First stop: your new Heath/Zenith "Computer Center" – for all your computer needs.

We feature a complete selection of Heathkit and Zenith Data Systems computers...plus all the accessory boards, peripherals, supplies and software you need to go with them.

Heathkit®

ZENITH | data systems

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Get top performance boards at the right price in the "Board Room." Selected and tested for your Heath/Zenith or IBM computer and guaranteed for 90 days or your money back!

The in-store "Service Department"

What makes us one of the best is not new: we offer **complete** in-store parts and service support for all computers we sell. This combination of major-brand products and trained service technicians offers you a trusted place to buy top quality computer products. We will be here in the future to service and support you.

Our Computer Professionals will help you get the most out of your computer.

For more than 20 years, we've been helping customers understand and use complicated electronic equipment. Those same professionals will help you get the most out of your computer. We Promise: "We won't let you fail."

See the exciting <u>kit news</u> on the back page! ▶

More exciting products featuring the latest technological advances in home security, home weather forecasting, laser education, amateur radio gear, instrumentation, television, robotics, computers, computer peripherals and accessories, and home stereo equipment.

Heathkit

Helping you make things better

Meet HERO® JR. – the home and personal robot with an entertaining personality

The versatile and entertaining HERO JR. is a fully preprogrammed personal robot with speech output, light and sound sensors, an ultrasonic sonar, drive and steering motors and an on-board computer control system.

Low kit price of

$599⁹⁵

with voice

- Has a dynamic personality consisting of six traits
- Sings songs, tells nursery rhymes, plays games
- Performs tasks at specific times in the future
- Guards your home and challenges intruders
- Wakes you up on time and announces special dates
- Lets you modify his personality as desired
- Add capabilities with additional plug-in cartridges

Meet the first affordable, personal robot with a dynamic personality...HERO JR. A very friendly robot, HERO JR. will fit right in with your family and into your home. He sings songs, plays games, tells nursery rhymes, recites poems, guards your home and he can even wake you in the morning. Without supervision or help, HERO JR. will explore his surroundings and will seek to remain near his human companions. HERO JR.'s personality is preprogrammed and doesn't require any computer programming skills to operate.

The traits comprising HERO JR.'s dynamic personality include: singing songs like "Daisy" and "America"; speaking preprogrammed English phrases; exploring and moving about, using his sensors to avoid most obstacles and seeking out humans; playing games such as "Cowboys and Robots," "Let's Count" and "Tickle Robot"; telling a nursery rhyme; and gabbing in "Roblish" (a robot gibberish that sounds like English). All routines are stored in *32K of built-in ROM*. Additional functions can be easily added to HERO JR. through optional plug-in cartridges.

In addition to these six traits, HERO JR. has an internal clock with a 100-year calendar that even compensates for Daylight Savings Time (if observed in your area). 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, the Robot listens to be sure you are awake or permits two ten-minute snoozes if you desire. You can also make HERO JR. announce the day of the week, date and time at predetermined intervals or just at one important time and date. With his on-board 2K of RAM, HERO JR. can store and then remind you of birthdays and anniversaries, or other calendar events – up to sixteen dates per year.

To see, hear and speak, and to move about; HERO JR. uses a light sensor, ultrasonic sonar and motion detector, sound detector, speech synthesizer and an internal clock which are controlled by an on-board computer using a Motorola 6808 microprocessor. The light sensor has an adjustable 256-part resolution range and a 30-degree reception angle. A Polaroid ultrasonic sonar transceiver is used for the Robot's sonar and motion detector which is accurate from four inches to 26 feet. The sound sensor has a 256-part adjustable resolution range and a 200-5000 Hz bandwidth. An optional infrared sensor easily installs to add superior heat/motion detection capability.

Show off HERO JR.'s many talents to your friends using the single-button DEMO feature. In this mode, a built-in "Robot Variety Show" demonstrates the Robot's ability to see, hear, speak, tell time and move. You can even participate in the show as HERO JR. tells you what to do and when.

HERO JR. can perform other very useful tasks, including security guard. In this mode, HERO JR. will guard your home against intruders with a coded security system. You can even leave HERO JR. in the Guard mode while you are at home. If you are detected by one of the Robot's sensors, you simply respond with the proper password when requested by the Robot. Should an intruder be detected, the Robot gives a verbal warning and requests the password. If you own the Heath GD-2800 Security System (page 20), HERO JR. can activate a GDA-2800-3 RF Security Transmitter (page 20) when it challenges someone and an incorrect password or no response is given. HERO JR. can guard a specific area or patrol randomly around the house.

HERO JR. also has another human-like characteristic, it can go to sleep. This occurs randomly as part of his personality and allows the Robot to conserve battery power by keeping only critical circuits energized. You can make HERO JR. go to sleep with the SLEEP switch or by activating the Wake-Up Alarm feature.

HERO JR. can duplicate all English sounds using its built-in Votrax SC-01 phoneme synthesizer. This permits the Robot to say just about anything. Volume and pitch adjustments tailor the Robot's voice to whatever sounds best to you. All of HERO JR.'s vocabulary is preprogrammed for you.

Although HERO JR. normally speaks, sings and performs tasks between moving about at random, an optional wireless remote unit allows the Robot to be manually driven from place to place. HERO JR. will also speak while moving about on the remote control. Four buttons on the handheld RF remote transmitter control the Robot's forward and backward movement, stop, and left and right steering. The remote operates at 75 MHz and provides control from up to 150 feet away.

A number of easy-to-install accessories are available for HERO JR. Install the Infrared Motion Detector Accessory to improve HERO JR.'s ability to seek out humans and to detect intruders. An RS-232 Accessory allows you to program the Robot using a special BASIC language through the console of a video terminal or computer. Add two extra batteries to double HERO JR.'s operating time. And, extend HERO JR.'s capabilities even further by adding on the Cartridge Adapter Accessory. It enables you to plug in a variety of preprogrammed cartridges that expands HERO JR.'s list of routines, songs, games and phrases. Even a BASIC cartridge that will allow you to program the Robot through a home computer.

Once you understand all the facets of the Robot's personality, you can advance your skill level to that of "Robot Wizard" which permits HERO JR. to identify you by name. Other wizardry enables you to change the Robot's name, adjust the sensitivity of the light and sound sensors, and make HERO JR. measure distances and more. Learn secret passwords and become a Robot Wizard.

HERO JR. is powered by two six-volt rechargeable batteries that allow the Robot to operate from 4 to 6 hours, with an average amount of exploring. The batteries recharge overnight from a plug-in wall charger that's included with the kit. HERO JR. is 19 inches tall, weighs 21½ lbs. and can carry your favorite beverage (up to 10 pounds) on a 94 cubic inch compartment built into the top of his head. Three wheels, including a single rear drive and steering wheel, enable him to move about. HERO JR. is easily assembled in approximately twenty hours.

HERO JR. is also equipped with a 17-key keypad which permits the owner to modify the Robot's personality or initiate a special task. The alphanumeric keypad features clearly marked function keys including Sing, Play, Poet, Gab, Alarm, Guard, Help, Plan, Set Up and Enter. Eight data LEDs flash in time with his speech.

Kit RT-1, HERO JR., Shpg. wt. 32 lbs. **599.95**

$AVER! Save $239.75 with 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. . . **749.95**

$AVER! Save $204.60 with 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. **649.95**

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 150 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 93 and terminal emulation software such as CPS), 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, preprogrammed cartridges for HERO JR. (all require the installation of the RTA-1-5 Cartridge Adapter Accessory):

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 TicTacToe 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 (such as CPS), requires RTA-1-3 RS-232 port, Shpg. wt. 1 lb. **49.95**

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

NEW 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**

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

using simple 17-key keypad

Moves about and avoids obstacles while remaining in your company

Guards specific areas or your home against intruders with sensitive detectors

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

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

Heathkit clocks add both accuracy and elegance to timekeeping

① Heathkit Digital Alarm Clock is practical, fun-to-build kit

$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: 2¼" H x 7" W x 4¾" D.

Kit GC-1107, Shpg. wt. 3 lbs. 29.95
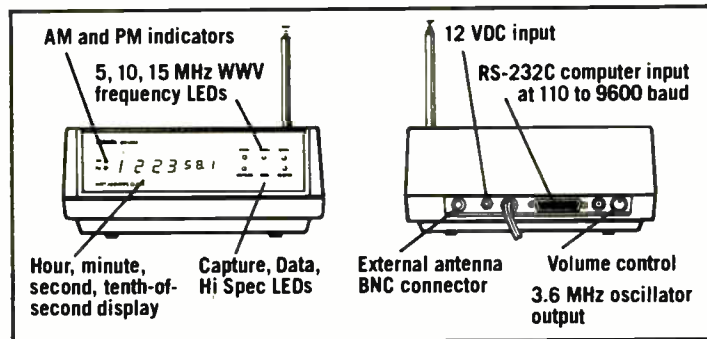
② Have the National Bureau of Standards (NBS) time in your office or home — with the GC-1000

$249⁹⁵

- Synchronize with the NBS cesium-atomic clock
- An accuracy of ± 10 ms when Hi Spec LED lights
- ASCII computer output provided by RS-232C Accessory
- Mutable audio monitor allows you to listen to audio broadcasts on WWV Frequencies

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 guaranteed "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.

AM and PM indicators
5, 10, 15 MHz WWV frequency LEDs
12 VDC input
RS-232C computer input at 110 to 9600 baud
Hour, minute, second, tenth-of-second display
Capture, Data, Hi Spec LEDs
External antenna BNC connector
Volume control
3.6 MHz oscillator output

An RF receiver scans the 5, 10 and 15 MHz frequencies of WWV and locks onto the strongest signal. A mutable audio monitor permits you to listen to the audio broadcasts 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 tenth-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 sampled, 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 and factory-aligned. 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 wet-cell 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 µV 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:** 3⅞" H x 9" W x 6¼" D (9.8 x 22.9 x 15.9 cm) less antenna.

③ GC-1195 Digital Floor Clock — a stylish timepiece for your home

$239⁹⁵

- 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, 3¼"-high digital readout adjusts to surrounding light for a subtle gold-toned display. The display will flash to let you know when there has been a power disruption.

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 time advance switches on the bottom of the clock chassis.

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 ¼" shelves are perfect for showing off your knick-knacks, plants or books.

The GC-1195 Digital Floor Clock operates on 120/240 VAC. Its dimensions are 60½" H x 14" W x 9½" D.

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

④ Heath Digital Wall Clock for quartz-precision time

$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 insure 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 5¼" high x 7⅛" deep, it fits in places where many other clocks won't.

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 light-weight, 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:** 5¼" H x 7⅛" W x 1½" D.

② Heath's Most Accurate Clock

The GC-1000 supplies the most accurate timekeeping available at an affordable price: lock-in on the National Bureau of Standards atomic clock to have the universal time standard (UTC) in your home or office: set the Most Accurate Clock for any of the standard 24 time zones; have time that even corrects for wobble in the earth's rotation; connect that time to your computer with the RS-232C Accessory.

Heath GC-1000

AM PM   3 24 88.   5 MHz 10 MHz 15 MHz

MOST ACCURATE CLOCK   CAPTURE DATA HI SPEC

Useful, easy-to-build Heathkits for the home, the hobbyist and the family

① Rechargeable Portable Light makes it easy to see

$39⁹⁵

- 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 Heathkit Rechargeable Portable Light will bathe your working area with a bright, yet soft-on-the-eyes fluorescent light for a multitude of uses. Helps you to clearly see a wider area without sharp, eye-straining shadows. Safer to use than fire-hazardous candles and kerosene lamps in a power outage or while camping. And it saves money by recharging over and over for just pennies. "Soft start" feature extends tube life. 120 VAC and car lighter socket chargers included. A single charge lasts for several hours. Heavy-duty metal case with handle is 10⅝" H x 3⅛" W x 5" D. It's designed to survive rugged use – perfect for camping or night work and emergencies – *always ready when you need light!*

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

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 TO-1257, Shpg. wt. 2 lbs. 29.95

③ This AM Portable Radio is an easy kit to build

$18⁹⁵

- 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 44. Includes earphone for private listening.

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

④ 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 cleaners

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 GO-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 2⅜" 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. 4⅝" H x 11" W x 5¾" D. Operates on 120 VAC.

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

⑤ 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 2⅝" W.

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

⑥ 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 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 5⅜" H x 4⅜" W x 5¼" D.

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

⑦ Battery Life Tester saves on replacements

$14⁹⁵

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

Test all popular-sized batteries and end waste – be certain a battery is dead before you throw it away. Does more than just give a "good-?-bad" reading like other testers – actually indicates *how much useful life* remains on a 0-to-5 meter scale. Tests alkaline or carbon-zinc 9V or 1.5V AA, C & D-size batteries, plus 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 GO-1703, Shpg. wt. 1 lb. 14.95

⑧ Inexpensive, easy-to-build Freezer Alarm

$19⁹⁵

- Prevent costly food loss from freezer failure
- Be alerted to a freezer door left open
- Freezer Alarm even works during a power outage

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

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

⑨ 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 hazard in your home, office, boat, basement, RV, factory, garage – anywhere excess moisture threatens! The reliable Heathkit Flood Alarm will detect water when it first appears, giving you maximum time for corrective action *before it can do major damage.*

Use it in a hundred places: The water sensor sticks anywhere. When water touches the sensor foil, the Flood Alarm produces a loud, insistent beeping in time with a flashing red LED to get fast attention! Safeguard against water seepage in cellar, kitchen, bathroom, computer room; near dehumidifier, dish or clothes washer, leaky plumbing, sump pump – even place sensor on the edge of a windowsill to wake you if rain comes in an open breezeway. Size: 1¾" H x 3⅝" W x 4⅞" D.

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

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

HEATHKIT
RECHARGEABLE
LIGHT

[1]

[2]

HEATHKIT

[3]

TIMER

[4]

[5]

Heathkit

BATTERY LIFE TESTER

15V   9V

[6]

[7]

[8]

[9]

① Use Heath's computerized weather station for up-to-the-minute meteorological information

Kit version
$399⁹⁵

- Displays time and date, indoor and outdoor (F or C) temperatures, wind speed and direction, and barometric pressure (whether it is rising or falling and rate of change)
- Microprocessor accuracy with memory storage of past weather data so you can see trends
- Remote windcup-and-weathervane transmitter assembly mounts on a 1" to 1½" mast (such as a TV antenna mast) for years of dependable service
- Professional-looking solid walnut cabinet with brushed-aluminum trim panels

The Heathkit Digital Weather Computer uses a microprocessor to instantly give you accurate past and present weather data to aid in forecasting future activities. For professional weather watchers, farmers, boaters, pilots, campers, fishermen, science teachers – for anyone going outdoors – the weather station can let you know what to expect. The microprocessor-controlled display puts *ALL* the important weather information at your fingertips!

Complete weather information at the touch of a button: The ID-4001 Digital Weather Computer gives you the time in AM/PM or 24-hour format, plus the date for log entries; both the indoor and outdoor temperatures, whether above zero or below, in Fahrenheit or Celsius scales; outdoor wind chill factor, plus the indoor/outdoor minimum and maximum temperatures since last memory clearance; instantaneous wind velocity with digital accuracy and 16-point compass resolution, in mph, kph or knots; the average wind speed and direction, and peak gust since last cleared; barometric pressure with four-digit accuracy, in selectable inches or millibars, and whether rising or falling and rate of change.

Our electronic almanac has more memories to store data: The Digital Weather Computer 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 – to let you know when a major storm is about to develop. Connection to an external battery will hold memory contents in case of a brown-out or 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 utilizes 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. For example, our wind speed sensor is sensitive to variations as small as one-tenth of a mile per hour!

In addition, the barometer readings are derived from a newly-developed piezoresistive silicon bridge transducer that senses the most minute changes in atmospheric pressure, from 28 to 32 Hg (inches of mercury). The four-digit readout also has separate indicators to show whether the pressure is rising or falling. An output for interfacing with a computer is available for even more sophisticated weather forecasting, research and pattern forecasting.

The computer contains a 6-digit clock to display time in either a 12- or 24-hour format. A 4-year calendar also uses the same six digits on alternate cycles, and a rear-panel switch permits selecting either a constant time or date display.

Beautiful styling and an easy-to-read digital display: Not only does this Weather Computer provide more data, but its functionally elegant design will blend in with almost any decor. The readout panel is trimmed in brushed aluminum and features large bright-red ½" LED segment displays against a black background. Solid oiled-walnut computer cabinet has clearly marked front panel buttons.

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

Whether for hobby or professional reasons, you'll find Heath's Digital Weather Computer an investment that pays for itself, again and again. Order your Weather Computer today, with the length of cable you need, and have reliable, up-to-the-second weather information at your fingertips – whenever you need it!

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

Computerized Weather Station factory assembled and tested.

IDW-4001, Shpg. wt. 25 lbs. **699.95**

② Five-function weather station supplies accurate atmospheric and temperature information at a low cost

Only
$159⁹⁵

- Monitors barometric pressure, indoor/outdoor temperatures, wind speed and direction
- Temperature-compensated barometer can be used to an altitude of 10,000 feet
- All solid-state circuitry requires a minimum of power from the AC line
- Walnut grained cabinet can be displayed horizontally on a desk or table, or hung on a wall for comfortable eye-level viewing
- Quality, non-corroding transmitter assembly

For the price, you can't beat the features or the accuracy of the ID-1290 Weather Station. This weather instrument was designed for quality and reliability: it contains professional-grade sensors; the all solid-state circuitry operates from 120 VAC with a minimum power consumption to provide maximum component life; and a non-corroding remote transmitter assembly ensures years of trouble-free service – all for less than $160.

Heathkit's ID-1290 provides instant and accurate weather information: True indoor/outdoor temperatures are displayed in both Fahrenheit and Celsius; thermometer calibration from −40°F to +120°F (−40°C to +49°C), with a switch to select continuous indoor or outdoor readings. A sensitive barometer helps you keep on top of the most significant meteorological parameter (changing atmospheric pressure conditions) by indicating changes as small as 0.05 inches of mercury. Wind speeds can be read in two ranges: from 0 to 30 mph or from 0 to 90 mph. The eight wind direction indicators provide a 16-point compass resolution when two adjacent indicators are lighted.

Remote, windtunnel-tested anemometer/weather vane assembly has long-life Teflon bearings that require no lubrication, to ensure accurate readings year after year. Well-insulated 8-wire cables provide excellent weather resistance (not included, order from this page).

The four instrument dials are housed in an attractive, simulated wood-grained cabinet. Gold graphics on black dials make the long-range precision scales easy to read. The anemometer/weather-vane transmitter assembly mounts conveniently on any standard 1" to 1½" diameter mast.

To simplify construction, all electronic components in the console are mounted on a durable epoxy circuit board. Only a few simple adjustments are needed to place the Weather Station into operation – these can be completed without the use of test instruments.

Heathkit's well-written assembly manual is amply illustrated to lead you step-by-step through construction. After just three or four evenings, you can have the ID-1290 Weather Station assembled, installed and working for you. And all the important weather information (wind speed and direction, temperature and barometric pressure) will be yours.

The ID-1290's walnut grained, sturdy indoor console can be placed on a wall, or used as a handsome and distinctive desk set with the included triangular stands. Operates on 120 VAC. Measures 7" H x 20½" W x 2" D.

Kit ID-1290, Shpg. wt. 8 lbs. **159.95**

ID-1290 SPECIFICATIONS: Wind Speed: 0-30 mph, ±2 mph; 0-90 mph, ±5 mph. Direction: 8-point readout over 360°. Temperature: 0° to +120°F, ±2°F (typ. INDOOR); −40° to +120°F (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°F. Wind Direction: 16-point resolution by lighting two adjacent lights.

ID-4001 SPECIFICATIONS: DIGITAL CLOCK/4-YEAR CALENDAR. Time Accuracy: Determined by accuracy of AC line. No accumulative error. WIND VECTOR. Accuracy: ±5% or better. Direction Display: Accuracy: ±11.25 degrees. THERMOMETER. Temperature Range: −40° to 70°C; −40° to 158°F. Accuracy: ±1° on Celsius readings; ±2° on Fahrenheit readings. BAROMETER. Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury). 981.9 to 1050 millibars. Accuracy: ±0.075 in. Hg, ±0.01 in Hg/°C. Operating Temperature: Outdoor assemblies, −40°C to +70°C (−40°F to 158°F). Unit, 15° to 35°C (59° to 95°F). Power Requirement: 120/240 VAC. Provision for external battery connection for memory backup during power failures. Dimensions: 7¼" H x 16" W x 6" D.

8-Wire Cable for the ID-4001, ID-1290 and ID-1590 Instruments	
IDA-1290-1, 50' cable, Shpg. wt. 2 lbs.	9.95
IDA-1290-2, 100'cable, Shpg. wt. 4 lbs.	16.95
IDA-1290-3, 150' cable, Shpg. wt. 6 lbs.	23.95

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

① Heath's best and most advanced weather station

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

② Low cost weather station

Five-function station displays barometric pressure to within 0.05 inches of mercury, wind direction on 16-point compass, wind speed using two scales, and temperature in either Fahrenheit or Celsius.

Brass Name Plate adds prestige to your kit

Be proud of your kitbuilding skills! Adding your name to a kit product reflects the painstaking care you've invested in it. The Heathkit Name Plate is made of solid brass, brushed to a jeweler's finish and has a self-adhesive backing for easy, no-mess application.

for one plate
$2⁰⁰

each, 2 or more
$1⁶⁰

① Relative Humidity Indicator monitors air moisture

$99⁹⁵
- Monitors the relative humidity to improve your living environment and reduce heating/cooling costs
- Costs half as much as comparable units and offers more

The ID-2295 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 winter to save on your heating bill.

Electronic sensors provide accuracy and reliability: Heath's electronic sensors, unlike most barometers that use animal membrane or hair, uses a conductive film covered with a layer of gold for greater reliability — and electronic sensors permit making accurate readings in remote locations. Place the console in a convenient location, the two sensors where you want to measure relative humidity.

With both sensors connected, the console can display readings alternately, 1.5 or 5 seconds apart, or can be switched for a constant display of either reading. Bright red ½"-high digits display the humidity by percentage, from 0 to 99 percent. LEDs identify which sensor's readout is being displayed. A 100-foot easily-concealed transmission cable is included. Assembly and calibration requires only two or three evenings. Console measures 2½" H x 7" W x 5" D.

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

② 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

This ID-1590 Digital Wind Indicator skimps on price, but certainly not on accuracy or reliability. The outdoor transmitting unit is one of the best around. It's designed to give you precise wind speed and direction, year after year. The anemometer and weather vane are constructed from non-corroding waterproof materials for error-less readings under any condition.

The indoor console features an easy-to-read seven-segment display and can be wired to report in two of three scales: mph, kph and knots. The readout displays wind speeds on these scales from 0 to 99. Incandescent bulbs mark the principal compass points, providing 16-point resolution by temporarily lighting two adjacent bulbs simultaneously. It uses the same transmitter boom as the ID-1290 (shown on page 9).

In only three evenings, you can have this Wind Speed/Direction Indicator working for you. And you can calibrate it for true north to gather weather data — or for magnetic north if you are a pilot. Only two simple adjustments are required to place the Indicator in operation, and these can be performed without test equipment. Requires 8-wire cable (see page 8). Operates on 120 VAC.

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

③ Practical Digital Indoor and Outdoor Thermometer

$84⁹⁵
- Digital display of indoor and outdoor temperatures
- Continuous or alternating Fahrenheit or Celsius display
- Electronic accuracy and reliability with Heathkit quality

When you compare the advantages this Digital Indoor/Outdoor Thermometer has over a conventional mercury bulb "sun-or-snow" thermometer, you'll wonder how you did without one for so long. The big, red ½" display digits can be seen easily from across the room, at night and in bright daylight. Eliminate the guesswork in getting accurate temperature readings.

The ID-1390B Thermometer monitors temperature readings from two sensors for accurate indoor/outdoor readings. Measure temperatures from −30°F to 120°F outdoors and indoors. This Thermometer has an accuracy of ± 1° from 20°F to 120°F, ± 2° from −40°F to 120°F. The 2½ digit display has plus and minus indicators for quick identification of above- and below-zero readings. Select Fahrenheit or Celsius temperature scales, with a continuous reading of indoor or outdoor temperatures, or alternate readings of both. The 10' indoor and 75' outdoor cables (included) let you place the sensors almost anywhere (freezer, sauna, basement, etc.).

Step-by-step instructions make this kit easy to assemble and calibrate, and it is a practical gift that gives year-round value. Operates at 120 VAC, 60 Hz (order model ID-1390BE for 240 VAC, 50/60 Hz operation). Small size (2½" H x 7" W x 5" D) and an attractive black Cycolac cabinet with teakwood trim make this Thermometer a handsome addition almost anywhere in your home. Styling is the same as for the ID-1590 Digital Wind Speed/Direction Indicator.

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

④ Heath's GR-3000 25" Diagonal TV Computer System

$uper $aver: Get a complete deluxe 25-inch TV Computer system that includes a GR-3000, a GRA-3000-1 Programmer Accessory Module, a GRA-3000-2 Auto Rotor Accessory Module with a GDA-1184-1 Electronic Rotor Assembly, and either a small GRA-705-25 or large GRA-715-25 TV cabinet at great discount prices.

Kit GRS-3000-1 with small TV cabinet, 256 lbs., Mtr. Frt.
Regular Price...1259.75 Discount Price **799.95**
Kit GRS-3000-2 with large TV cabinet, 280 lbs., Mtr. Frt.
Regular Price...1309.75 Discount Price **799.95**

At first glance, your GR-3000 looks like a normal TV, but revolutionary new hardware, superior performance and advance design make it the world's most talented receiver. And it's all available from your armchair.

The Remote Control unit uses infrared telemetry to perform some never-before-possible computerized TV magic. Light-touch buttons have audible feedback and provide special functions only possible with the GR-3000 TV.

A special 3-line information display appears briefly on the screen by command or when channels are changed. It identifies the tuned station, current time in the selected 12- or 24-hour format, and current date. A fourth, accessory line shows the function in use or Auto-Rotor compass rotation and direction status.

Automatically set your antenna for optimum reception. The microprocessor-guided GRA-3000-2 Auto-Rotor Accessory Module seeks a maximum signal level when you select any one of the 82 addressable channels. It memorizes antenna orientations and returns to them when those channels are selected.

A "Learn" mode with eight channels of input space (94 bytes of soft memory) will let you custom-program up to eight different sequences of TV operation and repeat them with a single command.

The GR-3000 is cable compatible for immediate installation in equipped areas. Direct audio and video input and output jacks on the rear panel permit you to connect and switch between a video recorder/disc player or standard channel reception. Two 6" x 9" and two 2" tweeters supply excellent sound.

A multi-level video display consists of five different display screens. First is the standard video screen; second is a backdrop screen which can be set for any of sixteen different colors; third is a pattern/text screen for alignment/test purposes and built-in help messages; next is a 40-character display screen for configuring on-screen displays and messages; the fifth is a computer-generated screen, to display text and graphics generated by an external computer.

Kit GR-3000, 129 lbs. Motor Freight **799.95**
Kit GRA-3000-2, Auto Rotor Accessory Module, Shpg. wt. 2 lbs. **19.95**
GDA-1184-1, Cornell-Dublier Electronic Rotor Assembly Model AR-40, required for proper Auto-Rotor operation, Shpg. wt. 11 lbs. **89.95**
GRA-3000-1, Programmer Accessory Module gives you preset control of your GR-3000 Television Set. You can preset your TV programming in the weekly mode for a day, or an evening — to repeat once a week by day and time, or once a year.
Kit GRA-3000-1, Shpg. wt. 2 lbs. **199.95**

④ **Large cabinet for the GR-3000 Television Computer System.** Has oak veneer parquet top and sides with antique-finish metal hardware and latticework. Hardwood framing. 32½" H x 50½" W x 20" D with casters and tube cap.
GRA-715-25, 136 lbs. Motor Freight **199.95**

⑤ **Small cabinet for the GR-3000 Television Computer System.** Antique latticework accents distressed-finish oak veneer. 33" H x 43" W x 20" D with casters, cap.
GRA-705-25, 112 lbs. Motor Freight **149.95**

⑥ Zenith TV Stereo Adaptor enhances TV viewing

Make quality stereo broadcasts part of your television entertainment as soon as these signals are available from your local TV station using a method developed by Zenith and adopted by the TV industry as a standard. In addition, second audio programming (such as a second language) can also be decoded. Mode settings for auxiliary stereo, extended stereo and mono audio are also available. Adjust the bass, treble and balance controls to suit your individual taste. Works with Heath GR-2502, or Zenith TVs with an "IF tap output." Add-on kits (below) are available for many other Heath TVs. Uses 120 VAC, 2¼" H x 16¾" W x 13⅜" D.

GDZ-524, Assembled and tested, Shpg. wt. 12 lbs. **179.95**
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-254 with Heath GR-300, GR-400, GR-500, GR-2000, GR-2001 and GR-2050 TV's, 1 lb. **9.95**

1

2

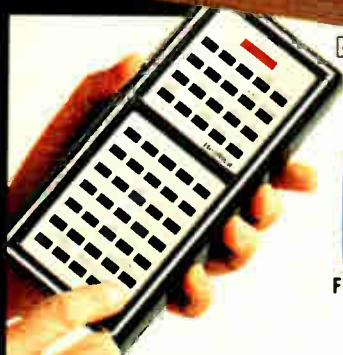Wind Speed

HEATHKIT

3

+20

HEATHKIT

4

Five different, overlapping screens

Infrared Remote provides complete control of TV and special functions

5

Simulated TV pictures

6

NEW

Stereo Adaptor decodes stereo broadcast TV sound

- Decodes and plays broadcast stereo TV sound through a TV's speakers or an external amplifier and speaker
- Separate adjustable bass, treble and balance controls

☐ Advanced System 3 GR-2502 25-Inch Diagonal Color Television kit with optional Space Phone

Dramatic TV for only

$649⁹⁵
Kit

- Colors remain "like new," year after year with exclusive automatic CRT tracking feature
- Improved picture sharpness, even at high brightness levels, and enhanced highlight detail made possible by a high-resolution tri-focus picture tube
- Clearer pictures with greater resolution provided by a special video filter plus a comb filter
- Greater user conveniences with optional space phone and antenna switching accessory

A lot of your friends will buy color TV sets this year. *You can build one!* Both the outstanding value and magnificent rewards of this easy-to-build kit can be yours in as little as five fun evenings.

High fidelity picture sharpness is yours with a Peak Resolution Picture circuit that achieves 25% greater detail than ordinary TV by reproducing up to 330 lines of broadcast resolution. This comb filter eliminates shimmering, spurious color and makes picture detail 'pop out' sharp and clear for a lifelike degree of clarity found previously in only the most expensive, professional-quality video monitors. Our Tri-Focus picture tube has three concentrated focusing actions instead of just one – for cleaner, brighter image. The 100% modular chassis design of the GR-2502 guarantees outstanding reliability by using fewer inter-connections, with most modules factory pretested and aligned before you unpack the kit.

Like a chromatic control center in your TV set, the sophisticated Color Sentry combines 8 automatic picture and color sub-systems for magnificent viewing pleasure. It maintains accurate color level, life-like flesh tones, tint and contrast – even adjusts the picture brightness as surrounding room lighting changes. One button does it all for you...scene to scene, channel to channel...automatically!

A sharpness control lets you adjust the GR-2502's level of picture definition. Advanced digital circuits scan and lock on the broadcast signal, eliminating any kind of vertical and horizontal hold controls. A no-wear, quartz PLL Varactor electronic tuning system seeks out and fine tunes the exact station frequency. Because the tuners are electronic, they have no moving parts to corrode, wear or cause noisy picture problems. A power-sensing voltage regulator helps conserve energy by supplying only the power needed by the TV and maintaining a stable chassis voltage. Electronically self-regulating, it virtually eliminates the effects of household line variations and provides a more constant voltage for improved component and picture tube life. Solid-state automatic fringe-lock circuitry provides unshakable picture stability on fringe area reception. A special phase-locked AFC switch 'pulls in' off-frequency signals from cable or master antenna systems and video games. For optimum clarity, a picture control permits you to adjust the contrast and color levels, which maintain proper balance for varying room light conditions. Altogether, the most impressive picture you can build!

Advanced System 3 means greater value. Together, the EFL Tri-Focus picture tube, cool-running Triple-Plus chassis, and advanced Color Sentry combine to create

the sharpest, most realistic picture in Heath history! You're assured of fewer service calls, greater reliability and ease of operation.

Your new GR-2502 comes with our Computer Space Command Remote Control for scanned or direct access channel selection, on/off with variable volume, on-screen display of channel with current time, and using the Advanced Space Phone. An easy-to-read, on-screen channel/time display appears briefly when channels are changed, or recalled from set or remote control. Expanded 178-channel tuning capability lets you select from up to 122 cable offerings as easily as VHF and UHF, except scrambled premium services.

Advanced Space Phone is one option worth its price in convenience alone. With it you can take or make calls anywhere in the world. A dialed number prints out on the TV screen, and in case you get a busy signal you can even program the remote to redial automatically. The TV set itself is readily connected to any telephone line to work as a sensitive speaker phone, so you don't have to leave your easy chair...and the whole family can participate in conversation! And if you don't want the other party to overhear what's being said in the room, there's even a Mute button on the remote control you can touch for complete privacy.

Equipped with a stereo audio system, the GR-2502 has a five-watt RMS per channel stereo amplifier with a 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 a hi-filter switch and a mode switch for auxiliary stereo or TV audio. Two 5" x 7" oval speakers and two 2" tweeters provide clean, rich audio. Video/audio input/output jacks are also provided.

Put the GR-2502's custom-installable chassis behind a wall, mount it in a cabinet of your own custom design or save when purchasing your kit with one of the fine furniture cabinets featured on page 13. Clearly written and fully illustrated, the step-by-step assembly manual has all directions, dimensions and templates necessary to install the TV successfully. No instrument alignment is required. The kit includes a crosshatch generator which you build and use to perform the convergence and color purity setup. After just 15 hours average build time, you can touch the Power button on your GR-2502 and begin to admire a beautiful, lifelike parade of pictures you'll be proud to show off always.

The commanding 25" Heathkit GR-2502 has a lot more of what you're looking for – top-of-the-line features and performance plus the utmost in service simplicity.

Kit GR-2502, Shpg. wt. 100 lbs., Motor Freight **649.95**
Kit GRA-2502-1, Advanced Space Phone accessory, 2 lbs. **49.95**
$AVER! Save $100.00 on a GR-2502 TV and a Classic cabinet.
GRS-2502-1, Shpg. wt. 185 lbs. Mtr. Frt. **699.90**
$AVER! Save $100.00 on a GR-2502 TV and a Modern cabinet.
GRS-2502-2, Shpg. wt. 182 lbs. Mtr. Frt. **749.90**
GSZ-4600, Assembled Remote Antenna Switch Accessory, allows selection of four different antenna sources by front panel or remote control, includes AC power supply, Shpg. wt. 4 lbs. **29.95**

☐ Advanced System 3 GR-1902 19" Diagonal Color Television kit provides excellent performance

$449⁹⁵
Kit

- New CRT tracking system keeps your picture looking brand new – day after day, year after year
- Quartz-controlled tuning of 178 cable and standard broadcast channels with infrared remote control
- Built-in VHF/UHF antennas; earphone included

This space-saving table-top model unites a 19" size and spectacular System 3 technology in a meticulous kit design you'll take great pleasure in building.

Inside the GR-1902, you'll find circuit improvements that offer enviable advantages over other color TVs. First, the chassis. Cool-running and 100% modular in design, it consists of a clean, uncluttered arrangement of modules. Every module is 100% pre-tested and aligned for outstanding reliability.

The Tri-Focus Picture Tube attracts your eye with exceptional – almost three-dimensional – sharpness and detail. It uses an ultra-high-resolution EFL Electron Gun with three extended focusing actions to concentrate the beam and produce a smaller spot than is possible in one-element guns. The precise horizontal alignment brings you an increased image crispness, better highlight definition and crystal clear resolving power, with proper levels of color intensity, tint and contrast.

A new, advanced Color Sentry corrects the picture 30 times per second. Eight essential hue and picture sub-systems work together to deliver critically sharp and vivid color reproduction every time...automatically!

For extra depth and visual presence, the amazing detail-adding PRP (Peak Resolution Picture) comb filter circuit achieves maximum optical resolution by reproducing all 330 lines of detail being transmitted.

The GR-1902 gives you 178 UHF/VHF/CATV channel capability without a converter

(except for scrambled programs). Connect cable directly to the set, and you're in touch with 122 easily-selected cable channels.

No fine tuning adjustments needed – ever! In every Advanced System 3 television, a quartz controlled, synthesized channel tuner provides super accurate reception.

A handy slim-line infra-red Computer Space Command remote control offers direct access or two way scanned channel selection, volume up/down, muted sound, recall of on-screen channel/time display, and on/off power control from anywhere in the room.

The elegantly finished pedestal cabinet measures 17⅞" H x 26¾" W x 17⅛" D and includes detachable telescoping dipole and clip-on bowtie antennas. Provisions for external UHF/VHF and matched cable-ready CATV/MATV hookup are also provided, with switchable Normal/Special AFC.

To match the pleasing performance of what you hear to the clearly superior picture you see, a 1.5 watt amplifier and two 3" x 5" acoustically optimized speakers are used to send out warm, full-bodied sound. For truly room-filling response, the GR-1902 can be connected via an Audio Output jack to your high-fidelity system for richly-toned soundtracks that will enhance your enjoyment of concerts, culture and film. Includes private earphone with 15' cord for discreet listening, and all tools for setup/alignment.

Kit GR-1902, Shpg. wt. 101 lbs. **449.95**
GRA-1901-1, Mobile TV Cart (shown), Shpg. wt. 10 lbs. **24.95**
GRA-2502-1, Advanced Space Phone Accessory, Shpg. wt. 2 lbs. **49.95**
GSZ-4600, Assembled Remote Antenna Switch Accessory, allows selection of four different antenna sources by front panel or remote control, 4 lbs. . . . **29.95**

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

The GR-2502's hide-away control panel reduces tampering with TV adjustment

Quartz-controlled electronic tuning gets rid of the need for fine tuning and eliminates the normal wear-and-readjustment common with mechanical tuners. Select any channel being telecast in your area. A built-in computer selector instantly seeks out and locks on to the exact frequency. Have sharp, color-fast television at your fingertips or from a remote location! The panel closes after making those fine adjustments.

Large-Scale Integrated Circuits let these TVs run cooly and economically. Modular construction minimizes connections and makes repair quick and easy — should it ever be required a few years down the line.

Simulated TV pictures

①

Choose the cabinet to suit your decor

Four speakers, two on each side, surround the picture to provide more realism. Choose the elegant Classic or the smart Modern cabinet. Have an attractive piece of furniture and probably the best TV available.

Elegantly styled Classic console features the warm tones of richly-grained Pecan finish on top and sides made from durable wood products. Simulated wood front and base matches finish. Cabinet measures 32⅛" H (with casters) x 43½" W x 19¼" D (add 2⅝" to depth for tube cap).

GRA-706-25, 85 lbs. Mtr. Frt. **149.95**

Beautifully proportioned, symmetrical design marks this Modern console for the GR-2502. Oak veneers on top, ends and base add to its smart styling. The front is framed with hardwood solids. The cabinet measures 28⅞" H (gliders included) x 42½" W x 18" D (add 2⅝" to depth for tube cap).

GRA-716-25, 82 lbs. Mtr. Frt. **199.95**

Make and receive phone calls using the optional Advanced Space Phone Accessory

②

QUALITY FEATURES

- Single UHF/VHF/CATV 75Ω antenna input
- New auto CRT tracking keeps colors like new — year after year
- Peak Resolution Picture Circuit adds 25% more detail
- Internally shielded tri-focus picture tube
- New switchable video filter removes excess picture-noise
- Quartz-controlled electronic tuning of 178 channels
- Complete picture and sound control with audio output

Television and home video entertainment products for the whole family to enjoy

① Compact 5-inch diagonal TV goes almost anywhere

$159⁹⁵

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

The GRZ-5010 combines a 5-inch diagonal black and white TV, and an AM/FM radio in a compact unit that weighs just 6 pounds without batteries. Have all 82 VHF and UHF channels, as well as AM and FM broadcast stations, at your fingertips with this versatile and convenient television.

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.

Tune in to your favorite radio and television stations with the built-in omni-directional collapsing antenna or hook-up to an external antenna with 300-ohm antenna input terminals. For your convenience, the GRZ-5010 also has an easy-carrying handle and earphone. TV measures 7¼" H x 6" W x 11⅛" D.

GRZ-5010, Assembled and tested, Shpg. wt. 9 lbs. 159.95
GRZ-5005-1, Rechargeable Battery Pack, Shpg. wt. 3 lbs. 19.95

② Put the Epson ELF color television in your pocket

NEW

- Has a bright, pure color picture on a 2" diagonal screen
- Continuously variable manual tuner covers channels 2 to 13 in the VHF range and channels 14 to 69 in the UHF range

The world's smallest color television, using a new liquid display (LCD) technology, features an ultra-thin flat screen with good picture quality. The fast-acting LCD screen is both sharp and has good color saturation. The tuning system consists of independent channel, volume, color, tint, brightness, and VHF/UHF controls. Includes AC adapter charger, battery operation, mini earphones, video and audio input jacks, handstrap, soft case, built-in stand, and a 27" antenna. ELF weighs 1 lb. and measures 3" H x 6¼" W x 1⅛" D.

GVP-3411, Assembled and tested, Shpg. wt. 4 lbs. 399.95

③ Smart Outlet Box for audio systems

- Automatically turns on power to ten other sockets
- Protects equipment from line surges

Power to ten other sockets is switched on when a device plugged into the control socket is turned on. Great for audio, computer or Amateur Radio systems, or work benches. The Smart Outlet Box protects units from line surges and transient spikes to a maximum 325 watts at 6500 amps. Maximum control power is 250 watts at 2A; and 1200 watts at 10A for all other outlets. The twelfth outlet is unswitched for constant AC devices.

Kit GD-1295, Shpg. wt. 4 lbs. 49.95

④ Personal 13" diagonal color TV with remote control

- Get quality features in this conveniently-sized TV
- Has quartz PLL tuning and an electronic tuner

This bedroom, kitchen or camper sized TV has everything including remote control. A quality Zenith 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

⑤ Heathkit's Video Organizer switches RF sources

$49⁹⁵

- A versatile 'control center' for your home video system
- Switch from one program source to another without ever changing cable connections

Heath's GS-4500 Video Organizer eliminates the confusing mess of cables that accumulate behind your television set when you use multiple inputs. Eight separate input and output jacks allow complete connection to your set: UHF/VHF antennas, community cable service, subscription TV, video disc player, video games, computer and other auxiliary equipment such as a satellite receiver, video camera or security monitor.

Ten front panel pushbuttons permit instant selection of any one of six different program sources for immediate viewing without changing individual cable connections. And, you can select 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 to eliminate electromagnetic interference and maintain pure picture quality.

An ideal beginner's kit, the Video Organizer takes only one evening to complete. This no-soldering kit includes three 48" 75-ohm coaxial cables with connectors and an AC power adapter. The Organizer is styled in an attractive walnut-grained metal cabinet that measures 10⅞" L x 7" W x 2⅝" H.

Kit GS-4500, Shpg. wt. 7 lbs. .... WAS $59.95 NOW ONLY 49.95
GSZ-4500, Assembled, Shpg. wt. 8 lbs. 69.95

⑥ Six-head VHS video recorder with remote control

- Full-featured video cassette recorder with two-channel stereo
- Three speeds with up to eight hours of recording and playback

One of the new generation of VHS video recorders from Zenith, the GDZ-4000 is cable ready with direct tuner access using electronic tuning to 136 channels. A 14-day programmable auto-timer lets you select eight events and you can record them at SP and EP speeds (LP is available for playback). Connect a camera to record video and two audio channels.

GDZ-4000, Assembled and tested, Shpg. wt. 27 lbs. 1099.95

⑦ Budget-priced VHS recorder loaded with features

- 14-day, one-event programmable tuner or use a video camera
- Still, pause and frame-by-frame video viewing

Features include: automatic front self-loading; four-head scanning; SP, LP and EP playback; automatic rewind; precision 14-position electronic tuning; two-way picture speed search; microphone inputs for dubbing; and cables.

GDZ-2000, Assembled and Tested, Shpg. wt. 23 lbs. 459.95
GDZ-2000-1, Wireless Remote Control, Assembled, Shpg. wt. 1 lb. 24.95

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

⑧ Dual 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 a television.

You get an entire video system in a camera with the compact GDZ-6000. It features a high-performance 6X auto-zoom lens, electronic viewfinder, auto white balance and iris control, and more.

GDZ-6000, Assembled and tested, Shpg. wt. 10 lbs. 1399.95
GDZ-6000-1, Cassette Adapter permits standard VCR replay, 1 lb. 39.95
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
GDZ-6000-6, Solid Carrying Case, Shpg. wt. 5 lbs. 109.95

⑨ Add realistic sound with Stereo Synthesizer

Turn your monaural sound into stereo sound with the ADP-1501 Stereo Synthesizer. Simply add this unit to your television or VCR to enjoy high-quality, realistic stereo sound.

Uses the same technique as professional studios to transform a monaural source into realistic stereo. A new circuit using active filters and a unique summing circuit create a comb response. You can even use the compact synthesizer with your portable units since it operates on 12 VDC and 120 VAC.

ADP-1501, Assembled and tested, Shpg. wt. 3 lbs. 119.95

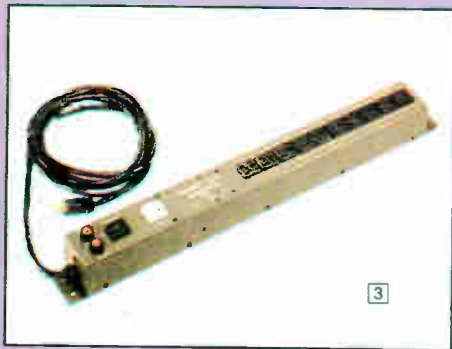**VISA** **MasterCard** **Use your Visa or MasterCard credit cards to purchase your kit!**

Simulated TV pictures

NEW

Great hi-fi sound to go with
great VHS video recordings

7 Quality VHS video within
everyone's price range

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

9 Enjoy quality stereo sound
from your TV or VCR

Heath products for the home, hobbies and your health

1. Program your doorbell to suit your mood

$49⁹⁵

- Program it to play up to 16 beats of your favorite tunes
- Easily programmed for your mood or any special occasion
- Includes song book with over 50 programmable melodies

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

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

2. 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 kg

The Heathkit Digital Scale is a multi-purpose scale that offers far more accuracy than mechanical scales. Dieters and fitness enthusiasts can closely watch their weight improve, and everyone will enjoy a precision readout on items requiring accurate measurement. An electronic transducer element eliminates the springs and weights that wear out on conventional scales.

Four bright, easy-to-read ½" digits display the weight. You decide whether to wire the kit to read in pounds or kilograms. Features both manual and automatic modes; in manual, the display is on constantly and can measure weights as small as 2 ounces, to a 300-lb. capacity. On automatic, it conserves power by remaining off until weight is placed on the platform.

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

3. 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. **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**

4. 3-Tune Doorbell greets with beautiful music

$19⁹⁵

- Can be built and easily installed in a single night
- Adjustable volume carries tune throughout your home
- The low-cost way to put a difference in your doorbell

If you want to replace your ho-hum doorbell, you'll be proud to install this Electronic Doorbell kit. The TD-2089 plays three different selections: an upbeat 4-note ring, a short tune (Beethoven's *Für Elise*) and a long tune (*Romance*). Two "C" cell batteries (not included) power the electronics while your present 10 to 16 volt doorbell transformer supplies your pushbutton circuits. For use with unlighted doorbells.

Kit TD-2089, Shpg. wt. 1 lb. **19.95**

5. Find buried valuables on dry land or at the beach with Heathkit's Metal Locator

$219⁹⁵

- Find valuable objects where most locators are useless
- Easy-to-read meter installs for left- or right-hand users
- Telescoping shaft collapses to 22 inches
- Search head folds flat for easy storage, portability
- 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. **219.95**
GDA-1190-1, AC/DC Rechargeable Battery Pack, Shpg. wt. 2 lbs. **24.95**
HDP-1396, Mura Headphones, Shpg. wt. 2 lbs. **19.95**

GD-1290 SPECIFICATIONS: Sensitivity: Locates dime at 4" to 6" typical, may be less depending on soil conditions, mode of operation and amount of discrimination selected. **Method of Detection:** Induction-balance circuit. **Detector Output:** Meter, speaker, phone jack. **Power Requirement:** Six AA cells or Rechargeable Battery Pack. **Dimensions:** Extended height, 45½." **Net Weight:** 3.4 lbs.

6. Digital Thermometer for accurate measurements

If you need to accurately measure the temperature of liquids or air, this battery powered electronic thermometer delivers reliable readings every time. This micro-marvel weighs only 5.5 ounces and gives easy-to-read 4-digit temperatures in less than ten seconds. Wand senses from 32° to 230°F (0° to 110°C) with ±0.2°F (±0.1°C) biomedical accuracy and 0.5% overall accuracy with 0.1°F or C resolution.

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

7. Take temperatures quickly with digital accuracy

Eliminate the squinting and guessing that's required when using a conventional mercury-bulb thermometer. Easy-to-read accuracy from 89.6° to 107°F within 60 seconds. When the F symbol stops blinking, the peak temperature is displayed in a digital readout. 10 sanitary probe covers (more can be ordered) and battery are included.

GXP-2121, Assembled, Shpg. wt. 1 lb. . . . . **NOW ONLY 13.95**

8. 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 place the cuff in place and inflate. Electronic metering does the rest. Battery powered for portable use — batteries included with unit.

GXP-2120, Assembled, Shpg. wt. 2 lbs. . . . . . . **WAS $79.95 NOW ONLY 59.95**

9. Put our Computer on your 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 Calculator 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 stopwatch 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).
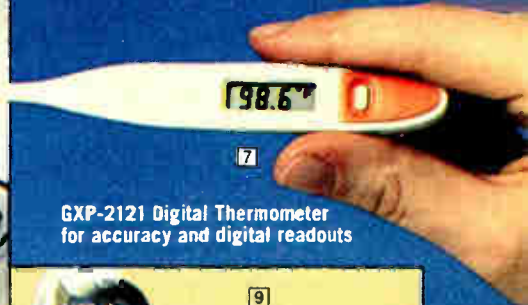
GXP-2105, Assembled, Shpg. wt. 2 lbs. **49.95**

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

Portable Electronic Digital
Blood Pressure/Pulse Monitor
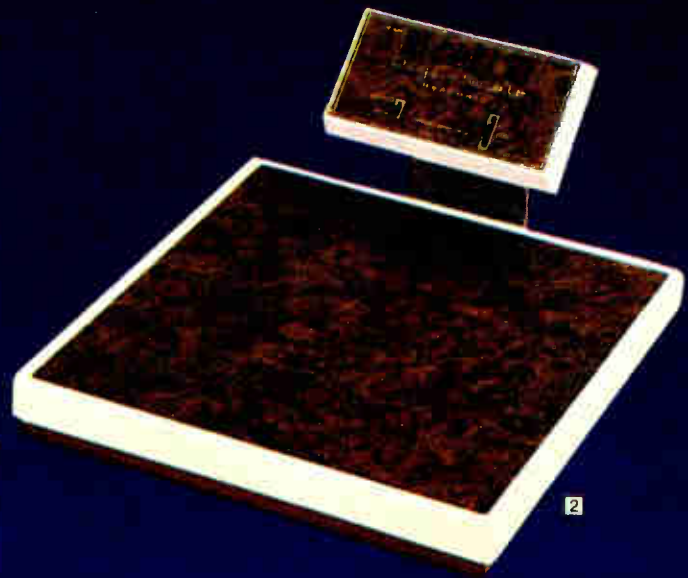
GXP-2121 Digital Thermometer
for accuracy and digital readouts

Keep track of your
goals with the
GXP-2105 Computer

Advanced electronic security, remote control and home monitoring systems and devices

BSR X-10 Home Control System commands up to 16 groups of lights and appliances from one location

[1] **The Controller Command 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 it in. Console signals are transmitted over existing house wiring to the module of your choice. Just plug lights and appliances into the appropriate module. Use as many modules on the same code as you wish. Dim or brighten lights. Two "all lights on" and "system off" buttons provide extra security and savings.

Control lights, fans, TVs and stereos anywhere in and around your house from a single location. Or, place other Controller Command Consoles 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 Controller Command Console acknowledges each command entry by a flashing red LED on the front of the unit. It also includes an ultrasonic receiver and circuitry so that it can be controlled by the GDP-1511 Ultrasonic Cordless Commander described below. Flip-down cover hides command switches.

GDP-1510, Assembled, Shpg. wt. 2 lbs. **24.95**

[2] **The Ultrasonic Cordless Commander** transmits signals to the Controller Command Console from up to 30 feet away, using identical pushbuttons. This line-of-sight remote transmitter can duplicate every operation of the GDP-1510 Controller Command Console above.

GDP-1511, Assembled, Shpg. wt. 1 lb. **14.95**

[3] **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. 1 lb. **69.95**

[4] **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, or window air conditioners and fans depending on the weather. Includes modular phone cable. Control center measures 2¾" H x 5¾" W x 5½" D, Remote Responder measures 1¼" H x 2¼" W x 5¼" D and requires one 9 volt battery (not included).

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

[5] **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 6⅜" wide x 6⅜" deep (7.6 x 16.2 x 16.2 cm).

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

[6] **Lamp Module** receives signals from any of the consoles or the GD-1530 Interface to turn incandescent lamps on and off. And dim and brighten lamps through 16 individual levels. Handles up to a maximum of 300 watts.

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

[7] **Appliance Module** controls most other devices like televisions, stereos, radios, coffee makers, fans, heaters, etc. 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, ⅓ hp motor, 500 watt lighting load and a 40 watt TV/stereo load.

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

[8] **New Burglar Alarm Interface Module** increases the effectiveness of your security system by controlling other BSR modules on your circuit. Has selectable low-voltage or contact closure trigger inputs. If alarm is triggered, 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**

[9] **Wall Switch Module** replaces existing standard wall switches. Operates inside and outside lights by remote or local control. Responds to signals from any console controller or GD-1530 Interface. 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**

[10] **Three-Way Wall Switch Module and Companion** with independent on/off control. Replaces hallway and upstairs/downstairs 3-way switches. Responds like a lamp module. Handles a maximum load of 500 watts.

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

[11] **Air Conditioner Module** is a standard 240 VAC receptacle for air conditioners that's rated for a 15 amp load. See GDP-1517B below for alternate perpendicular-pronged type plug arrangement.

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

[12] **Perpendicular-Pronged Module** is also a 240 VAC receptacle for air conditioners, but accepts perpendicular-pronged AC plugs and is rated for a higher 20 amp load. See GD-1517A for standard-type plug arrangement.

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

[13] Use the Passive Infrared Security Light Control to invisibly detect movement or provide light when needed

- **The GD-3511 turns on lights to make an intruder believe he has been seen — scaring him off without disturbing your neighbors**
- **Light Control activates to deter intruders before damage is done**
- **Replace expensive, all-night floodlights with automatic security lighting**

Light is the most effective deterrent to crime, and the Heathkit GD-3511 turns on up to 500 watts of light when security lighting is needed. Since lights are activated only when intruders are present they believe they have been seen. Selective lighting also saves you money since lights are on only when needed. 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. Additionally, the Security Lighting Control has a built-in photo-transistor to deactivate the system during daylight hours.

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 the size and shape of the coverage area. The GD-3511 has a typical operating range of 35 feet, with a coverage width of 35 feet at that range. Lights remain on from ten seconds to more than fifteen minutes once motion leaves 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 waterproof. The GD-3511 connects to a standard 120 VAC, 60 Hz household power line and consumes only one watt when operating but not activated. Measures 14½" D x 5½" W x 4⁹⁄₁₆" H.

Kit GD-3511, Shpg. wt. 4 lbs. **149.95**
**GDA-3511-1, Dual Floodlight Accessory,** Shpg. wt. 5 lbs. **29.95**

[14] Get 24-hour protection with unique Security Sentinel-verbal commands and up to eight floodlights deter intruders and protect your home

- **Effective infrared sensors detect intruders and activate system**
- **Commanding digitized male voice warns intruders — day or night**

Security Sentinel uses both light and sound to deter intruders, providing you with the maximum 24-hour a day security available in passive systems. 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.

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

BSR X·10 CONTROL SYSTEM

NEW

NEW
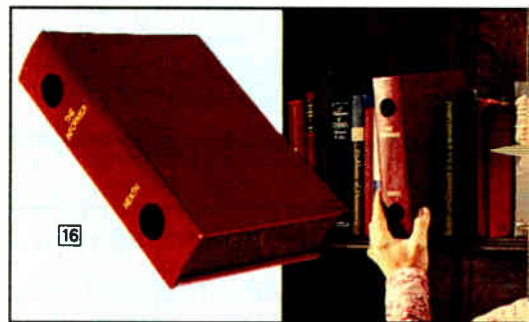
Infrared sensors detect body heat within the GD-3810's coverage area, and activate the verbal message which is a man's voice that has been digitized for realistic reproduction. The verbal message is: "Warning. You are entering a secured area. Please exit immediately." During darkness, security lighting is also activated. A phototransistor circuit deactivates the peripheral lighting during the day. A Voice-Off feature deactivates the verbal warning for up to eight minutes while the unit still lights the way for 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. You and your family or guests will 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. Inexpensive to operate, the GD-3810 connects to a standard 120 VAC, 60 Hz household power line. The GDA-3511-1 Dual Floodlight Accessory, which houses two adjustable aim floodlights, may be used with the Security Sentinel. 12½" D x 5½" W x 3½" H.
Kit GD-3810, Shpg. wt. 6 lbs. **199.95**

⒖ Protect your home from theft and damage with the ever vigilant SENSAPHONE Home Monitoring System

- 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
- Use as an automatic dialer that stores up to eight phone numbers

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, unusual sounds and disturbances like a smoke or fire alarm going off, and other alarm conditions when set up to do so.

Connected to your phone, SENSAPHONE reacts to an alarm condition by automatically dialing up to four telephone numbers in sequence 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 so any unusual sounds, if any, can be heard.

Listen in on your house while you are away. Just call home. After a preprogrammed number of rings, SENSAPHONE answers and reports on all monitored conditions. Then it lets you listen to room sounds for yourself. Reassured, you can return to work or 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 storing up to eight of your most frequently called numbers and dialing them automatically at the press of a 1-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**

⒗ The *Informer*® Ultrasonic Intrusion Alarm

ONLY
$69⁹⁵
- "See" up to 25 feet away from unit
- Time delay lets you deactivate alarm
- No one but you will ever know it's there

Disguised to look like a fine hardcover book, the Informer will sit quietly on bookshelf or table...until something or someone enters its wide field of surveillance. Ultrasonic sound waves thwart intruders by sensing their movements during entry. Then it will activate indoor/outdoor buzzers or alarms, table or floor lamps to alert you to an unfamiliar presence within your home.

Easy to set: Simply flip a hidden, back panel switch to activate the system. Two AC outlets on the back panel control lights and alarms you have plugged in. Ten seconds after the first movement is detected, the lamp outlet is triggered, suddenly turning on any lights you have connected. Approximately 30 seconds later, the alarm outlet is triggered. Has switch-selectable auto or manual reset. Adjustable control sets the sensitivity of the Informer to movement and therefore its operating range. Solid-state circuitry. Requires 120/240 VAC.
Kit GD-49, Shpg. wt. 5 lbs. **69.95**

Heathkit's RF Security System gives total, dependable home protection without wires

The GD-2800 system is easy to install and provides 24-hour security. It protects interior/perimeter zones, entrances and high risk areas.

- One of the most advanced microprocessor-controlled systems available
- RF control eliminates the hassle of wiring and possible tampering
- 8-channel receiver lets you customize the system to meet your needs

[1] RF Security Receiver/Processor Kit with outdoor alarm horn and indoor annunciator speaker, processes all incoming signals to provide appropriate alarm warning action. Four modes (Off, Home, Away and Panic) control entire system operation. 'Home' monitors doors and windows while you're inside. 'Away' additionally arms indoor motion detectors. Five coded channels give separate alarms for door, windows, indoor motion, fire and emergency (Panic) situations. 'Auxiliary' and 'Panic' alarm channels alert you to special concerns like fire, breach of computer room, safe or gun cabinet — even if the system is off. Unique annunciator tone sounds from indoor speaker whenever a protected door opens, telling you when a youngster left to play or your daughter returns from a date; also sounds to confirm receipt of mode-change signal from Control Transmitters.

Other sophisticated features include: time-delayed entry/exit, power to drive two alarm horns, internal 12-hour stand-by battery, highly visible security warning labels for house exterior, system test mode, key-locking master power switch, four output triggering options for automatic dialing devices. Permits enforcement to be extended to nearby buildings, shed or garage within 200' receiving range. All mode operations are remotely controlled by GDA-2800-4 or GDA-2800-9 Transmitters (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. **139.95**

[3] Wired-Circuit Transmitter protects doors and windows against entry, includes one magnet/reed switch. Also connects to GD-1701 Flood Alarm (page 6).
GDA-2800-3, Assembled, Shpg. wt. 1lb. **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 GD-2800 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. **39.95**

[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. **19.95**

[8] Passive Infrared Motion Detector for hard wired security systems. Requires 6-18 VDC. (Not for use with GD-2800 Security System.)
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. **109.95**
GDA-1800-3, Additional Outdoor Alarm Horn (like shown). 2 lbs. **24.95**

$AVER! 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. 20 lbs. **499.95**

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

[10] Cordless portable telephone provides freedom

(NEW)

$119⁹⁵

- Portable operation up to 1000 feet away from base unit
- Security system protects your line from unauthorized access

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; dual-tone coded security system; high/low volume control switch; clear button; operates on easily recharged nickel-cadmium batteries. The system includes desktop control unit which may also be wall-mounted, dial-out & receive handset, connector cord with modular plugs and user's manual.
GDP-1342, Assembled, Shpg. wt. 5 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.

[11] Save time and money with the Demon Dialer

$89⁹⁵

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

The Demon Dialer's memory stores 93 7-digit numbers, 60 11-digit numbers or 55 23-digit numbers. The Memory Expansion Accessory almost doubles the memory. A 3-volt battery provides memory protection in case of power failures.

Computer-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 Demon will silently dial a busy number 5 times in the 1st minute, every 2 minutes for 10 minutes and 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. Six simple commands give you complete control of this versatile instrument which operates with any telephone and extension phones equipped with touch-tone service.

Kit includes AC power cube, 3-volt battery, two cables with modular plugs, series jack, user's manual and a reference Dial Guide/List. 1⅝" H x 5⅞" D x 5⅛" W.
Kit GT-2217, Shpg. wt. 3 lbs. **89.95**
GTA-2217-1, Memory Expansion Accessory, Shpg. wt. 1 lb. **19.95**

[12] Vacation/Home Sentry ends homeowner worries

$29⁹⁵

- Device detects low in-house temperatures-add more sensors to detect water, or other problems
- A quick phone call to your home activates the Vacation/Home Sentry and alerts you if something is amiss

The Vacation/Home Sentry turns your telephone into a home information line while you are away. You or a neighbor simply call your number to find out if all is well. The Sentry monitors the house temperature. If it drops below 40° F you hear a 5 to 10 second beeping signal, if the temperature is normal you hear silence. Exterior sensors may be added to detect flooding and other problems.
Kit GD-1702, Shpg. wt. 2 lbs. **29.95**

[13] Replace phone bells with a Pleasant Phone Ringer

$29⁹⁵

- Select from four relaxing telephone signals
- Adjustable volume control with separate extension speakers

Replace the boring ring-ring-ring of your telephone. A pre-programmed musical IC in this one-evening kit offers four delightful alternatives: a beeping signal, an upbeat four-note chime, ten seconds of Beethoven's "Fur Elise" or 20 seconds of "Romance." The battery operated Ringer simply installs between the phone and the outlet. Use two speaker terminals to extend melodies to other rooms. Has variable volume control. 1¼" H x 5⅞" W x 4¾" D.
Kit GT-1218, Shpg. wt. 1 lb. **29.95**

[14] Instant one-number access dialer for any situation

(NEW)

- Stop dialing lengthy 13-digit phone and billing numbers
- Dial an emergency number by simply 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-adapter (included in kit).
Kit GT-2218, Shpg. wt. 2 lbs. **69.95**

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

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

1 Solar energy can save you fuel-dollars

Solar energy is economical for do-it-yourselfers

As the cost of fossil fuel continues to rise, and ecological debates increase the national awareness of our environmental responsibility, all forms of alternate energy will become even more promising. We offer the highest quality solar components on the market. You probably cannot hire a contractor to install a system this good. Plus, you can save up to 40% over a comparable dealer-installed system.

Designed as a complement to your existing water heating system, the NS-1100 system is properly sized for your own climate, home size, family and hot water requirements by a sophisticated computer program run at your nearby Heath/Zenith Computers & Electronics Center (also available by calling Heath's Marketing Service Dept. at 616-982-3411). *Plug into the sun!*

Solar gives you the most for your money

- New solar panel absorbs even more sunlight
- Federal Tax Credits can pay for 40% of the total system invoice purchase price
- Many states offer additional tax incentives
- Most systems recover cost in three years
- The Heathkit NS-1100-3 Manual Set answers all your questions about the system

The NS-1100 system preheats water going to your conventional water heater — so instead of cold water, it receives solar-heated water. *This free preheating dramatically lowers the energy requirement of your water heater, allowing it to become a holding tank to keep water at the desired temperature.*

Build it in as little as three weekends: Only common carpentry and plumbing tools are required to assemble and install the NS-1100 Solar Water Heater in your home. The profusely illustrated, step-by-step Heathkit manual allows you to plan the complete kitbuilding and installation operation ahead of time. The NS-1100 Water Heater System includes all the components you need for kitbuilding and installation except ¾" copper pipe, insulation and solar fluid.

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

SAVE 40% on the NS-1100-3 Manual Set for the NS-1100 system! Written for people with little or no previous experience, it has the answers to all your questions — everything you need to know to install a customized Heathkit Solar Water Heater System successfully, including complete site evaluation, installation and operation information. A solar shade finder helps you find a site where no trees or buildings will block your solar panel from full sunlight. And the price of this Manual Set is deductible from the cost when you purchase a system.

SAVE twice with a 10% discount AND tax credits.

Most items for the NS-1100 Home Solar Heater System have been discounted 10% so you can start saving this year on your water heating bills. A Federal income tax credit of 40%, plus state credits (if available), will also help you pay for your NS-1100 Kit. This credit is not a deduction. It means you receive back 40% of the system cost.

SAVER! NS-1100-3, Manual Set, 3 lbs. . . . . **NOW ONLY 9.95**

Kit NS-1100-1, Plumbing Hardware pack for NS-1100 systems, 65 lbs., Motor Freight Collect . . . . **Was $393.00, NOW ONLY 354.00**

NS-1100-12, 3' x 8' Solar Collector Panel and Mounting Hardware, 136 lbs. Motor Freight Collect . . . . **Was $383.00, NOW ONLY 345.00**

NS-1100-4, 80 Gallon Capacity Solar Tank, 350 lbs., Shipped Motor Freight Prepaid . . . . **Was $286.00, NOW ONLY 258.00**

NS-1100-5, 120 Gallon Capacity Solar Tank, 447 lbs., Shipped Motor Freight Prepaid . . . . **Was $399.00, NOW ONLY 360.00**

NS-1100-6, 5 Sq. Ft. Heat Exchanger, 18 lbs. . **Was $113.00, NOW ONLY 102.00**

NS-1100-7, 8 Sq. Ft. Heat Exchanger, 20 lbs. **Was $126.00, NOW ONLY $114.00**

NS-1100-8, 8 Sq. Ft. Double-Walled Heat Exchanger (required in Oregon, Los Angeles and Memphis areas), 24 lbs. . . . . **Was $159.00, NOW ONLY 144.00**

2 Clear the air of dust, dirt and unhealthy contaminants

$149⁹⁵
- No metalwork or wiring — complete instructions at every step
- Removes dust, dirt, cigarette smoke — even allergens
- Automatic — works with your furnace or air conditioner

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

Easy to install in place of your old filter. 120 VAC, 60 Hz Power Supply measures 8" H x 12" W x 4" D. One power supply and at least one filter needed for operation — two filters can be used with a single power supply.

Electronic Air Cleaner Power Supply:
Kit GD-2196 (needs Filter Accessory below), Shpg. wt. 5 lbs. **149.95**
Filter Accessory GDA-2196-1, 20" x 25" x 1", 1000 cfm, Shpg. wt. 3 lbs. . **99.95**
Filter Accessory GDA-2196-3, 16" x 25" x 1", 800 cfm, Shpg. wt. 3 lbs. . . . **99.95**

3 Heath's GD-1298 Office Air Cleaner

Save $100

$99⁹⁵
- Removes pollutants and pollen, dust and odors
- Portable and efficient, with quiet operation
- A one-evening project for the novice kitbuilder

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.

Kit GD-1298, Shpg. wt. 20 lbs. . . . . **Was $199.95 NOW ONLY 99.95**
GDA-1298-1, Replaceable charcoal filter, Shpg. wt. 2 lbs. **7.95**

4 Quickly remove dust, dirt, allergens and smoke

Save $40

$249⁹⁵
- Filtering eliminates 99% of pollen and 94% of harmful particles in the air
- 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 remove 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. . . . . **Was $289.95 NOW ONLY 249.95**
GDA-1297-2, Replacement Charcoal Filter for GD-1247/1297, 2 lbs. . . . **9.95**

5 Substantially reduce your heating and cooling costs

- Set the temperature you want for the time of day you want
- Program up to six daily settings, for a full week

It makes sense! Program your furnace and air conditioner for a weekly cycle of temperatures between 60°-82°F. (Not for 2-stage systems).

Keep your home within 2° of the temperature you want, day-in/day-out. Use manual and "Slow-Cycle" functions to override programmed settings. Extra value — NE-1211 includes isolation relay (may be required with some systems).

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

6 Sound-Activated Switch turns on lights for you

- Instantly turns lights on when it hears you, turns them off when it doesn't
- LED helps you set audio sensitivity level
- 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. . . . . **WAS $29.95 NOW ONLY 19.95**

HEATING (Closed Loop)

Heath's Solar Panel system is easy to install – with tax credits, it can pay for itself in 3 years. The savings are all yours.

Pump B

Domestic Cold Water Supply

Domestic Hot Water Supply

The collector is designed to withstand winds over 180 mph. Each panel is rated at 945 BTU output per square foot of panel per day.

Pump A

Expansion Tank

Controller

Storage Tank

Existing Water Heater
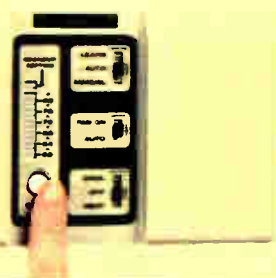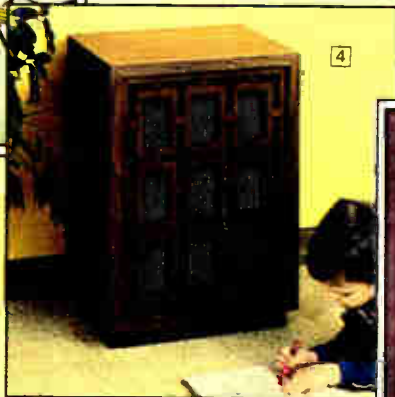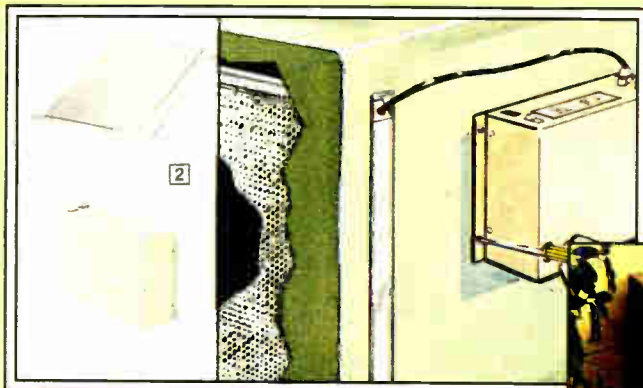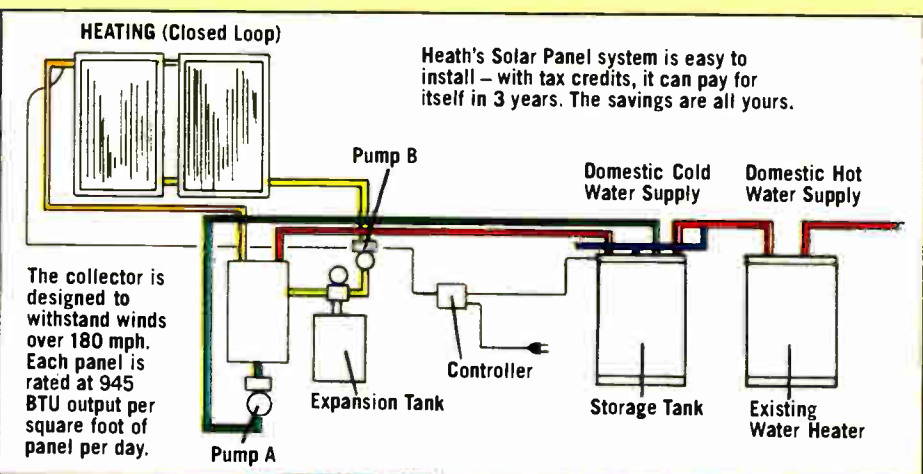
Economize with the Heat Sniffer

FAST, EASY 1-EVENING KIT

$24⁹⁵

The NE-2112 is easy to use. Turn the unit on and adjust for silence. Then move the Sniffer's sensor along where heating/cooling losses might occur. Changes in temperature set off a beeping alarm and a flashing LED. Use in temperatures from 59°-95°F (15°-35°C). Requires 9-volt battery (not included).

Kit NE-2112, Shpg. wt. 2 lbs. **24.95**

Use the Watt Wizard to economize

Save money three ways: with a 15% tax credit, by reducing the power consumption of motorized devices and by protecting motors against burn-out

Triple savings: As an energy-monitoring device, the Watt Wizard qualifies for a 15% tax credit of the purchasing price – save part of the cost of running some motorized electrical devices 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, 1 lb. **39.95**

Fingertip on/off control of lights

$19⁹⁵

- Can also be used conveniently for small appliances, TVs, fans

FAST, EASY 1-EVENING KIT

Instant 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. Not for AM radios.

Kit GD-1287, Shpg. wt. 2 lbs. **19.95**

Heath Pro-Series Audio components bring studio quality and performance to the home

① GFT-1A Stereo Tuner from ADCOM features superior performance characteristics and ease of operation

$369⁹⁵
- Digitally synthesized, quartz referenced tuning locks on to stations with an accuracy of 0.00025%
- Scan button automatically tunes the Tuner up or down the AM or FM frequency range

Designed to maximize your listening pleasure, the GFT-1A combines outstanding specifications with simplicity of operation. Synthesized tuning ensures that your station is tuned in without any drift. Touch the scan button and automatically, or manually, tune up or down the frequency range. Program in up to eight FM and eight AM stations for instant one button tuning. An FM signal-to-noise ratio of 80 dB for mono and 75 dB for stereo provides you with the pure enjoyment of noise-free music.

FM sensitivity of 17.2 dBF in mono and 34.7 dBF in stereo for 50 dB of quieting is featured along with a capture ratio of 1.0 dB to bring in fringe stations. The receiver has a low 65 dBF harmonic distortion. Channel separation is 55 dB at 1000 Hz for clear listening. The tuner has a five-stage LED signal strength display and record level oscillator. 19" W x 3" H x 11½" D.

AJP-1801, Assembled, Shpg. wt. 14 lbs. **369.95**

② Flexible high-performance preamp gives you complete control over your audio system

$369⁹⁵
- ADCOM GFP-1A accommodates two turntables, a tuner, two tape decks, and a signal processor, and provides very low noise input for a digital audio disk or high fidelity VCR

The GFP-1A Preamplifier offers features and performance, and handles virtually every operating and listening condition you might encounter. It even has a built-in decoder for playing records made with the CX noise-reduction encoding process. And this excellent preamp is available at an attractively low price.

Extremely versatile, the GFP-1A has two separate phono inputs which can be used with most fixed-coil and moving-coil cartridges with the option of a switchable gain on one and a variable capacitance on the other. The tape monitor allows you to record from any input source or dub from one tape deck to another while listening to any other input source.

Other uncommon features of this high-tech preamplifier include: a built-in headphone amplifier, defeatable tone controls, separate preamps for both phono inputs, and a loudness compensation that moderately boosts both low (below 200 Hz) and high (above 10,000 Hz) frequencies. Tone-control characteristics are excellent with the midrange response unaffected even by extreme settings of the tone controls. Switchable infrasonic and ultrasonic filters remove rumble from warped records, and noise above 25 kHz. 19" W x 3" H x 12½" D.

APP-1802, Assembled, Shpg. wt. 16 lbs. **369.95**

③ Sophisticated 10-Band Octave Equalizer tone control

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

Control the total audio spectrum. The ISO-centered frequency band slide controls for each channel give you octave-by-octave boost or cut (greater than 10 dB) preference over the entire audible range. The slide controls let you eliminate 'live' or 'dead' room spots for smooth, flat-graph characteristics. You'll notice right away that selective frequency-band equalization can enrich cartridge response, cut harmful subsonics, boost deep bass response to the anatomical vibration level and put musical life back into your woofer, midrange and tweeter speakers.

A six-way mode/monitor combination network allows you to equalize, monitor, record or bypass your music system without rearranging cables. Useful left and right channel LED clipping indicators warn you of peak overload conditions within your system. Harmonic distortion is a low 0.001% from 20-20,000 Hz.

The AD-1703 Octave Equalizer tailors a stereo system to any home environment and enhances every component's performance. From reducing tape hiss to customizing recordings, the Equalizer improves almost all stereo systems for less than the cost of a good set of speakers. It fits any standard 19" rack or it can be mounted in its own attractive oak-finish wood cabinet.

Kit AD-1703, Shpg. wt. 17 lbs. **274.95**
AEA-1800-2, Oak-finished Cabinet, Shpg. wt. 6 lbs. **34.95**

④ Active Audio Processor increases your music's dynamic range and adds life to your recordings

Dynamic range is to music what perspective is to painting or photography. It gives audio depth and feeling. Some of the dynamic range in most music is lost in the recording or broadcast process, but the expansion circuit in the AD-1706 can restore up to 8 dB of this loss. You'll discover your music has even more realism, better definition and lower background noise while maintaining full response and ultralow distortion—even at high volume levels.

Superb noise reduction circuitry sifts out up to 10 dB of noise from records and hiss from tapes, increasing your system's total dynamic range up to 18 dB. A 7 kHz linear-phase high frequency filter can reduce ultrasonic noise in unusually noisy material such as AM broadcasts, TV and cassette tapes.

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

The AD-1706 can be mounted in any standard 19" rack. Handles ease the installation process. An optional Accessory Cabinet is also available for use of the AD-1706 with component audio systems. 19" W x 14" D x 5¾" H.

Kit AD-1706, Shpg. wt. 18 lbs. **299.95**
AEA-1800-2, Oak-finish Cabinet, Shpg. wt. 6 lbs. **34.95**

⑤ Reduce distortion and improve low-end response

The Variable Electronic Crossover adds a separate bass channel to your audio system. Used with a subwoofer, the component will give you a more accurate crossover alignment for lower distortion and clearly-improved low end response down to as low as 20 Hz!

Frequency scale crossover points up to 6 kHz at 40, 60, 80, 100, 125 and 150 Hz. Switches select 6 dB/octave or 18 dB/octave slopes for flat frequency response at crossover points and well-defined imaging.

Outputs for stereo, monaural and bridged hookup allow you to connect another amplifier and subwoofer to your audio system. The Variable Electronic Crossover also has bass level control, crossover bypass switch and a 15 Hz infrasonic filter to remove annoying record warp noise.

Kit AD-1702, Shpg. wt. 15 lbs. **199.95**
AEA-1800-3, Solid Oak End Panels, Shpt. wt. 2 lbs. **19.95**

⑥ Build the finest high-level Stereo Power Amplifier

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

The Pro-Series AA-1800 Amplifier has the power modern recording techniques require. It delivers 250 watts continuous power per channel into an 8-ohm load; and on those troublesome transient peaks, the AA-1800's typical dynamic headroom of 3 dB translates into 500 watts per channel. Enjoy clean sound with the Pro-Series Stereo Amplifier. Hum and noise are reduced a full 85 dB, and sound/phase distortions are virtually eliminated.

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

Two line cords with remote AC switching relieve your preamp from the burden of transferring high current. The Amplifier is designed for mounting in an EIA standard 19" equipment rack. Large handles are provided on each side of the front panel for easy installation when rack mounting.

The AA-1800 reproduces music with uncompromising accuracy. Distortion specifications are low, less than 0.025% harmonic distortion from 20 to 20,000 Hz and less than 0.03% transient intermodulation distortion.

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

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

1. Heathkit AS-1373 deluxe 3-Way Speaker System will please even the most critical music listener

- Careful design delivers superb source accuracy and wide dynamic range; mirror-image driver mounting creates a sharp stereo image
- Compare the performance with speakers costing twice as much

Designed for use with the best audio components, the 10" woofer provides gutsy, well-defined bass response, with a 500 Hz woofer/mid-range crossover frequency to ensure smoothness and minimize intermodulation distortion. The 4½" mid-range driver has a polyester-damped subenclosure to prevent woofer reflections, while a 1" dome tweeter exhibits power handling and definition, with full 120° horizontal dispersion at 12 kHz. In addition, flush-mounted drivers create a sharply focused sound image.

Driven to sensational sound by as little as 10 watts, a higher-powered amplifier like the AA-1800 (on page 26) can deliver up to the maximum rated 200 watts to reveal an awesome dynamic range and three-dimensional clarity. Music will take on a new feeling as you listen to your favorite selections.

A sophisticated crossover circuit (a weak link in many systems) is every bit as rugged as the drivers. In addition, two subtle but effective controls match the mid- and the high-frequency response to your room's acoustics. And the AS-1373 provides maximum protection by individually fusing each driver, thereby virtually eliminating expensive burnouts. Both fuses and controls are easily accessible behind the handsome foam grille that is more acoustically transparent than ordinary grille cloth. Comes with fully assembled walnut-finish veneer cabinet.

Kit AS-1373, Shpg. wt. 68 lbs. . . . . **Each 224.95**

AS-1373 SPECIFICATIONS: Frequency Response: (± 3 dB): 40-20,000 Hz. Maximum Power: 250 watts per channel. Crossover: 500 Hz (12 dB/octave) and 3000 Hz (12 dB/octave). Controls: 3 kHz switch, flat or 2.5 dB attenuation; 10 kHz switch, rolloff or flat. Dimensions: 26" H x 14½" W x 11⅞" D.

2. Audiophile quality in a medium-powered 30-Watt Stereo Receiver from Heath's Pro-Series engineers

$349⁹⁵

- All-in-one audio quality – designed for highest fidelity first, then for high styling
- An array of exceptional specifications with a multitude of versatile features and more performance for your dollar with our high 2.5 dB (53 watt) dynamic headroom

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. Easily assembled in four evenings, this Receiver fuses the best in audio technology with versatile features.

Heath's award-winning Pro-Series 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 and 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.

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

SPECIFICATIONS: FM SECTION: Mono/Stereo. Usable Sensitivity: 1.9 µV (10.8 dBf)/3.5 µV (16.1 dBf). 50 dB Sensitivity: 3.5 µV (16.1 dBf)/38 µV (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 @ ± 1.5 dB. PREAMPLIFIER: Frequency Response: 20-20,000 Hz @ ± 0.5 dB Phono, 20-20,000 Hz @ ± 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 @ ± 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: 4½" H x 17" W x 15¼" 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 ½- and 1-octave Real-Time Spectrum Analyzer, Heath's new Pro-Series AD-1308 is a breakthrough in uncompromising mobile capability. It has comparable specs and more features than many units costing thousands of dollars. It gives the audio technician, recording engineer or home music enthusiast, a precise means of 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. **279.95**

SAVER! ADS-1308, Includes AD-1308 Spectrum Analyzer, ADA-1308-1 Power Supply/Rack Mount Accessory and AD-1309 Pink/White Noise Generator, 27 lbs. . . . . Separately $449.85 **System Price 399.95**

AD-1308 SPECIFICATIONS: SPL and Spectrum Analyzer Display Range: 23-126 dB SPL. SPL Accuracy: ± 1 dB A-weighted. Microphone Self-Noise Level: <36 dB SPL. A and C Weighting Filters per ANSI: SI.4-1971 (Rev. 1976). Fast and Slow SPL Response per ANSI: SI.4-1971 (Rev. 1976). Flatness on Direct Input: ± 1 dB. Input Impedance: >10k ohms. Input Sensitivity, 90 dBspl Range: 0 dB = 350 mV RMS ± 10%. Power Requirements: 10.5 V, ± 10% @ 425 mA. Low Battery Indications: 6 V ± 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: ± 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. Front panel phono plug outputs and rotary power level control. Operates on one 9 VDC battery.

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

AD-1309 SPECIFICATIONS: PINK NOISE: Frequency Response: ± 1 dB from 20 Hz to 20 kHz. Output Level: RMS average is >350 mV; peak is 1.5 V. WHITE NOISE: Frequency Response: ± 3 dB from 20 Hz to 20 kHz. Output Level: RMS average is >350 mV; peak is >1.5 V. Dimensions: 2½" H x 4⅛" 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 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. The AA-18 Mono Amplifier features rear panel speaker terminals and input jack. On the front panel are a headphone jack, power switch with 'on' lamp, and volume and tone controls. Dimensions are 2⅝" H x 7¾" W x 5½" 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**

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

NEW
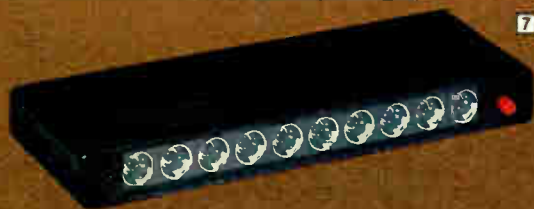
⑦ Infrared Stereo Headphone System gives you cordless headphone listening

NEW

- Enjoy private stereo listening – without confining cords
- System works with any audio source and any number of listeners

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 in with 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 GDS-1431-1 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. The transmitter easily plugs into the earphone or headphone jack of any equipment. 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-1431-1, Assembled Infrared Stereo Transmitter, Shpg. wt. 2 lbs. **49.95**
GDP-1431-2, Assembled Infrared Stereo Headphone, Shpg. wt. 1 lb. **39.95**
GDS-1431-1, Assembled Infrared Stereo Headphone System, includes Transmitter and Headphone. Shpg. wt. 3 lbs. **79.95**

Hands-Free Telephone Headset

NEW

- Comfortable and easy to use headset
- For all standard business/home phones

Your hands can work while you talk with the convenient Hands-Free Telephone Headset by Nady. Just plug the amplifier into the modular hand jack on your phone. The amplifier operates on phone line voltage so no batteries are needed. Volume adjusts up to 6 dB – louder than conventional phone handsets. Plug both your headset and handset into the amplifier so that a quick flip of a switch lets you change from one to the other.

GDP-1343, Assembled Hands-Free Headset, 1 lb. . **34.95**
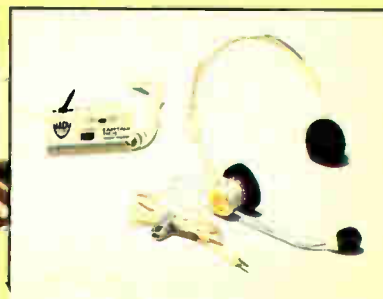
Get high performance at a low cost – with Heath Transceivers

[1] HW-99 Novice CW Transceiver is the ideal radio for the new operator

NEW

- Broadband circuits cover the first 250 kHz of the 80, 40, 15 and 10 meter bands
- RF power output of 50 watts on all bands except 10 meter which is 40 watts

Get off to a good start with the HW-99, you will enjoy this transceiver long after advancing beyond the novice level. Power, quality features and affordability make this durable transceiver an unusually good investment.

To give you the best possible novice CW transceiver we have combined many of the quality features found on the HW-9 Deluxe QRP CW Transceiver with plenty of power for easy contact. Broadband design ends the need to tune circuits within the band. The wide-band front-end uses a 4-pole crystal filter to handle wide dynamic range signals with ease and eliminate the usual receiver RF amplifier. You get superior performance with AGC circuits.

Use of single frequency conversion in the main signal path reduces spurious responses and maintains superior image rejection. The HW-99 also has a balanced product detector and an active-audio filter. The power amplifier is VSWR protected. A front panel bar display indicates relative signal strength in receive and relative power in transmit. The solid-state, compact Transceiver has a built-in AC power supply and operates on 120 VAC at 60 Hz.

Kit HW-99, Shpg. wt. 20 lbs. (Available June 1985) **299.95**

[2] The Heathkit SP-99 Station Speaker is a 3" communications receiver speaker housed in an attractive cabinet designed to match the HW-9 and HW-99.

Kit SP-99, Shpg. wt. 3 lbs. **29.95**

HW-99 SPECIFICATIONS: TRANSMITTER: RF output power: 50 watts, except 40 watts on 10 meters. **Transmitter Frequency Offset:** App. 700 Hz. **Antenna Load Impedance:** 50 ohms unbalanced nominal. **Harmonic and Spurious Radiation:** – 40 dB minimum at rated output. **T/R Operation:** CW, full break-in to 30 WPM. **RECEIVER: Sensitivity:** less than 1.0 μV for 10 dB S + N/N. **Selectivity:** App. 450 Hz at 6 dB. **Dynamic Range:** 70 dB. **Image and IF Rejection:** 50 dB minimum. **Audio Hum Noise:** – 40 dB. **Audio Output:** 1 watt into 8-ohm load. **GENERAL: Frequency Stability:** Less than 200 Hz/hr drift after 30-minute warmup. **Power Requirement:** 120 VAC at 60 Hz. **Dimensions:** 11½" W x 10¾" D x 4⅝" H.

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[3] The SS-9000 Deluxe Synthesized HF Transceiver sets new standards in Amateur Radio performance

HIGHEST TECHNOLOGY AT A MODEST COST

$1649⁰⁰

- Microprocessor-based circuitry controls the entire operation of the SS-9000 for easy, reliable performance
- Entirely solid-state, broadbanded in design – this Transceiver delivers 100 watts to a 50 ohm load
- A built-in Terminal Interface with an RS-232C I/O port allows instant and direct control of operating parameters via ASCII terminal, modem or computer
- Nine-band operability, including the newly allocated 10, 18 and 24 MHz WARC bands and WWV at 15 MHz

Explore the leading edge of convergent radio and computer technology with Heath's SS-9000. This transceiver represents a quantum leap forward in terminal-controllable communications gear and it's streamlined for great results even without keyboard control. You can set new high standards of performance and be part of the exciting Amateur Radio future with the SS-9000.

Designed for versatility: The SS-9000 operates in LSB, USB, CW-wide, CW-medium, CW-narrow and RTTY. The Deluxe Synthesized Transceiver delivers an RF power output of 100 watts PEP minimum on SSB, and a 100 watts minimum on CW and RTTY – to get your signals out with low distortion rates while excellent sensitivity and selectivity ensure that you can read distant transmissions.

Completely synthesized for absolute accuracy: A crystal-controlled master oscillator provides exact reference to phase-lock the BFO and HFO for super stability and repeatability. Likewise, a single precise VFO is tied to each display through 256 bytes of CMOS RAM. This extended on-board storage capacity accepts three separate inputs per band for a total of 27 frequencies.

Two displays are better than one: Our unique dual digital display is more than a cosmetic frill. Simultaneous working readout gives serious contesters and DX hunters greater advantage in frequency-handling speed and agility. Pushbutton exchange with memory or opposite display permits instantaneous QSY. Place the SS-9000 under terminal control and you can enjoy versatility in QSO capture that shatters all precedent.

The Terminal Interface: At the heart of your SS-9000, an "intelligent" controller circuit assists a serial interface in maintaining communications protocol between external requests, via front panel controls or terminal guidance, and the internal circuits on the synthesizer, T/R and audio circuit boards. It allows two-way control/monitor communication between the Transceiver and a video terminal (like the H/Z 29, p. 103), hard copy ASCII teletypewriter, or computer (like the HS-89, p. 89).

Total control, simple controls: Commands let you select, display and change the band, mode, all 27 operating and memory frequencies, passband shift, band scan and baud rates, lock and release one or all switches to their terminal-controlled or physical states and print all parameters. Keyboard commands place the unit in transmit or receive mode, assign and toggle T/R/Tr status on the dual readouts, and manipulate the three stored frequencies on each band, with full diagnostic error-prompting at the terminal.

Free software: A 5¼" hard-sectored floppy diskette is supplied with every SS-9000. It demonstrates many ways of providing useful communication between a computer and the Transceiver, using graphics and video text to introduce you to its amazing control capabilities.

This is the HF Transceiver the world has been waiting for. There is no other, no better system than the SS/PS-9000 team. See it at your nearby Heath/Zenith Computers & Electronics Center. Try out the demonstration disk. Listen to what others say about its performance advantages. Then put it on the air from your club or QTH. *And take command of the world's most capable Transceiver!*

SS-9000, Assembled and tested, 35 lbs. **1649.00**

PS-9000 Power Supply/Speaker, provides 13.8 VDC for base operation with high temperature, short circuit and current surge protection, clock has independent 24- or 12-hour capability. Assembled and tested, 33 lbs. **249.00**

SS-9000 SPECIFICATIONS – GENERAL: Tuning: 100 Hz per step, 5 kHz per knob rotation with pushbutton up and down scan (rate is internally adjustable). **Operation:** Split transmit/receive or transceive from either readout. **Synthesized Lock Indicators:** Visual indication when synthesizer is unlocked. Transmitter is disabled. **Frequency Coverage (MHz):** 1.8-2.0,* 3.5-4.0,* 7.0-7.3,* 10.1-10.15, 14.0-14.350,* 18.068-18.168,* 21.0-21.450,* 24.890-24.990, 28.0-29.7,* WWV @ 15.0 (*Extended Frequency Coverage). **Frequency Stability:** Less than 3 PPM from turn-on for first 15 minutes; Less than 3 PPM/hour drift after 15 minutes warmup; Less than 20 PPM drift from 0°C to + 40°C (single crystal-controlled 10 MHz frequency standard). **Modes of Operation:** LSB, USB, CW-Wide, CW-Medium, CW-Narrow, RTTY. **Operating Temperature:** 0°C to + 40°C. **Power Requirements:** 11 to 16 VDC with a nominal current maximum of 25 amps and at 17 watts (40 dB down). Receiver current is 2 amps nominal. (*All specifications are referenced to 13.8 VDC at 25°C ambient). **Rear Panel Connectors & Control:** Antenna (SO-239), Linear ALC In, Linear ALC Adjust, Low Power Enable, Spares (5), DC Power Input, CW Key Jack, External Transmit Audio In (2), Speaker Out, External Receiver Audio, T/R In, T/R Out, Mute, Mute (inverted), External Relay (linear), and RS-232 Interface. **TRANSMITTER: RF Power Output:** SSB = 100 watts PEP minimum, CW & RTTY = 100 watts minimum. **Load Impedance:** 50 ohms. **VSWR:** Stable at any VSWR and load impedance. Cutback circuitry guarantees at least 80% of rated power at any VSWR less than 2:1 and a minimum of 15 watts at any VSWR. **Carrier Suppression:** 50 dB down from a 100 watt, single-tone (1000 Hz) output. **Harmonic Radiation:** 50 dB down below 50 MHz, 65 dB down above 50 MHz. **Spurious Radiation:** 50 dB down, except at 17 meters (40 dB down). **Third Order Distortion:** 30 dB down from a 100 watt PEP, two-tone output. **Unwanted Sideband Suppression:** 55 dB down from 100 watt, single-tone (1000 Hz) output. **T/R Operation:** SSB = PTT or VOX, CW = semi break-in. **CW Sidetone:** 750 Hz tone, adjustable level. **Microphone Input:** High impedance (25K ohm) with – 55 dBm rating. **RECEIVER: Sensitivity:** 0.3 μV for 10 dB (S + N)/N SSB on the 40 through 10 meter bands, 0.5 μV on the 160 and 80 meter bands. **Selectivity:** 2.1 kHz at 6 dB down, 5 kHz at 60 dB down. CW filters, CWM = 400 Hz at 6 dB down and 1.5 kHz at 60 dB down. CWN = 200 Hz at 6 dB down and 1 kHz at 60 dB down. **Overall Gain:** Less than 1 microvolt for a 0.25 watt audio output. **Audio Output:** 1.5 watts into 4 ohms at less than 10% THD. **AGC:** Fast-attack with switch selectable Off, Fast and Slow decay. **Intermodulation Distortion (20 kHz spacing):** – 70 dB. **Image Rejection:** – 80 dB (except – 65 dB on the 17 and 12 meter bands). **Second IF Rejection:** – 90 dB. **First IF Rejection:** – 80 dB (except – 60 dB on the 40 and 30 meter bands). **Internally Generated Spurious Signals:** All below 1 μV equivalent. **RIT:** ± 250 Hz. **Available Accessories:** PS-9000 AC Power Supply/Speaker with built-in dual 12/24-hour clock and Customer Service Manual. **Dimensions:** 6⅛" H x 14" W x 13¾" D (15.6 x 35.6 x 34.9 cm).

PS-9000 SPECIFICATIONS – GENERAL: Output Voltage: 13.8 VDC, regulated (adjustable). **Maximum Output Current:** 25 amps intermittent (50%, 10 minutes on/off) and 15 amperes continuous. **Power Requirements:** 110 to 130 VAC at 6 amperes or 220 to 260 VAC at 3 amperes, 50/60 Hz. **Regulation:** Less than 4% from no load to 25 amperes. **Ripple:** Less than 2% at 25 amperes. **Circuit Breaker:** 20 amperes for 110 to 130 VAC primary, 10 amperes for 220 to 260 VAC primary. **Current Limiting:** Over-current protected (set typically for 28 amperes). **Thermal Protection:** Automatic shutdown with over-temperature on the heat sink. **DUAL CLOCK: Display:** Two independent readouts with four digits and a colon. **Clock Format:** 12- or 24-hour display. **Accuracy:** Determined by the line frequency (no cumulative error). **Power Requirements:** 120 or 240 VAC, 50 or 60 Hz., 3.5 watts. **Cabinet Dimensions:** 6⅛" H x 9⅝" W x 13¾" D (15.6 x 24.4 x 34.9 cm). **Weight:** 33 lbs. (15 kg). Specifications apply when the Power Supply is used with the SS-9000.

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④ Heathkit HW-5400 Synthesized HF SSB/CW Transceiver is a price-performance triumph

$499⁹⁵

- Save $250 more on the world's most fascinating rig
- PLL-synthesized stability with crystal accuracy
- Digital display with direct keypad frequency entry, two memories per band and mode/status symbols

For the ham who dreams of owning the finest quality, multi-purpose equipment. Heath has created a kit-form rig, breaking the cost barrier to sophisticated, dependable talk power and microtech flexibility for home or field use. Controlled and monitored by an 8-bit microprocessor, the compact HW-5400 yields quick-change versatility in adapting to uncertain band conditions. You add new skill and adventure to your Amateur Radio experience with the HW-5400.

Three modes, eight bands and lots of power for HF excitement: It operates in USB, LSB, and CW on 80-10 meters with automatic sideband selection. Solid-state and broadbanded, with QSK for proficient CW ops, sixteen memories, power supply activation at the panel and defeatable amp relay for quiet keying.

Beats the QRM every time: A tremendously versatile Split-Memory Access function lets you review and change the transmit frequency while in receive with practically no information loss from the station in contact.

High resolution tuning employs an efficient dual-speed technique. Rapidly scan a band in 1 kHz increments, while tuning to pick out closely-packed calls for more QSOs over a narrow frequency range at 50 Hz per step. You also get total Transceiver status at a glance, including current mode, T/R status, split operation, split-access memory handling and if transmit frequency is outside the band edge. Just three knobs command signal isolation and maintenance.

Kit HW-5400, Transceiver, 24 lbs. **499.95**

Kit HWA-5400-1, Power Supply/Speaker/Digital Clock provides a well-regulated, 13.8 volt source of DC power. Shpg. wt. 39 lbs. **179.95**

Kit HWA-5400-3, Frequency Entry Keypad for instantly synthesized direct QSY to any in-band position, and fast DX, contest and net work when using the Split-Memory function. Improve contact agility with this cursor-controlled, single-digit, random or sequential access to any frequency and 50 Hz PLL accuracy.
Shpg. wt. 1 lb. **59.95**

Kit HWA-5400-2, Deluxe 2.1 kHz 4-Pole SSB Crystal Filter provides sharper skirt selectivity in the IF bandpass for ten total poles of filtering and optimum receiver performance. Shpg. wt. 1 lb. **59.95**

HW-5400 SPECIFICATIONS – GENERAL: Overall Band Coverage: 80 through 10 meters, 10 MHz WWV; WARC bands operational. **Frequency Coverage:** 3.450 – 4.050, 6.950 – 7.350, 10.000 – 10.200, 13.950 – 14.400, 18.018 – 18.218, 20.950 – 21.500, 24.840 – 25.040, 28.000 – 29.750 MHz. **Frequency Readout:** 7-digit vacuum fluorescent display with special symbols. **Readout Symbols:** – (Split), – (Out of band), L (LSB), U (USB), C (CW Wide), C (CW Narrow), M (Memory). ⁻ (Transmit). **Readout Accuracy:** To nearest 50 Hz. **Frequency Control:** Synthesized. **Synthesized Lock Indicators:** Display reads 'PLL' and LEDS show which loops are unlocked. Transmitter is disabled. **Dual Rate Frequency Tuning:** Slow = 50 Hz per step, 1.25 kHz per knob rotation. Fast = 1 kHz per step, 25 kHz per knob rotation. **Tuning Backlash:** None. **Split Frequency Operation:** Transmit from memory frequency, receive from displayed frequency. **Memory:** Stores two frequencies per band. **Frequency Stability:** Less than 50 PPM drift from turn on. **Modes:** SSB Normal and Reverse; CW, Wide or Narrow. **Operating Temperature:** 0° to 40°C. **Power Requirements:** 11 to 16 VDC, 120/240 VAC with optional AC power supply. All specifications referenced to 13.8 VDC. **RECEIVER: Sensitivity:** Less than 0.35 µV for 10 dB, S + N/N. **Selectivity:** With standard filter, 2.0 kHz minimum at 6 dB to 6 kHz maximum at 60 dB; with HWA-5400-2 optional filter, 1.8 kHz minimum at 6 dB; CW active audio filter, 250 Hz minimum at 6 dB centered at 700 Hz. **Overall Gain:** Less than 1 µV for 0.25 watt audio output. **Audio Output:** 2 watts minimum into 4 ohms; less than 10% THD. **AGC:** Selectable Fast or Slow (no more than 8 dB audio change for a 100 dB or greater input signal range). **Intermodulation Distortion:** 70 dB minimum at 25 kHz. **Image Rejection:** 80 dB minimum. **If Rejection:** 100 dB minimum. **IF Shift Tuning:** ±600 Hz in Receive only. **Internally Generated Spurious Noise:** All below 1.0 µV. **Audio Hum and Noise:** Greater than 40 dB below maximum output. **Receiver Incremental Tuning:** ±350 Hz. **TRANSMITTER: RF Output:** High SSB, 100 watts PEP power minimum, except 80 watts on 10 meters. CW, 100 watts minimum, except 80 watts on 10 meters. **Duty Cycle:** Continuous SSB (voice). 50% receive-transmit ratio on CW; 5 min. on 5 min. off. **Load Impedance:** At least 90% rated power with less than 2:1 SWR. Protected against high VSWR. **Carrier Suppression:** – 50 dB minimum from a 100 watt, single-tone (1000 Hz). **Unwanted Sideband Suppression:** – 50 dB minimum from a 100 watt, single-tone (1000 Hz). **Spurious Radiation:** – 60 dB minimum, referenced to 100-watt output. **Third Order Distortion:** – 30 dB minimum from a 100 watt PEP two-tone output. **T/R Operation:** SSB = PTT or VOX, CW = full break-in (simplex only). **CW Sidetone:** 700 Hz to speaker or headphones. **Microphone Input:** High impedance (25k ohm) with – 55 dBm rating. **Operation with External Linear Amplifier:** Linear relay, linear ALC rear panel connections. **Front Panel Meter:** Automatically-switched S-units in Receive, ALC in Transmit. **Cabinet Dimensions:** 4¼" H x 11¼" W x 14" D (10.8 x 28.6 x 35.6 cm). **Weight:** 24 lbs. (10.9 kg).

HWA-5400-1 SPECIFICATIONS: Line Voltage: 120/240 VAC, 50/60 Hz. **Output Voltage:** 13.8 VDC at rated load. **Protection:** 20-ampere DC output fuse. 7- and 4-ampere slow blow fuses for 120 and 240 VAC primaries, respectively. **Output Current:** As required by Transceiver, up to 18 (20 peak) amperes during transmit. **DC Output Regulation:** 7% from receiver load to transmit load at 120 VAC primary; 4% additional with AC primary at 110-130 or 220-260 VAC. **Ripple:** 50 mV or less at rated load. **Duty Cycle:** 9 amperes DC continuous. 18 amperes at 50% (5 min. on, 5 off). **Speaker:** 4 ohms impedance, 300-3000 Hz response, 2 watts peak power. **Clock:** 4-digit blue fluorescent display in 12 or 24 hour format, synchronized to line frequency. **Cabinet Dimensions:** 4¼" H x 8½" W x 14" D (10.8 x 21.6 x 35.6 cm).

① Be part of exciting new packet radio communication with Heath Terminal Node Controller

NEW

We bring you the Heathkit version of the Tucson Amateur Packet Radio (TAPR) node controller, representing the newest frontier of Amateur Radio; terminal control and packet transmission. The HD-4040 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 intermediate 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, or leave a message at a friend's shack, and do it all quickly and without errors. The HD-4040 and packet radio make it all possible. Simply hook-up the Terminal Node Controller 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 Heath Terminal Node Controller. This packet radio interface provides terminal control of your existing Amateur Radio 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. The HD-4040 automatically checks and acknowledges that each burst of information, or packet, has been correctly received. If the information is incorrect the HD-4040 will not acknowledge it and the sending station will continue to retransmit until the packet 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 transmissions are printed on your terminal or computer monitor for you to read. The HD-4040 and packet radio frees you to concentrate on communicating, instead of worrying about QRM or missing important information.

Most packet radio operates at 1200 baud and can run much faster. With the HD-4040 you can use the same frequency for both calling and working channels. Since packet operates in bursts many users can operate on the same frequency at the same time. The HD-4040 uses the AX.25 and VADCG protocols.

Packet radio helps to eliminate channel interference and preserves spectrum. The Heath TNC automatically monitors the channel and relays information only when the channel is open. You notice only a slight delay on heavily loaded channels.

Three useful modes of operation are provided. A conversation mode allows you to converse with another operator by typing messages on the terminal keyboard and reading the other operator's transmission which is displayed in type on the monitor. A command mode configures the Terminal Node Controller and allows you to use a variety of operating commands. A transparent mode is used in computer file transfer.

A built-in automatic beacon can be set to transmit your call letters and any message you desire at the time intervals which you set. The beacon even operates when you are linked with another operator.

The HD-4040's automatic digital repeater lets you relay transmissions from one operator to another. You can greatly extend the range of your existing station by relaying transmissions through up to eight intermediate stations. The "digipeater" also operates when you are conversing with another operator. You can set the system to recognize only the calls you wish to receive.

As long as power is supplied to the HD-4040 it will continue to act as a beacon and as a digital repeater for other stations — even if you turn off your computer or terminal. The TNC can also store up to 2K of local activity in memory. This allows you to receive messages while not at your station.

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

A built-in modem interfaces the HD-4040 to your transceiver. This modem is capable of baud rates up to 1200 and filters input prior to demodulation for a cleaner signal. The filter constants are hardware selectable. You can plug in your own external modem to bypass the internal modem and achieve baud rates up to 19,600 (with optional clock) on UHF. Baud rate for either internal or external modem is adjustable through the keyboard. A header kit for 1200 baud operation is supplied with the HD-4040. A 300 baud header kit will soon be available for use below the 10 MHz HF band.

Ports include a serial port for an RS-232C terminal or computer interface for baud rates from 50 to 4,800 (optionally up to 19,200), and parallel port for TNC status, command channel and diagnostic signal.

Eight front panel indicator lights provide complete TNC status. A quick glance lets you know exactly what is going on. A crystal oscillator supplies clock signals to the UART, the switched-capacitor filter, and E & Q systems. The HD-4040 operates on 120 VAC, 15 watts. An RS-232C Cable is required to connect the HD-4040 to your terminal or computer. A Cable to connect the HD-4040 to your radio comes with the TNC. Technician or above licensing is required to use the HD-4040.

All you need to enter the new technology of packet radio is the HD-4040 Terminal Node Controller and a terminal (see page 87) or a personal computer with terminal emulation software (see pages 76-103). You need no computer or programming knowledge to use the HD-4040. The Heath Terminal Node Controller does the computer work for you, allowing you to run your Amateur Radio station more efficiently and with more activity and variety of uses than were ever possible before packet radio.

Kit HD-4040, Shpg. wt. 7 lbs. **299.95**

HD-4040 SPECIFICATIONS: Processor: 6809. Clocks: 7.3728 MHz crystal oscillator supplies signals to 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: 13-5/8" x 7-3/4" D x 2-3/8" H.

Matching Wattmeter and Antenna Tuner for the dedicated QRP operator

② 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 QRP signal on the air with confidence and keep your low-watt 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. .... **WAS $49.95 NOW ONLY 39.95**

③ 50-Watt Antenna Tuner with 4:1 balun

- Designed for repeated dependability using the finest-quality components
- 100% transmatch to a wide range of output impedances 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! Kit QRS-9, HM-9 HF/VHF Wattmeter and HFT-9 50-Watt Antenna Tuner, Shpg. wt., 14 lbs. .... **ONLY 84.95**

④ SW-7800 General Coverage Synthesized Receiver

$349⁹⁵

- 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
- Portable capability coupled with lower power consumption

The SW-7800 General Coverage Receiver 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 eliminate 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 is used to provide excellent image rejection.

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

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 ¾ amp. Only a VTVM is required for Receiver alignment.

Kit SW-7800, Shpg. wt. 12 lbs. **349.95**

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. **59.95**

SW-7800 SPECIFICATIONS. GENERAL: **Frequency Coverage:** 150 kHz to 30 MHz in thirty 1 MHz ranges. **Frequency Readout:** LEDs, 5 digits. **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 μ V 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 (SO239) and high-impedance wire. **Muting:** External jack for use with transmitter. **Recorder Output:** Miniature phone jack. **Power Requirements:** 120 VAC, internally; 13.8 VDC at ¾-ampere, externally. **Dimensions:** 11½" W x 10½" D x 4⅝" H.

⑤ The compact HW-9 Deluxe QRP CW Transceiver

$249⁹⁵

- 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. Microelectronic 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 wideband 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. **249.95**
Kit HWA-9, Accessory Band Pack, Shpg. wt. 1 lb. **39.95**
Kit PSA-9, Accessory Power Supply, Shpg. wt. 4 lbs. **29.95**

HW-9 SPECIFICATIONS: **TRANSMITTER: RF Output Power:** 4 watts, except 3 watts on 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 μV for readable signal; 0.5 μV 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 8Ω. **GENERAL: Frequency Stability:** Less than 150 Hz/hour drift after 30-minute warmup. **Power Requirement:** 11-16 VDC, 12.6 specified. **Dimensions:** 4¼" H x 9¼" W x 8½" D.

☐ 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 μV (30-50, 144-174 MHz) and 0.8 μV (421-512 MHz), ± 5 kHz deviation 12 dB SINAD; Aircraft, 1 μV 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: 3½" H x 10⅝" W x 8" D.

☐ 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-141B, Shpg. wt. 3 lbs. .... **WAS $129.95 NOW ONLY 99.95**
PS-5012 Power Cube, For 120 VAC operation, Shpg. wt. 1 lb. **15.95**

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

- **Obtain maximum SSB output with clearer sounding signal**
- **Variable high and low response and audio gain permit adjusting for differences between microphone and transmitter**
- **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 ¼" 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 connec-

tion between microphone and transceiver. Requires 9-volt battery.
Kit HD-1986, Shpg. wt. 2 lbs. **39.95**

HD-1986 SPECIFICATIONS: Adjustable Microphone Gain: Low Frequency Response: ± 12 dB at 490 Hz; High Frequency Response: ± 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: 5¾" W x 2" H x 4¼" D.

☐ 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 bandwith. The SA-2060A Deluxe Antenna Tuner can solve that problem. The built-in wattmeter/SWR bridge has an accuracy of ± 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. **249.95**

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: 5¾" H x 14½" W x 13⅞" D.

☐ 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**
- **Standby switch lets you go barefoot or perform tune-ups**

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

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. .... **WAS $799.95 NOW ONLY 649.95**

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: 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: 8¼" H x 14⅞" W x 14½" D.

☐ 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 preselected 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 watt-meters. 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 $599.95 NOW ONLY 499.95**
Kit SA-2500-1, 4:1 Balun Accessory, Shpg. wt. 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; 500 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.

☑ 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-5010, 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):** 1⅝" H x 4⅛" W x 6" D.

Reliable and money-saving accessories to improve the performance of your radio station

1 New Heathkit HD-1481 Remote Coax Switch

$89⁹⁵
- Remotely controlled coax switch uses only a single feedline to operate up to four antennas

Conveniently control the switching of antennas from inside your station with the HD-1481 Remote Coax Switch. Two units, a remote and indoor control unit, interconnect through a single coaxial cable to eliminate the need for any multi-conductor control cable. The remote unit, a tower- or mast-mounted RF remote coaxial switch, needs only one feedline to operate up to four antennas. It is rain tight and easily 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. The HD-1481 can handle 2000 watts PEP and has a VSWR of 1.15:1 or less. It has an impedance of 50 to 70 ohms and a loss at 54 MHz of less than 0.2 dB. The control unit operates from 120 VAC at 50/60 Hz and measures 2⅝" H x 5½" W x 7½" D. The remote measures 7⅜" H x 8⅜" W x 4½" D.

Kit HD-1481, Shpg. wt. 5 lbs. 89.95

2 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
- An enjoyable and easy-to-build two-evening kit

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 (± 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

3 Highly accurate Dip Meter covers 1.6 to 250 MHz

$79⁹⁵
- Injection and absorption modes let you measure energized and de-energized circuits, also acts as signal injector

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.

For a delicate instrument of this type, only exceptional-grade components are used. In the balanced Colpitts RF oscillator, silver mica coupling capacitors provide improved frequency stability. The detector uses a broadband MOSFET amplifier, hot-carrier diodes and a Q-multiplier for improved sensitivity and a better dip action. A responsive 150 μA meter movement yields sharper resonance indications. Includes a headphone jack for positive modulation monitoring. Operates on one 9-volt battery (not included) and goes anywhere you do.

Kit HD-1250, Shpg. wt. 4 lbs. 79.95

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:** (Meter, case and coils) 2 lbs. **Dimensions:** 2" H x 2¼" W x 5⅞" D.

4 Heath 'Cantenna' load resistor dissipates RF

This important device has improved specifications, better components and our famous low, build-it-yourself kit price. The HN-31A handles 1 kilowatt of RF energy (2 kW PEP) with VSWRs always less than 1.5:1 for frequencies up to 450 MHz. Stabilized ceramic resistor element provides ideal 50 ohm noninductive load to your setup. Power derating curves and spring-loaded lid vent help maintain a high safety factor. The Cantenna eliminates unnecessary QRM during tune-up and minimizes mistakes while performing 'hot' gear maintenance or alignment. Holds one gallon of transformer oil (not supplied). The Cantenna load resistor should be standard in every hamshack.

Kit HN-31A, Shpg. wt. 3 lbs. .... WAS $24.95 NOW ONLY 19.95

5 Low-cost, quieting Mura 8-ohm headphones

Make copying traffic a lot easier with the Mura SP-104 Headphones featuring a wide 40 to 15,000 Hz frequency range, 2¼" dynamic speakers for clear comprehension, individual volume controls, and isolating ear cups. Headphones have 10-foot coiled cord with plug.

HDP-1396, Assembled, Shpg. wt. 2 lbs. 19.95

6 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 eartip receiver is ideal for listening to environmental sounds while monitoring the radio.

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

7 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 lb. 99.95

8 CONTROLLED MAGNETIC Fixed Station Microphone

- High-output, durable, totally reliable CONTROLLED MAGNETIC cartridge encased in black, high-impact casing

Heath's model HDP-444 Microphone was designed by Shure with amateur radio features. It has dual selectable output impedance and a frequency response tailored for speech intelligibility. A slide switch permits selection of high or low impedance. A second slide switch permits choosing between Normal and VOX operation. The push-to-talk switch bar allows for momentary or locked operation. A three-conductor plus shielded cable easily connects to any ham rig.

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

9 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 rated for legal power.

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

10 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

Smart Outlet Box

Turn on a device plugged into the box's control socket and the unit's ten other sockets automatically turn on. Power surge protected. See page 24.

11 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. 9.95

HD-1481 Remote Coax Switch operates up to four antennas

12 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.

Kit HD-1234, Shpg. wt. 1 lb. **19.95**

13 Mobile Antenna for the 146 to 148 MHz range

Cushcraft AMS-147 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.

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

14 80 to 10 meter Cushcraft AV5 has long DX reach

Vertically-polarized omni-directional antenna is designed to provide complete CW and SSB coverage on 80-40-20-15-10 meters. Its especially effective high-Q stabilized traps give wider bandwidth. SWR is 1.5:1 or less at resonance on each band. Self-supporting height is 25 ft. (7.4 m). Built-in coax connector accepts PL-259 on your station feedline. Antenna handles 2000 watts PEP.

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

15 Specially designed short wave listening antenna

Completely assembled and ready to use, the heavy 14-gauge HDP-7800 antenna covers 60-49-41-31-25-19-16-13-11 meters. A high-performance trapped dipole with an overall length less than 43 feet.

HDP-7800, Shpg. wt. 3 lbs. **59.95**

① *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. . . . . **Was $249.95 NOW ONLY 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 Adapter (on page 35). Dimensions: 2⅞" H x 15½" W x 8" D.

② 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

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. With 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 HDA-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 HDA-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 7½" 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. . . . . **WAS $49.95 NOW ONLY 29.95**

SUPER RTTY Software for Heath H-8 and H/Z-89 computers. ASCII/Baudot system uses full disk/graphics capabilities. Requires H-DOS 1.5 and 24K memory.
HDP-1020, Shpg. wt. 2 lbs. . . . . **WAS $49.95 NOW ONLY 29.95**

③ Heathkit's HD-3006 Crossfire Tuning Indicator

- 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. . . . . **WAS $59.95 NOW ONLY 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: 3³⁄₁₆" H x 5" W x 4" D.

Let Heath's Amateur Radio Courses put you on the air, at the level you want

④ Heathkit's Novice Course will get you on the air

$44⁹⁵

- Communicate with nearly a million other hams all around the world...right from your own home or car...transmitting and receiving CW on a variety of frequencies
- Heath guarantees that you will pass the Novice FCC test – or we will refund the full purchase price of the course

Join the expanding world of Amateur Radio. Where else do you have the opportunity to communicate one-on-one with such a diversity of people – this hobby spans all professions, in all countries. You'll probably get to know most of the hams in your area on a personal level, and 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 a public service.

Long a leader in Amateur Radio technology, Heath has prepared a self-instruction program that's guaranteed to help you earn a Novice ticket. Everything you need to get your license and become a part of a privileged fraternity is in this comprehensive, well organized study package, including information on how you apply to take the latest FCC Novice exam. Also, it provides helpful guidelines for setting up and operating a good station when your license and personal call sign arrive.

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

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

The Course includes two audio cassette tapes full of important knowledge. The

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

ER-3701, 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 FCC 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. 2⅝" H x 4⅛" W x 4⅜" D. Operates on 9V battery (not included).

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

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

1 This CW Keyboard lets you send letter-perfect code every time

2 The HD-3030 Terminal Interface will put you into RTTY inexpensively

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

4

5

6

7
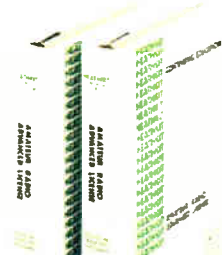
6 Take our General License Course for voice communication and move up to the General Class

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

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

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

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 FCC rejection notice. It's a claim exclusive to Heath.

ER-3702, Shpg. wt. 24 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 FCC exam the first time — if you fail to pass the enclosed exam, we'll refund program cost

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 FCC test. The self-instructional nature of the Course allows you to progress at your own pace and backtrack to review any subject.

Fully one-fifth of the 80-15 meter HF spectrum in four specific subbands (3800-3890, 7150-7225, 14175-14275 and 21270-21350 kHz) is allocated to the Advanced and Extra Class license holders. Why be left out? These are the choicest kilocycles with more DX hot spots and experienced amateurs. Demonstrate your desire for self-improvement and upgrade your ticket with the Heathkit/Zenith Advanced Class License Course. Send us a copy of your new license or FCC notification of passing to receive 4.0 Continuing Education Units and a personalized Certificate of Achievement. Don't delay — start by ordering your guaranteed Course today!

ER-3703, Shpg. wt. 9 lbs. **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 it's 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, DC, 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.

IOS-4360, Shpg. wt. 53 lbs. . . . . Separately $1349.90 **ONLY 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 11½" 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 OC 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 3½ 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

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 cnt. **VDC (internal): Ranges:** ±2 V, 2V on 2 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:** 3½ digit, LED, automatic minus for negative, positive implied. **Dimensions:** 1½" H x 10¾" W x 9¾" 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 41) 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-persistance 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

NEW

● **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 OC voltmeter capabilities to the IO-4360 Triple Trace Oscilloscope.

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 page 41. 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 bench 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). **EXTERNAL: 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:** 120/240 VAC, 50/60 Hz, 70 watts. **Overall Dimensions:** 6⅞" H x 12⅞" W x 19¼"D (17.6 x 32.7 x 48.9 cm).

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 7¼" W x 9½" 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. **249.95**

IG/SG-4244 SPECIFICATIONS: TIME: **Range:** 0.5 s to 10 ns. **Amplitude:** 0.5 s to 20 ns, 100 mV to 1 V peak; 10 ns, 100 mV to 0.5 V peak. **Rise Time:** <1 ns. **Leading Edge Aberrations:** <2% of peak-to-peak amplitude or 10 mV, whichever is greater. **Output Impedance:** 50 ohms, nominal. VOLTAGE: **Range:** 1 mV to 100 V peak in a 1-2-5 sequence. **Accuracy:** ±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 7¼" W x 9½" D.

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 ± 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, μF 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 μF, 19.99 μF, 199.9 μF, 1999 μF, 19.99 mF, 199.9 mF. Accuracy: Using Laboratory Standards: 199.9 pF, 1999 pF, 19.99 nF and 199.9 nF ranges ± (0.2% of reading + count + 0.5 pF); 1.999 μF, 19.99 μF, 199.9 μF, 1999 μF, 19.99 mF and 199.9 mF ranges ± (5% of reading + 1 count). Using Heath Supplied Standards: 199.9 pF, 1999 pF, 19.99 nF, and 199.9 nF ranges + (0.75% of reading 1 count + 0.5 pF); 1.999F, 19.99 F, 1999 μF, 19.99 mF and 199.9 mF ranges, ± (6% of reading + 1 count). NOTE: The accuracy of the Heathkit IT-2250 Capacitance Meter depends on whether you calibrate with the Heath-supplied standards or laboratory standards. Specifications are listed above for both methods of calibration. Accuracy specifications apply to a temperature range of 67 to 77 degrees F (19 to 25 degrees C). Conversion and Display Rate: For values up to 1999 μF, less than 1.5 seconds; For values up to 199.9 mF, less than 10 seconds. Display: 3½ digit (maximum count, 1999) liquid crystal. Testing Voltage: 2.00 VDC maximum; typically varying from 0.6 to 1.4 VDC. Operating Temperature Range: 32 to 104 degrees F (0 to 40 degrees C). Storage Temperature Range: – 4 to + 140 degrees F (– 20 to + 60 degrees C). Battery Life: Approximately four to ten hours, in continuous operation. Battery Indicator: Displays "LO BAT" warning when battery is down to approximately 5 VDC. Overall Dimensions: 2" H x 3¼" W x 7½" L.

② IM-2420 Frequency Counter for accurately measuring frequencies into the UHF range

$269⁹⁵

- 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.	269.95
SM-2420, Assembled and tested, Shpg. wt. 9 lbs.	320.00
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. ≃ 9°F (75°C ± 5°C). Warm-up Time From Cold Oven (unplugged) Start: 10 minutes to within 1.0 PPM, 20 minutes to within 0.1 PPM. External Input: 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

$129⁹⁵

- 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. A locking swing-down stand provides a choice of an alternate display viewing angle.

Kit IM-2410, Shpg. wt. 6 lbs.	129.95

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: 3⅜" H x 7¼" W x 9½" 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.	32.95

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.

PK-1, Assembled, Shpg. wt. 1 lb.	14.95

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.

PK-3A, Assembled, Shpg. wt. 1 lb.	12.95

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 μs 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.	14.95
SMA-100-10, Assembled, Shpg. wt. 1 lb.	19.95
Kit IMA-100-11, For 11 megohm input meters. Shpg. wt. 1 lb.	14.95

Discover the fun of kitbuilding at your Heath/Zenith Computers & Electronics Center.
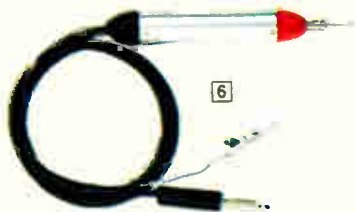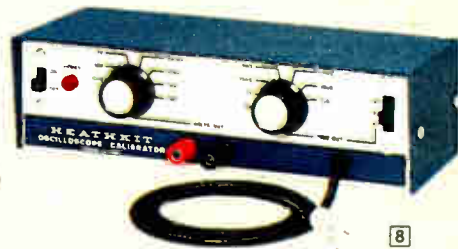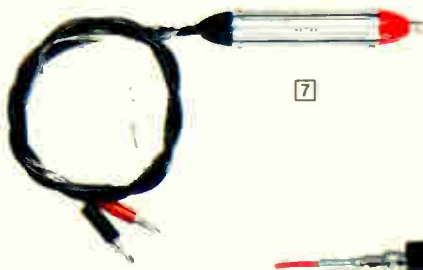
Expand the testing capabilities of your work bench with these quality Heathkit instruments

① Handy tester locates phone line problems

- 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

Convenient Telephone Line Analyzer 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 a phone. With this handy tester, check your home phone line for defective devices or too many phone products that could be loading down the phone line; check new do-it-yourself wiring for improper loading or shorts; verify the condition of the phone line from the central office to the phone jack in your home; and more. This tester is phone-line powered, no batteries or external power needed. Dimensions 2¾" H x 5" H x 1½" D.

ST-2204, Assembled and tested, Shpg. wt. 1 lb. **19.95**

② IG-5240 Color Generator supplies 16 TV signals

$74⁹⁵
- Hand-held instrument easily slips into a shirt pocket

A portable color pattern generator, the IG-5240 supplies color bar, dot, crosshatch, and vertical and horizontal line patterns for aligning color and B&W TV sets. Three crystals controlling the RF channel carrier, and color and timing oscillators provide a stability and frequency accuracy of ± 0.005%. The RF carrier frequency is calibrated to channel 4 but can be changed to channel 3 as an option. Two 9-volt DC transistor batteries are required to power this 8-ounce generator and are protected by a five-minute turn-off circuit. NTSC systems only.

Kit IG-5240, Shpg. wt. 2 lbs. . . . . **LAST CALL 74.95**

③ Conveniently make clamp-on AC measurements

$49⁹⁵
- Electrician's tool for testing power/lighting circuits
- Homeowner's aid for checking appliance current usage

Clamp-on current meter: Really easy to operate, the SM-2206 measures the 50 and 60 Hz current flow in a circuit or appliance by simply clamping its inductive pickup around a conducting AC wire. 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.

Convenient: For those hard to reach one-handed current measurements, the SM-2206 features a handy finger-operated pointer lock switch. With this special switch, the Meter's pointer can be locked into position during a measurement, the meter removed from the circuit and then the current can be read directly from the scale, safely and accurately.

Rugged: Whether it's the homeowner looking for possible savings by checking appliance current usage or an electrician checking power and lighting circuits, the SM-2206 is built to take constant use. The Meter is protected by a shock-resistant housing and a pointer lock-down switch. Included are test leads, 1.5 V "AA" battery, spare resistance range fuse and carrying case.

SM-2206, Assembled, Shpg. wt. 2 lbs. **49.95**

④ IG-1271 0.1 Hz to 1 MHz Function Generator

This quality instrument produces sine, square and triangular waveforms over six variably-controlled frequency ranges. It supplies a 10 V P–P signal into a 50-ohm load through a calibrated attenuator that is adjustable in 10 dB steps from 0 to 50 dB. Includes a 20 dB variable attenuator. Uses 120/240 VAC at 50/60 Hz.

Kit IG-1271, Shpg. wt. 7 lbs. **159.95**
SG-1271, Assembled and tested, Shpg. wt. 6 lbs. **225.00**

⑤ IG-5218 Sine/Square Wave Audio Generator

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 square wave output has a 50 ns rise time and is available in three ranges up to 10 V P–P.

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

⑥ IG-1277 Pulse Generator for precision pulses

$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 1-decade vernier range switches. 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 output 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. One 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. Operates on 120 VAC at 30 watts.

Kit IG-1277, Shpg. wt. 9 lbs. . . . . **WAS $179.95 NOW ONLY 149.95**

⑦ IM-4180 FM Deviation Meter measures peak FM

- Checks peak FM deviation of signals between 25 MHz to 1000 MHz

Measures the peak deviation (frequency modulation) of transmitters and signal generators whose carrier frequencies are between 25 and 1000 MHz. 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. Level controls for meter sensitivity and audio output. Jack for speaker or headphone listening. Portable or AC operation.

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

⑧ IM-5228 Service Vacuum Tube Voltmeter

- Simply-designed, rugged and accurate workbench meter

This versatile VTVM provides servicemen, engineers, hobbyists and maintenance workers with dependability and accuracy. It features seven DC voltage ranges to ± 1500 volts with a full scale accuracy of ± 3%, seven AC voltage ranges from 1.5 V to 1500 VRMS with accuracy of ± 5% and seven ranges of resistances from 0.1 ohm to 1000 megohms. Has a high 11-megohm input resistance and uses a pivoting gimbal for better viewing. Requires one "C" battery, uses 120/240 VAC.

Kit IM-5228, Shpg. wt. 6 lbs. **79.95**
PKW-4, Assembled Replacement Probe for IM-5228, Shpg. wt. 1 lb. **19.95**

⑨ IM-5217 Solid-State Utility Voltmeter

- Easy-to-operate meter goes anywhere in impact-resistant case

General purpose meter is perfect for home use and service calls. Features four ± DC and AC voltage ranges from 1.7 V full scale up to 500 volts, and four ohmmeter ranges up to x1 megohm. Low voltage ohmmeter allows safe semiconductor checking. Requires two 9-volt transistor batteries and one 1.5 volt "C" cell.

Kit IM-5217, Shpg. wt. 4 lbs. **44.95**

⑩ IM-5215 40 kV Probe with built-in meter

Self-contained probe measures extremely high positive voltages up to 40,000 volts (negative ground) with a full-scale accuracy of ± 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.

Kit IM-5215, Shpg. wt. 2 lbs. **29.95**

⑪ IMA-100-10 test probe for checking kilovolts

Use this accessory probe to extend the DC voltage measuring range of any 10-megohm input digital multimeter up to 30,000 volts.

Kit IMA-100-10, Shpg. wt. 1 lb. **14.95**
SMA-100-10, Assembled and tested, Shpg. wt. 1 lb. **19.95**
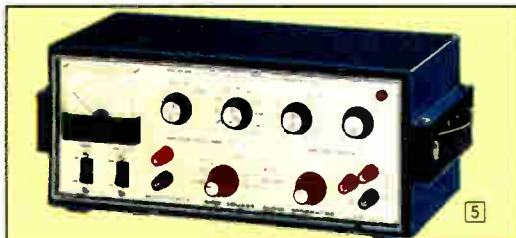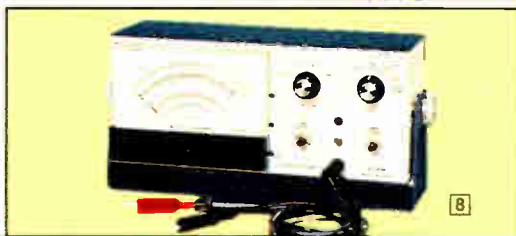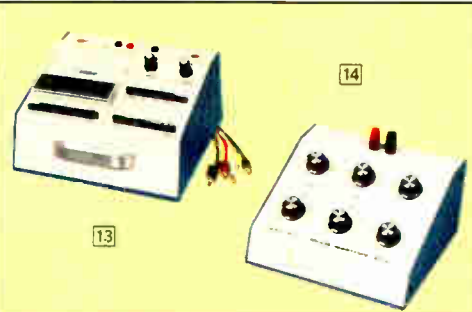
⑫ IT-7410 Logic Probe checks digital circuits

Detects and indicates high and low logic levels in 5 VDC TTL and CMOS circuits up to 100 MHz and 15 VDC CMOS circuits up to 80 MHz. Indicates polarity and presence of signal pulses as short as 10 ns duration. Two indicator lights for clear readings. Powered from circuit under test through 34" long power leads. Includes detachable ground clip. Dimensions: ¾" H x 1" W x 9¼" L.

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

⑬ IT-3120 Portable FET and Transistor Tester

● **Large easy-to-read meter clearly shows tested values**

This quick checker tests transistors, diodes, FETs, SCRs, triacs and UJTs in- and out-of-circuit. Shows gain, transconductance and leakage current. Uses two 1.5 VDC "D" cells (not included). Dimensions are 5¼" H x 8½" W x 8⅝" D.

Kit IT-3120, Shpg. wt. 5 lbs. **89.95**

⑭ IN-3117 Decade Resistance Box for the bench

Versatile substitution box provides resistance values from 1 ohm to 999,999 ohms in 1 ohm steps. All resistors are 1 watt, 0.5% tolerance type. It features a rugged case and binding posts for easy test set-ups. This laboratory-type Decade Resistance Box has dimensions of 5" H x 7½" W x 6⅝" D.

Kit IN-3117, Shpg. wt. 3 lbs. **59.95**

⑮ Low-cost IT-5230 CRT Tester and Rejuvenator

● **Test, clean and restore almost any color or B/W picture tube**
● **Optional socket adapter accessory widens range of testable CRTs**

A must for every TV shop, the IT-5230 offers pushbutton control of separate testing, cleaning and rejuvenation of almost all current color and black-and-white television picture tubes — even in-line-gun tubes. Each gun is individually controlled and monitored on its own grid current meter.

From the front panel you can precisely set the heater voltage of the CRT under test using a separate heater voltage meter. A cutoff control checks the operation of the tube's control grid and indicates a possible gassy condition. A front panel lamp indicates shorts in CRTs. A restore indicator glows brighter as a guns current level is increased for an easy visual indication of rejuvenation. After rejuvenation, a separate cleaning process is applied to the guns to ensure proper tube operation. A special pushbutton provides a good indication of the life expectancy of the CRT. Included is a 4-foot heavy-duty test cable and four adapter sockets with instructions for assembling optional sockets. This tester operates on 120/240 VAC and has dimensions of 5½" H x 13½" W x 10" D.

Kit IT-5230, Shpg. wt. 9 lbs. **139.95**
CRT Socket Adapter allows you to test even more CRTs on the IT-5230. Uses universal clip leads to hook up and test CRTs with known basing configurations.
ITA-5230-1, Shpg. wt. 1 lb. **29.95**

Image labels within the photo montage:
⑩ IM-5215 High-Voltage Test Probe with built-in meter
⑪ IMA-100-10 30 Kilovolt Test Probe for 10 megohm input VTVMs
IT-7410 Logic Probe tests TTL/CMOS digital circuits ⑫

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

$109⁹⁵

- 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. **109.95**
SP-2718, Assembled and tested, Shpg. wt. 12 lbs. **195.00**

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 13⅜" 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. **239.95**

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. **44.95**

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 28 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 28 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. **49.95**

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.

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

IP-2728 Regulated DC Power Supply

AD-1309 Noise Generator

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-5238 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. **49.95**

IT-5283 SPECIFICATIONS: Functions: Substitute speaker, AF signal tracing, RF signal tracing. Audible volt/ohmmeter. Speaker: 3" permanent magnet. Dimensions: 11" W x 5¾" H x 7¾" 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. **34.95**

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
COA-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 COA-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 COA-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:** ± 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:** 12⅞" high x 25¼" wide x 14⅛" 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 COA-1015-1, 12 VDC lighter-socket Power
Inverter, Shpg. wt. 3 lbs. 39.95

$AVER! Save $39.95 on a CO-1015 Analyzer and a Power Inverter.
COS-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

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 ¾" H x 2¾" W x 5½" L. Be prepared in case of trouble – don't be stranded without the help these Testers provide!

Kit CI-2065, Shpg. wt. 2 lbs. 24.95

6 Exhaust Gas Analyzer for tune-up evaluations

$119⁹⁵
- Squeeze more performance power from gasoline
- Includes all you need for total exhaust vapor analysis

Perhaps the best way to guarantee your engine is running at maximum potential and emitting as few pollutants as possible is by testing it with the Heathkit Exhaust Gas Analyzer. A CI-1080 can monitor for minimum pollution, review the emission control system and indicate positive diagnosis.

By measuring thermal conductivity of your exhaust gases, it can show the air-to-fuel ratio, overall combustion efficiency and percentage of carbon monoxide present. From these you can determine if an auto's fuel mixture is unnecessarily too rich or lean for best economy. It's essential when tuning up engines to meet a specific rating for clean air standards in many states. Not intended for use with Chrysler "lean burn" engines.

To facilitate setup, the easy-to-read, 4½" color-coded meter is designed to hang on a partly open window or stand upright without marring paint finishes. The removable sensor/probe assembly uses a flexible stainless steel tube for safe routing of all gaseous material. The CI-1080 is housed in a rugged polyduralene case with foldaway handle for easy portability and storage. Powered by 6 or 12-volt battery in auto under test. All accessories included.

Kit CI-1080, Shpg. wt. 6 lbs. 119.95

7 Portable digital Engine Analyzer

$129⁹⁵
- Measures dwell angle, engine speed, DC voltage, resistance and current
- 3½ 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 ± 0.2%. Check idle speed in two tachometer ranges up to 10,000 RPM with an accuracy of ± 0.1%. Measure DC voltage in two ranges up to 200 volts at ± 1.5%, current to 20 amps with ± 3% accuracy and resistance to 2 megohms at ± 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 overranges.

Kit CM-1551, Shpg. wt. 5 lbs. 129.95
CMA-1550-1, 400-Ampere Shunt, 1 lb. 15.95

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

Highly efficient
exterior horn

Concealed
grille horn
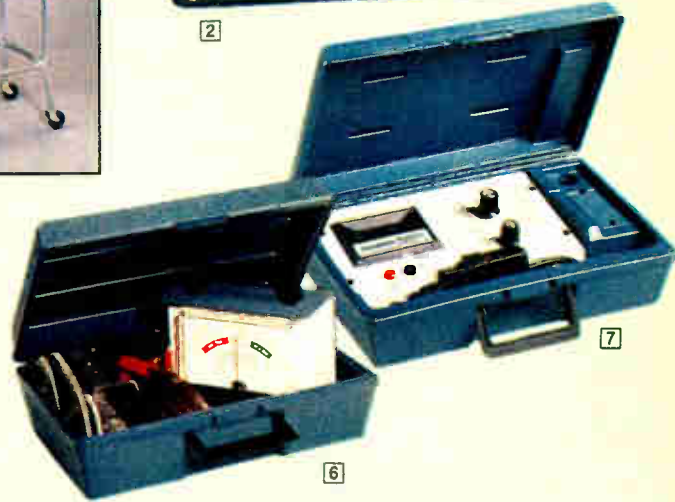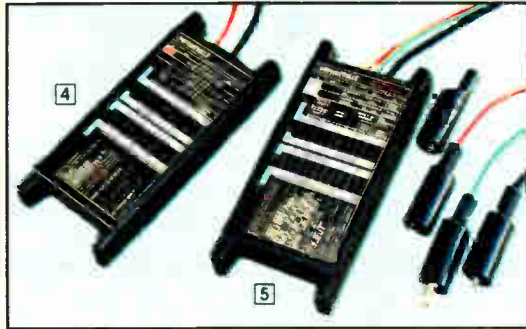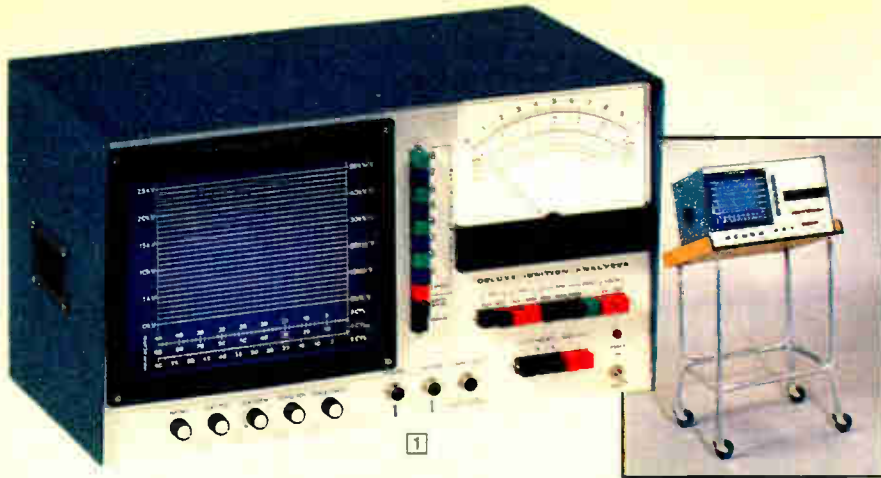
IMPORTANT:
This product is designed for use in emergency
vehicles. Consult authorities before installing
or operating.

8 Siren/PA for mobile public services

$99.95

- 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. **99.95**
GOA-18-1, Weatherproof Exterior Horn Speaker, assembled. 10 lbs. **99.95**
Kit GOA-18-2, Concealed Grille Speaker, Shpg. wt. 10 lbs. **99.95**
Kit GOA-1558-1, Emergency Lighting Relay, Shpg. wt. 1 lb. **4.95**

9 Radar Detector keeps you aware of road conditions

NEW

- 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 adjustable brightness warning light. A highway/city control provides maximum flexibility. Easily installs on or under dash, or on sun visor.

CRP-1402, Assembled, Shpg. wt. 2 lbs. **149.95**

Develop a solid foundation for all your studies in electronics with these entry level courses

Concepts of Electricity Course starts at the beginning
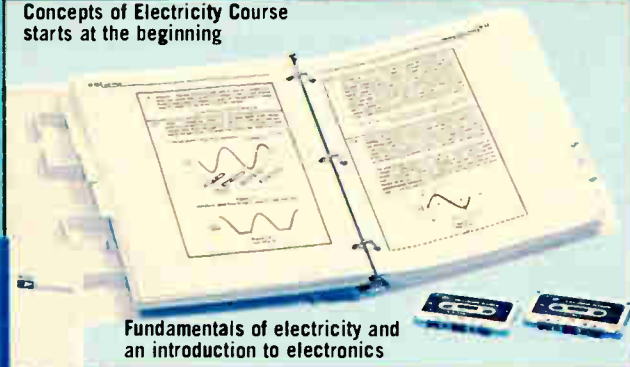
Fundamentals of electricity and an introduction to electronics

[1]

DC Electronics Course teaches DC principles
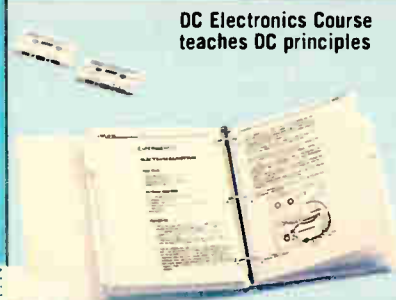
Optional audio-visual accessory available

Build and experiment with DC circuits

[2]

AC Electronics Course teaches AC principles
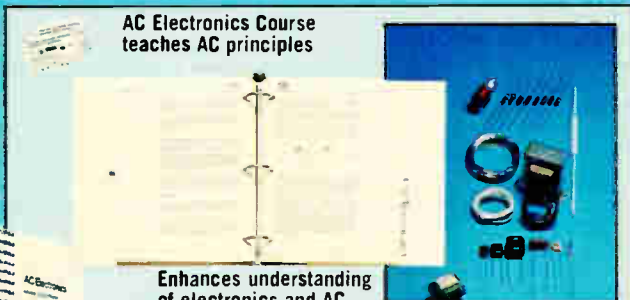
Enhances understanding of electronics and AC

Optional audio-visual accessory available

AC experiments included

[3]

Semiconductor Devices Course covers theory
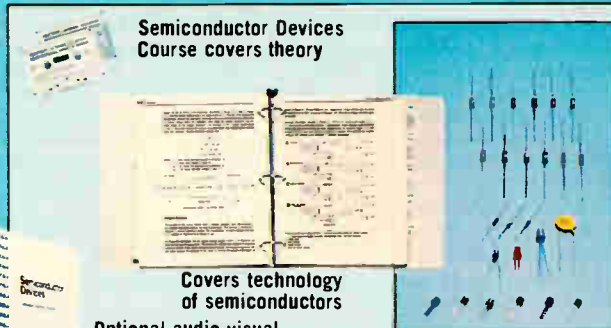
Covers technology of semiconductors

Optional audio-visual package available

Includes parts for experiments

[4]

[5] **Increase your learning success with hands-on experiments**

$109⁹⁵

ET-3100B Experimenter and Trainer

Solderless bread-board sockets for circuit building

Center-tapped transformer supplies 30 V RMS and 60 Hz signal

Compact, rugged, reliable and versatile, experimental and circuit design tool

Variable power supplies and 200 Hz to 200 kHz frequency generator

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, Shpg. wt. 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, Concepts of Electricity Course, 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).

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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.

EE-3102A, AC Electronics Course, Shpg. wt. 7 lbs. **59.95**

EEA-3102A, Optional Audio-Visual Accessory Package, Shpg. wt. 2 lbs. . . **19.95**

$AVER! Buy both the AC Course and the ET-3100B Trainer and save $30.

EES-3102B, EE-3102A and ET-3100B Kit Trainer, Shpg. wt. 19 lbs. **ONLY 139.90**

Spanish Language AC Electronics Course: Spanish translation of this course, less EB-6102-30 Parts for the experiments (see page 73).

EE-3102S, AC Electronics Course in Spanish, 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, Shpg. wt. 6 lbs. **179.95**

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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. 42). 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, DC Electronics Course, Shpg. wt 6 lbs. **49.95**

EEA-3101A, Optional Audio-Visual Accessory, Shpg. wt. 2 lbs. **19.95**

$AVER! Save $25 with the purchase of both the DC Electronics Course and the ET-3100B Kit Experimenter/Trainer. Separately they cost $159.90.

EES-3101B, Includes EE-3101A and ET-3100B, Shpg. wt. 17 lbs. . . **ONLY 134.90**

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, Semiconductor Devices Course, Shpg. wt. 6 lbs. **59.95**

EEA-3103A, Optional Audio-Visual Accessory Package, Shpg. wt. 2 lbs. . . . **19.95**

$AVER! Save $30 when you purchase both the EE-3103A Semiconductor Course and ET-3100B Trainer at the same time.

EES-3103B, EE-3103A and ET-3100B Kit Trainer, Shpg. wt. 18 lbs. **ONLY 139.90**

Spanish Language Semiconductor Devices Course: Spanish translation of this course, less EB-6103-30 Parts Package for experiments (see page 73).

EE-3103S, Semiconductor Devices Course in Spanish, Shpg. wt. 6 lbs. . . **59.95**

Save $75 on entire Fundamental Electronic Series
Purchase the DC and AC Electronics, Semiconductor Devices, Electronic Circuits and Test Equipment Courses along with the ET-3100B Kit Trainer.
$AVER! EES-3115B, Listed Courses and Trainer, 66 lbs. **344.70**

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 59 and 62 (EE-3101A, -3102A, -3103A, -3104A, -3105A, -3201A, -3401) or EC-1100 on page 101, 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, Shpg. wt. 1 lb. each . . . . **each 25.00**

Continue your education in the fundamentals of electronics with these challenging courses

Electronics Circuits Course explains circuits
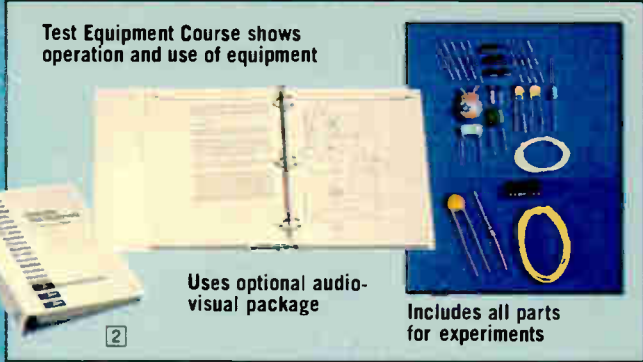
Optional audio-visual package

Parts for experiments

1

Test Equipment Course shows operation and use of equipment

Uses optional audio-visual package

Includes all parts for experiments

2

Electronic Communications Course covers wide area

All parts included for experiments

3

Digital Techniques Course begins with the fundamentals and theory of digital circuitry

All electronic parts needed for 24 experiments

Optional audio tapes

4

ET-3200B Trainer with test lab features

$109⁹⁵ Kit

- Four LED logic indicators
- Three-frequency generator
- Logic and data switches
- Three power supply outputs
- Large solderless breadboard

- Provides many facilities for experimentation
- Used for experiments and circuit prototyping

Put your digital knowledge to work with the ET-3200B Electronic Trainer. Designed for the experiments in both the Digital Techniques and CMOS Digital Techniques Courses, the ET-3200B is a useful tool that helps to speed comprehension by allowing practical application of Course material. This versatile Trainer also allows you to build and test prototypes, confirm circuit operation and test digital ICs.

Built-in regulated power supplies furnish ± 12 VDC and $+5$ VDC. Solderless breadboard sockets accept 14- or 16-pin dual in-line ICs; and 24-, 28- or 40-pin DIPs. Has four binary data switches, two no-bounce logic switches, three-frequency pulse clock generator, and more.

Kit ET-3200B, Shpg. wt. 6 lbs. **109.95**
ETW-3200B, Assembled and tested, Shpg. wt. 6 lbs. **179.95**

CMOS Course stresses practical application

Reduced $30 CMOS Digital Techniques Course

$59⁹⁵
- Stresses practical applications and advantages
- Shows interfacing with other logic families

Learn about CMOS (complementary metal-oxide semiconductor) and why these devices are so desirable in a circuit. This self-instruction Course covers the basic concepts of CMOS technology to complex CMOS circuits designed to acquire and process information. Seven units cover such topics as: an introduction to CMOS, interfacing, logic blocks, multivibrators, counters and registers, and analog applications.

Learn by doing with practical experiments that illustrate topics from each unit. All components are included with the Course for the experiments that are performed on the ET-3200B Trainer. Also recommended for the experiments is the use of an oscilloscope and a multimeter. The EE-3201A Course or equivalent knowledge is a prerequisite. Earn 3.0 CEUs.
EE-3202A, Shpg. wt. 6 lbs. . . . . **WAS $89.95 NOW ONLY 59.95**

① Electronics Circuits Course shows how electronic theories work together to make a circuit operate

$69⁹⁵
- Put your knowledge to work and build more skills
- Hands-on experiments add to your enjoyment and help to explain technical concepts presented in the Course
- Optional audio-visual accessory package available

Go directly from theory to practice with the Heathkit/Zenith Electronics Circuits Course. Seven carefully designed units cover electronic circuits from basic amplifiers through modulation and demodulation. The easy-to-understand text carefully explains a concept before moving on to the next. In this way, you completely master the Course without missing any vital information. Many informative illustrations help explain difficult ideas and add to your understanding of the material presented.

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

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

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

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

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

Pass the optional final exam with a 70% or better score and receive 4 Continuing Education Units (CEUs). You'll also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems that's suitable for framing.

EE-3104A, Shpg. wt. 7 lbs. **69.95**
\$AVER! EES-3104B, EE-3104A and ET-3100B Kit Trainer, 19 lbs. **ONLY 154.90**
EEA-3104A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. **19.95**

③ Learn Electronic Communications quickly, easily

$64⁹⁵
- Includes a comprehensive 400-page text and all electronic components for conducting experiments
- Hands-on learning provided by detailed experiments

Learn all about the fascinating variety of new technologies involved in electronics communication, in your spare time and at your own pace. With this clearly written Electronics Communications Course, you can develop a full understanding of broadcast and data communications fundamentals.

It covers a wide variety of information: amplitude, frequency, phase and angle modulation; through a study of transmitters and antennas; and an analysis of a communications receiver and specific circuits; to an understanding of state-of-the-art broadcasting and data communications. Seven units in all.

In seven hands-on experiments you'll build an AM transmitter, balanced modulator, AM detector, FM transmitter, receiver, pulse modulator, time division multiplex transmitter and data communications modem. All necessary parts are included. The ET-3100B Trainer (page 59) or equivalent is required.

This specialized Course is suggested as a follow-up to the EE-3101A through EE-3104A Courses. Successful passage of the final exam earns you 2.0 Continuing Education Units and a personalized Certificate of Achievement.

EE-3106A, Shpg. wt. 7 lbs. **64.95**
EEA-3106A, Audio-Visual Accessory Package, Shpg. wt. 2 lbs. **19.95**
Kit ET-3100B, Trainer, Shpg. wt. 6 lbs. **109.95**

② Practical Electronic Test Equipment Course

$69⁹⁵
- Learn to use a wide variety of test equipment including oscilloscopes, meters, counters and other instruments
- Includes experiments that allow a look into the operation and practical applications of test equipment

This Electronics Test Equipment Course offers the knowledge you need to make measurements with digital and analog meters; explain the operation of, and use of the oscilloscope in electronic testing and servicing. From this Course you'll also learn to use frequency generators and frequency counters. A unit on special measuring instruments covers bridge circuits, transistor testers, curve tracers, spectrum analyzers and logic probes. The optional Audio-Visual Accessory Package enhances your learning process in these areas.

Fifteen interactive experiments give you the chance to actually use many different types of test equipment. All components for the experiments are included with the Course. You should have access to the following equipment to obtain the full benefit from the experiments: a digital multimeter, an analog meter, oscilloscope, frequency generator and frequency counter. Uses the ET-3100B Trainer.

Pass the optional final examination with a 70% or higher score and earn 6.0 Continuing Education Units (CEUs). Also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems. A previous knowledge of material in the EE-3101A thru EE-3104A and EE-3201A is required for this Course.

EE-3105A, Shpg. wt. 9 lbs. **69.95**
\$AVER! EES-3105B, EE-3105A and ET-3100B Kit Trainer 21 lbs. **ONLY 154.90**
EEA-3105A, Audio-Visual Accessory package, Shpg. wt. 2 lbs. **19.95**

④ Comprehensive Digital Techniques Course provides a thorough training in logic circuits

$99⁹⁵
- Learn to design and apply modern digital circuitry
- Loaded with practical, hands-on experiments
- Learn in your spare time, at your own speed at a fraction of college or technical school costs

Gain a working knowledge of Digital Techniques the fast Heathkit/Zenith way. Begin with the fundamentals and theory of digital logic including number systems. Become familiar with Boolean algebra, flip-flops and registers, sequential logic circuits, combinational logic circuitry and digital design. Learn at your own pace and when you have the time. After you've completed the Course, you'll know how to design digital circuitry for virtually any modern application. All this knowledge at an invitingly low price.

Many explanatory illustrations, audio aids and experiments speed your comprehension of concepts and practical applications presented in the text. Learn using three methods — by reading, listening and doing — a proven method that helps you understand complex subject matter more easily and naturally. Self-test reviews, included with each unit of the Digital Techniques Course, aid retention of important points and help you check yourself before moving on to the next concept. Unit exams further summarize material and test your understanding of the material presented in the Course.

Included with the Course are all of the electronic components for performing all of 24 experiments. This expertly-organized Course is contained in two heavy-duty vinyl binders. They'll keep your text material together and ready for use as a reference long after you've completed the Course. A pair of optional audio cassettes are available which contain supplemental verbal text that can be used to help you with your study of digital circuitry.

This Course is designed for those with a basic electronics background. Such a background is obtainable by completing Heathkit/Zenith DC, AC, Semiconductors and Electronic Circuits Courses on this and the preceding page. The ET-3200B Trainer is required for performing the 24 experiments in the Course. To obtain the full benefit from the experiments in this Course, a multimeter and a dual-trace oscilloscope are recommended.

Earn 4.0 Continuing Education Units (CEUs) by passing the optional final examination with a 70% or better score. And, receive a personalized Certificate of Achievement from Heathkit/Zenith Educational Systems.

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

EE-3201A, Shpg. wt. 7 lbs. **99.95**
\$AVER! Buy the Digital Techniques Course and the ET-3200B Trainer Kit together and save $25.00. Individually they would cost $209.90.
EES-3201B, Shpg. wt. 14 lbs. . . . . **ONLY 184.90**
EEA-3201A, Optional Learning Cassettes, Shpg. wt. 2 lbs. **19.95**
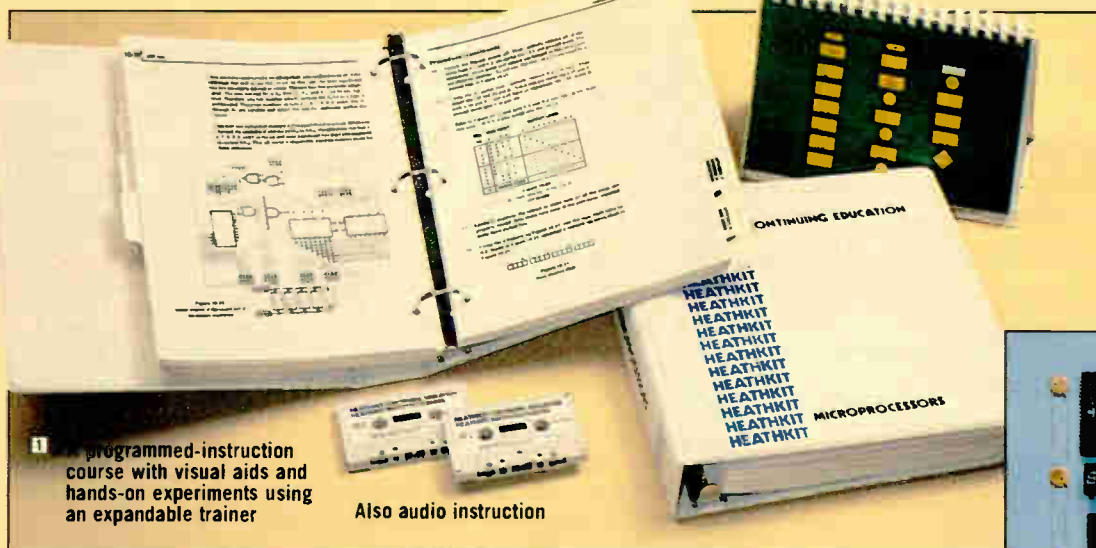
1 A programmed-instruction course with visual aids and hands-on experiments using an expandable trainer

Also audio instruction

HEATHKIT MICROPROCESSORS

Includes all components for experiments

Learn all about microprocessors, microcomputers, interfacing and programming

2 ET-3400A Microprocessor Trainer

512 bytes of random access memory (RAM)

MC6808 Central Processing Unit

Connectors supplied for power, switches, LEOs
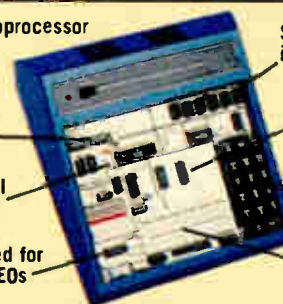
Six 7-segment LEO information display

1K monitor ROM program

Hexadecimal keyboard

Solderless breadboarding 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.

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.

Continue your microprocessor education with the EE-3402 Microprocessor Interfacing Course on page 65 after completing this course. It continues with advanced training in the use of the 6800/6808 microprocessor.

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**

$AVER! Order the EE-3401 Microprocessor Course and the ET-3400A Trainer together and save $30.00. If purchased separately, they would total $359.90.

ETS-3400A, Shpg. wt. 25 lbs. . . . . **ONLY 329.90**

$AVER! Order the EE-3401, ET-3400A, ETA-3400 and ETA-3400-1 together and save $70.00. If purchased separately, they would total $594.80.

ETS-3401A, Shpg. wt. 46 lbs. . . . . **ONLY 524.80**

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

Expand your digital and microprocessor knowledge with these four courses

① 6809 Microprocessor Course with Trainer adapter

$49⁹⁵

- Learn to program and interface the 6809 microprocessor
- Learn to use this microprocessor's flexible instruction set that includes over 1400 different commands
- Includes an assembled module which converts the ET-3400 or ET-3400A into an advanced 6809 microprocessor trainer

Progress to programming and interfacing the extremely fast logic processor with the Heathkit/Zenith EE-3404 6809 Microprocessor Course. This seven-unit Course completely covers programming and interfacing the advanced 6809 microprocessor. And ten programming experiments provide hands-on experience.

Seven units take you from concepts and 6809 chip structure to interfacing applications. In Unit 1 you begin with fundamental 6809 concepts and how the integrated circuit is structured. This includes the 6809's design philosophy, its evolution and the improving it has undergone. At your own speed, you progress through the 6809's addressing modes in Unit 2; and, go into register and data movement instructions in Unit 3. Unit 4 explains arithmetic, logic and test instructions for the 6809 microprocessor. Unit 5 covers branch and miscellaneous instructions while Unit 6 explains the 6809's input and output signals. The final unit, Unit 7, teaches 6809 interfacing and applications.

Ten hands-on programming experiments are included to enhance your understanding of the 6809 family of microprocessors. These optional programming exercises use the ET-3400 or ET-3400A Microprocessor Trainer (not included). By performing these experiments you'll reinforce the concepts learned from the text, thereby retaining more and understanding material better.

A special adapter module is included which converts the ET-3400 or ET-3400A Microprocessor Trainer into a 6809-based microprocessor trainer. This assembled module includes a handy debugging routine, contained in the 2K byte ROM monitor program. NOTE: This module is not compatible with the ETA-3400's monitor ROM of tiny BASIC.

Four appendices are included with the text. They contain listings for the 6809/6809E Instruction Set and the 6820/6821 Peripheral Interface Adapter (PIA), specification sheets for the MC6809 through MC68B09E microprocessors and peripheral devices, and a summary of the MC6809 Instruction Set.

To prepare yourself for the material contained in the 6809 Microprocessors Course, we recommend that you successfully complete the EE-3401 Microprocessor Course or obtain an equivalent knowledge.

Earn 3.0 Continuing Education Units (CEUs) by passing the optional final exam with a 70% or better score. In addition, receive a Certificate of Achievement in recognition of your effort from Heathkit/Zenith Educational Systems.

EE-3404, Shpg. wt. 6 lbs. 49.95

② Detailed Microprocessor Interfacing Course

$99⁹⁵

- Begins where the EE-3401 Microprocessor Course ends with a logical continuation to your studies of the 6809 processor
- 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 study 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. Gain additional knowledge about microprocessors, interfacing techniques and more advanced microprocessors. Programmed self-learning allows you to proceed at your own speed through step-by-step mastery of each important concept.

Eleven in-depth units let you explore topics like: the advanced Peripheral Interfacing Adapter (PIA), analog conversion, serial data communications, peripheral and memory devices, programmable timers, and a thorough discussion of both the 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 quick reference guide.

Ten hands-on experiments focuses your attention on 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. All components required for the experiments are included. 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.

Pass the optional final examination with a 70% or better score and earn 7.0 Continuing Education Units. Also receive a Certificate of Achievement from Heathkit/Zenith Educational Systems that's suitable for framing.

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

③ Voice Synthesis Course details techniques

- Course covers the hardware and software used in voice synthesis
- Includes complete chip sets 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 state-of-the-art techniques in easy-to-follow format with hands-on experiments that will have your ET-3400 or ET-3400A Microprocessor Trainer talking to you in no time at all.

The two most popular methods of voice synthesis are thoroughly covered, 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. Also learn about the programming and interfacing needed for both digitized and phoneme voice synthesis. In addition, this Course prepares you to write machine code programs tailored for the ET-3400 and ET-3400A Microprocessor Trainer. All components are included for experiments.

Complete chip sets for both digitized and phoneme voice synthesis are included, purchased separately they would cost over $150.00. 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 (p. 63) 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. . . . . **WAS $99.95 NOW ONLY 69.95**

④ Real-world Microprocessor Applications Course

$69⁹⁵

- Put previous microprocessor knowledge to work
- Learn how microprocessors can sense and control events
- See practical demonstrations of microprocessor use

The Microprocessor Applications Course shows you practical ways to adapt and utilize the power 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. This includes 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 to a microprocessor to sense real-world events. Completely covered are temperature, light, position, motion, force, pressure, flow, and level sensors and transducers of various types and styles.

Further units describe microprocessor control of devices and circuits. Covered are control devices and motors including: transistor arrays, SCRs, TRIACs, relays, DC motors and stepper motors. Phase-locked loops, used more and more frequently in microprocessor applications, are presented with interfacing and controlling them with a microprocessor. Numerous examples of microprocessor uses are shown in consumer, industrial and business applications.

The last unit takes a look at present and future microprocessor applications. It was written to stimulate your imagination by examining several actual and possible consumer, industrial and business applications of the microprocessor.

To perform the 13 experiments in this Course, you'll need the ET-3400 or the ET-3400A Microprocessor Trainer featured on page 63, plus a VOM and an oscilloscope. You should also complete the EE-3401 Microprocessor Course, also on page 63, and the EE-3402 Microprocessor Interfacing Course on this page or have an equivalent knowledge before attempting this Course. Take and pass the optional final exam with a 70% or higher score and earn 8.0 CEUs.

EE-3405, Shpg. wt. 10 lbs. **69.95**

1 Computer Fundamentals Course introduces modern computer technology

2 Advanced Microprocessor Course

NEW

NEW! Heathkit/Zenith Computer Servicing Series

This 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 advanced ET-100 Computer Trainer is used in all course exercises.

1 New Computer Fundamentals Course introduces computers, hardware and software

$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

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 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 material presented in this Course. 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 (like the H-125 on page 95) is also helpful.

EC-2001, Shpg. wt. 6 lbs. **99.95**

Interfaces to a TV set or video monitor

Huge solderless breadboard area for experiments

Access to address lines and power supplies

Access to data, control and PPI lines

Detached keyboard with 6-foot coiled cable

Sixteen special function and control keys

Sixty-one key alpha-numeric keyboard

Eighteen numeric and control button keypad

3

4

Master 16-bit microprocessing with the Advanced Microprocessor Course and the ET-100

② 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**

Heathkit/Zenith Educational Systems helps you master 16-bit microprocessing with a complete training system consisting of a truly remarkable, dual learning package. The first half is the EE-8088 Advanced Microprocessors Course. A comprehensive training course, it provides an in-depth study of 16-bit microprocessors including 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 trainer for use with experiments in the Course. The ET-100 can also be used as a valuable learning tool, a low-cost engineering proto-typing fixture or expanded into a very powerful disk-based 16-bit microcomputer.

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.

Study material is brought to life through more than three hundred pages of experiments which includes both hardware interfacing and software programming. Because the ET-100 is a trainer and a computer, both types are easily carried out. Included with the Course are all the parts necessary for performing the experiments. Together, the EE-8088 Advanced Microprocessors Course and the ET-100 Computer Trainer provide you with the knowledge and the experience needed to master 16-bit microprocessing.

Thorough examinations for each unit test your understanding of the material. After completing the Course, you can take the optional Final Examination. Besides testing your accumulated knowledge, the final exam provides an excellent review of the material you've covered. After successfully passing the exam with a 70% or higher score, you'll receive 8.0 Continuing Education Units and a personalized Certificate of Achievement.

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 Heathkit/Zenith Digital Techniques Course (EE-3201A, on page 61) or similar program. You should also be familiar with binary and hexadecimal numbering systems, and computer math which are reviewed in the EE-8088's Appendix.

EE-8088, Shpg. wt. 10 lbs. **99.95**

$AVER! Purchase the Advanced Microprocessors Course and the ET-100 Computer/Trainer and save $50.00 over the cost of buying them separately.

EES-8088, Shpg. wt. 49 lbs. **849.90**

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③ 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 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**

A valuable learning tool and a very powerful computer, the ET-100 Learning Computer has more features than most basic computers and includes a convenient breadboard for experimenting and interfacing. Plus it is expandable to a full disk-based 16-bit computer system through several available options.

The ET-100 is ideal for breadboarding computer circuits that interface to the Trainer's 8088 microprocessor. All control, data and address lines as well as programmable parallel interface (PPI) lines are readily accessible around three solderless breadboards. All access lines are buffered to protect the microprocessor from damage. Four power supply voltages, independently regulated from the logic board for protection, are also available on the breadboard to power your experimental projects.

A huge solderless breadboard area allows engineers, technicians and experimenters to easily and conveniently modify circuits, build interfaces or simply experiment with the 8088 microprocessor. For moving complete circuits to another location for testing or safekeeping, the top breadboard is removable so that the entire circuit can be moved without disassembly. This feature is especially useful in classroom situations where a large number of circuits can be put together and then tested on the ET-100 Trainer.

As a 16-bit computer, the ET-100 features the same sophisticated 8088 microprocessor as our H/Z-100 Desktop Computer. It has 16K of RAM which can be upgraded to 64K with the addition of a Z-105-1 Upgrade Kit (page 81). A powerful screen editor, assembler and graphic de-bugger 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) comes with a 6-foot coiled connecting cable which enables you to place it wherever it's most comfortable. The keyboard generates a full ASCII character set plus 33 graphic characters. The ET-100's video output can be displayed in twenty-four 80-character lines on a monitor like the ZVM-121A or ZVM-123A (page 87). Or, displayed as twenty 40-character lines on either channel 3 or channel 4 of a television set through a TV modulator listed at the bottom of this page.

Kit ET-100, Shpg. wt. 33 lbs. **799.95**
ETW-100, Assembled and tested Trainer, Shpg. wt. 33 lbs. **1095.00**

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④ ETA-100 Learning Computer Accessory turns the ET-100 into a disk-based 16-bit computer system

- **Increases user RAM to 128K which can be expanded up to 192K**
- **Provides two RS-232C serial ports and one Centronics parallel port**
- **Includes a disk controller board and one 320K 48 TPI disk drive**
- **Provides bit-mapped video graphics that can be upgraded to color**
- **Includes MS-DOS and Z-BASIC software packages**

Turn your ET-100 Trainer into a powerful 16-bit disk-based computer system with the ETA-100 Accessory to help you with a variety of applications, such as data processing, telecommunications and financial analysis. The ETA-100 Accessory package consists of two circuit boards, a boot ROM and an external disk drive unit.

Gain many features found in our most powerful desktop computer, the H/Z-100. The first circuit board of the ETA-100 Accessory expands system RAM to 128K bytes (or 192K bytes with the Z-205-1 Upgrade kit installed). It adds a programmable timer which is totally independent of the system clock. And, it also adds two full RS-232C serial ports that permit communication with printers, modems and voice synthesizers. The Accessory also contains a floppy disk controller so that you can interface your ET-100 Learning Computer to a 5¼" floppy disk drive (also included) that can store up to 320K bytes of data. A second 5¼" disk drive (Z-207-3) can be added to double the amount of storage.

The second Accessory circuit board provides the ET-100 with bit-mapped video capabilities. This allows you to control individual pixel dots in a single color 640 x 225 pixel high-resolution graphics display. An eight-color display can be obtained with the addition of two Z-219-1 video RAM chip sets found on page 81. The ETA-100 Accessory also adds a Centronics compatible parallel printer port to the ET-100 Learning Computer. All this results in a disk-based computer system that can run 16-bit software capable of running in the H/Z-100 Computer.

Kit ETA-100, Shpg. wt. 70 lbs. **1299.95**
ETS-100, Kit ET-100 and Kit ETA-100, Shpg. wt. 102 lbs. **1999.90**
EWA-100-A, Assembled Expansion Accessory, plus software, 70 lbs. ... **1650.00**
EWS-100-A, Assembled ET-100 and ETA-100, plus software, 96 lbs. . **2750.00**
ETA-100-1, Extra Removable Breadboard, Shpg. wt. 1 lb. **29.95**
ETA-100-2, Channel 4 Modulator for use with TVs, Shpg. wt. 1 lb. **39.95**
ETA-100-3, Channel 3 Modulator for use with TVs, Shpg. wt. 1 lb. **39.95**

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

Analog Circuit Design Course

Engineering Series teaches design fundamentals

Learn to analyze and design practical circuits from these three courses: Passive Circuit Design, Transistor Circuit Design and Analog Circuit Design.

① NEW! Analog Circuit Design Course shows basic design techniques using linear-integrated circuits

$69⁹⁵

● Learn how to 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 discusssed 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 basic building blocks in modern electronic systems. In addition, numerous applications of multipliers and phase-locked loops to electronic communications are provided. Twelve accompanying experiments using the ET-1000 Engineering Design Trainer illustrate the design and operation of circuits discussed in the text.

Earn 4.0 Continuing Education 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 course, we recommend the completion of the Passive (EE-1001) and Transistor (EE-1002) Circuit Design Courses on the next page or the equivalent education.

EE-1003, Shpg. wt. 9 lbs. **69.95**

Build your own circuit boards

Includes everything you need to make printed circuit boards

Clearly illustrated text shows detailed steps of every process

Actually build two kits that can control lamps and appliances

④ **Printed Circuits Course shows techniques in making printed circuit boards**

Basic electronics

Two textbooks and parts for experiments

⑤ **Electronics for Hobbyists Course shows basic knowledge relating to many fields**

ET-1000 Analog/Digital Circuit Design Trainer

Function generator

Variable and fixed DC power supplies

Hi/low level logic probe

Removable solderless breadboard

Sine/square/triangle 1 Hz to 100 kHz generator
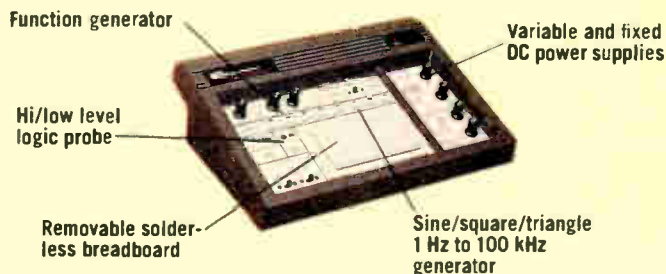
● **A versatile tool for learning circuit design through experiments**

Quickly build and test circuits that you've designed or experiment with others using this flexible, all-in-one prototyping unit. The ET-1000 Design Trainer features: a built-in logic probe that can detect hi and low logic levels; two fixed (± 12 VDC) and two variable (1.2 to 20 VDC) ± power supplies; two 'no-bounce' logic switches; eight LED logic indicators; and more.

Kit ET-1000, Shpg. wt. 14 lbs. **219.95**

ET-1000-1, Extra Removable Breadboard Accessory, 1 lb. **29.95**

ETW-1000, Asembled and tested Trainer, Shpg. wt. 13 lbs. **369.95**

SAVER! EES-1000, Save $60.0. when you purchase the ET-1000 Trainer and all three Design Courses (EE-1001, EE-1002, EE-1003), Shpg. wt. 58 lbs. .... **NOW ONLY 349.80**

Low Cost Metric and Intermediate Algebra Courses

Think Metric, U.S.A. Course helps you learn the international standard system of weights and measurements in a fun and easy way. A self-instructional text and audio cassette tape acquaint you with all the aspects of measuring with metrics and the simple rules for conversion. Earn 1.0 CEU and receive a Certificate of Achievement.

EM-2, Shpg. wt. 4 lbs. **5.00**

Intermediate Algebra Course consists of a nine-unit text and nine audio cassette tapes that covers: two variable expressions, special functions, binomial expansion, solving problems by graphing equations, logarithms, functions, quadratic equations, relations and inverses, probability and more. Take and pass the optional final examination and earn 3.5 Continuing Education Units plus receive a Certificate of Achievement.

EM-5, Shpg. wt. 7 lbs. **24.95**

Variable Speed Recorder and 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, and 3-digit tape counter. Multiple external connectors include DC input, earphone/external speaker, remote and microphone. Compact 8¾" x 5¼" x ¾" and lightweight 2 lb. unit operates on batteries, + 9 VDC and 120 VAC.

ECP-3804, Assembled, 3 lbs. **139.95**

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 programmed learning begins with how to analyze circuits and 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 like the EE-1002 Transistor Circuit Design Course on this page.

Before you can design circuits, you must be able to analyze them. For this reason the first three units provide a thorough review of the techniques and associated mathematical concepts. Unit 1 is devoted to DC Circuit Analysis, Unit 2 teaches you Mathematics for Circuit Design and Unit 3 follows with AC Circuit Analysis. But a circuit that "works" on paper may not do what you want it to once built. Consequently, Unit 4, Real Circuit Components, is devoted exclusively to the nonideal properties of real components and various guides to help you select an appropriate-type component for a given application.

The remaining units concentrate on using these techniques to design circuits. Unit 5, Unregulated Power Supplies, discusses the design of numerous rectifier circuits and smoothing filters. Unit 6, Additional Passive Circuits, examines how clippers, clampers, peak detectors, multipliers, RC and other waveshaping circuits are designed. Unit 7, Selected Applications, illustrates seven general and nine measurement applications for passive circuits. In addition, Unit 8 contains ten hands-on experiments which reinforce the text material by giving you direct experience in prototype design. Requires the ET-1000 Circuit Design Trainer.

Two appendices with a resistor color code chart plus circuits, equations and parameters related to passive circuit design conclude the material.

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**

④ 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. 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.

For experiments you'll actually design, layout and etch circuit boards for two home electronic kits: the GD-600 Photoelectric Lamp Switch and 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.

No previous training is needed as you proceed to an in-depth knowledge of circuit board manufacturing and the completion of two useful Heathkit products. The GD-600 can turn lamps up to 150 watts on at dusk and off at dawn. The GD-1287 turns appliances on and off with just a slight touch.

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**

③ Transistor Circuit Design Course teaches 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
- Includes experiments that integrate theory with practical hands-on experience in transistor circuit design

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 used in 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. It continues by having you analyze these equivalent circuits to determine how various component values affect their operation. In the final phase of the Course, you move step-by-step through the actual circuit design process.

Consisting of nine units complete transistor design theory and its implementation is presented plus complementary experiments. Unit 1 through 8 covers: Bipolar Transistors, Biasing Schemes, Common-Emitter Voltage Amplifiers, Common-Base and Common-Collector Voltage Amplifiers, Power Amplifiers, Multiple-Transistor Circuits, Field Effect Transistors and Common-Emitter Frequency Effects. Unit 9 contains thirteen experiments that help you to develop the know-how and the confidence to construct various types of transistor-based application circuits. All experiments are performed on the ET-1000 Engineering Design Trainer on page 68. It contains all the functions necessary to complete all the experiments.

Completing the Course is a 35-page appendix filled with summary and design guides from Units 1 through 8. Included are device data sheets, formula and conversion tables, operating modes, graphical information and notational summaries. By referring to these guides you could use them to easily design a multitude of useful transistor circuits.

After completing this Course, you should be able to analyze and design many different types of voltage, power and differential amplifier circuits. You should also be able to describe their characteristics as well as predict the approximate lower and upper cutoff frequencies.

Take and pass the optional final examination with a 70% or higher score and earn 4.0 Continuing Education Units. Plus, you'll receive a Certificate of Achievement.

To better understand the information in this Design Course, some previous electronics background is needed. All needed material is thoroughly covered in the Passive Circuit Design Course on this page.

EE-1002, Shpg. wt. 9 lbs. **64.95**

⑤ 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. In seven units, you are taken step-by-step through an excellent course on an introduction to the various aspects of electronics.

Subjects covered include: voltage, current, resistance, power, 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 is also discussed. Different analog and digital circuit operations are presented as is the complex world of computers including programming and software. The last unit surveys electronics hobbies: experimentation, radio controlled models, computers, audio and amateur radio.

Previous knowledge of electronics isn't required with this course. Arranged in a logical manner, all information is presented to make learning easier.

To perform the experiments included with the Course you'll need the use of the ET-3100B Trainer on page 60. A multimeter and oscilloscope are also needed to make measurements and to observe waveforms.

Complete the optional final exam with a 70% or better score and earn yourself 4.0 Continuing Education Units and receive a Certificate of Achievement.

EE-3140, Shpg. wt. 11 lbs. **69.95**

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

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**
$AVER! EES-105B, Combined EE-105 and ET3300B, 11 lbs.	**ONLY 154.90**

Active Filters Course shows how filters work

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**
$AVER! EES-102B, Combined EE-102 and ET-3300B, 11 lbs.	**ONLY 129.90**

Learn the principles of Phase-Locked Loops

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**
$AVER! EES-1048, Combined EE-104 and ET-3300B, 11 lbs.	**ONLY 144.90**

Learn about the ideal amplifier in Op-Amps Course

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**
$AVER! EES-101B, Combined EE-101 and ET-3300B, 11 lbs.	**ONLY 134.90**

IC Timers Course covers the many uses of timers

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**
$AVER! EES-103B, Combined EE-103 and ET-3300B, 11 lbs.	**ONLY 134.90**

④ Versatile ET-3300B Breadboard Trainer makes doing experiments a lot easier and a lot more fun

$109⁹⁵ 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 (±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 3½" 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**
$AVER! 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**

⑥ Advanced digital logic TTL/CMOS Circuits Course

- Examines TTL and CMOS circuits in detail while you learn by doing
- A series of circuits arranged in a logical sequence for studying
- Includes electronic components for assembling over 50 circuits

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**
$AVER! EHS-712, Purchase the EH-701 Linear Circuits and EH-702 TTL/CMOS Circuits Courses and save $30.00, 6 lbs.	**84.90**

Effective, 450-page text
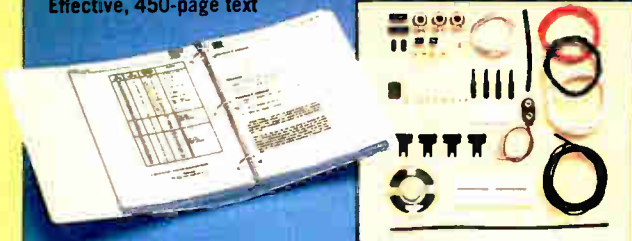
Glossary of terms included in Appendix

All components for experiments included except for 9V battery

Learn all about state-of-the-art Fiber Optics in this exciting course

- Comprehensive Course covers theory, components and fiber optic system in detail
- Includes components and instructions to develop a two-way fiber optic link and other experiments
- Self-instructional course enables self-paced learning with reviews for reinforcing important concepts

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 is 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 overview of fiber optics.

The five-unit Heathkit/Zenith Fiber Optics Course covers the fundamentals of fiber optics. Unit 1, Optical Energy, deals with the nature of light. Just as electronics students need a basic understanding of atomic structure and the nature of electrons, so does the student of fiber optics need an understanding of optical radiation. Once this is established, you move on.

Unit 2, Optical Fibers, describes the principles of the transmission medium. You will learn the various fiber types and their construction, how they propagate light, the importance of such characteristics as numerical aperture, source area and radiation pattern in the energy launch, and loss factors.

Units 3 and 4 deal with the active devices used to generate and detect the light used in fiber optic transmission. As you progress through the study of Fiber Optic Light Sources, you will learn much about light-emitting diodes. This unit covers their physical construction, theoretical operation, biasing characteristics and several types of fiber optic LED design considerations. A detailed discussion of laser emissions and principles associated with the use of injection laser diodes in fiber optic circuits concludes the unit.

Finally in Unit 5, Fiber Optic Systems, you will tie all of the component parts together into an operational fiber optic link. You will examine the requirements of the various types of links and learn which components best fulfill certain requirements. Four optional hands-on experiments are also included in the course to enhance your understanding of the text. You will construct a modulated source driver circuit, a fiber optic receiver circuit, and fabricate actual fiber optic links. These experiments will allow you to gain valuable design experience, and let you observe the parameters of a fiber optic link directly. To perform them, you will need either a Heathkit/Zenith ET-3400 or ET-3400A Microprocessor Trainer or the ET-3200B Digital Techniques Trainer, an oscilloscope, a multimeter and common hand tools (not included). All other necessary parts are furnished with the course.

In addition to the text, two supplemental appendices support the learning program. A listing of standard resistor values will come in handy when the student is building actual circuits from mathematically-derived schematics. Typical data sheets for several fiber optic devices will help in evaluating your newly acquired knowledge. Includes 25-page glossary of terms.

Earn 3.0 Continuing Education Units and a Certificate of Achievement by passing the enclosed optional final exam with a score of 70% correct or better.

Prerequisites: It is recommended that a student pass the Heathkit/Zenith EE-3101 DC Electronics and EE-3102 AC Electronics courses (or have equivalent knowledge) before taking the Fiber Optics Course. EE-3201A Digital Techniques is also recommended, but not required. If not completely satisfied, return course materials for a refund of the purchase price.

EE-4201, Shpg. wt. 6 lbs. **99.95**

Teach Computer-Aided Drafting and Design with EC-1300 CAD Graphics Software

Featuring AUTOCAD, the EC-1300 is a low-cost software package that can teach all the important features of a full-fledged industrial CAD system. AUTOCAD is easy to learn, easy to use and it runs on low-cost microcomputers. Draw buildings and landscapes; or layout mechanical, electrical, chemical, structural and civil engineering designs; and arrange parts on printed circuit boards.

Through on-screen menus, create drawings of any size to any scale. Use previously created drawings or use basic drafting elements such as lines (of any width), circles, arcs and solid-filled areas. A large set of editing commands allow drawn objects to be moved, copied, modified, erased, rotated, and scaled vertically and horizontally. A full bi-directional zoom enables a drawing to be worked on at any desired level of detail. Selectively view or plot drawings as if they were transparent overlays using eight different colors. Use an unlimited number of layers that can be turned on and off as desired, and viewed and plotted separately or together.

See page 98 for further information about AutoCAD and the AutoCAD tutorial course.

CEU exams for Classroom Courses

A new opportunity: Students and employees using classroom versions can earn Continuing Education Units. Each package contains ten copies of that course's CEU exam, with full instructions.

CEU 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

Easier learning through new Video Training

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.

Complete details are available in colorful brochures. See your local Heath/Zenith Computers & Electronic Center.

Heathkit/Zenith Classroom Courses are carefully designed to fit your custom training needs

Now you can apply famous Heathkit/Zenith learning courses to meet your special training needs. Success-oriented with just the right amount of technical theory and a maximum emphasis on real-world applications, Heathkit/Zenith Classroom Courses incorporate the very latest methods and materials that are available. Specify them with confidence, because our pledge prevails:

"We won't let you fail."

Classroom courses are available in these areas:

- **Exploratory Courses:** Concepts of Electronics
- **Fundamental Electronic Series:** DC Electronics, AC Electronics, Semiconductor Devices, Test Equipment, Electronic Communications, Electronic Circuits
- **Advanced Electronic Series:** Operational Amplifiers, Active Filters, IC Timers, Phase-Locked Loops, Optoelectronics, Robotics and Industrial Electronics, Robot Applications, HERO 1 Advanced Experiments, Passive and Transistor Circuit Design
- **Microprocessor Technology:** Digital Techniques, Microprocessors, Microprocessor Interfacing, Advanced 16-bit Microprocessors, Microprocessor Applications
- **Computers:** BASIC Language Programming

SIX HIGH-TECHNOLOGY COURSES: Add these advanced learning programs to your classroom curriculums for the future...courses in Passive Circuit Design, Transistor Circuit Design, Advanced 16-bit Microprocessors, Robotics and Industrial Electronics, plus Robot Applications. See box in chart.

Heathkit/Zenith Classroom Courses are the complete answer for all types of industries, government agencies, and forward-thinking schools who want to teach technical subjects with maximum efficiency at minimum cost. Courses start at the entry level of electronics and move into new state-of-the-art technology, branch into the use of instruments or teach computer literacy. All of these multimedia courses employ the latest learning enhancement techniques. Text material is presented in concise, fast-paced units of study, with major topic areas highlighted in modular subsections. "Hands-on" experiments provide positive reinforcement through interactivity. Illustrations are used profusely for fast, thorough mastery by students of all ages and previous technical experience.

Organized in three separate publications: Each course is designed for greater student and teacher convenience. The student text is the core of the learning material, supported by a workbook with exams and experiments keyed to the text presentation. All courses are written in a logical learning sequence that first explains concepts and then builds upon them for a thorough understanding of each topic. The instructor's guide lets the teacher add his or her own parameters for challenge and guidance—providing each student with a fully rounded learning experience. At a fraction of the cost of institutional options.

Separate parts packs for each student or group of students contain all the electrical and accessory components necessary for implementing the workbook experiments. To complete the full range of experiments integrated within each program, assembled Heathkit/Zenith trainers are required (see chart list).

If rapid advances in technology are leaving your employees or students behind, they *can* catch up quickly and comprehensively. Review the extensive list of courses below, and contact us for more information regarding your needs.

	Course	Text Shpg. wt. 2 lbs.	Price	Workbook Shpg. wt. 2 lbs.	Price	Instructor's Guide Shpg. wt. 1 lb.	Price	Assembled Trainer Wt. 6 lbs.	Price	Parts Shpg. wt. 1 lb.	Price	Cassettes Shpg. wt. 2 lbs.	Price
Six Classroom Courses in higher technology	Passive Circuit Design	EB-6001 (3 lbs.)	17.95	EB-6001-40	10.95	EB-6001-50	9.95	ETW-1000 (13 lbs.)	369.95	EB-6001-30	10.95	NOT USED	
	Transistor Circuit Design	EB-6002	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	
	Robotics & Ind. Electronics	EB-1801 (4 lbs.)	29.95	EB-1801-40	14.95	EB-1801-50	9.95	ETW-18 (70 lbs.)	2199.95	EB-1801-30 (2 lbs.)	44.95	NOT USED	
	Robot Applications	EB-1812 (2 lbs.)	19.95	EB-1812-40 (1 lb.)	10.95	EB-1812-50	9.95	ETW-18 (70 lbs.)	2199.95	EB-1812-30 (2 lbs.)	49.95	NOT USED	
	Hero 1 Advanced Experiments	EB-1802 (1 lb.)	24.95	NOT USED				ETW-18 (70 lbs.)	2199.95	NOT USED			
	Advanced 16-bit Microprocessors	EB-808B (5 lbs.)	24.95	EB-808B-40	11.95	EB-808B-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-808B-30	59.95	NOT USED	
	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	
Fundamental Electronics Series	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	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-6104	19.95	EB-6104-40	10.95	EB-6104-50	9.95	ETW-3100B	179.95	EB-6104-30	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
	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	
Introduction to microprocessors	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
	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 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	
	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	
	BASIC Programming	EB-6100 (4 lbs.)	21.95	EB-6100-40	10.95	EB-6100-50	9.95	NOT USED		PARTS, CASSETTES NOT USED			

tions permit booting from different disk drives or partitions, examining and manipulating memory and registers, controlling input/output functions, setting video scrolling, and tracing program execution.

Further diagnostics are contained in a disk package included with all kit computers. These tests enable you to identify system operations and malfunctions down to the level of IC chips. An alarm sounds when a defect is detected.

One especially powerful feature of the Personal and Portable Computer is a debugger in its monitor ROM. It is an extremely flexible tool for use in a programming environment. The built-in commands are identical to Microsoft's DEBUG and allow disassembling user programs, executing user programs (with optional breaks), searching memory, moving blocks of memory, performing hex arithmetic, and other operations. Other major advantages included in the ROM are single-stepping through a program without locking up and much faster operation. Plus the debugger is always available from the keyboard.

Many editing capabilities are provided with the HS-151 and HS-161 Computer to aid you in program writing. You can insert and delete characters and lines; erase a line; erase to the beginning of a line, to the end of a line, or to the end of a page. While editing control the cursor with up, down, left, right, and home functions.

The MS-DOS operating system is included free with both kit and assembled Personal and Portable Computers. More information about this operating system is found on page 79. See our full line of applications software for these two computers on pages 76-79 and pages 98 and 99. To learn more about this operating system and other programming software turn to pages 100 and 101.

Preassembled and 100% tested circuit boards for kit computers include the CPU and video logic boards, as well as the power supply. These help to shorten construction time and ensure you of properly working strategic circuitry. Quick assembly and easy circuit board installation is also aided by modular components that snap in and out in minutes.

Well-written assembly manuals filled with many illustrations guide you step-by-step to a versatile and powerful computer that will run a wide variety of software. A detailed short course on soldering is also included to help you in successfully completing your Personal or Portable Computer kit. Fully detailed operating manuals and user's manuals are packed with both kit and assembled computers.

Heathkit — **Kit HS-151-21,** Low-Profile Personal Computer with monochrome and color capability, 128K RAM, one 5.25" disk drive with 360K total storage, and the MS-DOS operating system, 73 lbs. **1599.00**

Heathkit — **Kit HS-151-22,** Low-Profile Personal Computer with monochrome and color capability, 128K RAM, two 5.25" disk drives with 720K total storage, and the MS-DOS operating system, 78 lbs. **1899.00**

Zenith data systems — **ZF-151-21,** Assembled Low-Profile Personal Computer with monochrome and color capability, 128K RAM, one 5.25" disk drive with 360K total storage, and MS-DOS, Shpg. wt. 38 lbs. **2199.00**

Zenith data systems — **ZF-151-52,** Assembled Low-Profile Personal Computer with monochrome and color capability, 320K RAM, two 5.25" disk drives with 720K total storage, and MS-DOS, Shpg. wt. 41 lbs. **2799.00**

Zenith data systems — **ZW-151-52,** Assembled Low-Profile Personal Computer with monochrome and color capability, 320K RAM, 10.6MB Winchester hard disk drive, one 5.25" disk drive with 360K storage, and the MS-DOS operating system, Shpg. wt. 42 lbs. **4499.00**

Heathkit — **Kit HSA-161-21,** Portable Personal Computer with non-glare 9-inch amber CRT, color capability, 128K RAM, one 5.25" disk drive with 360K total storage, and MS-DOS, Shpg. wt. 85 lbs. **1699.00**

Heathkit — **Kit HSA-161-22,** Portable Personal Computer with non-glare 9-inch amber CRT, color capability, 128K RAM, two 5.25" disk drives with 720K total storage, and MS-DOS, Shpg. wt. 94 lbs. **1999.00**

Heathkit — **Kit HSG-161-21,** Portable Personal Computer with non-glare 9-inch green CRT, color capability, 128K RAM, one 5.25" disk drive with 360K total storage, and MS-DOS, Shpg. wt. 85 lbs. **1699.00**

Heathkit — **Kit HSG-161-22,** Portable Personal Computer with non-glare 9-inch green CRT, color capability, 128K RAM, two 5.25" disk drives with 720K total storage, and MS-DOS, Shpg. wt. 94 lbs. **1999.00**

Zenith data systems — **ZFA-161-21,** Assembled Portable Personal Computer with non-glare 9-inch amber CRT, color capability, 128K RAM, one 5.25" disk drive with 360K total storage, and MS-DOS, Shpg. wt. 55 lbs. **2399.00**

Zenith data systems — **ZFA-161-52,** Assembled Portable Personal Computer with non-glare 9-inch amber CRT, color capability, 320K RAM, two 5.25" disk drives with 720K total storage, and MS-DOS, Shpg. wt. 61 lbs. **2999.00**

HS-151 Personal and HS-161 Portable Computer Accessories:

Second 5.25" Floppy Disk Drives for both the Personal and Portable Computers are available by visiting your local Heath/Zenith Computers & Electronics Center (see page 55) or calling TOLL-FREE 800-253-7057 from 8 AM to 4:30 PM ET, Monday thru Friday.

HS-317, Winchester Upgrade Kit adds a rigid disk drive with 10.6 megabytes of total storage to Low-Profile Personal Computers only. Kit includes controller board, Winchester disk drive, all mounting hardware, complete documentation, and step-by-step installation instructions. Shpg. wt. 19 lbs. **1499.00**

Z-205-1, Ram Upgrade package, a nine chip set that installs onto the main board of a kit or assembled HS-151 Personal or HS-161 Portable Computer for increased memory capability. Three sets are required to fully populate (320K of RAM) the main board. Shpg. wt. 1 lb. .... **Each set 79.99**

Kit H-305, System RAM Board, an accessory board for kit and assembled HS-151 Personal and HS-161 Portable Computers. The H-305 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 for a total RAM capacity of 640K. Shpg. wt. 2 lbs. **235.00**

NEW! Z-305, Assembled and tested System RAM Board, 2 lbs. **299.00**

Z-316, 8087 Numeric Co-Processor significantly improves the performance of HS-151 Personal Computers and HS-161 Portable PCs in arithmetic-intensive activities, Shpg. wt. 1 lb. **225.00**

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. The Z-319 Card enables the HS-151 or HS-161 to emulate H-100 Computer video attributes and uses mapping to functionally emulate the keys of an H-100 keyboard. Requires use of the MS-DOS operating system (OS-63-50) and the MS-DOS Enhancement (OS-63-51). 1 lb. **499.00**

NEW! HCA-150-4, Second Serial Port, all the required hardware to install a serial port into the HS-151 or HS-161 Computer, 1 lb. **39.95**

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. 5 lbs. **25.00**

HS-151 and HS-161 SPECIFICATIONS: Processor: Intel 16-bit 8088. **Clock:** 4.77 MHz. **On-Board Memory:** 128 KB standard expandable to 320 KB on main board, up to 640 KB total memory via expansion slot. **VIDEO DISPLAY: CRT (HS-161 only):** Non-glare 9-inch diagonal, amber phosphor. **Display Format:** 25 lines of 80 characters. **Display Size:** 5.0" high x 7.0" wide. **Character Size:** 0.165" high x 0.075" wide. **Character Type:** 8 x 8 dot matrix. **Dot Resolution:** 640 horizontal x 200 vertical. **Colors:** Characters: 1 of 8 background colors with 1 of 16 foreground colors. Graphics: Eash pixel can be 1 of 4 colors selected from 1 of 2 color palettes. **Gray Scale:** Eight levels on a monochrome display. **Video Outputs:** RGB with intensity control and composite monochrome. **Cursor:** Blinking underline or reverse video or off. **Cursor Controls:** Up, down, left, right, home. **Cursor Addressing:** Relative and direct. **Tab:** 8 columns. **Refresh Rate:** 60 Hz, 50 Hz. **Edit Functions:** Insert and delete characters or lines. **Erase Functions:** Erase line, erase to beginning of line, erase to end of line, erase to end of page. **Bell:** Audible alarm in receipt of ASCII BEL command. **BUS STRUCTURE: Type:** IBM compatible. **Slots:** 8, 4 available for expansion. **KEYBOARD: Type:** 84 keys, 57 alphanumeric and 10 special function plus 17 keypad keys including separate numeric keypad. **Key Click:** Yes. **DISK SYSTEM: Drives:** Single or double 5.25-inch double-sided double-density 48 TPI floppy disk drive. **Capacity:** IBM formatted for 360 KB each. **Winchester Drive:** Optional internal 5.25-inch rigid disk drive and single 5.25-inch floppy disk drive. **Capacity:** 12.76 MB unformatted, 10.68 MB formatted. **INPUT/OUTPUT: Serial I/O:** One DTE RS-232C port. **Baud Rate:** 110-9600. **Operation:** Asynchronous full or half duplex. **Parallel I/O** Centronics compatible. **Power Supply:** 120/240, 50/60 Hz, 300 watts (maximum). **Dimensions:** HS-151: 16" W x 6¼" H x 16½" D (40.6 x 15.9 x 42 cm). HS-161: 19½" W x 8⅜" H x 19⅛" D (20.9 x 49.5 x 48.6 cm). **Weight:** HS-151: Approximately 42 lbs. with keyboard and two disk drives. HS-161: 39 lbs.

Open the door to computerized accounting with BPI accounting programs

- All packages can work together as a system or be used individually. Run these programs on an HS-151 Personal or Portable Computer equipped with two 5.25" disk drives, 192 KB of RAM, a compatible monitor and a printer that can print a minimum of 80 columns. All need MS-DOS and GW-BASIC.

General Accounting is more than a general ledger

The General Accounting system offers flexibility, fast data entry, informative reports, accuracy and practice data with which to learn the system. Tailor this system to your company's needs with detailed accounts receivable and payable ledgers. Produce single or multiple income statements for up to as many as ten departments or stores. Set up a payroll ledger and print out checks automatically. To reduce the number of data entries, single transactions are made on all appropriate ledgers. Even enter regular monthly entries by a single command. Reports generated are: a balance sheet, a trial balance, income statements, four different ledgers, journals and schedules. End of month procedures clear the data disk of current transactions and close accounts for the current period.

BP-5063-1, Shpg. wt. 3 lbs. **595.00**

Self-Training Series for BPI General Accounting

This self-training series consists of two disks and a guide to help both the first-time or inexperienced user and the experienced user become fully acquainted with this accounting system. The training disks contain eight lessons on the system's basics. A quick reference card is also included for your convenience.

BP-5063-71, Shpg. wt. 1 lb. **69.00**

Accounts Receivable offers choice of account detailing

This Accounts Receivable program details each item on the receivable ledger with amounts and dates. This allows you to print an alphabetical listing of all accounts, cross-indexed to their account numbers, or analyze the account at any time. The system automatically produces an aged accounts receivable report for early account collection and business planning. This program automatically checks for valid account numbers and balancing entries. Enter up to 1000 customer accounts with each account holding up to 360 transactions per billing period. And, any number of customers can be designated to receive up to 100 repetitive charges in a period.

BP-5063-2, Shpg. wt. 3 lbs. **595.00**

Accounts Payable computerizes vendor control

Accounts Payable allows you to choose between two different accounting methods, cash or accrual. When using the accrual method, you can maintain two open fiscal periods. This accounting program offers three check printing options, including: payment of individual vouchers, individual vendors, or all open vouchers due on a date that you select. You can maintain vendor files dealing with specific information such as name and address, regular due date, discount percentage, discount due date and general ledger account distribution.

BP-5063-3, Shpg. wt. 5 lbs. **595.00**

Payroll program simplifies your company's payday

Payroll offers a choice of three principal methods by which you can pay your employees: salary, by the hour, or by commission. When using pay by commission, this accounting program allows you to figure base pay plus percentage of sales, base pay plus piece rate, it allows pay drawn against commission, and allows you to calculate and manually enter commissions. You can specify up to nine deductions including FICA, federal income tax and state income tax, plus six optional deductions. Pay employees each week, every two weeks, twice a month, or once a month. Then print paychecks and a check register. Also print out W-2 forms.

BP-5063-4, Shpg. wt. 3 lbs. **595.00**

Inventory Control for versatile inventory management

With Inventory Control, you can choose one of three accounting methods to cost your inventory: first-in, first-out; last-in, first-out; or average. Establish up to ten departments in your company, each with its own sales, cost of sales, inventory overage and inventory shrinkage accounts. Enter purchase orders as quickly and easily as you make journal entries and produce single or consolidated income and

expense statements. Inventory Control automatically creates back orders and tracks low balance inventory items.

BP-5063-5, Shpg. wt. 3 lbs. **795.00**

Job Costing for quick and accurate job estimates

With Job Costing, you can report job income by the completed job or by percentage of completion. Keep more accurate track of costs for each job and print out a status report that compares actual to estimated costs and quantities on a percentage of completion basis. Also, be able to obtain job profit and loss reports in print that provide a monthly statement of job income and expenses. With this system, you establish coded names for jobs and also parts of jobs. Then you estimate their cost by entering quantities, rates and dollar amounts. Print out a job estimate that shows a rate per unit measure, the number of units, and the estimated dollar amount to do the job. Keep on top of jobs and all current activity.

BP-5063-6, Shpg. wt. 3 lbs. **795.00**

Personal Accounting manages your own finances

Personal Accounting enables you to take advantage of computerized accounting for your own personal finances. Set up accounts to handle your assets, liabilities, net worth, income and expenses. With Personal Accounting, you can plan a budget for income and expenses. Use this program to figure your checkbook balance when the monthly statement arrives. Other uses include keeping track of checks and deposits in up to ten separate accounts. Likewise, record your credit card charges in up to ten separate credit card accounts.

BP-5063-8, Shpg. wt. 3 lbs. **195.00**

Complete accounting system saves you time and money

Totally automate your company's accounting functions with a package of six accounting programs from BPI. This powerful computerized accounting system provides all the features you'll need to run a business. Included in this specially discounted system are BPI's General Accounting, Accounts Receivable, Accounts Payable, Payroll, Inventory Control and Personal Accounting programs.

ZSS-150-6, Shpg. wt. 49 lbs. .... Please call for price.

Emulator software packages for use with HS-151 and HS-161 Personal Computers

Two new emulator packages to add power and versatility to your Personal or Portable Computer, or any IBM-compatible computer. Be able to access IBM mainframe computers quickly, easily and economically.

IRMA helps microcomputers think like mainframes

IRMA consists of software and a Decision Support Interface (DSI) board; and provides mainframe data access, selection and storage, and data communications back to the mainframe. The terminal emulator program is an integral part of IRMA and makes it possible for an HS-151 Personal or HS-161 Portable Computer to emulate an IBM 3278-2 terminal. It allows the computer to function as a stand-alone microcomputer and also act as part of a 3270 network accessing the full computing power and data base of the host computer. The DSI board plugs into a full size slot in the computer and functions independently of the computer's microprocessor. It provides a back panel BNC connection for attaching a coaxial cable to either a 3274, 3276 or integral type "A" terminal controller. An HS-151 or HS-161 Computer requires 128K RAM, one 5.25" disk drive and MS-DOS.

DC-5063-1, Shpg. wt. 2 lbs. **1195.00**

ZSTEMpc enables emulation of VT100/52 terminals

A sophisticated terminal emulator program, ZSTEMpc enables you to access DEC mainframe computers with the added advantage of supported microcomputer-to-microcomputer data communications. Standout features include: disk file transfer, including XMODEM protocol with error checking; alternate terminal support; programmable soft keys; full support of VT100 special graphics characters; and, concurrent serial and parallel printer support. To properly run ZSTEMpc, an HS-151 Personal or HS-161 Portable Computer requires one 5.25" disk drive, 128K RAM, MS-DOS and an asynchronous modem with cables.

KE-5063-1, Shpg. wt. 3 lbs. **150.00**

GrafTalk for easy and exciting graphics

● An interactive business graphics package that enables the user to completely control graphic presentations

Produce dramatic bar, pie, line and symbol charts almost instantly with this sophisticated and powerful software. An interactive program, GrafTalk immediately responds to English-like commands so that even a novice can produce complete and meaningful graphs. Includes screen editor and menu mode.

To run GrafTalk, an H/Z-100 Desktop Computer requires two 5.25" disk drives and the MS-DOS operating system. A printer is needed for screen copies.

RG-463-1, Shpg. wt. 5 lbs. 449.00

CPS-86 Computerized Phone System

● A 16-bit software system that simplifies and enhances the use of your H/Z-100 as a data communications device

With this software and a modem, use your H/Z-100 Computer to access the many information services, computerized bulletin boards and other time sharing systems currently available to the public. Even communicate with other computers using this or some other CPS software. Includes many useful features.

This CPS package needs an H/Z-100 Computer equipped with 128K of RAM and one 5.25" disk drive while using MS-DOS (Vers. 1.25 or higher).

CB-463-7, Shpg. wt. 3 lbs. 40.00

8-bit CPS computer phone system software for the H/Z-100 Computer: Requires 128K of RAM, one 5.25" disk drive and CP/M* (Version 2.2 or later).

CB-253-7, Shpg. wt. 1 lb. 40.00

SAVE $550 on MP/M-86

● A compact and powerful multi-user, multi-tasking operating system for use with the H/Z-100 Desktop Computer

Designed for microcomputers using the 8086/8088 microprocessor, MP/M-86 offers multi-user support while allowing users to run different programs simultaneously. It manages up to a megabyte of memory and supports a wide range of peripheral devices. The MP/M-86 file system allows larger files than CP/M, supports password protection, and supports CP/M data file compatibility. Features include: real-time capability, record and file locking, date and time stamps, and extensive error-handling and reporting.

OS-63-5, Shpg. wt. 6 lbs. . . . . WAS $649 NOW ONLY 99.00

16-bit MS-DOS Version 2 and 8-bit CP/M

● MS-DOS and CP/M operating systems offer disk file handling efficiency and versatile peripheral support

MS-DOS Version 2 provides a number of significant improvements over previous versions of the MS-DOS operating system. Among the enhancements that increase its functionality are new support programs, command line I/O redirection and a hierarchial file system.

OS-61-8, Version 2, Shpg. wt. 5 lbs. 150.00

CP/M operating system offers flexibility and a logical structure. It supports many different disk drive systems and peripherals, and includes fast and easy-to-use software development tools. See EC-1120 CP/M Course on page 101.

OS-53-2, Version 2, Shpg. wt. 5 lbs. 150.00

A wide variety of software for your H/Z-100

In support of your H/Z-100 Desktop Computer, Heathkit offers a wide range of quality software from operating systems, to programming languages, to utility and applications software. On the following pages you'll find 16-bit software and on pages 90 to 93 you'll find many 8-bit packages that'll run on the Desktop Computer. For even more software options, see page 90 and the H/Z-100 Software Directory.

SAVE $300 on UCSD p-System

● Lets you use a variety of hardware and languages plus a full library of p-System application programs that are already available.

With the UCSD p-System, you get a powerful screen-oriented text editor, two printing utilities, a File and a Library Manager, disk recovery tools and three configuration utilities. It also includes a Pascal and an 8086 Assembler. An H/Z-100 needs 128K of RAM and one 5.25" disk drive for this system.

OS-61-3, Shpg. wt. 14 lbs. . . . . WAS $399 NOW ONLY 99.00

SAVE $150 on efficient and powerful CP/M-86*

● Manages the full 768 kilobytes of the H/Z-100 Computer's memory

Designed for the 8086/8088 microprocessor, CP/M-86 is an efficient and powerful operating system that supports small to complex applications programs. Its file structure is compatible with that of 8-bit CP/M (OS-53-2 on this page). Includes 8-bit Emulator for 8-bit software.

CP/M-86 manages up to 768K of memory which allows software programs to take full advantage of the 8088's address space, the 16-bit microprocessor that's used in the H/Z-100 Desktop Computer. All 5.25-inch, 8-inch and Winchester disk drives used with the H/Z-100 are supported under this disk operating system. And all necessary utility programs for creating and editing text and data files are included with full documentation manual.

OS-63-2, Version 1.2, Shpg. wt. 3 lbs. . . . . WAS $250 NOW ONLY 99.00

SAVE $100 on Z-Chart* software package

● Design and display bar, pie, side bar, line, multiple pie, trend line and three-dimensional bar charts
● Create graphs with data entered from other business programs
● Create a slide presentation of graphs with multiple screen displays

Communicate and analyze your company's data faster and easier with the Z-Chart business graphics program. Clear up business reports muddled with hard to find data and replace them with clear, concise graphic representations. See trends and relationships that might otherwise go unnoticed. Z-Chart was designed to help you in these areas by enabling you to create effective and easy-to-read business charts. Z-Chart is a series of programs written to take full advantage of the H/Z-100 Desktop Computer's keyboard, screen and versatile design.

Running Z-Chart requires an H/Z-100 Computer with 128K of RAM, at least one 5.25" disk drive, the MS-DOS operating system and Z-BASIC.

CB-463-11, Shpg. wt. 3 lbs. . . . . WAS $150 NOW ONLY 50.00

Check your H/Z-100 Computer with disk-based tests

● Tests run with a minimum of user commands for easy operation and provides audio alarm with visual error messages

Greatly reduce service costs and hardware down time with the tests contained in the H/Z-100 Series Disk-Based Diagnostics program. Emphasis is placed on ease of operation, consistency of screen messages, and clarity of information displayed for the user. Resolve faults to the subassembly, microprocessor or support ICs, and to individual ROMs or RAMs. Once a fault is detected all information required to correct the error is given on-screen. Save the fault information by transferring it to a printer for future reference. A real time clock dates printouts for easier tracking. All tests can be run continuously.

Checking out an H/Z-100 Computer using this diagnostic program requires a computer with 128K of RAM and one 5.25" disk drive.

CB-463-13, Shpg. wt. 4 lbs. 79.00

Z-Chart is a trademark of Zenith Data Systems Corp. CP/M and CP/M-86 are registered trademarks of Digital Research, Inc. Condor is a registered trademark of Condor Computer Corp. SuperCalc is a registered trademark of Computer Associates Intl. Inc. WordStar is a registered trademark of MicroPro International Corporation.

SAVE $250 on Pascal/MT + programming language

- **A full implementation of the standard Pascal programming language**

This 8-bit software system is useful for both data processing applications and for real-time control applications. With its added enhancements, Pascal/MT + becomes more suitable for commercial programming by increasing its power to develop high-quality, efficiently maintainable software. The Pascal/MT + system includes a compiler, linker and programming tools.

DR-253-5, Shpg. wt. 5 lbs. .... **WAS $349 NOW ONLY 99.00**

Zenith Local Area Network connects H/Z-100s

- **ZLAN packages enable shared computing among many H/Z-100s**

Create a fast and efficient communication network between H/Z-100 Computers equipped with 5.25" disk drives and one or more H/Z-100s with a Winchester drive. In this network, each computer functions as if it had all the capacity of its own hard disk without conflict and almost transparently to one another. ZLAN simplifies the use of commonly shared information and data by eliminating the need to keep multiples of disk copies. It also provides for batch processing.

To establish a ZLAN network you'll need at least two H/Z-100 Desktop Computers and a ZSS-100-22 Two-Computer ZLAN System package. One of the Computers must be equipped with a version 2.5 Monitor ROM, a Winchester hard disk drive, and a 256K Memory Upgrade Board (Z-205 on page 81). The other H/Z-100 Computer must be equipped with at least one 5.25-inch disk drive. The ZLAN System package that enables these computers to become a network consists of two Interface Cards, one for each computer, plus Server and Node software. The Interface Cards are assembled and tested, and install easily. The Server software is installed into the H/Z-100 with the Winchester drive and permits access by other computers to information and data residing on the hard disk. Node software (using MS-DOS 1.25) is installed into the floppy disk H/Z-100 and enables users to call up files or send files to the Server hard disk drive. Coaxial cables available in two lengths, connect the computers.

Up to 255 H/Z-100 Desktop Computers can benefit from ZLAN. Each H/Z-100 connected into the network must have the ZSS-100-23 Add-On System package installed. It consists of an Interface Card and Node software.

ZSS-100-22, Two-Computer ZLAN System that includes Server and Node software plus two Interface Cards, Shpg. wt. 21 lbs. **1499.00**

ZSS-100-23, ZLAN Add-On System for expanding a ZLAN network and includes Node software and one Interface card, Shpg. wt. 12 lbs. **599.00**

HCA-60, 25 foot cable, Shpg. wt. 1 lb. **20.00**

HCA-61, 100 foot cable, Shpg. wt. 4 lbs. **40.00**

Multiplan a sophisticated electronic spreadsheet

- **Powerful modeling and presentation capabilities for business uses**
- **Easy to learn and to use with on-line references and plain commands**

Make better, faster business decisions and explore alternatives faster with Multiplan. Its 255 row by 63 column worksheet provides a giant financial ledger sheet which can be set up with titles and numbers. Make number, word or formula entries and change the screen display around by widening or shrinking columns to suit your needs. Use upper or lower case for titles and left or right justify them, or align text left and numbers right, as you see fit. Easily move and insert text and data anywhere on the worksheet and then, just as easily, remove it. Use any arithmetic operation plus: Boolean algebra, trigonometric functions, scientific notation, rounding off, and dollar and percent formats.

Multiplan's real power lies in its ability to automatically perform calculations. Because this program remembers the relationship between entries, "what if" questions can be easily answered to test out plans and prepare forecasts. When you make a change on the worksheet you immediately see the results of that change throughout the sheet and any related worksheets.

Running Multiplan on an H/Z-100 Computer requires one 5.25" disk drive and the MS-DOS operating system. Multiplan only accesses 64K of RAM for data.

MS-463-7, Shpg. wt. 6 lbs. **195.00**

Microsoft BASIC-80, an excellent 8-bit interpreter

- **Features a full set of built-in and a group of special functions**

An extensive application of 8-bit BASIC, Microsoft BASIC-80 has many enhancements including sequential and random file manipulation. Plus, this programming language has direct access to CPU ports and memory locations. Commands

and statements include an IF-THEN-ELSE control structure which allows execution of conditional statements. String and numeric variables can be used while a full range of logical and mathematical operators are available for additional user convenience. Extensive editing and output capabilities are also available with this interpreter. BASIC comes with a simply organized Reference Manual for easy referrals and includes a handy reference card.

To run BASIC-80, an H/Z-100 Computer requires one 5.25" disk drive and the CP/M operating system (Version 2.2).

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

Languages and compilers for all programming situations

For home, hobby, mathematical or business related needs, you'll find a programming language or compiler below to fit your specific requirements. They meet the skill level and the needs of both the experienced and the entry level user. Easy-to-read manuals with instructions in use and operation are included with each product. General descriptions of these languages and compilers follow.

Powerful and exciting GW-BASIC

(NEW)

Version 2 of GW-BASIC offers many more commands and features than previous versions. Besides features like TRON/TROFF, error trapping, PEEK/POKE and others, this version adds CHDIR and ENVIRON commands plus VIEW and WINDOW statements. New tree-structure management commands provide easier programming while draw and paint statements have been expanded. Create useful and interesting programs with easy-to-use editing commands. An H-100 Computer must have at least one 5.25" disk drive and be using the MS-DOS operating system.

MS-5163-13, Shpg. wt. 3 lbs. .... Please call for price.

FORTRAN for scientists, mathematicians and engineers

FORTRAN-86 Compiler accepts programs written according to the ANSI X3.1978 standard (including most of the features of FORTRAN-77 except the COMPLEX data type). Rigorous syntax rules permit the user to fully define the characteristics of the solution to a problem in a series of precise statements. Therefore, a general understanding of FORTRAN is recommended. To run the FORTRAN Compiler, an H/Z-100 requires one 5.25" disk drive (two are recommended), 192K of RAM and the MS-DOS operating system.

MS-5063-2, Shpg. wt. 5 lbs. **195.00**

Powerful COBOL business programming language

Certified to be in compliance with the ANSI X3.23-1974 standard, this COBOL-86 Compiler has many standard features plus extensions designed to make it more useful for your business data processing tasks. Built-in utilities also extend the versatility of this programming language. An H/Z-100 Computer requires one 5.25" disk drive (two are recommended) and the MS-DOS operating system to run this programming language.

MS-5063-3, Shpg. wt. 5 lbs. **395.00**

Z-BASIC Compiler increases program execution speed

Use the Z-BASIC Compiler to provide yourself with an extremely powerful BASIC programming environment. Compile your programs with the Z-BASIC Compiler to increase their execution speed (your software will run three to ten times faster than the same interpreted programs) and reduce the amount of memory space required to store the programs. This compiler requires an H/Z-100 Computer with one 5.25" disk drive and the MS-DOS operating system to run properly. Does not support all of the new features found in GW-BASIC (MS-5163-13).

MS-463-4, Shpg. wt. 3 lbs. **250.00**

High-level Pascal Compiler programming language

This highly extended version of the Pascal language makes system programming and applications programming a lot easier for you. Some of the valuable extensions found in the Pascal Compiler include structured constants, super arrays, variable length strings, string reads, separate compilation and more. The hardware required to run this Compiler on an H/Z-100 is one 5.25" disk drive (although two are recommended for user convenience) and 192K of RAM. Software requirements include the MS-DOS operating system.

MS-5063-5, Shpg. wt. 5 lbs. **295.00**

More versatile and powerful software to take advantage of the H/Z-100's capability

Software that includes: accounting and integrated accounting packages, word processing with spelling editor, data base management, computer-assisted instruction, a sorter, terminal emulators, an electronic spreadsheet and more on page 97.

PeachText 5000* integrated software package

● A powerful applications package with menu-driven features

A complete system that includes the PeachText* Word Processor, Spelling Proofreader, Random House Electronic Thesaurus, PeachCalc,* and a List Manager. All modules are fully integrated using a central menu.

For an H/Z-100 Computer to run PeachText 5000, 128K of RAM, two 5.25" disk drives and the MS-DOS operating system are needed.

RS-463-75, Shpg. wt. 3 lbs. 395.00

$AVER! Verifiable H-100 Computer owners...save $120 ...... ONLY 275.00

LOTUS 1-2-3 combines popular decision-making tools

● Combination of spreadsheet, graphics and data base functions
● Menu-driven with an extended series of help screens

Three important electronic aids to decision making are combined in one fast, easy-to-use business package. And, they perform interactively and instantly at the press of a key. LOTUS 1-2-3 provides you with information management, spreadsheet analysis, and a business graphics program all in one.

An H/Z-100 Computer needs two 5.25" disk drives, 192K or RAM and MS-DOS to run this integrated software package. Not available via mail order.

LS-463-1, Shpg. wt. 4 lbs. .... Please call for price.

WordStar* 3.3 offers performance and flexibility

● User-friendly features like simple commands and instant response

Upgraded WordStar 3.3 is a powerful word processing system that adds a number of new capabilities to its many well-known word processing advantages. Increased support is given to the H/Z-100 Computer's function and numeric keypad keys.

To use WordStar, an H/Z-100 requires one 5.25" disk drive and MS-DOS.

MP-463-10, Version 3.3, Shpg. wt. 4 lbs. 299.00

MailMerge* combines files with WordStar documents

● Allows you to turn form letters into personalized letters

Combine files containing names and addresses with WordStar letter text files. Requires WordStar 3.3 and the MS-DOS operating system when used with the H/Z-100 Computer. Includes many versatile printing features.

MP-463-11, Version 3.3, Shpg. wt. 3 lbs. 249.00

SpellStar* checks WordStar files for spelling errors

● Original dictionary consists of approximately 20,000 words that can be added to at any time or create your own specialized word list

SpellStar 3.3 rapidly checks WordStar files and labels or adds words to dictionary as desired. Create specialized dictionaries. Requires MS-DOS operating system and WordStar 3.3 for use in an H/Z-100 Computer.

MP-463-6, Version 3.3, Shpg. wt. 5 lbs. 149.00

(NEW) WordStar Professional* for language processing

● WordStar plus three programs for efficient word processing

WordStar Professional provides everything you need to handle all your text management and printing needs. Included are CorrectStar,* an automatic proofreader; StarIndex,* for generating an index and table of contents; and MailMerge for customizing all your mailings. This package requires an H/Z-100 (and added memory board) with two 5.25" disk drives, 256K RAM and using MS-DOS.

MP-463-17, Shpg. wt. 5 lbs. 695.00

PeachText 5000, and PeachCalc are trademarks of MSA, Inc. WordStar, MailMerge, SpellStar, WordStar Professional, CorrectStar* and Starindex are trademarks of MicroPro International Corp.

Sorting and merging with Microsoft Sort program

● A stand alone utility used with many programming languages

For full details on this simple and powerful utility, see page 78. It requires an H/Z-100 Computer 128K of RAM under MS-DOS 2.0. Two 5.25" disk drives.

MS-5063-12, Shpg. wt. 1 lb. 199.00

SuperSort* for powerful, yet easy-to-use sorting

Make your work go faster by being able to sort and merge up to 32 files into a single file at a rate of 560 records per minute. Perform all functions on data files compatible with BASIC, FORTRAN, COBOL and Assembler applications programs. Use fixed or variable length records and fields.

To use SuperSort on an H/Z-DOS Computer, one 5.25" disk drive (two are recommended) and at least 128K of RAM are needed along with MS-DOS.

MP-463-1, Shpg. wt. 3. lbs. 199.00

SuperCalc* for solving everyday financial problems

A powerful 16-bit electronic spreadsheet, SuperCalc provides a simple and straightforward tool for solving financial problems. It contains a worksheet 254 rows by 63 columns large where numbers and text can be easily entered. Use with an H/Z-100 Computer equipped with a 5.25" drive and MS-DOS.

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

dBASE II management system from Ashton-Tate

● Relational data base management system that handles your most complicated inventory control problems

Quickly and easily create a full information system that does exactly what you need and lets you expand in the future. Simple English-like commands let you add, delete, edit, display, print and handle your information. Features 64,000 records per file, 1000 characters per record and 32 fields per record.

To run this data base system on an H/Z-100 Computer, one 5.25" disk drive and 128K of RAM are needed with the MS-DOS operating system.

AT-5065-1, Shpg. wt. 3 lbs. 495.00

Condor* Relational Data Base Management

● Design and create data files with this powerful filing system

Quickly and economically search, sort, merge, analyze, index and print out your data base records. Process up to 32,767 records per data base with up to 1023 bytes in a record. Create your own help menus. Produce sophisticated reports.

An H/Z-100 Computer requires two 5.25" disk drives, a minimum of 128K RAM and the MS-DOS operating system to run this data base system.

CD-463-1, Shpg. wt. 4 lbs. 650.00

Fast and easy File Management System from Condor

Sort, merge files, analyze and print out information using plain and simple English commands. Process up to 32,767 records per data base with this fast, easy-to-use and powerful data base management system.

To use this File Management System, an H/Z-100 Computer requires two 5.25" disk drives and a minimum of 128K of RAM while using MS-DOS.

CD-463-2, Shpg. wt. 4 lbs. .... Please call for price.

NEW! ZSS-100-28, Both Condor FMS and Pecon Interface software, 7 lbs.   Call.

Pecon Peachtree* to Condor Interface System

Transfer data from master and transaction files in Peachtree accounting files to data bases processed under either Condor file management systems.

An H/Z-100 Computer with 192K of RAM and two 5.25" disk drives operating under MS-DOS are needed to run this software. Also required are either Condor package and a minimum of one Peachtree accounting package.

CB-463-9, Shpg. wt. 3 lbs. 99.00

NEW! ZSS-100-28, Both Condor FMS and Pecon Interface software, 7 lbs.   Call.

SuperSort is a registered trademark of MicroPro International Corp. SuperCalc is a registered trademark of Computer Associates Intl. Inc. Condor is a registered trademark of Condor Computer Corp. Pecon is a trademark of Zenith Data Systems Corp. Peachtree is a trademark of MSA Inc.

Peachtree software accounting packages

Maintain a complete financial picture of your business. On an H/Z-100 Computer, you'll need two 5.25" disk drives, 192K of RAM, the MS-DDS operating system and the Z-BASIC programming language.

General Ledger System keeps your financial records

Financial transaction record: The General Ledger System allows you to record the financial transactions of your company during a specified accounting period. Included are accurate and timely statements describing your company's current financial status as well as comparative data of a year ago to date. Can be used with Accounts Receivable, Accounts Payable, and Sales Invoicing programs.
RS-463-1, Shpg. wt. 5 lbs. **399.00**

Accounts Receivable System helps in your collections

A complete invoicing system, the Accounts Receivable package maintains a record for each of your customers including: name, address, phone number, current balance, sales tax, credit limit, and other pertinent information. It is easy to operate and produces comprehensive, up-to-date reports.
RS-463-2, Shpg. wt. 4 lbs. **399.00**

Accounts Payable System helps control your cash flow

Payable information: Accounts Payable package maintains current and aged accounts. It keeps a complete file for each of your vendors, determines whether invoices should be paid by the due date or by the specified discount date, and automatically prints checks and a check register. Security measures are provided to protect the privacy of your data. Can also be used with General Ledger.
RS-463-3, Shpg. wt. 4 lbs. **399.00**

Inventory Control for all aspects of inventory operations

Improve your inventory control, reduce your dollar investment in inventory management, and decrease the response time to your customers with this effective and straightforward program. Keep your inventory records current and print out comprehensive reports that completely cover the inventory operation. Use independently or in conjunction with Accounts Receivable and Sales Invoicing.
RS-463-5, Shpg. wt. 4 lbs. **499.00**

Sales Invoicing System bridges accounts packages

Systems bridge: Actually a subsystem of the Accounts Receivable and Inventory Management systems. Provides the capability to access and update the data files of both systems. Update customer accounts with sale or return information. Update inventory with the stocked items returned or sold.
RS-463-6, Shpg. wt. 4 lbs. **299.00**

Save over $900 on this new comprehensive Peachtree Business Accounting System

Five linked packages – General Ledger, Accounts Receivable, Accounts Payable, Inventory Control, and Sales Invoicing that, used together, provide complete control over vital accounting functions. Save over individual purchase costs and keep up to date with orderly reports on your financial situation.
ZSS-100-24, Shpg. wt. 46 lbs. **999.00**

Write courses and tests using ZDS* Teacher program

- Design and create an entire course of study including tests
- Create your courses without any previous programming experience

One-half of a two-part educational programming package, ZDS Teacher can be used for any instructional purpose that requires written text. You select the topic, decide how the course is to be structured, write the text, and create test and quiz questions. Then the second package, ZDS Student, is used to take the individualized course and exam questions.
To use ZDS Teacher, an H/Z-100 Computer needs a minimum of 128K of RAM and one 5.25" disk drive while using the MS-DOS operating system.
TA-463-1, Shpg. wt. 3 lbs. **299.00**

Use ZDS Student program to take courses and exams

- Run customized instructional courses and exams created by your instructor developed with the ZDS Teacher program

The second part of an educational package that includes the ZDS Teacher program. Take courses or programs written by your instructor. On-disk instructions show how to use the program. Run the program on an H/Z-100 Computer with one 5.25" disk drive and using the MS-DOS operating system.
TA-463-2, Shpg. wt. 2 lbs. **100.00**

Emulate an IBM 3274/3276 with SNA/SDLC

NEW
- Enables an H/Z-100 to emulate a terminal and also be used for personal computing and interactive program development

Emulate such remote devices as IBM S/360, S/370, 4300 and 3000 series of central processing units in addition to other IBM-like devices equipped with SNA/SDLC communications capability. This emulator software runs on an H/Z-100 Computer equipped with a minimum of 192K of RAM, at least one 5.25" disk drive, a Z-204 Multiport I/O Card (page 75), an RS-232C Cable, and using the MS-DOS Version 2.0 operating system.
IE-463-2, Shpg. wt. 3 lbs. **649.00**

ZSTEM* allows H/Z-100 to emulate VT100

NEW
- An asynchronous terminal emulator that allows any H/Z-100 Computer to operate in a DEC mainframe environment

Add the capability of the popular DEC VT100 and VT102 terminals to the power and performance of your H/Z-100 Computer. ZSTEM uses XMODEM and XON/XOFF protocols with baud rates between 45.5 and 19,200. This software offers programmable softkeys, local printing, and VT100 graphics and keyboard layout.
ZSTEM requires an H/Z-100 Computer equipped with 128K of RAM and one 5.25" disk drive while using the MS-DOS operating system.
KE-463-1, Shpg. wt. 3 lbs. **149.00**

H/Z-100 Remote Batch Terminal Emulator

- For distributed processing, remote job entry, and more

Batch processing: Add terminal capability to your microcomputer with this versatile software package. It allows the H/Z-100 Computer to emulate several IBM mainframe terminals including the 2770, 2780, 3780, 2968, and the 3741. Capabilities include baud rate of 2000, 2400 and 4800; Bell 201A3, 201C, 208A and B compatible; EIA RS-232C communications; and more.
What you need: 128K of RAM, one 5.25" disk drive and MS-DOS.
WI-463-1, Shpg. wt. 4 lbs. **899.00**

3270 Emulator emulates IBM 3270 display station

- Runs on either leased line or dial-up configurations

Dual operation: With the 3270 Emulator program, your H/Z-100 Computer can do microprocessing as well as teleprocessing that results in a substantial savings for you. The emulator is also compatible with a variety of IBM or similar host computers using display attributes such as structured fields. Special key labels are provided to show you the relationship between emulator keys and the IBM display station keys. A unique 25th line displays the status of certain system functions.
Hardware and software requirements: On an H/Z-100 Computer, one 5.25" disk drive and 128K of RAM are needed. MS-DOS is also required.
PO-463-1, Shpg. wt. 2 lbs. **650.00**

Microstat performs statistical tests and procedures

- Developed for real life applications using large data sets

Human engineered: Microstat is designed to be flexible and fail-safe in operation and use. All algorithms have been selected with great care to ensure your complete confidence in analysis results. A wide range of statistical tests and a complete set of programs for data manipulations are offered. Most tests use data files for easy changing, sorting, merging and printing. Many tests have a number of variations of the basic test. All analysis programs offer screen and printer output.
Hardware and software requirements: To run Microstat on an H/Z-100 Computer, a minimum of 128K of RAM and two 5.25" disk drives are required. The MS-DOS operating system is also required. Z-BASIC.is also needed.
ES-463-1, Version 2.3, Shpg. wt. 2 lbs. **249.00**

ZDS is a trademark of Zenith Data Systems Corp. ZSTEM is a trademark of KEA Systems Limited.

Beautiful computer workcenter furniture for your home or private office
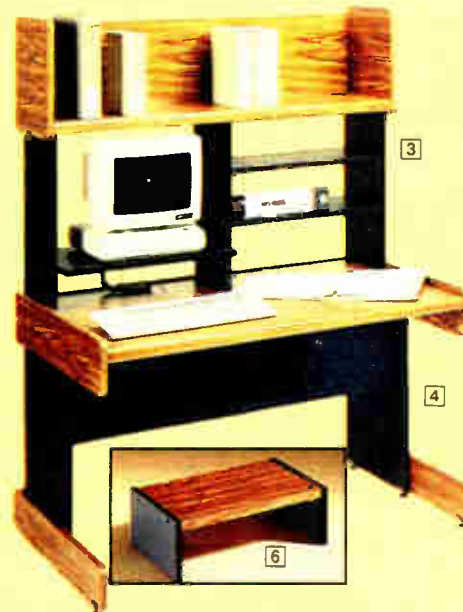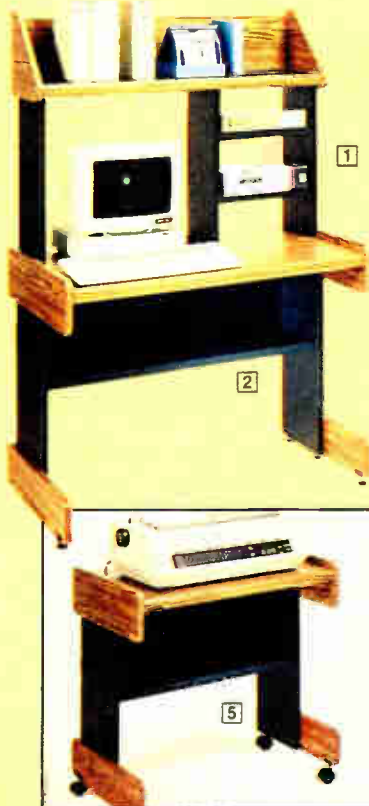
These smart looking modular furniture pieces enable you to create a workcenter that fits your needs and your computer system. Cantilever design provides ample leg room and strength for heavy loads. Wood grain and black finish.

② Computer System Desk
Computer Desk offers a 35¾" W by 21" D work area, a back opening for printer paper, storage shelf, floor levelers and stands 28" high.
PF-125, Shpg. wt. 51 lbs. **119.95**

③ 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 two adjustable shelves.
PF-131, Shpg. wt. 46 lbs. **99.95**

④ Large Computer Desk
Spacious Desk measures 28" H x 45½" W x 29" D and features a lockable cabinet. Has storage shelf.
PF-130, Mtr. Frt. 85 lbs. **169.95**

⑤ Roll-Around Printer Stand
Versatile Stand has 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**

⑥ 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**

① 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 to the left or right of the desk. Has two adjustable storage shelves.
PF-126, Shpg. wt. 33 lbs. **79.95**

Economically-priced video monitors

① CV-2562 25-inch Diagonal Color Video Monitor

- High-resolution display of up to 450 lines on large 25-inch screen
- Direct RGB inputs plus direct TV and VCR video and audio inputs

The new CV-2562 is a versatile 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 using either RGB or Composite Video inputs. A three-in-one tri-focus system of red, green and blue color guns improves picture sharpness and enhances details.

A unique green-only switch eliminates all other colors so that monochrome text material can be easily displayed. This is especially helpful when using the CV-2562 to view computer accounting programs or other text intensive programs that require a lot of reading. Flip the switch back to color and enjoy true color reproduction from other video sources.

Other quality features include: automatic light sensor; automatic monitoring and control of picture, color, tint and black level; audio amplifier with 2" x 6" speaker; and 120 VAC 60 Hz. Monitor measures 22¾" H x 25¼" W x 20¼" D.

CV-2562, Assembled and tested, Shpg. wt. 108 lbs. Mtr. Frt. **729.95**
ZVM-134-1, Cable for H/Z-100 Computers, Shpg. wt. 2 lbs. **20.00**
ZVM-134-21, Cable for HS-151 and IBM-PC Computers, 1 lb. **20.00**

② HVM-122A 12" Amber Monochrome Video Monitor

- Compatible with most of today's popular personal computer systems
- Excellent character definition and intensity at an economical price
- Specially equipped for displaying either 40 or 80 characters per line

A sharp display is always seen on the HVM-122A. A wide 15 MHz bandwidth and a fast 30 nanosecond rise time combine to produce a noticeably improved character definition. And special DC-coupling circuitry enables the video display to retain its brightness even when the screen is full of information.

An easy-to-read 25 lines containing 80 characters each are displayed on the 12-inch diagonal non-glare screen. A special 40-80 character switch accommodates computers whose video formats have a 40-column display output.

Adjustment controls are conveniently located behind a fold-down front panel door. These controls include: power, black level, contrast, horizontal and vertical hold, and vertical height. Get super video from computers such as: the H/Z-100 Desktop and new Personal Computers, the IBM-PC (with color board) and PCjr, Apple II and III, Compaq, Texas Instruments 99/4, and the Atari 800 and 1200.

Kit HVM-122A, Shpg. wt. 22 lbs. **89.95**
ZVM-122A, Assembled with non-glare amber CRT, Shpg. wt. 18 lbs. **139.95**
ZVM-123A, Assembled with non-glare green CRT. Shpg. wt. 18 lbs. **139.95**
ZVM-124, Assembled monitor for use with IBM-PC and PC compatible computer systems, amber CRT, needs monochrome printer adapter card, 18 lbs. . . **199.00**
ZVM-123-2, Tilt Base, Shpg. wt. 2 lbs. **15.00**
ZVM-121-1, Cable for IBM-PC. Shpg. wt. 1 lb. **5.00**
ZVM-121-2, Cable for Atari 800 and 1200. Shpg. wt. 1 lb. **15.00**

③ Compact 13" Diagonal Color Video Monitors

- Four models with true color reproduction for use with personal computers, VCRs, video discs, video games and modular TV tuners
- All have unique "green screen only" switch for easier text display

NEW! ZVM-130: Medium resolution monitor; composite video input; audio capability; 25 line display with 40 characters per line; composite video "loop-thru" feature; and easy-to-reach front access controls.

Special introductory offer on the new ZVM-130 color monitor saves you $30.00 off our regular list price of $329.00.

ZVM-130, Assembled, 38 lbs. .... **Regularly $329.00 SPECIAL 299.00**

NEW! ZVM-135: High resolution monitor; composite video and RGB inputs; 25 line by 80 column display; composite video "loop-thru"; audio capable; and front panel controls.

ZVM-135, Assembled, Shpg. wt. 39 lbs. **599.00**

ZVM-133: A high resolution RGB-only color monitor featuring an 80-column display. Permits the display of as many as 640 pixels horizontally and supports the IBM brown. Includes IBM-PC/HS-151 Personal computer cable.

ZVM-133, Assembled, Shpg. wt. 39 lbs. **559.00**

ZVM-136: Has all the features of the ZVM-133 RGB-only monitor with the added advantage of a long-persistence phosphor CRT.

ZVM-136, Assembled, Shpg. wt. 39 lbs. **799.00**

Cables for use with ZVM-130/135/136/133 Color Video Displays:
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 EACH

④ HS-207 8-Inch Disk System with 2.5 MB storage

- Expands the storage capabilities of the H/Z-100 Desktop Computer with optional one or two 8-inch drives

Add additional data storage capacity to the H/Z-100 Computer with either one or two 8-inch disk drives in the HS-207 Disk System. Each drive uses soft-sectoring to store up to 1.26 MB on both sides of an 8-inch 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. Uses 110/220 VAC.

Heathkit Kit HS-207-41, Eight-Inch Floppy Disk System with one disk drive, 1.25 MB of data storage. Shpg. wt. 57 lbs. **999.00**
Heathkit Kit HS-207-42, Eight-Inch Floppy Disk System with two 8" disk drives. 2.5 MB of data storage. Shpg. wt. 69 lbs. **1599.00**
Z·nith data systems Z-207-41, Assembled and tested single drive Eight-Inch Floppy Disk System with 1.25MB data storage. Shpg. wt. 53 lbs. **1599.00**
Z·nith data systems Z-207-42, Assembled and tested Eight-Inch Floppy Disk System with two disk drives and 2.5MB storage. Shpg. wt. 60 lbs. **2299.00**
Z-207-6, Assembled and tested second Half-Height Eight-Inch Disk Drive, 1.25MB double-sided, double-density storage, Shpg. wt. 8 lbs. **699.00**
HDC-207, Dust Cover for the HS/Z-207. Shpg. wt. 1 lb. **16.00**

Spectacular savings make H-89 All-In-One Computer Systems more affordable than ever

Tremendous close-out prices on H-89 Computer Systems provide you with an excellent opportunity to acquire an outstanding performer for less than a similarly equipped home computer. With the popular H-89 Computer you can increase your efficiency at the office with business applications and word processing, create your own programs using versatile operating systems and programming languages, and manage your home easier and better with financial programs and access to information services. See pages 95 and 97 for printers, modems, and other peripherals, as well as accessories, to add onto the H-89 Computer.

LAST CALL
As low as

$599⁰⁰

- Dual 8-bit microprocessors for faster computing
- 48K byte RAM memory that expands to 64K bytes
- Optional 5.25″ disk drive storage capability
- High-quality, professional typewriter keyboard
- Uses both H-DOS and CP/M operating systems

Take advantage of a LAST CALL on these H-89 Computer Systems and get a powerful desktop computer at a low low price. It is a very good value for a small investment with a large library of software programs available that extends over a broad range of subject areas. The H-89 is a tough, time-tested all-in-one computer that provides the memory, storage capability, and communication versatility to be an asset in any application.

Separate Microprocessors: The H-89 Computer uses two Z-80 microprocessors, one for video and keyboard functions and the other for just powerful computing. With the terminal using its own microprocessor, the H-89 can concentrate on high-speed processing. This makes it more versatile and much faster than other 8-bit desktop computers.

Expandable Memory: At 48 kilobytes, memory in the H-89 is large enough to run most 8-bit software. And for larger programs, its memory can be increased up to 64 kilobytes. To add the extra 16 kilobytes of RAM, you simply install the wired WH-88-16 RAM Expansion Kit on page 91.

Data Storage Options: Five systems offer different amounts of data storage. Two systems have an internal 5.25″ 48 TPI disk drive to provide 100K bytes using hard-sectored storage in a kit computer and 160K bytes using soft-sectored storage in a fully assembled model.

External Storage: The three remaining systems use external 5.25″ disk drives, without an internal drive, to achieve even greater data storage capability. With a hard-sectored controller board installed in the H-89, one system has two external 48 TPI drives for a total data storage capability of 200K bytes (100K each). With a soft-sectored controller board installed, another system uses one 48 TPI disk drive to store 160K bytes of data. The last system also uses a soft-sectored controller board along with two 96 TPI double-sided, double-density disk drives to achieve a massive 1.28 megabytes (640K each) of data storage.

External Drive Cabinets: A damage-resistant steel cabinet houses all external drives. And they contain their own power supply. The cabinet matches the color of the H-89 and has dimensions of 8⅝″ H x 8⅞″ W x 15″ D. These units are powered by 120/240 VAC at 50/60 Hz.

Professional Keyboard: With its standard keyboard, the H-89 Computer allows touch-typists to immediately take advantage of word-processing. No need to worry about lost time retraining on odd keyboards as typists easily move from their electric typewriters to the keyboard of the H-89. And the rugged, highly-reliable keyboard is built to take the constant use found in the office environment. For programmers, the keyboard can generate the entire ASCII character set, both upper and lower case, along with 33 graphic symbols. A 12-key keypad to the right of the keyboard allows accountants to rapidly enter numbers while using bookkeeping and other spreadsheet programs.

Quality Video Terminal: All information is shown on a high-quality, anti-glare 12-inch diagonal video display tube that shows highly detailed characters. The optional white or green screen displays 24 rows of 80 characters each, as well as a software-controlled 25th line. The display is always bright even when the maximum 2000 characters fill the screen. On the screen, upper case characters are formed by a 5x7 dot matrix while lower-case characters use a 5x9 dot matrix.

Add The Peripherals: For your convenience and the H-89 Computer's versatility, three EIA standard RS-232C serial interface ports are available. These three ports let you connect peripherals that make this computer more useful. Connect a printer such as the H-125 located on page 95 for high-speed printed copies of documents. Or connect a modem (page 95) and use the H-89 to talk to other computers or access information services with their wealth of interesting, useful and profitable information and services. See page 97 for increased capability.

Pretested Dependability: To ensure a properly working computer after assembly, both the CPU and terminal logic circuit boards come preassembled. And these complex circuit boards are thoroughly tested to eliminate any possible problems in your new computer's operation.

Other Special Features: An internal monitor automatically sizes the memory and initializes the inputs and outputs at power-up to eliminate the need for bootstrap and loader programs at turn-on. Special keyboard and software-controllable escape sequences enable you to select and use thirty-two special functions. And you have the ability to address the cursor directly, insert and delete characters and lines, enter and exit a graphics and reverse video mode, erase lines or pages of text, and modify baud rates.

Software: Choose from either H-DOS or CP/M (both on page 90) as your disk operating system, or use both. Each operating system features sophisticated system control and both support all Heath/Zenith disk storage systems. Software that can be used with either H-DOS or CP/M can be found on pages 90 through 93 and on page 99. Included are programming languages, financial modeling and planning software, utilities, word processing software, and software for use in the home. By joining HUG (on page 87) you can gain access to a library of over 700 programs for your H-89 Computer.

User Oriented Manuals: A step-by-step assembly manual shows you exactly how to put your own H-89 together. A unique opportunity to see the insides of a computer for a more intimate knowledge of its inner workings. Each step is clearly written and well illustrated to ensure a properly built and working computer. After assembly, the operation manual takes you through all the workings of the H-89 to enable you to become entirely familiar with your computer.

Heathkit **Kit HS-89-2,** All-In-One Computer equipped with 48K RAM, an anti-glare green CRT, one internal 5.25" 48 TPI disk drive with a total data storage capability of up to 100 kilobytes.
Shpg. wt. 96 lbs. .... **WAS $799.95 NOW ONLY 599.00**

Heathkit **Kit HS-89-3,** All-In-One Computer equipped with 48K RAM, an anti-glare white CRT, one internal 5.25" 48 TPI disk drive with a total data storage capability of up to 100 kilobytes.
Shpg. wt. 96 lbs. .... **WAS $799.95 NOW ONLY 599.00**

Heathkit **Kit HS-89-8,** All-In-One Computer equipped with 48K RAM, an anti-glare green CRT, no internal disk drive, two external 5.25" 48 TPI disk drives with a total data storage capability of 200 kilobytes.
Shpg. wt. 143 lbs. **699.00**

Heathkit **Kit HS-89-9,** All-In-One Computer equipped with 48K RAM, an anti-glare white CRT, no internal disk drive, two external 5.25" 48 TPI disk drives with a total data storage capability of 200 kilobytes.
Shpg. wt. 143 lbs. **699.00**

Heathkit **Kit HS-89-10,** All-In-One Computer equipped with 48K RAM, an anti-glare green CRT, no internal disk drive, two external 5.25" 96 TPI disk drives with a total data storage capability of 1.28 megabytes.
Shpg. wt. 143 lbs. **899.00**

Heathkit **Kit HS-89-11,** All-In-One Computer equipped with 48K RAM, an anti-glare white CRT, no internal disk drive, two external 5.25" 96 TPI disk drives with a total data storage capability of 1.28 megabytes.
Shpg. wt. 143 lbs. **899.00**

Heathkit **Kit HS-89-12,** All-In-One Computer equipped with 48K RAM, an anti-glare green CRT, no internal disk drive, one external 5.25" 48 TPI disk drive with a total data storage capability of 160 kilobytes.
Shpg. wt. 130 lbs. **650.00**

Heathkit **Kit HS-89-13,** All-In-One Computer equipped with 48K RAM, an anti-glare white CRT, no internal disk drive, one external 5.25" 48 TPI disk drive with a total data storage capability of 160 kilobytes.
Shpg. wt. 130 lbs. **650.00**

Zenith data systems **Z-90-92,** Assembled and tested H-89 Computer equipped with 64K RAM, one internal 5.25" 48 TPI disk drive with a total data storage capability of up to 160 kilobytes.
Shpg. wt. 55 lbs. .... **WAS $1899 NOW ONLY 999.00**

H-89A SPECIFICATIONS: CPU AND MEMORY: Processor: Z80. **Clock:** 2.048 MHz. **Memory:** 8K bytes used by system for ROM and RAM; 48K bytes user RAM (expandable to 64K). **VIDEO TERMINAL: CRT:** 12-inch diagonal. **Display Size:** 6½" H x 8½" W (16.5 x 21.6 cm). **Character Size:** Approximately ⅕" H x ¹⁄₁₀" W (0.5 x 0.3 cm). **Character Type:** Upper case and lower case without descenders, 5 x 7 dot matrix; Lower case with descenders, 5 x 9 dot matrix; Graphics, 8 x 10 dot matrix. **Keyboard:** 84 keys (60 alphanumeric keys and 12 function/control keys) – plus a 12-key numeric/control pad. **Cursor:** Blinking, or non-destructive underline or block. **Cursor Controls:** Up, down, left, right, home, CR, LF, back space and tab. **Cursor Addressing:** Relative and direct. **Tab:** Standard eight-column tab. **Refresh Rate:** 60 Hz at 60 Hz line frequency, 50 Hz at 50 Hz line frequency. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase line or page, from beginning of line or page, to end of line or page. **Bell:** Audible alarm on receipt of ASCII BEL. **Video:** Normal and reverse, by character. **FLOPPY DISK (H-88-4): Tracks:** 40. **Sectors:** 10. **Formatted Bytes Per Sector:** 256. **Spindle Motor Speed:** 300 RPM ±1%. **Data Transfer Rate:** 128 kHz. **Motor Start Time:** 1 second. **ACCESSORIES: Interfacing:** Three EIA standard RS-232C Serial Interface ports are provided. **GENERAL: Operating Temperature Range:** 50-95 degrees F (10-35 degrees C). **Power Requirements:** 120/240 VAC, 50/60 Hz, 90 watts. **Dimensions:** 13" H x 17" W x 20" D (33 x 43.2 x 50.8 cm). **Weight:** 46 lbs. (20.7 kg).

H/Z-89 Computer Systems			
System*	Hard-Sectored Disk Storage	Soft-Sectored Disk Storage	Total Disk Storage Capacity
HS-89-2 HS-89-3	One 100 KB internal drive	—	100 KB
HS-89-8 HS-89-9	Two 100 KB external drives	—	200 KB
HS-89-10 HS-89-11	—	Two 640 KB external drives	1.28 MB
HS-89-12 HS-89-13	—	One 100 KB external drive	160 KB
Z-90-92	—	One 100 KB internal drive	160 KB
*See product descriptions for models using anti-glare white or green CRTs.			

Need help?
Call TOLL FREE: 800-253-7057

For ordering assistance or information, call toll-free between 8:00 A.M. and 4:30 P.M. ET, Monday through Friday. In Alaska, Hawaii and Michigan, call 616-982-3411.

SAVE ON SOFTWARE!

Purchase an H-89 Computer and receive **FREE** your choice of either H-DOS or CP/M (hard- or soft-sectored) operating systems. And, save 50% on any H-89 software package when you order an H-89 Computer.

Optional Accessories for H-89 and Z-90 Computer Systems

H-88-1, Hard-Sectored Disk Controller Board, Assembled and tested controller board for use in H-89 Computers equipped with single-sided single-density 5.25" 48 TPI disk drives (not for use with double-sided double-density disk drives). Can be used along with the Z-89-37 Controller Board. Shpg. wt. 3 lbs. **150.00**

Z-89-37, Soft-Sectored Disk Controller Board, Assembled and tested controller board for use in H-89 Computers equipped with either single-sided single-density 5.25" 48 TPI or double-sided double-density 5.25" 96 TPI disk drives. Can be used along with the H-88-1 Disk Controller Board.
Shpg. wt. 4 lbs. .... **WAS $299 NOW ONLY 249.00**

Z-89-11, Multi-Mode Interface, for H-89 and Z-90 Computers, has Centronics-style output port for use with parallel printers. Needs CP/M.
Shpg. wt. 1 lb. **100.00**

WH-88-16, Assembled 64K Random Access Memory (RAM) Expansion Circuit Board expands the RAM capacity of the H-89 Computer to 64K bytes. Requires an H-89 with 48K bytes of RAM. Shpg. wt. 1 lb. **115.00**

HA-88-3, Three-Port RS-232 Serial Interface provides printer and telecommunications capability plus connection of other peripherals for older H-89 Computers, Shpg. wt. 2 lbs. .... **WAS $150 NOW ONLY 79.00**

HA-88-5, Cassette Interface for the H-89 All-In-One Computer enables loading and storing data on cassette tapes with appropriate software (not for use with CP/M), Shpg. wt. 2 lbs. .... **WAS $49 NOW ONLY 25.00**

HCA-7, Wire Wrapping Socket Kit, helps you experiment with your own computer board ideas, includes 36 three-level wire wrapping sockets ranging from 14-pin to 40-pin, Shpg. wt. 1 lb. **29.95**

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

A full line of software for your H/Z-89 or Z-90 Computer

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

You'll find a wide variety of software programs on this and the following pages. They include: operating systems, programming languages, utility and applications programs. For an even greater selection of software programs, there's the Heath User's Group (HUG) on page 87 with its software library of over 700 programs which is constantly expanding.

All these software packages come with easy-to-understand instructions manuals and are fully indexed to make it easy to locates specific information. Many include glossaries of terms and appendices filled with useful information. All software is subjected to stringent tests to ensure quality and user satisfaction. All software is stored on high-quality disk media for longer worry-free operation.

Several of the software packages on this and the following pages are compatible with and ready for use in the H/Z-100 Desktop Computer. Also see page 98.

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

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

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

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

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

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

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

HOS-8917-2, CP/M-80 on hard-sectored 5.25" disk, Shpg. wt. 5 lbs. .. **150.00**
HOS-8937-2, CP/M-80 on soft-sectored 5.25" disk, Shpg. wt. 5 lbs. ... **150.00**
*CP/M is a registered trademark of Digital Research Corp.

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

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

Simplified system: H-DOS* provides a complete environment for program construction, storage, and editing. It also provides assembly and checkout facilities. The H-DOS system has a high degree of flexibility and is structured to function with many commands executed on an internal basis. This relieves the user from having to consciously command each step of a program sequence. Increased system discipline, and the ability of H-DOS to recognize and report all command and reference errors saves operators time, reduces mistakes and helps prevent inadvertent loss of valuable data. An easy-to-use Benton Harbor BASIC programming language is included along with ASM Assembly Language, a two-pass 8080 assembler. Also included are several utilities.

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

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

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

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

Hardware requirements: A Z-90 Computer requires a minimum of 48K RAM, but 64K is highly recommended. Two soft-sectored 96 TPI disk drives are also needed to run the P-System and the Pascal Compiler.

HOS-8937-3, UCSD P-System on soft-sectored 5.25" disk, 7 lbs. **495.00**
*H-DOS is a trademark of Heath Company.

SOFTSTUFF
Quality software tools to fit your budget

H-DOS – CP/M File Converter: Easily transfers H-DOS text files to CP/M-80 disks and vice versa to effectively double the information handling capability of your H/Z-89 Computer. Now you can use ASCII data generated by H-DOS software in CP/M programs, or use most CP/M data in H-DOS programs. This file conversion package requires an H/Z-89 computer system with 48K or RAM, two hard-sectored 5.25" disk drives, and H-DOS and CP/M operating systems.

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

PIE Full-Screen Text Editor: An easy and effective way to create a program or text file, or to incorporate changes or improvements into existing program or text files. Alterations can be made anywhere on the screen. Special user-defined function keys are available to perform character, word and line insertions or deletions. Also features string search, move or copy single or multiple lines, and scrolling. Requires an H/Z-89 with 48K RAM, one 5.25" disk drive, and either H-DOS or CP/M.

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

CP/M Z-90 CPS: Permits data transfer between your computer and time-sharing mainframes. Features auto log-in, full error checking and on-screen elapsed time clock. Requires Z-90 with 48K RAM, one disk drive, H-DOS or CP/M, and a modem.

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

Software Directory for the H/Z-100 Desktop Computer

- Lists more than 475 programs for the H/Z-100
- Products grouped by subheadings for easier locating

H/Z-100 software locator: The Software Directory, second edition, is designed to help H/Z-100 Computer users locate software products that meet their specific needs. It lists more than 475 programs that have been reported as available and operable on the H-100 and Z-100 microcomputers.

Contents: This edition is divided into 21 chapters from accounting to word processing. Within chapters, products are categorized into subsections for easier location of specific product types. All products are listed alphabetically within each subsection.

Each listing contains a description of the software product as provided by the vendor. The description contains: the amount of memory required; language required, if any; the disk format; documentation; and a brief summary of the program. Along with the description is the vendor's name, address and phone number for those interested in a specific program.

The last two sections of the Software Directory contain a Heath/Zenith product index of all non-Zenith and non-Heath software, and a Vendor index.

CB-463-15, Shpg. wt. 3 lbs. **25.00**

SuperCalc* – one of the most versatile and comprehensive electronic spreadsheets available

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

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

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

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

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

Advanced output capabilities: Additional enhancements can be added to your file as it is printed out. Some of these options are: boldface, double strike, underline, strikeout, subscripts, superscripts, variable character pitch and variable line height. WordStar also supports simultaneous printing and editing.

Hardware and software requirements: To run WordStar on an H/Z-89 or Z-90 Computer, 64K RAM and two disk drives are needed. CP/M-80 is the required operating system. A letter quality printer is recommended for documents. To run this soft-sectored version of WordStar on an H/Z-100 Computer two disk drives are needed along with the CP/M operating system for the H/Z-100.

HMP-817-2, Vers. 3.3 on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. . . . **395.00**
HMP-837-2, Vers. 3.3 on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **395.00**

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

Powerful file merging: With MailMerge, you can combine a file containing names and addresses with a file in WordStar containing a letter text. Automatically, data can be inserted where variables are specified, even in mid-paragraph.

Hardware and software requirements: The MailMerge program can be run on an H/Z-89 or Z-90 Computer having 64K RAM and two disk drives. The CP/M operating system and WordStar software are needed. To use MailMerge on an H/Z-100 Computer, two disk drives and the CP/M operating system for the H/Z-100 are required along with WordStar.

HMP-817-3, Vers. 3.3 on hard-sectored 5.25" disk, Shpg. wt. 4 lbs. **135.00**
HMP-837-3, Vers. 3.3 on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **135.00**

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

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

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

Additional features; With Magic Wand, you can define up to 128 variables of up to 55 characters each that can be used for repetitive jobs. And merge with Magic Spell to automatically proofread your documents.

Hardware and software requirements: To run Magic Wand, an H/Z-89 or Z-90 computer requires 48K of RAM, one disk drive and the CP/M operating system. A letter quality printer is also recommended for printed documents. An H/Z-100 Computer needs one disk drive and the H/Z-100 CP/M operating system.

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

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

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

Extensive capabilities: To its standard 20,000 word dictionary, you can add any number of additional words or you can build your own dictionaries. You can add, subtract or customize them to meet your needs.

Easy to use: One of Magic Spell's distinct advantages is that you can request all its features from a simple menu. This spelling checker also contains many reference displays that can be displayed on the screen at any time you desire.

Hardware and software requirements: A Z-90 Computer requires 48K bytes of RAM, one double-density disk drive, CP/M-80, and Magic Wand. On an H/Z-100 Computer, one disk drive and CP/M are needed along with Magic Wand.

HIS-837-1, on soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **295.00**

*SuperCalc is a trademark of Computer Associates International Inc. CP/M is a registered trademark of Digital Research, Inc. WordStar and MailMerge are trademarks of Micropro International Corp. Magic Wand is a trademark of MSA, Inc.

Programming languages, emulators and other software for the H-89 All-In-One Computer

Flexible C BASIC Version 2.0 programming language

● Includes a pseudo-code and a run-time interpreter with extremely versatile disk file accessing facilities

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

Hardware and software requirements: To run C BASIC, an H/Z-89 or Z-90 Computer needs 48K of RAM, one floppy disk drive and the CP/M* operating system. Also for an H/Z-100 with one disk drive and CP/M.

HCM-817-1, Vers. 5.2 on hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **115.00**
HCM-837-1, Vers. 5.2 on soft-sectored 5.25" disk, Shpg. wt. 1 lb. **115.00**

Microsoft BASIC Interpreter provides many features

● Includes many enhancements that make it more powerful and versatile than most other versions of the 8ASIC language

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

Interpreter's features: The IF-THEN-ELSE control structure allows for highly structured programming including editing during programming and random or sequential filing capabilities. You get access to CPU ports and memory locations. Provides a full range of logical and mathematical operators.

What you need: To use this language, an H/Z-89 or Z-90 requires 48K of RAM, one disk drive, and the H-DOS* or the CP/M operating system.

HMS-837-1, Vers. 5.2 on soft-sectored 5.25" disk for CP/M-80, 4 lbs. ... **175.00**
H-8-21, Vers. 4.8 on hard-sectored 5.25" disk for H-DOS, 3 lbs. **150.00**

Fortran for scientific and engineering programs

● Provides more power to meet your heavier programming requirements

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

What you need: To run FORTRAN, an H/Z-89 or Z-90 Computer needs 48K of RAM, two disk drives, and either H-DOS or CP/M-80.

HMS-817-2, Vers. 3.4 on hard-sectored 5.25" disk for CP/M-80, 5 lbs. . **195.00**
HMS-837-2, Vers. 3.4 on soft-sectored 5.25" disk for CP/M-80, also runs under CP/M-85 in the H/Z-100 Computer, Shpg. wt. 4 lbs. **195.00**
H-8-20, Vers. 3.4 on hard-sectored 5.25" disk for H-DOS, 4 lbs. **175.00**

Microsoft BASIC compiler speeds program execution

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

Increased execution speed: Compiled programs are fast because the BASIC Compiler produces highly optimized machine code which is directly executed. During the compiling of a program, expressions are recorded to minimize temporary storage and, whenever possible, to transform floating point division into multiplication. Constant multiplications are optimumly distributed.

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

HMS-817-41, On hard-sectored 5.25" disk for H-DOS, 4 lbs. **250.00**
HMS-817-4, On hard-sectored 5.25" disk for CP/M-80, 4 lbs. **250.00**
HMS-837-4, On soft-sectored 5.25" disk for CP/M-80, 4 lbs. **250.00**

Powerful and versatile MACRO-80 Assembly Language

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

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

Utilities include: LINK-80, a linking loader for connecting modules together; LIB-80, a library manager for creating and modifying libraries which are linked to compiled programs; and CREF-80, a cross reference facility used to generate special listings that can be used as diagnostic tools.

What you need: An H/Z-89 or Z-90 Computer needs 48K of RAM, one disk drive (two drives are recommended) and either the H-DOS or CP/M operating system.

HMS-817-51, On hard-sectored 5.25" disk for H-DOS, 2 lbs. **65.00**
HMS-837-52, On soft-sectored 5.25" disk for CP/M-80. Also runs under CP/M-85 in the H/Z-100 Computer, Shpg. wt. 3 lbs. **65.00**

COBOL Compiler for business-oriented computing

● An ideal programming language for business data processing tasks

A powerful business programming language, COBOL is designed for business applications including: inventory, personnel, payroll, order entry, accounting and forecasting. It supplies the tools to meet the rising challenge of information processing. These tools consist of a powerful use of disk files, easy-to-use syntax, long variable names and readable programs.

To run the COBOL Compiler, an H/Z-89 or Z-90 needs a minimum of 48K RAM and two disk drives. Also required is either H-DOS or CP/M-80.

HMS-817-31, On hard-sectored 5.25" disk for H-DOS, 4 lbs. **395.00**
HMS-817-3, On hard-sectored 5.25" disk for CP/M-80, 5 lbs. **395.00**
HMS-837-3, On soft-sectored 5.25" disk for CP/M-80. Also runs under CP/M-85 in the H/Z-100 Computer, Shpg. wt. 4 lbs. **395.00**

ZDS Teacher program to write courses and tests

● Features creating, updating and printing course material as well as quizzes and tests for the courses you develop

A built-in full screen editor aids you in creating and developing individualized courses including quizzes and tests. On-screen messages assist programming. An H/Z-89 or Z-90 Computer requires 48K RAM, one 5.25" disk drive and CP/M (2.2 or higher).

HTA-837-1, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **295.00**
HTA-837-1, On soft-sectored 5.25" disk, Shpg. wt. 2 lbs. **295.00**

ZDS Student program for computer-assisted study

● Enables a student to independently view, study and be tested on customized courses written with the ZDS Teacher program

Helpful on-screen messages keep student's concentration on material. ZDS Student has no authoring capabilities and must be used with ZDS Teacher software. It runs on an H/Z-89 or Z-90 Computer with 48K RAM and one 5.25" disk drive using CP/M 2.2 or higher.

HTA-817-2, On hard-sectored 5.25" disk, Shpg. wt. 1 lb. **40.00**
HTA-837-2, On soft-sectored 5.25" disk, Shpg. wt. 1 lb. **40.00**

SuperSort* for sorting almost any kind of record

- SuperSort can be used with WordStar,* Magic Wand* or by itself to sort, merge and select information from your data files

Performance and flexibility: SuperSort can sort and merge 32 input files (up to 512 kilobytes) into a single master file in one simple and efficient operation at an unmatched speed of 560 records a minute. This sorter accepts a wide variety of records in which data can be justified; or include floating decimals, exponential notation, or upper and lower case letters. Data can also be in several formats: binary, EBCDIC, BDC, ASCII and others. With SuperSort, you can sort fixed and variable length records and fields. Sorting is even possible with a different number of fields in each record. Specify up to 32 different criteria.

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

Hardware and software requirements: An H/Z-89 requires 48K bytes of RAM and one disk drive to run SuperSort. The CP/M operating system is also needed. An H/Z-100 Computer requires one disk drive and the CP/M operating system.

HMP-817-1, On hard-sectored 5.25" disk, Shpg. wt. 4 lbs. **195.00**
HMP-837-1, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **195.00**

MAC* Assembler for easier Assembly Language writing

- MAC features an SID-compatible symbol table file for debugging use

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

MAC is fully compatible with CP/M's Assembly Language and comes with a manual that provides a text book study of macro assemblers. An accompanying disk contains a variety of macro libraries for performing useful tasks.

To run this Assembler, a Z-90 needs 48K of RAM and one disk drive plus CP/M. An H/Z-100 needs one disk drive and the CP/M operating system.

HDR-837-1, On soft-sectored 5.25" disk, Shpg. wt. 2 lbs. **85.00**

Print a file and work on another with DESPOOL*

- A multi-tasking printer utility that provides simultaneous printing of one file while working on another file

Improve your computer's efficiency with DESPOOL by allowing the use of two programs at the same time. Taking up little memory space, DESPOOL can be loaded and stored in your computer until needed. Print one file through your printer while you continue to use the assembler, editor, BASIC, or applications program. An H/Z-89 needs a minimum of 48K of RAM and one disk drive to run this program. The CP/M operating system is also needed.

HDR-817-3, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **50.00**

SID/ZSID* is an upgraded version of DDT Debugger

- Debugging utility includes both 8080-compatible SID and Z-80-compatible ZSID at a substantial savings over separate prices

While maintaining all CP/M's DDT features, SID/ZSID allows the use of names at the source level. It can draw histograms, maintain pass counts and provide trace-backs of execution paths to selected breakpoints plus many more advanced features. SID/ZSID requires an H/Z-89 with 48K RAM, one disk drive and CP/M. The MAC Assembler is recommended for the full use of SID/ZSID's capabilities. An H/Z-100 Computer requires one disk drive and the CP/M operating system.

HDR-817-2, On hard-sectored 5.25" disk, Shpg. wt. 2 lbs. **125.00**
HDR-837-2, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **125.00**

Condor* Relational Disk Base Management

- Easy data base creation and maintenance for simplified information processing without professional computer programmer assistance
- Effortless data entry and updating using self-designed screen formats with complete menu selections you tailor to your requirements
- Extensive analysis and information report writing capabilities

Condor's Relational Data Base Management System is a series of programs designed for simple and fast information storage, sorting and filing. rDBMS* allows you to design and create files of information, data bases, for keeping records of any subject you desire. With this System you can quickly search, sort, merge, analyze, index and print out any records. Condor's rDBMS is a powerful data management system that can process up to 32,767 records per file.

Written in Assembly Language, rDBMS operates much faster than other data base managers. While fast, it is also one of the most powerful relational data base management systems available. With this System's outstanding capabilities you can create new data bases within minutes, calculate statistics for field values within a data base and efficiently post transactions to a master file.

Besides being powerful, rDBMS is so easy to use that a new user can achieve results within several hours. A number of built-in operator aids such as help screens, command files and user-defined messages make your program use a lot easier. You can further simplify the use of this relational data base management system by creating your own different help menus.

With rDBMS you can perform addition, subtraction, multiplication, division and other arithmetic operations on numeric entries, Julian calendar dates and dollar amounts. Specify up to 32 logical conditions including AND, OR and NOT Boolean operations. And, extensive error checking helps prevent clerical errors.

To effectively run this version of Condor rDBMS, a Z-90 Computer is needed and must be equipped with a full 64K of RAM plus two high-capacity soft-sectored 5.25" 96 TPI disk drives. The CP/M operating system is also required.

HCD-8937-1, On soft-sectored 5.25" disk, Shpg. wt. 4 lbs. **650.00**

*CP/M, MAC, DESPOOL and SID/ZSID are trademarks of Digital Research, Inc. H-DOS is a trademark of Heath Company. SuperSort, WordStar and MicroPro are trademarks of MicroPro International Corp. Magic Wand is a trademark of MSA, Inc. Condor and rDBMS are trademarks of Condor Computer Corp.

High-quality supplies and accessories for all Heath/Zenith computers

Pre-wired, 10-foot RS-232 cables (connects pins 1-8, 20)

HCA-10, Male-to-Male Cable, Shpg. wt. 1 lb. 20.00
HCA-11, Male-to-Female Cable, Shpg. wt. 1 lb. 20.00
HCA-12, Female-to-Female Cable, Shpg. wt. 1 lb. 20.00

Pre-wired, 6-foot Personal and Portable IBM cables

HCA-51, Male-to-Female Cable, Shpg. wt. 1 lb. 30.00
HCA-52, Female-to-Female Cable, Shpg. wt. 1 lb. 30.00
HCA-53, Parallel Cable, Shpg. wt. 2 lbs. 30.00

Protection for your floppy disks and computer system

HCA-16, Transient Surge Suppressor protects computer equipment from damaging electrical voltage spikes. It is a parallel protection device that clamps down on transients in less than 5 nanoseconds, well before destructive spikes can reach critical equipment. Handles 4.5 kilowatts of peak pulse power for 1 ms. Computer, audio, video, amateur radio and other electronic equipment's power cords just plug into this protective device. Shpg. wt. 1 lb. 65.00
HCA-18, Storage Cabinet for 8" floppy disks, Shpg. wt. 5 lbs. 30.00

High-quality, highly-reliable 5.25" and 8" floppy disks

HCS-70, 5.25" hard-sectored, single-sided floppy disks with a capacity of up to 100K bytes. Used with H-17-1 48 TPI drives and H-88-1 Controller Board. Shpg. wt. 1 lb. . . . . **Package of ten, 40.00**
HCS-66, 5.25" soft-sectored, single-sided, double-density floppy disks. For use in H/Z-89 Computers equipped with 48 TPI H-17-1 or H-17-5 disk drives and Z-89-37 Controller Board for up to 160K byte storage capacity on a single disk. Shpg. wt. 1 lb. . . . . **Package of ten, 45.00**
HCS-71, 5.25" soft-sectored, double-sided, double-density floppy disks. These 48 TPI disks are used with H-17-5 drives and Z-89-37 Controller Board to store up to 320K bytes of data on a single disk. 1 lb. . . . . **Package of ten, 50.00**
HCS-68, 5.25" soft-sectored, double-sided, double-density floppy disks. These 96 TPI disks are used with H-17-5 drives and Z-89-37 Controller Board for storing up to 640K bytes of data. Shpg. wt. 1 lb. . . . . **Package of ten, 55.00**
HCS-69, 8" soft-sectored, single-sided, single-density floppy disks. IBM 3740 formatted, 250K bytes storage, Shpg. wt. 2 lbs. . . . . **Package of ten, 55.00**
HCS-64, 8" soft-sectored, single-sided, double-density floppy disks. up to 500K bytes of data storage. Shpg. wt. 2 lbs. . . . . **Package of ten, 60.00**
HCS-65, 8" soft-sectored, double-sided, double-density floppy disks. One megabyte of data storage on a single disk. 2 lbs. . . . . **Package of ten, 70.00**

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, Heath/Zenith HS-151 PC, HS-161 Portable, H-100 Desktop and H-89 All-In-One Computers.

We've looked at hundreds of "compatible" items and selected those shown here on pages 95-97 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 pages 96 and 97 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.
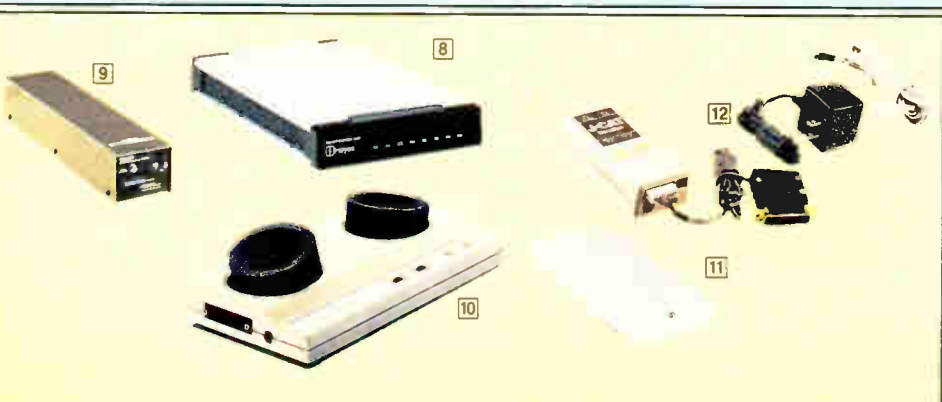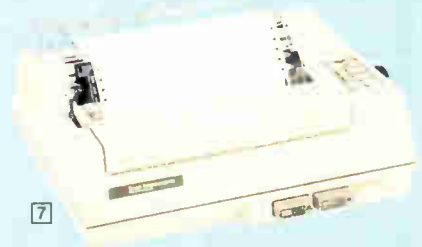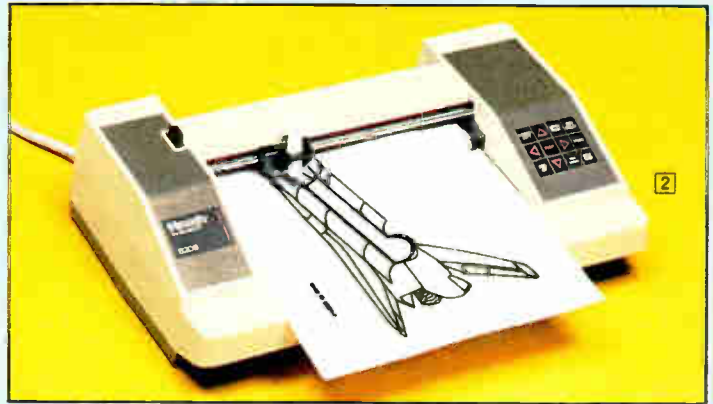
1 New Low Price on High Speed Line Printer Kit

$750.00 Kit

- Prints out copies at over 150 characters per second
- Compatible with most computers and terminals
- Capable of printing graphics characters

Packed with valuable features this versatile dot matrix printer offers speed and quality for both personal and business printing uses. It can print the full 96-character ASCII set including upper and lower case letters, descenders, and underlining at a rate of 152 characters per second. An alternate set of 33 graphics characters is also available upon entering the graphics mode.

Microprocessor controlled functions include hardware or software selectable pitches of 10, 12, 13.2, and 16.5 characters per inch and vertical line spacing of 6 or 8 lines per inch. Also has adjustable vertical and horizontal tabs.

Communications occur through a user selectable RS-232 Serial Interface or a 20 mA current loop with handshaking adjustable by reverse channel and busy control signals. Speeds are adjustable from 110 to 9600 baud.

A specially designed cabinet encloses the printing mechanism to reduce printing noise. An impact-type head prints out a 9 x 9 print or 12 x 9 graphics character on regular paper and uses an easy drop-in cartridge ribbon. A quad tractor feed with adjustable widths handles standard edge-punched, single or multiple forms (up to 6 parts thick) or fan-fold paper. "Paper out" and "jammed" detectors prevent damage and loss of data. Has self-testing capability. Operates on 120/240 VAC, 50/60 Hz. Dimensions: 8¼" H x 26½" W x 18½" D.

Kit H-125, Shpg. wt. 85 lbs. . . . . **WAS $899 NOW ONLY 750.00**
HDC-125, Protective Dust Cover, Shpg. wt. 1 lb. 16.00
HCA-9, Printer Stand with wire paper tray, Shpg. wt. 21 lbs. 99.00

2 Plot high-quality graphics, graphs and charts

$349.95 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 new 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.

Hook 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 8½" D x 3" H) and lightweight (7.2 lbs.) enough to be carried in a standard briefcase.

Kit IR-5208, Shpg. wt. 10 lbs. 349.95
IRA-5208-1, Support Pack for H/Z-100, HS-151, HS-161, 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
ET-500, Assembled and tested Plotter, Shpg. wt. 12 lbs. 499.95

3 Sophisticated DTC 380Z Daisy Wheel Printer

Ideally suited for professional, commercial and personal uses, this mid-priced DTC 380Z printer features superior print quality, high reliability, versatility and flexibility. A letter quality printer, it has print speeds ranging from 10 characters per second to approximately 32 characters per second. A built-in 48K buffer allows a computer to dump large documents and proceed with other tasks.

Data transmission speeds are switch selectable from 50 to 19,200 baud using the standard EIA RS-232 interface. Even faster speeds are available through the Centronics-compatible parallel interface. An IEEE 488 interface is also available. All communications are made in an ASCII-coded asynchronous mode. Commands used with this advanced design daisy wheel printer are compatible with Diablo printer commands.

PP-260, Assembled and tested, Shpg. wt. 43 lbs. . . . . **LAST CALL 1295.00**
PPA-260-2, Cut-Sheet Feeder, Shpg. wt. 10 lbs. 574.95

PPA-260-4, RS-232 Cable, Shpg. wt. 1 lb. 49.95
PPA-260-5, Parallel Cable, Shpg. wt. 1 lb. 49.95

4 Superior DTC Style Writer Daisy Wheel Printer

A letter quality printer, it is budget priced and ideally suited for personal computer environments. Connect it to a computer through its standard parallel (Centronics) interface for speeds up to 130 words per minute. Communicates in an ASCII-coded synchronous mode. A 37K character buffer is a standard feature of this printer. Requires HCA-53 cable on page 93.

PP-270, Assembled and tested, Shpg. wt. 24 lbs. **599.00**
PPA-270-1, Tractor Feeder, Shpg. wt. 6 lbs. 149.95
PPA-270-2, Cut-Sheet Feeder, Shpg. wt. 11 lbs. 249.95
PPA-270-3, 32K Buffer Extender, Shpg. wt. 1 lb. 49.00

5 Advanced MPI-150 Impact Dot Matrix Printer

Print up to 6120 individually addressable dots per square inch for exceptional graphics and special character resolution. Requires AP-PAK on page 103.

MPI-150, Assembled and tested, 35 lbs. . . . . **WAS $995 NOW ONLY 695.00**

6 New Low Price on Primage I Daisy Wheel Printer

Delivering speed and quality, the Primage I Printer prints out letter quality documents at 45 characters per second. It uses a 100-character daisy wheel allowing use of special accents and characters without changing wheels. With its serial and parallel ports, the Primage I can be plugged into virtually any computer printer port. And this printer fully emulates Diablo 630 commands. An optional sheet feeder easily installs for automatic printing of up to 200 sheets of normal stationery. Requires either an HCA-10 or HCA-53 cable on page 93.

PP-250, Assembled and tested, 63 lbs. . . . . . . **WAS $1699 NOW ONLY 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

7 TI 855 Dual Mode Printer offers flexibility

Dual function dot matrix printer offers data processing capability and letter quality printing. Outstanding features include: 35 cps for documents, 150 cps for drafts, bi-directional printing, 256 character buffer and more. Requires cable.

WH-64, Assembled and tested, Shpg. wt. 18 lbs. 995.00

8 Hayes Automatic 300 baud Smartmodem

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. Requires HCA-11 cable on page 93 and CPS software.

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

9 Use ultraviolet light to erase EPROMs for reuse

Compact and easy to use, the ID-4803 EPROM Eraser will erase all your ultraviolet erasable integrated circuits for you to use again and again. Interlock system prevents accidental eye exposure to ultraviolet rays. Includes lamp on indicator and locking non-removable tray. Easy one-evening kit.

Kit ID-4803, Shpg. wt. 4 lbs. 49.95

10 Convenient acoustic modem transfers data

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 93 and CPS software.

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

11 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, Assembled, Shpg. wt. 3 lbs. . . . . **WAS $499 NOW ONLY 299.00**

12 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. Includes cables.

PP-310, Assembled and tested, Shpg. wt. 2 lbs. 129.95

Accessories for peripherals are found on page 103.

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

Money-back guaranteed accessories for Heathkit/Zenith and IBM-PC Computers
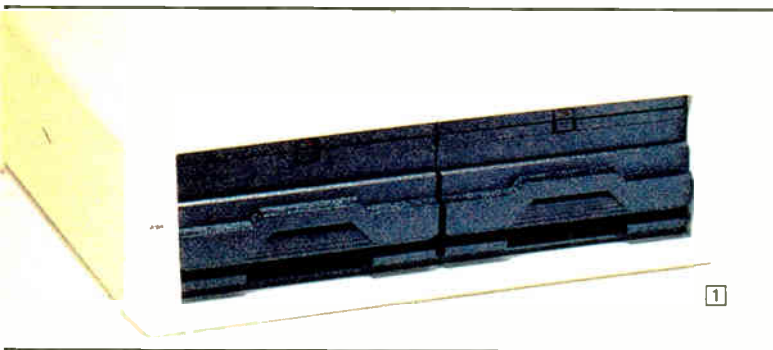
At its one-stop shopping center, Heath Company strives to maintain competitive prices on all accessories along with careful selection and testing of products, free installation and/or hook-up information, full service and support, and a 90-day money-back guarantee. For up-to-the-minute prices contact your nearest Heath/Zenith Computers & Electronics Center (page 55).
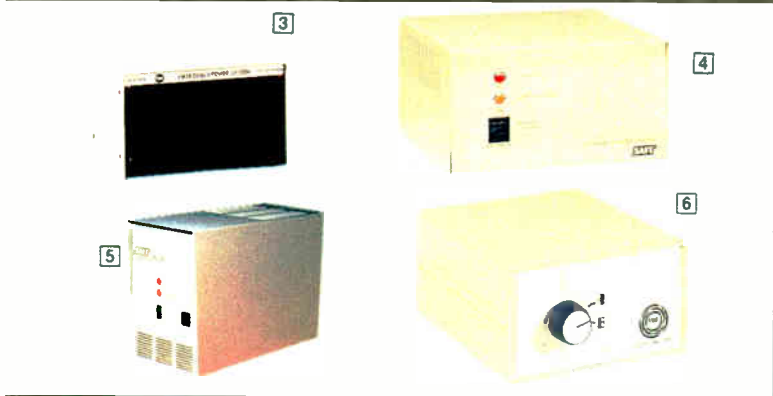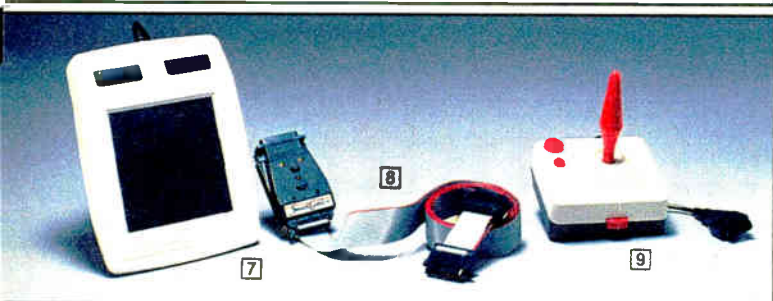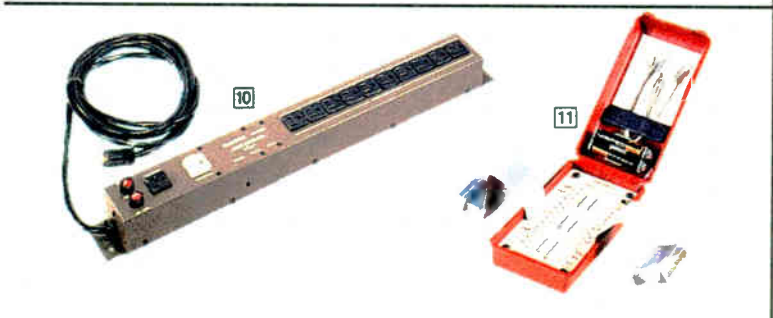
① Ten megabyte disk storage from IOMEGA

Picked 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.

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 the HS-151 Personal Computer and the HS-161 PC, as well as, the IBM-PC and all its compatibles. Exceed the capacity of hard disk drives and get transfer and access times 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 data storage cartridge per drive.

PP-500-1, Single drive 10M storage, 57 lbs. . . **WAS $2695 NOW ONLY 2195.00**
PP-500-2, Dual drive 20M storage, 63 lbs. . . . **WAS $3695 NOW ONLY 2995.00**
PPA-500-1, Blank 8" cartridge, Shpg. wt. 2 lbs. **79.00**
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**

② 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.

Add-on SixPakPlus 64K memory card from AST

Multi-function card for HS-151 Personal, HS-161 Portable and IBM-PC. Comes with standard 64K of RAM that can be expanded to 384K using Z-205-1 RAM Chip Sets (see special $AVER box on this page). Features one serial asynchronous communications port, one parallel printer port, a clock/calendar with battery backup, and an optional game adapter port for use with IBM-type joystick. Requires a fully populated 320K of RAM on computer system board.

PC-120, Shpg. wt. 2 lbs. **299.00**
PCA-120-1, Game Port Option, Shpg. wt. 1 lb. **39.95**

NEW! Budget priced plug-in 300/1200 baud modem

An auto dial/answer modem from U.S. Robotics Inc. for use in HS-151 Personal Computer, HS-161 Portable PC and 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 telecommunications software and phone cord.
PC-131, Shpg. wt. 4 lbs. **349.95**

NEW! Multifunction Board adds many features

The Captain Multifunction Board from Tecmar fits into an open slot of an HS-151 Personal or an HS-161 Portable PC. It is fully socketed for the easy addition of up to 320K 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. A large collection of utility programs are included besides helpful RAMdisk, spooler, and timer software. These include a forms generator, checkbook balancer, address filer, mailing list, memo writer, inventory manager, and many others. Captain comes without RAM.

PC-121, Shpg. wt. 2 lbs. **199.95**
PC-121-50, Captain Board populated with 320K RAM, Shpg. wt. 3 lbs. . . **449.00**

$AVER! 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-120, PC-121 or PC-310 board purchase and receive half off the regular price.
Z-205-1, Shpg. wt. 2 lbs. . . . . . . **Regularly $79.99, Discount Price 39.99**

NEW! High resolution monochrome/color multi board

The Graphics Master Board from Tecmar supplies HS-151 Personal, HS-161 Portable 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 such as the ZVM-124. External sync is provided for use with a video mixer. Has 128K of on-board video memory. Requires ZCA-6 ROM in HS-151 Personal and HS-161 Portable Computers.
PC-185, 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 HS-151, HS-161 and IBM-PC Computers.

PC-110, Shpg. wt. 1 lb. **49.95**
PCS-110, PC-110 with clock/calendar chip, battery, software, 1 lb. **99.95**

NEW! 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. It installs very simply on the motherboard. 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 bootup.

PC-240, Shpg. wt. 2 lbs. **99.95**

US Robotics Auto Dial Modem Card for H/Z-100s

An integrated serial telecommunications device, to connect your computer to a telephone network. 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 functions are controlled by Hayes-type programming commands. Comes with a phone cord.

PC-200, Shpg. wt. 2 lbs. **449.00**
PA-100-1, US Robotics TELPAK Software, uses MS-DOS, 2 lbs. **99.00**

Programmable Sound/Speech/Time (P-SST) Card

From Software Wizardry, a plug-in multifunction circuit board for the H/Z-100 Computer. 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 (not supplied). 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 which can be used for joysticks and compatible printers (cables not included).

PC-220, Shpg. wt. 3 lbs. **395.00**

Powerful DG Super 89 enhanced processor board

Replaces central processor board in H/Z-89 and Z-90 Computers and features: 128K RAM, fully compatible with all Heath/Zenith products, full CP/M* and H-DOS* compatibility, standard 128K memory that can be expanded to 256K using Z-205-1 64K RAM Chip Sets (see $AVER box on page 96), two serial ports, on-board real time clock, 4 MHz operation, six expansion slots, multi-user capability, parity checking for RAM, and provision for an arithmetic processor.

PC-310, Shpg. wt. 3 lbs. .... **WAS $799 NOW ONLY 699.00**

MAGNOLIA MICROSYSTEMS CP/M-Plus and RAM Board

Add new system commands and an additional 128K of RAM to your fully populated H/Z-89 or Z-90 Computer. You get a total memory capacity of 176K which can be used in several different memory maps under program control and your computer still retains full compatibility with existing operating systems. CP/M-Plus adds new utilities and features including a HELP command, optional password protection, time and date stamping of files, console redirection to or from disk files, and many more. The source code for BIOS is included to allow you to make any changes necessary for your particular application.

PC-300, Shpg. wt. 10 lbs. .... **WAS $495 NOW ONLY 395.00**

③ Emergency Power System protects your computer

This completely self-contained 200 watt emergency power system automatically protects your small computer from black-outs without any installation. Plug the Power System into an AC outlet and all your computer equipment into the PP-110. With a 200 watt load you'll have 5 minutes to safely shut down your equipment. With lesser loads, more time is available. Built-in AC line filters clamp transients and surges for clean on-line power. Ten millisecond switchover time.

PP-110, Shpg. wt. 20 lbs. **349.00**

④ 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. Acts as a line filter during normal operation.

PP-115, Shpg. wt. 39 lbs. **549.95**

⑤ 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. Sine wave output and synchronized to the line for quick complete power protection. Features built-in surge suppression, over-current protection, voltage regulation, and built-in EMI/RFI filters.

PP-120, Shpg. wt. 73 lbs. **1195.00**

⑥ NEW! 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. Instead of changing cables just turn the knob and the common line is switched from one connection to another. All 25 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.

PM-120, Shpg. wt. 1 lb. **79.95**

⑦ 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. Has built-in male and female connectors and derives its power from the lines through current summing junctions.

PP-100, Shpg. wt. 1 lb. **89.95**

⑧ WICO Computer Command Analog Joystick

Arcade quality joystick adds to the fun of playing games on your HS-151 Personal, HS-161 Portable or IBM-PC computer. Arcade size and strength gives this accessory the feel and durability of professional equipment. Choose self-centering or non-centering operation. Used with the PC-110 Analog Game Board.

PP-401, Shpg. wt. 2 lbs. **39.95**

⑨ KoalaPad Touch Tablet and software

Just a touch of your finger can control an HS-151 Personal, HS-161 Portable or IBM-PC computer. Software included with pad allows 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 Vers. 2.0 is required to use all the features of PC Design software included with the pad. Requires PC-110 Analog Game Card.

PP-400, Shpg. wt. 3 lbs. **99.95**

⑩ Smart Outlet Box powers up all your peripherals

Plug the AC line cord of your computer into the special current-sensing socket of the outlet box and your peripherals into any of the ten switched outlets. The moment you turn the computer on, current flow in the sensing socket is detected and the Smart Box automatically switches power to the other sockets. A clearly marked unswitched outlet is provided for powering clocks or other constant AC voltage devices. An internal MOV device protects your computer from damage causing line surges and voltage transients up to a maximum 325 watts at 6500 amps (70 joules at one time, 35 joules repeated). Maximum control power is 250 watts at 2 amps; maximum for all other outlets is 1200 watts at 10 amps.

Kit GD-1295, Shpg. wt. 4 lbs. **49.95**

⑪ Breakout Box RS-232 Terminal Interface Tester

Isolate problems within a computer system with this pocket sized, self-contained tester. LEDs signal line condition. Includes jumper pins and test points.

WH-15, Shpg. wt. 1 lb. **159.00**

*CP/M is a registered trademark of Digital Research, Inc. H-DOS is a trademark of Heath Company.

Master computer-aided design and drafting

NEW

- Learn to use the important features of a full-sized industrial CAD system with an easy-to-learn and easy-to-use drafting package
- An ideal learning tool for high performance drafting training

Enter the world of computer graphics and see how to put CAD capability at your fingertips with this tutorial package using AutoCAD drafting and design software. Begin with a general introduction to computer graphics, find out about the equipment that makes up a work station, and then delve into the production of drawings using an incredibly powerful drafting software tool.

Divided into eight major subject areas the AutoCAD Tutorial course introduces and guides you in the use of this computer-aided drafting system. It begins with an introduction to computer graphics and helps you get ready to run the drafting software. Next, all the commands necessary to produce drawings accurately and quickly are covered including the use of: points, lines, arcs, circles, text, panning, zooming, layering, blocks, and arrays. Plotters and digitizers are discussed to familiarize you with the wide range of input/output devices that are available. One unit is dedicated to the advanced features of AutoCAD for those who desire a broader and deeper exposure to the power of AutoCAD. All areas are sequential in nature and build on previously presented material.

The final unit contains experiments that reinforce the lessons learned in the course and enables you to use your newly acquired skills. You learn by actually working with real CAD software. Disks included with the tutorial allow you to create and modify drawings using virtually all of the commands of AutoCAD.

Two versions of this tutorial are available. One is for use with the H/Z-100 Computer while the other can be used with the HS-151 Personal Computer, HS-161 Portable PC, IBM-PC, and IBM-compatible computers. Whichever computer is used it must be equipped with a minimum 256K of RAM, two 5.25" disk drives, and have color capability. To benefit fully from this tutorial a color monitor should be used to take advantage of AutoCAD's layering function. A digitizer and plotter can be used but are not required. AutoCAD supports many different models of input and output devices. This drafting software program uses the MS-DOS operating system.

EBS-609, For use with H/Z-100 Computers, Shpg. wt. 2 lbs. **59.95**

EBS-609PC, For use with the HS-151 Personal Computer, HS-161 Portable PC, IBM-PC, and IBM-compatible computers, Shpg. wt. 2 lbs. **59.95**

Learn to use the potential of Microstat

NEW

- Tutorial provides a general understanding of almost all of the functions and capabilities of the Microstat program
- Learn to use statistical tests and procedures for data manipulation

ZDS Microstat Tutorial is a series of interconnected programs designed to acquaint you with most of the functions and capabilities of the Microstat program. Since Microstat is such a comprehensive library of statistical programs, it is impossible to include all information about this system. However, this tutorial does present most subprograms and their most frequently used options. The tutorial can be used as a learning tool for those who are not familiar with Microstat or as a refresher for those who would like to review particular programs in the wide range offered by Microstat.

Screens and prompts displayed by the tutorial coincide with those found in Microstat programs. As a result of working with the tutorial you'll know what to expect when executing any of the statistical programs. Like Microstat, ZDS Microstat Tutorial is designed as an interactive program using menus and prompts. From the main tutorial menu you can select any of the subprograms and functions that make up Microstat including: Data Management Subsystem, Descriptive Statistics, Frequency Distributions, Hypothesis Tests: Mean, Analysis of Variance, Scatterplot, Correlation Matrix, Regression Analysis, Time Series Analysis, Non-parametric Statistics, Crosstabs/Chi-Square Tests, Factorials/Permutations/Combinations, Probability Distributions, and Hypothesis Tests: Proportions.

A tutorial text, sample screen displays, and prompts follow all subprogram and function selections from the main menu. Simply follow the on-screen instructions and prompts as the tutorial shows you how to use the selected subprogram or function. Single key entries let you proceed to the next screen of information or return to the previous menu when completed. So that you'll always know where you're at in the tutorial you are automatically returned to the menu from which you made your last selection whenever a phase is completed.

To operate this tutorial you'll need an HS-151 Personal Computer, an HS-161 Portable PC, an IBM-PC, or IBM-compatible computer. You must use the MS-DOS Version 2 operating system and the GW-BASIC programming language.

CB-5063-22, Shpg. wt. 2 lbs. .... Please call for price.

Become a proficient user of Condor* 3

NEW

- Learn to simplify information management
- Discover how to use the power and memory of a computer to access and manipulate information you have entered

The Condor 3 Tutor is a series of lessons designed to help you become skillful in the use of this data base management system as soon as possible. Divided into ten lessons, you can study only selected features if you wish or complete each lesson if you are a first time user of Condor. Each lesson consists of instruction, practice exercises on-disk, and practice lessons in the accompanying handbook that let you directly interact with the Condor 3 program.

Topics covered on the four education disks include: the basic concepts and terminology of data base systems, and how to define a Condor 3 file; how to enter information in the records of a previously defined data set and how to examine the data you have entered; how to revise and delete records within your data set and how to organized records in a logical order; and how to create data sets from existing ones. Also covered is how to: perform mathematical operations in Condor 3, use relational operators, transfer updated information and records from one data set to another, and how to use some utility commands to maintain your Condor data sets more effectively. You will further develop skills in order to create a master data set and an entry data set. In the final lessons you'll learn how to use Transaction and change data sets to perform updates on your master set, plus you'll further develop your skills in order to print simple reports from a data set.

Requirements for this tutorial includes use of an HS-151 Personal Computer, HS-161 Portable PC, IBM-PC, or IBM-compatible computer equipped with one or two 5.25" disk drives. Exercises in the tutorial require the use of the Condor 3 software package and the use of two disk drives. A printer is optional. You also need the MS-DOS Version 2 operating system and GW-BASIC.

CD-5063-5, Shpg. wt. 1 lb. .... Please call for price.

Home computer programs from

MYCHESS: A world class championship chess game. Best micro in the 1979 ACM North American Computer Chess Championship and winner at the 1980 West Coast Computer Faire over such opponents as Sargon 2.5 and Atari. Nine skill levels let you tailor this chess game to any opponent. Play games from the beginning, choice of white or black, or set up a position and proceed from there.

PA-251-1, On HS-151, HS-161 and H/Z-100 Computers, 1 lb. **34.95**
PA-251-3, On H/Z-90 Computers using CP/M, soft-sectored, 1 lb. **34.95**
PA-251-4, On H/Z-89 Computers using H-DOS, 1 lb. **34.95**
PA-251-5, On H/Z-89 Computers using CP/M, hard-sectored, 1 lb. **34.95**

COMPUTER CHEF: An automated recipe file that eliminates cook book page flipping and portion figuring for different numbers of servings. Plus, you can list the food items on hand and COMPUTER CHEF will suggest recipes for using them. This works great for planning your week's menu from supermarket ad specials. Print out recipes so you need never worry about spilling anything on your cookbook. COMPUTER CHEF contains over 70 kitchen-tested recipes from salad to dessert. COMPUTER CHEF also automatically scales the recipe to your needs.

PS-252-1, For HS-151, HS-161 and H/Z-100 Computers, 1 lb. **29.95**
PA-252-3, On H/Z-89 Computers using CP/M, soft-sectored, 1 lb. **29.95**
PA-252-5, On H/Z-89 Computers using CP/M, hard-sectored, 1 lb. **29.95**

BEST OF WOK TALK: Oriental cuisine made easier by computer. From the Chinese culinary newspaper, Wok Talk, are assembled over 100 recipes from all over China. Select recipes by ingredients, type of cuisine, or key words. This program automatically scales your recipes for the ingredients on hand or the number of people to be served. List recipes on a printer as you need them and eliminate the possibility of damaging cookbooks due to spilled ingredients.

PA-253-1, For HS-151, HS-161, H/Z-100 Computers, 1 lb. **29.95**
PA-253-3, On H/Z-89 Computers using CP/M, soft-sectored, 1 lb. **29.95**
PA-253-5, On H/Z-89 Computers using CP/M, hard-sectored, 1 lb. **29.95**

WHAT'S FOR DINNER: This software package contains over 200 delicious recipes already formatted for use with COMPUTER CHEF (not included). A collection of over 100 main and side dishes plus over 100 dessert items. It has everything from quick and easy dinners for two to entertaining a crowd in style. Includes meat, seafood, chicken, pasta and vegetarian entrees, soups from gourmet consommes to hearty meal-in-itself family dining, all types of salads, and ethnic dishes from around the world. Desserts include baked goods and special occasion recipes for the holidays or the right moment.

PA-254-1, for HS-151, HS-161 and H/Z-100 Computers, 1 lb. **19.95**
PA-254-3, On H/Z-89 Computers using CP/M, soft-sectored, 1 lb. **19.95**
PA-254-5, On H/Z-89 Computers using CP/M, hard-sectored, 1 lb. **19.95**

*Condor is a registered trademark of Condor Computer Corporation.

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 DOS 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, HS-151 Personal or HS-161 Portable Computer. With these computers, you'll need the appropriate CP/M* or MS-DOS operating system 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**

Use your Visa or MasterCard credit cards to purchase your kit

BASIC Course teaches you to program in one of the most popular microcomputer 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 59.

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

$59⁹⁵
- 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 makes 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, Shg. 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 your everyday problems
- Learn to make intelligent decisions when 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 3.0 Continuing Education Units 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**

Versatile and compatible terminals that provide quality and economy

① Smart H-29 Terminal features performance

- **Built-in flexibility provides room to grow as your needs increase**
- **Complete communications compatibility with terminals and computers**

One of the most user-friendly terminals 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-setable 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 emulates the Lear-Siegler ADM-3A 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 then either.

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.

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.

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 DCE type for an auxiliary device. An RS-232 serial cable is included for connecting the H-29 to computers and other peripherals.

Heathkit Kit H-29, Shpg. wt. 41 lbs.	....	**549.00**
data systems NEW! Z-29-A, Z-29 with 14" amber CRT, 45 lbs.	......	**799.00**
Z-29-1, Palm Rest Accessory, Shpg. 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 8½" 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.

② HT-10 Terminal for a low-cost data-entry point

- **Instant and user-friendly access to personal and business computers**

Information processing terminal with DEC-VT 52 compatibility features integral RS-232 standard port that functions at speeds from 110 to 9600 baud. Also has easy-to-use keyboard, built-in prompts and parallel port for use with printer.

Heathkit Kit HT-10, Terminal includes ZVM-121 video monitor without modem, Shpg. wt. 36 lbs.	......	**399.00**
Heathkit Kit HTX-10, Terminal less monitor and modem, 10 lbs.	......	**279.00**
data systems ZT-10, Assembled and tested Terminal, includes video display monitor without modem, Shpg. wt. 32 lbs.	......	**499.00**
data systems 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).

③ HT-1011 for access to time sharing services

- **Single key access of up to 26 pre-selected information sources**

Telecomputing system features internal modem and single key dialing of information services or normal voice calls. Log-on procedure includes account numbers, escape codes and passwords. Includes battery-protected memory system.

Heathkit Kit HT-1011, Includes ZVM-121 video display monitor, RS-232C port and 300 baud modem, Shpg. wt. 44 lbs.	......	**449.00**
data systems ZT-11-Z, Assembled and tested HT-1011 with video display, RS-232C port and modem, Shpg. wt. 32 lbs.	......	**579.00**
data systems ZTX-11-Z, Assembled and tested HT-1011 with modem RS-232C port less video display monitor, Shpg. wt. 6 lbs.	......	**479.00**
data systems ZT-1-UZ, Assembled and tested Terminal with monitor and modem less RS-232C serial port, Shpg. wt. 30 lbs.	......	**549.00**
data systems 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, Portable Cable, Shpg. wt. 1 lb.	......	**25.00**
ZVM-121-Z, Optional Monochrome Video Display, high resolution 12" green CRT that displays 25 lines of 80 characters, 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**

4 Z-49 Terminal features increased flexibility

- All features are keyboard accessible; settings are stored in memory
- 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.

Zenith data systems Z-49, Assembled and tested, Shpg. wt. 37 lbs. **1099.00**

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.

5 NEW economical and user-friendly Z-22 Terminal

- On-screen parameter selection and storage in nonvolatile memory

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 Zenith's special Chromgold II phosphor tilts and rotates.

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 include 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.

The Z-22 Terminal also features compatibility with the popular Lear Siegler ADM11 and TeleVideo 914 terminals which are found on many of today's systems.

Zenith data systems Z-22, Shpg. wt. 37 lbs. **649.00**

Z-22 SPECIFICATIONS: DISPLAY: CRT: 12" diagonal, Chromogold II. 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 line. 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.

Supplies and accessories for your Heath/Zenith computers and peripherals

Pre-wired 10-foot special application cables

HCA-22, WH-64 Parallel Cable, Shpg. wt. 1 lb. **35.00**
HCA-24, WH-64 Serial Cable, Shpg. wt. 1 lb. **35.00**

Quality printer paper at economical prices

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 paper, continuous 1000 sheets, Shpg. wt. 13 lbs. **25.00**

Convenience accessories for your computer system

PM-100, Locking 5.25" floppy disk storage cabinet, holds 70 disks in charcoal-colored copolymer plastic case. Comes with rigid dividers, index tabs, and built-in handles, Shpg. wt. 3 lbs. **19.95**

Cartridge Fonts for the WH-64 Printer

HCS-30, Prestige Elite Font with 12 cpi pitch, 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**

High-quality, long-life printer ribbons

HCS-50, 3 plug-in cloth ribbons for Primage and Diablo 1640/630, 1 lb.   18.00
HCS-51, 3 plug-in film ribbons for Primage and Diablo 1640/630, 1 lb. . . 18.00
HCS-52, 3 ribbons for H/WH-14 and ASR-33 Printers, Shpg. wt. 1 lb. . . . 8.00
HCS-54, One ribbon for LA-34 Printer, Shpg. wt. 1 lb. 29.00
HCS-55, One plug-in ribbon cartridge for MX-80 Printers, 1 lb. 14.00
HCS-56, 2 plug-in ribbon cartridges for H/Z-25 and H/Z-125, 3 lbs. 20.00
HCS-57, One plug-in ribbon cartridge for WH-64 Printer, 1 lb. 12.00

Accessories for the MPI-150 Printer

MPI-150-2, Serial adapter card for MPI-150 Printer, allows asynchronous serial data transfer up to 9600 baud, Shpg. wt. 1 lb. **110.00**
MPI-150-3, MPI-150 programmable status keypad, Shpg. wt. 2 lbs. **130.00**
MPI-150-4, 64K buffer memory expansion for MPI-150, 1 lb. **259.00**

MPA-1, H/Z-100 AP-PAK is a graphics applications package that enables the MPI-150 Printer to print out any H/Z-100 graphics character, large displays and decorative fonts. Includes interconnecting cable; some features require GW-BASIC. Shpg. wt. 1 lb. **75.00**

MPA-3, H/Z-89 AP-PAK is a graphics applications package that enables the MPI-150 Printer to print out any H/Z-89 graphics character, large displays and decorative fonts. Includes interconnecting cable; some features require MBASIC. Shpg. wt. 1 lb. **75.00**

MPA-4, H/Z-90 AP-PAK is a graphics applications package that enables the MPI-150 Printer to print out any H/Z-90 graphics character, large displays and decorative fonts. Includes interconnecting cable; some features require MBASIC. Shpg. wt. 1 lb. **75.00**

Accessories for the single-pen ET-500 Plotter

ETA-500-1, 100 sheets of 8½" x 11" plotter paper, 1 lb. **7.50**
ETA-500-2, Four replacement pens (red, green, blue and black), 1 lb. **9.95**
ETA-500-3, Transparency Presentation Package consisting of a set of 50 blank transparencies, two sets of pens and instruction sheet, 4 lbs. **89.95**

The President's Letter:

Dear Friends,

500 Master Builder Points – just for joining the Master Builder Club.

That's what we're offering because we don't want you to miss out on all the "for members only" offers planned for 1985 and beyond. More than 8,000 Heathkit customers have already discovered the benefits of belonging to the Master Builder Club. Check out page 52 for more details on the Club's first year.

If you are already a Club member – watch your mail for a special April offer. It's coming soon!

On page 53 you'll notice that all of our stores have a new name: **Heath/Zenith Computers & Electronics,** a new name that reflects our determination to become one of the most important computer and electronics retailers in North America.

And, our commitment to you to provide a full line of electronic kit and assembled products will continue. On page 70, for example, you'll find the first-ever **Laser Course and Trainer.** If you're into computers, check out pages 98 and 99 for our new **AutoCAD Drafting and Design Software** and companion tutorial course. And a new **Terminal Node Controller** is featured on page 32.

There's a lot of news in this catalog – new products, new store name, and a new Master Builder offer! And if you are not already a Master Builder Club member, sign up now. Your 500 points are waiting just for you!

Sincerely,

Joe Schulte

Joseph M. Schulte
President
Veritechnology Electronics Corporation

The Heathkit Index

For the Heath/Zenith Computers & Electronics Center* nearest you see page 55. Retail prices, special offers herein are effective April 2, 1985 through July 15, 1985. Prices, product availability and specifications are subject to change without notice. Veritechnology Electronics Corporation cannot be responsible for typographical and pictorial errors. Printed in the U.S.A.

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Retail Catalog No. 869R • Spring/Summer 1985

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