

7-19-86



Heath has just the kit

for you...whether

you're just

starting out

or have been

putting

them together



for

years



LIST OF PRODUCTS - TOP TO BOTTOM:
SK-104 Audio Amplifier with SK-99 Cabinet;
SK-108 Intercom; SK-106 Wireless FM Microphone;
SK-105 Fish Caller; ID-4850 Digital Memory
Oscilloscope; ID-4001 Weather Computer

Heathkit®

Helping you make things better

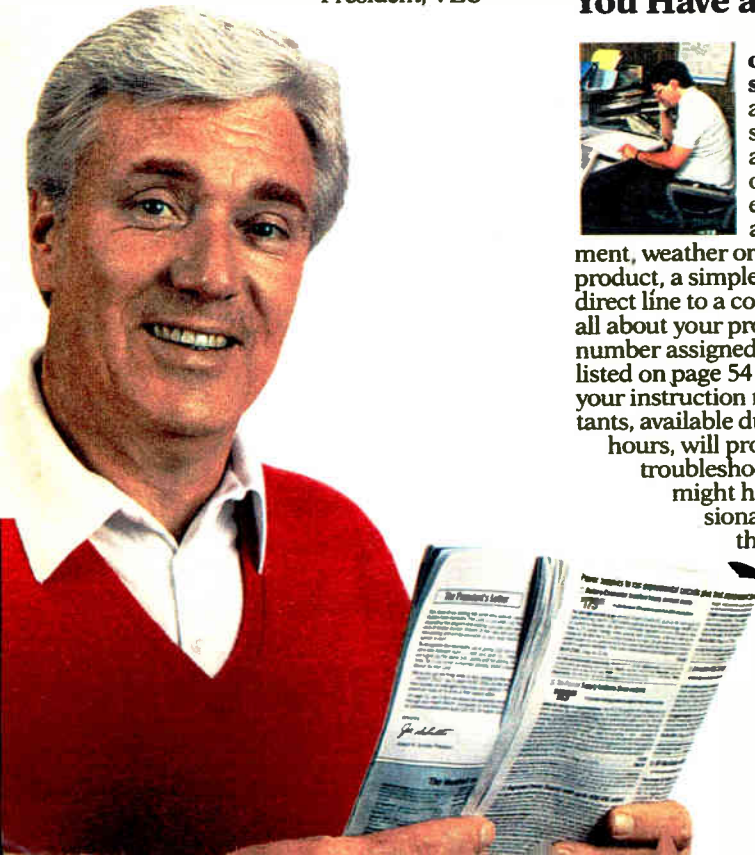
A Tradition of Stability, Progress and Craftsmanship

Dear Friends:

Our nation has been built on experimentation, achievement, and the conquering of new frontiers. In this age of technological advancement, this pioneering spirit is asserting itself more than ever before. The Heath philosophy always has been based on this pioneering spirit...and will continue to be for years to come. Building your own electronic equipment is unique because it bridges the gap between high technology and you. Through kitbuilding, everyone can become an active participant in today's exciting movement toward tomorrow's technology. And it's Heath's continuing commitment to bring to you quality kits. Kits that utilize new technology, provide "hands-on" experience and result in practical products that will serve you for many years to come. And as these pioneering efforts continue you'll notice a new look to the catalog. Let us know how you like it.

Joe Schulte

Joseph M. Schulte
President, VEC

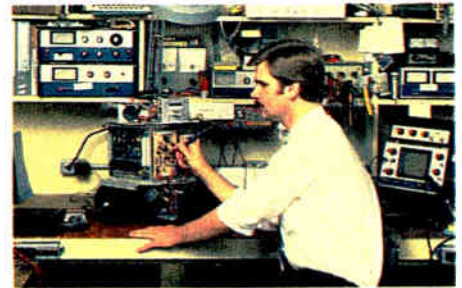


For You...the Company that Offers More

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.

We also have several convenient ways to shop. Purchase products through mail order and on-line services plus the nation-wide retail chain of Heath/Zenith Computers & Electronics one-stop shopping 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, educational product, 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 your instruction manual. 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.

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 do all we can to make sure that both you and the Heathkit product you own never become obsolete to us. No matter how old your product is, you can be sure we'll be here to help you with it.

You see, 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 more than just to have you feel good about the product you buy. We want you to feel good about yourself. And isn't that what a friend's all about?





Kitbuilding – A New Dimension in Product Ownership

At Heath Company we sell excellent pre-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 – advantages that can save you time and money. And of course there's that bonus unique to all Heathkit products – the sense of accomplishment and pride you experience as a kit builder.

We Won't Let You Fail – Complete, Easy-to-Read Instructions

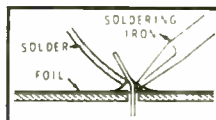
We know how frightening it can be to open an instruction manual and realize that you can't understand everything in it. That's why we've spent a lot of time and effort to make our manuals complete and easy to follow.



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.

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 necessary.

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

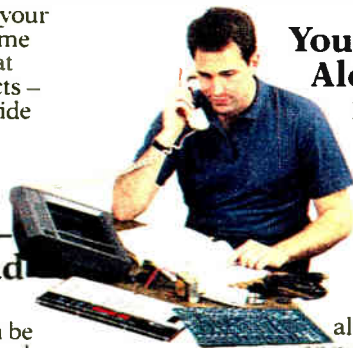
We Make Your Job Easier Yet

Even the package your kit comes in is specially designed to make your job 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.

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.



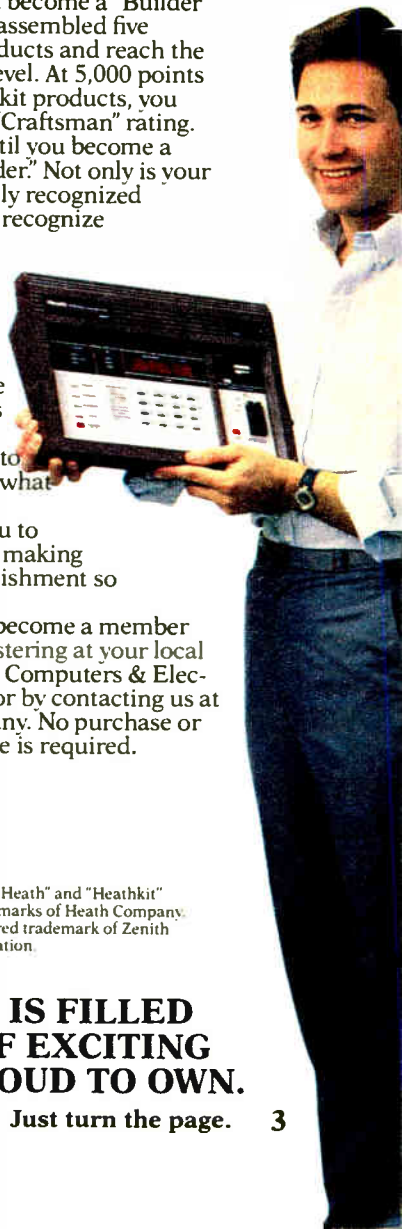
Our Master Builder Club – For You

Building a Heathkit product is a real accomplishment. And when you've built one, we feel you should be recognized for it. That's the concept behind our Master Builder Club.

As a member you can earn Master Builder Points everytime you build a kit. These points accumulate to give you a rating. For example, you become a "Builder" when you've assembled five Heathkit products and reach the 2,000 point level. At 5,000 points and 10 Heathkit products, you receive your "Craftsman" rating. And so on until you become a "Master Builder." Not only is your rating officially recognized by us, but we recognize

you, too, in the form of product discounts and bonuses. The higher the rating, the more benefits you receive. We want you to succeed, and what better way to encourage you to do so than by making your accomplishment so much fun?

You can become a member by either registering at your local Heath/Zenith Computers & Electronics store or by contacting us at Heath Company. No purchase or prior purchase is required.



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OUR NEW CATALOG IS FILLED WITH ALL KINDS OF EXCITING KITS YOU'LL BE PROUD TO OWN.

Just turn the page. **3**

The Heathkit Home...

A special place where you can enjoy the ultimate in electronic products for the family – the best that modern technology can provide. Let's take a walk through a Heathkit Home.

1 Entryway

It's late at night, there's no one home, and you don't have any keys. But you aren't worried because there's a Keyless Doorlock (page 25) keypad next to the door. You simply enter the special four-digit code that you set up earlier and your door unlocks. On entering the house you are greeted by a pleasant temperature and enough light to put your coat into the closet. The SMARTHOME I Controller (page 27) did it all automatically upon sensing your arrival.



4 Den

Later you go upstairs to compose a letter on your HS-241 IBM PC-AT Compatible Computer (page 90). You enjoy its power and speed, and feel pride over the fact that you built the computer yourself. And while you're computing in the comfort of your den, your equipment is protected against power surges because it's connected to the Smart Outlet Box (page 96).



To make sure you don't stay too long, you check the time on the computer's screen. The time is accurate to a tenth of a second because the computer is hooked up to the GC-1000 Most Accurate Clock (page 17). Your clock is ultra-reliable because it locks onto

2 Living Room

As you step into the living room, the SMARTHOME I turns off the entryway light and turns on the living room light. You glance at the far wall, noting the precise time on the Digital Floor Clock (page 16). Next to the clock, the 45"-diagonal rear-projection stereo TV (page 19) blends into the room's decor.



3 Kitchen

As you walk into the kitchen, the smell of fresh coffee fills the air because SMARTHOME I turned on the coffee maker at just the right time. On your kitchen wall is a quartz digital clock encased in a simulated oak woodgrain finish cabinet (page 17). It's battery-operated and light weight, blending style and time-keeping accuracy. A few bars of a delightful classical tune sparkles from the Pleasant Phone Ringer (page 34) connected to your phone.



the National Bureau of Standards broadcast, which even compensates for the earth's rotational wobble.

5 Bathroom

Your bathroom has advantages unheard-of in most homes. There,



electronics and advanced medical technology merge in the form of our digital Thermometer, Blood Pressure Monitor and Scale (pages 21, 30, 31). These helpful devices let you keep more accurate track of your and your family's important physical condition.

6 Bedroom

Time to stretch out and take it easy. Switch on your favorite program on the GR-1903 19"-diagonal stereo TV (page 21). Relax and enjoy stereo video entertainment while the remote unit does the TV control work for you. You can even lock out channels to control what your children watch. An unbelievable hand-crafted quality kit product.



The timekeeper in this room is the Digital Alarm Clock (page 16) with snooze alarm and a display that automatically adjusts to surrounding light.

7 Rec Room

You now take a trip downstairs to the rec room where you often spend



hours with your Heath amateur radio equipment. You switch on your Deluxe QRP CW Transceiver (page 45) and tune in on the signal you want quickly and easily. And with the revolutionary μMatic Memory Keyer (page 42) your messages go out cleanly and errorless. You can't wait to get a hold of all that other Heath Ham equipment that's available. What a system you'll have then.

8 Workbench

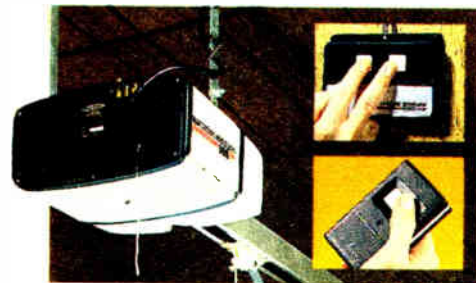
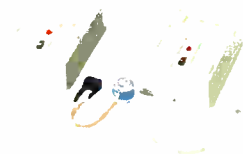
And what Heathkit Home would be complete without a well-stocked workbench? This basement workbench is full of durable and accurate Heath tools, accessories and instruments. Under the bright, cool light of your GDP-200 Illuminated Magnifier



(page 52), you see the IO-4210 Dual Trace Oscilloscope (page 50) – a laboratory-grade troubleshooting and alignment instrument priced for the hobbyist. And, of course, there's your IT-2232 Component Tracer (page 56) which lets you identify defective components and circuit boards.

9 Utility Room

Take a peek in the utility room and you'll find that inconspicuous little helper, the Furnace Air Cleaner (page 35). Take a breath of the clean, pure air that it provides. In the corner stands your home freezer. You know you don't have to worry about expensive food loss from spoilage because the freezer is connected to the Freezer Alarm (page 9). This alarm warns you if the freezer door is left open or if there is a freezer failure.



10 Garage

After getting in the car to leave your Heathkit Home, you press the hand-held remote control for the Garage Door Opener (page 52). Swiftly and smoothly your garage door opens, while the built-in light comes on automatically.

Turn the page and take a look at our dazzling array of quality Heathkit products. You'll find many of our new products showcased on pages 10-13, while still others are highlighted throughout our full-color catalog. Heathkit products offer a unique blend of modern ingenuity and handmade quality to enhance your life.



Have daylight whenever you need it

This Heathkit Rechargeable Portable Light has a bright, yet eye-soothing fluorescent tube that bathes a wide area around you with soft, steady light. Take your portable light with you camping or use it during power outages. 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 – over and over again.

So if you want lighting that's safer than candles or kerosene lamps, and brighter than both put together, our Portable Light is for you. 10 $\frac{3}{8}$ " H x 3 $\frac{1}{8}$ " W x 5" D. Kit **GD-1246-A** \$49.95, ship wt 6 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 2-evening kit takes a minimum 250 mV audio signal from sources like televisions, tape players or radios and clearly amplifies it.

Operates on 120/240 VAC, 50/60 Hz. 2 $\frac{5}{8}$ " H x 7 $\frac{3}{4}$ " W x 5 $\frac{1}{2}$ " D. Kit **AA-18** \$44.95 ship wt 4 lbs.



Heathkit products:
fun and enjoyment
for the whole family



Fun and success come with this AM radio starter kit

This Portable Radio is an ideal way to get your child interested in electronics and kitbuilding. Its 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 first time kitbuilder. Clear tone, excellent AM sensitivity and a high-gain ferrite rod antenna for

long-distance reception are just a few of the features offered with this kit.

Uses 9V battery (not included) or PS-2350 Battery Eliminator on page 59. This handy little radio goes everywhere and includes an earphone. Put it together in less than two evenings. 3 $\frac{1}{4}$ " H x 6 $\frac{3}{8}$ " W x 1 $\frac{1}{4}$ " D. Kit **GR-1009** \$19.95 ship wt 2 lbs.



The Heathkit® Pledge

You will succeed. Carefully written instruction manuals help ensure 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 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!"



STARTER KITS **1**

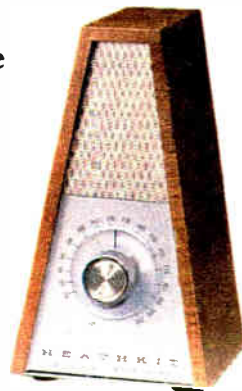


Put a geiger counter in your pocket

This shirt-pocket sized radiation monitor with exceptional sensitivity is ideal for 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 radiation has been detected and the easy-to-read meter shows measured levels on three selectable ranges. Includes battery. 5 $\frac{7}{8}$ " H x 2 $\frac{7}{8}$ " W x 1 $\frac{3}{8}$ " D. Kit **RM-4** \$149.95, 2 lbs.

Keep the beat and be unique with this metronome

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 $\frac{3}{4}$ " H x 3 $\frac{3}{4}$ " W x 4" D. Kit **TD-1257** \$29.95, ship wt 2 lbs.



Credit card orders call TOLL-FREE:

1-800-253-0570

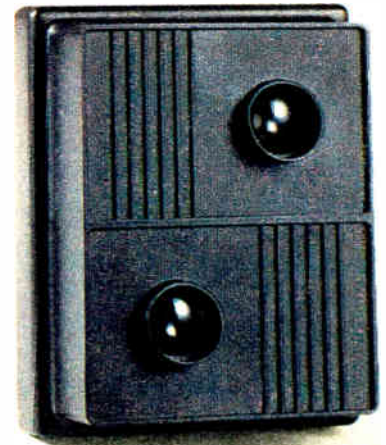
Alaska and Michigan residents call: 616-982-3411.

Professional results with this safe Ultrasonic Cleaner

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 3/8" D tank with one inch of solution and this gem of a cleaner is ready to go to work for you.

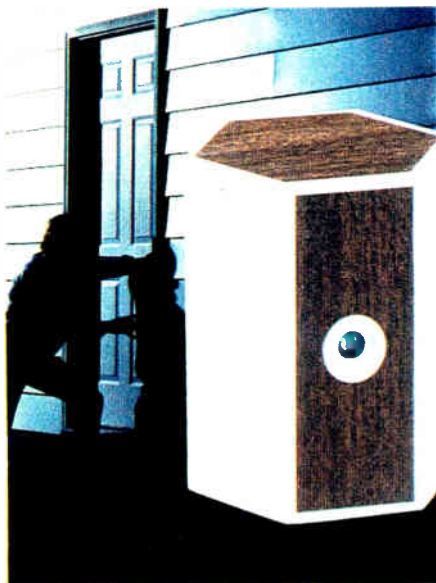
For that professional sparkle that's yours anytime, this affordable, easy-to-build kit is a must! Build it in one short evening. Plugs into household AC outlet. Kit **GD-1151** \$99.95, ship wt 5 lbs.



Sleep better

Imagine what it would be like to have a guard on duty at your home all night long. Now you can have this feeling of security with the Heathkit Photo-beam Alarm Relay because it detects intruders instantly with a narrow beam of light. This beam, which is bounced back to the Alarm with a reflecting mirror, can activate a lamp or any 120 VAC warning device up to 300 watts total. And, our Alarm Relay is sensitive to its own light source from up to 25 feet away from the mirror.

A one-evening kit. 5 3/8" H x 4 3/8" W x 5 1/4" D. Kit **GD-1021** \$19.95, ship wt 3 lbs.



Credit card orders call TOLL-FREE:

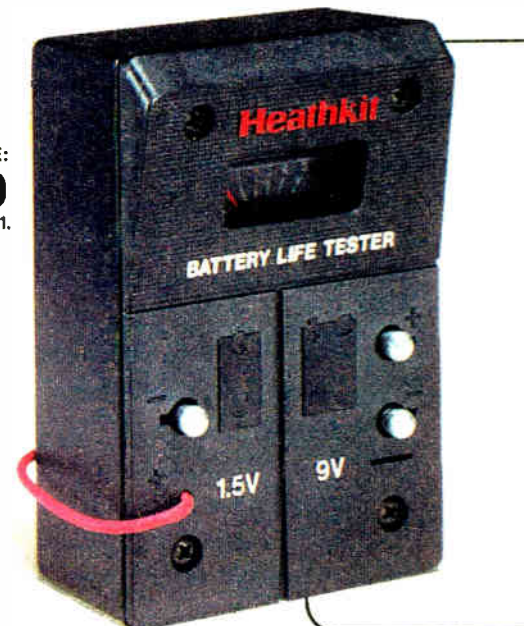
1-800-253-0570

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

Outwit potential thieves

Here's a sure-fire way to ease your "how's the house" worries when you're away. Your Heathkit Photoelectric Light Switch turns selected lights on in the evening, off at dawn - automatically. It gives that "lived-in" look to an empty house. Plug in the switch, adjust the sensitivity and you have complete control of lamps or other AC-operated devices up to 150 watts.

A unique form of insurance that's low in cost but high in value. A quick one-evening kit. 3 1/2" H x 2 5/8" W. Kit **GD-600** \$9.95, ship wt 2 lbs.





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.

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! 1¾" H x 3⅝" W x 4⅞" 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. 1¾" H x 3⅝" W x 4⅞" L. Kit **GD-1701** \$24.95, ship wt 2 lbs.

This handy tester won't let your batteries play dead

Don't throw away those batteries – yet. They may not fire up your flashlight, but they might be useful in a child's toy. To know for sure, get the Heathkit Battery Life Tester. It not only tests whether batteries are dead or alive, but it also shows you how much useful life remains on a wide 0-to-5 meter scale. This money-saver tests alkaline and carbon-zinc 9V and 1.5V "AA," "C" & "D"-size batteries, or 1.2V rechargeables. Get maximum use from your batteries and have fun building this easy, one-evening kit. 1⅝" H x 2½" W x 3½" L. Kit **GD-1703** \$16.95, ship wt 1 lb.





Power up equipment with DC Power Supply

Power your new Starter Kits, tape player, CB or experimental project with the DC Power Supply. The Power Supply has a variable output from 4 to 18 volts and supplies 2 amps of current. You can add a zener diode (included) to change the output to 4 to 14 volts at 3 amps. Complete the lesson in the optional Starter Kits Educational Manual (p. 10) to understand the purpose of a power transformer, rectifier circuit, filter circuit and regulator circuit. 3" H x 4½" W x 6½" D. Kit **SK-101** \$39.95, ship wt 5 lbs.



Protect your phone

Now, you can stop worrying about losing data or having valuable equipment damaged by phone line power surges or lightning. The Telephone and Modem Surge Protector safeguards telephones, modems, automatic dialers – anything connected to your phone line. An easy one-evening kit. 1½" H x 2⅞" W x 4" D. Kit **SK-201** \$14.95, ship wt 1 lb.



Personalize your kits with a brass name plate

You've just finished that kit and everything works great and looks great because you did it yourself. Now mark the special care and the technical skills that you've invested in your finished kit with a Name Plate engraved with your name. The Name Plate is made of solid brass, brushed to a jeweler's finish. It has a self-adhesive backing for easy, no-mess application.



Show off your DJ personality

Entertain your friends or develop your own radio show with the FM Wireless Microphone. Transmit your voice to any FM radio receiver up to 50 feet away. A great way to live up any party. Follow the lesson in the optional Educational Manual (p. 10) to learn about FM radio theory. Operates on two included watch batteries. Kit **SK-106** \$9.95, ship wt 1 lb.

FILL IN THIS COUPON TO ORDER

Please send _____ solid brass name plate(s) with my name engraved on them. Enclosed is \$ _____ (\$2.00 for one plate or \$1.60 each, for two or more) which covers first class postage and handling.

Please print name plainly in capital letters using no more than 14 characters (including spaces) in the boxes below.

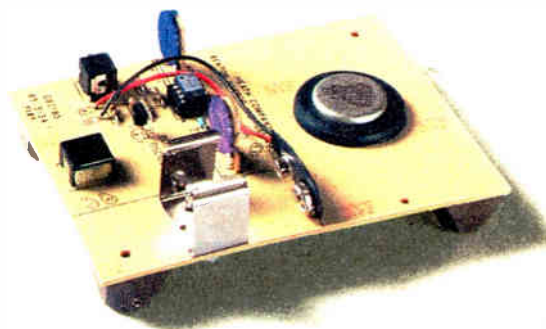
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Name: _____

Address: _____

City: _____ State: _____

GDP-1225 Zip: _____



Master Morse Code with Code Practice Oscillator

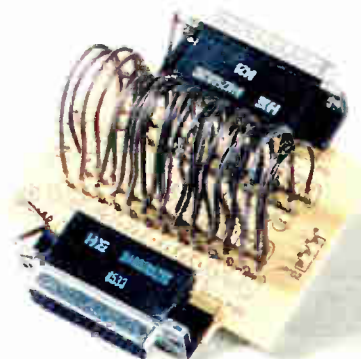
Learn International Morse Code with the economical Code Practice Oscillator. Enter code on the push-button or hook up your

personal keyer to the kit. Adjust the tone and volume to your liking. Besides being a low cost oscillator, this Starter Kit demonstrates the use of the popular 555 astable timer IC to generate an audio tone. Learn about the 555 timer IC and its many applications when you complete the lesson in the optional Starter Kits Educational Manual (p. 10). Kit **SK-102** \$9.95, ship wt 1 lb.

Connect mismatched equipment quickly and easily

Link-up a new printer to your old computer system, or mate any hardware without being thwarted by the annoying problem of differently wired cables. Plug your mismatched male and female cable into the RS-232 Patch Board and patch locations together to determine the correct configuration for interconnecting the two devices. You can then use this knowledge to make a cable that fits your application, or leave the Patch Board in place. The Patch Board is an easy one-evening kit. Kit **SK-210** \$14.95, ship wt 1 lb.

STARTER KITS **1**



The AC Conductor directs your computer and peripherals from one convenient control unit

You'll never try to print and discover your printer's not on. You'll never forget to turn off a peripheral, you'll never again stretch to reach those often-inconvenient power switches. The AC Conductor brings all of these controls together in a neat row of labeled switches you can easily reach. Now you can sit down in front of your computer and flip a Master Switch to turn on all five devices, or flip on only two or three of them. An LED near each switch reminds you of what's on and what's not.

The AC Conductor gives you this much desired convenience without adding another piece of equipment to crowd your desk. And, it doubles as a handy swivel base that tucks in right under your monitor. Plug your devices into the back of the base and control everything from the front panel. The AC Conductor even protects your valuable equipment against power surges. A one-evening kit. 1 $\frac{3}{4}$ " H x 13 $\frac{1}{2}$ " W x 14" D. Kit **SK-209** \$49.95, ship wt 11 lbs.



An electronic weather almanac



No more over-dressing in sultry weather because you didn't know it would be hot. No more rain-soaked clothes because you didn't know it would be wet. And it's all made possible with the Heathkit Digital Weather Computer. You'll always know exactly what the weather is doing because your Weather Computer displays everything from wind chill factor to indoor and outdoor temperatures to

wind speed and direction with accurate 16-point compass resolution. Your Weather Computer even tells you barometric pressure, its rate of change and whether pressure is rising or falling – all with four-digit accuracy. What's more, all readings are also available in metric units so you can choose the format that you understand. No storms or freezing temperatures will take you by surprise again.

If knowing the weather is part of your job, or if you're just someone who goes outdoors regularly, you'll appreciate the microprocessor controlled memory which stores weather data by date and time. You can take a look at minimum and maximum readings for anything from indoor temperature to peak

wind gust. With all this information at your fingertips, you'll be able to plan 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.

Not only is the Heathkit 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), 981.9 to 1050 millibars. Accuracy: ± 0.075 in. Hg. ± 0.01 in. HG/°C. **Operating Temperature:** Outdoor assemblies, -40°C to +70°C (-40°F to 158°F). Indoor Unit, 15° to 35°C (59° to 95°F). **Power Requirements:** 120/240 VAC. Provision for external battery connection for memory backup during power failures.



Monitor the weather yourself with your own station

Keep track of the weather in style with the Heathkit 5-Function Weather Station. Take readings of barometric pressure, indoor/outdoor temperatures, and wind speed and direction with professional-grade sensors. With its non-corroding remote transmitter assembly and minimum power consumption, your Weather Station will last and last. And, installation is easy. Anemometer/weathervane connects to any standard 1" to 1½" mast.

A 4-evening kit that can be wall-mounted or used as desk set with included stand. Watching the weather was never so much fun. Wall mounted,

20½" L x 7" W x 2" D. Desk mounted, 6¾" D. Kit **ID-1290** \$169.95, 8 lbs.

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

Other Specifications: **Wind Speed:** 0-30 mph, ± 2 mph; 0-90 mph, ± 5 mph. **Direction:** 8-point readout over 360°. **Temperature:** 0° to +120°F, ± 2°F (typ. INDOOR); -40° to +120°F (typ. OUTDOOR). **Barometric Pressure:** 28-31 inches of mercury within 0.5 inches, accurate up to altitudes of 10,000 ft. **Operating Temperature:** Receiver, 32° to 100°F; Transmitter, -40° to +120°F. **Wind Direction:** 16-point resolution by lighting two adjacent lights. **Weight:** 7 lbs.



A way to measure rainfall and eliminate 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 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 the display. And you'll appreciate the compact size of your gauge. The display measures 2½" H x 7" W x 5" D while the sensor unit measures 9" in diameter x 9½" H. Your gauge even includes a 60' cable and a power cube for convenient 120 VAC operation. Kit **ID-1795** \$99.95, 7 lbs.



Save money by monitoring air moisture

Here's a sure-fire way to make your home more comfortable while saving heating and cooling costs. The Heathkit Relative Humidity Indicator is unlike most hygrometers because ours uses a gold-covered conductive film for greater reliability. With the electronic sensors and 100' transmission cable, you get accurate readings in remote locations, indoors and out. So you'll always know when it's dry enough to paint outdoors in summer or time to turn on the humidifier indoors in winter. With both sensors, you can see alternate indoor and outdoor readings or display one reading constantly if you like. Bright 1/2" digits display the humidity by percentage. And, it's a kit. In only two to three evenings you can build a quality hygrometer that costs half as much as comparable units. 2 1/2" H x 7" W x 5" D. Kit ID-2295 \$99.95, ship wt 6 lbs.

Digital technology for monitoring the winds

The Heathkit Digital Wind Speed/Direction Indicator measures wind speed and direction with precision, fits anywhere in your home, and can be built by you in just three evenings. Your Indicator combines both a non-corroding anemometer and weather vane for truly accurate readings and an indoor console display with 16-point compass resolution for always-easy viewing. For your convenience, you can even wire your Indicator to report in two of three scales: mph, kmh and knots from 0 to 99. Plus, you can calibrate for either true north or magnetic north. All this quality instrument needs to be up and running is an 8-wire cable, two simple adjustments, and 120 VAC. Requires one of the 8-wire cables from the ID-1290 accessories. It's a breeze. 2 1/2" H x 7" W x 5" D. Kit ID-1590 \$99.95, ship wt 7 lbs.

A better household thermometer

We've improved the household thermometer just for you. How? First, our Digital Indoor/Outdoor Thermometer has large, red display digits that can be clearly seen from across the room, at night and in bright daylight. Second, this special thermometer has two sensors for continuous or alternating indoor/outdoor readings and an accuracy of from $\pm 1^\circ$ to $\pm 2^\circ$. The 2 1/2 digit display even shows you above-and below-zero temperatures in Fahrenheit or Celsius. And you can build it in three evenings. Operates at 120 VAC, 60 Hz (order ID-1390-BE for 240 VAC, 50/60 Hz operation). 2 1/2" H x 7" W x 5" D. Kit ID-1390-B \$89.95, ship wt 4 lbs.



Time gracefully passes by with this striking clock

A five-foot high handsome simulated walnut-veneer cabinet. Smoked $\frac{1}{4}$ " thick glass shelves. Sounds like an attractive piece of furniture, right? But it's more than that – it's the Heathkit Digital Floor Clock. You'll love the bright, $\frac{3}{4}$ "-high digital readout that adjusts to surrounding light. Choose between a contemporary "see-through" styling with a dark background and a golden-orange display or a dark smoked glass with a subtle gold-toned display. And as a time-piece this floor clock is superb. Plus, the easy-to-use advance switches on the bottom of the clock chassis make setting the time a breeze.

This simple kit will add elegance to any room in your home. Operates on 120/240 VAC, 50/60 Hz. $60\frac{1}{2}$ " H x 14" W x $9\frac{1}{2}$ " D. Kit **GC-1195** \$174.95, ship wt 58 lbs.



A time-piece that is easy to build and easy to use

Our Heathkit Digital Alarm Clock kit has special metal-oxide semiconductor (MOS) integrated circuits for space-age accuracy. And its four-digit blue-green fluorescent display automatically adjusts to the amount of light in your bedroom. What's more, your clock's easy-to-use switches let you set your alarm for extra snooze time. And you can select either a 12- or 24-hour time format. Operates on 120 or 240 VAC, 50/60 Hz. $2\frac{1}{2}$ " H x 7" W x $4\frac{3}{4}$ " D. Kit **GC-1107** \$29.95, ship wt 3 lbs.



The clock that taps into the atomic age

Experience the precision of a microprocessor-based time piece that is synchronized with the National Bureau of Standards cesium atomic clock. The patented Heathkit Most Accurate Clock locks into the NBS radio station to give you the hour, minute, second and tenth-of-a-second in Universal Coordinated Time. With a "Hi Spec" accuracy of ± 10 milliseconds, this unique clock lets you switch to any of the world's standard 24 time zones. Not only do you get a bright digital readout of the time, but you can feed that data to your computer, listen to the NBS broadcast over the audio monitor and keep track of the data transmission. Powered with standard home AC power, your Most Accurate Clock automatically resets to the correct time even after power failure. An outdoor antenna is recommended but may not be needed in your area.

Be the envy of all your house guests. $3\frac{3}{8}$ " H x 9" W x $6\frac{1}{4}$ " D. Kit **GC-1000** \$249.95, ship wt 7 lbs. Assembled **GCW-1000** with RS-232C Output, \$425.00, ship wt 6 lbs.

Accessories: **GCA-1000-1** RS-232C Output Accessory required for use with a computer \$49.95, ship wt 1 lb.

Finally...a wall clock that's right for any room

Have you ever seen a wall clock that fits in everywhere? And attractively? The Heathkit Digital Wall Clock does. With its simulated oak wood-grain finish cabinet it lends style to whatever room it's in. With its sturdiness and light weight, this versatile clock is easy to move. What's more, 1" high LCD digits clearly and legibly display time in a 12- or 24-hour format. But you get much more. Your Digital Wall Clock is efficient. It has quartz-crystal accuracy of ± 1 minute per year while running up to two years on a single 1.5 "AA" alkaline cell. Just think... all this in an easy-to-build, one evening kit. $5\frac{1}{4}$ " H x $7\frac{7}{8}$ " W x $1\frac{1}{2}$ " D. Kit **GC-1720** \$49.95, ship wt 2 lbs.



The level that thinks

Measuring angles and grades can be crucial. That's why you want to use a level like the Digital Levelmeter. The photo-electric transducer and microprocessor control supply readings accurate to 0.5° over the wide range of $\pm 120^\circ$. You can even view your readings from any angle with the help of two liquid crystal displays. And with a push of a button a beeper will let you know when your Levelmeter is horizontal. Working at night or in low light? Your Levelmeter has its own lamp. Unable to see the display while you're checking a level? Just freeze the value on the display by pushing the HOLD button. Uses two "AA" batteries. $3\frac{3}{4}$ " H x $6\frac{1}{4}$ " W x $1\frac{3}{8}$ " D. Assembled **SM-2370** \$99.95, ship wt 1 lb.

Accessory: **SMA-2370-1** Levelmeter Base, securely holds the SM-2370 making it into a 60 cm long level \$39.95, ship wt 2 lbs.



If you've been dreaming about the perfect stereo TV, wake up to the GR-2700

Imagine what would happen if you took your 25" TV screen, cut out those rounded corners and flattened it. You'd get more pictures – 25 sq. inches more. Then surround the 27"-diagonal picture with stereo sound. For the final touches, add some extras that are so handy you'll wonder why they weren't standard on that TV you just cut and flattened. Extras like Parental

Slide-out panel gives you complete audio and video control

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 of all audio and video features. You get all of these and more when you build the GR-2700 kit TV. A kit with all but one circuit board preassembled and a built-in cross-hatch generator – so you can make alignment adjustments yourself. Imagine that.

When you actually stand in front of your dream set, you'll discover that it's what's inside that makes the picture look so great. Besides the extra care and quality you put in when you build it, the GR-2700 features the newest Advanced System 3 television technology. 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 life-like flesh-tones and accurate color and contrast. Automatic CRT tracking ensures that colors remain vivid and true year after year. You get an incredibly sharp, realistic picture with the Advanced System 3's Chromacolor Contrast picture tube and peak resolution picture circuit.

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.

The Parental Control Provision allows you to lock out any channels for a 12 hour period. During this time, only you may access these channels by a code which you create. Even unplugging the set won't disturb your privacy setting. Select up to 178 channels (except scrambled premium services) with quartz electronic tuning on the set or with the included remote control. The remote also operates most Zenith VHS recorders. Must be assembled with included cabinet. Cable ready.

Configurations:

Kit **GRS-2700-1** 27"-diagonal TV with Modern Cabinet. Features a walnut veneer finish. Includes concealed casters and two 3" x 6½" speakers. Modern Cabinet measures 29¾" H x 41" W x 18½" D \$799.95, ship wt 208 lbs., Motor Freight.

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 \$749.95, ship wt 199 lbs., Motor Freight.



Modern Cabinet

Simulated TV pictures



Mediterranean Cabinet



Credit card orders call TOLL-FREE:

1-800-253-0570

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

Economical table-top stereo TV has big set features

You can turn even the smallest room in your home into a state-of-the-art entertainment center. And, you won't have to sacrifice any of the advanced features you want for the convenience of a table-top TV. With built-in stereo system including a decoder and 2-watt amplifier, special channel selection commands and Advanced System 3 chassis, this 19"-diagonal TV packs big features and a small price.

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

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 football games, and use the remote to operate Zenith VHS recorders. 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 every 30 seconds. 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).

You can 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 100 lbs.

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

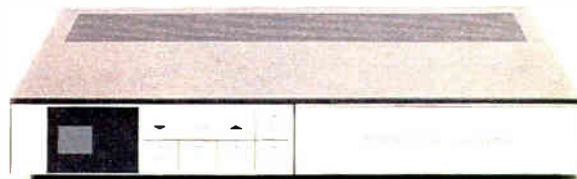


Convenient
Mobile TV Cart

Simulated TV picture

Switch video sources

Switch between up to four video sources with your remote or panel controls. For GR-1902, GR-1903, GR-2502, GR-4500, GR-2700 TV's. Assembled **GSZ-4600** \$39.95, 4 lbs.



Hear stereo broadcasts with Adapter

Decodes and plays broadcast stereo and second audio programming. Can be set for auxiliary stereo, extended stereo and mono audio. Works with TV speakers or your audio system. Bass, treble, balance controls. Use with Heath GR-2502 or Zenith TV's with an "IF tap output." Add-on kits (below) for other Heath TV's. Assembled **GDZ-524** \$189.95, ship wt 12 lbs.

Accessories:

Kit **GDA-524-1** Cable Adapter for use of GDZ-524 with Heath GR-1901, GR-1902, GR-2501, and GR-3000 TV \$9.95, ship wt 1 lb.

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



Watch your weight with Digital Scale

Whether you're a fitness enthusiast or just dieting, you'll appreciate the Digital Scale's precision readout on items from 2 ounces up to 300 lbs. It's sensitive to 1/10th of a pound and has manual zero adjustment. Has no springs or weights to wear out. Wire it to read in pounds or kilograms. Requires 6 "C" batteries. Two-evening kit. Kit **GD-1186** \$99.95, ship wt 9 lbs.

Share your VCR with every television in the house

Your family's video enjoyment will be multiplied with the VCR-RABBIT. It sends the video/audio signal from your VCR to all other televisions in your home. You can watch movies in bed and the kids can watch a favorite show in their room. You can even send cable TV and satellite TV from a single hook-up to all your TV's. Watch the football game while the rest of the family watches a movie. You can view regular television on any set while a video tape is showing on another set. With the VCR-RABBIT system, all the functions of your wireless remote VCR can be controlled from any TV. Plus, your non-remote TV is turned into a remotely-controlled TV. The system includes everything you need for easy installation. Just hook up the transmitter to your VCR and attach a receiver to each TV. Then connect the transmitter to your receivers with the thin, easy-to-hide wire (included). Each unit measures: 1 $\frac{3}{4}$ " H x 6 $\frac{1}{2}$ " W x 4" D. Manufactured by Rabbit Systems, Inc. Assembled **GDW-5700** Complete system of transmitter, receiver and wire \$79.95, ship wt 4 lbs. Assembled **GDW-5800** Extra receiver \$39.95, ship wt 3 lbs.

NEW



Stereo Synthesizer

Add this Synthesizer to your TV or VCR to enjoy high-quality, realistic stereo sound. Assembled **ADP-1501** Was \$99.95 Now \$74.99, 3 lbs.



Put a television in your pocket

This black-and-white CASIO TV-21 is perfect for the businessman or sports fan. The 2"-diagonal screen provides sharp, clear images. Continuous electronic scan tuning makes UHF or VHF channel selection easy. Has channel display, tuning indicator, volume and brightness controls, and earphone. Optional backlight enhances night-time or dim light viewing. 2 $\frac{1}{2}$ " H x 4 $\frac{3}{8}$ " W x 1 $\frac{3}{8}$ " D.

Assembled **GVP-3412** \$89.95, ship wt 4 lbs.

Accessories: Assembled **GVA-3412-1** Backlight \$14.95, ship wt 1 lb.



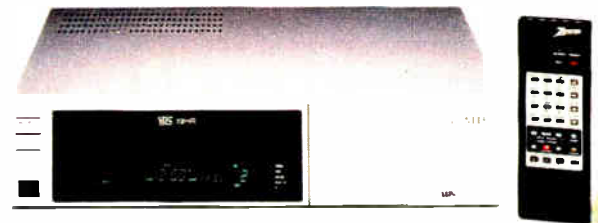
Simulated TV pictures

NEW



CASIO Color TV is smaller than a paperback book

Take this color TV along on family outings. The tiny CASIO TV-2000 has a large 2.6"-diagonal high-resolution screen and a speaker so the whole family can watch together. A backlight enhances viewing in the dark. Press a button and the electronic tuner scans the UHF or VHF stations. The GVP-3414 also features brightness, tint, color and volume controls; channel display; earphone jack and audio-video jack. Includes earphone. Measures 1 $\frac{1}{8}$ " H x 5 $\frac{3}{4}$ " W x 3 $\frac{3}{8}$ " D. Assembled **GVP-3414** \$249.95, ship wt 2 lbs.



Deluxe VHS recorder

Four video and two audio heads, a built-in stereo decoder, VHS HiFi and dolby stereo make this the ultimate VHS recorder. Has 14-day 8-event programmable auto-timer with 8 hours of recording and playback at SP (LP available for playback). Also features: front self-loading; automatic rewind; two-way picture speed search; still picture; frame by frame advance; time remaining indicator; remote programming; slow and fast motion video action in forward and reverse, and direct quartz tuning to 178 channels. Cable ready. Assembled **GDZ-4100** \$999.95, ship wt 23 lbs.



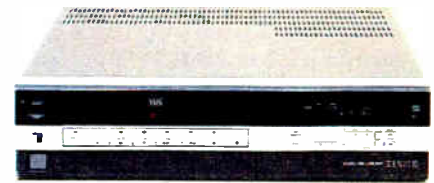
Economy VHS recorder

Has SP or EP speed for up to 8 hours of recording, and switches to the correct speed for SP, LP or EP playback. Also has 14-day, 1-event programmable auto record timer, automatic front self-loading, automatic rewind, 2-way speed search, slow motion, still picture, and 82 channel quartz electronic tuning with two-speed up/down channel scan. Includes remote. Assembled **GDZ-1801** \$399.95 ship wt 21 lbs.



Six-heads and MTS

This VHS recorder has a rotary six-head scanning system plus Multi-Channel Stereo Sound. Features stereo and second audio decoder; front self-loading; 178 channel quartz electronic tuning; audio dubbing; continuous picture advance, still/pause; 14-day, 8-event programmable auto record. Includes remote. Cable ready. Assembled **GDZ-3200** \$749.95, ship 23 lbs.



Four-head VHS recorder

Features: 14-day, 4-event auto record timer, automatic front self-loading; SP or EP recording and SP, EP or LP playback; automatic rewind; 2-way picture speed search; still picture, pause and frame-by-frame viewing; and 157 channel quartz electronic tuning with direct access and two speed up/down selection. Includes remote. Cable ready. Assembled **GDZ-2100** \$499.95, ship wt 21 lbs.

Zenith VHS video tapes

GDZ-2000-2 T-60 \$7.95, ship wt 1 lb.
GDZ-2000-3 T-120 \$8.95, ship wt 1 lb.
GDZ-2000-4 T-160 \$14.95, ship wt 1 lb.
GDZ-2000-5 T-120 SHG for optimum quality \$12.95, ship wt 1 lb.

Mini-Cassette VHS-C Video Movie Camera/Recorder



Besides being the smallest, this video camera/recorder is also the lightest at 3½ lbs. including the battery pack and cassette. And it is loaded with features like a 1-hour record time; 15 lux sensitivity for low-light filming; a fast and precise f/1.6, 6:1 auto-focus zoom lens; and automatic filter selection, white balance, iris opening and focus. For monaural recording a detachable microphone is built in.

This compact camcorder is a complete system with accessories like a camera-mounted battery pack, a cassette adapter for viewing cassettes on VHS recorders, A/V cable, battery charger, RF converter and cassette. Assembled **GDZ-6200** Available August, ship wt 5 lbs.

Accessories: **GDZ-6000-2** Compact Video Cassette \$7.99, ship wt 1 lb.



Disposable cartridge gives you virtually service-free operation

Canon Personal Copier for home or business

Stop spending time and money running out for copies. Produce excellent, inexpensive copies with Canon Personal Copiers. Snap-in cartridges let you replace problem-causing devices for virtually service-free operation. One cartridge produces about 2,000 high quality copies. Order black, brown or red cartridges separately.

The PC-10 produces two-sided copies, transparencies and address labels. 7" H x 16½" W x 18¾" D. Assembled **PP-710** Was \$695.00 Now Only \$599.00, ship wt 48 lbs.

The Canon PC-14 makes up to 8 copies a minute. An automatic stack-

sheet feed allows up to 19 multiple copies on paper from business card to letter size. 7" H x 17¾" W x 19¾" D. Assembled **PP-714** Was \$895.00 Now \$799.00, 49 lbs.

The Canon PC-25 is for almost any copying task. Besides 1:1 copying, it can reduce by 67% or 78% and enlarge to 120%. Features automatic feed, 1 to 19 multiple copies and copies up to legal size from originals up to 10 x 14. 11½" H x 18¾" W x 19¾" D. Assembled **PP-725** Was \$1195.00 Now Only \$999.00, 72 lbs.

Accessories: **PPA-710-1** black cartridge \$64.95, 5 lbs. **PPA-710-2** brown cartridge \$79.95, 6 lbs. **PPA-710-3** red cartridge \$79.95, 6 lbs.



Wireless security system offers total home protection

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 200' 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. 3 $\frac{3}{4}$ " H x 11 $\frac{1}{2}$ " W x 8 $\frac{1}{2}$ " D. Kit **GDA-2800-1** \$299.95, ship wt 24 lbs.

Accessories:

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

Assembled **GDA-2800-3** Wired-Circuit Transmitter protects doors, windows against entry. Also works with GD-1701 Flood Alarm (p. 9) \$39.95, ship wt 1 lb.

Assembled **GDA-2800-4** Remote Command Transmitter controls System within 200' range \$49.95, ship wt 1 lb.

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

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.

Assembled **GDA-2800-7** Four Magnetic/Reed Switches for single or parallel connection \$24.95, ship wt 1 lb.

Assembled **GDA-2800-8** Passive Infrared Motion Detector for hard wired security systems. Requires 6-18 VDC. (Not for GDA-2800 or GDA-3800) \$99.95, ship wt 1 lb.

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.

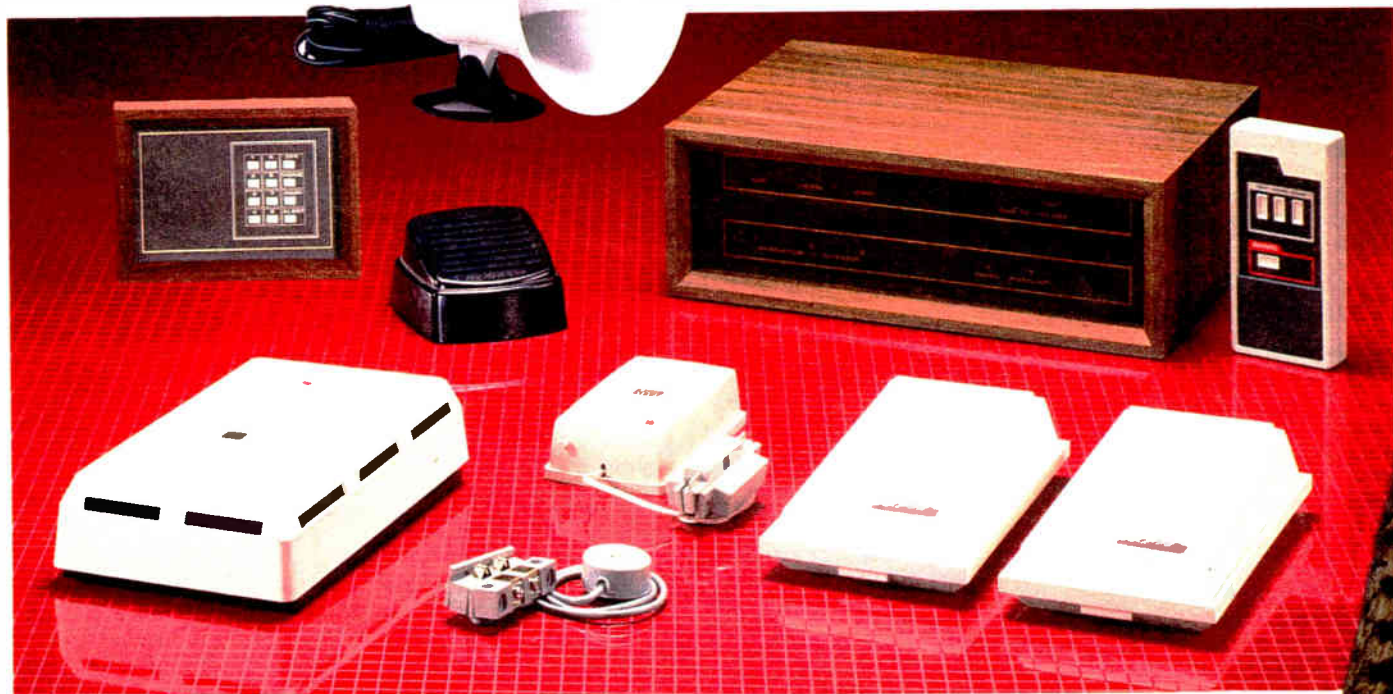
Assembled **GDA-1800-3** Extra Outdoor Alarm Horn (like shown) \$24.95, ship wt 3 lbs.

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 \$539.95 Our System Price \$499.95, ship wt 43 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 between light and alarm activation gives you time to deactivate the audible alarm when you enter the area. The Informer is ideal for alerting you when your child leaves its bed. It can also be used as a convenient 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.





Program the Controller to run your lights and appliances

Let the SMARTHOME I Controller take 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 the way and shut off behind you. You hear the radio turn on in time for the news. When you leave an hour later the coffee-maker and radio 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 given you a smooth 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. You program the Controller to turn lights and appliances on and off or to dim lights at specific times through software and your home computer. Using the software, draw your floor plan on your 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. It uses house

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



Smoke Detector/
Transmitter

Motion Detector/
Transmitter

Wired-Circuit
Transmitter

wiring – just plug BSR modules (p. 29) into wall sockets and plug lamps or appliances into the modules.

The Controller also will receive and act on RF signals. Touch a button on your remote control (included) to dim a light or turn on the stereo. Add sensors or a whole security system from the GDA-2800 series to have a home in which appliances and lights are controlled, not only by your preset patterns and remote control, but by events the sensors detect.

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.

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.



Credit card orders call TOLL-FREE:

1-800-253-0570

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



Add a touch of distinction to your welcome with a musical doorbell

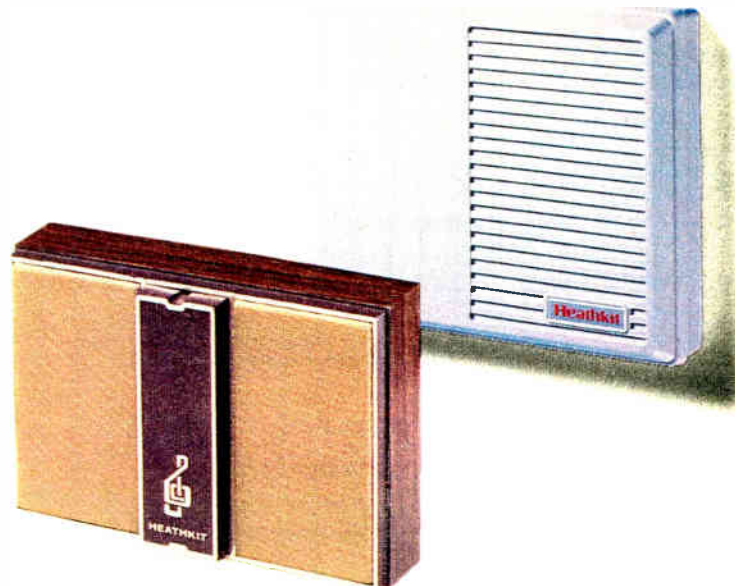
Replace your ho-hum doorbell with one that offers your guests a unique and pleasant welcome. This doorbell plays your choice of three selections: an upbeat 4-note ring, a short selection of Beethoven's Für Elise, and a longer selection of Rubinstein's Romance.

You can select different tunes for your front and back door by jumping wires to small sockets. You will always know which door to answer and won't keep your guest waiting while you check the wrong door. Put a warm and classical spirit of welcome in your home with the 3-Tune Doorbell. It can be built and easily installed in an evening. The Doorbell operates on 2 "C" batteries (not included). For unlit doorbells. 4¾" H x 5⅞" W x 1¼" D. Kit **TD-2089** \$24.95, ship wt 1 lb.

Greet guests with their favorite song and open your door to smiles

Watch your guests smile when they are greeted with a song you have chosen just for the holiday or occasion. The Programmable Doorbell is a great ice breaker and conversation starter. You can program it with any tune, simply by arranging wire leads on a one-octave "keyboard" behind the front panel.

The Doorbell comes with a songbook containing over 50 songs with 15 college songs, 7 seasonal songs plus 9 Christmas songs, and 5 songs to commemorate special occasions. Add a touch of fun or elegance to a special event or day by programming in an appropriate song. For your convenience, 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. 5¾" H x 8⅝" W x 2⅞" D. Kit **TD-1089** \$49.95, ship wt 3 lbs.

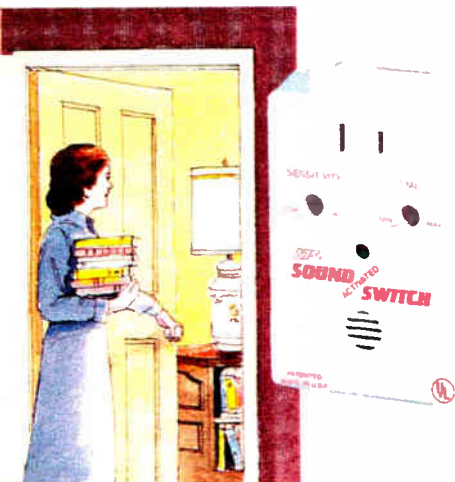


Get safety and savings – put a Sound Switch there

Do you fall over your shoes or down the steps before you reach that light switch? Are your kids afraid to cross a dark room to turn on a light? Are you throwing money away because of lights left on in empty rooms?

There are probably several areas in your home that could be made safer or more economical by the addition of a Sound Activated Switch. This unobtrusive little unit turns lights on when it hears you and turns them off when it doesn't. You simply plug the Switch into your outlet and plug your lamp into the Switch.

The UL approved Sound Activated Switch operates up to 300 watts of 120 VAC lights. A sensitivity adjustment lets you set the sound-triggering level and a timing adjustment sets the turn off delay. Assembled **GDP-1270** \$19.95, ship wt 1 lb.



Experiment with 10 robotic devices

The Fischer Technik Robotic Experimenter lets you build intriguing, computer-controlled devices. Use the included software and interface to program your computer to control a plotter, robotic arm and more.

Configurations:

Kit **GDP-1620-1** for Heath/Zenith PCs and IBM compatibles \$179.95, ship wt 3 lbs.

Kit **GDP-1620-2** for Apple II, II+, IIe computers \$179.95, ship wt 3 lbs.

Kit **GDP-1620-3** for Commodore 64 and VIC 20 computers \$179.95, ship wt 3 lbs.

Design your own electronic home control system

HOME PRODUCTS 

Control lamps and appliances with a single timer, by remote control and by computer

Put together a home control system which will fit your own unique needs with BSR components. You can even turn on the air conditioner or the lights by phone. Decide what types of control you want, order the components and start creating your custom system.

Begin with the Mini Controller Console for remote control, from beside the bed or wherever you plug in the unit. Console signals are transmitted over house wiring to the module of your choice. Just plug lights and appliances into the appropriate module. Your control can extend to unattached buildings or outdoor lighting. Control up to 8 groups of modules with as many modules as you wish in each group. Dim and brighten lights by holding down a key. Touch a button to turn all lights on, or all lights off. Assembled **GDP-1550** Was \$21.95 Now \$12.99, ship wt 2 lbs.

Accessories:

Assembled **GDP-1520-A** Timer Command Console automatically controls lights, appliances Was \$69.95 Now Only \$29.99, ship wt 3 lbs.

Assembled **GDP-1515** Telephone Responder lets you phone home to activate lights or other devices. Requires 9V battery Was \$99.95 Now \$49.95, 6 lbs.

Kit **GD-1530** Heathkit RS-232/C Interface makes your dream of a computer controlled home a reality. Use it with any terminal or computer with an RS-232C Serial Interface Port capable of a baud rate between 110 and 2400. Use MBASIC under H-DOS or CP/M to create programs that control 256 groups of modules with unlimited timing patterns \$99.95, ship wt 3 lbs.

Assembled **GDP-1512** Lamp Module, 300 watts maximum load \$16.95, ship wt 1 lb.

Assembled **GDP-1514** Appliance Module controls most electric devices. Gives on/off control of lights and self-starting fluorescents. Maximum ratings of a 15 amp resistive load, 1/3 hp motor, 500 watt lighting load and a 40 watt TV/stereo load \$16.95, ship wt 1 lb.

Assembled **GDP-1519** Burglar Alarm Interface Module converts your BSR modules into a security system.

If activated, turns on selected lights and appliances, or selected lights can flash on/off, or selected lights can turn on Was \$44.95 Now \$39.99, 1 lb.

Assembled **GDP-1513** Wall Switch Module replaces your wall switch to operate inside and outside lights by remote or local control. Dims with Remote. Max. 500 watt load \$17.95, ship wt 1 lb.

Assembled **GDP-1516** Three-Way Wall Switch Module replaces hall and stair 3-way switches for remote and local control. Maximum 500 watt load

\$24.95, ship wt 1 lb.

Assembled **GDP-1517-A** Air Conditioner Module. Standard 240 VAC receptacle, 15 amps \$39.95, ship wt 1 lb.

Assembled **GDP-1517-B** Perpendicular-Prolonged Air Conditioner Module. 240 VAC receptacle for perpendicular-pronged plugs, 20 amp load Was \$39.95 Now \$29.99, 1 lb.

Assembled **GDP-1521** Thermostat Control Set controls your heating and air conditioning Was \$49.95 Now Only \$39.99, ship wt 1 lb.



Now it costs even less
to automate your home —
see our new lower prices



Digital Blood Pressure and Pulse Monitor

Eliminate frequent trips to the doctor's office or clinic for blood pressure readings. You can take blood pressure and pulse-rate measurements at home and at your convenience. You'll save money too. The Monitor is easy to use and to read. Just put the cuff in place and inflate. Electronic metering does the rest for you! Includes 4 "AA" batteries. Distributed by Marshall Electronics, Inc. Console: 1" H x 7" W x 3" D. Assembled **GXP-2120** Was \$59.95 Now Only \$49.99, ship wt 2 lbs.

Break free from the bonds of your phone cord

Stop running to the phone just in time to hear that caller hang up. Take the handset of the Freedom Phone 750 up to 1000' away from the base. Select pulse or tone dialing and have one-button automatic redial, separate mute button, high/low volume control and clear button. A digitally encoded security system protects your line from unauthorized entry. Includes rechargeable NiCd batteries. Manufactured by Electra. Assembled **GDP-1342** Was \$119.95 Now Only \$99.99, ship wt 3 lbs.

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



Enjoy cordless headphone listening

Listen to your stereo or TV without disturbing others and without being tied in with a bothersome cord. The Stereo Headphone System by Nady converts sound into infrared light waves which are received by your headphone and converted back into high quality stereo sound. Covers a conical range up to 35' in front of unit. Does not penetrate walls. Accepts phone plug type earphone or headphone jack. Includes AC power adapter. Adjustable-size headphone has volume control, on/off, battery compartment for the required 9V battery, and auxiliary jack for use as a standard headphone. 1" H x 8½" W x 3½" D. Assembled **GDP-1432** \$89.95, ship wt 3 lbs.



Explore the universe with your Cometrone Reflector Telescope

View the rings of Saturn, Mars, the phases of Venus and four of Jupiter's moons. Show your kids the Great Nebula, Andromeda Galaxy and dozens of other planetary and deep space objects with your high-quality Cometrone Reflector Telescope from Celestron. Complete your exciting evening by capturing the night sky on film.

This super 4.5" Reflector telescope gathers 256 times the light of the human eye and all optics are coated. The Cometrone features a German made precision equatorial mount with setting circles to help you locate new objects. Two eyepieces are provided: 25 mm for 40 power and 10 mm for 111 power. The telescope also includes a 6 x 24 Finderscope, accessory tray, dew shield and lens cap. For photography and easier viewing, use the optional Pulse Motor Drive. It compensates for the earth's rotation to aid in tracking objects. Order the appropriate photography set for your camera. (Some Assembly Required) **TL-400** \$299.95, ship wt 35 lbs.

Accessories: Assembled **TLA-400-1** Pulse Motor Drive \$99.95, ship wt 2 lbs. Assembled **TLS-400** Telescope T-mount Adapter and Camera Ring Photography Set for your 35 mm SLR, **TLS-400-C**, **-M**, **-N**, or **-P** (Specify for Canon, Minolta, Nikon or Pentax by using appropriate suffix such as **TLS-400-N** for Nikon) \$19.95, ship wt 1 lb.

SAVER! **TLS-400-1** Save on a complete system including the Cometrone Reflector Telescope, Pulse Motor Drive and Photography Set. (Specify camera on order) Separately \$549.85 Our System Price \$399.95, ship wt 38 lbs.



It calls and tells you when something is wrong

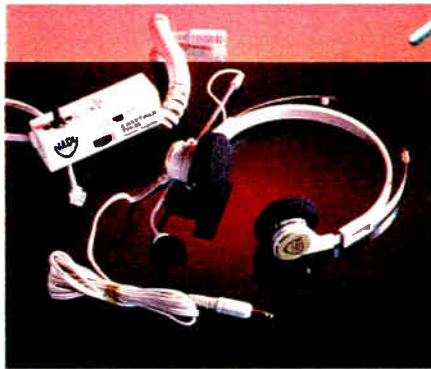
You answer your office phone to be told there's an unusual disturbance in your home, then a sensitive microphone lets you listen in on the problem yourself. This unique monitoring system continuously checks your home or office for power outages, excessively high or low temperatures and unusual sounds and disturbances. It reacts to an alarm condition by dialing up to four numbers, in sequence, until the warning message is received and acknowledged. You can also call to check on your house – after a preprogrammed number of rings, the unit answers, reports on monitored conditions and lets you listen. Switches to batteries during power failure, calls if batteries are low. Also acts as one-key dialer for 8 numbers. Add additional sensors to monitor doors/windows ajar, flooding and more (see GDA-2800 Series, page 26). 2" H x 7 $\frac{1}{4}$ " W x 8 $\frac{5}{8}$ " D. Assembled **GDP-2156** \$199.95, ship wt 3 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 any standard business or home phone. Both the headset and your handset plug into the amplifier.

Flip an easy-to-reach switch on the top of the amplifier to alternate between the headset and handset. Or, get up and move around without taking the trouble to remove the headset – a tug on the lightweight cord quickly disconnects you from the Amplifier. The cord clips to your clothing and out of your way.

Volume is adjustable up to 6 dB louder than conventional telephones! For private conversations turn off the amplifier with a mute switch. The built-in condenser mic has high definition for



clear, clean sound. Operates off phone line voltage – no batteries are needed. Surge voltage circuitry protects the unit from line surges. Assembled **GDP-1343** \$39.95, ship wt 1 lb.

A thermometer you can always trust

You're not feeling well and think you might be running a fever. You take your temperature but even after turning your thermometer this way and that you still aren't sure what it reads. Now you can get the precise temperature measurements you need and be able to easily read them with this electronic fever thermometer. It eliminates the annoying squinting and guessing that's required with a conventional mercury-bulb thermometer.

Inexpensive and reliable, the GXP-2121 thermometer provides electronic accuracy from 89.6° to 107°F. The digital display is easy to see and gives you the exact temperature reading. And you get the results within 60 seconds! To ensure correct readings the "F" symbol on the readout blinks until the peak temperature is displayed. Touch the ON/OFF button to activate the thermometer. Distributed by Marshall Electronics, Inc. Assembled **GXP-2121** \$13.95, ship wt 1 lb.



Credit card orders call TOLL-FREE:

1-800-253-0570

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

This Thermometer does more than measure fevers

Don't wait until you have a cold to use this super accurate digital thermometer. It has dozens of practical applications, from developing film to fixing the baby's bath water. The electronic thermometer fulfills all your temperature needs. It will deliver perfect readings every time – wherever you need temperatures in a hurry.

Solid-state circuitry ensures easy-to-read 4-digit temperature measurements in less than 10 seconds. The digital thermometer's wand senses from 32° to 230°F (0° to 110°C) with $\pm 0.2^\circ\text{F}$ ($\pm 0.1^\circ$) biomedical accuracy and 0.5% overall accuracy with 0.1°F or C resolution. Bright red LED's display the temperature of liquids or air and never needs calibration or "shake-down." Operates on 9V battery (not included). A flashing decimal warns you of low battery. Weighs only 5.5 ounces and fits comfortably in the palm of your hand. Assembled **GD-1226** \$59.95, ship wt 2 lbs.





Mobile Siren/PA for emergency services workers

Designed for the public service volunteer or professional, this compact, 55-watt siren has automatic or manual wail, hi-lo emergency tone and yelp. A 20-watt public address circuit amplifies your voice for outside announcements and allows you to monitor incoming radio calls while away from the vehicle. Low-noise, push-to-talk microphone will instantly go from any siren function to clear audio-PA mode. **IMPORTANT:** This product is designed for use in emergency vehicles. Consult authorities before installing or operating. 2 $\frac{7}{8}$ " H x 8 $\frac{3}{8}$ " W x 7 $\frac{3}{8}$ " D. Kit **GD-1810** \$109.95, ship wt 6 lbs.

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

Concealed Grill Speaker

\$109.95, ship wt 10 lbs.

Kit **GDA-1558-1** Emer-

gency Lighting Relay
\$4.95, ship wt 1 lb.



Highly efficient
exterior horn

Concealed
grill horn



Credit card orders call TOLL-FREE:

1-800-253-0570

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

Improve fuel economy with Exhaust Analyzer

Keep your engine running at maximum potential and efficiency. Plus be assured that it is emitting as few pollutants as possible. The Exhaust Gas Analyzer monitors engine exhaust to verify interacting carburetor and ignition settings. And it also provides a good way to check emission control systems.

By measuring thermal conductivity of your car's exhaust gases, the Analyzer can show the air-to-fuel ratio, overall combustion efficiency and percentage of carbon monoxide present. From these you can determine if an auto's fuel mixture is unnecessarily rich or lean for best economy. It's essential when tuning up engines to set them to a specific rating for clean air standards in many states. Not intended for use with Chrysler "lean burn" engines. Powered by your car battery. Includes all accessories. The Exhaust Gas Analyzer is an easy one-evening kit. Kit **CI-1080** \$129.95, ship wt 6 lbs.

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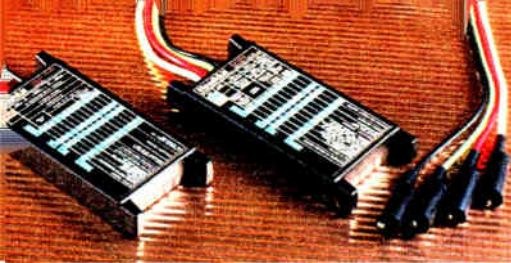


**FAST, EASY
1-EVENING KIT**

Have a peak performance engine

Make tune-up measurements with this digital analyzer. Check dwell on 4-, 5-, 6- and 8-cylinder engines from 0 to 90° within $\pm 0.2\%$. Check idle speed in two tach ranges to 10,000 RPM with $\pm 0.1\%$ accuracy. Measure DC voltage in two ranges up to 200 volts at $\pm 1.5\%$, current to 20 amps with $\pm 3\%$ accuracy and resistance to 2 megohms at $\pm 1.5\%$. Use Shunt Accessory to measure starting and battery currents. Requires 9V battery. Displays circuit polarity, low battery, over-ranges. 3 $\frac{3}{8}$ " H x 1 $\frac{1}{4}$ " W x 8" D. Kit **CM-1551** \$139.95, ship wt 5 lbs.

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



Charging System Tester

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.



Test electronic ignitions

Take the guesswork out of pinpointing defective components in modern electronic ignitions. Four quick tests tell

you: if your battery is sufficiently charged; if the reluctor and pickup coil are providing an input to the ignition module; if the ignition module is properly switching the coil primary; and the location of a faulty component in the ignition primary circuit. Requires some ignition knowledge. Pickup coil test does not work on Hall-effect ignitions. One-evening kit. 5¼" H x 2½" W x ¾" D. Kit **CI-2055** \$24.95, ship wt 2 lbs.

Add convenience with Wiper Delay

You'll have a clear view of the road even when constant wiper action isn't necessary. Easy to build and install, this Wiper Delay 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. The Wiper Delay is an easy one-evening kit. Kit **CH-1068** \$21.95, ship wt 2 lbs.

New products increase your driving enjoyment



It's like having a mechanic in your glove box

Keep this handheld Digital Engine Analyzer right in the glove compartment. You can pull it out whenever you need assurance that your engine is running efficiently or when you need to find the cause of an engine problem. Check dwell on 4-, 6-, and 8-cylinder engines to 90° with resolution to 0.1° within ± 1.5%. Check up to 10,000 RPM with resolution to 10 RPM and an accuracy of 1.5%. Measure DC voltage in three ranges up to 200 volts at ± 0.7%. Measure resistance from 200 ohms full scale to 2 megohms full scale. The Digital Engine Analyzer has an easy-to-read LCD display and operates up to 300 hours on the included 9V battery. Comes with test leads and instruction manual. 5" H x 2¾" W x 1" D. Assembled **CMW-1570** \$49.95, ship wt 1 lb.



See what your car can do on the curves

Measure the G-forces as you swing around your favorite corner, accelerate or brake. This G-Meter indicates forces from 0.1 to 0.8G through green, yellow and red LED's. Plus, a volt meter mode lets you check your battery in a 10 to 15V range. For 12V batteries. 1½" H x 6¾" W x 1" D. Assembled **CGW-1562** \$39.95, ship wt 1 lb.



Add class to your dash with LED Tach

You'll enjoy having the slick styling and LED graphics of this tachometer on your dash. The LED Graphic Tachometer indicates the RPM of your engine with red, yellow and green LEDs from 0 to 6,000 RPM in 500 RPM steps. Flip a switch to turn the Tachometer into a handy volt meter to check your battery voltage from 11.5 to 17.0V in 0.5V steps. For 12V batteries. Not for diesel engines. 1½" H x 4¾" W x ¾" D. Assembled **CTW-1572** \$24.95, ship wt 1 lb.



Give your fingers a rest – let the Demon dial for you

Enter your special letter/number code to dial up to 176 seven digit numbers. If the line is busy or there is no answer, the Dialer will redial or "Demon Dial" a busy number 5 times in the 1st minute, once every 2 minutes for 10 minutes and once every 10 minutes for up to 2 hours. While it 'Demon Dials' incoming calls can be received, and a success signal alerts you when the party answers. Dials numbers up to 32 digits long. Memory Expansion Accessory nearly doubles memory. Requires touch-tone service. 2-evening kit. 1 5/8" H x 5 7/8" D x 5 5/8" W. Kit **GT-2217** \$79.95, ship wt 3 lbs.

Accessories: Assembled **GTA-2217-1** Memory Expansion Accessory \$19.95, ship wt 1 lb.



Be alerted to damaging AC line variations

Be assured that you can safely shut down voltage sensitive equipment. The Line Voltage monitor lets you know when brownout conditions exist on the AC line. This accurate instrument is also extremely useful in displaying the critical line voltage of minicomputer, medical or communications systems. A manually reset Fault Indicator can be set to light any time the AC drops below a user-adjusted voltage between 90 and 120 VAC. Basic accuracy is within $\pm 5\%$. Large easy-to-read LED's display all AC voltages. This compact monitor measures 3 3/4" H x 5 1/2" W x 1 5/8" D. Kit **IM-2203** Was \$59.95 Now Only \$49.95, ship wt 3 lbs.

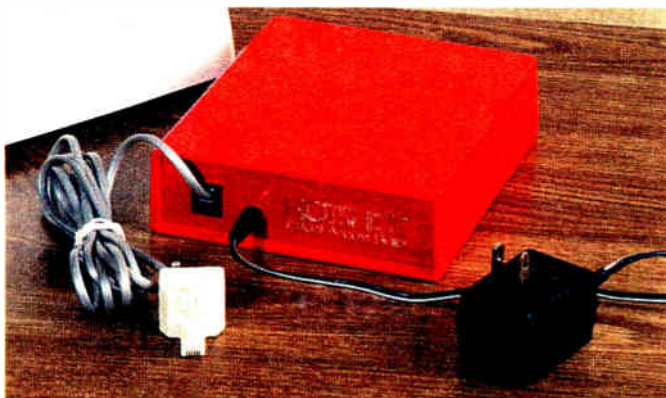


This phone ringer will please your ears

You won't mind when the phone rings off the hook if you've got the Pleasant Phone Ringer. It replaces the annoying ring of your phone with a choice of 10 seconds of Beethoven's Für Elise or 20 seconds of Rubinstein's Romance, a beeping signal or an upbeat four-note chime. Build this easy kit in an evening and enjoy the synthesized melodies provided by a pre-programmed musical IC. A pushbutton switch lets you choose your phone bell or one of the four signals. 5 7/8" H x 4 3/4" W x 1 1/4" D. Kit **GT-1218** \$29.95, ship wt 1 lb.

You don't have to dial that number

The HOTSHOT ends the aggravation of dialing a 13-digit number to access Alternate Long Distance service. It's great for credit card checking, automatic prefix dialing, WATS line entry, security, hotline applications, and instant dialing of emergency numbers. This unique one-number dialer quickly dials any number up to 31 digits. The easy-to-program memory doesn't require battery backup since it's mechanically programmed. The HOTSHOT plugs into any standard touch-tone modular phone jack with the included Y-adaptor. Build this dialer in just one evening. 1 1/2" H x 5" W x 5 7/8" D. Kit **GT-2218** \$39.95, ship wt 2 lbs.





Sniff out 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 the Heat Sniffer on and adjust it for silence. Then move the Sniffer's sensor along areas where heating/cool-

ing 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 Was \$24.95 Now \$19.95, 2 lbs.

No more stumbling in the dark

Avoid trips and falls caused by fumbling in the dark for a light switch. Touch the sensor to remotely control lamps, appliances or TVs. Plug your lamp or appliance into the control unit which is plugged into an AC outlet, then connect the touch plate with an easily concealed wire. Includes two touch plates. Operates up to 300 watts of 120 VAC lights. Easy one-evening kit. Kit GD-1287 \$21.95, ship wt 2 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, dirt, 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. This kit takes only an evening to build 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.

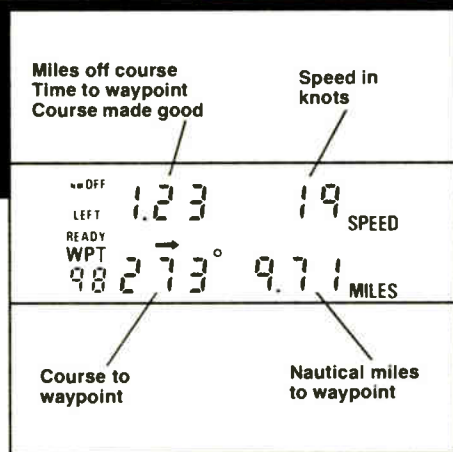
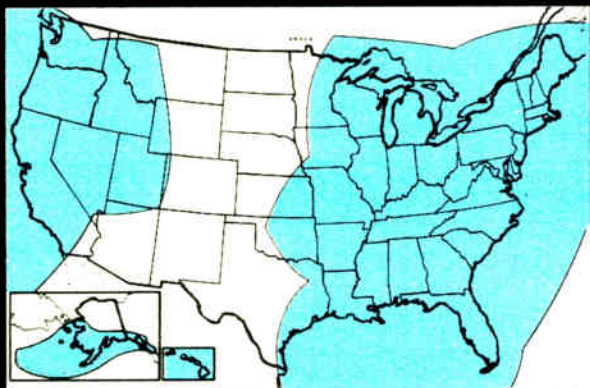
Accessories: Assembled GDA-1297-2 Replacement Charcoal Filter \$9.95, ship wt 2 lbs.



Breathe deeply and enjoy

Take a deep breath and enjoy air which is free of pollen, cigarette smoke and dust. The Furnace Air Cleaner works with your heating or air conditioning system. 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. Power supply operates one filter and runs on 120 VAC. The required 1" thick filters are easy to install. (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.



Be on course with Loran Receiver

Steer straight for that secret fishing spot you found last summer. You don't have to remember where it is. Your Loran Receiver remembers and shows you what heading to take. It also shows you'll arrive in 50 minutes and lets you know when you deviate 2°W of the most direct course.

The Loran Receiver recalls any of up to 100 locations then guides you using Loran-C navigation. It helps you determine: location, heading, speed, distance from a destination, estimated time of arrival, the most direct route to a destination, and navigational deviation from that route. You select either true or magnetic compass readings. Store destinations or waypoints in memory and use a series of waypoints to plot and follow a course. Enter a "home" waypoint before you depart, touch the Home Key to find your way back.

An excellent aid for boating, backpacking and other activities, Loran-C navigation may be used in many land regions as well as at sea or on inland lakes and waterways. The shaded portion of the map (above) represents the Loran-C transmission area. Completely portable, the Loran Receiver has a telescoping antenna and operates 50 hours on the included rechargeable sealed battery. 4½" H x 7" W x 5" D. Assembled **MNW-2980** \$499.95, ship wt 7 lbs.



Navigate coastal waters without fear of running aground

You can safely explore coastal waters with the dual-range Digital Depth Sounder on-board. The self-adjusting range selection monitors depth from 2' to 499' and alerts you to changes both audibly and visually. An easy-to-read LCD display with automatic night light shows depths in 0.1' increments to 9.9' and 1' intervals from 10' to 499'. Five selectable alarm depths at 2', 4', 10', 20', and 40' add extra safety. A self-adjusting gain ensures accurate depth readings in either fresh or salt water. Operates on 12 VDC. A two-evening kit. 2½" H x 7" W x 5½" D.

Configurations:

Kit **MI-2916-1** Depth Sounder with through-hull transducer \$189.95, ship wt 8 lbs.

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Kit **MI-2916-2** Depth Sounder with transom-mount transducer \$179.95, ship wt 7 lbs.

Kit **MI-2916-3** Sounder with flush-mount transducer \$199.95, ship wt 8 lbs.

Accessories:

Kit **MI-2917** Digital Remote Depth Sounder provides an additional depth reading station in your boat's cabin, flying bridge or any other location on board. Same case and features as MI-2916 including visual and audible alarms. The alarm and depth warning on the remote can be set independent of the settings on the MI-2916. The included 25' cable carries power and depth signals from the MI-2916 to the remote unit \$69.95, ship wt 4 lbs.



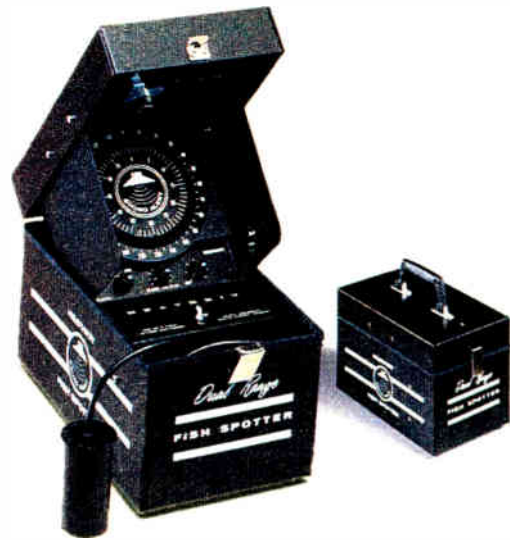
Enjoy fishing, cruising or scuba diving in safety

Relax and enjoy your water activities. The Dual-Range Depth Sounder is on duty and you don't even have to keep an eye on it. A high-pitched beeping alarm alerts you to shoals or submerged objects above any preset depth from 5 to 60 or 5 to 240 feet. Objects above the depth you select trigger a neon flash on the appropriate scale. A sensitivity control aids in discriminating between bottom readings and those returned by a single or school of fish. A sun shield and bright neon indicator make depth reading easy, day or night. Uses your boat's 12 VDC battery. A three-evening kit. 6½" H x 5¾" W x 7¼" D.

Configurations:

Kit **MI-1031-1** Depth Sounder with through hull transducer and 25 feet of connector cable \$119.95, ship wt 8 lbs.

Kit **MI-1031-2** Depth Sounder with transom-mount transducer and 25 feet of connector cable \$119.95, ship wt 8 lbs.



Come back from your fishing trip with more than stories

This time you can catch "the fish that got away." The hard part, finding the fish, is done for you by the Deluxe Fish Spotter. It will help increase the size and weight of your catches by detecting fish swimming between the surface and any preset depth, down to 60 or 120 feet. Two ranges ensure the high accuracy and definition you need in a fish spotter. A bright neon indicator shows you the exact depth of fish.

If your fishing ventures take you into unknown waters, the Deluxe Fish Spotter can double as a depth sounder. Use it to navigate safely and to chart underwater areas to find the best fishing spot. Includes transducer with suction cup mount. Requires two 6V lantern batteries. A two-evening kit. 7" H x 6" W x 10¾" D. Kit **MI-2901A** \$139.95, ship wt 9 lbs.



An underwater view gives you the edge

See below your boat down to 480 feet. The sophisticated Video Fish Recorder shows you the location of fish and illustrates bottom conditions with four distinct shades of gray on the display monitor. A range scale divides the display with dashed lines so it's easy to pinpoint the location of fish. The 5½" high-contrast, anti-glare screen provides a vast amount of information. Select any one of eight depth regions. Alarms warn you of a rising bottom or strong fish echo. Freeze an image on screen so you can analyze it. Adjust sweep speed for a broader or a more condensed image. Adjustable sensitivity. Operates on 12 VDC. Manufactured for Heath Company by IMPULSE. 6" H x 7½" W x 7¼" D.

Configurations:

Assembled **MIP-2915** with transom-mount transducer
Was \$349.95 Now \$299.95, ship wt 8 lbs.

Assembled **MIP-2914** with through-hull transducer
Was \$369.95 Now \$299.95, ship wt 8 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 battery (not included). Easy one-evening kit. 2 $\frac{5}{8}$ " H x 4 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D. Kit **HD-1416-A** \$19.95, ship wt 2 lbs.

Make new friends on the airwaves: become a Novice Operator

Join the world of Amateur Radio and communicate one-on-one with a diverse group of people from all professions and in all countries. This new, updated course reflects the latest licensing requirements and is guaranteed to help you earn a Novice ticket. If it doesn't, we'll refund the full purchase price of the course when you return the materials with a copy of your rejection notice. Everything you need to get your license is in this comprehensive, well-organized study package, including information on how you apply to take the latest exam. Practice exams and a final exam 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 the 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 this page. Plus get a 10% certificate good for up to \$10 off Heathkit equipment *Separately* \$64.90 *Our System Price* \$49.90, ship wt 9 lbs.

You can talk to the world

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

A completely revised and up-to-date text takes you through the subjects 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 speeds 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 materials with a copy of your rejection notice. **ER-3702-A** \$64.95, ship wt 21 lbs.



We want you to start out right so we made the Novice CW Transceiver

Get off to a good start in Amateur Radio with the Novice CW Transceiver. To give you the best possible transceiver, we combined many of the quality features of the HW-9 Deluxe QRP CW Transceiver (page 45) with plenty of power for easy contacts. Broadband design ends the need to tune circuits within the band. The wide-band front-end uses a double balanced mixer and 4-pole crystal filter to handle wide dynamic range signals with ease, eliminating 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** \$299.95, ship wt 20 lbs.

Station Speaker

The Heathkit SP-99 Station Speaker is a 3" communications receiver speaker in an attractive cabinet designed to match the HW-9 and HW-99. You can easily build this kit in one evening. 8" H x 4 $\frac{1}{2}$ " W x 6 $\frac{3}{4}$ " D. Kit **SP-99** \$29.95, ship wt 3 lbs.



Other 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 μ 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.

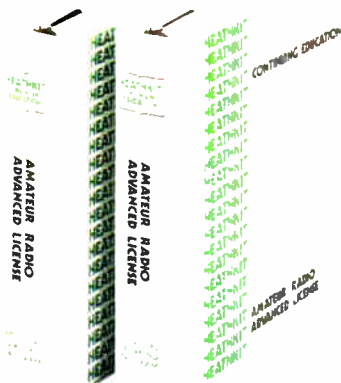
Join the elite class of Advanced-rank operators

One-fifth of the 80-15 meter HF spectrum in four specific subbands is allocated to the Advanced and Extra Class license holders. Why be left out? These are the choicest frequencies with more DX hot spots and experienced amateurs. Upgrade your ticket with the Advanced License Course.

Prepared with the General Class license holder in mind, this is the first completely up-to-date compilation of the technical and examination material required to help you achieve Advanced

Class status. It assumes you have a General License or equivalent skills and knowledge. Designed for easy learning, the Advanced License Course includes self-test reviews so you can see problem areas which require more study.

We guarantee you'll pass the Advanced Class exam the first time - if you don't we'll refund the cost of the course when you return the materials with a copy of your rejection notice. Send a copy of your new license or notification of passing to receive 4.0 CEU's. **ER-3703** \$54.95, ship wt 9 lbs.



Credit card orders call TOLL-FREE:

1-800-253-0570

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



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. Mobile operation possible with 11-15 volt DC source. 4 $\frac{5}{8}$ " H x 11 $\frac{1}{2}$ " W x 10 $\frac{1}{2}$ " D. Kit **SW-7800** \$299.95, ship wt 12 lbs.

Accessories: Kit **HDP-7800** High-performance trapped dipole antenna for 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 μ V for 10 dB (S+N)/N; AM, less than 2.5 μ V for 10 dB (S+N)/N. **Selectivity:** SSB/CW, 2.5 kHz min. at 6 dB; AM, 5.5 kHz min. at 6 dB. **Selectivity Shape Factor:** 1.5 at 6/50 dB. **Image Rejection:** 55 dB min. **OTHER: Antenna:** Built-in telescoping whip. Connection for 50 ohm, unbalanced, external antenna (SO239) and high-impedance wire. **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 $\frac{1}{4}$ -ampere, externally.



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 4.000 MHz on your CW receiver. The Converter's local oscillator generates a 3.5 MHz signal that, when mixed with the incoming VLF frequencies on your antenna, produces an RF signal. Requires 9V battery, PS-2350 Power Supply (p. 59), or any DC source 8.5 to 14 volts. 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.

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. It can also be used to preset an antenna tuner for faster tune-up, to tune a quarter-wave transmission line, and to measure the value of unknown capacitors and inductors. Gives direct readout of antenna's resistive and reactive characteristics. Requires 9V battery or PS-2350 Power Supply (p. 59). 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. Has built-in collapsible antenna and provisions for 50 ohm antenna. Requires 9V battery or PS-2350 Power Supply (p. 59). 2 $\frac{1}{4}$ " H x 5 $\frac{1}{8}$ " W x 5" D. Kit **HD-1424** \$49.95, ship wt 5 lbs.



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 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. 2 $\frac{1}{8}$ " H x 7" W x 5" D. Kit **HD-1530** \$79.95, ship wt 2 lbs.



Merge your transceiver and computer for fast, error-free communication

Converse with a friend by satellite link, remotely program computers or receive computer programs over the air, and do it all quickly and without errors. The Heath Terminal Node Controller merges computer technology with Amateur Radio and lets you explore packet radio and its countless applications.

In addition to high-speed, error-free communication, Heath's TNC allows you to turn your rig into an automatic beacon and a digital repeater. With the repeater, you can relay transmissions through up to eight intermediate stations. The TNC can store up to 2K of local activity in memory, so you can receive messages while away from your station. You can also set the TNC to recognize only the calls you wish to receive. No programming knowledge required. You need only the HD-4040, a terminal (p. 102) or computer with terminal emulation software (p. 94) and a RS-232C Cable. Technician or

above licensing required. 2 $\frac{3}{8}$ " H x 13 $\frac{5}{8}$ " W x 7 $\frac{3}{4}$ " D.

Configurations:

Kit **HDS-4040-3** HD-4040 with free HDA-4040-1 and HDA-4040-2 \$199.95, ship wt 14 lbs.

SAVER! **HDS-4040-V** Save on an HD-4040, HDA-4040-1, HDA-4040-2, Kit HTX-10 terminal (less monitor and modem), and interface cable *Separately* \$478.95 *Our System Price* \$449.95, ship wt 37 lbs.

SAVER! **HDS-4040-VM** Save on an HD-4040, HDA-4040-1, HDA-4040-2, HTX-10 terminal with ZVM-122-A monitor (less modem), and interface cable *Separately* \$598.95 *Our System Price* \$549.95, ship wt 62 lbs.

Accessories:

Kit **HDA-4040-1** TNC Status Indicator. 8 LED's report state of connect, mode buffer, frame error. Generates tone when connect is initiated \$24.95, ship wt 2 lbs.

Kit **HDA-4040-2** Flat Filter Option \$9.95, ship wt 1 lb.

Other Specifications: **Processor:** 6809. **Clocks:** 7.3728 MHz crystal oscillator of UART, switched capacitor filter, and E & Q systems. **Memory:** ROM, 32K (expandable to 48K), RAM, 8K (expandable to 24K). **Serial Port:** RS-232C interface to terminal or computer. Baud rates 50 to 1200 (optional to 4800). **Parallel Port:** Controller status and command channel and diagnostic signal port. **Non-volatile RAM:** 128 4-bit locations. **Protocols:** AX.25, VADCG; **Power:** 120V, 15 watts.

Talk any time, any place

Slip the 2-M handheld onto your belt for remote operation. Hop in the car and slip the handheld into the mobile mount for mobile operation.

You can switch select all CTC frequencies on the built-in CTCSS encoder. The handheld also features: S/BATT meter; selectable 5 W, 1.5 W and 200 mW RF power outputs; squelch control, and thumbwheel channel selector switches with + 5 kHz switch. Plus, tone and \pm 600 kHz repeater offset switches and lamp switch for illumination of the S/BATT meter and switches. Frequency range is 144 MHz to 147.995 MHz in 5 KHz steps and sensitivity is 0.25 μ V. The included NiCd rechargeable battery pack slides over the base of the handheld and charges in only 4 to 6 hours. An optional microphone/speaker plugs into both the handheld and into the Console.

Put the handheld in the Mobile Console for 25-watt operation. The Console has Power, UHF and VHF switches, and lit frequency display. RF output impedance is 50 ohms. The Console has provisions for the HWA-6502-1 25 watt 2-M Amplifier. Console: 21 $\frac{1}{4}$ " H x 6 $\frac{1}{2}$ " W x 8 $\frac{1}{2}$ " D. Assembled **HW-6502** 2-M Handheld \$199.95, ship wt 2 lbs.

SAVER! 2-meter system includes transceiver, 25-watt amp, mobile console and speaker/microphone **HWS-6502-6** *Separate Prices* \$364.80 *System Price* \$299.95, ship wt 7 lbs.

Accessories: Assembled **HWA-6502-1** 25-watt 2-M Amplifier \$49.95, ship wt 1 lb. Assembled **HWA-6502-2** Mobile Console \$89.95, ship wt 3 lbs. Assembled **HWA-6502-5** Speaker/Microphone \$24.95, ship wt 1 lb. Assembled **HWA-6502-4** Accessory Pack includes 12 VDC Mobile Charger and Dry Battery Tray \$9.95, ship wt 1 lb.



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

Have versatile communication anywhere with tone dialing capabilities, too



Double your antenna's bandwidth

Work both CW and phone segments in a band from one antenna. The Antenna Matcher lets you adjust dipole and vertical antennas to resonance on any band between 1.8 and 30 MHz. Your 50-ohm coaxial-fed antenna can have double the bandwidth while maintaining a low VSWR. Connect your antenna to the remote unit, 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. A variable capacitor tunes the antenna for a broader bandwidth. Uses your coax or a simple 2-wire cable. Bandwidth increase is typically over 100% with a 2:1 VSWR. Input capability is 1500 watts PEP. Does not double bandwidth of 50-ohm beam antennas. Not for open- or balanced-type feed lines or random length wire antennas. Remote: 16 $\frac{3}{8}$ " H x 8 $\frac{1}{8}$ " W x 3 $\frac{7}{8}$ " D. Control: 2 $\frac{1}{2}$ " H x 5 $\frac{1}{2}$ " W x 7" D. Kit SA-2550 \$149.95, ship wt 10 lbs.

Automatic Antenna Tuner

Preset the roller inductor for two frequencies on each of nine bands. The Antenna Tuner will set the roller inductor to the preselected value and adjust the transmitter and antenna capacitors. Automatically tune selected frequencies using only transmitter band switches if your transmitter is equipped for remote operation. Manually tune with three front panel lever switches and dual wattmeters. 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 \$349.95, 26 lbs.

Accessories: Kit SA-2500-1 4:1 Balun \$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 Ω . **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; VWSR, user selected. **Power:** 120 VAC 50/60 Hz @ .25 amps max., internal; 12 VDC at 1 amp. max., external.

Revolutionize your CW with the μ Matic Memory Keyer

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 at whatever speed and weight are comfortable for you, and send them with any other setting you wish. Text can be added into a buffer message being sent. CMOS memory with battery backup retains the buffer contents, last-selected speed, spacing, weight and repeat count when the Keyer is without power. Two-evening kit. 1 $\frac{1}{8}$ " H x 4 $\frac{1}{8}$ " W x 6" D. Kit SA-5010-A \$99.95, ship wt 3 lbs.

Accessories: 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.



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. 1 7/8" H x 8 7/8" W x 6 5/8" 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.



Credit card orders call TOLL-FREE:

1-800-253-0570

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



Tailor your microphone for optimum voice clarity and maximum talk-power

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

The Heathkit HD-1986 Microlizer lets you optimize the clarity of your voice transmissions and get a better match between your microphone and transceiver. Make sure you're heard – clearly. This microphone equalizer fits in series using a standard 4-pin microphone jack and 1/4" phone output jack.

Continuously variable high and low frequency controls provide a 12 dB boost or cut at 490 Hz and 2800 Hz

Increase or decrease over-all gain of the microphone signal you feed to your transceiver for more efficient and cleaner operation. Requires a 9V battery. A one-evening kit. 2" H x 5 3/4" W x 4 1/2" D. Kit **HD-1986** \$39.95, ship wt 2 lbs.

Other Specifications: **Adjustable Microphone Gain:** **Low Frequency Response:** ± 12 dB at 490 Hz; **High Frequency Response:** ± 12 dB at 2800 Hz. **Input Impedance:** 100k 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, or 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. The built-in wattmeter's full legal limit input capacity allows it to be installed directly into your transmission line. It 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 with a forward accuracy $\pm 5\%$. Silver-plated straps and roller contact assembly minimize 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 200 watts PEP on SSB and 1000 watts CW. A three-evening kit. 5 3/4" H x 14 1/2" W x 13 7/8" D. Kit **SA-2060-A** \$269.95, ship wt 20 lbs.



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

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. 2½" H x 5⅜" W x 7" D. Kit **HM-9** \$39.95, ship wt 3 lbs.

50-watt antenna tuner with 4:1 balun

You can have almost unlimited matching capabilities with the HFT-9. 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** \$49.95, ship wt 3 lbs.



Ensure signal purity and stability

Continuously monitor your signals with the Station Monitor which displays SSB, TRAP, or RTTY. Also use it with a receiver to view other audio signals or 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. Has a 10:1 vertical and horizontal input switch attenuator, with constant input impedance.

Add the HOA-5404-1 Pan Adapter Module board to view other signals within ± 20 kHz or ± 100 kHz from the frequency. For receivers with IFs of 3.395 MHz and 8.83 MHz. 120 VAC. 1⅜" H x 11¼" W x 12⅝" D. Kit **HO-5404** \$249.95, ship wt 13 lbs.

Accessories: Kit **HOA-5404-1** Pan Adapter Module \$99.95, ship wt 2 lbs.

Other Specifications: **RF SAMPLING SECTION:** Frequency Coverage: 80-6 meter (3.5-54 MHz). Sensitivity: ¼" vertical deflection at 10 watts, ⅜" vertical deflection at 100 watts. **RF Power Limits:** Exciter Input (50-75Ω) 10 to 300 watts. Antenna Input (50-75Ω) 10 to 1000 watts. **Insertion Loss:** Negligible. **VERTICAL AND HORIZONTAL AMPLIFIERS:** Sensitivity: 60 mV per ¼" vertical deflection. **Attenuator:** 2-position switch; X1: 1 V RMS maximum, X10: 10 V RMS maximum. **SWEEP GENERATOR:** Type: Recurrent, automatic sync. **Frequency Range:** 10 Hz to 10 kHz in three steps.



Get in on the RTTY revolution with the RTTY Terminal Interface

Six poles of active preselect filtering deliver strong, readable tones that print clearly, even in a crowded band. Optional filters for 425 and 850 Hz audio shifts enable even more performance. This interface features separate RTTY and CW demodulator boards, 170 Hz standard shift, crystal controlled AFSK generator, capability for full FSK with equipped transmitters, true mark/space detection, oscilloscope tuning outputs, front panel LED bargraph tuning, and data and status indicators. TTL and RS-232C I/O compatible. 3" H x 7½" W x 10" D. Kit **HD-3030** \$199.95, ship wt 8 lbs.

Accessories:

Kit **HDA-3030-2** Universal 425/850 Hz Filter Circuit Board Accessory provides frequency shift of 425 or 850 Hz (builder's option). Plugs into HD-3030 mother board \$14.95, ship wt 1 lb.

Kit **HDA-3030-4** 170 Hz Preselector Filter Circuit Board Accessory dramatically improves performance of standard shift tones by removing strong adjacent channel signals \$19.95, ship wt 1 lb.

HDP-1010 Super CW Software for Heath H-8 and H/Z-89 computers. Has auto CW-ID, user-configurable parameters, type-ahead buffer. Requires H-DOS 1.5 or above \$29.95, ship wt 2 lbs.

HDP-1020 Super RTTY Software for Heath H-8 and H/Z-89 computers. ASCII/Baudot system uses full disk/graphics capabilities. Requires H-DOS 1.5 and 24K memory \$29.95, ship wt 2 lbs.

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 μ V for readable signal; 0.5 μ V or less for 10 dB S + N/N. **Selectivity:** Wide, 1 kHz max. @ 6 dB; Narrow, 250 Hz @ 6 dB. **Dynamic Range:** 85 dB. **Image & IF Rejection:** 60 dB, min. **Audio Hum Noise:** -60 dB. **Audio Output:** 1 watt into 8 Ω . **GENERAL: Frequency Stability:** Less than 150 Hz/hour drift after 30-minute warmup.



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 allows 1000 training sessions.

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. **Keyer Output:** +25 V @ 100 mA; -200 V @ 40 mA. **Memory Backup:** Three mini-cells (included) with typical 1 year life. **Sidetone:** 300-1500 Hz adjustable. **Indicators:** 4-digit display plus SET, MSG, LOAD, PRAC and type-ahead buffer status LEDs. **Power Requirements:** 7.5 to 11 VAC or 11 to 16 VDC. 450 mA max. Input for PS-5012 120 VAC Adaptor (page 42).



Credit card orders call TOLL-FREE:

1-800-253-0570

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

Quickly and easily tune RTTY

Tune RTTY transmissions quickly without using an oscilloscope or costly equipment. With the Crossfire Tuning Indicator you just tune your receiver for maximum vertical and horizontal display to get a strong signal for your computer or printer. Compatible with almost any interface/terminal unit that has oscilloscope outputs for tuning and at least .5 VRM output. Uses 8-16 volts AC/DC power cube included. 3¼" H x 5" W x 4" D. Kit **HD-3006** \$39.95, ship wt 3 lbs.





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. Eighth socket unswitched. Surge protection, noise filtering. 2¼" H x 14¼" W x 2¾" D. Kit **GD-1495** \$59.95, ship wt 5 lbs. Assembled **GDW-1495** \$99.95, ship wt 4 lbs.



1.6-250 MHz Dip Meter

Hams will find dozens of practical uses for this multi-purpose Dip Meter. Use it to find approximate resonant and operating frequency of either energized or de-energized circuits and to help adjust traps, detect parasitic oscillations and harmonics, measure unknown Q/L/C values, locate sources and frequencies of RF energy, or use 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.



For the serious listener

Long-wire 75' SWL antenna helps you pull in distant stations. Copper line with 30' lead-in, all insulators and hardware for easy setup. **GRA-72** \$14.95, ship wt 2 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. The twelfth outlet can be used for a clock or equipment with memory saver circuits. 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, ship wt 4 lbs.



Dual HF Wattmeter

Achieve peak efficiency on low bands. Install the HM-2140-A in your transmission line to monitor both forward and reflected power simultaneously. 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-switched high and low power ranges plus a factory-tested sensor ensure 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.



Lengthen your DX reach

Cushcraft AV5 vertically polarized omni-directional antenna covers CW and SSB on 80-40-20-15-10 meters. Effective high-Q traps give wide bandwidth. Handles 2000 watts PEP. 25' high. Some assembly required. **HDP-1473** \$119.95, ship wt 10 lbs.



Route up to 4 antennas

Efficiently and quickly choose from up to four antennas or interconnecting equipment. This Coaxial Switch switches one RF source to any one of several antennas or loads, while grounding all outputs not in use. Handles 2 kW PEP with maximum 1.1:1 SWR to 250 MHz. Built-in mounting brackets. One-evening kit. Mounting width: 4¼". Kit **HD-1234** \$22.95, ship wt 1 lb.



146-148 MHz Antenna

Cushcraft AMS-147 $\frac{5}{8}$ -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. **HDP-1472** \$29.95, ship wt 3 lbs.



Heath Antenna Dummy Load

The Antenna eliminates unnecessary QRM during tune-up and minimizes 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 transformer oil. A one-evening kit. **HN-31-A** \$19.95, ship wt 3 lbs.

Be heard more clearly

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, ship wt 3 lbs.



Change antennas fast

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



Innovative Phone Patch

New design and circuitry make this Phone Patch a breakthrough in transferring audio signals between a phone line and two-way radio equipment. It provides a high degree of electrical isolation and you can monitor transmissions on the phone line. FCC registered as protective device. Uses phone line voltage with battery assistance in very low voltage conditions (battery not included). Built-in detector circuit for adjustment with VTVM or VOM. $1\frac{3}{4}$ " H x $5\frac{3}{4}$ " W x $3\frac{3}{4}$ " D. Two-evening kit. Kit **HD-1515** \$49.95, ship wt 2 lbs.

AMATEUR RADIO



Affordable headphones

Quieting 8-ohm headphones have 40 to 15,000 Hz frequency range, $2\frac{1}{4}$ " speakers, individual volume controls, isolating ear cups, 10' cord. Assembled **HDP-1396** \$14.95, ship wt 2 lbs.



End your TVI problems

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



SWL antenna

This specially designed short wave listening antenna comes completely assembled and ready to use. The heavy 14-gauge **HDP-7800** antenna covers 60-49-41-31-25-19-13-11 meters. A high-performance trapped dipole with an overall length less than 43 feet. Assembled **HDP-7800** \$64.95, ship wt 3 lbs. **47**



Test instrument evolution... computer-based instruments

New, powerful diagnostic tools are emerging to make your job easier and faster. Tools that combine the features of traditional test instruments that we use every day with the advantages of a personal computer. This highly versatile combination is being labeled "computer-based instrumentation."

Heath Company is helping you to keep in step with these advancements with a sophisticated, yet simple-to-use tool. A combination of hardware and software integrated with a personal computer to produce a dual trace 50 MHz digital storage oscilloscope. This advanced kit will greatly increase your testing, troubleshooting and servicing capabilities. It will allow you to perform tests, display and record measurements, and even help analyze the results. This matchup is hard to beat in terms of convenience, versatility and cost.

Connect the Computer Oscilloscope to your personal computer through its standard RS-232C interface. All functions are controlled from the keyboard of the computer. The computer's monochrome monitor screen displays either one or two channels on a graphic 8 x 10 division graticule. Also on-screen are menus showing all scope function selections.

At the touch of a key, obtain automatic readouts of voltage, time and frequency at any point on a waveform. Also store waveforms indefinitely on a floppy disk for later analysis.

Connect the Computer Oscilloscope to an IBM PC-compatible computer, like the Heath/Zenith PC series, equipped with at least 128K RAM and one 5.25" floppy disk drive. Or do it through a modem for remote operations. If you are using an IBM PC or compatible computer you'll need a color graphics card and the computer must be capable of RS-232 communications. All this is standard equipment on Heath/Zenith Personal Computers. You'll also need a null-modem cable like the HCA-52 cable on page 101. Use the MS-DOS Version 2 (or above) operating system. The GW-BASIC Version 2 (or above) programming language is required only if you want to customize the included software. Kit **IC-4802** \$399.95, ship wt 10 lbs. Assembled **SC-4802** \$575.00 ship wt 11 lbs.

Other Specifications: **VERTICAL: Display Modes:** Y1, Y2. **Dual Sensitivity:** 5 mV/div to 5 V/div. **Rise Time:** 7 ns or less. **Overshoot:** Less than 5%. **HORIZONTAL: Time Base Range:** 20 s/div to 500 μ s/div; Real Time Sampling. 200 μ s/div to 10 ns/div; Equivalent Time Sampling. **Maximum Real Time Sampling Rate:** 100 kHz. **TRIGGER: Source:** Y1, Y2. **Modes:** Automatic baseline, Normal, Single Sweep. **GENERAL: Vertical Resolution:** 8 bits (1 part in 256). **Record Length:** 512 Samples. **Interface Baud Rate:** 150 to 9600 baud (selected by internal jumper). **Power:** 120 VAC, 60 Hz. **Dimensions:** 4 1/2" H x 10" W x 12 1/2" L. **Weight:** 8 lbs.





A computer-based instrument for both oscilloscopes and computers

While a personal computer may not yet be commonly found on every service or hobby bench, the workhorse oscilloscope most certainly is a very familiar tool. 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.

Other Specifications: **OSCILLOSCOPE OUTPUT:** Vertical: 4 volts peak-to-peak (oscilloscope setting is 0.5 V/div. vertical, 1.0 ms/div. horizontal). **Trigger:** TTL level.



NEW





**FAST, EASY
2-EVENING KIT**

Keep your scope at its peak accuracy and performance level

Want your scope as accurate as possible at all times? We have a solution – the Heathkit Precision Oscilloscope Calibrator. It is a laboratory-precise calibrator that provides

extremely accurate signals for making critical scope adjustments and calibrations.

This instrument lets you calibrate scopes with bandwidths up to 100 MHz. Adjust scope sweep speeds using time signals ranging from 0.5 seconds (2 Hz) to 10 nanoseconds (100 MHz). With a rise time of less than 1.0 nanosecond (at less than 2% or 10 mV aberrations), these signals are especially suited for high frequency vertical amplifier adjustments. Time signals have an excellent 0.015% accuracy.

Precisely calibrate vertical amplifier attenuator networks using a 1 kHz square wave ranging in sixteen steps from 1 mV to 100 V peak. A 1 V peak-to-peak sine wave is also available for adjusting a scope's trigger circuits.

This instrument can also be used to calibrate other test equipment or as a bench standard. It takes about 8 hours to assemble. Uses 120 or 240 VAC. 3" H x 7¼" W x 9½" D. Kit **IG-4244** \$149.95, ship wt 6 lbs.

An oscilloscope with the accuracy for lab use but in the price range of the hobbyist

This dual trace 10 MHz Oscilloscope kit is made to precisely display a wide range of waveforms. Like those encountered by electronics engineers and research scientists. Outstanding features like a fast 35 ns rise time, triggered sweep and excellent 10 mV sensitivity make it a versatile high tech tool. Yet its low price makes it affordable for every service technician's bench or hobbyist's work shop.

You'll continually use and appreci-

ate features like a vertical and horizontal accuracy of 3%, a calibrated time base from 0.2 s/cm to 0.2 μ s/cm, X-Y operation, X5 signal magnifier and a complete trigger system that includes a switchable TV filter. A high brightness CRT makes all displays easily readable on an 8x10 cm rectangular viewing area. A front panel calibration signal aids in testing and self-calibration of this full featured scope. Uses 120 VAC. 6⅞" H x 12⅞" W x 19¼" D. Kit **IO-4210** Was \$449.95 *Now Only* \$399.95, ship wt 28 lbs.



Dual trace oscilloscope has a built-in component checker for in- and out-of-circuit tests



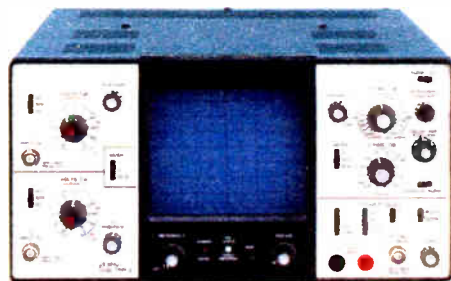
Digital display add-on

Critical waveform information in a brief glance to analyze any signal. The Time-Voltage Accessory Module is specifically designed to enhance the measurement capability of the IO-4225 oscilloscope.

Mounted atop this scope, simply select time, frequency or voltage. Place the cursor on the waveform for direct readings in bright 3½ digits at the point where the scope probe is placed.

Measure time intervals from 1.0 s to less than 20 ns and frequencies from 1 Hz to 19.99 MHz. Read \pm DC voltages from a low 0.1 mV to 199.9 V with an accuracy of 0.75%. You get added convenience with automatic decimal point placement, time and frequency unit indicators, and polarity and overrange indicators. 1½" H x 10¾" W x 9¾" D. Kit **IOA-4200** Was \$349.95 *Now Only* \$249.95, ship wt 7 lbs.

50



Outstanding performance at an affordable price

Dual trace capability, wide 25 MHz bandwidth with \pm 3% accuracy, 16 ns rise time, and low 5 mV/cm sensitivity. All these add up to a laboratory-grade oscilloscope that is ideal for the wide range of measurements found in general electronics shops, development labs and scientific research facilities. And its priced so that hobbyists can take advantage of this indispensable tool.

Select from 11 vertical ranges from 5 mV/cm to 10 V/cm and 19 time base ranges from 0.1 s/cm to 0.1 μ s/cm, all

calibrated and all continuously variable. Expand sweep speeds to 20 ns/cm with the X5 magnifier. Use the delayed sweep and variable holdoff to view stable complex signals. And for solid TV waveforms, switch in an active TV filter.

This scope features a variety of operating and triggering modes including X-Y operation. See all waveforms on a high-brightness rectangular 8 x 10 cm CRT with an internal graticule. A special test function displays the characteristic I-V curve of components like transistors and diodes for a quick check of suspect parts. And for additional diagnostic power, you can add on the optional IOA-4200 Time-Voltage Accessory Module. Uses 120 or 240 VAC. 6" H x 10" W x 18" L. Kit **IO-4225** \$499.95, ship wt 28 lbs.

Other Specifications: **Vertical Display Modes:** Y1, Y2, Dual, Alt/Chop (Chop frequency, approx. 200 kHz). **Overshoot:** Less than 5%. **Horizontal Modes:** A, AXB, B, X-Y, EXT, Horiz. **Trigger Source:** Y1, Y2, EXT, Line.



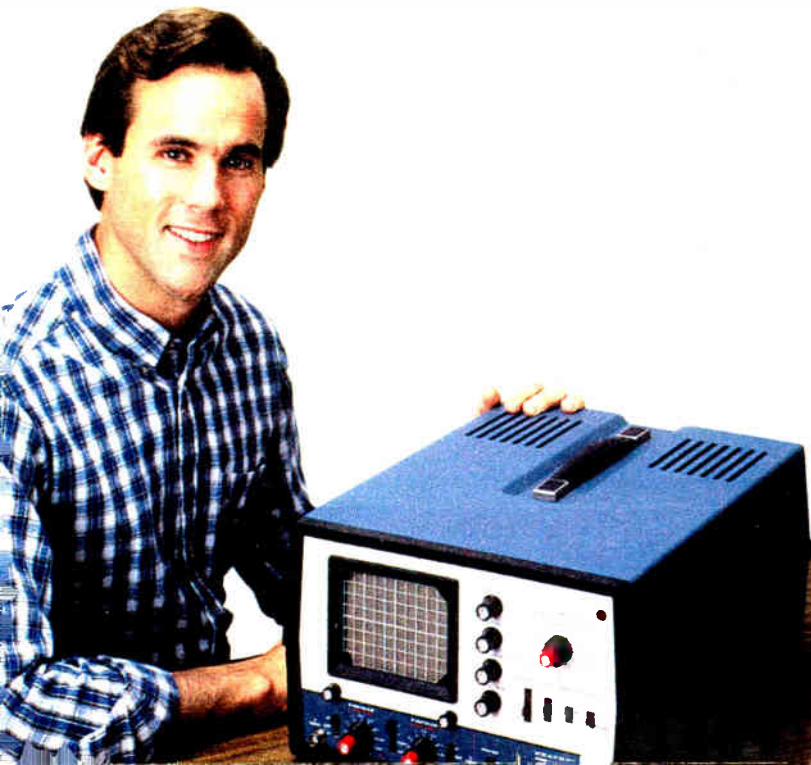
A fully assembled scope with unmatched performance and price

You would have to look a long time to find a dual trace 20 MHz oscilloscope for this price. With it comes an impressive list of features and specifications that only appear with more expensive models. This scope is definitely built to meet your demand for excellent performance.

Two excellent values for any hobbyist's bench

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 only require a single channel scope.

Both of these scopes are proven workhorses, being used in countless homes, workshops and school labs across the country. They are compact, versatile and easy to build. These scopes can display many types of waveforms in different electronic



This fully assembled, tested and factory calibrated scope has a high 5 mV sensitivity and fast 200 ns sweep speed. Select from 20 calibrated sweep time ranges from 0.2 μ s/div to 0.5 s/div with fully adjustable sweep times between ranges.

Use either automatic or manual triggering from four different sources including an external input. Set the trigger mode to TV and easily observe stable TV or video signals. For closer views of waveforms, a X5 sweep magnification is provided.

Other features include a hold-off function for observing complex waveforms, X-Y operation, a Z-axis input, a front panel calibration signal, and a bright 6" square CRT with an internal graticule for easier waveform viewing. Assembled **SO-4221** \$500.00, ship wt 20 lbs.

Other Specifications: **VERTICAL: Sensitivity:** To 5 V/div \pm 3%, 12 steps in a 1-2-5 sequence. **Rise Time:** 17.5 ns or less. **Overshoot:** 3% or less. **Input Impedance:** 1 megohm \pm 2%, 25 pF \pm 3 pF. **Maximum Input Voltage:** 400 volts P-P or 200 volts (DC + AC peak). **Cross Talk:** 60 dB or more (at 50 kHz). **HORIZONTAL: Linearity:** 3% or less. **Sweep Mode:** NORMAL, AUTO, SINGLE. **GENERAL: Calibration Voltage:** 3.0 V P-P \pm 5% (1 kHz wave). **CRT:** 8 x 10 div (1 div = 10 mm), internal graticule. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 6 $\frac{1}{2}$ " H x 12 $\frac{3}{4}$ " W x 17 $\frac{1}{8}$ " D.

circuits with their 5 MHz bandwidth. And, a 10 mV/cm input sensitivity allows their use in many low-level signal applications.

Both of these value-packed scopes have seven calibrated time bases. The range extends from 200 ms/cm to 0.2 μ s/cm to really spread a signal out for closer examination. And you can vary each range for added accuracy and convenience.

All signals are rock steady on a bright 8x10 graticule screen. This is due to a very stable triggering circuit with automatic sync... a feature found on more expensive scopes. There is also a special setting that makes it easier to trigger on the vertical signals of a TV. This setting passes low frequencies to the trigger circuit while rejecting high ones.

Further capability is added by a 10 to 1 attenuator circuit that can be used for signals applied to the external horizontal input jack. Put together this winner in about four days. 8" H x 13" W x 17" D. Kit **IO-4205** \$349.95, ship wt 25 lbs. Kit **IO-4105** \$279.95, ship wt 25 lbs.

Other Specifications: **Rise Time:** 70 ns. **Overshoot:** 5% or less at 1 kHz. **Impedance:** 1 M Ω , shunted by 38 pF. **Trigger Source:** Y1, Y2, External, Line. **Trigger Modes:** AC, DC or TV; plus or minus slope; automatic or normal. **GENERAL: CRT:** Blue-green medium-persistence phosphor, 5-inch round flat-face tube. **Power:** 120/240 VAC, 50/60 Hz.



Credit card orders call TOLL-FREE:

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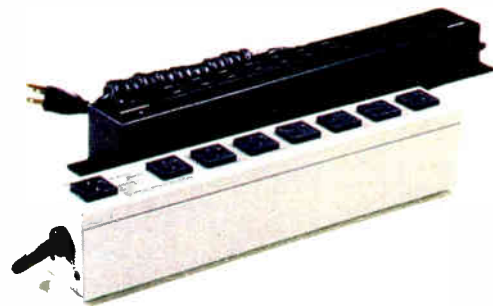


Get up close to your work with light to spare

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 your hands for your work. Shatter and scratch resistant lenses magnify 2½ times. Works well with eyeglasses. **GDP-201** \$24.95, ship wt 1 lb.



You'll always have plenty of 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. 2½" 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** \$99.95, 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.

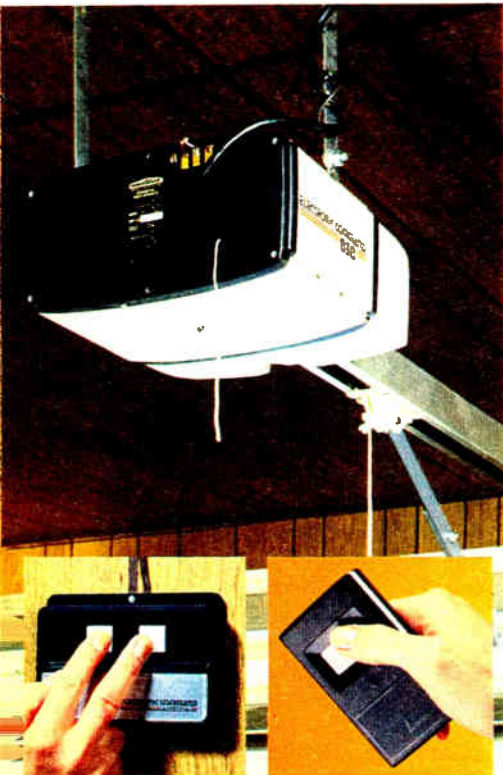
Simply touch the button on the remote transmitter in your car. The garage door opens automatically. A powerful ⅓ horsepower motor effortlessly opens the heaviest garage doors up to 18 feet wide and 7 feet high. You stay warm and dry in the nastiest weather as you drive into the protection of your garage. 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.

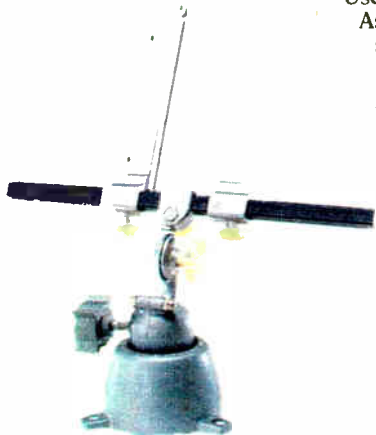
This kit includes a transmitter, receiver and remote dual switch. Requires 120 VAC. Kit **GD-3509** \$199.95, ship wt 41 lbs. Motor Freight.

Accessories for earlier model 2-wire garage door openers: 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. Assembled **GDP-3329-A** Two transmitters and one receiver \$69.99, ship wt 2 lbs. Assembled **GDA-3309-3** Power transformer for adapting two-wire opener to newer three-wire system \$12.95, ship wt 1 lb.



PanaVise circuit board holder

Position circuit boards in the best working position. 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



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

Consistent 700°F temperature for steady and fast soldering. Comes with storage tray and removable sponge. Uses 120 VAC. Assembled **GDP-1108** \$89.95, ship wt 5 lbs. Accessories: Assembled **GDP-1109** Set of five assorted 700°F 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.



At Heath/Zenith Computers
& Electronics Stores



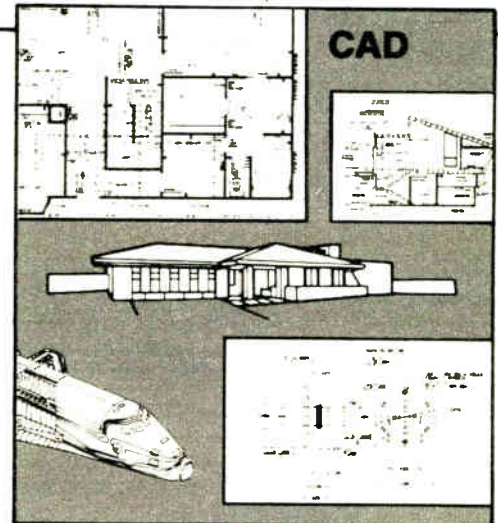
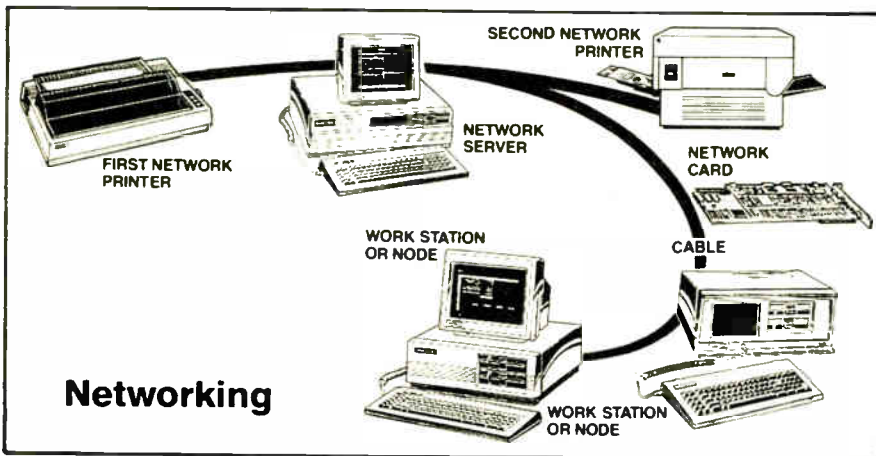
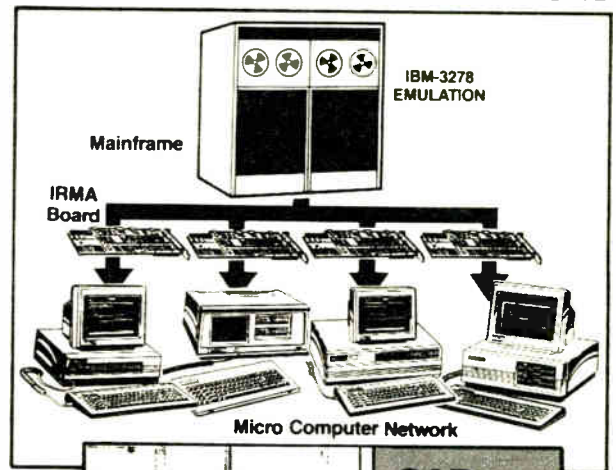
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computer solutions:

- AutoCAD 3D by Autodesk, Inc., the ultimate system for design flexibility and improved drawing productivity.
- 3Com's EtherNet System, the world standard for micro networking.
- Communications, your key link to terminal emulation, micro to micro, and micro to mainframe communications.

Visit your local Heath/Zenith Computers & Electronics store for more information on these excellent CAD, Networking, and Communications systems. Business lease programs also available.

Communications



Heathkit[®]
Master Builder
Club



Master Builder Club News

IT's OUR 2nd ANNIVERSARY! Your Master Builder Club is two years old this year and to celebrate we're expanding the program and adding bonuses and new incentives to help you to the rank of Master Builder.

First of all there's a new Master Craftsman rank now at the 15,000 point level between Senior Craftsman and Master Builder. The new Master Craftsman level is reached by accumulating 15,000 points and building 20 eligible kits. We'll be awarding at this level a Master Craftsman Plaque, lapel pin and \$150 gift certificate.

We've also created two new bonus levels to help you up the Master Builder ladder. The two new bonus levels are at the 3,500 point level and the 7,500 point level and are special gifts to you from the Master Builder Club.

More information on the Master Craftsman rank and the two new bonus ranks is available from your local Heath/Zenith Computers & Electronics Center. Stop in today.

There's never been a better time to be a Master Builder Club member. Come join the nearly 20,000 kitbuilding club members in this our second year.

				MASTER BUILDER
			MASTER CRAFTSMAN	20,000 pts. 25 kits built
	Craftsman Plus Bonus		15,000 pts. 20 kits built	
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7709 E. Broadway
602-665-6773

CALIFORNIA - Anaheim 92805

330 E. Bal Rd
714-776-9420

Campbell 95008

2350 S. Bascom Ave
408-377-8920

El Cerrito 94530

6000 Peters Ave
415-236-8870

La Mesa 92041

8363 Center Dr
619-461-9110

Los Angeles 90007

2309 S. Flower St
213-749-0261

Pomona 91767

1555 N. Orange Grove Ave
714-623-3543

Redwood City 94063

2001 McCaffery Rd
415-365-8155

Sacramento 95825

1860 Fulton Ave
916-466-1575

Woodland Hills 91364

22504 Ventura Blvd
818-883-0531

COLORADO - Westminster 80003

(Denver)
6725 Sheridan Blvd
303-429-2292

FLORIDA - Hialeah 33012

4705 W. 161st Ave
305-823-2280

Jacksonville 32211

8262 Arlington Expressway
904-725-4554

Plantation 33317

7773 W. Broward Blvd
305-791-7300

Tampa 33614

4019 W. H. Isborough Ave
813-686-2541

GEORGIA - Atlanta 30342

5285 Roswell Rd
404-252-4341

HAWAII - Honolulu

(Pearl City) 96782
96-254 Kaanumahu St
808-487-0029

ILLINOIS - Chicago 60645

3466 W. Devon Ave
312-583-3920

Downers Grove 60515

224 Ogden Ave
312-852-1304

INDIANA - Indianapolis 46220

2112 E. 62nd St
317-257-4321

KANSAS - Mission 66202

5960 Lamar Ave
913-362-4486

KENTUCKY - Louisville 40243

12401 Shelbyville Rd
502-245-7811

LOUISIANA - Kenner 70062

1900 Veterans Memorial Hwy
504-467-6321

MARYLAND - Baltimore 21234

1713 E. Jooppa Rd
301-661-4446

Rockville 20852

25542 Nicholson Lane
301-881-5420

MASSACHUSETTS - Peabody 01960

242 Ancover St. Rt. 114
617-531-9330

Wellesley 02181

165 Worcester Ave. Rt. 9
617-237-1510

MICHIGAN - Farmington Hills 48018

29433 Orchard Lake Rd
313-553-4171

East Detroit 48021

8149 E. Eight Mile Rd
313-772-0416

St. Joseph 49085

2987 Lake Shore Drive
616-982-3215

MINNESOTA - Hopkins 55343

101 Shady Oak Rd
612-936-6371

St. Paul 55106

1645 White Bear Ave
612-778-1211

MISSOURI - Bridgeton 63044

3794 McKelvey Rd
314-291-1850

NEBRASKA - Omaha 68134

9207 Maple St
402-391-2071

NEW JERSEY - Ocean 07712

1013 State Hwy 35
201-775-1231

Fair Lawn 07410

35-07 Broadway RT 41
201-791-6935

NEW YORK - Amherst 14226

3476 Sheridan Dr
716-835-3090

Jericho, L.I. 11753

15 Jericho Turnpike
516-334-8181

Rochester 14623

937 Jefferson Rd
716-424-2560

N. White Plains 10603

7 Reservoir Rd
914-761-7690

NORTH CAROLINA -

Greensboro 27407

4620-C W. Market St
919-299-5390

OHIO - CLEVELAND 44122

28100 Chagrin Blvd
216-292-7553

Columbus 43229

2500 Morse Rd
614-475-7200

Toledo 43615

48 S. Byrne Rd
419-537-1887

Woodlawn 45215

10333 Sprucefield Pike
513-771-8850

OKLAHOMA - Oklahoma City 73112

2727 N.W. Expressway
405-648-7593

PENNSYLVANIA - Frazer 19355

630 Lancaster Pike Rt. 301
215-647-5555

Philadelphia 19149

6318 Roosevelt Blvd
215-288-0180

Pittsburgh 15235

3482 Wm. Penn Hwy
412-824-3564

RHODE ISLAND - Warwick 02886

558 Greenwich Ave
401-738-1510

TEXAS - Dallas 75201

2715 Ross Ave
214-826-4053

Fort Worth 76116

6825-A Green Oaks Rd
817-737-8822

Houston 77008

1704 W. Loop N
713-869-5262

North Houston 77069

5050 FM 1960 W
713-583-1163

San Antonio 78216

7111 Blanco Rd
512-341-8876

UTAH - Midvale 84047

58 East 7200 South
801-566-4626

VIRGINIA - Alexandria 22303

6201 Richmond Hwy
703-765-5515

Virginia Beach 23455

1055 Independence Blvd
804-460-0997

WASHINGTON - Seattle 98109

505 8th Ave N
206-682-2172

Federal Way 98003

2120 S. 320th
206-941-6940

Vancouver 98664

516 S.E. Chkalov Dr
206-254-4441 - Washington
503-241-3776 - Oregon

WISCONSIN - Milwaukee 53216

5215 W. Fond du Lac Ave
414-873-8250

Pocket size DMM does basic jobs

Finally, a low-cost alternative to big test meters. A multimeter that features the five most-often used DC voltage ranges, from 200 mV to 1000 V. And the basic accuracy is a low $\pm 0.5\%$ which is found on meters costing much more. Plus you have 200 and 750 VAC ranges to cover most frequently encountered AC voltages. You'll go a long time before you measure outside five DC current ranges from 200 μA to 2 A and five resistance ranges from 200 ohms to 2 megohms.

And you keep all the niceties of a DMM like a high contrast 3½ digit LCD display, autopolarity, over range indication and autozero plus overload protection. Includes probes, carrying case, battery and extra fuse. 1" H x 2¼" W x 5" L. Assembled **SM-2310** \$49.95, ship wt 1 lb.



Accurate, heavy duty digital multimeter

A full-function handheld digital multimeter with a wide range of features. One rotary switch enables fast and convenient selection of five voltage ranges to 1000 VDC ($\pm 0.5\%$ basic accuracy) and 750 VAC, current ranges to 10 A (four DC and three AC), and six resistance ranges from 200 Ω to 20 M Ω .

And if you need to check capacitances, there are five ranges from 2 nF to 20 μF to make your job easier. As an

added extra, you can check a PNP or NPN transistor's h_{FE} or amplifying ability. All measurements are clearly displayed in 0.5" high numbers on a high-contrast 3½" digit LCD.

Other features include autopolarity, autozero, a diode tester and audible continuity checker, and overload protection. Includes vinyl case, probes and battery. 6⅞" H x 3½" W x 1½" D. Assembled **SM-2320** \$79.95, ship wt 1 lb.

One of the fastest methods to troubleshoot a circuit

And, one of the handiest test instruments you could ever find to put on your service bench. It will increase your troubleshooting capability and efficiency of electronic components and circuit boards. Part scope and part signal generator, the Heathkit Component Tracer simultaneously tests and monitors whatever you are checking.

To put it simply, the Tracer displays characteristic voltage-current signatures of components like capacitors and transistors, or completely non-energized circuits. The display you see is a visual representation of the operational quality of the tested device or circuit.

The Component Tracer uses two traces (one solid and one patented dotted) to check or compare components or circuits. Two sets of colored test probes included. Uses 120 or 240 VAC. 4" H x 10" W x 12½" D. Kit **IT-2232** \$249.95, ship wt 15 lbs.



Economical portable/bench digital multimeter

The Heathkit Digital Multimeter is an economical way to put a full function meter on your bench. The bright, easy-to-read 3½ digit LED display shows DC and AC voltages in four ranges up to 1000 VDC ($\pm 0.5\%$ basic accuracy) and 750 VAC. Pushbutton switches select all functions including DC and AC current in five ranges up to 10 amps and resistances in five ranges up to 20 M Ω . Six "C" batteries (not included) let you use this meter where AC isn't readily available. A built-in recharger circuit keeps NiCd batteries fully charged. Also uses PS-2404 Battery Eliminator (p. 57) for AC operation. Kit assembles in three quick evenings. 3" H x 8½" W x 11" D. Kit **IM-2260** \$129.95, 5 lbs. Assembled **SM-2260** \$189.95, 4 lbs.



Slip a digital multimeter into your shirt pocket

The smallest autoranging DMM made and it's practically goof proof. The Pocket DMM is only $\frac{3}{8}$ " thick and weighs less than three ounces. It's hardly noticeable in your pocket. Yet you are prepared for locating problems in electrical and electronic equipment commonly found around the home, in the car, at work – the list is endless.

Easily check DC and AC voltages from 2000 mV up to 400 V. And check resistances from 200 ohms to 2000 kilohms. A continuity checker with buzzer alarm is also built in for your convenience. Batteries, small screwdriver, test probes and a hard cover wallet carrying case is included. A perfect, inexpensive "spare" multimeter. $4\frac{1}{4}$ " H x $2\frac{1}{4}$ " W x $\frac{3}{8}$ " D. Assembled **SM-2300** \$24.95, ship wt 1 lb.



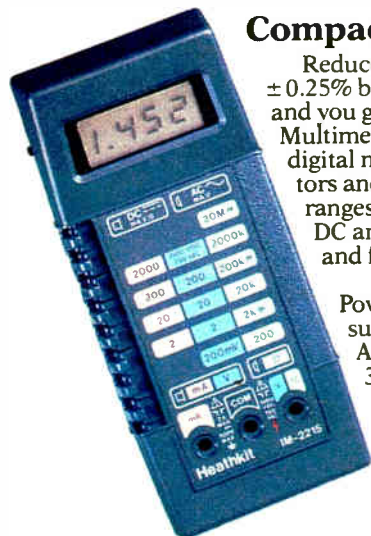
NEW

Compact handheld DMM

Reduce a digital bench multimeter with $\pm 0.25\%$ basic DC accuracy to fit your hand and you get the Heathkit Portable Digital Multimeter. It has all the advantages of a digital meter plus it checks semiconductors and in-circuit resistances. Has five ranges to 1000 VDC and 750 VAC, five DC and AC current ranges to 2000 mA, and five resistance ranges to 20 M Ω .

Has large $3\frac{1}{2}$ digit LCD display. Powered by a 9 VDC battery (not supplied) or optional AC converter. A quick two-evening kit. 2" H x $3\frac{3}{4}$ " W x $7\frac{1}{2}$ " L. Kit **IM-2215** Was \$89.95 Now: \$79.95, 2 lbs.

Accessories: **IMA-2215-1** Leather Case \$14.95, 1 lb.
AS-2350 120 VAC Battery Eliminator \$7.95, 1 lb.



Digital and analog DMM

A deluxe multimeter from FLUKE with both a digital and an analog bar-graph display for easier peak and null adjustments. It measures DC voltages up to 1000 volts with a basic accuracy of 0.3% and AC up to 750 volts. Resistances are measured up to 32 M Ω . A "touch hold" function locks in a reading while you concentrate on a test point. Also check continuity with a beeper. Features autozero and autopolarity. Plus the speed and convenience of auto-ranging with range hold. Uses a single 9 volt transistor battery (not included). Assembled **SM-77** \$119.95, 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.



A handheld frequency counter

Here's a compact and portable digital frequency counter that is easy to use. It has a wide 50 Hz to 512 MHz range. A guaranteed 25 mV RMS sensitivity (typically 10 mV) allows you to make very low signal measurements, directly with the optional telescopic antenna. And the counter features a ± 1 part-per-million time base stability. A seven digit LED display gives excellent 10/100 Hz resolution in low/high ranges. Uses five rechargeable batteries (included) or optional battery eliminator. Kit **IM-2400** \$149.95, ship wt 3 lbs.

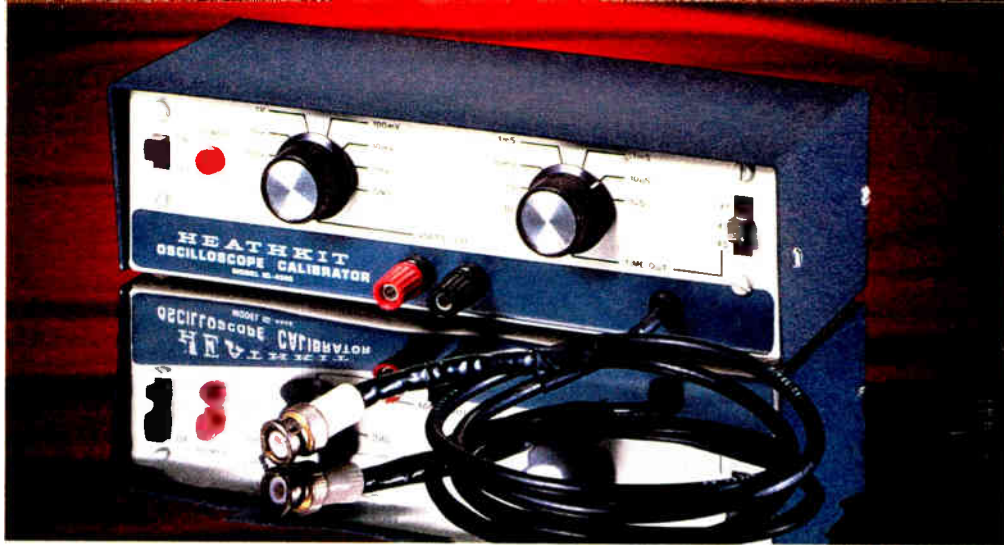
Accessories: Assembled **SMA-2400-1** Telescopic Antenna \$9.95, ship wt 1 lb. Assembled **PS-2404** 120 VAC Battery Charger/Eliminator \$7.95, 1 lb.



Always have confidence in your oscilloscope

You rely on your scope to show you the exact representation of a monitored waveform. And your scope will never let you down if you keep it calibrated with the Heathkit Oscilloscope Calibrator. It supplies precise 0.5 s to 1.0 μ s time signals with a rise time less than 4 ns and accurate voltage signals from 1.0 mV to 100 V.

All it takes is two evenings of your time to put this generator together so you can keep most scopes up to their specifications. 2 $\frac{3}{4}$ " H x 9 $\frac{1}{8}$ " W x 4 $\frac{1}{4}$ " D. Kit **IG-4505** \$59.95, ship wt 4 lbs.



A heavyweight universal counter to take on all your measuring needs

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 LED display the frequency being measured down to 0.1 of a cycle. And it also displays period and frequency ratio as well. Talk about accuracy. This one delivers with a highly stable, crystal oscillator time base. The crystal itself is enclosed in an oven for increased stability. Time base drift is held to less than one part per million per year.

Feature after feature is built in, like a trigger level control, a front panel standby switch and a rear panel time base jack. Build time is less than four evenings. Operates on 120 or 240 VAC. 4 $\frac{1}{2}$ " H x 10" W x 12 $\frac{1}{2}$ " D. 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.

Other Specifications: **Ranges:** 5 Hz to 50 MHz. 40 MHz to 512 MHz. **Input Sensitivity:** 25 mV RMS guaranteed, 4 to 15 mV RMS typical. **Input Protection:** 5 Hz to 50 MHz range, 250 V RMS to 100 kHz derated to 25 V RMS at 50 MHz. 40 MHz to 512 MHz, 5 V RMS. **Time Base Frequency:** 10 MHz. **Time Base Accuracy:** 0.2 parts per million. **General Gate Time:** 0.01 sec, 0.1 sec, 1.0 sec and 10 sec (switch selectable). **Sampling Rate:** Every 0.1 sec, 0.33 sec, 1.0 sec or 10 sec.

58

An accurate digital frequency counter in everyone's price range

Look no further for a digital counter that can put accurate and dependable frequency measurement capability on your work bench at an affordable price. Precisely measure frequencies from 10 Hz into the VHF range up to 225 MHz. And a crystal-controlled time base provides an excellent ± 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. A low 25 mV input sensitivity allows indirect frequency checks using the telescopic antenna (at left). Operates on 120 or 240 VAC. Two-evening build time. 3 $\frac{3}{8}$ " H x 7 $\frac{1}{4}$ " W x 9 $\frac{1}{2}$ " D. Kit **IM-2410** \$139.95, ship wt 6 lbs.



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



Check any capacitor quickly and easily with this portable meter

A capacitance checker is great for use on a workbench to check the values of unknown capacitors or detecting leaky capacitors. But what about in-the-field testing? Do you take an extra long extension cord with you to measure capacitors? Of course not. You take along 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, μ F, or mF LED. The reading appears on a 3½ 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 hours to assemble and is powered by a 9 volt transistor battery (not included). 2" H x 3¼" W x 7½" L. Kit **IT-2250** \$159.95, ship wt 3 lbs.

Accessories: **IMA-2215-1** Leather carrying case \$14.95 1 lb. **PS-2350** 120 VAC Battery Eliminator \$7.95, 1 lb.

A necessity in radio or television servicing

Put your VTVM or scope right on high frequency test points in radios and TVs using this demodulator/detector probe. The probe brings high frequencies in RF and IF circuits down to low frequency levels by rectifying the modulated waveform and recovering the modulation envelope. Kit **337-C** No Longer Available, 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.



Get laboratory grade accuracy in your capacitance and inductance measurements

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 check the associated dissipation or loss factor of the component as well.

Measure capacitances from less than 1.0 pF to 2000 μ F. And measure inductances from less than 1.0 μ H to 2000 H. Basic accuracy of both is $\pm 0.5\%$. Also check the loss factor of the component under test in ranges between 0.000 and 1.999 with a basic accuracy of $\pm 3\%$.

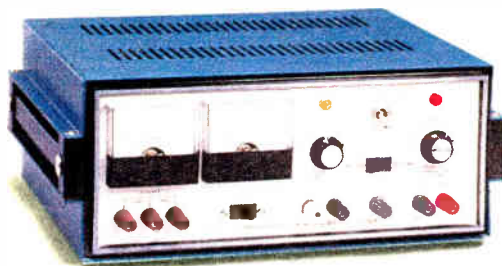
A four-point Kelvin input connection eliminates the variable effects of components with large lead lengths or large lead diameters. A null control also eliminates stray capacitance on the lower ranges. Separate rear panel connectors allow the application of a DC voltage for batch testing or the hookup of a plotter for charting capacitance/voltage curves. Uses 120 VAC. 3¾" H x 10" W x 12½" D. Kit **IT-2240** \$269.95, ship wt 11 lbs.

Measure RF voltages with this probe

Provide high voltage RF measurement capability for DC voltmeters with 10 and 11 megohm input impedances. It 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.

Another valuable probe for use in TV servicing

This low-capacitance scope and counter 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. Kit **PK-1** \$16.95, ship wt 1 lb.



Work with high voltage circuits

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 with

this well-regulated variable-output supply.

Separate panel meters allow you to accurately monitor current and voltage. Also built in is a 0 to -100 volt DC bias supply so you can adjust the operating range of vacuum tubes. Tube heater filament voltages of 6.3 and 12.6 VAC are readily available from front panel binding posts. Heater voltages can be left on while a switch removes the high voltage. Rugged cabinet has dimensions of 5½" H x 13¾" W x 11¼" D. Kit **IP-2717-A** \$189.95, ship wt 19 lbs. Assembled **SP-2717-A** \$250.00, ship wt 20 lbs.

Other Specifications: **Regulation:** Less than 1% from no load to full load for output of 100 to 400 VDC. **Ripple:** Less than 10 mV RMS. **Power:** 120 or 240 VAC.



Indispensable for spectrum analyzers

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. It is a compact 2¾" H x 4¾" W x 4¾" D and requires a 9 VDC transistor battery (not included). Kit **AD-1309** \$49.95, ship wt 2 lbs.



Rack Mount Accessory

The best way to keep your AD-1308 Spectrum Analyzer always close at hand yet out of the way. Install it into its rack mount accessory and keep it with your other rack mount equipment.

Permanently connect the AD-1308 for constant in-line monitoring. And easily snap the Analyzer out for portable use. Has internal power supply for Analyzer. 5¼" H x 19" W x 8½" D. Kit **ADA-1308-1** \$119.95, 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.



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. Music is picked up by a built-in calibrated microphone. These signals are then analyzed by a microprocessor which are displayed as sound pressure levels and frequency response. Uses six "C" batteries (not included). 4½" H x 9½" W x 4" D. Kit **AD-1308** \$299.95, 5 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 7 lbs.

Our most economical power supply

In less than three and a half hours you can assemble a truly handy power supply. 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. And protect circuits with adjustable current limiting from 10 mA to 500 mA.

Either positive or negative voltages can be obtained through its three-point floating outputs. Terminals on the rear panel allow you to control this supply's output with either an AC or DC voltage. At any voltage you have a clean output with less than 5 mV ripple and noise. 4¾" H x 5½" W x 5¾" D. Kit **IP-2728** \$49.95, ship wt 5 lbs.

Know your test equipment inside and out by building it yourself





Audio generator

Put together an economical test center that includes this inexpensive sine and square wave generator. With its 10 Hz to 100 kHz frequency range, you can test audio equipment and digital circuits.

The 5 $\frac{3}{4}$ " H x 11" W x 7 $\frac{3}{4}$ " D cabinet can be stacked with other 5280 Series instruments. Operates on two 9 VDC transistor batteries (not included) or IPA-5280-1 AC Power Supply. Kit **IG-5282** \$59.95, ship wt 5 lbs.

Test the unknown

Unmarked and obliterated resistors, capacitors and inductors are always piling up on work benches. So instead of wasting money by throwing them away, determine their value with the RLC Bridge. In four hours you can put together its single circuit board and rugged cabinet. Test leads store in snap-tight compartment. Operates on two 9 VDC transistor batteries (not included) or IPA-5280-1 AC Power Supply. 5 $\frac{3}{4}$ " H x 11" W x 7 $\frac{3}{4}$ " D. Kit **IB-5281** \$59.95, 5 lbs.

Other Specifications: **Resistance Ranges:** 10 Ω to 10 m Ω . **Inductance Ranges:** 10 μ H to 10 H. **Capacitance Ranges:** 10 pF to 10 μ F.



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.

The output is variable from 9 to 15 VDC with excellent regulation that varies less than 2% from no load to full load. A continuous current of 12 amps (20 amps intermittent) is supplied with negligible ripple. Effective filtering allows less than 1% ripple at full load. Operates on 120 or 240 VAC. 5 $\frac{3}{4}$ " H x 11" W x 11" D. Kit **IP-2760** \$179.95, 31 lbs.

3 supplies in one

This is the all-in-one power supply that furnishes most often needed voltages. Two variable 20 VDC and a constant 5 VDC outputs supply power to most analog and digital circuitry. Connect them in different series-parallel combinations for a wide range of voltage and current values.

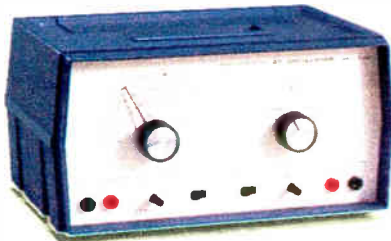
A special tracking circuit maintains voltage differences when working with operational amplifier circuits. 4 $\frac{1}{2}$ " H x 10 $\frac{3}{4}$ " W x 9" D. Kit **IP-2718** \$119.95, ship wt 12 lbs. Assembled **SP-2718** \$200.00, ship wt 12 lbs.

bad components. Also use on audio circuits.

This one-evening kit lets you check voltages and resistances by simply listening to an audible tone. Operates on two 9 VDC transistor batteries (not supplied) or the IPA-5280-1 Power Supply on this page. 5 $\frac{3}{4}$ " H x 11" W x 7 $\frac{3}{4}$ " D. Kit **IT-5283** \$59.95, ship wt 5 lbs.

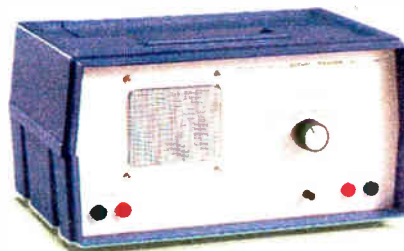
5280 Series Supply

Simultaneously supply DC power to all the 5280 Series instruments on this page. Operates on 120 or 240 VAC. 6" H x 3 $\frac{3}{4}$ " W x 3" D. Kit **IPA-5280-1** \$39.95, ship wt 3 lbs.



RF Generator

Align tuned stages in AM, FM, television, longwave, and shortwave receivers with this low-cost and easy-to-assemble generator. Both modulated and unmodulated signals are available from 310 kHz to 110 MHz range. Calibrated harmonics lets you use this generator all the way to 220 MHz. Operates on two 9 VDC transistor batteries (not included) or IPA-5280-1 AC Power Supply. 5 $\frac{3}{4}$ " H x 11" W x 7 $\frac{3}{4}$ " D. Kit **IG-5280** \$59.95, ship wt 5 lbs.



Track down problems with sound

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



Rugged service veteran

One of our longest running and successful instrument kits. The Vacuum Tube Voltmeter has been and still is a favorite among technicians and hobbyists as a versatile troubleshooting instrument.

On the wide 6" meter accurately measure \pm DC voltages from 1.5 volts to 1500 volts within \pm 3% full scale accuracy. Measure AC voltages from 0 to 1500 volts RMS including a low 1.5 V range. The resistance range covers 0.1 Ω to 1000 M Ω .

In less than three evenings you can put this 11 M Ω input meter together. Use the gimbal bracket to mount the meter almost anywhere. Requires one "C" size battery. Uses 120 or 240 VAC. 5" H x 12 $\frac{3}{4}$ " W x 4 $\frac{3}{4}$ " D. Kit **IM-5228** \$89.95, 6 lbs.

Accessories: Assembled **PKW-4** Replacement probe \$19.95, ship wt 1 lb.

Sine and square waves from 1 Hz to 100 kHz

Here is a signal generator to satisfy most all your work bench needs. It 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.

Generate sine wave up to 10 VRMS and square wave up to 10 VP-P with a 50 ns rise time for all types of circuits. Uses 120 or 240 VAC. 5 $\frac{1}{8}$ " H x 13 $\frac{1}{4}$ " W x 7" D. Kit **IG-5218** \$149.95, ship wt 10 lbs.

A special meter for working with FM

Anyone who works with FM will appreciate this deviation meter. It will quickly and accurately let you measure the frequency deviation from 2 kHz to 75 kHz of transmitters and generators whose output frequencies range between 25 and 1000 MHz. Install the meter in-line for continuous monitoring. Or use the optional antenna for checking high-power outputs.

This lightweight and portable meter easily transports to remote locations. Powered by ten "AA" batteries (not included) or an AC Battery Eliminator. 5 $\frac{1}{2}$ " H x 10 $\frac{3}{8}$ " W x 4 $\frac{1}{4}$ " D. Kit **IM-4180** \$179.95, ship wt 7 lbs.

Accessories: Kit **IMA-4180-1** Battery Charger/Eliminator \$29.95, ship wt 2 lbs. Assembled **SMA-2400-1** Swiveling telescopic antenna \$9.95 ship wt 1 lb.



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.

From this small package comes 10 volts of peak-to-peak signal, enough drive for practically all applications. A calibrated range attenuator adjusts the output in 10 dB steps from 0 to 50 dB. A variable 0 to 20 dB attenuator precisely adjusts the output between ranges.

This little powerhouse will take up very little room on your workbench. Uses 120 or 240 VAC. 3" H x 7 $\frac{1}{4}$ " W x 8 $\frac{3}{8}$ " D. Kit **IG-1271** \$169.95, ship wt 7 lbs. Assembled **SG-1271** \$250.00, ship wt 6 lbs.

Measure AC current with one hand

Nothing could be simpler or safer than making an AC current check with this clamp-on meter. All you do is clamp the inductive pickup around the conducting AC wire. And you can do it with one hand. No more bothersome breaking of the AC line and inserting a meter to measure current flow. Now an AC current measurement becomes one quick and easy snap-on check.

Electricians – test electrical and lighting circuits as well as balance power circuits. This rugged shock-resistant tool measures current to 300 amps and AC voltage up to 600 volts. Or make continuity checks on the 0 to 5 kilohm scale. Homeowners – check appliances and motors for current energy wasters. Or test hard to reach AC circuits by locking in a meter reading with one finger.

Everything you need is included: a test lead set, 1.5 volt "AA" battery, a handstrap to prevent accidental drops, a spare fuse, and even a carrying case. Assembled **SM-2206** \$49.95, ship wt 2 lbs.



Credit card orders call TOLL-FREE:

1-800-253-0570

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

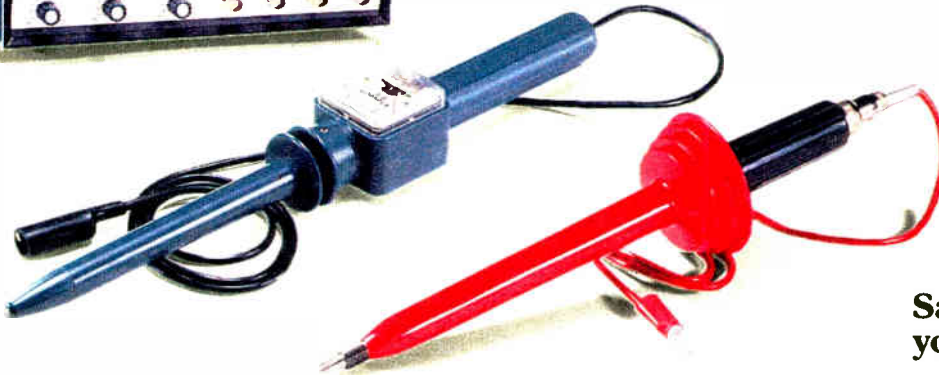
Precise pulses by the train load

Ever need a repetition of an exact number of pulses? Or just a one shot pulse to observe a circuit in slow motion? The Heathkit Pulse Generator can supply you with these and more.

Generate pulse widths from 100 ns to 1 s in repetition rates from 200 ns to 1 s. Almost any signal you may need in a design lab, classroom, service shop, inspection or test facility, or even in your home hobby shop. And you can delay pulses from 100 ns to 1 s for triggering equipment like oscilloscopes.

A 50 Ω output supplies up to 20 VP-P into an open circuit. A TTL output drives up to ten loads with a logic "1" greater than 2.4 volts. And a third output is for triggering or 3 TTL loads.

Build this highly desirable kit in approximately ten hours. Operates on 120 VAC. 3 $\frac{3}{4}$ " H x 10" W x 12 $\frac{1}{2}$ " D. Kit **IG-1277** \$149.95, ship wt 9 lbs.



All-in-one 40 kV probe

Here is a fast and easy way to check high voltages commonly found in televisions, computer terminals and oscilloscopes. In fact, measure extremely high 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. Lightweight probe has dimensions of 1 $\frac{1}{2}$ " H x 1 $\frac{7}{8}$ " W x 15" L. Kit **IM-5215** \$34.95, ship wt 2 lbs.

Increased DC voltmeter power for just pennies

That's what it amounts to when you can increase the voltage measuring capability of your several hundred dollar voltmeter with this under \$20 probe. It effectively extends the DC voltage measuring range of 10M Ω (or 11M Ω) input voltmeters up to 30,000 volts.

Takes less than an hour to assemble. Kit **IMA-100-10** \$16.95, ship wt 1 lb. Assembled **SMA-100-10** \$19.95, ship wt 1 lb.

For 11 M Ω input meters: Kit **IMA-100-11** \$16.95, ship wt 1 lb.

INSTRUMENTS

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.

Measure \pm DC and AC voltages up to 500 volts and use four ohmmeter ranges up to X1 megohm. Also safely check semiconductors using the low voltage ohmmeter.

Test leads are built right into the rugged case so you'll never lose them. The meter requires two 9-volt transistor batteries and one 1.5 volt "C" cell (not included). 5 $\frac{3}{8}$ " H x 9 $\frac{3}{8}$ " W x 9" D. Kit

IM-5217 \$49.95, ship wt 4 lbs.



Save money by checking your own phone and line

Why spend your hard-earned money on a service man to check your phone and the incoming line? You can do the same tests and determine where any telephone problem is located with the Telephone Line Analyzer. You simply plug it into a modular phone jack.

Check for defective phones and other devices, or if too many phone products are on a line. Test do-it-yourself wiring and phone cords.

The compact 2 $\frac{3}{4}$ " H x 5" W x 1 $\frac{1}{2}$ " D Analyzer is phone-line powered and doesn't need batteries or external power. Completely safe to use on your telephone line. Assembled **ST-2204** \$19.95, ship wt 1 lb.



Do better than storing your computer programs on disk

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, you'll find the simulate mode really useful. In this mode you can load a program into the Programmer and then plug it into the EPROM socket of the device the EPROM will be used in. This way you can check the program and make any needed changes before burning in an EPROM.

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. Two blank personality modules are supplied with the kit along with commonly used EPROM wiring diagrams.

This four-evening kit is equipped with a 4K x 8 system ROM and 2K x 8 system RAM that can be expanded up to 16K with optional expansion accessories. Six LEDs indicate function selections while six 7-segment LEDs display addresses, data, and operation prompts. Also available is an assembled version that includes a fully loaded memory of 16K RAM and assembled personality modules configured for use with 2532, 2516/2716, 2732, 2732A, 2764, 2764A, 27128, and 27128A EPROMs. 4 3/4" H x 15 3/4" W x 10 3/4" D. Weighs 6 lbs. and uses 120 VAC at 60 Hz. Kit **ID-4801** \$369.95, ship wt 11 lbs. Assembled **SD-4801** \$525.00 ship wt 10 lbs.

Accessories: Kit **IDA-4801-1** Personality Module Accessory contains five personality modules plus labels \$19.95, ship wt 1 lb. Kit **IDA-4801-2** 8K RAM Expansion Accessory contains additional RAM to expand the Programmer's memory up to 8K bytes \$19.95, ship wt 1 lb. Kit **IDA-4801-3** 16K RAM Expansion Accessory contains additional RAM to expand the Programmer's memory up to 16K bytes, requires previous installation of IDA-4801-2 Accessory \$39.95, ship wt 1 lb. **SDA-4801-10** User-friendly software for all Heath/Zenith computers, IBM PC and compatibles to upload or download binary, text, and Intel-Hex files to the ID-4801 Programmer. Does offset loading and relocation offset loading for EXE-type files. Uses MS-DOS \$49.95, ship wt 1 lb.

Other Specifications: **Input/Output:** RS-232C from 25-pin D connector. **Input/Output Formats:** Intel Hex. **Data Transfer Rate:** 9600 baud. **Processor:** Z-80 CPU. **Clock Speed:** 2 MHz. **Programming Time:** 50 ms per byte.

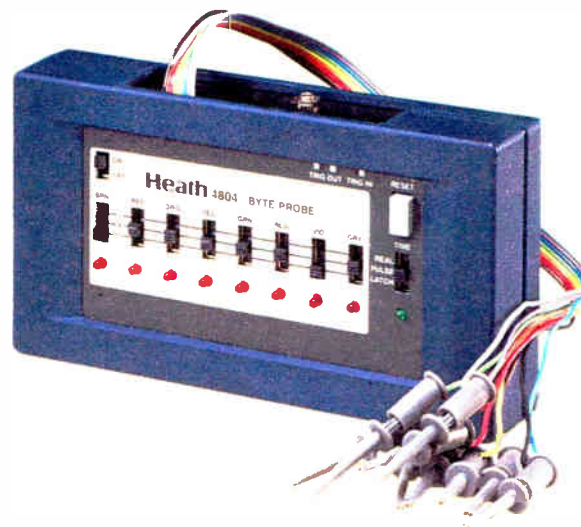
64

See high speed pulses occur

You're troubleshooting a digital circuit and must observe eight different lines at once. It might sound impossible but you can do it with the versatile Byte Probe. A unique device, the Probe can test 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.

Check each switchable channel for low-"don't care"-high selections with highs indicated by a red LED. 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.

Cut your troubleshooting time with this one-evening kit. It is powered by either a 9-volt transistor battery or an optional PS-2350 Battery Eliminator on page 57. 1 3/8" H x 6" W x 3 3/8" D. Kit **ID-4804** \$69.95, ship wt 2 lbs.

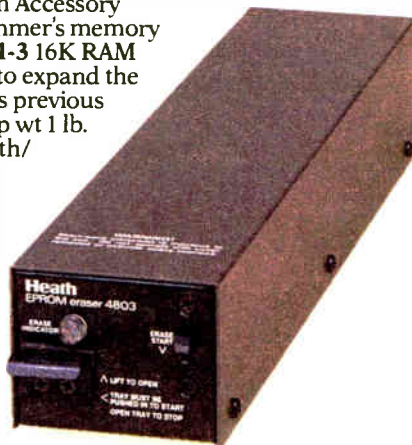


Use EPROMs over and over

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. It will erase all 24-, 28-, and 40-pin ultraviolet erasable read only memory devices and other ultraviolet erasable integrated devices. 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.

This compact 2 1/2" H x 3 1/4" W x 13 1/4" L eraser weighs only 3 1/2 lbs. It uses 120 volts AC, 60 Hz at 10 watts. Kit **ID-4803** \$59.95, ship wt 4 lbs. Assembled **SD-4803** \$100.00, ship wt 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. Use it on current color and B/W television picture tubes, even in-line-gun tubes.

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

From the front panel precisely set CRT heater voltages. Each gun is individually controlled and monitored on its own grid current meter. Also check for shorts and gassy tubes. After rejuvenation, a separate cleaning process is applied to the guns to ensure proper TV tube operation. A special push-button provides a good indication of tube life expectancy.

A 4-foot heavy-duty test cable and four adapter sockets with instructions for assembling optional sockets are included. Operates on 120 or 240 VAC. 5½" H x 13½" W x 10" D. 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.



Quick, easy testing of TTL/CMOS circuits

You want to quickly follow a digital signal through a circuit. You really don't need to see the signal on a scope, you just want to know that it's there. There is an easy solution to this troubleshooting task. Use the Heathkit Logic Probe.

This handy, quick-checking 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. The probe is a compact 9¼" long x 1" diameter and is a lightweight 2½ ounces. Kit **IT-7410** \$39.95, ship wt 1 lb.

Other Specifications: **AC THRESHOLD LEVELS: TTL Logic ZERO (V):** 0.8 ± 0.15 @ 5 VDC. **TTL Logic ONE (V):** 2.1 ± 0.25 @ 5 VDC. **CMOS Logic ZERO (%):** 30 ± 10% of supply voltage. **CMOS Logic ONE (%):** 70 ± 10% of supply voltage. **INPUT IMPEDANCE:** 400 kΩ in parallel with 10 pF. **RESPONSE LIMIT:** 10 ns for single pulse or train for TTL and CMOS.



The reliable way to check transistors

Tired of being misled by ohmmeter checks of transistors? Use this portable tester and see the actual operating characteristics of semiconductor devices.

Test transistors, diodes, FETs, SCRs, triacs, and UJT's in- and out-of-circuit. Get more than a mere "good/bad" reading. Actually

measure the gain, transconductance and leakage current of a device to make sure it is operating correctly.

Clearly read all tested values on a large three-scale meter. This tester features pushbutton control of all checks plus an internal battery check. Use either the color-coded test leads or built-in sockets to test devices. This kit takes two evenings to assemble and is powered by two 1.5 VDC "D" cells (not included). Its dimensions are 5¼" H x 8½" W x 8⅝" D and weighs 3½ lbs. Kit **IT-3120** \$99.95, ship wt 5 lbs.

Always have the right resistor

Instead of maintaining an expensive inventory of resistors just keep this Decade Resistance Box on your work bench. Imagine, any resistance value from 1 ohm to 999,999 ohms ready and waiting to drop into your next project or experiment.

All resistance values are obtained in 1-ohm steps from a six-switch decade

resistor arrangement. All resistors are precision 1 watt, 0.5% tolerance type. The zero setting completely bypasses the resistor box.

This one-evening kit is housed in a rugged 5" H x 7½" W x 6⅝" D metal case with two binding posts for easy test set-ups. Kit **IN-3117** \$69.95, ship wt 3 lbs.



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

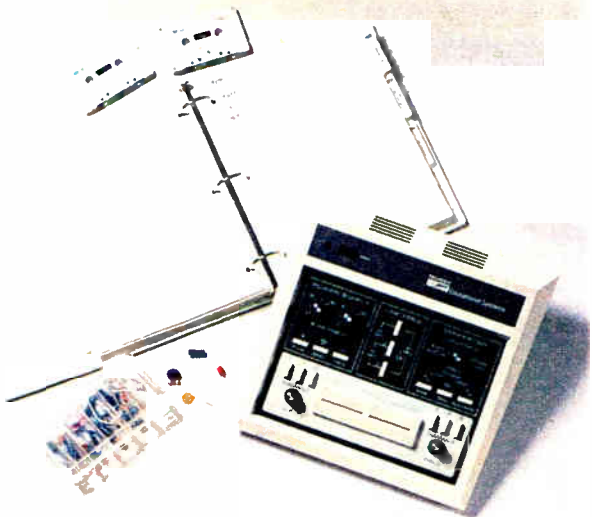


Our Heath/Zenith education courses are designed to meet your needs, whether they be self-study, classrooms or special industrial training. Our courses are success-oriented integrating technical theory with a maximum emphasis on real-world applications. They feature a methodical system of instruction that lets you start at entry level and branch off to specialized areas like robotics, microprocessor technology, circuit design and computer servicing. Learning enhancement techniques and self-test reviews ensure that you're learning what you need to learn. 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.

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 85). In addition to the self-study format, classroom versions of our courses, including text, workbook and instructor's guide, are also available. And, video courses on selected subjects are available, too. For more information on classroom and video courses, see page 85.

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.





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 ET-3100-B Trainer and such instruments as multimeters and oscilloscopes.

Learn the essentials of DC electronics

With this newly revised 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 56). 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: **EAA-3101-A** Optional Audio-Visual Package \$19.95, ship wt 2 lbs.



Electronic design trainer for successful experiments

Our Heathkit Analog/Digital Circuit Design Trainer makes your hands-on course experiments profitable and fun. See for yourself when you use it in the DC, AC, Semiconductor Devices, Electronic Communications, Electronics for Hobbyists and Test Equipment courses. This versatile trainer will thoroughly teach you to build, analyze, test, modify and gain experience in practical electronic circuit design.

The trainer is amply equipped for all experiments. It has variable power supplies and a 200 Hz to 20 kHz frequency generator. The electronic trainer also has solderless breadboard sockets for circuit building and a center-tapped transformer that supplies 30 VAC RMS at 60 Hz. Built-in 1 kilohm and 100 kilohm variable resistors are included, too. 4 $\frac{3}{4}$ " H x 15 $\frac{3}{4}$ " W x 10 $\frac{3}{4}$ " D. Kit **ET-3100-B** Trainer \$109.95, ship wt 6 lbs. Assembled **ETW-3100-B** \$184.95, ship wt 6 lbs.

Useful AC electronics principles

This newly revised 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. Two new units in this expanded text include motor and motor controllers, and AC home appliances.

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

Take this exciting step to digital technology and microprocessing

These courses bring you further into the world of electronics with a comprehensive and in-depth understanding of digital circuitry and microprocessors. You'll explore all aspects of 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 facet of your learning experience. For the Digital Techniques Course you'll need the ET-3200-B Trainer. All Microprocessor Courses, including the revised EE-3401-A, require either the ET-3400 or ET-3400-A Trainer.

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, combinational 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 two 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.



Credit card orders call TOLL-FREE:

1-800-253-0570

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

Your own mini test lab

Now you can have electronic help to quicken your comprehension of digital technology. How? With a trainer that lets you apply course material in a practical way, through experiments and building and testing prototypes. With it, you'll be able to experiment in both the Digital Techniques and CMOS Digital Techniques Courses. Our Trainer also lets you confirm circuit operation and test digital ICs. Includes built-in regulated power supplies and solderless breadboard. Assemble this trainer in less than two evenings. **Kit ET-3200-B** \$109.95, ship wt 6 lbs. **Assembled ETW-3200-B** \$184.95, ship wt 6 lbs.



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.

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 70).

You'll really enjoy and benefit from 19 hardware experiments in microprocessor theory and application. And 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.



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 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 ± 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. Kit **ET-3400-A \$259.95, ship wt 7 lbs.** Assembled **ETW-3400-A \$359.95, ship wt 6 lbs.**

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.

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. 71).

Before attempting this comprehensive course, we recommend that you complete the EE-3401-A Microprocessor Course (p. 71) 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 Continuing Education Units upon completion. **EE-3402** \$99.95, ship wt 11 lbs.

Voice Synthesis lets you listen to your experiments

Be on speaking terms with your ET-3400 or ET-3400-A Microprocessor Trainer by taking the EE-3403-A Voice Synthesis Course. You'll study the two most popular methods of voice synthesis - digitized voice synthesis which uses a fixed vocabulary with human voice qualities and phoneme voice synthesis which allows you to reproduce



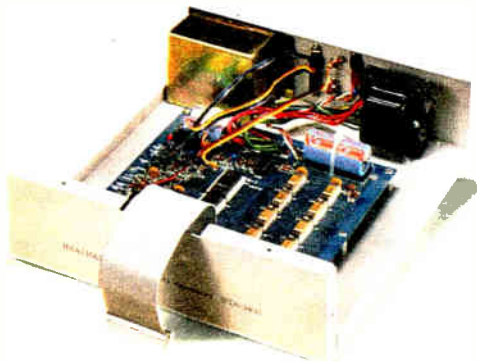
any English word and almost all pronounceable sounds.

The five units of this course cover the human voice, with an overview of voice reproduction and voice patterns. Included in the course are linear and logarithmic coding, delta modulation and variable slope delta modulation, speech synthesis by linear predictive coding, the phoneme speech synthesizer (PSS) and advanced programming for the phoneme speech synthesizer.

All components are included for the hands-on experiments you'll perform as you learn about the basic hardware and software necessary for breadboarding (on the ET-3400 or ET-3400-A Trainer) computer synthesized speech circuits. 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 on a single integrated circuit which can produce an unlimited vocabulary.

To better prepare yourself for the material in the Voice Synthesis Course, the EE-3401-A Microprocessor Course (p. 71) or equivalent knowledge is needed. You'll earn 3.0 Continuing Education points with this course. **EE-3403-A** \$69.95, ship wt 4 lbs.



ETA-3400
converts
ET-3400-A
trainer
into an 8-bit
personal
computer

Expand your ET-3400-A Trainer's power

The ETA-3400 Microprocessor Trainer Accessory turns your ET-3400 or 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 the 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. Since modifying the trainer changes the clock frequency, we recommend you complete experiments in EE-3401-A thru EE-3405 before adding the Accessory. An H-29 or Z-49 Video Terminal is required to use BASIC and monitor features of the ETA-3400. Assemble this kit in about 10 hours. Kit **ETA-3400** \$179.95, 8 lbs. Assembled **EWA-3400** \$279.95, 8 lbs.

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

Explore the powerful 6809 microprocessor with this course

Advance your microprocessor skills as you learn programming and interfacing of an extremely fast logic processor with the 6809 Microprocessor Course. Seven units in this course take you from concepts and 6809 chip structure to interfacing applications. You'll begin by studying the fundamental 6809 concepts and how the integrated circuit is structured. This includes the 6809's design philosophy, its evolution and improvement. With this material as a base, you'll go on to examine the 6809's addressing modes, registers and data movement instructions. Following units cover arithmetic, logic, test instructions, branch and miscellaneous instructions. The course continues by explaining the 6809's input and output signals and finishes with a unit on 6809 microprocessor interfacing and applications.

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.

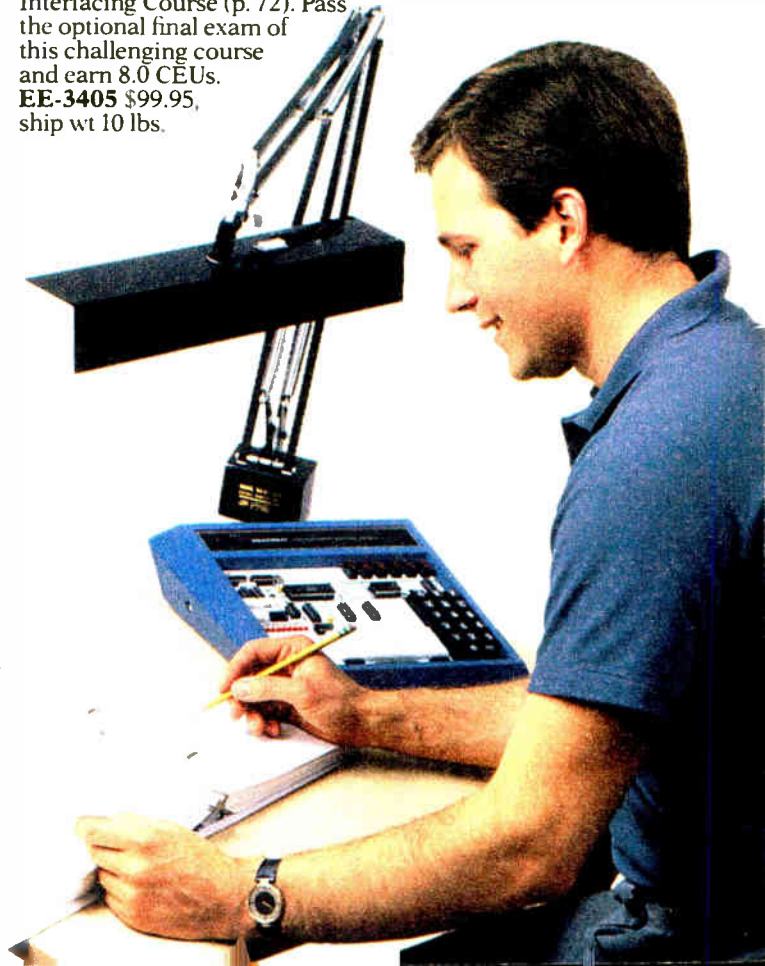
A microprocessor must first sense or receive information before it can carry out an assigned task. To acquaint you with this side of a microprocessor, the EE-3405 Course covers, in depth, sensors and transducers and how they interface to a microprocessor to sense real-world events. Complete coverage 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 a look at future microprocessor applications.

Included with the course are ten hands-on programming experiments. By performing these experiments you'll reinforce the concepts learned from the text, thereby retaining more and understanding the material better. Performing these programming exercises is optional and requires the ET-3400 or ET-3400-A Microprocessor Trainer (p. 71).

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

To prepare yourself for the material contained in the 6809 Microprocessors Course, we recommend that you successfully complete the EE-3401-A Microprocessor Course (p. 71) or obtain equivalent knowledge. Pass the optional final exam and you'll earn 3.0 Continuing Education Units. **EE-3404** \$49.95, ship wt 6 lbs.

To perform the 13 experiments in this course, you'll need the ET-3400 or ET-3400-A Microprocessor (p. 71), a VOM and an oscilloscope. You should also complete the EE-3401-A Microprocessor Course (p. 71) and the EE-3402 Microprocessor Interfacing Course (p. 72). Pass the optional final exam of this challenging course and earn 8.0 CEUs. **EE-3405** \$99.95, ship wt 10 lbs.



Credit card orders call TOLL-FREE:

1-800-253-0570

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

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 H/Z-100, Heath/Zenith PCs, IBM PC and other compatibles. Plus you'll get invaluable training experience with the ET-100 Trainer used in all of these courses.



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 the meaning of 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** \$99.95, 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 75), 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 talking 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.



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

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 70). You should also be famil-



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.

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 the same sophisticated 8088 micro found in the H/Z-100 Desktop Computer. 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-122-A (page 102) or on TV channel 3 or 4 with the help of the TV modulators listed at the right. Kit **ET-100** \$799.95, ship wt 33 lbs. Assembled **ETW-100** \$1095.00, ship wt 33 lbs.



Give your ET-100 many of the features found in our most powerful desktop computer, the H/Z-100

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-232 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** Was \$999.95 Now \$799.95, 69 lbs.
- Assembled **EWA-100-A** \$1650.00, ship wt 70 lbs.
- Assembled **EWS-100-A** with ET-100, \$2750.00, ship wt 96 lbs.

Accessories:

- ETA-100-1** Extra Removable Breadboard \$29.95, ship wt 1 lb.
- ETA-100-2** Channel 4 Modulator to use with TVs \$39.95, ship wt 1 lb.
- ETA-100-3** Channel 3 Modulator to use with TVs \$39.95, ship wt 1 lb.
- Z-205-1** 64K RAM Upgrade \$79.99, ship wt 1 lb.



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.

HERO 2000 – Ready to lead you to your future

Hero 2000 will help you learn about, explore and test the interrelated 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 eleven 8-bit peripheral microprocessors. The powerful HERO 2000 BASIC stored in the 64K ROM makes your programming easier.



We've even added over 20 robot commands not usually included in standard BASIC. 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 more 64K RAM chip sets.

No other educational robot can offer you the expansion capability of HERO 2000. You can access twelve circuit card slots, five with openings for back panel connectors from a rear panel. Along with the optional RAM boards, an optional Experimenter Board is available for conducting experiments and testing your own circuits. The board includes two solderless breadboards, bidirectional buffered interface lines and fused power supply outputs. Plus, your robot comes equipped with two RS-232 DCE ports configured for a terminal 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 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 robot arm is multi-jointed and fully articulated with a gripper that has a sense of touch. A closed loop system is used so HERO always knows the position of the motors and its arm.

Programming HERO 2000 is done from the top-mounted hexadecimal keypad or the optional wireless remote control (included with an assembled HERO 2000). 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 from four hours to six days on its single 24 amp-hour battery. A 120 VAC charger is included.

Configurations:

Kit **ET-19** HERO 2000 Robot \$1999.95, ship wt 108 lbs.

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

Assembled **EWS-19-35** HERO 2000 Robot, Arm and 75.43 MHz Remote Control \$4499.95, ship wt 121 lbs.

Assembled **EWS-19-36** HERO 2000 Robot, Arm and 75.67 MHz Remote Control \$4499.95, ship wt 121 lbs.

Accessories:

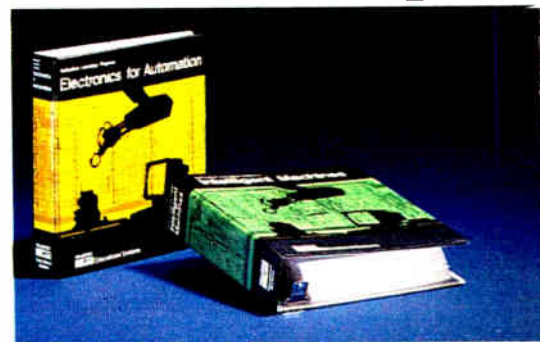
Kit **ETS-19-1** HERO 2000 Arm with Controller Card \$699.95, ship wt 14 lbs.

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 64 RAM Chip Set \$49.95, ship wt 1 lb.



Self-paced courses continue your robotics education

Enhance your study of robotics and intelligent machines by combining these home courses with your HERO 2000 Automation Trainer. Both courses are self-paced to maximize your understanding and retention of the material.

Begin your study with EE-1900, the Intelligent Machines course. As an introduction to intelligent machines, you'll study input and output devices such as keyboards and digitizers. Sensors and transducers are introduced with such complex devices as vision and tactile sensor systems. Other subjects include basic signal conditioning, digital/analog conversion, the hardware and software involved in machine communication, and an introduction to computer aided design and manufacture.

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 67 or equivalent knowledge. There are 3.0 CEUs for passing the optional exam.

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 explored, including visual and tactile sensing systems.

All experiments are performed on the HERO 2000. Passing the optional exam earns you 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, ship wt 8 lbs. **EE-1901** \$99.95, ship wt 11 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 enables you to create, execute or edit a program easier than if you were using HERO's head-mounted hexadecimal keypad. Also, programs are written in HERO BASIC which is 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.



Credit card orders call TOLL-FREE:

1-800-253-0570

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



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

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-18-35** HERO 1 with Arm and Remote Control operating at 75.43 MHz and without voice *Regularly* \$1399.85 *Now Only* \$1299.95, ship wt 78 lbs.

Kit **ETS-18-36** HERO 1 with Arm and Remote Control operating at 75.67 MHz and without voice *Regularly* \$1399.95 *Now Only* \$1299.95, ship wt 78 lbs.

Assembled **EWS-18-35** HERO 1 with Arm and Remote Control operating at 75.43 MHz *Regularly* \$2669.80 *Now Only* \$2149.90, ship wt 95 lbs.

Assembled **EWS-18-36** HERO 1 with Arm and Remote Control operating at 75.67 MHz *Regularly* \$2669.80 *Now Only* \$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.

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 101 \$49.95, ship wt 1 lb.

SAVER! **ETS-18-9** Expansion System. Everything needed to let you program your robot and 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.

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 speak in complete sentences, but it can also simulate the sound of human speech. You can see a demonstration of HERO's sensors, voice and movements as soon as you get your robot by purchasing our special HERO 1 Demo Cassette.

And HERO's smart. On-board 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.



Learn all about 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 67), EE-3102-A AC Electronics (page 67), EE-3201-A Digital Techniques (page 70), and EE-3401-A Basic Microprocessors (page 71). 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

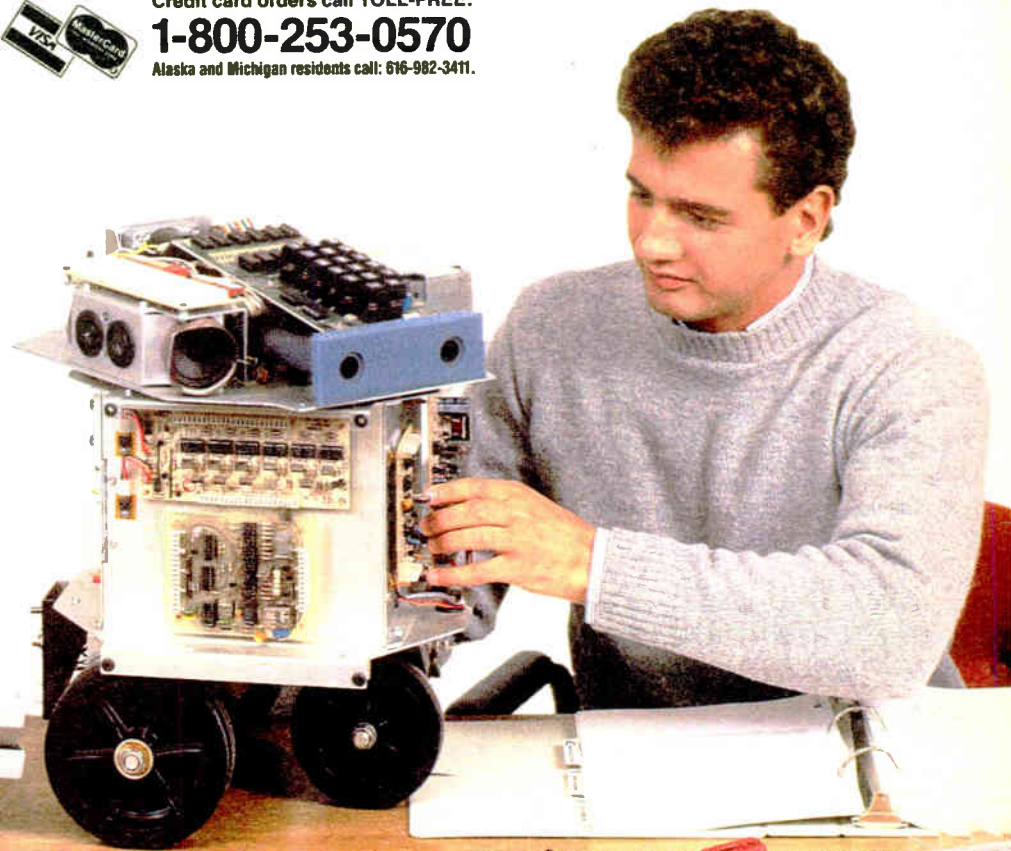
Master the operation of your HERO 1 and unlock the power of the Robot Language Interpreter. Our sixty-one programming experiments show you how with a wide range of examples that teach general programming principles, including subroutines in HERO 1's monitor ROM. **EB-1802** \$24.95, ship wt 1 lb.



Credit card orders call TOLL-FREE:

1-800-253-0570

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



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

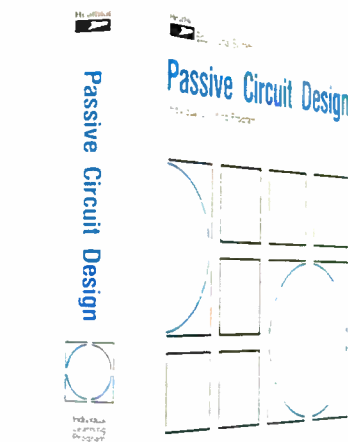
The next step in circuit design is provided by our Transistor Circuit Design Course. It teaches you the basic techniques for designing circuits using transistors. You'll start with a discussion of transistor characteristics and relevant parameters. Next, you'll see how to develop appropriate AC and DC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

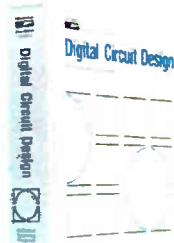
Your journey begins with a discussion of digital logic gates that are used as the fundamental building blocks of all digital electronics. You'll review design considerations that relate to

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 means you can 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.

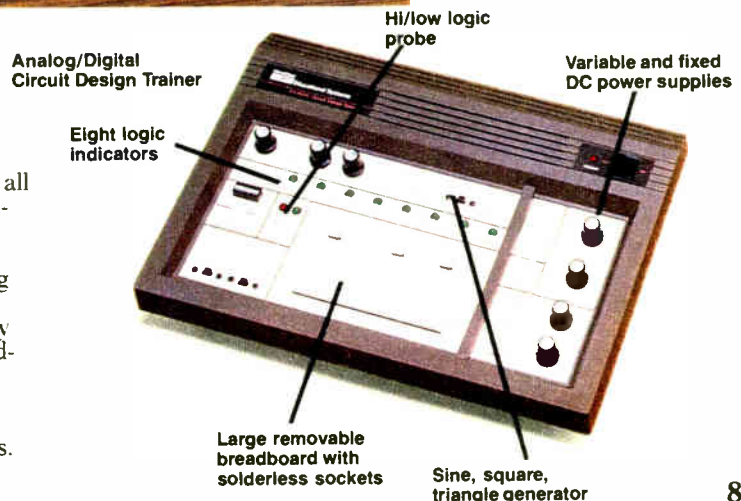


Use your own analog/digital circuit design trainer

Our solderless double Breadboard Trainer is a regular minilab for learning the basic techniques of circuit design in all courses on the previous two pages. It includes a built-in function generator for producing sine, square and triangle waveforms in five switch-selectable ranges from 1 Hz to 100 kHz. 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.



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 electronics applicable to hobbies and many other areas of interest, a Variable Speed Tape Recorder to increase your learning speed and a Tutorial Electronics Dictionary that defines electronics technical terms. And as always, you can earn valuable CEUs: 4.0 for courses EH-701 and EH-702 and EE-3140, 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-3100-B Trainer is used with EE-3140.

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 complimentary 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.

84

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.

A tape recorder that increases your learning speed

Our Variable Speed Player gives you a full range of pitch-corrected speeds that cut your listening time in half. Assembled **ECP-3804** \$139.95, ship wt 3 lbs.

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.

The electronics overview that makes your hobbies more fun

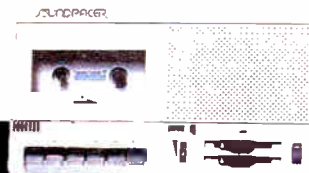
If you want to enjoy electronic hobbies and understand electronics magazines in your area of interest, this course is for you. You'll learn about fundamental electronic concepts, the operation of various electronic devices and circuits, and much more. **EE-3140** \$69.95, ship wt 11 lbs.



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1-800-253-0570

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



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. Also, several of our courses are worth college credit through member colleges of the American Council on Education. If you have taken and passed the examinations on pages 67-71 (EE-3101-A, -3102-A, -3103-A, -3104-A, -3105-A, -3201-A, -3401) you may be eligible for college credit. Consult "The National Guide" for course recommendations.

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, visit your local Heath/Zenith Computers & Electronics Center and pick up one of our colorful brochures.

	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
Introductory	Concepts of Electronics	EB-6140 (3 lbs.)	24.95	EB-6140-40 (1 lb.)	10.95	EB-6140-50	9.95	ETW-3100-B	184.95	EB-6140-30	29.95	NOT USED	
Basic Electronics	DC Electronics	EB-6101-A	19.95	EB-6101-41 (1 lb.)	10.95	EB-6101-51	9.95	ETW-3100-B	184.95	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-3100-B	184.95	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-3100-B	184.95	EB-6103-31	19.95	EEA-3103-A	19.95
	Electronic Circuits	EB-6104	19.95	EB-6104-40	10.95	EB-6104-50	9.95	ETW-3100-B	184.95	EB-6104-30	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-3100-B	184.95	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-3100-B	184.95	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-3200-B	184.95	EB-6201-31	34.95	EEA-3201-A	19.95
Microprocessor Technology	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 (5 lbs.)	24.95	EB-8088-40	11.95	EB-8088-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-8088-30	59.95	NOT USED	
Advanced Electronics	Operational Amplifiers	EB-601	19.95	EXPERIMENTS IN TEXT		EB-601-50	9.95	ETW-3300-B	194.95	EB-601-30	24.95	NOT USED	
	Active Filters	EB-602	19.95	EXPERIMENTS IN TEXT		EB-602-50	9.95	ETW-3300-B	194.95	EB-602-30	14.95	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	
Robotics and Automation	Intelligent Machines	EB-1900	19.95	EB-1900-40 (1 lb.)	10.95	EB-1900-50	9.95	EWS-19-35 EWS-19-36 (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	39.95	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	
	Robot Applications	EB-1812	19.95	EB-1812-40 (1 lb.)	10.95	EB-1812-50	9.95			EB-1812-30	49.95	NOT USED	
	Hero 1 Advanced Experiments	EB-1802 (1 lb.)	24.95	NOT USED								NOT USED	
Computer Servicing	Computer Fundamentals	EB-2001 (3 lbs.)	19.95	EB-2001-40	10.95	EB-2001-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-2001-30	39.95	NOT USED	
	Computer Peripherals	EB-2002	19.95	EB-2002-40 (1 lb.)	10.95	EB-2002-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-2002-30	39.95	NOT USED	
	Computer Maintenance	EB-2003	19.95	EB-2003-40 (1 lb.)	10.95	EB-2003-50	9.95	ETW-100 (33 lbs.)	1095.00	EB-2003-30	29.95	NOT USED	
Circuit Design	Passive Circuit Design	EB-6001 (3 lbs.)	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	
Computer Programming	BASIC Programming	EB-6100 (4 lbs.)	21.95	EB-6100-40	10.95	EB-6100-50	9.95	NOT USED		NOT USED			
	AutoCAD	EB-609 (6 lbs.)	39.95	NOT USED		EB-609-50	9.95	NOT USED		NOT USED		NOT USED	

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Teach yourself how to get the most from your computer and software

Take the self-instructional road to increased knowledge and travel at your own speed and convenience

Business-oriented Pascal

An audio-tutorial course on a tailor-made programming language for business use. A language that is structured and block oriented with an ability to easily access machine-specific functions. Whether you're an experienced user or just a beginner, this programming course can teach you to write programs in the high-level language of Pascal. Begin by learning to write simple programs. Then advance to longer, self-contained procedures. 4.0 CEUs. **EC-1111** \$99.95, ship wt 7 lbs.

Ideal start to computers

Learn what a microcomputer can do for you. Written in simple, everyday language, this Microcomputing course supplies you with all the knowledge you need to make an intelligent buying decision about computers, peripherals and software.

The different parts of a computer are explained along with how to apply a computer's capabilities to your needs. Learn to evaluate hardware and software applications, too. 3.0 CEUs. **EC-1000** \$49.95, ship wt 5 lbs.

Improve your touch typing skills with this personal 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. Even if you're a beginner, you'll start off with just a few keys. More keys are added 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 included. It enables you to sharpen your typing skills while having 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.

Powerful FORTRAN

Preferred by engineers, scientists and mathematicians. Highly effective tutorial explains the fundamentals and reveals how to use its power. Learning process involves actual program writing.

To get the most from hands-on programming experiments provided with the course, we recommend that you perform them on a computer such as the H/Z-89, H/Z-100 or Heath/Zenith PC. You'll need either CP/M or MS-DOS plus the compatible FORTRAN programming language. 5.0 CEUs. **EC-1101** \$99.95, ship wt 7 lbs.

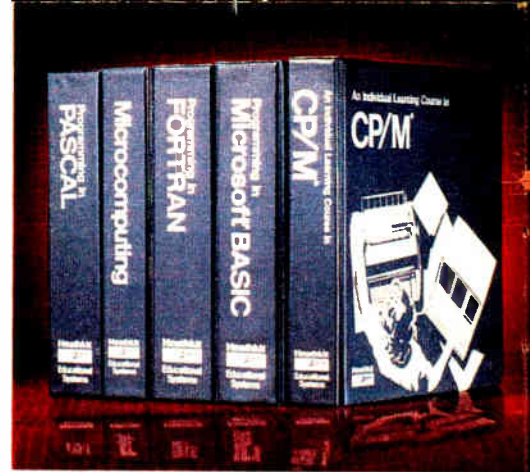
Microsoft BASIC

An audio-tutorial course that shows how to get the most from the programming language that's used on most home computers. It concentrates on essential programming skills and methods.

To obtain full benefit from this course and to complete the included hands-on computer exercises, you'll need access to a computer that uses Microsoft BASIC. 5.0 CEUs. **EC-1110** \$99.95, ship wt 7 lbs.

CP/M* operating system

A beginner-oriented course that requires no previous background. Starting at ground level, this audio-tutorial based



course first shows you how to use the most basic commands. Use of the resident text editor is also covered.

This course is designed for use with computers having at least 48K of RAM and able to use the CP/M operating system. 2.5 CEUs. **EC-1120** \$59.95, ship wt 6 lbs.

*CP/M is a registered trademark of Digital Research, Inc.

8080 Assembly Language

There are many programming languages but none will execute a program faster than assembly language. That's because a computer understands best this low-level language without wasting time interpreting commands. And it uses less memory space. Learn how in this course. The included workbook contains experiments for use on the H/Z-89 Computer. 3.0 CEUs. **EC-1108** \$54.95, ship wt 7 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 the most frequently used commands along with how to enter and edit command lines. Further into the course you'll cover the batch processor and the program debugger.

Fifteen computer exercises included on a 5.25" 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 93. Some commands and files that are MS-DOS Version 2 and 3 specific are not covered. 3.0 CEUs. **EC-1121** \$59.95, ship wt 6 lbs.

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

MACRO-86 Assembly Language programming

Learn to program virtually any computer using the familiar Intel 88/86 series of microprocessors and Microsoft DOS. First we describe the features of MACRO-86 simply and clearly. Then we dramatically demonstrate them using programs specific to each subject and programs that we'll teach you to write.

For this course you should have access to a Heath/Zenith 100 or PC, an upgraded ET-100 Trainer, or an IBM PC or compatible with the appropriate operating system. Since this course doesn't include MACRO-86 software, you'll need it and its supporting programs. For MS-DOS Version 3, the MACRO-86 Assembler is part of the CB-3163-30 Programmer's Package found on page 93. You should also be familiar with the operating system and have access to system programs and supporting files. 5.0 CEUs. **EC-1201** \$59.95, ship wt 10 lbs.

MACRO-86 Algorithms

A natural follow-up course to MACRO-86 Assembly Language. This Algorithms course demonstrates an important phase in computer programming...algorithms. Use provided programs or programs that you learn to write. Programs that plainly demonstrate applications of 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, and the IBM PC or compatible. The MS-DOS operating system and MACRO-86 Assembler (not supplied) are used in all experiments. A 5.25" floppy disk, included with the course, contains experiments, programs and demonstrations for use in the course. 4.0 CEUs. **EC-1202** \$59.95, ship wt 6 lbs.

Create your own dazzling graphics

Written for the beginner, 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. 6.0 CEUs. **EC-3000** \$59.95, ship wt 6 lbs.

Your own private tutor for AutoCAD

An easy-to-use package on how to take maximum advantage of the important features of AutoCAD, a full-sized industrial CAD system. An ideal learning tool, this tutorial introduces and guides you in the use of high performance computer-aided drafting. Covered are commands necessary to produce drawings accurately and quickly including: points, lines, arcs, circles, text, panning, zooming, layering, blocks and arrays.

Plotters and digitizers are discussed to familiarize you with the wide range of input and output devices used with this drafting system. Even the advanced features of AutoCAD are examined for a fuller knowledge of a broad subject. Includes a floppy disk containing hands-on experiments with CAD.

Computers used with either of the programs listed below require a mini-



Precision graphics with low-cost AutoCAD

Control the power of large-scale computer-aided design software to

produce high-quality drawings and schematics on your personal computer: Even visualize models in 3D with an optional extension package.

AutoCAD from Autodesk Inc. handles drawings as easily as a word processor manipulates text. And it requires no computer knowledge.

Configurations:

EC-1307 AutoCAD with ADE-1 and ADE-2 advanced drafting extensions for use with the H/Z-100 Computer \$2000.00, ship wt 7 lbs.

EC-1307-PC AutoCAD with ADE-1 and ADE-2 advanced drafting extensions for use with Heath/Zenith Personal Computers \$2000.00, ship wt 7 lbs.

Get behind the wheel with these 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.

There's nothing compared to seeing 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.

um of 256K RAM, two 5.25" disk drives, color capability and MS-DOS. A digitizer and plotter are also needed. For use with AutoCAD Version 1.4 and below.

Configurations:

EBS-609 AutoCAD tutorial for use with H/Z-100 Computers \$59.95, 3 lbs.

EBS-609-PC AutoCAD tutorial for use with Heath/Zenith PCs and the IBM PC and its compatibles \$59.95, 3 lbs.



Go with the winners in CAD - AutoCAD and Heath/Zenith computers and peripherals

EC-1308 AutoCAD with ADE-1 + 2 plus ADE-3 drafting enhancements that include 3D for use with the H/Z-100 Computer \$2500.00, ship wt 7 lbs.

EC-1308-PC AutoCAD with ADE-1 + 2 plus ADE-3 drafting enhancements that include 3D for use with Heath/Zenith Personal Computers \$2500.00, ship wt 7 lbs.

Accessories:

Assembled **DMP-29** Graphics Plotter from Houston Instruments handles drawings with a $\pm 0.2\%$ accuracy up to 11" x 17" (ANSI size B) in 8 colors at adjustable pen speeds up to 22.6"/second. Uses RS-232 serial input, standard DMP graphics language and has a 1K buffer \$2295.00, ship wt 32 lbs.

DMP-29-2 Set of acetate pens for plotting on overhead transparencies \$59.00, ship wt 1 lb.

CD-5063-5 Condor* III tutorial \$99.00, ship wt 1 lb. **CB-3163-36** Learning about the H/Z-158/200 \$40.00, ship wt 1 lb. **CB-3163-37** MS-DOS Version 3 tutorial \$40.00, ship wt 1 lb. **CB-5063-34** WordStar Professional* Options tutorial \$79.00, ship wt 1 lb. **RG-5063-3** Graftalk tutorial Please Call, ship wt 2 lbs.

*Condor is a registered trademark of Condor Computer Corporation. WordStar Professional is a trademark of MicroPro International Corporation.

Your easy and convenient 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, terminals and computer supplies. Stop in at any one of our 63 customer-oriented Heath/Zenith Computers & Electronics centers. Here you'll find a trained and experienced computer professional that will help you select the best computer hardware and software to fit your exact requirements. Put your purchase on your Visa or MasterCard credit card, or on a personal Heath Revolving Charge. While you're in the store, check out the special sales and discounted items on a wide range of kit and assembled computer and electronic products. Take advantage of our personalized service.

Two IBM PC-compatible computers to fit your needs and your price range

The first 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 an inexpensive, intelligent workstation in a local area network. And we are including a FREE HVM-122-A Monochrome Monitor as well.

The second is the HS-158 Expandable Personal Computer. It offers all the features of the Compact PC in a kit that requires basic soldering skills. Plus you gain the ability to greatly expand the capabilities of the computer with numerous add-ons. Expand in many directions as your needs change.

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 HS-148 and HS-158 IBM-compatibles to run 99% of all IBM PC software. In addition, you get a full 8 MHz operation which allows you to run as much as 60% faster than computers running at a slower

5 MHz. And just in case an application requires a slower 5 MHz processing speed, a dual-speed switch flips over to accommodate this need.

The HS-148 PC and the HS-158 PC are ready for all your computing needs with plenty of memory and storage capacity. They are standard-equipped with 256K of memory and one 5.25" floppy disk drive capable of storing up to 360K of information. For more computing power, memory can be expanded up to 640K on the main board without using any additional expansion cards. Add on another disk drive to double the amount of data storage. Or install a Winchester drive to the HS-158 for an extensive 20 MB of additional storage.

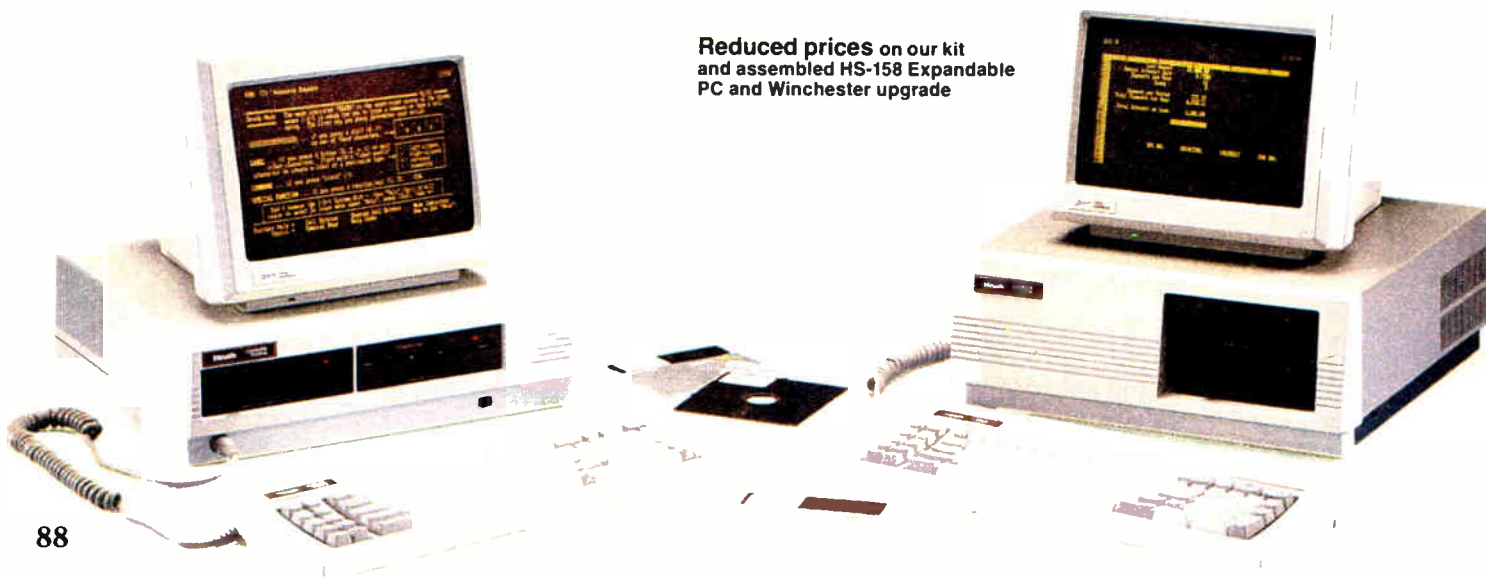
Meet your growing needs by expanding. Most any IBM PC accessory board can be used with the HS-148 Compact PC. Just insert it into the optional ZA-141-1 Expansion Board that plugs into the computer's main board. With the HS-158 PC you have four open IBM-compatible slots that can accept most any off-the-shelf accessory boards designed for the IBM PC. Future expansion couldn't be easier with increased hardware flexibility and, in turn, you can choose from a wider variety of software and peripherals to meet your changing computer needs.

Get improved video over the IBM PC with either the HS-148 or the HS-158 PC. You'll enjoy the absence of video flickering during scrolling and a substantial improvement in the speed at which text is displayed. A much clearer display is achieved by special circuitry that removes video interference.

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. With the Z-319 Card installed, the Expandable PC can reproduce any graphics display produced on the advanced H-100 Computer. Or, add an optional H-329 Monochrome Video Card (can be installed in the HS-148 using a ZA-141-1) and get a video output compatible with the output from an IBM monochrome video card. Use this card with special monitors like the ZVM-1240 on page 103.

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.

Reduced prices on our kit and assembled HS-158 Expandable PC and Winchester upgrade





Put the detached keyboard where you like for more relaxed typing. The Selectronic-style keyboard features clearly labeled and color-coded keypads and a calculator-style keypad for quick access to the correct key. Ten programmable function keys and an L-shaped return key make data entry a lot easier.

The MS-DOS operating system from Microsoft Corp. and a diagnostics disk is included FREE with both of these top-performing computers. The HS-148 Compact PC and the HS-158 Expandable PC are also available in assembled Zenith Data Systems versions for ready to go computing.

And with every 20 MB Winchester-equipped kit or assembled HS-158 Expandable PC, or every Winchester Upgrade Kit, we will include FREE Windows software from Microsoft Corp. Put the model number MS-5063-30 (ship wt 2 lbs.) on the order form and write "No Charge" in the price column. Configurations:

Kit HS-148-1 Compact Personal Computer with monochrome and color capability, 256K RAM, one 5.25" disk drive with 360K total storage, and includes the MS-DOS operating system. Also includes a FREE HVM-122-A Monitor Was \$999.00 *Now Only* \$899.00, ship wt 50 lbs.

Kit HS-158-1 Expandable Personal Computer with monochrome and color capability, 256K RAM, one 5.25" disk drive with 360K total storage, and MS-DOS Was \$1599.00 *Now Only* \$1399.00 ship wt 25 lbs.

Assembled **ZF-148-41** Compact PC with monochrome and color capability, 256K RAM, one 5.25" drive with 360K total storage, and MS-DOS Was \$1499.00 *Now Only* \$1299.00, 28 lbs.

Assembled **ZF-148-42** Compact PC with monochrome and color capability, 256K RAM, two 5.25" disk drives with 720K total storage, and MS-DOS \$1499.00, ship wt 30 lbs.

Assembled **ZF-158-41** Expandable PC with monochrome and color capability, 256K RAM, one 5.25" disk drive with 360K total storage, and MS-DOS \$1999.00, ship wt 38 lbs.

Assembled **ZF-158-42** Expandable PC with monochrome and color capability, 256K RAM, two 5.25" disk drives with 720K total storage, and MS-DOS \$2199.00, ship wt. 41 lbs.

Assembled **ZW-158-43** Expandable PC with monochrome and color capability, 256K RAM, 20 MB Winchester hard disk drive, one 5.25" disk drive with 360K storage, and MS-DOS \$2799.00, ship wt 42 lbs.

Accessories:

Assembled **Z-207-7** Optional 5.25" floppy disk drive for the HS-148 Compact PC with 360K storage \$250.00, 5 lbs.

Kit Winchester Upgrade for installing an optional 20 MB Winchester hard disk drive *only* into the HS-158 Expandable Personal Computer. And as a special bonus, Microsoft Windows software is included FREE. **Kit HS-317-20** Was \$1195.00 *Now Only* \$895.00, ship wt 16 lbs.

Assembled **Z-316-8** 8087 Numeric Co-Processor \$285.00, ship wt 1 lb.

Assembled **Z-205-4** 256K Memory Chip Set, a set of nine memory expansion ICs for increasing RAM memory capability of HS-148 and HS-158 Personal Computers \$199.00, 1 lb.

NEW! Assembled **Z-304** Async Serial Port provides one sync/async port for use with terminal emulation packages \$249.00, ship wt 2 lbs.

Assembled **ZA-141-1** Expansion Board for HS-148 Compact PCs only. Plugs into main board of computer and allows the addition of one accessory card Was \$149.00 *Now Only* \$99.00, 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) of both alphanumeric characters and graphics.



Enables emulation of H-100 Computer video attributes and uses mapping to functionally emulate the keys of an H-100 keyboard. Requires MS-DOS (OS-63-31) and MS-DOS Enhancement (OS-63-32) \$424.00, ship wt 1 lb.

SAVER! Purchase both the Z-319 Video Card and the MS-DOS Enhancement (OS-63-32) and save over separate costs. Assembled **ZSS-100-27** \$449.00, ship wt 12 lbs.

Kit H-329 Monochrome Video Card for use with HS-148 Compact (requires ZA-141-1 Expansion Board) and HS-158 Expandable PCs. It provides a high resolution video output compatible with the output from an IBM monochrome video card. Displays 25 lines of 80 characters and stores one page in 8K of RAM \$159.95, ship wt 3 lbs.

Assembled **Z-329** version of the H-329 Card \$200.00, ship wt 2 lbs.

TM-140 Technical Manual for the HS-148 and Z-138 Compact Personal Computers. Includes theory of operation, circuit descriptions and block diagrams \$49.00, ship wt 3 lbs.

TM-150 Programmer's Reference Manual provides information about the features of the HS-151 Personal and HS-161 Portable Computer as related to programming and interfacing \$25.00, ship wt 3 lbs.

50% OFF! HS-148 AND HS-158 PC SAVERS

Take 50% off the price of these selected items when you purchase them within 90 days of buying either a kit or assembled HS-148 Compact or HS-158 Expandable PC.* A copy of the computer purchase receipt is required.

Any three Heath/Zenith software packages.

Z-205-4 256K Memory Chip Set.

Z-316-8 8 MHz 8087 Numeric Co-Processor.

Z-207-7 Optional 5.25" floppy disk drive (kits only).

H-329 High Resolution Video Card (H/Z-158 PCs only).

*To qualify the computer must be purchased from the Heathkit Catalog or a Heath/Zenith Computers & Electronics Center.

Other Specifications: **Display Graphics:** 640 x 200 dot addressable pixels in monochrome; 320 x 200 pixels in color, each pixel can be 1 of 4 colors selectable from 1 of 2 color palettes. Characters can be 1 of 8 background colors with 1 of 16 foreground colors. **Video:** Both RGB with intensity and composite monochrome outputs provided. Standard 9-pin D connector for RGB monitors, sync polarity is jumperable positive or negative. Standard phono type connector for monochrome output, color displayed by corresponding gray level. **Cursor:** Blinking, underline, or reverse. **Cursor Controls:** Up, down, left, right, home. **Cursor Addressing:** Relative or direct. **Tab:** 8 columns. **Bell:** Audible alarm on receipt of ASCII BEL command. **Edit Functions:** Insert and delete character or line. **Erase Functions:** Erase line, to beginning of line, to end of page, to end of line. **Serial I/O Ports:** EIA RS-232 standard DTE connector, 110 to 19,200 baud rate, asynchronous full or half duplex. **Parallel I/O Port:** Female Centronics compatible 25-pin D connector. **Expansion Capability:** **HS-148:** Optional daughter board provides full-size internal IBM-compatible card slot, plus connector to external expansion box. **HS-158:** Four card slots available. **Power Requirements:** 120/240 VAC at 50/60 Hz. **Dimensions:** **HS-148:** 4 3/4" H x 16" W x 16 1/4" D. **HS-158:** 6 1/4" H x 16" W x 16 1/2" D. **Weight:** **HS-148:** 22.5 lbs. **HS-158:** 42 lbs.

More accessory boards can be found on page 97.

New lower prices on the Advanced PC

Increased power, expanded memory, massive storage and high speed processing are added to IBM PC-AT compatibility for demanding professionals who want and deserve the best in an advanced computer system.

The HS-241 Advanced PC is based on the 80286 processor to become your key to both multi-tasking and multi-user operations. Plus you also gain one-third faster operation than the IBM PC-AT with "no wait" technology.

Comes with a standard 512K RAM that can be expanded to more than 15MB. Use two fully loaded Z-405 Memory Cards to get 3MB of added memory. Take advantage of extensive storage with a 1.2MB 5.25" floppy disk drive to which you can add another floppy drive or multiple Winchester drives.

MS-DOS is just one of the many extras provided (kits include GW-BASIC). Others are seven open expansion slots, an RS-232C serial and a Centronics parallel port, English labeled keyboard and a 6 MHz operating speed. Plus the option of choosing the video card that best fits your needs.

Configurations:

Kit **HS-241-1** Advanced PC with 512K RAM and one 1.2MB floppy disk drive. Includes MS-DOS and GW-BASIC. Requires video card. *Was \$2899.00 Now \$2499.00*, 65 lbs.

Assembled **ZF-241-81** Zenith Data Systems Advanced PC with 512K RAM, one 1.2MB floppy disk drive and MS-DOS. Requires video card *Was \$3999.00 Now Only \$3499.00*, 52 lbs.

Accessories:

Z-207-7 Optional 5.25" 360K disk drive \$250.00, 5 lbs.

Z-205-4 256K RAM Chip Set \$199.00, ship wt 1 lb.

Z-405 1.5MB Memory Board (128K installed) \$399.00, 2 lbs.

Z-409 Assembled Standard Video Card \$239.00, 2 lbs.

Z-329 Assembled High Resolution Video Card with an IBM monochrome compatible output \$200.00, ship wt 2 lbs.

Z-416 80287 Numeric Co-Processor \$205.00, ship wt 1 lb.

ZD-12 Optional 5.25" 1.2MB floppy drive \$599.00, 5 lbs.

ZD-200 Optional 20MB Winchester drive \$1499.00, 9 lbs.

ZD-400 Optional 40MB Winchester drive \$2499.00, 9 lbs.

Z-417-1 Winchester Cable required for the installation of either a 20MB or a 40MB Winchester drive into an HS-241 PC without a Winchester drive \$20.00, ship wt 1 lb.

HCA-200-PC Serial Cable. A six foot cable for use with the HS-241 Computer's serial output \$35.00, 1 lb.

TM-240 Technical Manual for the HS-241 \$49.00, 3 lbs.

50% OFF! HS-241 ADVANCED PC SAVER\$

Get a big 50% off any or all of the following items when purchased within 90 days of a kit or assembled HS-241 PC.* Copy of purchase receipt required.

Any three Heath/Zenith software packages.

Z-205-4 256K RAM Chip Set.

Z-409 Video Card.

H-329 or **Z-329** High Resolution Video Card.

Z-405 1.5 Megabyte Memory Board.

Z-416 8087 Numeric Co-Processor.

Z-207-7 360K 5.25" Floppy Disk Drive.

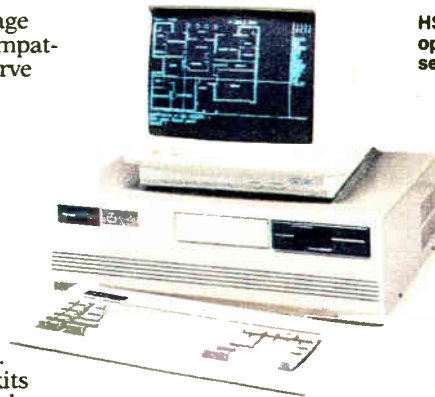
ZD-12 1.2 Megabyte Floppy Disk Drive.

Z-417-1 Winchester Cable.

ZD-200 20 Megabyte Winchester Drive.

ZD-400 40 Megabyte Winchester Drive.

TM-240 Technical Manual.



HS-241 Advanced PC with optional monitor and second floppy disk drive

DOUBLE
Master
Builder
POINTS



H-100 Desktop Computer with optional monitor and second floppy disk drive

Save \$600 on kit H-100 Computers

The Low-Profile H-100 Desktop Computer is an exceptionally advanced computer with dual microprocessors that allow you to use sophisticated 16-bit MS-DOS software as well as existing 8-bit CP/M programs.

Handle large programs with a standard 256K memory that easily expands up to 768K on the motherboard. And store up to 360K of data using a 5.25" disk drive. Or store more data with another optional drive or even a Winchester drive for really big jobs. Also increase capability by adding up to four more boards in the industry-standard S-100 expansion slots.

On the low-profile H-100 you can create extraordinary graphics on a 640 x 225 pixel area. That's 144,000 individually controlled pixels for extensive graphs, charts and drawings. Or display 25 lines of 80 characters on a monochrome or color monitor. This computer has outputs for both but monochrome capability is standard. Upgrade to color with the addition of optional video memory.

Three ports on this computer provide you with the flexibility to expand in almost any direction. It has two serial ports and one parallel port. Plug in a matrix or letter quality printer, use a modem or plotter without wasting an internal expansion slot.

And with your H-100 you'll get a sculpted keyboard geared for speed, ease and efficiency to let you do your computing faster and more accurately. A whisper-light touch reduces typing fatigue, even after hours of operation.

Also available is an assembled Zenith Data Systems version of the Low-Profile H-100 Desktop. And included with this assembled computer is the popular LOTUS 1-2-3 integrated business software package.

For this catalog only you can earn twice the usual number of Master Builder points for building your own advanced H-100 Desktop Computer kit.

Configurations:

Kit **HS-1108-41** Low-Profile less built-in monitor but with monochrome graphics, 256K RAM, one 5.25" drive for 360K bytes of storage, 8 MHz operation and MS-DOS *Was \$1599.00 Now Only \$999.00*, ship wt 89 lbs.

Assembled **ZF-118-42** Low-Profile Desktop without video display and with monochrome graphics, 256K RAM, two 5.25" drives for 720K bytes of storage, 8 MHz operation, and MS-DOS and LOTUS 1-2-3 software \$2399.00, ship wt 54 lbs.

Accessories:

Optional second 5.25" disk drives for H/Z-100 Computers with one drive, visit your nearest Heath/Zenith Computers & Electronics Center (consult telephone white pages).

Winchester Upgrade Kit replaces an existing floppy drive in an H/Z-100 with a 5.25" Winchester drive. For models with full height drives **HS-217** \$999.00, ship wt 33 lbs. For models with half height drives **HS-217-A** \$999.00, 30 lbs.

8 MHz Conversion Kit for H-100 kit computers equipped with half-height drives. Converts these computers from 5 MHz to 8 MHz operation. Also adds 256K RAM chip capability (one included) and enables RAM expansion on the main board up to 768K. For remaining kit and assembled H-100 Computers visit your nearest Heath/Zenith Computers & Electronics Center **HA-108** \$249.95, ship wt 2 lbs.

Z-205-4 256K RAM chip set for use in extending the RAM capability of 8 MHz H/Z-100 Computers \$199.00, ship wt 1 lb.

Z-216-8 8087 Numeric Co-Processor for H/Z-100 Computers operating at 8 MHz \$429.00, ship wt 2 lbs.

Z-205-1 RAM Upgrade package for use only with 5 MHz operation H/Z-100 Computers and provides 64K of RAM for increasing memory on the motherboard \$79.99, ship wt 1 lb.

Z-205 Expansion RAM Card gives your H/Z-100 Computer an additional 256K of memory (requires 192K of RAM on main computer board). For use only in 5 MHz

50% OFF! H-100 Desktop \$AVER\$

Get a big 50% discount on any or all of the following items when you buy them within 90 days of any kit or assembled H-100 Computer* purchase. Copy of purchase receipt required.

Any three Heath/Zenith software packages.

Z-205-4 256K RAM Chip Set.

Z-216-8 8087 Numeric Co-Processor.

Two Z-219-1 Color Chip Sets.

PC-250 UCI IBM PC Emulator (assembled 100s only).

PC-251 Gemini Emulator (assembled 100s only).

*To qualify, the computer must be purchased from the Heathkit Catalog or a Heath/Zenith Computers & Electronics Center.

More accessory circuit boards for these two computers can be found on page 97.

operation H/Z-100 Computers. Card is fully populated \$599.00, ship wt 2 lbs.

Z-219-1 One Color Video RAM Chip Set, two sets are required to upgrade H/Z-100 Computers with monochrome outputs to color capability \$74.99, ship wt 1 lb.

TM-100 H/Z-100 Technical Manuals \$110.00, 22 lbs.

Run IBM-PC software on your H/Z-100

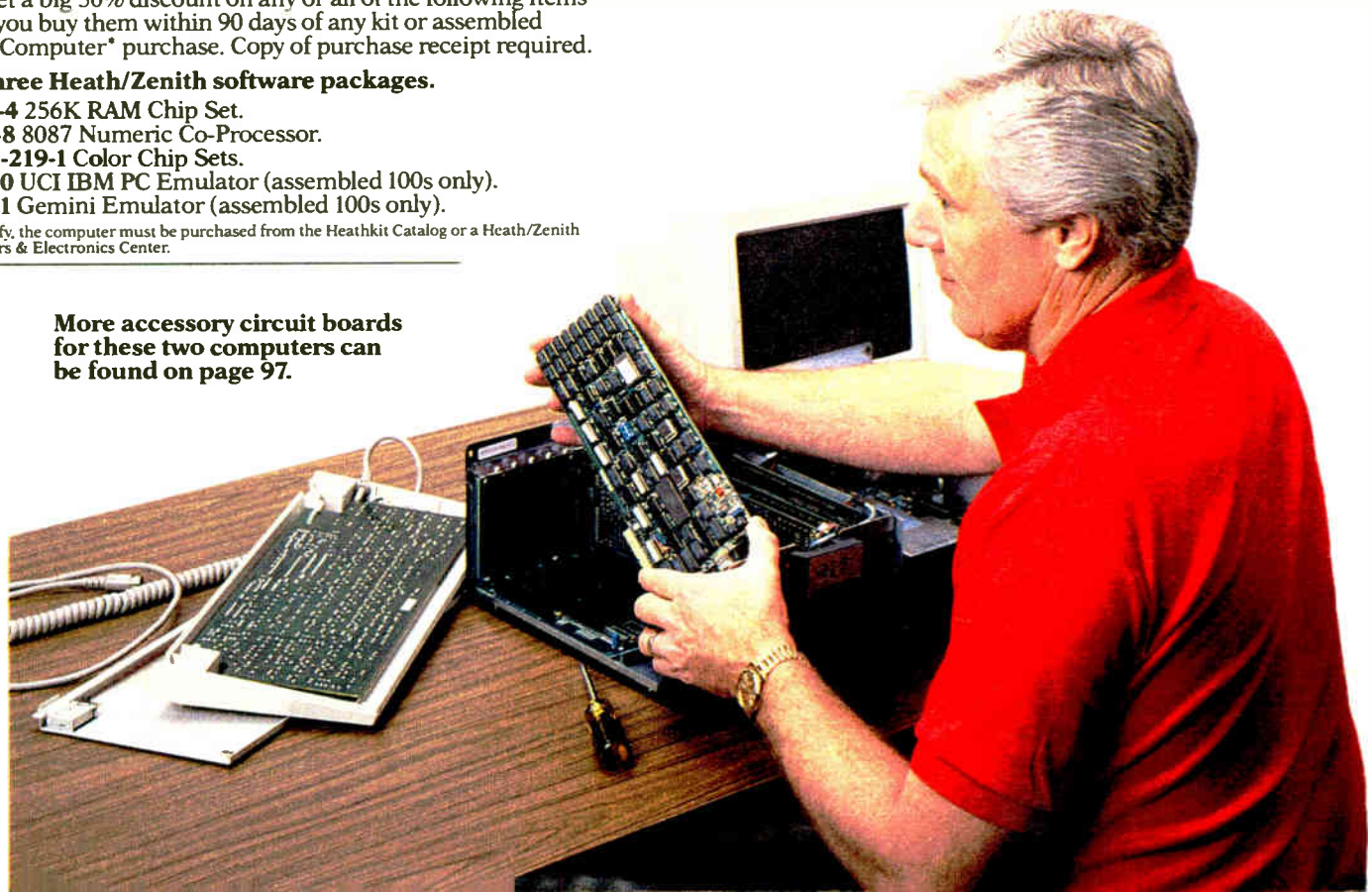
Give your H/Z-100 Advanced Desktop Computer what it lacks – the ability to run many (but not all) IBM PC applications programs. Now load your H/Z-100 with IBM PC versions of LOTUS 1-2-3, WordStar, Multiplan and other popular business programs. And still retain all the capabilities and features of your H/Z-100 with either of these two IBM PC emulators.

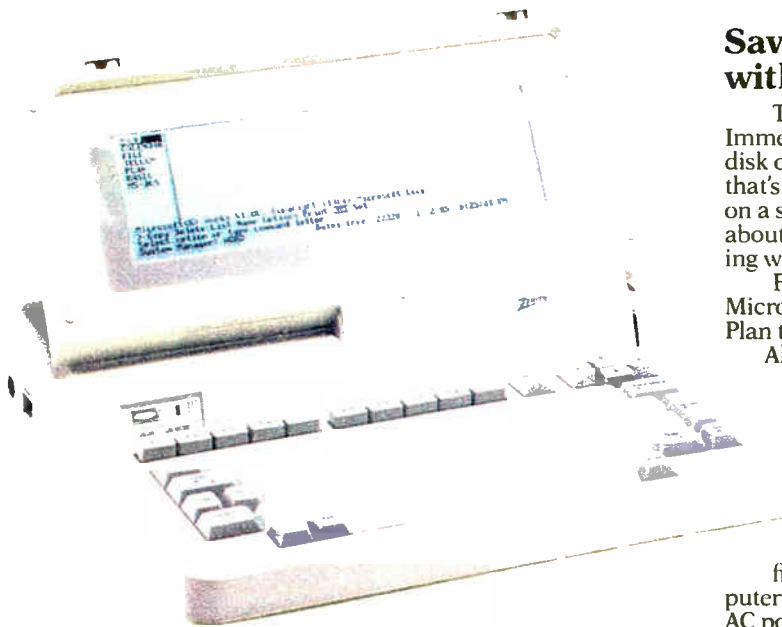
They work equally well at 4.77 MHz or 8 MHz and both require a PC operating system. And neither conflict with the computer's hardware. Although each system supports IBM PC software, they do not enable IBM PC accessories to work with the H/Z-100. Both emulators also have a 90-day unconditional guarantee. Either you're satisfied or we'll refund your money.

EASY PC from UCI Corporation uses a hardware approach to IBM PC compatibility. It consists of three separate boards but uses only one expansion slot **PC-250** \$599.00, 3 lbs.

Gemini IBM PC Emulator from D.E.L. Professional Systems Ltd. uses software emulation to run many software programs designed for the IBM PC. It uses one plug-in circuit board to the H/Z-100 motherboard **PC-251** \$599.00, 2 lbs.

SAVER! Purchase either the **PC-250 EASY PC** or **PC-251 Gemini emulators** and get MS-DOS (OS-63-31) for PCs at a special price *Regularly* \$150.00 *Only* \$90.00, 5 lbs.





Has a built-in 300 baud modem, 32K RAM and a full-sized typewriter keyboard



Don't let the size of this computer fool you

The Z-171 Portable PC from Zenith Data Systems supplies you with total PC performance in a lightweight portable. With this computer you'll always

have complete desktop PC capability and virtual IBM PC compatibility wherever you go...all at a compact price.

The Z-171 uses the 16-bit MS-DOS operating system so you can run most software programs written for the IBM PC right out of the box. Standard features include 256K of RAM memory that can be easily expanded to 640K; two 5.25" disk drives with 360K bytes of storage each; a full 25 line by 80 character LCD screen that's backlit for excellent visibility; and a comfortable full-sized keyboard. Plus built-in convenience software that uses easily recognizable icons.

Stay a step ahead with the Z-171 Computer that weighs less than 15 pounds and folds up to the size of a small briefcase. It uses 120 or 240 VAC, or an optional 12 volt rechargeable battery pack. 9½" H x 13" W x 6⅝" D. Assembled **ZF-171-42** Was \$2699.00 Now *Only* \$2399.00, 20 lbs.

Accessories: **ZA-170-1** Optional Battery Pack \$69.00, 4 lbs. **ZA-170-2** Optional Padded Computer Carrying Case \$69.00, 1 lb. **ZA-170-3** Optional Internal Color Video Card \$229.00, 1 lb. **ZA-170-4** Optional 30/1200 Baud Modem \$379.00, 1 lb. **Z-205-4** 256K Memory Upgrade \$199.00, 1 lb. **TM-170** Technical Manual \$25.00, 3 lbs.

50% OFF! Z-171 PC SAVERS\$

Save 50% on the following selected items when you buy them within 90 days of purchasing a Z-171 Computer.* A copy of the purchase receipt is required.

*To qualify the computer must be purchased from the Heathkit Catalog or a Heath/Zenith Computers & Electronics Center.

Save \$300 on a portable lap computer with six built-in Microsoft programs

Tilt up the LCD screen and flip the power switch to ON. Immediately a Systems Manager display appears. Unlike a typical disk operating system, the Systems Manager shows everything that's available – all commands, software programs and file names on a single screen – much easier to use than a DOS. You are now about to enjoy computing wherever you may be, the way computing was meant to be...easy and convenient.

From the screen you can access six built-in programs from Microsoft's WORKS ROM. Select Word for creating documents, Plan to do spreadsheet analysis, and BASIC for writing programs.

Also choose from Microsoft's Calendar to record appointments, File for data base management, and Telcom to use the Laptop as a remote terminal. And you can call up an alarm, a calculator and a telephone dialer from within any of the six programs.

And now for a limited time only, the CB-5063-27 File Transfer software is being included FREE with each ZP-150 Laptop.

Weighs less than eight pounds and small enough to fit in most standard briefcases. This assembled Laptop Computer uses ten "AA" size batteries (not included) when not using AC power. **ZP-150** Was \$999.00 Now *Only* \$699.00, ship wt 22 lbs.

Accessories: **ZP-150-2** 32K RAM Module Was \$199.00 Now *Only* \$79.00, 1 lb. **ZP-150-4** Parallel to Centronics Printer Adapter Cable \$19.00, 1 lb. **CB-5063-27** Software for transferring files from the ZP-150 to other MS-DOS computers \$49.00, 3 lbs.



Any three Heath/Zenith software packages

ZA-170-1 Battery Pack. **ZA-170-4** Internal 300/1200 Modem.
ZA-170-2 Carrying Case. **Z-205-4** 256K Memory Upgrade.
ZA-170-3 Video Card. **TM-170** Technical Manual.



	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 (\$)
OPERATING SYSTEMS Concurrent CP/M* CP/M* (5) CP/M-86* (5) MP/M-86* (5) MS-DOS Enhancement (5,12,18) MS-DOS Vers. 3 (2,5) MS-DOS Vers. 3 Programmer's Package (2,6,7) UCSD p-System (1,5) *Microsoft Windows* (3,6,7) *XENIX				OS-61-12	3	299.00
				OS-53-2	5	150.00
				OS-63-2	3	99.00
				OS-63-5	5	99.00
	OS-63-32	2	150.00	OS-63-30	5	150.00
	OS-63-31	5	150.00	CB-3163-30	5	225.00
	CB-3163-30	5	225.00	OS-61-3	14	99.00
	MS-5063-30	2	99.00	MS-3063-30	2	Call
	OS-63-70	5	429.00			
	WORD PROCESSING MailMerge* (7,10) Multimate* (3,6,7) PeachText 5000* (1,6,7) Word (1,5,7) WordStar* (1,5,7) WordStar Professional* (2,5,7) WordStar Professional Option (2,5,7,10)				MP-463-11	3
SS-5063-1		3	495.00	RS-463-75	3	295.00
RS-463-75		3	295.00	MP-463-10	4	299.00
MS-5063-9		3	375.00	MP-463-17	4	399.00
MP-5063-10		3	299.00			
MP-5063-13		3	399.00			
MP-5063-12		3	199.00			
SPREADSHEETS *LOTUS 1-2-3 Release 2 (2,6,7,16) LOTUS 1-2-3 (2,6,7) Multiplan (1,5,7) SuperCalc* (5,7) SuperCalc 3 (1,6,7)	LS-5063-2	5	495.00	LS-463-1	4	299.00
	MS-5063-17	2	195.00	MS-5063-17	2	195.00
	SC-5063-4	3	Call	SC-463-1	4	195.00
DATA BASE MANAGEMENT SYSTEMS Condor* rDBMS* (1,5,7) Condor FMS* (1,6,7) dBASE II* (1,5,7) *dBASE III* (3,6,7) *dBASE III Plus (3,6,7) Pecon* Peachtree*/Condor Interface (2,6,7,14) Package: Condor FMS and Pecon (2,6,7,14)	CD-5063-3	2	650.00	CD-5063-3	2	650.00
	CD-5063-2	3	199.00	CD-463-2	4	199.00
	AT-5065-2	3	495.00	AT-5065-2	3	495.00
				AT-463-4	2	695.00
	AT-5063-5	11	695.00	CB-463-9	3	99.00
	CB-5063-9	1	99.00	ZSS-100-28	7	249.00

Minimum Computer Hardware and Software Requirements:

- | | |
|--------------------------------|--|
| (1) 128K RAM | (14) Either Condor rDBMS or FMS |
| (2) 192K RAM | and one Peachtree Accounting Package |
| (3) 256K RAM | (16) Not available by mail order. Visit your nearest |
| (5) One 5.25" disk drive | Heath/Zenith Computers & Electronics Center. |
| (6) Two 5.25" disk drives | (18) For H-100 mode operation |
| (7) MS-DOS Operating System | (19) H/Z-200 Computers only. |
| (10) WordStar | (22) 1.2 MB floppy and 20 MB Winchester Drive. |
| (11) Z-204 Multiport I/O Card | (23) 512K RAM |
| (12) Z-319 Video Graphics Card | |

***Look for these new products.**

*CP/M and CP/M-86 are registered trademarks of Digital Research Inc. MailMerge, and WordStar are registered trademarks of MicroPro International Corporation. PeachText 5000 is a registered trademark of MSA, Inc. SuperCalc is a registered Trademark of Computer Associates International Inc. Condor is a registered trademark of Condor Computer Corporation. MP/M-86 and Concurrent CP/M are trademarks of Digital Research Inc. WordStar Professional is a trademark of MicroPro International Corporation. SuperCalc3 is a trademark of Computer Associates International Inc. Condor FMS and rDBMS are trademarks of Condor Computer Corporation. Peachtree is a trademark of MSA, Inc. XENIX and Windows are trademarks of Microsoft Corporation. dBASE II is a registered trademark of Ashton-Tate. dBASE III is a trademark of Ashton-Tate. Pecon is a trademark of Zenith Data Systems Corporation.



	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 (\$)
ACCOUNTING						
BPI General Accounting (2,6,7,9)	BP-5063-1	3	595.00			
BPI General Accounting, Training	BP-5063-71	1	69.00			
BPI Accounts Receivable (2,6,7,9)	BP-5063-2	3	595.00			
BPI Accounts Payable (2,6,7,9)	BP-5063-3	5	595.00			
BPI Payroll (2,6,7,9)	BP-5063-4	3	595.00			
BPI Inventory Control (2,6,7,9)	BP-5063-5	3	795.00			
BPI Job Costing (2,6,7,9)	BP-5063-6	3	795.00			
BPI Personal Accounting (2,6,7,9)	BP-5063-8	1	195.00			
BPI Package: Six Accounting Programs (2,6,7,9)	ZSS-150-6	49	999.00			
Peachtree* General Ledger (2,6,7)	RS-5065-1 (9)	3	499.00	RS-463-1 (21)	5	399.00
Peachtree Accounts Receivable (2,6,7)	RS-5065-2 (9)	3	499.00	RS-463-2 (21)	4	399.00
Peachtree Accounts Payable (2,6,7)	RS-5065-3 (9)	3	499.00	RS-463-3 (21)	4	399.00
Peachtree Inventory Control (2,6,7)	RS-5065-5 (9)	3	499.00	RS-463-5 (21)	4	499.00
Peachtree Sales Invoicing (2,6,7)	RS-5065-6 (9)	3	399.00	RS-463-6 (21)	4	299.00
Peachtree Package: Six Accounting Programs (2,6,7)	ZSS-150-7 (9)	40	999.00	ZSS-100-24 (21)	46	999.00
Pecon Peachtree/Condor Interface (2,6,7,14)	CB-5063-9 (9)	1	99.00	CB-463-9 (21)	3	99.00
COMMUNICATIONS AND TERMINAL EMULATION						
CPS-150 (1,5,7)	CB-5063-7	3	49.00			
CPS-86 (1,5,7)				CB-463-7	3	40.00
CPS (8-bit) (1,5,8)				CB-253-7	1	40.00
*3270 Emulator (2,6,7,17)	PO-5063-1	2	499.00			
*3780 Emulator (2,6,7,17)	PO-5063-2	3	499.00			
*MT-983 Emulator (1,5,7)	MB-463-1 (17)	2	295.00	MB-463-1	2	295.00
3276/8 Emulator BSC (RS-232 connection)				PO-463-1 (1,5,7)	2	650.00
IBM 3276/8 SNA/SDLC Emulator (RS-232 connection) (2,5,7,11)				IE-463-2	4	649.00
Remote Batch Terminal Emulator (1,5,7)				WI-463-1	4	899.00
ZSTEM-VT100 Emulator (1,5,7)	KE-5063-2	2	149.00	KE-463-1	3	149.00
COMMUNICATIONS: NETWORKING						
ZLAN* Two Computer System (5,7,15)				ZSS-100-22	21	1499.00
ZLAN Computer Add-On				ZSS-100-23	12	599.00
ALAN 25 ft. Cable				HCA-60	1	20.00
ZLAN 100 ft. Cable				HCA-61	4	40.00
COMPUTER AIDED INSTRUCTION						
ZDS Teacher (1,5,7)				TA-463-1	3	299.00
ZDS Student (1,5,7)				TA-463-2	2	100.00
*Z-Tap Typing Tutor (3,5,7)	CB-5063-32	3	79.00			
*Teach-N-Tutor (3,5,7)	CB-5063-33	3	199.00			



	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 (\$)
DIAGNOSTICS Disk-Based Computer Tests (1,5) Personal Computer Diagnostics (1,5) Z-200 PC Diagnostics (3,5)	CB-5063-28 CB-3163-31	3 1	79.00 79.00	CB-463-13	4	79.00
DIRECTORIES H/Z-100 Software (3rd Party)				CB-463-15	3	25.00
GRAPHICS *Microsoft Write/Paint (3,6,7) *Painter's Apprentice (3,5,7) GrafTalk (1,6,7) Z-Chart (1,5,7,9) 4-Point Graphics (4,6,7)	MS-5163-30 RG-5063-2 IM-5063-1	2 3 3	49.00 499.00 195.00	CB-463-25 RG-463-2 CB-463-11	1 3 3	79.00 479.00 49.00
PROGRAMMING LANGUAGES *Microsoft Mouse (3,5,7) BASIC-80 (5,8) 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) Pascal/MT+ (1,6,8) GW-BASIC Compiler (5,7) Z-BASIC Compiler (5,7)	MS-5063-11 MS-5063-3 CI-5063-2 MS-5063-2 MS-5063-13 MS-5163-13 (12,13,18) MS-5063-5 MS-5063-4	4 5 2 5 3 3 3 5	135.00 395.00 395.00 195.00 49.00 100.00 295.00 250.00	MS-253-1 MS-5063-3 MS-5063-2 MS-5163-13 MS-463-1 MS-5063-5 DR-253-5 MS-463-4	3 5 5 3 5 3 5 3	175.00 395.00 195.00 100.00 175.00 295.00 99.00 250.00
SORTING Sort (1,6,7) SuperSort* (1,6,7)	MS-5063-12	1	199.00	MS-5063-12 MP-463-1	1 3	199.00 199.00
STATISTICAL ANALYSIS Microstat (1,6,7)	ES-5063-1	3	249.00	ES-5063-1	3	249.00

Minimum Computer Hardware and Software Requirements:

- | | |
|-----------------------------------|---|
| (1) 128K RAM | (12) Z-319 Video Graphics Card |
| (2) 192K RAM | (13) MS-DOS Enhancement Op. Sys. |
| (3) 256K RAM | (14) Either Condor rDBMS or FMS
and one Peachtree Accounting Package |
| (4) 320K RAM | (15) Version 2.5 Monitor ROM and a
Z-205 Memory Card |
| (5) One 5.25" disk drive | (17) Z-304 Synchronous Serial Port |
| (6) Two 5.25" disk drives | (18) For H-100 Mode Operation |
| (7) MS-DOS Operating System | (20) Accesses 64K of RAM |
| (8) CP/M Operating System | (21) Z-BASIC Programming Language |
| (9) GW-BASIC Programming Language | |
| (11) Z-204 Multiport I/O Card | |

*Condor is a registered trademark of Condor Computer Corporation. CP/M is a registered trademark of Digital Research Inc. Peachtree is a trademark of MSA, Inc. ZLAN and Pecon are trademarks of Zenith Data Systems Corporation. Pascal/MT+ is a trademark of Digital Research Inc. SuperSort is a registered trademark of Micropro Int. Corp.

***Look for these new products.**

A world of accessories and peripherals for Heath/Zenith Computers and the IBM PC



Winchester storage capacity on a removable disk

Build-in 10 megabytes of on-line storage into your Heath/Zenith PC, IBM PC or other PC compatible. From Media Winchester Ltd. comes a Winchester Kit that you can install. It uses a proven SyQuest 5.25" Winchester replaceable cartridge drive that puts a full 10 MB of data storage at your disposal. Use it as an archival backup to your system. Or use it as a source of virtually limitless and easily accessible data.

The Kit contains a drive, cartridge, disk controller, cabling and software. It is designed to operate with a Heath/Zenith PC, IBM PC or PC compatible utilizing MS-DOS Version 2 or greater, and a minimum of 128K of RAM. Kit **PO-312** Please Call for Price, ship wt 7 lbs. Assembled external drive system **PO-315** Please Call for Price, ship wt 21 lbs.

Accessories: **PO-310** Replacement 10 MB Cartridges Please Call for Price, ship wt 1 lb.

Save time and money by sharing

Eliminate tiresome unplugging of peripherals. Save on the cost of expensive expansion ports. With a press of a button you can instantly switch any RS-232 device without touching a cable. Takes less than one evening to complete. Has three female DB-25 connectors. 1 1/4" H x 6 7/8" W x 5 5/8" D. Kit **PMK-121** \$49.95, ship wt 3 lbs.

From IDE Corp. a fully assembled RS-232 rotary two-position transfer switch with three female input connectors. 3 1/4" H x 6" W x 6 1/4" D. Assembled **PM-120** \$79.99, 1 lb.



Touch the difference of advanced design

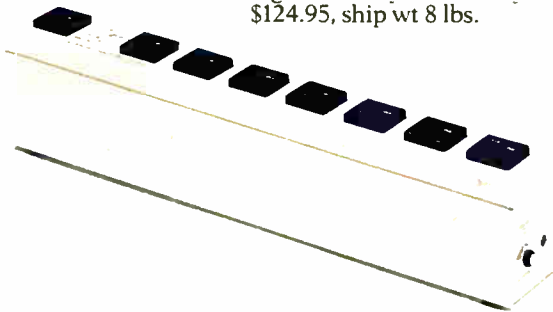
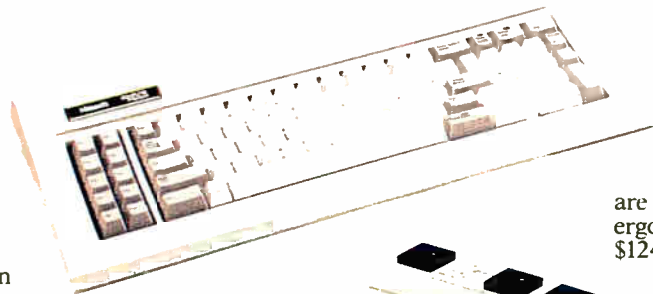
Replace your AT or compatible keyboard with the same one used on the Heath/Zenith Advanced PC. It is functionally compatible with the IBM PC AT keyboard but with several unique features. LEDs in the CAPS LOCK AND NUM LOCK keys light up when in the locked position to help reduce typing errors. The ESCAPE key is placed in its more familiar upper left-hand corner and all keys have autorepeat to save you keystrokes. Among other features are larger size frequently used keys and ergonomically labeled keys. Kit **HK-200** \$124.95, ship wt 8 lbs.

A better way to switch and protect a computer system

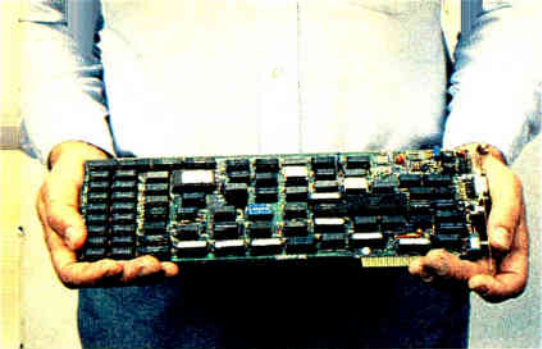
What could be better than an outlet strip that protects your computer? How about one that electronically transfers the ON/OFF switches of many peripherals to any single device that you want to use? In less than two evenings you can assemble a Smart Outlet Box that does all this.

All you do is plug the AC line cord of the device you wish to use as the master controller, say a video monitor, into the control outlet of the Box. Then plug the remaining line cords of the computer system into the other outlets. When you turn on the monitor, everything else turns on, automatically. Turn the monitor off and the entire system turns off.

And all the while your computer system is protected from up to 70 joules of spike energy by a surge protector and a new



surge absorber. The Box is circuit-breaker protected for 10 amps. 2 1/4" H x 2 3/4" W x 14 1/4" L. Kit **GD-1495** \$59.95, ship wt 5 lbs. Assembled **GDW-1495** \$99.95, ship wt 4 lbs.



New Advanced 1200 baud modem for your PC

Talk about loaded with features, the ZOOM/MODEM PC1200 is it. The latest integrated modem technology and advanced computerized assembly methods are used to cram the most power and flexibility possible into a plug-in board for Heath/Zenith and IBM PCs along with their compatibles. The PC1200 features almost totally automatic operation, including auto-dial, auto-answer/originate, auto-test and automatic speed selection.

For those who like the Hayes modem, you'll love the PC1200. It is 100% SMARTMODEM hardware and software compatible. The ZOOM/MODEM will do everything that the Hayes will do...respond to every command and work with every program in every machine. Then, the PC1200 gives you extra special features.

This 13-inch modem card lets you Demon dial a phone number over and over until a busy phone rings. The PC1200 uses advanced tone detection to insist that callers enter a password before a carrier is sent. Intruders don't know a modem is on the line, and that's added security for you and your files.

The ZOOM/MODEM has 8K of on-board RAM. This buffer enables you to work on a program in the foreground while your computer can auto-answer the phone and receive messages in the background.

On-board are many extras that are options on other modems, like a system clock, backed up by an extra long life lithium battery, that allows date and time stamping of all files. There's an audio input jack for use with a voice synthesizer or microphone. And it has extra serial port flexibility with COM 1,2,3, and 4 capability.

The PC1200 comes complete with software, phone cord, bracket and card guide. FCC Approved. From Zoom Telephonics Inc. Assembled **PC-132** Was \$349.95 Reduced to \$299.95, ship wt 3 lbs.

High resolution color

That's what you get when you install the Graphics Master board from Tecmar into a Heath/Zenith PC, IBM PC or a compatible computer. Use it to create 640 x 400 pixel graphics in 16 colors or 720 x 700 pixel graphics in monochrome. This full-size card provides a wider choice of monitors including RGB, NTSC composite and IBM Monochrome monitors. Has 128K of on-board RAM and is compatible with LOTUS 1-2-3. Assembled **TE-37** \$545.00, 3 lbs.

Analog game port

From DG Electronics comes a plug-in board for Heath/Zenith PCs, the IBM PC and their compatibles. With it, you can add on analog devices like the WICO joystick and the KOALA graphics pad. Includes a clock/calendar with backup battery and software for on-screen time. Supported by GW-BASIC. Assembled **PCS-110** Was \$119.95 Now \$99.95, 1 lb.



Breakout box is a handy timesaver

Assembled breakout box saves time and money

You've got your computer and peripherals linked together but they just aren't talking to each other. There's one quick and easy way to isolate your problem...use the RS-232 Terminal Interface Tester. This pocket-sized, self-contained breakout box connects between your equipment and cabling to monitor 12 different signals.

Twelve LEDs show you if signals are where they are supposed to be. If not, 24 in-line switches and interface pins enable you to cross-patch lines with included jumpers. Two 1.5 volt batteries (not included) supply power to the LEDs. 1 1/2" H x 2 7/8" W x 5 1/2" D. Assembled **WH-15** \$159.00, ship wt 1 lb.

COMPUTERS

NEW! Intel Above Board

Expand your computer's memory beyond the 640K limit with the board that uses the Lotus-Intel Expanded Memory System. You'll also get a RAM disk and a printer buffer. And with the PC-122 you'll get an additional clock/calendar with battery backup, serial port and a parallel port.

Configurations:

Assembled **PC-146** for 5 MHz PCs and compatibles, 64K installed with 512K RAM max \$395.00, 3 lbs.

Assembled **PC-122** for 5 MHz PCs and compatibles, 64K installed with 384K RAM max \$445.00, 3 lbs.

Assembled **PC-400** for PCs, ATs and compatibles. 128K installed with a maximum of 1.6MB \$595.00, 3 lbs.

SAVER! Purchase extra 256K RAM Chip sets within 90 days of buying an

INTEL ABOVE-BOARD* and save 50%.

Z-205-4 Regularly \$199.00 Discount Price \$99.50, ship wt 1 lb.



\$10 off kit Breakout Box

In one evening you can build a valuable timesaver for troubleshooting defective computer equipment or solving system connection problems...the Heathkit Breakout Box. It provides access to all 25 lines of RS-232-C 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 to carry adaptor cables and connectors.

Two "AA" batteries power LEDs for monitoring but are not needed for Box operation. 1 3/8" H x 2 7/8" W x 6" D. Kit **PMK-130** Was \$89.95 Now \$79.95, 2 lbs.

*To qualify the ABOVE BOARD must be purchased from the Heathkit Catalog or a Heath/Zenith Computers & Electronics Center.

Epson printers – the leader in features, graphics and precision

The #1 choice of businesses and computer enthusiasts, Epson printers give you unmatched value. Unmatched in:

Features. You can plug an Epson into virtually any micro-computer made and be printing right away. All Epson printers have bidirectional printing using their famous disposable logic seeking printhead. All have programmable line spacing, page length, column width and skip over perf. All have parallel interfaces for connecting to personal computers and most have a 2K print buffer. And all Epson printers feature a Quiet Mode for quieter home or office operation.

Graphics. Epson dot matrix printers are versatile in their graphic advantages. They produce high-speed drafts and tack-sharp, correspondence quality letters in scores of different typesets. Plus you get the added versatility of their corresponding speed options. And Epson printers can draw some very convincing pictures, including true circles.

Precision. Precision printers are reliable printers and Epson's reliability rate is second to none. It's almost 100% and still climbing. So contact us today to see how Epson can be of value to you.

For the latest prices contact your local Heath/Zenith Computers & Electronics Center. You'll find it listed in the telephone directory white pages.



Fast, easy
3-evening kit

Plot high-quality graphics, charts and graphs

And do it all with speed, accuracy, and reliability when you get this kit version of the popular Sweet-P Plotter. Produce high-resolution charts and bar graphs, as well as quality straight and curved line graphs, illustrations and alphanumeric labeling – on plain bond paper or overhead transparency material. Just hook up the Plotter to your computer for colorful graphs and engineering graphics. The Plotter provides high resolution line segments accurate to four-thousandths of an inch at a maximum speed of six inches per second. And this briefcase-size wonder uses the simplest of computer commands for easy operation. Takes less than two evenings to assemble. 3" H x 14" W x 8½" D. Weighs a light 7¼ lbs. Kit **IRA-5208** Was \$349.95 Now Only \$229.95, ship wt 10 lbs.

Accessories: The following two support packs include software support package, tutorial, parallel interface cable and four pens (red, green, blue, black). **IRA-5208-1** Support Pack for H/Z-100, Heath/Zenith Personal Computers, IBM PC and IBM PC compatible computers \$19.95, ship wt 1 lb. **IRA-5208-2** Support Pack for H/Z-89 Computer (using CP/M* software) on hard-sectored 5.25" disk, requires Z-89-11 Multi-Mode Interface Board \$19.95, ship wt 1 lb. **IRA-5208-3** Replacement Pen Set includes 4 black pens \$9.95, 1 lb.

Other Specifications: **Plotting Area:** Y-axis 7.4" X-axis variable from 1" to 120" 2500 x 1838 plotter units. **Interface Options:** 8-bit parallel – I/O port (Centronics compatible). **Repetition Accuracy:** 0.004" **Distance Accuracy:** 0.004" **Power Requirements:** 120 VAC ± 5%, 55-65 Hz, 30 watts.

*CP/M is a trademark of Digital Research, Inc.



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

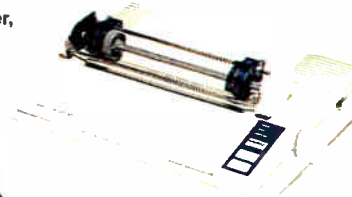
PP-243 LQ-1000 letter
quality printer, 24 lbs.



PP-246 LQ-800 letter
quality printer, ship wt 16 lbs.

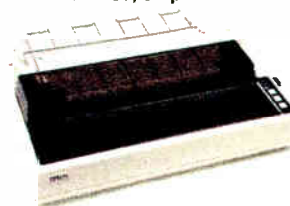


PP-236 FX-286 136
column business printer,
ship wt 32 lbs.



PP-225 FX-85 Bidirectional Printer,
ship wt 21 lbs.

PPA-225-1 Replacement ribbon
for FX-80/FX-85, ship wt 1 lb.



PP-220 LX-80 draft and near letter
quality printer, ship wt 15 lbs.

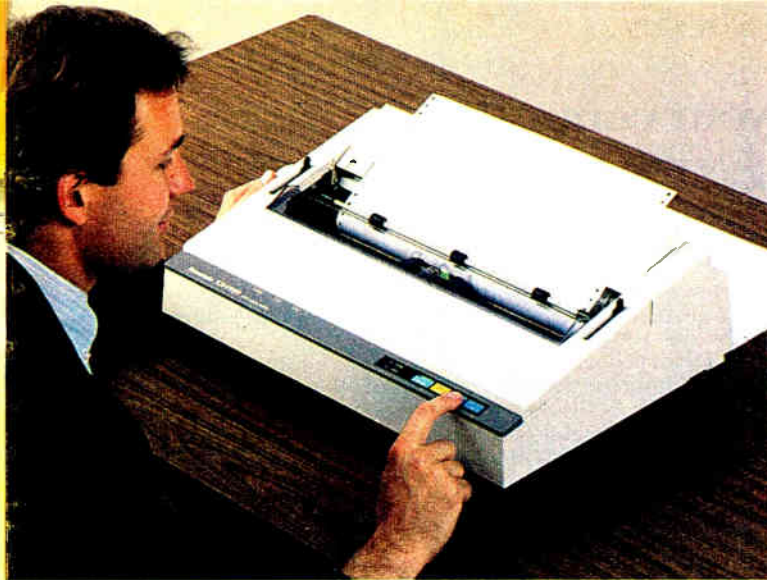
PPA-220-1 Replacement ribbon
for LX-80, ship wt 1 lb.

PPA-220-2 Tractor feed for LX-80,
ship wt 2 lbs.

PP-205 An optional serial port with
2K buffer for all EPSON LX, FX,
RX and JX series printers, 1 lb.

PP-230 RX-100 136 column
standard printer, ship wt 27 lbs.

PPA-230-1 Replacement ribbon
for RX-100/FX-185, ship wt 2 lbs.



Learn what high-speed printing is really like

You won't believe your eyes or your ears. The Primage Daisy Wheel Printer does everything from printing documents up to 90 characters per second to printing at pitches of 10, 12, and 15 cpi, with proportional spacing – and quietly.

You can connect this printer to virtually any mini- or microcomputer through a serial RS-232 or Centronics parallel interface port. No cables or adapters needed. 7½" H x 24½" W x 15½" D. Assembled **PP-251** \$1299.00, ship wt 63 lbs.

Accessories: **PPA-250-1** Cut-Sheet Feeder \$299.95, ship wt 18 lbs. **PPA-250-2** Tractor Feeder \$275.00, ship wt 6 lbs. **PPA-250-7** Tile printwheel with dual 10 or 12 characters per inch spacing *Was* \$29.95 *Now* \$24.95, ship wt 1 lb.

Low cost daisy wheel printer

How about a printer that features high performance, reliability, and versatility? We've got one – the Panasonic Daisy Wheel Printer. It prints out 22 fully-formed characters per second using word processing bold, shadow, underline, justification and centering functions. And this sleek machine is compatible with most popular small business and personal computers. This Panasonic printer will even print on paper up to 15½" wide with a capacity for an original, 3 copies and 3 carbons. 7½" H x 22" W x 15" D. Assembled **PP-261** *Was* \$599.00 *Now Only* \$549.95, ship wt 35 lbs.

Cost-effective communications

Cut valuable hours off telecommunications times with the Courier 2400 from U.S. Robotics. This powerful modem uploads or downloads data at 2400 baud. You'll find the auto-dial and auto-answer fully compatible with both CCITT and Bell. Plus you can use any of the popular telecom software packages because the Courier responds to the full AT command set. You can even use the detailed help screens to display the entire set, along with S-register functions and dialing commands. And if you want to know the length of each call or the status of a call in progress, a help screen will give you all the details while the special speaker with audio level control lets you monitor your phone line. Assembled **PP-320** *Was* \$649.95 *Now* \$549.95, 5 lbs.

Additional accessories can be found on pages 100 and 101.



A smart modem

Make your life easier with the Hayes Automatic 300 baud Smart Modem. With it you can automatically dial, answer, send, receive and disconnect calls. And you can use your modem with rotary or TOUCH-TONE phone systems. You can even listen in on the phone connection with the built-in audio speaker. The Smart Modem has an RS-232 connector and includes a 120 VAC adapter and phone cable. Requires HCA-11 cable on page 101 and CPS software. Assembled **WH-43** \$279.00, 3 lbs.



Convenient acoustic modem

The LEX-11 gives you efficient 300 baud operation in half or full duplex. Needs HCA-11 on page 101. Assembled **WH-23** \$119.00, ship wt 3 lbs.



US Robotics modem

This 1200 baud auto-answer modem brings dependability home with its full and half duplex operation. Directly connects to an RJ11C standard phone jack. Comes with RS-232 cable. Assembled **PP-300F** *Was* \$299.00 *Now* \$249.95, 3 lbs.



Communications power at your fingertips

With HYPERACCESS software from Hilgraeve Inc. you get a startup program to set up everything automatically. Includes an on-screen tutorial and easy to use menus. You can use this software with virtually any modem even those that operate at 2400 baud. Emu-

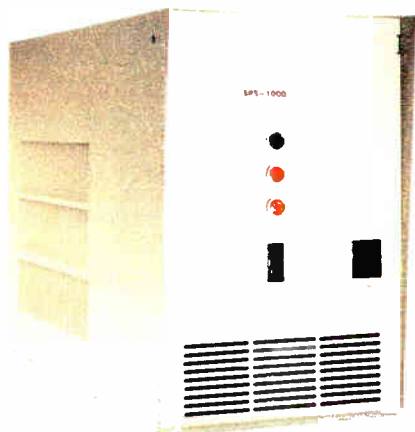
late various terminals or operate your computer from a remote station. Use this versatile software with Heath/Zenith PCs, the IBM PC or their compatibles. **PM-160** \$149.00, ship wt 3 lbs. For H/Z-100 Computer **PM-162** \$149.00, ship wt 3 lbs.

Peripherals and accessories for your computer

Providing high quality and making your work faster and easier is important to us. That's why we carefully select every peripheral, accessory and support product that we stock.

Instantly switch to computer backup power

The 1000 VA standby power system from Safe Electronics Systems uses all-new detection and a solid state transfer switch to make it the fastest power switching supply at one millisecond or less. You'll get clean sine wave output (required for IBM XT and AT computers) that's both voltage regulated and current limited anytime AC voltage drops below 108 volts. Eliminate the effects of 98% of all AC power related problems. With 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, 78 lbs. Mtr. Frt.



Win with this lightning fast joystick

If you like arcade type games, you won't want to be without the Gravis MK VI Analog Controller. You'll be able to fire at will with a full-sized, metal-reinforced padded handle. It has an integrated firing button, two additional and programmable fire buttons, trim adjusts and extra long 72-inch cable. Requires PCS-110 (page 97) or other analog game port. For use with Heath/Zenith PCs. Assembled **PP-402** \$39.95, ship wt 2 lbs.

For use with Apple Iie and Iic. Assembled **PP-450** \$39.95, ship wt 2 lbs.



Floppy disks that you can depend on

Soft-sectored, double-sided, quad-density 5.25" floppy disks for use only with the Heath/Zenith Advanced PC, the IBM PC AT and other AT compatibles. Stores up to 1.2 MB of data on a single disk. Package of ten. **HCS-60** \$59.00, 1 lb.

Soft-sectored, 96 TPI, double-sided, double-density 5.25" floppy disks that you can use with H-17-5 drives and the Z-89-37 Controller Board for storing up to 640K bytes of data on a single disk. Package of ten. **HCS-68** \$55.00, ship wt 1 lb.

Soft-sectored, single-sided, single-density 8" floppy disks formatted in the IBM 3740 style with up to 250K bytes of storage capacity. Package of ten. **HCS-69** \$55.00, ship wt 2 lbs.

Hard-sectored, single-sided, single-density 5.25" floppy

disks that you can use with 48 TPI disk drives (H-17-1) and the H-88-1 Controller Board to store up to 100 kilobytes of data on a single disk. Package of ten. **HCS-70** \$40.00, ship wt 1 lb.

Soft-sectored, double-sided, double-density 5.25" floppy disks that you can use in all Heath/Zenith Personal Computers and the H/Z-100 Advanced Computer for up to 360 bytes of data storage. You can even run these floppies on any Heath/Zenith computer equipped with H-17-5 drives and a Z-89-37 Controller Card. Package of ten. **HCS-71** \$50.00, ship wt 1 lb.

Worldwide Heath User's Group



Join with thousands of other Heath/Zenith computer users and keep up with the latest happenings and the newest Heath/Zenith computer products. With a HUG membership, you receive the highly informative and interesting REMark magazine every month for a year. It keeps you in touch with other members as you share

hardware modifications, software improvements and ideas on computer topics through REMark's open forum. And as a member you gain access to over 700 low-cost programs from HUG's software library. You can even purchase Heath/Zenith computer products at a discount using your HUG ID card. So get the latest on Heath/Zenith computer developments and HUG activities...join today. You'll find a HUG application enclosed with each Heath computer.

100

Send to: HUG Membership, Hilltop Road, St. Joseph, MI 49085

Yes, I want to become a member of HUG and keep up to date on the latest Heath/Zenith computer developments.

I've enclosed \$_____ (U.S. Funds only) to cover the cost of my membership. NOTE: No charge orders or billings are accepted.

Annual Rates	U.S.	APO/FPO, all orders
New Members:	\$20	\$35
Renewal:	\$17	\$30

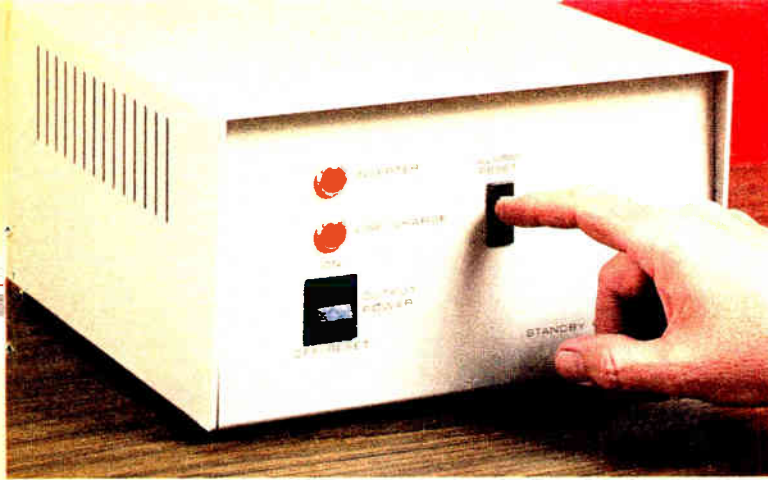
Name _____ 203

Address _____

City _____ State _____ Zip _____

Country _____

Signature _____



Protect data, memory

COMPUTERS 

Loss of power or brownouts can be catastrophic when they wipe out your data. But we've got just the thing to put that smile back on your face – the 400 VA Standby Power System from Safe Electronics Systems. If you have a PC or business computer and power drops, this backup system turns on in less than one-half cycle to protect data stored within your computer. This power system provides up to ten minutes of standby power with a full load. During normal operation, it acts like a line filter to protect against harmful power line spikes. Has 4 AC power outlets and operates from 120 VAC at 60 Hz. 6" H x 10 3/4" W x 12 5/8" L. Assembled **PP-115** \$549.95, ship wt 39 lbs.

And for 200 VA of standby power...

The 200 VA Standby Power Protection System from Safe Electronics will switch 200 VA to your computer for 20 minutes when AC line voltage drops below 108 volts. Plus it gives you every bit of the same protection as the 400 VA model above. So blackouts or brownouts won't wipe you out any more. Has two AC outlets. Alarm features include indicator lamp and buzzer. Surge protection provided up to 80 joules. 6" H x 12 5/8" L x 10 3/4" D. Assembled **PP-111** \$349.95, 34 lbs.

A Smart cable

Plug in the cable, set the two switches and you're ready to go. That's all it takes when you've got our Smart Interface Cable. It looks at the RS-232 signals from computers and peripherals and uses its own logic circuitry to match up all data, handshake and control lines automatically. Manufactured by IQ Technologies, Inc. Assembled **PP-100** \$79.95, 1 lb.

Gender converters

Make your male connector into a female connector and vice versa. Full 25-pin back-to-back RS-232 connectors are directly wired. Assembled **PM-125** Male/Male \$14.95, ship wt 1 lb. Assembled **PM-126** Female/Female \$14.95, 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

HCA-51 Male/Female (6 ft.) \$30.00, ship wt 1 lb.
HCA-52 Female/Female (6 ft.) \$30.00, ship wt 1 lb.
HCA-53 Parallel (10 ft.) \$30.00, 1 lb.
HCA-100 PC, PC Serial Conversion Cable (1 ft.) \$16.00, ship wt 1 lb.

Pre-wired 10-foot special application cables

HCA-22 WH-64 Parallel Cable \$35.00, ship wt 1 lb.
HCA-24 WH-64 Serial Cable \$35.00, ship wt 1 lb.

Economical, quality paper

Premium 8.5" x 11" paper, continuous 2700 sheets **HCS-1** \$32.00, 28 lbs.



Standard 8.5" x 11" paper, continuous 3200 sheets **HCS-2** \$32.00, 31 lbs.
 Standard 14.875" x 11" paper, continuous 3200 sheets **HCS-3** \$42.00, 47 lbs.
 Bond form-feed 8.5" x 11" continuous 1000 sheets **HCS-4** \$25.00, 13 lbs.

Protect your floppy disks

The Data Defender from Ring King locks up to seventy 5.25" floppy disks. **PM-100** \$19.99, ship wt 3 lbs.

Control static buildup

Zenith STAT-ATTACK Computer Cleaning System **PM-111** \$14.99, 2 lbs.

Long-life printer ribbons

Six plug-in film ribbon cartridges for use in the Primage 90 and Diablo 1640 and 630 daisy wheel printers **PM-250** \$29.99, ship wt 1 lb.

One plug-in ribbon cartridge for use in the WH-64 TI 855 Dual Mode dot matrix printer **HCS-57** \$12.00, ship wt 1 lb.

Primage 90 printwheels

Courier 10 printwheel with 10 cpi **PPA-250-4** \$24.95, ship wt 1 lb.
 Prestige Elite printwheel with 12 cpi **PPA-250-5** \$24.95, ship wt 1 lb.
 Versa-Tile PS printwheel and proportional spacing **PPA-250-6** \$24.95, 1 lb.

Epson Accessories

Replacement ribbon for the PP-243 LQ-1000 Printer **PPA-243-1** \$24.95, 1 lb.
 Tractor feed for the PP-243 LQ-1000 Printer **PPA-243-2** \$59.95, ship wt 4 lbs.
 Replacement ribbon for the PP-246 LQ-800 Printer **PPA-246-1** \$14.95, 1 lb.
 Tractor feed for the PP-246 LQ-800 Printer **PPA-246-2** \$49.95, ship wt 3 lbs.

Easier and more enjoyable computing with this kind of support

At your one-stop shopping center, get easy-to-use terminals that access mainframe computers or on-line services. Learn about monitors that live-up computer graphics or relieve eye strain while viewing text. And see how computer furniture can make your computer look good, keep everything orderly and make your computing more comfortable.

A terminal designed for your comfort and budget

A smart terminal and a smart buy for you. Features, price and high reliability combine into a logical solution for almost all your terminal needs.

You configure all parameters to fit your requirements, not the terminal's. You choose selections from on-screen menus. They are then stored in memory until you reset them. Even a 24-hour clock is accessible for keeping track of standard or elapsed time.

Clearly see 25 lines of 80 characters on a non-glare green CRT in normal or reverse video. In less than eight hours you can assemble a terminal that emulates the Lear Siegler ADM-3A, the Hazeltine 1500A and many DEC-VT 100 features. Uses 120 VAC. Also available in a fully assembled Zenith Data Systems version with an amber CRT. Monitor is 13 $\frac{3}{8}$ " H x 15" W x 14 $\frac{1}{4}$ " D. Keyboard is 3" H x 18" W x 7 $\frac{1}{4}$ " D. Kit **H-29** \$449.00, ship wt 41 lbs. Assembled **Z-29-A** \$699.00, ship wt 45 lbs.

Accessories: Assembled **Z-29-2** ROM Source Listing \$25.00, 4 lbs.



Low-cost data entry

Be on friendly terms with all types of computers when using this information processing terminal. Communicate with business, school, personal or other computers using the RS-232 standard port. The port can communicate at speeds ranging from 110 to 9600 baud.

You won't get lost using this terminal. It uses built-in prompts and cues in simple English to make it easy to use – even by those without typing or computer training. The terminal has self-prompting, follow-along display menus.

This terminal can even be used as an electronic typewriter. Connect a parallel-type printer to the rear Centronics interface and take advantage of the terminal's printing features. Uses 120 VAC.

Configurations:

Kit **HT-10** Terminal with fully assembled ZVM-121-Z video monitor \$399.00, ship wt 36 lbs.

Kit **HTX-10** Terminal without video monitor \$279.00, ship wt 10 lbs.

Your favorite on-line service with one key

A built-in 300 baud modem and a universal log-on feature puts you in touch with your favorite on-line service with the press of a single key. It also transmits all the required codes to log on including account numbers, escape codes and passwords. Preprogram up to 26 on-line service or bulletin board phone numbers and any required access information. All entries are permanently stored until changed in battery-protected memory.

Included is the ZVM-121-Z monochrome monitor with its green 12-inch diagonal screen. Uses 120 VAC and is 3" H x 15 $\frac{1}{2}$ " W x 7 $\frac{1}{8}$ " D. Kit **HT-1011** \$449.00, ship wt 44 lbs.

Accessories to HT-10/1011 Terminals: **ZTA-1-1** Parallel Cable \$25.00, ship wt 1 lb. **ZVM-121-Z** Monochrome Monitor with 12-inch diagonal green CRT that displays 25 lines of 80 characters \$119.95, ship wt 18 lbs. **HTX-10-1** Auto-dial/answer 300 baud modem \$69.95, ship wt 1 lb.

Unmatched monitor at an economical price

Build your own 12" video monitor and get performance comparable with models costing much more. Match it up with Heath/Zenith Computers, Apple II and III, IBM PC and others for super sharp composite video displays.

Relax and enjoy the non-glare screen with its easy-on-the-eyes green display with sharp 25 lines of 80 characters. This monitor is designed with a 15 MHz bandwidth and a fast 21 ns rise time. It also has a special switch that optimizes the character display of those computers having a 40-column video format. Takes less than 15 hours to complete. Uses 120 VAC. 12" H x 12 $\frac{7}{8}$ " W x 12" D. Kit **HVM-122-A** \$79.95, ship wt 22 lbs.

Accessories: **ZVM-121-1** IBM PC Cable with RCA connectors \$5.00, 1 lb. **ZVM-121-2** Atari 800 and 1200 Cable \$15.00, 1 lb.



Special prices on 12-inch monitors

Zenith Data Systems monitors have "flat screen" viewing of 25 line by 80 character display. 10" H x 11 $\frac{3}{4}$ " W x 12 $\frac{3}{8}$ " D.

Assembled **ZVM-1220-A** with non-glare amber CRT, NTSC composite video *Regularly* \$199.00 *Fall Price* \$119.95, 16 lbs.

Assembled **ZVM-1230-A** with green CRT *Regularly* \$199.00 *Fall Price* \$119.95, 16 lbs.

Assembled **ZVM-1240** TTL-compatible with amber CRT, 9-pin D-type video output connector. For use with the H/Z-329 High Resolution Card or IBM-type monochrome cards *Regularly* \$229.00 *Fall Price* \$169.95, ship wt 17 lbs.



Sharp 13" color display

Get vivid reds, bright blues and true greens on this RGBI-only video monitor with intensity input. And it supports the IBM brown. Displays 25 lines of 80 characters and up to 640 x 240 pixels on a nonglare screen.

The ZVM-1360 version has added long persistence CRT phosphor and is capable of displaying 640 x 480 pixels or 80 columns by 50 lines when driven by interlace signals.

Both Zenith Data Systems monitors use 120 VAC. 12 $\frac{7}{8}$ " H x 14 $\frac{3}{8}$ " W x 15" D. Assembled **ZVM-1330** \$649.00, 31 lbs. Assembled **ZVM-1360** \$799.00, 34 lbs.

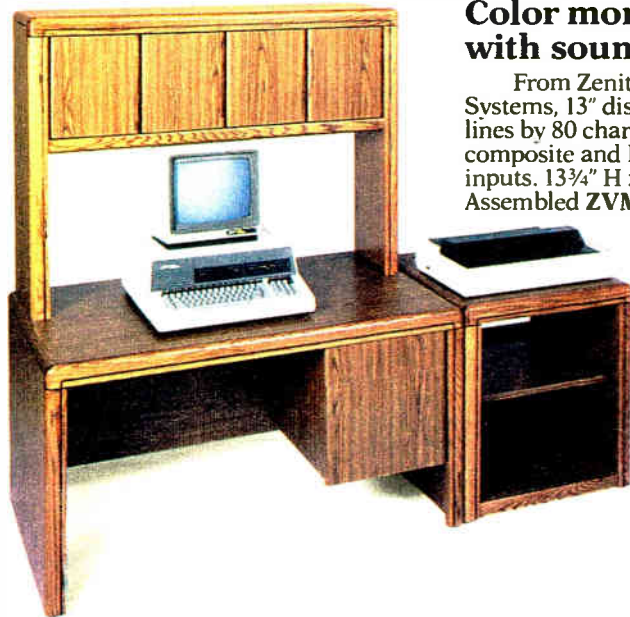
Accessories: **ZVM-1300-1** Tilt Swivel Base \$30.00, ship wt 4 lbs.



Color monitor with sound

From Zenith Data Systems, 13" display, 25 lines by 80 characters, composite and RGB inputs. 13 $\frac{3}{4}$ " H x 15 $\frac{1}{4}$ " W x 15 $\frac{1}{4}$ " D. Assembled **ZVM-135** \$599.00, 39 lbs.

Accessories: **ZVM-135-1** H/Z-100 Cable \$25.00, 1 lb. **ZVM-135-2** H/Z PC and IBM PC Cable \$25.00, 1 lb.



Elegant furniture

The perfect combination of function and fine furniture to enhance your computer system and your home or office. Softly rounded corners and a solid oak frame make this desk attractive from any angle. And a high performance Melamine work surface holds up to the roughest punishment. Work in comfort on an expansive 50" wide by 29" D work area that stands 27" high on floor levelers.

Add on the carefully matched hutch with its enclosed storage for software, binders and accessories. 35 $\frac{5}{8}$ " H x 48" W x 13 $\frac{3}{8}$ " D. Then add the 16 $\frac{1}{4}$ " H x 15 $\frac{7}{8}$ " W x 17 $\frac{1}{8}$ " D pedestal module to either side of the desk. It has one box drawer and one file drawer with frames.

Then finish off this good looking set with a 27" H x 25" W x 24" D printer stand. Has two paper slots.

Configurations:

PF-160 Desk \$199.95, 113 lbs. Mtr. Frt.
PF-161 Hutch \$199.95, 84 lbs. Mtr. Frt.
PF-165 Stand \$159.95, 81 lbs. Mtr. Frt.
PF-167 Module \$139.95, 44 lbs.



More room economically

Put your computer system on this attractive oak-finish desk with its spacious 45 $\frac{1}{2}$ " W x 29" D work area and it stands 28" high. Add on a matching 33" H x 45 $\frac{1}{2}$ " W x 11 $\frac{3}{4}$ " D hutch to gain more room. Then mate it with the 28" H x 28 $\frac{1}{4}$ " W x 19" D printer stand.

Configurations:

PF-130 Desk \$169.95, 85 lbs. Mtr. Frt.
PF-131 Hutch \$99.95, 46 lbs.
PF-120 Printer Stand \$79.95, 35 lbs.

Massive storage

Match the immense storage capacity of this 8-inch disk system with your H/Z-100 Computer.

Store up to 1.26 MB on a single disk or have up to 2.52 MB of unformatted data storage capacity on-line at all times with a versatile two-drive system. Uses 120 VAC. 7 $\frac{3}{4}$ " H x 13 $\frac{3}{4}$ " W x 20 $\frac{1}{2}$ " D.

Configurations:

Kit **HS-207-41** One Drive System \$799.00, 57 lbs.
 Kit **HS-207-42** Two Drive System \$1399.00, 69 lbs.
 Assembled **Z-207-41** One Drive System \$1599.00, 53 lbs.
 Accessories: Assembled **Z-207-6** Second Drive \$699.00, 8 lbs.



Tilt and swivel

For better and more relaxing viewing of ZVM-1200 series monitors. **ZVM-1200-1** \$25.00, ship wt 2 lbs.



Compute in comfort

Adjustable chair fits your body and puts you at the right height. **PF-103** Was \$59.95 Now \$49.95, ship wt 20 lbs.



Just a little more room

Oak-finish platform adds 19" W x 11 $\frac{3}{4}$ " D of room 6 $\frac{1}{4}$ " above your desk. **PF-132** \$17.95, ship wt 6 lbs.



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