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a 10MB hard disk –  
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Analog Trainer and  
Backpack – see page 58



Wireless Security  
System – see page 102



Logic Analyzer  
converts PC into  
a test instrument  
– see page 42



Pack-Kit Multi-Mode TNC  
and 1KW Linear Amplifier –  
see pages 32 and 36

# Heathkit®

Helping you make things better



**I have a special gift for you! This original Old Timer Schrade Cutlery Mighty Mite Lockblade can be yours absolutely free with any catalog purchase of \$25 or more made before September 11, 1987.**

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The catalog that you hold in your hands is the most complete mail order computer and electronics catalog around. It's filled with all the information you need to make the selection that's just right for you. From amateur radio kits to products for the home to consumer-ready products and much more. We have it all!

And I'm sure you haven't forgotten the benefits of owning a Heathkit kit product – fun, product knowledge, and do-it-yourself satisfaction. Plus, with each kit we promise that "We won't let you fail!"

For easy ordering, simply fill out the order form or call our TOLL-FREE number, using your Visa, MasterCard or Heath Revolving Charge. Bonus offer expires September 11, 1987. Happy shopping!

Sincerely,

*William E. Johnson*  
William E. Johnson  
President

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WP-503

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Dear Friends,

When I joined Heath Company back in 1957 I knew it was going to be an exciting career. I just didn't know *how* exciting. That's because new products are a way of life in the technology business and every year seems to get better; more new ideas, more new devices and more new products to whet our appetites.

This new Fall catalog is certainly a good example of what I'm talking about. Over 25 new products make their debut on these pages...and there's something new for every interest. You'll find a full line of new home security products on pages 100 through 103. They're all based on the latest infrared technology and priced within easy reach of everyone. New test instruments include a new logic analyzer that taps into the power of your computer, two new oscilloscopes and a clamp-on ammeter. Plus amateur radio customers will find the SB-1000 1 KW Linear Amplifier to be an excellent value...and there's a new HK-232 Multi-Mode TNC that even decodes weather facsimile pictures. To the already-famous ZFL-181 IBM compatible Laptop Computer we've added even more features plus 10MB Winchester capability. And in the education section you'll find a whole new line of Analog and Digital Trainers plus new courses.

And there's lots more. All backed by our pledge of superior customer service and support...either directly from our factory or through any of 68 Heath/Zenith Computers & Electronics Centers throughout the United States and Canada.

Sincerely,

William E. Johnson  
President, Heath Company

## For You...A Company That Offers More

Heath Company is a subsidiary of Zenith Electronics Corporation. Working in conjunction with companion subsidiaries Veritechnology Electronics Corporation and Zenith Data Systems, we can offer you the latest in computer and electronics technology.

In addition to our fifty-year history as the world's leading electronic kit manufacturer, we offer quality pre-assembled products, a wide variety of educational courses, the Heathkit Master Builder Club and technical support by phone or by mail.

We also have several convenient ways to shop. Select products at your convenience in the comfort of your home through mail order or use our toll-free phone number (except Michigan and Alaska). You can even order by computer using on-line services (see page 54). Plus you can visit any of the nation-wide Heath/Zenith Computers & Electronics one-stop shopping retail centers.



## You Have a Friend To Talk To

We're proud of our technical consultation team. They are highly-trained specialists in their own areas. Whether you own a computer, TV or an educational, amateur radio, instrument, weather or home electronics product, a simple phone call is your direct line to a consultant who knows all about your product. Just call the number assigned to your product area listed on page 54 of this catalog or inside the assembly instruction manual included with your kit. Our consultants, available during regular business hours, will promptly and courteously troubleshoot any problem you might have. This same professional help is also available through your nearest Heath/Zenith Computers & Electronics center (consult the telephone book white pages).

We feel that, as our special customer, you've put your confidence in us as your partner. And partners support one another. That's why we've set up a service and support network that keeps us in close touch with you. Even if you want to write us for information or answers, we'll do our best to answer your written correspondence within three business days of receiving your letter.

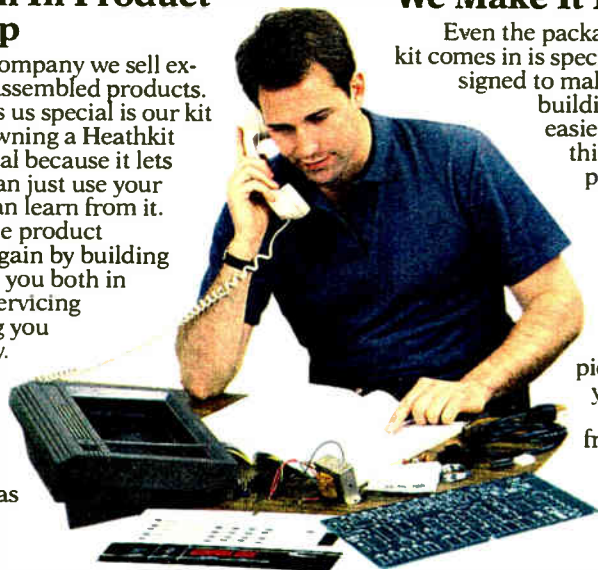
In keeping with our partnership, we fully understand that without you, our company wouldn't exist. That's why we do all we can to make sure you successfully build your product. We want you to feel good about the product you buy. We want you to feel good about yourself.





## Kitbuilding – A New Dimension In Product Ownership

At Heath Company we sell excellent kit and assembled products. But what makes us special is our kit product line. Owning a Heathkit product is special because it lets you do more than just use your product...you can learn from it. What's more, the product knowledge you gain by building it yourself helps you both in operating and servicing your kit – saving you time and money. And there's that unique bonus – the sense of pride and accomplishment you experience as a kit builder.



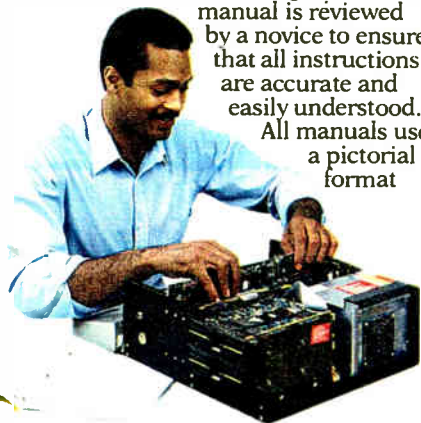
## Even From The Start We Make It Easy

Even the package your kit comes in is specially designed to make your kit building go a little easier. Everything is packed in sections so that locating a part is quick and easy. And there's little chance you'll mix up pieces because you only remove a part from the box when you need it.

## We Won't Let You Fail – Building Instructions

We know how important it is that instructions be clear, concise and easy to understand. That's why we've spent a lot of time and effort to make our manuals complete and easy to follow.

Our manuals are written by technical experts who know about the product you are assembling. And each manual is reviewed by a novice to ensure that all instructions are accurate and easily understood. All manuals use a pictorial format



that reduces even the most complex procedures to simple steps. Instructions of just a few sentences reference well-drawn illustrations. And additional detailed drawings are placed wherever there's a need for clearer understanding of an assembly step.

And each manual contains an introduction to the assembly process, soldering information, a detailed parts identification chapter, kit operation section, troubleshooting chart and specifications.

## You're Never Alone

If you ever need any help at all, just give our technical consultation line a call. Our specially-trained consultants are always there to answer questions and help you through the building process. It's all part of our partnership philosophy – we only succeed if you do.

## GENERAL INFORMATION FREE HEATH/ZENITH PARTNERSHIP PACK

A big package of savings worth up to \$500, and possibly more, is yours free with the purchase of any Heathkit Personal Computer. The Heath/Zenith Partnership Pack includes:

- **A free 1-year extended warranty** – an extra nine months of protection beyond the normal 90-day warranty for your computer.
- **A free diagnostic check-up** – receive a complete diagnostic check of your computer including cleaning the heads of the floppy disk drives.
- **Discounts on winchester or floppy upgrades** – expand the data storage capability of your computer by adding a compatible winchester or 5¼" floppy drive listed in this catalog...and at tremendous savings.
- **Discounts on software** – save big on popular software packages, the savings vary according to the cost of the software.
- **Free software offer** – even get a software package free with a great deal inside the Partnership Pack.
- **Free computer training** – learn how to get the most from your computer through this special offer with an estimated retail value of up to \$80.

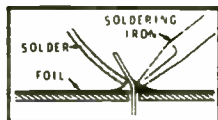
Full details on all of these savings are provided inside the Partnership Pack. Get a package with your name on it and maximize the benefits from your computer.



Hold a 47k (yellow-violet-orange) resistor with long-nose pliers and bend the leads straight down to fit the hole spacing on the circuit board.



Press the resistor against the circuit board. Then bend the leads outward slightly to hold the resistor in place.



As the solder begins to melt, allow it to flow around the connection. Then remove the solder and the iron and let the connection cool.

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**OUR CATALOG IS FILLED WITH EXCITING PRODUCTS YOU'LL BE PROUD TO OWN.**

Just turn the page.

July-September 1987

We've marked this season with quality products for your whole family to enjoy. The Heathkit Fall Catalog has something for everyone!



Convenience Light Control p. 24



Fischertechnik  
Compressor p. 111

Answering Machine/  
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*Call Now!  
Toll free  
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Wireless FM  
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*New  
9" TV  
kit to  
build*

9-inch portable TV p. 18







Heath products offer a unique blend of modern ingenuity, everyday convenience and superior quality to better help you in your busy life. Now you can choose from our selection of quality Heath kits you build yourself or from our

excellent collection of consumer-ready products. Look for all the exciting new products we've introduced in our Fall Catalog. See how our complete line of quality Heath products can help make your life better.



**Intelligent Machines**  
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Automation Course p. 69



**Smart Outlet**  
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**Advanced PC**  
p. 82



**256K Printer Buffer** p. 92



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Monitor p. 108

*Easy  
to use -  
works  
great!*



**Dual Trace Oscilloscope** p. 105



**2400 Baud**  
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**Digital Clock** p. 16

**Rain Gauge**  
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**Speaker**  
Phone p. 13

*Discover  
fun and exciting  
new products*



**Digital Weather**  
Station p. 14

**Turn the pages for  
all this and more**

You'll find many more innovative products on the following pages. New products are highlighted throughout. Take time to browse through our full-color catalog and discover products that can provide you with fun and enjoyment the whole year round.

## The Heathkit Pledge

You *will* succeed. Carefully written instruction manuals help make certain that you clearly understand the assembly and operation of your kit. Step-by-step instructions include large, detailed pictorials, while sections on product operation, specifications and troubleshooting give you a complete package of valuable information. And if you ever have any questions, just call or write our Heath Technical Consultants or consult your nearest Heath/Zenith Computers & Electronics Center. They'll be more than happy to help you solve your problem. So, with a team like this behind you, you're sure to be a winner. After all, we've built our world famous reputation on this one simple pledge:

**"We won't let you fail!"**



### Have bright, portable light when you need it

The Heathkit Rechargeable Portable Light bathes the area around you with a bright, yet eye-soothing fluorescent light for a variety of uses. It helps you see a wider area without eye-straining shadows. It's also safer to use than candles or kerosene lamps, and brighter than both put together. What's more, the AC and DC battery chargers that come with this kit let you recharge your light from any AC outlet or car cigarette lighter socket – over and over again. Designed for rugged use, it's perfect for camping, shop work or for use during power outages. A single charge lasts several hours. Heavy-duty metal case measures 10 $\frac{5}{8}$ " H x 3 $\frac{1}{8}$ " W x 5" D. Kit **GD-1246-A** \$49.95, ship wt 6 lbs.

### This radiation monitor fits in your pocket

Here's a shirt-pocket sized radiation monitor with exceptional sensitivity that's ideal for use in industrial, medical, educational and commercial applications – even around your home. Our monitor uses the sensitive, industry standard Geiger-Mueller tube. And for the ultimate in accuracy, your monitor can optionally be calibrated to a standard traceable to the National Bureau of Standards Cesium 137 Gamma source. A beeper indicates that radiation has been detected and the easy-to-read meter shows measured levels on three selectable ranges. Requires a 9 VDC battery. 5 $\frac{3}{4}$ " H x 2 $\frac{7}{8}$ " W x 1 $\frac{1}{2}$ " D. Kit **RM-4** \$129.95, ship wt 2 lbs.



See March



Review





Heathkit products:  
fun and enjoyment  
for the whole family



## Have fun and sure success with this AM radio starter kit

The Heathkit Portable AM Radio is a perfect way to get your child interested in electronics and kitbuilding. It's an ideal first time project for anyone that's just starting out in kitbuilding. Simple assembly instructions, combined with the thrill of "turning it on" as soon as it's built, are sure to provide a delightful experience for the beginning kitbuilder. Clear tone, excellent AM sensitivity and a high-gain ferrite rod antenna for long-distance reception are just a few of the features that are part of this AM radio kit.

Requires a 9-volt battery (not included) or use the PS-2350 Battery Eliminator (p. 47). Includes earphone. Build in less than two evenings. 3 1/4" H x 6 3/8" W x 1 1/4" D. Kit GR-1009 \$19.95, ship wt 2 lbs.

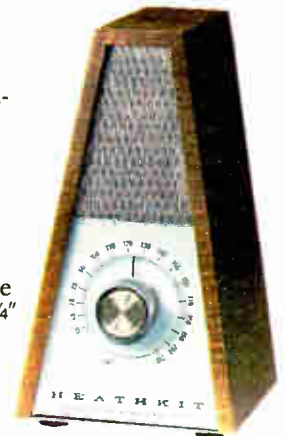
## Get more with this affordable amplifier

Switch on the power, turn up the volume and enjoy the added boost your headphones or alternate speaker system receives with this Multi-Purpose Solid-State Mono Amplifier. You'll experience the clean sound provided by 3.25 watts, minimum RMS, going into your 8 Ohm speakers – and with less than 1.5% total harmonic distortion from 40-20,000 Hz. This easy-to-build two evening kit takes a minimum 250 mV audio signal from sources like televisions, tape players or radios, and cleanly amplifies it.

Operates on 120/240 VAC, 50/60 Hz. 2 3/8" H x 7 3/4" W x 5 1/2" D. Kit AA-18 \$39.95, ship wt 4 lbs.

## Keep perfect time

Let the precision of electronics keep your tempo on track with a steady, authentic metronome sound. Set the tempo you want on the front panel, adjust the "tick-tock" volume on the back. You can even relate the number of beats per minute to tempos in different time signatures. Variable between 40 and 210 beats per minute and housed in a cherry-finish birch enclosure, this unique Electronic Metronome is both versatile and attractive. 6 3/4" H x 3 3/4" W x 4" D. Kit TD-1257 \$29.95, ship wt 2 lbs.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.

Relax and enjoy peace of mind knowing that these inconspicuous Heathkit alarms are doing their job.

The GD-1183 Freezer Alarm warns you about rising temperatures in your freezer, while the GD-1701 Flood Alarm detects unwanted water when it first appears in your home.



## This handy tester won't let your batteries play dead

Don't throw away those batteries until you've tested them with the Heathkit Battery Life Tester. It tests whether batteries are live or dead, and shows you how much useful life remains on a wide 0-5 meter scale. This money saver tests alkaline and carbon-zinc 9V and 1.5 "AA," "C" and "D"-size batteries or 1.2V rechargeables. Get maximum use from your batteries and have fun building this easy one-evening kit. 1 $\frac{5}{8}$ " H x 2 $\frac{1}{2}$ " W x 3 $\frac{1}{2}$ " L. Kit **GD-1703** \$16.95, ship wt 1 lb.



## Here's a food and money saver

The freezer door left ajar or an unnoticed blown fuse almost certainly spells disaster for your freezer food, right? Not if you have the Heathkit easy-to-build Freezer Alarm. If the temperature inside your freezer rises above +20°F, both the two-speed beeping alarm and the red flashing LED spring into action. They'll go slowly at first, and pick up speed if the condition continues.

A two-hour kit that includes 20 feet of thin hook-up wire plus a temperature and a door ajar sensor. A real handy little friend! 1 $\frac{3}{4}$ " H x 3 $\frac{3}{8}$ " W x 4 $\frac{7}{8}$ " L. Kit **GD-1183** \$19.95, ship wt 2 lbs.

## Spend a little – save a lot

If you've ever experienced leaking water pipes or a seeping basement wall, you know what water damage can do. But with the Heathkit Flood Alarm, you can avert costly water damage. Take less than three hours to build an alarm that will alert you to a water problem. 1 $\frac{3}{4}$ " H x 3 $\frac{3}{8}$ " W x 4 $\frac{7}{8}$ " L. Kit **GD-1701** \$24.95, ship wt 2 lbs.



## Protect your empty home

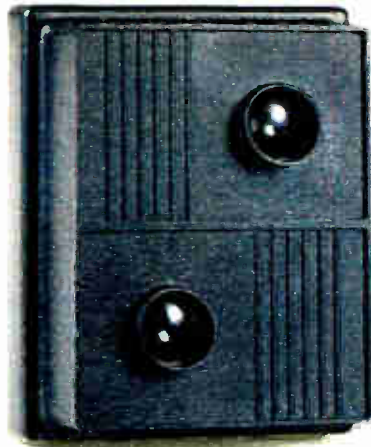
The Heathkit Photoelectric Light Switch is sure to ease your worries when you are away from home. It turns selected lights on in the evening and off at dawn – all automatically. It gives a "lived-in" look to your empty house. Just plug in the switch, adjust the sensitivity and you have complete control of lamps or other AC-operated devices up to 150 watts.

The Photoelectric Light Switch is a unique form of insurance that's low in cost, but high in value. It's also a quick one-evening kit. 3 $\frac{1}{2}$ " H x 2 $\frac{3}{8}$ " W. Kit **GD-600** \$9.95, ship wt 2 lbs.



## Electronic Security

Imagine having a guard on duty at your home all night long. Now you can have the same feeling of security with the Heathkit Photobeam Alarm Relay. It detects intruders instantly with a narrow beam of light that's reflected back to the Alarm by a mirror. When the beam is interrupted, the Relay can activate a lamp or any 120 VAC warning device up to 300 watts total. Housed in an attractive small-sized cabinet, the Alarm Relay serves as an inconspicuous sentry to your home. A one-evening kit. 5 $\frac{3}{8}$ " H x 4 $\frac{3}{8}$ " W x 5 $\frac{1}{4}$ " D. Kit **GD-1021** \$19.95, ship wt 3 lbs.



## Get professional cleaning results

Now you can use the same ultrasonic method popular with professional artisans, jewelers and coin collectors to clean and sanitize precious, delicate items. The Heathkit

Ultrasonic Cleaner makes items that might otherwise be damaged by abrasive scrubbing or harsh cleansers sparkle like new. It literally vibrates dirt, stains and undissolved solids from hard-to-clean jewelry, watch parts, glass, coins, components, dentures, paint brushes and more. All delicate items, except pearls and turquoise, are safely cleaned without abrasion.

The Ultrasonic Cleaner is extremely efficient and uses ordinary laundry soap or softener for most cleaning jobs. Just fill the 6" L x 4" W x 2 $\frac{3}{8}$ " D tank with one inch of solution and this gem of a cleaner is ready to go to work. Build this efficient and affordable kit in one quick evening. Plugs into household AC outlet. Kit **GD-1151** \$99.95, ship wt 5 lbs.





## Make your universal motors variable speed

Save energy and wear and tear on any of your universal-type motor-driven devices. With the Motor Speed

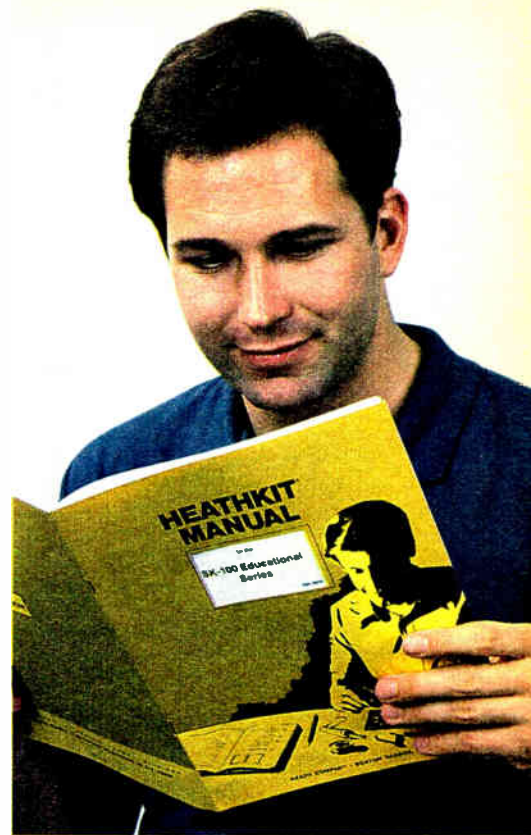
Control, you can use a large drill to cut through steel at slow speed without overheating the motor. Because it varies the motor speed with virtually no torque loss, it's ideal for use with electric hand tools and small household appliances. You will also learn the function of a diac and triac for AC control with this easy Starter Kit. Just follow the lesson in your optional Starter Kits Educational Manual. Operates on 120 VAC, 60 Hz. 2" H x 5 3/8" W x 3 5/8" D. Kit **SK-103** \$34.95, ship wt 1 lb.



Use your Visa or MasterCard to purchase your kit!

## Add fun to your next party

Add some sure party success to your next get-together. The Sound Flasher makes Christmas tree lights or lamps respond to room sound such as music or voices. It controls up to three strings of lights, making them brighter or dimmer according to ambient sound. This Starter Kit demonstrates the use of pulses to control lamp brightness and explains rectifier theory when used with the optional Starter Kits Educational Manual. Operates on 120 VAC, 60 Hz. 2 1/4" H x 3 1/8" W x 5 7/8" D. Kit **SK-109** \$16.95, ship wt 1 lb.



## Learn Electronics while building Starter Kits

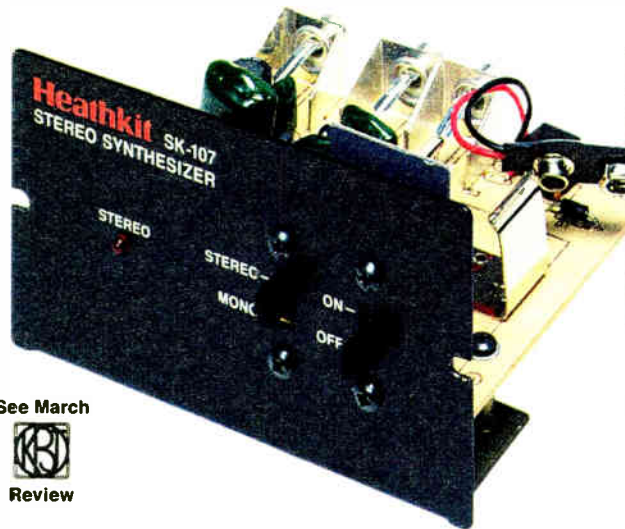
Turn Starter Kits into learning tools with the Starter Kits Educational Manual. It teaches you the electronic principles used in all of the SK-100 Series Starter Kits. With this manual, you'll gain additional satisfaction from kitbuilding by understanding the why and how behind your kit's operation.

Each kit is discussed in a separate lesson which is complete in itself. So, you need not follow a specific order as you choose and build Starter Kits. Lessons include an introduction and learning objectives. Topics are broken down into small units for easier learning, and many of these units contain quizzes so you can measure your learning progress. A test at the end of each lesson checks what you have learned. **SK-100** \$10.00, ship wt 1 lb.

**SAVER!** Buy any two SK-100 Series Starter Kits (SK-100 thru SK-111) and get the SK-100 Series Educational Manual FREE. Just write SK-100 on the order form and "No Charge" in the price column.



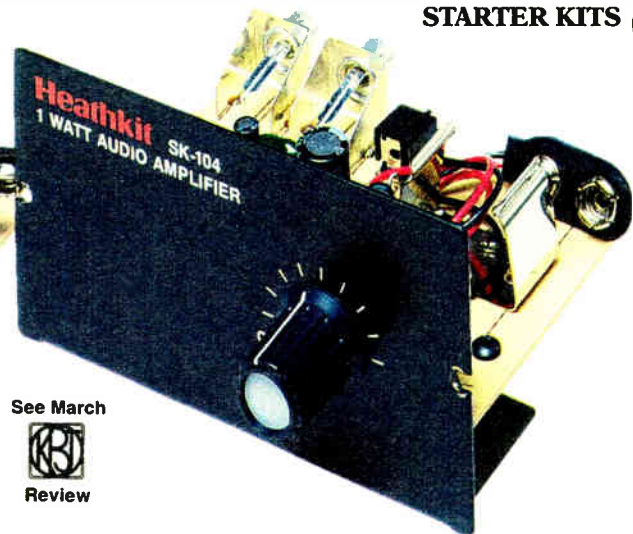




See March



Review



See March

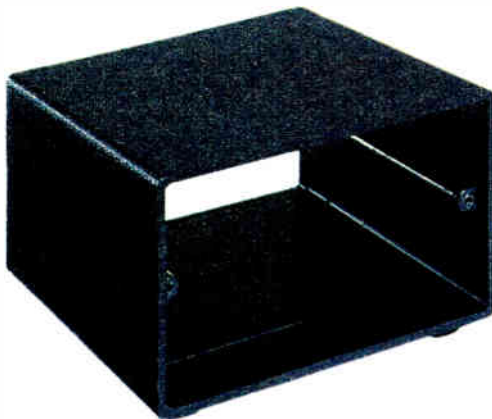


Review

## Enjoy the realism of synthesized stereo

Get more enjoyment from TV viewing simply by adding this low-cost Stereo Synthesizer. It has two modes: Mono and Pseudo-Stereo. Pseudo-Stereo converts a mono input into two different channels for synthesized stereo. The Mono mode allows straight through operation.

Used with the Starter Kits Educational Manual, the Stereo Synthesizer demonstrates the purpose of low-pass, high-pass and band pass filters. Order separate SK-99 Cabinet (below). Requires 9V battery or PS-2350 Battery Eliminator (p. 47). Kit **SK-107** \$16.95, ship wt 1 lb.



## The finishing touch

Slide your SK-104 Audio Amplifier or your SK-107 Stereo Synthesizer into this tough and attractive black cabinet to finish up your kit. 2 $\frac{3}{8}$ " H x 4 $\frac{1}{8}$ " W x 3 $\frac{1}{2}$ " D. Kit **SK-99** \$6.95, ship wt 1 lb.

## Boost your audio

Get extra sound and listening pleasure with the 1-Watt Audio Amplifier. It expands the sound of radios, portable tape players, TVs, intercoms or other audio equipment. For easy hookup between your audio equipment and speaker, the Amplifier has a phono input and output socket.

Follow the lesson in the optional Educational Manual to learn how your amplifier operates and how to change gain and frequency response. Order separate SK-99 cabinet (below). Requires 9V battery or PS-2350 Battery Eliminator (p. 47). Kit **SK-104** \$14.95, ship wt 1 lb.

## Easily communicate from room to room

Talk to a family member in another room of the house without leaving what you're doing. Or call someone to the phone without running to another room or shouting for them. The Heathkit Intercom will be appreciated by the whole family. You'll soon wonder how you ever did without it!

You can link up to four intercoms using two-conductor wire (at least two intercoms are required). The Intercom has excellent audio quality so you'll hear messages clearly. It runs for months on one 9V battery (not included) since current is drawn only when the unit is being used. The Intercom can also be powered by the PS-2350 Battery Eliminator (p. 47).

Follow the lesson in the optional Educational Manual to learn about audio amplifier theory and matching different impedances. 4 $\frac{1}{2}$ " H x 3 $\frac{1}{4}$ " W x 1 $\frac{3}{4}$ " D. Kit **SK-108** \$19.95, ship wt 2 lbs.









## Be a DJ or talk show host

Entertain your friends or start your own radio show with this FM Wireless Microphone kit. Transmit your voice to any FM radio up to 50 feet away. It's a sure way to liven up any party. In less than one evening you can assemble a fun kit and also learn about FM radio theory with the optional Starter Kits Educational Manual (p. 10). Operates on two watch batteries (included). Kit **SK-106** \$9.95, ship wt 1 lb.

## STARTER KITS ①



## Sound activated switch

This simple unit lets you turn on anything from a TV to a lamp from across the room – just by clapping your hands. The first time the Switch picks up a loud sound it turns on the device. The next time it picks up a loud sound it turns off the device. Used with the optional Starter Kits Educational Manual, this kit demonstrates the operation of a flip-flop circuit. Uses 120 VAC. 2 1/4" H x 3 1/8" W x 5 7/8" D. Kit **SK-111** \$16.95, 1 lb.

See May



Review

## Hands-free phone conversations

Continue with other activities during a telephone call. The Heathkit Speakerphone Starter Kit frees both your hands while allowing you to carry on a phone conversation. You can even answer your phone without lifting the handset from its cradle. Connect the Speakerphone to your phone line by plugging it into your standard modular telephone connector. This device is phone-line powered so you don't even need batteries. Volume, privacy and answer controls are all there is to operating the Speakerphone. As you build your kit, follow the matching Educational Manual lesson and learn about rectifiers and filters. 2" H x 5 3/4" L x 4 3/4" D. Kit **SK-110** \$39.95, 2 lbs.

See January



Review



## Attract fish to your favorite spot

You won't believe that attracting and catching fish can be this easy. But you'll find that it is with our simple-to-build Fish Caller. The Fish Caller produces a clicking sound resembling the sound made by a dying fish. The sound travels through water to attract hungry fish to your area. You can just relax and wait for the fish to come to you.

Used with the optional Starter Kits Educational Manual (p. 10) you can learn about the 555 timer IC. Requires a 9V battery. Kit **SK-105** \$4.95, ship wt 1 lb.



## Keep your eye on the weather

The Heathkit Digital Weather Computer is an indispensable addition to your home. It's also great for industrial use or anywhere you need to know exact weather conditions. You'll use it every day to find out current conditions in the area where you live. Never again rely on weather information from a distant airport. And, it's up to date information is perfect for the outdoorsman, pilot or boater.

Everyone using the Weather Computer will appreciate the microprocessor controlled memory that stores weather data by date and time. High and low readings give you: the high temperature for the day, the low temperature from the previous night, and the time that the last high or low pressure front moved through your area. Check the rate of barometer change to tell you the severity of a storm and look at both wind direction and barometer readings to determine the near-future weather picture. With all this information at your finger tips, you'll always be prepared for what the weather is doing, and you can plan all your outdoor activities with confidence.

How does this amazing machine work? It has both a remote windcup and a weathervane transmitter with solid-state infrared sensors and optical encoding technology for unsurpassed accuracy. These mount to a compact boom assembly. The assembled IDW-4001 includes 100 feet of cable. Kit ID-4001 requires cable from ID-1290 accessories (p. 15).

Not only is the Heath Weather Computer finely-crafted for performance, but it's also attractive in appearance. A compact size of 7¼" H x 16" W x 6" D and weighing only 9 lbs., this top-grade instrument is stylishly housed in a solid oiled-walnut cabinet. Kit ID-4001 \$399.95, ship wt 15 lbs. Assembled IDW-4001 \$699.95, ship wt 25 lbs.

Other 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°. **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), 948 to 1083 millibars. **Basic Accuracy:** ± 0.25% plus ± 0.033%/°C. **Operating Temperature:** Outdoor assemblies, -40°C to +70°C (-40°F to 158°F). Indoor Unit, 15°C to 35°C (59°F to 95°F). **Power Requirements:** 120/240 VAC. Provision for external battery connection for memory backup during power failures.



## Measure rainfall without the guesswork

With the Heathkit Digital Rain Gauge, you'll know for sure when to water your lawn or garden, or sprinkle the flowers. Place the attractive display unit indoors and mount the outdoor measuring device on a roof, fence post or antenna tower. Your gauge will record rain in 1/100th's of an inch up to 9.99" or in 1/10 of an inch up to 99.9". You won't even have to worry about power outages because a 9-volt backup battery (not included) powers memory and maintains accurate measurement during power loss. The display unit measures a compact 2½" H x 7" W x 5" D. The sensor measures 9" in diameter x 9⅝" H. Includes 60' cable and power cube for convenient 120 VAC operation. Kit ID-1795 \$99.95, ship wt 7 lbs.





## Monitor weather conditions with your own station

Keep track of the weather in style with the Heathkit 5-Function Weather Station. Use your Weather Station to instantly get accurate weather information as it happens. True indoor/outdoor temperatures are displayed in Fahrenheit or Celsius with a switch to select indoor or outdoor readings. Professional grade sensors also monitor barometric pressure and wind speed and direction. The anemometer/weathervane is easily mounted to any standard 1" to 1½" mast.

Designed for quality and reliability, the Weather Station operates with minimum power consumption and has a non-corroding remote transmitter assembly to ensure years of trouble-free service. A 4-evening kit, the Weather Station can be wall-mounted or used as a desk set with the included stand. Wall-mounted, 20½" L x 7" W x 2" D. Desk mounted, 6¾" D. Kit **ID-1290** \$169.95, ship wt 8 lbs.

Accessories: **IDA-1290-1** 50' cable \$11.95, ship wt 2 lbs. **IDA-1290-2** 100' cable, \$19.95, ship wt 4 lbs. **IDA-1290-3** 150' cable \$26.95, ship wt 6 lbs.

WEATHER



Other Specifications: **Wind Speed:** 0-30 mph, ± 2 mph; 0-90 mph, ± 5 mph. **Direction:** 8-point readout over 360°; 16-point resolution by lighting two adjacent lights. **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.



## Monitor air moisture for comfort and savings

Now you can reduce heating and cooling costs with the Heathkit Relative Humidity Instrument. It helps you determine when to turn on the humidifier indoors or the best time to paint outdoors. You get accurate readings even in remote locations with the electronic sensors and 100' transmission cable. Bright ½" digits display the humidity in percent. Choose alternate indoor/outdoor readings or display one reading constantly. Build in just 2 or 3 evenings and also learn how it operates with our comprehensive assembly manual. 2½" H x 7" W x 5" D. Kit **ID-2295** \$99.95, ship wt 6 lbs.

Other Specifications: **Measurement Range:** 10%-90% relative humidity. **Accuracy:** 25°C, ± 10 counts; 0°-55°C, ± 20 counts. **Operating Temperature Range:** 0°-55°C (32°-131°F). **Power Requirements:** 120/240 VAC, 50/60 Hz.

## Use digital technology to monitor the winds

The Heathkit Digital Wind Speed/Direction Indicator combines both a non-corroding anemometer and weather vane for truly accurate readings with an attractive indoor console display that has 16-point resolution for always-easy viewing. You can wire the Indicator to read in two of three scales: mph, km/h or knots, plus you can calibrate for either true north or magnetic north. Requires one of the 8-wire cables from the ID-1290 accessories (above). Operates on 120 VAC. It's a breeze to assemble in just three evenings. 2½" H x 7" W x 5" D. Kit **ID-1590** \$99.95, ship wt 7 lbs.

Other Specifications: **Wind Speed:** 0-99 mph, ± 1 digit or ± 10%. **Wind Direction:** 8-point readout over 360° with 16 points of resolution. **Wind Speed Sensitivity:** 3 mph, 4 km/h, or 2 knots. **Operating Temperature:** Receiver: 0° to 150°F. **Transmitter:** -40° to 150°F. **Power Requirements:** 108-132 VAC, 50/60 Hz.

## A better household thermometer

Accurate temperature readings are also convenient with our Digital Indoor/Outdoor Thermometer. Large, orange display digits can be clearly seen at any time of day or night, plus two sensors allow for continuous or alternating indoor/outdoor readings. The 2½ digit display even shows above- and below-zero temperature in Fahrenheit or Celsius. It's a cinch to build in just three evenings. Operates on 120 VAC, 60 Hz. (Order ID-1390-BE for 240 VAC, 50/60 Hz operation.) Measures 2½" H x 7" W x 5" D. Kit **ID-1390-B** \$89.95, ship wt 4 lbs.

Other Specifications: **Temperature Range:** -40° to +120°F, -40° to +50°C. **Accuracy:** ± 1°C from -15°C to +50°C, ± 2°C from -40°C to -15°C; ± 1°F from +20°F to +120°F, ± 2°F from -40°F to 20°F.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.

## A clock to get you up on time — even if power is interrupted

This attractive and reliable digital clock is also a fun and easy kit to build. It's perfect to introduce you or your youngster to kitbuilding. You might build the clock as a gift for someone special or just give the kit as a gift for the ideal way to get someone else started in kitbuilding.

After completing this fun-to-build kit, you have an alarm clock you can rely on to get you up in the morning. The Heathkit GC-1108 Digital Clock has a built-in battery backup feature to keep its internal clock circuits running and to keep you on time. (9-volt battery not included.) In addition to being dependable, the GC-1108 digital clock is easy to read and operate. It displays hours and minutes, and the month and day, using

four large, green

LEDs. For comfortable reading at any time of the day or

night, the display's

brightness automatically varies according to the surrounding

light. You also have the option of wiring

the GC-1108 for either a 12-hour or 24-hour display mode.

In the 12-hour display

mode, a red PM indicator will light during

the appropriate time period. A snooze pushbutton on the top of the cabinet causes the alarm to sound at 9-minute intervals whenever you press it. You can take as many 9-minute intervals as you like and set the alarm's volume level at high or low, whichever is right for you.

It's also easy to set both the time and the alarm. Now you can wake-up to a pleasant alarm sound, an easy-to-read LED display and the security of a battery backup system.

The GC-1108 is attractively styled in a dark grey cabinet. Build this kit quickly and easily in just two evenings. 2 $\frac{7}{8}$ " H x 7 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D. Operates on 120/240 VAC, 50/60 Hz. Kit GC-1108 \$24.95, ship wt 4 lbs.

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Review



FAST, EASY  
2-EVENING KIT





failure, the Most Accurate Clock resets itself to the correct time.

It's the first affordable, microprocessor-based time machine that provides the ultimate "Hi Spec" accuracy of  $\pm 10$  milliseconds. You get a bright digital readout in hours, minutes, seconds and tenths-of-seconds. An RS-232C Accessory allows this data, along with the date, to be fed to your computer. You can even listen to the NBS broadcast over the audio monitor and keep track of the data transmission.

Bright LEDs show which WWV frequency is being received, when 'capture' of the time-encoded NBS carrier occurs, when data is being received and when the Clock is at "Hi Spec" accuracy. Simple switch changes allow you to set 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 GC-1000 Most Accurate Clock is powered with standard home 120 VAC or 12 VDC. An outdoor antenna is recommended, but may not be required in your area.  $3\frac{7}{8}$ " H x 9" W x  $6\frac{1}{4}$ " D. Kit GC-1000 \$249.95, ship wt 7 lbs.

Accessory: GCA-1000-1 RS-232C Output Accessory for kit GC-1000. Required for use with a computer \$49.95, ship wt 1 lb.

## Get the exact time with the Heath Most Accurate Clock

Experience the precision of a microprocessor-based time piece that is synchronized with the National Bureau of Standards cesium atomic clock. The patented Heath Most Accurate Clock locks onto the NBS standard for unparalleled accuracy. The GC-1000 sets itself to the correct time when it locks onto WWV, the NBS radio station. Even after a power

See March



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Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.



## The perfect wall clock for any decor

With its simulated oak wood-grain finish cabinet, the Heathkit Digital Wall Clock lends its style and versatility to any room in your home. And what's more, 1" high LCD digits clearly and legibly display time in a 12- or 24-hour format. The Digital Wall Clock is also efficient. It has quartz-crystal accuracy of  $\pm 1$  minute per year while running up to two years on a single 1.5 "AA" alkaline cell. An easy-to-build one evening kit.  $5\frac{1}{4}$ " H x  $7\frac{1}{8}$ " W x  $1\frac{1}{2}$ " D. Kit GC-1720 \$49.95, ship wt 2 lbs.

## New fun sized 9" color TV

The GR-9009 9"-diagonal color television is designed to "get up and go." You can take this portable with you while you're camping, relaxing by the pool, working in the garage or preparing a meal in the kitchen. Now you can follow along with your favorite cooking or do-it-yourself program because this TV can go anywhere you go. It operates anywhere there's normal house current (AC) or through a 12-volt DC (negative ground) lighter socket in automobile electrical systems.

This easy-to-carry, ultra-compact sized portable with all its advanced features provides you with excellent performance wherever you take it. The Chromacolor Contrast picture tube features reflection-absorbing glass for exceptional contrast and color fidelity. You get bright, true-to-life colors with its black matrix and tinted phosphors. Plus, the in-line electron gun produces remarkable picture detail and dramatically improved edge and corner sharpness. Quartz-controlled electronic tuning has 178 channel capability and makes channel selection convenient and exact – with no moving parts to wear out or cause picture problems. Once adjusted, the TV maintains accurate color, tint and contrast with the auto-control color system. The system also blends color levels and tint for lifelike flesh tones and assures channel-to-channel color stability. An auto-picture control keeps brightness level and color saturation in balance simultaneously as you adjust it.

The GR-9009 is easy to take along and just as easy to use. Up/Down Channel Scanning can be programmed to scan your favorite channels or all available channels. A digital, true-lock

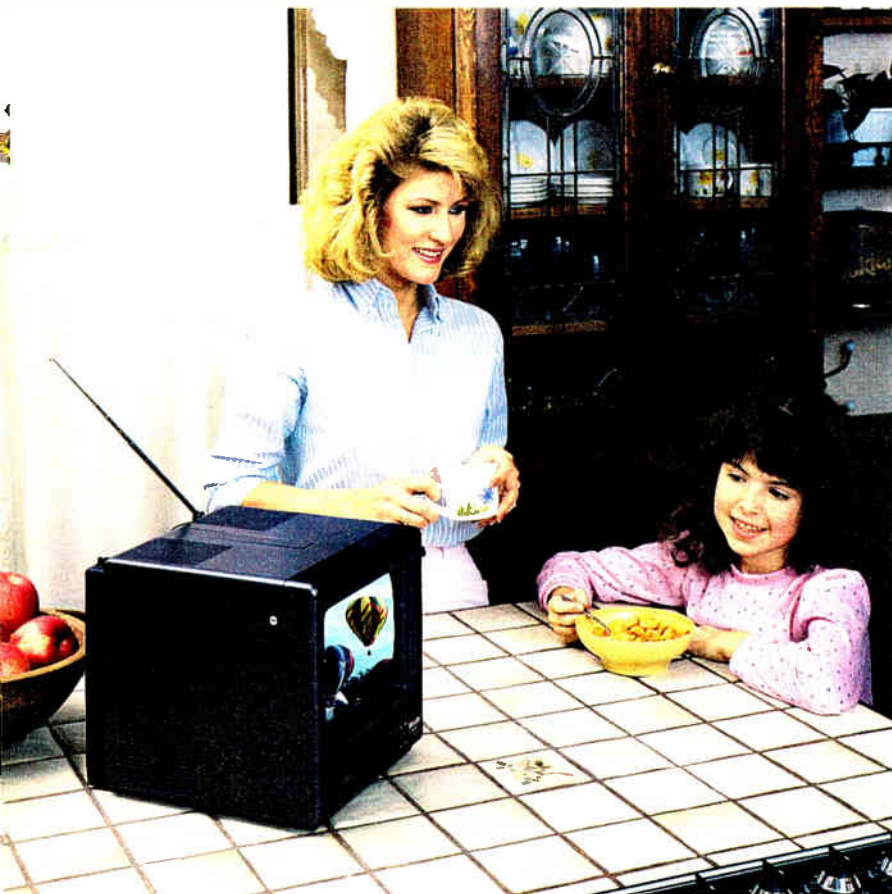


Simulated TV pictures

See May



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picture hold eliminates the need for vertical and horizontal hold controls. Phase-lock loop tuning locks in the signal during normal TV operation. It also has a search position to "pull in" off-frequency channels that you may receive from cable, master antenna systems or video games. The timed entry channel selection offers a 2-second channel change delay after selection. For an instant channel change, simply press the ENTER key after you've selected the channel number. A 2½-digit LED display provides large, easy-to-read numbers and letters.

Most circuit boards are preassembled and the GR-9009 has a built-in crosshatch generator so you can build and align the TV in just 3 quick evenings. Inside this modular designed TV you'll find advanced, large-scale integrated circuits (LSIs) for long-life reliability. Each assembled module is completely pretested and factory aligned. And to make this portable television even handier, it comes with a sun screen to cut the glare and reduce reflection in strong outdoor light; an ear-phone for private listening; a built-in whip antenna; a DC power cord; and a flush-mounted carrying handle. Attractively housed in a slate grey finish cabinet. Cabinet measures 10¼" H x 10½" W x 11⅞" D. Kit GR-9009 \$249.95, ship wt 25 lbs.



## Save \$200 with this 45"-diagonal super screen TV

You'll think you're a part of that nostalgic old western or hard-hitting game on the gridiron when television comes to life on this 45"-diagonal screen. And, you'll enjoy the realism of big screen viewing without crowding your living room. The GR-4500 takes no more floor space than a console TV.

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

The remote control features Parental Control, Flashback and VCR functions. With Parental Control you can program the TV to make selected channels accessible only by entering a secret code that you choose. Touch the Flashback button to alternate viewing between two programs and use the remote to make instant channel selections. Channel number and the time are displayed on the screen at the touch of a button. Scan favorite programmed channels with the Channel Up/Channel Down buttons. Quartz-controlled electronic tuning ends the need for fine-tuning adjustments and locks on up to 178 channels (except scrambled premium services). Liquid-cooled CRT's and optically-coupled lenses provide exceptional picture contrast and brightness. You'll always have comfortable viewing because the special black matrix screen absorbs room light to reduce glare and reflections. Use the set as a monitor for your VCR, video camera or video disc player. Conveniently switch between video services with your remote or front panel controls with the GSZ-4600 Antenna Switch (page 21).

Three times the viewing area of a standard 25" TV, big stereo sound and the latest TV technology are yours in just 20 hours of kitbuilding. All circuit boards except one are preassembled and the GR-4500 has a built-in crosshatch generator. Includes cabinet. Kit **GR-4500** Was \$1695.00 Now Only \$1495.00, ship wt 256 lbs., Mtr. Frt.



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



Simulated TV picture

## Save \$50 on the perfect stereo TV – the Heathkit GR-2700



Slide-out panel gives you complete audio and video control

Take your 25" screen, cut out those rounded corners and flatten it out. You get 25 square inches more picture – a spacious 27" – diagonal picture. Then surround the screen with stereo sound. Finally, add extras like Parental Control of selected channels, flashback to the football game you wanted to check, audio/video jacks, built-in stereo decoder and stereo control center, on-screen display of time and channel, and remote control. Get all this and more when you build the GR-2700 kit TV. With all but one circuit board preassembled and a built-in crosshatch generator, you can build it in just 2 evenings. Plus you can make alignment adjustments better in your own home.

Besides the extra care and quality you put in when you build it, the GR-2700 features the newest Advanced System 3 television technology. Dark glass absorbs ambient light to provide a picture with exceptional contrast and color fidelity. A black matrix surrounds each phosphor element to produce deep, rich colors. The color picture is automatically corrected 30 times a second by the Advanced Color Sentry so you always have lifelike flesh-tones, and accurate color and contrast. Automatic CRT tracking ensures that colors remain vivid and true year after year. You get an incredibly sharp, realistic picture with the Advanced System 3's Chromacolor Contrast picture tube and peak resolution picture circuit.

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

Quartz-controlled electronic tuning locks on up to 178 channels (except scrambled premium services). Make channel selections on the set or with the included remote control. The GR-2700 must be assembled with the included cabinet. Cable ready.

### Configurations:

Kit **GRS-2700-1** 27"-diagonal TV with Modern Cabinet. Cabinet features a nutmeg oak veneer finish. Includes concealed casters and two 3" x 6½" speakers. Modern Cabinet measures 29⅞" H x 41" W x 18½" D. Was \$699.95 Now \$649.95, ship wt 208 lbs., Mtr. Frt.

Kit **GRS-2700-2** 27"-diagonal TV with Mediterranean Cabinet. Cabinet has simulated pecan finish. Includes concealed casters and two 5" x 7" speakers. The Mediterranean Cabinet measures 33" H x 47½" W x 18½" D. Was \$649.95 Now \$599.95, ship wt 199 lbs., Mtr. Frt.



Modern Cabinet

Simulated TV pictures



Mediterranean Cabinet





## Table-top TV with big set features

You can turn even the smallest room in your home into a state-of-the-art entertainment center. Get advanced features like built-in stereo, special channel selection commands and Advanced System 3 chassis with this 19"-diagonal TV.

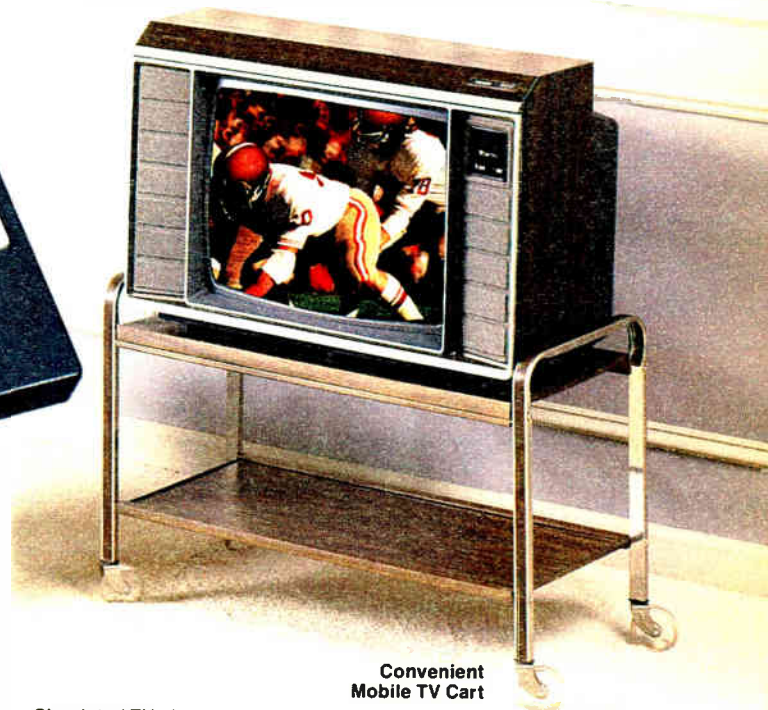
The Full Stereo Sound System processes multi-channel television sound (MTS) into exciting stereo. It also processes simultaneously telecast second audio programs or mono telecasts. You get bass, treble, and balance controls over dual speakers on each side. Audio input/output jacks allow you to run the sound through your own hi-fi system or to run other audio equipment through the television's stereo.

The remote control features Parental Control, Flashback and VCR functions. You can control what your children watch by programming the television to make selected channels accessible only by inputting a secret code. Touch a button to alternate viewing between two programs. Use the remote to make instant channel selections or scan your favorite programmed channels with the Channel Up/Channel Down buttons.

The Advanced System 3 provides an exceptionally sharp picture which is automatically color corrected 30 times a second. The Video Filter and Peak Resolution Picture Comb Filter clean up the picture and provide resolution up to 25% greater than ordinary televisions. The black matrix screen enhances picture contrast and absorbs room light to reduce glare and annoying reflections. Quartz-controlled electronic tuning locks in on up to 178 channels (except scrambled premium channels).

Build this TV in just 14 hours. All but one circuit board is preassembled and the TV has a built-in cross hatch generator. The GR-1903 has a simulated walnut finish cabinet. 18" H x 26 $\frac{3}{4}$ " W x 17" D. Kit **GR-1903** \$499.95, ship wt 100 lbs.

Accessories: **GRA-1901-1** Mobile TV Cart (shown) \$29.95, ship wt 10 lbs.



Simulated TV picture

Convenient Mobile TV Cart

**Attention GR-2502 owners.** Get close-out prices on your choice of stylish console cabinets. **GRA-706-25** 25" Classic cabinet *Regularly* \$149.95 *Now* \$59.95, ship wt 85 lbs. Mtr. Frt. **GRA-716-25** 25" Modern cabinet *Regularly* \$199.95 *Now* \$79.95, ship wt 82 lbs. Mtr. Frt.

## Video source selector

Switch between up to four video sources such as your roof antenna, cable service, video game, compatible computer or other RF input sources with your television's remote control or front panel control. For use only with GR-1902, GR-1903, GR-2502, GR-4500 and GR-2700 televisions. Attaches to rear of TV set. Assembled **GSZ-4600** \$39.95, ship wt 4 lbs.



Use your Visa or Mastercard credit card to purchase your kit!





Program the  
Controller to run  
your lights and  
appliances

## The SMARTHOME I Controller takes care of you and your home

Awakened by the odor of fresh brewed coffee, you rise and walk through the already warm house. Lamps turn on to light your way and then shut off behind you. You hear the radio turn on in time for the morning news. When you leave an hour later, the radio and coffeemaker go off and the thermostat shuts down the furnace, leaving your home in safe, quiet silence while your electronic security system keeps watch. The SMARTHOME I system has again given you a comfortable start to another day.

The SMARTHOME system allows programmed, remote and sensor-activated control of home lighting, appliances, heating, air conditioning and a wide variety of electronic devices. Using software and your home computer you program the Controller to turn lights and appliances on and off or to dim lights at specific times. Use the software to draw your floor plan on your home computer's monitor and install lights and appliances with icons. Enter up to six floor plans and include outdoor fixtures. Then disconnect the Controller from your computer, plug it into a wall outlet and watch it run your home. Just plug X-10 modules (p. 23) into wall sockets and plug lamps or appliances into the modules.

Touch a button on the included remote control to dim a light or turn on the stereo. Add sensors for a complete security system from the GDA-2800 series (p. 26) for a home in which appliances and lights are controlled by events the sensors detect as well as your preset patterns and remote control.

For even more protection, complete your system with the Alarm Center accessory. You determine what type of emergency each of four distinct alarms will indicate, and set up an emergency priority system. The Alarm Center operates on included AC power cube and comes with 12 V battery for up to 10 hours of backup power. Kit **GD-3800** \$299.95, ship wt 5 lbs.

See May



Review



## Order the required software for your home computer:

**GDA-3800-1** Software for H/Z PC/IBM PC \$99.95, ship wt 2 lbs. **GDA-3800-2** Software for H/Z-100 Series \$99.95, ship wt 2 lbs. **GDA-3800-3** Software for Apple II, II+, IIe, IIC \$99.95, ship wt 2 lbs. **GDA-3800-4** Software for MacIntosh \$99.95, ship wt 2 lbs.

Accessories:

Kit **GD-3880** Alarm Center \$299.95, ship wt 16 lbs.





**SMARTHOME I  
Controller and  
Alarm Center bring  
intelligent control  
and security to  
your home**



**Smoke Detector/  
Transmitter**



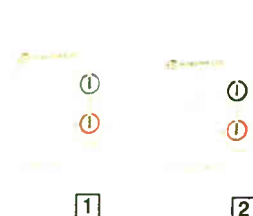
**Motion Detector/  
Transmitter**



**Wired-Circuit  
Transmitter**



**9**

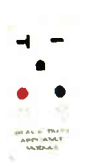


**1**

**2**



**3**



**4**



**5**

**6**



**7**



**Get convenient home control with X-10 devices**

**1** Assembled **BC-465** Lamp Module, 300 watts maximum load *Was \$14.99, Now \$12.99, ship wt 1 lb.*

**2** Assembled **BC-466** Appliance Module turns appliances on/off. 15 amp resistive load, 1/2 hp motor; 500 watt lighting, 400 watt TV/stereo *Was \$14.99, Now \$12.99, ship wt 1 lb.*

**3** Assembled **BC-284** Burglar Alarm Interface Module turns on selected lights, appliances, siren or selected lights can flash on and off *\$39.99, ship wt 1 lb.*

**4** Assembled **BC-245** Perpendicular-Pronged Air Conditioner Module. 240 VAC receptacle for 20 amp load *\$29.99, ship wt 1 lb.*

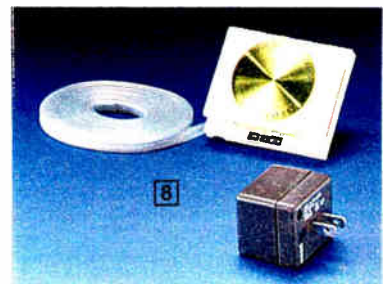
**5** Assembled **BC-227** Wall Receptacle Module rated at 15 amps *\$24.99, ship wt 1 lb.*

**6** Assembled **BC-467** Wall Switch Module, 500 watt load *Was \$14.99, Now \$12.99, ship wt 1 lb.*

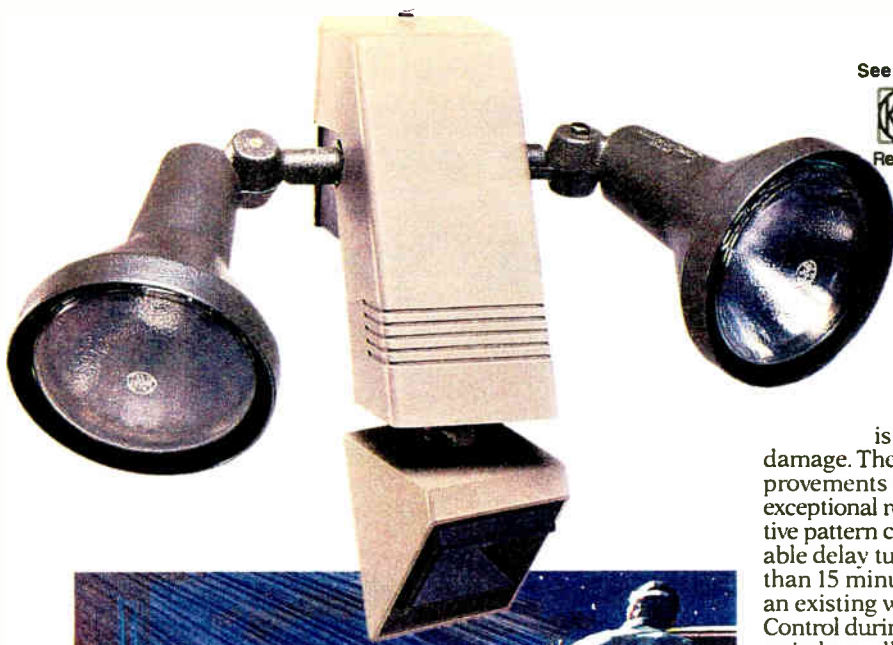
**7** Assembled **BC-4777** Three-Way Wall Switch Module replaces hall and stair 3-way switches. Maximum 500 watt load *\$24.99, ship wt 1 lb.*

**8** Assembled **BC-2807** Thermostat Set. Requires BC-466 Module *\$19.99, ship wt 1 lb.*

**9** Kit **GD-1530** RS-232C Interface allows computer control of 256 groups of modules with unlimited timing patterns *\$99.95, ship wt 3 lbs.*



**8**



See March



Review

## Get automatic lighting — safety and convenience plus you save \$10

The Convenience Light Control brings you the latest in infrared technology to protect your property and stop your security worries. Now with the most sophisticated 8-sensor array available, the GD-3610 offers automatic lighting to greet guests, light your way at night, and even triggers from the heat of your car when you enter the drive. Security is a bonus as it provides the most effective deterrent to crime...light. Intruders believe they have been seen and, unlike other security systems, the intruder is scared off before breaking a window or causing other damage. The new 8-sensor array offers dramatic performance improvements over units using one or two sensors and lenses. With exceptional resistance to false triggering, the GD-3610 has an effective pattern coverage of over 40 feet wide by 60 feet long. An adjustable delay turns the light off after less than 1 minute or up to more than 15 minutes. Wire in the GD-3610 to control your lighting from an existing wall switch. A photo-transistor deactivates the Light Control during daylight hours, so you can simply leave your control switch on all the time. You can manually activate your controlled lights by turning the switch off and then back on again. Lights turn off automatically after delay. Operates on 120 VAC, 50 or 60 Hz. 14½" H x 5½" W x 4¾" D. Kit **GD-3610** Was \$99.95 *Now Only* \$89.95, ship wt. 4 lbs.

Accessory: Assembled **GDA-3511-1** Dual Floodlight (light bulbs not included) \$29.95, ship wt 5 lbs.



## Save \$20 and enter your home without using keys

Leave your keys behind when out jogging or working in the yard. The Keyless Doorlock lets you in the house just by entering a four digit number of your choice. Change the code as often as you like. For safety, the door always locks behind you. During power failures you can still use your key, or connect a +12 VDC battery (not included) for backup power. The Doorlock replaces your door frame strike plate, but you keep your lock and key. Professional installation may be needed on metal frame door jambs. Kit **GD-3830** Was \$99.95 *Now Only* \$79.95, ship wt 5 lbs.

Other Specifications: **Power Requirements:** 120 VAC using included power cube. **Dimensions:** Keypad: 4½" H x 2¾" W x 1½" D. Control module: 4¾" H x 3" W x 1¼" D. Stroke mechanism: 5¼" H x 1¼" W x 1¼" D.

**Easy enough for a child to use or give a neighbor access to your home while you are on vacation.**



## Save \$10 on a keyless garage lock

Have access to your garage without a key or transmitter and never again take a chance on equipment being stolen from an open garage. The Digital Garage Door Lock works like the GD-3830 Keyless Doorlock (left) to activate your electric garage door opener. (See p. 56 for garage door openers.) Easy to install. Kit **GD-3835** Was \$59.95 *Now* \$49.95, 2 lbs.

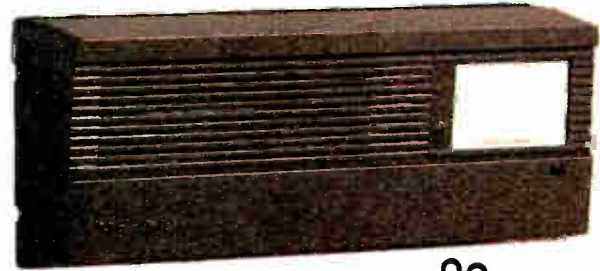




## The Informer keeps a watchful eye

Disguised to look like a hardcover book, the Informer sits quietly on a shelf until someone invades its field of surveillance. Ten-seconds after movement is detected, it triggers a lamp outlet to turn on a light. Thirty-seconds later it activates an alarm outlet to trigger any indoor buzzer alarm or outdoor bell you have connected to it. The delay time allows you to deactivate the audible alarm when you enter the area. The Informer is ideal for alerting you when your child leaves his bed. It can also be used as an automatic light switch in dark hallways or garages. Sensitivity is adjustable. Operates on 120/240 VAC. A one-evening kit. 10 $\frac{1}{8}$ " H x 2 $\frac{3}{8}$ " W x 7 $\frac{1}{2}$ " D. Kit **GD-49** \$79.95, ship wt 5 lbs.

SECURITY 



## Get \$50 off on this 24 hour security guard



FAST, EASY  
2-EVENING KIT

Suddenly you hear a commanding male voice state, "Warning. You are entering a secured area. Please exit immediately." Actually, it's the Heathkit Security Sentinel with its realistic digitized voice guarding your property. During darkness, the Security Sentinel issues the verbal warning and turns on lights when it detects an intruder. During the day, only the voice is activated.

Completely covers an area up to 40' by 40'. You can adjust sensitivity and the coverage area size and pattern to suit your needs. Use with up to 1200 watts of your lighting. 12 $\frac{1}{2}$ " H x 5 $\frac{3}{4}$ " W x 3 $\frac{1}{2}$ " D. Kit **GD-3810** Was \$149.95 Now Only \$99.95, ship wt 6 lbs.



## Relax while the Vacation Home Sentry monitors your home

Phone home while you're away to check on critical household conditions. The Vacation Home Sentry monitors the house temperature with its built-in sensor. If the temperature drops below 45°F, you hear a steady 5 to 10 second tone. If the temperature is normal, you hear silence. Add optional sensors to detect flooding, opened doors or freezer failure. Avert costly disasters by knowing about problems soon after they occur – not weeks or months later. Requires two 9-volt batteries. Batteries draw current only when the unit responds to a call. An easy one-evening kit. 1 $\frac{5}{8}$ " H x 2 $\frac{7}{8}$ " W x 4" D. Kit **GD-1702** \$19.95, ship wt 2 lbs.





## Wireless security system offers total home protection

1 This professional-quality system installs in a day to provide 24-hour protection for your home. The RF Security Receiver processes signals from transmitters within a 150' range and provides appropriate alarm action. Remotely controlled Receiver operates with handheld GDA-2800-4 Transmitter or GDA-2800-9 Wall-Mount Transmitter (at least one required). Receiver includes indoor/outdoor alarm horn and indoor annunciator. 3¾" H x 11½" W x 8½" D. Kit **GDA-2800-1** \$299.95, 24 lbs.

Accessories:

2 Assembled **GDA-2800-2** Infrared Motion Detector/Transmitter covers 25' x 35' indoors. Requires 9V battery \$149.95, ship wt 1 lb.

3 Assembled **GDA-2800-3** Wired-Circuit Transmitter protects doors, windows against entry. Also works with GD-1701 Flood Alarm (p. 8) \$39.95, ship wt 1 lb.

4 Assembled **GDA-2800-4** Remote Command Transmitter controls System within 150' range \$49.95, 1 lb.

5 Assembled **GDA-2800-5** Smoke Detector/Transmitter with own alarm \$79.95, ship wt 2 lbs.

6 Assembled **GDA-2800-6** Four WINDOW/BUG sensors and take-off contacts, each protects up to 32 sq. ft. of glass \$49.95, ship wt 1 lb.

7 Assembled **GDA-2800-7** Four Magnetic/Reed Switches for single or parallel connection (Not pictured) \$24.95, ship wt 1 lb.

8 Assembled **GDA-2800-9** Keypad Controller operates with, or in place of, GDA-2800-4. Enter and exit without triggering alarms by entering a secret code on the keypad. Operates like GDA-2800-4 after entry of user access code \$119.95, ship wt 2 lbs.

9 Assembled **GDA-1800-3** Extra Outdoor Alarm Horn (like shown) \$24.95, ship wt 3 lbs.

**SAVER! GDS-2800-1** Save on a Starter Security System including one Receiver kit, one Infrared Motion Detector/Transmitter, one Wired-Circuit Transmitter and one Command Transmitter. Separately \$539.80 Our System Price \$499.95, ship wt 43 lbs.

See GD-2800 Series Review in May



Use different tones to clear the way through the busiest traffic

## A dependable siren/PA for emergency use

This compact and mobile siren/PA is designed for the public service volunteer or professional. Open up traffic lanes with 55 watts of attention-getting automatic or manual wail, hi-lo emergency tone or yelp. Has a 20-watt public address position or switch to the radio position for monitoring incoming calls while away from the vehicle. A low-noise, push-to-talk microphone breaks from any siren function to the audio-PA

mode. IMPORTANT: This product is designed for use in emergency vehicles. Consult authorities before installing or operating. 2⅞" H x 8⅜" W x 7⅝" D. Kit **GD-1810** \$109.95, ship wt 6 lbs.

Accessories: Assembled **GDA-18-1** Weatherproof Exterior Horn Speaker \$109.95, ship wt 10 lbs. Kit **GDA-18-2** Concealed Grill Speaker \$109.95, ship wt 10 lbs.



## Add convenience to your car's wipers with a Delay

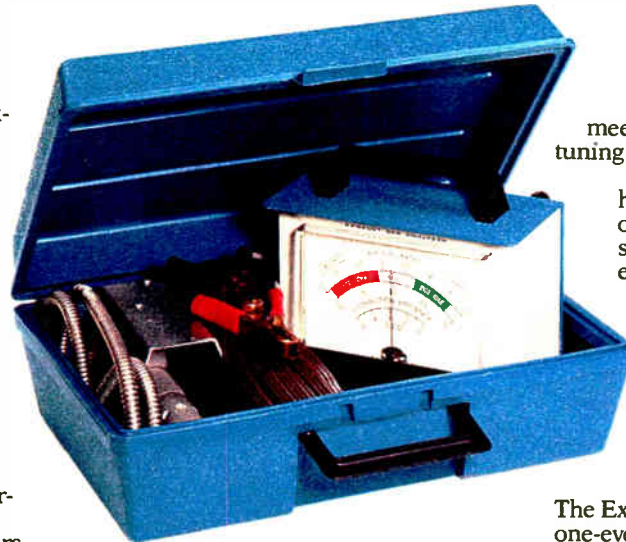
You'll have a clear view of the road even when constant wiper action isn't necessary with this Wiper Delay kit. Easy to build and install, the kit includes a test lamp with instructions to locate and identify hookup leads in your wiring system. Designed to fit most single and 2-speed wipers. Incompatible with motor-reversing hidden wipers. Contact your auto dealer for wiring specifics. A quick one-evening kit. Kit **CH-1068** \$21.95, ship wt 2 lbs.



## Get maximum mileage and efficiency

Keep your engine running at maximum efficiency with the Heathkit Exhaust Gas Analyzer. Plus check your engine for minimum pollution, review the emission control system and see a resultant analysis on an easy-to-read scale.

The Analyzer is an instrument that shows the interaction of carburetor and ignition settings on a large meter. It works by comparing the thermal conductivity of exhaust gases with that of air and will indicate the air-to-fuel ratio, overall combustion efficiency and the percentage of carbon monoxide present in the exhaust. These readings help you determine best fuel economy. Then you can make the needed adjustments or repairs to achieve manufacturer's engine specifications. In many states it's mandatory to



AUTOMOTIVE 

meet clean air standards when tuning up engines.

The Analyzer is designed to hang on a partially open window or to sit on a level surface. The sensor, used to detect gases at the exhaust pipe, has a rugged and removable stainless steel flexible probe tip. Everything stores neatly inside a durable case. The Analyzer is not intended for use with Chrysler "lean burn" engines. A 7-foot cable enables you to use your car battery as a power source. Includes all accessories.

The Exhaust Gas Analyzer is an easy one-evening kit. Kit **CI-1080** \$129.95, ship wt 6 lbs.

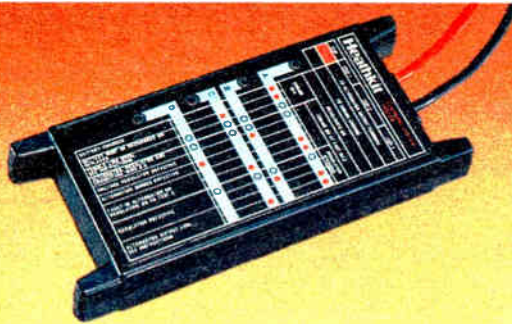
See March



Review

## Test charging systems

Diagnose faulty components in your vehicle's charging system with accuracy and ease. A 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. No external power or battery required. An easy one-evening kit. 5½" H x 2¾" W x ¾" D. Kit **CI-2065** \$24.95, ship wt 2 lbs.



## Save \$80 now and save on tuneup costs later

Make precision tests and adjustments with this portable analyzer. The Heathkit Digital Engine Analyzer tests conventional point-type, transistor and magneto ignition systems. Tests the storage battery, generator or alternator, voltage regulator, starter and all other electrical circuits.

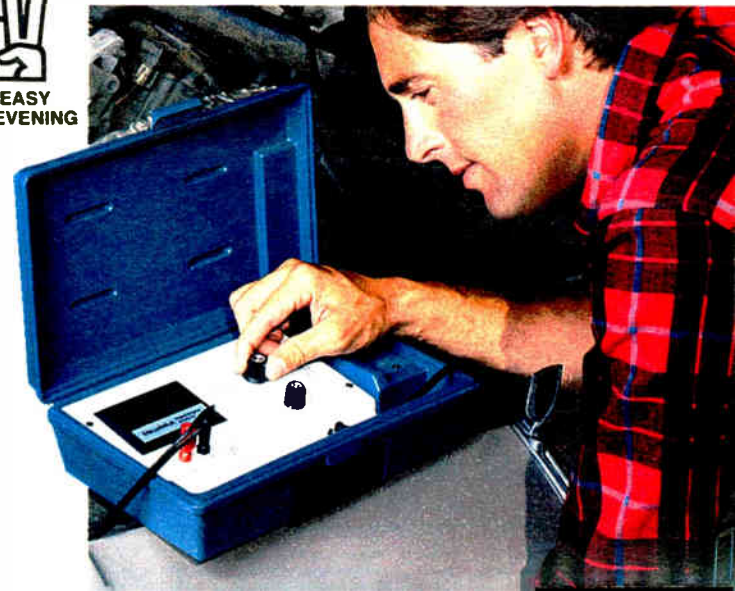
Save money on tuneup costs by doing it yourself. Check dwell on 4-, 5-, 6- and 8-cylinder engines from 0 to 90° and idle speed in two tachometer ranges up to 10,000 RPM. Measure DC voltage up to 200 volts, current to 20 amps and resistance to 2 megohms. Optional Shunt Accessory enables you to measure starting current and battery charge/discharge currents.

It's easy to use and easy to read with a 3½ digit display and ½" high numbers. An internal 9V battery (not included) powers the Analyzer. Display shows circuit polarity, low battery and over-ranges. Case measures 3½" H x 12¼" W x 8" D. Kit **CM-1551** Regularly \$139.95 Now \$59.95, ship wt 5 lbs.

Accessory: Assembled **CMA-1550-1** 400-Ampere Shunt \$15.95, ship wt 1 lb.



**FAST, EASY  
TWO-EVENING  
KIT**





See May



Review

## You can accurately watch your weight with the Digital Scale

Whether you're serious about losing weight or just a fitness enthusiast, you'll appreciate the Digital Scale's precision read-out on items from 2 ounces up to 300 lbs. Because it uses strain gauge technology, the Digital Scale eliminates the springs that wear out on conventional scales. The strain-gauge mechanism is sensitive to weight changes as small as  $\frac{1}{10}$ th of a pound. A manual zero adjustment makes it easier to weigh small items with accuracy. All weights appear in bright LEDs for easy reading and in your choice of pounds or kilograms. Requires 6 "C" batteries. An easy two-evening kit. Kit **GD-1186** \$99.95, ship wt 9 lbs.

## Track down lost treasures

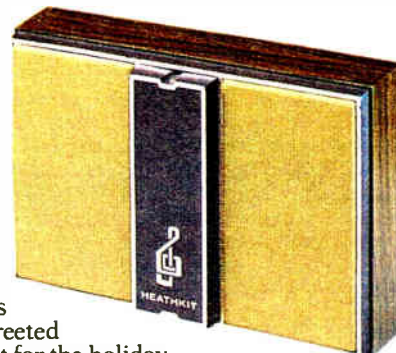
Your Groundtrack screens out pulltabs, bottle caps, ferrous and alloyed items, and leads you to valuable finds missed in the past by other metal locators. You'll know exactly where to dig with the help of Groundtrack's sensitive tuning and adjustable filtered background signals. This metal locator even combs ground submerged in up to two feet of water – imagine the valuables you might discover in a popular swimming area.

The detector remains silent until an object enters the 6" diameter field of detection. Then a clear tone sounds that grows louder as you approach vertical center. An easy-grip handle, height-adjustable shaft and  $\frac{3}{2}$  lb. weight make the Groundtrack extremely easy to handle. Use it with or without headphones. The telescoping shaft collapses to 22 $\frac{1}{2}$ " for storage. Requires 6 "AA" batteries (not included) or optional Rechargeable Battery Pack (below) which includes AC outlet and DC car lighter socket chargers. An easy two-evening kit. Kit **GD-1290** \$249.95, ship wt 5 lbs.

Accessories: **GDA-1190-1** AC/DC Rechargeable Battery Pack \$29.95, ship wt 2 lbs.  
**HDP-1396** Headphones (pictured on page 39) \$14.95, ship wt 2 lbs.

## Greet your guests with a tune fit for the occasion

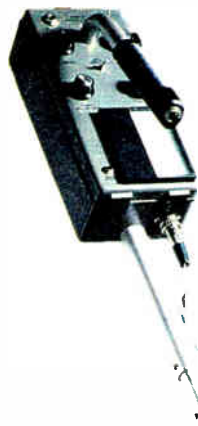
Watch your guests smile when they are greeted with a song chosen just for the holiday or a special occasion. Simply arrange wire leads on a one-octave "keyboard" inside the Programmable Doorbell to program any tune. The Doorbell comes with a songbook containing over 50 college, seasonal, Christmas and special occasion songs. The back door button activates a portion of the tune – so you know which door to answer. Volume, tone, speed and delay characteristics are adjustable. A two-evening kit. 5 $\frac{3}{4}$ " H x 8 $\frac{5}{8}$ " W x 2 $\frac{5}{8}$ " D. Kit **TD-1089** \$49.95, ship wt 3 lbs.



## Choose a tune to greet your guests

Replace your ho-hum doorbell with one that offers your guests a unique and pleasant welcome. This doorbell plays your choice of three selections: an upbeat 4-note ring, a short selection of Beethoven's *Für Elise* or a longer selection of Rubinstein's *Romance*.

Electronically select different tunes for your front and back door. The 3-Tune Doorbell can be built and easily installed in one evening. The Doorbell operates on 2 "C" batteries (not included). For unlit doorbells. 4 $\frac{3}{4}$ " H x 5 $\frac{7}{8}$ " W x 1 $\frac{1}{4}$ " D. Kit **TD-2089** \$24.95, ship wt 1 lb.







### Discover costly heat leaks

The hardest part of reducing heat loss in your home is finding those leaks. Now you can easily detect heat loss areas with the Heat Sniffer. Just turn it on and adjust for silence. Then move the Sniffer's sensor along areas where heating/cooling losses

might occur. Changes in temperature set off a beeping alarm and a flashing LED – alerting you to heat loss. The Heat Sniffer can be used in temperatures from 59°-95°F. Operates on a 9-volt battery (not included). A one-evening kit. 8¼" H x 1⅝" W x 2⅜" D. Kit **NE-2112** \$19.95, ship wt 2 lbs.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.

### Breathe deeply and enjoy

The Furnace Air Cleaner works with your heating or air conditioning system for air that is free of pollen, dust and cigarette smoke. The power supply mounts on a cold air duct and turns the filter on when the blower is running. A red LED indicates proper operation. The power supply operates one filter and runs on 120 VAC. Requires easy-to-install 1" filters. (Works with GD-2196). 3½" H x 4½" W x 10" D. Kit **GD-3196** \$149.95, ship wt 9 lbs.

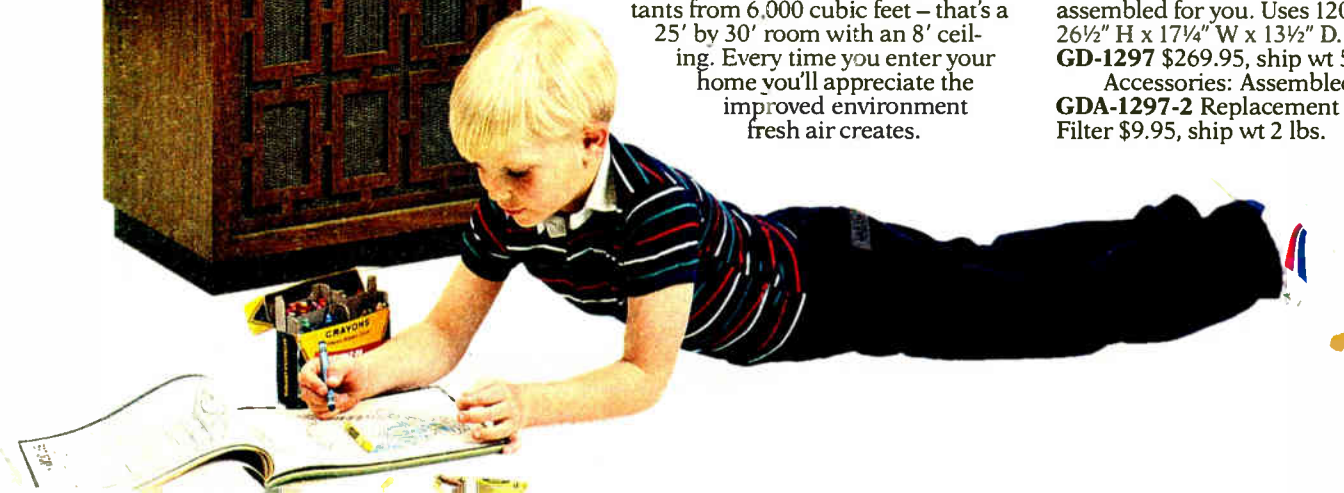
Accessories: Assembled **GDA-3196-1** 16" x 20" Filter \$99.95, ship wt 5 lbs. Assembled **GDA-3196-2** 16" x 25" Filter \$99.95, ship wt 6 lbs. Assembled **GDA-3196-3** 20" x 20" Filter \$99.95, ship wt 6 lbs. Assembled **GDA-3196-4** 20" x 25" Filter \$99.95, ship wt 7 lbs.

### Refresh yourself with 6,000 cubic feet of pure air

Now you can enjoy cleaner, fresher air in your home with the Heathkit Portable Air Cleaner. It solves your toughest air cleaning problems by efficiently removing dust, smoke and other pollutants from 6,000 cubic feet – that's a 25' by 30' room with an 8' ceiling. Every time you enter your home you'll appreciate the improved environment fresh air creates.

Three speeds tackle a variety of jobs and three filters work together to keep your air clean and fresh. It's an easy one-evening kit because the power supply, 3-speed fan control and filter are already assembled for you. Uses 120 VAC, 60 Hz. 26½" H x 17¼" W x 13½" D. Kit **GD-1297** \$269.95, ship wt 59 lbs.

Accessories: Assembled **GDA-1297-2** Replacement Charcoal Filter \$9.95, ship wt 2 lbs.



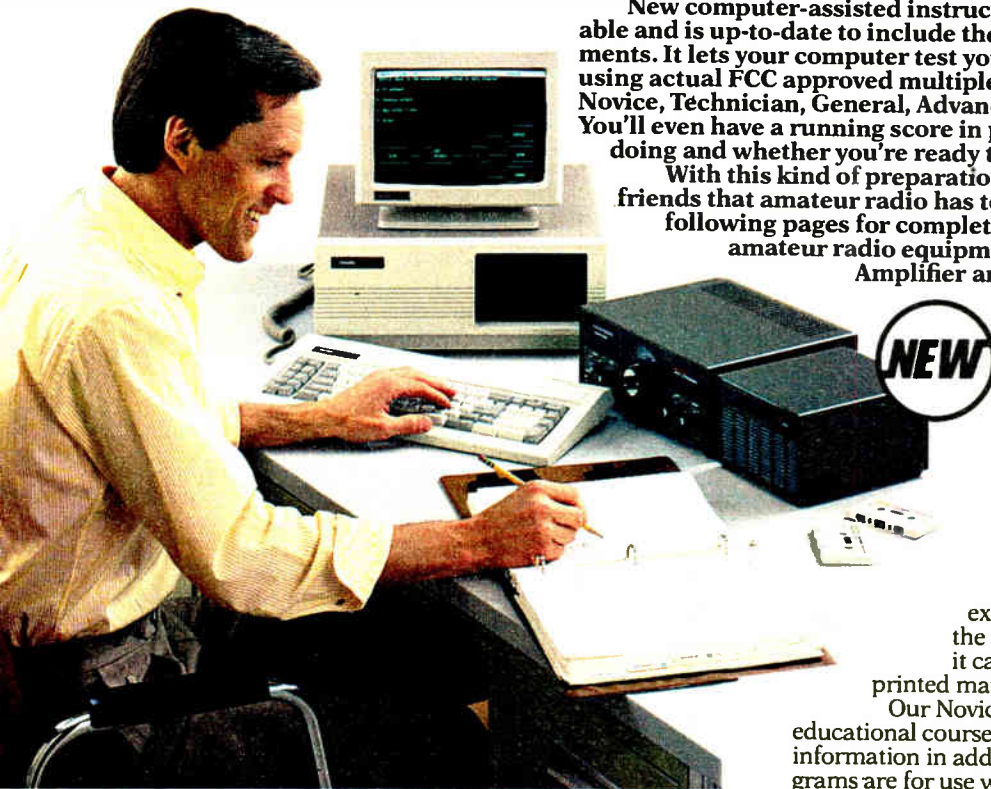
## Amateur radio is even more exciting with new Novice Enhancement privileges for entry level hams

If you've ever considered joining the ranks of amateur radio operators, now is the time to get involved. The Novice license traditionally allows Morse Code operation, but now includes voice communication privileges and communication between home computers linked by radio. Now you can pursue amateur radio as a fun and exciting way to enter the world of high-technology communications.

Heath offers you all the support you need to get started in Amateur Radio. Courses ER-3701-A and ER-3702-A (below) provide you with the theory and background material needed to master the Novice, Technician or General Class exams. We're so sure that these courses will prepare you for the exams that we guarantee a full refund of your money in the event you don't pass. Just send us a copy of your rejection notice and return the course materials.

New computer-assisted instruction (CAI) software (below) is also available and is up-to-date to include the latest Novice Enhancement requirements. It lets your computer test you before you take the license examination using actual FCC approved multiple choice questions. Test yourself for Novice, Technician, General, Advance or Extra Class license examinations. You'll even have a running score in percentage to know how well you're doing and whether you're ready to take the actual exam.

With this kind of preparation, you're sure to gain all the fun and new friends that amateur radio has to offer. Take time to look through the following pages for complete information on our full line of quality amateur radio equipment including the new SB-1000 Linear Amplifier and HK-232 Pack-Kit Multi-Mode TNC.



### Use your computer to study for amateur radio license exams

This computer software offers the most up-to-date FCC approved pool of questions for all five class license exams, including the latest "enhanced" novice class. The disk in each program contains both a CW practice program and complete multiple choice questions from the FCC approved pool of questions used for actual exams. The program will be revised each time the question pool changes and, since it's software, it can be updated much more quickly than printed material.

Our Novice ER-3701-A or General Class ER-3702-A educational course (below) is recommended for more complete information in addition to this exam study material. All programs are for use with Heath/Zenith and IBM PC's. **HDP-1601** Novice program \$39.95, 1 lb. **HDP-1602-T** Technician program \$39.95, 1 lb. **HDP-1602-G** General program \$39.95, 1 lb. **HDP-1603** Advanced program \$49.95, 1 lb. **HDP-1604** Amateur Extra program \$49.95, 1 lb.

### Make new friends on the airwaves – become a Novice Ham Operator

Join the world of Amateur Radio and communicate one-on-one with a diverse group of interesting people from all professions and in all countries. This course is guaranteed to help you earn a Novice ticket or we'll refund the full purchase price of the course. Everything you need to get your license is in this comprehensive, well-organized study package, including information on how you apply to take the latest Novice Class License test. Practice exams and a final examination give you confidence to pass the first time. Two cassette tapes explain the RST signal reporting system, review electronic circuit components, and cover practical circuits. You also learn International Morse Code in letter groups and improve your copy speed to 5 words per minute. **ER-3701-A** \$44.95, ship wt 6 lbs.

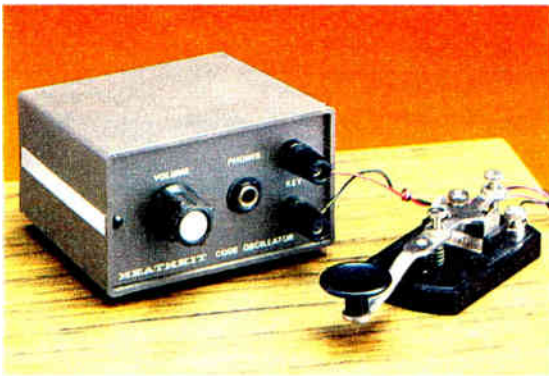
**SAVER! ERS-3701** Save on the Novice Course and CW Oscillator on page 31. Plus get a 10% certificate good for up to \$10 off any Heathkit Amateur Radio product. *Separately* \$64.90 *Our System Price* \$49.90, ship wt 9 lbs.

### Talk to the world and more

Move up to the General Class and enjoy all the added privileges – more frequencies to operate on, plus radio teletype, slow-scan TV, facsimile, satellite activity – an impressive list of incentives that add up to more QSO's, QSL's, and thousands of new friends.

This text takes you through the material covered on the written test. Its in-depth coverage will give you more than enough information to pass either the Technician or General Class exams. Extra code practice brings your copy speed up to 15 words per minute. This gives you a two-word edge on the 13 wpm requirement. Four sample tests prepare you for the actual exam. When you pass your General exam, send us a copy of your license or notice to receive 5.0 CEU's. We guarantee you'll pass the General Class exam – or we'll refund your money when you return the course materials with a copy of your rejection notice. **ER-3702-A** \$64.95, ship wt 21 lbs.





## Build up your code speed to pass your exam

Get your code speed up and pass your exam in a simple and inexpensive way with the CW Code Oscillator. This handy practice oscillator features a telegraph key with adjustable rebound, built-in speaker, volume and tone controls. The CW Code Oscillator even has a headphone jack for private listening so you won't disturb others. And once you get your license, it can serve as a side tone oscillator for any transmitter using negative-grid block keying. The CW Code Oscillator operates on a 9V transistor battery (not included). This kit takes only one short evening to put together. 2 $\frac{3}{8}$ " H x 4 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D. Kit **HD-1416-A** \$19.95, ship wt 2 lbs.



## Save \$50 with the Novice CW Transceiver

Get off to a good start in Amateur Radio with the Novice CW Transceiver. To give you the best possible Novice CW transceiver we combined many of the quality features of the HW-9 Deluxe QRP CW Transceiver (page 37) 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 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. 4 $\frac{3}{8}$ " H x 11 $\frac{1}{2}$ " W x 10 $\frac{3}{4}$ " D. Kit **HW-99** Was \$299.95 Now \$249.95, ship wt 20 lbs.

**SAVER!** Kit **HW-99** includes a \$100 gift certificate good for any Heathkit product (except Educational Products). Requires a copy of your Novice license to redeem. Valid even if you get your Novice license after you buy the transceiver.

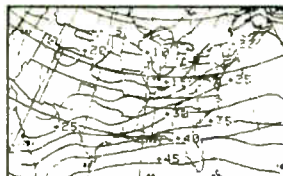
## Companion Station Speaker to HW-99

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. This 8 ohm speaker has a frequency response of 200 to 5000 Hz and can handle 1.5 watts RMS. You can easily build this kit in one quick evening. 8" H x 4 $\frac{1}{2}$ " W x 6 $\frac{3}{4}$ " D. Kit **SP-99** \$29.95, ship wt 3 lbs.

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Other 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  $\mu$ V 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.

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**Now you can enjoy multi-mode operation with this single unit TNC**



The Pack-Kit Multi-Mode TNC gives you the latest in Packet Radio and takes the challenge out of getting on RTTY. It lets you work CW at speeds you never dreamed of, gets you on AMTOR and ASCII and even lets you print Weather Facsimile pictures. Just adding the Pack-Kit to your radio and computer gives you everything you need to get on the air in every mode. You'll also need an Epson or compatible graphics type printer to print Weather Facsimile pictures.

The Pack-Kit TNC combines computer technology with amateur radio so you can explore packet radio and all its applications, plus explore the capabilities of additional modes. Connect both your HF and VHF rig at the same time and you can switch between VHF Packet and copying a W1AW RTTY bulletin on 40 meters with the push of a button. Work Packet in both HF (300 baud) and VHF (up to 9600 baud – above 1200 baud requires external modem).

A unique "SIGNAL" command causes the Pack-Kit to determine correct RTTY, ASCII or AMTOR mode for the signal you are listening to and presets baud rate and mode – it even inverts the signal if necessary. All you have to do is type, "OK." Use the "OPMODE" command to display full details of your current operating mode without having to change modes. Also, front-panel LEDs clearly display your present operating mode and the system status for more efficient and simple operation.

The same connections work for all other modes, too – even CW. For excellent performance, the HK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction to copy signals that could baffle other units. Also a high-performance feature, the answer-back memory permits autoanswer with message in both Packet and RTTY. It automatically responds to "WRU" requests with your station ID and system status. And for easy HF tune-up, the Pack-Kit TNC features a built-in front panel bar graph tuning indicator.

This outstanding value in performance, quality and unique new features is yours with the Heathkit Pack-Kit Multi-Mode TNC. It even includes our well organized and easy-to-understand operational manual with hook-up connections for most popular HF and VHF radios. The manual is available separately to anyone that is not purchasing the HK-232, but desires complete multi-mode TNC operational information (\$30 plus shipping). 2½" H x 8¼" W x 11" D. Kit **HK-232** \$279.95, ship wt 5 lbs. Available August.

Accessory: **HKA-232-2** "Ham-Pak" Communications Software Program for use with Heath/Zenith and IBM PC's \$19.95, ship wt 1 lb. Available August.

See March



Review



## Get remote control with decoder

The Touch Tone Decoder lets you hear only the messages meant for you – eliminating extraneous monitor racket. Connect it in series with your receiver or scanner speaker. Turn it on and it mutes the speaker until it detects the unique DTMF code you have programmed. In addition, use the HD-1530 for operation of single functions in the control of a repeater, or as a secondary control link for autopatch ON/OFF. You can preset the "line open" time length for up to 8 minutes, or the user can enter a two-digit code to open and close the line at will. 2½" H x 7" W x 5" D. Kit **HD-1530** \$79.95, ship wt 2 lbs.



## You'll be a great listener with this Shortwave Synthesized Receiver

Designed specifically for the avid shortwave listener, the SW-7800 covers 150 kHz through 30 MHz continuously in 30 overlapping, 1 MHz bands. Broadband front-end circuits mean you don't have to tune circuits within a band. The wide-band front-end stages eliminate the usual RF amplifier so the Receiver can easily handle incoming signals within a wide dynamic range. Excellent image rejection is provided by an up-converting, double-conversion mixing design. Other features you'll appreciate include: 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 receiver material — unaffected by volume control setting; and telescoping whip antenna for local reception and portable operation. Mobile operation is possible using any 11 to 15 volt DC source at  $\frac{3}{4}$  amp. Only a VTVM is required for receiver alignment.  $4\frac{3}{8}$ " H x  $11\frac{1}{2}$ "



W x  $10\frac{1}{2}$ " D. Kit **SW-7800** \$299.95, ship wt 12 lbs.

Accessory: Kit **HDP-7800** 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 11, 13, 16, 19, 25, 31, 41, 49 and 60 meter bands \$64.95, ship wt 3 lbs.

Other Specifications: **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  $0.35 \mu\text{V}$  for 10 dB (S + N)/N; AM, less than  $2.5 \mu\text{V}$  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. **Audio Output:** Internal speaker; jack for headphone or external speaker. **Muting:** External jack for use with transmitter. **Recorder Output:** Miniature phone jack. **Power:** 120 VAC, internally; 13.8 VDC at  $\frac{3}{4}$ -ampere, externally.



## Fine tune your antenna

The Antenna Noise bridge reveals the cause of any mismatch between the station transmitter and antenna — so you can trim each antenna for the most effective transmission. A tone-modulated broadband noise signal is generated in the Antenna Noise Bridge and coupled to an impedance bridge. Then, using

your station receiver as an indicator, the impedance bridge is used to measure the resistive and reactive components of your antennas. It can also be used to preset an antenna tuner for faster tune-ups, to tune a quarter-wave transmission line and to measure the value of unknown capacitors and inductors. An LED on the front panel indicates power on and front panel controls give you a direct readout of resistive and reactive characteristics of the antenna being tested. Rear panel has an external power jack and coaxial connectors for the receiver and unknown antenna connections. Requires 9V battery or PS-2350 Power Supply (p. 47).  $2\frac{1}{4}$ " H x  $5\frac{1}{8}$ " W x 5" D. Kit **HD-1422** \$49.95, ship wt 2 lbs.

## Active SWL Antenna

Perfect for portable use or locations where an outside antenna is not available, the Active SWL Antenna allows you to receive radio signals from 300 kHz to 30 MHz. It also acts as a high frequency preamplifier when used with an external 50 ohm antenna. In addition, you can use the HD-1424 as a pre-selector for both indoor and outdoor antennas. It has a built-in collapsible



antenna and provisions for a 50 ohm antenna. Requires 9V battery or PS-2350 Power Supply (p. 47).  $2\frac{1}{4}$ " H x  $5\frac{1}{8}$ " W x 5" D. Kit **HD-1424** \$49.95, ship wt 5 lbs.



## Tune in to the world

Listen to the U.S. Submarine Fleet, European broadcasts and other distant transmissions below the standard AM band. The VLF Converter installs in your receiver antenna line to let you listen to the 10 to 500 kHz band from 3.510 to 4.010 MHz on your CW receiver. The converter contains a local oscillator generating a 3.5 MHz signal that, when mixed with the incoming VLF frequencies on your antenna, produces an RF signal that can be heard on any CW receiver capable of tuning 3.510 to 4.010 MHz. Requires 9V battery or PS-2350 Power Supply (p. 47) or any source of DC power, 8.5 to 14 volts. Sized to fit in any small corner near your receiver, the VLF Converter measures  $5\frac{1}{8}$ " H x  $5\frac{1}{8}$ " W x  $2\frac{1}{4}$ " D. Kit **HD-1420** \$49.95, ship wt 2 lbs.

## Last call for auto-tune

Preset the roller inductor for two frequencies on each of nine bands and let the Antenna Tuner do the rest. Remote operation lets you tune selected frequencies using only transmitter band switches if your transmitter's equipped for remote operation. Manually tune with three front panel lever switches and dual watt-meters. 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 balanced ladder line antennas. Use front panel coax switch to select from three permanent antennas or bypass. 6 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 20" D. Kit **SA-2500** Last Call \$349.95, ship wt 26 lbs.

Accessory: Kit **SA-2500-1** 4:1 Balun Last Call \$39.95, 2 lbs.

Other Specifications: **Frequency Range:** 1.8 to 30 MHz. **Input Power Capability:** 2000 watts, SSB; 1000 watts, CW. **Input Impedance:** 50 $\Omega$ . **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,  $\pm 5\%$  average; 50 watts reflected,  $\pm 7.5\%$  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; VSWR, user selected. **Power:** 120 VAC 50/60 Hz @ .25 amps max., internal; 12 VDC at 1 amp. max., external.



## Double your antenna's bandwidth and save \$30

Work both CW and phone segments in a band from only one antenna. The Heath Remote Antenna Matcher lets you adjust the length of dipole and vertical antennas to resonance on any band between 1.8 and 30 MHz. By inserting the Matcher's variable capacitor into the antenna's driven element, your 50-ohm coaxial-fed antenna can have double the bandwidth while maintaining a low VSWR. Mount the outdoor remote unit on a mast or tower leg or any suitable flat surface close to the feed point of your antenna. Lengthen your antenna by 10 to 15% and tune it for maximum power with the indoor control unit. The Matcher tunes out the added length. No extra wires are needed because the Matcher uses your coax or a simple 2-wire cable for connection to the remote tuner.

Bandwidth increase is typically over 100% with a 2:1 VSWR. Input capability is 1500 watts PEP. Does not double the bandwidth of 50-ohm beam antennas. Not for open- or balanced-type feed lines or random length wire antennas. Both the Remote and Control units are easy to build and install. Control unit measures 2 $\frac{1}{2}$ " H x 5 $\frac{1}{2}$ " W x 7" D. Remote unit measures 16 $\frac{3}{8}$ " H x 8 $\frac{3}{8}$ " W x 3 $\frac{7}{8}$ " D. Kit **SA-2550** Was \$149.95 Now Only \$119.95, ship wt 10 lbs.

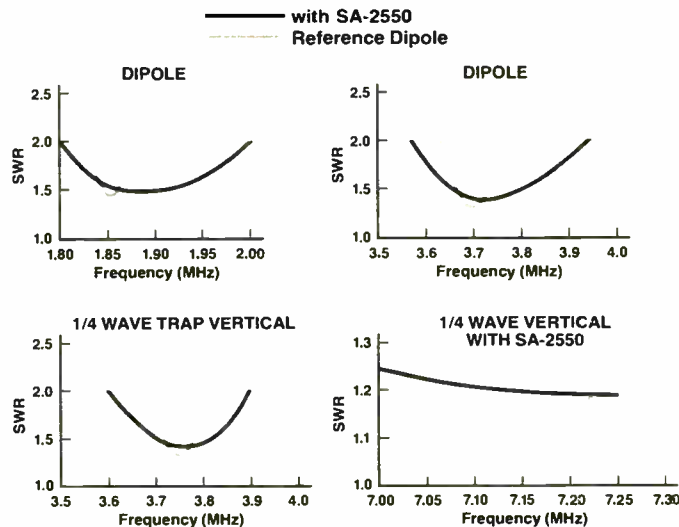


Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.

## Bandwidth Improvement with the SA-2550 2.0:1 Bandwidth





## Revolutionize your CW with the $\mu$ Matic Memory Keyer

AMATEUR RADIO 

Add programmable excellence to all your CW. Patented "command strings" let you store text in 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 correct programming errors. Enter text and send with any setting you wish. Text can be added into a buffer message being sent. CMOS memory with battery backup retains the buffer contents and last selected setting when the Keyer is without power. 1 $\frac{1}{8}$ " H x 4 $\frac{1}{8}$ " W x 6" D. Kit SA-5010-A \$99.95, ship wt 3 lbs.

Accessory: Assembled PS-5012 120 VAC Power Adapter Cube \$15.95, ship wt 1 lb.

Other 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.



## Save \$10 on a mic equalizer

One of the greatest needs in Amateur radio is to improve the quality of transmitted speech. A poor microphone or even the pitch of a speaker's voice can make a SSB transmitter difficult to understand. And in mobile operation, peaks at the lower end of the voice range often obscure clarity.

With the Heath Microlizer you can optimize the clarity of your voice transmissions and get a better match between your microphone and transceiver. This microphone equalizer fits in series using a standard 4-pin microphone jack and  $\frac{1}{4}$ " phone output jack. Continuously variable high and low frequency controls provide a 12 dB boost or cut at 490 Hz and 2800 Hz. Increase or decrease over-all gain of the microphone signal you feed to your transceiver for more efficient and cleaner operation. Requires 9V battery. A one-evening kit. 2" H x 5 $\frac{3}{4}$ " W x 4 $\frac{1}{2}$ " D. Kit HD-1986 Was \$39.95 Now \$29.95, ship wt 2 lbs.

Other Specifications: **Adjustable Microphone Gain:** **Low Frequency Response:**  $\pm 12$  dB at 490 Hz; **High Frequency Response:**  $\pm 12$  dB at 2800 Hz. **Input Impedance:** 100 k $\Omega$  normal. **Maximum Input Level:** 500 mV RMS. **Frequency Response:** 200 Hz to 10 kHz. **Distortion:** 0.5% or less.

## Deluxe Antenna Tuner eliminates loss of precious, mismatched power

Stop losing precious bandwidth because of touchy solid-state finals. The Deluxe Antenna Tuner can exactly match an antenna to your transmitter at any frequency in the 160-10 meter HF spectrum. Bypass for your tri-band beam or dummy load, select either of two coax outputs. Connect unbalanced feedlines or long wire antennas - a built-in 4:1 balun lets you use balance feedlines. A convenient front panel counter permits you to quickly set the continuously-variable inductor to previously calibrated frequencies.

Dual wattmeters read forward and reflected power simultaneously for more efficient low band operation. Installs directly into your transmission line and measures 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. Construction and design minimizes RF loss at high frequency operation. Insertion SWR is less than 1.1:1. Large feed-through insulators withstand high-voltage RF. Handles power inputs up to 2000 watts PEP on SSB and 1000 watts CW. 5 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " W x 13 $\frac{7}{8}$ " D. Kit SA-2060-A \$269.95, ship wt 20 lbs.

## Get reliable high-performance with this new linear amplifier



You get unparalleled performance at an affordable price with the new Heathkit Linear Amplifier. It's a completely self-contained, grounded grid linear amplifier that is designed to operate at 1000 watts PEP output on SSB or 850 watts output on CW and 500 watts RTTY. The SB-1000 covers 160, 80, 40, 20 and 15 meter amateur bands with tuned input filters your solid state rig will like, and also includes WARC and most MARS bands at 80% of rated output.

The Amplifier uses a single 3-500Z tube in a high efficiency circuit for top performance. And its hypersil steel E-I core transformer takes up less room, runs cooler and gives you more high-performance power. Other selected features include door knob caps in critical RF circuits, adjustable ALC so it works with any rig, a stiff full-wave power supply with computer grade capacitors, a quiet computer-style fan, and plate and load controls with smooth vernier tuning. Front panel meters are illuminated and grid current is continuously monitored for protection and long tube life. Operates on 240 VAC, 60 Hz, at 7½-A maximum or 120 VAC, 60 Hz, at 15-A maximum. Overall cabinet size measures 8¼" H x 14½" W x 13⅞" D. Kit **SB-1000** \$739.95, 57 lbs. Avail. August.

Other Specifications: **INPUT: Circuit type:** Pi-network. **Maximum VSWR at resonance:** 1.3:1 or less. **Minimum 2:1 VSWR bandwidth:** 20% or greater. **Maximum drive power permissible:** 100 W. **Typical drive for full power output:** 85 W. **OUTPUT: Circuit type:** Pi-L network. **½ hour continuous carrier:** 500 watts. **30 second continuous carrier:** 850 watts. **½ hour PEP two-tone test:** 850 watts. **30 second PEP two-tone test:** 1000 watts. **POWER SUPPLY: Circuit type:** Voltage doubler. **No load voltage:** 3000. **Full load voltage:** 2700. **Full load current:** 0.45 amp. **Regulation:** 10%. **Transformer:** 22 lbs. Hypersil steel. **Maximum draw at rated output:** 12 amps at 120 V 60 Hz.



**TUBE: Type:** 3-500Z. **Continuous dissipation:** 500 W. **Warm-up time:** 10 seconds. **Estimated life:** 20,000 hours. **GENERAL: Metering:** Dual meters; plate volts, plate current, grid current, power output PEP. **ALC:** Adjustable, 0-20 V, negative going, phono jack. **MARS/WARC:** Yes, set to nearest amateur band. **Keying:** Requires contact closure or sink of +12 VDC at 100 mA, phono jack. **RF Connectors:** SO239. **Line Connector:** NEMA 5-15P, standard 120 V three wire. **Frequency Coverage:** All amateur bands from 1.8 to 21 MHz, including WARC and most MARS. **Third Order IMD at Rated Output:** -35 dB.



## Ensure signal purity and stability

Continuously monitor your signals with the Station Monitor that displays SSB, TRAP or RTTY. Also use it with a receiver to view other audio signals or use as an oscilloscope. Solve common problems such as improper alignment or tuning, insufficient or excessive drive, poor carrier or sideband suppression, regeneration, parasitics and CW key clicks. For testing, the Monitor displays audio signals from 10 Hz to 40 kHz with good sync capability and high input sensitivity. In addition, it has a 10:1 vertical and horizontal input switch attenuator, with constant input impedance.

Add the Pan Adapter Module board to view other signals within  $\pm 20$  kHz or  $\pm 100$  kHz from the frequency. For receivers with IFs of 3.395 MHz and 8.83 MHz. Operates on 120 VAC, 60 Hz. 1⅜" H x 11¼" W x 12⅞" D. Kit **HO-5404** \$249.95 (see **SAVER** system price below), ship wt 13 lbs.

Accessory: Kit **HOA-5404-1** Pan Adapter Module \$99.95, ship wt 2 lbs. **SAVER! Kit HO-5404-1** Includes both HO-5404 and HOA-5404-1 Accessory \$249.95, ship wt 15 lbs.

Other Specifications: **RF SAMPLING SECTION: Frequency Coverage:** 80-6 meter (3.5-54 MHz). **Sensitivity:** ¼" vertical deflection at 10 watts, ¾" vertical deflection at 100 watts. **VERTICAL AND HORIZONTAL AMPLIFIERS: Sensitivity:** 60 mV per ¼" vertical deflection.



## Send letter-perfect code

Microprocessor-based CW keyboard has specialized prompting features and a simplified operating system that minimize key errors and increase the ease and accuracy of high-speed sending. Four-level practice mode. 2⅞" H x 15½" W x 8" D. Kit **HD-8999** \$149.95, ship wt 7 lbs.

Other Specifications: **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. **Key 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. **Power Requirements:** 7.5 to 11 VAC or 11 to 16 VDC. 450 mA max. Input for PS-5012 120 VAC Adaptor (at right).



## Deluxe QRP CW Transceiver

Superior design of the transmitter and receiver section sets this transceiver apart from the others. Microelectronic circuits reduce transceiver weight, while providing a level of performance and features unexpected at this price. Features like: continuously variable RF output up to 4 watts, front panel relative signal/power strength meter, wide dynamic range, AGC circuits, single conversion, product detector, and active audio filter. Receiver Incremental Tuning (RIT) lets you tune the receiver 1 kHz above or below the transmit frequency. You get CW coverage in 80, 40, 20 and 15 meter bands, expandable to 30, 17, 12 and 10 meter bands with the HWA-9 Accessory Band Pack. Ideal for portable operation, the Transceiver can be powered from batteries, lighter socket, solar photovoltaic array or by 120 VAC with the PSA-9 Power Supply. 4¼" H x 9¼" W x 8½" D. Kit **HW-9** \$199.95, ship wt 8 lbs.

Accessories: Kit **HWA-9** Band Pack \$29.95, ship wt 1 lb. Kit **PSA-9** Power Supply \$19.95, ship wt 4 lbs.

Other 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  $\mu$ V for readable signal; 0.5  $\mu$ V or less for 10 dB S + N/N. **Selectivity:** Wide, 1 kHz max. @ 6 dB; Narrow, 250 Hz @ 6 dB. **Dynamic Range:** 85 dB. **Image & IF Rejection:** 60 dB, min. **Audio Hum Noise:** -60 dB. **Audio Output:** 1 watt into 8 $\Omega$ .



**SAVER! QRS-9** Save on the matching HM-9 Wattmeter and HFT-9-A Antenna Tuner *Separately* \$89.90  
Our System Price \$84.95, ship wt 14 lbs.

See  
January  Review

## Multi-mode Active Audio Filter makes the tough ones easy to copy

Twelve total poles of filtering can be combined to work in 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. Two-evening kit. 1⅞" H x 8⅞" W x 6⅞" D. Kit **HD-1418** \$79.95, ship wt 3 lbs.

Accessories: Assembled **PS-5012** 120 VAC Power Adapter Cube \$15.95, ship wt 1 lb.

## Put your best signal on the air with confidence

Your low-watt HF or VHF station will operate at peak power efficiency when you are using the responsive HM-9 wattmeter. This HF/VHF wattmeter with 3:1 SWR bridge simplifies continuous metering of exciter or amplified output level. Plus it gives you a quick, exact SWR readout for fine-tuning your antenna system. Wire the HM-9 for monitoring in three different ranges: 1.8-30, 50-54 or 144-148 MHz. A one-evening kit. 2⅝" H x 5⅜" W x 7" D. Kit **HM-9** \$39.95, ship wt 3 lbs.

## 100-watt antenna tuner with 4:1 balun

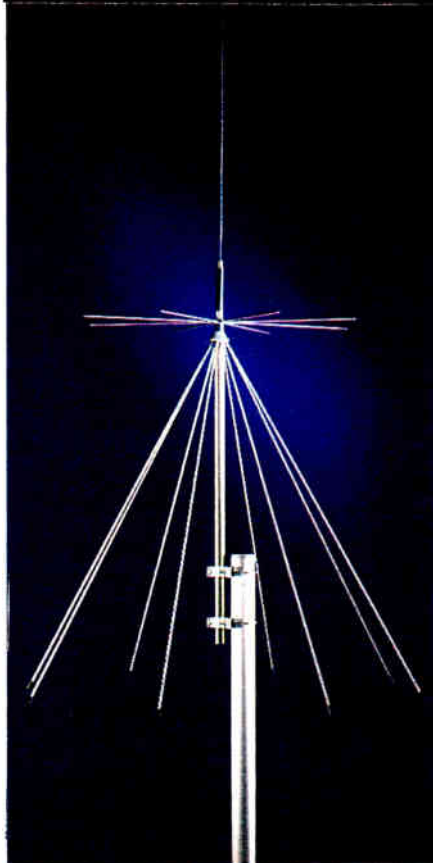
You can have almost unlimited matching capabilities with the HFT-9-A. It provides an exact 100% transmatch to a wide range of output impedances with a built-in 4:1 ferrite balun. Has connectors for coaxial feed, balanced line and long-wire antennas. A large 12-tap, air-wound inductor with silver-plated wire and tap switch allows precise matching capability between 1.8 and 30 MHz. Adjustments are easy with continuously variable transmitter/antenna controls. A one-evening kit. 2⅝" H x 5⅜" W x 7" D. Kit **HFT-9-A** \$49.95, ship wt 3 lbs.



## Save \$10 with this high performance broadband antenna

The HA-2513 Antenna can effectively cover amateur radio, public service, CB, police, fire and government frequency bands. Transmit with up to 200 watts of power with SWR below 2:1 on all ham bands between 50 and 1300 MHz. Ultra-wideband design offers excellent reception from 25 to 1300 MHz.

Compact and lightweight design enables the HA-2513 to be installed almost anywhere, even on apartment balcony railings. Vertically polarized, omnidirectional pattern unity gain. Stainless steel parts and hardware. Assemble in one evening. A 50' coaxial cable is included. Requires 1-2" mast. 5½' high. Kit **HA-2513** Was \$79.95 Now Only \$69.95, ship wt 6 lbs.



See March Review

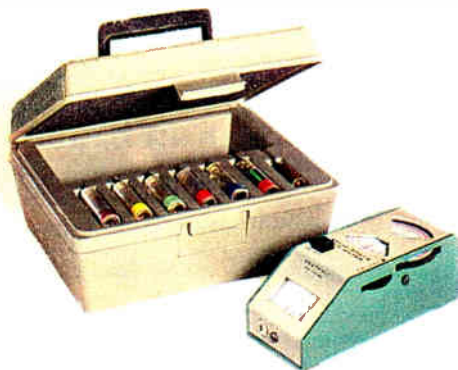
## This outlet box is smart

Flip on your transceiver and your whole system powers up. Smart Outlet Box turns on six other units when the device plugged into its control socket goes on. Surge protection, noise filtering. 2¼" H x 14¼" W x 2¾" D. Kit **GD-1495** \$59.95, ship wt 5 lbs. Assembled **GDW-1495** Last Call \$79.95, 4 lbs.



## Ham's Problem Solver

Twelve-socket Outlet Strip multiplies convenience by providing extra electrical outlets for your equipment. Eleven fused 3-prong outlets can be switched on and off. A twelfth outlet provides constant AC for a clock or equipment with memory saver circuitry. Rated at 10-amp maximum load. 12' cord. A one-evening kit. 2¼" H x 15⅞" W x 2¼" D. Kit **HD-1274** \$24.95, 4 lbs.



## 1.6-250 MHz Dip Meter

Use this multi-purpose Dip Meter to find approximate resonant and operating frequencies of either energized or de-energized circuits. Also, it helps adjust traps, detect parasitic oscillations and harmonics, measure unknown Q/L/C values, locate sources and frequencies of RF energy, or can be used as a signal generator, relative field strength meter or receiver alignment tool. Requires 9V battery. 2" H x 2¼" W x 5⅞" D. Kit **HD-1250** \$89.95, ship wt 4 lbs.

Other specifications: **Controls:** Tuning capacitor, oscillator level, ON/OFF. **Meter Movement:** 150 µA. **Solid-State Circuits:** 1 NPN transistor oscillator, 1 dual-gate MOSFET amplifier, 2 diffused silicon hot carrier diode detectors.



## Dual HF Wattmeter

Achieve peak efficiency on low bands. The HM-2140-A monitors both forward and reflected power in your transmission line. A second scale on the reflected meter reads SWR directly from 1:1 to 3:1. Output is measured up to 200/2000 watts PEP (± 5%) forward direction and up to 50/500 watts reflected. Pushbutton switch to high or low power ranges for precise readings. Dual-position switch lets you read PEP or Average power. Requires 9V battery or use 120 VAC with the PS-2350 Battery Eliminator. One-evening kit. 4⅞" H x 7½" W x 6⅜" D. Kit **HM-2140-A** \$99.95, ship wt 5 lbs.

Accessories: Assembled **PS-2350** Battery Eliminator \$7.95, ship wt 1 lb.

## Route up to 4 antennas

This manual Coaxial Switch routes one RF source to any one of several antennas or loads, while grounding all outputs not in use. Switch from up to 4 antennas or interconnecting equipment. Handles 2 kW PEP with maximum 1.1:1 SWR to 250 MHz. Built-in mounting brackets. Mount width: 4¼" Kit **HD-1234** \$22.95, ship wt 1 lb.



## For the serious listener

Long-wire 75' SWL antenna helps you pull in distant stations. Has copper line with 30' lead-in; all insulators and hardware. **GRA-72** \$14.95, 2 lbs.







### SWL Antenna

This specially designed short wave listening antenna comes completely assembled and ready to use. Sturdy 14-gauge HDP-7800 antenna covers 60-49-41-31-25-19-13-11 meters. A high performance trapped dipole with an overall length less than 43 feet. Assembled **HDP-7800** \$64.95, ship wt 3 lbs.

### Lengthen your DX reach

Cushcraft AV5 vertically polarized omnidirectional wideband antenna covers CW and SSB on 80-40-20-15-10 meters. Handles 2000 watts PEP. 25' high. Some assembly required. **HDP-1473** \$119.95, ship wt 10 lbs.



### Be clearly heard

Shure's CONTROLLED MAGNETIC Fixed Station Microphone was designed with Amateur radio features. It offers dual selectable output impedance and frequency response tailored for intelligibility. Select Normal or VOX operation. Push-to-talk switch bar for momentary or locked operation. Assembled **HDP-444** \$59.95, 3 lbs.

### 146-148 MHz Antenna

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. Some assembly required. Includes PL-259 connector and coax. **HDP-1472** \$29.95, ship wt 3 lbs.



See  
Reviews



### Remote Coax Switch

Switch antennas from inside your station with the Remote Coax Switch. Remote and indoor control unit connect through your coax cable to eliminate multiconductor control cable. Tower- or mast-mounted remote operates up to 4 antennas. Handles 2000 watts PEP and has a VSWR of 1.15:1 or less. Frequency range is from 1.8 to 54 MHz with

impedance of 50 to 70 ohms and loss at 54 MHz of less than 0.2 dB. Uses 120 VAC. Control: 2 5/8" H x 5 1/2" W x 7 1/2" D. Remote: 7 3/8" H x 8 3/8" W x 4 1/2" D. Kit **HD-1481** \$79.95, ship wt 5 lbs.

### Innovative Phone Patch

New design and circuitry make this Phone Patch a break-through in transferring audio signals between a phone line and two-way radio equipment. It provides a high degree of electrical isolation and is FCC registered. Normally uses phone line voltage or uses 9 VDC battery assistance in very low voltage conditions (battery not included). Built-in detector circuit for adjustment with VTVM or VOM. 1 3/4" H x 5 3/4" W x 3 3/4" D. Kit **HD-1515** \$49.95, ship wt 2 lbs.



### Heath Antenna Dummy Load

Eliminate unnecessary QRM during tune-up and minimize mistakes

while performing 'hot' gear maintenance or alignment. Handles 1 kW of RF with VSWR's less than 1.5:1 up to 450 MHz. Requires 1 gallon mineral or transformer oil. A one-evening kit. Kit **HN-31-A** \$19.95, ship wt 3 lbs.



### End your TVI problems

Solve emissive RF interference problems with this low-pass Barker & Williamson filter for 160-10 meters. Minimum 70 dB attenuation. Cut-off frequency of 34 MHz, less than 0.3 dB insertion loss. 50 ohm impedance. Rated for legal power. Assembled **HDP-3700** \$34.95, ship wt 2 lbs.

### Seal out the noise

Quiet and comfortable 8-ohm headphones have 40 to 15,000 Hz frequency range, 2 1/4" speakers, individual volume controls, 10' cord. Assembled **HDP-1396** \$14.95, 2 lbs.



## 50 MHz digital storage oscilloscope accessory for PC computers

Keep up-to-date with the latest in computer-based instrumentation...the Heathkit Computer Oscilloscope. It is a sophisticated accessory that turns a PC computer into a powerful dual trace 50 MHz digital storage oscilloscope. The Computer Oscilloscope allows you to perform tests, display and record measurements, and even help analyze the results. A test instrument with this ability is hard to beat in terms of convenience, versatility and cost.

All scope functions are controlled from the keyboard of your computer. The computer's monochrome monitor screen displays your choice of either one or two channels on a graphic 8 x 10 cm division graticule. Also on-screen are menus showing all scope function selections. At the touch of a key you can obtain automatic readouts of voltage, time and frequency at any point on a waveform. Even store waveforms on a floppy for later analysis or comparison. All you'll need is a null-modem cable (like the HCA-52 on page 95) to connect the Computer Oscilloscope to your IBM PC or compatible computer. Kit **IC-4802** \$399.95, ship wt 10 lbs. Assembled **SC-4802** \$575.00, ship wt 11 lbs.

Specifications: **VERTICAL: Display Modes:** Y1, Y2, Dual. (All displays except 500  $\mu$ s/div are chopped. 500  $\mu$ s/div uses an alternate display.) **Deflection Factor:** Sensitivity: 5 mV/div to 5 V/div; 10 steps in a 1-2-5 sequence. Accuracy: Within 3%  $\pm$  2 bits referenced to 20 mV/div.

**Vertical Response:** DC Coupling: 5 mV to 5 volts/div, DC to 50 MHz. AC Coupling: 5 mV to 5 volts/div, 10 Hz to 50 MHz. Rise Time: 7 ns or less. Overshoot: Less than 5%. Maximum Input: 125 volts peak combined AC and DC. **HORIZONTAL: Time Bases Ranges:** 20 s/div to 500  $\mu$ s/div; Real Time Sampling, 200  $\mu$ s/div to 10 ns/div; Equivalent Time Sampling. **Positions:** 29 steps in a 1-2-5 sequence. **Accuracy:** Within 3%  $\pm$  2 bits referenced to 1 ms/div. **TRIGGER: Source:** Y1, Y2. **Coupling:** Same as vertical Input. **Modes:** Automatic Baseline, Normal, Single Sweep. **Level:** Variable over at least eight divisions; 256 steps. **SYSTEM REQUIREMENTS: Operating Software:** Microsoft MS-DOS version 2.0 or later, Microsoft GW-BASIC version 2.0 or later (both not supplied). GW-BASIC is not required to run the compiled version of the scope program. If you develop your own software, you can use the Oscilloscope with any computer that has RS-232 serial communications and graphics capabilities. **Operating Hardware:** PC-compatible computer with RS-232 card, color graphics card, single 5 $\frac{1}{4}$ " disk drive, 128K RAM (minimum), such as the Heath/Zenith Personal Computer series. **GENERAL: Vertical Resolution:** 8 bits (1 part in 256). **Record Length:** 512 samples. **Interface:** RS-232C. **Baud Rate:** 110 to 9600 baud (selected by internal jumper). **Power:** 120 VAC 60 Hz. **Dimensions:** 4 $\frac{1}{2}$ " H x 12 $\frac{1}{2}$ " L x 10" W. **Weight:** 8 lbs.







## Upgrade scopes and computers with 50 MHz scope capability

Although a personal computer may not be a common test instrument found on every service or hobby bench, you'll most certainly find the workhorse oscilloscope. For these scope users we enhanced the computer oscilloscope interface on the opposite page. We made it work with, and tremendously improve, the operation of low-bandwidth scopes. And it still works with a personal computer, so scope users retain all the features and specifications of the interface on the previous page.

With the Heathkit Digital Memory Oscilloscope you get the maximum in versatility, flexibility and cost-effectiveness. Right now you can upgrade your low-bandwidth, single-channel bench scope into a powerful dual trace 50 MHz storage instrument capable of displaying fast digital pulses. And do it at a cost well below any comparable scope.

Get laboratory-instrument features like a ten-step 5 mV/div. to 5 V/div. sensitivity, three display modes, and solid waveform displays from three trigger modes. All operations are controlled from the clearly marked front panel of the Memory Oscilloscope. All scope settings are plainly identified by bright LED indicators. Waveforms are sharply displayed on the CRT of the scope being upgraded.

Then when it's time to take advantage of computer-based instrumentation, all you need is a personal computer. With this combination you gain a powerful diagnostic tool that features waveform storage on a floppy disk.

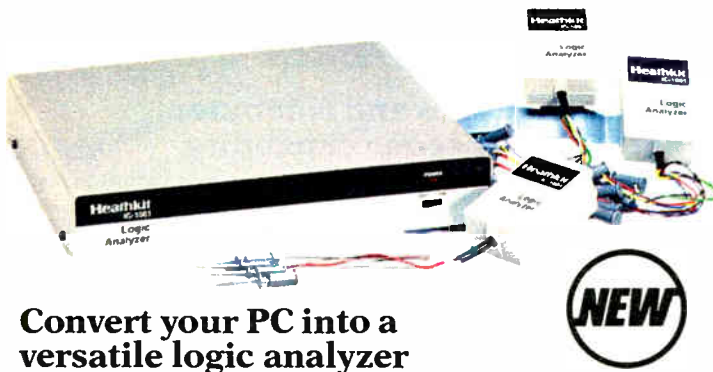
The Digital Memory Oscilloscope is a money-saving solution for many applications, even computer-equipped engineering workstations. Inexpensively add accurate testing and waveform analysis to engineering programs, word processing and other business applications.

Your scope must have a 5 MHz or greater bandwidth, one vertical channel with 0.5 V/division sensitivity, ability to trigger from a second source, and triggered sweep (on the plus slope of a TTL level signal) to work with the Digital Memory Oscilloscope. Two BNC to BNC coaxial cables are also needed. For use with your personal computer, the same requirements are needed as for the IC-4802 Computer Oscilloscope. Kit ID-4850 \$499.95, ship wt 11 lbs. Assembled SD-4850 \$750.00, ship wt 11 lbs.

Specifications: The same as for the IC-4802 Computer Oscilloscope except for the following additions.  
**OSCILLOSCOPE OUTPUT: Vertical:** 4 volts peak-to-peak (oscilloscope setting is 0.5 V/div vertical, 1 ms/div horizontal).  
**Trigger:** TTL level.

For industry, science and education, Heath/Zenith now offers a new and complete line of sophisticated, assembled computer-based instruments. To receive a colorful, free brochure detailing these advanced products, call 616-982-3672 or write to Heath/Zenith Computer-Based Instruments Group, Dept. 599-980, Benton Harbor, MI 49022.





## Convert your PC into a versatile logic analyzer

Transform your PC-compatible computer or standard terminal into a high-performance logic analyzer. The IC-1001 Logic Analyzer Kit is a versatile test instrument that can be used to troubleshoot or verify the proper operation of a wide variety of circuits that contain sequential and/or combinational

**NEW**

logic. And with the included specific software, the Analyzer is fully keyboard configurable and menu driven.

With its 16 input lines, the Logic Analyzer can check a 16-bit wide data bus or 16 separate logic test points in circuits with clock speeds up to 10 MHz. Acquired data can then be displayed on-screen in state or timing displays including hex/octal and ASCII equivalents, an address relative to triggering and other information. This data can then be saved on disk for later examination or comparison. Other advanced operations include a check-sum capability with bit selection for easy comparison of acquired data and the ability to search this data for a specific bit pattern.

The Analyzer requires a terminal or computer using terminal emulation software. Used with a computer, an HCA-85 cable (page 92) is also needed along with the MS-DOS operating system (Ver. 2.0 or later). The IC-1001 is powered by an included 120 VAC wall cube and has dimensions of 13/4" H x 9 1/4" W x 8 1/2" D. Kit **IC-1001** \$269.00, ship wt 4 lbs. Available August.

Other Specifications: **Depth:** 2046 words. **Logic Compatibility:** 5 volt TTL or CMOS. **Input Impedance:** All inputs >1 megohm, 10 pF. **Serial Protocol:** RS-232.

## Save \$20 – an oscilloscope with lab specifications and priced for the hobbyist

A dual trace 10 MHz Oscilloscope made to precisely display a wide range of waveforms. It's a versatile high tech tool made affordable for the busy service tech or budget-limited hobbyist. Kit **IO-4210** Was \$399.00 Now \$379.00, 38 lbs.

Specifications: **VERTICAL: Deflection Factor:** Sensitivity: 10 mV/cm to 20 V/cm. Attenuator: 11 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 60 V/cm. Accuracy: Within 3% (10°C to 40°C). **Vertical Response:** DC Coupling: DC to 10 MHz (-3 dB) at 6 cm. AC Coupling: 2 Hz to 10 MHz (-3 dB) at 6 cm. Rise Time: 35 ns. Overshoot: Less than 5%. **Vertical Input:** Maximum: 400 V peak combined AC and DC. **Vertical Modes:** Display: Y1, Y2 or Test. **HORIZONTAL: Time Base:** Ramp: 0.2 s/cm to 200 ns/cm. Positions: 19 steps in a 1-2-5 sequence. Variable: Continuous between ranges to approximately 0.6 s/cm. Accuracy: Within 3% (20°C to 30°C). **External:** Sensitivity: 0.1 V/cm (approximately). Frequency Response: DC to 1 MHz (-3 dB). **TRIGGER: Internal:** Automatic and Normal: Adjustable over 10 divisions. Slope Selection: + or -. **GENERAL: CRT:** Graticule: 8 x 10 cm. **Power:** 120 VAC. **Dimensions:** 7" H x 12 7/8" W x 19 1/4" D. **Weight:** 22 lbs.



## Prices reduced with Last Call on excellent single/dual-trace scopes



All the important features a beginner in electronics or a hobbyist will likely ever need in a scope. The IO-4205 offers dual channel capability for comparing signals as well as checking phase and timing functions. The IO-4105 is available for those who require only a single channel scope.

Both of these scopes are proven workhorses and are used in countless homes, workshops and school labs across the

country. They are compact and versatile being used to display many types of waveforms in different electronic circuits. And they are both easy to build. Either scope can be assembled in four evenings. Kit **IO-4205** Was \$349.95 Last Call \$299.00, 25 lbs. Kit **IO-4105** Was \$279.95 Last Call \$229.00, 25 lbs.

Specifications for both IO-4105 and IO-4205 Oscilloscopes:

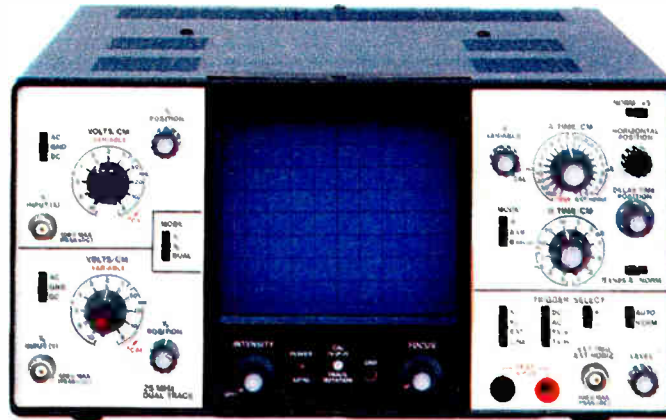
**VERTICAL: Bandwidth:** DC to 5 MHz,  $\pm 3$  dB. **Attenuator:** 1-2-5 sequence, calibrated and variable. **Rise Time:** 70 ns. **Overshoot:**  $\leq 5\%$ . **Impedance:** 1 M $\Omega$ , 38 pF. **Sensitivity:** 10 mV/cm. To 20 V/cm in 11 ranges. **SWEEP: Type:** Triggered. **Range:** 200 ms to 0.2  $\mu$ s in seven steps, plus variable. **Trigger Source:** INT/Ext/Line. **Trigger Modes:** AC/DC/TV; +/- Slope; Auto/Norm. **HORIZONTAL: Sensitivity:** 0.1 V/cm. **Bandwidth:** DC to 1 MHz. **Impedance:** 1 M $\Omega$ , 50 pF. **Ext Horiz Input:** X1 and X10 attenuator and variable. **GENERAL: CRT:** 5DEP31F 8 x 10 centimeter viewing area. Blue-green, medium-persistence phosphor. 5" round, flat face tube. **Accelerating Potential:** Approximately 1.6 kV. **Graticule:** Screened, 8 x 10 centimeters. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 8" H x 13" W x 17" D. **Weight:** 15 lbs.



## Our best kit scope – an outstanding performer at an affordable price

Dual trace capability, delayed sweep and specifications ideal for the wide range of measurements found in general electronics shops, development labs and scientific research facilities. Yet it's priced so that hobbyists can obtain this indispensable test and troubleshooting instrument. Kit **IO-4225** \$499.95, ship wt 28 lbs.

Specifications: **VERTICAL:** **Display Modes:** Y1, Y2, Dual, (Alt/Chop selected by Time/Cm switch. Chop frequency is approximately 200 kHz). **CHANNELS Y1 AND Y2:** **Deflection Factor:** Sensitivity: 5 mV/cm to 10 V/cm. 11 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 30 V/cm. Accuracy: Within 3% (20°C to 30°C). **Vertical Response:** DC Coupling: 5 mV/cm to 10 V/cm, DC to 25 MHz. AC Coupling: 5 mV/cm to 10 V/cm, 10 Hz to 25 MHz. Rise



Time: 16 ns or less. Overshoot: Less than 5%. **Maximum Vertical Input:** 400 volts peak combined AC and DC. **HORIZONTAL:** **Modes:** A, A intensified by B, B, X-Y, Ext. Horiz. **A Time Base:** Ranges: 100 ms/cm to 0.1  $\mu$ s/cm. Positions: 19 steps in a 1-2-5 sequence. Variable: Continuous between ranges to approximately 300 ms/cm. Accuracy: Within 3% (20°C to 30°C). **Magnifier:** X5. **B Times Base:** Ranges: 0.5 ms/cm to 0.1  $\mu$ s/cm. Positions: 12 steps in a 1-2-5 sequence. Accuracy: Within 3% (20°C to 30°C). **External:** Sensitivity: 0.1 V/cm (approx.). Frequency Response: DC to approx. 1.2 MHz. **TRIGGER:** **Source:** Y1, Y2, EXT, Line. **Coupling:** AC, DC, TV-V, TV-H. **Modes:** Automatic baseline, Normal. **GENERAL:** **1-Volt P-P CAL Accuracy:**  $\pm$  5%. **CRT Type:** 8 x 10 cm mesh with internal graticule. **Power:** 120/240 VAC, 50/60 Hz. **Dimension:** 6" H x 12" W x 20" L. **Weight:** 19½ lbs.

## One of the handiest troubleshooting instruments you'll ever use

Reduce troubleshooting time with the Heathkit Component Tracer. Part signal generator and part curve tracer, this handy instrument uses patented display circuitry to help you quickly track down faulty components in problem equipment.

This dual trace test instrument lets you see the operational quality of a component or circuit. See the unique "signatures" of resistors, capacitors, diodes, transistors and other components. Use the solid trace to test components, in circuit or out. Use the second dotted trace to compare good components, or even entire circuits, to an unknown.

The Component Tracer will save you many hours of troubleshooting by giving you an instant electronic evaluation of active and passive devices. Two sets of colored leads are included with this great bench testing tool. Kit **IT-2232** \$249.95, ship wt 15 lbs.

Specifications: **Display Mode:** Channel A, Channel B, Dual. **Channel A:** Solid line trace. **Channel B:** Dotted line trace. **Test Voltages:** 5 V and 50 V P-P. **Current Limits:** 5 V P-P at 5 mA; 50 V P-P at 0.5 mA. **CRT:** 3RP1A, round 3", flat face. **Accelerating Potential:** 1.2 kV. **Power Requirements:** 120/240 VAC, 50/60 Hz, 22 watts. **Dimension:** 4" H x 10" W x 12½" D. **Weight:** 8½ lbs.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.



## Economical portable and bench digital voltmeter

The Heathkit Digital Multimeter is the smart way to put a full function meter on your work bench without straining your budget. This 3½ digit meter features diode and internal battery test, blanking, polarity and overrange indicators, built-in battery charger, and auto decimal point location. A 3-evening kit. Kit **IM-2260** \$129.95, ship wt 5 lbs.

Specifications: **VOLTS DC:** 2 V, 20 V, 200 V, 1000 V. **Accuracy:** ± (0.5% reading + 1 count). **VOLTS AC:** 2 V, 20 V, 200 V, 750 V. **Accuracy:** ± (1.0% reading + 3 counts). **AMPS DC:** 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. **AMPS AC:** 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. **OHMS:** 2 kΩ, 20 kΩ, 200 kΩ, 2000 kΩ, 20 MΩ. **Power:** Heath PS-2404 120 VAC Adaptor (p. 45) or six 1.5 volt batteries (not included).

## Save \$50 on true RMS DMM

The Heathkit IM-2264 Digital Multimeter features true RMS conversion circuitry, a 3½ digit display, a crest warn indicator, diode test, analog meter, an alarm and automatic polarity, over-range and decimal point. Kit **IM-2264** Was \$249.95 Now Only \$199.00, ship wt 7 lbs.

Specifications: **VOLTS DC:** 200 mV, 2 V, 20 V, 200 V, 1000 V. **Accuracy:** ± (0.25% of reading + 1 count). **VOLTS AC:** 200 mV, 2 V, 20 V, 200 V, 750 V. **Accuracy (50 and 60 Hz):** ± (0.5% of reading + 2 counts). **Frequency Response:** ± (0.75% reading + 2 counts), 40 Hz to 10 kHz, except to 400 Hz on 750 range. **Crest Factor Limit:** 3.0 at full scale. 200 mV and 2 V ranges.

**DC/AC AMPS:** 200 μA, 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. **Ohms:** 200Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2000 kΩ, 20 MΩ. **Power:** Heath PS-2404 120 VAC Adaptor (p. 45) or six 1.5 volt batteries (not included). **Note:** All accuracies are obtained using lab standards during calibration.



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Review

## Heavy-duty handheld digital multimeter

All the functions you'd expect in a high quality digital multimeter at a low price, plus you get capacitance and transistor  $h_{FE}$  checking too. Has 3½ digit display, autopolarity, autozero, a diode and audible continuity checker, and overload protection. Kit **IM-2320** \$69.95, ship wt 5 lbs. Assembled **SM-2320** \$79.95, ship wt 1 lb.

Specifications: **VOLTS DC:** Ranges: 200 mV, 2 V, 20 V, 200 V, 1000 V. **Resolution:** 100 μV. **Accuracy:** ± (0.5% of reading + 1 digit). **VOLTS AC:** Ranges: 200 mV, 2 V, 20 V, 200 V, 750 V. **Resolution:** 100 μV. **Accuracy:** ± (1.25% of reading + 4 digits).

**AMPS DC:** Ranges: 200 μA, 20 mA, 200 mA, 10 A. **Resolution:** 0.1 μA. **Accuracy:** ± (1.0% of reading + 1 digit), except for ± (2.0% of reading + 3 digits) on 10 A range. **AMPS AC:** Ranges: 20 mA, 200 mA, 10 A. **Resolution:** 10 μA. **Accuracy:** ± (1.5% of reading + 3 digits), except for ± (2.5% of reading + 4 digits) on 10 A range. **OHMS:** Ranges: 200Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ. **Resolution:** 0.1Ω. **Accuracy:** ± (0.75% of reading + 1 digit), except for 200Ω and 20 MΩ ranges. **CAPACITANCE:** Ranges: 2 nF, 20 nF, 200 nF, 2 μF, 20 μF. **Resolution:** 1 pF. **Accuracy:** ± (2.0% of reading + 4 digits). **Power:** One 9 V battery (not included).



## A superior handheld frequency counter

An ideal compact and portable frequency counter for checking mobile car, boat and airplane transmitter frequencies. Kit **IM-2400** \$149.95, ship wt 3 lbs.

Accessories: Assembled **SMA-2400-1** Telescopic Antenna \$9.95, ship wt 1 lb. Assembled **PS-2404** 120 VAC Battery Eliminator/Charger \$7.95, ship wt 1 lb.

Specifications: **INPUTS: Frequency Range:** 50 Hz to 50 MHz, 40 MHz to 512 MHz. **Sensitivity:** 25 mV RMS guaranteed (10 mV RMS typical). **Input Impedance:** 1 M $\Omega$  shunted by <24 pF on low range and 50 $\Omega$  on high

range. **Input Protection:** 150 V RMS to 100 kHz derated to 10 V RMS at 50 MHz on low range, 5 V RMS on high range. **TIME BASE: Frequency:** 10 MHz. **Setability:**  $\pm 1$  PPM. **Temperature Stability:**  $\pm 10$  PPM, 0 $^{\circ}$ C to 40 $^{\circ}$ C. **GENERAL: Gate Time:** 1 second or 0.1 second (switch selected). **Power Requirements:** Five 1.2 volt nickel-cadmium batteries (included) or external battery charger/eliminator. **Dimensions:** 1 $\frac{5}{8}$ " H x 3 $\frac{3}{8}$ " W x 8 $\frac{3}{8}$ " L. **Weight:** 13 ounces with batteries.

## Save \$10 on AC line monitor

Display the AC voltage at any outlet with the Line Voltage Monitor. A manually reset Fault Indicator can be set to light any time the AC drops below a user-adjusted line voltage. Kit **IM-2203** Was \$49.95 Now \$39.00, 3 lbs.

Specifications: **Operating Range:** 85 to 140 VAC, 60 Hz. **Accuracy:**  $\pm 1.5\%$  of reading + 1 count). **Fault Adjustment Range:** 90 to 120 VAC. **Display:** 3-digit, 0.43", high-brightness LED. **Resolution:**  $\pm 1$  VAC. **Power:** 5 watts maximum at 120 VAC, 60 Hz. **Dimensions:** 3 $\frac{3}{4}$ " H x 5 $\frac{1}{2}$ " W x 1 $\frac{5}{8}$ " D. **Weight:** 8 oz.



## Keep your oscilloscope at its peak accuracy and performance level

Keep your scope up to specs at all times with the Heathkit Precision Oscilloscope Calibrator. It provides all the extremely accurate signals you'll need for making critical scope adjustments and calibrations. Also use it to calibrate other test equipment. Kit **IG-4244** \$149.95, ship wt 6 lbs.

**Time:** <1 ns. **Leading Edge Aberrations:** <2% of peak-to-peak amplitude or 10 mV, whichever is greater. **Output:** 50 $\Omega$  nominal. **VOLTAGE OUTPUT SIGNAL: Ranges:** 1 mV to 100 V peak square wave in a 1-2-5 sequence. **Accuracy:** Within 1% into a  $\geq 1$  M $\Omega$  load when calibrated with an external voltmeter. **Rise Time:** <5  $\mu$ s. **Frequency:** Approximately 1 kHz. **SINE WAVE OUTPUT SIGNAL: Frequency:** Approximately 1 kHz. **Amplitude:** Approximately 1 volt peak-to-peak. **GENERAL: Power Requirements:** 120/240 VAC, 50/60 Hz.



## FAST, EASY 2-EVENING KIT

Specifications: **TIME OUTPUT SIGNAL: Range:** 0.5 s to 10 ns square wave in a 1-2-5 sequence. **Accuracy:** 0.015%. **Amplitude:** 0.5 s to 20 ns – 100 mV to 1 V peak. 10 ns – 100 mV to 0.5 V peak. **Rise**

## Oscilloscope calibrator

All it takes is two evenings of your time to put this generator together and keep most scopes up to their specifications. Kit **IG-4505** \$59.95, ship wt 4 lbs.

Specifications: **TIME SIGNAL:**

**Range:** 0.5 s to 1  $\mu$ s square wave in a 1-2-5 sequence. **Accuracy:** 0.01%. **Amplitude:** Approx. 200 mV peak. **Rise Time:**

$\leq 4$  ns. **Overshoot:**  $\leq 3\%$ . **Output:** 50 $\Omega$  terminated cable. **VOLTAGE SIGNAL:**

**Ranges:** 1 mV to 100 V peak square wave. **Accuracy:** Within 2%. **Rise Time:**

$\leq 2$   $\mu$ s. **Frequency:** DC, 2 Hz to 10 kHz in a 1-2-5 sequence. **GENERAL:**

**Power:** 120/240 VAC, 50/60 Hz.

**Dimensions:** 2 $\frac{3}{4}$ " H x 9 $\frac{1}{8}$ " W x 4 $\frac{1}{4}$ " D.



## A versatile universal counter

Technicians, hams, engineers...this top-of-the-line 512 MHz digital counter delivers long and reliable performance. It lets you know in a bright half-inch high 8-digit LED display the frequency being measured down to 0.1 of a cycle. It also displays period and frequency ratio. And with this counter's accuracy you can adjust 2-way radios and others to within FCC specs. Features a trigger level control, oven-housed crystal, a front panel standby switch and a rear panel time base jack. Build in four evenings. Kit **IM-2420** \$289.95, ship wt 9 lbs. Assembled **SM-2420** \$350.00, ship wt 9 lbs.

Accessories: Assembled **SMA-2400-1** Telescopic antenna \$9.95, ship wt 1 lb.

Specifications: **FREQUENCY MEASUREMENT:**

**Range:** Input A, 5 Hz to 50 MHz. Input B, 40 MHz to 512 MHz. **Sensitivity:** 25 mV RMS (4 to 15 mV RMS typical). **Display Resolution:** Input A, 0.1 Hz to 10 Hz. Input B, 1 Hz to 1000 Hz.

**PERIOD MEASUREMENT:** Input: Input A only. **Range:** 5 Hz to 10 MHz. **Display Resolution:** 100 ns to 0.1 ms in decade steps. **RATIO B/A MEASUREMENT:** Input Frequency

**Limits:** Input A, 5 Hz to 25 MHz. Input B, 50 MHz to 512 MHz. **Effective Range:** From 1.6 to 1.024 x 10<sup>8</sup>

**OSCILLATOR:**

**Frequency:** 10 MHz. **Crystal Aging Rate:** <1 PPM/yr.

**Stability:**  $\pm 0.2$  PPM, 0° to 40°C. **GENERAL:** **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 4 $\frac{1}{4}$ " H x 10" W x 12 $\frac{1}{2}$ " D.

## An accurate digital frequency counter in everyone's price range

Put accurate and dependable frequency measurement capability on your work bench at an affordable price. Precisely measure frequencies from 10 Hz up to 225 MHz. And a crystal-controlled time base provides an excellent  $\pm 10$  parts-per-million long term accuracy. These are specifications that make this counter a valuable instrument for engineers, technicians and hobbyists.

This Heathkit Frequency Counter is also easy to operate making it an ideal instrument for beginners. The eight-digit display always shows the measurement in MHz for quick reading of frequencies with a resolution as low as 1 Hz. Even allows indirect frequency checks using the telescopic antenna (at left). Two-evening build time. Kit **IM-2410** \$139.95, ship wt 6 lbs.

Specifications: **Display:** 8-digit LED. **Frequency Ranges:** 10 Hz to 50 MHz. 20 MHz to 225 MHz. **Sensitivity:** 10 Hz to 50 MHz range: 25 mV RMS maximum (10 mV typical) from 10 Hz to 30 MHz and 50 mV RMS maximum from 30 MHz to 50 MHz. 20 MHz to 225 MHz range: 25 mV RMS maximum (10 mV typical). **Input Impedance:** 1 M $\Omega$  shunted by  $\leq 24$  pF. **Input Protection:** 150 VAC up to 100 kHz, derated to 5 VAC from 160 MHz to 225 MHz. **Internal Time Base Frequency:** 3.58 MHz. **Temperature Stability:**  $\pm 10$  PPM from 0°C to 40°C. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 3 $\frac{3}{8}$ " H x 7 $\frac{1}{4}$ " W x 9 $\frac{1}{2}$ " D. **Weight:** 5 lbs.





## Check any capacitor quickly and easily with this portable meter

Whether on the bench or out in the elements you'll always have the right instrument in your hand to measure the capacitance of any capacitor with the Heathkit Auto-Ranging Digital Capacitance Meter.

To verify capacitor tolerances or to select and match capacitors for critical circuit applications just plug in the

component and press the power button. Automatically the range is selected and indicated by a lit pF, nF,  $\mu$ F, or mF LED. The reading appears on a  $3\frac{1}{2}$  digit liquid crystal display for all values ranging between 0 pF and 199.9 mF.

Get the correct value of large, chassis-mounted parts and easily make cable capacitance checks with an included extension cable. A Kelvin (4-terminal) error-canceling input connector and a zero offset control compensate for stray capacitance and ensure display accuracy.

Use this handheld instrument to preset trimmer capacitors, measure complex series-parallel capacitor networks, or sample production components for quality assurance. It takes about 11.0 hours to assemble. Kit **IT-2250** \$159.95, ship wt 3 lbs.

Accessories: **PS-2350** 120 VAC Battery Eliminator \$7.95, ship wt 1 lb.

Specifications: **Ranges:** 199.9 pF, 1999 pF, 19.99 nF, 199.9 nF, 1.999  $\mu$ F, 19.99  $\mu$ F, 199.9  $\mu$ F, 1999  $\mu$ F, 19.99 mF, 199.9 mF. **Accuracy:** 199.9 pF, 1999 pF, 19.99 nF, 199.9 nF ranges:  $\pm$  (0.2% of reading + 1 count + 0.5 pF). 1.999  $\mu$ F through 199.9 mF ranges:  $\pm$  (5% of reading + 1 count). Using laboratory standards. **Battery Indicator:** Displays "Lo Batt" when battery voltage is down to approximately 5 volts. **Power:** 9-volt battery (NEDA 1604, not included), or Heath PS-2350 120 VAC Battery Eliminator. **Dimensions:** 2" H x  $3\frac{1}{4}$ " W x  $7\frac{1}{2}$ " L. **Weight:** 16 ounces with battery.

## Measure RF voltages with this probe

Provide high voltage RF measurement capability for DC voltmeters with 10 and 11 megohm input impedances. This probe provides a DC voltage approximately equal to the positive peak value of the AC voltage in the circuit under test up to 100 MHz. An easy one-evening kit. Kit **PK-3-A** \$14.95, ship wt 1 lb.

## Deluxe 10:1 and direct 1:1 combination probe

A flexible probe ideal for all frequency counter and scope uses from DC to 10 MHz in X1 position, DC to 100 MHz in the X10 position. Includes several adaptors and probe tips. Assembled **PKW-105** \$34.95, ship wt 1 lb. Assembled **IOA-3220-1** Pouch with two probes \$64.95, ship wt 1 lb.



## Another valuable probe for use in TV servicing

This low-capacitance scope probe is extremely helpful in tracing waveforms in TV circuits without causing signal distortion from overloading or frequency discrimination. Has switchable direct and X10 positions. Use the X10 position for minimum capacitive loading of the circuit. Use the X1 position for maximum sensitivity. Kit **PK-1** \$16.95, ship wt 1 lb.

See May



Review

INSTRUMENTS



## Save \$70 on Digital L/C Bridge

To verify that a 10 pF capacitor or 10 mH inductor are precisely what they are supposed to be, you need the Digital LC Bridge. This versatile instrument will even check the associated dissipation or loss factor of the component as well.

A four-point Kelvin input connection eliminates the variable effects of components with large lead lengths or large lead diameters. A null control also eliminates stray capacitance on the lower ranges. Separate real panel connectors allow the application of a DC voltage for batch testing or the hookup of a plotter for charting capacitance/voltage curves. Kit **IT-2240** Was \$269.95 Now \$199.95, 11 lbs.

Specifications: **INDUCTANCE: Ranges:** 200  $\mu$ H to 2000 H in 8 decade steps. **Accuracy ( $\pm$  4 counts):**  $\pm$  [0.5% (L) + 1.5% (L) x D + 0.5  $\mu$ H] for readings from 10 to 2000 counts when the Bridge is calibrated using laboratory standards. **CAPACITANCE: Ranges:** 200 pF to 2000  $\mu$ F, 8 decades. **Accuracy ( $\pm$  2 counts):**  $\pm$  [0.5% (C) + 1.5% (C) x D + 0.5 pF] for readings from 10 to 2000 counts when the Bridge is calibrated using laboratory standards. **DISSIPATION: Range:** 000 to 1999, limited to D x  $\mu$ F = 1000 on 2000  $\mu$ F range. **Accuracy ( $\pm$  20 counts):**  $\pm$  3% for value displays greater than 200 counts. **GENERAL: Over-**

**voltage Protection:** Input protected against  $\pm$  20 VDC/VAC (5 seconds maximum), or capacitor up to 2000  $\mu$ F charged to 50 VDC and by an internal 1-ampere fuse. **Power:** 120 VAC, 60 Hz. **Dimensions:**  $3\frac{3}{4}$ " H x 10" W x  $12\frac{1}{2}$ " D.



## High voltage supply

Hams, test out ideas to increase the efficiency and output of your transmitter's finals. Audio buffs, experiment with clear stereo sound from vacuum tube amplifiers. Or, power any circuit requiring voltages up to 400 volts DC at

up to 100 mA with this well-regulated variable-output supply.

Separate panel meters allow you to accurately monitor current and voltage. Heater voltages can be left on while a switch removes the high voltage.

Kit **IP-2717-A** \$189.95, 19 lbs.  
Assembled **SP-2717-A** \$250.00, 20 lbs.

Specifications: **B+ VOLTS:** **Voltage:** 0 to 400 volts DC, regulated. **Current:** 0 to 100 mA continuous, 125 mA intermittent. **Regulation:** Output variation less than 1% from no load to full load. **Ripple:** Less than 10 mV RMS. **C- VOLTS:** **Voltage:** 0 to -100 volts DC at 1 mA. **FILAMENT VOLTS:** **Voltage:** 6.3 VAC at 4 amperes or 12.6 VAC at 2 amperes. **GENERAL:** **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5½" H x 13¾" W x 11¼" D.



## Make a home or car stereo sound its best

And save money by getting the most sound improvement for your dollar. With our Real-Time Spectrum Analyzer you can see which frequencies are underpowered on a bright fluorescent display. Kit **AD-1308** \$299.95, 5 lbs.

Specifications: **SPL Range:** 23-126 dB. **SPL Accuracy:** ±1 dB "A" weighted. **Input Sensitivity (90 dB SPL Range):** 0 dB = 350 mV RMS ±10%. **A and C Weighting Filters per ANSI: S1.4-1971 (Rev. 1976).** **Power:** 6 "C" batteries (not included). **Dimensions:** 4½" H x 9¼" W x 4" D. **Weight:** 2½ lbs.

**SAVER!** For a limited time only get a FREE AD-1309 Noise Generator with every AD-1308 Spectrum Analyzer by ordering **ADS-1308-1** \$299.95, ship wt 8 lbs.

Know your test equipment inside and out by building it yourself



## Noise Generator Kit

To properly check out any stereo system with a spectrum analyzer you need a noise source with nearly constant energy output. This one-evening Pink/White Noise Generator kit will do just that...and at a fraction of the cost of comparable units. Kit **AD-1309** \$49.95, ship wt 2 lbs.

Specifications: **Frequency Response:** Pink Noise, ±1 dB from 20 Hz to 20 kHz. White Noise, ±3 dB from 20 Hz to 20 kHz. **Output Levels:** >350 mV RMS, >1.5 V peak. **Power:** 9-volt (NEDA 1604) battery. **Dimensions:** 2½" H x 4½" W x 4½" D.

## Save \$20 on Rack Mount

Install the AD-1308 Spectrum Analyzer into its rack mount accessory and keep it with your other rack mount equipment. Permanently connect the AD-1308 for constant in-line monitoring. Easily snaps out for portable use. Has internal power supply for Analyzer with a built-in recharger for Ni-Cd batteries. 5¼" H x 19" W x 8½" D. Kit **ADA-1308-1** Was \$119.95 Now \$99.95, ship wt 8 lbs.

**SAVER!** Buy the ADA-1308-1 within 90 days of purchasing the ADS-1308-1 and get the rack mount for half price.

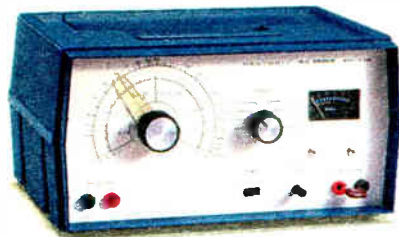
## Our most economical power supply

In less than three and a half hours assemble a truly handy power supply (pictured). With its variable 1 to 15 volt output you can use it for many digital and analog circuit applications. Even use it as a substitute for batteries when checking out portable equipment. Terminals on the rear panel allow you to control this supply's output with either an AC or DC voltage. Kit **IP-2728** \$49.95, ship wt 5 lbs.

Specifications: **Load Regulation:** Less than 50 mV, no load to full load. **Ripple and Noise:** Less than 5 mV. **Current Output:** 500 mA max. **Current Limiting:** Adjustable 10 mA to over 500 mA. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 4¾" H x 5½" W x 5¼" D. **Weight:** 3¼" lbs.



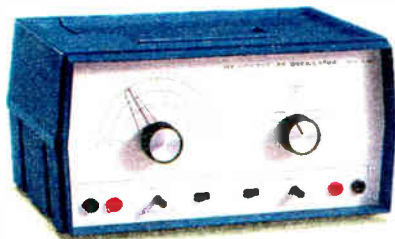




## Test the unknown

Stop wasting money by throwing away unmarked resistors, capacitors and inductors. Determine their value with this RLC Bridge. An easy four hour kit. Test leads store in snap-tight compartment. Kit **IB-5281** \$59.95, 5 lbs.

Specifications: **Resistance Ranges:** 10 to 10 MΩ in three ranges. **Inductance Ranges:** 10 μH to 10 H in three ranges. **Capacitance Ranges:** 10 pF to 10 μF in three ranges. **Power:** Two 9-volt transistor batteries (not included) and/or IPA-5280-1 Power Supply. **Dimensions:** 5¾" H x 11" W x 7¾" D. **Weight:** 3½ lbs.



## RF Generator

Align tuned stages in AM, FM, television, longwave, and shortwave receivers with this low-cost and easy-to-assemble generator. Kit **IG-5280** \$59.95, ship wt 5 lbs.

Specifications: **RF OUTPUT: Frequency:** 310 kHz to 110 MHz in five bands. 100 MHz to 220 MHz using calibrated harmonics. **Voltage:** Approx. 100 mV RMS. **Internal Modulation:** 1 kHz. **AF OUTPUT: Frequency:** 1 kHz. **Voltage:** Approx. 2 volts RMS. **Power:** Two 9-volt transistor batteries (not included) and/or IPA-5280-1 Power Supply. **Dimensions:** 5¾" H x 11" W x 7¾" D.

## Audio generator

Put together an economical sine and square wave generator. Test audio equipment and digital circuits. Kit **IG-5282** \$59.95, ship wt 5 lbs.

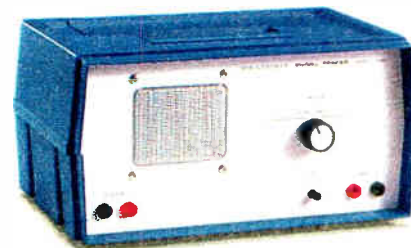
Specifications: **Frequency Output:** 10 Hz to 100 kHz in four ranges. **Sine Wave Voltage:** 0 to 3 volts RMS. **Square Wave Voltage:** 0 to 3 volts peak. **Power:** Two 9-volt transistor batteries (not included) and/or IPA-5280-1 Power Supply. **Dimensions:** 11" H x 5¾" D x 7¾" D. **Weight:** 3½ lbs.



## 3 supplies in one

This is the all-in-one power supply that furnishes most often needed voltages. A special tracking circuit maintains voltage differences when working with operational amplifier circuits. Kit **IP-2718** \$119.95, ship wt 12 lbs. Assembled **SP-2718** \$200.00, ship wt 12 lbs.

Specifications: **Outputs:** 5 VDC at 1.5 amps. Two outputs at 0 - 20 volts at 0.5 amps. **Regulation:** <0.1% on 20 V supplies. <3% on 5 V supplies. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 4½" H x 10¾" W x 9" D. **Weight:** 10 lbs.



## Listen for problems

Keep your eyes on your work while your ears detect a good or bad signal. This way you can quickly trace receiver and transmitter circuits in radios and TVs. Detect RF or IF stage failures, even bad components. Also use on audio



## Heavy amp handler

When servicing amateur and CB radio equipment you need a power supply that provides a well regulated output voltage and a massive amount of steady current. In as little as four hours of assembly time you can build a rugged Heathkit Battery Eliminator to satisfy these and other heavy current demands. Kit **IP-2760** \$179.95, 31 lbs.

Specifications: **Output:** Variable from 7.5 to 15 VDC. **Current:** 20 A intermittent, 12 A continuous. **Ripple:** <1%. **Regulation:** <2%. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5¾" H x 11" W x 11" D. **Weight:** 22½ lbs.

circuits. This one-evening kit lets you check voltages and resistances by simply listening to an audible tone. Kit **IT-5283** \$59.95, ship wt 5 lbs.

Specifications: **Speaker:** 3" permanent magnet, 16Ω. **Power:** Two 9-volt transistor batteries and/or IPA-5280-1 Power Supply. **Dimensions:** 5¾" H x 11" W x 7¾" D. **Weight:** 3 lbs.

## 5280 Series Supply

Simultaneously supply DC power to all the 5280 Series instruments on this page. Operates on 120 or 240 VAC. 6" H x 3¾" W x 3" D. Kit **IPA-5280-1** \$39.95, ship wt 3 lbs.



## Proven service veteran

This Vacuum Tube Voltmeter has been and still is a favorite with service technicians as a versatile troubleshooting instrument. It's more tolerant of an overload than a DMM, and more accurate than a VOM.

On the wide 6" meter accurately measure  $\pm$  DC voltages from 0 volts to 1500 volts within  $\pm$  3% of full scale ac-

curacy. Measure AC voltages from 0 to 1500 volts RMS including a low 1.5 V range. The resistance range covers 0.1 $\Omega$  to 1000 M $\Omega$  in seven ranges. A zero center and dB scale add versatility.

In less than three evenings you can put this 11 M $\Omega$  input meter together. Use the gimbal bracket to mount the meter almost anywhere. Requires one "C" size battery (not included). Kit **IM-5228** \$89.95, ship wt 6 lbs.



## Sine and square waves from 1 Hz to 100 kHz

Here is a signal generator that supplies high quality sine waves with less than 0.1% distortion, ideal for testing audio amplifiers. And its sharp, clean square waves are just what you need to check frequency responses and test digital instruments. Kit **IG-5218** \$149.95, ship wt 10 lbs.

Specifications: **SINE WAVE OUTPUT: Frequency Range:** 1 Hz to 100 kHz. **Output Voltage Ranges:** 0-0.003, 0-0.01, 0-0.03, 0-0.1, 0-0.03, 0-1.0, 0-3.0, 0-10.0. **Internal Load:** Internal 600 $\Omega$  load available on 0.003, 0.01, 0.03, 0.1, 0.3, and 1.0 volt ranges. **dB Ranges:** -62 to +22 dB (-12 to +2 dB on meter; -50 to +20 dB in eight 10 dB switch positions.) +2 dB maximum into 600 $\Omega$  load. **Output Variation:**  $\pm$ 1 dB from 10 Hz to 100 kHz. **Output Indication:** Two voltage

scales and one dB scale on front panel meter. **Output Impedance:** 10 volt range; 0-1000 $\Omega$ . 3 volt range; 800-1000 $\Omega$ . 1 volt range and lower; 600 $\Omega$ . **Meter Accuracy:**  $\pm$ 10% of full scale with proper load termination. **Distortion:** Less than 0.1% from 10 Hz to 20 kHz. **SQUARE WAVE OUTPUT: Frequency Range:** 5 Hz to 100 kHz. **Output Voltage Ranges:** 0-0.1 V, 0-1.0 V and 0-10 V zero-to-peak into 2000 $\Omega$  or higher load. **Output Impedance:** 52 $\Omega$  on 0.1 V and 1.0 V ranges. Up to 220 $\Omega$  on 10 V range. **Rise Time:** Less than 50 nanoseconds. **GENERAL: Frequency Selection:** First two significant figures on 0-100 and 0-10 switches each in ten steps. Third figure on continuously variable 0-1 control. Multiplier switch; X1, X10, X100, X1000. **Frequency Error:** Within  $\pm$ 5% of first and second digit. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5 $\frac{1}{8}$ " H x 13 $\frac{1}{4}$ " W x 7" D. **Weight:** 7 lbs.

Specifications: **DC VOLTMETER: Ranges:** 0-1.5, 5, 15, 50, 150, 500, 1500 volts full scale. **Input Resistance:** 11 megohms on all ranges. **Accuracy:**  $\pm$  3% of full scale. **AC VOLTMETER: Ranges:** 0-1.5, 5, 15, 50, 150, 500, 1500 RMS scales (0.353 of peak-to-peak). **Frequency Response (5 V range):**  $\pm$ 1 dB 25 Hz to 1 MHz (600 $\Omega$  source, referred to 60 cps). **Accuracy:**  $\pm$  5% of full scale. **Input Impedance:** 1 megohm shunted by 40 pF measured at input terminals (200 pF at probe tip). **OHM-METER: Ranges:** Scale with 10 $\Omega$  center X1, X10, X100, X1000, X10K, X100K, X1 Meg. Measures 0.1 $\Omega$  to 1000 megohms with internal battery. **GENERAL: Meter:** 6-inch, 200  $\mu$ A movement. **Probe:** Combined AC-OHMS-DC switching probe, single jack input for probe and ground connections. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5" H x 12 $\frac{3}{4}$ " W x 4 $\frac{3}{4}$ " D. **Weight:** 5 lbs.



## Three basic waveforms from one generator

Sine, square and triangular waveforms - every type you'll need to drive experimental circuits or service electronic equipment. All three waveforms are adjustable over a wide frequency range from 0.1 Hz to 1 MHz. Kit **IG-1271** \$189.95, ship wt 7 lbs. Assembled **SG-1271** \$250.00, ship wt 6 lbs.

Specifications: **Frequency Range:** 1.0 Hz to 1 MHz. **FUNCTIONS: Triangle:** Nonlinearity, 5% maximum. Symmetry within 10% of 50% duty cycle. **Square:** 100 ns maximum rise or fall time. Symmetry within 10% of 50% duty cycle. **Sine:** Harmonic distortion; 3% maximum, 5 Hz to 100 kHz. **Attenuator:** 0 to 50 dB in 10 dB steps. 0 to 20 dB minimum variable.  $\pm$ 1 dB accuracy. **Output:** 10 volts peak-to-peak into 50 ohms, 20 volts peak-to-peak into open circuit. 50 ohms impedance  $\pm$ 5%. Flatness  $\pm$ 1.5 dB from 0.1 Hz to 1 MHz. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 3" H x 7 $\frac{1}{4}$ " W x 8 $\frac{3}{8}$ " D. **Weight:** 4 $\frac{1}{4}$  lbs.





## A special FM meter

This Deviation Meter quickly and accurately measures frequency deviation from transmitter and generator outputs. Install in-line or use the optional antenna. Listen to audio or connect to a scope. Kit **IM-4180-1** \$179.95, 7 lbs.

Accessories: Kit **IMA-4180-1** Special low noise Battery Charger/Eliminator. \$29.95, ship wt 2 lbs. Assembled **SMA-2400-1** Swiveling Telescopic Antenna. \$9.95, ship wt 1 lb.

Specifications: **Carrier Frequency Ranges:** 25 - 50 MHz in fundamental. 50 - 1000 MHz on harmonics. **Deviation Ranges:** 0 - 2, 0 - 7.5, 0 - 20 and 0 - 75 kHz peak. **Accuracy:**  $\pm 3\%$  full scale. **Sensitivity:** 10 mV min. 25 - 50 MHz. 35 mV min. 50 - 500 MHz, 100 mV min. 500 - 1000 MHz. **Power:** Ten "AA" batteries (not included) or optional IMA-4180-1. **Dimensions:** 5½" H x 10¾" W x 4¼" D.



## Precise pulses – \$30 off

Almost any pulse signal you'll ever need from the Heathkit Pulse Generator. Build it in approximately ten hours. Kit **IG-1277** Was \$149.95 Now \$119.00, 9 lbs.

Specifications: **PULSE CONTROLS:** **Period:** 200 ns to 1 s (5 MHz to 1 Hz) in 7 decade steps. Continuously variable between ranges. **Width and Delay:** 100 ns to 1 s in 7 decade steps. Continuously variable between ranges. **Maximum Duty Cycle:** Capable of 100%. **Operating Modes:** Run/Gate, External Trigger, Trigger Delay, Pulse Delay, Square Wave, Complement, Manual Trigger. **Outputs:** 50Ω out; 0.2 V to 20 V P-P (open circuit) [0.1 V to 10 10 V P-P (50 ohm termination)] with rise/fall time less than 15 ns for 5 V level change. TTL Out; drives up to ten TTL loads. Trig Out; drives up to 3 TTL loads. **Inputs:** Gate/Trig In. **Overlap Indicator:** LED lights when pulse width exceeds period. **Power:** 120 VAC, 60 Hz. **Dimensions:** 3¾" H x 10" W x 12½" D.

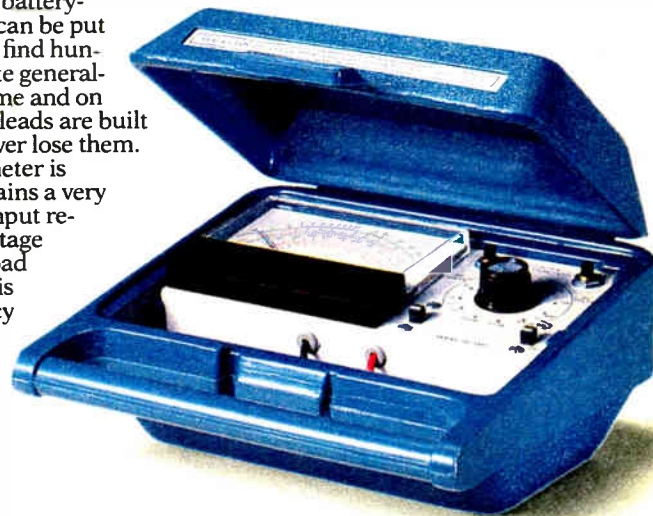
## A beginner's voltmeter a veteran can value

It's compact, lightweight, battery-powered, easy to operate and can be put together in one evening. You'll find hundreds of uses for this solid-state general-purpose meter around the home and on your workbench. And the test leads are built right into the case so you'll never lose them.

While inexpensive, this meter is loaded with features. It maintains a very good accuracy due to a high input resistance on the DC and AC voltage ranges that places very little load on the circuit being tested. This voltmeter has a wide frequency response on the AC voltage ranges that covers the full audio frequency range and beyond. And the ohmmeter ranges provide a 1½ volt test voltage that's useful in checking semiconductors.

The simplicity of this valuable meter makes it an ideal construction project for the novice in electronics. Kit **IM-5217** \$49.95, ship wt 4 lbs.

Specifications: **DC VOLTS: Ranges:** 0 - 1.5, 0 - 15, 0 - 500 volts full scale. **Input Resistance:** 10 megohms on all ranges. **Accuracy:**  $\pm 3\%$  of full scale. **AC VOLTS: Ranges:** 0 - 1.7, 0 - 15, 0 - 150, 0 - 500 volts full scale. **Input Resistance:** 1 megohm on all ranges. **Input Capacitance:** Approximately 100 pF (40 pF on 500 V range). **Accuracy:**  $\pm 5\%$  of full scale. **Frequency Response:**  $\pm 1$  dB 10 Hz to 1 MHz (from low source impedance). **OHMS: Ranges:** X1, X100, X10K, X1M; 10Ω center scale. **GENERAL: Meter:** 4½", 100 μA, 100 degree movement. **Power:** One 1.5 volt "C" battery and two 9 volt transistor batteries (not included). **Dimensions:** 5¾" H x 9¾" W x 9" D.



## All-in-one 40 kilovolt probe meter

The Heathkit 40 kV Probe Meter is a fast and convenient instrument that you can use to check extremely high positive voltages commonly found in televisions, computer terminals and oscilloscopes. Measure voltages up to 40,000 volts in any negative ground circuit with a full scale accuracy of  $\pm 3\%$ .

Directly read all measurements on the built-in meter of this easy-to-build kit. In just one hour you can be making high voltage checks of your own equipment. Probe has dimensions of 1½" H x 17¾" W x 15" L. Kit **IM-5215** \$34.95, ship wt 2 lbs.



## Save \$50 on EPROM Programmer

Put your own adventure game, accounting package or home security program in an EPROM memory chip. Then plug it into your computer for easy access from the keyboard. But don't stop with programming EPROMs. With our Programmer you can also duplicate and verify EPROMs. In addition, using the simulate mode, you can substitute the Programmer for an EPROM to check your program and make any needed changes before burning in the memory device.

Heath's microprocessor-controlled EPROM Programmer can be used with popular 2500 and 2700 series EPROMs that use a single power supply. Other compatible memory devices up to 16K bytes can also be accommodated. Specific personality modules, wired by the user, are required for use in some modes for different EPROM configurations. Seven blank personality modules are supplied with the Programmer kit along with commonly used EPROM wiring diagrams. The assembled version of the EPROM Programmer comes with assembled personality modules configured for use with 2532, 2516/2716, 2732, 2732A, 2764, 2764A, 27128, and 27128A EPROMs.

The kit Programmer takes four evenings to assemble. Kit **IDS-4801** Was \$329.00 Now Only \$279.00, ship wt 11 lbs. Assembled **SD-4801** \$525.00, ship wt 10 lbs.

Accessories: **SDA-4801-10** User-friendly software for use with all Heath/Zenith computers, IBM PC and compatibles. This software allows you to upload or download binary, text and Intel-Hex files to the EPROM Programmer. Does offset loading and relocation offset loading for EXE-type files. Uses the MS-DOS operating system \$49.95, ship wt 1 lb.

Specifications: **Programmed Devices:** 2500 and 2700 series and compatible devices that use a single supply voltage. **Features:** Keypad entry to RAM (stand-alone operation). EPROM to RAM download (address selectable). EPROM simulation using programmer RAM. Displays 16-bit check sum. EPROM test before programming start. Edit includes: insert byte, delete byte, search for byte and display address, and verify (EPROM to RAM comparison). **I/O:** RS-232C from 25-pin D connector provides read/write channel to computer. **I/O Formats:** Intel Hex. **Data Transfer Rate:** 9600 baud. **Processor:** Z-80 CPU. **Clock Speed:** 2 MHz. **Memory:** 4K ROM, 16K RAM. **Display:** Six 7-segment LEDs for address, data and prompt. Six LEDs for function indicators. **Keys:** 4 x 4 HEX keypad. Address, Increment, Decrement, Repeat, Function Select and Load Function keys. **Programming Time:** 50 ms per byte. **Power:** 120 VAC, 60 Hz. **Dimensions:** 4 $\frac{3}{4}$ " H x 15 $\frac{3}{4}$ " W x 10 $\frac{3}{4}$ " D. **Weight:** 6 lbs.

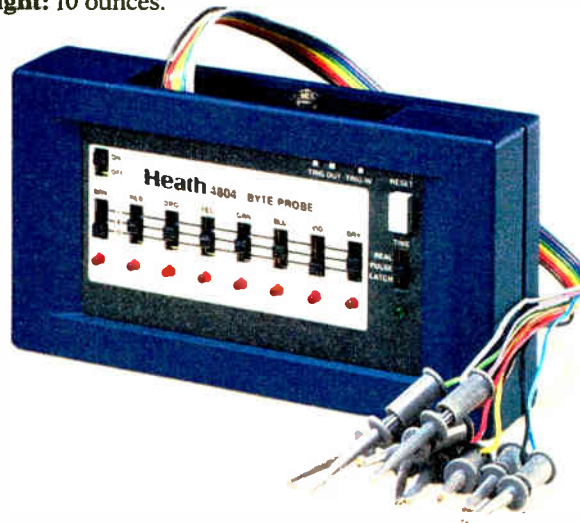


## Save \$20 on a digital Byte Probe

The versatile Byte Probe is a unique device that tests the logic states, up to 10 MHz, of address lines, data lines and other general TTL or CMOS circuitry. All circuits under test must operate from a +5 VDC power supply.

With its trigger output, the Probe can be used to trigger a scope for in-depth real time waveform analysis. Observe actual data on a scope in real time, pulse stretch, or latched mode. Also connect multiple Probes together for testing of more than eight lines. A one-evening kit. Kit **ID-4804** Was \$49.95, Now \$29.95, ship wt 2 lbs.

Specifications: **Pulse Repetition Rate:** 10 MHz typical, 8 MHz minimum. **Input to Trigger Output Delay:** 40 ns max. **Latching Pulse Width:** 25 ns min. **Display Modes:** Real time, Pulse time and Latch time. **Display:** Eight red LEDs for input and one green LED for coincidence. **Power:** One 9-volt battery (NEDA 1604) or optional PS-2350 120 VAC Battery Eliminator (page 47). **Dimensions:** 1 $\frac{3}{8}$ " H x 6" W x 3 $\frac{3}{8}$ " D. **Weight:** 10 ounces.



## Use EPROMs over and over

A fast and easy one-evening kit that saves you money for other projects. The EPROM Eraser cuts memory device costs by letting you use the same EPROMs again and again. This inexpensive eraser is a money saver for all computer or electronics hobbyists interested in EPROM programming.

And the Eraser is easy to operate. Just place the EPROMs into the locking tray and wait for them to be erased. A safety interlock system prevents accidental exposure to ultraviolet rays when the tray is opened. Kit **ID-4803** \$59.95, ship wt 4 lbs. Assembled **SD-4803** \$100.00, ship wt 5 lbs.

Specifications: **Erase Time:** 3 minutes per watt-second of erase energy specified by manufacturer. **Capacity:** Seven 24-pin, six 28-pin or four 40-pin IC's. **UV Source Wavelength:** 253.7 nanometers. **UV Lamp:** 12 inch, 8 watts. **Typical Tube Life:** 3000 hours. **Power:** 120 VAC, 60 Hz. **Dimensions:** 2 $\frac{1}{2}$ " H x 3 $\frac{3}{4}$ " W x 13 $\frac{1}{4}$ " L. **Weight:** 3 $\frac{1}{2}$  lbs.





## For every TV shop

Satisfy your customers even more with an improved TV picture while increasing your profits. Do it by cleaning and rejuvenating virtually any TV CRT that comes into your shop with our CRT Tester and Rejuvenator.

Follow the easy operating instructions on the inside cover. They take you step by step through separate testing, cleaning and rejuvenating processes.

Each gun is individually controlled and monitored on its own grid current meter. Also check for shorts and gassy tubes. And a good indication of tube life expectancy. Four adapter sockets with instructions for assembling optional sockets are included.

Kit **IT-5230** \$149.95, ship wt 9 lbs.

Accessories: Kit **ITA-5230-1** CRT Socket Adapter allows you to test even more CRTs on the IT-5230. Uses universal clip leads to hookup and test CRTs with known basing configurations \$29.95, ship wt 1 lb.

Specifications: **Sockets (type supplied):** 14-pin for 90 color tubes. 13-pin for inline-gun color tubes. 8-pin for B&W tubes. 7-pin for B&W tubes. **Case:** Molded plastic. **Heater Supply Voltage:** Variable from 2 to 12 volts at 1 amp. **Power:** 120/240 VAC, 50/60 Hz. **Test Cable:** 4 foot, heavy duty.



## Quick, easy testing of TTL/CMOS circuits

This handy, quick-checking Logic Probe detects and indicates high and low logic levels in 5 VDC TTL circuits up to 100 MHz and 15 VDC CMOS circuits up to 80 MHz. Two indicator lights are located at the tip of the probe to show a high or low logic level. This gives you a clear view of what is happening without having to remove your eyes from the circuit test point.

Power is provided to the logic probe from the circuit under test through 34" leads with built-in strain relief and color-coded mini-clips. Detachable ground clip included. Kit **IT-7410** \$39.95, ship wt 1 lb.

Specifications: **AC THRESHOLD LEVELS:** TTL Logic **ZERO (V):**  $0.8 \pm 0.15$  @ 5 VDC. TTL Logic **ONE (V):**  $2.1 \pm 0.25$  @ 5 VDC. **CMOS Logic ZERO (%):**  $30 \pm 10\%$  of supply voltage. **CMOS Logic ONE (%):**  $70 \pm 10\%$  of supply voltage. **INPUT IMPEDANCE:** 400 k $\Omega$  in parallel with 10 pF. **RESPONSE LIMIT:** 10 ns for single pulse or train for TTL and CMOS. **Probe Input Protection:**  $\pm 50$  VDC, continuous.  $\pm 175$  VDC (124 VAC), 5 seconds. **Power:** 4.75 to 5.5 VDC @ 75 mA max. (TTL). 4.75 to 15 VDC @ 115 mA max. (CMOS). **Dimensions:** 9/4" L x 1" Diameter. **Weight:** 2 1/2 ounces.

## Semiconductor checker

Use this portable tester and see the actual operating characteristics of transistors, diodes, FETs, SCRs, triacs, and UJT's.

Takes two evenings to assemble. Kit **IT-3120** \$99.95, ship wt 5 lbs.

Specifications: **DC Beta**

**Ranges:** 1 to 50, 5 to 250, 10 to

500, 50 to 2500 and 100 to 5000. **Collector Currents:** 1 mA, 5 mA, 10 mA, 50 mA, 100 mA, 500 mA and 1 A. **G<sub>m</sub>:** 0 to 50,000  $\mu$ mhos. **Leakage Current Ranges:** 0 to 100  $\mu$ A, 0 to 1 mA, 0 to 10 mA, 0 to 100 mA and 0 to 1 A. **Out-of-Circuit Accuracy:**  $\pm 2\%$ ,  $\pm 2\%$  arc for DC beta and leakage. **In-Circuit Accuracy:** Indicates good or bad. **Diode Test:** Tests for forward conduction and reverse leakage (out-of-circuit). **SCR and Triac Tests:** Test for proper conduction and blocking. **Unijunction Transistor Test:** Measures  $I_{eb,s}$ ,  $I_{b,b,s}$  and Emitter Current (out-of-circuit). **Power:** Two 1.5 volt D batteries (not included).

## Choose from 999,999 resistors

The Heathkit Decade Resistance Kit is an accurate laboratory-type instrument that supplies a very wide range of resistance values for use in electrical measurements. Use it whenever you need an accurate variable multiplier or shunt, substitute resistor, or as an arm for DC and AC bridges. A one-evening kit. Kit **IN-3117** \$69.95, ship wt 3 lbs.

Specifications: **Range:** 1  $\Omega$  to 999,999  $\Omega$  in 1  $\Omega$  steps. **Resistors:** Precision, 1/2% accuracy, 1 watt. **Max Current:** X1 = 1000 mA, X10 = 300 mA, X100 = 100 mA, X1K = 30 mA, X10K = 10 mA, X100K = 3 mA. **Min. Resistance:** 0.025  $\Omega$  at terminals with all switches at zero. **Dimensions:** 5" H x 7 1/2" W x 6 5/8" D. **Weight:** 2 1/2 lbs.





### Shop on Your Computer

Enjoy the ease and convenience of shopping via your computer with the Heathkit Online Catalog through CompuServe®. Just type in GO HTH at any "!" or "OK" prompt and you get instant electronic access to bargains, specials and new products. Through a series of easy-to-follow menus, you'll browse through 17 major product categories that make up the over 400 products in the Heathkit line. You can even place your order online using your Visa, MasterCard or Heath Revolving Charge.

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As a result of our continuing growth and future plans in the computer and electronics industry, the following exciting and challenging job opportunities currently exist at Heath Company.

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- Financial Analysts
- Programmer Analyst
- Technical Writers
- Systems Engineers
- Hardware/Software Design Engineers
- Manufacturing Engineers
- Documentation Writers
- Product Line Managers
- Retail Management/Outside Sales
- Circuit Board Designers
- Continuing Engineer
- Production Supervisors
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To find out more, call or send your resume and salary requirements to Mr. Wayne Petzke, Heath Company, Dept. HF87, Hilltop Rd., St. Joseph, MI 49085, (616) 982-3484.

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**BY PHONE: 1-800-253-0570**  
**CALL TOLL FREE!**

TO ORDER TOLL-FREE: call 800-253-0570, using your Heath Revolving Charge or Visa or MasterCard credit cards (min. purchase \$10). Call toll-free between 8:00 A.M. and 5:00 P.M. Eastern Time Monday through Friday, Alaska and Michigan orders, or after 5:00 P.M. and weekends, call 616-982-3411. If you want the quickest handling and service possible, just fill out our order form between pages 56 and 57 before you call.



**BY MAIL:** Please follow these simple steps so we can handle your order quickly:

- Use the handy order form between pages 56 and 57.
- Write your name the same, each time you order.
- Give your complete address with full details. Include your ZIP Code and daytime phone number in case we have to call you about your order.
- For UPS deliveries to rural route or P.O. Box addresses, please give complete delivery information.
- When you fill out the form, include: 1) quantity, 2) model number, 3) description, 4) price, and 5) shipping weight. Figure out and write down the shipping and handling charges for each item from the rate chart on page 55.
- Please use separate sheet to order parts, manuals or for any correspondence.

**TERMS:** • Open new accounts with purchases as small as \$100 with 10% down. Write to Heath Company for your Heath Revolving Charge application. No minimum required for "add-ons" to your account (except parts orders - see credit card plans below). Be sure to sign the charge agreement. Use credit cards for parts orders.

• MasterCard and Visa credit plans. Use your credit cards to charge Heathkit products. Just fill in your credit card number in the space provided on the order form. Include your card expiration date and sign the order form. NOTE: We accept credit card orders for replacement parts.

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If you'd like to see how easy kit building is, order the manual first. We'll deduct the price of the manual when you buy the kit. Simply include a copy of your manual invoice with your order.

The typical kit assembly manual sells for \$8.00 depending on the nature of the product. Should the manual for the kit you are interested in be less than \$8.00 we'll refund the overpayment, if it is over \$8.00 we'll bill you for the balance. Add 10% for shipping and handling for each manual ordered.

Manuals are not available for the EE series of Educational courses or the SK-100 Educational Manual.

Send orders for manuals on a separate sheet of paper to Heath Co., Parts Department, Benton Harbor, MI 49022.

To get a free copy of the warranty for any customer product in this catalog costing more than \$15, simply write the Manager of Marketing Services, Heath Company, Benton Harbor, MI 49022.





**HOW TO FIGURE YOUR SHIPPING AND HANDLING CHARGES**

1. Find your zone number using the Zone Chart at the right.
2. Locate the shipping weight of the item in the first column of the Rate Chart.
3. Determine the shipping charge for the area.

**ZONE CHART**

Your zone is indicated by the first three digits of your ZIP Code.

**The following notice is required by the Fair Credit Billing Act:**

**IN CASE OF ERRORS OR INQUIRIES ABOUT YOUR BILL**

The Federal Truth in Lending Act requires prompt correction of billing mistakes.

1. If you want to preserve your rights under the Act, here's what to do if you think your bill is wrong or if you need more information about an item on your bill:
  - a. Do not write on the bill. On a separate sheet of paper write (you may telephone your inquiry but *doing so will not preserve your rights under this law*) the following:
    - i. Your name and account number (if any).
    - ii. A description of the error and an explanation (to the extent you can explain) why you believe it is in error.
  - iii. The dollar amount of the suspected error.
  - iv. Any other information (such as your address) which you think will help the creditor to identify you or the reason for your complaint or inquiry.
2. Send your billing error notice to the address on your bill which is listed after the words: "Send inquiries to:"

Mail it as soon as you can, but in any case, early enough to reach the creditor within 60 days after the bill was mailed to you. If you have authorized your bank to automatically pay from your checking or savings account any credit card bills from that bank, you can stop or reverse payment on any amount you think is wrong by mailing your notice so the creditor receives it within 16 days after the bill was sent to you. However, you do not have to meet this 16-day deadline to get the creditor to investigate your billing error claim.

2. The creditor must acknowledge all letters pointing out possible errors within 30 days of receipt, unless the creditor is able to correct your billing during that 30 days. Within 90 days after receiving your letter, the creditor must either correct the error or explain why the creditor believes the bill was correct. Once the creditor has explained the bill, the creditor has no further obligation to you even though you still believe there is an error, except as provided in paragraph 5 below.
3. After the creditor has been notified, neither the creditor nor an attorney nor a collection agency may send you collection letters or take other collection action with respect to the amount in dispute; but periodic statements may be sent to you, and the disputed amount can be applied against your credit limit. You cannot be threatened with damage to your credit rating or sued for the amount in question, nor can the disputed amount be reported to a credit bureau or to other creditors as delinquent until the creditor has answered your inquiry. However, you remain obligated to pay the parts of your bill not in dispute.
4. If it is determined that the creditor has made a mistake on your bill, you will not have to pay any FINANCE CHARGES on any disputed amount. If it turns out that the creditor has not made an error, you may have to pay FINANCE CHARGES on the amount in dispute, and you will have to make up any missed minimum or required payments on the disputed amount. Unless you have agreed that your bill was correct, the creditor must send you a written notification of what you owe; and if it is determined that the creditor did make a mistake in billing the disputed amount, you must be given the time to pay which you normally are given to pay undisputed amounts before any more FINANCE CHARGES or late payment charges on the disputed amount can be charged to you.
5. If the creditor's explanation does not satisfy you and you notify the creditor in writing within 10 days after you receive this explanation that you still refuse to pay the disputed amount, the creditor may report you to credit bureaus and other creditors and may pursue regular collection procedures, but the creditor must also report that you think you do not owe the money, and the creditor must let you know to whom such reports were made. Once the matter has been settled between you and the creditor, the creditor must notify those to whom the creditor reported you as delinquent of the subsequent resolution.
6. If the creditor does not follow these rules, the creditor is not allowed to collect the first \$50 of the disputed amount and FINANCE CHARGES, even if the bill turns out to be correct.
7. If you have a problem with property or services purchased with a credit card, you may have the right not to pay the remaining amount due on them; if you first try in good faith to return them or give the merchant a chance to correct the problem. There are two limitations on this right:
  - a. You must have bought them in your home state or if not within your home state within 100 miles of your current mailing address; and
  - b. The purchase price must have been more than \$50.

However, these limitations do not apply if the merchant is owned or operated by the creditor, or if the creditor mailed you the advertisement for the property or services.

Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone
006-009	8	260-261	3	363-369	5	476-477	4	598-599	7	820-822	5
010-069	5	262-278	4	370-386	4	478	3	600-609	2	823-826	6
070-089	4	279	5	387	5	479-489	2	610-619	3	827	5
090-099	5	280-283	4	388	4	490-491	1	620-623	4	828-832	6
		284-285	5	389-397	5	492	2	624-628	3	833	7
100-108	5	286-293	4			493-495	1	629-668	4	834	6
109	4	294-295	5	400-406	3	496-499	3	669-679	5	835-838	7
110-119	5	296-297	4	407-409	4			680-687	4	840-847	6
120-123	4	298-299	5	410-412	3	500-516	4	688-693	5	850-864	7
124-126	5			413-422	4	520-524	3			865-884	6
127-128	4	300-303	4	423	3	525	4	700-722	5	890-898	7
129	5	304	5	424-426	4	526-528	3	723-727	4		
130-152	4	305-307	4	427-432	3	530-534	2	728-768	5	900-921	8
153	3	308-329	5	433-436	2	535-539	3	769	6	922-928	7
154-160	4	330-334	6	437-457	3	540	4	770-778	5	930-934	8
161	3	335-338	5	458	2	541-546	3	779-789	6	935	7
162-163	4	339	6	460-462	3	547-548	4	790-792	5	936-960	8
164-165	3	340	6	463-464	2	549	3	793-799	6	961	7
166-199	4	350-352	4	465-466	1	550-566	4			962-976	8
		354	5	467-469	2	567	5	800-803	5	977-979	7
200-232	4	355-359	4	470-472	3	570-572	4	804-805	5	980-987	8
233-237	5	360-361	5	473	2	573-588	5	806-807	5	988-994	7
238-259	4	362	4	474-475	3	590-597	6	808-816	6	995-999	8

**RATE CHART**

Heath Shipping and Handling Charges, available items only. See special shipping and handling information for Motor Freight items.

Your shipping and handling charges are indicated in the zone column across from the shipping weight.

**NOTE: UPS 2nd Day Air Service covers continental U.S. Zone D covers HI (Honolulu).**

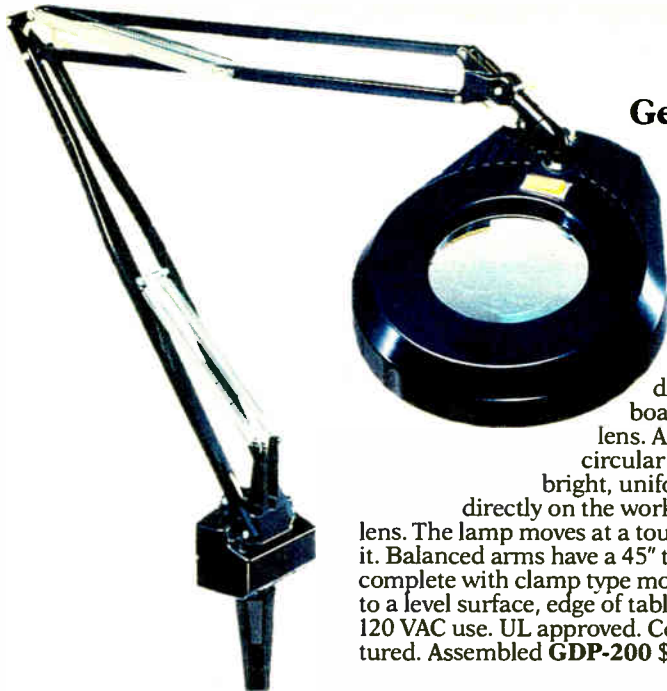
**IMPORTANT:** Shipping weights listed for model numbers shipped in more than one carton, or of excessive length, have been adjusted to provide correct postage.

For weights over 50 lbs. and up to 70 lbs.

Shpg. Wt.	Zone 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	UPS 2nd DAY AIR SERVICE	
								Zone A	Zone D
1	\$1.23	\$1.32	\$1.46	\$1.52	\$1.59	\$1.67	\$1.74	\$3.00	\$4.53
2	1.24	1.34	1.53	1.73	1.87	2.01	2.16	4.00	5.71
3	1.32	1.48	1.80	1.95	2.15	2.36	2.57	5.00	6.69
4	1.40	1.61	1.97	2.16	2.43	2.70	2.99	6.00	8.07
5	1.49	1.76	2.13	2.37	2.70	3.05	3.40	6.50	9.25
6	1.57	1.89	2.30	2.59	2.98	3.39	3.82	7.50	10.43
7	1.65	2.02	2.47	2.80	3.26	3.74	4.24	8.50	11.61
8	1.74	2.14	2.64	3.02	3.54	4.00	4.50	9.50	12.79
9	1.82	2.27	2.81	3.23	3.82	4.43	5.07	10.50	13.97
10	1.90	2.39	2.97	3.44	4.09	4.77	5.58	11.50	15.15
11	1.98	2.52	3.14	3.66	4.37	5.12	5.90	12.50	16.33
12	2.06	2.65	3.31	3.87	4.65	5.46	6.32	13.50	17.51
13	2.15	2.77	3.48	4.09	4.93	5.81	6.73	14.50	18.69
14	2.23	2.90	3.65	4.30	5.21	6.15	7.15	15.50	19.87
15	2.31	3.02	3.81	4.51	5.48	6.50	7.56	16.50	21.05
16	2.39	3.15	3.98	4.73	5.76	6.84	7.98	17.50	22.23
17	2.48	3.38	4.15	4.94	6.04	7.19	8.40	18.50	23.41
18	2.56	3.40	4.32	5.16	6.32	7.53	8.81	19.50	24.59
19	2.64	3.53	4.49	5.37	6.60	7.88	9.23	20.00	25.77
20	2.72	3.65	4.65	5.58	6.87	8.22	9.64	21.00	26.95
21	2.81	3.78	4.82	5.80	7.15	8.57	10.06	22.00	28.13
22	2.89	3.91	4.99	6.01	7.43	8.91	10.48	23.00	29.31
23	2.97	4.03	5.16	6.23	7.71	9.26	10.89	24.00	30.49
24	3.05	4.16	5.33	6.44	7.99	9.60	11.31	25.00	31.67
25	3.14	4.28	5.49	6.65	8.26	9.95	11.72	26.00	32.85
26	3.22	4.41	5.66	6.87	8.54	10.29	12.14	27.00	34.03
27	3.30	4.54	5.83	7.08	8.82	10.64	12.56	28.00	35.21
28	3.38	4.66	6.00	7.30	9.10	10.96	13.07	29.00	36.39
29	3.47	4.79	6.17	7.51	9.38	11.33	13.39	30.00	37.57
30	3.55	4.91	6.33	7.72	9.65	11.67	13.80	31.00	38.75
31	3.63	5.04	6.50	7.94	9.93	12.02	14.22	32.00	39.93
32	3.71	5.17	6.67	8.15	10.21	12.36	14.64	33.00	41.11
33	3.80	5.29	6.84	8.37	10.49	12.71	15.05	34.00	42.29
34	3.88	5.42	7.01	8.58	10.77	13.05	15.47	35.00	43.47
35	3.96	5.54	7.17	8.79	11.04	13.40	15.88	36.00	44.65
36	4.04	5.67	7.34	9.01	11.32	13.74	16.30	37.00	45.83
37	4.13	5.80	7.51	9.22	11.60	14.09	16.72	37.50	47.01
38	4.21	5.92	7.60	9.44	11.88	14.43	17.13	38.50	48.19
39	4.29	6.05	7.85	9.65	12.16	14.78	17.55	39.50	49.37
40	4.37	6.17	8.01	9.86	12.43	15.12	17.96	40.50	50.55
41	4.46	6.30	8.18	10.08	12.71	15.47	18.38	41.50	51.73
42	4.54	6.43	8.35	10.29	12.99	15.81	18.80	42.50	52.91
43	4.62	6.55	8.52	10.51	13.27	16.16	19.21	43.50	54.09
44	4.70	6.68	8.69	10.72	13.55	16.50	19.63	44.50	55.27
45	4.79	6.80	8.85	10.93	13.82	16.85	20.04	45.50	56.45
46	4.87	6.93	9.02	11.15	14.10	17.19	20.46	46.50	57.63
47	4.95	7.06	9.19	11.36	14.38	17.54	20.88	47.50	58.81
48	5.03	7.18	9.36	11.58	14.66	17.89	21.29	48.50	59.99
49	5.12	7.31	9.53	11.79	14.94	18.23	21.71	49.50	61.17
50	5.20	7.43	9.69	12.00	15.21	18.57	22.12	50.50	62.35
Add'l lbs.	08	12	16	21	27	34	41	1.00	1.18
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.

**SPECIAL SHIPPING AND HANDLING:**

- **MOTOR FREIGHT ITEMS** - Items indicated Motor Freight exceed weight or size limitations of UPS or Parcel Post. They are shipped with freight charges collect. If one item on your order is Motor Freight, all items will be shipped Motor Freight. Consult your local motor freight carrier for charges and type of service available in your area before ordering.
- **AP0/FPO Shipments** - Use the following Zones to estimate costs: West Coast - Zone 8; East - Zone 5; Miami - Zone 6. PAL (Airlift Military), transports packages by air for \$1.00 per package plus postage. Parcel must weigh less than 30 lbs. and not exceed 60" in length and girth.
- **SAM** - Parcel must weigh less than 15 lbs. and not exceed 60" in length and girth. Check with your local postmaster for exceptions to certain AP0 or FPO numbers.



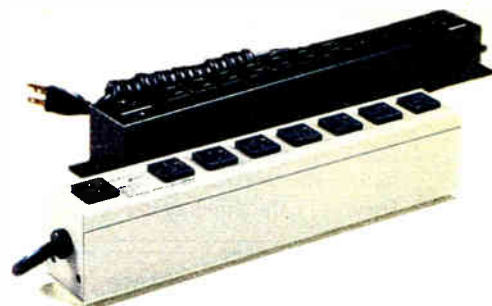
## Get up close to your work with light to spare

See better, clearer and easier with the famous LUXO magnifier lamp. No more hard-to-see soldering connections.

A precision-ground 2 to 1 magnifier provides a wide distortion-free view of a circuit board through a polished 5" lens. An energy-conserving 22-watt circular fluorescent bulb provides bright, uniform and shadowless lighting directly on the work being inspected through the lens. The lamp moves at a touch and stays where you put it. Balanced arms have a 45" total reach. The lamp comes complete with clamp type mounting bracket for attaching to a level surface, edge of table or desk up to 2½" thick. For 120 VAC use. UL approved. Color may vary from that pictured. Assembled **GDP-200** \$89.95, ship wt 7 lbs.

## Flip down magnifier brings work up close

This comfortable fitting magnifier with adjustable headband frees both your hands for work. Shatter and scratch resistant lenses magnify 2½ times. Works well with eyeglasses. **GDP-201** \$24.95, ship wt 1 lb.



## Extra AC outlets

No more dangerous extension cords. No more unplugging equipment to free up an AC outlet. In one and a half hours you can put together a strip of twelve 3-prong outlets. Single switch controls eleven outlets. One outlet is constant AC. 2¼" H x 15⅞" L x 1¼" D. Kit **HD-1274** \$24.95, ship wt 4 lbs.

## Use your computer to turn on the printer

Simply plug in the AC line cord from the computer into the control outlet of this easy one-evening Smart Outlet kit. Plug the printer into one of the remaining six switched outlets. Power up the computer, the printer comes on automatically. And your system is also surge protected. 2¼" H x 14½" L x 2¾" D. Kit **GD-1495** \$59.95, ship wt 5 lbs. Assembled **GDW-1495** *Last Call* \$79.95, ship wt 4 lbs.

## A home improvement that adds value to your house

A garage door opener belongs in every home garage. It's an investment that pays off time and again in convenience and added security. Ask someone who already has one installed. They'll tell you how handy a door opener is and how they'll never be without one again.

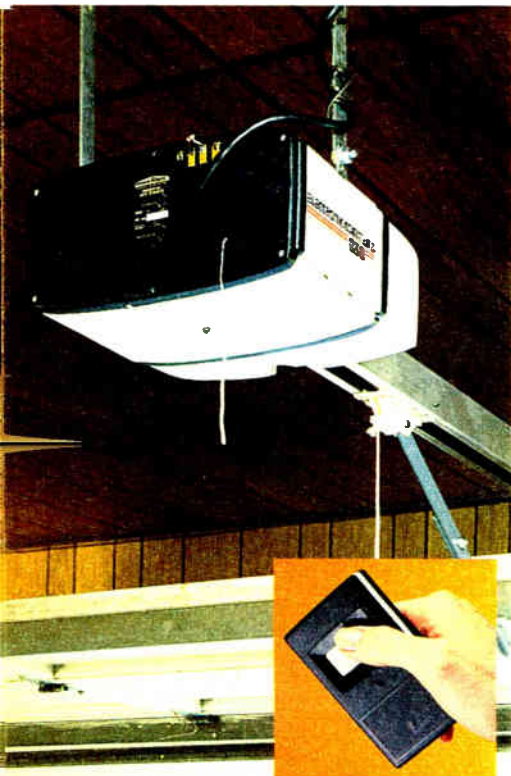
Simply touch the button on the remote transmitter in your car. The garage door opens automatically. A powerful ½ horsepower motor effortlessly opens the heaviest garage doors up to 18 feet wide and 7 feet high. You stay warm and dry in the nastiest weather as you drive into the protection of your garage. A built-in 80-watt light automatically turns on. You press the button again and the garage door closes behind you. The light blinks to alert you of a closing door. With the door down it is securely locked to prevent anyone from opening it from the outside by hand. The light stays on for about five minutes until you're safely into the house.

Most of the work is already done for you with the Moore-O-Matic Garage Door Opener. Absolutely no soldering is required. You put the motor-drive unit together with a screwdriver and pliers. All wiring uses push on connectors. When it's completed, install it and the track assembly on your garage door. The whole process of assembly and installation takes only a couple of evenings.

This garage door opener is loaded with features. It has an exclusive triple-thread screw-drive system for smooth and worry-free operation. The door instantly reopens if it's blocked while closing. The remote transmitter uses digitally coded signals for added security. And a quick release mechanism disengages the door from the opener in case of an emergency.

This kit includes a transmitter, receiver and remote switch. Requires 120 VAC. Kit **GD-3509** \$199.95, ship wt 41 lbs. Motor Freight.

Accessories: Assembled **GDP-3309-A** Transmitter only \$19.99, ship wt 1 lb. Assembled **GDP-3319-A** One transmitter and one receiver \$49.99, ship wt 1 lb.







Authorized Dealer

# APPLE COMPUTERS

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At Heath/Zenith Computers & Electronics, we've broadened our line to include Apple computer products and now have 55 Apple dealerships\* around the country to serve you better, with one near you. And as always, we offer you our many years of experience and comprehensive service and support for all the computer products we sell.

### Macintosh™ – Now more options than ever before!

The name "Macintosh" has become synonymous with Desktop Publishing. And you can now choose between two sensational models.

The NEW, incredibly fast *Macintosh SE* features 1MB of memory, an external disk interface, a sound port, and AppleTalk™ built in. Plus support of up to six external peripherals and 16 input devices. All for more computing flexibility.

The already-famous *Macintosh Plus* has a full megabyte of built-in memory (expandable to 4 Meg) and an 800K disk drive for more memory, more speed, more storage, and more performance.

*Now, more than ever, Macintosh is the world's premier desktop publishing computer.*

*\*See page 54 of the catalog for locations.*



**NEW!** Macintosh™ SE



Macintosh™ Plus

VEC-156

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Computers & Electronics



## **NEW** Apple® IIGS

A true innovation, the IIGS lets you create near-photographic-quality images in a broad range of colors. And features an advanced digital sound synthesizer for reproducing sound with startling reality. The IIGS also runs almost all of the 10,000 programs designed for the Apple II family. Plus it can be expanded with a wide range of peripherals and memory options. *A real step forward!*



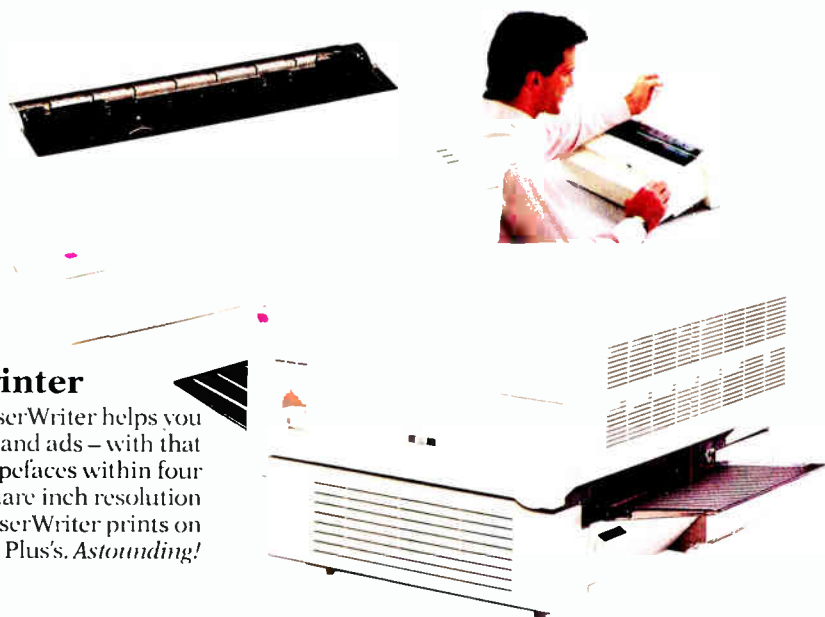
Enjoy amazing sound reproduction over the built-in speaker or your own external speakers or headphones.

## Apple® Printers

### **The versatile ImageWriter™ II**

This workhorse of a printer lets you combine detailed graphics and near-letter-quality text in letters, reports, and illustrations.

ImageWriter prints up to 2½ pages per minute in draft mode. Also connects easily to the AppleTalk™ network. *What could be better?*



### **LaserWriter™ – More than just a printer**

An integral part of your desktop publishing system, LaserWriter helps you design bids, presentations, proposals, newsletters, and ads – with that professional touch. You get printing in dozens of typefaces within four type families. And an astonishing 90,000 dots per square inch resolution that's four times that of ordinary laser printers. Plus LaserWriter prints on a variety of media and connects to as many as 31 Mac Plus's. *Astounding!*



# Apples for the home and school

## The NEW Apple® IIe

The perfect computer for home education. Famed for its reliability and expandability, the Apple IIe runs more education software than any other computer around. This new model includes the new IIe 128K CPU with extended 80-column card, monochrome monitor, 5¼" disk drive with controller; plus built-in graphics and sound. (Color monitor optional).  
*Makes learning fun!*



## The Apple® IIc

Perfect for school or home, the Apple IIc provides unbelievable capabilities for such a compact, lightweight model. Easy-to-use, the Apple IIc includes the IIc 128K CPU, built-in disk drive, IIc monochrome monitor, full-size keyboard, stand, plus expandability. (Color monitor optional).  
*The inexpensive answer to your computing needs.*



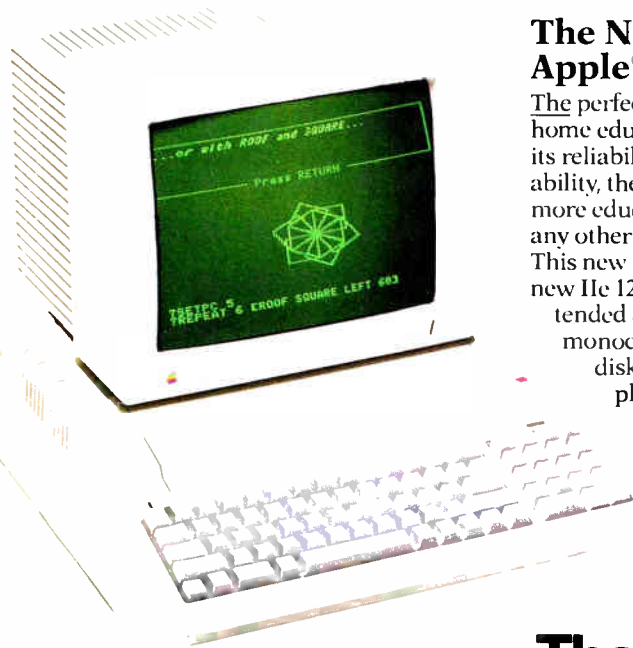
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Besides constantly upgrading our product selection, we're taking on a new look to make Heath/Zenith Computers & Electronics more responsive to your needs. Crisp, pleasant colors and in-store product centers are part of our new, integrated interior design.

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And, as always, our computers are sold by people who know how to help you make knowledgeable decisions. Whether you're interested in IBM PC/AT compatibles, portables, or Apple desktop computers, you can be sure we'll have it.

***Our stores are unique, and we are dedicated to building them into one of the major computer chains in North America.***

See page 54 of this catalog for locations.



*We're proud of our stores. Come see why.*

**Heath<sup>®</sup> ZENITH<sup>®</sup>**  
Computers & Electronics



## PanaVise circuit board holder

Position circuit boards at the best working angle. Spring-loaded arms hold boards that can be tilted 220° and rotated 360°. Use with standard or vacuum base. Assembled **GDP-1254** \$21.95, ship wt 2 lbs.



## PanaVise base

This rugged base can be used with any workholder on this page. It rotates 360° and tilts 180° to fit your best working angle. Adjustable ball joint locks in position. Three holes permit solid bench mounting. Assembled **GDP-1251** \$16.95, ship wt 2 lbs.



## Wide opening PanaVise vertical holder does the big jobs



TOOLS 

This vertical-opening vise is designed to position and hold large items. Hold instruments, cameras, electronic equipment or entire chassis between these wide-opening 9" jaws. Replaceable jaw pads protect equipment from damage. Use this holder with either the standard or the vacuum base. Assembled **GDP-1255** \$9.95, ship wt 2 lbs.

## PanaVise standard vise head

Hold circuit boards and other projects steadily in place while you work on them. Nylon vise jaws open to a full 2½". Use with standard or vacuum base. Assembled **GDP-1253** \$19.95, ship wt 2 lbs.

## PanaVise vacuum base

Attaches instantly and securely to almost any smooth surface; glass, metal, formica, and more. Also uses multi-angle ball-joint positioner. Assembled **GDP-1252** \$21.95, ship wt 2 lbs.



## All your kit building tools in one neat storage case

This is a perfect starter selection of tools for the beginning kit builder. Included are a Weller 25-watt soldering iron with two interchangeable tips, a soldering aid, a 4 ounce spool of solder, wire strippers, diagonal cutters, 4" needle nose pliers, ¼" nut driver and a slotted and Phillips screwdriver. These tools are contained in a durable 3" H x 10¾" W x 10" D carrying case with a built-in carrying handle. All tools are stored in a molded storage tray. Assembled **GHP-1270** \$42.95, ship wt 2 lbs.

## WELLER temperature-controlled soldering station

This lightweight soldering pencil features low voltage, 700°F "closed loop" temperature control and a component-protecting grounded tip. A detachable stand contains a water reservoir. Assembled **GDP-1108** \$89.95, ship wt 5 lbs.

Accessories: Assembled **GDP-1109** Set of assorted soldering iron tips \$17.95, ship wt 1 lb.



## Hobbyist soldering iron

A popular soldering iron for all your kit building needs. The 860°F ⅛" screwdriver tip of this pencil-type iron allows you to make those close soldering jobs easier and cleaner. Lightweight iron uses 120 VAC. (Color and manufacturer may vary.) Assembled **GDP-207** \$16.95, ship wt 1 lb.

## Put all the light where you need it

This flexible extension lamp can put needed light on any type of job from electronics work to needlework. A rugged counter-balanced arm flexes over 360° with a 32" reach to stretch out light for maximum area coverage. And this lamp stays where you put it.

White reflective inner coating throws the maximum amount of light in the direction you need it. Uses a standard 60-watt incandescent light bulb. Secure clamp mounting bracket attaches to most level surfaces. Uses 120 VAC. (Light bulb not included). Assembled **GDP-202** \$24.95, ship wt 4 lbs.



# Learn the latest electronics technology with our effective, economical self-study and classroom courses

Our Heathkit/Zenith education courses are designed to meet your needs – for self-study, classrooms or special industrial training. Our courses are success-oriented integrating technical theory with a maximum emphasis on real-world applications. They feature a well organized system of instruction that lets you start at entry level and branch off to specialized areas like robotics, microprocessor technology, circuit design and computer servicing. Course trainers like the laser, robots, and a learning computer, combined with course experiments, give you hands-on experience that increases your skill unlike any other learning method. The new ET-3600 Trainer and ET-3700 Trainer are now available, in addition to the familiar ETW-3100-B and ET-3200-B Trainers, to support your hands-on experience. Video courses on selected subjects are available, too (see page 73).



## Increase learning success with the new analog trainer

The new ET-3600 Analog Trainer is a versatile experimental tool for successful hands-on learning. It's used in experiments contained in the DC, AC, Semiconductor Devices, Electronic Circuits, Electronic Communications, Concepts of Electronics and Test Equipment courses. The Analog Trainer is completely equipped to help you build, analyze, test, modify and gain experience in practical electronic circuit design. In addition, the ET-3600 Trainer is designed to accept the new ET-3567 Backpack Accessory (right). The Backpack extends the versatility of your Analog Trainer for even more simple and reliable bench testing and allows you to experiment with the optional ETB-3300 experiment module (p. 59).

The Analog Trainer is amply equipped for all your experiments. It has variable, regulated positive and negative 15 VDC power supplies, plus 15 and 30 volt AC voltage sources and a 200 Hz to 20 kHz frequency generator, with sine wave and square wave outputs. The trainer has solderless breadboard sockets for circuit building and also includes built-in 1 kilohm and 100 kilohm potentiometers. A built-in connector accommodates the ET-3567 Backpack.

You can quickly build and test experimental circuits with this rugged and compact new trainer. Measures 4 1/4" H x 12" W x 11 3/8" D. Kit **ET-3600** \$119.95, ship wt 6 lbs. Assembled **ETW-3600** \$199.95, ship wt 6 lbs. Both avail. August.

You'll receive a handsome certificate from Heathkit/Zenith when you pass the optional final exam for each course with a score of 70% or higher. Plus you can earn Continuing Education Units for non-credit adult education. What's more, our programs are approved by nationally recognized organizations (see page 73). We've put together the information you need in a clear and comprehensive format, and we stand behind each course with a money-back guarantee. If you're not completely satisfied with any self-study course, simply return all course material (excluding trainer) and your receipt for a full refund.

**Attention U.S. NAVY personnel: Heathkit/Zenith courses are now eligible for reimbursement under the Navy's Tuition Assistance Program. See your Education Services Officer or your Navy Campus representative. Ask to see the Dantes Guide to National Home Study Council Courses. DOD 1322.8C (Supplement 1).**

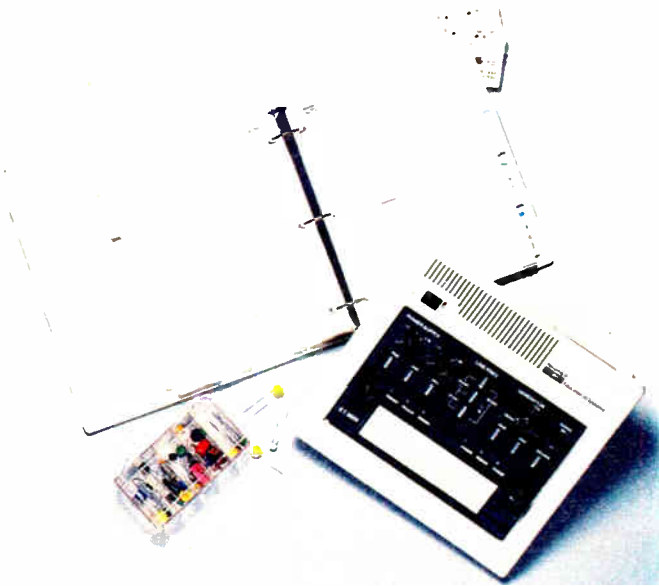


## Extend your trainer's capability

The ET-3567 Accessory Backpack mounts directly to the new ET-3600 and ET-3700 (page 62) Trainers to extend the trainer's versatility and reliability. The Backpack includes programmable, positive and negative 1.2 to 15 volt DC power supplies to power analog, linear and CMOS circuits and a 5 volt DC power supply. In addition, a digital voltmeter is included to allow AC and DC voltage measurements up to 500 volts, DC current measurements up to 200 mA and resistance measurements up to 2 megohms, without the need for additional test equipment. The Backpack also features a fused, high-impedance voltmeter input for maximum circuit protection and minimum circuit loading. The meter has an easy-to-read LCD display with automatic polarity sensing.

The Accessory Backpack is designed for long and reliable performance for experimenting with your electronic trainer and Heathkit/Zenith Educational courses. AC power is coupled through the power switch of the associated trainer to assure that power for experimental circuits and the DVM is always applied only when the trainer is on. The Backpack also includes connectors for accepting experiment modules from Heathkit/Zenith Educational Systems courses. (See ETB-3300 Breadboard Experiment Module and ETB-6201 Digital Circuits Experiment Module on pages 59 and 62.) Add the Backpack for even more and easier learning, experimenting and designing of electronic circuits. Kit **ET-3567** \$119.95, ship wt 6 lbs. Assembled **ETW-3567** \$199.95, ship wt 6 lbs. Both avail. August.





## You'll get a broad foundation in electronics with our entry-level electronics courses

Start discovering the world of electronics with these fundamental courses. Learn the basics of DC and AC electronics as you actually build and analyze circuits. Progress to a comprehensive understanding of semiconductor devices where you'll learn about their construction, operating characteristics and schematic symbols. Explore electronic circuits from theory to practice; learn about the application and operation of test instruments; and gain a working knowledge of electronic communications. It's all here for you in our fundamental series. When you take these courses, you'll use the new ET-3600 Analog Trainer or your ETW-3100-B Trainer and instruments such as multimeters and oscilloscopes.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.



## Expand breadboard capabilities

The new ETB-3300 Breadboard Experiment Module slides into the ETW-3567 Accessory Backpack (p. 58) to add more breadboarding capabilities to your ET-3600 or ET-3700 electronic trainer. The solderless sockets in the three large breadboards accept solid wire up to #20 and the leads of most common electronic components. The ETB-3300 gives you access to +5 volt DC power supply, variable positive and negative 1.2 to 12 volt DC power supplies and the internal trainer speaker.

You can avoid tangle and confusion with the ETB-3300's three additional 640-hole breadboards. It's ideal for designing and experimenting with prototype circuits extending beyond the physical capacities of the ET-3600 and ET-3700 circuit design trainers.

**ETB-3300** \$99.95, 2 lbs. Avail. August.



## Learn the essentials of DC electronics

With this course you'll learn all about necessary principles like current, voltage, resistance, Ohm's Law, magnetism, electrical measurements, DC circuits, inductance and capacitance. You'll even build and experiment with DC circuits of your own design. Plus you'll learn how to draw a schematic from a wiring diagram and how to use a multimeter.

With the optional audio/visual package you'll get two audio tapes and a 123-page illustration booklet with over 230 illustrations that will enrich your learning experience.

The experiments in this course require you to also use a multimeter, like the IM-2260 (page 44). And when you pass the final exam, you'll earn 2.0 Continuing Education Units. **EE-3101-A** \$49.95, ship wt 6 lbs.

Accessories: **EEA-3101-A** Optional Audio-Visual Package \$19.95, ship wt 2 lbs.



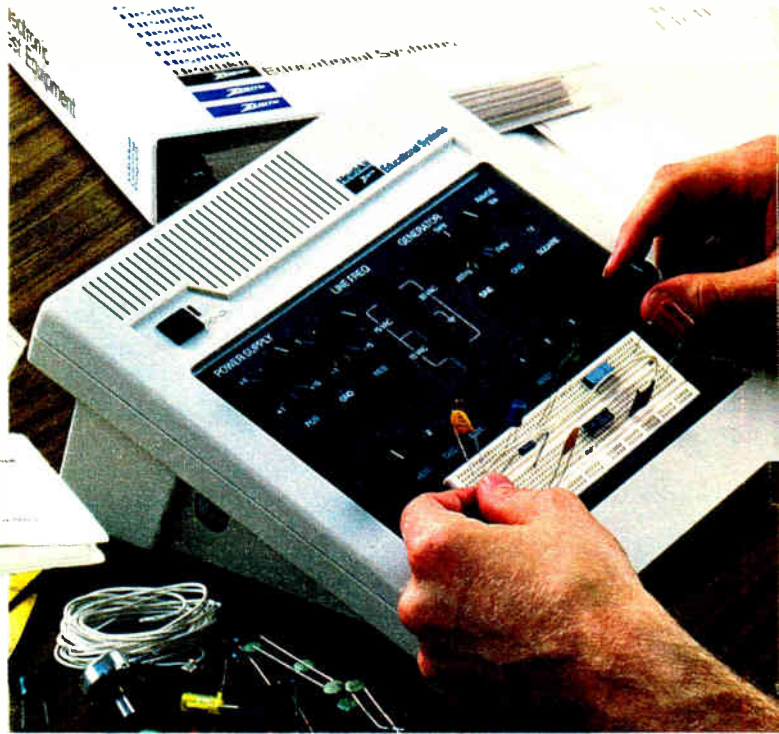
## Useful AC electronics principles

This course gives you a firm foundation in alternating current and its special applications in electronics circuits. You'll learn how various components react in AC circuits and see the application and use of AC components. You'll find the text interesting reading as it discusses AC theory, measurement and circuit behavior in a simple, no-nonsense style that makes learning enjoyable.

Plus you'll really benefit from the exciting experiments in RC Circuits, RL Circuits, Transformer Characteristics, LC Filters and more.

We recommend that you use a multimeter and an oscilloscope for this course. You'll earn 1.5 Continuing Education Units when you successfully pass the final exam. **EE-3102-A** \$59.95, ship wt 7 lbs.

Accessories: **EEA-3102-A** Optional Audio-Visual Package \$19.95, 2 lbs.



## Semiconductor Devices Course covers solid-state

Expand your electronics background with this in-depth study of semiconductors, their properties and uses. Step by step you'll learn about the backbone of modern electronics as you examine solid-state devices like diodes, transistors and integrated circuits. You'll also

learn about zeners, bipolar transistors, FETs, thyristors and UJT's. Through text and experiments you'll find out how to properly use the semiconductor components essential to today's fascinating electronic world. And you'll discover how semiconductors can be damaged by operating them beyond the component's rating or through improper handling.

For a better understanding of semiconductors, you'll see how they are made and how they operate in the micro-sized world of solid-state electronics. You'll also learn the electrical characteristics of semiconductor materials. And you'll see how to correctly test various devices to determine if they are operating as they should.

Each concept is presented in clearly written text and instantly reinforced with a programmed review. Optional experiments illustrate and enhance your understanding of important concepts with hands-on training. To perform the experiments in this course you'll need the ET-3600 Trainer located on page 58. A multimeter is also recommended.

Pass the optional final exam and earn 3.0 Continuing Education Units. Your successful completion of this course opens up a world of understanding for semiconductors as they are used in everything from flood alarms, to amateur radio, to computers, to robotics. **EE-3103-A** \$59.95, ship wt 6 lbs.

Accessories: **EEA-3103-A** Audio-Visual Package \$19.95, ship wt 2 lbs.

## Learn Electronic Test Equipment theory and applications

Discover the exciting operation and theory behind electronic test equipment in this course. Become proficient with bench and field test equipment as you learn how to make measurements using digital and analog meters, how the meters operate and what they measure. You'll gain practical knowledge in the operation and use of the oscilloscope in electronic testing and equipment servicing by following our proven instruction methods of reading and then doing. From this instruction method, you'll also learn to use frequency generators and frequency counters. Included in the course is a unit on special measuring instruments for bridge circuits, transistor testers, curve tracers, spectrum analyzers and logic probes. The optional Audio-Visual Accessory Package enhances your learning process by reinforcing each lesson with audio cassettes and a supplemental manual. Fifteen interactive experiments give you the chance to use many different types of test equipment.

To get the most out of this course, there are a few things you'll need. 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. This course also uses the ET-3600 Trainer found on page 58. Plus you must have a previous knowledge of material in the EE-3101-A thru EE-3104-A and EE-3201-A courses. It's well worth the 6.0 CEUs earned when you pass the final exam. **EE-3105-A** \$69.95, ship wt 9 lbs.

Accessories: **EEA-3105-A** Audio-Visual Package \$19.95, ship wt 2 lbs.



## Follow Electronic Circuits from theory to board

Develop new skills with the very informative Electronic Circuits Course. Seven carefully designed units lead you through circuits that you'll find in everyday electronic products. In this course you'll learn how to identify power supply rectifiers, filters and regulation

circuits. You'll also develop an understanding of radio circuits by studying amplitude and frequency modulation circuits along with the heterodyne principle of modulation and detection circuits. You'll even be able to construct transistor and integrated circuit amplifiers, oscillators, active filters and pulse-shaping circuits with the knowledge gained from your work in this course.

The course continues with explanations of power supplies and power supply regulation circuits, as well as a basic modulation and demodulation system. Included with the Electronic



## Discover the world of broadcast communications

With the Electronics Communications Course you can develop a full understanding of broadcast and data communications fundamentals. Working at your own pace from the detailed text you'll cover amplitude, frequency,

phase and angle modulation. And then you'll study transmitters, antennas and communications receivers including many specific circuits.

In this course you'll find out how to analyze the composition of complex waveforms. You'll see how to construct basic communications circuits. And you'll examine transmission lines with their characteristics and different uses. Also ana-

Circuits Course are over 100 electronic components for use in the 18 fun experiments contained in the text.

The Electronic Circuits Course leads you step by step through this challenging subject while our proven self-instruction format lets you learn at your own pace. The concise text, backed up by easy-to-understand visuals, lets you learn and retain more information. An optional Audio-Visual Accessory package aids in your understanding of the text material by reinforcing the course with audio cassette instruction.

You should complete the DC and AC Electronics and Semiconductor Devices courses (EE-3101-A thru EE-3103-A) or have an equivalent knowledge. We also suggest a dual-trace oscilloscope, a VOM and the ET-3600 Trainer (page 58) to complete the experiments in this course. You'll receive 4.0 Continuing Education Units (CEUs) upon successfully passing the optional final exam. **EE-3104-A** \$69.95, ship wt 7 lbs.

Accessories: **EEA-3104-A** Audio-Visual Package \$19.95, ship wt 2 lbs.



## Learn how data gets from here to there

Data Communications and Networks describes the concepts, terminology, equipment and techniques that make up today's data communications systems. It breaks down the complexities of transferring information

between distant and not so distant points into clearly detailed discussions of each fundamental data movement phase. Centered on computer communications, this course highlights signaling techniques, terminals and codes, modulation and multiplexing, transmission media and errors, telephone network, security and also provides an overview of current digital data networks.

To better understand this course you should have already completed course EE-3201-A Digital Techniques and course EE-3102-A AC Electronics or have an equivalent knowledge. To perform the experiments in the course you'll need the ET-1000 Circuit Design Trainer on page 77, a multimeter and a dual-trace oscilloscope. Pass the optional final exam and earn 7.0 Continuing Education Units. **EE-8090** \$99.95, ship wt 11 lbs.

lyzed are FM stereo and television broadcasting systems along with data communications systems.

In the optional hands-on experiments you'll build an AM transmitter, balanced modulator, AM detector, FM transmitter, and an FM receiver. You'll also build such advanced systems as a pulse modulator, time division multiplex transmitter and a data communications modem with the included components. For these experiments you'll need the ET-3600 Trainer (page 58), a multimeter and an oscilloscope.

We suggest that you follow up the EE-3101-A thru EE-3104-A with this specialized course in communications. And by passing the optional final exam you receive 2.0 Continuing Education Units. **EE-3106-A** \$64.95, ship wt 7 lbs.

Accessories: **EEA-3106-A** Audio-Visual Package \$19.95, ship wt 2 lbs.

# Take this exciting step into the fields of digital technology and microprocessing

These courses provide you with a comprehensive and in-depth understanding of digital circuitry and microprocessors. You'll explore these technologies, from fundamental concepts to the most advanced applications. Learn to design your own digital circuits. Gain a working knowledge of microprocessors and machine level programming and interfacing. And get on speaking terms with your computer with the Voice Synthesis Course. When you finish this course, you'll be able to make the ET-3400-A Microprocessor Trainer talk.

As with the basic electronics courses, trainers are an important part of a successful learning experience. For the Digital Techniques Course you'll use the new ET-3700 Digital Trainer or the ET-3200-B Trainer. All Microprocessor Courses, including the revised EE-3401-A, require either the ET-3400 or ET-3400-A Trainer.



## Fast help for digital circuit design

The new ET-3700 Digital Trainer allows you to quickly and efficiently design and experiment with digital electronic circuits. It lets you apply course material in a practical way, through experiments and by building and testing prototypes. It also lets you confirm circuit operation and test digital ICs. Also, use it to experiment with the EE-3201-A Digital Techniques Course. Plus, the ET-3700 Trainer is designed to accept the new ET-3567 Backpack Accessory (p. 58). The Backpack extends the capabilities of your Digital Trainer for even more simple and reliable bench testing and allows you to experiment with optional experiment modules (p. 59 and right).

Three built-in, regulated power supplies furnish positive and negative 12-volt DC and positive 5-volt DC voltages to power both digital and linear circuits. The ET-3700 Trainer not only supplies common DC voltages used in digital electronics, but it also supplies a line-frequency square wave (60 or 50 Hz); complementary clock signals of 1 Hz, 1 kHz, and 100 kHz; logic and data switches to control input levels; and four LED logic-state indicators to visually monitor logic states and transitions. Connector blocks allow for solderless breadboard connections between parts and wires and a built-in connector accommodates the ET-3567 Backpack.

Supplement your learning with this versatile new educational tool. 4 1/4" H x 12" W x 11 1/4" D. Kit **ET-3700** \$119.95, ship wt 6 lbs. Assembled **ETW-3700** \$199.95, ship wt 6 lbs. Both available in August.

## Learn digital circuits inside and out

You'll feel like an expert on digital circuitry once you've finished this course. You'll start off with fundamentals and theory of digital logic, including number systems. You'll then learn how to design and apply modern digital circuitry. You'll also become familiar with Boolean algebra, flip-flops and registers, sequential logic circuits, combina-

tional logic circuitry and digital design. Plus you'll gain skills in designing digital circuitry for virtually any modern application.

This course comes with electronic components for performing all of the 24 experiments. And all material comes in two heavy-duty vinyl binders so that you'll always have a complete and easy reference. Your learning experience is then topped off with 2 optional audio cassettes that will help integrate everything you've studied.

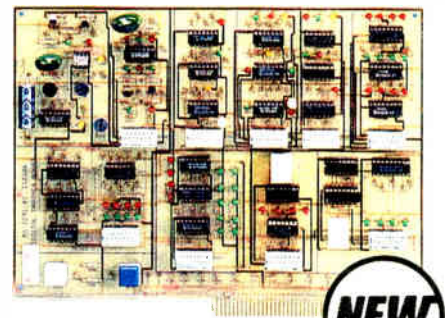
To complete this course successfully, you must have a basic electronics background, which you can get from the DC, AC, Semiconductors and Electronics Circuits courses on the preceding pages. We also suggest that you use a multimeter and dual-trace oscilloscope for your course experiments.

This is a comprehensive course that you can take in your spare time, at your own speed. And you get it at a fraction of college or technical school costs. **EE-3201-A** \$99.95, ship wt 7 lbs.

Accessories: **EEA-3201-A** Optional Learning Cassettes. Two text descriptive audio cassette tapes plus a vinyl holder to keep them in and an illustrated booklet \$19.95, ship wt 2 lbs.

## Master the concepts of digital circuitry

These new applications manuals and supplemental experiment module are designed for use with the new ET-3700 Trainer and ET-3567 Accessory Backpack: The Administrator's Guide for the instructor and the Laboratory Manual for the student are both used in conjunction with the ETB-6201 Experiment Module. The ETB-6201 slides into the Backpack (p. 58) that's mounted to the ET-3700 Trainer. It's an invaluable tool for the lab since it provides visual demonstrations of concepts and theories of digital electronics that are applied to real-life circuits. Students develop hands-on knowledge of digital circuitry as they use the ETB-6201 to perform the 40 prewired experiments detailed in the student lab manual. And the Administrator's guide provides even more circuit descriptions, experiment information and classroom demonstrations to help explain the material. **ETB-6201** Experiment Module \$149.95, 2 lbs. **EB-6201-52** Administrator's Guide \$9.95, 1 lb. **EB-6201-71** Student Laboratory Manual \$12.95, 1 lb.







## Get a thorough education in microprocessors

This course won an International Award from the Society for Technical Communication. It provides a well-organized, economical, self-paced home study program covering all the basics of 8-bit microprocessors, microcomputers and

machine level programming. Concepts are carefully integrated into 8 learning units for thorough training. A ninth unit reviews MPU programming techniques through 10 topic-related experiments. A tenth unit provides hands-on hardware experiments in the areas of memory interfacing, display control and I/O interfacing for a total learning experience.

Your study starts with a review of the basics of computer number systems and codes: decimal, binary, octal and hexadecimal numbering systems. Unit 2 covers terms and conventions, an introduction to several programming instructions plus how programs are written and executed. In unit 3 you'll learn about binary addition, subtraction, multiplication and division, and two's complement arithmetic. You'll also learn how to use Boolean logic operators like NOT, AND, OR, Exclusive OR and INVERT. Unit 4 gives you a thorough introduction to programming. You'll study branching, conditional branching, algorithms and programming instructions. In units 5 & 6, you'll learn about 6800/6808 microprocessors and pick up valuable details on architecture, instruction sets, addressing modes, stack operations, subroutines, input/output operations and interrupts.

Units 7 & 8 cover 6800/6808 microprocessor architecture and interfacing. You'll also find information on interfacing with both static and dynamic random access memory, read only memory, displays, switches and the Peripheral Interface Adapter (PIA).

In unit 9 you'll increase your skills through programming experiments and writing programs. Plus, you can use your trainer to drill yourself and provide practice in the numbering systems. In later experiments, you'll use all instructions and addressing modes including subroutines, stack operations and more. You'll continue to benefit from 19 hardware experiments in microprocessor theory and microprocessor applications found in unit 10.

But what makes this course even more incredible is that, for most of it, you don't have to have any prior knowledge about electronics. Only units 7, 8 & 10 require knowledge equivalent to the EE-3201-A Digital Techniques Course (page 62).

To make this course even more effective, we request that you use either the ET-3400 or the ET-3400-A Microprocessor Trainer. You'll really be proud of the 8.0 CEUs that you'll earn upon passing the final exam. EE-3401-A \$99.95, ship wt 10 lbs.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.



## Learn about microprocessors with an 8-bit computer trainer

You'll be thrilled with this versatile, low-cost trainer. It's designed to teach and illustrate microprocessor operation, programming and applications. It even includes microprocessor-based software and a special interface development system. So, you can use your Trainer as a miniature digital computer for experiments in microprocessor related courses EE-3401-A through EE-3405.

This special trainer features the popular 6808 microprocessor as a CPU and built-in 512 bytes of RAM, plus a built-in 1K ROM monitor program controlling the unit's operation. A 17-key hexadecimal keyboard lets you enter machine language program code, access memory locations and examine their contents through a six-digit hexadecimal 7-segment LED display; modify the contents of memory; examine or change any of the microprocessor's internal registers; set break points for program debugging; or reset the CPU. And thanks to the flexible instruction set of the 6808, you'll even be able to use 5 addressing modes, 2 accumulators, an index register and a stack pointer.

Added to all this is a microprocessor breadboard that 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. You'll also get a 40-pin external connector for expanding memory and the Trainer's I/O capacity.

And there's even more. Your experiments will really fly with the 8 individual and independently buffered LEDs for monitoring logic states; the 8 SPST binary data switches for logic level switching; the built-in +5 and  $\pm 12$  VDC power supply connections; and the 1 Hz and 60 Hz clock outputs.

Your Trainer takes three evenings to build and requires 120 VAC at 50/60 Hz, 30 watts. For increased personal microcomputer power, just team up your Trainer with the ETA-3400 Microprocessor Trainer Accessory (page 64). Kit ET-3400-A \$259.95, ship wt 7 lbs. Assembled ETW-3400-A \$359.95, ship wt 6 lbs.

## Expand your ET-3400-A Trainer

The ETA-3400 Microprocessor Trainer Accessory turns your ET-3400-A Trainer into an 8-bit cassette-based microcomputer system with an optional 3K bytes of RAM. 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. A cassette interface permits you to store programs on standard cassette tapes. Included with the Accessory is a ROM monitor/debugging program to implement the standard trainer monitor functions through an external terminal. Memory locations can be examined or changed, break points initiated and program debugging can be accomplished with a single-step feature. A tiny BASIC Interpreter stored in ROM lets you program in the BASIC language. Use the Trainer to run machine code routines learned in the EE-3401-A Microprocessor Course from BASIC. All parts required to modify the Trainer and connect the Accessory are included. Modifying the ET-3400 trainer changes the clock frequency, so we recommend you complete experiments in EE-3401-A thru EE-3405 before adding the Accessory. An RS-232 compatible video terminal is required to use BASIC and monitor features of the ETA-3400. Assemble this kit in about 10 hours. Kit **ETA-3400** Was \$179.95 Now Only \$129.95, ship wt 8 lbs.

Accessory: **ETA-3400-1** 3K Chip Set \$54.95, ship wt 1 lb.

Now you can get \$50 savings on the **ETA-3400 Trainer Accessory**



## Comprehensive microprocessor interfacing course

The EE-3402 Microprocessor Interfacing Course is a natural second step after completing the EE-3401-A Microprocessor Course. This course will introduce you to the powerful 6809 and 68000 processors. The eleven units of Microprocessor Interfacing let you explore topics like the advanced Peripheral Interface Adapter (PIA), analog conversion and serial data communications. You'll also study peripheral devices, memory devices and programmable timers.

Programmed self-learning allows you to proceed at your own speed for a thorough understanding of all the material in the text.

64



Ten hands-on experiments focus 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. Other experiments cover 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, and are performed on the ET-3400 or ET-3400-A Microprocessor Trainer (p. 63).

Before attempting this comprehensive course, we recommend that you complete the EE-3401-A Microprocessor Course (p. 63) or already have an equivalent working knowledge of the material contained in that course.

The in-depth scope of this course means you can qualify for 7.0 CEUs upon completion. **EE-3402** \$99.95, ship wt 11 lbs.



## Listen to your experiments with Voice Synthesis

Be on speaking terms with your ET-3400 or ET-3400-A Microprocessor Trainer by taking the EE-3403-A Voice Synthesis Course. The five units cover the human voice, with an overview of voice reproduction and voice patterns. Included in the course are linear and logarithmic coding, delta modulation, speech synthesis by linear predictive coding, the phoneme speech synthesizer (PSS) and advanced programming for the phoneme speech synthesizer.

All components are included for the hands-on experiments you'll perform as

you learn about the basic hardware and software necessary for breadboarding computer synthesized speech circuits on the ET-3400 or ET-3400-A Trainer. Other experiments instruct you in 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-3400-A Microprocessor Trainer.

Included with the course are complete chip sets for digitized and phoneme voice synthesis. 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 in

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-A Microprocessor Course (p. 63) or equivalent knowledge is needed. You'll earn 3.0 Continuing Education Units with this course.  
**EE-3403-A \$69.95, ship wt 4 lbs.**



## Practical microprocessor applications



Learn how to put your previous microprocessor knowledge to work with the Microprocessor Applications Course as you see ways to adapt and use 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 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. Complete coverage is given to temperature, light, position, motion, force, pressure, flow and level sensors and transducers of various types and styles. Further coverage is given to microprocessor control of devices and circuits such as transistor arrays, SCRs, TRIACs, relays, DC motors and stepper motors. Phase-locked loops, which are being used more frequently in microprocessor applications, are presented along with information for interfacing and controlling them with a microprocessor. You'll see examples of microprocessor uses in consumer, industrial and business applications and take a look at future microprocessor applications.

To perform the 13 experiments in this course, you'll need the ET-3400 or ET-3400-A Microprocessor (p. 63), a VOM and an oscilloscope. You should also complete the EE-3401-A Microprocessor Course (p. 63) and the EE-3402 Microprocessor Interfacing Course (p. 64). Pass the optional final exam of this challenging course and earn 8.0 CEUs.  
**EE-3405 \$99.95, ship wt 10 lbs.**

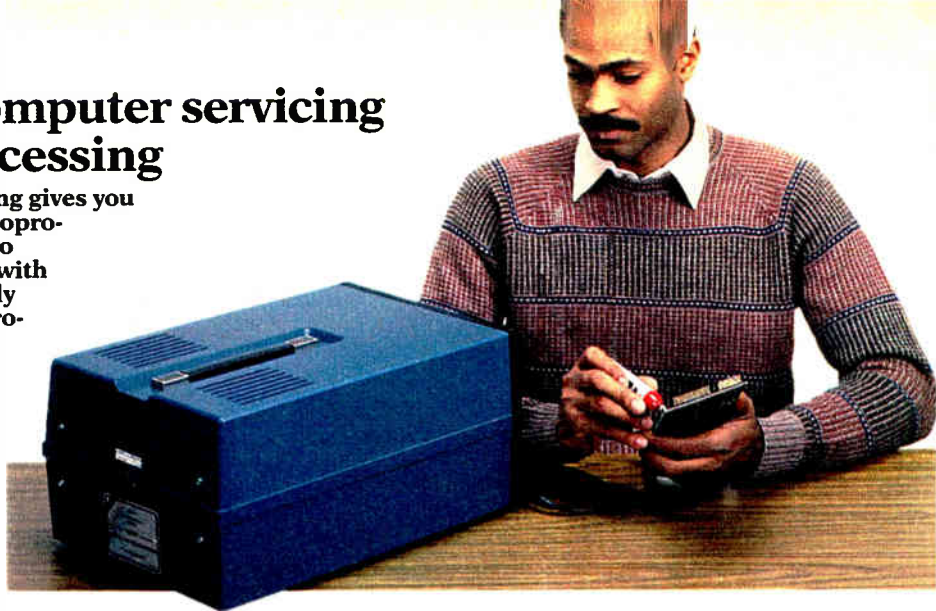


Discover the fun of computer kitbuilding at your Heath/Zenith Computers & Electronics Center.



# The easy way to learn computer servicing and advanced microprocessing

Our fascinating series in computer servicing gives you a thorough introduction to the computer, microprocessor, and peripherals. You'll also learn how to maintain, troubleshoot and repair computers with the help of a step-by-step method that gradually builds on your knowledge. Our Advanced Microprocessor Course is the culmination of the microprocessor series, instructing you in 16-bit computer technology and the 8088 microprocessor used in the Heath/Zenith PC, IBM PC and other compatibles.



## Get to know the modern computer

This is an eight-unit Computer Fundamentals Course with an emphasis on microcomputers. In it you'll find an effective step-by-step presentation of computer basics, applications and systems. You'll learn about power supply sources, 16- and 8-bit micros, bussing and interfacing CPUs, semiconductor memories and much more. You'll also be introduced to programming using high- and low-level languages, assemblers, editor, compilers and interpreters. Plus you'll learn many popular computer terms.

Your learning experience will be easier if you have a background in basic electronics and digital theory. You can get such a background by taking the EE-3101-A DC electronics, EE-3102-A AC Electronics, EE-3103-A Semiconductor Devices, EE-3104-A Electronic Circuits and EE-3201-A Digital Techniques courses.

To perform the hardware and software experiments, in addition to the ET-100 Trainer, you'll need a cassette recorder, video monitor (or TV receiver and RF modulator), a single-trace oscilloscope, a multimeter and a dot matrix printer. You'll earn 2.0 Continuing Education Units upon passing the final exam. EC-2001 \$79.95, ship wt 6 lbs.



## Complete peripherals course

We've designed this course to build on the knowledge you acquired in the Fundamentals Course. You'll learn about each category of peripheral device, including printers, displays, disk drives and modems. You'll study the purpose, capabilities and fundamentals of each, plus how each is interfaced to a minor microcomputer. And you'll find our discussion of control and data flow of electronic and electro-mechanical devices stimulating as well as informative.

Methodically-presented segments let you go at your own pace. This step-by-step course covers serial, EIA and parallel data communications, communication standards and non-standard interfaces. You'll also learn the ins and outs of input devices, visual displays, printers, plotters and memory peripherals. Plus so much more.

To perform the fascinating experiments that bring this topic to life, you'll need the ET-100 Micro Trainer and ETA-100-A Upgrade Accessory (page 67), a cassette recorder and a video display. You'll also need a volt-ohm meter and an oscilloscope. All other components are included. We also recommend that you complete the EC-2001 Computer Fundamentals Course before taking this course.

Pass the optional final exam and earn 2.0 Continuing Education Units. EC-2002 \$99.95, ship wt 10 lbs.



## Learn to service computers

You can learn to troubleshoot and maintain both digital and microprocessor systems with our Computer Maintenance Course. You'll start with a review of TTL and MOS devices and move on to study and gain practical experience in standard digital troubleshooting techniques like: determining electrical characteristics of integrated circuit input and output pins, and using logic and logic pulser probes.

We then extend your learning experience to a typical microprocessor based system. You'll learn how all system hardware sections interact with each other and how to troubleshoot them. You'll develop valuable skills in finding the defective block of a system and applying classical troubleshooting techniques like logic state analysis and signature analysis. We also present new troubleshooting techniques such as static stimulus testing and the use of the mobile I/O port. Plus, you'll learn to write system diagnostics for a particular system.

To perform the experiments, you'll need the ET-100 Trainer and ETA-100-A Accessory, an oscilloscope and a multimeter. We also recommend that you complete the DC Electronics, AC Electronics, Digital Techniques, and Computer Servicing - Fundamentals and Peripherals courses before taking Computer Maintenance. Optional final exam worth 3.0 CEUs. EC-2003 \$69.95, 9 lbs.



## You'll get a lot out of this in-depth study of microprocessors



Our comprehensive and thorough Advanced Microprocessor Course is designed to make you well-versed in 16-bit computer technology and the 8088 microprocessor. It includes more than 300 pages of software programming and interfacing experiments along with 1200 pages of text divided into ten units. You'll start with an examination of microcomputers and be introduced to the 8088 microprocessor with instruction addressing

modes. From there, you'll become familiar with machine and assembly language programming, conditional/unconditional loops and loop addressing plus subroutines. To this we add informative discussions of the 8088 instruction set addressing modes and memory segmentation. And you're sure to learn a lot as we examine I/O operations, internal/external interrupts and string operations. Later we teach you about the various MPU bus and control lines, typical address and data bus networks, and data handling techniques. We also examine the memory system in detail and go into various forms of input/output interfacing.

To get the most out of this course you should know digital electronics. You can get this background with the Digital Techniques Course (EE-3201-A, page 62). You should also be famil-

Access to data, control and PPI lines

Interfaces to a TV set or video monitor

Huge solderless breadboard area for experiments

Access to address lines and power supplies

Detached keyboard has 6-foot coiled cable

Eighteen numeric and control key keypad

Sixteen special function and control keys



Sixty-one key alpha-numeric keyboard

## Train on this 16-bit computer

Whether you're an experimenter or a technician, you'll enjoy using the ET-100 as an advanced trainer. With it, you'll be able to easily modify circuits, build interfaces or simply experiment with the 8088. The ET-100 is ideal for breadboarding computer circuits that interface to the 8088 microprocessor. All access lines are buffered to protect the microprocessor from damage. And you'll be able to power your projects using the four power supply voltages available on the breadboard.

As a 16-bit computer, the ET-100 is equally effective. It has 16K of RAM expandable to 64K and uses a sophisticated 8088 microprocessor found in many popular personal computers. The ET-100 includes a powerful editor, assembler and debugger permanently stored in 32K of ROM. And you'll find the cassette port, RS-232 Input/Output port and detached 95-key keyboard extremely useful. Also, a video output can be displayed on a monitor, like the HVM-1220-A (page 96). Kit **ET-100** \$799.95, ship wt 33 lbs. Assembled **ETW-100** \$1095.00, ship wt 33 lbs.



iar with binary and hexadecimal numbering systems, and computer math. Worth 8 CEUs. **EE-8088** \$99.95, ship wt 10 lbs.

**SAVER!** Purchase the EES-8088 package and get this course with the ET-100 Computer Trainer. You'll save \$50 over buying each separately. **EES-8088** \$849.90, ship wt 49 lbs.



Give your ET-100 many of the features found in popular personal computers

## Give your ET-100 more power

With this accessory, you can modify your trainer/computer to help with applications like data processing, telecommunications, and financial analysis. Once modified, your computer will have 128K bytes of RAM expandable to 192K with the addition of accessory Z-205-1. This package consists of 2 circuit boards, a boot ROM, an external disk drive unit and a dust cover. Two full RS-232C serial ports let you communicate with printers, modems and voice synthesizers. And you also get a programmable timer that's independent of the system clock.

### Configurations:

Kit **ETA-100-A** \$799.95, ship wt 69 lbs.

Assembled **EWA-100-A** version of ETA-100-A \$1650.00, ship wt 70 lbs.

Assembled **EWS-100-A** includes ETW-100 and EWA-100-A, \$2750.00, ship wt 96 lbs.

### Accessories:

**ETA-100-1** Extra Removable Breadboard \$29.95, 1 lb.

**Z-205-1** 64K RAM Upgrade \$40.00, ship wt 1 lb.



## HERO 2000 leads you into the future

Hero 2000 will help you explore the related technologies of robot automation programming, electronics for automation, intelligent machines and robotics.

This incredible robot features a 16-bit 8088 master microprocessor that runs user programs and controls eleven 8-bit peripheral microprocessors, plus HERO 2000 BASIC stored in the 64K ROM. Other built-in programs are for demonstrations, diagnostics and sensor adjustment routines. The 24K of RAM is expandable up to 576K by using three optional memory boards. Each memory board contains 64K of RAM and will accept two additional 64K RAM chip sets.

The new 360K disk drive accessory expands HERO's capabilities even more by allowing you to store and retrieve programs and data on a 5 $\frac{1}{4}$ " floppy disk.

## Prepare for the advanced world of robotics with Heath's HERO® 2000 and HERO 1

We bring the concepts of robotics and automation to life for you with hands-on experience and self-paced training. With the HERO 2000 and HERO 1 robotic trainers, you'll gain practical knowledge of the robotic systems used in modern manufacturing. Based on the same principles that control real-world automated systems and intelligent machines, these robotic trainers provide you with the opportunity to experiment with industrial electronic systems. Both robots feature abilities found on sophisticated factory robots and automation systems. You'll see how various sensors, such as light, sound or motion, are interfaced with microprocessors to provide object recognition and initiate command sequences. Optional manipulator arms (standard on an assembled HERO 2000) let you examine the challenge of servo-control. Plus, our robotics trainers give you the tools to experiment with software as well as hardware. What's more, you'll find these comprehensive courses on robotics a valuable resource in understanding the mechanical operation and electronic control systems that give today's industrial and domestic robots their capabilities – and their limitations. Whether your interests are intelligent machines or simulating industrial robotic applications, these robotics trainers have an enormous capability that can stimulate, challenge and inspire you.

It includes the MS-DOS software package and requires the ETW-19-15 Extension Board with a minimum of 128K RAM installed for use with your HERO 2000.

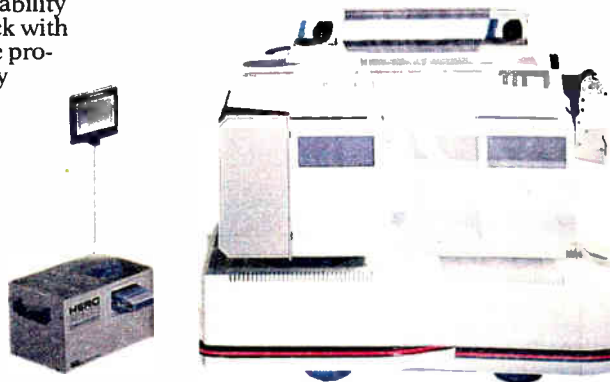
Other expansion features include 12 circuit card slots, an optional Experimenter Board for conducting experiments and testing your own circuits, two RS-232 DCE ports configured for a ter-

минаl and printer, and a cassette port for storing your programs on a standard tape recorder.

You'll soon find that HERO 2000 is an unequalled educational trainer for robot simulation. It is sonar equipped and built-in sensors measure light, sound and temperature levels. An electronically synthesized voice delivers an unlimited vocabulary in virtually any

### Auto-Docking Accessory

Equip HERO 2000 with the ability to search for, locate and then dock with its charger, all automatically. The procedure begins when a low battery voltage is detected or through your own BASIC battery level test program. The accessory consists of a special Docking ROM and two infrared transceivers. The docking routine does not affect any program already stored in memory. Kit **ET-19-5** \$149.95, 3 lbs.





language and a variety of musical and sound effects. Over a dozen programs are available on the optional demonstration ROM to show you the versatility of the synthesizer and sensors. The optional robot arm is multi-jointed and fully articulated with a gripper that has a sense of touch.

Access ROM routines and perform movements from the top-mounted hexadecimal keypad or the optional wireless remote control (included with an assembled HERO 2000). HERO 2000 requires the Remote Console or a computer terminal for programming and checkout routines. Sixteen head-mounted LED status indicators (eight user definable) show you what function HERO is performing. And with three power modes, HERO 2000 is able to operate up to six days on its single 24 amp-hour battery. A 120 VAC charger is included.

#### Configurations:

Kit **ET-19** HERO 2000 Robot without Arm \$1999.95, ship wt 108 lbs.

Kit **ETS-19** HERO 2000 Robot with Arm \$2499.95, ship wt 129 lbs.

Assembled **EWS-19-45** HERO 2000 Robot, Arm and 75.43 MHz Remote Control \$4499.95, ship wt 121 lbs.

Assembled **EWS-19-46** HERO 2000 Robot, Arm and 75.67 MHz Remote Control \$4499.95, ship wt 121 lbs.

#### Accessories:

Kit **ETS-19-1** HERO 2000 Arm with Controller Card \$699.95, 22 lbs.

**ET-19-14** Experimenter Board \$99.95, ship wt 2 lbs.

**ET-19-51** Demonstration ROM \$29.95, ship wt 1 lb.

**ETW-19-15** 192K Static RAM Expansion Board with 64K RAM installed \$99.95, ship wt 2 lbs.

**ETA-19-15** 64K RAM Chip Set \$49.95, ship wt 1 lb.

*New!* **ETW-19-6** Accessory 360K Disk Drive \$399.95, ship wt 4 lbs. Available August.



## An education in robotics

Begin your study with EE-1900, the Intelligent Machines course. Here, you'll study input and output devices, sensors and transducers, basic signal conditioning, digital/analog conversion, the hardware and software involved in machine communication, and also take a look at CAD/CAM operations.

You'll need the HERO 2000 Robot and Arm for the 15 experiments. We recommend completion of the DC and AC electronics courses on page 59 or equivalent knowledge. 3.0 CEUs.

Course EE-1901 is a comprehensive look at the electronics used at the component level in automated systems. You'll examine industrial controllers, active and passive sensory devices and circuits, analog sampling and analog-digital conversion circuits. Industrial applications are also studied.

All experiments use HERO 2000. Earn 6.0 CEUs. We recommend you complete EE-1900 and the Fundamental Electronic Series prior to this course. A working knowledge of BASIC is helpful for both courses. **EE-1900** \$99.95, 8 lbs. **EE-1901** \$99.95, 11 lbs.

## HERO 2000: Programming and Interfacing Course

This is a superlative overview of the internal workings of our most advanced educational trainer, HERO 2000. It covers both the hardware and software aspects of the automation trainer along with highly detailed technical discussions of the various robotic subsystems. A familiarity with the BASIC programming language is recommended for this course. Experiments are performed on a HERO 2000 equipped with an arm and a remote control. **EB-1950** \$59.95, ship wt 5 lbs.



## Wireless full ASCII keyboard controls HERO 2000

With this wireless remote control console, you are in charge of HERO 2000 up to 100 feet away. You can control in real time or teach HERO complex tasks involving its arm and base using special speed and position keys. The full ASCII typewriter-style keyboard on the console makes it easy for you to create, edit or execute a program. Also, programs can be written in HERO BASIC from the Remote and then permanently stored in ROM. An RS-232C connector on the remote also allows you to connect

the remote to the robot in the same manner as a terminal. Each console kit comes with two frequency modules for wireless communication between the remote and HERO. **ETS-19-35** operates at 75.43 MHz, **ETS-19-36** operates at 75.67 MHz. The Remote Console features a 2 line by 40 character LCD display and is powered by rechargeable nickel-cadmium batteries (included). A 120 VAC charger is included. Kit **ETS-19-35** \$499.95, ship wt 10 lbs. Kit **ETS-19-36** \$499.95, ship wt 10 lbs.



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

# Learn high-tech robotics with the HERO® 1 Robot and its complete training system

demonstration of HERO's sensors, voice and movements as soon as you get your robot by purchasing our special HERO 1 Demo Cassette.

On-board HERO 1 is an 8-bit 6808 microprocessor that can guide the robot through complex maneuvers, activate and monitor sensors, and modify actions as a result of sensor or real-time clock inputs. HERO 1 also has 8K of ROM as well as 4K of RAM which can be increased up to 56K with the addition of an optional memory expansion board.

Commanding HERO 1 is easy with three different methods available to you. A top-mounted 17-key hexadecimal keyboard lets you easily enter, verify and modify programs, and select any of seven separate operating modes. You can also access any of the microprocessor's registers through the keypad. An attachable Teaching Pendant lets you manually control all motor and arm movements, or store them for later duplication. Or you can control HERO 1 with a remote, radio frequency-controlled transmitter available in two models, each operating at a different frequency. The Remote controls all keyboard and Teaching Pendant operations from up to 100 feet away. You can also guide HERO 1 by directly linking a host computer with the help of the Memory Expansion Board and an optional RS-232 Interface that plugs into the top experimental HERO 1 breadboard.

## Configurations:

Kit **ET-18-A** Basic HERO 1 Robot less arm and voice \$799.95, ship wt 66 lbs.

Assembled **ETW-18-WA** HERO 1 without arm assembly \$1699.95, ship wt 65 lbs.

Kit **ETS-18-37** HERO 1 with Arm and Remote Control operating at 75.43 MHz and with voice \$1299.95, 89 lbs.

Kit **ETS-18-38** HERO 1 with Arm and Remote Control operating at 75.67 MHz and with voice \$1299.95, 89 lbs.

Assembled **EWS-18-35** HERO 1 with Arm and Remote Control operating at 75.43 MHz \$2149.90, ship wt 95 lbs.

Assembled **EWS-18-36** HERO 1 with Arm and Remote Control operating at 75.67 MHz \$2149.90, ship wt 95 lbs.

## Accessories:

Kit **ET-18-1** HERO 1 Arm with gripper mechanism \$349.95, ship wt 6 lbs.

Assembled **ETW-18-1** HERO 1 Arm \$549.95, ship wt 5 lbs.

Kit **ET-18-2** HERO 1 Voice \$99.95, ship wt 1 lb.

Kit **ET-18-35** Remote Control Accessory for HERO 1 that operates at 75.43 MHz \$249.95, ship wt 5 lbs.

Assembled **ETW-18-35** Remote Control Accessory that operates at 75.43 MHz \$399.95, ship wt 5 lbs.

Kit **ET-18-36** Remote Control Accessory for HERO 1 that operates at 75.67 MHz \$249.95, ship wt 5 lbs.

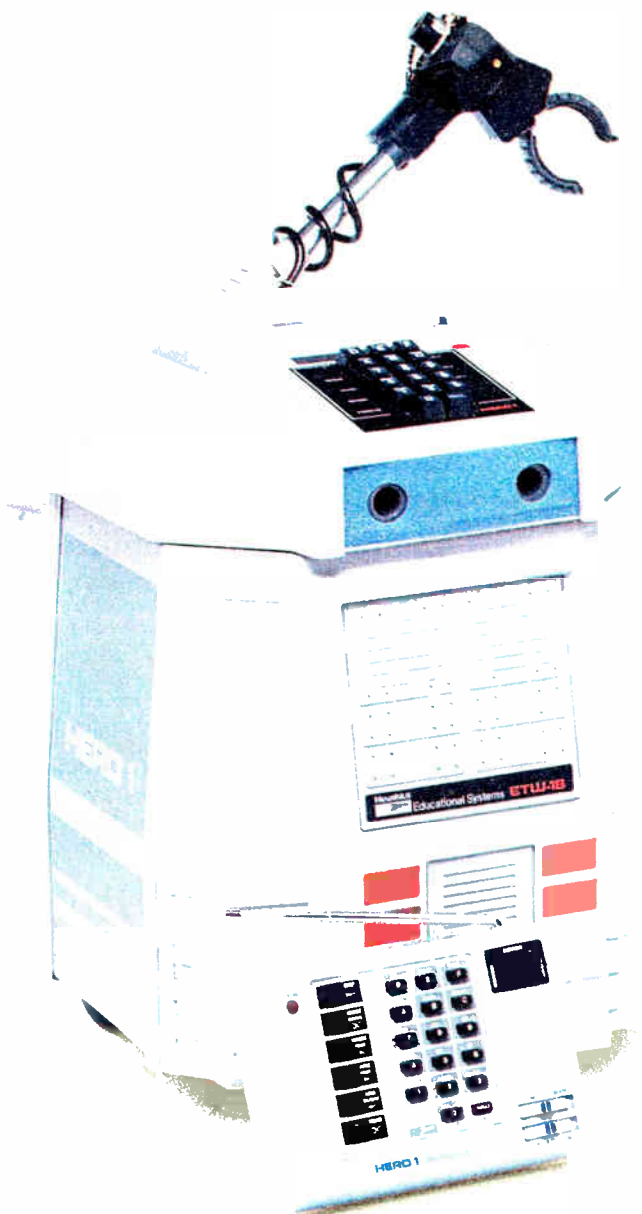
Assembled **ETW-18-36** Remote Control Accessory for HERO 1 that operates at 75.67 MHz \$399.95, ship wt 5 lbs.

**ET-18-4** A plug-in Demo ROM containing several routines demonstrating all of HERO 1's motor and sense circuits and voice \$49.95, ship wt 1 lb.

**ET-18-5** Monitor ROM listing \$39.95, ship wt 1 lb.

Assembled **ET-18-6** Memory Expansion Board allows the addition of over 40K of memory \$49.95, 2 lbs.

**ETA-18-6** Memory Expansion RAM (8K x 8) chip that installs onto the ET-18-6 memory board \$24.95, ship wt 1 lb.



An ideal teaching tool, HERO 1 is a completely self-contained robot that interacts with you and its environment. HERO 1 detects sound, light, motion and obstacles and travels over a course that you predetermine. The robot can see and hear through on-board light, sound and motion detectors plus a sonar ranging system. The sound detector hears over a 300 to 5000 Hz frequency range while the light detector sees over the entire visible spectrum and into the infrared range. HERO 1's motion detector senses movement up to a distance of 15 feet while a sonar system determines ranges between objects and the robot.

HERO 1's abilities are limited only by your imagination. For example, you can get an optional Arm with Gripper and program it to pick up small objects with its manipulator. The arm moves through five axes and can lift 16 ounces when retracted. You can also purchase the optional voice synthesizer. It not only lets HERO 1 simulate the sound of human speech, but it can also speak in complete sentences. You can see a





**ET-18-7** Automatic Mode ROM that plugs into HERO 1 and enables the robot to move independently around a room while avoiding obstacles \$29.95, ship wt 1 lb.

**ET-18-9** HERO 1 BASIC is a plug-in ROM that allows you to program HERO 1 in a simple integer BASIC with modifications to use the robot's voice synthesizer and its various motors and sensors. Requires an ET/ETW HERO 1, an ET-18-6 Memory Expansion Accessory, one or more ETA-18-6 Memory Expansion RAM, an ETW-18-10 RS-232 Interface Accessory, a terminal or computer with a terminal emulation program and a serial interface cable such as the HCA-10 or

HCA-11 on page 95 \$49.95, ship wt 1 lb.

**SAVER! ETS-18-9** Expansion System. Everything needed to let you program your robot. Includes: BASIC ROM, RS-232 Interface, Memory Expansion Board and one Memory Expansion RAM \$179.80, ship wt 6 lbs.

**ET-18-11** HERO 1 Demo Cassette contains programs on cassette tape demonstrating the robot's sensors and voice along with a variety of arm and body movements \$14.95, ship wt 1 lb.

Assembled **ETW-18-10** RS-232 Interface allows serial communication between the robot and a terminal or computer. Requires ET-18-6 Memory Expansion Board \$59.95, 1 lb.



## Examine robotics and industrial electronics

Our Robotics and Industrial Electronics Course teaches

you how robots work. After a review of elementary electronic principles, you'll be introduced to robot mechanics, computer control and low, medium and high-technology robots. From there, you'll master different power systems and familiarize yourself with the operation of various AC and DC motors and generators, industrial hydraulic and pneumatic systems and DC stepper motors.

You'll get an over-all understanding of the robotics system as we link computer applications with mechanical principles. You'll also learn how to write robot control programs and see how sensing systems and voice synthesis work.

Do the optional experiments and let your HERO 1 guide you to a practical understanding of the principles of industrial electronics, computers, automated equipment, sensors, servos, stepper motors, controllers and more.

We recommend that, before you start, you complete EE-3101-A DC Electronics (page 59), EE-3102-A AC Electronics (page 59), EE-3201-A Digital Techniques (page 62), and EE-3401-A Basic Microprocessors (page 63). 8 CEU's. **EE-1800** \$99.95, 12 lbs.

### \$100 OFF! ROBOTICS TRAINING SAVERS

Our special offer includes: EE-1800 Robotics and Industrial Electronics Course, EE-1812 Robot Applications Course, EB-1802 Advanced Programming Experiments, ET-18-A Basic HERO 1 Robot, ET-18-1 Robot Arm with Gripper, and ET-18-2 Voice Synthesizer. **EES-1800** \$1374.70, ship wt 111 lbs.



## Study real-world applications and design of industrial robots

Learn about the driving technologies behind advanced industrial robots, why robots are important, and where they go from here with our Robot Applications Course.

You'll start with a review of robotics basics. Next, you'll plug into an in-depth study of how corporations use tasks, payback reliability, quality and other factors in deciding the need for and kind of industrial robot to buy. You'll learn about the process of signal conditioning that gets a signal from sensor to microprocessor controller. Plus, you'll gain a thorough knowledge of the different types of vision, tactile and environmental feedback sensor systems. This comprehensive coverage is designed to give you a solid understanding of the capabilities, present uses and limitations of industrial and domestic robots.

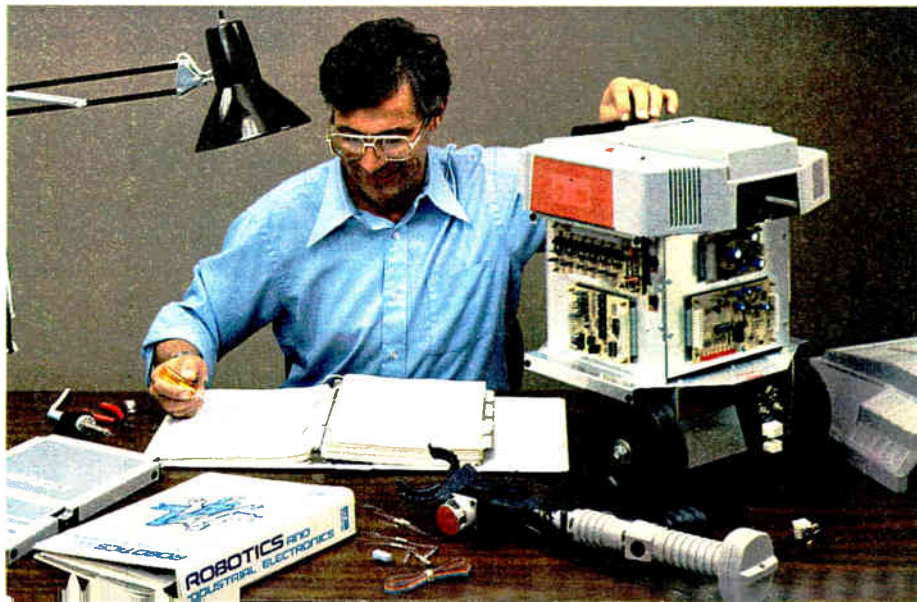
We then take you to the future manufacturing plant, where we explore "computer-aided" production and the possible future applications of industrial robots.

We reinforce your learning with nine experiments that you can perform on HERO 1. All components for the experiments are included. You'll even get an audio cassette tape containing the experiment programs for this course.

Pass the optional final exam and you'll earn 4.0 Continuing Education Units. **EE-1812** \$99.95, ship wt 6 lbs.

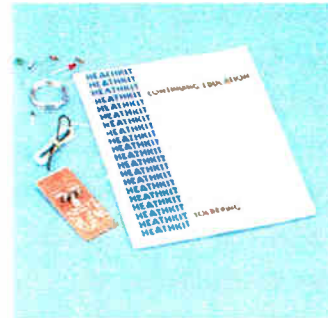
## Advanced programming experiments for HERO 1

Master the operation of your HERO 1 and unlock the power of the Robot Language Interpreter. Our sixty-one programming experiments show you how with a wide range of examples that teach general programming principles, including subroutines stored in HERO 1's monitor ROM. **EB-1802** \$24.95, ship wt 1 lb.



## Introductory courses that will spark your interest and give you that special head start

If you're starting out in electronics, we've got a diverse assortment of courses and learning aids just for you. Our courses can do everything from giving you a working knowledge in fundamentals and concepts of AC and DC electricity to providing instruction in soldering that includes soldering a working light blinker. We teach you about linear circuits by covering dozens of basic circuits and their modifications. We also have a course that examines TTL/CMOS circuits in detail and another that teaches you all about printed circuit boards; their properties, manufacturing processes, and how to make your own. Our offerings even include an overview of fundamental electronic concepts for beginners and an Electronics Learning Dictionary that defines electronic's technical terms. And as always, you can earn valuable CEUs: 4.0 for courses EH-701, EH-702 and EE-3140-A, 2.0 for EI-3134 and 1.0 for EE-3100. The ET-3300-B Trainer is used with EH-701 and 702, while the ET-3600 or ETW-3100-B Trainer is used with EE-3140-A.



## Beginning electricity course

This audio/visual supplemented course teaches you the concepts of direct and alternating current, circuit theory and electromechanical systems. You'll also learn about electrical devices and how to solve basic problems in electricity. **EE-3100** \$29.95, ship wt 5 lbs.

## Everything you need to know about soldering

This course teaches you professional soldering facts and techniques. You'll learn the chemistry of soldering, proper soldering iron size, cleaning and tinning the soldering iron, visual troubleshooting for repair, and more. **EI-3133** \$19.95, ship wt 3 lbs.

## Cover basic circuits with our linear circuits course

Learn basic circuit operation and modifications through concise descriptions and schematics. You'll construct over 30 linear circuits including various amplifiers and modulators. A background in DC and AC Electronics and Semiconductor Devices is necessary. **EH-701** \$54.95, ship wt 2 lbs.



## Learn digital logic design and use in basic circuits

Our TTL/CMOS Course gives you a basic knowledge of both digital transistor-transistor logic and complementary metal oxide semiconductor building blocks and how they perform various functions. **EH-702** \$59.95, ship wt 3 lbs.



## Master the printed circuit

This course teaches you all the steps necessary for making circuit boards from scratch. Our study also includes properties and manufacturing of printed circuit board materials. Plus you'll put your knowledge into practice with an actual photoelectric lamp switch and touch switch. **EI-3134** \$69.95, ship wt 7 lbs.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.

## Your complete reference for electronic technical terms

Our Tutorial Dictionary defines terms in 832 pages and contains a summary of 16 electronics-related topics. **EB-1010** \$16.95, ship wt 3 lbs.

## New fundamental electronics course teaches the basics



Concepts of Electronics is an ideal course for the person just starting out in the field of electronics. You'll learn about the properties of electricity and the operation of various electronic devices and circuits. Gain additional insight with included hands-on experiments. **EE-3140-A** \$69.95, ship wt 9 lbs.



# Accredited self-study, classroom, or video courses

Heathkit/Zenith Continuing Education is accredited by the National Home Study Council and licensed as a school by the State of Michigan. So, you can be sure that all Heathkit Self-Instruction Programs are quality self-study programs.

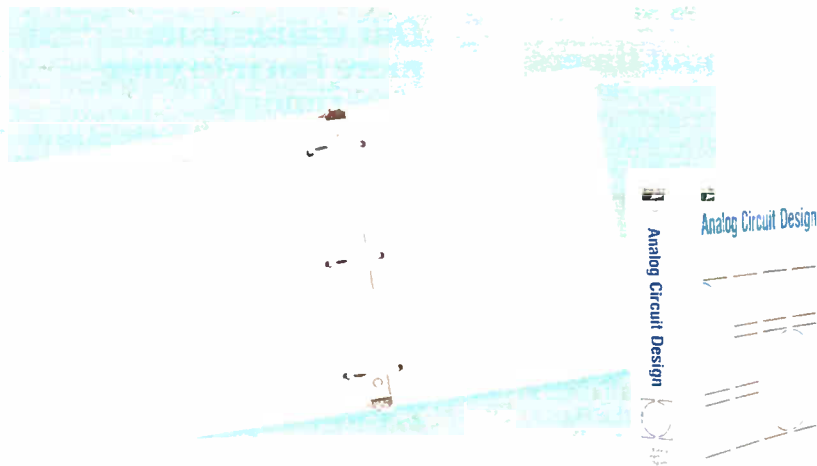
Continuing Education Units (CEU's), a nationally-used method of recognizing achievement in non-credit adult education, may be earned by passing the optional final examination of self-study courses with a 70% or higher score.

You can obtain video courses from our Heathkit Video Training Series. These special courses make learning complete, convenient, effective and economical. When you use this study method, students actually see how electronic processes work. Our video courses include: Microprocessors, Digital Techniques and Soldering. For complete details, write: Heath Company, Dept. 518-000, Benton Harbor, MI 49022. Or call TOLL-FREE: 800-253-0570.

	Course	Text ship wt 2 lbs.	Price	Workbook ship wt 2 lbs.	Price	Instructor's Guide ship wt 1 lb.	Price	Assembled Trainer wt 6 lbs.	Price	Parts ship wt 1 lb.	Price	Cassettes ship wt 2 lbs.	Price		
<b>Introductory</b>	Concepts of Electronics	EB-6140 (3 lbs.)	24.95	EB-6140-40 (1 lb.)	10.95	EB-6140-50	9.95	ETW-3600	199.95	EB-6140-30	29.95	NOT USED			
<b>Basic Electronics</b>	DC Electronics	EB-6101-A	19.95	EB-6101-41 (1 lb.)	10.95	EB-6101-51	9.95	ETW-3600	199.95	EB-6101-31 (2 lbs.)	24.95	EEA-3101-A	19.95		
	AC Electronics	EB-6102-A (3 lbs.)	19.95	EB-6102-41	10.95	EB-6102-51 (2 lbs.)	9.95	ETW-3600	199.95	EB-6102-31	19.95	EEA-3102-A	19.95		
	Semiconductor Devices	EB-6103-A (3 lbs.)	19.95	EB-6103-41	10.95	EB-6103-51	9.95	ETW-3600	199.95	EB-6103-31	19.95	EEA-3103-A	19.95		
	Electronic Circuits	EB-6104-A	19.95	EB-6104-41	10.95	EB-6104-51	9.95	ETW-3600	199.95	EB-6104-31	34.95	EEA-3104-A	19.95		
	Test Instruments	EB-6105 (4 lbs.)	19.95	EB-6105-40	10.95	EB-6105-50	9.95	ETW-3600	199.95	EB-6105-30	29.95	EEA-3105-A	19.95		
	Electronic Communications	EB-6106	19.95	EB-6106-40 (1 lb.)	10.95	EB-6106-50	9.95	ETW-3600	199.95	EB-6106-30	34.95	EEA-3106-A	19.95		
	Digital Techniques	EB-6201-A (3 lbs.)	24.95	EB-6201-41	11.95	EB-6201-51	9.95	ETW-3700	199.95	EB-6201-31	34.95	EEA-3201-A	19.95		
	Digital Techniques Additional Experiments	NOT USED			EB-6201-71 (1 lb.)	12.95	EB-6201-52	9.95	ETW-3700	199.95	NOT USED		NOT USED		
Data Communications and Networks	EB-8090 (5 lbs.)	24.95	EB-8090-40 (1 lb.)	10.95	EB-8090-50	9.95	ETW-1000 (13 lbs.)	369.95	EB-8090-30	19.95	NOT USED				
<b>Microprocessor Technology</b>	Microprocessors	EB-6401-A (4 lbs.)	24.95	EB-6401-41 (1 lb.)	11.95	EB-6401-51	9.95	ETW-3400-A	359.95	EB-6401-31	64.95	NOT USED			
	Microprocessor Interfacing	EB-6402 (5 lbs.)	24.95	EB-6402-40 (1 lb.)	10.95	EB-6402-50	9.95	ETW-3400-A	359.95	EB-6402-30	64.95	NOT USED			
	Microprocessor Applications	EB-6405 (3 lbs.)	24.95	EB-6405-40	10.95	EB-6405-50	9.95	ETW-3400-A	359.95	EB-6405-30 (2 lbs.)	54.95	NOT USED			
	Advanced 16-bit Microprocessors	EB-8088 (4 lbs.)	24.95	EB-8088-40	11.95	EB-8088-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-8088-30	59.95	NOT USED			
<b>Advanced Electronics</b>	Operational Amplifiers	EB-601	19.95	EXPERIMENTS IN TEXT		EB-601-50	9.95	ETW-3300-B	194.95	EB-601-30	24.95	NOT USED			
	IC Timers	EB-603	19.95	EXPERIMENTS IN TEXT		EB-603-50	9.95	ETW-3300-B	194.95	EB-603-30	29.95	NOT USED			
	Phase-Locked Loops	EB-604	19.95	EXPERIMENTS IN TEXT		EB-604-50	9.95	ETW-3300-B	194.95	EB-604-30	29.95	NOT USED			
	Optoelectronics	EB-605	19.95	EB-605-40 (1 lb.)	9.95	EB-605-50	9.95	ETW-3300-B	194.95	EB-605-30	29.95	NOT USED			
	Laser Technology	EB-610	19.95	EB-610-40 (1 lb.)	10.95	EB-610-50	9.95	EWS-4200 (12 lbs.)	395.00	EB-610-30 (3 lbs.)	39.95	NOT USED			
	Electro-optics	EB-611	19.95	EB-611-40 (1 lb.)	10.95	EB-611-50	9.95	ETW-3300-B	194.95	EB-611-30 (2 lbs.)	79.95	NOT USED			
<b>Robotics and Automation</b>	Intelligent Machines	EB-1900	19.95	EB-1900-40 (1 lb.)	10.95	EB-1900-50	9.95	EWS-19-45 EWS-19-46 (121 lbs.)	-4499.95	EB-1900-30 (2 lbs.)	39.95	NOT USED			
	Electronics for Automation	EB-1901	19.95	EB-1901-40 (1 lb.)	10.95	EB-1901-50	9.95			EB-1901-30	69.95	NOT USED			
	HERO 2000: Programming and Interfacing	EB-1950 (5 lbs.)	59.95	NOT USED						NOT USED					
	Robotics & Ind. Electronics	EB-1801 (4 lbs.)	29.95	EB-1801-40	14.95	EB-1801-50	9.95			EWS-18-35 EWS-18-36 (95 lbs.)	-2149.90	EB-1801-30 (2 lbs.)	44.95	NOT USED	
	HERO 1 Advanced Experiments	EB-1802 (1 lb.)	24.95	NOT USED								NOT USED			
<b>Computer Servicing</b>	Computer Fundamentals	EB-2001 (3 lbs.)	19.95	EB-2001-40	10.95	EB-2001-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-2001-30	39.95	NOT USED			
	Computer Peripherals	EB-2002	19.95	EB-2002-40 (1 lb.)	10.95	EB-2002-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-2002-30	39.95	NOT USED			
	Computer Maintenance	EB-2003	19.95	EB-2003-40 (1 lb.)	10.95	EB-2003-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-2003-30	29.95	NOT USED			
<b>Circuit Design</b>	Passive Circuit Design	EB-6001 (3 lbs.)	19.95	EB-6001-40	10.95	EB-6001-50	9.95	ETW-1000 (13 lbs.)	369.95	EB-6001-30	10.95	NOT USED			
	Transistor Circuit Design	EB-6002 (3 lbs.)	19.95	EB-6002-40	10.95	EB-6002-50	9.95	ETW-1000 (13 lbs.)	369.95	EB-6002-30	19.95	NOT USED			
	Analog Circuit Design	EB-6003 (4 lbs.)	19.95	EB-6003-40 (1 lb.)	10.95	EB-6003-50	9.95	ETW-1000 (13 lbs.)	369.95	EB-6003-30	19.95	NOT USED			
	Digital Circuit Design	EB-6004 (4 lbs.)	19.95	EB-6004-40	10.95	EB-6004-50	9.95	ETW-1000 (13 lbs.)	369.95	EB-6004-30	44.95	NOT USED			
<b>CAD</b>	AutoCAD	EB-609 (6 lbs.)	39.95	NOT USED		EB-609-50	9.95	NOT USED		NOT USED		NOT USED			

## Learn circuit design with this fascinating engineering series

This series teaches you everything you need to know for analyzing and designing a variety of practical circuits. **Passive Circuit Design** helps you to develop design skills through analytical techniques and associated math concepts. **Transistor Circuit Design** teaches you how to design circuits using transistors, as well as how to develop appropriate AC and DC equivalent circuits needed in the circuit design process. In **Analog Circuit Design**, you'll learn how to analyze and design circuits that serve as building blocks in modern electronic systems. And **Digital Circuit Design** provides a working knowledge of digital electronic skills needed by electrical as well as computer engineers and technicians. The thrust of our program is to give you as comprehensive and practical a course of study as possible. From circuit analysis to hands-on training with the ET-1000 Analog/Design Trainer, you're sure to get a good start in engineering.



## Learn to design a multitude of useful circuits

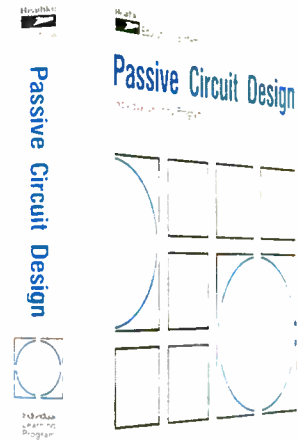
The next step in circuit design is provided by our Transistor Circuit Design Course. It teaches you the basic techniques for designing circuits using transistors. You'll start with a discussion of transistor characteristics and relevant parameters. Next, you'll see how to develop appropriate AC and DC equivalent circuits needed in designing transistor circuits, which you'll analyze to determine the effects of varying component values. You'll finish up by studying the actual circuit design process.

This course, worth 4.0 Continuing Education Units, includes thirteen exciting experiments and requires previous electronics background, which you can get by taking our Passive Circuit Design Course. **EE-1002** \$64.95, ship wt 9 lbs.

## Learn basic design techniques using linear-integrated circuits

Analog Circuit Design teaches you how to analyze and design circuits that are more reliable and effective than circuits using discrete components. You'll start by learning to analyze and design several amplifier and comparator circuits using the versatile operational amplifier. You'll study op amps and comparators, both of which are used in designing instruments like a digital probe. You'll also learn to analyze and design linear regulators, oscillators and waveform generators. Twelve experiments reinforce everything you learn.

Before taking Analog Circuit Design, you should complete both Passive and Transistor Circuit Design. This interesting course is worth 4.0 CEUs. **EE-1003** \$69.95, ship wt 9 lbs.



## Study circuit analysis and design using passive components

The foundation for our Engineering Design Series, **Passive Circuit Design** teaches you how to analyze and design circuits using components that don't provide a power gain.

For the math background needed for circuit design, you'll start with a thorough review of DC circuit analysis. You'll then study AC circuit analysis, nonideal properties of real components and methods for selecting appropriate devices for given applications.

For the rest of your study, you'll concentrate on using previously-discussed design techniques. You'll learn how to design unregulated power supplies using numerous rectifier circuits and smoothing filters. Plus, we show you how to design other passive circuits like clippers, peak detectors and waveshaping circuits. And you'll integrate all of this stimulating information with ten hands-on experiments.

To take this course, all you need is a basic knowledge of DC and AC electronics, algebra and trigonometry. On passing the optional final exam, you'll earn 4.0 CEUs. **EE-1001** \$54.95, ship wt 9 lbs.



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



## Enter the real world of electronics with our digital circuit design course

This course provides you with a fascinating journey into digital design, including a close look at the logic circuit – the basis for decision and memory circuits used in all digital computers.

Your journey begins with a discussion of digital logic gates that are used as the fundamental building blocks of all digital electronics. You'll review design considerations that relate to

various digital IC technology options with an overview of various digital IC devices. From there, you'll design working circuits using logic decision circuits.

Your new found knowledge will rapidly grow as you learn a host of interesting skills. You'll learn how to: incorporate memory elements into the operation of a digital circuit, input data, and output results of logic operations to the outside, real world with interfacing analog-to-digital and digital-to-analog converters. You'll finish your journey by solving problems arising in designed circuits through the use of test instruments and general problem-solving guidelines.

Since we treat the logic circuit as a simple input/output device, you won't need much electronics background at all. You'll simply need to know the two-state binary system and basic electronic circuit principles, both of which are covered in two appendix selections. All this enables you to take this course at any stage of your electronics design education.

And you'll get so much more, like detailed experiments that you can build on your Trainer plus 6.0 Continuing Education Units that you'll earn on passing the optional final exam. A single trace scope and a multimeter are also needed to perform the experiments. **EE-1004** \$99.95, ship wt 10 lbs.

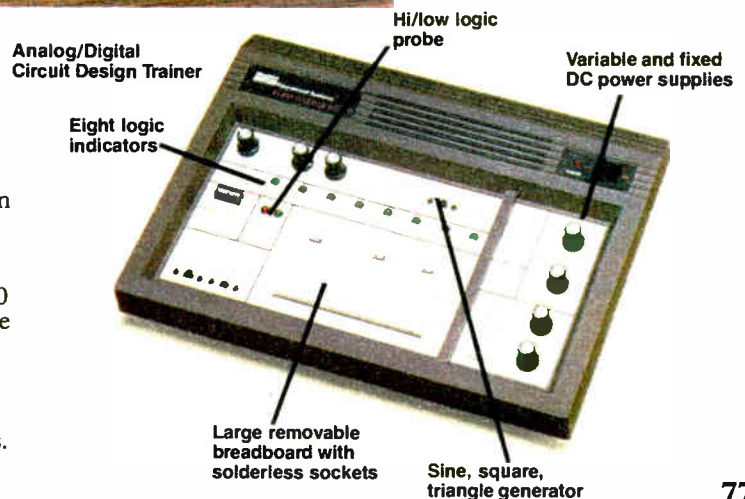


## Use your own analog/digital circuit design trainer

Our solderless double Breadboard Trainer is a regular minilab for learning the basic techniques of circuit design in all courses on this and the previous page. It includes a built-in function generator for producing sine, square and triangle waveforms from 1 Hz to 100 kHz in five switch-selectable ranges. The trainer will even handle your heavy circuit loads by using variable and regulated positive and negative 1.2 to 20 volt DC power supplies. And you'll find the built-in logic probe handy for detecting and indicating HI and LOW logic levels in breadboarded digital circuits.

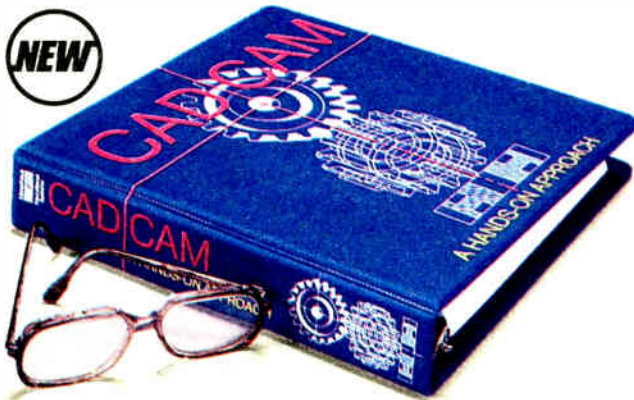
The trainer has two 60 Hz sine wave signal sources of 15 VAC and 30 VAC. 4¾" H x 15¾" W x 10¾" D. Kit **ET-1000** \$219.95, ship wt 14 lbs. Assembled **ETW-1000** \$369.95, 13 lbs.

Accessories: **ET-1000-1** Extra Removable Breadboard \$29.95, ship wt 1 lb.



# Teach yourself how to get the most from your computer and software through self-study

Take the self-instructional road to increased computer knowledge while traveling at your own speed



## CAD/CAM: A Hands on Approach

A new course describing the advances in numerous industrial processes brought about by the use of computers. This course supplies much-needed information about the improving tools and techniques that are rapidly appearing in the manufacturing environment.

First, an overview of computer-aided drafting (CAD) and computer-aided manufacturing (CAM) is presented. Here the workstation concept is also introduced. Then hardware, software and their applications are covered. CAM is then discussed featuring numerically controlled machinery and data communications, as well as intelligent machines.

Experiments included on a disk with the course emphasize manipulation of drawings, rather than creating new ones, using AutoCAD (also included). Experiments require a Heath/Zenith or IBM PC compatible computer equipped with 256K RAM, two 5¼" disk drives and CGA or Hercules video capability. Worth 6.0 CEUs. **EES-109** \$79.95, ship wt 5 lbs.

### Typing Tutor III



## Improve your touch typing skills with this personal typing tutor

TYPING TUTOR III is a unique keyboard instruction program. First this tutor program tests your typing ability. Then it continually adjusts to your improving proficiency level. If you're a beginner, start off with just a few keys. Tutor will automatically add more keys until you're accurately and easily typing the whole alphabet, numbers and punctuation. Lessons and tests are automatically tailored to your unique requirements and learning advancement.

An arcade style LETTER INVADERS game is also included. It enables you to sharpen your typing skills while having some fun at the same time. Both the game and typing tutorial program are easy to use with one-key on-screen help messages. Requires a Heath/Zenith PC, an IBM PC or compatible using MS-DOS. **EZ-1007** \$49.95, ship wt 1 lb.



## Become your own computer consultant

The new Microcomputer Professor course is a thorough and simply written tutorial on personal computer systems. The expert guidance contained in this course enables you to make an informed decision about

purchasing the right computer, software and peripherals like printers and modems.

This practical course is written in an easy-to-digest format especially for the beginner. And it contains hands-on experiments that illustrate course concepts which require a Heath/Zenith, IBM PC or compatible computer using the MS-DOS or PC-DOS operating system. Successfully pass the optional final exam and receive a certificate of achievement from Heathkit/Zenith Educational Systems and 2.0 Continuing Education Units (CEUs). With the Microcomputer Professor course you can be answering questions about personal computers and software instead of asking them. **EC-1123** \$99.95, ship wt 5 lbs.



## Learn MACRO-86 Assembly Language

Learn to program virtually any computer using the familiar Intel 88/86 series of microprocessors and Microsoft DOS. For this course you should have access to a Heath/Zenith PC, an upgraded ET-100 Trainer, or an IBM PC or compatible with the appropriate operating system. This course requires MACRO-86 software and support programs. For MS-DOS Version 3, the MACRO-86 Assembler is part of the CB-3163-30 Programmer's Package found on page 85. You should also be familiar with the operating system and have access to system programs (and supporting files). Pass the optional final exam and earn 5.0 Continuing Education Units. **EC-1201** \$59.95, ship wt 10 lbs.



## MACRO-86 Programming Algorithms

A natural follow-up course to MACRO-86 Assembly Language (page 78) that demonstrates an important phase in computer programming. Find out how to use a major tool to solve problems on a computer with a structured plan...an algorithm. Use provided programs or programs that you learn to write that clearly demonstrate the covered material.

Experiments in the course are written for computers using the Intel 8088 microprocessor such as: the H/Z-100, Heath/Zenith PCs, an upgraded ET-100 Trainer, the IBM PC or compatible. The MS-DOS operating system and MACRO-86 Assembler (not supplied) are used in all experiments. A 5 1/4" floppy disk, included with the course, contains experiments, programs and demonstrations. A programmer's pad is also supplied. 4.0 CEUs. **EC-1202** \$59.95, ship wt 6 lbs.



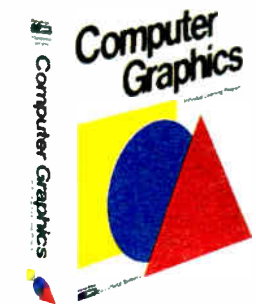
### Know how to effectively use MS-DOS\*

A self-study course directed to the novice computer user. And it is accompanied by a cassette narration that guides the user through the course plus exercises that provide computer experience. See how MS-DOS Version 1, Z-DOS and PC-DOS are organized with instructions on all the built-in commands.

Start with a background in the disk operating system. Then learn how to enter and edit command lines. You'll also cover the batch processor and the program debugger.

Fifteen computer exercises included on a 5 1/4" floppy disk provide an opportunity to use MS-DOS Version 1 features and commands. Use this course with an H/Z-100 Desktop, Heath/Zenith PC, an upgraded ET-100 Trainer, IBM PC or PC compatible. This course requires the MACRO-86 Assembler software. For MS-DOS version 3, the MACRO-86 Assembler program is part of CB-3163-30 Programmer's Package found on page 85. Some commands and files that are MS-DOS Version 2 and 3 specific are not covered. Pass the final exam and earn 3.0 CEUs. **EC-1121** \$59.95, ship wt 6 lbs.

\*MS-DOS is a registered trademark of Microsoft Corp.



### Create your own dazzling graphics

Written for the beginner or experienced programmer, the High Resolution Graphics course presents a broad overview of a whole new world from creation to stimulating professional careers. Draw figures. Use color. Merge text with graphics. Animate graphics. Learn how to photograph on-screen graphics using ordinary camera

equipment. Learn to control the video screen

of your H/Z-100 or Heath/Zenith PC. An IBM PC equipped with a color graphics card can also be used. Worth 6.0 CEUs. **EC-3000** \$59.95, ship wt 6 lbs.

## Software to make your computing go faster and easier

These software packages run on Heath/Zenith Personal Computers and compatibles equipped with a 5.25" disk drive and 128K RAM, and using MS-DOS Version 2 or above.



### TRUE BASIC Programming

**Language:** From the creators of the original BASIC comes a much better, more powerful TRUE BASIC. **ECT-1001** \$149.95, ship wt 4 lbs.

**Algebra II:** Use it as an instructional aid for high school algebra II. Covers systems of equations, quadratics, inequalities and more. **ECT-1002** \$49.95, ship wt 1 lb.

**Trigonometry:** Another instructional aid using radians or degrees to show trig functions, graphs, tables, solving triangles and roots of trig functions. **ECT-1003** \$49.95, ship wt 1 lb.

**TrueSTAT:** A standalone interactive statistical analysis system that stresses simulation of various distributions. Can switch between graphic and tabular outputs. **ECT-1004** \$79.95, ship wt 1 lb.

**Professor DOS:** A menu-driven tutorial that teaches common DOS applications plus basic and advanced commands. Includes using a hard disk and managing a system. **ECT-1005** \$59.95, ship wt 1 lb.

**Professor Pixel:** This excellent tutorial introduces the fundamentals of graphics and music composition using BASIC. **ECT-1006** \$59.95, ship wt 1 lb.

**LOTUS 1-2-3 Tutorial:** Learn to use the full power of 1-2-3 with this tutorial that covers more features than any other of its kind. **ECT-1007** \$69.95, ship wt 1 lb.

**dBASE III Tutorial:** Beginner or advanced user will learn from this in-depth tutorial. **ECT-1008** \$69.95, 1 lb.

## Get behind the wheel with these PC tutorials

There's only one real way to learn about your computer and the software you run in it...and that's to use them. With these tutorials that's just what you get to do. Work directly with the software and hardware you are learning about. See how a program will actually respond when you input a command, make an entry or make a mistake. **CB-5063-22** Microstat tutorial \$80.00, ship wt 2 lbs. **CD-5063-5** Condor\* III tutorial \$99.00, ship wt 1 lb. **CB-3163-36** Learning about the Heath/Zenith 150 and 200 series personal computers \$40.00, ship wt 1 lb. **CB-3163-37** MS-DOS Version 3 tutorial \$40.00, ship wt 1 lb. **RG-5063-3** Graftalk tutorial \$39.00, ship wt 1 lb.

\*Condor is a registered trademark of Condor Computer Corporation.

## Your one-stop computer shopping center

Everything you need to start computing or to build up your computer system is here. You'll find computers, software, printers, modems, video monitors, furniture, external disk storage, plug-in accessory boards and computer supplies. And you'll get your order faster by calling TOLL-FREE 800-253-7057 between 8:00 A.M. and 4:30 P.M. Eastern Time on regular business days. Alaska and Michigan residents call 616-982-3411. Charge the order to your Visa or MasterCard credit card or put it on your personal Heath Revolving Charge.

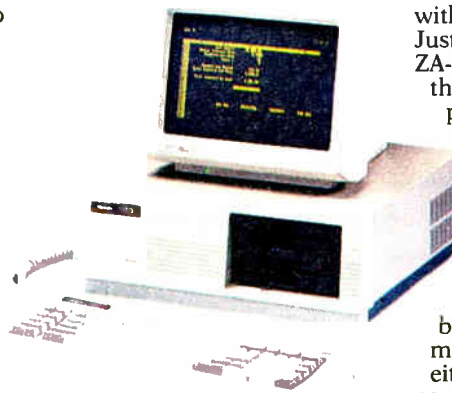
## Increased computing power made more affordable plus a FREE Partnership Pack

Choose from these two IBM PC-compatible computers. They are designed to fit your needs and your price range. Plus you get the bonus of a FREE Partnership Pack. It's worth up to \$500 and includes savings on hardware, software and more. See page 83 for details.

The first of the two computers is the HS-148 Compact Personal Computer. It is an ideal, low-cost start to computing...especially for the beginning kit builder since the computer can be quickly assembled without soldering a single connection. The HS-148 PC is also a perfect choice for business, educational and home users with everything needed to begin personal computing in a compact and space efficient cabinet. Or use it as



HS-148 Compact Personal Computer



HS-158 Expandable Personal Computer

Computers are shown with optional monitors and second disk drives

an inexpensive, intelligent workstation in a local area network. And, in a special package with the Compact Computer, we will include our "flat screen" HVM-1220-A 12"-diagonal Monochrome Monitor kit (see page 96 for monitor details).

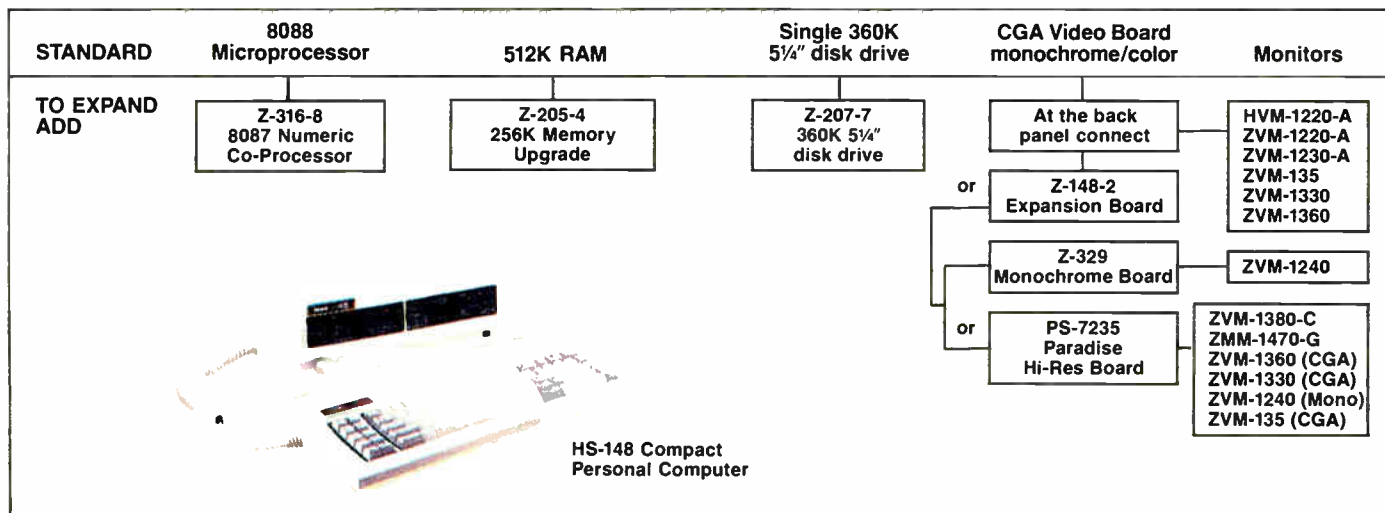
The second is the HS-158 Expandable Personal Computer. It offers all the features of the Compact PC in a kit that also requires no soldering. Plus you gain the ability to greatly expand the capabilities of the computer with numerous add-ons.

Both the Compact PC and the Expandable PC are designed around the 16-bit 8088 microprocessor, the same as used in the IBM-PC. This allows the Heathkit PCs to run 99% of all IBM-PC software. And you can run practically all of them right out of the box without any program alterations. In addition, you get switchable 8 MHz or 5 MHz operation for different running software programs.

Consult our charts at the bottom of these two pages. They'll show the standard features of the HS-148 PC and the HS-158 PC. They'll also show how to expand each one to meet your ever-changing needs. Meet your growing needs by expanding.

Almost any IBM PC accessory board can be used with the HS-148 Compact PC. Just insert it into the optional ZA-148-2 Expansion Board that plugs into the computer's main board. With the HS-158 PC you have six open IBM-compatible slots that can accept most any off-the-shelf accessory boards designed for the IBM PC.

Enjoy interest-grabbing full color graphics or monochrome displays with either the Compact or Expandable PC. Both outputs are available on each computer for you to use. Or choose higher resolution graphics for the HS-158 with







the addition of a Z-319 Video Card. Or, add an optional Z-329 Monochrome Video Card (can be installed in the HS-148 using a ZA-148-2) and get a video output compatible with the output from an IBM monochrome video card.

For communications flexibility, make use of an IBM compatible serial and a parallel port. Add a dot matrix or letter quality printer, plotter, modem or other peripheral to help you get your work done faster, easier and more effectively.

The MS-DOS operating system and a diagnostics disk are included FREE with both of these top-performing computers. Configurations:

**New! Kit HS-148-M** Compact Personal Computer with monochrome and color capability, 512K RAM, one 5¼" disk drive with 360K total storage, and includes MS-DOS and diagnostics. Also includes an HVM-1220-A Monitor *Only* \$749.00, ship wt 82 lbs.

**New! Kit HS-148-G** Compact PC with all the features of the above HS-148-M excluding the HVM-1220-A Monitor. *For Less At* \$679.00, ship wt 64 lbs.

**Kit HS-158-G** Expandable PC with monochrome and color capability, 256K RAM, one 5¼" disk drive with 360K total storage, and MS-DOS *Specially Priced At* \$889.00, 64 lbs.

**NEW! Kit HS-158-X** Expandable PC equipped with a 20MB Hard disk drive. Has standard monochrome and color capability, 256K RAM, one 5¼" disk drive with 360K total storage, and MS-DOS. *Specially Priced At* \$1299.00, ship wt 73 lbs.

Accessories:

Assembled **Z-207-7** Optional 5¼" floppy disk drive with 360K storage \$199.00, ship wt 5 lbs.

**NEW! Winchester Upgrade** for installing an optional 20MB Winchester hard disk drive into only the HS-158 Expandable PC. Kit **HWD-20** \$549.95, ship wt 5 lbs.

**NEW!** Assembled **Z-316** 8087 Numeric Co-Processor for Heath/Zenith Personal Computers operating at 4.77 MHz \$225.00, ship wt 1 lb.

Assembled **Z-316-8** 8087 Numeric Co-Processor that can be inserted into the empty socket on the CPU board of an 8 MHz Heath/Zenith Personal Computers operating at 4.77 MHz or 8 MHz \$285.00, ship wt 1 lb.

Assembled **Z-205-4** 256K Memory Chip Set expands memory capacity of HS-148 and HS-158 Personal Computers \$80.00, ship wt 1 lb.

Assembled **PS-7235 PARADISE** Hi-Res Graphics Card for HS-148 (requires ZA-148-2) and HS-158 Computers. It supplies the highest resolution possible on a standard monitor. With monochrome displays you get Hercules compatible 720 x 348 graphics. With RGB and composite displays you get Plantronics compatible graphics of 16 colors in 320 x 200 or 4 colors in 640 x 200 pixels \$299.00, 1 lb.

Assembled **ZA-148-2** Expansion Board for Heath/Zenith 148 Compact Personal Computers contains two PC compatible slots, one for a Winchester controller and the second for use with any IBM PC compatible card \$99.00, ship wt 3 lbs.

Assembled **Z-304** Optional Async Serial Port provides one sync/async port for use with terminal emulation packages *Was* \$249.00 *Now Only* \$20.00, ship wt 2 lbs.

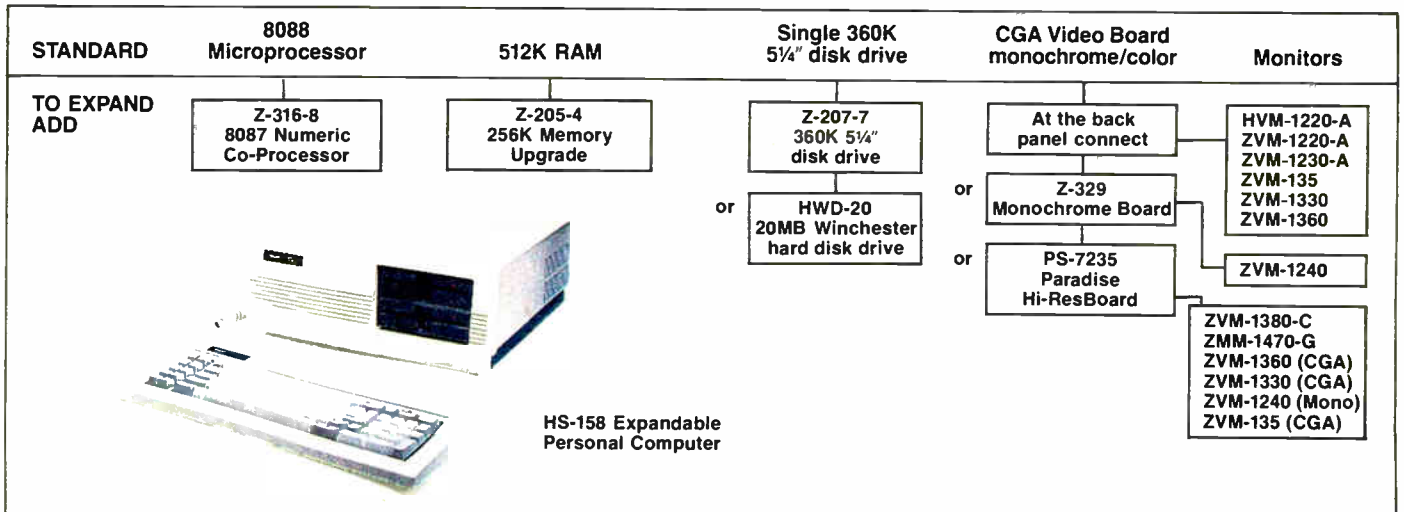
Assembled **Z-319** Bit-Mapped Video Graphics Card provides a high-resolution, 8-color, 640 x 225 pixel display (640 x 512 interlaced). Emulates video of the H/Z-100 Computer. Has red, green, blue, composite video, composite sync and separated horizontal and vertical sync. Requires MS-DOS (OS-63-41) and the MS-DOS H/Z-100 Operating System for the Heath/Zenith-150 (OS-63-32) on page 85 \$424.00, ship wt 1 lb.

**SAVER!** Get both the Z-319 Video Card and the MS-DOS Enhancement (OS-63-32) in this combination package and save over separate costs. Assembled **ZSS-100-27** \$449.00, ship wt 12 lbs.

Assembled **Z-329** Monochrome Video Card for use with HS-148 Compact (requires ZA-148-2 Expansion Board) and HS-158 Expandable PCs. It provides a high resolution video output compatible with the output from an IBM monochrome video card. Displays 25 lines of 80 characters and stores one page in 8K of RAM. Has 9-pin video, intensity, horizontal sync and vertical sync output connector. No Longer Available.

**TM-140** Technical Manual for the HS-148 and Z-138 Compact Personal Computers \$49.00, ship wt 3 lbs.

**TM-158** Technical Manual for the HS-158 Expandable Personal Computer \$25.00, ship wt 3 lbs.





HS-248 Advanced PC  
with optional video monitor  
and second disk drive

## New power for the serious computer user plus a FREE Partnership Pack

Stay ahead of the pressing demands made on your computer when it's the Heathkit Advanced Personal Computer. It's built for power with a blistering 8 MHz operating speed, extensive memory, huge data storage capacity, internal expandability and IBM PC AT compatibility. And it's an easy kit to assemble. All the circuit boards are preassembled, fully factory tested and test-run for complete reliability. Plus you get a FREE Partnership Pack with a value of \$500. See page 83 for details.

The Advanced PC is highly compatible with the IBM PC AT, so you can run

virtually all PC AT applications software as well as many programs written for the IBM PC and XT. The Advanced PC can act as a stand-alone tool or serve as the center of a powerful and expandable business system. Or this computer can efficiently serve as many as 16 PCs in a cost-effective local area network.

Based on the 80286 processor, the Advanced PC levels mountains of data to give you answers faster. It speeds through calculations using "zero wait state" technology and a lightning fast 8 MHz operating speed making it one-third faster than the PC AT. And by installing an optional Z-416 Numeric Co-Processor, many number intensive programs are accelerated even more.

Memory in the Advanced PC comes fully loaded with 512K of RAM, enough memory to handle almost any program. And for those other memory hungry programs, you can install two optional Z-445 Memory Expansion Cards for up to 3MB of RAM.

The Advanced PC has an extensive storage capacity. A 1.2 MB floppy disk drive comes as standard equipment. To this you can add an optional 360K floppy drive to easily transfer PC software. Or you can add another 1.2MB floppy drive. Or install the optional Z-417 Winchester controller card and add an internal 20MB or 40MB Winchester hard disk drive. With the optional controller card installed your Advanced PC can now handle two floppy and two Winchester disk drives for a maximum in data storage efficiency.

The Advanced PC comes without a video board so you can select from text, graphics or high-resolution video options. Choose from among our video

cards that supply a monochrome output, color display or enhanced graphics. Also, virtually any PC video card works in the Advanced PC.

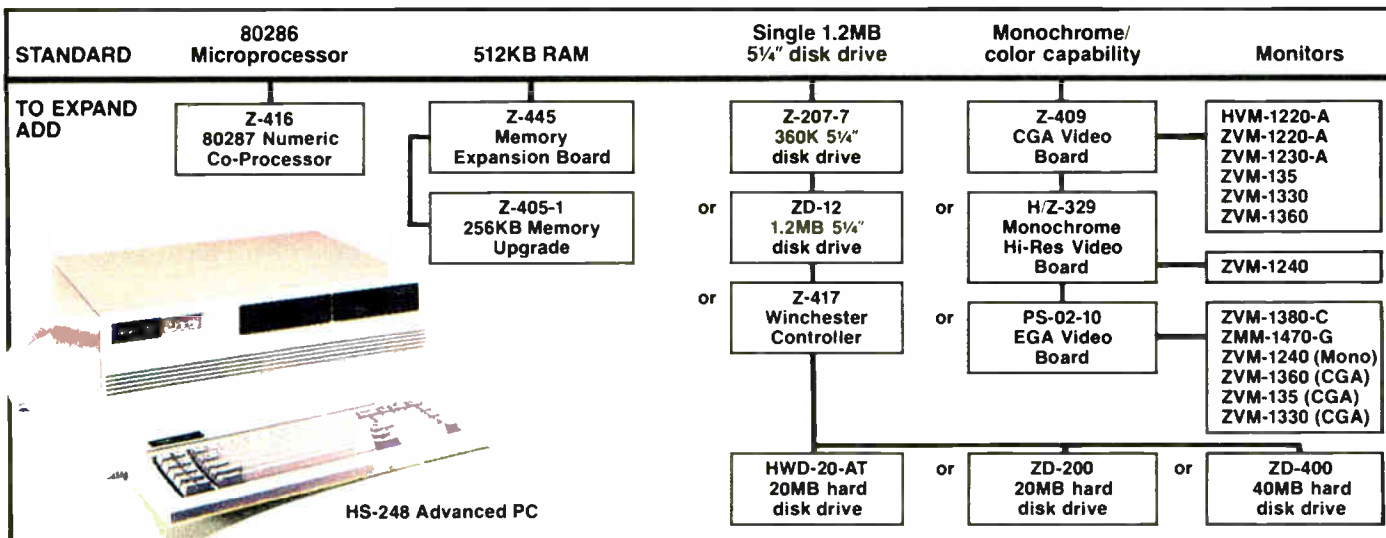
Seven open expansion slots inside the Advanced PC allow you to easily expand or upgrade this computer whenever you need. Install memory cards, modems, enhanced video display options, and multi-port serial cards to name but a few choices. Available inside are two 8-bit only slots, four 8-/16-bit slots and one Zenith video option slot.

One serial and one parallel port are also standard on this advanced expandable computer. You get a 9-pin RS-232-C male connector at the serial port and a Centronics-type 25-pin DB25 female connector at the parallel port. These two ports enable you to use a wide variety of peripheral devices, such as printers, modems, graphics pads and plotters.

The Advanced Personal Computer is powered by a 200 watt switching-type supply that provides plenty of reserve power. It can accommodate up to the maximum of ten circuit boards, two floppy disk drives and two Winchester drives. This computer operates from a switchable 120 VAC or 240 VAC.

Configurations:

**NEW! Kit HS-248-S** Advanced PC equipped with a floppy-only controller and one 5¼" 1.2MB disk drive. Requires video board. *Regularly* \$2249.00 *Special Fall Price* \$1999.00 (and also includes diagnostics disk, MS-DOS and GW-BASIC), ship wt 65 lbs.





**NEW! Kit HS-248-SW** Advanced PC with all the features of the above HS-248-S plus the Z-417 Winchester Controller and a HWD-20-AT 20MB Winchester hard disk drive \$2799.00, ship wt 73 lbs.

**Accessories:**

Assembled **Z-445** Memory Expansion Card for Heath/Zenith 200-series computers operating at 8 MHz with zero wait states. Comes with 512K RAM. The first 128K is used to expand base memory to 640K. This card can also be used to increase extended memory up to 1.0M byte using two sets of Z-405-1 256K RAM chip set \$349.00, ship wt 2 lbs. Available in November.

Assembled **Z-405-1** 256K Memory Chip Set for use with the Z-445 Memory Expansion Card \$240.00, ship wt 1 lb.

Assembled **Z-409** CGA compatible video card supports RGBI color or composite monochrome monitors, 320 x 200 in color and 640 x 200 in monochrome \$239.00, ship wt 2 lbs.

Assembled **Z-329** High-Resolution Monochrome Video Card provides a video output compatible with the output from an IBM monochrome video card. No Longer Available.

Assembled **PS-02-10** Enhanced Graphics Card is compatible with virtually all major PC graphics standards including IBM CGA,

Plantronics Extended CGA Color Mode, IBM EGA, IBM MDA and Hercules Monochrome Graphics. This card also offers automatic transparent switching between video modes without special software or manual hardware switching, 256K video memory, flicker free scrolling and an IBM compatible parallel printer port \$499.00, ship wt 2 lbs.

Assembled **Z-416** 80287 Numeric Co-Processor that can be inserted into an empty socket on the CPU board of Heathkit/Zenith 200-series computers operating at 6 or 8 MHz \$375.00, ship wt 1 lb.

Assembled **Z-207-7** Optional 5¼" high density floppy disk drive capable of storing 360K bytes of information on a single floppy disk \$199.00, ship wt 5 lbs.

Assembled **ZD-12** Optional 5¼" 1.2MB floppy disk drive with 1.2MB data storage \$250.00, ship wt 5 lbs.

**NEW!** Assembled **Z-417** Winchester Controller Card \$349.00, ship wt 1 lb.

**NEW!** Assembled **HWD-20-AT** Winchester Upgrade Kit for installing an optional 20MB 65 ms hard disk drive, cables included. Requires Z-417 Controller Card \$449.95, ship wt 4 lbs.

Assembled **ZD-200** Optional 20 MB 40 ms Winchester disk drive. Requires Z-417-1 cable (and separate

Z-417 Controller Card for floppy-only models) \$1199.00, ship wt 9 lbs.

Assembled **ZD-400** Optional 40MB 30 ms Winchester disk drive. Requires Z-417-1 cable (and separate Z-417 Controller Card for floppy-only models) \$1699.00, ship wt 9 lbs.

Assembled **Z-417-1** Winchester Cable required for the installation of the first 20MB or 40MB Winchester drive into Heath/Zenith 200-series computers \$20.00, ship wt 1 lb.

Assembled **HCA-200-PC** Serial RS-232-C Cable features a female 9-pin "D" connector to a male 25-pin "D" connector. This 6-foot cable converts the serial output connector from the Heath/Zenith 200-series computer and the IBM PC AT to the serial output connector standard of Heath/Zenith PCs and the IBM PC \$35.00, ship wt 1 lb.

**More accessory circuit boards can be found on page 89.**

## FREE Partnership Pack with every Heathkit Personal Computer

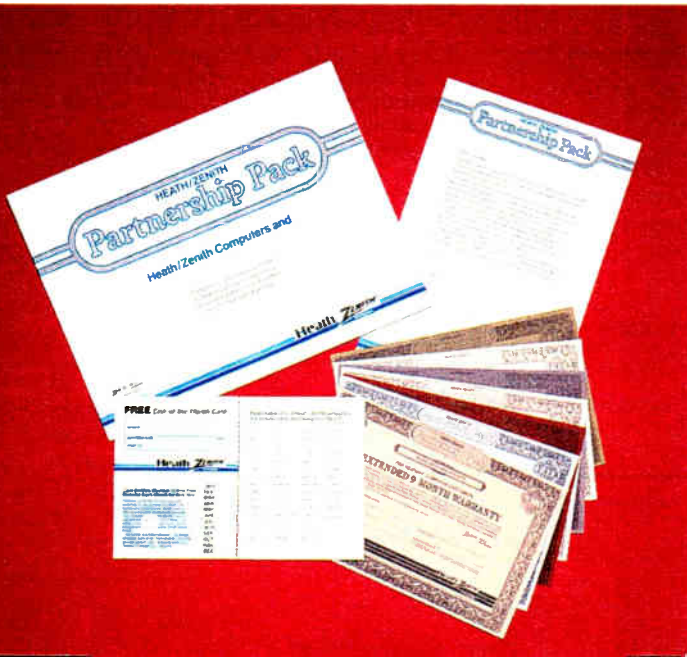
Save up to \$500, and even more, with the discounts you'll find inside a Heath/Zenith Partnership Pack. And it's yours FREE with every Heathkit Personal Computer purchase. The Pack is loaded with valuable certificates designed to help get you up and running on your new computer. And the Pack will supply you with support through your very important first year of ownership.

The Partnership Pack includes an extra 9 months of extended warranty, a free diagnostic check-up and discounts on Winchester or floppy disk drive upgrades. Inside the Pack you'll also find certificates good for discounts on software, a free software offer and free computer training software. With the options provided by these certificates your savings could total even more than \$500.

Get your own personalized Partnership Pack and become a partner with those who are dedicated to bringing you quality products, service and support. See page 3 for more information about the super savings available in this package to make your computing more productive and rewarding.



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





## Winchester drive in Zenith full-featured portable computer

Zenith Data Systems now adds Winchester data storage capability to its popular Portable Personal Computer. With an internal 3½" hard disk drive, the Z-183 puts 10 megabytes of on-line data storage at your disposal in addition to its other desktop-like functions. More than ever, the Z-183 is capable of satisfying your portable computer needs.

This IBM compatible laptop offers a full 640KB RAM, switchable 4.77 and 8 MHz operation, large capacity 720KB pop-up 3½" disk drive, serial and parallel port, and a user-friendly full-function keyboard. Plus the Z-183 boasts a large 25 line by 80 character screen that's perhaps the most advanced screen available in a portable. Display images are crisp, bold and bright.

The Winchester equipped Z-183 measures 13½" wide by 11⅝" deep. The screen can be tilted throughout a 150-degree range. When closed, the Z-183 is 3⅝" thick. Assembled **ZWL-183-92** \$3499.00, ship wt 18 lbs.

Accessories: Assembled **ZA-180-40** Optional 4 amp/hr "D" cell battery \$129.00, ship wt 1 lb. Assembled **ZA-180-45** Optional 2.5 amp/hr "D" cell battery \$119.00, ship wt 1 lb.



## Improved Z-181 Portable Personal Computer

To the advanced Z-181 Portable PC, Zenith Data Systems is adding a switchable 4.77 and 8 MHz system clock and an external bus connection for an optional 3½" 20 MB Winchester hard disk drive. These new enhancements plus the full desktop features of the Z-181 make it a truly superior laptop.

Other outstanding features include a standard 640K memory, IBM PC/XT compatibility, two 3½" pop-up disk drives with 720K storage per diskette, a serial and a parallel port, and a professional keyboard. All this in a compact package weighing less than 12 pounds. Plus it has a built-in backlit display that earned the Z-181 an Award for Technical Excellence from *PC Magazine*.

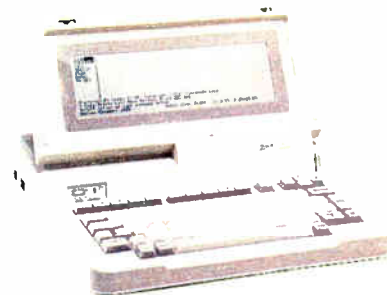
Measures 3⅝" H x 13½" W x 11⅝" D. Assembled **ZFL-181-93** \$2399.00, 18 lbs.

Accessories: **ZA-180-20** External 20MB Winchester hard disk drive in separate case with 120/240 VAC power supply (requires HCA-78 cable) \$1299.00, ship wt 12 lbs. **ZA-180-21** Optional 12.5 volt 2 amp/hr battery \$99.00, ship wt 2 lbs. **ZA-181-4** 240 VAC Adapter \$69.00, ship wt 1 lb. **HCA-78** Winchester to Z-181 interconnecting data cable (4 ft.) \$99.00, ship wt 1 lb.

## More accessories for both Z-181 and Z-183 Computers

**ZA-180-35** External battery recharger \$29.00, ship wt 1 lb.  
**ZA-181-12** External battery recharger only for ZFL-181-92 \$29.00, ship wt 1 lb.  
**ZA-181-5** 1200 baud internal modem \$399.00, ship wt 2 lbs.  
**ZA-181-6\*** 2400 baud internal modem \$549.00, ship wt 2 lbs.  
**ZA-181-7** Auto cigarette lighter power adapter \$19.00, ship wt 1 lb.  
**ZA-181-8** External 5¼" disk drive (requires HCA-77 cable; ZF-181-92 requires HCA-76) \$399.00, ship wt 12 lbs.  
**ZA-181-9** Monochrome video cable \$19.00, ship wt 1 lb.  
**ZA-181-17** Universal padded laptop computer carrying case \$59.00, ship wt 3 lbs.  
**HCA-77** External floppy disk drive data cable (4 ft.) \$49.00, ship wt 1 lb.  
**HCA-76** Cable only for ZFL-181-92 external disk drives \$19.00, ship wt 1 lb.

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



## \$600 in savings plus six great built-in Microsoft programs

With the Zenith Data Systems ZP-150 Laptop Computer you save three ways. You get \$300 off the computer's regular price and you get \$100.00 worth of accessories FREE, one RAM Module and the Printer cable are included. Plus you also get a certificate good for \$200 off any future purchase. That's a total savings of \$600 on a powerful laptop computer that can go anywhere and do sales forecasts, school work, budgeting, pricing and more.

Access six built-in programs from Microsoft's WORKS ROM. On the LCD screen create documents, do spreadsheets, write BASIC programs, record appointments, work with data bases or use it as a terminal. (HAMS... the ZP-150 makes a great and inexpensive remote terminal for your shack.) And you can call up an alarm, a calculator and a telephone dialer from within any of these six programs. A Systems Manager (much easier to use than a DOS) allows you to run the six programs, exchange information between programs and manage files.

The ZP-150 comes equipped with an easily readable LCD display that can be tilted and the intensity adjusted for optimum viewing. The Laptop weighs less than eight pounds and is small enough to fit in most standard size briefcases. The ZP-150 uses ten "AA" batteries (not included) when not using AC.

And the File Transfer software (below) is included FREE. When ordering your Laptop, remember your FREE accessories and include ZP-150-2 and ZP-150-4 on the order form and write "No Charge" in the price column. Assembled **ZP-150 Regularly** \$999.00 **Now** \$699.00, ship wt 22 lbs.

Accessories: **ZP-150-2** 32K RAM module \$79.00, ship wt 1 lb. **ZP-150-4** Parallel to Centronics printer adapter cable \$19.00, ship wt 1 lb. **CB-5063-27** Software for transferring files from the ZP-150 to other MS-DOS computers \$49.00, ship wt 3 lbs.





\*Look for these new products.

	Heath/Zenith Personal Computers and Portable PCs			H/Z-100 Advanced Desktop Computer		
	Model Number	Ship Wt (lbs.)	Price (\$)	Model Number	Ship Wt (lbs.)	Price (\$)
<b>OPERATING SYSTEMS</b>						
CP/M-86* (5)				<b>OS-63-2</b>	3	99.00
MS-DOS H-100 Op. Sys. for H-150 (5,12,18)	<b>OS-63-32</b>	1	150.00	<b>OS-63-30</b>	5	150.00
MS-DOS Vers. 3 (2,5)				<b>CB-3163-30</b>	5	225.00
*MS-DOS Vers. 3.2 (2,5)	<b>OS-63-41</b>	3	149.00	<b>MS-3063-30</b>	3	99.00
MS-DOS Vers. 3 Programmer's Package (2,6,7)	<b>CB-3163-30</b>	5	225.00			
*MS-DOS Vers. 3.2 for Z-181 (Win.)	<b>OS-63-43</b>	4	149.00			
Microsoft Windows* (3,6,7)	<b>MS-5063-30</b>	3	99.00			
PolyWindows Desk Plus (1,6,7)	<b>PT-5063-1</b>	3	49.00			
XENIX*	<b>OS-63-70</b>	5	429.00			
XENIX Development System (24)	<b>OS-63-71</b>	5	499.00			
*XENIX Systems 3 Text Processor	<b>OS-63-72</b>	4	149.00			
*XENIX Systems 5 Time Share System	<b>OS-63-80</b>	3	429.00			
*XENIX Systems 5 Development System	<b>OS-63-81</b>	3	499.00			
*XENIX Systems 5 Text Processor	<b>OS-63-82</b>	3	149.00			
<b>WORD PROCESSING</b>						
Multimate* (3,6,7)	<b>SS-5063-1</b>	3	495.00			
PeachText 5000* (1,6,7)	<b>RS-463-75</b>	3	295.00	<b>RS-463-75</b>	3	295.00
Word Version 3 (1,5,7)	<b>MS-5063-29</b>	3	450.00			
WordStar Professional* (2,5,7)	<b>MP-5063-13</b>	3	399.00	<b>MP-463-17</b>	4	399.00
<b>SPREADSHEETS</b>						
LOTUS 1-2-3 Release 2 (2,6,7,16)	<b>LS-5063-2</b>	5	495.00			
LOTUS 1-2-3 (2,6,7)				<b>LS-463-1</b>	4	299.00
Multiplan (1,5,7)	<b>MS-5063-17</b>	2	195.00	<b>MS-5063-17</b>	2	195.00
SuperCalc* (5,7)				<b>SC-463-1</b>	4	195.00
SuperCalc 3 (1,6,7)	<b>SC-5063-4</b>	3	395.00			
<b>DATA BASE MANAGEMENT SYSTEMS</b>						
R:BASE 5000 (3,5,7)	<b>MR-5063-1</b>	6	695.00			
R:BASE 5000 Interface (3,5,7)	<b>MR-5063-2</b>	3	395.00			
Condor rDBMS* (1,5,7)	<b>CD-5063-3</b>	5	650.00	<b>CD-5063-3</b>	5	650.00
dBASE II* (1,5,7)	<b>AT-5065-2</b>	3	495.00	<b>AT-5065-2</b>	3	495.00
dBASE III Plus(3,6,7)	<b>AT-5063-5</b>	11	695.00			

**Minimum Computer Hardware and Software Requirements:**

- |                                |   |
|--------------------------------|---|
| (1) 128K RAM                   | (16) Not available by mail order. Visit your nearest Heath/Zenith Computers & Electronics Center. |
| (2) 192K RAM                   | (18) For H-100 mode operation   |
| (3) 256K RAM                   | (19) H/Z-200 Computers only.  |
| (5) One 5 1/4" disk drive      | (22) 1.2 MB floppy and 20 MB Winchester Drive.  |
| (6) Two 5 1/4" disk drives     | (23) 512K RAM   |
| (7) MS-DOS Operating System    | (24) XENIX Operating System   |
| (11) Z-204 Multiport I/O Card  |   |
| (12) Z-319 Video Graphics Card |   |

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★Look for these new products

	Heath/Zenith Personal Computers and Portable PCs			H/Z-100 Advanced Desktop Computer		
	Model Number	Ship Wt (lbs.)	Price (\$)	Model Number	Ship Wt (lbs.)	Price (\$)
<b>COMMUNICATIONS AND TERMINAL EMULATION</b> CPS-150 (1,5,7) CPS-86 (1,5,7) ★HYPERACCESS (See page 89) ★VIP-7705W Emulator (3,5,7,17) ★3278/79 Standard Coax Connector (1,5,7) ★MBridge Emulator (1,5,7,17) 3270 Emulator (2,6,7,17) 3780 Emulator (2,6,7,17) ZSTEM-VT100 Emulator (1,5,7) ★Z-181 Interface software to PCs (25) ★Z-181 Interface plus 9 pin/25 pin null modem cable (25) ★Z-181 Interface + 25 pin/25 pin null modem cable (25)	CB-5063-7	3	49.00	CB-463-7	3	40.00
	PM-160	3	149.00	PM-162	3	149.95
	CC-5063-2	2	795.00			
	CX-5063-1	3	895.00			
	MB-5065-1	1	295.00			
	PO-5063-1	2	499.00			
	PO-5063-2	3	499.00			
	KE-5063-2	2	149.00	KE-463-1	3	149.00
	CB-5063-37	1	79.00			
	CBG-5063-1	2	99.00			
	CBG-5063-2	2	99.00			
	<b>COMPUTER AIDED INSTRUCTION</b> Z-Tap Typing Tutor (3,5,7) Teach-N-Tutor (3,5,7)	CB-5063-32	3	79.00		
CB-5063-33		3	199.00			
<b>DIAGNOSTICS</b> Disk-Based Computer Tests (1,5) Personal Computer Diagnostics (1,5) Z-200 PC Diagnostics (3,5) Z-181 Diagnostics (25)	CB-4164-28	3	79.00	CB-463-13	4	79.00
	CB-4164-40	3	79.00			
	CB-3163-38	1	79.00			
<b>DIRECTORIES</b> ★XENIX Applications Software (3rd Party)	CB-7063-1	1	14.95			

## Your own private tutor for AutoCAD

Learn to use the full-sized industrial CAD system, AutoCAD, in your own spare time and at your own pace. This easy-to-use tutorial is an ideal learning tool that introduces you to and guides you in the use of high-performance computer-aided drafting. You'll learn the commands necessary to produce drawings accurately and quickly like points, lines, arcs, circles, text, panning, zooming, layering, blocks and arrays.

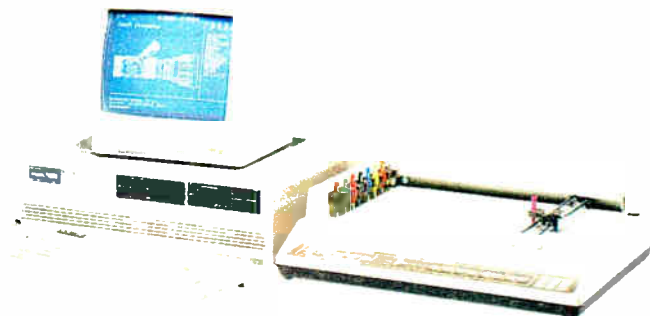
Also covered are plotters and digitizers to acquaint you with the wide range of input and output devices that can be used with this drafting system. Even the advanced features of AutoCAD are examined for a fuller knowledge of this broad subject. This package includes a floppy disk containing hands-on experiments with CAD.

Computers used with either of the following listed tutorials require a minimum of 256K RAM, two 5¼" disk drives, color CGA or Hercules video capability and MS-DOS. A digitizer and plotter are optional.

Configurations:

**EBS-609** AutoCAD Tutorial for use with Heath/Zenith 100-series computers \$59.95, ship wt 3 lbs.

**EBS-609-PC** AutoCAD Tutorial for use with Heath/Zenith Personal Computers \$59.95, ship wt 3 lbs.







★Look for these new products

	Heath/Zenith Personal Computers and Portable PCs			H/Z-100 Advanced Desktop Computer		
	Model Number	Ship Wt (lbs.)	Price (\$)	Model Number	Ship Wt (lbs.)	Price (\$)
<b>GRAPHICS</b> Microsoft Write/Paint (3,6,7,26) Painter's Apprentice (2,5,7,27) GrafTalk (1,6,7) 4-Point Graphics (4,6,7)	<b>MS-5163-30</b>	2	49.00	<b>CB-463-25</b>	1	79.00
	<b>RG-5063-2</b>	3	499.00	<b>RG-463-2</b>	3	479.00
	<b>IM-5063-1</b>	3	195.00			
<b>PROGRAMMING LANGUAGES</b> ★EGA GW* BASIC Interpreter Vers. 3 (2,5,7) ★EGA GW BASIC Compiler Vers. 3 (2,5,7) COBOL (1,6,7) C86 C Language Compiler (2,6,7) FORTRAN (2,6,7) GW-BASIC 2 (5,7) GW-BASIC 2 (5,7) MS BASIC-86 Pascal (2,6,7) Z-BASIC Compiler (5,7)	<b>MS-4164-11</b>	4	99.00	<b>MS-5063-3</b>	3	395.00
	<b>MS-4164-14</b>	3	250.00			
	<b>MS-5063-3</b>	3	395.00			
	<b>CI-5063-2</b>	2	395.00	<b>MS-5063-2</b>	3	195.00
	<b>MS-5063-2</b>	3	195.00			
	<b>MS-5063-13</b>	3	49.00	<b>MS-5163-13</b>	3	100.00
	<b>MS-5163-13</b> (12,13,18)	3	100.00	<b>MS-463-1</b>	5	175.00
	<b>MS-5063-5</b>	3	295.00	<b>MS-5063-5</b>	3	295.00
				<b>MS-463-4</b>	3	250.00
<b>SORTING</b> Sort (1,6,7)	<b>MS-5063-12</b>	1	199.00	<b>MS-5063-12</b>	1	199.00
<b>STATISTICAL ANALYSIS</b> Microstat (1,6,7)	<b>ES-5063-1</b>	3	249.00	<b>ES-5063-1</b>	3	249.00

**Minimum Computer Hardware and Software Requirements:**

- |                        |                                   |                                    |                           |
|------------------------|-----------------------------------|------------------------------------|---------------------------|
| (1) 128K RAM           | (6) Two 5¼" disk drives           | (13) MS-DOS Enhancement Op. Sys.   | (20) Accesses 64K of RAM  |
| (2) 192K RAM           | (7) MS-DOS Operating System       | (15) Version 2.5 Monitor ROM and a | (25) MS-DOS for the Z-181 |
| (3) 256K RAM           | (9) GW-BASIC Programming Language | Z-205 Memory Card                  | (26) Microsoft Windows    |
| (4) 320K RAM           | (11) Z-204 Multiport I/O Card     | (17) Z-304 Synchronous Serial Port | (27) Microsoft Mouse      |
| (5) One 5¼" disk drive | (12) Z-319 Video Graphics Card    | (18) For H-100 Mode Operation      |                           |

\*GW is a registered trademark of Microsoft Corporation.

**Affordable CAD from the makers of AutoCAD**

AUTOSKETCH – from Autodesk Inc. brings the power of full-function computer-aided design software into the price range of shoe-string budgets. AutoSketch runs on Heath/Zenith and IBM PCs equipped with a minimum of 512K RAM, two 5¼" floppy disk drives, and CGA and Hercules video capability. **EC-1310-PC** AutoSketch for Heath/Zenith PCs \$79.95, ship wt 2 lbs.

And for those requiring the power of a large-scale CAD program we have AutoCAD, also available with 3D modeling. Configurations:

**EC-1305** Basic AutoCAD for the H/Z-100 Computer \$300.00, ship wt 3 lbs.

**EC-1305-PC** Basic AutoCAD for Heath/Zenith PCs \$300.00, ship wt 3 lbs.

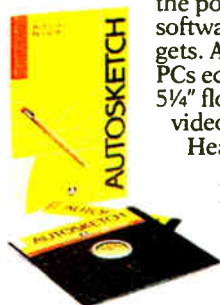
**EC-1308-PC** AutoCAD with ADE-1 and ADE-2 plus ADE-3 3D enhancements for use with H/Z PCs \$2500.00, ship wt 7 lbs.

**NEW! EC-1311-PC** AutoCAD Version 2.6 for H/Z Personal Computers equipped with a numeric co-processor, 640K RAM and a Winchester hard disk drive \$2850.00, ship wt 1 lb.

Accessories:

Assembled **DMP-29** Graphics Plotter from Houston Instruments handles drawings with a ± 0.2% accuracy up to 11" x 17" (ANSI size B) in 8 colors at adjustable pen speeds up to 22.6"/second \$2295.00, ship wt 32 lbs.

**DMP-29-2** Set of acetate pens for transparencies \$59.00, ship wt 1 lb.



## EPSON and Heath – joining together to answer all your computer system needs

Look to Heath for a solution to any printing problem. We will solve it with an Epson printer, the #1 choice among businesses and computer enthusiasts.

Epson makes any size printing job easier and more efficient with printers that cover a wide range of tasks. There are printers that offer high-speed dot matrix versatility to tackle numerous printing jobs. For proposals, presentations and business letters, there's sophisticated letter quality printing. And there are printers that handle wide ledger paper for financial report spreadsheets. Epson printers can draw some very convincing pictures too, including true circles.

These printers are loaded with features. You can plug an Epson into virtually any microcomputer made and be printing right away. All Epson printers have bidirectional printing using their famous disposable logic seeking printhead. All have a parallel interface for connecting to a personal computer and most have a 2K print buffer. And all Epson printers feature a Quiet Mode for less noise in your home or office.

Epson printers are well known for their versatility, reliability, performance and value...plus you get a one year warranty.

**For the latest prices call TOLL-FREE 800-253-7057 from 8:00 A.M. to 4:30 P.M. E.T. Monday through Friday. Alaska and Michigan residents call: 616-982-3411.**

### Dot matrix printing of letters or spreadsheets

This 136-column printer is ideal for printing spreadsheets and financial reports. It features fast, efficient printing at 180 cps in the draft mode and 60 cps in the letter quality mode. This printer also can turn out sharp, finely defined graphics. Has built-in serial and parallel interfaces making it easy to use with virtually all business and personal computer systems. A 7K internal buffer stores up to four pages of data at a time and allows you to use your computer while printing continues. 3 $\frac{7}{8}$ " H x 23 $\frac{1}{2}$ " W x 13 $\frac{1}{4}$ " D. Assembled **PP-243** Epson LQ-1000, ship wt 24 lbs.

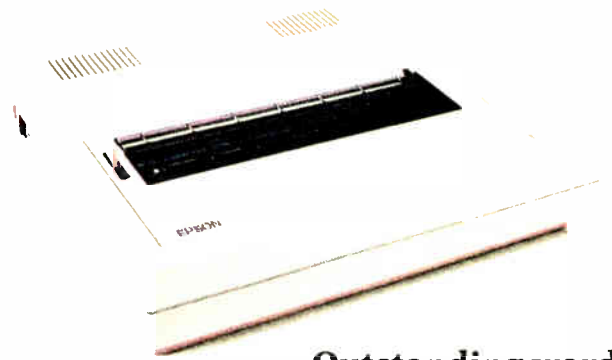
Accessories: **PPA-243-1** Replacement ribbon, ship wt 1 lb.  
**PPA-243-2** Tractor feed, ship wt 4 lbs.



### An ideal office addition

In this FX-86-E printer you'll find many features normally found exclusively on costly 24-pin printers. Do fast draft printing at 240 characters per second in draft elite or 200 cps in draft pica. Then switch to Near Letter Quality Roman or Sans Serif fonts for letter perfect documents at 40 cps. Has graphics capability and a parallel interface. Accepts single-sheet paper up to 8 $\frac{1}{2}$ " wide and continuous feed paper up to 10" 5 $\frac{5}{8}$ " H x 16 $\frac{1}{2}$ " W x 13" D. Assembled **PP-86-E** Epson FX-86-E, ship wt 23 lbs.

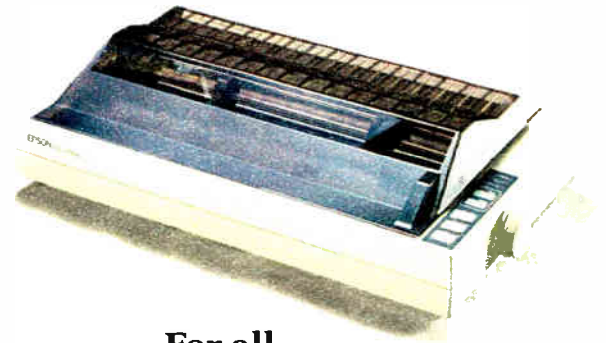
Accessories: **PPA-225-1** Replacement Ribbon, ship wt 1 lb.



### Outstanding word processing dot matrix printer

For efficient letter printing and superb print quality, the LQ-800 printer delivers. A 24-pin printhead with a smaller wire diameter allows a higher resolution character which means elegant printing for you. This 80-column printer prints bidirectionally at 180 characters per second in the draft mode and 60 cps in letter quality. Also has a graphics mode, built-in serial and parallel interface, 7K buffer and built-in fonts. 3 $\frac{7}{8}$ " H x 16 $\frac{1}{2}$ " W x 13 $\frac{1}{4}$ " D. Assembled **PP-246** Epson LQ-800, ship wt 16 lbs.

Accessories: **PPA-246-1** Replacement ribbon, ship wt 1 lb.  
**PPA-246-2** Tractor feed, ship wt 3 lbs.



### For all your office jobs

The FX-286-E Printer will take care of all your printing needs. Get your drafts out quicker with 240 character per second printing in draft elite or 200 cps in draft pica. Then, for those letter perfect documents, switch to Near Letter Quality Roman or Sans Serif fonts to print out at 40 cps. And for spreadsheets, use the wide carriage that handles single-sheet or continuous feed paper up to 16" wide. The FX-286-E also features printing of startling graphics. This printer comes equipped with a parallel interface. 5 $\frac{5}{8}$ " H x 21 $\frac{3}{8}$ " W x 13 $\frac{1}{2}$ " D. Assembled **PP-286-E** Epson FX-286-E, ship wt 31 lbs.

Accessories: **PPA-230-1** Replacement Ribbon, ship wt 2 lbs.





## Epson's top-of-the-line dot matrix printer

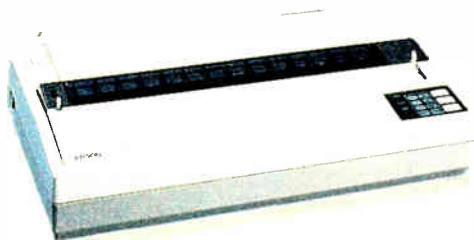
Super high-speed printing and versatility mark this 136-column wide business printer. Get a very fast 324 or ultra-fast 405 character per second draft mode printing, 108 cps in the letter quality mode, and an IBM-style graphics character set. Built-in are five fonts that can be selected at the press of a button. A 20-character LCD display shows print modes and settings while four memory cells store different printing selections. Has built-in 8K buffer and serial and parallel interfaces. 5 $\frac{5}{8}$ " H x 23 $\frac{1}{4}$ " W x 14 $\frac{3}{4}$ " D. Assembled **PP-262** Epson LQ-2500, ship wt 32 lbs.

Accessories: **PR-120** Replacement ribbon, ship wt 1 lb.

## For your word processing needs

This high-speed printer will help you master those sizable document printing jobs with flair. Choose 300 character per second draft mode printing or 60 cps near letter quality printing. Plus, you get superb graphics with excellent resolution. And customize your documents on this 80-column wide printer using eight different typestyles. Also features an 8K buffer, serial and parallel interfaces, and a built-in Push-Feed Tractor that helps save paper. 4 $\frac{7}{8}$ " H x 17 $\frac{5}{8}$ " W x 14 $\frac{7}{8}$ " D. Assembled **PP-256** Epson EX-800, ship wt 26 lbs.

Accessories: **PR-100** Replacement ribbon, ship wt 1 lb.



## High-speed business printer

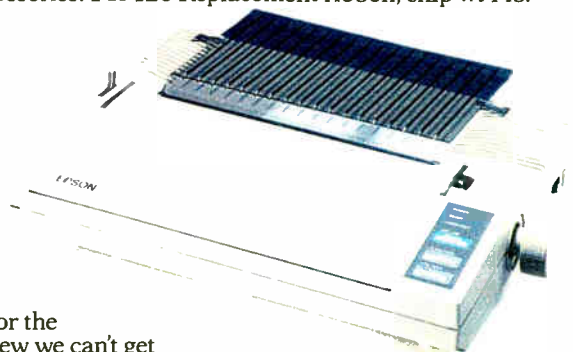
A top choice with fast 300 character per second draft and 60 cps near letter quality printing. It has a 136-column carriage for handling fan-fold and ledger paper up to 16 inches wide. Even create customized documents using IBM Graphics characters and eight different typestyles. Other features include an 8K buffer, standard serial and parallel interfaces, and an automatic sheet load function with a built-in bidirectional push feed tractor. 4 $\frac{7}{8}$ " H x 23 $\frac{3}{8}$ " W x 15 $\frac{3}{8}$ " D. Assembled **PP-253** Epson EX-1000, 34 lbs.

Accessories: **PR-100** Replacement ribbon, ship wt 1 lb.

## New addition to fine Epson printer line

The LX-800 replacement for the LX-86 printer (pictured) is so new we can't get a picture of it for you. But we can tell you about this quality printer. The LX-800 adds increased printing speed of 150 characters per second in the draft mode and 25 cps Near Letter Quality printing. Plus this printer has a built-in tractor feed. The LX-800 still retains all the features of the LX-86 such as a built-in graphics mode, a 1K buffer, several typestyles at the press of a button and a built-in parallel interface. Assembled **PP-222** Epson LX-800 (not pictured), ship wt 15 lbs.

Accessories: **PPA-225-1** Replacement ribbon, ship wt 1 lb.



## Quality printer paper

Premium 8 $\frac{1}{2}$ " x 11" blank paper. It is an ideal letter-quality word processing paper for all business correspondence and upper management reports. A continuous 2700 sheets of one-part fan-fold paper. **HCS-1** \$32.00, ship wt 28 lbs.

Standard 8 $\frac{1}{2}$ " x 11" paper for letter writing and general usage. Comes in a continuous 3200 sheets of one-part fan-

fold paper. **HCS-2** \$32.00, ship wt 31 lbs.

Standard 14 $\frac{7}{8}$ " x 11" extra wide paper provides room for your spread sheets. This one-part fan-fold paper comes in a continuous 3200 sheets. **HCS-3** \$42.00, ship wt 47 lbs.

Bond form-feed 8 $\frac{1}{2}$ " x 11" blank paper. A continuous 1000 sheets of one-part fan-fold paper for your most important correspondence. **HCS-4** \$25.00, ship wt 13 lbs.



## Printer buffer prevents wasted computer time

The Heathkit Printer Buffer lets you use your computer instead of waiting around until a document is finished printing. No more wasted computer time while large spreadsheets or long word-processing documents are being printed. The Printer Buffer can accept data as fast as your computer can send it with serial baud rates up to 38.4K and parallel rates to 100,000 CPS. The Buffer then stores the data in 64K of memory, that's equal to 21 typewritten pages. And memory can be expanded to 512K or 170 typewritten pages. After your files are stored they are sent to the printer while you're back at the computer getting other work done.

The Printer Buffer has *both* serial *and* parallel inputs *and* outputs which allow you to connect more than one computer and printer. This amazing accessory lets you accept files from both computers and then send them to separate printers at the same time. Or files can be sent to either printer. A priority print function permits you to interrupt printing, print out a priority document and then reprint the interrupted document. To add to its versatility, you can even print up to 99 copies of a file.

The Printer Buffer even checks its own memory through a self-diagnostic program every time you turn it on. And to make sure you don't overload memory, a front panel display shows the remaining amount of free memory.

Once you use the Printer Buffer you'll wonder how you ever did without it. And it only takes two evenings to assemble. The Buffer has dimensions of 1½" H x 9¼" W x 7½" D. Order yours today and stop wasting time because you're waiting on your printer. Kit **SK-203** \$199.95, ship wt 5 lbs.

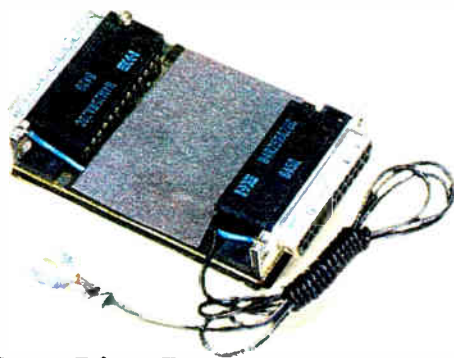
Accessories: **HCA-85** A 9-pin to 9-pin serial I/O cable for use with AT-compatible computers \$20.00, ship wt 1 lb.



## Instantly measure baud rates with compact analyzer

Here is an ideal test instrument for anyone involved in installing, testing or repairing computer systems. The unique Baud Rate Analyzer goes between a computer and any RS-232C serial device and measures the data transmission rate. Once it's connected in-line you can verify baud rates and switch settings.

The Analyzer has a direct-reading display ranging from 300 baud to 38.4K baud and connects in-line with a combination 25-pin male/female connector. Has selectable pin 2 or pin 3 test configuration. Requires a 9V transistor battery (not included). 1⅝" H x 6" W x 3⅝" D. Kit **SK-205** \$49.95, ship wt 3 lbs.



## Data Line Protector

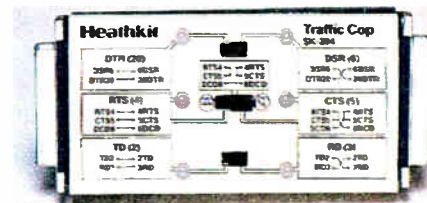
An easy beginner kit with computer applications. Connect it in-line between your computer and peripherals to prevent damage from voltage spikes, transient voltages and static charge buildups. Take just one evening to build a RS-232C project that protects interconnecting peripheral lines 2 through 8 and 20 from static charges up to 15,000 volts with a power dissipation of 500 mW.

Includes two DB-25 connectors, one male and one female, and has no effect on line signals. ¾" H x 3½" L x 2⅝" D. Kit **SK-202** \$14.95, ship wt 1 lb.



## Safeguard equipment

Stop worrying about damage to modems or other telephone equipment caused by voltage spikes, transient surges or static charge buildups. This one-evening kit uses MOVs to protect *both* the green/red and yellow/black telephone wire pairs from voltage transients up to 15,000 volts and current peaks up to 10,000 amps. It uses an RJ-11 connector so it may be used on all standard telephone lines. 1⅝" H x 2⅞" W x 4" D. Kit **SK-201** \$14.95, ship wt 1 lb.



## Use this traffic cop to direct your data

The Heathkit Traffic Cop helps you guide data to its proper destination. Connect it between a computer and a peripheral to help identify the correct cable wiring. Three slide switches provide twelve different switching combinations. Six LED indicators quickly show when proper interfacing is achieved between computer and peripheral. After determining the right wiring configuration replace the Traffic Cop with an exact cable.

The Traffic Cop uses two 25-pin RS-232 connectors, one male and one female, for easy installation. It monitors data lines 2, 3, 4, 5, 6 and 20. All power is derived from the lines. ⅞" H x 4¾" L x 2⅝" D. Kit **SK-204** \$39.95, ship wt 2 lbs.



## Know at a glance what your AC line is doing

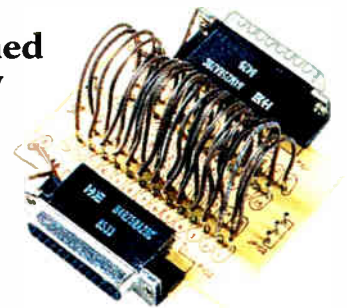
Keep track of an important part of any system – the AC power line. When you have voltage sensitive equipment like computers, communications gear, medical apparatus and others, you must be alerted to anything that could influence their operation. And the Heathkit AC Monitor will do it for you inexpensively. Eight LED indicators show the AC line voltage from 95 to 130 VAC in 5 volt steps. A separate fault LED lights if the AC voltage falls below 90 VAC and a separate spike LED lights if a voltage transient occurs. 3 $\frac{3}{8}$ " H x 2 $\frac{3}{8}$ " W x 1 $\frac{1}{4}$ " D. Kit **SK-211** \$39.95, ship wt 1 lb.



## Connect mismatched equipment quickly and easily

Linkup a new printer to your computer system, or mate any standard RS-232 hardware without being thwarted by the annoying problem of differently wired cables. Just plug your mismatched equipment into this Patch Board test instrument to determine the correct wiring configuration for interconnecting the two devices. After establishing the proper wiring a permanent cable can be made.

The Patch Board allows access to all 25 lines of the interfacing circuitry. The board consists of one male and one female 25-pin "D" plug connector. Separate 2- and 3-pin common pads allow you to tie several lines together. The Patch Board is an easy one-evening kit. Kit **SK-210** \$14.95, ship wt 1 lb.



## Save time and money by sharing

Eliminate the bothersome unplugging and replugging in of peripherals. Also save on the cost of expensive expansion ports. Just add this Switch Box kit to your computer system and with the press of a button you can instantly alternate between two RS-232 devices without touching a cable.

In less than one evening you can put together an inexpensive solution to major hardware expense problems. Features three EIA RS-232C compatible DB-25 female connectors. Cabinet has dimensions of 1 $\frac{1}{4}$ " H x 6 $\frac{7}{8}$ " W x 5 $\frac{5}{8}$ " D. Eliminate expensive duplicate equipment with this low-cost way to interconnect peripherals and computers. Kit **PMK-121** \$49.95, ship wt 3 lbs.



## Control your computer and peripherals from one convenient power director

Add convenience and protection to your computer system with the Heathkit AC Conductor. Simply plug the AC line cords of your computer equipment into the Conductor and control the AC power to each from the Conductor's front panel. This handy addition means no more groping for power switches hidden behind widely spaced computer system components.

And more importantly, the AC Conductor filters the AC line voltage and shields your equipment against power line spikes with a protective MOV device. The Conductor also protects against excessive loads with a 15-amp fused line.

The AC Conductor controls up to five individual devices: computer, monitor, printer and two auxiliary peripherals. Or it can control any other five devices. A flip of the master switch and all five components turn on. Or each one can be turned on individually. Separate LEDs show you what's on and what's not.

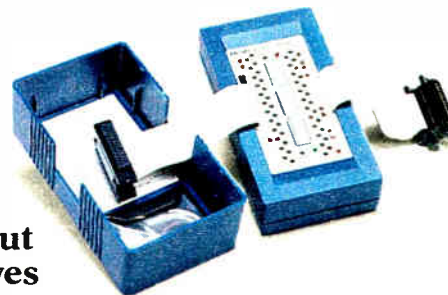
A unique feature of the AC Conductor is its turntable base. Place your monitor on the Conductor and then rotate for easier monitor viewing. And, by tucking the Conductor between your computer and monitor, you gain convenience and protection without losing precious desk space.

The AC Conductor easily assembles in one evening. It has dimensions of 1 $\frac{3}{4}$ " H x 13 $\frac{1}{2}$ " W x 14" D. Order today and get convenience plus protection for your computer system. Kit **SK-209** \$49.95, ship wt 11 lbs.



## Breakout Box saves you time

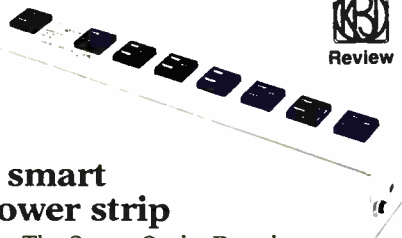
In one evening build a valuable timesaver...the Heathkit Breakout Box. It provides access to all 25 lines of RS-232C cables linking computer system devices. Twelve LEDs monitor key signal lines while 23 lines can be switch disabled and then cross-connected. Five jumper wires are included. Built-in dual DTE and DCE gender connectors eliminate the need for adapter cables and connectors. Two "AA" batteries power the line monitoring LEDs but they are not needed for the Breakout Box to operate. 1 $\frac{3}{8}$ " H x 2 $\frac{1}{8}$ " W x 6" D. Kit **PMK-130** \$79.95, ship wt 2 lbs.



## Computer peripherals, accessories and supplies

Providing you with high quality kit and assembled products is important to us. That's why we carefully select every peripheral, accessory and support product we stock. So choose with confidence what you need for your computer system.

See March



### A smart power strip

The Smart Outlet Box electronically transfers the ON/OFF switch of many peripherals to a single device. Plus this multiple-outlet AC power strip protects your equipment with damage-preventing surge suppressors.

Just plug the AC line cord of the device you wish to use as the master controller, such as a video monitor, into the control outlet of the Smart Box. Then plug in the remaining line cords of the computer system into the other six outlets. When you turn on the monitor, the Smart Outlet applies AC to the six outlets.

A separate socket is unswitched with constant AC always available. This allows you to connect a clock or other device that you do not wish to turn on and off with the other outlets.

In addition, your computer system is protected by the best circuitry we've ever devised - from up to 70 joules of spike energy. We use a popular MOV device plus a new laser-cut spark gap surge absorber. This new design assures you that your Smart Box will perform reliably for many years.

A two-evening kit that's circuit-breaker protected up to 10 amps. 2¼" H x 2¾" W x 14¼" L. Kit **GD-1495** \$59.95, ship wt 5 lbs. Assembled **GDW-1495** Last Call \$79.95, ship wt 4 lbs.



### NEW Kraft Micromouse

The opto-mechanical Micromouse uses precise and reliable technology with a high 200 pulses-per-inch resolution. It has three function buttons and five programmable button options. The Kraft mouse comes with pop-up menu software and requires a serial interface. A 120 VAC power supply is included. Assembled **PI-23** \$99.95, 1 lb.

### FREE camera or video tape offer with NASHUA diskettes

NASHUA, the leading name in coating technologies since 1849, makes high quality diskettes. And to show you how exceptional these diskettes are, NASHUA is offering two special packages to make it really worth your time to give them a try. After you do, you'll be convinced. And all NASHUA diskettes carry a manufacturer's lifetime replacement warranty.

**Five-pack camera special** - buy 50 double-sided double-density 5¼" diskettes at a special price and receive a FREE KEYSTONE Pocket EVERFLASH camera...a \$25.95 retail value.

**Three-pack special** - buy 30 double-sided double-density 5¼" diskettes at a special price and receive a FREE TDK VHS T-120-HS high standard video tape...a \$7.95 retail value.

Take advantage of these valuable specials.

**PM-8705** 5-pack camera special \$69.95, ship wt 2 lbs. **PM-8703** 3-pack video tape special \$39.99, ship wt 3 lbs. **PM-9125** Box of ten 5¼" DSHD diskettes \$24.99, ship wt 1 lb. **PM-8725** Box of ten 5¼" DSDD diskettes \$13.99, ship wt 1 lb. **PM-8326** Box of ten 3½" diskettes \$24.99, ship wt 1 lb.



### NEW Kraft Joysticks

Micro-computer control allows mouse or joystick operation with three cursor speeds. Has limited 1-year warranty.

Use with Macintosh computers. Assembled **PI-330** \$69.95, ship wt 1 lb. Assembled **PI-47** Standard joystick (only) for Apple, IBM and compatibles (not pictured) \$29.99, ship wt 1 lb.



### Gravis MK VI

This comfortable joystick has a pistol-grip stick with integrated fire button, two program-

mable fire buttons and an extra-long 72" cable. Assembled **PP-402** For Heath/Zenith, IBM PC and compatibles \$39.95, ship wt 2 lbs. Assembled **PP-450** For Apple IIe and IIc \$39.95, ship wt 2 lbs.

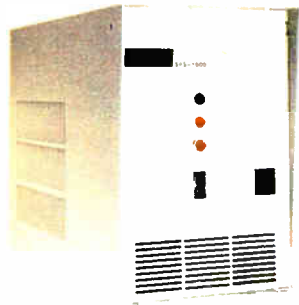
### Freely express all your ideas

From Summagraphics Corporation comes a graphics tablet designed for the IBM PC and compatibles. With it you can make a computer understand things not possible using a keyboard. Use the tablet's 11¾" x 11¾" active area to: trace pictures, drawings, and maps; draw freehand; steer a cursor on a computer screen; or pick selections from a menu. The list becomes endless the more you use the tablet.

The SummaSketch graphics tablet is a sophisticated device that uses electromagnetic technology, which makes it very accurate and reliable. The tablet has a typical accuracy of ±0.025" with a repeatability of ±0.010" or better.

All your computer needs is an RS-232C DTE configured port to accept the tablet's 9-pin female "D" connector. It has overall dimensions of 16" x 16¼" x ¾" and uses 120 VAC. Assembled **SI-1201** \$479.00, ship wt 10 lbs.





## Safe computer backup power

Protect the data in your computer with the 1000 VA Standby Power System from Safe Electronics Systems. It uses all new detection circuitry and a solid state transfer switch to make it the fastest power switching supply available. It switches at one millisecond or less to save your precious data whenever the line voltage drops below 108 volts. At half load, it will supply power for 18 minutes.

This power system has a clean sine wave output (for IBM XT and AT), 4 AC outlets, overload protection, built-in surge suppressors, over-current protection, voltage regulation and built-in EMI/RFI filters. 13" H x 8" W x 19" L. Assembled **PP-120** \$1195.00, ship wt 78 lbs. Mtr. Frt.



## Protect your data

Also from Safe Electronics Systems is a 400 VA Standby Power System to protect your computer and the data it contains from brownouts or loss of power. When AC line power drops below 108 volts this system switches in less than one-half cycle to backup power.

At full load the 400 VA System provides up to ten minutes of power so you can safely transfer all data in memory onto a floppy disk. This system also provides ongoing line filtering of harmful power line spikes. It has four AC power outlets and operates from 120 VAC. 6" H x 10 $\frac{3}{4}$ " W x 12 $\frac{5}{8}$ " L. Assembled **PP-115** \$549.95, ship wt 39 lbs.



## Diskette storage cases protect your investment

Organize your disks and keep them dust-free with these storage trays going clockwise starting from bottom left.

**FLIP 'N' FILE/10** has specially hinged easel-type design that opens up for easy scanning of up to ten 5 $\frac{1}{4}$ " floppy disks. **PM-3025** \$3.95, ship wt 1 lb.

**FLIP 'N' FILE/MINI** stores up to 50 floppy disks in a durable plastic cabinet with hinged lid. Tabbed dividers with index labels simplify filing and retrieval. **PM-3079** \$16.95, ship wt 2 lbs.

**NEW! FLIP 'N' FILE DATA CASE** stores up to 50 5 $\frac{1}{4}$ " floppy disks in a ruggedly built case. Includes index dividers. Built-in carrying handle eases transporting. **PM-3794** \$11.95, 2 lbs.

**NEW! FLIP 'N' FILE MICRO** holds up to 25 3 $\frac{1}{2}$ " micro diskettes. Comes with plastic index dividers. Closed lid acts as carrying handle. **PM-3737** \$12.95, ship wt 1 lb.

## Analog game port and clock/calendar

For Heath/Zenith PCs, the IBM PC and compatibles. With it, you can add on analog devices like joysticks. The board includes a clock/calendar with a backup battery and software. Supported by GW-BASIC. Assembled **PCS-110** \$89.95, ship wt 1 lb.

## Dependable floppy disks

Soft-sectored, double-sided, quad-density 5 $\frac{1}{4}$ " floppy disks for use only in the Heath/Zenith Advanced PC, the IBM PC AT and other AT compatibles. Stores up to 1.2MB of data on a single disk. Package of ten. **HCS-60** \$59.00, ship wt 1 lb.

Soft-sectored, double-sided, double-density 5 $\frac{1}{4}$ " floppy disks for use in all Heath/Zenith Personal Computers (except Z-181 Laptop) and the H/Z-100 Advanced Computer for up to 360KB of data storage. You can also use these diskettes on any Heath/Zenith computer equipped with H-17-5 disk drives and a Z-89-37 Controller Card. Package of ten. **HCS-71** \$50.00, ship wt 1 lb.

Soft-sectored, 96 TPI, double-sided, double-density 5 $\frac{1}{4}$ " floppy disks for use with H-17-5 drives and the Z-89-37 Controller Board. Stores up to 640KB of data on a single disk. Package of ten. **HCS-68** \$55.00, ship wt 1 lb.

## Pre-wired, 10 foot RS-232 cables (connects pins 1-8, 20)

**HCA-10** Male/Male \$20.00, 1 lb.  
**HCA-11** Male/Female \$20.00, 1 lb.  
**HCA-12** Female/Female \$20.00, 1 lb.

## Pre-wired Heath/Zenith PC and IBM PC cables (shielded)

**HCA-51** Male/Female serial (6 ft.) \$30.00, ship wt 1 lb.

**HCA-52** Female/Female null-modem (6 ft.) \$30.00, ship wt 1 lb.

**HCA-53** Centronics Parallel (9 ft.) \$30.00, 2 lbs.

**HCA-84** Male/Male 25-pin straight through RS-232/parallel 6-foot cable with "D" connectors and a ferrite bead at each end \$30.00, ship wt 1 lb.

**HCA-100-PC** PC Serial Conversion cable (1 ft.) \$16.00, ship wt 1 lb.

## Gender converters

All 25 pins are directly wired back-to-back on these male/male and female/female RS-232 connectors. Assembled **PM-125** Male \$11.99, 1 lb. Assembled **PM-126** Female \$11.99, 1 lb.

## Keyboard Slideaway – a perfect solution

Finally, a solution to the problem of a keyboard that just doesn't have enough room. The Keyboard Slideaway fits easily under your PC to let you store that space-seeking keyboard. Then it extends your workspace forward by 8 inches to give you plenty of keyboard room. When you're finished, you easily and conveniently slide the keyboard back under the PC where it's out of the way and protected from dust and spills.

The Slideaway accommodates any PC and keyboard with a depth of 8 inches or less. Assembled **PM-2212** \$49.99, ship wt 5 lbs.



## Organize, direct and protect with MasterPiece

MasterPiece solves four problems at once. Five switched outlets organize your AC line cords for convenient on/off control from a single location. Surge protection stops surges, spikes and line noise. A static guard nameplate grounds body-accumulated static at a touch. And a swivel base adjusts your monitor with fingertip ease. UL approved. 13/8" H x 13 1/2" W x 13 1/4" D. Assembled **PM-2100** \$149.95, 12 lbs.



## Performance, reliability and savings in a kit monochrome monitor

Build your own 12" diagonal screen video monitor and get performance comparable to models costing much more. With this video display kit you get an improved flat-looking screen that provides excellent character definition and clarity for comfortable and enjoyable viewing. Features an easy-on-the-eyes non-glare amber screen, a sharp 25 lines by 80 characters (640 x 200 pixels) display, typical 15 MHz bandwidth and a fast 21 ns rise time and brightness and contrast controls. All circuit boards are pre-assembled for a fast two-evening assembly. For use with PCs having NTSC composite video outputs. Includes RCA to RCA cable. Uses 120 VAC. 12" H x 12 7/8" W x 12" D. Kit **HVM-1220-A** \$89.95, ship wt 19 lbs.

**Special Close-out** on HVM-122-A 12" amber-screen monochrome composite Monitors. Only \$49.95, ship wt 22 lbs.

## EGA-class 14" diagonal monochrome monitor

This Zenith Data Systems monitor is specially designed to reproduce the enhanced graphics displays created by an EGA card. Top features include automatic selection of either CGA or EGA scanning frequency, non-glare green-phosphor CRT, graphics resolution of up to 640 x 350 pixels in EGA mode, built-in tilt and swivel stand, and easily accessible operator controls. Accepts RGB, RGBI or RGBrgb signals through an attached 40" cable with a 9-pin D connector. Assembled **ZMM-1470-G** \$299.00, ship wt 24 lbs.



## Reduce printer noise by 80%

Stop a noisy printer from putting your nerves on edge with a Print Muffler. Two models provide extraordinary quiet, one muffles most standard 80 column printers and the other silences most standard 132 column printers. Both of these sound covers will soak up printer noise so you can think clearly and work more productively.

Besides being easy on your ears, these Print Mufflers are easy on your budget too. So treat yourself to some quiet while you're working at your computer. Assembled **PM-2250** Print Muffler for 80 column printers \$59.95, ship wt 15 lbs. Assembled **PM-2252** Print Muffler for 132 column printers \$79.95, 20 lbs.

## Sharp 13" diagonal color monitor

Also from Zenith Data Systems is another quality monitor specially designed to display the detailed video generated by the Enhanced Graphics Adapter card. The **ZVM-1380-C** has a high-resolution, non-glare color CRT that displays up to 64 brilliant colors from computers using RGB, RGBI or RGBrgb outputs. The monitor's dual horizontal frequency operation provides you with three exceptional resolutions of 640 x 200, 640 x 225 and 640 x 350. Conveniently located user controls include power, brightness, contrast, amber/normal/green screen, vertical size and horizontal position. Has selectable 120/240 VAC and an attached 40" video cable with a 9-pin D connector. Assembled **ZVM-1380-C** \$799.00, 36 lbs.





## A medium-resolution color monitor with a 13" diagonal screen

Get vivid reds, bright blues and true greens on the ZVM-1330 RGBI-only video monitor. It is designed to work with CGA compatible video cards and supports up to 16 colors including brown. The monitor displays 25 lines of 80 characters and up to 640 x 240 pixels on a non-glare screen.

Accessible controls include Power ON/OFF, brightness, contrast, focus and horizontal and vertical controls. Comes with attached 40-inch 9-pin video cable.

This Zenith Data Systems monitor uses 120 VAC and has dimensions of 12 $\frac{7}{8}$ " H x 14 $\frac{3}{8}$ " W x 15" D. Assembled **ZVM-1330** \$649.00, ship wt 34 lbs.

Accessories: **ZVM-1300-1** Tilt Swivel Base \$30.00, 4 lbs.



## Save up to \$80 on video monitors

Zenith Data Systems has three first class mono-

chrome monitors. The ZVM-1220-A is an NTSC composite input monitor with non-glare amber screen. The ZVM-1230-A is the same except with a green screen. The ZVM-1240 is a TTL-compatible monochrome monitor with amber CRT with a micromesh anti-glare filter and 9-pin D-type video output connector. All use 120 VAC. 10" H x 11 $\frac{3}{4}$ " W x 12 $\frac{3}{8}$ " D. Assembled **ZVM-1220-A** Regularly \$199.00 Now \$119.95, ship wt 16 lbs. Assembled **ZVM-1230-A** Regularly \$199.00 Limited Quantities At \$119.95, 16 lbs. Assembled **ZVM-1240** Regularly \$229.00 Now \$169.95, 17 lbs.

Accessories: **ZVM-121-1** RCA to RCA cable \$5.00, ship wt 1 lb.

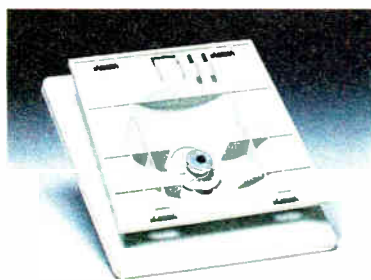


## Color monitor with sound

This Zenith Data Systems monitor delivers a crisp, clear, high-resolution display plus excellent sound reproduction. The 13" diagonal screen, with its 25 lines of 80 characters, can exhibit intensely clear text and impressive 640 x 240 pixel graphics. A unique "green only" switch enables easier reading of monochrome text on a black background.

The ZVM-135 is also compatible with both composite video or RGB direct drive outputs. Uses 120 VAC. 13 $\frac{3}{4}$ " H x 15 $\frac{1}{4}$ " W x 15 $\frac{1}{4}$ " D. Assembled **ZVM-135** \$599.00, ship wt 39 lbs.

Accessories: **ZVM-135-2** H/Z PC and IBM PC Cable \$25.00, ship wt 1 lb.



## Add tilt and swivel

Position HVM-1220-A, ZVM-1220-A, ZVM-1230-A and ZVM-1240 monitors to a better working angle for your viewing comfort. Just snap on this tilt/swivel base to increase the positioning flexibility of these video displays. Assembled **ZVM-1200-1** \$25.00, ship wt 2 lbs.

## Join the Heath User's Group today



Join thousands of other Heath/Zenith computer users and keep up with the latest happenings and the newest Heath/Zenith computer products. Become a member and receive the highly informative and interesting REMark monthly magazine for a year. It will keep you in touch with others as you share hardware modifica-

tions, software improvements and ideas through the magazine's open forum. And as a member you'll gain access to over 700 low-cost programs from HUG's software library. You can even purchase Heath/Zenith computer products at a discount using the HUG ID card. So get the latest on Heath/Zenith computer developments and HUG activities...join today. And don't miss out on the fun of our annual international HUG conference - a grand time for all members.

Subscribe now and get the latest issue of the monthly REMark magazine. New members, order REM-1000-NM and get 12 issues for \$22.95. To renew your subscription, order REM-1000-RM and get 12 more issues for only \$19.95. Use your VISA, MasterCard or Heath Revolving Charge to pay for your subscription. To order, call TOLL-FREE 1-800-253-0570 Monday through Friday, 8 A.M. to 5 P.M. Eastern Time. In Alaska and Michigan call 616-982-3411. You'll also find a HUG application enclosed with each Heath computer.

For orders outside the United States, including APO/FPO, the rates are \$37.95 for new members and \$32.95 for renewal. Send your name and postal address to Heath Company, P.O. Box 1288, Benton Harbor, MI 49022. Payment must be in U.S. funds only.

## Attractive, versatile workcenter

Add the beauty of this desk and hutch combination to your home or office. It's finished in handsome library oak and has rounded edges to provide added comfort and safety. The desktop work surface is acrylic coated for protection and durability.

The accompanying hutch has a 9-position adjustable shelf for your monitor or other computer accessories. A fully enclosed storage area hides all your computer clutter.

The workcenter has a fully finished back, box drawer and a modesty panel. It stands on easy-to-adjust leveling glides and has overall dimensions of 55½" H x 47" W x 26" D and the desktop is 28" H. **PF-152** \$189.95, ship wt 122 lbs. Mtr. Frt.

## Matching printer stand

A hard-working addition (not pictured) to the PF-152 workcenter. Use it for your printer or just for storage. The center shelf is adjustable. Has easy-to-adjust leveling glides. The printer stand has dimensions of 28" H x 21¾" W x 21" D. **PF-156** \$79.95, ship wt 55 lbs.



## Two-drawer cabinet

A perfect companion to the above workcenter. Or, use it as a stand-alone file for any paper work you need to keep in order. This legal-size cabinet matches the PF-152 with its library oak finish and softly shaped top. Has a fully finished back and large 17½" D by 12⅞" W interior drawer dimensions. Includes a metal suspension system. 28" H x 16" W x 19⅜" D. **PF-157** \$119.95, ship wt 50 lbs.



## Versatile Roll-About

Use this mobile oak-finish table for just about anything you want to make movable—like your computer, printer, video game, TV or typewriter. Underneath the table is a full-length shelf for storing most anything. And at the back of the table is an opening for printer paper. Dual casters make for easy moving. 28" H x 28¼" W x 19" D. **PF-120** \$79.95, ship wt 35 lbs.



## Solid oak frame hutch

This softly shaped hutch adds beautiful storage space to its attractive companion desk. Radiused door panels enclose a full-length 12 $\frac{3}{8}$ " high by 48" long storage space for software, binders and accessories. Overall the hutch measures 35 $\frac{3}{8}$ " H x 13 $\frac{3}{8}$ " D x 48" L. **PF-161** \$199.95, ship wt 83 lbs. Mtr. Frt.

## Elegant computer desk

A perfect combination of elegance and efficiency for your home or office. This fine furniture desk is 50" wide by 29" deep and stands 27" high. Deluxe features include a solid oak frame, softly rounded corners and a high performance scratch-resistant work surface. **PF-160** \$199.95, ship wt 112 lbs. Mtr. Frt.

## Combine pedestal module with desk

Add on this graceful pedestal module to the left or right side of the matching desk. With its gently curved corners the module fits in with the overall design of the entire workcenter. It has one 4 $\frac{1}{2}$ " box drawer for storing your papers and smaller items. The module also has a 11 $\frac{3}{4}$ " high file drawer that includes metal frames for letter or legal size Penaflex file folders. **PF-167** \$139.95, ship wt 42 lbs.

## Be comfortable all day in this chair

This is a comfort-conscious chair designed for you. The dual adjustment spring steel backrest supports your back for less stress and strain. A pneumatic control sets the seat height for your maximum convenience. And the thick 2" foam-padded seat and back are both comfortable and durable. **PF-103** \$49.95, ship wt 20 lbs.

## Beautiful printer stand puts finishing touch to workcenter

This handsome printer stand features the same solid oak frame and rounded corners as its furniture counterparts. The stand has slots for rear or bottom feed printers and its center shelf is adjustable. The back of the stand is fully finished. The same easy-to-adjust leveling guides as used on the desk are also used on the stand. 27" H x 20 $\frac{1}{2}$ " W x 24" D. **PF-165** \$159.95, ship wt 79 lbs. Mtr. Frt.

Use your VISA or MasterCard credit card to make your purchase!



## Dear Electronics Enthusiast:

In response to interviews, surveys and conversations with thousands of people like you, our valued customer, we are expanding our traditional product offerings. This new 12-page section is filled with innovative, high-tech electronics products you've asked for. Some are tools to help you do a better job. Some are designed to make your life easier or more enjoyable. All of these products reflect the type of customer you are; a forward-looking individual interested in the latest technological advances.

Products in this section are fully assembled so you can enjoy them as soon as they're unpacked. You'll find most items are unique or have unique features, or combine several features not found in similar products.

Another characteristic you'll find in common to all these high-tech products is quality. They were selected because of it. They will definitely satisfy you with their performance and reliability.

Our continuing goal in this section is to consistently bring you the newest and hottest high-tech electronic products at top quality levels and competitive prices.

Sincerely,



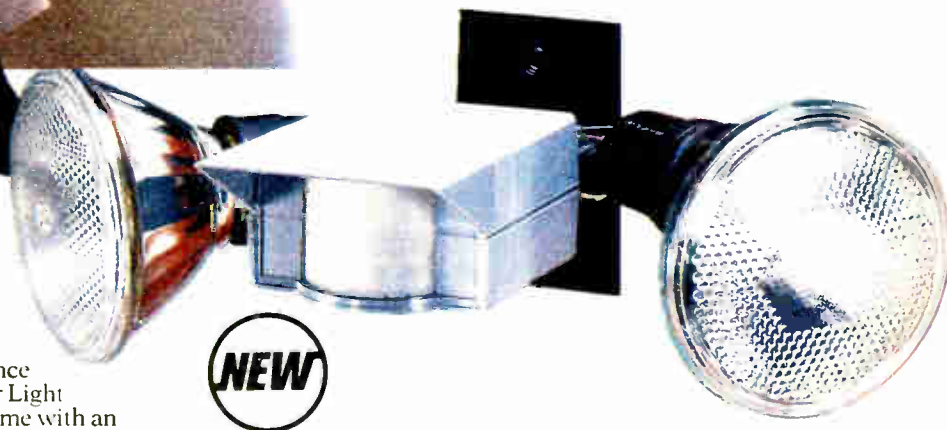
William E. Johnson  
President, Heath Co.

## Turn lights on and off – automatically

Provide your family with security, convenience and safety with the Heath/Zenith Motion Sensor Light Control. Welcome late-evening guests to your home with an illuminated walkway or driveway. Or discourage intruders by flooding your yard with inescapable light. The SL-5310 Light Control easily connects to your present outside incandescent or halogen lights to provide lighting whenever heat and motion are detected.

The SL-5310 utilizes reliable passive infrared sensor technology to activate lighting automatically. The light control uses a high-quality, precision-crafted sensor for extreme sensitivity. It can detect heat and motion from up to 60 feet away in a 110° arc providing over 2000 square feet of coverage. And the SL-5310's sensitivity is conveniently adjustable. Plus a swivel mount allows you to aim the light control over a 180° range to cover a specific or broad area. The SL-5310 Light Control also uses an overlapping multi-zone detection field for complete area coverage – it's inescapable.

100



**NEW**

A five-minute delay automatically shuts off the lighting only after the area the Light Control covers returns to normal. This saves energy and saves you money. Another energy-saving feature is the built-in photocell. It deactivates the light control in daylight to save enough in one year to more than pay for the control versus all-night lighting. A manual override lets you switch on the outside lights from your inside wall switch.

The SL-5310 controls up to 500 watts of lighting. It has a watertight housing for safe use in all weather conditions. And the SL-5310 comes with easy-to-follow instructions and a full 1-year warranty. Uses 120 VAC. 2 1/4" H x 4" W x 8 3/4" L. Assembled **SL-5310-A** Light Control with mounting plate and light fixture (pictured) \$69.95, ship wt 2 lbs. Assembled **SL-5310** Control \$59.95, ship wt 2 lbs.



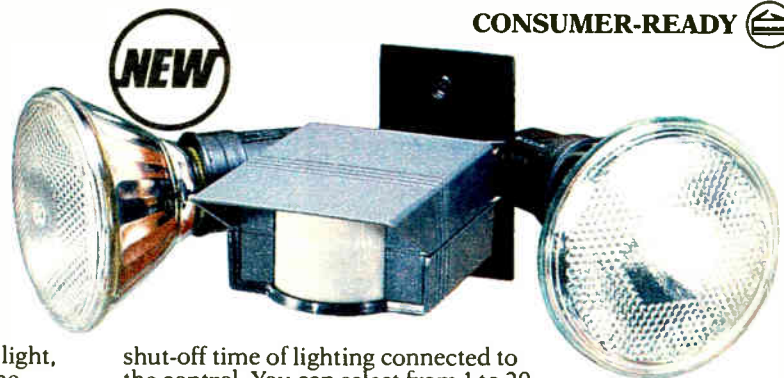
## Take the convenience of security lighting indoors

The Heath/Zenith SL-5320 Advanced Light Control offers a new dimension in lighting control – outside *and* inside lighting control. And it combines all the features of the SL-5310 (page 100) plus increased wattage rating and a variable shut-off delay.

Besides turning on outside lights when heat and motion are detected, the SL-5320 also sends two unique signals over the power line into your home. These signals communicate with modules like those on pages 23 and 104. The first Light Control signal activates any device connected to the receiver module set to accept the signal. When the SL-5320 turns on an outside light, an inside light, radio, TV or other device also turns on. The additional devices will also turn off when the monitored area returns to normal. The second signal will work even in daylight to announce activity in the monitored area.

With the Advanced Light Control you can connect up to 1000 watts of incandescent or halogen lighting. This allows you to control higher wattage lighting or several smaller fixtures from one central location.

With the SL-5320 you have the advantage of varying the



CONSUMER-READY

shut-off time of lighting connected to the control. You can select from 1 to 20 minutes of delay before lights are automatically shut off after the monitored area returns to normal.

The SL-5320 Advanced Motion Sensor Light Control offers you the most features in sophisticated infrared light control and comes with a full 1-year warranty. It uses 120 VAC and has dimensions of 2¼" H x 4" W x 8¾" L. Assembled **SL-5320-A** Light Control with mounting plate and light fixture (pictured) \$109.95, ship wt 2 lbs. Assembled **SL-5320** \$99.95, ship wt 2 lbs.



## Motion Sensor Light Control for decorative lighting

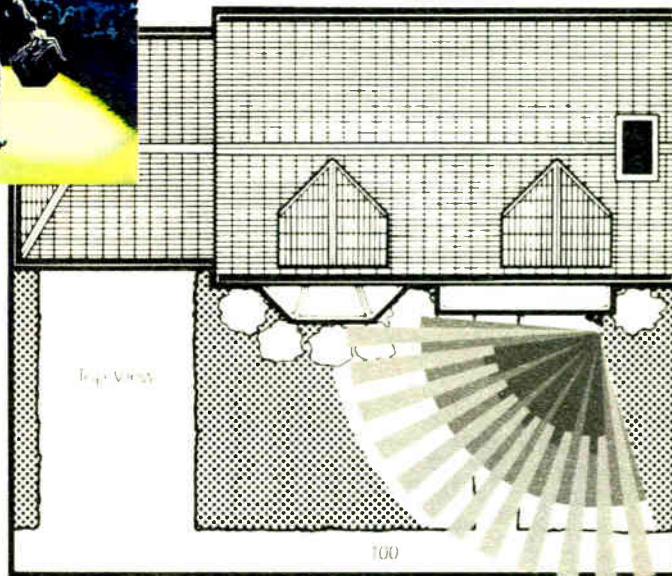
Mount this Heath/Zenith

SL-5410 Light Control next to your decorative front or back porch light and get the convenience and security of an automatic motion/heat-sensing lighting switch. The compact size of this control allows you to easily install it in tight locations. And the SL-5410 is weather resistant for reliable operation in rain, snow and driving winds.

The SL-5410 Light Control uses the same safe and dependable passive infrared sensor with an overlapping multi-zone detection field as used in our other fine lighting controls. It can detect heat and motion up to 50 feet away in an adjustable field consisting of a wide 110° arc. The SL-5410 can even be adjusted for the amount of sensitivity that you need.

Other features of this excellent lighting control include three modes of operation and an adjustable 1 to 20 minute delayed lighting shut-off. In the automatic mode, lights turn on only at night when movement is detected. A test mode allows you to check aim and sensitivity. And a manual override enables you to switch on the controlled lighting whenever you need it.

The SL-5410 Control handles up to 500 watts of either incandescent or halogen lighting and is easy to install. It uses normal household 120 VAC and has dimensions of 4⅞" H x 2⅝" W x 6¼" D (includes mounting shaft). Full 1-year warranty. Assembled **SL-5410** \$44.95, ship wt 2 lbs. Available August.



Typical coverage pattern



Light controllers are recognized as effective fighters in crime prevention by the Neighborhood Crime Prevention Coordinating Committee, the national organization for Neighborhood Watch programs.



## Get savings and convenient home control with X-10 devices

1 Now you have even more choices on how to personalize your home electronically with X-10 POWERHOUSE controllers and modules. Use the Home Control Interface for security whether you're at home or away. You program the Interface from your personal computer, then disconnect it so your computer can be used for other tasks. The Interface controls up to 256 modules and you can program up to 128 events. Three different software programs are available that use easy-to-follow menus or graphic maps of your home. Assembled **BC-290-A** Interface for Apple IIe/IIc Was \$59.99 Now \$49.99, ship wt 3 lbs. Assembled **BC-290-M** Interface for MacIntosh Was \$69.99 Now \$49.99, ship wt 2 lbs. Assembled **BC-290-P** Interface for IBM PC and compatibles Was \$59.99 Now \$49.99, ship wt 2 lbs.

2 Radio Control System gives you wireless remote control of lamps and appliances. Turn on lights from your driveway for convenience. Keep one at bedside for security. Give one to an elderly or disabled person to flash in case of emergency. The receiver also lets you control up to 7 additional modules by retransmitting the control signal over house wiring. Assembled **BC-5000** Transmitter and Receiver Was \$49.99 Now \$39.99, ship wt 1 lb. Assembled **BC-504** Extra Transmitter \$19.99, ship wt 1 lb.

3 Maxi Controller enables you to control up to 16 groups of modules for blanket control of lamps and appliances. Assembled **BC-503** \$24.99, ship wt 1 lb.

4 Assembled **BC-227** Wall Receptacle Module rated at 15 amps \$24.99, ship wt 1 lb.

5 Assembled **BC-260** Mini Controller controls up to eight groups of modules \$12.99, ship wt 2 lbs.

6 Assembled **BC-262** Timer Command Console for timed control of lights and appliances \$29.99, ship wt 3 lbs.

7 Assembled **BC-2700** Telephone Responder lets you phone home to activate lights or other devices. Requires 9V battery \$49.95, ship wt 2 lbs.

8 Assembled **BC-465** Lamp Module, 300 watts maximum load Was \$14.99 Now \$12.99, ship wt 1 lb.

9 Assembled **BC-466** Appliance Module turns appliances on/off. 15 amp resistive load, 1/3 hp motor, 500 watt lighting, 400 watt TV/stereo Was \$14.99 Now \$12.99, ship wt 1 lb.

10 Assembled **BC-284** Burglar Alarm Interface Module turns on selected lights, appliances, siren or selected lights can flash on and off \$39.99, ship wt 1 lb.

11 Assembled **BC-467** Wall Switch Module, 500 watt load Was \$14.99 Now \$12.99, ship wt 1 lb.

12 Assembled **BC-4777** Three-Way Wall Switch Module replaces hall and stair 3-way switches. Maximum 500 watt load \$24.99, ship wt 1 lb.

13 Assembled **BC-245** Perpendicular-Pronged Air Conditioner Module. 240 VAC receptacle for 20 A load \$29.99, 1 lb.

14 Assembled **BC-2807** Thermostat Set. Requires BC-466 Module above Was \$39.95 Now Only \$19.99, ship wt 1 lb.





**NEW**

### Dual trace 25 MHz oscilloscope

Meet a broad range of applications in design, testing and servicing of both analog and digital circuits and equipment with this precision scope. It features alternate triggering, trace magnification and an 8 x 10 cm internal graticule. Assembled **SO-4226** \$549.95, ship wt 22 lbs.

Specifications: **VERTICAL DEFLECTION: Deflection Factor:** 5 mV to 5 V/div  $\pm$  3%; 10 steps in 1-2-5 sequence with variable control. **Rise Time:** Approx. 14 ns. **Overshoot:** Less than 3%. **Input Impedance:** 1 M $\Omega$ , 25  $\pm$  3 pF. **Operating Modes:** CH1, CH2, DUAL and ADD. **Chop Frequency:** Approx. 250 kHz. **HORIZONTAL DEFLECTION: Sweep Mode:** AUTO, NORMAL and SINGLE. **Sweep Time:** 0.2  $\mu$ s to 0.5 s/div; 20 steps in 1-2-5 sequence with variable control and X-Y mode. **Magnify:** X10. **Sweep Time Accuracy:** 3%. **Linearity:** 3%. **X-Y MODE: Sensitivity:** Same as CH1 vertical axis. **Frequency Response:** DC to 1 MHz ( $-$  3 dB). **TRIGGER: Source:** CH1, CH2, LINE and EXT. **Coupling:** AC, HF REJ, TV and DC. **Polarity:** + or  $-$ . **Mode:** AUTO, NORM and SINGLE. **GENERAL: Calibration Voltage:** 2 V P-P  $\pm$  2%, 1 kHz square wave (positive-going). **Power:** 100/117/220/240 VAC; 50/60 Hz. **Dimensions:** 6 1/2" H x 12 1/2" W x 17" D.



**NEW**

### Dual trace 50 MHz oscilloscope

For critical applications we have an advanced 50 MHz scope equipped with features to make your job easier, including delayed sweep. This scope is an outstanding value. Assembled **SO-4251** \$799.95, ship wt 22 lbs.

Specifications: **VERTICAL DEFLECTION: Factor:** 5 mV to 5 V/div  $\pm$  3%; 10 steps in 1-2-5 sequence with variable control. **Magnify:** X5. **Rise Time:** Approx. 7.0 ns. **Overshoot:** Less than 3%. **Operating Modes:** CH1, CH2, DUAL and ADD. **Chop Frequency:** Approx. 250 kHz. **HORIZONTAL DEFLECTION: Modes:** A, A INT, B and B TRIG'D. **A SWEEP: Time:** 0.2  $\mu$ s to 0.5 s/div; 20 steps in 1-2-5 sequence with variable control and X-Y mode. **Magnify:** X10. **Sweep Time Accuracy:** 3%. **B SWEEP: Delay System:** Continuous and triggered delay. **Sweep Time:** 0.2  $\mu$ s to 9.5 ms/div. **Sweep Time Accuracy:** 3%. **Delay Time:** 2  $\mu$ s to 5 ms/div. **Delay Time Accuracy:** 4%. **Delay Jitter:** 0.0001 or less. **EXT HOR Mode:** Trace swept by signal applied to EXT IN terminal. **TRIGGER: Source:** CH1, CH2, LINE and EXT. **Coupling:** AC, HF REJ, TV and DC. **Polarity:** + or  $-$ . **Modes:** AUTO, NORM and SINGLE. **Power:** 100/117/220/240 VAC. **Dimensions:** 6 1/2" H x 12 1/2" W x 17" D.



Credit card orders call TOLL-FREE:

**1-800-253-0570**

Alaska and Michigan residents call: 616-982-3411.

### Durable and easy-to-operate clamp-on ammeter

This miniature, pocket size clamp-on meter provides high accuracy in measuring AC amps and volts plus a resistance scale. And for instant continuity checks, a built-in buzzer sounds when resistance is less than 2 kohms. In addition, this handy meter features data hold display readings for all functions and ranges, a large 3 1/2 digit LCD display, 1.0% basic accuracy and a black and red probe set. Includes 9 volt battery. Assembled **SM-2208** \$69.95, ship wt 1 lb.



**NEW**

Specifications: **AC VOLTAGE: Ranges:** 750 V, 200 V. **Resolution:** 1 V, 750 V range. 0.1 V, 200 V range. **Accuracy:**  $\pm$  (1.0% of reading + 3 digits) from 45 Hz to 400 Hz. **Over Voltage Protection:** 1200 VDC and 850 VAC on both ranges. **Input Impedance:** 1 M $\Omega$ . **AC CURRENT: Ranges:** 200 A, 300 A. **Resolution:** 0.1 A, 200 A range. 1.0 A, 300 A range. **Accuracy (50/60 Hz):**  $\pm$  (2.0% of reading + 1 digit). **RESISTANCE: Range:** 2000 ohms. **Resolution:** 1 ohm. **Accuracy:**  $\pm$  (1.0% of reading + 1 digit). **Overload Protection:** 250 V DC/AC. **Other Features:** Automatic polarity, over range indication, automatic zero, low battery indication. **Dimensions:** 1" H x 2 1/2" W x 7 3/8" L.

### Pocket Size Digital Meter

Here's a low-cost, compact multimeter with all the measuring capability you'll need for jobs around the house and in the shop. It has a 3 1/2 digit LCD display that shows readings up to 1999, an audible continuity checker and a diode test. Assembled **SM-2310** \$49.95, ship wt 1 lb.



Specifications: **DC VOLTS: Ranges:** 200 mV, 2.0 V, 20 V, 200 V, 1000 V. **Resolution:** 0.1 mV. **Basic Accuracy:**  $\pm$  0.5%. **DC CURRENT: Ranges:** 200  $\mu$ A, 2.0 mA, 20 mA, 200 mA, 2 A. **Resolution:** 0.1  $\mu$ A. **Basic Accuracy:**  $\pm$  0.75%. **AC VOLTAGE: Ranges:** 200 V, 750 V. **Resolution:** 100 mV. **Basic Accuracy:**  $\pm$  1.2%. **RESISTANCE: Ranges:** 200  $\Omega$ , 2 k $\Omega$ , 20 k $\Omega$ , 200 k $\Omega$ , 2 M $\Omega$ . **Power:** Single 9-volt transistor battery (included). **Dimensions:** 1" H x 2 3/4" W x 5" L.



## Heath DMM from FLUKE

**FREE  
CASE**

Get a FREE soft carrying case – a \$9.95 retail value – when you purchase this deluxe multimeter with its dual digital and analog bar-graph display. You also get the resolution of costlier 4½-digit meters, touch-hold function and a continuity checker with beeper. Remember your FREE case, just enter SMA-77-1 on the order form and “No Charge” in the price column. Assembled **SM-77** \$129.95, ship wt 3 lbs.

Accessories: **SMA-77-1** Soft Carrying Case \$9.95, ship wt 1 lb. **SMA-77-2** Holster Case \$5.95, ship wt 1 lb.

Specifications: **DC VOLTS:** Ranges: 320 mV, 3.2 V, 32 V, 320 V, 1000 V. **AC VOLTS:** Ranges: 3.2 V, 32 V, 320 V, 750 V. **OHMS:** Ranges: 320 Ω, 3200 Ω, 32 kΩ, 320 kΩ, 3.2 MΩ, 32 MΩ. **AC/DC AMPS:** Max Reading: 10 A. **Power:** Single 9 V battery (included).



## Measure the G force

Measure the G-forces as you swing the car around your favorite corner, accelerate or brake. This G-Meter indicates forces from 0.1 to 0.8G through green, yellow and red LEDs. Plus, a volt meter mode lets you check your battery in a 10 to 15 volt range. For use with 12 volt systems. Has dimensions of 1½" H x 6¾" W x 1" D. Assembled **CGW-1562** \$39.95, ship wt 1 lb.



## Graphic LED Tachometer

See your car's engine RPM in red, yellow and green LEDs ranging from 0 to 6000 RPM in 500 RPM steps. Transforms into handy battery voltage checker. For use with 12 volt systems. Not for use with diesel engines. Assembled **CTW-1572** \$24.95, ship wt 1 lb.



## Highly-precise digital pocket multimeter

The smallest autoranging DMM made and its practically goof proof. The 3½-digit LCD automatically shows the reading in the correct range up to a maximum 1999 display. A built-in continuity checker with buzzer alarm adds convenience. Includes hard cover wallet carrying case and test probes. A perfect and inexpensive “spare meter” only ⅜" thick. Assembled **SM-2300** \$24.95, 1 lb.

Specifications: **DC VOLTAGE:** Range: 2000 mV to 400 V. **Accuracy:** ± (1.3% reading ± 2 digits). **AC VOLTAGE:** Range: 2000 mV to 400 V. **Accuracy:** ± (2.3% reading ± 5 digits). **RESISTANCE:** Range: 200 Ω to 2000 kΩ. **Accuracy:** ± (2.0% reading ± 2 digits). **POWER:** Two LR-44 batteries (included). **DIMENSIONS:** 4¼" H x 2¼" W x ⅜" D.

## Handheld Digital Engine Analyzer

Small enough to store in your glove compartment, but more than big enough to help you keep your car's engine running at its peak efficiency. Or use the Heath Digital Engine Analyzer to find the cause of a malfunctioning engine.



Check dwell of 4-, 6- and 8-cylinder engines to 90° with a resolution of 0.1° within ± 1.5% accuracy. Check an engine's RPM up to 10,000 RPM with a resolution to 10 RPM and an accuracy of 1.5%. Also use this meter to measure DC voltages in three ranges up to 200 volts within an accuracy of ± 0.7%. There's even five resistance ranges from 200 ohms to 2 megohms to aid in checking out wiring and electrical circuits.

The Analyzer has an easy-to-read LCD display and operates on the included 9 volt battery. The meter comes with test leads and an instruction manual. 5" H x 2¾" W x 1" D. Assembled **CMW-1570** \$49.95, ship wt 1 lb.



## TTL/CMOS Logic Probe

Simplify logic circuit testing with this powerful Logic Probe troubleshooting tool and its built-in audible beeper. Use both high and low tones to check out TTL and CMOS circuits operating at up to 20 MHz. Input over-voltage protected to ± 50 VDC or 220 VDC/AC for 15 seconds. Assembled **ST-7420** \$39.95, ship wt. 1 lb.

Specifications: **Input Impedance:** 1 megohm. **LOGIC THRESHOLDS:** **TTL:** Low, 0.8 V ± 0.2 V DC; High, 2.3 V ± 0.2 V DC. **CMOS:** Low, 30% of circuit V<sub>cc</sub>; High, 70% of circuit V<sub>cc</sub>. **GENERAL:** **Controls:** Threshold select (TTL or CMOS), Pulse/Memory. **Pulse LED (Yellow) Flashing Time:** 500 ms. **Power Supply Protection:** ± 20 V. **Voltage Range:** 5 V to 15 VDC. **Dimensions:** ⅝" H x ¾" W x 7⅝" L.



## Digital Pulser Probe

Inject your own substitute logic pulses into circuits for quicker and easier evaluation of problems. This slim Pulser Probe can generate square waves with 10 μs pulse widths at repetition rates of 0.5 pulses per second or 400 PPS. Comfortably fits your hand. Assembled **ST-7430** \$39.95, ship wt 1 lb.

Specifications: **Sync Input Impedance:** 1 megohm. **Pulse Width in Pulser Output:** 10 μs at 100 mA load. **Output Current:** (1) Pulse Mode: 100 mA sink or source maximum. (2) 90% Pulse Mode: 20 mA sink or source maximum. **Maximum Allowable Supply Voltage:** ± 25 V. **Maximum Output Voltage:** ± 50 V. **Operating Supply Voltage Range:** 5 V to 15 V. **Power Supply Protection:** ± 25 V, 10 seconds. **Output Protection:** ± 50 V, 1 minute. **Dimensions:** ⅝" H x ¾" W x 7⅝" L.



## Utility thermometer also keeps time

Check a wide range of temperatures, 19.9° to 68.8° C (68° to 155° F), indoors and out with this portable, multi-purpose digital thermometer. Use it as a guide in adjusting heaters and cooling equipment or for measuring water temperatures. You'll find this portable thermometer extremely helpful in many applications.

Manually set minimum and maximum temperatures, and an audible alarm will warn you of exceeded limits. The probe tip can be immersed in water or easily placed into heating/cooling ducts. A 3-foot 3-inch cord allows you to place the probe almost anywhere. Also includes an external sensor mounting fixture.

Use the handy built-in clock when you need the time and temperature. Includes battery. Not intended as a fever thermometer. 4¼" H x 2⅝" W x ¾" D. Assembled **SM-2326** \$34.95, ship wt 1 lb.



CONSUMER-READY



## Recharge your nickel-cadmium batteries

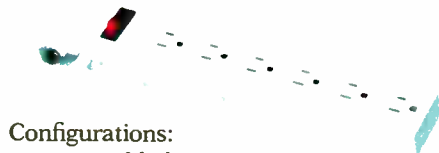
Keep your rechargeable nickel-cadmium batteries charged to their capacity with this easy-to-use deluxe Jeckson Battery Charger. It can handle up to 10 "AA," "C" or "D" batteries in any combination. And it can also charge up to three 9-volt transistor batteries at the same time for a total of 13 batteries.

Just place the batteries in the compartment and close the see-through lid. Spring-loaded terminals adjust to battery size making it easy to charge different sized batteries. Tri-colored red/green/orange LEDs indicate which type of batteries are being recharged. Typical charging time is from 14 to 16 hours for most batteries, providing you with fresh batteries overnight. Assembled **BP-1234** \$24.99, ship wt 4 lbs.

## Reduced prices on power strips

Take advantage of reduced prices to get a multiple outlet strip that will relieve the crowding around your AC wall outlet. These three power strips supply an extra six grounded outlets for use with computer systems, audio and video equipment, shop tools, kitchen appliances – any where that you run short of AC outlets. These power strips are also extremely useful in the office.

All three of these multi-outlet strips from Pacific Electriccord have 6-foot long cords, are UL approved and are finished in an attractive beige enamel on a durable steel case. Separate features offer three choices of protection.



Configurations:

Assembled **PM-1493** Multi-Outlet Strip with circuit breaker protection and lighted rocker switch *Was* \$19.99 *Now* \$14.99, 2 lbs.

Assembled **PM-1494** Multi-Outlet Strip with single line surge protection, circuit breaker, lighted rocker switch and green power on light *Was* \$29.99 *Now Only* \$24.99, ship wt 2 lbs.

Assembled **PM-1495** Multi-Outlet Strip with full 3-line surge protection, EMI and RFI filter, circuit breaker, lighted switch and green pilot light \$39.99, ship wt 2 lbs.



## A unique see-through alarm clock

This is a smart looking addition to your desk or a dependable take-along alarm. It's an extraordinary clock with time and date displays that seem to float in midair. Three different display modes show time, date and alarm set time. Also features an hourly chime.

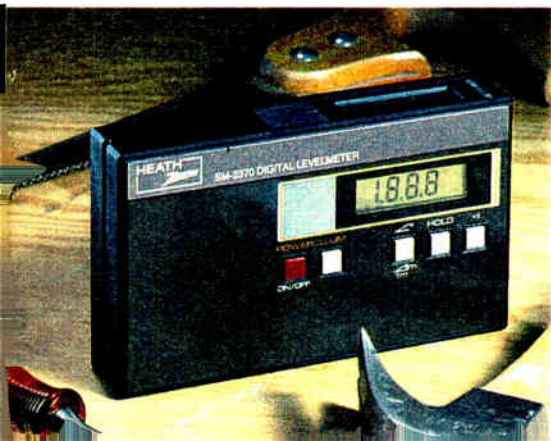
Normal time display shows time to the second in either a 24-hour or 12-hour format with AM and PM indicators. Press a button and the calendar display shows the month and date until the button is released. You can also check the hour and minute you've set for the alarm to sound. When the alarm sounds, you can press "snooze" for an additional 4-5 minutes of sleep. Battery and carrying case included. 2⅝" H x 3½" W x ½" D. Assembled **GDP-3900** \$14.95, ship wt 1 lb.

## Keep it level with digital accuracy

Easily measure crucial angles and grades with the Heath/Zenith Digital Levelmeter. This unique tool uses a photoelectric transducer and microprocessor control to supply angle readings accurate to 0.5° over a wide ±120° measuring range. View readings from almost any position with the help of two LCD displays. And with the push of a button, a beeper will let you know when your level is perfectly horizontal. A built-in light aids readings in dim light and the display can be locked in for out-of-sight readings.

This amazing shop helper operates on two "AA" batteries (not included). It has dimensions of 3¾" H x 4¼" W x 1⅜" D. Assembled **SM-2370** \$99.95, ship wt 1 lb.

Accessories: **SMA-2370-1** Levelmeter Base securely holds the SM-2370 making it into a 60 cm (23.6 inch) long level \$39.95, ship wt 2 lbs.



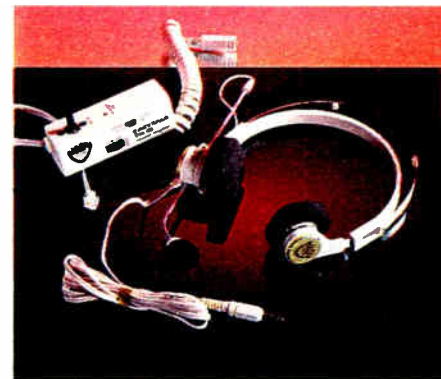
## A digital thermometer to trust

When you need to know if a fever's present, trust the dependable accuracy of this fever thermometer. It's small, light and has an easily readable LCD display which makes temperature taking a simple matter – even for a child. For added convenience a buzzer sounds when the reading is completed. This compact thermometer also has an automatic power-off system. Includes battery.  $4\frac{3}{8}''$  L x  $\frac{1}{2}''$  W x  $\frac{3}{8}''$  D. Assembled **BH-110** \$9.95, ship wt 1 lb. (Color and manufacturer may vary.)



## Fully automatic blood pressure readings

Keep an accurate, printed record of your blood pressure with this professional desktop instrument. Wrap the soft cuff around your arm and press a button. The cuff is automatically inflated and then deflates at the same rate each and every time to give you consistently accurate readings. Date and time are also printed out so you have an exact time of blood pressure reading for later referral. Includes batteries and printer paper. Assembled **BH-1750** \$99.95, ship wt 5 lbs.



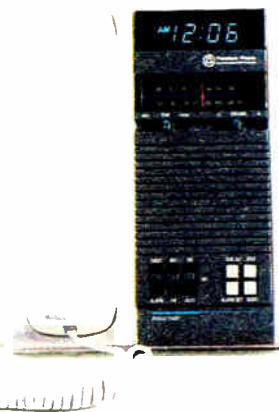
## Telephone Headset frees your hands for work

Your hands can work while you talk with the Hands-Free Telephone Headset and Amplifier by Nady. Just plug the amplifier into the modular jack on almost any standard business or home phone. Flip an easy-to-reach switch on the top of the amplifier to alternate between headset and handset. A quick disconnect on the lightweight cord lets you leave the phone without removing the headset. It also has one "dummy" earpad designed for comfortable wear.

Volume is adjustable up to 6 dB louder than conventional telephones. For private conversations, turn off the amplifier with a mute switch. You get clean, clear sound with the built-in condenser microphone. Operates off phone line voltage – no batteries needed. Line surge protected. Assembled **GDP-1343** \$39.95, ship wt 1 lb.

## Telephone/radio/clock

Perfect for your kitchen or bedroom, this top-quality Southwestern Bell wall or desk telephone has a lighted dial and is pulse/tone switchable. When you're not on the phone, listen to AM or FM broadcasts. The radio features a lighted tuner, base and treble controls, sliding volume control and an auto-stop that shuts off the radio when you lift up the phone. Wake up to an alarm or music with the built-in alarm clock. It has a fluorescent tilt display and includes snooze. Assembled **BT-500** \$89.95, ship wt 5 lbs.



## Enjoy the convenience of a cordless phone

It's easy to stay in touch with this cordless Freedom Phone from Southwestern Bell. Make or answer calls using the handset anywhere over a 1000 foot range from the base. Also, you have ten different remote channels to choose from for complete privacy with this one-line phone. Other features include a built-in two-way intercom, hands-free speaker phone, digital-coded security,

nine-number memory, external ringer on hand-set, tone/pulse dialing, automatic redialing and volume control. Assembled **BT-1700** \$169.95, ship wt 5 lbs.

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





**NEW**

### A single-line, full featured memory phone

Southwestern Bell's Memory Phone is a welcome addition to any home or office that needs big features at an affordable price. It's styled for use either as a desk or wall telephone and has switchable pulse/tone dialing.

Especially convenient for business, an elderly person, a child or just for those frequently called numbers, the Memory Phone features one-touch dialing of up to 24 telephone numbers and three emergency numbers. Additional quality features include last number redial and hold, plus pause spacing and combination dialing for codes and long distance access. An electronic ringer has High/Low and Off position. Requires three "AA" batteries (not included) for memory and feature functions. Assembled **BT-1550** \$79.95, ship wt 3 lbs.

### Full featured 2-line desk telephone

**NEW**

Have a second line in your home for teenagers or business without the need for two separate phones. This attractive, traditional style desk telephone from Southwestern Bell permits you to use one phone for two lines. Each line has its own separate ringer, set to sound differently, and the corresponding line LED flashes to let you know which line is being called.

Select line 1 or 2 simply by depressing the corresponding buttons. A red LED indicates when a line is in use and tells you if an extension phone is in use. Other useful features include a hold button that puts a call on hold without disconnecting it and conference capability that allows a three-way conversation between the user, line 1 and line 2. Use the convenient Redial pushbutton to redial a number that was busy or unanswered. Ringer switch allows you to switch ringer on/off and controls loudness. The Freedom Phone 2-line desk phone works with either Tone or Pulse (rotary) phone systems. Requires 4 "AA" batteries (not included). Assembled **BT-325** \$89.95, ship wt 4 lbs.

CONSUMER-READY



### Southwestern Bell has an answer to your answering needs

When you need a reliable answering machine look to the Southwestern Bell Freedom Phone solution. This high-tech designed machine supplies all the top quality and dependability of the combination BT-1600 phone/answerer (below), but without the telephone. With its extension phone jack, you can connect the machine to an existing phone.

This answering machine has LED call counter, message indicator and answer-ready LED indicators. A built-in microphone allows you to record your own outgoing announcements up to 30 seconds in length. Also, screen incoming calls using the answerer's call monitoring feature.

This Freedom Phone answering machine frees you from worry. You'll never worry about this machine's workmanship and dependability or missing that all important phone call. Assembled **BT-1500** \$124.95, ship wt 6 lbs.



**Southwestern Bell Freedom Phone®**

**Full five-year warranty free to Heath customers**

### An all-in-one answering machine/telephone

Looking at the high tech styling of this top-of-the-line Freedom Phone inspires nothing short of confidence in design, quality and features. That's what you get when you choose Southwestern Bell, plus uncompromising durability and dependability. You also get features like dual standard cassettes for recording your own personalized announcements, unlimited message length, ring select, two-way record, call monitoring, beeperless remote, call counter, memo record, pulse/tone switching and automatic phone number redialing. You'll also find that the Freedom Phone answering machine is easy to install and operate. Assembled **BT-1600** \$159.95, ship wt 7 lbs.







## FISCHERTECHNIK Program helps your child develop

Your child may think it's a wonderful new toy filled with exciting possibilities, but you know that it's really an intelligent playing system for your child to build and play with...to experiment with and learn from. Begin with Start 100 and your child learns to create models and situations that, in turn, encourage imaginative play. Simple picture instructions show how to build 100 different models. For ages 6 and up. **BP-100** \$49.99, ship wt 3 lbs.

## Larger Start 200 for even more fun

Challenge your child with 200 different models from this extensive building set. Easy-to-follow pictorial information leads your child to quick and successful construction of simple models. A 48 large page manual shows various assembly steps. For ages 6 and up. **BP-200** \$69.99, ship wt 5 lbs.

**\$AVER!** Take 10% off Start 200 when purchased with any system on pages 110 and 111.



## Motorize your Start 100 and 200 models

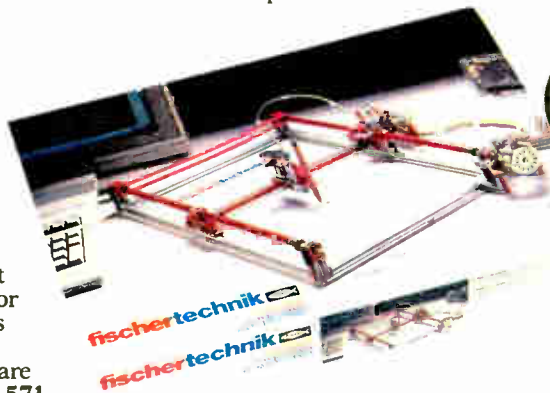
The Motors + Gears set contains all the parts your child will need to add motion to models constructed using either Start 100 or Start 200. The set contains gears, gearing components and battery holder.

For ages 6 and up. Requires 4 "C" batteries (not included). **BP-300** \$59.99, ship wt 3 lbs.



## Add graphics

For more sophisticated learning fun, the plotter/scanner lets your computer write. It combines two graphics units for drawing graphics and graphics copy using your computer. Requires BP-567 or BP-568 software package listed on page 111. **BP-571** \$399.00, 6 lbs. Avail. August.



**fischertechnik**





**NEW**



## Learn real-world applications with 3-Axis Robotic Arm

Build a robotic arm that features: positioning repeatability, ability to move up to 100 grams, easy-to-use software, and much more.

Control with your home computer and required software. Requires one of the software packages listed below. **BP-572** \$350.00, ship wt 7 lbs. Software for Heath/Zenith and IBM PCs, Apple II, II+, IIe **BP-567** \$99.99, ship wt 1 lb. Software for Commodore 64, C-128 **BP-568** \$99.99, ship wt 1 lb.

CONSUMER-READY



## Then go into electromechanics

An extension to Start 100 and 200. Introduces electro-mechanical control of models and demonstrates electrical principles. Ages 10 and up. **BP-320** \$89.99, ship 3 lbs.



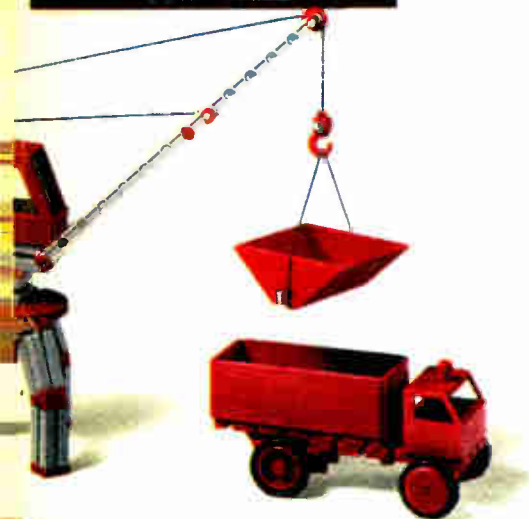
## Followed by pneumatic control

An extension for the construction of air-operated models. Needs Start 100 or 200 to assemble models. Models can be operated by included "Blow Tube" or by BP-458. For ages 12 and up. **BP-340** \$79.99, ship wt 3 lbs.



## Compressor to power models

This is a source of compressed air for models constructed using the Start 100 and the Pneumatics add-on set. The mobile compressor is for use by ages 12 and older. **BP-458** \$79.99, ship wt 3 lbs.



## Experiment with ten robotic devices

Build devices and control them with your home computer and required software. **GDP-1620** \$119.99, ship wt 4 lbs. Requires either BP-567 or BP-568 software package as listed with BP-572 Robotic Arm above.

## Expand the possibilities with these Add-ons



For ages 6 and up. **BP-140** \$29.99, ship wt 3 lbs.



For ages 6 and up. **BP-145** \$39.99, ship wt 3 lbs.



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Mail Order Catalog No. 207 Fall 1987



# Your choices couldn't be more exciting!



**10 MHz Dual Trace Oscilloscope** is a laboratory grade instrument that you can build and use for service work, electronic experimentation, hobby or in your profession. See it on Page 42, and find an extensive line of test instruments on Pages 40 through 53, 105 and 106.



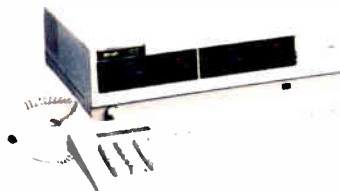
**Build this ultra-compact 9" diagonal color TV.** Features remarkable picture detail and sharpness, color accuracy and 178-channel capability. See Page 18 for this and many more television kits to build.



**The PackKit Multi-Mode Terminal Node Controller** is an all-in-one unit for Packet, decoding and printing weather pictures, and running Morse code. Plus it lets you work Packet error-free in both HF and VHF. You'll find this great new kit, as well as other amateur radio gear on Pages 30 through 39.



**The Convenience Light Control** features the latest in infrared technology to keep your property safe from accident or robbery. Automatic lighting with wide coverage scares off potential burglars and lights your way at night. Also gives you control from an existing wall switch. See Page 24.

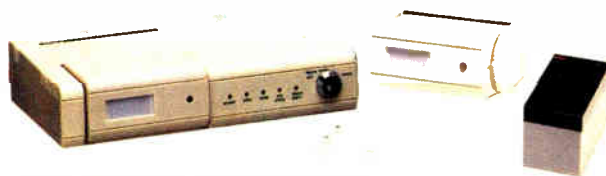


**A perfect computer kit for the beginner.** IBM PC compatible, dual 5 MHz and 8 MHz operating speeds, standard 512K RAM, 360K single disk drive storage and it doesn't require any soldering. See Pages 80-84 to discover this and many more computers to build and learn from.



**The Hero® 2000 robot** is a high technology tool for exploring and learning about the automated machines of the real world. It's also an advanced 16-bit computer that can walk and talk. The centerpiece of a complete automation training system, Hero 2000 has a fully programmable arm with a "sense of touch" gripping system. See Page 68.

**Wake up in style with this attractive, Digital Clock.** It's adjustable and easy-to-set-up. Plus it comes with battery backup for superb reliability. See Page 16.



**This all-in-one security system** detects heat changes and motion with a built-in infrared sensor and alerts you with a loud alarm. Includes panic button and tamperproof-design alarm. Plus it's easy to expand. Optional battery backup available. See Page 103.

