmental feedback sensor systems. After finishing this course, you'll better understand the capabilities as well as the limitations of today's industrial and domestic robots.

A look into a future manufacturing plant is also presented. In this plant, "computer-aided" production is viewed. Present use of industrial robots are then discussed with a look at possible future robot applications.

None experiments add to your training experience. All are performed on the versatile robotics trainer, HERO 1. These experiments provide a hands-on opportunity to become acquainted with the concepts and technology covered in the text. All components needed to complete the experiments (including a programmable ROM) are included. An audio cassette tape containing the experiment programs for the EE-1812 course is also supplied.

After completing the optional final exam and passing with a 70% or higher score, you'll earn 4.0 Continuing Education Units. You'll also receive recognition in the form of a Certificate of Achievement suitable for framing.

EE-1812, Shpg. wt. 6 lbs. **99.95**

Save \$100.00 on a complete robotics training program

This special offer includes the: EE-1800 Robotics and Industrial Electronics Course, EE-1812 Robot Applications Course, EB-1802 Advanced Programming Experiments, ET-18A Basic HERO 1 Robot, ET-18-1 Robot Arm with Gripper, and ET-18-2 Voice Synthesizer.

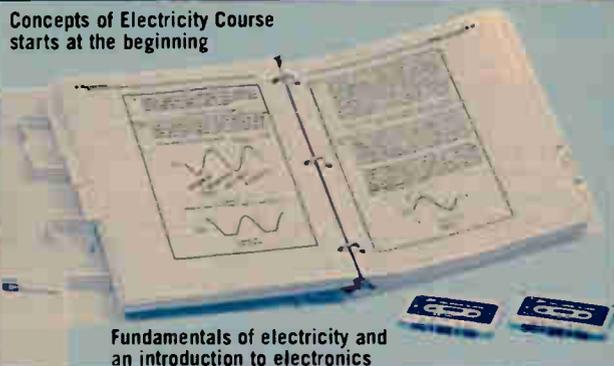
EE-1800, Shpg. wt. 111 lbs. **1374.70**



Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.

Develop a solid foundation for all your studies in electronics with these entry level courses

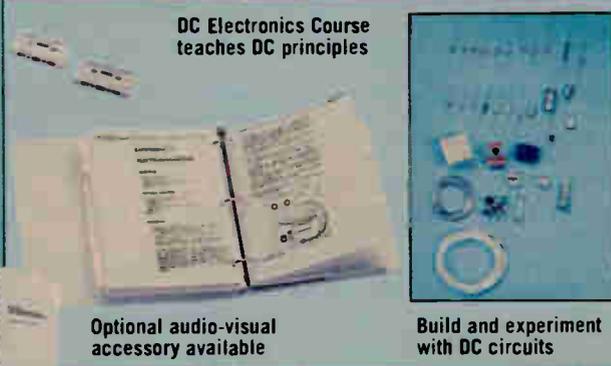
Concepts of Electricity Course starts at the beginning



Fundamentals of electricity and an introduction to electronics

1

DC Electronics Course teaches DC principles

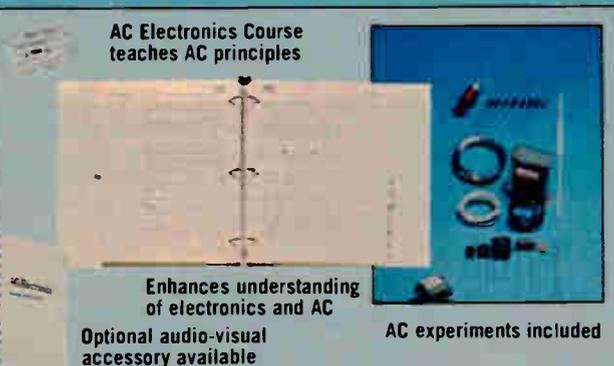


Optional audio-visual accessory available

Build and experiment with DC circuits

2

AC Electronics Course teaches AC principles



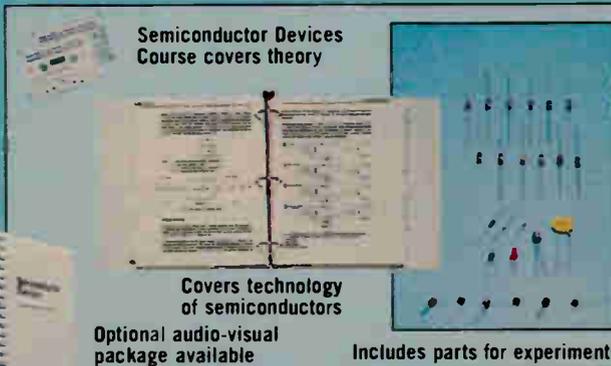
Enhances understanding of electronics and AC

AC experiments included

Optional audio-visual accessory available

3

Semiconductor Devices Course covers theory



Covers technology of semiconductors

Includes parts for experiments

Optional audio-visual package available

4

5 Increase your learning success with hands-on experiments

\$109⁹⁵

ET-3100B Experimenter and Trainer

Compact, rugged, reliable and versatile, experimental and circuit design tool



FAST, EASY
2-EVENING KIT

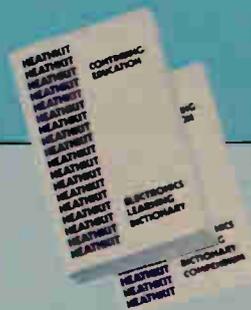
Variable power supplies and 200 Hz to 200 kHz frequency generator



Solderless bread-board sockets for circuit building

Center-tapped transformer supplies 30 V RMS and 60 Hz signal

Built-in 1 kilohm and 100 kilohm variable resistors



Tutorial Electronics Dictionary

This Tutorial Dictionary does more than clearly define electronics technical terms in 832 pages. This Dictionary also contains a summary of 16 electronics-related topics. These outlines allow this informative and well-illustrated Dictionary to become a low-cost self-instructional course in electronics. Each topic outline lists related terms making it an effective learning tool. Approximately 20,000 terms are covered in a clear and concise manner. Make this Learning Dictionary part of your professional library.

EB-1010, 3 lbs. 16.95

1 Concepts of Electricity Course for the beginner

\$29⁹⁵

- Provides a working knowledge in the fundamentals and concepts of both AC and DC electricity
- Expands into circuit theory and electromechanical systems

From the very beginning: For those without previous knowledge or experience in the field of electronics, this programmed Course is designed to examine the subject at a beginner's level. And, at the same time, act as an introduction to other electronics courses. Begin by learning about the fundamental concepts of both direct and alternating current. Then you expand into the areas of circuit theory and associated electromechanical systems such as motors, generators and meters.

Reviews: Each audio/visual section is followed by a programmed instruction section designed to reinforce what you have just covered. And, a review at the end of each unit tests your understanding of the material.

Course Goals: When you complete this Course, you'll be able to explain the difference between AC and DC, and be able to explain the operation of DC and AC generators and motors. After completing the Course in your own step-at-a-time pace, you'll know the difference between resistors, capacitors, diodes and other electronic components. Besides being able to solve basic problems involving current, voltage, and resistance, you'll know how to measure them.

Final Examination: Besides being an excellent learning activity, it provides a comprehensive review of the material you've covered. With a passing grade on the Exam, you are awarded an attractive certificate and 1.0 Continuing Education Unit.

EE-3100, Shpg. wt. 5 lbs. 29.95

MONEY-BACK GUARANTEE

If you are dissatisfied with any self-instruction course for any reason, return all course materials (except trainer) and your receipt for a full refund of purchase price (excluding trainer).

3 AC Electronics Course teaches principles of AC

\$59⁹⁵

- Gives a firm foundation in the principles of AC electronics
- Shows how various components react in AC circuits
- Demonstrates the application and use of AC components

Advance your knowledge with a comprehensive coverage of the principles of alternating current. Presented are AC theory, measurement and circuit behavior. Programmed reviews and experiments reinforce text material. Uses the ET-3100B Trainer. Recommend using multimeter and scope for experiments. Earn 1.5 CEUs after passing final exam with a 70% or higher score.

EE-3102A, Shpg. wt. 7 lbs. 59.95

EEA-3102A, Optional Audio-Visual Accessory Package, 2 lbs. 19.95

SAVER! Buy both the AC Course and the ET-3100B Trainer and save.

EES-3102B, EE-3102A and ET-3100B Kit Trainer, Shpg. wt. 19 lbs. 149.90

Spanish Language AC Electronics Course: Spanish translation of this course, less EB-6102-30 Parts for the experiments (see page 61).

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

5 Versatile ET-3100B Electronic Design Experimenter

Allows you to construct, modify and test circuits. Designed for hands-on use with experiments from the DC, AC, Semiconductor, Electronics Circuits, Electronic Communications, Electronics for Hobbyists and Test Equipment Courses.

Kit ET-3100B, Trainer, Shpg. wt. 6 lbs. 109.95

ETW-3100B, Assembled and tested, 6 lbs. 179.95

2 DC Electronics Course for essential principles

\$49⁹⁵

- Complete background coverage of basic DC electronics
- Positive reinforcement provided through experiments
- Optional audio-visual package enhances learning process

DC electronics coverage: An ideal point at which to begin your electronics training, the EE-3101A Course explains the necessary principles required for understanding DC electronics. Subjects covered include: current, voltage, resistance, Ohm's Law, magnetism, electrical measurements, DC circuits, inductance and capacitance. The use of a multimeter is also covered.

Self-instructional learning: Heathkit/Zenith's programmed learning allows you to work at your own pace. Review tests are provided so that you can check your progress while reinforcing what you learned. An optional audio/visual package contains two audio tapes and a 123-page illustration booklet with over 230 illustrations to enhance your learning experience. Also included are experiments to help you see concepts as they are put into use. These experiments use the ET-3100B Experimenter/Trainer and a multimeter, like the IM-2260 (p. 44). By taking the final exam and passing with a score of 70% or better, you can earn 2.0 Continuing Education Units and be awarded a handsome certificate.

EE-3101A, Shpg. wt. 6 lbs. 49.95

EEA-3101A, Optional Audio-Visual Accessory, 2 lbs. 19.95

SAVER! Save with the purchase of both the DC Electronics Course and the ET-3100B Kit Experimenter/Trainer.

EES-3101B, Includes EE-3101A and ET-3100B, Shpg. wt. 17 lbs. 144.90

4 Semiconductor Devices Course covers solid-state

\$59⁹⁵

- Examines semiconductor materials and their electrical properties to form a basic foundation of study
- Completely covers diodes, transistors, and integrated circuits and how they are used in circuits.

A self-instructed semiconductor education: Step-by-step you learn about the micro-sized world of diodes, transistors and integrated circuits. You examine zeners, bipolar transistors, FETs, thyristors, and UJTs. See how they are made, how they operate and how they are used. Programmed reviews check your progress while optional experiments illustrate and reinforce your understanding of important concepts with hands-on training.

Trainer and final exam: To perform the experiments in this Course you'll need the ET-3100B Trainer. A multimeter is also recommended to make measurements. Pass the optional final exam with a 70% or better score and earn 3.0 CEUs.

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

EEA-3103A, Optional Audio-Visual Accessory Package, 2 lbs. 19.95

SAVER! Save when you purchase both the EE-3103A Semiconductor Course and ET3100B Trainer at the same time.

EES-3103B, EE-3103A and ET-3100B Kit Trainer, Shpg. wt. 18 lbs. 149.90

Spanish Language Semiconductor Devices Course: Spanish translation of this course, less EB-6103-30 Parts Package for experiments (see page 61).

EE-3103S, Semiconductor Devices Course in Spanish, 6 lbs. 59.95

Fundamental Electronics Series

Begin your electronics education with this comprehensive set of basic courses: DC and AC Electronics and Semiconductor Devices on this page, and Electronics Circuits and Test Equipment on page 67. All use the ET-3100B Trainer in experiments that bring course material to life.



Accredited by
the NHSC



Licensed school -
State of Michigan

Approved by nationally recognized organizations

Heathkit/Zenith Continuing Education is accredited by the National Home Study Council and licensed as a school by the State of Michigan. These acknowledgements are your assurance that all Heathkit Self-Instruction Programs are quality self-study programs.



Earn College credit for many Heathkit/Zenith courses

The American Council on Education recommends that member colleges grant credit for several of our courses. Consult "The National Guide" for course recommendations. If you have taken and passed the examinations on pages 65 and 69 (EE-3101A, -3102A, -3103A, -3104A, -3105A, 3201A, -3401) or EC-1100 on page 83, you may be eligible for college credit.

If your college participates in this program, and you have taken the course and passed the final exam, order the Heathkit/Zenith College Credit Program Exam. To order, simply take the course number (for example EE-3101A) and change the prefix to ECC. In our example, you would specify ECC-3101 to order the exam.

ECC-3101, ECC-3102, ECC-3103, ECC-3104, ECC-3105, ECC-3201, ECC-3401, ECC-1100, 1 lb. each Each 25.00

Credit Card Orders Call TOLL-FREE: 800-253-0570. Alaska and Michigan Residents Call: 616-982-3411.

EDUCATION/65

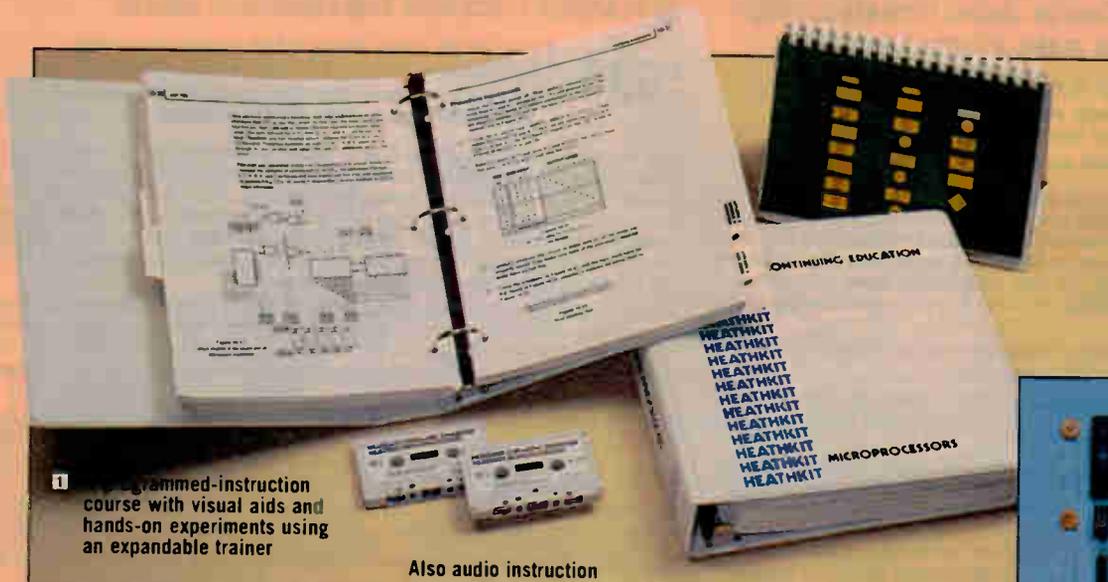
Heathkit



Educational
Systems

WINNER

International Award
Society for Technical
Communication



1 Programmed-instruction course with visual aids and hands-on experiments using an expandable trainer

Also audio instruction

Learn all about microprocessors, microcomputers, interfacing and programming



Includes all components for experiments

2 ET-3400A Microprocessor Trainer

512 bytes of random access memory (RAM)

MC6808 Central Processing Unit

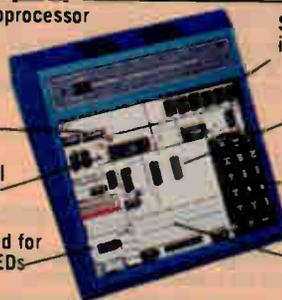
Connectors supplied for power, switches, LEDs

Six 7-segment LED information display

1K monitor ROM program

Hexadecimal keyboard

Solderless bread-boarding sockets



3 ETA-3400 Trainer Accessory

RS-232 connector for terminal

Shielded 120 VAC power supply

Heath/Pittman Tiny BASIC ROM

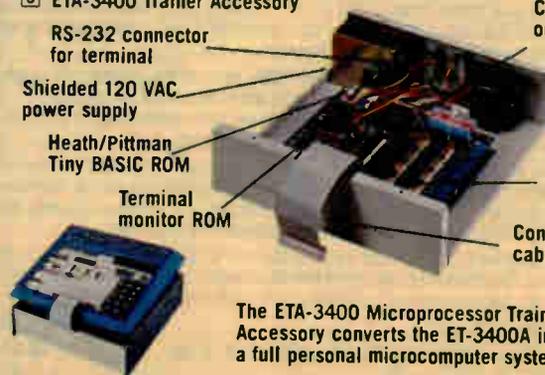
Terminal monitor ROM

Cassette input/output port

Add up to 4K user RAM

Connector cable

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



Learn all about 8-bit microprocessing with this Microprocessor Course and Trainer

1 Award-winning EE-3401 Microprocessor Course



- Covers all the basics of microprocessors, microcomputers and machine level programming
- Includes hands-on hardware, memory interfacing and programming experiments
- Learn about microprocessors faster and more efficiently through programmed instruction with audio and illustrative visual aids
- Includes reviews for self-check of progress
- Self-instruction course provides an economical and self-paced study-at-home method of training in 8-bit microcomputer technology

You'll start learning about microprocessors, microcomputers and computer programming as soon as you begin this complete microprocessor self-instruction course from Heathkit/Zenith Educational Systems. Microprocessor basics, computer arithmetic, programming and interfacing...everything you need to know to get a start in the exciting and fascinating world of computers is presented in an efficient and well-organized manner.

Preliminary training begins with a review of the basics of computer number systems and codes. Then 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 that you can put to use immediately.

Concepts are carefully integrated into ten learning units for a thorough training in microprocessors. Starting off is Unit 1 on number systems and codes. It covers decimal, binary, octal and hexadecimal numbering systems. It also includes conversions between number systems, binary codes and positional notation. Unit 2 on microcomputer basics teaches terms and convention, and introduces you to several programming instructions plus how programs are written and executed. In Unit 3 you learn about binary addition, subtraction, multiplication and division, and two's complement arithmetic. You'll also see how to use Boolean logic operators like NOT, AND, OR, Exclusive OR and INVERT.

Progressing at your own speed you are introduced to programming in Unit 4. Here you find out about branching, conditional branching, algorithms and programming instructions. In the next two units, 5 and 6, the 6800/6808 microprocessor is studied. Covered in detail is its architecture, instruction set, addressing modes, stack operations, subroutines, input/output operations and interrupts. Units 7 and 8 continue your education of the 6800/6808 microprocessor with interfacing and its fundamentals. Included is interfacing with random access memory (RAM), displays, switches, and the Peripheral Interface Adapter (PIA).

Programming experiments are the subject of Unit 9. In this unit, you'll write and experiment with a wide variety of increasingly complex programs. At the beginning you'll actually turn the ET-3400A Trainer (used in all the experiments) into a teaching machine that'll give you drills and practice in computer numbering systems. In later experiments, you'll use all instructions and addressing modes including subroutines, stack operations and more.

The final unit of this microprocessor Course involves interfacing experiments. Here you put into practice everything you've learned about programming and interfacing. Using the electronic components supplied with this Course you convert the ET-3400A Trainer 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 through 6 and Unit 9 assume no prior knowledge of electronics. Units 7, 8 and 10 assume knowledge equivalent to the Heathkit/Zenith EE-3201A Digital Techniques Course described on page 67.

Everything is included with this thorough course. Text is clearly written in the time-proven step-by-step self-instruction format. Colorful visual presentations and reinforcing audio cassette tapes of text material help you to understand concepts more completely. Nineteen hardware experiments provide a hands-on opportunity to apply microprocessor theory in practical applications. All components are included: RAMs, a Peripheral Interface Adapter integrated circuit, a digital to analog converter, op-amps and a variety of other microprocessor-oriented devices. All experiments are performed on the ET-3400A Microprocessor Trainer which was designed for this award-winning course.

Pass the optional final exam with a 70% or better and earn 8.0 Continuing Education Units. In addition, you'll receive a Certificate of Achievement.

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

2 ET-3400A Microprocessor Trainer doubles as a learning tool and a low-cost 8-bit computer

Functioning as a miniature digital computer, the ET-3400A Trainer is used with the experiments in the EE-3401 through EE-3405 microprocessor related courses. It features the popular 6808 microprocessor as the central processing unit (CPU) and a built-in 1K ROM monitor program for controlling the unit's operation. Also built in is 512 bytes of random access memory (RAM).

A 17-key hexadecimal keyboard enables you to access memory locations and to examine their contents on a six-digit hexadecimal 7-segment LED display. Through the keyboard you can step backward or forward to examine or alter other memory locations, examine or change any of the microprocessor's internal registers, set break points for program debugging, or reset the CPU. The flexible instruction set of the 6808 permits use of five addressing modes, two accumulators, an index register and a stack pointer.

A microprocessor breadboard, the ET-3400A features solderless sockets for rapid assembly of IC circuitry. All microprocessor address, control and data busses are buffered and terminated on the front panel for easy connection to experimental memory and interface circuits. There's also a 40-pin external connector for expanding memory and the Trainer's I/O capacity.

Other experimental features include: eight individual and independent buffered LEDs for monitoring logic states, eight SPST binary data switches for logic level switching, built-in +5 and ± 12 VDC power supply connections and a clock output. The ET-3400A requires 120 VAC at 50/60 Hz and uses 30 watts.

As a general-purpose training tool and a design aid, the ET-3400A offers flexibility and low cost in a microprocessor breadboard. Team it up with the ETA-3400 Microprocessor Trainer Accessory for increased personal microcomputing power.

Kit ET-3400A, Shpg. wt. 7 lbs. 259.95

ETW-3400A, Assembled and tested, Shpg. wt. 6 lbs. 359.95

3 ETA-3400 Microprocessor Trainer Accessory

Add this accessory to your ET-3400 or ET-3400A Microprocessor Trainer and turn it into an 8-bit cassette-based microcomputer system. It increases the computing power of the Trainer so that you can run more sophisticated programs. The Accessory's memory expands to 4K bytes of RAM with optional memory.

A serial interface with EIA and 20 mA loop formats enables hook-up to a smart video terminal or a 20 mA ASCII teletypewriter machine. The Accessory also provides a cassette interface which allows you to store programs on convenient cassette tapes. 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 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 learned in the EE-3401 Microprocessor Course.

The ETA-3400 easily connects to the ET-3400 or ET-3400A Trainer through a 40-pin connector supplied with the Accessory. Parts required to modify the trainer are included. Since modifying the trainer changes the clock frequency, experiments in the EE-3401 through EE-3405 Courses which use timing loops will be changed. It is recommended that all experiments in these courses be completed before adding the Accessory. An H-29 or Z-49 Video Terminal is required to use BASIC and monitor features of the ETA-3400 Microprocessor Accessory.

Kit ETA-3400, Shpg. wt. 8 lbs. 179.95

EWA-3400, Assembled and tested, Shpg. wt. 8 lbs. 279.95

ETA-3400-1, Optional 3K Chip Set, Shpg. wt. 1 lb. 54.95

SAVER! Order the EE-3401 Microprocessor Course and the ET-3400A Trainer together and save \$20.00. If purchased separately, they would total \$359.90.

ET-3400A, Shpg. wt. 25 lbs. **Only 339.90**

SAVER! Order the EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together and save \$40.00. If purchased separately, they would total \$594.80.

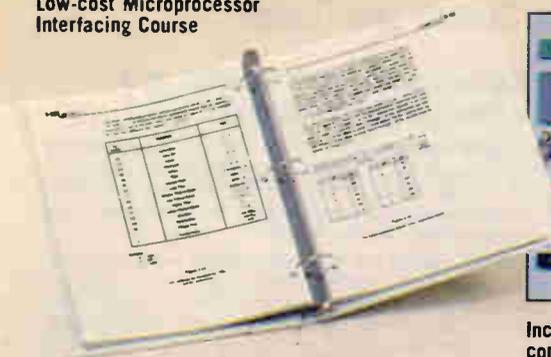
ET-3401A, Shpg. wt. 46 lbs. **Only 554.80**



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EDUCATION/69

**Low-cost Microprocessor
Interfacing Course**



Easy-to-understand



Includes all electronic
components necessary to
conduct the experiments



**A complete
8-bit microprocessor
training package**

Get everything you need to learn about 8-bit microprocessing with the EE-3401 Microprocessors Course, the EE-3402 Interfacing Course, and the ET-3400A Microprocessor Trainer on pages 69 and 71. Cover basic hardware and programming, then advance to interfacing techniques and higher order microprocessors. Put your knowledge to work with experiments and the ET-3400A.

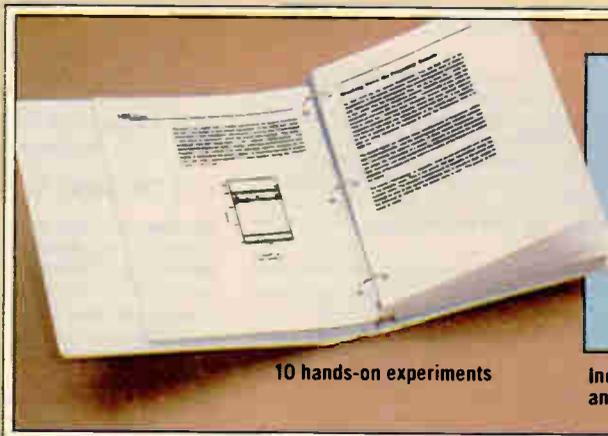
1 Microprocessor Interfacing Course

2
Voice Synthesis Course teaches digitized and phoneme voice techniques in an easy-to-follow format with experiments

\$69⁹⁵



Two popular voice synthesis methods are covered



10 hands-on experiments



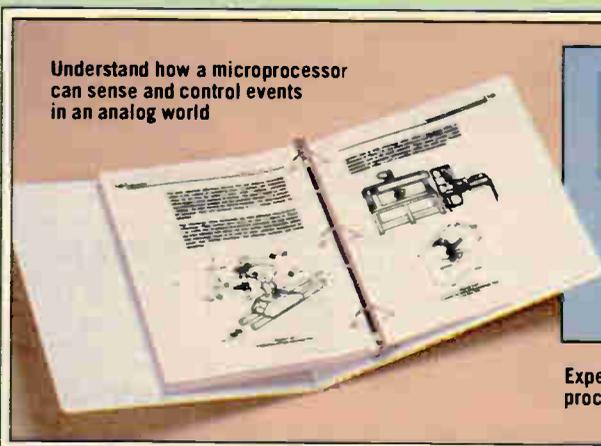
Includes two complete chip sets and components for experiments

3
Microprocessor Applications Course fills the knowledge void between the real analog world and the microprocessor

\$99⁹⁵



Microprocessor Applications Course teaches practical ways to use the microprocessor's power



Understand how a microprocessor can sense and control events in an analog world



Experiments show how microprocessor control is applied

1 Detailed Microprocessor Interfacing Course covers advanced microprocessor technology

\$99⁹⁵

- Begins where the EE-3401 Microprocessor Course ends with a logical continuation to your studies of the 6800 family of processors
- Provides in-depth coverage of the 6800 microprocessor family and introduces the powerful 6809 and 68000
- Add to your knowledge with detailed interfacing techniques

Continue your studies of microprocessors with this low-cost course from Heathkit/Zenith. The EE-3402 Microprocessor Interfacing Course is a natural starting point after completing the EE-3401 Microprocessor Course on page 65.

Designed for people who have a working knowledge of microprocessor fundamentals, this course will expand your knowledge about microprocessors, interfacing techniques and more advanced microprocessors. Programmed self-learning allows you to proceed at your own speed so that you master each important concept in a thorough step-by-step manner. You check your progress as you proceed through the materials with a unit examination included in each unit of the textbook.

Eleven in-depth units help you explore interesting microprocessor topics such as: the advanced Peripheral Interfacing Adapter (PIA), analog conversion, serial data communications, peripheral and memory devices and programmable timers. Microprocessors in the 6800 family are examined, with a thorough discussion of the powerful 6809 and 68000 advanced microprocessors.

Four detailed appendices at the end of the course contain useful listings, data sheets and a summary of the 6800 microprocessor family for you to use as a convenient reference guide.

Ten hands-on experiments in Unit 11 focus your attention on the concepts presented in the text. You'll experiment with display multiplexing, I/O control and handshaking using the PIA, analog-to-digital conversion and ADC interfacing, parallel-to-serial conversion using the 6850 ACIA, serial standard conversion, 2708 EPROM programming, ROM/EPROM interfacing, 6840 PTM input and output, and 6809 software operation.

A multitude of components are included with the course: These components include a 6821 PIA, a 6850 ACIA, a 2708 EPROM, a 6840 PTM, an analog-to-digital converter, an RS-232C Serial Interface Driver and Receiver, an optoisolator and other TTL chips. All experiments are performed on the ET-3400 or ET-3400A Microprocessor Trainer.

Before attempting this comprehensive course, we recommend that you complete the EE-3401 Microprocessors Course or already have an equivalent working knowledge of the material contained in that course.

By passing the optional course final examination with a score of 70% or better you can earn 7.0 Continuing Education Units. At this time you will also receive a personalized Certificate of Achievement from Heathkit/Zenith Educational Systems that is suitable for framing.

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

2 Voice Synthesis Course details digitized and phoneme voice synthesis techniques

\$69⁹⁵

- Covers the hardware and software used in voice synthesis
- Course includes complete chip sets needed for digitized and phoneme voice synthesis
- Practical course featuring a great deal of experimentation

Get on speaking terms with your computer by taking the EE-3403A Voice Synthesis Course. With this course, you can learn voice synthesis techniques. With the aid of the easy-to-follow format and hands-on experiments, you will have your ET-3400 or ET-3400A Microprocessor Trainer talking to you in no time at all.

The two most popular methods of voice synthesis are thoroughly covered, in both the text and experiments. You will explore digitized voice synthesis which uses a fixed vocabulary with human voice qualities and phoneme voice synthesis which allows you to reproduce any English word and almost all pronounceable sounds.

The five units of this clearly written course cover the human voice, with an overview of voice reproduction and voice patterns including: linear and logarithmic coding, delta modulation and variable slope delta modulation, speech synthesis by linear predictive coding, the phoneme speech synthesizer (PSS), and advanced programming for the phoneme speech synthesizer.

By completing the hands-on experiments, you learn about the basic hardware and software necessary for breadboarding (on the ET-3400 or ET-3400A Trainer) computer-synthesized speech. You also learn about the programming and interfacing needed for both digitized and phoneme voice synthesis. In addition, this

Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.

course prepares you to write machine code programs tailored for the ET-3400 and ET-3400A Microprocessor Trainer. When you finish the experiments in this course you'll know how to make your Microprocessor Trainer talk.

Complete chip sets for both digitized and phoneme voice synthesis are included with this course. The digitized set contains both a ROM chip and a synthesizer chip, featuring a vocabulary totaling more than 200 words. The phoneme synthesizer is self-contained on a single integrated circuit which can produce an unlimited vocabulary.

To better prepare yourself for the material in the Voice Synthesis Course, the EE-3401 Microprocessors Course on p. 69, or equivalent knowledge is needed.

Take the optional final examination and earn 3.0 Continuing Education Units and receive a Certificate of Achievement after passing with a 70% or better score.

EE-3403A, Shpg. wt. 4 lbs. 69.95

3 Microprocessor Applications Course links the real analog world and the digital world of the microprocessor

\$99⁹⁵

- Put previous microprocessor knowledge to work
- Learn how microprocessors can sense and control events
- See practical demonstrations of microprocessor use
- Earn 8.0 CEU's by scoring 70% or more on the optional final exam

The possible applications of microprocessors are almost endless and only limited by the imagination. Dedicated computer intelligence in such everyday items as automobiles, appliances and toys is becoming commonplace — yet it is only a beginning. Because of the microprocessor, just about any electromechanical device is a candidate for computer control. The next few years will see increasingly widespread application of this technology. The Microprocessor Applications Course shows you practical ways to adapt and utilize the power of the microprocessor.

This course will help you bridge the gap between the daily analog world and the digital world of the microprocessor. A complete discussion of analog circuits starts you on your way to an understanding of how a microprocessor can sense and control events in an analog world. You will learn about digital-to-analog and analog-to-digital conversion techniques along with analog signal conditioning.

A microprocessor must first sense or receive information before it can carry out an assigned task. To acquaint you with this side of a microprocessor, the EE-3405 Course covers, in depth, sensors and transducers, and how they interface a microprocessor to real-world events. Completely covered are temperature, light, position, motion, force, pressure, flow, and level sensors and transducers of various types and styles.

Control devices and stepper motors are also described. These include transistor arrays, SCR's, TRIAC's, relays and motors. See how to interface and control stepper motors, very popular in robotics, with a microprocessor. Learn how to control motor rotation, both speed and amount.

Phase-locked loops are used more and more frequently in microprocessor applications. This course shows how to interface and control phase-locked loops with a microprocessor.

Concluding the course is a look at present and future microprocessor applications. Written to stimulate your imagination, it examines numerous examples of actual and possible consumer, industrial and business applications of the microprocessor.

Learn at your own comfortable speed. You decide how quickly or slowly you wish to progress through each of eight comprehensive units. Course objectives guide you to the important concepts and show you what you should be learning from your studies. You can measure your newly acquired knowledge with unit tests, then if you feel that you need to spend more time with a subject you can go back and review the unit again.

Experiments illustrate the concepts you have just studied so that you can see them at work. This reinforces learning and gives you important experience with microprocessors and components.

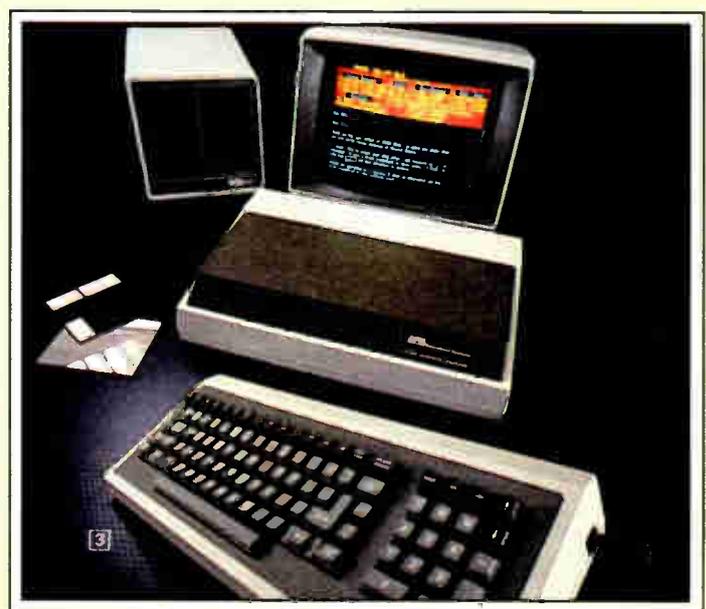
To perform the 13 experiments in the Microprocessor Applications Course you will need the ET-3400 or the ET-3400A Microprocessor Trainer featured on page 65. You will also need a VOM and an oscilloscope. The course includes a parts package with all the ICs, resistors, motors, sensors and other components which you will need to complete the experiments.

Before attempting the Microprocessor Applications Course you should successfully complete the EE-3401 Microprocessor Course on page 69 or have an equivalent knowledge of microprocessors.

Earn 8.0 Continuing Education Units by taking the optional final examination and passing it with a score of 70% or higher.

EE-3405, Shpg. wt. 10 lbs. 99.95

EDUCATION/71



Master 16-bit microprocessing with the Advanced Microprocessor Course and the ET-100

1 In-depth Advanced Microprocessor Course

\$99⁹⁵

- Covers 16-bit computer technology and the 8088 microprocessor used in the H/Z-100 and other computers
- Learn to program and interface powerful and incredibly fast 16-bit microprocessors as used in the H/Z-100
- Reinforce your studies with experiments designed to illustrate concepts learned in each unit
- Perform all experiments on the ET-100 Trainer, a low-cost 16-bit computer that expands into a disk-based system

Complete training system: Heathkit/Zenith introduces a truly remarkable, dual learning package. The first half consists of an Advanced Microprocessors Course...EE-8088. A comprehensive training course, it provides an in-depth study of 16-bit microprocessors and covers terms, architecture, and programming. In addition, thorough coverage is given to interfacing the microprocessor to its support devices and to the outside world. The second half is a one-of-a-kind 16-bit training computer, the ET-100 (see below). Available separately, the ET-100 supports the EE-8088 as a working computer-trainer. When the course is completed, the ET-100 can be used as a valuable learning tool, a low cost engineering proto-typing fixture, or a very powerful computer.

Already being used to control many personal and small-business computers, 16-bit microprocessors dominate the marketplace. To help you keep up with this technology, the Advanced Microprocessors Course eases you into the world of 16-bit computing. It begins by acquainting you with microprocessor terms and then introduces assembly language. Progressing at your own speed, you learn about program writing, addressing modes, memory, logic and control lines, dynamic and static RAM, and input/output interfacing. An Appendix ends the Course with additional educational information like reviews of number systems and computer math, program code, and hardware and data sheets.

Hands-on learning: To bring your study material to life, the EE-8088 provides more than three hundred pages of experiments. These include experiments in software programming and hardware interfacing. Because it is both a trainer and a computer, both types of experiments can be carried out on the ET-100 Trainer.

2 The world's lowest priced 16-bit computer is our most advanced computer trainer...ET-100

- Teaches 16-bit microprocessing with EE-8088 Course experiments
- Features the H/Z-100's super-fast 16-bit 8088 microprocessor
- Has buffered access to all 8088 address, data and control lines
- Permits solderless computer circuit building on its large breadboard
- Comes with 16 kilobytes of RAM that can be expanded to 64 kilobytes
- Has a powerful assembler, screen editor and debugger in 32K of ROM

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

16-bit computer: The ET-100 Learning Computer uses the same sophisticated 8088 microprocessor that's found in our H/Z-100 Desktop Computer. A powerful editor, assembler and debugger are permanently stored in ROM for your program writing and editing convenience. The ET-100 has its own cassette port for loading and storing programs and data. And, its RS-232 Input/Output port can be used with a printer or other peripherals. A detached 95-key keyboard includes 16 function keys and a numeric keypad. It generates a full ASCII character set plus 33 graphic characters. The ET-100's video output can be displayed in twenty-four 80-character lines on a monitor, like the HVM-122A monochrome monitor (p. 95). Or, display twenty 40-character lines on either channel 3 or 4 of a television using a TV modulator listed at the right.

Kit ET-100, Basic Learning Computer, Shpg. wt. 33 lbs. 799.95
ETW-100, Assembled and tested, Shpg. wt. 33 lbs. 1095.00

Together, the EE-8088 Advanced Microprocessor Course and ET-100 Trainer provides you with the knowledge and experience to master 16-bit microprocessors and computers.

Course materials: An easy-to-read self-instruction program, the EE-8088 consists of 1200 pages of text divided into ten units. Units one through eight cover the subject material and units nine and ten contain experiments to be done following each completed unit. Included with the course are all the parts necessary for performing every end-of-unit experiment.

Course Contents: *Unit 1* examines microprocessors and introduces the 8088 microprocessor with instruction addressing modes. *Unit 2* introduces machine and assembly language programming. *Unit 3* shows conditional/unconditional loops and loop addressing plus subroutines. *Unit 4* details the instruction set of the 8088 along with a summary of its addressing modes. *Unit 5* discusses memory segmentation. *Unit 6* explains input/output operations, internal/external interrupts, and string operations. *Unit 7* describes the various MPU bus and control lines, typical address and data bus networks, and data handling techniques. *Unit 8* examines the memory system in detail and goes into the various forms of input/output interfacing. *Units 9 and 10* contain programming and interfacing experiments.

A thorough examination ends each unit and tests your understanding of the material. After completing the course, you can take the optional "Final Examination." Besides testing your knowledge, the final exam provides an excellent review of the material you've covered. After successfully passing the exam with a 70% or better score, you'll receive a Certificate of Achievement and 8 CEUs.

Prerequisites: A better understanding of the material in the EE-8088 Course is achieved with a prior knowledge of digital electronics. This can be obtained through the Heath/Zenith Educational Systems "Digital Techniques" course (EE-3201A, p. 67) or a similar program. You should also be familiar with binary and hexadecimal numbering systems, and computer math.

EE-8088, Advanced Microprocessor Course, Shpg. wt. 10 lbs. 99.95
SAVER! Purchase the Advanced Microprocessors Course and the ET-100 Computer/Trainer and save \$50.00 over the cost of buying them separately.

EE-8088, Shpg. wt. 49 lbs. 849.90

3 ETA-100A Learning Computer Accessory turns the ET-100 into a disk-based 16-bit computer system

Save
\$300
\$999⁹⁵

- Increases user RAM to 128K
- Provides two serial and one parallel port
- Includes one 320K 48 TPI disk drive
- Provides bit-mapped video graphics
- Includes MS-DOS/Z-DOS and Z-BASIC

Powerful ETA-100A Accessory package: Turns your ET-100 Trainer into a powerful 16-bit disk-based computer that helps you with a variety of applications, such as data processing, telecommunications, and financial analysis. This upgrade package consists of two circuit boards, a boot ROM, and an external disk drive unit. A dust cover is also included so that a monitor such as the HVM-122A monochrome monitor (p. 95) can be placed on top of the Computer.

H/Z-100 features: After installing the ETA-100A package, your Computer will gain many features found in our most powerful desktop computer, the H/Z-100. Features like, 128K bytes of RAM that can be expanded to 192K bytes with the addition of accessory Z-205-1 (p. 87). A programmable timer is included that's independent of the system clock. Two full RS-232C serial ports permit communication with printers, modems and voice synthesizers.

Further features: With the addition of the floppy disk controller and 48 TPI disk drive, the ETA-100A can store up to 320K bytes of data. And by adding a second 48 TPI drive with accessory Z-207-3, storage can be doubled to 640K bytes. The ETA-100A uses bit-mapped graphics where individualized pixel-dots are controlled for a 640 x 225 pixel high-resolution graphics display. For an eight-color display, add two Z-219-1 video RAM chips sets found on page 87.

Kit ETA-100A, Expansion Accessory, 69 lbs. Was \$1299.95 Now 999.95
ETS-100, Kit ET-100 and ETA-100A, 102 lbs. 1999.90
EWA-100A, Assembled Expansion Accessory, Shpg. wt. 70 lbs. 1650.00
EWS-100-A, Assembled ETS-100, 96 lbs. 2750.00
ETA-100-1, Extra Removable Breadboard, Shpg. wt. 1 lb. 29.95
ETA-100-2, Channel 4 Modulator, use with TVs, Shpg. wt. 1 lb. 39.95
ETA-100-3, Channel 3 Modulator, use with TVs, Shpg. wt. 1 lb. 39.95

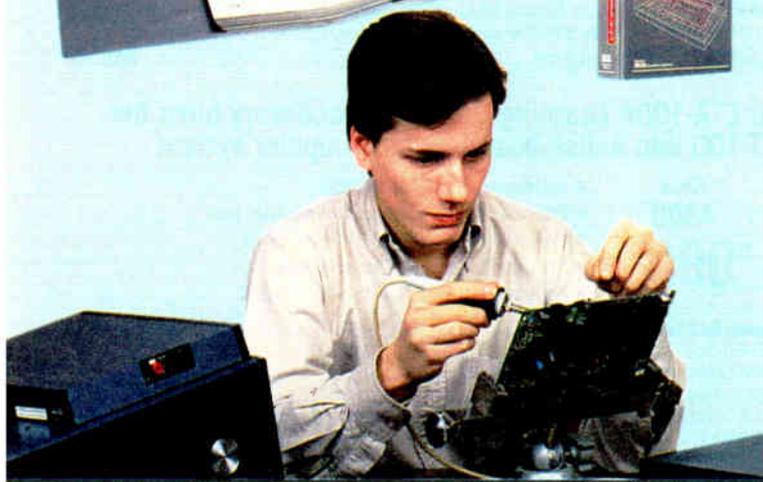
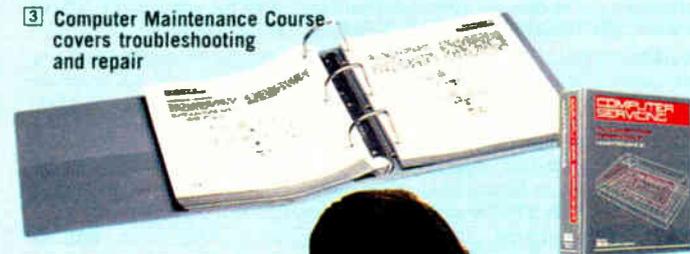
- 1 Computer Fundamentals Course introduces modern computer technology



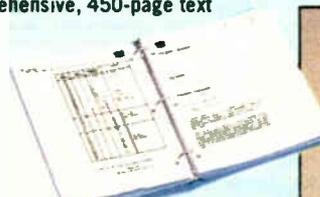
- 2 Computer Peripherals Course examines a variety of peripheral devices



- 3 Computer Maintenance Course covers troubleshooting and repair



Comprehensive, 450-page text



Glossary of terms included in Appendix



All components for experiments included except 9V battery



- 4 Fiber Optics Course explores lightwave technology

Heathkit/Zenith Educational Systems offers a

The new Computer Fundamentals Series covers the entire microcomputer system including microprocessors, computer architecture, individual sections and the operation of a computer, programming, applications of computers, peripherals, and all about maintaining computers with how to troubleshoot and repair them. The ET-100 Trainer is used in all courses to provide invaluable training experience.

- 1 Computer Fundamentals Course introduces computers, hardware, software, and their applications

\$99⁹⁵

- Get a complete overview of a computer system with a detailed look at the inside of a microcomputer
- Learn the meaning of frequently used computer terms
- Perform hardware and software experiments on the expandable ET-100 Computer Trainer

The first in a new series from Heath/Zenith Educational Systems, the Computer Fundamentals Course introduces you to the modern computer. While the concepts discussed in this eight-unit course can apply to computer systems of all sizes, the emphasis is placed on the microcomputer...the machine that has revolutionized the way we do things at the office, at school and at home.

This is a thorough step-by-step introduction to the world of microcomputers that begins with computer basics, applications and systems. You'll learn about power supply sources for computers and the importance of keeping them noise free. You'll become acquainted with 16- and 8-bit microprocessors, bussing and interfacing the central processing unit, different types of semiconductor memories plus bubble and electromagnetic memories, and input and output interfacing. You'll also learn about programming using high- and low-level languages, assemblers, editors, compilers and interpreters. In addition, you'll learn the meaning of many frequently used terms associated with computers, equipment that can be connected to a computer and the software used in them.

Computer Fundamentals is a self-paced learning program written in easy-to-understand terms. Review exercises and unit examinations help you to track your progress and point out areas where extra study is needed. Pass the optional final examination with a 70% or higher score and earn 2.0 Continuing Education Units, and receive a personalized Certificate of Achievement.

A background in basic electronics and digital theory is needed to better understand the concepts presented. This knowledge is available in EE-3101A DC Electronics, EE-3102A AC Electronics, EE-3103A Semiconductor Devices, EE-3104A Electronic Circuits and EE-3201A Digital Techniques courses.

To perform the hardware and software experiments at the end of each unit you'll need the ET-100 Microcomputer Trainer, a cassette recorder, a video monitor (or television receiver and RF modulator), a single-trace oscilloscope and a multimeter. A dot matrix printer is also helpful.

EC-2001, Shpg. wt. 6 lbs. 99.95

- 2 New Computer Peripherals Course explains the purpose, capabilities, operation, and interfacing of computers to all types of peripherals

\$99⁹⁵

- Learn about important peripheral devices such as printers, displays, disk drives, modems, and many others
- Course covers both the internal and external operation of peripheral devices
- Perform experiments on the ET-100 Trainer, a 16-bit computer which is expandable to a powerful disk-based system

After you have mastered Computer Fundamentals you are ready for the Computer Peripherals Course. The second course in the Computer Servicing Series, the Peripherals Course builds on what you learned in Computer Fundamentals to introduce you to a multitude of peripheral devices.

Explore every aspect of peripheral devices including the purpose, capabilities and fundamental operation of each one and how they are interfaced to a mini or microcomputer. In addition, various input/output (I/O) standards used within and between computers and their peripherals are defined. Control and data flow of electronic and electro-mechanical devices are also discussed.

Seven units, including one on each category of peripheral devices provide a complete and well-organized tour of this important part of computer servicing. You'll start with an explanation of communication standards in serial, EIA and parallel data communications, and will also learn about non-standard interfaces. Next you move on to chapters detailing the ins and outs of input devices, visual displays, printers and plotters, and memory peripherals. Data transmission and peripherals in computer control systems are also thoroughly discussed.

complete education in microcomputer systems and a thorough training in fiber optics

Interesting experiments provide real experience with the topics you read about. To perform the experiments you will need the ET-100 Microcomputer Trainer and its upgrade accessory (shown on page 73), a cassette recorder and a video display. You will also need a volt-ohm meter, and an oscilloscope. All other components are included with the course.

Proceed through the course at your own pace. All material is presented in easy-to-digest segments that enable you to understand concepts in a step-by-step learning method. Self-test reviews throughout the text let you check your progress, too, for complete understanding. If test results indicate certain information is unclear, you can review before continuing on with the course. Nothing is assumed as all information is complete, clear, and well illustrated.

Pass the optional final examination with a 70% or higher score and earn 2.0 Continuing Education Units, and receive a personalized Certificate of Achievement from Heathkit/Zenith Educational Systems.

To better understand the material and concepts which are presented in the Heathkit/Zenith Computer Peripherals Course you should complete EC-2001 Computer Fundamentals Course on the opposite page.

EC-2002, Shpg. wt. 10 lbs. 99.95

3 New Computer Maintenance Course teaches you how to troubleshoot, repair and maintain computers

\$69⁹⁵

- Learn valuable professional troubleshooting techniques for computer repair in addition to servicing basics
- Hands-on experiments let you learn to approach computer maintenance using problem solving methods
- 21 Units provide you with detailed coverage on computer servicing and repair

Prepare for a career in one of the fastest growing job markets – computer repair and servicing. As computer systems are used in more homes, schools and offices, the need for computer service technicians also grows. You can be part of this wave of opportunity with training in computer servicing and repair. You don't have to be a programmer or system designer to maintain and repair computers. You just need to know the ins and outs of microprocessors, digital troubleshooting and other skills such as those you will learn in this course. The Computer Maintenance Course prepares you for the future with an overall approach to learning how to troubleshoot and maintain computer systems. This course is designed for those with a limited background in microprocessor systems and digital troubleshooting.

The third course in the Computer Servicing Series, Computer Maintenance starts with a review of TTL and MOS devices and then moves on to standard digital troubleshooting techniques. This includes determining the electrical characteristics of integrated circuit input and output pins, using a logic probe and logic pulser probe. You quickly get to apply what you have learned on a digital troubleshooting problem in Unit III.

Next, you are introduced to a typical microprocessor based computer system and will learn how each section of the system hardware interacts with the other sections. From here you learn how to troubleshoot each section and how to approach a malfunctioning system. Topics include: how to find the defective block of the system and how to apply classical troubleshooting techniques such as logic state analysis and signature analysis.

You even learn some of the new troubleshooting techniques in this up-to-date course. Explore new techniques such as static stimulus testing and use of a mobile I/O port. Finally, the course discusses system software diagnostics including how to write system diagnostics for a particular system.

Computer Maintenance leads you into the problem solving world of troubleshooting and maintaining computer systems with a simple step-by-step approach. Each unit builds on the preceding one to achieve optimum comprehension and understanding of each topic. You work at your own pace so that you can take time to master each concept before you go on to the next one. Review exercises and unit examinations help you measure your progress and show you areas in which you need extra work. By passing an optional final examination with a score of 70% or higher you can earn 3.0 Continuing Education Credits and receive a personalized Certificate of Achievement.

Experiments provide you with practical experience in course concepts. To properly conduct these experiments you will need the ET-100 Microcomputer Trainer, an oscilloscope and a multimeter.

To better understand the material presented in Computer Maintenance you should complete DC Electronics, AC Electronics, Digital Techniques, and Computer Servicing – Fundamentals and Peripherals courses before beginning the Computer Maintenance Course.

EC-2003, Shpg. wt. 9 lbs. 69.95



Use your Visa or MasterCard credit cards to purchase your kit!

4 Learn all about state-of-the-art fiber optics in this exciting Heathkit/Zenith Course

For only
\$99⁹⁵
up-to-date
technology

- Learn how a single fiber optic cable can carry multiple phone calls as well as TV channels
- Comprehensive course covers theory, components and the fiber optic system in detailed, illustrated text
- Comes with all the components you need and instructions for developing a two-way fiber optic link
- Self-instructional course enables self-paced learning with experiments and reviews for reinforcing important concepts
- Earn 3.0 Continuing Education Units and a Certificate of Achievement – proof of your new technical knowledge!

Managers, engineers, students and hobbyists will benefit from this broad, in-depth introduction to the fascinating and challenging science of lightwave technology. Fiber optics is an important, future-shaping breakthrough in rapid signal transmission with cost/performance benefits that are revolutionizing the world of data communications. Even now fiber optics is used as a transmission medium for multiple and simultaneous telephone and television signals. Prepare yourself for the future with this innovative overview of fiber optics from Heathkit/Zenith.

The five-unit Fiber Optics Course covers the fundamentals of fiber optics. Unit 1, Optical Energy, deals with the nature of light. Just as electronics students need a basic understanding of atomic structure and the nature of electrons, so does the student of fiber optics need an understanding of optical radiation. Once this is established, you move on to Unit 2 and optical cables.

Unit 2, Optical Fibers, describes the principles of the transmission medium. You will learn the various fiber types and their construction and how they propagate light. And you will become aware of the importance of such characteristics as numerical aperture, source area and radiation pattern in the energy launch, and loss factors.

Units 3 and 4 of the textbook deal with the active devices used to generate and detect the light used in fiber optic transmission. As you progress through the study of fiber optic light sources, you will learn much about light-emitting diodes. This unit covers their physical construction, theoretical operation, biasing characteristics and several types of fiber optic LED design considerations. A detailed discussion of laser emissions and principles associated with the use of injection laser diodes in fiber optic circuits concludes the fourth unit.

Finally, in Unit 5, Fiber Optic Systems, you will tie all of the component parts together into an operational fiber optic link. You will closely examine the requirements of the various types of links and learn which components best fulfill certain requirements. You'll examine different systems that are in use today and see how they perform as a whole. You'll also see how to design a system with a required bandwidth and with a minimum loss of power.

Four optional hands-on experiments are also included in the course to enhance your understanding of the text. You will construct a modulated source driver circuit, a fiber optic receiver circuit, and fabricate actual fiber optic links. These experiments will allow you to gain valuable design experience, and let you observe the parameters of a fiber optic link directly.

To perform the experiments you will need either a Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer or the ET-3200B Digital Techniques Trainer, an oscilloscope, a multimeter and common hand tools (not included). All other necessary parts are furnished with the course.

In addition to the text, two supplemental appendices support the learning program. A listing of standard resistor values will come in handy when you are building actual circuits from mathematically-derived schematics. Typical data sheets for several fiber optic devices will help in evaluating your newly acquired knowledge. Includes 25-page glossary of terms.

Work at your own pace for optimum learning. Course objectives point out important concepts and provide you with learning goals. Measure your progress with unit tests and use these to decide when to move on to the next unit.

Earn 3.0 Continuing Education Units and a Certificate of Achievement by passing the enclosed optional final exam with a score of 70% or better.

Prerequisites: It is recommended that a student pass the Heathkit/Zenith EE-3101 DC Electronics and EE-3102 AC Electronics courses (or have equivalent knowledge) before taking the Fiber Optics Course. EE-3201A Digital Techniques is also recommended, but not required.

Money-back guarantee: If you are not completely satisfied with the Fiber Optics Course return the course materials to Heathkit/Zenith for a refund of the purchase price (not applicable to trainer).

EE-4201, Shpg. wt. 6 lbs. 99.95



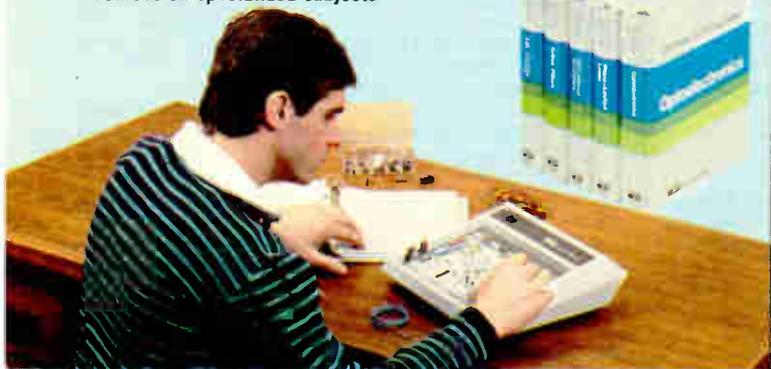
1 Laser Technology Course



2 DHHS Class II Laser Trainer with modulator inputs



3 Advanced Electronic Series features five courses on specialized subjects



1 Explore new frontiers with the first training system to teach exciting laser technology

\$99⁹⁵

- Learn the terms associated with laser technology and become acquainted with the characteristics of lasers
- Learn the basic functions of the laser and its many applications to different areas plus laser safety
- Perform fifteen fascinating "hands-on" experiments on a safe, low-power laser trainer

The **Laser Technology Course** provides clear, thorough instruction on the basics of lasers. Covered are optical terms and concepts, characteristics of laser light, laser design and construction, types, components, applications and safety.

Using the new **Laser Trainer** and accompanying receiving unit below, you perform 15 exciting experiments demonstrating the principles and use of lasers. Transmit your voice over a laser beam and listen to the reproduced speech over the audio speaker in the receiving unit and measure beam intensity with the power meter.

After passing the optional final exam with a 70% or higher score earn yourself 2.0 Continuing Education Units and receive a Certificate of Achievement.

EE-110, Shpg. wt. 7 lbs. **99.95**

SAVER! Purchase both the Laser Technology Course and the ETS-4200 Laser Trainer with Receiver and save \$30.00 over the cost of separate purchases.

EES-110, Shpg. wt. 32 lbs. **349.90**

2 Trainer enables first-hand look at laser technology

\$279⁹⁵

- Commercial-grade low-power Class II Helium Neon Laser
- Includes Receiver Unit with Speaker and power meter

Laser Trainer has built-in tripod mount, aperture shutter, an input jack for a crystal microphone, and an auxiliary jack for any signal generator waveform up to 1 volt P-P to modulate (15%) the laser beam. Operates on 120 VAC, 60 Hz. Output power from 0.5 mW to 0.9 mW. Receiver requires two 9-volt batteries (not included).

Kit ETS-4200, Trainer and Receiver, Shpg. wt. 12 lbs. **279.95**

EWS-4200, Assembled and tested Trainer and kit Receiver, 12 lbs. **395.00**



4
ET-3300B Trainer
designed for
Advanced courses



5



6

SAVE on Electronics Courses and ET-3300B Trainer

Save \$75.00 by ordering the entire Advanced Electronics Series plus the versatile ET-3300B Breadboard Trainer in one complete package.

Take advantage of this valuable cost-cutting discount offer on all five of the Advanced Electronics Series Courses plus the versatile ET-3300B Breadboard Trainer designed for use in all experiments in these courses. Get the EE-105 Optoelectronics Course, the EE-102 Active Filters Course, the EE-104 Phase-Locked Loops Course, the EE-101 Operational Amplifiers Course, the EE-103 I.C. Timers Course and the ET-3300B Trainer for \$75.00 off the total cost of \$374.70. That's like getting the Optoelectronics Course for free.

Discover light wave technology and optoelectronic devices. Learn to design active filters. Grasp the principles of phase-locked loops. Become familiar with op-amp parameters and circuits. Explore the workings and uses of integrated circuit timers. And do it all using the ET-3300B Trainer specifically designed to help you on your way.

SAVER! EES-1015A, Shpg. wt. 34 lbs. **299.70**

An outstanding Soldering Course for all kitbuilders

The **EI-3133 Soldering Course** is a fun and easy way to perfect your soldering skills whether you're a novice or experienced kitbuilder. The Course teaches professional soldering facts and techniques in detail using the proven method of hands-on learning.

Topics covered include: the chemistry of soldering, proper soldering iron size, cleaning and tinning, the characteristics of good solder connections, solder bridges, visual troubleshooting for repair, and the best methods of desoldering.

Six soldering experiments are included which require you to use a soldering iron and several small hand tools. Circuit board, components and solder are included. When completed you'll have a two-transistor light oscillator.

EI-3133, Shpg. wt. 3 lbs. **19.95**



3 Advanced Electronics Series courses specialize in specific areas of electronics

Whether you're an electronics professional, part-time student, or inquisitive hobbyist, the Heathkit/Zenith Advanced Electronics Series provides you with the latest state-of-the-art information on specific subjects. All Courses use the ET-3300B Trainer. Each Course is worth 3.0 Continuing Education Units.

Optoelectronics Course covers latest devices

- The latest on light-interactive devices in a rapidly changing field

Course focuses on light sources and the different types of optoelectronic displays available, including how to drive and multiplex them. It also provides an in-depth look at light-sensitive components such as: photodiodes, phototransistors, solar cells, optocouplers, lasers and fiber optics. Experiments require the use of a multimeter and an oscilloscope. A previous knowledge of the EE-3101A and EE-3201A Courses is needed.

EE-105, Shpg. wt. 5 lbs.	64.95
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs.	109.95
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs.	189.95

Active Filters Course shows how filters work

- Learn about low-pass, high-pass, bandpass, and notch filters

Gain a complete understanding of this critical element of circuit design. Acquire a proficiency in: designing active filters with op-amps; plotting and predicting frequency responses; breadboarding first-order low- and high-pass active filters; second- and higher-order filters; plus bandpass and state-variable filters. The ET-3300B Trainer, an oscilloscope and a function generator are needed to perform the experiments in this Filters Course.

EE-102, Shpg. wt. 5 lbs.	44.95
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs.	109.95
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs.	189.95

Learn the principles of Phase-Locked Loops

- Error-correcting devices and how they tightly control circuits

See how these state-of-the-art devices work and how they operate. Topics cover: PLL principles, phase detector, voltage controlled oscillator, loop filter, digital frequency synthesizers, and monolithic PLL ICs and their applications. A DC voltmeter, a dual-trace oscilloscope and an audio generator are needed to perform the experiments included with this Course. A previous knowledge obtained in the EE-3101A through EE-3104A and EE-3201A Courses is desirable.

EE-104, Shpg. wt. 5 lbs.	54.95
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs.	109.95
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs.	189.95

Learn about the ideal amplifier in Op-Amps Course

- The design and operation of basic operational amplifier circuits

A comprehensive text details common op-amp parameters, basic op-amp linear circuits, integrator and differential circuits, and the performance of op-amp constant current sources. Also discussed are current/voltage and voltage/current converters, and more. Experiments use a multimeter, an oscilloscope, and a function generator. Prerequisites include courses EE-3101A through EE-3104A.

EE-101, Shpg. wt. 5 lbs.	49.95
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs.	109.95
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs.	189.95

IC Timers Course covers the many uses of timers

- Satisfy timing circuit needs with precision, simplicity and low cost

See how IC timers work, what they do and where they are used in this Advanced Electronics Course. Learn the applications of common IC timers to: logic functions, output drive and time delay circuits, wide-range pulse generators, voltage/frequency converters, freewheeling and sine/square wave oscillators, universal timers, speed alarms and precise clock sources. To get the most from the experiments in the Course, a multimeter and an oscilloscope are recommended. Knowledge obtained from the EE-3201A Course is needed.

EE-103, Shpg. wt. 5 lbs.	49.95
Kit ET-3300B, Trainer, Shpg. wt. 6 lbs.	109.95
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs.	189.95



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4 Versatile ET-3300B Breadboard Trainer makes doing experiments a lot easier and a lot more fun

\$109.95
KIT

- Redesigned to match our fully updated electronics courses
- Features convenient breadboards and multiple power supplies for large, complex circuits
- Short circuit protected by fuse and current limiting

Designed to make your experimental circuit assembly more fun, the ET-3300B Trainer provides several circuit building conveniences. Featured are seven solderless circuit boards, room enough for your larger and more complex circuits. These sockets are designed to accept up to #20 (0.032") solid wire and most common component leads for fast circuit assembly and easy circuit modifications. Accommodates any size dual, in-line integrated circuit package.

Three self-contained power supplies add the convenience of optional voltages to power breadboarded experiments. Save set-up time and eliminate long and tangly power hook-up wires. Output voltages available at output sockets are +5 volts DC ($\pm 4\%$) at 1.5 amp, 0 to +12 volts DC at 100 mA, and -12 volts DC at 100 mA. All the supplies are short-circuit protected by fixed current limiting.

A multi-purpose Trainer, the ET-3300B is specifically designed for use with the specialized experiments contained in all the courses on this page. If you've ever tack-soldered an experimental circuit together just to see what happens, you'll really enjoy the convenience of this plug-in breadboard Trainer. No mess. No parts confusion. No tangled wires. And no connections that come unsoldered.

The ET-3300B Trainer is a light and portable experimental tool that can be assembled in a fast two evenings. It is a UL listed device that requires 120 VAC and 60 Hz power. It measures $3\frac{1}{2}$ " H x 12" W x 12" D.

Kit ET-3300B, Shpg. wt. 6 lbs.	109.95
ETW-3300B, Assembled Trainer, Shpg. wt. 6 lbs.	189.95

SAVER! EES-1015A. Purchase all five courses in the Advanced Electronics Series (EE-101, EE-102, EE-103, EE-104 and EE-105) and the ET-3300B Trainer at the same time and save \$75.00, Shpg. wt. 34 lbs. **299.70**

5 Linear Circuits Course covers basic circuits

- Cover dozens of basic circuits and their many modifications
- Includes components for building more than 30 experimental circuits
- Build up each circuit as you study each component's importance

Learn from concise descriptions of basic circuits and their operation. Progress through a series of circuits where each is used in schematic and then modified showing how useful parameters can be altered. Construct over 30 linear circuits including various amplifiers, astable and monostable multivibrators, pulse position and width modulators, active filters and many more applications. Expand your skills faster and make learning more meaningful with this easy-to-understand integration of text, diagrams and experiments.

To observe circuit operation, a voltmeter and an oscilloscope are required. The ET-3300B Trainer provides an orderly working area for your experiments. DC and AC Electronics and Semiconductor Devices Courses' knowledge is needed.

Earn 4.0 Continuing Education Units and receive a Certificate of Achievement by passing the optional final exam with a 70% or better score.

EH-701, Shpg. wt. 2 lbs.	54.95
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6 Advanced digital logic TTL/CMOS Circuits Course

- Examines TTL and CMOS circuits in detail while you learn by doing
- Includes electronic components for assembling over 50 circuits

Gain a basic knowledge of both digital transistor-transistor logic (TTL) and complementary metal oxide semiconductor (CMOS) building blocks and how they perform their various functions. Learn about the advantages and disadvantages of each as you perform practical, hands-on experiments in their use.

Learn practical digital logic design and IC applications in this learning and doing Course. Put theory to work as you construct decoders, adders, flip-flops, gates, selectors, distributors, comparators and more.

For observing the operation of your experimental circuits, a voltmeter and a dual-trace oscilloscope are needed. All experiments are easily performed on the ET-3300B Trainer. Knowledge obtained in the AC, DC and Semiconductor Devices Courses is needed to fully understand the material in this Course.

Earn 4.0 Continuing Education Units and receive a Certificate of Achievement by passing the optional final exam with a 70% or better score.

EH-702, Shpg. wt. 3 lbs.	59.95
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EDUCATION/77

Engineering Series teaches circuit design

You can learn to analyze and design practical circuits from these four comprehensive courses: Passive Circuit Design, Transistor Circuit Design, Analog Circuit Design, and the new Digital Circuit Design.

1 New Digital Circuit Design Course shows how to design digital circuits that have real applications

\$99⁹⁵

- Understand how digital circuits operate and obtain maximum learning experience through experiments that demonstrate and apply the material in the text

This self instruction course on digital circuit design provides a working knowledge of digital electronics which is an essential part of the skills needed by electrical as well as computer engineers and technicians. It involves a very close look at logic circuits which are the basis for decision and memory circuits that are used in all digital computers. When these logic circuits are treated as simple input/output devices, as in this course, little background in electronics is required. You need only be concerned with what goes in and what comes out of the logic device.

An enjoyable and instructive journey into digital circuit design begins with a discussion of digital logic gates that are used as the fundamental building blocks of all digital electronics. Design considerations are presented that relate to various digital IC technology options with an overview of various digital IC devices. After this you start to design working circuits using logic decision circuits.

Extending your new found knowledge, you learn how to incorporate memory elements into the operation of a digital circuit. Then you learn how to input data and how to output the results of the logic operation to the outside, real world with interfacing analog-to-digital and digital-to-analog converters. As you finish your instructive journey, you learn about problems arising in designed circuits and their solutions, using test instruments, and general problem-solving guidelines.

No prerequisites courses are required for this area of electronics. Knowledge of the two-state binary system and some basic electronic circuit principles are needed, and is provided for in two appendix selections. Since this course has been written totally independent of any other electronics courses, it can be taken and completed during any stage of an electronics design education.

Use the versatile ET-1000 Analog/Design Trainer to conduct all experiments in the Digital Circuit Design Course and to aid in the development of your own circuits. A single trace scope and multimeter are also required to perform the experiments.

Earn 6.0 Continuing Education Units by passing the optional final examination with a score of 70% or higher. Also receive a personalized Certificate of Achievement, suitable for framing, from Heathkit/Zenith Educational Systems.

EE-1004, Shpg. wt. 8 lbs. **99.95**

2 Passive Circuit Design Course teaches circuit analysis and design using passive components

\$54⁹⁵

- First in the Engineering Design Series teaches successful passive-component circuit design
- Step-by-step learning begins with how to analyze the needed mathematical skills
- Real components and their properties are discussed

Learn to analyze and design practical circuits using components that do not provide a power gain, such as: resistors, capacitors, inductors, voltage and current sources, transformers and diodes. And, establish a foundation for other design courses in the continuing Engineering Design Series.

Before you can design circuits you must be able to analyze them. For this reason the first three units of this course provide a thorough review of the analysis techniques and associated mathematical concepts. DC circuit analysis teaches you the math needed for circuit design followed by AC circuit analysis. This is followed by a thorough discussion on the nonideal properties of real components and how to select appropriate devices for given applications.

The remaining four units concentrate on using the techniques discussed in the previous units to design passive circuits. You are shown how to design unregulated power supplies using numerous rectifier circuits and smoothing filters. You learn to design other passive circuits like clippers, clammers, peak detectors, multipliers, and waveshaping circuits. Also illustrated are seven general and nine measurement applications for passive circuits. A final unit contains ten hands-on experiments in using the ET-1000 Trainer, a scope and a VOM.

Earn 4.0 Continuing Education Units and receive a Certificate of Achievement by passing the optional final examination with a 70% or higher score.

Prerequisites for the Passive Circuit Design Course are a basic knowledge of DC and AC electronics, algebra and trigonometry, and a desire to learn.

EE-1001, Shpg. wt. 9 lbs. **54.95**



5 Analog/Digital Circuit Design Trainer

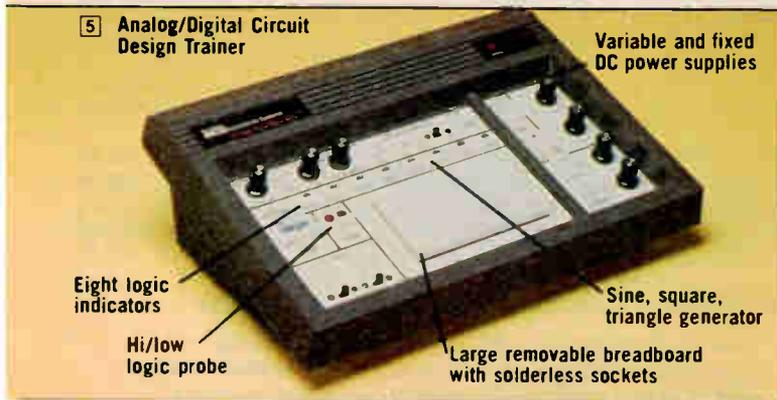
Variable and fixed DC power supplies

Eight logic indicators

Hi/low logic probe

Large removable breadboard with solderless sockets

Sine, square, triangle generator



6 Hands-on Printed Circuits Course

PRINTED CIRCUIT BOARDS

Fun self-study courses for the beginner

Electronics for the Hobbyists Course for a quick look at a fascinating subject



8

Variable speed recorder and player increases your learning capability



3 Transistor Circuit Design Course teaches and shows how to design a multitude of useful circuits

\$64⁹⁵

- Second in the educational Engineering Design Series
- Focuses on the fundamental techniques of successful transistor circuit design using programmed learning

Continuing with the development of the skills necessary for successful circuit design is the Transistor Circuit Design Course. This clearly written course presents basic techniques for designing circuits using transistors. It begins by describing transistor characteristics and defining their relevant parameters. Using simplified models, you are shown how to develop the appropriate AC and DC equivalent circuits needed in designing transistor circuits. Then you analyze these circuits to determine how various component values affect their operation. At the end of this course you move step-by-step through the actual circuit design process.

Thirteen experiments, all performed on the ET-1000 Trainer, help you to develop the know-how and the confidence to design your own transistor circuits. An oscilloscope and VOM are also required.

To better understand the information in this course, some previous electronics background, like that contained in the Passive Circuit Design Course, is needed.

Earn 4.0 Continuing Education Units and receive a Certificate of Achievement by passing the optional final examination with a 70% or higher score.

EE-1002, Shpg. wt. 9 lbs. 64.95

4 Analog Circuit Design Course shows basic design techniques using linear-integrated circuits

\$69⁹⁵

- Learn how to analyze and design circuits that have a reliability and quality of performance unobtainable in circuits using discrete components

Third in the Heathkit/Zenith Engineering Design Series, The Analog Design Course shows you how linear-integrated circuits may be used in the design of circuits and instruments that would be impractical with discrete components. At the start of this course, you learn to analyze and design several amplifier and comparator circuits using the versatile operational amplifier. Both op amps and comparators are discussed as specific illustrative examples. They are also used in designing several instruments such as an electronic ohmmeter and a logic probe. Learn to analyze and design linear regulators, oscillators, waveform generators, and other circuits that serve as building blocks in modern electronic systems.

Twelve accompanying experiments performed on the ET-100 Engineering Design Trainer illustrate the designing process and the operation of circuits discussed in the text. You'll also need a dual trace oscilloscope and a VOM.

Earn 4.0 Continuing Educational Units and receive a personalized Certificate of Achievement from Heathkit/Zenith Educational Systems by passing the optional final examination with a 70% or higher score.

To prepare yourself for the material in this engineering design course, we recommend the completion of the EE-1001 Passive and EE-1002 Transistor Circuit Design courses or have an equivalent knowledge of their material.

EE-1003, Shpg. wt. 9 lbs. 69.95

5 ET-1000 Analog/Digital Circuit Design Trainer

A mini-lab for learning the basic techniques of circuit design this trainer is an excellent tool for performing all the experiments in the Heathkit/Zenith Engineering Design Series. And, its many built-in test instruments and features also provide engineers and technicians with a versatile all-in-one prototyping unit for use in designing and testing analog and digital circuits.

Self-contained test instruments in the ET-1000 Trainer include a function generator that produces sine, square, and triangle waveforms in five switch-selectable ranges from 1 Hz to 100 kHz. These frequencies are also pulse width adjustable in five ranges from 2 ms to 200 ns. To handle your heavy circuit loads, the trainer uses variable and regulated positive and negative 1.2 to 20 volt DC power supplies. In addition, a handy built-in logic probe can be used to detect and indicate HI and LOW logic levels in breadboarded digital circuits.

This solderless double breadboard trainer features two 60 Hz sine wave signal sources of 15 VAC and 30 VAC. Two no-bounce logic switches, a binary switch block, and eight LED logic indicators are all built-in to aid in your digital circuit assembly. Trainer is 15³/₄" W x 10³/₄" D x 4³/₄" H and uses 110 VAC or 220 VAC.

Kit ET-1000, Shpg. wt. 14 lbs. 219.95

ET-1000-1, Extra Removable Breadboard Accessory, 1 lb. 29.95

ETW-1000, Assembled and tested Trainer, Shpg. wt. 13 lbs. 369.95

6 Printed Circuits Course shows how to design, layout, and build printed circuit boards

\$69⁹⁵

- Learn direct pattern and photographic etching techniques
- Copy printed circuit board layouts from electronics books and magazines or fabricate your own from schematics
- Includes all materials to etch your own circuit boards
- Make boards for and construct a photoelectric lamp switch and a touch switch for appliances

Learn to make your own printed circuit boards in this fascinating course. Make them from scratch using either the direct pattern or the photographic transfer technique. Also learn about circuit board materials, layout, preparing artwork, image transfer and assembly.

Learn about the properties of different types of printed circuit board materials and the processes used in manufacturing them. In accompanying experiments learn how to design a circuit, prepare the artwork, and transfer clean art images to the circuit board. Also, learn how printed circuit boards are assembled using automated insertion machines and wave soldering techniques.

In accompanying experiments you'll actually design, layout and etch circuit boards for two home electronic kits, the GD-600 Photoelectric Lamp Switch and the GD-1287 Touch Switch. All necessary materials, components, and hardware to complete the kits and experiments are included. An etch-resist pen, rub-on transfers, art tape, etchant, solvent, and plastic bags are provided to make printed circuit boards by the direct pattern method. A positive pattern, clear acetate, photographic developer and sensitized printed circuit boards are also provided for making boards using the photographic method.

Pass the optional final exam with a 70% or better score and earn 2.0 Continuing Education Units and receive a Certificate of Achievement. Course is available only within the continental United States.

EI-3134, Shpg. wt. 7 lbs. 69.95

7 Electronics for Hobbyists Course presents a basic knowledge that is applicable in many fields

\$69⁹⁵

- Gain an overview of electronics that can apply to hobbies and many other areas of interest
- Be able to understand do-it-yourself electronics magazine projects and other basic electronics articles
- Optional 26 experiments that offer an insight into the world of electronics and its broad range of applications

Understand those articles about interesting projects in popular electronics magazines. You can, after you complete the easy-to-understand Electronics for Hobbyists Course from Heathkit/Zenith Educational Systems.

In seven well written and illustrated units, you are taken step-by-step through an excellent course on an introduction to the various aspects of the electronics world. You'll learn about voltage, current, resistance, power, the fundamental mathematics of electronics, and magnetism. Direct and alternating current are introduced along with the operation of transformers, diodes, transistors and ICs.

The use of the voltmeter, ammeter, and ohmmeter for measurement purposes is discussed. Different analog and digital circuit operations are presented, as is the complex world of computers including programming and software. The last unit surveys electronic hobbies: experimentation, radio controlled models, computers, audio and amateur radio.

Previous electronics knowledge isn't required with this beginners course. It is arranged in a logical order and all concepts and terms are explained in a manner that makes learning fun and easy.

To perform the experiments included with the course you'll need the use of the ET-3100B Trainer on page 64. A multimeter and oscilloscope are also needed.

Complete the optional final exam with a 70% or better score and earn 4.0 Continuing Education Units and receive a Certificate of Achievement.

EE-3140, Shpg. wt. 11 lbs. 69.95

8 Learn faster with this Variable Speed Player

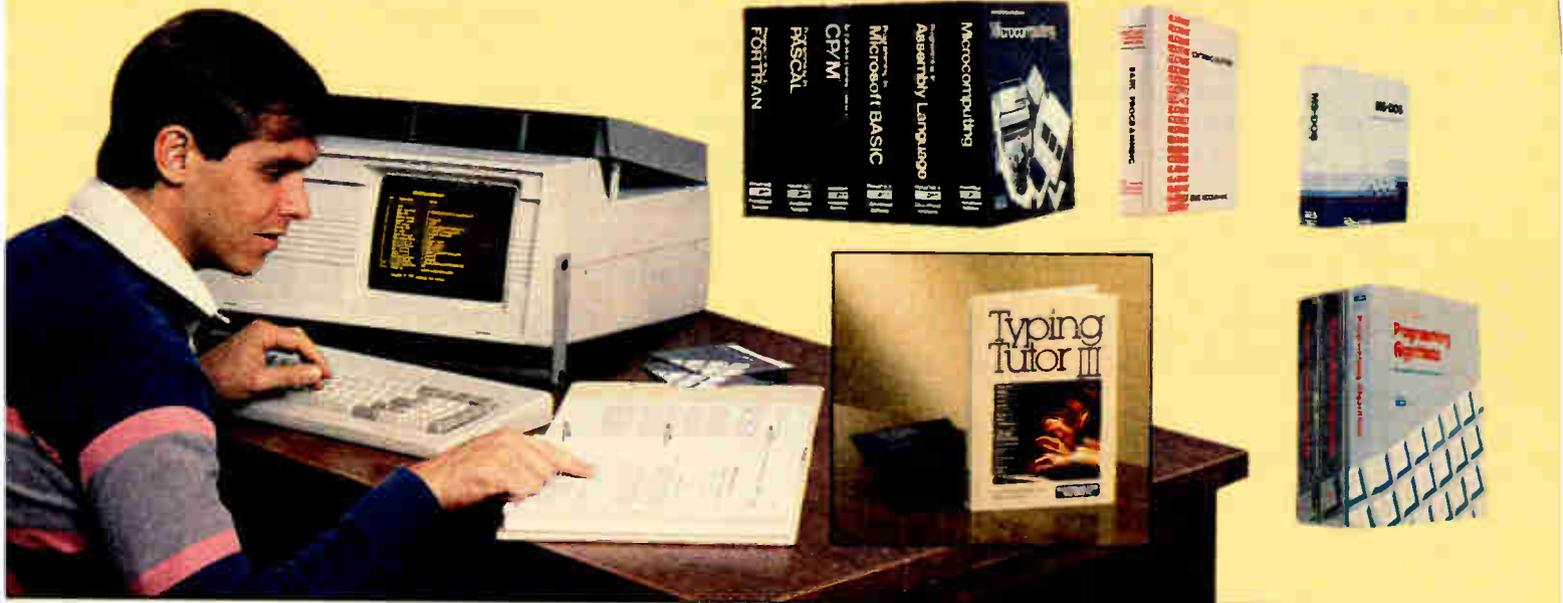
Get a full range of pitch-corrected speeds, from normal to 2 times faster, to cut your listening time in half and still be able to understand every word that you hear. This speed-listening tape recorder features slow-down to 90% of normal speech, built-in electret microphone, tape counter, earphone/external speaker jack, and remote jack. Compact and lightweight with battery, DC, and AC operation.

ECP-3804, Assembled, Shpg. wt. 3 lbs. 139.95



Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.

EDUCATION/79



Learn computer programming effectively and thoroughly with these self-study courses

MACRO-86 Assembly Language Course

\$59⁹⁵

- Learn to program virtually any computer using the Intel 88/86 series of microprocessors
- Designed for use with Heathkit/Zenith Computers and the IBM Personal Computer

A new addition to Heathkit/Zenith Educational Systems' computer programming series is the MACRO-86 Assembly Language Programming Course. With it, you'll learn the fundamentals of Assembly Language programming using MACRO-86. Setting this Course apart from any other on this subject is the "laboratory" method of instruction. Rather than just tell you, we will describe and then demonstrate all of the features of MACRO-86. These demonstrations will use programs supplied with the Course and programs that you will write.

After completing this nine-unit Course, you'll be able to describe the internal structure of the Intel 8088 microprocessor and trace instruction and data flow. You'll know how to write COM- and EXE-type programs, develop flow charts, and design program arrays, structures and records. You'll also be able to input and output data, develop interrupt service routines and design macro instructions.

For this programming course, you should have access to a Heath Zenith 100-series Desktop or Heath/Zenith Personal Computer, an upgraded ET-100 Trainer or an IBM-PC and the appropriate operating system: MS-DOS, Z-DOS* or PC-DOS. You should also be familiar with the basic operation of the operating system and have access to system programs (and supporting files). Also requires CB-5063-16 Programmer's Package. You should be familiar with binary and hexadecimal number systems, and computer math.

Pass the final examination with a 70% or higher score and earn 5.0 Continuing Education Units. In addition, you'll also receive a Certificate of Achievement from nationally recognized and accredited Heathkit Zenith Educational Systems.

EC-1201, Shpg. wt. 10 lbs. **59.95**

MACRO-86 Programming Algorithms Course

\$59⁹⁵

- Gain familiarity with algorithms as programming tools
- Run experiments on a Heathkit/Zenith or PC Computer

Heathkit/Zenith Educational Systems introduces another new course in its computer programming series, the Programming Algorithms Course. It is a seven-unit Course that shows you how to solve a given problem using a computer with a particular plan (or algorithm). The Course demonstrates the importance of the algorithm phase in developing a program. And, it has you using programs that are provided or using programs that you write yourself to demonstrate applications of the ideas presented in the text.

In addition to writing algorithms, you'll learn to translate them into MACRO-86/Intel 8088 mnemonics. Control structures, an extended example of translating an algorithm and conventions are also discussed. When finished, you'll know how to clearly define a problem and solve it with an algorithm.

Experiments at the end of each unit are written for a computer system using the Intel 8088 microprocessor, such as the: H/Z-100 Desktop Computer, Heath/Zenith personal or portable computer, the upgraded ET-100 Trainer or the IBM Personal Computer. The MS-DOS operating system is used in all experiments. A 5.25" floppy disk supplied with the Course contains experiments, programs and demonstrations for use in the Programming Algorithms Course.

Before you begin this Course, you should be familiar with the instruction set for the 8088 microprocessor and its various addressing modes. You should also know the commands to your operating system that manipulate files and the basic programming techniques including loops, tests and subroutines.

Take and pass the optional final examination with a 70% or better score and earn 4.0 CEUs. Plus, you'll receive a handsome Certificate of Achievement.

EC-1202, Shpg. wt. 6 lbs. **59.95**

Learn touch typing with TYPING TUTOR III

\$49⁹⁵

- Unique keyboard-instruction program teaches you to type faster and more efficiently, and more enjoyably

A Computer-aided instruction program, TYPING TUTOR III is a series of typing lessons and tests that continually adjust to your proficiency level. If you're a beginner, start off with just a few keys. This tutor program will add keys as you become more proficient until you're accurately and easily typing the alphabet, special symbols and numbers. TYPING TUTOR III creates lessons and tests specially tailored to your unique requirements that encourage you to respond automatically and without errors. Numeric keypad lessons are also included.

Included is an arcade-style game called LETTER INVADERS that enables you to sharpen your speed skills while having some fun at the same time. TYPING TUTOR III is easy to use with one-key on-screen help messages. It requires a Heath/Zenith PC or IBM PC computer with one 5.25" disk drive.

EZ-1007, Shpg. wt. 1 lb. **49.95**

MS-DOS Course covers fundamentals and organization

\$59⁹⁵

- Complete coverage with how to access system routines, to do console input/output and work with disk files

In seven units, this comprehensive Course teaches how MS-DOS, Z-DOS and PC-DOS are organized and all about how to effectively use them. Directed toward the novice computer user, this self study course provides instructions on all the built-in commands and on the typical transient utilities.

Fifteen computer exercises, included on a 5.25" floppy disk, provide an opportunity to use MS-DOS features/commands on an H/Z-100 Desktop, Heath/Zenith personal or portable computer, an upgraded ET-100 Trainer or an IBM PC. Requires MACRO-86 Assembler.

Pass the optional final examination with a 70% or better score and earn 3.0 Continuing Education Units. And, receive a Certificate of Achievement.

EC-1121, Shpg. wt. 6 lbs. **59.95**

8080 Assembly Language Course teaches you to write faster and more efficient computer programs

\$54⁹⁵

- Learn to use less memory space and to run faster programs that don't waste time interpreting commands
- Workbook includes discussion of OOS console I/O

Learn to program in the low-level language your computer understands best, Assembly Language. It uses labels, operands, comments and assembler directives that enable you to create a source code that's both easily read and adapted to your computer system. Symbolic notation and easy-to-carry-out documentation methods make program-listings easy to understand.

Workbook contains experiments for use on the H/Z-89 computer.

Take and pass the optional final examination with a 70% or better score and earn 6.0 Continuing Education Units plus receive a Certificate of Achievement.

EC-1108, Shpg. wt. 7 lbs. 54.95

Learn Programming in Microsoft BASIC Course

- Learn to write and modify programs using popular Microsoft BASIC
- Gain experience in writing BASIC Programs by doing experiments

Cover every aspect of programming using Microsoft BASIC, one of the most versatile programming languages for microcomputers. Learn how to get the most from this programming language and improve your programming skills whether you're using an H/Z-89, TRS-80, APPLE or other computer.

A comprehensive text and programming experiments combine to give you complete coverage of MBASIC programming fundamentals. You'll learn about: computer arithmetic, program structures, sequences, branching, and more.

To obtain the full benefit from this Course, you'll need access to a computer that uses the Microsoft BASIC language. Pass the optional final examination with a 70% or better score and earn 5.0 Continuing Education Units plus receive a Certificate of Achievement from Heathkit/Zenith Educational systems.

EC-1110, Shpg. wt. 7 lbs. 99.95

Learn modular Pascal programming with this course

- Pascal is sophisticated, structured, efficient, powerful, easy to use

Whether you're an experienced user or just a beginner, this programming course can teach you to write programs in the high-level language of Pascal. Our audio-tutorial format shows you how to program in this powerful modular language with quick results. And, programming experiments provide experience.

A clearly written text and five audio cassette tapes combine to form an integrated and effective learning program. You are shown how to identify and write simple Pascal programs. Then you learn to identify and write self-contained procedures. Other areas covered include: the decision making part of programming; how and when to incorporate IF, THEN, ELSE and CASE statements; Boolean variables; and how to use REPEAT, UNTIL, WHILE, DO and FOR loops.

Earn 4.0 Continuing Education Units by taking and passing the optional final exam with a 70% or higher score. Also receive a Certificate of Achievement.

EC-1111, Shpg. wt. 7 lbs. 99.95

FORTRAN Programming Course for Science/Math

- Learn all about FORTRAN, the powerful programming language preferred by scientists, mathematicians and engineers

A powerful program, FORTRAN simplifies complicated scientific and mathematical problem solving. Learn its fundamentals and how to use its power with the economical and effective Programming in FORTRAN Course.

This 11-Unit Course begins with a special introduction to computers and then introduces FORTRAN programming. Subjects covered in this course include: program analysis, variables, expressions, input and output, identify and write self-contained procedures, making decisions, loops, data types, and more.

Hands-on experiments provided with this course enable you to actually write FORTRAN programs. Coding forms are included. To get the most from the experiments, as well as the course, we recommend that you perform the experiments on a computer such as the H/Z-89, H/Z-100, Heath/Zenith Personal or Portable Computer. With these computers, you'll need the appropriate CP/M* or MS-DOS and the Microsoft FORTRAN programming language.

Pass the optional final examination with a 70% or better score and earn 5.0 Continuing Education Units. Plus, receive a Certificate of Achievement.

EC-1101, Shpg. wt. 7 lbs. 99.95

BASIC Course teaches you to program in one of the most popular languages

- Learn to write and make corrections to powerful computer programs

Learn to write BASIC programs that instruct a computer to perform specific tasks. In fourteen programmed instruction units, you proceed at your own speed and learn the standard words and commands of BASIC. In this Course, many BASIC versions, formats, commands, statements and procedures are covered. You'll learn about the tools of the language, and learn to define and plan a program. Then you'll format and write a program as well as adapt programs to suit your needs.

The BASIC Programming Course includes a self-instructional textbook and a workbook filled with exercises in writing and running BASIC programs. Access to a computer is recommended to obtain the maximum benefit from this Course. In addition, handy reference cards with Benton Harbor BASIC statements, ASCII number codes, BASIC direct command statements and a reference chart with math and Boolean algebra operations are included.

After completing the Course and passing the optional final examination with a 70% or higher score, you'll be awarded 3.0 Continuing Education Units and receive a Certificate of Achievement from Heath/Zenith Educational Systems.

EC-1100, Shpg. wt. 7 lbs. 49.95

College Level Examination: Earn valuable college credit for successfully completing this course. For more information see page 65.

ECC-1100, Shpg. wt. 1 lb. 25.00

Learn how to use CP/M* and how to get the most from this industry-standard operating system

- Covers all aspects of the CP/M operating system
- Use with many 8080/Z-80/8085 computer systems
- Uses proven audio-visual tutorial method

A beginner-oriented Course, the EC-1120 CP/M Course makes it possible for even first-time computer users to easily learn about the operating system that has become an industry standard. It begins with the basics, so elementary that a previous background in CP/M or Assembly Language isn't necessary.

A thorough 500-page text and five audio cassette tapes make it very easy for you to learn about CP/M. This Course begins with an introduction to the operating system and how to use basic CP/M commands. This includes the operating system's major control functions and diagnosing problems from error messages. Built-in commands of the command control processor are discussed along with a coverage of transient programs. You also learn to use the STAT and CONFIGUR commands. In addition, you'll learn to use the system's resident text editor, ED, to edit files plus how to submit command files.

This Course is designed for use with computers having 48K bytes of RAM and able to use the CP/M operating system, such as an H/Z-89 or H/Z-100 Computer.

Pass the optional final exam with a 70% or higher score and earn 2.5 Continuing Education Units, plus receive a personalized Certificate of Achievement.

EC-1120, Shpg. wt. 6 lbs. 59.95

Microcomputing Course teaches you the basics of computers and what they can do for you

- See how a computer can be used to solve everyday problems
- Learn to make intelligent decisions about purchasing a computer

For those who want to know what a computer can do for them, this Microcomputing Course is an ideal place to start. In easy and simple terms, you are shown what a computer can do for you. The self-instruction text fully explains the different parts of a computer and shows you how to apply its capabilities to your specific needs. With the text and two accompanying audio cassette tapes, you'll learn about computer hardware and how it works to better evaluate what extras you'll need along with your computer. And, you'll also learn about software and how to choose the best programs for your use.

The main objective of this Course is to make personal computing understandable to you. It puts the various types of computer systems into perspective so that you can make informed decisions about a computer purchase.

Earn 1.0 Continuing Education Unit and receive a Certificate of Achievement by passing the optional final exam with a 70% or higher score.

EC-1000, Shpg. wt. 5 lbs. 49.95

*CP/M is a registered trademark of Digital Research, Inc. Z-DOS is a trademark of Zenith Electronics Corporation.



Use your Visa or MasterCard credit cards to purchase your kit!



NEW

**HS-148 Compact
Personal Computer kit with
ZVM-1220A and featuring
IBM PC compatibility**

NEW

**HS-158 Expandable
Personal Computer
kit with ZVM-1220A**

Tough competitors in a PC world that will meet all your expectations at a low kit price

As low as
\$999⁰⁰

Two new high-performance kit computers, the HS-148 Compact PC and the HS-158 Expandable PC, with complete PC capability and IBM PC compatibility. Two computers with features and flexibility to keep up with your needs now and later, and priced within your budget.

Two new computer kits to put power and performance at your fingertips. Two choices, the Compact Personal Computer and the Expandable Personal Computer, for differing needs and price ranges. The HS-148 Compact PC is an ideal start for business, educational, and home users with everything needed to begin personal computing in a compact and space efficient cabinet. Or use it as an inexpensive, intelligent workstation in a local area network. The HS-158 Expandable PC offers all the features of the HS-148 PC plus the ability to add on as desired. And both are available in ready-to-use assembled versions.

A low-cost system, the HS-148 Compact PC comes equipped with 256K of memory that can be expanded up to 640K. Advanced 256K memory chips are used to increase RAM on the main board without using an expansion card. Any IBM PC accessory board can be used with the Compact PC by inserting it into the optional ZA-141-1 Expansion Board that plugs into the computer's main board. The Expansion Board also includes sockets for on-board ROM based software.

A fully expandable system, the HS-158 Personal Computer is a total performer. It has a standard 256K of memory that can easily be increased to 640K by adding 256K chips to the CPU board. And this Heathkit PC features six open IBM-compatible slots that can accept most any off-the-shelf accessory boards designed for the IBM-PC. Future expansion couldn't be easier with increased hardware flexibility and, in turn, more choices from a wider variety of software and peripherals to meet your changing computer needs.

Both computers are designed around the 16-bit 8088 microprocessor, the same as used in the IBM-PC. This allows the Heathkit HS-148 and HS-158 IBM-compatibles to run 99% of all IBM-PC software. With this compatibility you can access a huge and growing amount of applications software for the IBM-PC. And you can run most of them right out of the box without any program alterations.

Shift your Heathkit PCs into high gear with a special "high speed" switch. An external operator-selectable switch allows you to increase the operating speed of the computers from 4.77 MHz to 8 MHz. Increase these computers number crunching ability even more with the addition of an optional 8087 math co-processor. It simply plugs into its own socket on the CPU boards of the HS-148 and HS-158 computers to supply heavy-duty number crunching. Such arithmetic-intensive activities are found in FORTRAN programs, computer-aided drafting and design software, and graphic displays.

High-capacity auxiliary storage is provided by a double-sided, double-density 5.25" disk drive that is IBM formatted and stores up to 360K bytes of data. Get your Compact or Expandable PC with one drive or with an optional second 5.25" disk drive. Optional 10 megabyte and 20 megabyte Winchester hard disk drives are also available for installation in HS-158 PCs for those needing the capacity to handle larger, more comprehensive business programs.

Two video outputs are available at the rear panel of both the Compact and Expandable Personal Computers. One output is a standard nine-pin D connector for connecting an external RGB color monitor and the other is a phono plug for a monochrome monitor. In the character mode, you have a 25 line by 80 character display with a selectable 8 background colors and 16 foreground colors. In the graphics mode, each pixel (dot) of a 320 x 200 pixel area can be painted in one of four colors selected from one of two color palettes. Color displays on a monochrome monitor are represented by a corresponding gray level.

Increased video resolution is made possible for the HS-148 Compact (using the ZA-141-1 Expansion Board) and the HS-158 Expandable PCs with the addition of a Z-319 Video Card and its 192 kilobytes of usable video RAM. This optional card enables these computers to produce high resolution 8-color bit-mapped graphics on a 640 x 225 pixel area. More colors are possible by mixing the eight available colors. With the Z-319 card installed, the Compact and Expandable PCs can reproduce any graphics displays produced on the advanced H-100 Computer. Add an optional H-329, Monochrome Video Card (HS-148 requires ZA-141-1) and get a video output compatible with the output from an IBM monochrome video card that can store up to one page in 8K of RAM.

Improved video is one of the obvious advantages of the HS-148 Compact and HS-158 Expandable PCs. A complete absence of video flickering during scrolling and a substantial improvement in the speed at which text is displayed is a very big plus for users. The display is also much clearer, achieved by special circuitry that removes video interference. In addition, both computer versions offer ROM or software selected smooth and jump scrolling.

A serial port and a parallel communication port provide these computers with the flexibility to use dot matrix and letter quality printers, modems, and other peripheral devices. The serial I/O port has a standard EIA RS-232 DTE connector and is capable of baud rates between 110 and 9600 while operating in asynchronous full or half duplex. The parallel interface is a Centronics compatible port using a 25-pin D connector. The ports are configured to peripherals using a simple menu-driven program supplied with the operating system software. Selections are made from on-screen choices and many pre-defined configurations are available for many popular printers and modems.

A detached low-profile keyboard adds to the ease of use for both Compact and Expandable PCs. It is an electronic keyboard with 84 keys and 57 alpha-numeric keys that are laid out like Selectric-style keyboards. LED status lights indicate CAPS LOCK and NUM LOCK conditions. The keyboard has an L-shaped return key and double-wide shift key for easier word processing. All keys have a positive tactile feedback for faster typing and a switchable electronic key click. The keyboard is sculpted and each key repeats itself when held down with the rate increasing as the key is held down longer.

Special function keys and a numeric keypad are also contained on the keyboard. Ten function keys line up to the left of the keyboard and a 17-key keypad is clustered at the right. An additional ENTER key is located on the keypad. This key becomes very useful when many numbers must be entered when using accounting programs and large spreadsheets.

Excellent documentation is provided with each computer and takes into account the various needs of users and their different experience levels. All kits contain assembly manuals that are clearly instructive and carefully illustrated. All kit and assembled computers include user's information such as plugging in cables and booting the computer for fast and easy computer access without paging through a complete system explanation. Also provided are detailed operating procedures, diagnostics, maintenance steps, and troubleshooting procedures.

Free MS-DOS, operating system. All kit and assembled HS-148 Compact and HS-158 Expandable PCs include the MS-DOS operating system and a diagnostics disk. All assembled 2-drive Expandable PCs (ZF-158-42 and ZW-158-42) include the Z-329 Card, a high resolution monochrome video card equivalent to the IBM PC Hi-Res Card.

Plug in the optional WORKS ROM into a HS-148 Compact PC equipped with a Z-141-1 Expansion Board and directly execute six Microsoft programs from ROM.

	Kit HS-148-41 , Compact Personal Computer with one 5.25" disk drive, Shpg. wt. 25 lbs.	999.00
	ZF-148-41 , Assembled Compact Personal Computer with one 5.25" disk drive, Shpg. wt. 28 lbs.	1499.00
	ZF-148-42 , Assembled Compact Personal Computer with two 5.25" disk drives, Shpg. wt. 30 lbs.	1799.00
	Kit HS-158-41 , Expandable Personal Computer with one 5.25" disk drive, Shpg. wt. 25 lbs.	1599.00
	Kit HS-158-42 , Expandable Personal Computer with two 5.25" disk drives, Shpg. wt. 28 lbs.	1799.00
	ZF-158-41 , Assembled Expandable Personal Computer with one 5.25" disk drive, Shpg. wt. 38 lbs.	2199.00
	ZF-158-42 , Assembled Expandable Personal Computer with two 5.25" disk drives, Shpg. wt. 41 lbs.	2499.00
	ZW-158-42 , Assembled Expandable PC with a 10.6MB Winchester hard disk drive and one 5.25" drive, 42 lbs.	3699.00

HS-148 Compact and HS-158 Expandable PC Accessories:

Z-207-7, Optional 5.25" floppy disk drive for HS-148 Compact PC, 48 TPI drive with 360K data storage capability, Shpg. wt. 6 lbs. **250.00**

Winchester Upgrade Kits for installing optional rigid disk drives into HS-158 PCs only. Upgrade Kits include controller board, Winchester disk drive, mounting hardware, complete documentation, and step-by-step installation instructions.

HS-317-10, 10M byte Winchester storage, Shpg. wt. 16 lbs. **995.00**

HS-317-20, 20M byte Winchester storage, Shpg. wt. 10 lbs. **1195.00**

NEW! MS-5066-20, The WORKS software in ROM for HS-148 Compact PCs. Contains six Microsoft programs: Word, Plan, BASIC, File, Calendar, and Telcom. HS-148 PC must be equipped with a ZA-141-1 Expansion Board and 256K RAM. Shpg. wt. 5 lbs. **Please Call**

NEW! Z-316-8, 8 MHz 8087 Numeric Co-processor simply installs into socket on CPU board of HS-148 or HS-158 Computers to give superior arithmetic handling capabilities, Shpg. wt. 1 lb. **Please Call**

NEW! Z-205-4, 256K Memory Chip Set, Shpg. wt. 1 lb. **199.00**

NEW! ZA-141-1, Expansion Board for HS-148 Compact PCs. Plugs into main board of computer and allows the addition of one accessory card. Also includes sockets for on-board ROMs. Shpg. wt. 2 lbs. **149.00**

Z-319, Assembled Bit-Mapped Video Graphics Card provides a high-resolution, 8-color, 640 x 225 pixel display (640 x 512 interlaced) of both alphanumeric characters and graphics. Enables emulation of H-100 Computer video attributes and uses mapping to functionally emulate the keys of an H-100 keyboard. Requires MS-DOS (OS-63-50) and the MS-DOS Enhancement (OS-63-51). Shpg. wt. 1 lb. **424.00**

SAVER! Purchase both the Z-319 Video Card and the MS-DOS Enhancement (OS-63-51) operating system and save over separate costs.

NEW! ZSS-100-27, Shpg. wt. 6 lbs. **449.00**

NEW! Kit H-329, Monochrome Video Card for use with HS-148 Compact (requires ZA-141-1 Expansion Board) and HS-158 Expandable PCs. It provides a high resolution video output compatible with the output from an IBM monochrome video card. Shpg. wt. 3 lbs. **159.95**

NEW! Z-329, Assembled H-329, Shpg. wt. 2 lbs. **200.00**

TM-150, Programmer's Reference Manual provides information about the features of the HS-151 Personal and HS-161 Portable Computer as related to programming and interfacing, Shpg. wt. 3 lbs. **25.00**

NEW! TM-140, Compact PC Series Technical Manual, Shpg. wt. 3 lbs. **49.00**

COMPACT PC SAVERS

Get a big 50% off of these selected items when you buy them within 90 days of a kit or assembled HS-148 Compact Personal Computer purchase. Copy of computer purchase receipt required.

Any three Heath/Zenith software packages.

Z-205-4, 256K Memory Chip Set.

Z-316-8, 8 MHz 8087 Numeric Co-Processor.

Z-207-7, Optional 5.25" floppy disk drive (kit versions only).

EXPANDABLE PC SAVERS

Take 50% off the price of these selected items when you purchase them within 90 days of buying a kit or assembled HS-158 Expandable Personal Computer. A copy of the computer purchase receipt is required.

Any three Heath/Zenith software packages.

Z-205-4, 256K Memory Chip Set.

Z-316-8, 8 MHz 8087 Numeric Co-Processor.

Spectacular Closeout Savings on Low-Profile and Transportable IBM PC compatible personal computers

Terrific savings can now be made on HS-151 Low-Profile and HS-161 Transportable Personal Computers. These multi-featured IBM PC-compatible computers use the same 16-bit 8088 microprocessor as the IBM PC and operate at 4.77 MHz for access to the library of IBM PC software. These PCs are equipped with a 128K RAM and are available with optional single or dual 5.25" floppy disk drives that store 360K bytes of data. Four open IBM PC compatible expansion slots accept most any off-the-shelf accessory boards designed for the IBM PC. Both monochrome and color video outputs are available with the Transportable featuring a built-in 9" CRT. A serial and a parallel communications port provide both PCs with the flexibility to use a wide range of peripherals. Plus these computers feature the bonus of the MS-DOS operating system included **FREE**.

 **Kit HS-1151-21**, Low-Profile Personal Computer with a single 5.25" disk drive. Shpg. wt. 73 lbs. **1299.00**

 **Kit HS-1151-22**, Low-Profile Personal Computer with dual 5.25" disk drives. Shpg. wt. 78 lbs. **1499.00**

 **Kit HSA-2161-21**, Portable PC with amber CRT and single 5.25" disk drive. Shpg. wt. 101 lbs. **1299.00**

 **Kit HSG-2161-21**, Portable PC with green CRT and single 5.25" disk drive. Shpg. wt. 101 lbs. **1299.00**

 **Kit HSA-2161-22**, Portable PC with amber CRT and dual 5.25" disk drives. Shpg. wt. 113 lbs. **1499.00**

 **Kit HSG-2161-22**, Portable PC with green CRT and dual 5.25" disk drives. Shpg. wt. 113 lbs. **1499.00**

 **ZFA-161-21**, Assembled Transportable PC with amber CRT and dual 5.25" disk drives. Shpg. wt. 55 lbs. **2150.00**

 **ZFA-161-52**, Assembled Transportable PC with amber CRT, dual 5.25" disk drives, and 320K RAM. Shpg. wt. 61 lbs. **2599.00**

For use only in kit and assembled HS-151 and HS-161 PCs:

Kit H-305, System RAM Board comes with 128K of RAM and can be increased with additional Z-205-1 Upgrade packages up to a total complement of 320K. Requires a fully populated (320K) main board, 2 lbs. **149.95**

Z-305, Assembled and tested System RAM Board, Shpg. wt. 2 lbs. **199.00**

Z-316, 8087 Numeric Co-Processor, Shpg. wt. 1 lb. **225.00**

Z-205-1, 64K RAM Upgrade package, Shpg. wt. 1 lb. **Each set 79.99**

HCA-150-4, Second Serial Port, all the required hardware to install a second serial port into the HS-151 or HS-161 Computer, Shpg. wt. 1 lb. **49.95**

HS-151 PERSONAL COMPUTER SAVERS

Save 50% on these selected items when you buy them within 90 days of a kit HS-151 Personal Computer purchase (receipt required).

Any three Heath/Zenith software packages.

Z-205-1, 64K RAM Upgrade Chip Set.

Z-316, 8087 Numeric Co-Processor.

H-305, RAM Board.

Z-305, Assembled H-305 RAM Board.

More accessory boards can be found on pages 98 and 99.



NEW Z-200 Advanced PC
with optional monitor



H-100 Low-Profile Computer
with optional ZVM-135

H-100 All-In-One Desktop Computer
with built-in 12-inch display

1 The New Z-200 Advanced Personal Computer with IBM PC-AT compatibility and increased power

Only
\$3999⁰⁰
for a top performer

Increased power, expanded memory, extensive storage, and high speed processing are added to IBM PC-AT compatibility for demanding professionals who want and deserve the best in an advanced computer system. Plus performance that you can count on, always.

Handle a lot more work and do it faster and easier with the Z-200 Advanced Personal Computer. Based on the 80286 microprocessor, this computer puts at your fingertips unparalleled processing speed, extensive data storage capacity, and IBM PC-AT compatibility. And with its built-in flexibility this Advanced PC lets you expand in any direction, even into cost-effective local area networking.

Meet the demands of applications software that require increasing amounts of user memory. The Z-200 Advanced PC comes equipped with a standard 512K of RAM to satisfy most all memory requirements. When more memory is needed you can easily and economically expand up to more than 15MB with the addition of Z-405 Memory Cards and Z-205-4 256K Memory Chip Sets.

Extensive data storage. The Z-200 Advanced PC is available with a single 1.2MB 5.25" floppy disk drive and also with a 20MB Winchester plus a 1.2MB floppy drive. A 40MB Winchester drive is another option for the maximum in data storage. The Z-200 PC comes with a controller card that can handle up to two floppy and three hard disk drives. A second 360K byte floppy drive is also available to simplify the transfer of PC software to the computer.

Optional video cards offer you economical color, graphics, and high resolution options so you can choose a video output that best fits your computer's purpose. Virtually any PC video card works in the Z-200 PC.

The MS-DOS operating system is included and is just one of the many extras provided with the Z-200 Advanced PC. Others are eight expansion slots (two 8-bit, four 8/16-bit, one video), a serial and a Centronics parallel port, English labelled keyboard, and a 6 MHz clock for high speed processing.

 **ZF-241-81**, Assembled Z-200 with 512K RAM and one 1.2MB floppy disk drive. Requires video card for monochrome or color video output. Shpg. wt. 52 lbs. **3999.00**

Z-207-7, 5.25" 360K Floppy Disk Drive, Shpg. wt. 5 lbs. **250.00**

Z-205-4, 256K RAM Chip Set, Shpg. wt. 1 lb. **199.00**

Z-405, 1.5MB Memory Board, 128K installed, 2 lbs. **399.00**

Z-409, Standard Video Card with monochrome and RGB outputs, and a 320 x 200 pixel resolution. Shpg. wt. 2 lbs. **239.00**

Z-329, High Resolution Monochrome Video Card, Shpg. wt. 2 lbs. **200.00**

Z-416, 80287 Numeric Co-Processor, Shpg. wt. 1 lb. **Please Call**

ZD-12, Optional 5.25" 1.2MB Floppy Disk Drive, Shpg. wt. 5 lbs. **599.00**

ZD-200, Optional 20MB Winchester Disk Drive, Shpg. wt. 9 lbs. **1499.00**

ZD-400, Optional 40MB Winchester Disk Drive, Shpg. wt. 9 lbs. **2499.00**

Z-417-1, Winchester Cable, required for the installation of either a 20 MB or a 40

MB Winchester drive into a Z-200 PC without a Winchester drive. 1 lb. **Call**
HCA-200PC, Serial Converter Cable. A one foot cable with a 9-pin IBM AT-compatible D connector to a 25-pin D connector for use with the Z-200 serial output. Shpg. wt. 1 lb. **Please Call**
TM-240, Technical Manual for the Z-200, Shpg. wt. 3 lbs. **49.00**

50% OFF! Z-200 ADVANCED PC SAVERS

Get a big 50% discount on the following items when you buy them within 90 days of any Z-200 Advanced PC purchase. Receipt required.

Any three Heath/Zenith software packages.

Z-205-4, 256K RAM Chip Set.

Z-409, Video Card.

Z-329, High Resolution Video Card.

Z-405, 1.5 Megabyte Memory Board.

Z-416, 80287 Numeric Co-Processor.

ZD-12, 1.2 Megabyte Floppy Drive.

ZD-200, 20 Megabyte Winchester Drive.

ZD-400, 40 Megabyte Winchester Drive.

TM-200, Technical Manual.

Z-200 SPECIFICATIONS: Processor: 80286. Memory: 512K of RAM expandable to more than 15MB, 64K ROM, 4K special RAM. Video: Optional. Keyboard: Detached low-profile with 10 function keys; 57 alphanumeric; lit caps; numeric and scroll lock; audible click on key press; and auto-repeat with rate advance. Cursor: Blinking, underline, or reverse. Cursor Controls: Up, down, left, right, home, end, page up, and page down. Cursor Addressing: Relative or direct. Tab: 8 column tab. Bell: Audible alarm in receipt of ASCII BEL command. Clock: Continuous running real time clock with nickel-cadmium battery. Diagnostics: Automatic power-on with LED indicators; ROM-based user-invoked LED display; and optional disk-based diagnostics. Serial I/O Port: A 9-pin IBM PC AT-compatible connector; asynchronous; 110 - 19,200 baud rate; and supports both full and half duplex operation. Odd, even, or null parity. Parallel I/O Port: Female connector Centronics compatible. Expansion Capability: 10 bus slots with 7 empty and available for expansion. 2 for 8-bit only PC-compatible, 4 for 8/16-bit PC-AT compatible, and one for Zenith video option slot. Power Requirements: 110/220 VAC at 50/60 Hz. Dimensions: 21" W x 16.5" D x 6.5" H. Weight: 35 lbs. with single floppy drive. 38 lbs. with Winchester and floppy drive.

2 The H-100 Desktop Computer with advanced features

Low-Profile

\$1595⁰⁰
Kit

Lowest prices ever
on assembled models

The H-100 Desktop Computer features dual microprocessors for running 8 and 16-bit software plus S-100 expansion slots so you can take advantage of advancing technology. In addition, the H-100 offers high speed processing, large capacity disk storage, easy-to-use keyboard, high resolution graphics capability, and an expandable memory.

The H-100 Desktop Computer is an exceptionally advanced computer with a conveniently flexible and easily expandable system to meet your growing business and personal needs. It has two microprocessors that allow you to use sophisticated 16-bit MS-DOS applications software, and also to run most of today's existing CP/M 8-bit software programs...now totalling more than 10,000.

Work faster and save precious time with an H-100 Computer that operates at 8 MHz (some assembled models operate at 5 MHz). You'll be able to run application programs faster, search data bases faster, and compile and assemble programs faster. Add an 8087 numeric co-processor to increase the operating efficiency of applications requiring math-intensive operations.

Standard 256K RAM and high capacity storage. All H-100 Computers are equipped with 256K RAM that's easily expandable to 768K on the motherboard, without wasting expansion slots. And a choice of one or two high capacity 5.25" disk drives add faster operational speed and efficiency. Each double-sided double-density drive has a storage capacity of 320K. Or choose an 11MB Winchester rigid disk to conveniently store data.

The H-100 Computer is available in two models, All-In-One and Low-Profile. The All-In-One is equipped with a built-in high-resolution 12" monochrome video display that presents an easy-to-read 25 line by 80 character display. Screen colors are available in non-glare green, amber or white. Both models offer monochrome and color video outputs. Control 144,000 individual dots on a 640 x 225 area pixels for highly detailed drawings and graphs.

Designed for easy expansion, the H-100 Computer features four open industry standard IEEE 696 S-100 slots to accommodate most any peripheral. Also expand using three communication ports, one parallel and two serial, for total communications flexibility without using a single expansion slot.

MS-DOS is included with all H-100 Computers, both kit and assembled. All assembled Z-100s include the popular integrated LOTUS 1-2-3 software package.

NEW! Kit HSA-1128-41, All-In-One with monochrome graphics, non-glare amber CRT, 256K RAM, one 5.25" drive for 320K bytes of storage, 8 MHz operation, and MS-DOS, Shpg. wt. 112 lbs. 1699.00

NEW! Kit HSA-1128-42, All-In-One with monochrome graphics, non-glare amber CRT, 256K RAM, two 5.25" drives for 640K bytes of storage, 8 MHz operation, and MS-DOS, Shpg. wt. 122 lbs. 1899.00

NEW! Kit HSG-1128-41, All-In-One with monochrome graphics, non-glare green CRT, 256K RAM, one 5.25" drive for 320K bytes of storage, 8 MHz operation, and MS-DOS, Shpg. wt. 112 lbs. 1699.00

NEW! Kit HSG-1128-42, All-In-One with monochrome graphics, non-glare green CRT, 256K RAM, two 5.25" drives for 640K bytes of storage, 8 MHz operation, and MS-DOS, Shpg. wt. 122 lbs. 1899.00

NEW! Kit HSW-1128-41, All-In-One with monochrome graphics, non-glare white CRT, 256K RAM, one 5.25" drive for 320K bytes of storage, 8 MHz operation, and MS-DOS, Shpg. wt. 112 lbs. 1699.00

NEW! Kit HSW-1128-42, All-In-One with monochrome graphics, non-glare white CRT, 256K RAM, two 5.25" drives for 640K bytes of storage, 8 MHz operation, and MS-DOS, Shpg. wt. 122 lbs. 1899.00

NEW! Kit HS-1108-41, Low-Profile with 256K RAM, one 5.25" drive for 320K storage, 8 MHz operation and MS-DOS, 89 lbs. 1599.00

NEW! Kit HS-1108-42, Low-Profile with 256K RAM, two 5.25" drives for 640K storage, 8 MHz operation and MS-DOS, 100 lbs. 1799.00

NEW! ZF-118-42, Assembled Low-Profile with monochrome graphics, 256K RAM, two 5.25" drives for 640K bytes of storage, 8 MHz operation, and MS-DOS and LOTUS 1-2-3, 54 lbs. Mfr. Frt. Regularly \$3099.00 **Reduced To 2399.00**

ZFG-121-32, Assembled H-100 with a non-glare green CRT, 192K RAM, two 5.25" drives for 640K bytes of storage, 5 MHz operation, and MS-DOS and LOTUS 1-2-3, 68 lbs. Mfr. Frt. Regularly \$3729.00 **Reduced To 2499.00**

NEW! ZW-118-42, Assembled Low-Profile with internal 11 MB Winchester, one 5.25" drive with 320K bytes of storage, 256K RAM, 8 MHz operation, plus MS-DOS and LOTUS 1-2-3, 55 lbs. Regularly \$4675.00 **Reduced To 3399.00**

ZWG-121-32, Assembled All-In-One with internal 11 MB Winchester, one 320K 5.25" drive, 192K RAM, 5 MHz operation, plus MS-DOS and LOTUS 1-2-3 software, 68 lbs. Mfr. Frt. Regularly \$5599.00 **Reduced To 3499.00**

For additional second 5.25" disk drives for H/Z-100 Computers with one drive, visit your nearest Heath/Zenith Computers & Electronics Center (consult telephone white pages) or call TOLL-FREE 800-253-7057 from 8 AM to 4:30 PM ET, Monday thru Friday. Alaska and Michigan residents call 616-982-3411.

Winchester Upgrade Kit allows you to replace an existing 5.25" floppy drive in an H-100 Computer with a 5.25" Winchester rigid disk drive. The Winchester Upgrade Kit is for use with H-100 Computers only. For use in assembled Z-100 Computers, contact Heath Customer Service (see page 52). Or, contact your nearest Heath/Zenith Computers & Electronics Center.

HS-217, For models with full height drives, Shpg. wt. 33 lbs. 999.00
HS-217A, For models with half height drives, Shpg. wt. 30 lbs. 999.00

NEW! HA-108, 8 MHz Conversion Kit for H-100 kit computers equipped with half-height drives. Converts these kits from 5 MHz operation to 8 MHz operation. Also adds 256K RAM chip capability (one included) and enables RAM expansion on the main board up to 768K. For remaining kit and assembled H-100 Computers call Heath Co. TOLL-FREE at 800-253-7057 from 8 A.M. to 4:30 P.M. Or contact your nearest Heath/Zenith Computers & Electronics Center.

Shpg. wt. 2 lbs. 249.95
NEW! Z-205-4, 256K RAM Chip Set for use in extending the RAM capability of 8 MHz H-100 Computers, Shpg. wt. 1 lb. 199.00

Z-204, Assembled H/Z-100 Multiport Input/Output Card provides four additional serial I/O ports, one 8-bit parallel input port and one 8-bit parallel output port. Includes two cables, Shpg. wt. 3 lbs. **395.00**

NEW! Z-216-8, 8087 Numeric Co-Processor for H/Z-100 Computers operating at 8 MHz. Shpg. wt. 2 lbs. **429.00**

Z-205-1, RAM Upgrade package for use only with 5 MHz operation H/Z-100 Computers and provides 64K of RAM. Shpg. wt. 1 lb. **79.99**

Z-205, Expansion RAM Card gives your H/Z-100 Computer an additional 256K of memory (requires 192K of RAM on main computer board). For use only in 5 MHz operation H/Z-100 Computers. Card is fully populated. 2 lbs. **599.00**

Z-219-1, One Color Video RAM Chip set, two sets are required to upgrade H-100 Computers with monochrome outputs to color capability, Shpg. wt. 1 lb. **74.99**

ZA-100-4, S-100 Extender Board, Shpg. wt. 1 lb. 59.00

HDC-100, Dust Cover for Low-Profile Computer, Shpg. wt. 1 lb. 16.00

HDC-120, Dust Cover for All-In-One Computer, Shpg. wt. 1 lb. 16.00

TM-100, H/Z-100 Technical Manuals, Shpg. wt. 22 lbs. 110.00

50% OFF! H-100 DESKTOP SAVERS

Get a big 50% discount on any or all of the following selected items when you buy them within 90 days of any kit or assembled 100 Computer purchase. Computer purchase receipt required.

Any three Heath/Zenith software packages.

PC-250, UCI IBM PC Emulator (Assembled 100s only).

PC-251, Gemini IBM PC Emulator (Assembled 100s only).

Z-205-4, 256K RAM Chip Set.

Z-216-8, 8087 Numeric Co-Processor.

Two Z-219-1 Color Chip Sets.

ZA-100-4, S-100 Extender Board.

Run IBM PC software on your H/Z-100 Desktop Computer

Two new IBM PC Emulators enable the H/Z-100 Computer to run many (but not all) IBM PC applications programs. Load and run IBM PC versions of LOTUS 1-2-3, WordStar, Multiplan and other popular business programs while retaining all the capabilities and features of your H/Z-100. These emulators allow you to use software that does not bypass ROM BIOS and does not directly control hardware elements in the computer such as printer ports and drive access. Both emulators are totally transparent to the computer when it is in the 100 mode of operation and they work equally well at 4.77 MHz or 8 MHz. Both require PC operating system.

These new emulators plug into the H/Z-100 Computer and do not conflict with the computer's hardware. Each system supports IBM PC software only and does not allow IBM PC accessories to work on the H/Z-100 Computer. Both emulators also have 90-day unconditional guarantees, either you're satisfied with the emulators or we'll refund your money.

EASY PC from UCI Corporation uses a hardware approach to IBM PC compatibility for the H/Z-100. This emulator consists of three separate boards (but uses only one expansion slot), a video board, a floppy disk controller board, and an add-on PC system board to the H/Z-100 motherboard. A remote audio speaker is also included. This system features PC compatibility for color graphics video, audio support for program sound effects, and Winchester support.

NEW! PC-250, Shpg. wt. 3 lbs. 699.00

Gemini H/Z-100/IBM PC Emulator from D.E.L. Professional Systems Ltd. uses software emulation to allow H/Z-100 Computers to run many software programs designed for the IBM PC. The Gemini Emulator uses one plug-in circuit board to the H/Z-100 motherboard to achieve PC compatibility. This emulator also contains a socket for an optional 8087 numeric co-processor which is accessible even while operating in the 100 mode.

NEW! PC-251, Shpg. wt. 2 lbs. 599.00

SAVER! Purchase either the PC-250 EASY PC or the PC-251 Gemini emulators and get MS-DOS (OS-63-31) for PCs. Regularly \$150.00 90.00

More accessory boards are located on pages 98 and 99.



Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center

COMPUTERS/87

Compact Z-138-42 Transportable with
full PC compatibility and full capability



1
A full-featured
compact
computer

Detached
user-friendly
keyboard



2

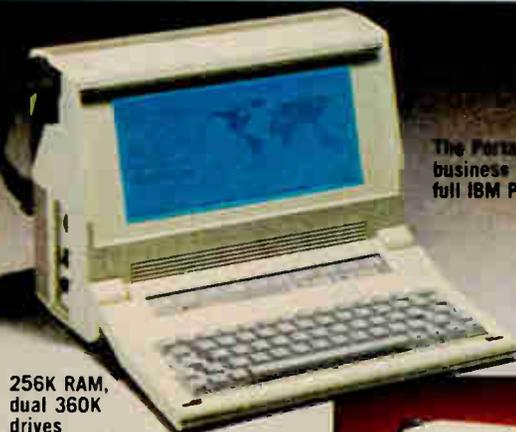
NEW

ZP-150 Laptop
Computer with
built-in software

LCD screen
and full-sized
typewriter
keyboard

Built-in 300
baud modem

7.7 lb. portable
fits in most standard
sized briefcases



The Portable Z-171-42
business computer with
full IBM PC compatibility

25 line by
80 character
back lite LCD
display

256K RAM,
dual 360K
drives

Operates on AC power as well as
an optional rechargeable battery
pack for hours of uninterrupted
computing



1 All the power of a desktop PC in a compact and portable computer with IBM PC compatibility

For only
\$1999⁰⁰

Get full personal computer capability in less space and at a lower cost than comparably equipped desktop computers. The new compact Z-138 Transportable Computer packs all the power of a desktop into a small, total performer that helps you keep pace with business no matter where it occurs.

Take full IBM compatibility on the road and take along all the business tools that you used back at the office on your desktop computer. The Z-138 Transportable Computer provides you with all the features and all the performance that you get from an office desktop. And you get the ability to access the complete software library of advanced 16 bit software developed for the IBM PC.

Based on the same 8088 16 bit microprocessor as the IBM PC, the Z-138 Transportable not only offers 4.77 MHz operation, but it can also be manually switched to operate at a higher 8 MHz. This allows you to take advantage of the latest software developments without sacrificing compatibility for software requiring slower speeds. And add an 8 MHz co-processor for faster math-intensive operations.

Memory and data storage capability to do the job. The Z-138 Compact Transportable is equipped with a standard 256K user memory that can handle most any software application. And if more user memory is ever required, RAM can be easily expanded up to 640K on the memory board by adding plug-in Z-205-4 Memory Chip Sets. Large data storage potential is also offered by the Z-138 Compact PC. Each of the computer's IBM standard format double-sided, double-density 5.25" floppy disk drives is capable of storing up to 360K bytes of data. Together these two floppy drives provide up to 720K bytes of total storage.

Get real communications flexibility with this computer's standard RS-232C serial port and a Centronics parallel port. Connect off-the-shelf IBM PC type printers, modems, hard disk drives, and other peripherals when you need them. And, an optional internal IBM-compatible expansion slot can be added via a main board plug with the Z-130-1 Expansion Card for IBM PC accessory cards.

A 7" diagonal amber monitor is built into the Z-138 Transportable. The screen displays a full 25 lines x 80 characters and also has full graphics capabilities. A gray scale function allows programming of color intensities. Separate external

3 A portable personal computer with total PC performance and IBM PC compatibility

Only
\$2699⁰⁰

The Z-171 Portable Personal Computer features all the power and performance of desktop PCs in a compact and lightweight package. Don't let its size fool you. Anything you can do in your office, you can also do in a train, car, or your backyard... and at an affordable price.

The Z-171 Portable Personal Computer is a lightweight, briefcase-sized computer that can take care of any number of personal or business computing needs. It is a portable system with all the features of a full-sized system and it can run virtually all software from IBM's vast library. It can be used as a self-contained personal computer or act as part of large computer network. And it's the right size to carry home, to the office, or into the field while small enough to hand-carry onto an airplane. No longer sacrifice features for portability.

The Z-171 Portable PC is designed to operate with MS-DOS. Using this operating system it can handle a wide variety of business and personal computing needs as well as provide practical and affordable solutions to many business computing problems. Several useful functions are available without using an operating system, accessed through keyboard pictures or icons. Pressing these icons let you change set-up options, check the time in another area of the world from a displayed world map, dial a telephone number or access a database from its directory, activate a four-function calculator which can be placed on the left or right side of the screen, and start a normal boot routine.

A backlit LCD screen permits excellent visibility of a 25 line by 80 character display at any angle and in any lighting. This is due to electroluminescent backlighting which can be adjusted to control the display's intensity. The display has full graphics capability and is compatible with the IBM PC color graphics adapter in text and graphics modes.

Extensive memory and storage capacity. The Z-171 PC comes standard with 256K of on-board memory that can easily be expanded up to 640K with affordable Z-205-4 Memory Chip Sets as you need the extra memory. Also standard are two 5.25" double-sided, double-density disk drives that are formatted in the IBM PC standard. Each drive stores up to 360K of data for a total capacity of 720K.

Other outstanding features include complete communications flexibility with a RS-232C serial port and a Centronics parallel port, a user-friendly keyboard with

RGB and composite video outputs are available for the connection of external monochrome or color video monitors to make your expressive graphic presentations even more appealing.

The same enhanced detached keyboard found on all the other popular Heath/Zenith Personal Computers is used in the Z-138 Transportable. This keyboard has user-friendly features such as an L-shaped return key, plus and minus on a separate numeric keypad, caps lock and numbers lock LED status indicators, and ten programmable special function keys.

FREE software with the Z-138 Compact Transportable. The MS-DOS operating system, the multiple-window word processor Word, and the electronic spreadsheet Multiplan from Microsoft are included at no charge. These three popular software packages, valued at over \$700.00, supply powerful and time-saving solutions to most any business or personal needs.

ZFA-138-42, Assembled Compact Transportable PC with 256K RAM, two 5.25" disk drives capable of storing 720K bytes of data, 7" amber CRT, 8 MHz operation, and monochrome and color capability. Shpg. wt. 35 lbs. **1999.00**

Z-130-1, Internal Expansion Card, Shpg. wt. 2 lbs. **149.00**

Z-316-8, 8 MHz 8087 Numeric Co-Processor for increasing the speed of math-intensive programs, Shpg. wt. 1 lb. **Please Call**

MS-5066-20, Microsoft's WORKS in ROM. Contains six Microsoft programs: Word, Plan, BASIC, File, Calendar, and Telcom. HS-138 PC must be equipped with a Z-130-1 Expansion Board and 256K RAM minimum.

Shpg. wt. 5 lbs. **Please Call**

50% OFF Z-138 COMPACT PC SAVERS

Save 50% on the following selected items when you buy them within 90 days of purchasing a Z-138 Compact Transportable PC. Computer purchase receipt required.

Any three Heath/Zenith software packages.

Z-130-1, Internal Expansion Card.

Z-205-4, 256K Memory Upgrade Chip Set.

Z-316-8, 8 MHz 8087 Co-Processor.

MS-5066-20, Microsoft's WORKS in ROM.

four cursor control keys and ten programmable function keys, and automatic self-test diagnostics when the computer is first turned on. An optional ZA-170-3 video controller allows the use external monochrome or color monitor.

The Z-171 Portable also features sound capabilities compatible with the IBM PC for interesting gaming and instructional applications. There is one voice which can be programmed for both frequency and duration. This computer system operates on AC power, from an included adapter, as well as an optional rechargeable battery pack. And you can utilize the extensive library of IBM compatible software through MS-DOS which is included with the computer. A demonstration disk is also included that shows you how to operate the computer.

ZFL-171-42, Assembled Portable Computer with 256K RAM, two 5.25" disk drives with 720K byte storage capability, 4.77 MHz operation, 25 line x 80 character LCD display, and an AC power supply. Shpg. wt. 18 lbs. **2699.00**

ZA-170-1, Optional Battery Pack, Shpg. wt. 3 lbs. **69.00**

ZA-170-2, Optional Padded Computer Carrying Case, 3 lbs. **69.00**

ZA-170-3, Optional Internal Color Video Card, Shpg. wt. 1 lb. **229.00**

ZA-170-4, Optional Internal 300/1200 Baud Modem, 1 lb. **379.00**

Z-205-4, 256K Memory Upgrade Chip Set, Shpg. wt. 1 lb. **199.00**

TM-170, Z-171 Technical Manual, Shpg. wt. 3 lbs. **Please Call**

50% OFF Z-171 PC SAVERS

Save 50% on any or all of these selected items when you buy them within 90 days of a Z-171 Portable PC purchase. Computer receipt required.

Any three Heath/Zenith software packages.

ZA-170-1, Z-171 PC Battery Pack.

ZA-170-2, Z-171 Carrying Case.

ZA-170-3, Z-171 Color Video Card.

ZA-170-4, Z-171 Internal 300/1200 Modem.

Z-205-4, 256K Memory Upgrade Chip Set.

2 A truly portable lap-sized personal computer with the power of six built-in Microsoft programs

Specially priced at **\$999.00**

Includes FREE software

Microsoft WORKS included FREE. In ROM are:

WORD, a flexible word processor

PLAN, popular Multiplan spreadsheet

BASIC, a subset of GW-BASIC

FILE, data base management

CALENDAR, tracks appointments with alarm

TELECOM, for telecommunications

From traveling business people to note-taking students, the Heath/Zenith ZP-150 Laptop Personal Computer is a real solution to many problems. The ZP-150 Laptop's compact size, battery power supply, and built-in Microsoft programs make it an invaluable tool for active people who don't have time to sit in front of a desktop computer. And the ZP-150 easily fits in most standard size briefcases.

Six built-in Microsoft applications programs, stored in 224K of ROM, provide all the tools supplied by your desk-bound computer. Available are special customized versions of Word, Multiplan, and GW-BASIC as well as a calendar/alarm, a data base management filer, and a telecommunications program. A built-in calculator with memory is available from within any of the six application programs.

Produce letters, memos, and reports easily and efficiently with Word, a flexible word processor. Word lets you create and correct documents with some of the same features found on dedicated word processors and professional typesetting equipment. Word also lets you control the appearance of your work.

Analyze and organize numbers, and perform calculations involving elaborate formulas for both business and personal use with the electronic spreadsheet Plan. It is a dynamic worksheet that can contain text, numbers, or formulas to help you examine and use the relationships between values in different parts of a spreadsheet 255 rows long by 63 columns wide.

Write and execute your own application programs using built-in BASIC. A powerful and easy-to-use programming language, this version is a very large subset of Microsoft's GW-BASIC for desktop computers.

Keep track of appointments with the ZP-150 Laptop's built-in calendar. Even have an alarm remind you of them. The interactive clock/calendar program consists of a daily diary that lets you view a detailed schedule for any given day and a monthly calendar that lets you see the days of any month where activities are scheduled or to be scheduled. You can even set a priority level for scheduled events.

Create your own information filing and retrieval system using the File data base. Create, delete, and edit records that keep track of inventory, billing, mailing lists, or any record that you want to keep. Organize data the way you want and be able to exchange the information between any two data bases or with Word and Plan application programs. File can hold a maximum of 4096 records with 64 fields, with each field holding up to 255 characters.

Access computer data bases, electronic mail, bulletin boards, or other computers using the built-in telecommunications program. An internal 300 baud modem is always available or connect a high speed modem for faster file transferring. You can even switch to voice for making a regular phone call.

Store your data in 32K RAM, expandable to 416K, even when the computer is turned off. The easily readable LCD display can be tilted and the intensity adjusted for optimum viewing comfort. The Laptop is powered by 10 'AA' size alkaline batteries (not included) when not using AC power. A battery saving feature of the ZP-150 automatically shuts power off after a preset idle time. A 120 VAC adapter and carrying case are included.

SPECIAL OFFER! For a limited time only the CB-5063-27 File Transfer software is included FREE with a ZP-150 Laptop. This package offer allows you to do your computing on the road, transfer files to your desktop when you return to the office, and then reload needed information back into the Laptop for your next trip.

ZP-150, With Free WORKS software and CB-5063-27 File Transfer software, Shpg. wt. 22 lbs. **Was \$1995.00 Now Only 999.00**

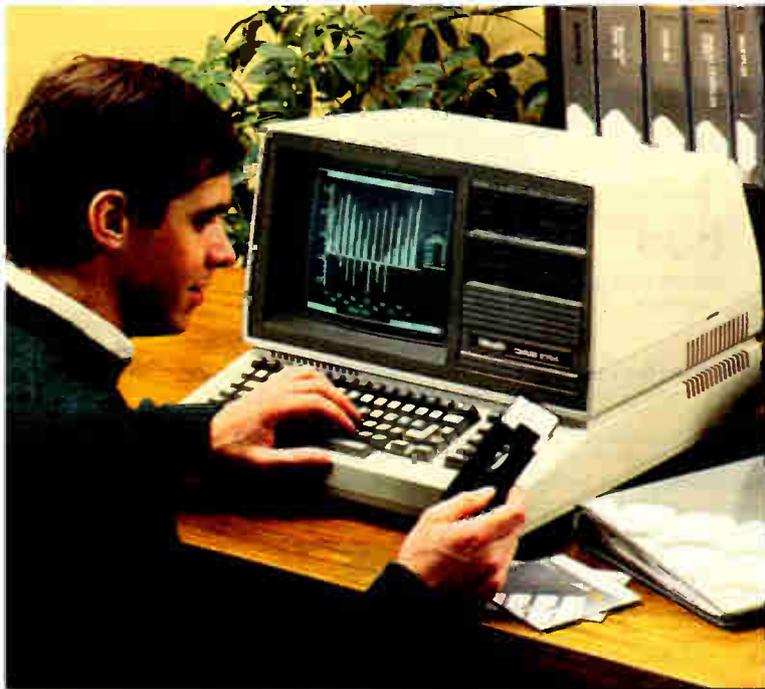
ZP-150-2, RAM Module, 32K of additional internal RAM, 1 lb. **199.00**

ZP-150-4, Parallel Printer Adapter Cable, Shpg. wt. 1 lb. **19.00**

Transfer files from the Laptop to other computers

Transfer text or binary files error-free at 9600 baud between the ZP-150 Laptop, and Heath/Zenith Personal Computers or the H/Z-100 Computer using this software package. Includes female to female null modem cable to directly connect the Laptop to the RS-232C connector of a host computer. Host computer must have one 5.25" floppy drive and be using the MS-DOS operating system. Included FREE with the Heath/Zenith ZP-150 Laptop Computer.

CB-5063-27, Shpg. wt. 3 lbs. **49.00**



Easy, one-stop software shopping for Heath/Zenith Computers that comes with friendly, expert technical support

Popular software packages from accounting to word processing, including operating systems and programming languages, are available for all the powerful and versatile Heath/Zenith Computers detailed on pages 84 through 89 of this catalog. You'll find familiar products like WordStar, Multiplan, Word, dBASE II, IRMA, and others. Many are designed to relieve the tedious financial and record keeping tasks encountered in all businesses. These packages are listed in easy-to-read charts on pages 91 to 94. Make your selections and then order by phone or by mail. And we back all our software used on Heath/Zenith Computers with FREE support and service.

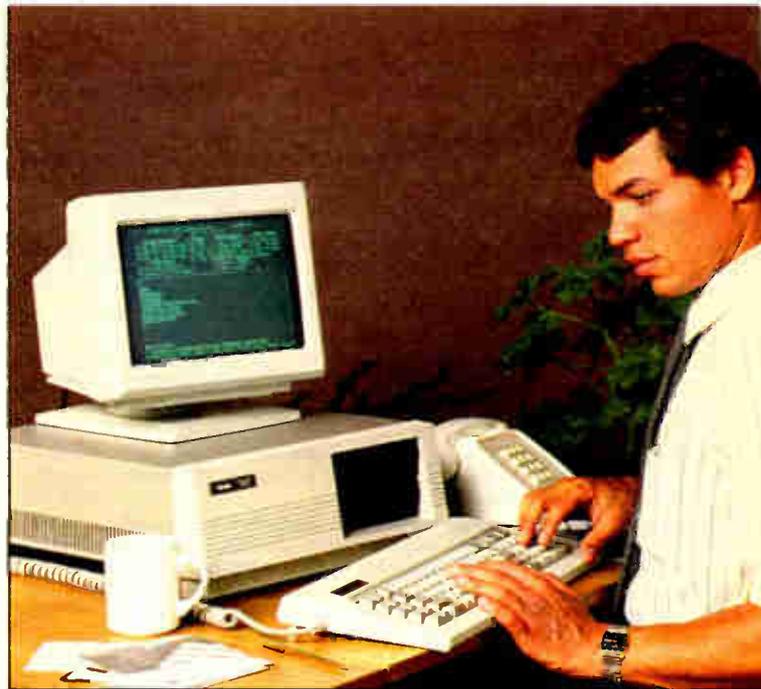
These software charts on the following pages are divided into two sections. They contain software that runs on the H/Z-100 Advanced Desktop Computer, and kit and assembled Heath Personal Computers. The Heath PCs include the new Z-200 Advanced PC, the HS-158 Expandable PC, the new HS-148 Compact PC, the new assembled Z-138 Compact Transportable, and the Z-171 Portable PC.

We make software ordering as easy as possible. Locate the category of the software in which you are interested and note the many different packages available for the Heath/Zenith PCs and the H/Z-100 Advanced Desktop Computer. Choose a desired software package and look opposite it on the same line for the model number, its price, and the shipping weight. Take for example the category of word processing. In this section there are several popular programs listed for use with both the Heath PCs and the H/Z-100 Computer. If you are interested in WordStar for your HS-158 Expandable PC, the model number, shipping weight, and price are given in the same line as the software's name under the column heading of Heath/Zenith Personal Computers and Portable PCs.

Minimum hardware and software requirements are also given for each package. This information lets you know ahead of time what your computer must be equipped with for a particular software program to perform properly. In the same line of every product there are several numbers enclosed by parentheses. Refer to these numbers at the bottom of the chart. There you'll find information about minimum RAM requirements, whether one or two 5.25" disk drives is sufficient, which operating system to use, is a programming language required, and if other software or special accessory boards are needed for you to take full advantage of a desired software package's features. Special instructions or information is also included when needed.

Easy TOLL-FREE ordering

Get your software selections faster by calling TOLL-FREE 800-253-7057 (Alaska and Michigan residents call 616-982-3411). Telephone orders are accepted between 8:00 A.M. and 4:30 P.M. Eastern Time, Monday through Friday. Or, use our handy order blank located between pages 52 and 53 of this catalog for convenient shopping by mail.



By phone, a trained and experienced computer marketer will help you with your order. This professional is also available to answer virtually any question about product compatibility with your computer if you are unsure of hardware and/or software requirements. Need advice about which software packages will work together? Our friendly and courteous staff has the answers. Just give them a call.

One very good reason to call in your software order is to check our current prices. We must constantly adjust many of them to stay in step with the software industry and be able to offer you the best possible prices. Some manufacturer's prices vary quite often, sometimes daily, and our press deadline times prevent us from listing the latest selling price. So, to be sure you have our up-to-date "latest" prices call our TOLL-FREE telephone number, 800-253-7057.

Use your Visa or MasterCard credit cards

More value-added benefits are yours when you order software from your one-stop shopping center. You get popular and powerful software from the same people you purchased your computer from...so you can be confident that it works on your computer. You can pay for it by personal check or money order. Put it on your Visa or MasterCard credit card or on a personal Heath Revolving Charge (see ordering information on pages 52 and 53 of this catalog). There is NO surcharge for any credit card order. All orders are shipped UPS and they are insured at no extra charge. And there is no sales tax (except for deliveries in Michigan) on mail order items which can save you anywhere from 2% to 7.5% depending on your state's sales tax rate.

Heath/Zenith Computers & Electronics Centers offer many of these same advantages plus personalized service. Our fully-stocked retail stores feature complete demonstration facilities and expert advice to help you do what you want to on your computer. Our courteous and friendly sales teams are ready to serve you anytime you visit any of our 63 computer hardware and software one-stop shopping centers. Consult the white pages of the telephone directory for the nearest Computers & Electronics Center.

FREE technical support

You get a most important extra with every Heath/Zenith software package you purchase...technical support. If you should encounter a problem running any of our software on Heath/Zenith computer systems, our expert team of consultants will get your hardware and software to work together, as it should. Have a question about hardware requirements, initial boot-up procedures, initial software configuring of drives and printers, backup procedures, how to determine if a program is defective, or alternate program recommendations? Our friendly, expert technical support people have the answers. For questions about operating systems, languages, and utilities; call 616-982-3860. For questions on applications programs, call 616-982-3884. Call between 8:00 A.M. and 7:30 P.M. Eastern Time, Monday through Friday, on regular business days. Or write to our consultants at Zenith Data Systems Corporation, Software Consultation, Hilltop Road, St. Joseph, Michigan 49085.



**1-STOP
SOFTWARE
SHOPPING**

	Heath/Zenith Personal Computers and Portable PCs			H/Z-100 Advanced Desktop Computer		
	Model Number	Shpg. wt. (lbs.)	Price (\$)	Model Number	Shpg. wt. (lbs.)	Price (\$)
OPERATING SYSTEMS						
★Concurrent CP/M* CP/M*(5) CP/M-86*(5) MP/M-86*(5) MS-DOS Vers. 2(5) MS-DOS Enhancement(5,12) ★MS-DOS Vers. 3(2,5) UCSD p-System(1,5)	OS-63-50 OS-63-51 OS-63-31	5 5 3	150.00 150.00 150.00	OS-61-12 OS-53-2 OS-63-2 OS-63-5 OS-61-8 OS-63-30 OS-61-3	3 5 3 5 5 3 14	299.00 150.00 99.00 99.00 150.00 150.00 99.00
WORD PROCESSING						
MailMerge*(7,10) Multimate*(3,6,7) PeachText 5000*(1,6,7) SpellStar*(7,10) Word(1,5,7) WordStar*(1,5,7) WordStar Professional*(2,5,7) WordStar Professional Option(2,5,7,10)	SS-5063-1 RS-463-75 MS-5063-9 MP-5063-10 MP-5063-13 MP-5063-12	3 3 3 3 3 3	495.00 295.00 375.00 299.00 399.00 199.00	MP-463-11 RS-463-75 MP-463-6 MP-463-10 MP-463-17	3 3 5 4 4	249.00 295.00 149.00 299.00 399.00
SPREADSHEETS						
LOTUS 1-2-3(2,6,7) Multiplan(1,5,7) SuperCalc*(5,7) SuperCalc3*(1,6,7)	LS-5063-1 (16) MS-5063-17 SC-5063-3	3 3 3	299.00 195.00 395.00	LS-463-1 MS-463-7 SC-463-1	4 6 4	299.00 195.00 195.00
DATA BASE MANAGEMENT SYSTEMS						
Condor* rDBMS*(1,5,7) Condor FMS*(1,6,7) dBASE II(1,5,7) Pecon Peachtree*/Condor Interface(2,6,7,14) Package: Condor FMS and Pecon(2,6,7,14)	CD-5063-3 CD-5063-2 AT-5065-1 CB-5063-9	5 3 3 1	650.00 199.00 495.00 99.00	CD-463-1 CD-463-2 AT-5065-1 CB-463-9 ZSS-100-28	4 4 3 3 7	650.00 199.00 495.00 99.00 249.00

Minimum Computer Hardware and Software Requirements:

- | | |
|-----------------------------|---|
| (1) 128K RAM | (11) Z-204 Multiport I/O Card |
| (2) 192K RAM | (12) Z-319 Video Graphics Card |
| (3) 256K RAM | (14) Either Condor rDBMS or FMS
and one Peachtree Accounting Package |
| (5) One 5.25" disk drive | (16) Not available by mail order.
Visit your nearest Heath/Zenith Computers
& Electronics Center. |
| (6) Two 5.25" disk drives | |
| (7) MS-DOS Operating System | |
| (10) WordStar | |

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★Look for these new products.

Use your Visa or MasterCard credit cards to purchase your kit!

COMPUTERS/91

	Heath/Zenith Personal Computers and Portable PCs			H/Z-100 Advanced Desktop Computer		
	Model Number	Shpg. wt. (lbs.)	Price (\$)	Model Number	Shpg. wt. (lbs.)	Price (\$)
ACCOUNTING						
BPI General Accounting (2,6,7,9)	BP-5063-1	3	595.00			
BPI General Accounting, Training	BP-5063-71	1	69.00			
BPI Accounts Receivable (2,6,7,9)	BP-5603-2	3	595.00			
BPI Accounts Payable (2,6,7,9)	BP-5063-3	5	595.00			
BPI Payroll (2,6,7,9)	BP-5063-4	3	595.00			
BPI Inventory Control (2,6,7,9)	BP-5063-5	3	795.00			
BPI Job Costing (2,6,7,9)	BP-5063-6	3	795.00			
BPI Personal Accounting (2,6,7,9)	BP-5063-8	1	195.00			
BPI Package: Six Accounting Programs (2,6,7,9)	ZSS-150-6	49	999.00			
Peachtree* General Ledger (2,6,7,9)	RS-5065-1	3	499.00	RS-463-1	5	399.00
Peachtree Accounts Receivable (2,6,7,9)	RS-5065-2	3	499.00	RS-463-2	4	399.00
Peachtree Accounts Payable (2,6,7,9)	RS-5065-3	3	499.00	RS-463-3	4	399.00
Peachtree Inventory Control (2,6,7,9)	RS-5065-5	3	499.00	RS-463-5	4	499.00
Peachtree Sales Invoicing (2,6,7,9)	RS-5065-6	3	399.00	RS-463-6	4	299.00
Peachtree Package: Six Accounting Programs (2,6,7,9)	ZSS-150-7	40	999.00	ZSS-100-24	46	999.00
Pecon Peachtree/Condor Interface (2,6,7,14)	CB-5063-9	1	99.00	CB-463-9	3	99.00
COMMUNICATIONS						
CPS-150 (1,5,7)	CB-5063-7	3	49.00			
CPS-86 (1,5,7)				CB-463-7	3	40.00
CPS (8-bit) (1,5,8)				CB-253-7	1	40.00
COMMUNICATIONS: NETWORKING						
EtherLink (1,5,7,17)	TC-5063-1	4	650.00			
EtherShare (3,5,7)	TC-5063-2	3	449.00			
EtherMail (19)	TC-5063-3	3	649.00			
EtherPrint (1,6,7,18)	TC-5063-4	3	199.00			
Ethernet 25 ft. Cable	TC-5063-5	1	20.00			
Ethernet 100 ft. Cable	TC-5063-6	6	50.00			
Ethernet Terminator Kit	TC-5063-7	1	25.00			
Ethernet Connector	TC-5063-8	1	6.00			
EtherStart ROM for diskless PC (18)	TC-5063-9	3	125.00			
ZLAN Two Computer System (5,7,15)				ZSS-100-22	21	1499.00
ZLAN Computer Add-On				ZSS-100-23	12	599.00
ZLAN 25 ft. Cable				HCA-60	1	20.00
ZLAN 100 ft. Cable				HCA-61	4	40.00
COMMUNICATIONS: TERMINAL EMULATION						
3270 Emulator (1,5,7)				PO-463-1	2	650.00
IBM 3276/8 SNA/SDLC Emulator (2,5,7,11)				IE-463-2	4	649.00
IRMA (1,5,7)	DC-5063-1	2	1195.00			
Remote Batch Terminal Emulator (1,5,7)				WI-463-1	4	899.00
ZSTEM-VT100 Emulator (1,5,7)	KE-5063-1	3	150.00	KE-463-1	3	149.00

	All Heathkit Personal Computers and Portable PCs			H/Z-100 Advanced Desktop Computer		
	Model Number	Shpg. wt. (lbs.)	Price (\$)	Model Number	Shpg. wt. (lbs.)	Price (\$)
COMPUTER AIDED INSTRUCTION						
ZDS Teacher (1,5,7)				TA-463-1	3	299.00
ZDS Student (1,5,7)				TA-463-2	2	100.00
DIAGNOSTICS						
Disk-Based Computer Tests (1,5)				CB-463-13	4	79.00
★ Personal Computer Diagnostics (1,5)	CB-5063-28	3	79.00			
★ Z-200 PC Diagnostics (3,5)	CB-3163-31	3	Call			
DIRECTORIES						
H/Z-100 Software (3rd Party)				CB-463-15	3	25.00
GRAPHICS						
GrafTalk (1,6,7)	RG-5065-1	3	499.00	RG-463-1	5	449.00
Z-Chart (1,5,7,9)				CB-463-11	3	49.00
4-Point Graphics (4,6,7)	IM-5063-1	3	195.00			
PROGRAMMING LANGUAGES						
BASIC-80 (5,8)	MS-5063-3	5	395.00	MS-253-1	3	175.00
COBOL (1,6,7)	CI-5063-1	3	395.00	MS-5063-3	5	395.00
C86 C Language Compiler (2,6,7)	MS-5063-2	5	195.00	MS-5063-2	5	195.00
FORTTRAN (2,6,7)	MS-5063-13	3	100.00			
GW-BASIC (5,7)	MS-5163-13 (12,13)	3	100.00	MS-5163-13	3	100.00
GW-BASIC 2 (5,7)				MS-463-1	5	175.00
MS BASIC-86	MS-5063-5	5	295.00	MS-5063-5	5	295.00
Pascal (2,6,7)				DR-253-5	5	99.00
Pascal/MT + (1,6,8)	MS-5063-4	3	250.00	MS-463-4	3	250.00
★ GW-BASIC Compiler (5,7)						
SORTING						
Sort (1,6,7)	MS-5063-12	1	199.00	MS-5063-12	1	199.00
SuperSort (1,6,7)				MP-463-1	3	199.00
STATISTICAL ANALYSIS						
Microstat (1,6,7)	ES-5063-1	3	249.00	ES-463-1	2	249.00
UTILITIES						
MS-DOS Vers. 2 Development Kit (2,6,7)	CB-5063-16	3	149.00			
MS-DOS Vers. 3 Programmer's Package	CB-3163-30	5	Call			

Minimum Computer Hardware and Software Requirements:

- | | |
|-----------------------------------|---|
| (1) 128K RAM | (11) Z-204 Multiport I/O Card |
| (2) 192K RAM | (13) MS-DOS Enhancement Op. Sys. |
| (3) 256K RAM | (14) Either Condor rDBMS or FMS
and one Peachtree Accounting Package |
| (4) 320K RAM | (15) Version 2.5 Monitor ROM and a
Z-205 Memory Card |
| (5) One 5.25" disk drive | (18) EtherShare |
| (6) Two 5.25" disk drives | (20) Accesses 64K of RAM |
| (7) MS-DOS Operating System | |
| (8) CP/M Operating System | |
| (9) GW-BASIC Programming Language | |

*Condor is a registered trademark of Condor Computer Corporation. CP/M is a registered trademark of Digital Research Inc. Peachtree is a trademark of MSA, Inc. ZLAN is a trademark of Zenith Data Systems Corporation. Pascal/MT+ is a trademark of Digital Research Inc.

★ Look for these new products.



1



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NEW



6



5

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4

NEW

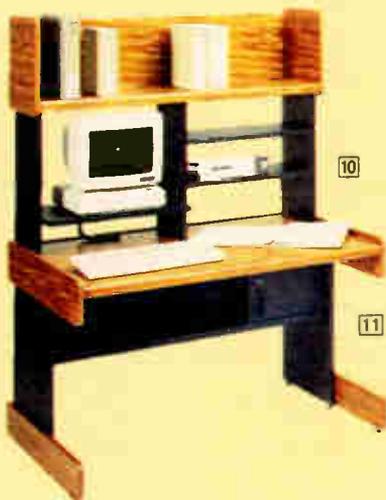


7

Beautiful computer furniture for your home or office



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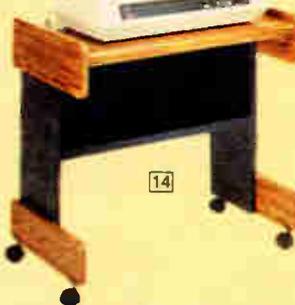
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8 Hutch for Computer Desk

Companion hutch to PF-125 Desk stands 28" high and 35¾" wide. It has a 9" deep full-length bookshelf with an electrical plug opening. An adjustable 20¾" wide by 10¾" deep monitor shelf can be positioned left or right of the desk. Also has two adjustable storage shelves.
PF-126, Shpg. wt. 33 lbs. 79.95

9 Computer System Desk

Computer Desk offers a 35¾" W by 21" D work area, a back opening for printer paper, storage shelf, wire harness clips, floor levelers and stands 28" high.
PF-125, Shpg. wt. 51 lbs. 119.95

10 Hutch for Large Desk

Add-on Hutch is 33" H x 45½" W x 11¾" D and securely fastens onto Large Desk. Its adjustable monitor shelf holds up to a 13" monitor. Has 11½" deep bookshelf and adjustable shelves.
PF-131, Shpg. wt. 46 lbs. 99.95

11 Large Computer Desk

Spacious Desk measures 28" H x 45½" W x 29" D and features a lockable security cabinet for software. Has storage shelf beneath work surface, safety retainer on desk top, wire harness clip on back of desk, and adjustable floor levelers.
PF-130, Mtr. Frt. 85 lbs. 169.95

12 NEW! Comfortable desk chair

Pneumatic seat with spring steel back rest.
PF-103, Shpg. wt. 20 lbs. 59.95

13 Add-On Monitor Platform

Use with either Computer Desk or Printer Stand to hold 13" monitor. 6¼" H x 19" W x 11¾" D.
PF-132, Shpg. wt. 6 lbs. 17.95

14 Roll-Around Printer Stand

Versatile Stand has full-length storage shelf and back opening for printer paper. Measures 28" H x 28¼" W x 19" D and has dual-wheel casters.
PF-120, Shpg. wt. 35 lbs. 79.95

High-resolution monochrome and color video monitors, and an add-on 8-Inch Disk System

1 Sharp pictures on a 25" diagonal color monitor

The CV-2562 is a versatile color monitor that can be used with your personal computer or enjoyed with your component television system, video cassette recorder/disc player, or video game. Advanced circuitry, developed for use with computer monitors, provides improved picture performance with a maximum horizontal picture resolution capacity of up to 450 lines (240 vertical) using RGB or Composite Video inputs. A unique green-only switch eliminates all other colors so that monochrome text material can be easily displayed. Flip the switch back to color and enjoy true color reproduction from other video sources on a monitor with a 6.4 MHz bandwidth. Other convenience features include: an automatic light sensor; automatic monitoring of picture, color, tint, and black level; audio and video multiple monitor loop-through; and an audio amplifier with a 2" x 6" speaker. Monitor is 22 3/4" H x 25 1/2" W x 20 1/4" D and uses 120 VAC at 60 Hz.

- CV-2562, Assembled, Shpg. wt. 108 lbs. Mfr. Frt. **729.95**
 ZVM-134-1, H/Z-100 Cable, Shpg. wt. 2 lbs. **20.00**
 ZVM-134-21, HS-151/IBM-PC Cable, Shpg. wt. 1 lb. **20.00**

2 Build your own 12" diagonal monochrome monitor

- \$89.95**
- Compatible with most personal computer systems
 - Excellent character definition and intensity

Performance comparable with monitors costing much more and in a kit that's fun to build. A wide 15 MHz bandwidth and a fast 21 ns rise time produces a noticeably improved character definition. Special DC-coupled circuits provide high screen brightness even with a screen full of characters. A special 40-80 character switch accommodates computers whose video formats have a 40-column display output. Has NTSC composite video input and amber CRT. Front panel controls adjust black level, contrast, horizontal and vertical hold, and vertical height. Also has power on/off switch. Dimensions: 12" H x 12 7/8" W x 12" D.

- Kit HVM-122A, Shpg. wt. 22 lbs. **89.95**
 ZVM-123-2, Tilt Base, Shpg. wt. 2 lbs. **15.00**
 ZVM-121-1, IBM-PC Cable (RCA connectors), Shpg. wt. 1 lb. **5.00**
 ZVM-121-2, Atari 800 and 1200 Cable, Shpg. wt. 1 lb. **15.00**

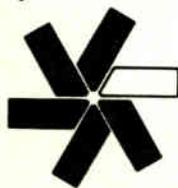
3 Special prices on new 12" diagonal monitors

- Save up to **\$79.00**
- For use with most popular personal computer systems
 - Sharp and distinct character viewing of 25 lines x 80 characters on a "flat" face CRT

Get sharp composite displays when connecting these contemporary-designed video monitors to most any personal or home computer. All three include 100% modular chassis, compact cabinets, and non-glare/dark tint glass screen for easier viewing. Controls include horizontal hold and width, vertical height, contrast, brightness, and power on/off. Front panel LED indicates power on. All cabinets have dimensions of 10" H x 11 3/4" W x 12 1/2" D and weigh 13 lbs.

ZVM-1220A, Assembled monochrome monitor with amber screen. Uses RCA phono plug cable to connect to Heathkit PCs, H/Z-100 Desktop, IBM Personal Computer, Osborne, Apple II and III, Compaq, TI, and others. Has 15 MHz bandwidth and 21 ns rise time. Byte magazine "gold medal winner." Shpg. wt. 16 lbs. Regularly \$199.00 **Special Introduction Price of 119.95**

Be part of Heath/Zenith's worldwide User's Group



Join with thousands of other Heath/Zenith computer users and keep up with the latest happenings and the newest Heath/Zenith computer products. With a HUG membership, you receive the informative RE-Mark magazine every month for a year. It keeps you in touch with other members as you share hardware modifications, software improvements and ideas on computer topics through RE-Mark's open forum. As a member you gain access to over 700 low-cost programs from HUG's software library. You can even purchase Heath/Zenith computer products at a discount using your HUG ID card. Get the latest on Heath/Zenith computer developments and HUG activities with a HUG membership, modem and a CompuServe time-sharing membership on the HUG Bulletin Board. You'll also be able to participate in RE-Mark's interactive forum with other members and use an on-line bulletin board via CompuServe. Get the most from your Heath/Zenith computer...join the Heath User's Group. You'll find a HUG application enclosed with each Heath computer. And don't miss the fun of HUG's annual International Conference.

- ZVM-1230A, Assembled monitor with the same features as ZVM-1220A except with a green screen. 16 lbs. Regularly \$199.00 **Special Introduction Price of 119.95**
 ZVM-1240, Assembled monochrome monitor for use with personal computers that provide TTL-compatible monochrome video output signals. Has amber CRT and 9-pin D-type video output connector. Features a micromesh antiglare filter for user viewing comfort. Has 18 MHz bandwidth and 19 ns rise time. For use with H/Z-329 High Resolution Card or IBM-type monochrome cards. Shpg. wt. 17 lbs. Regularly \$229.00 **Special Introduction Price of 169.95**
 4 ZVM-1200-1, Tilt Swivel Base for use with above monitors, 2 lbs. **25.00**

5 New stylish 13" diagonal color monitors

- ZVM-1330, Assembled RGB-only 25 line by 80 character display non-glare color video monitor which also supports IBM brown and an IBM intensity input. Front panel ON/OFF, Contrast, and Brightness controls with green LED power on indicator. Rear panel Width, Focus, Height, Vertical and Horizontal Centering. Has 9-pin D connector for directly connecting to PC video card. 31 lbs. **Please Call**
 ZVM-1360, Assembled RGB-only video monitor the same as the ZVM-1330 except with a long persistence phosphor CRT. Also permits viewing of interlace displays of up to 80 columns x 50 lines. Shpg. wt. 34 lbs. **Please Call**

6 Compact 13" diagonal color video monitor

Add sound and sharp color displays to most popular home and personal computers, or any video device that has either a composite video or RGB direct drive outputs. The high-resolution ZVM-135 monitor features: 25 line by 80 column display (640 x 240 pixels); 20 MHz bandwidth; composite video loop-thru; front access controls; and a unique "green screen only" switch for easier text viewing. The video monitor has dimensions of 13 3/4" H x 15 1/4" W x 15 1/4" D.

- ZVM-135, Shpg. wt. 39 lbs. **599.00**

Cables for use with the ZVM-135/130/133/136 Color Video Monitors:

- ZVM-135-1, For the H/Z-100 Desktop Computer, 1 lb.
 ZVM-135-2, For the HS-151/161 and IBM-PC, 1 lb.
 ZVM-135-3, For the Apple III Computer, 1 lb.
 ZVM-135-4, For Texas Instruments and Atari Computers, 1 lb.
 ZVM-135-5, For IBM-PC jr with audio, 1 lb.
- \$25.00**
Each

7 Massive 2.5 megabyte storage for H/Z-100 Computer

Add extra data storage capacity to your H/Z-100 Computer with either one or two drive versions of the HS-207 8-Inch Disk System. Each drive uses soft-sectoring to store up to 1.26 MB on a single double-sided double-density disk for a total of 2.52 MB of unformatted data storage. Disks are formatted in the industry-standard IBM 3740 style. Simple one-cable connection to host computer. Built-in power supply with line filter uses 110/220 VAC.

- Kit HS-207-41, One 8" drive, 1.25 MB storage, Shpg. wt. 57 lbs. **999.00**
 Kit HS-207-42, Two 8" drives, 2.5 MB storage, Shpg. wt. 69 lbs. **1599.00**
 Z-207-41, Assembled Disk System with one 8" drive, 53 lbs. **1599.00**
 Z-207-6, Assembled and tested second drive, Shpg. wt. 8 lbs. **699.00**

Send to: HUG Membership, Hilltop Road, St. Joseph, MI 49085.

Yes, I want to become a member of HUG and keep up to date on the latest Heath/Zenith computer developments, while I expand my software library.

I've enclosed \$_____ (U.S. Funds only) to cover the cost of my membership. NOTE: No charge orders or billings are accepted.

Annual Rates:	U.S.	APO/FPD, all others
New Members:	\$20	\$35
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Your one-stop shopping center for Heath/Zenith and IBM-PC accessories and peripherals

For over 40 years Heath has built a reputation for providing you with quality products at very competitive prices. And we've backed them up with technical consulting help by telephone from the factory... plus local assistance at 63 Heath/Zenith Computers & Electronics Centers across the country.

We're now extending the same philosophy to a special group of selected accessories and peripherals for the IBM-PC, all Heath/Zenith Personal Computers, the H-100 Desktop Computer, and the H-89 All-In-One Computer.

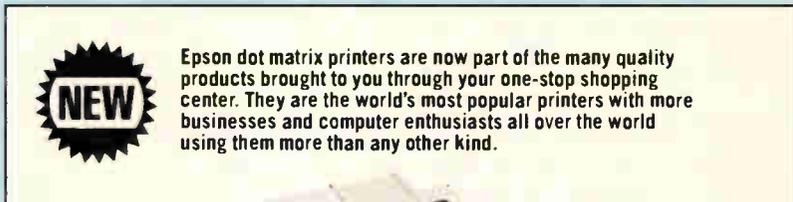
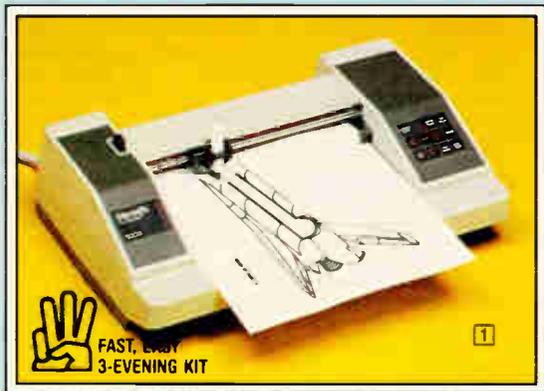
We've looked at hundreds of "compatible" items and selected those shown here on pages 98-100 as "best of breed." Functional checks and product tests have been performed on each item and our support team stands ready to provide

information to you regarding installation and/or connection of any of these products to your IBM-PC or appropriate Heath/Zenith computer.

We'll even install any of the accessory boards on page 98 and 99 that you buy at a Heath/Zenith Computers & Electronics Center **FREE OF CHARGE** when you bring in your computer.

Even though covered by manufacturers' warranty, we're so confident you'll be satisfied with these products that we're offering a **90-day money back guarantee**. Either you're happy with the product or return it and we'll cheerfully refund your money.

Look for these special performance-guaranteed products on pages 98 to 100.



1 Plot high-quality graphics, charts and graphs

\$299⁹⁵
Kit

- Compact and lightweight plotter is fast, highly accurate, and very reliable
- Operates on simple commands from a computer

Draw high resolution graphics with excellent line quality using the IR-5208 kit version of the popular Sweet-P Plotter. It draws virtually every graphic format you'll ever need including pie charts, bar graphs, straight and curved line graphs, illustrations, and alphanumeric labeling on plain bond paper or overhead transparency material. Line segments are accurate to four-thousandths (0.004) of an inch at a maximum speed of six inches per second.

Look up the Plotter to the parallel port of a computer for colorful graphs and engineering graphics. Support Packs, listed below, include a parallel interface cable for use with the entire line of Heath/Zenith Computers as well as the IBM-PC and its compatibles. A software support package is also included with the cable. It is an easy-to-use tutorial that prompts you through each step to help you get the most out of your Plotter. Four pens (red, green, blue and black) are included in the Support Pack. The Plotter is compact (14" W x 8 1/2" D x 3" H) and lightweight (7.2 lbs.) enough to be carried in a standard briefcase.

Kit IR-5208, Shpg. wt. 10 lbs. **Was \$349.95 Now Only 299.95**

IRA-5208-1, Support Pack for H/Z-100, Heath/Zenith Personal Computers, IBM-PC and IBM-PC compatible computers, Shpg. wt. 1 lb. **19.95**

IRA-5208-2, Support Pack for the H/Z-89 Computer (using CP/M* software) on hard-sectored 5.25" disk, requires Z-89-11 Multi-Mode Interface Board, Shpg. wt. 1 lb. **19.95**

IRA-5208-3, Replacement Pen Set includes 4 black pens, 1 lb. **9.95**



Get an EPSON Printer for any application at your Heath/Zenith one-stop shopping center

Features, graphics, and precision are qualities that have made Epson the leading printer manufacturer. Epson printers are picked by more businesses and computer enthusiasts than any other printer. For value they cannot be matched.

Six popular Epson printers are available for uses that range from personal to business needs. Contact us today and see how we can fill your needs with an Epson printer. Choose from dot matrix printers that have pin-point correspondence, letter quality, or draft quality printing. You even have a choice of color.

All Epson printers feature bidirectional printing using a logic seeking printhead. All Printheads are disposable (except for the LQ-1500) and most have a built-in 2K RAM buffer. All have programmable line spacing, page length, column width, and skip over perf. All these printers have parallel interfaces (choice of optional serial or parallel port on LQ-1500) and all feature Epson's special Quiet Mode for quieter office or home environment operation.

For the latest prices call TOLL-FREE 800-253-7057 from 8:00 A.M. to 4:30 P.M. E.T. Monday through Friday. Alaska and Michigan residents call: 616-982-3411.

2 PP-240, LQ-1500 draft and letter quality printer. Shpg. wt. 36 lbs.

PPA-240-1, Replacement ribbon for LQ-1500 Printer. Shpg. wt. 1 lb.

PPA-240-3, Serial Port for LQ-1500 Printer, Shpg. wt. 2 lbs.

PPA-240-4, Parallel Port for LQ-1500 Printer, Shpg. wt. 2 lbs.

3 PP-235, FX-185 136 column business printer. Shpg. wt. 32 lbs.

4 PP-230, RX-100 136 column standard printer. Shpg. wt. 27 lbs.

PPA-230-1, Replacement ribbon for RX-100/FX-185. Shpg. wt. 2 lbs.

5 PP-225, FX-85 bidirectional printer. Shpg. wt. 21 lbs.

PPA-225-1, Replacement ribbon for FX-80/FX-85. Shpg. wt. 1 lb.

6 PP-220, LX-80 draft and near letter quality printer. Shpg. wt. 15 lbs.

PPA-220-1, Replacement ribbon for LX-80. Shpg. wt. 1 lb.

PPA-220-2, Tractor feed for LX-80. Shpg. wt. 2 lbs.

7 PP-215, JX-80 seven color printer. Shpg. wt. 24 lbs.

PPA-215-1, Replacement ribbon for JX-80. Shpg. wt. 1 lb.



8 High-speed Primage 90 daisy wheel printer

- New hammer assembly and electronics increase printer speed and cut printer noise

Very quietly print out documents at up to 90 characters per second with this high-speed daisy wheel printer. It prints at pitches of 10, 12, and 15 cpi, and proportional spacing. It is bidirectional and offers horizontal spacing in increments of 1/20" and vertical spacing at 1/8". The Primage 90 can handle single sheets or an original plus up to 5 carbon copies.

For Computer Credit Card Orders or Information Call TOLL-FREE: 800-253-7057. Alaska and Michigan Residents: Call 616-982-3411.

Connect to virtually any mini- or micro-computer through a serial RS-232 or Centronics parallel interface port. No special cables or adapters needed. Select baud rates from 110 to 9600. The printer emulates the Diablo 630 command set including work processing functions. Printer comes with a 2K storage buffer.

PP-251, Assembled and tested, Shpg. wt. 63 lbs. **1299.00**

PPA-250-1, Cut-Sheet Feeder, Shpg. wt. 18 lbs. **299.95**

PPA-250-2, Tractor Feeder, Shpg. wt. 6 lbs. **275.00**



9 Low cost Panasonic Daisy Wheel Printer offers letter quality printing

High performance, reliability, and versatility are offered by this printer that features outstanding print quality with fully formed characters. And it is compatible with most popular small business and personal computers.

This Panasonic KX-P3151 Daisy Wheel Printer prints out at 22 characters per second using word processing bold, shadow, underline, justification, and centering functions. It can handle paper up to 15 1/2" wide with a capacity of an original plus 3 copies and 3 carbons. Printing is done bidirectionally with a logic seeking head at pitches of 10, 12, 15 cpi and proportional spacing.

Other features include a standard Centronics parallel interface to connect to most popular computers. A 7K storage buffer is also standard on this compactly designed printer. A convenient cassette cartridge makes replacing this printer's ribbon a no-mess operation.

PP-261, Assembled, Shpg. wt. 35 lbs. **599.00**

10 Hayes Automatic 300 baud Smart modem

Automatically dial, answer, send, receive, and disconnect calls. Use with rotary or TOUCH-TONE phone systems. Has RS-232 and includes 120 VAC adapter and phone cable. Built-in audio speaker allows listening in on phone connection. Requires HCA-11 cable on page 97 and CPS software.

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

11 Compact, versatile and easy to use modem

Novation J-CAT 300 Baud Modem is compatible with Bell 103 modems, and can automatically select answer and originate mode. Has visual and audio status indicators, built-in self-test, and two-key operation. Includes cables.

PP-310, Assembled and tested, 2 lbs. **Was \$129.95 Now 109.95**

12 New 2400 baud modem for faster communications

Lower phone costs by cutting valuable hours off your telecommunications times and increase your productivity with the Courier 2400 from U.S. Robotics. Upload or download data at twice the speed of a 1200 baud modem as this high-speed modem transmits at 240 characters a second. It features auto-dial and auto-answer and is fully CCITT and Bell compatible.

Use any of the popular telecom software packages as this modem responds to the full AT command set. For your convenience, this entire set, along with S-register functions, can be displayed on detailed help screens. All of the different dialing commands are also available on-screen. This 2400 baud modem lets you know the length of each call and displays on-screen the status of a call in progress. A speaker with audio level control provides phone line monitoring.

Automatic baud rate switching is a real plus with this modem. Without user intervention the modem can switch baud rates (300, 1200, and 2400) in either the originate or answer mode. And it can test itself in both modes as well. Nine front panel LEDs indicate High Speed, Auto Answer, Carrier Detect, Off Hook, Receive Data, Send Data, Terminal Ready, Analog Loopback, and Modem Ready/Power On.

PP-320, Assembled and tested, Shpg. wt. 5 lbs. **599.00**

13 Save \$20.00 on convenient acoustic modem

The LEX-11 operates at 300 baud in half or full duplex. Has RS-232 connector. Includes AC adapter. Requires an HCA-11 cable on page 101 and CPS software.

WH-23, Assembled, Shpg. wt. 3 lbs. **Was \$139.00 Now Only 119.00**

14 US Robotics 1200 Baud Auto-Answer Modem

Features full and half duplex operation, direct connection to RJ11C standard phone jack, auto and manual answer and originate modes. Includes cable.

PP-300F, Shpg. wt. 3 lbs. **Only 299.00**

Additional accessories are on page 101.

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



1 Ten megabyte disk storage from IOMEGA

Selected as an outstanding product of 1984 by PC Magazine, the Bernoulli Box from IOMEGA Corp. may well put the Winchester drive on the back shelf. Offering the hard disk capacity and speed of a Winchester plus the economy and convenience of flexible disks, the Bernoulli Box is the answer to more reliable, versatile and economical data storage. Each 8½" by 11" removable cartridge houses a flexible disk that stores ten megabytes of data. And, it doesn't require special handling as does familiar 5.25" and 8" floppy disks.

Available in two versions, single and dual drive models, the unique Bernoulli Box combines a number of technological breakthroughs that result in a storage system of amazing simplicity. Data and mechanical reliability is unmatched and the cost per megabyte of storage is dramatically low. The Bernoulli Box complements Heath/Zenith Personal and Portable Computers, as well as, the IBM-PC and all its compatibles. Exceed the capacity of hard disk drives and get transfer and access time that are faster than most Winchester drives. And, it features full support of the MS-DOS operating system. Includes interface card, software, cable and one high-capacity cartridge per drive. Physical configuration may differ.

PP-500-1, Single drive 10M storage, Shpg. wt. 57 lbs. 2195.00

PP-500-2, Dual drive 20M storage, Shpg. wt. 63 lbs. 2995.00

PPA-500-2, Tri-Pak blank 8" cartridges, Shpg. wt. 5 lbs. 199.95

PPA-500-3, Head Cleaner Kit, Shpg. wt. 3 lbs. 79.95



At its one-stop shopping center, Heath Company strives to maintain competitive prices on all accessories along with careful selection and testing of products, full service and support, and a 90-day money-back guarantee. For up-to-the-minute prices call TOLL-FREE 1-800-253-7057.

2 Guaranteed plug-in accessory cards for Heath/Zenith Computers and IBM-PC Computers

Expand the capabilities of your Heath/Zenith or IBM-PC Computer with these "best-of-breed" plug in accessory boards. All are Heath checked for quality and high reliability. Take advantage of all that Heath offers.

Budget priced 300/1200 baud modem with software

An auto dial/answer modem from U.S. Robotics Inc. for use in Heath/Zenith PCs and the IBM-PC. Features manual originate/answer, auto mode, auto speed, full and half-duplex operation, direct connection to phone lines through RJ11C modular phone jack, audio line monitor, and programmable commands. Includes TELPAC communications software and phone cord.

PC-131, Assembled U.S. Robotics Modem, Shpg. wt. 4 lbs. 349.95

Multifunction Board adds many features and software

The Captain Multifunction Board from Tecmar fits into an open slot of a Heath/Zenith Personal or Portable PC, or an IBM-PC. It is fully socketed for the easy addition of up to 384K of RAM. It features a serial port with a standard RS-232C connector and an internally mounted parallel port with its own cable. A clock/calendar with a backup battery keeps perfect time. Besides a helpful RAM-disk, spooler, and timer software, a large collection of utility programs are also included. Some of these are forms generator, checkbook balancer, address filer, mailing list, memo writer, inventory manager, automatic appointment alert, memory and printer diagnostics, tic-tac-toe, and many others. This board does not include RAM user memory.

PC-121, Assembled Captain Board, Shpg. wt. 2 lbs. 199.95

SAVER Get a big 50% discount on extra 64K of RAM

Purchase extra Z-205-1 64K RAM Chip Sets within 90 days of a PC-121 Multifunction accessory board and receive half off the regular price.

Z-205-1, Shpg. wt. 2 lbs. Regularly \$79.99 Discount Price 39.99



High resolution monochrome/color multifunction board

The Graphics Master Board from Tecmar supplies Heath/Zenith Personal and Portable Computers, and IBM-PC computers with high resolution color (640 x 400 in 16 colors) and monochrome (720 x 700) graphics capability. Provide yourself with a wider choice of monitors including RGB, NTSC composite, and IBM monochrome compatibles. External sync is provided for use with a video mixer to allow overlaying characters or other computer-generated images on a video picture. Has 128K of on-board memory. Is compatible with LOTUS 1-2-3, GrafTalk and other software. Requires ZCA-6 ROM in Heath/Zenith PC.

PC-1B5, Assembled Graphics Master Board, Shpg. wt. 3 lbs. 545.00

Add joystick capability with DG Analog Game Port

Plug-in Analog Game Port allows the addition and use of joysticks and graphic pads (such as WICO and KOALAPAD) and other analog devices. Supported by GW-BASIC. For use with the Heath/Zenith PCs and IBM-PC Computers.

PC-110, Assembled DG Analog Game Port, 1 lb. Last Call 49.95

PCS-110, Assembled PC-110 with clock/calendar chip installed, battery, software, Shpg. wt. 1 lb. 119.95

On-line time and date for the H/Z-100 Computer

An add-in circuit card for the H/Z-100 Desktop Computer, ZCLK from FBE Research Company, Inc. that provides the time in a 24-hour format to the second and a calendar in a numerical month, date, year format. This circuit card installs very simply on the motherboard and doesn't require an S-100 expansion slot. A long-life lithium battery maintains the time and date during power off periods. MS-DOS software is included to set and read the time and date and to automatically set the operating system time and date at bootstrap.

PC-240, ZCLK Board, Assembled, Shpg. wt. 1 lb. **119.95**

U.S. Robotics Auto Dial Modem Card for H/Z-100s Reduced \$50

This modem fits into an H/Z-100 expansion slot and connects directly to a phone line through a standard RJ11C modular phone jack. It can transmit and receive data at a rate of 1200 baud or at a slower 300 baud rate. It is Bell 212A/103 compatible. This auto dial modem also features auto answer, manual answer and manual originate modes of operation. All modem functions are controlled by commands (Hayes type programming commands) sent to the modem through the same channel as the data is transmitted and therefore doesn't require extensive software support. Includes a phone cord.

PC-200, Assembled, 2 lbs. **Was \$449.00 Now Only 399.00**

PA-100-1, U.S. Robotics TELPAK Software, uses MS-DOS, 2 lbs. **99.00**

PCS-200, PC-200 plus PA-100-1, Shpg. wt. 4 lbs. **449.00**

Save \$46 on the Programmable Sound/Speech/Time (P-SST) Card

A plug-in multifunction circuit board for the H/Z-100 Computer from Software Wizardry. It may be installed in any available IEEE-696 S-100 expansion slot to provide time, sound and speech capabilities for the Desktop Computer. It features a real-time clock/calendar with battery backup, a three channel sound synthesizer for generating both music and complex sound effects, and a phoneme speech synthesizer with unlimited vocabulary and an adjustable voice pitch. An on-board audio amplifier with adjustable volume control produces a one watt output for an external 8 ohm speaker. An unamplified audio out at 1.5 volts maximum is also available for connection to external audio equipment. The P-SST card also has two general purpose parallel I/O ports (cables not included) which can be used for joysticks and compatible printers.

PC-220, Assembled, Shpg. wt. 3 lbs. **Was \$395.00 Now Only 349.00**

16K Add-On Memory Board for the H/Z-89 Computer

Increase your H/Z-89 Computer RAM memory from 48K to 64K with this 16K byte Add-On RAM Card from Magnolia Microsystems, Inc.

PC-311, Assembled, Shpg. wt. 5 lbs. **Last Call 74.95**

New! Customize your own multifunction board by choosing the type and number of add-on modules

Put together your own multifunction board and optimize the use of expansion slots in your Heath/Zenith computer. With this innovative combination of expansion board and add-on input/output modules you choose the functions you need or want. This customizing concept also frees you from the limitations of off-the-shelf expansion boards that provide a fixed set of functions that cannot be expanded and may duplicate capabilities already present in your computer.

Each expansion board installs into an open slot of your Heath/Zenith computer and accepts add-on function modules. These modules plug directly into connectors on the expansion board. Currently there are three modules available, a very useful Real Time Clock/Calendar, a SCSI (ANSI Small Computer System Interface) Adapter, and an IBM PC-compatible RS-232 Port.

Three separate expansion boards are available for HS-158 Expandable PCs (and the IBM PC), the H/Z-100 Computer, and the H/Z-89 (Z-90) Computer. All add-on function modules operate on each computer expansion board. This provides a common set of functions to all Heath/Zenith computers. Then as new function modules become available, they too will operate on all Heath/Zenith computers.

Assembled expansion boards:

Expansion Board for HS-158 Expandable Personal Computers. This full-sized, IBM PC compatible board installs into a computer expansion slot and provides the capability to add on up to four input/output function modules.

PC-1100, Assembled, Shpg. wt. 3 lbs. **99.95**

Expansion Board for the Advanced H/Z-100 Desktop Computer. A full-sized IEEE-696 S-100 card that uses one computer expansion slot and allows the addition of up to four input/output function modules.

PC-1200, Assembled, Shpg. wt. 3 lbs. **99.95**

Expansion Board for the H/Z-89 (Z-90) Computer. A plug-in card that enables the addition of up to three input/output function modules.

PC-1300, Assembled, Shpg. wt. 3 lbs. **99.95**

Assembled input/output function modules (requires an expansion board):

SCSI Adapter. An ANSI Small Computer System Interface module that plugs into an expansion board and interfaces many cartridge and fixed disk systems. Includes software that allows use of the IOMEGA Bernoulli Box.

PC-900, Assembled, Shpg. wt. 2 lbs. **149.95**

Real Time Clock/Calendar. A plug-in module to an expansion board that will provide the time of day and calendar information, from tenths of seconds to years, to the operating system and many user programs.

PC-91D, Assembled, Shpg. wt. 2 lbs. **89.95**

IBM PC-Compatible RS-232 Port. A plug-in module to an expansion board that allows the connection of IBM PC accessories.

PC-92D, Assembled, Shpg. wt. 2 lbs. **99.95**

New tools for computer and electronics hobbyists

Move into the growing field of programming EPROMs with two inexpensive Heathkit tools, the ID-4801 EPROM Programmer and the ID-4803 EPROM Eraser. The Programmer enables you to program, duplicate, verify, and simulate EPROMs for use in computers. The Eraser lets you quickly and easily erase EPROMs so you can use them over and over again. See page 55 for further details.

3 Turn a knob instead of switching cables

A real convenience and it can save on additional costly equipment. This two position RS-232 switch allows you to share printers, modems, computers, terminals, or any RS-232 device. Just turn the front panel knob and any device, such as a printer, can be switched to either of two computers. No more lost time in connecting and disconnecting cables, or running the danger of bent connector pins while you're hurriedly swapping cables. A simple knob turn and the cable reconnection is complete, safely and quickly.

Twenty-four signal lines on the interface are switched when the knob is turned and all are transparent to data speeds and code types. This unit can also be used with IBM-type parallel cables. Make shared equipment a lot easier to use with this compact 3 1/4" H x 6" W x 6 1/4" D transfer switch.

PM-120, Assembled RS-232 Switch, Shpg. wt. 1 lb. **79.95**

4 New kit breakout box checks RS-232 interfacing

Take the guesswork out of RS-232 interfacing problems with this versatile breakout box. With it you can check all 25 lines of a computer system's interface circuitry. And switch disabling of 23 lines enables you to isolate lines and then cross-connect them to track down hard-to-find problems. LED indicators monitor 12 key circuit lines for a quick indication of line activity. Two flat cables connect the Breakout Box between any 25-pin D connectors on computers, printers, modems, etc. Each cable end has both DTE and DCE connectors for any male/female connector situation. Five jumper wires are provided. Requires two "AA" batteries. Dimensions: 1 3/8" H x 2 1/8" W x 6" D.

Kit PMK-130, Shpg. wt. 2 lbs. **89.95**

5 Breakout Box RS-232 Terminal Interface Tester

Isolate problems within a computer system with this pocket sized, self-contained tester. Connect it between equipment and communication lines to monitor 12 different signals. LEDs signal line condition. Interface pins can be cross-patched with the tester's connection jumpers to test and correct problems. Twenty-four in-line switches allow interrupting any interface signal.

WH-15, Assembled RS-232 Breakout Box, Shpg. wt. 1 lb. **159.00**

6 NEW! Smart Outlet Box with increased protection

• Automatic AC line control; surge suppression

The **GDW-1495 Smart Outlet Box** combines fast response to and suppression of pulse, surge, and lighting induced voltages along with automatic AC control of up to six other components. This device has eight AC (3-prong type) outlets. Six are controlled by a sense socket and the eighth is a constant AC outlet for a device such as a clock that you do not wish to turn off.

Plug the AC cord of a conveniently located component into the labelled control socket. Anytime you turn on this device, current flow is sensed and AC power is automatically switched to any equipment plugged into the six switched outlets of the Smart Outlet Box. This allows you to power up a number of devices such as a printer, modem, external drives, etc. using your computer's power switch. The control socket even allows a small amount of current to pass through it for equipment containing digital clocks. This UL approved surge suppressor has dimensions of 14 1/4" x 2 1/4" x 2 3/4" and weighs 2.8 lbs.

Kit GD-1495, Shpg. wt. 5 lbs. **59.95**

GDW-1495, Assembled Smart Outlet Box, Shpg. wt. 4 lbs. **99.95**

Peripherals and accessories for Heathkit/Zenith,

NEW! 200 VA Standby Power Protection System

In less than one-half cycle this Standby Power System from Saft Electronics will switch 200 VA of power to your computer equipment whenever the AC line voltage drops below 108 volts. Power will last for a minimum of 20 minutes...time enough to save all your computer data and to safely power down.

This system will provide power during blackouts or brownouts to personal and small business computers, or any device that needs up to 200 VA of emergency power. During normal operation this power system acts like a line filter to protect your equipment from harmful power line surges and voltage spikes. When the line voltage drops, the system turns on to protect data and memory in your computer until you can safely exit your software and power down your computer system.

The 200 VA Standby Power System has two AC outlets for equipment that you want protected. Its dimensions are 12 $\frac{3}{4}$ " L x 10 $\frac{3}{4}$ " D x 6" H. Alarm features include an indicator lamp and buzzer. Surge protection is provided up to 80 joules.

PP-111, Assembled, Shpg. wt. 34 lbs. **349.95**

3 KoalaPad Touch Tablet and software

Just a touch of your finger can control Heath/Zenith Portable or Personal Computer, or IBM-PC computer. Software included with pad enables you to draw and color pictures on a color monitor screen by simply moving your finger or a stylus (included) across the 4" x 4" touch-sensitive surface of the KoalaPad. Or, write your own application programs using GW-BASIC's built-in commands. GW-BASIC version 2.0 is required to use all the features of PC Design software included with the pad. Requires PC-110 (or similar) Analog Game Card on page 98.

PP-400, Assembled, Shpg. wt. 3 lbs. **99.95**

NEW! PPA-400-1, SPEED KEY software turns pad into combination mouse and 37 programmable softkeys. Includes overlays for BASIC, dBASE II, LOTUS 1-2-3, Multiplan, WordStar, and others, or program your own softkeys. Rated by INFOWORLD as excellent in performance, documentation, ease of use, and error handling. Speed Key replaces multiple keystrokes required by most software with a single pushbutton command. With Speed Key, you can create your own custom overlays that take care of repetitive, day-to-day computer commands.

Shpg. wt. 2 lbs. **59.95**

NEW! PPS-400, Package KoalaPad and Speed Key software, 9 lbs. **139.95**

4 Ultra-responsive and lightning fast joystick

Blow away the competition with this responsive state-of-the-art Gravis MK VI Analog Controller. The full-sized, metal-reinforced padded handle on this controller has an integrated firing button for rapid thumb firing during arcade type games. An eight-level handle spring tension adjustment allows you to set the response of the handle from free floating to a very strong and very tight center. Also has two additional and programmable fire buttons, trim adjusts, and extra long 72-inch cable. Requires PC-110 or other analog game port on page 98.

PP-402, Assembled, Shpg. wt. 2 lbs. **39.95**

5 Smart Interface Cable connects all RS-232 devices

An intelligent interface cable, Smart Cable looks at the RS-232 signals from the computer and the peripheral and uses its own logic circuitry to match up all data, handshake, and control lines automatically. All you do is plug in the cable and set two switches. The computer can be any make or model and the peripheral can be any RS-232 serial device. Any word length or code format used in transmission is acceptable and any baud rate up to 19,200 can be used. Has built-in male and female connectors and derives its power from the lines through current summing junctions. Always have the right cable at hand and be able to hook your computer to virtually any peripheral instantly and automatically.

PP-100, Assembled, Shpg. wt. 1 lb. **Was \$89.95 Now Only 79.95**

6 Compact, versatile and easy-to-use modem

Novation J-CAT 300 Baud Modem is a high-performance small-sized modem that is easy to stick on or place just about anywhere you want. It is compatible with Bell 103 modems and operates in both answer and originate modes. The J-CAT is very easy to operate with an automatic mode selection and an automatic answer. A self-test feature verifies that you properly connected the cables between it and the telephone line. Two key operation allows easy control.

Other features include off-hook and carrier LED indicators, audio line status beeper, and EIA-RS232C serial interface compatibility. All this in a very small 5" x 1.9" x 1.3" package that is powered by a UL listed low-voltage 115 VAC wall mount power supply. Includes cable.

PP-310, Assembled, Shpg. wt. 2 lbs. **Was \$129.95 Now Only 109.95**



1 NEW! Protect your computer's data and memory

Provide emergency power for your personal or business computer with the 400 VA Standby Power System from Saft Electronics Systems. Eliminate the headaches, lost time, and the expense of lost data caused by an unexpected loss of power or a brownout. As soon as the power drops, this power protection system turns on in less than one-half cycle to protect data stored within your computer. Up to ten minutes of standby power is provided with a full load (24 minutes under half load) to give an operator plenty of time to save data and files and then shut down the computer safely. During normal operation this standby power supply acts as a line filter to protect against harmful power line spikes. This power protection system has dimensions of 12 $\frac{3}{4}$ " L x 10 $\frac{3}{4}$ " W x 6" H, has four AC power outlets and operates from 110 VAC at 60 Hz.

PP-115, Assembled, Shpg. wt. 39 lbs. **549.95**

2 NEW! Fastest-switching backup power for computers

1000 VA Standby Power System from Saft uses all-new detection and a solid state transfer switch to make it the fastest power switching supply at one millisecond or less. This backup power system provides a clean sine wave output (required for IBM XT and AT computers) that is both voltage regulated and current limited. And it is synchronized to the line for proper operation of all phase controlled devices. Switchover takes place anytime the AC voltage drops below 108 volts. Run time at half load is over 18 minutes. Eliminate the effects of 98% of all AC power related problems with this protective standby power system.

Further protection is added built-in surge suppressors, over-current protection, voltage regulation, and built-in EMI/RFI filters. This standby power supply will even protect itself from damage due to overloading. Its dimensions are 19" L x 8" W x 13" H and weighs 69 lbs.

PP-120, Assembled, Shpg. wt. 78 lbs. Mtr Frt **1195.00**

IBM-PC computers and their compatibles

High quality computer supplies and accessory support for your computer system

Do your shopping at our one-stop computer center where you can get everything you need for your computer system. Every accessory and support product is selected with your satisfaction in mind. Whether it's cables, printer paper, floppy disks, or cleaning materials, you'll be satisfied with the quality of the product and the way they make your work go faster and easier.

re-wired, 10-foot RS-232 cables (connects pins 1-8, 20)

CA-10, Male-to-Male Cable, Shpg. wt. 1 lb.	20.00
CA-11, Male-to-Female Cable, Shpg. wt. 1 lb.	20.00
CA-12, Female-to-Female Cable, Shpg. wt. 1 lb.	20.00

re-wired, 6-foot Heath/Zenith PC and IBM PC cables

CA-51, Male-to-Female Cable, Shpg. wt. 1 lb.	30.00
CA-52, Female-to-Female Cable, Shpg. wt. 1 lb.	30.00
CA-53, Parallel Cable (10 ft.), Shpg. wt. 2 lbs.	30.00

re-wired 10-foot special application cables

CA-22, WH-64 Parallel Cable, Shpg. wt. 1 lb.	35.00
CA-24, WH-64 Serial Cable, Shpg. wt. 1 lb.	35.00

Protect your data and computer equipment from damage caused by voltage spikes with surge suppression

CA-16, Transient Surge Suppressor protects your computer equipment from imaging electrical transients by absorbing destructive spikes. It is a parallel protective device that clamps down on transients in less than 5 nanoseconds, well before damage-causing spikes can reach critical equipment. This surge suppressor can handle 4.5 kilowatts of peak pulse power for 1 millisecond. Just plug your equipment's power cord into this device for protection from destructive voltage transients caused by utility company power load switching, nearby lightning strikes, electrical power factor corrections, and on/off switching of inductive motors and air conditioners. Shpg. wt. 1 lb. **65.00**

Consistently dependable 5.25-inch and 8-inch floppy disks that will perform to your satisfaction

DS-70, 5.25" hard-sector, single-sided, single-density floppy disks that are used with 48 TPI disk drives (H-17-1) and the H-88-1 Controller Board to store up to 100 kilobytes of data on a single disk.

Package of ten, Shpg. wt. 1 lb. **40.00**

DS-66, 5.25" soft-sector, single-sided, double-density floppy disks for use in H/Z-89 All-In-One Computers equipped with 48 TPI H-17-1 or H-17-5 disk drives and Z-89-37 Controller Board. Stores up to 160K bytes on a single disk.

Package of ten, Shpg. wt. 1 lb. **45.00**

DS-71, 5.25" soft-sector, double-sided, double-density floppy disks for use in Heath/Zenith Personal Computers and the H/Z-100 Advanced Computer for up to 320K bytes of data storage. Also for use with Heath/Zenith computers equipped with H-17-5 drives and Z-89-37 Controller Card.

Package of ten, Shpg. wt. 1 lb. **50.00**

DS-68, 96 TPI 5.25" soft-sector, double-sided, double-density floppy disks for use with H-17-5 drives and Z-89-37 Controller Board for storing up to 640K bytes of data on a single disk.

Package of ten, Shpg. wt. 1 lb. **55.00**

DS-69, Flexible 8" soft-sector, single-sided, single-density floppy disks formatted in the IBM 3740 style with up to 250K bytes of storage capacity.

Package of ten, Shpg. wt. 2 lbs. **55.00**

DS-64, Flexible 8" soft-sector, single-sided, double-density floppy disks with up to 500K bytes of data storage capability.

Package of ten, Shpg. wt. 2 lbs. **60.00**

DS-65, Flexible 8" soft-sector, double-sided, double-density floppy disks with the capability to store up to one megabyte of data.

Package of ten, Shpg. wt. 2 lbs. **70.00**

Quality paper to make small or large printing jobs easier to handle at an economical price

HCS-1, Premium 8.5" x 11" one-part fan-fold paper, continuous 2700 sheets. Shpg. wt. 28 lbs. **32.00**

HCS-2, Standard 8.5" x 11" one-part fan-fold paper, continuous 3200 sheets. Shpg. wt. 31 lbs. **32.00**

HCS-3, Standard 14.875" x 11" one-part fan-fold paper, continuous 3200 sheets. Shpg. wt. 47 lbs. **42.00**

HCS-4, Bond form-feed 8.5" x 11" one-part fan-fold, continuous 1000 sheets. Shpg. wt. 13 lbs. **25.00**

Protection and quick access in a convenient floppy disk organizer that uses very little space

PM-100, Data Defender by Ring King holds up to seventy 5.25" floppy disks in a charcoal-colored copolymer plastic case. A locked hinged lid protects your disks from unauthorized access. It comes complete with rigid dividers that can be placed where you want so you can make sections larger or smaller as desired. Index tabs are included for easy section identification. Built-in handles add convenience. Shpg. wt. 3 lbs. **19.95**

Quickly and easily reduce damaging static buildup while keeping computer equipment clean

PM-111, STAT-ATTACK Computer Cleaning System contains: inert dusting gas to spray dust and loose dirt away from computer equipment; antistatic spray to protect your computer from static discharges; monitor screen and keyboard cleaner to remove all types of dirt and grime from most surfaces; antistatic cabinet cleaner, combines cleaner and static fighter; greaseless antistatic hand lotion helps eliminate static discharges between body and sensitive equipment; and lint-free wipers and swabs to remove dirt and help keep equipment clean. Shpg. wt. 2 lbs. **24.95**

Popular cartridge fonts for the WH-64 TI Printer

HCS-30, Prestige Elite Font with 12 cpi pitch, Shpg. wt. 1 lb. **40.00**

HCS-31, Orator 85 Font with 10 cpi pitch, Shpg. wt. 1 lb. **40.00**

HCS-32, Courier Italic Font with 12 cpi pitch, Shpg. wt. 1 lb. **40.00**

HCS-33, Modern PS Font with proportional spacing, Shpg. wt. 1 lb. **40.00**

Dark, crisp print with long-life printer ribbons

HCS-51, 3 plug-in film ribbons for Primage and Diablo 1640/630, 1 lb. . . **18.00**

HCS-57, One plug-in ribbon cartridge for the WH-64 Printer, 1 lb. **12.00**

Accessory cable and applications packages for the MPI-150 Printer to print graphics and type fonts

MPA-10, Parallel cable for MPI-150 and MPI-99 Printers to Heath/Zenith Personal Computers, Shpg. wt. 1 lb. **35.00**

MPA-1, H/Z-100 AP-PAK is a graphics application package that enables the MPI-150 Printer to print out any H/Z-100 Computer graphics character, large displays, and decorative fonts. Includes interconnecting cable. Some features require the use of GW-BASIC. Shpg. wt. 1 lb. **75.00**

MPA-3, H/Z-89 AP-PAK is a graphics application package that enables the MPI-150 Printer to print out any H/Z-89 Computer graphics character, large displays, and decorative fonts. Includes interconnecting cable. Some features require the use of MBASIC. Shpg. wt. 1 lb. **75.00**

MPA-4, H/Z-90 AP-PAK is a graphics application package that enables the MPI-150 Printer to print out any H/Z-90 Computer graphics character, large displays, and decorative fonts. Includes interconnecting cable. Some features require the use of MBASIC. Shpg. wt. 1 lb. **75.00**

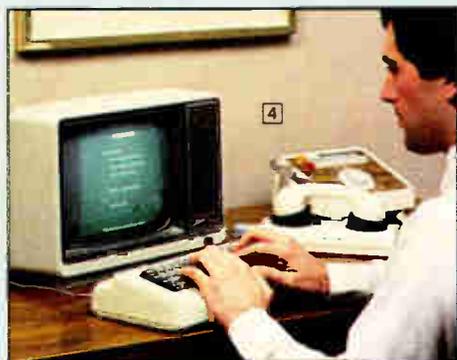
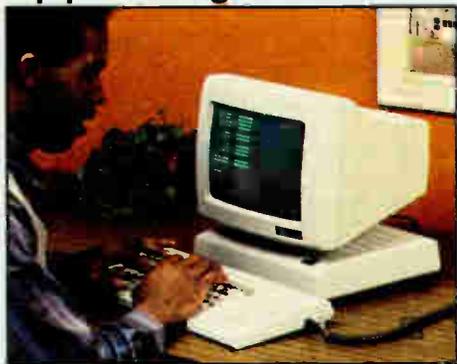
Printwheels for the Primage 90 daisy wheel printer

PPA-250-4, Courier 10 printwheel with 10 cpi, Shpg. wt. 1 lb. **19.95**

PPA-250-5, Prestige Elite printwheel with 12 cpi, Shpg. wt. 1 lb. **19.95**

PPA-250-6, Versa-Tile PS printwheel and proportional spacing, 1 lb. **19.95**

Top performing terminals that feature versatility, compatibility, economy, and ease of use



1 New terminal satisfies personal and business needs



- Built-in flexibility and ease of operation make this terminal one of the most versatile available
- Four modes emulate popular business terminals

The Z-39 Terminal is an ideal workstation for data or order entry, information retrieval, electronic mail, and clerical word processing. It represents a low-cost, high-performance answer to both your personal and business needs with professional features designed into a comfortable, human-engineered package.

Designed with the user in mind, the Z-39 features a professional 12-inch diagonal non-glare screen that helps increase productivity by relieving eye-strain caused by long periods of use. The green screen displays 24 lines of 80 characters each plus a 25th status line for terminal information or programmed for notes or reminders by the user. The large 8 x 10 dot matrix that makes up each character on the screen provides sharp and clear alphanumeric displays.

The low-profile keyboard is detached to let you freely move it around for maximum operator comfort. It is laid out in a standard QWERTY keyboard style for easy use by touch typists. The keyboard generates all the codes for upper and lower case letters, numbers, and punctuation plus subscripts, super-scripts, scientific notation and graphics characters. Dedicated function keys speed terminal operation while special function keys can be used for special purposes through software, or may be user-defined. A separate calculator style keypad makes rapid entry of numbers very easy for accountants and spreadsheet users.

Built-in editing commands permit fast, simple manipulation of text and data entry. Basic word processing edit and erase functions include insert or delete a character or line; erase a page, a line, to end of a line, to the beginning of a line, to the beginning of a page, and to the end of a page. In addition, select visual attributes like blinking to call attention to a certain condition, reverse video or half-intensity to distinguish between different types of data, or blanking to inhibit the display until a password is given.

All terminal features are keyboard accessible and can be stored in nonvolatile memory to remain until you change them. Among the accessible features are video attributes, status line, key click, keypad select, port assignment, tabs, test, handshaking, and others. One of these is the screen saver which increases the life of the screen by blanking it after a period of inactivity. Another is terminal emulation selection of ANSI, Lear Siegler ADM3A, Hazeltine 1500 or Zenith terminals. And you can select a baud rate for transferring data from a slow 75 baud to

transferring a screenful of characters in 1 second with a baud rate of 19200, better performance at lower phone line charges.

Other features include a tilt and swivel video display with a front mounted power switch, DCE and DTE RS-232C connectors, set mode, function indicators, automatic internal self checks, and a power-on indicator.

Z-39, Assembled, Shpg. wt. 36 lbs. 749.00

Z-39 SPECIFICATIONS: VIDEO DISPLAY: CRT: 12" diagonal, green phosphor, non-glare display. Display Format: 25 rows of 80 characters. Display Size: 6.0" (15 cm) H x 8.5" (21.3 cm) W. Character Type: 8 x 10 character cell. Character Size: approx. 0.2" (5 mm) H x 0.1" (2.5 mm) W. Character Set: Normal: 128 characters; 95 ASCII, upper and lower case, numerics and punctuation, 33 graphic characters. Alternate: 128 characters; 95 ASCII, superscript and subscript, scientific notation, and 33 graphic characters (VT-100). Refresh Rate: 60 Hz. CURSOR: Type: Underline or reverse (solid) video block. Attributes: On, off, blinking. Addressing: Direct or relative. KEYBOARD: Unit: Detached 91-key with 6 foot (1.9 m) coiled cord. Layout: 77-key QWERTY layout with programmable special function keys and 14-key numeric keypad. Indicators: Visible: POWER ON, KEYBOARD LOCK, OFF LINE, and CAPS LOCK. Audible: Programmable key click with each key entry, power-on beep, bell sound on receipt of ASCII bell character. COMMUNICATIONS: Mode: Half or full duplex on the primary port, half duplex on the auxiliary port. Code: ASCII. Format: Serial asynchronous. Word Length: 7 data bits, one parity bit. Stop Bits: Two at 75 and 110 baud rates, one at all others. Data Transmission Control: Hardware and software (XON and XOFF) handshaking. Parity: Even, odd, mark, or space. Power Requirements: 90 - 132 VAC, 60 Hz. DIMENSIONS: Video Unit: 13.6" H x 12.9" W x 11" D (34.5 x 33 x 28 cm). Keyboard: 1.4" H x 18.3" W x 8" D (3.3 x 46.3 x 20.5 cm). Weight: Monitor: 18.9 lbs. (8.5 kg). Keyboard: 3.8 lbs. (1.7 kg).

2 Smart H-29 Terminal features performance

- Built-in flexibility provides room to grow as your needs increase

The most user-friendly kit terminal available, the H-29 allows a user to configure parameters from on-screen selections. All parameters are set through keyboard selections and stored in nonvolatile memory until reset. Even a user-settable 24-hour clock is accessible for keeping track of standard or elapsed time. A keyboard HELP key is also provided for prompts or help messages used with some software. And, a special screen saver automatically shuts off the display after 15 minutes of nonuse for those forgetful moments. In addition, built-in power-up diagnostics ensure proper operation of the terminal at all times.

The H-29 Terminal is compatible with many ANSI protocol terminals including the popular Heathkit H-19 Terminal. For greater versatility in education and business, the H-29 models the Lear-Siegler ADM3A and the Hazeltine 1500A Display Terminals. And, it is compatible with the DEC VT52 Terminal and has many

attributes of the DEC VT100 Terminal, all at a lower price than any of them.

Information is clearly displayed in 25 lines of 80 characters each on a nonglare green CRT in normal or reverse video. Select a block or underline and a blinking or nonblinking cursor. The detached keyboard of the H-29 has 91 keys and includes a separate numeric keypad. All keys are a nonglare type to provide nonslip finger contact and reduce eye-fatiguing glare. Four LED status indicators on the keyboard show power, off line, and keyboard and caps locked.

Along with a 128-character ASCII set, the H-29's keyboard can generate codes for an alternate character set of 33 special symbols in an 8 x 10 dot matrix. Besides lower and upper case letters, other characters include: superscript and subscript letters, Greek symbols, H/Z-19 graphics, VT-100 graphic and other symbols. Each entry is confirmed by an audible click and is automatically repeated when held down for over half a second, getting progressively faster as the key is held down.

Designed as an input/output device for a computer system, the H-29 Terminal can be hooked either directly or through telephone lines (using a modem) to any computer. It has two RS-232 standard connectors, a DTE type for computers or modems and a DCE type for an auxiliary device. An RS-232 serial cable is included for connecting the H-29 to computers and other peripherals.

 Kit H-29, Shpg. wt. 41 lbs.	449.00
 Z-29-A, Z-29 with amber CRT, 45 lbs.	799.00
Z-29-1, Palm Rest Accessory, Shpg. wt. 1 lb.	15.00
Z-29-2, ROM Source Listing, Shpg. wt. 4 lbs.	25.00

H/Z-29 SPECIFICATIONS: DISPLAY: CRT: 12" P31, green, non-glare video screen. Display Format: 25 rows of 80 characters. Display Size: 6" H x 8 1/2" W. Character Type: 8 x 10 character cell. Character Size: 0.2" H x 0.1" W (approx.). Video Attributes: Normal or reverse character, normal or underline character, normal or half-intensity character, normal or blinking. Can be in any or all combinations. Refresh Rate: 60 Hz, or 50 Hz. CURSOR: Type: Underline or reverse (solid) video block. Attributes: On, off, blinking. Controls: Up, Down, Left, Right, Backspace, Tab, Back Tab, Back, Home, Carriage Return and Line Feed. Addressing: Direct and relative. COMMUNICATIONS: Type: EIA RS-232C. Baud Rates: 75 - 19,200 baud. Mode: Half or full duplex. Code: ASCII. Format: Serial asynchronous. Word Length: 7-data bits, one parity bit. Stop Bits: 2 at 75 and 110 baud rates, 1 at all other baud rates. Sync: Auto XON and XOFF. Parity: Even, odd, mark or space. Power Requirements: 105 - 127 VAC at 60 Hz and 45 watts.

3 A low-cost entry point data terminal

- Instant and user-friendly access to all types of computers

Information processing terminal: The HT-10 features an integral RS-232 standard port that can function at speeds from 110 to 9600 baud for communicating with personal, business and other computers. In addition, this versatile terminal is compatible with a DEC VT-52.

Plain talk: Built-in prompts and cues in simple English make it easy to communicate with and use this friendly terminal.

Easy-to-use keyboard: The keyboard features a standard 63-key layout including the full ASCII set with CTRL, ESC, BREAK, TAB and RETURN. Four cursor control keys and a special HELP key add further convenience.

Electronic typewriter: Connect a parallel-type printer to the rear Centronics interface and take advantage of the terminal's printing features.

 Kit HT-10, Terminal includes ZVM-121Z video monitor without modem, Shpg. wt. 36 lbs.	399.00
 Kit HTX-10, Terminal less monitor and modem, 10 lbs.	279.00
 ZT-10, Assembled and tested Terminal, includes video display monitor without modem, Shpg. wt. 32 lbs.	499.00
 ZTX-10, Assembled HT-10 less monitor and modem, 6 lbs.	399.00

HT-10 SPECIFICATIONS: Character Set: 95 ASCII, 33 graphics. Keyboard: 63 keys (26 alphabet, 10 numeric, 4 cursor/special function, 12 control, 11 punctuation). Cursor: Blinking or steady block, or off. Video: RS170 compatible. Printer: Parallel (Centronics-type).

4 A rapid access terminal with internal modem

- Single button accessing with universal log-on capability
- System setup allows automatic answering of incoming calls

Telecomputing system: With its internal modem, the HT-1011 can be connected anywhere there is a modular phone jack to gain complete access to computer data services. After preprogramming in a menu of up to 26 pre-selected information sources, a user simply presses one button to automatically select a desired information source or place a normal voice call.

Memory capability: Besides dialing a desired source, the terminal can transmit all required codes. A special universal log-on feature allows the user to program in log-on procedures including account numbers, escape codes and passwords into a battery-protected memory system.



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Included with some models is the ZVM-121Z monochrome monitor which features a green 12-inch CRT and excellent character definition.

 Kit HT-1011, Includes ZVM-121Z video display monitor, RS-232C port and 300 baud modem, Shpg. wt. 44 lbs.	449.00
 ZT-11-Z, Assembled and tested HT-1011 with video display, RS-232C port and modem, Shpg. wt. 30 lbs.	579.00
 ZTX-11-Z, Assembled and tested HT-1011 with modem RS-232C port less video display monitor, Shpg. wt. 6 lbs.	479.00
 ZT-1-UZ, Assembled and tested Terminal with monitor and modem less RS-232C serial port, Shpg. wt. 30 lbs.	549.00
 ZTX-1-UZ, Assembled and tested Terminal with modem less monitor and RS-232C serial port, 6 lbs.	449.00

Accessories for the HT-10 and HT-1011 Terminals

ZT-1-2, Terminal Carrying Case, Shpg. wt. 2 lbs.	24.99
ZTA-1-1, Parallel Cable, Shpg. wt. 1 lb.	25.00
ZVM-121-Z, Optional Monochrome Video Display, for use with HTX and ZTX terminals. Features high resolution 12" green CRT that can display 25 line of 80 characters each, Shpg. wt. 18 lbs.	139.95
HTX-10-1, Auto-dial/answer 300-baud modem, 1 lb.	69.95
ZT-1-3, Universal ROM, one key access upgrade, 1 lb.	49.95

5 Z-49 Terminal features increased flexibility

- 14" non-glare CRT displays 25 rows of a selectable 80/132 characters

The very friendly Z-49 Video Display Terminal is designed to satisfy all your business and personal needs while providing the greatest degree of user convenience. All Terminal functions, even screen brightness, are easily set up by programming selections through the keyboard as plain-English menus are displayed on-screen. These selections are then stored in non-volatile memory.

The Z-49 features an advanced 92-key keyboard that has: automatic key repeat, status indicators, user-defined function keys, and full cursor control keys. Other Terminal features include: a 14" Chromogold II™ (amber) screen; DTE and DCE connectors; H/Z-29, H/Z-19, DEC VT52 and VT100 compatibility; smooth scrolling; normal and alternate character sets; and more.

 Z-49, Assembled and tested, Shpg. wt. 37 lbs.	1099.00
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Z-49 SPECIFICATIONS: DISPLAY: CRT: 14" diagonal, enhanced contrast, video screen. Display Format: 25 rows of 80 characters or 25 rows of 132 characters. Display Size: 6.75" H x 9.25" W. Character Type: 80-column display, 10 x 12 character cell. 132-column display, 8 x 12 character cell. Video Attributes: Normal or reverse character, normal or underlined character, half intensity character and background normal or blinking display. Refresh Rate: 50 or 60 Hz. CURSOR: Type: Underline or reverse (solid) video block. Attributes: On, off, blinking. Addressing: Direct or relative. COMMUNICATIONS: Type: EIA RS-232C. Baud Rates: 50 - 19,200 baud. Mode: Half or full duplex. Code: ASCII. Format: Serial asynchronous. Sync: Auto XON and XOFF. Power: 105 - 127/210 - 254 VAC, 50/60 Hz, 73 watts.

6 Economical and user-friendly Z-22 Terminal

- Compatible with Lear Siegler ADM11 and TeleVideo 914 Terminals

Featuring parameter selection like the smart H-29 Terminal, the Z-22 also offers user programming of automatic logons to information services and programmable function keys. Ergonomic features include a low profile detachable keyboard with a 75-key standard QWERTY-type layout and an 18-key auxiliary keypad. The 12-inch monitor with green CRT tilts and rotates for comfortable viewing.

The easy-on-the-eyes CRT displays 25 rows of 80 characters, 24 rows of regular data plus a 25th status row which is user selectable between terminal status and defined through user selection. The Terminal displays a 96 character set including upper and lower case, numbers and punctuation. Three sets of graphics are also displayed which includes 33 graphics characters, 33 Zenith graphic characters and 33 foreign characters. The cursor can be set for blinking or nonblinking character, or blinking or nonblinking underline.

Also features compatibility with the popular Lear Siegler ADM11 and the TeleVideo 914 terminals which are found on many of today's systems.

 Z-22, Shpg. wt. 37 lbs.	649.00
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Z-22 SPECIFICATIONS: DISPLAY: CRT: 12" diagonal, green. Display Format: 25 rows x 80 characters. Character Size: 5 x 7 dot matrix with descenders. Refresh Rate: 60 Hz or 50 Hz. CURSOR: Type: Blinking or nonblinking block character or underline. COMMUNICATIONS: Type: EIA RS-232C. Baud Rates: 300-19,200 baud. Format: Serial Asynchronous. Data Transmission Control: Hardware and software (XON and XOFF) handshaking. Power: 120/220 VAC, 50/60 Hz. DIMENSIONS: Monitor: 13.6" H x 12.9" W x 11" D. Keyboard: 1.4" H x 18.3" W x 8" D. WEIGHT: Monitor: 18.9 lbs. Keyboard: 3.8 lbs.

The President's Letter:

Dear Friends,

Our marketing philosophy has always been based on the conviction that quality products will long outlast their cheaper counterparts. And their superior performance will bring you far greater satisfaction and pride over the long term. We're sticking with that philosophy. Its served both of us well — even in today's "disposable product" environment. With that philosophy in mind, we at Heath are happy to be able to bring you over twenty new products in this catalog to add excitement to your Christmas. You'll find many of these new products spotlighted on pages 2 through 9.

For the whole family to enjoy, there are two new state-of-the-art television sets. The GR-4500 Large Screen TV combines a crisp, rear projection 45"-diagonal picture with stereo sound for such realism you'll think you're part of the action. See it on page 8 along with a stereo sound 27"-diagonal screen television.

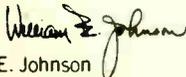
For amateur radio operators we have four new products on page 6. A Touch Tone Decoder, VLF Converter, Antenna Noise Bridge, and an Active SWL Antenna — each designed to add hours of enjoyment and improved station performance.

In the computer area, lots of new things are happening. Five — that's right — Five new computers make their debut on pages 84 thru 89. You'll be happy with the savings over comparably equipped systems and you'll find computers that fit any need from portable to advanced — all IBM compatible.

Look for the "NEW" symbol throughout this catalog to find many more new products. They're all opportunities to put something special under your tree this year with the perfect gift of a Heathkit.

Our Heath family wishes you and yours a very Merry Christmas. Have a Wonderful Holiday Season.

Sincerely,



William E. Johnson
President



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Build this advanced new Projection TV with giant 45" diagonal screen. Superb picture quality, outstanding dependability with 100% modular chassis, 178 channel capability. See Page 8 for this and many, many more television kits to build.

25 MHz Dual-Trace Oscilloscope is a laboratory grade instrument that you can build and use for service work, electronic experimentation hobby, or professionally. See it on Page 4, and find an extensive line of test instruments on Pages 42 through 55.



New for the Amateur Radio Operator is this group of products to build.



Very Low Frequency (VLF) Converter permits tuning of the 10 to 500 kHz band from 3.5 to 4.0 MHz, opens up new and interesting listening possibilities. Installs in standard shortwave or receiver antenna line. See Page 6.

Antenna Noise Bridge helps tune antenna accurately to chosen frequencies, can preset an antenna tuner for faster tune-up, and more. See Page 6.



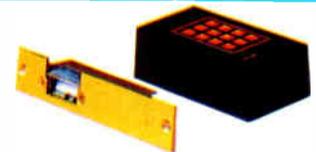
New computer system with increased speed due to an 8 MHz clock and you can build it yourself! Great for home and office. IBM-PC compatible, with 256K expandable memory. See Pages 84 through 87, to discover this and many other computers to build and learn from.

New Line Voltage Monitor displays AC line voltage and settable fault LED reveals low line voltage or a voltage drop-out. See Page 4.



A big 27" screen goes with the big stereo sound of the kit GR-2700 television. Built-in stereo system with decoder provides full, realistic sound. You have complete control with powerful features like Parental Supervision. Plus monitor capability and superior Advanced System 3 technology. See Page 8 for details.

Electronic keyless doorlock frees you from lost key worries. Four-number code is easy enough for children to use, and safe even in power failure. See Page 4.



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