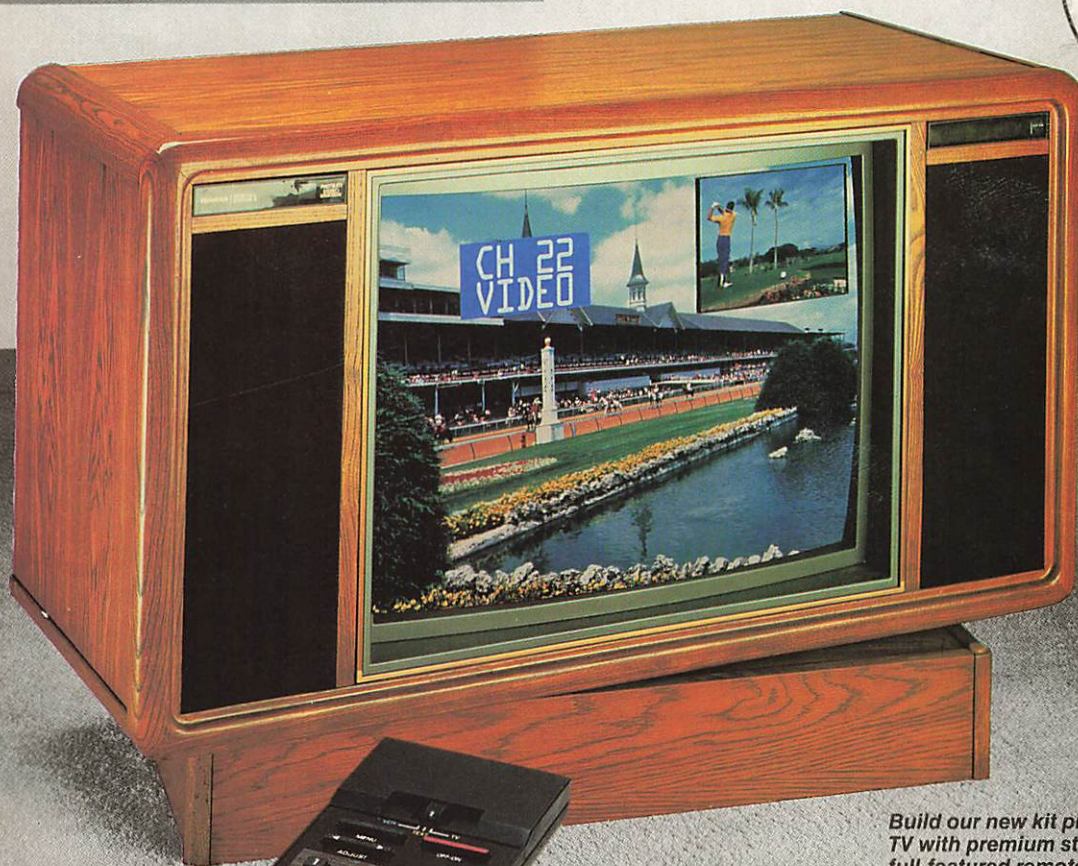


Heathkit[®]

**FREE
GIFTS**

See back
cover



*Build our new kit picture-in-picture
TV with premium stereo sound and
full-featured remote control.
Turn to pages 4 and 5.*

Heath Company

P.O. Box 8589

Benton Harbor, MI 49022



Dear Friends,

I was working late the other night, after most everyone had gone home. It's at quiet times like these I like to read

my mail. Hidden in among the usual business correspondence was a handwritten letter that caught my attention.

I'm always interested when I see something handwritten because I know it's a customer who has taken personal time to put thoughts on paper - favorable or not. What I found was a warm and friendly note from Grady Roberson Jr. who, as he said, just wanted to take the opportunity to tell us how much he enjoyed building one of our kits.

Mr. Roberson, who's from Candler, North Carolina, mentions in his letter that he has built several of our kits in the past year and finds our manuals excellent, a real tribute to our technical writers.

But his real reason for writing was to praise our technical consultants. It seems in his most recent build Mr. Roberson left out a jumper wire. The result was his scope couldn't work. He writes:

"Prior to discovering my mistake, I had to call your technical consultants. The one I talked to (Tom) was very helpful and patient with the questions I had." And he concludes, "I am looking forward to building and also recommending Heath kits in the future."

Letters like this one are important because they reassure me that our customers are in good hands. And, they remind me that we've got some awfully fine people on our Heath team.

Best regards,

William E. Johnson

William E. Johnson
President, Heath Company

The Heathkit Pledge

You will succeed. Carefully written instruction manuals help make certain that you clearly understand the assembly and operation of your kit. And if you do have any questions, just call or write our Heath technical advisors or consult your nearest Heath/Zenith Computers and Electronics Center. We've built our world famous reputation on this one simple pledge: **"We won't let you fail!"**

Your Heathkit Catalog

The new spring '89 Heathkit catalog brings a selection of fine electronic products into your home. You'll find both quality assembled products and our own electronic kits.

Fine Assembled Products

Many of the assembled products we feature carry another manufacturer's name; others are our own. Whether they carry our name or another name, all must meet the stringent standards of our engineers and undergo the careful testing and evaluation of our quality control experts.

Our Own Electronic Kits

What makes us special, however, is our electronic kit line. Our kits are fun to build and give you a real sense of accomplishment when you're finished. Like puzzles, they simply require you to follow directions and pay close attention to detail.

When you build one of our kits, you become the expert. You learn exactly what's inside and how the parts relate to each other. This kind of product knowledge gives you a unique advantage in operating and maintaining your kit.

Kit Skill Levels

Skill level one kits include relatively few components and require simple, if any, soldering. A few ordinary household tools such as pliers, blade and Phillips screwdrivers, wire strippers and a pencil soldering iron are all you need. Our starter kits on pages 48 and 49 and even our computers are examples of skill level one kits.

Skill level two kits, such as our new 27" TVs on pages 4 and 5, have more components and require more complex solder connections. Build time also increases and a few additional tools, such as a nut driver, may be required.

Skill level three kits are the most challenging projects, with increased numbers of components and soldering connections. Our ID-5001 Weather Computer on page 23 is an example.

World Famous Manuals

Included with each kit is one of our world famous assembly manuals to aid you every step of the way. They're written by our own technical writers, experts in the product lines, who are actively involved in the various stages of building each new product.

Clearly written manuals are the result of such involvement. The step-by-step format and large pictorials of key assembly steps give even the novice electronic kit builder the tools necessary to succeed.

Manual Preview Offer

If you'd like to see how easy kit building really is, order the manual first. We'll deduct the price of the manual when you buy the kit.

Most of our manuals sell for \$8.00. If the one you're interested in costs less than \$8.00, we'll refund the overpayment. If it costs more than \$8.00, we'll bill you for the balance. Please add 10% for shipping and handling for each manual ordered.

Send your request to Heath Company, Parts Department, Benton Harbor, Michigan, 49022.



Technical Consultation

Our specially trained technical consultants are available during regular business hours. Experts in their product lines, they'll help you troubleshoot a kit building problem or answer your questions about a product.

Their phone numbers are listed on page 51, according to product category. Call or write them in care of Heath Company, Technical Consultation, Benton Harbor, Michigan, 49022.

Table of CONTENTS

Home Entertainment

Five Heathkit TVs to build yourself including our two new 27" kit TVs with premium stereo sound, Zenith camcorders and VCRs, plus our complete line of hi fi components.



4-15

Amateur Radio

A wide selection of equipment for your ham shack including the SB-1400 All-Mode Transceiver. And on page 35, a listing of upcoming hamfests to mark on your calendar.



35-46

Security and Lighting

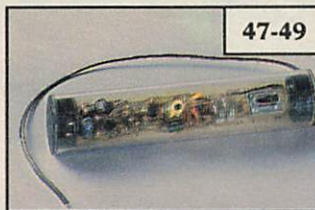
Wireless home security, a home monitor, indoor and outdoor security lighting and an expandable home convenience system for instant control of lights and appliances.



16-22

Tools, Starter Kits

The tools you need for kit building plus our starter kit series. The Educational Manual on page 48 helps you understand the principles of electronic kit building.



47-49

Weather

Our sophisticated ID-5001 Weather computer and weather stations to build yourself, a rainfall gauge, and a plug-in weather card for IBM and compatible PCs.



23-25

Ordering Information

Order by phone, toll-free 24 hours a day, seven days a week. Or mail the handy order form. Use your Visa, MasterCard, American Express or Heath charge.



50-52

Marine

Three new marine products for the fishing enthusiast: a fishing loran, a dual video sonar and a video fish finder. Plus a fully automatic portable loran.



26

Computers

Workstations custom designed to your exact needs, easy-to-build Heathkit computers including our first kit laptop, and a selection of software, peripherals and fine Zenith computers.



53-69

Home Products

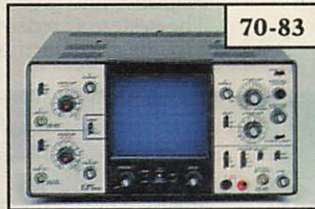
A digital clock with battery backup, our patented Most Accurate Clock and a selection of practical, easy-to-build kits for your home.



27-29

Instruments

Oscilloscopes, frequency counters, DMMs and more. Some kits, others assembled. Plus, our exclusive PC Logic Analyzer on page 76.



70-83

Radio Control

An exciting array of RC cars, RC planes and our latest – the radio controlled Fairwind sailboat. For solo fun or competitive challenge.



30-34

Education

Award-winning Heathkit/Zenith Educational Systems courses and trainers for the home-study learner. Pages 84 and 85 tell you more.



84-99



Simulated TV pictures



Feature-packed TV/
VCR remote control

Get two TVs in one with our kit picture-in-picture* TV

Channel flipping becomes a thing of the past with our new 27" picture-in-picture kit TV. This Digital System 3 television features the new picture-in-picture technology that allows you to watch simultaneously one video source on the main screen and another inside a framed inset. The second source can come from an external TV tuner, VCR, video camera or video disc player. Great for keeping up on more than one ball game at a time. With the picture swap feature, you can switch the inset with the main screen at any time to keep up with the most important action. In

addition, you can sequentially sample and freeze video from three different TV channels in three separate insets. All by remote control!

New premium stereo sound

Enjoy the latest in television audio with our new premium stereo sound system. Two 2-way stereo speaker systems are constructed inside their own ported enclosure and then mounted into the TV's cabinet to deliver deep bass response and greater dynamic range. The system's crossover network helps provide clear, virtually distortion-free

sound. Five watts minimum continuous RMS power is delivered to each channel's 4½" high compliance woofer and 2" piezo tweeter for true component system sound. An MTS stereo decoder processes stereo telecasts, simultaneously telecast second audio programs (SAP) or mono telecast programs. Also, an audio only feature allows you to listen to high quality sound through the television's speakers without having a picture on the screen.

On-screen menu displays

On-screen menus let you adjust the settings for picture, sound, programming, signal input and other selections all by remote control or from the convenient front panel controls. A master reset option allows you to return adjustments to factory-set levels if desired. And, automatic demonstration shows you how to select and adjust menu-driven controls and special features. Special picture alignment menus are also included.

World System Teletext

Available to nearly 40 million American homes (not broadcast in Canada), World System Teletext programming lets you receive news, sports, weather or business reports right on your TV. It's like having a news wire right in your living room — delivering the most up-to-date reports.

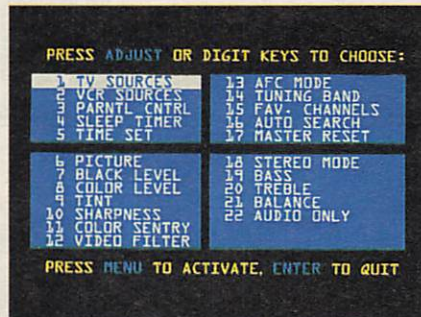
Infrared remote control

Sit back and relax as you turn your TV on/off, swap pictures, select channels, scan favorite programmed channels, mute sound and adjust volume all by remote control. You can even recall channel number and time, flash back to last channel viewed, and select TV stereo, monaural or second audio sound. In addition, you can make Teletext mode selection and access various functions of the on-screen menus. The remote also operates all Zenith VHS video recorders.



Experience double the TV excitement with picture-in-picture

*Requires an external TV tuner such as a VCR.



Adjust TV settings with the convenient on-screen menus



Keep track of changing news with built-in World System Teletext

Tune up to 178 channels

A quartz-controlled electronic tuner automatically locks onto the exact broadcast frequency for a striking picture. The 178 channel tuner permits reception of all VHF/UHF broadcast channels and up to 122 cable channels. You can choose channels by instant entry, timed entry (2-second automatic change after selection) or by up/down programmable favorite channel scanning, which skips unwanted channels.

Computer-controlled picture

Your eyes will appreciate pure, bright, true-to-life colors. The chromacolor contrast picture tube combines tinted phosphors and black matrix which together with reflection absorbing glass produce exceptional contrast and color fidelity. Colors are constantly in balance thanks to an exclusive digital computer brain which automatically monitors and adjusts the output of the red, blue and green guns of the picture tube. In addition, a crosshatch generator is included for initial color alignment.

Audio/video input/output jacks

Enjoy remote switching and volume control of audio/video components. The auxiliary jack panel allows you to connect a variety of audio/video components to your TV. These can include VCRs, camcorders, home video games, video disc players, satellite receivers and audio speakers.

RF inputs

The GR-2701 also includes two 75-ohm antenna connection jacks for outdoor or master antenna, cable TV, or RF output from a VCR.

Build it yourself

By building the GR-2701 yourself, you'll discover the fun and educational value of kit building, and obtain the confidence to do your own repairs – saving on costly TV service bills. Assembly is



Simulated TV pictures

easy, because all boards except one are preassembled and tested.

At Heath we believe in you, our customer, and understand the pride you take in assembling your kit. That's why we guarantee your success with clearly written, step-by-step assembly manuals and pictorials. It's easier than putting a jigsaw puzzle together, because we show you where to place the pieces. And, if you feel more comfortable with a knowledgeable guide at your side, give one of our television technical consultants a call at 616-982-3307.

27" Digital TV with Contemporary Cabinet. Honey Oak finish on genuine wood veneers and hardwood solids. Swivel base. Dimensions are 29 $\frac{3}{8}$ " H x 41" W x 20 $\frac{3}{4}$ " D.

Kit GR-2701-H
(170 lbs.) Mtr. Frt. \$849.00

27" Digital TV with Mediterranean Cabinet. Pecan finish on hardwood solids and durable wood products.

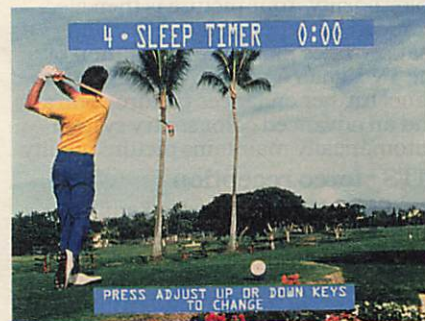
Dimensions are 32" H x 44 $\frac{1}{4}$ " W x 21 $\frac{5}{8}$ " D.
Kit GR-2701-P
(170 lbs.) Mtr. Frt. \$799.00



Switch between different signal inputs with the TV source index



Time and channel are displayed on-screen with large numerals



Set your TV to turn off automatically with the sleep timer



High-technology Zenith 20" stereo receiver/monitor with remote control **new**

The remarkable picture quality and sound characteristics of Zenith's Advanced System 3 20"-diagonal stereo receiver/monitor will bring new life to your television viewing. And, the contemporary styling of the Stardust Black finish cabinet gives the unit the good looks to blend in with any entertainment system.

Chromacolor picture tube

Zenith's Chromacolor Contrast Picture Tube combines tinted phosphors and black matrix with reflection-absorbing glass to give you a more detailed picture with exceptional contrast and color fidelity. Your picture is then electronically sharpened by a comb filter that provides maximum resolution of the TV signal. A removable tinted glass panel further enhances picture contrast, and an advanced color sentry system automatically maintains picture quality.

MTS stereo reception

Enjoy rich stereo with Zenith's Multi-Channel Television Sound (MTS) system. Incoming stereo signals are decoded and sent to separate stereo amplifiers that drive two 3½" oval front-firing speakers for powerful sound. The set even reproduces second audio (non-stereo) sound when broadcast. A head-

set jack allows for private listening.

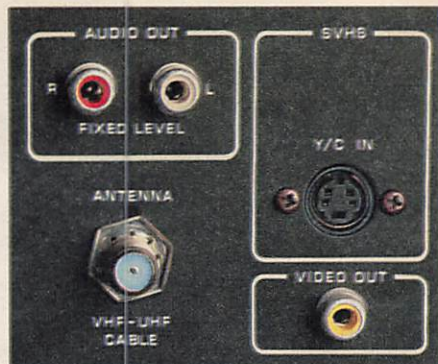
No need to worry about drifting signals, because a quartz-controlled electronic tuner automatically locks onto the exact broadcast frequency. The 178 channel tuner permits reception of all VHF/UHF broadcast channels and up to 122 cable channels.

Space Command remote control

Take command of a variety of television features from the infrared remote control. Turn the TV on/off, activate the on-screen menu display, adjust TV functions and select channels. You'll scan favorite channels, adjust volume, mute sound, set time, even recall channel number and time, flash back and set the sleep timer. Also operates all Zenith VHS and Super VHS (S-VHS) video recorders.

Get the most out of your video camera, video disc player or VCR, including S-VHS (providing over 400 lines of resolution), with the auxiliary jack panel. Audio/video input/output jacks, including a Y/C connector, allow direct hookup between video/audio sources and the TV for superior picture and sound. Dimensions are 19¼" H x 20½" W x 19" D.

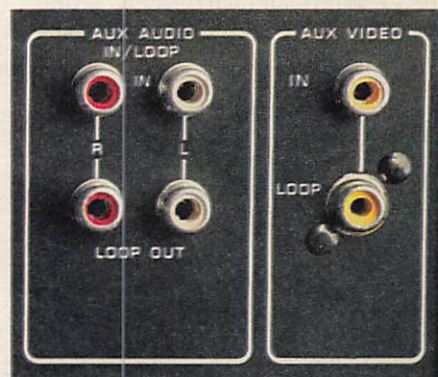
Assembled SE-2033-Y
(68 lbs.) Mtr. Frt. \$449.00



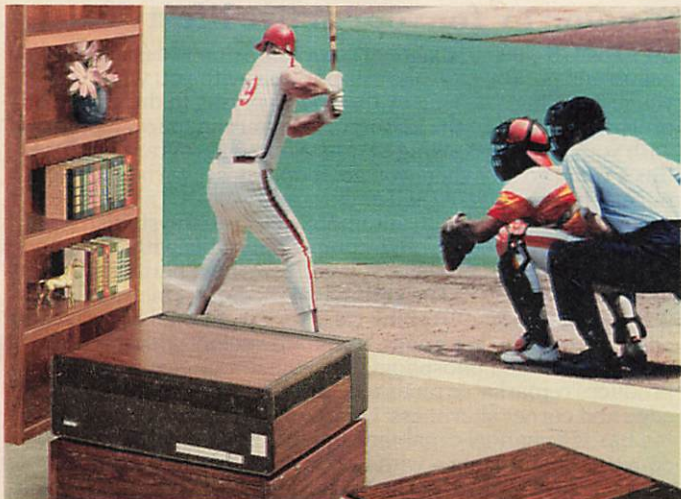
A Y/C connector allows direct connection of S-VHS VCRs. The result is high quality video with over 400 lines of resolution.



Drive external speakers through the Variable Audio jacks.



Audio/video input/output jacks give you monitor capabilities.



Simulated TV picture

Heathkit projection receiver/monitor with 8-foot diagonal picture

It's like going to the movies. Characters come to life right on your living room wall in a picture so large it rivals the screen of your favorite movie theater. And, the clean, crisp picture of the Heathkit Projection Receiver/Monitor projects on to any plain white wall. There's no picture degradation when you watch from the side or from wide angles, so no matter where you sit, your view will be undistorted — just like at the movies.

Optimum wall space is an 8-foot diagonal area, though any 7- to 10-foot flat white or off white area will work just as

well. Or use the Projection Receiver/Monitor with a screen such as the GRA-8000-3 described below. You'll want a distance of approximately 12 feet from the back of the TV to the projection surface, whether you're using a wall or screen.

Perfect for business presentations

With receiver/monitor capabilities, the GR-8000 is great for business meetings or presentations. You can directly connect a VCR, video camera or video disc player with outstanding picture results.

Use the remote control to turn the TV on and off, select channels, scan your favorite pre-programmed channels and adjust volume. You can also mute the sound, recall channel number and time, and select TV stereo, monaural or second audio sound. The flashback feature provides you with instant return to the last channel you were watching.

Enjoy Multi-Channel TV Sound (MTS) which provides you with clear, crisp stereo broadcast reception. Select the most pleasing sound adjustment with separate bass, treble and balance controls. And delight in extended stereo control which electronically increases the apparent separation of your speakers, giving a more "spacious" sound to your favorite program.

Long life liquid cooled tubes

Optical lens and picture tube coupling increases contrast and brightness by reducing the number of reflecting surfaces. Each tube is liquid cooled for long life and superior light output. You'll also get all VHF/UHF broadcast channels and up to 122 cable channels with the 178 channel tuning capability.

Other features include a 100% modular chassis for peak performance; digital true-lock picture hold; electronic power supply voltage regulator; single antenna connector for VHF, UHF and CATV; two 5" oval speakers and built-in crosshatch generator for convergence adjustments. The pecan color contemporary style cabinet measures 10 $\frac{1}{4}$ " H x 31" W x 25" D.

Kit GR-8000 (116 lbs.) Mtr. Frt. \$1495.00



TV floor stand

The pecan color finish of the Zenith TV and VCR floor stand perfectly matches the finish of the projection television shown above. Built-in castors make it easy for you to move the stand around the room to the most convenient projection location.

The GRA-8000-1 is designed with a flat top surface to hold the Zenith projection television and with additional shelf space below to house your VCR. Dimensions of the floor stand are 12 $\frac{3}{16}$ " H x 3 $\frac{1}{8}$ " W x 25 $\frac{1}{8}$ " D.

GRA-8000-1 (64 lbs.) \$69.95



Ceiling mount for GR-8000

Mount your GR-8000 projection TV in your family room viewing area. The unit is designed for mounting to a finished ceiling where joists are accessible. Can also be attached directly to a slab ceiling.

GRA-8000-2 (16 lbs.) \$49.95



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570

Simulated TV picture



98" diagonal screen

The GRA-8000-3 is a heavy-duty, manually operated pull-down screen specially designed for use with the Zenith projection system. If you don't have a flat white wall surface large enough for projection purposes, the GRA-8000-3 is a good quality screen that will serve the purpose.

Designed for systems with three separate light sources, this matte finish 98" diagonal screen prevents the side-to-side color distortion which can occur with conventional screens.

GRA-8000-3 (16 lbs.) \$149.95



AC/DC operation

9" color TV for your active lifestyle

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

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

The GR-9009 portable is also easy to operate. Up/down channel scanning can be programmed to scan your favorite channels or all available channels. Or make instant channel changes simply by pressing *enter* after you've selected the channel number.

Most circuit boards are preassembled and the GR-9009 has a built-in cross-hatch generator. Includes sun screen, earphone, built-in whip antenna, DC power cord and flush-mounted carrying handle. Cabinet measures 10 $\frac{1}{4}$ " H x 10 $\frac{1}{2}$ " W x 11 $\frac{7}{8}$ " D.

Kit GR-9009 (25 lbs.) \$249.95

Save \$100 on our MTS stereo 45" diagonal super screen television

You'll think you're a part of the action when television comes to life on this 45" receiver/monitor. And, you'll enjoy the realism of big screen viewing without crowding the living room. The GR-4500 takes no more floor space than a console TV.

A big sound system matches the big picture. The innovative Multichannel Stereo Sound System processes multichannel television sound into exciting stereo. It also processes simultaneously telecast second audio programs or mono telecasts. The stereo power amplifier has an output of 5-watts RMS per channel and features wide frequency response and low distortion. You also get bass, treble and balance controls. Plus, 6 $\frac{1}{2}$ " round woofers and 2 $\frac{1}{2}$ " tweeters deliver dramatic sound. Audio input/output jacks allow you to run the sound through your own hi-fi system or run other audio equipment through the TV's stereo.

The remote control features parental control, flashback and VCR functions. With parental control you can program the TV to make selected channels accessible only by entering a secret code that you choose. Touch the flashback button to alternate viewing between two programs. Up/down channel scanning can be programmed to scan your favorite channels or all available channels. Or use the remote to make instant channel selections.

Quartz-controlled electronic tuning ends the need for fine-tuning adjustments and has 178 channel capability. Liquid-cooled CRTs and optically-coupled lenses provide exceptional

picture contrast and brightness. You'll always have comfortable viewing because the special black matrix screen absorbs room light to reduce glare and reflections. You can also use the TV as a monitor for your VCR, video camera or video disc player.

All circuit boards except one are preassembled and the GR-4500 has a built-in crosshatch generator. Includes cabinet. Uses 120 VAC/60 Hz.

Kit GR-4500 (256 lbs.) Mtr. Frt. Was \$1295.00 Now \$1195.00



Simulated TV pictures

Reduced \$100, this compact camcorder is perfect for the traveller

With the new Zenith VHS-C camcorder, you get all the features of a full size unit in a camera that takes up only half the space. At less than 3 lbs., this compact camcorder lets you film longer – without the bulk and weight of larger cameras.

Zenith's new camcorder is small because it uses VHS-C mini-cassettes that let you record up to one full hour of memories per tape using the Extended Play (EP) mode. Smaller than standard cassettes, the VHS-C tapes are a perfect fit for your VCR, thanks to the special adapter included with your camcorder.

Picture quality will be excellent, regardless of your recording speed, with the four video heads used in the compact camcorder. Automatic exposure ensures accuracy indoors and out, even in extremely low lighting, down to 8 lux. New high quality (HQ) circuitry with White Clip and Detail Enhancement gives you excellent picture detail and clean, crisp images. Plus, the 1/2" CCD pickup device has 360,000 picture elements for superior color and over 400 lines of horizontal resolution, while still offering reduced power drain. Picture quality is further enhanced with a flying erase head that eliminates video signals frame by frame for smooth, precise, professional quality edits or transitions from one scene to another.

Through the VM-6180's electronic viewfinder you can play back what you just recorded – to see if you captured that special moment. The viewfinder also provides easy-to-use indicators that display mode, warning, date/time, elapsed time and other information.

Other features include high speed 1/1000 shutter for recording fast action shots, f/1.4 auto focus lens with 6:1 power zoom and macro capability, fully automatic white balance and iris with backlight compensation, omni-directional



HOME ENTERTAINMENT 



Lightweight at less than 3 lbs.

condenser microphone, and 3-way power capability for recording using the camera mounted battery pack, AC power supply or a cigarette lighter adapter (not included).

Included accessories are AC adapter/charger, rechargeable battery, mini-cassette tape, cassette adapter, 75-ohm RF cable, RF converter unit, and lens hood and cap. Optional hard-shell carrying case is padded and compartmentalized to hold your video camcorder and accessories.

Assembled VM-6180 (8 lbs.) . . . Was \$949.00 Now \$849.00

Accessory:

Hard-Shell Carrying Case

VAC-618 (2 lbs.) \$49.95

Save \$296 on this Zenith full size, auto focus camcorder

The VMS-7050 is a full size camcorder that uses the same standard VHS format tapes that you use in your VCR. With these full size cassettes, you can record up to 2 hours and 40 minutes in standard play (SP) mode on a T160 tape. You get more time filming and less time changing tapes.

Let this camcorder work for you with its quick and precise auto focus system. This image sensing system includes a two speed f/1.4-2.0 auto focus lens and 6:1 power zoom with macro capability. The two speed lens can tape at 1/60 speed or at 1/1000 speed – for fast action sequences.

Superior picture quality is a standard feature of the VMS-7050. A 1/2" CCD pickup device delivers outstanding color and picture resolution with less power drain. This two head camcorder also utilizes HQ circuitry with Detail Enhancement and White Clip to achieve sharp images. Even record great pictures in poor lighting situations – to as low as 7 lux.

Through the electronic viewfinder you can watch all the action as you see it, or play back what you just recorded. The viewfinder also displays mode, date/time, warning, elapsed time and more.

You won't miss a word with the built-in unidirectional condenser microphone, or add more sound during or after recording with the background music input.

Further features include an animation mode with variable shutter speeds for shooting individual frames of illustrated animation, flying erase head for precise edits, date/time insert



Weights less than 6 lbs.

capability, audio/video input, 3-way power, and fully automatic white balance and iris with backlight compensation.

Standard accessories include a rechargeable battery pack, video cassette, AC power adapter/battery charger, RF converter unit, shoulder strap, and lens hood and cap. An added value is the made-to-fit hard-shell carrying case included with your VMS-7050. The padded lining and sturdy outer casing give your camcorder and accessories the protection they deserve.

Assembled VMS-7050 (12 lbs.) . . Was \$1295.00 Now \$999.00



Slimline 6-head Hi-Fi stereo VCR with wireless remote

With all the advanced features in the VRE-510-HF, you may never go to a movie theatre again! Incorporating two rotary, slant azimuth audio heads, this VHS Hi-Fi VCR achieves a dynamic range of over 80 dB – for stereo sound approaching compact disc quality. Also, a built-in MTS (Multi-Channel Television Sound) decoder processes broadcast TV-stereo and SAP (Second Audio Program) signals, when available.

Four video heads for sharp images

The Slimline VCR features two pairs of video heads, one for the most economical use of tape (EP mode), and the other exclusively for picture quality (SP mode). Your picture will appear clear and undistorted when you pause to view a particular moment in your instructional tape or exercise routine. In addition, a series of high quality (HQ) circuits creates sharp edges around dark and light areas, sharpens detail in images where texture is important, and reduces irrelevant noise in the light and dark portions of the video signal.

Remote on-screen programming

For convenience, remote on-screen programming lets you set your VCR's controls all from the comfort of your favorite chair. Just watch your screen as you program days, start and stop times, channels, recording speed and other secondary controls. You can even program your VCR for unattended recording of up to four events over a two week period.

Slow motion special effects

With the 157 channel quartz electronic tuner you can access 101 cable channels either by direct access or scanning. In addition, with 5-speed ($\frac{1}{30}$, $\frac{1}{24}$, $\frac{1}{18}$, $\frac{1}{12}$ and $\frac{1}{6}$ normal speed) slow motion, you can reduce all your favorite programs to a crawl. Ideal for seeing how Hollywood directors really create those special effects.

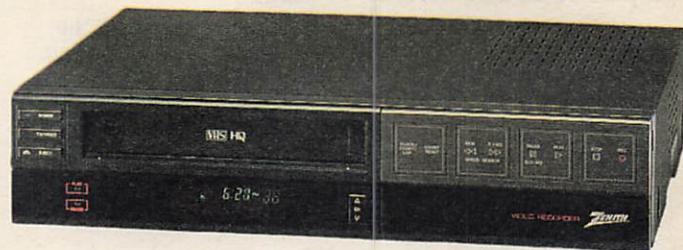
Quick program search

When you need to find a taped program quickly, the VRE-510-HF is the machine to do the job. The new VHS Index Search System speeds to your favorite show, scanning a tape in forward or backward mode at seven times normal speed. And, Counter Go-To assists in fast, accurate tape searching.

Auto functions replace routine commands

Other special features include Auto Power-On with Auto Play, Rewind, Eject, and Next Function Memory; Instant Record and dual function wireless TV/VCR remote control. And on nonbroadcast channels, Zenith's Silent Blue Screen replaces noisy static. Dimensions of the Slimline VCR are $3\frac{1}{4}$ " H x $17\frac{1}{4}$ " W x 13" D.

Assembled VRE-510-HF (19 lbs.) \$499.00



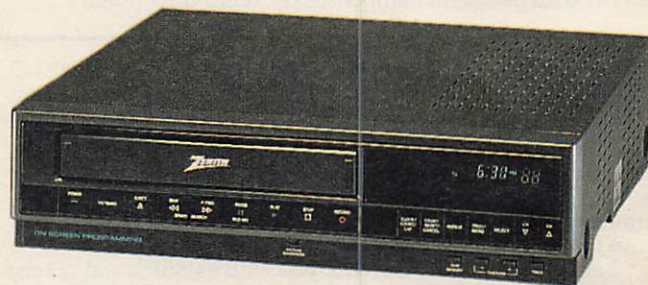
Zenith VHS recorder with quartz electronic tuning

The VRE-150 is a 3-head, remote control VCR integrating Double Azimuth design, for clean still pictures. The use of HQ circuitry further enhances the superb picture quality of this video recorder.

This VCR tunes up to 101 cable channels, either by direct access or scanning, and you won't miss any of the action on these channels with the 2-week, 4-event timer. In addition, via remote control, you can quickly locate the beginning of recorded programs with the VHS Index Search System.

Other features include Auto Power-On with Auto Play, Rewind, Eject and Next Function Memory; Instant Record; wireless remote; two recording speeds; 5-speed slow motion and Counter Go-To. $3\frac{7}{8}$ " H x $17\frac{1}{4}$ " W x 13" D.

Assembled VRE-150 (18 lbs.) \$299.00



Compact 4-head VCR with on-screen menus and remote programming

More than three inches narrower than a conventional VHS deck, the 4-head VRE-200 features 157 channel quartz electronic tuning, including 101 cable channels, and high quality (HQ) circuitry for picture enhancement. Also, Double Azimuth heads enable clear still frame, slow motion and speed search.

No need to turn on the power of your Zenith VCR because with Auto Power-On the VRE-200 does it for you. Additionally, with Auto Eject, you can take a tape out of your VCR without turning on the power, and with Auto Rewind your tape will rewind itself when completed.

Further features include 5-speed slow motion; VHS Index Search System; Counter Go-To; dual function wireless remote; 2-week, 4-event timer; remote on-screen programming; Instant Record and Silent Blue Screen on nonbroadcast channels. Dimensions are $3\frac{3}{4}$ " H x 14" W x 13" D.

Assembled VRE-200 (17 lbs.) .. Was \$349.00 Now \$329.00



Control your TV, VCR and CATV all from one remote with Zenith's PCC

Operate your TV, VCR and cable converter from a single remote control. Zenith's Personal Control Center (PCC), programmable for multiple brands, is as easy to use as any ordinary remote. Set the switches one time only to operate specific products. The on/off, volume, mute and other control functions will remain independent and you can operate them from any mode. Designed to control units operated via IR (infrared) signals. Three AAA batteries included.

Assembled PCC-200 (2 lbs.) \$59.95

Operates recent models of these TV brands**:

Akai • AOC • Centurion • Coronado • Curtis Mathis • Daytron • Emerson • Fisher • GE • Goldstar • Hitachi • JCP • JVC • KMC • KTV • Magnavox • Marantz • MGA • Mitsubishi • NEC • Panasonic • Philco • Philips • Portland • Quasar • Radio Shack • RCA • Sampo • Samsung • Sanyo • Scott • Sears • Sharp • Sony • Sylvania • Teknika • Toshiba • Wards • Yorx • Zenith.

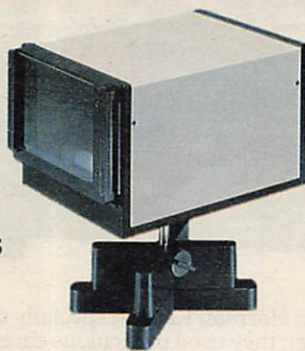
Operates recent models of these VCR brands**:

Akai • Broksonic • Cannon • Citizen • Curtis Mathis • Daytron • Emerson • Fisher • Funai • GE • Goldstar • Hitachi • JVC • Kenwood • Magnavox • Marantz • Marta • Mitsubishi • NEC • Panasonic • Pentax • Philips • Pioneer • Quasar • RCA • Realistic • Samsung • Sanyo • Scott • Sears • Sharp • Shintom • Sony • Sony Video 8 • Sylvania • Symphonic • Tashiko • Teac • Toshiba • Vector Research • Wards • Yamaha • Zenith Beta • Zenith VHS.

Operates these cable converters**:

Gemini MAC10 • General Instrument Starcom CS, XT • Hamlin CRP6, CRP6S, CRP7, CRP8, RCPX • Jerrold 400, 440, 450, 700, 770, SRCII, VI • Macom Satellite • Macom • Oak 500, 550, RCU-400, Sigma, TC56 • Panasonic TZ120, TZ170 • Philips CP67, CP100, CP200, CTC8R, CTC9, CV1000, CV2000, CV2500, CVS2700, PG67, TS67 • Pioneer BR50, BR80, BR81 • Regency • Scientific Atlanta 8550 • Texscan • Tocom RC100, VIP • Toshiba • Viewstar MXC2001A, MXC2501, VSC2000, VSC2020, VSC2040, VSC2500, VSC2511 • Zenith Drake Satellite • Zenith.

**Zenith cannot guarantee the PCC will operate every model of the brands listed because of possible changes by the manufacturer.



Convert photos to videotape and save with new low price

Boxes of photos from several years back. Albums you never really had time to organize. Sound familiar? With the Photo Converter you can transfer all your photo prints up to 4 by 6 inches onto videotape. A special macro lens and built-in balanced fluorescent illumination eliminate glare from the photographs, giving you excellent picture quality. You can view your family album on TV and even add music or other audio through your VCR. The Photo Converter mounts on its own tablepod for easy alignment with a video camera. Unit may be shipped with black or white casing. Color choice is not available.

Assembled V-617 (6 lbs.) \$79.95



Slide and movie converter for only \$79.95

Enjoy watching your slides and 8mm or 16mm home movies on TV without the bother of setting up a projector and screen. This converter makes it easy to transfer slides and movies to video. You can even add your own soundtrack using your VCR. Either narrate the occasion or add music. Making copies for family and friends is inexpensive, too. The converted tapes make wonderful gifts that remind special people of special occasions. An adjustable tablepod mount allows for easy set up with your projector and video camera. Unit may be shipped with black or white casing. Color choice is not available.

Assembled BV-612 (3 lbs.) \$79.95

Heath high-fidelity components – standing at the summit of audio technology

Enjoy the pride of building it yourself with the new line of high-quality stereo equipment from Heath Company. Once a leader in kit audio components, we went to the best names in the business to help put us back on top – and we got them.

Components designed with sonic excellence in mind

For the state-of-the-art electronics the obvious choice was Harman Kardon.* An innovator in the Hi-Fi industry for 35 years, Harman Kardon is dedicated to sonic excellence. They introduced the first Ultrawideband amplifier and the world's first cassette deck utilizing Dolby® noise reduction. Now Harman Kardon has achieved another first, designing for Heath a quality line of kit audio components integrating the latest in stereo technology.

Loudspeakers for the demanding audiophile

To generate the high-quality sound reproduction you expect from your audio system we went to JBL,** the company the pros depend upon for exacting performance. World renowned for studio monitors, JBL was the obvious choice to develop our high-efficiency speakers for those who insist upon studio-quality sound. With the new line of Heath/JBL loudspeakers you get stylistic excellence without sacrificing the technical attributes necessary to handle today's demanding music sources.

Enjoy the challenge of building it yourself

If you want to get a better understanding of the principles of sound reproduction, there is no better way than to build our

new line of high-quality audio equipment.

You may want to start by assembling the Heath/JBL loudspeakers if you've never built a kit before. These speakers carry a skill level one, which means a minimum amount of soldering is involved and you'll have a completed speaker system after only a few hours of kitbuilding enjoyment. Caution: After assembling your first kit you may become a kit building fanatic.

A completed kit in just three short evenings

For those who want a little more challenge, Heath stereo components are the perfect choice. Carrying a skill level two, these component kits require only a moderate amount of soldering. You'll find that most of your build time will involve mechanical assembly. Indeed, all circuit boards are pre-assembled and tested for guaranteed reliability. Also, there are no adjustments or testing involved with the kits, except with the AA-2500 amplifier which needs its bias tuned after assembly. In fact, we include with the AA-2500 the meter you need to perform the bias adjustment. After just three short evenings, you'll have a high quality audio component that will provide years of listening pleasure. Always remember, whether you're a beginning kit builder or not, we guarantee your success.

An offer you only dreamed of – before now

If you always dreamed of having a high-fidelity audio system and wanted the challenge of building it yourself, then components specially designed for Heath by Harman Kardon and Heath/JBL loudspeakers are what you've been waiting for. They're what dreams are built of.

Outstanding reception made easy with this digital stereo tuner

SKILL LEVEL Easy enough for the beginner yet challenging enough for the experienced kit builder, the AJ-2520 gives you a unique opportunity to understand your stereo tuner inside and out.

The 2520 guarantees optimum sound quality with a digitally synthesized, quartz-locked tuning system that uses a combination of a digital frequency control system and a highly accurate quartz reference crystal. The control system automatically locks onto the assigned frequency of any broadcast and compares it to the reference frequency 25,000 times per second. The result is not just automatic centering, but drift-free reception, as well. Also, an all-metal chassis helps maintain audio signal purity by providing shielding and noise rejection.

With 16 station FM or AM memory, you'll have plenty of room to program all of your favorite frequencies. And, should a power failure occur, station memory is retained for up to one week.



When Harman Kardon specially designed for Heath the 2520 Tuner, they used meticulous care in circuit layout and component selection to help minimize harmonic distortion and cross-coupling. A Low Group Delay I.F. (Intermediate Frequency) section makes for even lower distortion and wider stereo separation.

Other features include a 3-segment LED signal strength meter, muting, manual up/down tuning, bi-directional tuning and tuned indicator. Dimensions are 2¾"H x 17½"W x 14¼"D.

Kit AJ-2520 (11 lbs.) \$229.00
Assembled AJW-2520 (10 lbs.) \$249.00

Specifications: Usable FM Sensitivity: 10.8 dBf/0.95 μ V. 50 dB Quieting Sensitivity: 37 dBf mono, 19.4 μ V stereo. THD: 0.2% mono, 0.3% stereo. S/N: 82 dB mono, 74 dB stereo. Capture Ratio: 1.3 dB. Alternate Channel Selectivity: 50 dB. Power Supply: 120 VAC, 60 Hz. Power Consumption: 14W.

Dolby is a registered trademark of Dolby Laboratories, Inc.

*Harman Kardon is a registered trademark of Harman Kardon, Inc.

**JBL is a registered trademark of JBL, Inc.

Get complete control over your audio signal with this preamplifier

SKILL LEVEL 2 With the AP-2510 Preamplifier you not only get a quality component designed for Heath by Harman Kardon, but you get the satisfaction of saying, "I built it myself."

Virtually eliminating dynamic distortion, the 2510 has ultrawideband frequency response and low negative feedback to aid in the delivery of extremely fast transient response – a necessity in the accurate reproduction of digital recordings.

Transient response is also improved in the phono section with the use of dual RIAA equalization circuitry, which requires only low levels of negative feedback throughout the audio range. Also, a discrete Moving Coil (MC) head amplifier allows the use of nearly all MC cartridges. In addition, the 2510 features capacitance trim for the widest, flattest frequency response from Moving Magnet (MM) cartridges.

Other features include low noise discrete circuitry, subsonic and high cut filters, and a tape copy selector for dubbing between two tape decks or recording from another input. You'll also enjoy tone defeat which maximizes the purity of the signal when tone controls aren't necessary, and switchable bass



and treble turnover frequencies which allow for custom-tailoring of the tone control to the listening environment. Includes inputs for two tape decks, two turntables, a CD player and a video sound source. 4"H x 17½"W x 13¾"D.

Kit AP-2510 (19 lbs.) \$349.00

Assembled APW-2510 (16 lbs.) \$399.00

Specifications: **Frequency Response:** 0.1Hz-180kHz. **THD:** 0.006%. **S/N:** 83dB phono (MM), 80dB phono (MC), 92dB aux, 92dB tape. **Input Sensitivity/Impedance:** 2.2mV/47k ohms 130pF phono (MM), 130µV/56 ohms phono (MC), 130mV/22k ohms aux, 130mV/22k ohms tape. **Output Level:** 1V Rated, 10V Max. **Filters:** 15Hz Subsonic (6dB/Octave), 6kHz High Cut (6dB/Octave). **Power Supply:** 120 VAC, 60Hz. **Power Consumption:** 45W.

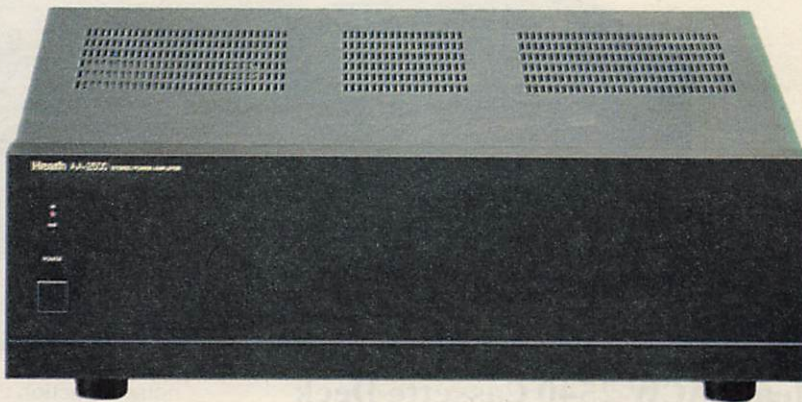
100W power amplifier unleashes the potential of your music

SKILL LEVEL 2 Featuring a High instantaneous Current Capability (HCC) of 60 amps, the 2500 Power Amplifier develops far more power under peak loads than its already impressive 100W per channel. The result is more headroom to handle today's demanding digital recordings.

Specially designed for Heath by Harman Kardon, the 2500 also demonstrates exceptionally wide bandwidth due to its low 12dB of negative feedback which provides improved transient accuracy and phase linearity. In addition, a massive toroidal power transformer eliminates the stray magnetic fields that cause hum. And, the power supply and amplifier circuitry include high grade capacitors with extremely low loss.

A superior example of high technology electronics, the 2500 features four dual polarity power supplies that eliminate channel-to-channel interference and assure proper balance of current between high and low level stages.

Another advanced feature of the 2500 is a protection circuit that shields speakers from turn-on transients and prevents short circuit by muting audio if a load of less than 2 ohms is placed across the speaker terminals.



When you assemble the AA-2500 yourself, you save money and get the satisfaction of knowing the care and effort you put into the construction of your new amplifier. Dimensions are 5¾"H x 17½"W x 14½"D.

Kit AA-2500 (33 lbs.) \$449.00

Assembled AAW-2500 (30 lbs.) \$499.00

Specifications: **Power Output:** 100W RMS per channel into 8 ohms, 20Hz-20kHz. **THD:** <0.06%. **HCC:** 60A. **Power Bandwidth:** 10Hz-70kHz (half rated output into 8 ohms). **Frequency Response:** 0.1Hz-170kHz (at 1W output, +0/-3dB). **S/N:** 98dB (IHF-A Wtd). **Input Sensitivity:** 1V/22k ohms. **Power Supply:** 120 VAC, 60Hz. **Power Consumption:** 550W.



Get remote control convenience with the Heath compact disc player

The ADW-2530 is a remote control compact disc player that uses a three-beam laser optical head for precise tracking and exact laser positioning. Also incorporated is a Sample-and-Hold Processor to reduce switching noise, and a Discrete Analog Output Section that significantly decreases inter-modulation distortion.

With the 10-function wireless remote control, you can skip forward and reverse, repeat, program, display, skip, search, play/pause and stop/clear all from the comfort of your favorite chair.

In addition, you can quickly scan through a disc to find your favorite passage with 2-speed audible cue and review. And, 36-track programmable memory lets you custom select which songs will play and in what order. Also included are track and index search, and separate analog, digital and transport power supplies. Dimensions are 3 $\frac{3}{4}$ "H x 17 $\frac{1}{2}$ "W x 10"D.

Assembled ADW-2530 (11 lbs.) \$349.00

Specifications: **Frequency Response:** 4Hz-20kHz \pm 0.5dB. **THD:** 0.03%. **S/N:** 103dB. **Dynamic Range:** 96dB. **Channel Separation:** 83dB. **Wow-and-Flutter:** Immeasurable. **Signal Detection:** 3-Beam Semiconductor Laser. **Error Correction:** CIRC System. **Quantization:** 16-bit. **Sampling Frequency:** 88.2kHz. **Line Output Level/Load Impedance:** 2.0V/10k ohms. **Power Consumption:** 15W.



The Heath ACW-2540 Cassette Deck for exacting sound reproduction

Developed specially for Heath by Harman Kardon, the ACW-2540 employs Dolby HX Professional, a headroom extension system that retains dynamic audio signals during recording – an especially important feature when recording from CDs. In addition, recording levels are easily set with the 7-segment LED peak metering system.

Using Ultrawideband technology, the ACW-2540 produces a frequency response of 20Hz-20kHz (\pm 3dB), using any tape formulation. Matching each tape formulation is effective and convenient too, with the bias fine trim control. And, Dolby B

noise reduction circuitry helps to reduce tape hiss considerably, while Dolby C knocks it out – dropping noise well below the level of audibility.

Other special features include an Amorphous Tape Head, record mute, memory search, MPX filter, metal tape capability and a solenoid transport for smooth operation. Dimensions are 4 $\frac{3}{4}$ "H x 17 $\frac{1}{2}$ "W x 10 $\frac{1}{4}$ "D.

Assembled ACW-2540 (12 lbs.) \$349.00

Specifications: **Heads:** 2. **Frequency Response:** 20Hz-20kHz \pm 3dB (all formulations). **THD:** 1.0%. **S/N:** 57dB no NR, 65dB Dolby B, 73dB Dolby C. **Channel Separation:** 45dB. **Wow-and-Flutter:** 0.05% WRMS. **Line Input Sensitivity:** 50mV (0dB). **Output Level:** 580mV (0dB, 10k ohm load).



Superior 3-way floor-standing speaker system

SKILL LEVEL 1 The Heath/JBL 3-way floor-standing speaker system combines quality electronics and fine cabinetry for a pleasurable kitbuilding experience.

You'll enjoy accurate stereo imaging from the three vertically aligned drivers which consist of a 12" Aquaplas laminate low-frequency transducer, a 5" high-polymer laminate mid-frequency transducer and a 1" pure titanium diaphragm high-frequency transducer. Together these drivers ensure a clean, flat frequency response. In addition, the speaker system is ported to extend the low-frequency response and allow it to operate with negligible distortion, for startling realism.

Constructed of real walnut veneer, the 1230 loudspeakers look good with or without their grilles because of a finished facing board. Dimensions are 40" H x 14" W x 10 1/2" D.

Kit AS-1230 (58 lbs.) .. each \$349.00
Assembled ASW-1230
 (58 lbs.) each \$399.00

Specifications: **Configuration:** 3-way ported enclosure. **Recommended Amplifier Power Range:** 10-200 watts. **Sensitivity:** 91 dB. **Frequency Response:** 60 Hz-20 kHz (-3 dB). **Frequency Range:** 45 Hz-23 kHz (-10 dB). **Woofer:** 12" Aquaplas laminate low-frequency transducer. **Midrange:** 5" high-polymer laminate mid-frequency transducer. **Tweeter:** 1" pure titanium diaphragm high-frequency transducer. **Impedance:** 8 ohms. **Crossover:** 800 Hz, 4,000 Hz.



High-performance 2-way bookshelf speaker system

SKILL LEVEL 1 Enclosed in an attractive walnut vinyl veneer cabinet, the Heath/JBL 2-way bookshelf speaker system offers you compact performance.

The 1082 speaker system delivers exacting sound reproduction from a 1" pure titanium diaphragm high-frequency transducer and an 8" high-polymer low-frequency transducer. In addition, precise circuitry, as well as low loss capacitors, provides maximum performance. Dimensions are 23" H x 13 1/4" W x 9" D.

Kit AS-1082 (29 lbs.) .. each \$129.95
Assembled ASW-1082
 (28 lbs.) each \$159.95

Specifications: **Configuration:** 2-way ported enclosure. **Recommended Amplifier Power Range:** 10-100 watts. **Sensitivity:** 90 dB. **Frequency Response:** 80 Hz-20 kHz (-3 dB). **Frequency Range:** 50 Hz-23 kHz (-10 dB). **Woofer:** 8" high-polymer low-frequency transducer. **Tweeter:** 1" pure titanium diaphragm high-frequency transducer. **Impedance:** 8 ohms. **Crossover:** 3 kHz.

High-tech stereophones

Using technologically advanced titanium elements, these two stereophones reproduce every detail of digital recordings. In addition, tuning each channel to perfection is made easy with the unique in-line volume/balance control. Other common features include a full length coiled cord and a 1/4" stereo plug.

1 Open-Air Stereophone. The TE-200 features comfortable hear-through ear cushions that let you absorb yourself in music, without shutting out your surroundings. Frequency response is 20-20,000 Hz.

Assembled TE-200 (2 lbs.) .. \$59.95



Display your audio components in this attractive cabinet

Made of select oak solids and veneers, the AE-2501 stereo equipment cabinet uses hidden construction and a metal-to-metal fastener assembly for greater strength and durability.

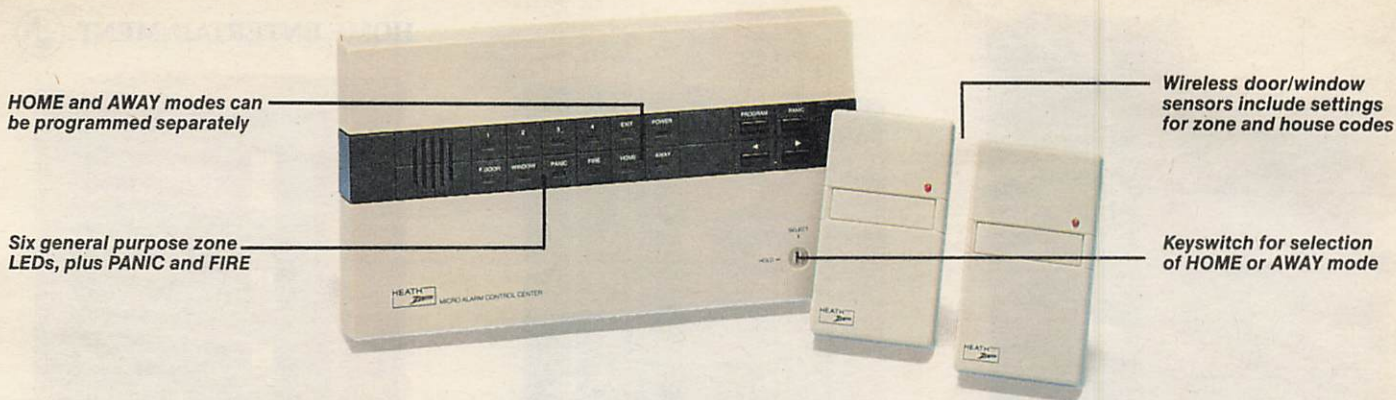
Features include four shelves (one a glide-out), 3/16" tempered glass with oak wood trim and hidden casters. Dimensions are 46 1/2" H x 22 3/4" W x 16 1/2" D.

AE-2501
 (102 lbs.) Mtr. Frt. \$189.95



2 Closed-Back Stereophone. The TE-400's closed-back design eliminates background noise for private listening. Frequency response is 20-30,000 Hz.

Assembled TE-400 (1 lb.) ... \$69.95



HOME and AWAY modes can be programmed separately

Wireless door/window sensors include settings for zone and house codes

Six general purpose zone LEDs, plus PANIC and FIRE

Keyswitch for selection of HOME or AWAY mode

Expandable wireless home security

This easy-to-install wireless security system gives you full eight-zone protection of areas you designate throughout your home. Fully expandable with accessories shown at right, the system comes with a main control center and two door/window transmitters. The control center is the same unit used in the SS-5910 wireless security system described on page 17.

Wireless installation means all sensors activate the control center through radio signals without the use of unsightly wiring. Adding new sensors is easy. The system has no limit to the number of wireless or wired accessories that can be used with it. In case of intrusion, the control center immediately displays the zone where the alarm sounded so you know exactly where

the problem is. And, after the alarm has sounded, the control center resets. The system never stops protecting your home.

An optional battery provides emergency power backup if electrical power is disconnected. And, since the power LED flashes when the system is running on battery power, you'll always know that it's working. In addition, two testing modes ensure that the system is operational and alarms are functional.

Mount the control center on a wall or set it on a table top—whatever location is most convenient. UL approved power supply and FCC approved transmitters and receivers. The Heath/Zenith SS-5900 comes with a one-year limited warranty.

Assembled SS-5900 (4 lbs.) \$249.95



Program number keys for emergency phone numbers, high and low temperature, listen-in time and more

Simple keyboard programming talks to you as you program

ALERT/CANCEL key cancels automatic dial-out, allows you to answer the phone

WHAT IS key lets you listen to function settings and dial-out numbers

The House Sitter monitors your home

"This is 655-3210. Alert condition is OK. Temperature is 65°. Electricity is on. Sound level is OK." Having heard this comforting message, you can return to your beach chair, take another sip of your tropical punch and completely and totally relax, knowing your house is safe in your absence.

Monitor your home from a vacation spot, monitor a vacation cabin from your primary residence or simply call in from the office to be sure everything is in order. Our new House Sitter Security Monitor/Dialer gives you complete peace of mind when you're away from home.

When you call, your House Sitter will report on the AC electric power, the room temperature—comparing it with high and low limits you've previously set, loud noises such as burglar

alarms and fire alarms, the unit's own battery backup condition, and an additional alert condition such as an alarm from a compatible security system. You can even listen to the sounds in the room using the built-in microphone.

Or, set the unit to call out to announce any alert conditions or condition that is outside your preset limits. You can program up to four numbers such as your office phone, neighbors' and relatives' phones. The House Sitter will call for temperatures that are too high or low, for loud noises and other alert conditions. The unit is also answering machine compatible.

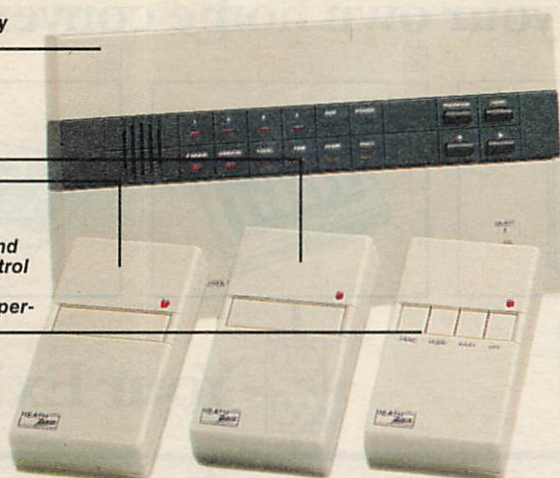
Installation is easy. Simply connect the House Sitter to any standard phone jack. Six AA batteries (not included) required for battery backup. For an expanded system, use in conjunction with the SS-5900 and SS-5910 systems above and on page 17.

Assembled SD-6230 (2 lbs.) \$129.95

Wireless control console with easy pushbutton programming

Wireless door/window sensors

Personal command remote gives control of HOME, AWAY, PANIC and OFF operating modes



PIR sensor detects heat and motion



Deluxe wireless security system with remote control

Our SS-5910 wireless security system adds components to the SS-5900 system described at left. With the advantage of remote control, it's as easy to use as it is to install.

The microcomputer controlled system includes control console, a passive infrared (PIR) motion detector, two door/window transmitters and a personal command remote. All units are wireless which means no tedious installation or unsightly wires running through the house. This also makes the system easy to expand with our wide assortment of accessories described at right.

This expanded system detects intrusion in two different ways. Like the SS-5900, the SS-5910 sounds an alarm when an intruder enters a door or window protected by a sensor.

With the addition of passive infrared technology, the system uses heat and motion detection to trigger the alarm. Position the motion sensor so when you're away from home, anyone entering that area crosses the sensor's path. The intruder's movement and body heat will cause the alarm to sound.

The system also gives you control from the battery-operated personal remote. To sound the alarm simply press the remote's panic button from wherever you are in the house. You can also set the control center to the home, away or off mode

by pushing a button on the remote unit. Includes power cube for use with 120 VAC and detailed Heath/Zenith owner's manual. Comes with one-year limited warranty.

Assembled SS-5910 (6 lbs.) \$329.00

Accessories for SS-5900 and SS-5910:

Additional Wireless Passive Infrared Sensor
SSA-5910-1 (1 lb.) \$119.95

Additional Wireless Door/Window Transmitter
SSA-5910-2 (1 lb.) \$29.95

Additional Personal Command Remote
SSA-5910-4 (1 lb.) \$59.95

1 Battery Backup, includes two NiCd batteries.
SSA-5910-3 (2 lbs.) \$29.95

2 Wireless Keypad. Wall-mounted digital keypad command transmitter provides security against unauthorized use of system. SSA-5910-5 (1 lb.) \$69.95

3 Siren Speaker. Optional external siren wires to control center. SSA-5910-6 (1 lb.) \$19.95

4 Digital Dialer notifies professional monitoring service of intrusion. SSA-5910-8 (1 lb.) \$99.95



The watch dog that guards your home

Heath/Zenith offers a novel solution to home security problems with the Barking Dog Security System. Leave this electronic watch dog in charge of your house for an evening or a week. He'll fend off intruders without ever needing to be fed or taken out for a run.

Our new deterrent security system uses passive infrared (PIR) technology to detect the presence of heat and motion. This means that when someone enters the pie-shaped detection zone, the person's body heat triggers the realistic bark of a good sized dog, giving an intruder the impression that an angry animal is just behind the door. Digitized on a RAM chip, the bark will sound as vicious after years of use as it is the first time you hear it.

The detection zone extends up to 70 feet from the PIR unit. You can shorten that distance if your house is less than 70 feet from the street, and can also adjust the left-right sensing area. Exclusive pulse count technology reduces false triggering since the unit must verify more than one pulse before it goes off.

When you're at home, you can switch the Barking Dog Security Alarm to a conventional door chime, which will pleasantly alert you to the arrival of visitors.

Fast and easy to install, the Barking Dog adjusts for high or low volume, or can be turned off altogether.

Assembled SD-6000 (3 lbs.) \$59.95

A personalized system

Call home to adjust the temperature *before* you arrive. Turn on house lights *before* you go inside. And keep your home looking lived in even *after* you've gone. All by presetting lights and appliances to turn on and off – automatically. These are just a few examples of how an X-10 system can add convenience and peace of mind to your lifestyle. The applications are endless.

How does it work?

With two basic elements: a controller and any number of modules. When you push a button on a controller, command signals travel over your existing house wiring to the modules. Lights and appliances you've connected to these modules are then activated. You can even control groups of lights at the same time, simply by setting an entire group to the same code.

First, select a controller

Your choice of controllers includes tabletop models that plug into any household wall outlet, a handheld wireless remote control you can take with you... even in the car, and a computer interface controller that gives you the fun of high tech control right from your PC.

Next, pick your modules

Once you've selected a controller, you'll want to decide which lights and appliances you'd like to operate. The controllers on these pages govern any of the modules shown, whether they're connected to indoor lamps, outdoor security lights or even the children's TV set.

X-10 means convenience

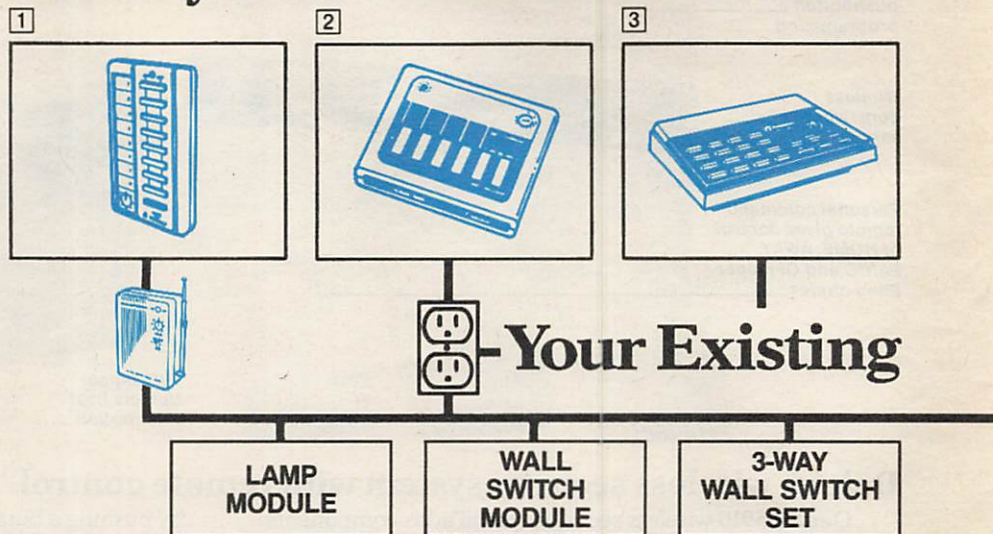
Think of starting your morning with lights already turned on so you don't have to fumble in the dark. Imagine the convenience of automated pool and patio lights, fans and air conditioners. And think of dimming and brightening lights according to the mood you're in – without the expense of three-way bulbs.

And peace of mind, too

If you hear a suspicious noise in the house, touch the *all lights on* button on your controller for instant illumination inside and out. Or, when you're out of town, set your lights and stereo to go on and off at random intervals so your house looks and sounds lived in. Plus, with the Burglar Alarm Interface you can set all lights to flash – a deterrent for even the experienced thief.

X-10 home convenience is simple to use and fun to expand. Once you've tried it, you'll want to create your own unique X-10 home.

Create your own home convenience



1 Remote control system

This handy system includes a handheld remote control transmitter and a combination plug-in transmitter/appliance module, giving you remote control of up to eight modules or groups of modules. Turns lights and appliances on and off from up to 150 feet away, inside or outside the house. Also dims lights.

Assembled BC-5000 (1 lb.) \$39.99

2 Mini controller

This handy plug-in controller is perfect for bedside use. Turn on and off up to eight modules or groups of modules individually, or touch a single rocker key to activate all at once. Includes dim and bright keys.

Assembled MC-460 (1 lb.) \$12.99



3 Maxi controller

Use this plug-in controller on a table or night stand to instantly control up to 16 modules or groups of modules throughout your house. Turn lights on and off individually or all at once, dim and brighten lights of your choice.

Assembled BC-503 (1 lb.) \$24.99

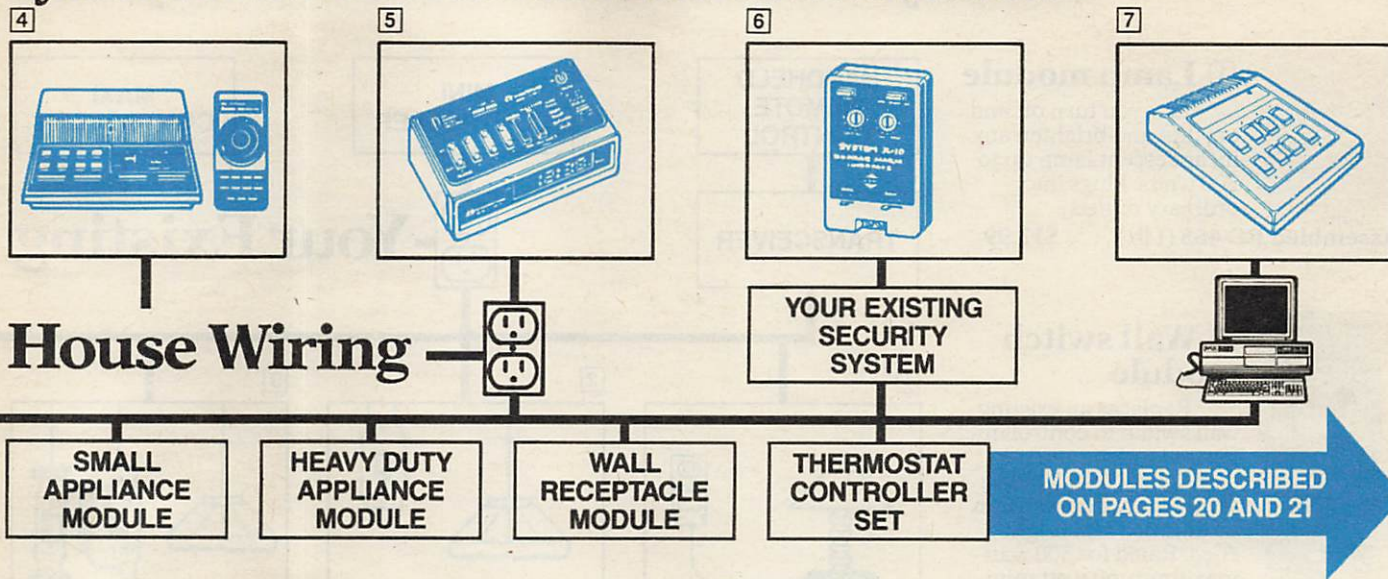


Mini controller starter set only \$19.99!

Begin your X-10 system with the MC-460 Mini Controller and your choice of one of the following modules: BC-465 Lamp Module, BC-466

Appliance Module or BC-467 Wall Switch Module. To order, list both model numbers and prices, then take a \$6.00 allowance on your order. (2 lbs.)

system with X-10 controllers and modules



4 Telephone responder



Turn on and off up to eight lights and appliances, including your central heating and air conditioning, from any phone in the world! The phone responder/controller and remote telephone transmitter plug into any standard modular phone jack and 120V wall outlet. Works even in the presence of an answering machine.
Assembled BC-2700 (2 lbs.) \$49.95

5 Timer command console



The X-10 Timer Command Console combines the features of a mini controller, timer and alarm clock into one unit. Plug it in anywhere and program up to eight modules or groups of modules to go on and off at times you choose. Special function keys include *daily* for automatic on/off at fixed times, *once* for one time on/off, *security* for random on/off so your house doesn't look like it's being controlled by a timer, *all lights on*, and *sleep* which turns off a selected module – such as your stereo – 60 minutes after you've turned it on. Battery backup requires four AA batteries (not included).
Assembled MT-522 (3 lbs.) \$29.99

X-10 INTERFACES

6 Burglar alarm interface



Connect the Burglar Alarm Interface to the output of any alarm panel or central controller of your existing alarm system via two screw terminals, then plug the interface into any AC outlet. When the alarm trips, all lights connected to plug-in modules and wall switch modules turn on instantly. You can even set the interface to flash all lights. Alarm output can be either dry contact closure or low voltage (AC, DC or audio 6-18 volts).
 Enjoy X-10 convenience on a daily basis by adding any of the controllers described on these pages.

Assembled BC-284 (1 lb.) \$39.99

7 Computer interface



Use the programming power of your home computer to generate complete home convenience and security. Simply load the software, plug the included cable into the joystick port of your computer and connect the X-10 interface. Once you've walked through the step-by-step programming, disconnect the interface so your computer is free for other tasks. Menu-driven software allows you to control up to 256 modules, storing up to 128 combinations of light and appliance settings. Eight rocker keys give manual control when the interface is disconnected.

Interface for Apple IIe/IIc BC-290-A (3 lbs.) \$39.99
Interface for 128K Mac, 512K Mac, Mac Plus, Mac II, Mac SE, Mac XL (additional cable adapter required for Mac Plus, II, SE, XL) BC-290-M (2 lbs.) \$39.99
Interface for IBM PCs and Compatibles BC-290-P (2 lbs.) \$39.99

Create your own home convenience system



1 Lamp module

Lets you turn off and on, dim and brighten any incandescent lamp up to 300 watts. Plugs into ordinary outlets.

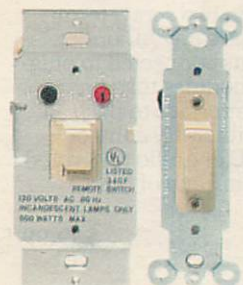
Assembled BC-465 (1 lb.) . . . \$12.99



2 Wall switch module

Replaces an existing wall switch to control important indoor and outdoor lights. Installs like an ordinary dimmer. Can be dimmed and brightened. Rated for 500 watt maximum, 60 watt minimum, incandescent only. Includes push button for on/off control at the wall switch.

Assembled BC-467 (1 lb.) . . . \$12.99



3 Three-way wall switch set

Set includes a master and a companion switch for controlling any light that currently operates from two locations, such as the bottom and top of a stairway. Also dims and brightens lights. For 500 watt maximum, 60 watt minimum incandescent lights only.

Assembled BC-4777 (1 lb.) . . . \$19.99

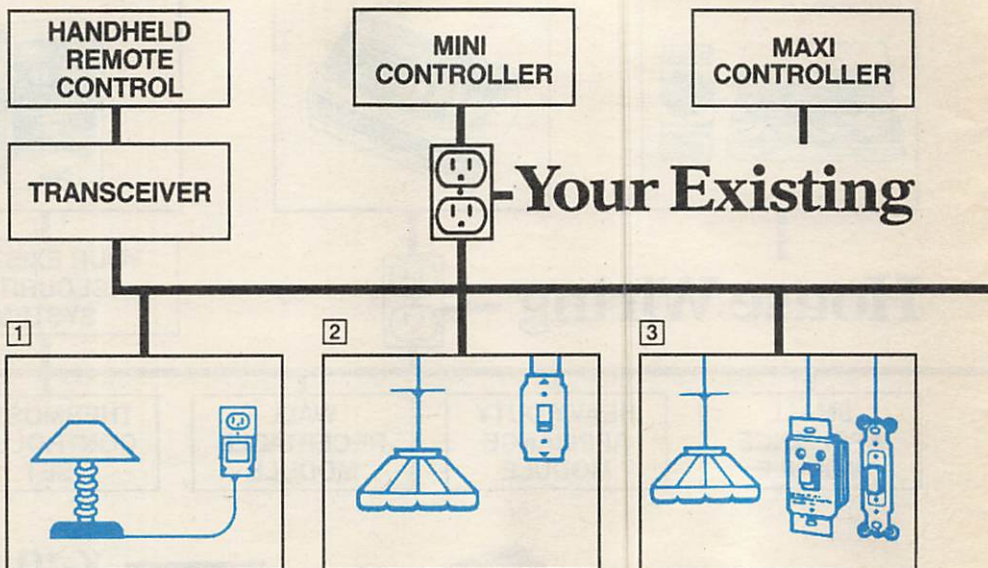
Assembled CS-277 Additional Companion Switch (1 lb.) . . . \$7.99

4 Small appliance module

Three-pin grounded module lets you turn on and off appliances anywhere in the house. Rated 15 amp for resistive loads such as coffee pots and heaters, 1/3 h.p. for motor loads, 400 watts for TVs, and 500 watts for lamps. New latching mechanism retains setting when power is restored after an outage.

Assembled BC-466 (1 lb.) . . . \$12.99

Assembled AM-486 Two-Pin Appliance Module (2 lbs.) . . . \$12.99



5 Heavy duty appliance module

For 220V, 20 amp air conditioners, water heaters, and other heavy duty appliances. Use with single phase or split phase (120/240V) wiring only.

Assembled BC-245 (1 lb.) . . . \$29.99

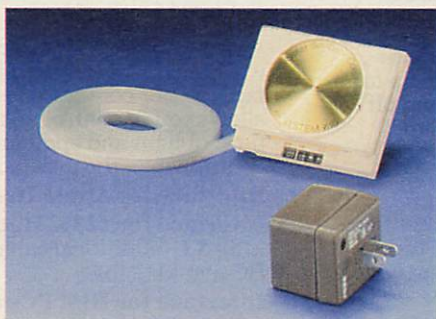
Assembled HD-243 15 Amp Module (1 lb.) . . . \$12.99



6 Wall receptacle module

Replaces an existing wall receptacle, giving you remote X-10 control of the top outlet while the bottom outlet continues to function normally. Controls any appliance up to 15 amps. Rated at 1800 watts unrestricted.

Assembled BC-227 (1 lb.) . . . \$19.99

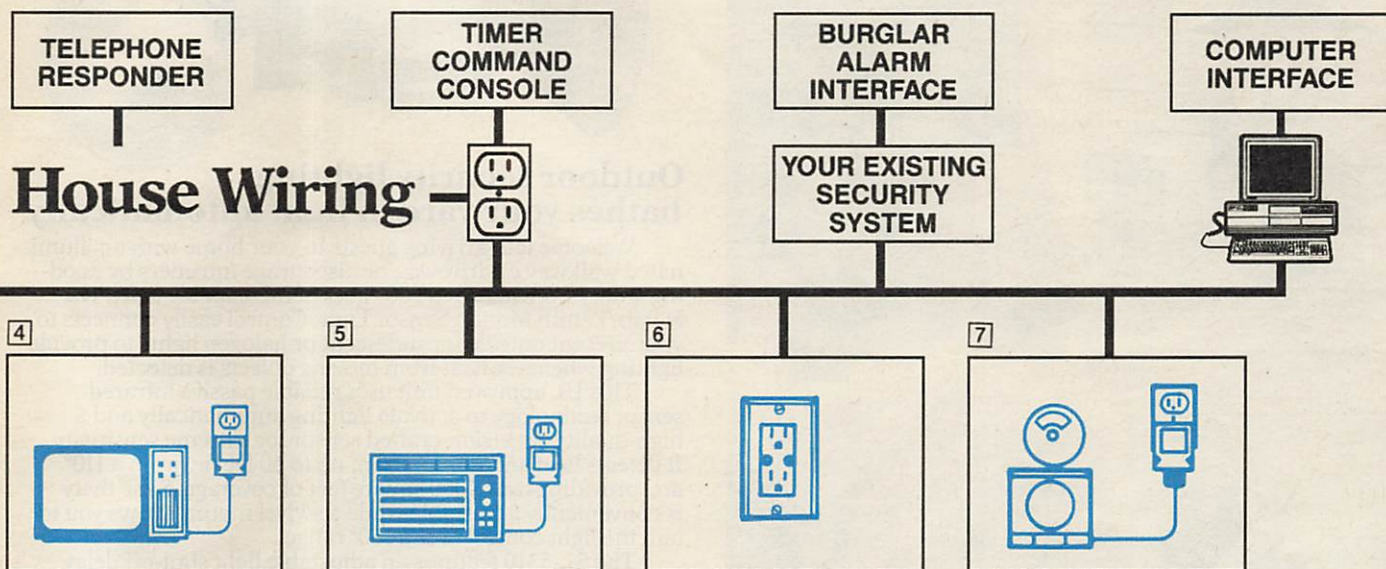


7 Thermostat controller set

Mount the temperature regulator on the wall immediately under your existing thermostat, then plug the low voltage adaptor into an X-10 Appliance Module (not included). The module supplies a small amount of heat under your thermostat, tricking the thermostat into turning your heating or air conditioning on or off, in increments of five degrees. Works with any thermostat.

Assembled BC-2807 (1 lb.) . . \$19.99

with X-10 controllers and modules



Our X-10 compatible units



Automatic remote light controller

Enjoy the convenience of automatic light control along with centralized remote control of lights and appliances of your choice. With the Heath/Zenith

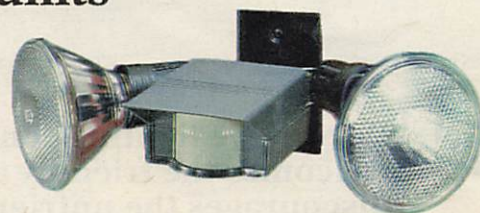
AutoRemote Light Controller you can set any four lights to go on at dusk and off at dawn, making your household look awake and busy even while you sleep. Plus, you can control individual lights and appliances throughout the house from any single convenient location.

The unit works by transmitting signals over your existing house wiring. Plug your lamps and appliances into the appropriate modules and you'll be able to control virtually everything electrical from a single location and even enjoy dimming of selected lighting – all by simply pushing a button.

One of the most convenient locations for the AutoRemote Light Controller is at your bedside. Without getting up you can turn off the TV, turn off the living room light that you forgot before you came upstairs, even turn on all lights connected to lamp and wall switch modules if you hear a suspicious noise in the house. Lamp modules work with any incandescent light up to 300 watts. Appliance modules turn on and off TVs, window fans, stereos, coffee makers and more – up to 500 watts. To use the automatic feature, turning lights on at dusk and off at dawn, simply set those lamps to the *on* position and adjust the darkness controls according to your needs.

Included is a BC-465 Lamp Module. The AutoRemote Light Controller works with all X-10 lamp and appliance modules described on these pages. UL approved.

Assembled SL-6320-A (1 lb.) \$29.97



Outdoor/indoor security lighting illuminates both house and yard

The Heath/Zenith SL-5320 Outdoor/Indoor Light Control offers a new dimension in security lighting. Besides turning on outside lights when heat and motion are detected, the SL-5320 automatically turns on inside lights to warn you of someone approaching or to make your home looked lived in. Both inside and outside lights turn off automatically when motion is no longer detected. In addition, a second signal works even in daylight to announce activity in the monitored area.

With the Outdoor/Indoor Light Control you can connect up to 500 watts of incandescent or halogen lighting. The detection field covers over 4000 square feet and adjusts easily over a 180° range. You also have the advantage of varying the shut-off time – from 1 to 20 minutes, before lights are automatically shut off after the monitored area returns to normal. Rated UL raintight, the unit is safe for all weather conditions. Comes with one year limited warranty. Uses 120 VAC, 60 Hz. Interior lamp module included. Works with all X-10 accessories shown on these pages.

Assembled SL-5320-A Light Control with mounting plate and light fixture as pictured (floodlights not included). (2 lbs.) \$84.97



new

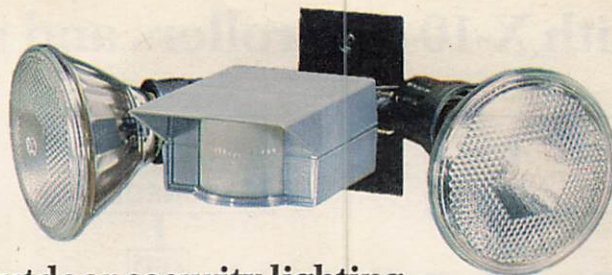
Decorative lighting control welcomes the friendly and discourages the unfriendly

This newest addition to our line of lighting controls is designed to work right along with your existing porch light. If you're used to thinking security lighting has to be big to be effective, you'll be pleasantly surprised at the size of this amazing little unit.

Our Decorative Lighting Control automatically activates your porch light when the heat of a moving object enters the pie-shaped 2000 square foot detection field. And, our unique pulse count technology reduces false triggering that's caused by blowing leaves or other moving objects. Pulse count requires a second detection – an instant after the first – of the person or object before the light is activated. Once activated, the light shuts off automatically after motion has stopped.

Besides security, motion sensor lighting also offers wonderful convenience. Come home after dark and the porch light turns on – automatically – the instant you approach the door. You'll save money because you don't have to leave outside lights on for hours when you're not home, and you can leave your house unattended for any length of time, knowing that anyone – welcome or unwelcome – will be bathed in light as they near your door. Manual override for wall switch control, simple installation, adjustable mounting for coverage where needed. One year limited warranty, UL approved for all weather conditions. Detection distance is 60 feet.

Assembled SL-5210 (3 lbs.) \$34.97



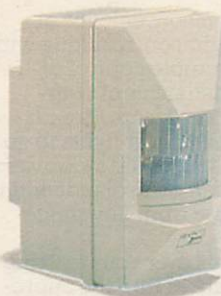
Outdoor security lighting bathes your yard in light automatically

Welcome late-arriving guests to your home with an illuminated walkway or driveway, or discourage intruders by flooding your yard with up to 500 watts of inescapable light. The Heath/Zenith Motion Sensor Light Control easily connects to your present outside incandescent or halogen lights to provide lighting whenever heat from moving objects is detected.

This UL approved unit uses reliable passive infrared sensor technology to activate lighting automatically and a high-quality, precision-crafted sensor for extreme sensitivity. It detects heat and motion from up to 60 feet away in a 110° arc, providing over 4000 square feet of coverage. Sensitivity is conveniently adjustable while a swivel mount allows you to aim the light control over a 180° range.

The SL-5310 features an adjustable light shut-off delay, built-in photocell to deactivate the control during daylight hours and a rain-tight housing for safe use in all weather conditions. And, manual override means you can switch on controlled lighting day or night. Easy installation, one year limited warranty. Uses household 120 VAC, 60 Hz power.

Assembled SL-5310-A Light Control with mounting plate and light fixture (floodlights not included). (2 lbs.) . . . \$59.97



Entryway light control detects movement up to 50 feet away

The Heath/Zenith Convenient Motion Sensor Light Control mounts next to your front or back porch light, giving you the security unexpected light provides and the convenience of outdoor lighting when you need it.

Like the Decorative Lighting Control described at left, this unit turns on automatically when it detects the combination of heat and motion. You're instantly alerted to movement up to 50 feet away in a field of 4000 square feet. The detection field is adjustable, according to the distance of your front or back door from the street and from neighboring houses.

Other features include automatic, adjustable shut-off and three modes of operation. In the automatic mode, lights turn on only when night movement is detected. The test mode allows you to check aim and sensitivity, and manual override lets you switch on controlled lighting day or night. Handles up to 500 watts incandescent or halogen lighting, can be used to activate existing outdoor floodlights. Uses normal household 120 VAC. Dimensions are 4³/₈"H x 2³/₈"W x 6¹/₄"D (including mounting shaft). One year warranty, UL approved.

Assembled SL-5410 (2 lbs.) \$39.97

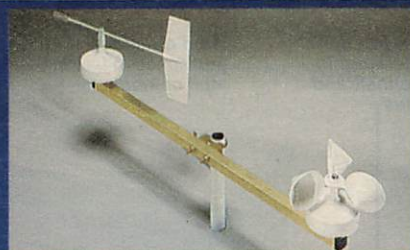
14
Wind Speed
and Direction
(patents applied)

42
Humidity

29.82
Barometric
Pressure

70
Indoor and Outdoor
Temperatures

Includes precision wind sensor assembly



Overall dimensions: 5 3/4" H x 15 1/2" W x 8 3/4" D

The Heathkit Advanced Weather Computer puts you in touch with the weather

The ID-5001 Advanced Weather Computer supplies all the information you need for making correct decisions about your local climate. Homeowners, sports enthusiasts and professional meteorologists can make use of the accurate environmental data collected, measured and displayed by this state-of-the-art personal weather station.

A striking cobalt blue, the backlit digital liquid crystal display shows wind speed in miles-per-hour, knots or kilometers per hour. A 16-point compass shows wind direction. Indoor and outdoor temperatures are continuously displayed in Fahrenheit or Celsius, barometric pressure in inches of mercury or millibars. Arrows show rising and falling values and their rates. A 6-digit 12- or 24-hour clock displays day and date, and features selectable automatic leap year and daylight savings time correction. This means you won't have to worry about resetting the clock for time changes, it automatically corrects itself.

Includes minimum and maximum readings plus time and date of occurrence, wind chill temperature and fog display (with optional humidity sensors). Audible and visual alert and alert-warn signals warn of severe conditions.

Kit ID-5001 (18 lbs.) \$499.95

Assembled IDW-5001 Includes RS-232 Interface and Humidity Sensor. 120 VAC only. (20 lbs.) \$999.95

SAVER! Purchase the ID-5001 along with the Humidity Sensor and Rain Gauge Sensor and receive a FREE RS-232 Interface Accessory (a \$49.95 value).

Kit IDS-5001-1 (25 lbs.) \$599.85

Accessories:

Indoor/Outdoor Relative Humidity Sensor
Kit IDA-5001-1 (3 lbs.) \$59.95

Rain Gauge Sensor Kit IDA-5001-2 (3 lbs.) \$39.95

Technical Manual. Comprehensive manual especially for the engineer includes detailed circuit descriptions, numerous signal wave forms and detailed explanation of the technology.

IDA-5001-4 (2 lbs.) Ordered separately \$24.95

Ordered with the ID-5001 or IDW-5001 \$ 9.95

RS-232 Computer Interface Includes installation parts for ID-5001. Hayes command compatible.

Kit IDA-5001-3 (1 lb.) \$49.95

50' Cable IDA-1290-1 (2 lbs.) \$11.95

100' Cable IDA-1290-2 (4 lbs.) \$19.95

150' Cable IDA-1290-3 (6 lbs.) \$26.95

SPECIFICATIONS: **WIND SPEED:** * **Displays:** Memory: Date, time and magnitude of minimum or maximum wind gust. Rate change selectable from last hour or last 24 hours. **Average Mode:** One minute wind speed average. **Memory:** Date, time and magnitude of minimum or maximum average wind speed. Rate change selectable from last hour or last 24 hours. **Accuracy:** ± 5% or better. **WIND DIRECTION:** * **Display:** 32 points of resolution. One of 16 indicators arranged in a circular compass configuration. Identified by compass points and radial degrees. **Gust Mode:** One second averaging. **Memory:** Direction when minimum or maximum gust occurred. **Average Mode:** 60 second averaging. **Memory:** Average direction when minimum or maximum average wind direction occurred. **Wind Mode:** One minute averaging of displays to nearest 10 degrees. **THERMOMETER:** **Displays:** 2½-digit readout with "-" sign outdoor indicator, Fahrenheit-Celsius indicators, and rising/falling indicators. Rate of change averaged per hour. **Temperature:** -40° C to +70° C. -40° F to +158° F. **Accuracy:** ± 1.0° from -40° C to +70° C. ± 2.0° from -40° F to +158° F. **Memory:** Date, time and magnitude of minimum and maximum temperatures since cleared; change in the last 24 hours. **BAROMETER:** **Displays:** 4-digit readout. Separate indicators show if pressure is rising or falling. Rate of change averaged per hour. **Pressure Range:** 28.00 to 32.00 in. Hg (inches of mercury), 948 to 1083 millibars. **Accuracy of Reading:** 28.00 to 32.00 in. Hg, ± 0.25% (± 0.075 in. Hg), 0.033%/C. **Memory:** Date, time and magnitude of minimum and maximum pressure since memory was cleared, change in the last 24 hours. **GENERAL:** **Power:** 120/240 VAC, 50/60 Hz.

*In conformance with the National Weather Service and FAA guidelines for Wx instrumentation at supplementary aviation Wx reporting stations.

Indoor/outdoor temperature in Fahrenheit and Celsius

Wind direction and speed in knots, mph or kmph

Barometric pressure in inches and millibars



Digital weather computer

SKILL LEVEL 3 The Heathkit Digital Weather Computer is an indispensable addition to your home or business – anywhere you'd like to know exact weather conditions. You'll use it daily to find out conditions right where you live. Its up-to-date information is perfect for the outdoors enthusiast, pilot, farmer, resort owner and more.

Microprocessor-controlled memory stores weather data by date and time. High and low temperature readings give you the high temperature for the day along with its time of occurrence, the low temperature and its time of occurrence for the night, and the time and pressure of the last high or low pressure front that moved through your area. Check the rate of barometer change for the severity of a storm, and watch both wind direction and barometer readings to determine the weather picture for the near future. With all this information at your finger tips, you'll plan your outdoor activities with confidence.

This amazing instrument features both a remote windcup and weathervane transmitter with solid-state infrared sensors which mount to a compact boom assembly. And, optical encoding technology means unsurpassed accuracy. Housed in a solid

oiled walnut cabinet, the Heathkit Weather Computer is handsome enough to display in your home.

Dimensions are 7¼" H x 16" W x 6" D.

Assembled IDW-4001 includes 100 feet of cable; Kit ID-4001 requires one of the cables listed below.

Kit ID-4001 (15 lbs.) \$399.95

Accessories:

50' Cable IDA-1290-1 (2 lbs.) \$11.95

100' Cable IDA-1290-2 (4 lbs.) \$19.95

150' Cable IDA-1290-3 (6 lbs.) \$26.95

Specifications: **DIGITAL CLOCK/4-YEAR CALENDAR:** Time Accuracy: Determined by accuracy of AC line. No accumulative error. **WIND VECTOR:** Accuracy: ±5% or better. **Direction Display:** Accuracy: ±11.25°. **THERMOMETER:** Temperature Range: -40° to 70°C; (-40° to 158°F). Accuracy: ±1° on Celsius readings; ±2° on Fahrenheit readings. **BAROMETER:** Pressure Range: 28.00 to 32.00 in. Hg (inches of mercury), 948 to 1083 millibars. **Basic Accuracy:** ±0.25% plus ±0.033%/°C. **Operating Temperature:** Outdoor assemblies, -40°C to +70°C (-40°F to 158°F). Indoor Unit, 15°C to 35°C (59°F to 95°F). **Power Requirements:** 120/240 VAC. Provision for external battery connection for memory backup during power failures.



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24 hours a day:

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
Measure rainfall with the Heathkit digital rain gauge

SKILL LEVEL 2 With the Heathkit Digital Rain Gauge, you'll know for sure when to water your lawn or garden, or sprinkle the flowers. Place the attractive display unit indoors and mount the outdoor measuring device on a roof, fence post or antenna tower. Your gauge will record rain in 0.01 or 0.1 of an inch up to 99.9". There's no need to worry about power outages because a 9-volt backup battery (not included) powers memory and maintains accurate measurement during power loss. The display unit measures a compact 2½" H x 7" W x 5" D. The sensor measures 9" in diameter x 9⅝" H. Includes 60' cable and power cube for 120 VAC operation.

Kit ID-1795 (7 lbs.) \$99.95



Monitor the weather with your own station

 Keep track of the weather in style with the Heathkit 5-Function Weather Station. Temperatures are displayed in Fahrenheit or Celsius with a switch to select indoor or outdoor readings. Professional grade sensors monitor barometric pressure and wind speed and direction. Designed for quality and reliability, this weather station operates with minimum power consumption. And, its non-corroding remote boom assembly ensures years of trouble-free service. Wall-mounted, set dimensions are 20½" L x 7" W x 2" D; desk-mounted, with included stand, 6¾" D. The anemometer/weather vane mounts to any standard 1" to 1½" diameter mast. Uses 120 VAC, 60 Hz.

Kit ID-1290 (8 lbs.) \$189.95

Accessories:

50' Cable, IDA-1290-1 (2 lbs.) \$11.95

100' Cable, IDA-1290-2 (4 lbs.) \$19.95


150' Cable, IDA-1290-3 (6 lbs.) \$26.95



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




Monitor air moisture for comfort and savings

 Now you can reduce heating and cooling costs with the Heathkit Relative Humidity Instrument. It helps you determine when to turn on the humidifier indoors or to paint outdoors. You get accurate readings even in remote locations with the electronic sensors and 100' transmission cable. Bright ½" digits display the humidity in percent. Choose alternate indoor/outdoor readings or display one reading constantly. Measures 2½" H x 7" W x 5" D.

Kit ID-2295 (6 lbs.) \$119.95

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


Use digital technology to monitor the winds

 The Heathkit Digital Wind Speed/Direction Indicator combines a non-corroding anemometer and a weather vane for truly accurate readings. The attractive indoor console display features 16-point resolution for easy viewing. You can wire the indicator to read in two of three scales: mph, km/h or knots, plus you can calibrate for either true north or magnetic north. Requires one of the 8-wire cables from the ID-1290 accessories (above). Operates on 120 VAC. 2½" H x 7" W x 5" D.

Kit ID-1590 (7 lbs.) \$119.95

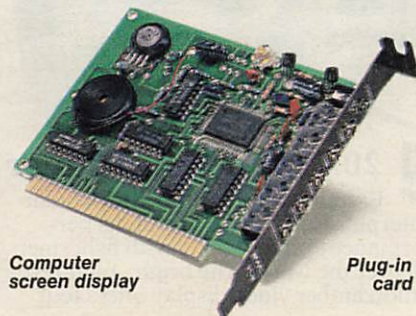
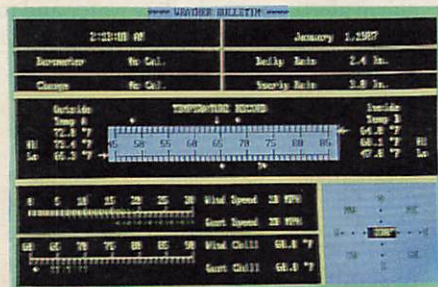
Specifications: **Wind Speed:** 0-99 mph, ±1 digit or ±10%. **Wind Direction:** 8-point readout over 360° with 16 points of resolution. **Wind Speed Sensitivity:** 3 mph, 4 km/h, or 2 knots. **Operating Temperature:** Receiver: 0° to 150°F. **Transmitter:** -40° to 150°F. **Power Requirements:** 108-132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

A better household thermometer

 Accurate temperature readings are also convenient with our Digital Indoor/Outdoor Thermometer. Large, orange display digits can be clearly seen at any time of day or night, plus two sensors allow for continuous or alternating indoor/outdoor readings. The 2½ digit display even shows above- and below-zero temperature in Fahrenheit or Celsius. Operates on 120 VAC, 60 Hz. (Order ID-1390-BE for 240 VAC, 50/60 Hz operation.) Dimensions are 2½" H x 7" W x 5" D.

Kit ID-1390-B (4 lbs.) \$99.95

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



Computer screen display

Plug-in card

Plug-in weather card for IBM PCs and compatibles

Monitor the weather from your computer – even when it's turned off. The BWS-400 supplies you with time, date, temperature, wind information, barometric pressure and rainfall readings. Includes software, accessories, 40' cable.

BWS-400 (7 lbs.) \$399.95



Fully portable loran

Totally automatic operation heads the long list of easy-to-use features found in this amazing navigation aid from Interphase. The list continues with a 2-line liquid crystal display for current position in latitude and longitude or time difference (TD), current boat speed and course over ground, time to go to a destination, cross track error (distance off a given track) and left/right steering data.

The waterproof 12-key keypad allows easy storing and recalling of up to 99 favorite locations. And, you can chain together as many as 40 spots and the Portable Loran will automatically help you steer to each. Set the audible alarm to sound when you get close to your destination or let it warn you, should your boat drift off anchor.

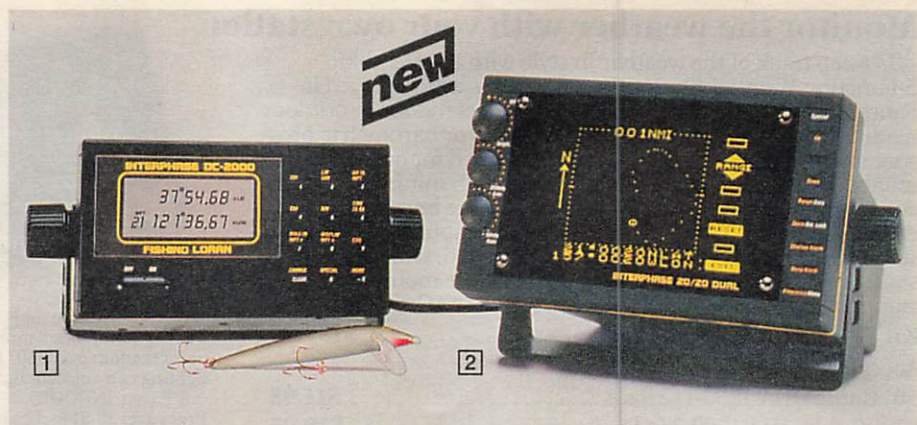
The Portable Loran features automatic selection of land-based loran stations. And even if the shore-based transmitter or one of its secondary transmitters fails, your unit continues to work. A feature few other lorans offer.

Two count-up timers, a 24-hour clock and a plan mode available for calculating course and distance between any two locations are standard features. Additional secondary factor (ASF) corrections for mountain ranges and ground conductivity are built in, as is a one-button *take me home* feature that guides you back over your previous course. Use at sea or on inland lakes and waterways in all but the central U.S., from the Dakotas and eastern Montana to western Texas and New Mexico.

Efficient microprocessor circuitry requires less than 0.1 amp for up to 100 hours of continuous use on the internal rechargeable battery. Or, permanently connect the unit to your boat's 12 VDC system and use the battery as safety backup. 10-14 VDC are required. Includes extending antenna, mounting bracket and knobs, 120 VAC battery recharger and operations manual.

Assembled MI-3000
(7 lbs.) \$399.95

26



Easy-to-use fishing loran

① Here's another affordable, full-function fish finder from Interphase that will guide you precisely to your favorite, hard-to-find spots. Identical in most features to the Portable Loran shown at left, the Fishing Loran operates off your boat's power supply to help you find fish...time after time.

Use the Fishing Loran by itself or as part of what Interphase calls a Fishing Data Center. As part of the Data Center, the Fishing Loran links with the 20/20 Dual Video Fishfinder, described at right, to give you a graphic track plot to any location.

Includes antenna coupler and NMEA 0183 output for interface to autopilot, track plotters or Interphase fish finders. Requires 12 VDC, less than 0.25 amp. 7" W x 4" H x 2 1/4" D.

Assembled DC-2000
(4 lbs.) \$429.95

Loran to Graph Interface Cable
MIA-2020-3 (2 lbs.) \$24.95

20/20 dual video sonar

② The secrets of commercial fishermen are now available to anyone who enjoys fishing for sport. With the Interphase 20/20 Dual Video Fishfinder, the underwater world comes to you.

A superpowerful 50KHz 40° beam searches waters to a depth of 1280 feet, while a high-frequency 200 KHz 10° beam outlines the finer details in shallow water. And, you can watch them both simultaneously on the split-screen video display. Other features include on-screen fish symbols in three sizes; audible alarms for *shallow, deep, zone and fish*; display freeze; split-screen variable zoom; 6-inch amber screen; 800-watts peak-to-peak power. Dimensions are 8" W x 4 1/2" H x 9" D.

Combine the technology of video fishing sonar with the wonders of loran for a Fishing Data Center that really works. Includes transom transducer.

Assembled MI-2020-D
(9 lbs.) \$499.95



new 20/20 video fish finder

Extremely easy to use, the popular Interphase 20/20 has proven its performance and reliability with fishermen all over the world. The bright, high-resolution amber video display offers four

different levels of shading for excellent visibility in all weather conditions. Both keyboard and o-ring sealed case are water and shock resistant, at home in either fresh or salt water. An adjustable zoom lets you take a closer look at underwater details, and an adjustable alarm alerts you to shallow water and to changes in bottom contours.

Displays include depth, surface water temperature, boat speed and distance traveled. This popular unit gives you six depth ranges, from zero to 1500 feet, and a 20° 200 KHz or 40° 50 KHz beam angle. Power consumption is less than 1.5 amps. Dimensions are 5 1/2" H x 7 1/2" W x 7 3/4" D. Includes transom transducer.

Assembled MI-2020-A
(9 lbs.) \$349.95

Save over \$100 on VisiTel's picture phone

Every once in a while a new product comes along that you wonder how you or your loved ones got along without. Now, you can actually see your far-away grandchildren and other family members as you talk to them on the phone.

Mitsubishi's VisiTel visual telephone display sends black and white still images over standard phone lines in only seconds. And, it plugs right into your modular telephone jack. Your phone, in turn, connects to a modular jack in the camera/display unit, which takes power from an AC wall outlet. The unit houses a fixed-focus, black and white video camera and a 4½" TV display tube. Pose up to two feet away from the camera, then press the *send* button to transmit the picture. Brightness controls help you compose a pleasing image. As soon as both parties have completed the 5½ second image transmission, conversation can resume. And, VisiTel stores up to three images on its internal memory chip, retaining them as long as power is supplied to the machine. These stored images can then be transmitted during another phone call.

VisiTel brings the picture phone into your home without adding a penny to your phone bills. Its compact size even allows you to take it with you when you travel or share it with friends in their home. And, yes, you can use your phone to make a conventional call – even if it is attached to the VisiTel. Uses 110/220 VAC.

Assembled LU-500 (7 lbs.) Was \$399.95 Now \$289.95

NOTE: Both parties must have a VisiTel unit in order to transmit images.



(Simulated picture)

LiteSet cordless personal telephone for hands-free communication

Imagine yourself at your desk, hands occupied with paperwork. The phone rings. Under normal circumstances you'd be required to put down what you're doing so you can pick up the phone. Now imagine yourself wearing a LiteSet cordless telephone headset. Your hands are totally free to write, work at your keyboard, look through reference material...all as you talk on the phone. And, your conversation takes place in privacy without disturbing people nearby.

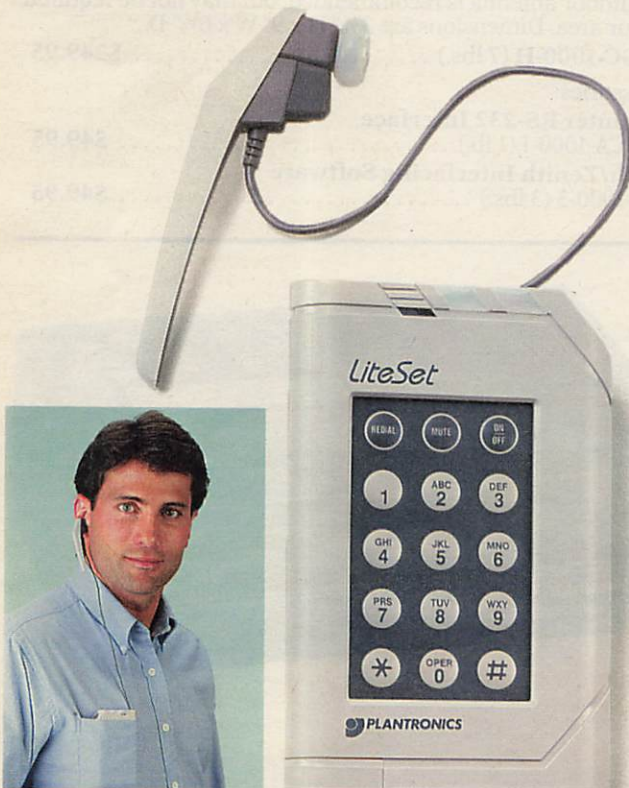
The new LiteSet phone is designed for use in situations that make holding a conventional receiver uncomfortable or inconvenient. Its specially designed modular base unit is easy to install. Just plug it into your wall jack, and you'll be free to move up to 1000 feet away. Carry the unbelievably lightweight headset and pocket-size dial pad with you as you move freely around your office, house or even your yard. You can receive calls and dial out no matter where you are.

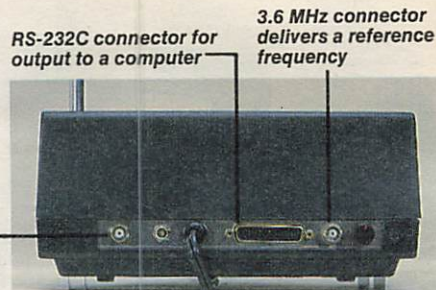
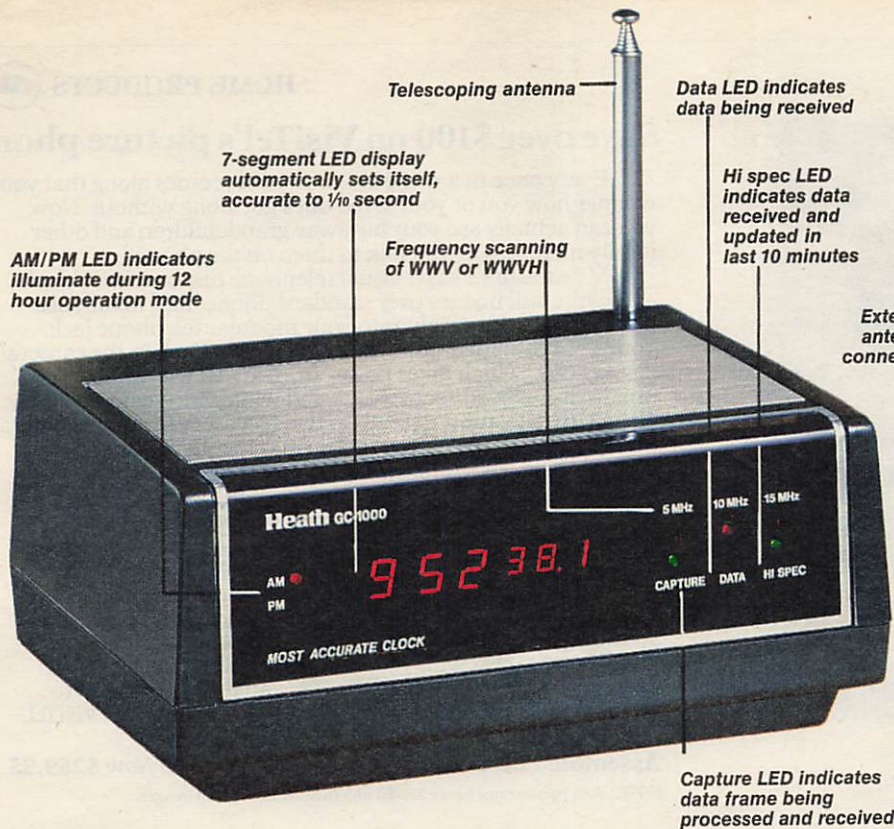
There's no need to wear the headset until a call comes in or you want to place a call since calls ring from the dial pad. A four foot cord connects the headset to the pad so you can slip the pad into your pocket or fasten it onto your belt.

Last number redial, call canceling, tactile-feel keypad, mute switch, switchable tone/pulse dialing and two volume settings are all standard LiteSet features.

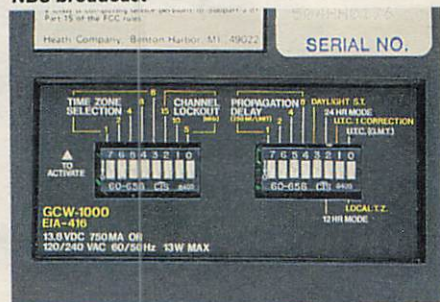
The actual weight of the set will amaze you. The pad weighs in at only 5.5 ounces and the 3-inch long headset at an incredible 0.5 ounces, giving you unprecedented comfort as you experience hands-free communication.

Assembled RF-100-1 (3 lbs.) \$129.95





Back panel input/output connections include volume control for monitoring the NBS broadcast



Case bottom clip switches for time correction adjustments

Heath's patented Most Accurate Clock

SKILL LEVEL 1 Experience the precision of a microprocessor-based time piece synchronized with the National Bureau of Standard's (NBS) cesium atomic clock. The patented Heath Most Accurate Clock locks onto 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 and propagation-delay correction, this unique clock lets you switch to any of the world's standard 24 time zones. Uses 120 VAC or 12 VDC.

An outdoor antenna is recommended, but may not be required in your area. Dimensions are 3 $\frac{7}{8}$ " H x 9" W x 6 $\frac{1}{4}$ " D.

Kit GC-1000-H (7 lbs.) \$249.95

Accessories:

Computer RS-232 Interface
Kit GCA-1000-1 (1 lb.) \$49.95

Heath/Zenith Interfacing Software
GCA-1000-3 (3 lbs.) \$49.95

Digital clock with battery backup

SKILL LEVEL 1 Dependable and easy to use, this reliable digital clock is perfect for anyone just getting started in kit building. Time and date are displayed in large 4-digit, 7-segment LEDs. For comfortable reading day or night, brightness automatically varies according to surrounding light. A built-in battery backup feature keeps internal circuitry running in case of power failure, and a snooze button causes the alarm to sound at 9-minute intervals each time you press it. Attractively styled dark grey cabinet measures 2 $\frac{7}{8}$ " H x 7 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D. Operates on 120/240 VAC, 50/60 Hz. Battery not included.

Kit GC-1108 (4 lbs.) \$24.95



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570



Portable AM radio is ideal first kit

SKILL LEVEL 1 Enjoy quality reception with this compact AM radio. The GR-1009 features a high-gain antenna and a 2-inch dynamic speaker for clear crisp sound. The sturdy, easy-to-clean cabinet measures 3½" H x 6¾" W x 1¼" D. Use a 9-volt transistor battery (not included) or the PS-2350 Battery Eliminator with 120 VAC. Separate earphone is supplied.

Kit GR-1009 (2 lbs.) \$24.95

Accessory:

Battery Eliminator

Assembled PS-2350 (1 lb.) \$7.95



Non-abrasive jewelry cleaner

SKILL LEVEL 1 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 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 uses ordinary laundry soap or softener for most cleaning jobs. Just fill the 6" L x 4" W x 2¾" D tank with one inch of solution and this gem of a cleaner is ready to go to work. Plugs into household AC outlet.

Kit GD-1151-H (4 lbs.) \$99.95



Keyless door lock

SKILL LEVEL 1 Replace your existing strike plate with the keyless door lock and enter your home with a convenient four-digit code. No modifications are required to the door or the lock itself and you keep your keys. Includes 120 VAC power cube.

Kit GD-3830 (5 lbs.) \$79.95



Keyless garage door activator

SKILL LEVEL 1 Open your garage door without a key or transmitter. The activator works like the keyless lock above to activate your electric

garage door opener. Includes control module, keypad, interconnecting cable and 120 VAC power cube.

Kit GD-3835 (2 lbs.) \$49.95



Exhaust gas analyzer

SKILL LEVEL 1 Use the Heathkit Exhaust Gas Analyzer to evaluate and adjust your car's emission control system. You'll get better gas mileage, and your car will meet its clean air standard, mandatory in some states.

The sensor that's used to detect gases at the exhaust pipe ahead of the catalytic converter is made of rugged stainless steel with a flexible probe tip for easier tail pipe insertion. A 7-foot cable enables you to use your car battery as a power source. All accessories are included. Not intended for use with Chrysler "lean burn" engines.

Kit CI-1080 (6 lbs.) \$129.95

Pocket size radiation monitor

SKILL LEVEL 1 This Heathkit Geiger counter uses the sensitive, industry-standard Geiger-Mueller tube to detect and warn of low levels of radiation – even "harmless" levels. The monitor can be calibrated to a standard traceable to the NBS Cesium 137 Gamma source as an option. A beeper indicates detected radiation and a meter shows measured levels on three selectable ranges. Includes carrying case with strap. Requires a 9-volt battery (not included). 5¾" H x 2¾" W x 1½" D.

Kit RM-4 (2 lbs.) \$129.95



Energy-saving thermostat cuts heating and cooling costs to 25 percent

The Set-Back Thermostat replaces your existing thermostat and lets you plan daily household temperatures to suit your lifestyle.

You can't afford to pass up this chance to cut your heating and cooling costs up to 25% – without sacrificing comfort or convenience. You can program up to four temperature changes a day with separate programs for weekdays and weekends. And if you don't work a regular schedule, any two days can be selected as your weekend days.

It's designed to fit most gas, oil and electric heating and air conditioning systems with 24-volt controls (3, 4 and 5 wire type), but will not work with heat pump, high voltage electric baseboard or electric ceiling heat, gravity flow or Millivolt systems. The included manual contains a full explanation of compatible systems and installation procedures. Return the unit for a full refund if it's not compatible with your system.

Assembled E-200 (1 lb.) \$69.99



17.8 inches long!

Experience the Fox. From starting line to 80 feet in 3.5 seconds

SKILL LEVEL 1 It's fast and it's a winner. Born and bred for superior performance, the Fox from MRC-Tamiya represents the ultimate in two-wheel drive action. This performance-oriented automobile will give you your money's worth in speed races, obstacle runs, drag races and rallies – whether at home or out on the race course. And, so it can handle the rough and tumble excitement of off-road running, this tough racing buggy is built to a 1/10 scale, one tenth the size of a real race car.

Acceleration, power and handling

Features that make this off-road dirt sprinter so outstanding include lightweight one-piece wheels for the quickest acceleration, and semi-pneumatic, low-profile rear tires that are oval block patterned so you'll get the traction you need, no matter what the driving surface. Once you're up and running, a powerful 540 competition motor hitched to a pre-assembled rear drive shaft – complete with ball bearings – keeps your power on the road.

An adjustable oil-filled damper and coil spring units guarantee a better ride, and race-proven double wishbone front and rear suspensions promise superior handling. And because the gearcase is sealed with precision ball bearings, your Fox will give you the superior performance you need on the race track, no matter what the weather.

Easy to build, complete system

This sleekly styled, off-road racer is not only lightweight and good looking, it's easy to build. Instructions are clear and straightforward so whether this is your first RC kit or you're adding to an existing collection, you'll find the directions complete and easy to follow.

The Fox comes complete with its own radio (eight AA batteries required), battery and trickle charger. Everything you need to put yourself in the winner's circle.

Kit RB-554 (8 lbs.) \$269.95
30



15.4 inches long!

The Hotshot II. An outstanding racer for the competition purist

SKILL LEVEL 4 Redesigned to the specifications of experienced racers, the original Hotshot has made way for the Hotshot II. This off-road racer is raring to go, hotter and meaner than ever.

Four wheel drive engineering

For thrills and high performance operation, four wheel drive racing can't be beaten. With its 540-type motor as standard equipment, the Hotshot II fits the bill. The 540 motor drives both front and rear differential axles through a solid propeller shaft for minimum friction and maintenance, plus greater strength. And, the oil-filled, adjustable monoshock front end, along with rear double wishbone suspension equipped with stabilizers, ensures easy handling, even in the toughest racing situations.

To decrease weight in the chassis thus increasing your top speed, the normal RC receiver battery has been replaced with a battery eliminator circuit. Front and rear sealed gear box with differentials, a forward three step and reverse two step speed controller, two oil-filled dampers on the rear wheels and a single oil-filled damper in front all contribute to making the Hotshot II a thoroughbred racing star.

Easily accessible working parts

Along with keeping track dirt out, the tough monocoque chassis still allows you easy access to interior mechanics. This means that when you're at the track and need to make a quick adjustment, you can get at the working parts you need. And, this racer looks and performs like the real thing. The large rear wing for stability and the sleek, aerodynamic body styling give the Hotshot II the look of a true winner. High performance combines with easy handling to satisfy even the most discriminating RC enthusiast.

The Hotshot II comes ready to race with its own battery, trickle charger and radio (eight AA batteries required).

Kit RB-562 (8 lbs.) \$299.95



Cover the roughest terrain in the ultimate all-terrain Clod Buster

SKILL LEVEL This one you've got to see to believe. One of the most exciting things to happen in radio control to date, the Clod Buster is so huge and so authentic you'll want to see it in action as it attacks the most vicious obstacles with determination.

Mammoth tires nearly 6½" high

RC 1/10 scale cars dwarf in comparison to the Clod Buster. Set on mammoth semi-pneumatic, rubber-like tires, this monster pickup plows over the roughest terrain without a tumble, over almost any obstacle in its path. You can even climb over other vehicles with this ultimate car crusher. Power mechanics and remarkable ground clearance take the Clod Buster where you want it to go.

Sturdy and lightweight, the Clod Buster's frame is made of engineering plastics. Its highly detailed styrene resin body is finished in lifelike detail, enhanced by a custom paint job that will attract the eyes of young and old RC enthusiasts.

Little can stop this giant

Dual 540-type monster motors can be switched to run in parallel for power climbing, or in series for endurance driving. And four wheel steering means you can navigate around fallen obstacles, park where you like and maneuver on wet or dry terrain with equal control.

The Clod Buster's rigid axle suspension incorporates eight heavy-duty coil spring damped shocks. And deep tread pattern tires are molded laterally, like the ones on real trucks and jeeps, for long life and excellent traction.

With an overall length of 19 inches, width of 14½ inches and height of 13½ inches, the Clod Buster stands at one tenth the size of a real, customized pickup.

Whether you're already a competition racer or you're just getting started in RC vehicles, the Clod Buster is a hard one to pass by. Comes complete with radio (eight AA batteries required), battery and trickle charger.

Kit RB-565 (10 lbs.) \$369.95



Enjoy clean, quiet electric flying fun with the Kyosho Express

new

SKILL LEVEL Enjoy the thrill of safe electric RC flying with the Kyosho Express. The Express, as with the RC planes on the next page, includes everything you need to soar through the skies. You don't have to know which servos, radio, battery and charger are best, because we've chosen them for you. The only decision you must make is which plane to buy.

Perfect for the beginner

An impressive 61" wingspan makes the Express a stable aircraft to fly – perfect for the beginning RC pilot. High T-tail and Eppler 178 airfoil aid in flight stability. And carefully designed wings tilt upward to increase that stability. The Express's durable construction along with a crash resistant molded plastic fuselage will survive all but the most severe landings. An extra prop is also supplied.

Easy assembly without adhesives

Manufactured to the highest standards, the Express's parts fit together so well that no adhesives are required during assembly. In fact, the only tools you'll need for constructing your plane are ones you probably have around the house: a pair of long nose pliers, a Phillips screwdriver, a flat head screwdriver, a utility knife, and an awl or drill.

Swift climb-out after liftoff

After takeoff, the 1/11 scale Express climbs out with unbridled power thanks to a reduction gear unit and a LeMans AP29R motor. After liftoff you'll maintain control with a Futaba Attack G, 4 channel dual stick radio and companion receiver, which use the new 20 kHz channel spacing scheme that will be required in the year 1991. Our Express package also includes two lightweight micro servos to extend flight time, the Kyosho Multi-Charger II and a 7.2V 600 mAh rechargeable battery pack with a Multi-Charger II connector. And, an auto-cutoff circuit eliminates the need for onboard receiver batteries.

Kit RC-402 (11 lbs.) \$469.95



Take to the skies with our Cessna Cardinal package

new

SKILL LEVEL You've just lifted off and you're climbing to two hundred feet. However, this time you're not the passenger. The stick's in your hands and you're in control. Lunge the stick forward and plummet toward the earth, or continue to climb, soaring higher and higher into the wild blue yonder.

These are just the beginning of the thrills you'll experience when you join the exciting world of electric RC flying. And, we've made it easy to experience RC flying fun by combining everything you need into our Cessna Cardinal package.

Enough power for off-the-ground launches

Manufactured by RC industry leader Kyosho, the 1/8 scale Cessna Cardinal features a LeMans Stock 05R motor and matched prop that deliver enough power for off-the-ground launches. And, if you're a beginning RC pilot, you'll feel like a pro the first time on the field thanks to a high design 47" wing that gives the aircraft very stable flying characteristics.

When you take to the air, you'll maintain control with the included Futaba 4NBL Attack E, 4 channel dual stick radio that uses the 20 kHz channel spacing scheme you'll be required to have in 1991. Also included are two lightweight micro servos to stretch flight time, an incremental speed control so you can bring your Cardinal in under power, a 7.2V 1200 mAh rechargeable battery pack and a Kyosho 6-cell DC Power Quick Charger that's capable of 15 minute battery recovery.

Made to survive the rough landings

Constructed to withstand the rough landings and other minor mishaps of beginner flying, the Cardinal comes with all main structural parts preassembled. In fact, you can have your plane flight-ready in just one evening. The only materials you need to supply are a Phillips screwdriver, a pair of scissors, an awl, a utility knife and some Epoxy adhesive.

Kit RC-403 (11 lbs.) \$489.95

Learn to fly with the gas powered Trainer Hawk

SKILL LEVEL If you've never experienced the excitement of RC flying, MRC's Trainer Hawk is a fine place to start. This extremely popular fuel-powered plane has been around for more than ten years. Thousands of RC enthusiasts, in fact, have learned to fly and have continued to build their skills with the Trainer Hawk, working from basic flight all the way up to the loops, barrel rolls and figure eights of more experienced fliers and more expensive, more sophisticated aircraft.

Great flight stability

When you're ready to fly, the Trainer Hawk's steerable nosewheel lets you taxi on or off the runway. And when you're up in the air, the full four foot wingspan increases the flight stability of this high wing trainer. The Trainer Hawk responds to two or three channel radio control, for rudder, elevator and throttle. And for improved aerodynamics and realistic appearance, this popular aircraft comes equipped with scale-like wheel pants and molded tail section.

Almost ready to fly

The Trainer Hawk comes with a .15 TV engine, fuel tank, push rods and clevises already installed so the plane is almost ready to fly when you take it out of the box. Plus, you'll find spinner, small hardware and glow plug are also included. Tools and materials required for assembly – such as screwdrivers, pliers and epoxy – are ones you already have around the house or can find in any hobby shop. A set of self-adhesive decals also comes with the plane.

Try radio controlled gas flight with this fine aircraft. It's a superior trainer for the novice *and* a reliable flier for the more experienced RC fan. The Trainer Hawk comes as a complete system, with four channel radio (12 AA batteries required) and three servos.

Kit IF-129 (12 lbs.) \$299.95

Catch a good breeze and head out to sea with the Kyosho Fairwind sailboat

new

Hoist the sails and head out past the breakers in the exciting Kyosho Fairwind RC sailboat. Now you can experience all the fun and challenge of navigating your own sailing ship even if you're on a dinghy budget. All you need is a body of water, a good breeze and you're ready to start your sailing adventure.

Over 5 feet tall!

Standing a dramatic 61½ inches tall and measuring over 35 inches in length, the Fairwind boasts the classic lines of a real sailing vessel. And, the molded ABS hull cuts through the seas just like a racing yacht.

Fast and maneuverable, the Fairwind comes with an aluminum mast, nylon sails with battens for shape, decals, hardware and decorative fittings.

Total sailing control

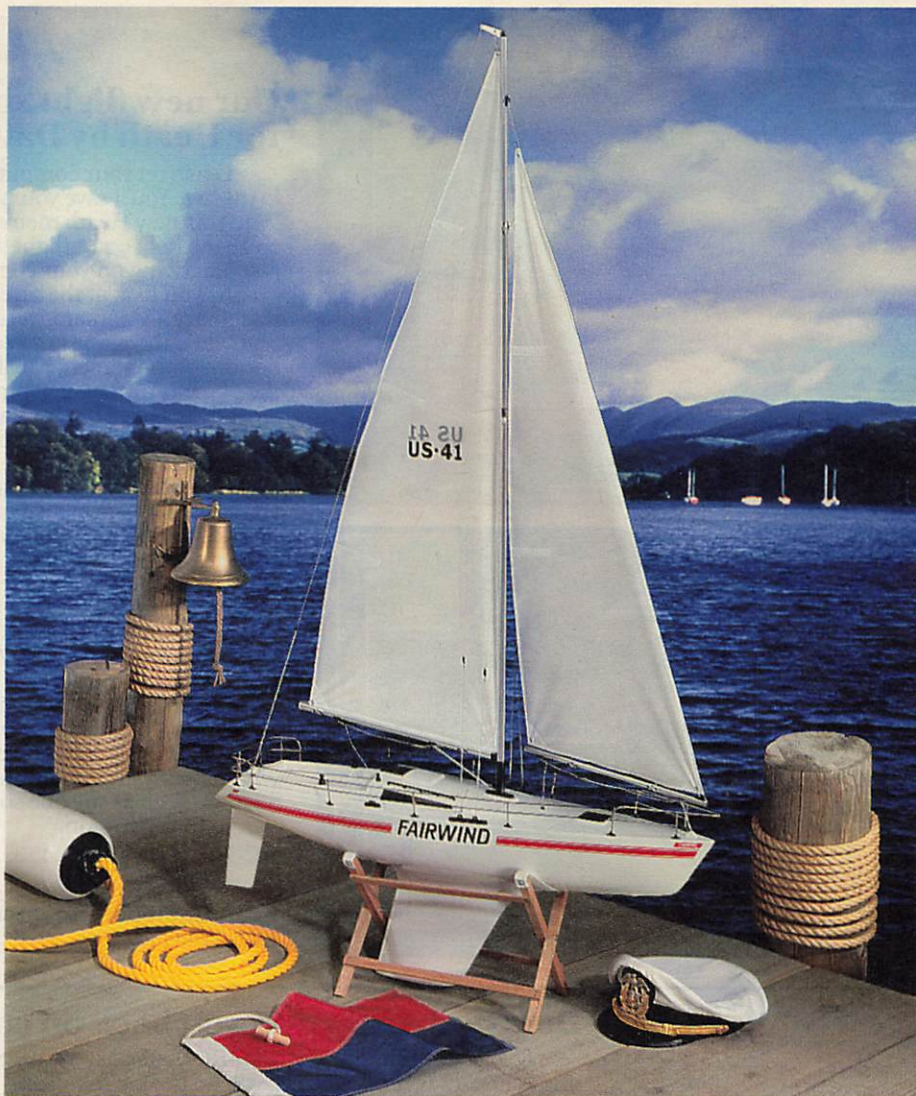
You'll launch the Fairwind with confidence knowing that a Futaba FP-2GS radio will keep you in touch with all onboard mechanisms. The ship's gear consists of a receiver and an S148 standard servo for rudder control. As a bonus, an FS-125 sail winch servo is supplied to give you full control over the Fairwind's sails. With this extra servo, your ship will glide through the water with the realism of a life-size sailboat, leaving boats with only rudder control far behind.

Attractive display piece

After you leave the lake, you'll take pride in displaying your majestic Fairwind at home. The ship's striking size and handsome good looks attract attention wherever it's placed on display. You'll amaze guests when you tell them that you not only assembled the craft, but you take it out to sea on weekends.

Almost ready to float

The Fairwind's not only fun to sail, it's fun to build as well. After only three short evenings of kit building enjoyment, your racing yacht is ready for the roughest seas. Our sailing package in-



cludes almost everything you need for assembly. The only materials you must supply are a few everyday household tools, 4 lbs. of buckshot for ballast, and epoxy and cyclocyranate adhesives. In addition, you'll need to purchase eight AA batteries for your Futaba radio and four AA batteries for the onboard receiver.

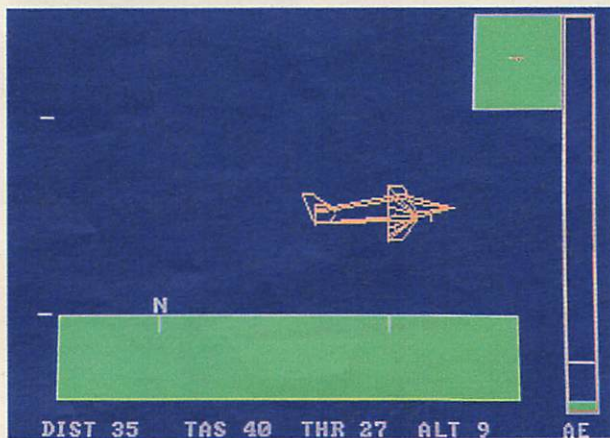
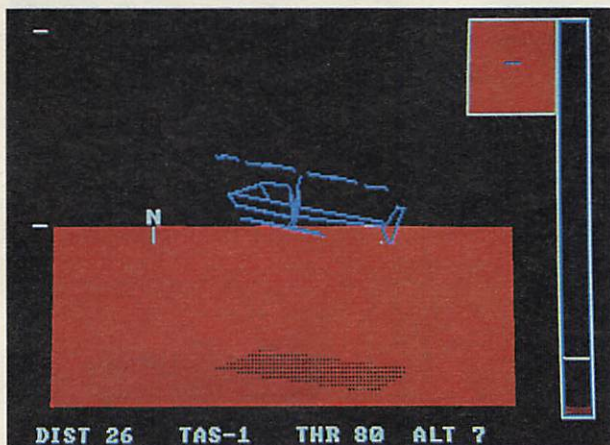
Plan your summer fun around the beautiful and graceful Fairwind. You'll be the envy of the neighborhood and the center of the beach crowd.

Kit RC-301 (11 lbs.) \$289.95

Our customers write...

I called the service department... and was connected to Matt. He's been in the Heath service department for the last 10 years or so, and he is good...I marvel at Heath's technical service department. These people know what they are doing!"

Peter O'Dell
St. James, New York



Our new flight simulator, custom designed for Heath by Dave Brown Products

Learn on your computer what could take months of flying lessons to master. You'll save yourself time and you'll save yourself money. With this new Heath menu-driven software, which includes both aircraft and helicopter flight simulation, you'll experience real flight by just practicing on your computer screen.

As you look at the screen, you'll watch your plane as though an imaginary TV camera were pointing at it. That means, for example, that when the plane is directly above you, you'll see its belly. At the bottom of the screen, you'll have a constant read-out of the distance the plane is from you, its true air speed, its throttle setting and its altitude in feet. The simulation also includes a wind direction indicator, with wind shown relative to the craft's pilot and turning as the pilot turns.

One of the toughest parts of RC flying is judging the orientation of your aircraft, especially when lighting is poor and when the plane is far away. Another problem is getting used to the apparent reversal of controls when the plane is flying toward you. The simulation lets you experience these difficulties to the fullest, and even accentuates the orientation problem since the ground is out of sight when your craft is high in the air. And, as you're learning, the simulation shows you the dollar amount of damage right on your screen each time you crash!

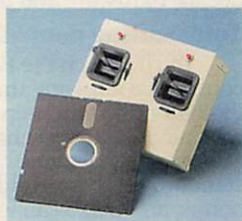
Become a master flier *before* you take your plane out on the field with this exciting new simulator, custom designed for Heath by Dave Brown Products. For use with Heath/Zenith and IBM PC, XT, AT and compatibles. Comes with dual joystick controller. A gameport adapter, such as the one sold below, is required for operation.

RC-701 (3 lbs.) \$129.95

Accessory:

Kraft Gameport Adapter

K82-44-1 (1 lb.) \$29.99



Deluxe charger gets you back on course in minutes

For quicker charging of your RC batteries, this deluxe 12 volt DC charger will do the job in minutes. If you're a driver who insists on top performance from your RC equipment, you'll want the option of running either 7.2 volt or 8.4 volt battery packs.

With this deluxe charger, you'll get a 15 minute mechanical timer, battery clips for con-

nection to a 12V battery, a fuse-protected circuit, and a pre-installed connector for fast hook-ups with Tamiya 7.2 volt batteries. Charge your batteries in the field through your automobile cigarette lighter.

Assembled RB-460 (1 lb.) \$34.95

Replacement batteries are reliable and economical

① For proven performance at an affordable price, the Kyosho 6-cell flat pack replacement battery uses high capacity NiCd cells, factory matched for excellent performance. A unique plate construction makes internal resistance low and discharge performance excellent. Order this battery if you purchased one of our previous RC models, the RC-101 Optima-Mid, the RC-102 Ultima or the RC-401 Valencia.

RC-650 (1 lb.) \$19.95

② The Kyosho 7-cell power battery increases voltage to 8.4 volts for maximum power. Extra high capacity NiCd cells

stand up to repeated back-to-back charge/discharge cycles without venting or loss of capacity. Order for use with the RB-554 Fox, the RB-562 Hot Shot, the RB-565 Clod Buster and the IF-167 Cessna Cardinal.

RC-651 (1 lb.) \$19.95

③ Equip your RC-402 Express electric plane with Kyosho's 7.2 volt, 600 mAh backup battery pack, for non-stop flying enjoyment, ready to go when you are.

RC-652 (1 lb.) \$29.95

There's always something going on



Plenty of opportunities exist throughout the year for hams to get together at hamfests and conventions. You'll have a chance to participate in forums, view equipment displays and demonstrations, and enjoy the fun of flea markets and social events.

We've included here a list of major events for the rest of 1989. You're sure to find one close to home. Check the monthly listings in **QST** magazine for details, or if you have ques-

tions, contact Bernice Dunn, KAIKXQ, **QST** convention program manager, at 203-666-1541, ext. 283.

And, if you're in the neighborhood of Orlando or Dayton in April, or Dallas/Ft. Worth in June, stop in and say hi to the hams from Heath. We'll look forward to meeting you and sharing an experience or two.

April

7-9	Orlando, FL	North Florida Section Convention
15	Flemington, NJ	ARRL Hamfest
15	Charleston, WV	ARRL Hamfest
16	Sullivan, IL	ARRL Hamfest
16	Lebanon, PA	ARRL Hamfest
16	Raleigh, NC	ARRL Hamfest
16	Southington, CT	ARRL Hamfest
22-23	Augusta, GA	ARRL Hamfest
28-30	Dayton, OH	Dayton Hamvention

May

5-6	S. Sioux City, NE	ARRL Hamfest
7	Sterling, NJ	ARRL Hamfest
14	Medina, OH	ARRL Hamfest
19-21	Rochester, NY	Atlantic Division/NY State Convention
21	Peotone, IL	ARRL Hamfest
21	Randolph, OH	ARRL Hamfest
21	Tamaqua, PA	ARRL Hamfest
21	Wheeling, WV	ARRL Hamfest
21	Wrightstown, PA	ARRL Hamfest

June

2-4	Dallas/Ft. Worth, TX	ARRL National Convention
2-4	Seaside, OR	ARRL Hamfest
4	Chelsea, MI	ARRL Hamfest
4	Salina, KS	ARRL Hamfest
4	Princeton, IL	ARRL Hamfest
4	Manassas, VA	ARRL Hamfest
10-12		June VHF QSO Party
11	Willow Springs, IL	ARRL Hamfest
16-17	Albany, GA	Georgia State Convention
18	Monroe, MI	ARRL Hamfest
24-25		Field Day

July

8	Des Moines, IA	ARRL Hamfest
8-9	Indianapolis, IN	Central Division Convention
8-9		IARU HF World Championship
9	Alexander, NY	ARRL Hamfest
9	Downers Grove, IL	ARRL Hamfest
15	Union, ME	ARRL Hamfest
16	St. Charles, IL	ARRL Hamfest
16	Washington, MO	ARRL Hamfest
23	Garden Prairie, IL	ARRL Hamfest
28-30	Oklahoma City, OK	West Gulf Division Convention
29	Texas City, TX	ARRL Hamfest
30	Peotone, IL	ARRL Hamfest

August

5-6	Cedar Rapids, IA	ARRL Hamfest
5-6		UHF Contest
6	Berryville, VA	ARRL Hamfest
12	Springfield, MO	ARRL Hamfest
19-20	Huntsville, AL	Southeastern Division Convention
19-20		10-GHz Cumulative Contest
25-27	Los Angeles, CA	Southwestern Division Convention
26-27	Saginaw, MI	Michigan State Convention
27	St. Charles, MO	ARRL Hamfest
27	Danville, IL	ARRL Hamfest

September

9	Windsor, ME	ARRL Hamfest
9-11		September VHF QSO Party
10	Butler, PA	ARRL Hamfest
16	Wichita Falls, TX	ARRL Hamfest
16-17	Virginia Beach, VA	Virginia State Convention
17-18	Cincinnati, OH	ARRL Hamfest
23-24	Milton-Freewater, OH	ARRL Hamfest
24	Berea, OH	ARRL Hamfest

October

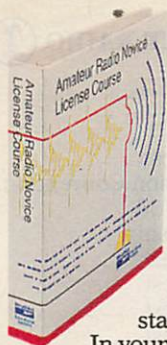
8	Lima, OH	ARRL Hamfest
14-15	Memphis, TN	ARRL Hamfest
21	Brooklyn Park, MN	ARRL Hamfest
21-22		Simulated Emergency Test

November

4	West Monroe, LA	ARRL Hamfest
4-6		November Sweepstakes, CW
10-12	Houston, TX	Texas State Convention
18-20		November Sweepstakes, phone

December

1-3		160-Meter Contest
9-10		10-Meter Contest



new

Our novice ham course now contains the latest FCC regulations

Join the world of amateur radio and communicate one-on-one with interesting people all over the world. We can get you started today with our novice ham course.

In your comprehensive study package you'll find information on how you apply to take the latest novice class license test. In addition, practice exams and a final examination give you the confidence to pass your exam the first time. And, we guarantee our course will help you earn your novice ticket or we'll refund your money.

Also in the course package you'll receive a cassette tape to assist you in learning the international Morse code and the FCC rule book to explain the latest changes. Pass the optional final exam and receive 1.0 Continuing Education Unit (CEU).

ER-3701-B (6 lbs.) \$44.95

\$AVER! Save \$15 when you buy the novice course and CW Code Oscillator shown below. Plus get a 10% certificate good for up to \$10 off any Heathkit amateur radio product.

ERS-3701-B (9 lbs.) \$54.90



Move up to general class and enjoy more operating privileges

Enjoy added general class privileges: more frequencies to operate on, radio teletype, slow scan TV, facsimile and satellite activity. An impressive list of incentives adds up to more QSOs, more QSLs and thousands of new friends.

Our general class course takes you through the material covered on the written test. Its in-depth coverage will give you more than enough information to pass either the technician or general class exam. Extra code practice teaches from zero 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 Continuing Education Units. We're so sure our courses provide the necessary theory and background material to prepare you for the exam that we guarantee a full refund in the event you don't pass.

ERS-3702-C (26 lbs.) \$64.95



Build up your code speed with the CW code oscillator

SKILL LEVEL 1 Increase your ability to receive and transmit Morse code easily and inexpensively 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 oscillator even has a head-phone jack for private listening so you won't disturb others. And once you get your amateur radio license, your unit can serve as a side tone oscillator for any transmitter using negative-grid block keying. The HD-1416-H operates on a 9V transistor battery (not included).

Kit HD-1416-H (1 lb.) \$24.95



Credit card orders call TOLL-FREE 24 hours a day:

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Amateur radio exams

Study for your amateur radio license with the exam study booklets pictured above. The booklets contain every question in the FCC pool for all elements of the exam, correct answers and distractors or "wrong" answer choices. In exams requiring a code element, study material includes a cassette tape for code practice. Bookware contains well over \$100 in discount coupons from major manufacturers, redeemable when you pass your exam.

Novice Bookware
HDP-1611 (1 lb.) \$19.95

Technician Bookware
HDP-1612-T (1 lb.) \$19.95

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HDP-1612-G (1 lb.) \$24.95

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HDP-1613 (1 lb.) \$19.95

Extra Bookware
HDP-1614 (1 lb.) \$24.95



Use a computer to study for your radio exams

This computer software offers the most up-to-date, FCC approved questions for all five exams, including the latest enhanced novice class. Continually updated, the software contains both a CW practice program and complete multiple choice questions from the FCC approved pool of questions used for actual exams. For use with Heath/Zenith and IBM PCs.

Novice Software
HDP-1601 (1 lb.) \$39.95

Technician Software
HDP-1602-T (1 lb.) \$34.95

General Software
HDP-1602-G (1 lb.) \$34.95

Advanced Software
HDP-1603 (1 lb.) \$49.95

Extra Software
HDP-1604 (1 lb.) \$49.95



100W HF all-mode transceiver with 20 memory channels

HF Transceiver. The SB-1400 is a feature-packed transceiver that delivers 100W of PEP output on all nine HF amateur bands, with 100kHz-30MHz general coverage reception.

An SSB/CW/AM and optional FM transceiver, the SB-1400 features dual VFOs along with 20 memory channels. These channels can store mode and skip-scan status allowing for auto resume scanning of selectable memories, controlled from the microphone up/down keys. In addition, you can store independent transmit and receive frequencies on 18 of the memories for easy recall of split-frequency operations.

Behind the SB-1400's convenient front panel layout are many standard features including narrowband (500Hz) CW and wideband (6kHz) AM IF filters, a switchable 20dB receiver attenuator, a clarifier, and a noise blander for better reception under harsh conditions. You'll also appreciate that the transmitter power amplifier is cooled by an internal fan and is enclosed in its own diecast aluminum heat-sink chamber, which allows for full power operation of FM and Packet, RTTY, AMTOR and SSTV.

Tuning is a snap with the user-selectable coarse and fine tuning steps provided in each mode: 25Hz and 2.5kHz for SSB and CW, 1kHz and 100Hz for AM, and 5 and 12.5kHz for FM with the optional FM Module.

Assembled SB-1400 (9 lbs.) \$799.95

Specifications: **RECEIVER:** Sensitivity: SSB & CW: 0.25 μ V above 1.5 MHz, 0.5 μ V (500 kHz-1.5 MHz); AM: 1 μ V above 1.5 MHz; FM: (option) 0.7 μ V for 12 dB SINAD above 28 MHz. **IF Frequency:** 47.055, 8.215 MHz (and 455 kHz FM triple conversion). **Image Rejection:** >70 dB above 1.5 MHz. **IF Rejection:** >60 dB above 1.5 MHz. **Selectivity:** SSB; CW(W); AM(N), 2.2 kHz at -6 dB, 5 kHz at -60 dB; CW(N), 500 Hz at -6 dB, 1.8 kHz at -60 dB. **TRANSMITTER:** **Amateur Bands:** 160m, 80m, 40m, 30m, 20m, 17m, 15m, 12m and 10m. **Output:** 100W PEP (SSB, CW and optional FM), 25 watt carrier (AM). **Harmonic and Spurious Output:** Exceeds FCC requirements: **RF Connector:** SO-239 type. **Supply Voltage:** 13.5 VDC 19 amps max. @ \pm 10%.

Speaker/Power Supply. The SBA-1400-4 is a matching speaker and power supply for your SB-1400, delivering full 20 amp output for 30 minutes on and 30 minutes off. Other features include thermally switched quiet cooling fan; high quality 3-watt, 4-ohm speaker; 13.5 VDC at 20 amps and 117 VAC, 50/60 Hz operation. UL listed.

Assembled SBA-1400-4 (2 lbs.) \$329.95

Accessories:

FM Module. Add FM transceiver to your SB-1400. Features triple conversion receive, 0.7 μ V sensitivity for 12 dB SINAD (>28 MHz) and 0.32 μ V squelch sensitivity.

Assembled SBA-1400-1 (1 lb.) \$44.95

Handheld Scanning Microphone (pictured). Includes convenient up/down keys that scan in frequency or memory. **Assembled SBA-1400-2 (1 lb.) \$27.95**

Mobile Bracket. Take your SB-1400 on the road with you. Mounts above or below the dash and features quick release. **Assembled SBA-1400-3 (1 lb.) \$25.95**

Switching Relay. Protect your rig from transient high voltage. Use if switching voltages are greater than 150 volts or current is in excess of 1.5A. Also perfect anytime switching voltages are unknown. Features an outboard relay for non-QSK linear amplifiers. Maximum switching voltage is 250V and current limit is 2.5A.

Assembled SBA-1400-5 (17 lbs.) \$17.95



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1 shown with
headphone

2

3

4 shown with
microphone speaker

Close-up
of HWS-4-XL
display and
keypad

2 Meter and 450 MHz handheld transceivers – in standard and deluxe models

Put more fun and enjoyment into portable communications with these compact 2 Meter and 450 MHz transceivers. Besides power and easy one-handed operation, both standard and deluxe models offer many impressive features with options.

The HWS-2 2 M and HWS-4 450 MHz standard transceivers have thumbwheel tuning, hi/low power operation, squelch, repeater \pm offsets, and optional CTCSS and DTMF capabilities. The deluxe HWS-2-XL 2 M and HWS-4-XL 450 MHz transceivers include 20 channel scanning, DTMF, CTCSS encode and decode, auto power off, an easy-to-read LCD display, 100 kHz channel stepping, signal meter, RF attenuator, programmable offsets, keypad operation and battery saver. All models now include one HWA-110 rechargeable battery pack and one HWA-130 wall charger.

Special Offer! While they last, get a free mobile battery charger and a free mobile bracket when you purchase one of the four handheld transceivers listed below.

- 1 Assembled HWS-2 2 Meter Handheld Transceiver. (2 lbs.) \$229.95
- 2 Assembled HWS-2-XL Deluxe 2 Meter Handheld Transceiver. (2 lbs.) \$329.95
- 3 Assembled HWS-4 450 MHz Handheld Transceiver. (2 lbs.) \$259.95
- 4 Assembled HWS-4-XL Deluxe 450 MHz Handheld Transceiver. (2 lbs.) \$349.95

Accessories:

- 120 VAC Wall Charger Assembled HWA-130 (1 lb.) .. \$13.95
- Soft Carrying Case. For HWS-2-XL and HWS-4-XL. Assembled HWA-200 (1 lb.) \$9.95
- Long Size Soft Carrying Case. For HWS-2-XL, HWS-4-XL using HWA-120 or HWA-125 battery. Assembled HWA-210 (1 lb.) \$11.95
- Soft Carrying Case. For HWS-2 and HWS-4. Assembled HWA-240 (1 lb.) \$7.95

CTCSS Unit. Includes programmable dip switches for any tone frequency on the HWS-2 and HWS-4.

Assembled HWA-220 (1 lb.) \$52.95

Touch Tone Encoder. Use with the remote control function on the HWS-2 or HWS-4.

Assembled HWA-230 (1 lb.) \$29.95

Specifications: **GENERAL:** Frequency: 2/2XL: 144 – 147.995 MHz. 4: 440 – 449.995 MHz. 4XL: 438 – 449.995 MHz. **Emission Type:** FM. **Microphone Input Impedance:** 600 ohm. **Speaker Impedance:** 8 ohm. **Operating Voltage:** 2/4: 5.5 – 11 VDC. XLs: 5.5 – 16 VDC. **Antenna Impedance:** 50 ohm. **Power Supply:** 9 VDC (nom.) **Dimensions:** 2/4: 5.2" H x 2.4" W x 1.3" D. XLs: 6.3" H. **Weight:** 2/4: 14.3 ozs. XLs: 16.3 ozs. **TRANSMITTER: Output Power:** 2/4: 3 W (hi), 400 mW (lo). XLs: 5 W (hi), 400 mW (lo). **Spurious Signal:** – 60 dB. **Max. Deviation:** \pm 5 kHz. **Modulation:** Reactance. **Built-in Microphone:** Electret condenser type. **RECEIVER: Sensitivity:** 0.158 μ V. **Squelch Sensitivity:** 0.1 μ V. **Circuitry:** Double conversion superheterodyne. **Selectivity:** – 60 dB. **Audio Output:** 400 mW at 8 ohms.

More accessories for all handheld transceivers:

- 120 VAC Desktop Quick-charge Charger Assembled HWA-140 (2 lbs.) \$39.95
- Mobile Car Battery Adapter. For charging battery during operation. Assembled HWA-160 (1 lb.) \$42.95
- Microphone Speaker (pictured above). Assembled HWA-180 (1 lb.) \$34.95
- Headphone. With push-to-talk switch (pictured above). Assembled HWA-190 (1 lb.) \$32.95
- Extended Life Rechargeable NiCd Battery Pack Assembled HWA-125 (1 lb.) \$72.95
- Small Rechargeable NiCd Battery Pack. For normal wattage output operation. Assembled HWA-110 (1 lb.) \$49.95
- Large Rechargeable NiCd Battery Pack. For higher wattage HWS-2-XL, HWS-4-XL and HWS-24-HT output operation only. Assembled HWA-120 (1 lb.) \$59.95



Close-up of HWS-24-HT display and keypad

Twin band transceiver/repeaters and dual band handheld transceiver

1, 2 10W & 50W Twin Band Transceiver/Repeaters. Tune up to 20 memory channels – 10 on each band – with the 10W and 50W VHF/UHF twin band transceiver/repeaters. Also set split or simplex receiver-transmitter operation for each memory channel. For repeater operation, you can memorize an offset frequency and a tone control frequency on all band channels. And, two internal VFOs allow simultaneous monitoring of one channel on each band.

Frequency response* is an impressive 144-147.995 MHz on VHF and 438-449.995 MHz on UHF. You also get full duplex operation when you use both the VHF and UHF bands. In addition a key lock switch locks the microphone's up/down scan buttons to prevent accidental entry.

Both the HW-24 and HW-24-H include an exclusive automatic repeater function. Just set your cross band frequencies (including repeater offset) for each band and enter the repeater mode – with or without hang tail. Use as an emergency repeater or remote link, or use two units placed apart as a permanent repeater (no cavities) linked on UHF. Even use in your car as a relay between your UHF HT and a VHF repeater that you would not normally be able to access with just an HT.

Assembled HW-24 10W Twin Band (7 lbs.) \$739.95

Assembled HW-24-H 50W Twin Band (7 lbs.) \$839.95

3 5W Dual Band Handheld Transceiver. The HWS-24-HT VHF/UHF Dual Band HT gives you powerful capabilities in a compact size. It shares both the memory channel and duplex functions of the HW-24 and HW-24-H. Enter frequencies directly from the keyboard or via a rotary channel switch. Internal dual watch allows the transceiver to survey the selected frequency and the frequency stored in memory address #1 or any other memory frequency. Alternately, internal dual watch can survey the selected frequency and each memory frequency in sequence.

The HWS-24-HT delivers an extremely wide frequency response* – 144-147.995 MHz on VHF and 438-449.995 MHz

on UHF. The unit also has a very sensitive receiver section at .15 μ V for 12 dB SINAD within amateur bands. You can receive 130-169.995 MHz on VHF and 360-469.995 MHz on UHF (except 400-418 MHz). Performance curves are available for out of band operation.

On the 22 memory channels you can scan only favorite memory channels, all channels, between two frequencies, within a band or you can search for a vacant channel. In addition, CTCSS decode as well as encode permits open squelch operation for maximum sensitivity.

Other features include full duplex operation for repeaters with full duplex autopatch, 9-step programmable battery saver, full 16-key DTMF keypad, backlit multi-function LCD display, one button open squelch, auto power off to reduce battery drain and PTT lockout prevents inadvertent operation.

Assembled HWS-24-HT 5W Dual Band Handheld Transceiver. Includes rechargeable battery, power cube and extra empty battery shell. (4 lbs.) **\$489.95**

Accessories:

Soft Carrying Case. For the HWS-24-HT using the HWA-110 battery. Assembled HWA-250 (1 lb.) **\$16.95**

Large Soft Carrying Case. For the HWS-24-HT using the HWA-120 or HWA-125 battery. Assembled HWA-260 (1 lb.) **\$19.95**

SEE "MORE ACCESSORIES" ON PAGE 38.

Specifications for HW-24, HW-24-H and HWS-24-HT: **Frequency Range*:** VHF: 144,000 to 147.995 MHz. UHF: 438,000 to 449.995 MHz. **Modulation Type:** F3. **Microphone Input Impedance:** 600 \sim . **Speaker Impedance:** 8 \sim . **Antenna Impedance:** 50 \sim . **Input Voltage:** 12 to 16 volts DC (5.5 to 16 volts DC on the HT). **Operational Temperature Range:** -4°F to +140°F. **Antenna Connector:** SO-239 type (BNC type on the HT). **Memory Channels:** 10 per band, VHF and UHF. **Scanning:** 1MHz segment, all band, all memory channels, or selected memory channels. **Tone Squelch:** Simplex/Duplex; user selected. **Automatic Repeater:** VHF to UHF, or UHF to VHF.

*May be modified for out-of-amateur-band operation for MARS, CAP and embassy operators. Contact Heath Customer Service for full information. Proof of participation required.



Heathkit deluxe QRP CW transceiver

SKILL LEVEL 3 The Heathkit HW-9 is a compact 80 through 10 meter HF transceiver created with the avid low-power CW operator in mind. Designed to cover the lower 250 kHz of the 80, 40, 20 and 15 meter amateur bands, the HW-9 can also cover the 30, 17 and 12 meter WARC bands and the lower 250 kHz of the 10 meter band with the optional HWA-9 Band Pack.

Utilizing broadband design, the HW-9 eliminates the need to tune circuits within a band. Just turn the band switch and select the desired frequency. The wide-band front-end uses a double-balanced mixer and 4-pole crystal filter to handle wide dynamic range signals with ease and to eliminate the customary RF amplifier in the receiver section.

The HW-9 uses a single conversion in the main signal path to reduce spurious responses and to maintain superior image rejection. In addition, a balanced product detector followed by an active audio filter provide outstanding performance. And, Receiver Incremental Tuning (RIT) lets you tune the receiver 1 kHz above or below the transmit frequency.

Microelectronic circuits reduce transceiver weight, while providing a level of performance and features unexpected at this price. Features include

continuously variable RF power output up to four watts, front panel relative signal/power strength meter and AGC circuits.

Rugged and lightweight, the HW-9 is ideal for portable operation. You can supply power to your HW-9 with batteries, lighter socket, solar photovoltaic array or by 120 VAC with the optional PSA-9 Power Supply. Dimensions are 4 1/4" H x 9 1/4" W x 8 1/2" D.

Kit HW-9 (8 lbs.) \$249.95
Accessories:

Band Pack. Expands the transmission and reception capabilities of your HW-9 Transceiver from four to eight amateur bands. Provides full coverage on all the amateur bands from 80 through 10 meters. **Kit HWA-9** (1 lb.) \$44.95

Power Supply. 12.6-volt, 1-ampere, voltage regulated power source. **Kit PSA-9** (4 lbs.) \$39.95

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 maximum, 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 .



Companion station speaker to HW-9

SKILL LEVEL 1 The Heathkit Station Speaker is a 3" communications receiver speaker housed in a custom designed cabinet to match the HW-9 QRP transceiver. The 8-ohm speaker has a frequency response of 200 to 5000 Hz and can handle 1.5 watts RMS. Dimensions are 8" H x 4 1/2" W x 6 3/4" D.

Kit SP-99 (3 lbs.) \$29.95



Accurate QRP wattmeter

SKILL LEVEL 1 Your low-watt HF or VHF station will operate at peak power efficiency when you're using the responsive HM-9 Wattmeter. A reliable instrument for measuring RF power output and the SWR of an amateur radio station, the HM-9 with 3:1 SWR bridge simplifies continuous metering of exciter or amplified output level. Plus it gives you 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. Full scale ranges from 0-5 watts and 0-50 watts with exceptional $\pm 10\%$ accuracy! Reads SWR from 1.1:1 to 3:1. Dimensions are 2 5/8" H x 5 3/8" W x 7" D.

Kit HM-9 (3 lbs.) \$59.95

100-watt antenna tuner with 4:1 balun

SKILL LEVEL 2 You can have almost unlimited matching capabilities with the HFT-9-A. It provides matching to a wide range of output impedances with a built-in 4:1 ferrite balun. The HFT-9-A includes 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. The HFT-9-A's small size and easy assembly make it perfect for mobile HF operation and an outstanding addition to any amateur radio station. Dimensions are 2 5/8" H x 5 3/8" W x 7" D.

Kit HFT-9-A (3 lbs.) \$59.95

SAVER! Purchase the matching HM-9 QRP Wattmeter and the HFT-9-A Antenna Tuner together and save. Separate prices total \$119.90.

QRS-9 (14 lbs.) . System Price \$109.95



Multi-mode operation with single unit TNC

SKILL LEVEL The Heathkit PackKit multi-mode TNC gives you the latest in packet radio and takes the trouble out of getting on RTTY. It lets you work CW at speeds you never dreamed of and gets you on AMTOR and ASCII. With the addition of a graphics printer, you can even print weather facsimile pictures.

Computer technology combines with amateur radio so you can explore packet radio and all its applications, plus additional modes. Connect both your HF and VHF rigs at the same time and with the push of a button, switch between VHF packet and copying a WIAW RTTY bulletin on 40 meters. Work packet in both HF (300 baud) and VHF (up to 9600 baud). Above 1200 baud requires an external modem.

Automatic baud rate and mode configuration

A unique *signal* command causes PackKit to determine correct RTTY, ASCII or AMTOR mode for the signal you're listening to and presets baud rate and mode. It even inverts the signal if necessary. All you have to do is type *OK*. Use the *oprmode* command to display full details of your current operating mode without having to change mode. And, front panel LEDs clearly indicate your present mode and system status for more efficient and simple operation.

The unit supports all common baud rates for Baudot RTTY and ASCII, and CW from 5 to 99 WPM. Radio link rates are supported to 1200 baud (9600 with external modem) and computer data rates to 9600 baud. What's more, no special software is needed. Use with any modem communication package made to run on your computer or order Ham-Pak software (below). You can use the HK-232 with computers or terminals using an RS-232 industry standard serial port.

Extensive features for greater flexibility

PackKit has all the features demanded by active amateur radio operators. For flexibility, two independent, selectable rear-panel connection ports provide interchangeable HF or VHF operation. All you need to do is connect your radio's PTT line, speaker output and microphone input. The same connections work for all other modes, too – even CW. Another high-performance feature, answer-back memory, permits auto-answer with message in both packet and RTTY. It automatically responds to WRU requests with your station ID and system status. And, for easy HF tune-up, the PackKit TNC features a built-in front panel bar graph indicator.

Includes operational manual with hookup connections for most popular HF and VHF radios. Operates on 12 VDC at 750 mA with 10% ripple or less. 2½" H x 8¼" W x 11" D.

Kit HK-232 (5 lbs.) \$279.95

SAVER! Save \$15 when you order the HK-232 TNC and the Technical Manual (sold below). HKS-232 (7 lbs.) ... \$289.90

Accessories:

Ham-Pak Communications Software Program. Use with Heath/Zenith, IBM PCs and compatibles.

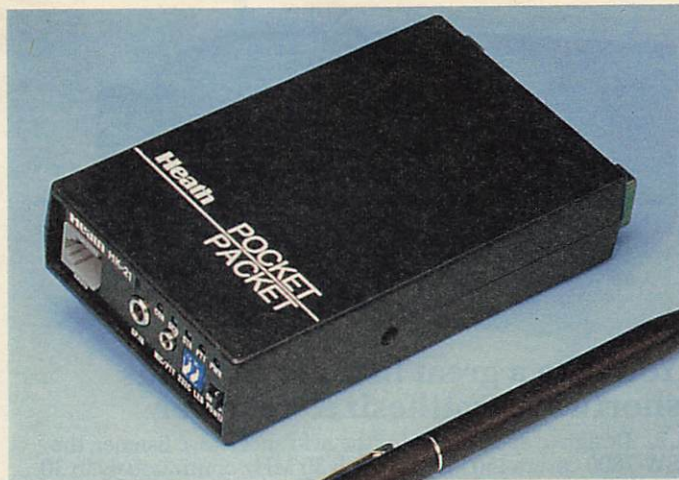
HKA-232-2 (1 lb.) \$19.95

Technical Manual. Comprehensive manual includes alignment, trouble-shooting – with over 80 waveforms, circuit board layout and detailed circuit description.

HKA-232-3 (2 lbs.) \$24.95

Power Supply 12V DC 1 Amp

Assembled HKA-232-4 (2 lbs.) \$19.95.



Pocket packet TNC

Packet radio is the fastest-growing segment of amateur radio today. With Heath's Pocket Packet TNC you get the latest and smallest TNC available, and it's TNC-2 compatible.

If your handheld transceiver, like most, uses a mini phone jack for speaker output and a sub-mini for microphone, in about 20 seconds you can connect your transceiver to the pocket packet unit at any time with the two shielded cables supplied. To connect the unit to your base or mobile (VHF or UHF) transceiver, another cable is also supplied. Once you've wired it into the microphone input, speaker output and transceiver keying line, hookup takes only seconds.

The HK-21 even includes a built-in mini bulletin board so you and your friends can leave messages for each other right on the system. They access your station with a *connect* request and automatically get a sign-on message welcoming them to your bulletin board (it uses your call!). Bulletin board commands include the following: *W(rite)* writes a message to a specific call; *R(ead)* reads a message sent to your call; *F(iles)* lists the last 10 – or all – messages in the system, plus the date each message was left; *M(ine)* lists only messages left for you. Additional commands are *H(elp)* or *?*, which lists all commands and their functions, plus instructions on how to write a message, *K(ill)* which kills a message addressed to you, and *B(ye)* which disconnects you from the bulletin board and also automatically disconnects your packet station from the mini BBS. The same commands work for you so you can leave messages for other stations.

The HK-21 requires a 9 to 13.8V supply @ 40 mA nominal current. Front panel switches disable RS-232 and turn off LEDs for maximum power savings when used as a remote site digi. You can connect it to your station 12 volt supply or order PS-2350 120 VAC Battery Eliminator.

The optional HKA-21-1 battery pack fits inside the unit, powering it for hours. And it recharges from the 12 volt DC jack on the pocket packet unit. Pocket Packet TNC comes with an industry-recognized Heathkit manual.

Assembled HK-21 (2 lbs.) \$219.95

Accessories:

Optional Battery Pack Assembled HKA-21-1 (1 lb.) . \$17.95

Battery Eliminator Assembled PS-2350 (1 lb.) \$7.95



You'll be a great listener with this shortwave synthesized receiver

SKILL 3 Designed specifically for the avid shortwave listener, the SW-7800 covers 150 kHz through 30 MHz continuously in 30 overlapping 1 MHz bands. Broadband front-end circuits mean you don't have to tune circuits within a band. The wide-band front-end stages eliminate the usual RF amplifier so the receiver can easily handle incoming signals within a wide dynamic range. Excellent image rejection is provided by an up-converting, double-conversion mixing design.

Other features you'll appreciate include AGC time constant switch, muting provision to allow operation with a transmitter,

local/DX switch to protect against overload from very strong local stations, front panel jack for taping receiver material – unaffected by volume control setting and telescoping whip antenna for local reception and portable operation. Mobile operation is possible using any 11 to 15 volt DC source at ¼ amp. Only a VTVM is required for receiver alignment. Dimensions are 4 7/8" H x 11 1/2" W x 10 1/2" D.

Kit SW-7800 (12 lbs.) \$299.95

Accessory:

High-Performance Trapped Dipole Antenna. Use with any general coverage or shortwave receiver. Eight high-Q parallel-tuned traps reduce length and isolate various segments of the antenna for full coverage of 11, 13, 16, 19, 25, 31, 41, 49 and 60 meter bands. See picture on page 46.

Assembled HDP-7800 (3 lbs.) \$64.95

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 µV for 10 dB (S + N)/N; AM, less than 2.5 µV for 10 dB (S + N)/N. **Selectivity:** SSB/CW, 2.5 kHz min. at 6 dB; AM, 5.5 kHz min. at 6 dB. **Selectivity Shape Factor:** 1.5 at 6/50 dB. **Image Rejection:** 55 dB min. **OTHER:** **Antenna:** Built-in telescoping whip. Connection for 50 ohm, unbalanced, external antenna (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 ¼-ampere, externally.



Antenna noise bridge

SKILL 1 Reveal the cause of any mismatch between station transmitter and antenna with the Heathkit Antenna Noise Bridge. A tone-modulated broadband noise signal is generated in the bridge and coupled to an impedance bridge. Then, using your station receiver as an indicator, the impedance bridge measures the resistive and reactive components of your antennas. Use the noise bridge also to preset an antenna tuner for faster tune-ups, tune a quarter-wave transmission line and measure the value of unknown capacitors and inductors. Front panel LED indicates power on, front panel controls give direct readout of resistive and reactive characteristics of the antenna being tested. Rear panel includes external power jack and coaxial connectors for receiver and unknown antenna connections. Requires 9V battery or PS-2350 Battery Eliminator, listed at right. 2 1/4" H x 5 1/8" W x 5" D.

Kit HD-1422-A (2 lbs.) \$49.95

Specifications: **Resistance:** approx. 0-200 Ω. **Capacitance:** ±60 pF. **Operating Range:** 1-30 MHz.



Active SWL antenna

SKILL 3 Perfect for portable use or locations where an outside antenna is not available, the Heathkit Active SWL Antenna allows you to receive radio signals from 300 kHz to 30 MHz. And it acts as a high frequency preamplifier when used with an external 50 ohm antenna. You can also use the HD-1424 as a preselector for both indoor and outdoor antennas. It has a built-in collapsible antenna and provisions for a 50 ohm antenna. Requires 9V battery or PS-2350 Battery Eliminator. 2 1/4" H x 5 1/8" W x 5" D.

Kit HD-1424-A (5 lbs.) \$59.95

Accessory:

Battery Eliminator
PS-2350 (1 lb.) \$7.95



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570



VLF converter

SKILL 1 Listen to the U.S. Submarine Fleet, European broadcasts and other distant transmissions below the standard AM band. The VLF Converter installs in your receiver antenna line to let you listen to the 10 to 500 kHz band from 3.510 to 4.010 MHz on your CW receiver. The converter contains a local oscillator generating a 3.5 MHz signal that, when mixed with the incoming VLF frequencies on your antenna, produces an RF signal that can be heard on any CW receiver capable of tuning 3.510 to 4.010 MHz. Requires 9V battery, PS-2350 Battery Eliminator, listed at left, or any source of DC power, 8.5 to 14 volts. The VLF Converter measures only 5 1/8" H x 5 1/8" W x 2 1/4" D.

Kit HD-1420 (2 lbs.) \$49.95

Get high performance from the Heathkit 1000W linear amplifier

SKILL LEVEL 2
4000
 You get unparalleled performance at an affordable price with the Heathkit Linear Amplifier. It's a completely self-contained, grounded grid linear amplifier designed to operate at 1000 watts PEP output on SSB or 850 watts output on CW and 500 watts RTTY. The SB-1000 covers 160, 80, 40, 20 and 15 meter amateur bands with tuned input filters your solid state rig will like. Also included are WARC and most MARS bands at 80% of rated output.

Instant heat tube gets you on the air faster

The amplifier uses a single 3-500Z tube in a high efficiency circuit for top performance. And its high silicon steel E-I core transformer takes up less room, runs cooler and gives you more high performance power than other models. Other selected features include door knob caps in critical RF circuits, adjustable ALC so your amplifier works with any rig, a stiff full-wave power supply with computer grade capacitors, a quiet computer-style fan, and plate and load controls with smooth vernier tuning. And, since the tube is an instant heating type, transmission may begin as soon as you turn on the amplifier after tune up.

Special RF section delivers maximum efficiency

The High-Q tank circuit and superb layout and design of the RF section result in maximum efficiency and put the RF power out on your antenna where it belongs - instead of burning it up as heat in the tube. Even the path of air flow was considered important in the design of the SB-1000. Intake is from the left side where the cool air flows over the power supply diodes, electrolytic caps and power transformer, then through the fan and into a completely separate RF compartment, where it is directed around the amplifier tube. Here temperature and smoke movement studies enabled the layout of an RF section which is both electrically and thermally efficient, where air turbulence could be maximized in order to efficiently remove heat from tank circuit components. The result? A reliable, top-performing amplifier. In fact, seasoned amateurs who have used the SB-1000 talk about the first class "feel" of the amplifier, and about how nicely it tunes and how well it performs in the pileups.

Continuously monitored grid current

Front panel meters are illuminated and grid current is continuously monitored for protection and long tube life. The amplifier may be operated from 120 VAC or 240 VAC (operation from a 240 volt AC line is recommended), 50/60 Hz power sources. Each side of the line cord is separately fused. Dimensions are 8 1/4" H x 14 1/2" W x 13 7/8" D.

Kit SB-1000 (57 lbs.) \$799.95



Specifications: **INPUT:** Circuit type: Pi-network. Maximum VSWR at resonance: 1.3:1 or less. Minimum 2:1 VSWR bandwidth: 20% or greater. Maximum drive power permissible: 100 W. Typical drive for full power output: 85 W. **OUTPUT:** Circuit type: Pi-L network. 1/2 hour continuous carrier: 500 watts. 30 second continuous carrier: 850 watts. 1/2 hour PEP two-tone test: 850 watts. 30 second PEP two-tone test: 1000 watts. **POWER SUPPLY:** Circuit type: Voltage doubler. No load voltage: 3000. Full load voltage: 2700. Full load current: 0.45 amp. Regulation: 10%. Transformer: 22 lbs. Hypersil steel. Maximum draw at rated output: 12 amps at 120 V, 60 Hz. **TUBE:** Type: 3-500Z. Continuous dissipation: 500 W. Warm-up time: 10 seconds. Estimated life: 20,000 hours. **GENERAL:** Metering: Dual meters; plate volts, plate current, grid current, power output PEP. ALC: Adjustable, 0-20 V, negative going, phono jack. **MARS/WARC:** Yes, set to nearest amateur band. **Keying:** Requires contact closure or sink of +12 VDC at 100 mA, phono jack. **RF Connectors:** SO239. **Line Connector:** NEMA 5-15P, standard 120 V three wire. **Frequency Coverage:** All amateur bands from 1.8 to 21 MHz, including WARC and most MARS. **Third Order IMD at Rated Output:** -35 dB.



Personalized name plate

You've finished your kit and everything looks and works perfectly because you did it yourself.

Indicate the special care and skill you've invested in your finished kit with an engraved name plate. Made of solid brass and brushed to a jeweler's finish, the name plate has a self-adhesive backing for easy, no-mess application.

FILL IN THIS COUPON TO ORDER

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Print name here

Please send _____ solid brass name plate(s) with name engraved. Enclosed is \$_____ (\$2.00 for one, \$1.60 each for two or more) which covers first class postage & handling. **Please print your name in capital letters using no more than 14 characters (including spaces).**

Name: _____
 Address: _____
 City: _____ State: _____
 GDP-1225 Zip: _____



Credit card orders call TOLL-FREE 24 hours a day:

1-800-253-0570



Revolutionize your CW with the programmable automatic memory keyer

SKILL LEVEL Add programmable excellence to all your CW. Patented command strings let you store text in buffers; select speed, weight, spacing or message repeat count for each; and link them together in any sequence. A special editing feature lets you correct programming errors. Enter text and send with any setting you wish. Text can be added into a buffer message being sent. CMOS memory with battery backup retains the buffer contents and last selected setting when the keyer is without power. 1 5/8" H x 4 1/8" W x 6" D.

Kit SA-5010-A (3 lbs.) \$129.95

Accessory:

120 VAC Power Adapter Cube

Assembled PS-5012 (1 lb.) \$15.95

Specifications: **Speed Range:** 1 to 99 wpm. **Character/Word Spacing:** Less than or equal to speed setting. **Number of Buffers:** 1 to 10. **Buffer Size:** 240 characters plus commands. **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. **Sidetone:** Approximately 300 to 1500 Hz, adjustable. **Power:** External transformer (optional) or 11 to 16 VDC @ 200 mA.

Our customers write...

I received the active audio filter I had ordered within 5 days. I was impressed with the clarity of the manual and the ease of assembly. It worked great the first time. In fact, I was so pleased that I ordered another item from the online store. Thanks!"

Joseph Bly
Denver, Colorado

Deluxe antenna tuner

SKILL LEVEL Use the Deluxe Antenna Tuner to match an antenna to your transmitter at any frequency in the 160-10 meter HF spectrum. You get all the features of a first-rate antenna tuner combined with most of the features of a dual wattmeter. In addition, it covers the 160-Meter and WARC amateur bands.

The tuner will effectively tune and match balanced or unbalanced feedlines and single-wire and ladder lines at the full legal power limit of your station. With its continuously variable inductor, you are assured of precise antenna matching from 1.8 to 30 MHz, including the MARS frequencies and all the newly allocated bands. A convenient front panel counter enables you to quickly set the inductor to previously calibrated frequencies.

With a single switch you can select a dummy load or any of three permanently connected antennas, including a long-wire antenna. There's no need to connect and disconnect feed lines to load your transmitter into the dummy load.

Dual wattmeters read both forward and reflected average power, in two ranges, for more efficient low band operation. The wattmeter section of the antenna tuner installs directly into your transmission line to measure the power on all frequencies between 1.8 and 30 MHz. It measures output up to 200/2000 watts in the forward direction and up to 50/500 watts reflected. Dual meters indicate the forward and reflected power separately with a high degree of accuracy. A factory aligned and



calibrated sensor head ensures that you get the highest accuracy measurement. SWR indications on the reflected meter provide direct readings from 1:1 to 3:1.

The silver-plated straps and roller contact assembly minimize RF loss at high frequencies. And the large feed-through insulators withstand high-voltage RF. The antenna tuner handles power inputs up to 2000 watts PEP on SSB and 1000 watts CW. With its factory-calibrated components, easy-to-read dual wattmeters and front panel controls, the Deluxe Antenna Tuner is an indispensable addition to your system. Dimensions are 5 3/4" H x 14 1/2" W x 13 7/8" D.

Kit SA-2060-A (20 lbs.) \$399.95

Specifications: **Frequency Range** (continuous tuning): 1.8 to 30 MHz. **INPUT POWER CAPABILITY:** SSB: 2000 watts (peak). CW: 1000 watts. **Input Impedance:** 50 ohms. **Output Impedance:** Wide range. **Balanced to Unbalanced Transformation:** 4:1 balun. **Meter Functions:** Forward and Reflected average power, and SWR. **METER RANGES:** Forward (2 ranges): Low - 0-200 watts. High - 0-2000 watts. **Reflected** (3 scales): Low - 0-50 watts. High - 0-500 watts. **SWR** - 1:1 to 3:1. **WATT-METER ACCURACY** (full scale): 200 W and 2000 W (FWD), 500 W (REF); ±5% (AVG). 50 W (REF); ±7.5% (AVG). **Insertion SWR:** Less than 1.1:1.

Multi-mode SSB/CW/RTTY active audio filter makes the tough ones easy to copy

SKILL LEVEL Solve overmodulation splatter, partially overlapped sideband signals and more with the Heathkit Active Audio Filter. The HD-1418 consists of five-pole (section) high-pass and low-pass filters, plus a two-pole notch/peak filter. You can move these filters through a 300 to 2500 Hz audio frequency band to help you select or reject certain frequency components of signals you tune in with your shortwave equipment. Versatile



power requirements make the Active Audio Filter usable almost anywhere. Just supply 7-13.5 volts AC or 9-18 volts DC. Dimensions are 1 7/8" H x 8 7/8" W x 6 5/8" D.

Kit HD-1418 (3 lbs.) \$89.95

Accessory:

120 VAC Power Adapter Cube
Assembled PS-5012 (1 lb.) \$15.95

1.6-250 MHz dip meter



Use the multi-purpose Dip Meter to find approximate resonant and operating frequencies of either energized or de-energized circuits. The HD-1250 helps adjust traps, detect parasitic oscillations and harmonics, measure unknown Q/L/C values, locate sources and frequencies of RF energy. Use too as a signal generator, relative field strength meter or receiver alignment tool. Requires 9V battery. 2" H x 2 1/4" W x 5 7/8" D. **Kit HD-1250** (4 lbs.) \$129.95

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

Coaxial switch

Manually route one RF source to any one of several antennas or loads, while grounding all outputs not in use. Switch from up to four antennas or interconnecting equipment. Handles 2 kW PEP with maximum 1.1:1 SWR to 250 MHz. Built-in mounting brackets. Mount width: 4 1/4"

Kit HD-1234 (1 lb.) \$29.95



Dual HF wattmeter

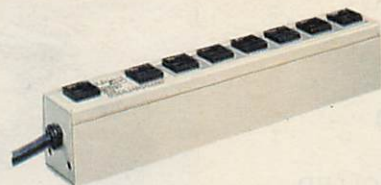
Achieve peak efficiency on low bands. The HM-2140-A monitors both forward and reflected power in your transmission line. A second scale on the reflected meter reads SWR directly from 1:1 to 3:1. Output is measured up to 200/2000 watts PEP ($\pm 5\%$) forward direction and up to 50/500 watts reflected. Pushbutton switch to high or low power ranges for precise readings. Dual-position switch lets you read PEP or average power. Requires 9V battery or use 120 VAC with the PS-2350 Battery Eliminator. 4 1/8" H x 7 1/2" W x 6 3/8" D.

Kit HM-2140-A (5 lbs.) \$129.95

Accessory:

Battery Eliminator

Assembled PS-2350 (1 lb.) \$7.95



This outlet box is smart

Flip on your transceiver and your whole system powers up. The Smart Outlet Box turns on six other units when the unit plugged into its control socket goes on. Our highest quality. Offers surge protection, noise filtering. 2 1/4" H x 14 1/4" W x 2 3/4" D. 10A capacity.

Kit GD-1495 (5 lbs.) \$59.95



Quiet headphones

Comfortable 8-ohm headphones feature 40 to 15,000 Hz frequency range, 2 1/4" speakers, individual volume controls and 10' cord.

Assembled HDP-1396

(2 lbs.) \$14.95

Our customers write...

"Shortly after getting my first Sham license in 1949, I purchased a Heathkit Handitester model M-1. ... The unit has performed magnificently ever since in spite of brutal service. ... Speaking from 30 years as an electronic engineer, it has to be the most solidly designed piece of electronic equipment I can recall!"

Charles W. Lobb
Lomita, California

Remote coax switch

Switch antennas from inside your station with the Remote Coax Switch.



Remote and indoor control unit connect through your coax cable to eliminate multiconductor control cable. Tower- or mast-mounted remote operates up to four antennas. Handles 2000 watts PEP and has a VSWR of 1.15: or less. Frequency range is from 1.8 to 54 MHz with impedance of 50 to 70 ohms and loss at 54 MHz of less than 0.2 dB. Uses 120 VAC. Control: 2 3/8" H x 5 1/2" W x 7 1/2" D. Remote: 7 1/8" H x 8 3/8" W x 4 1/2" D.

Kit HD-1481 (5 lbs.) \$79.95



Get remote control with decoder

Hear only messages meant for you — not extraneous monitor racket. Connect the Touch Tone Decoder in series with your receiver or scanner speaker. Turn it on and it mutes the speaker until it detects the unique DTMF code you've programmed. Use also for operation of single functions in the control of a repeater, or as a secondary control link for autopatch on/off. You can preset the open line time for up to eight minutes or enter a two-digit code to open and close the line at will. Requires 7.5-11 VAC, 11-16 VDC or PS-5012, below.

Kit HD-1530 (2 lbs.) \$79.95

Accessory:

120 VAC Power Adapter

Assembled PS-5012 (1 lb.) \$15.95



Low pass filter

Solve emissive RF interference problems with this low-pass Barker & Williamson filter for 160-10 meters. Minimum 70 dB attenuation. Cut-off frequency of 34 MHz, less than 0.3 dB insertion loss. 50 ohm impedance. Rated for legal power.

Assembled HDP-3700

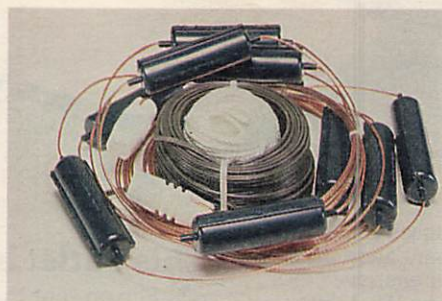
(2 lbs.) \$36.95



Fixed station microphone

Shure's CONTROLLED MAGNETIC Fixed Station Microphone is designed with amateur radio features. It offers dual selectable output impedance and frequency response tailored for intelligibility. Normal or VOX operation. Push-to-talk switch bar.

Assembled HDP-444
(3 lbs.) \$64.95



SWL antenna

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

Assembled HDP-7800 (3 lbs.) \$64.95

World-famous HAM-IV and Tailtwister rotators

For an antenna array of up to 15 sq. ft. wind load area, the HDP-1487 features bell rotator design, dual 98 ball bearing race, machine steel ring and ring drive gear system.

The HDP-1488 handles antennas with wind load areas of up to 20 sq. ft. Features thickwall castings, 138 ball bearings and triple bearing race. Maximum mast size for both is 2 1/16."

Assembled HDP-1487
HAM-IV (24 lbs.) \$299.95

Assembled HDP-1488
Tailtwister (28 lbs.) \$369.95



Heath antenna dummy load

Eliminate unnecessary QRM during tune-up and minimize mistakes while performing hot gear maintenance or alignment. Handles 1 kW of RF with VSWRs less than 1.5:1 up to 450 MHz. Requires 1 gallon mineral or transformer oil.

Kit HN-31-A (3 lbs.) ... \$24.95

High-quality amateur radio antennas from Heath

Model No.	HA-2513	HDP-1482	HDP-1483	HDP-1484	HDP-1485	HDP-1486	HDP-1472	HDP-1474
Bands (meters)	6, 2, 220, 450, 902, 1296	2	10	80-10	20, 15, 10	20, 15, 10	2	2
Maximum Gain (dB)	0	3	12	—	9.6	8.8	3	3
Bandwidth @ 2:1 VSWR (MHz)	50-1,300	7	1.5	—	—	—	2	4+
Front-to-Back Ratio (dB)	—	—	34	—	34	27	—	—
Elements	—	2	5	—	7	4	1	1
Max. Wind Survival (MPH)	—	100	100	80	100	100	—	—
Surface Area (sq. ft.)	—	.67	3.9	—	9.4	7.5	—	—
Length (ft.) (Beams = Boom Length)	5 1/2	—	24	25	24	14	4 1/2	2 3/4
Turning Radius (ft.)	—	—	15	—	20	17 1/4	—	—
Boom Diameter (in.)	2	—	2	1 5/8	2	2	—	—
Weight (lbs.)	6	4	29	12	82	50	3	2
Price	\$79.95	\$69.95	\$199.95	\$159.95	\$649.95	\$439.95	\$29.95	\$42.95
Antenna								

Storage tray

4" long nose pliers

Diagonal cutters

Wire strippers

Interchangeable tips



20-watt soldering iron


4 oz. rosin core solder

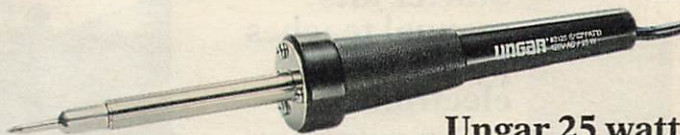
1/4" nut driver

Slotted screwdriver

Phillips screwdriver

Soldering aid tool




TOOLS 



**Ungar 25 watt
700°F soldering iron**

Ungar irons combine economy with performance for all types of home and work jobs. This 4-ounce unit is ideal for electronics, radio, hobbies and delicate repairs. Its replaceable tip design accommodates the variety of accessory tips shown below. And the heat-resistant handle is molded for comfortable handling. UL listed. Iron holder included.

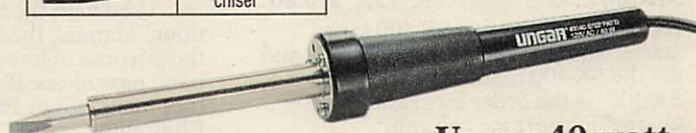
Assembled GDP-3125 (1 lb.) \$12.99

	(2) pencil
	(2) small chisel
	(2) long taper chisel

Replacement tips

2 pencil tips, 2 small chisel tips, 2 long taper chisel tips.

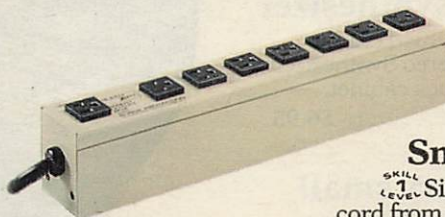
GDP-3100 (1 lb.) \$8.95



**Ungar 40 watt
900°F soldering iron**

This tool is essential for every work bench and tool kit. Balanced and cool-to-the-grip, this 40 watt soldering iron is the one you'll use for bigger electrical repair, electronics, hobby and kit assembly jobs. The GDP-3140 features a replaceable tip design to accommodate the variety of tips described above. UL listed, the GDP-3140 comes with its own holder.

Assembled GDP-3140 (1 lb.) \$17.95



Smart outlet box

Simply plug 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. Surge protection, 10A capacity.

Kit GD-1495 (5 lbs.) \$59.95

Electronic tool kit with carrying case

This is a perfect starter selection of tools for the beginning kit builder. Included are a Weller 20-watt soldering iron with two interchangeable tips, a soldering aid, a 4 ounce spool of solder, wire strippers, diagonal cutters, 4" needle nose pliers, 1/4" nut driver, and a slotted and Phillips screwdriver. These tools are contained in a durable 3" H x 10 3/4" W x 10" D carrying case with a built-in carrying handle. All tools are stored in a molded storage tray.

Assembled GHP-1270 (2 lbs.) \$42.95

Weller temperature-controlled soldering station



This lightweight soldering pencil features low voltage, 700°F closed loop temperature control for steady and fast soldering and a component-protecting grounded tip. Detachable stand contains a water reservoir.

Assembled GDP-1108 (5 lbs.) ... \$89.95

Accessory:

5 Assorted Tips GDP-1109 (1 lb.) \$17.95

Precision LUXO magnifier lamp



See the most minute details with the famous LUXO magnifier lamp - even those 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. And, an energy-conserving 22-watt circular fluorescent bulb provides uniform and shadowless lighting, moves at a touch and stays where you put it. Arms have 45" total reach. Includes clamp-type mounting bracket. 120 VAC, UL approved.

Assembled GDP-200 (7 lbs.) \$89.95

Headband magnifier



This comfortably fitting magnifier with adjustable headband frees both your hands for work. Shatter and scratch resistant lenses magnify 2 1/2 times. Works well with eyeglasses.

Assembled GDP-201 (1 lb.) \$24.95

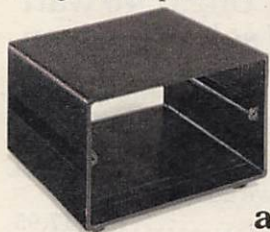


Starter kits manual teaches principles of electronics

Turn starter kits into learning tools with a Starter Kits Educational Manual. With this manual, you'll learn the electronic principles used in all the SK-100 series starter kits. Each kit is covered in a separate lesson so no particular sequence is required — you decide which kit to build. Lessons include an introduction and learning objectives, with topics broken down into small units to make studying easier. A test at the end of each lesson gives you a chance to check what you've learned.

SK-100 (2 lbs.) \$10.00

SAVER! Buy any two SK-100 series starter kits (SK-100 through SK-111) and get the SK-100 manual FREE. Just write SK-100 on the order form and "no charge" in the price column.



Cabinet for the audio amp and synthesizer

SKILL LEVEL 1 Finish up your SK-104-H Audio Amplifier or SK-107 Stereo Synthesizer with this handsome black cabinet.

Kit SK-99 (1 lb.) \$6.95



Vary small appliance motor speed

SKILL LEVEL 1 Save energy and wear and tear on any of your universal-type motor-driven tools and appliances. With the Motor Speed Control, you can use a large drill to cut through steel at slow speed without overheating the motor. It's ideal for use with electric hand tools and small household appliances. You'll also learn the function of a diac and triac for AC control with this easy starter kit. Just follow the lesson in the optional Starter Kits Educational Manual. Operates on 120 VAC, 60 Hz. 2" H x 5 3/8" W x 3 5/8" D.

Kit SK-103 (1 lb.) \$39.95



Low-cost stereo synthesizer

SKILL LEVEL 1 Get more enjoyment from TV viewing with this dual mode Stereo Synthesizer. Pseudo-Stereo converts a mono input into two different channels for synthesized stereo, and the mono mode allows straight-through operation.

Used with the Starter Kits Educational Manual, the SK-107 demonstrates the purpose of low-pass, high-pass and band pass filters. Requires 9V battery (not included) or PS-2350 Battery Eliminator.

Kit SK-107 (1 lb.) \$19.95

Accessory:

Battery Eliminator

Assembled PS-2350 (1 lb.) \$7.95



Liven parties with the sound flasher

SKILL LEVEL 1 Add sparkle to your next get-together with the Sound Flasher. Watch the fun as music and voices in the room cause lamps or party lights to brighten and dim in response to the ambient sound. Also see how pulses control lamp brightness and learn about rectifier theory when used with the optional Starter Kits Educational Manual. Operates on 120 VAC, 60 Hz. 2 1/4" H x 3 1/8" W x 5 1/8" D.

Kit SK-109 (1 lb.) \$19.95



1-watt audio amplifier

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

Learn how to change gain and frequency response with the optional Starter Kits Educational Manual. Requires 9V battery (not included) or PS-2350 Battery Eliminator.

Kit SK-104-H (1 lb.) \$19.95

Accessory:

Battery Eliminator

Assembled PS-2350 (1 lb.) \$7.95



An intercom system for your home

SKILL LEVEL 1 Use the Heathkit Intercom to talk to a family member

in another room without leaving what you're doing, or call someone to the phone without running to another room or shouting for them. Your whole family will appreciate the convenience and the excellent audio quality of this system.

At least two intercoms must be used, and you can link up to four units using two-conductor wire. The intercom runs for months on one 9V battery (not included) because current is drawn only when the unit is in operation. Or power your unit with the PS-2350 Battery Eliminator. The lesson in the optional Starter Kits Educational Manual will instruct you in audio amplifier theory and impedance matching. Dimensions of the unit are 4 1/2" H x 3 1/4" W x 1 3/4" D.

Kit SK-108 (2 lbs.) \$21.95

Accessory:

Battery Eliminator

Assembled PS-2350 (1 lb.) \$7.95

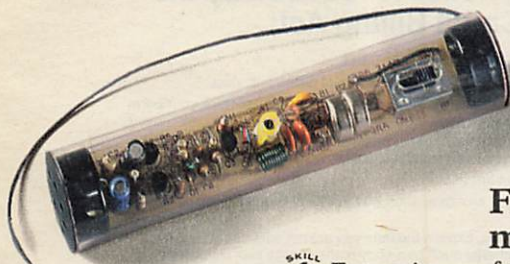


DC power supply

SKILL LEVEL 1 Power up your hobbyist kits, tape player or CB with the DC Power Supply. The Power Supply has a variable output from 4 to 18 volts and supplies 3 amps 50% duty cycle or 2 amps continuous. Included zener diodes change the output to either 9 or 14 volts to power DC equipment. Also learn the purpose of a power transformer, rectifier circuit, filter circuit and regulator circuit with the optional Starter

Kits Educational Manual. 3" H x 4½" W x 6½" D.

Kit SK-101 (5 lbs.) \$44.95



FM wireless microphone

SKILL LEVEL 1 Entertain your friends or be a DJ for your own radio show with this FM wireless microphone kit. Transmit your voice to any FM radio up to 50 feet away. It's a fun and easy kit that you can build in less than one evening. Also learn about FM radio theory with the optional Starter Kits Educational Manual. Operates on two watch batteries (included).

Kit SK-106-H (1 lb.) \$12.95

Hands-free speaker phone



SKILL LEVEL 1 Now you can continue with other activities during a telephone call. The Heathkit speaker phone starter kit frees both your hands while you carry on a phone conversation. You can even answer your phone without lifting the handset from its cradle.

Connect the speaker phone to your phone line by plugging it into your standard modular telephone connector. This device is phone-line powered so you don't even need batteries. Volume, privacy and answer controls are all there is to operating the speaker phone. As you build your kit, follow the matching Starter Kits Educational Manual lesson and learn about rectifiers and filters. 2" H x 5¾" L x 4¾" D.

Kit SK-110 (2 lbs.) \$44.95



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570

Practice Morse code with this oscillator

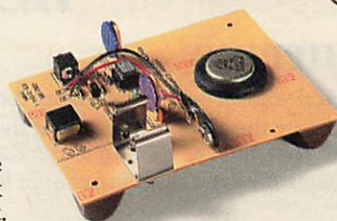
SKILL LEVEL 1 Learn international Morse Code with this low-cost code practice oscillator. Enter code on the built-in pushbutton or hook up your own keyer to the kit.

Adjust the tone and volume to your liking. A great practice aid for beginners in amateur radio, this starter kit also demonstrates the use of the popular 555 IC timer when used with the optional Starter Kits Educational Manual. Requires 9V battery (not included) or PS-2350 Battery Eliminator.

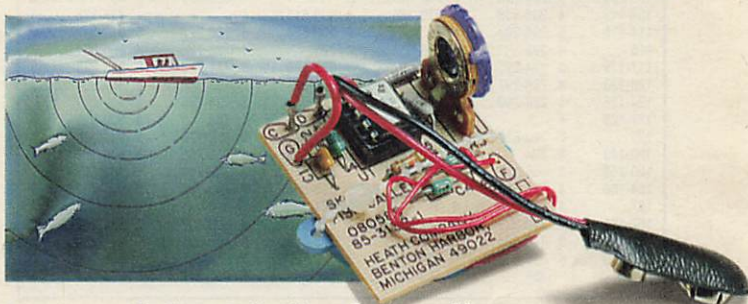
Kit SK-102 (1 lb.) \$14.95

Accessory:

Battery Eliminator Assembled PS-2350 (1 lb.) \$7.95



STARTER KITS 1



Attract fish with the fish caller

SKILL LEVEL 1 You'll find that it's easy to attract and catch fish with our simple-to-build Fish Caller. The Fish Caller produces a sound that travels through water to attract hungry fish to your area. You can relax and wait for the fish to come to you.

Learn about the 555 timer IC with the optional Starter Kits Educational Manual. Requires a 9V battery (not included).

Kit SK-105-H (1 lb.) \$7.95



Sound activated switch

SKILL LEVEL 1 Turn on a TV or a lamp from across the room – just by clapping your hands. The first time the switch picks up a loud sound it turns on the device. The following loud sound turns the device off again. Used with the optional Starter Kits Educational Manual, this kit demonstrates the operation of a flip-flop circuit. Uses 120 VAC. 2¼" H x 3⅞" W x 5⅞" D.

Kit SK-111 (1 lb.) \$19.95

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

Use your Visa, MasterCard, American Express or Heath Revolving Charge when you call us toll free. Our operators are ready to serve you 24 hours a day. For the most efficient handling of your order, please fill out your order form before you call.

BY MAIL:

Please follow these steps so we can process your order quickly:

1. Use the order form at left.
2. Use the same name each time you order.
3. Give your full address, including apartment number if any. Include zip code and daytime phone number in case we have questions about your order.
4. For UPS delivery to rural route or P.O. Box addresses, please give complete delivery information.
5. Include quantity, model number, description, price and ship weight (listed in parentheses following each product) for each item you order. Figure shipping and handling charges from the rate chart on page 50.
6. Please attach a separate sheet to order replacement parts and manuals, or for any correspondence.

BY COMPUTER:

Enjoy the ease and convenience of shopping by computer with the Heathkit Online Catalog through COMPUSERVE. Just type **GO HTH** at any ! or **OK** prompt and get instant electronic access to bargains, specials and new products. Browse through over 400 products by following a series of menus. You can even place your order online using your Visa, MasterCard or Heath Revolving Charge.

TERMS:

Heath Revolving Charge. You can open a new Heath account with a purchase as small as \$100 with 10% down. Call 616-982-3561 for an application, or write the Heath Company. Once your account is open, you may add to your existing balance in any amount within your credit limit. See below for ordering replacement parts.

Credit Card Purchases. Use Visa, MasterCard or American Express to charge Heathkit products. Just include your card number, expiration date and your signature in the spaces provided on the order form. Charge replacement parts to your credit card.

Commercial Accounts. Heath offers net 30-day terms to companies with rated credit.

Educational accounts. Heath offers net 30-day terms to Patterson-listed educational institutions. An authorized purchase order is required.

Note: All credit orders subject to Heath Credit Department approval.

**COMMERCIAL, INDUSTRIAL
AND EDUCATIONAL SALES:**

Custom Orders. Heath Company fills custom orders for any of its kit or assembled products. Plus, we'll customize your purchases of 250 units or more to reflect your company's image and market. We can also tailor our highly acclaimed educational materials to suit your target market, and even add your company logo.

Orders Above 250 Units. To find out how to put Heath quality products in your package or to get information about quantity sales and specific modifications, write or call Contract Sales: 616-982-3519.

Orders Under 250 Units. For orders of less than 250, write or call Marketing Services: 616-982-3454. Give us a call to find out what we can do for you.

ASSISTANCE AND INFORMATION:

- Product Orders** call TOLL-FREE
24 hours a day 1-800-253-0570
- Replacement Parts Orders:** (please have Heath part number available when you call) 616-982-3571
- Order information,** delayed shipments, etc. 616-982-3275
- Dealer Sales** 616-983-7313
- Overseas Orders:** International Division 616-982-3512
- Computer Sales** Information 616-982-3285
- General Office** (non-order calls) 616-982-3200

Technical Assistance (8:00 A.M. to 4:30 P.M. Eastern Time, weekdays only):

- Educational Products 616-982-3980
- Amateur Radio 616-982-3296
- Test Equipment, Weather Instruments, Clocks 616-982-3315
- TV, Audio, Video 616-982-3307
- Home Products, Security, Telephone, Marine, Auto, RC 616-982-3496
- Computer Hardware 616-982-3309

CAREER OPPORTUNITIES:

The following exciting and challenging job opportunities currently exist at Heath Company.


- Educational Media Designers
- Technical Writers
- Hardware/Software Design Engineers
- Production Supervisors
- Computer Technicians
- QA Engineers
- Test Engineers

To find out more, call or send your resume and salary requirements to Ms. Pat Kauffman or Mr. Steve Slonkosky, Heath Company, Dept. HS89, Hilltop Rd., St. Joseph, MI 49085, (616) 982-3203.

An Affirmative Action Employer
Part of the Zenith Computer Group



Workstations

COMPUTERS 

At Heath Company we're dedicated to making your computer purchase the easiest and most enjoyable buying decision you'll ever have to make. That's why we've established a team of expert computer sales consultants to help you design a workstation to meet your particular needs – from education and business to computer-aided design and desktop publishing. In addition, we'll give you a special price on your workstation, so it will actually cost less than buying each item separately.

Quality

Our workstations are made up of the finest products, from the compact Heathkit HS-42 for the advanced student, to the portable, yet powerful Heathkit HS-2860 for the executive on the go. And, you can outfit your system with well known peripherals such as Epson printers and Kraft mouses, and software such as Hyper-ACCESS and Aldus PageMaker. When you talk to our computer consultants, make sure you ask for more information on products not included in the catalog that could enhance your workstation.

Support

We've been in business for over 40 years and we'll be here tomorrow to stand by our products. This means the help doesn't stop after you purchase your system. We continue to support you with our famous technical assistance and service. If you ever have a problem or question, our technical assistance team is only a phone call away with the information you need. And, we include a 1-year limited warranty with all Heathkit products.

Simplicity

In keeping with our easy purchase pledge, we've made designing a workstation a simple procedure. Just look through the following pages and note any computer products you might want in your system. Then give one of our expert computer sales consultants a call at 1-800-253-0570. They'll guide you through the process of assembling a workstation to meet your exact needs. Or, if you just have questions regarding our workstation program, give us a call. Our consultants are available to assist you Monday through Friday from 8:00 a.m. to 4:30 p.m. Eastern Standard Time.



FREE Partnership Pack

Save up to \$500 with the discounts you'll find inside the Heath/Zenith Partnership Pack included with each kit or assembled computer.

The pack includes a free diagnostic check-up, savings on Winchester or floppy disk drive upgrades, and certificates good for discounts and free software.



Portable Workstation.

If your work takes you out of the office, take the office with you. Your workhorse portable system might include the Heathkit HS-2860 laptop computer for last minute spreadsheet analysis, Migen Ability Plus business software and a Brother 9-pin printer for sharp, professional looking documents.



Compact Workstation.

If space is at a premium in your office, then a compact workstation is the answer. Our high-performance Heathkit HS-42 desktop computer takes no more space than a typewriter. Add a 14" amber VGA monitor and an Epson LQ-500 printer for a price that fits your budget.



Desktop Publishing

Workstation. Get rid of high typesetting costs by doing it yourself with a desktop publishing workstation. Combine the power of the Heathkit HS-2526-A computer, Zenith FTM monitor, Aldus PageMaker and Qume's Crystal Print Series II printer for documents that rival typeset quality.



**HS-42 AT
Compatible
Computer
speeds through
spreadsheets
and databases**

new

Optional video display

MEMORY NOW INCLUDED!

The computer industry shortage of memory (RAM) chips has passed, and once again Heathkit computers come shipped with RAM for your convenience.

All the power of a professional desktop PC in only half the space

Taking up no more space on your desk than most monitors, the sleek, mini-cabinet Heathkit HS-42 computer features two 3.5" disk drives and fast processing speed.

Fully AT compatible, the HS-42 incorporates the 12MHz 80286 processor with zero wait state technology, making it perfect for those who demand their answers fast. In addition, you can add an optional 80287 math co-processor for quicker speeds through number intensive applications.



HS-42 Desktop Computer

Featuring two standard 1.4MB 3.5" disk drives, the HS-42 lets you add an optional 20MB (HWD-420) or 40MB (HWD-440) hard drive without sacrificing a floppy. Also, the optional HWD-420 and HWD-440 take up only half of a card slot, leaving 1.5 (after video installed) AT compatible slots for further expansion.

With 6MB RAM maximum potential on the main board, you'll have more than enough memory to run large spreadsheets or operate windowed applications. Also included is the Lotus Intel Microsoft Expanded Memory Specification, a feature allowing major software applications to take advantage of memory you install beyond the usual user limit of 640K.

Interfaces for the HS-42 include one 25-pin parallel connector and two 9-pin AT compatible serial connectors that allow for such peripherals as mouse devices, external modems, plotters and a standard printer.

The professional keyboard features 101 keys and a layout designed for efficiency and speed. The keyboard even tilts to the most convenient angle. Also included is a real time clock/calendar, integrated on the system board, that automatically dates your files for efficient storage.

The HS-42 delivers outstanding graphics performance, too, with the HVB-550 video card featuring a high resolution of 640 x 480 and providing VGA, EGA, CGA, MDA and Hercules video capabilities.

Measuring only 14" wide, 15" deep and less than 4" high, the contemporary, compact cabinet fits into any office or school work place. And, as an added security feature, you can lock the computer's cover which will prevent access to the system components.

Configurations:

Heathkit 12MHz AT Compatible Computer: Equipped with 1MB of RAM, two 1.4MB 3.5" disk drives, HVB-550 video card, deluxe 101-key keyboard and two expansion slots. Includes MS-DOS, Integrated 7+, Diagnostix and MS-Windows. Kit HS-42 (34 lbs.) **\$2249.00**

Heathkit 8MHz AT Compatible Computer: Equipped with 1MB of RAM, two 1.4MB 3.5" disk drives, HVB-550 video card, deluxe 101-key keyboard and two expansion slots. Includes MS-DOS, Integrated 7+, Diagnostix and MS-Windows. Kit HS-40-A (31 lbs.) **\$1799.00**

Zenith 8MHz AT Compatible Computer: Equipped with 1MB of RAM, one 1.4MB 3.5" disk drive, one 20MB Winchester hard drive, VGA video card, deluxe 101-key keyboard and two available AT compatible expansion slots. Assembled ZCV-2325-EY (34 lbs.) **\$3299.00**

Accessories:

External Drive Interface. Allows connection of 5.25" 360K disk drives. Requires an expansion slot. Assembled ZCA-2300-EF (1 lb.) **\$50.00**

5.25" 360K Disk Drive
Assembled Z-207-7 (5 lbs.) **\$199.00**

20MB 27 ms Winchester Hard Disk Drive
Assembled HWD-420 (4 lbs.) **\$539.00**

40MB 28 ms Winchester Hard Disk Drive
Assembled HWD-440 (3 lbs.) **\$699.00**

2MB Memory Upgrade Kit. Limited availability. Assembled ZCA-2300-MG (1 lb.) **\$1399.00**

80287 Numeric Co-Processor
Assembled Z-416-C (1 lb.) **\$375.00**



HS-2526-A Computer with 3.5" drive and optional monitor

MEMORY NOW INCLUDED!

The computer industry shortage of memory (RAM) chips has passed, and once again Heathkit computers come shipped with RAM for your convenience.

Get maximum performance from the Heathkit 12 MHz PC

SKILL LEVEL 1 The Heathkit HS-2526-A is a 80286-based 16-bit desktop computer featuring a 12 MHz CPU clock frequency and zero wait state technology – perfect for the engineer or serious home computerist.

Capable of running a large selection of readily available PC and AT compatible software, the HS-2526-A includes a 1.4MB 3.5" floppy drive, 1MB RAM (6MB maximum potential on the main system board), Expanded Memory Specification (EMS), high resolution 640 x 480 graphics card and four open 16/8-bit PC/AT expansion slots.



HS-2526-A 12 MHz Computer

In addition, the HS-2526-A's ROM-based diagnostics, with lithium battery-backed configuration, simplify system setup and instantly display the status of your computer at power-up. For more convenience, the deluxe 101-key keyboard tilts to a comfortable working angle for those long computing sessions.

Configurations:

- Heathkit HS-2526-A:** Equipped with 1MB of RAM, one 1.4MB 3.5" floppy drive, HVB-550 video card, two serial ports and one parallel port. Includes MS-DOS, Diagnostix, Integrated 7+ software and MS-Windows.
Kit HS-2526-A (46 lbs.) **\$2399.00**
- Zenith ZBV-2526-EK:** Equipped with 1MB of RAM, one 1.4MB 3.5" floppy drive, a 40MB Winchester, VGA video card, two serial ports and one parallel port. Includes MS-Windows. Assembled ZBV-2526-EK (52 lbs.) **\$4799.00**
- Zenith ZBV-2527-EK:** Equipped with 1MB of RAM, one 1.4MB 3.5" floppy drive, a 80MB Winchester, VGA video card, two serial ports and one parallel port. Includes MS-Windows. Assembled ZBV-2527-EK (55 lbs.) **\$5499.00**
- Zenith ZBO-2503-EK:** Equipped with 1MB of RAM, one 1.2MB 5.25" floppy drive, two serial ports and one parallel port. Assembled ZBO-2503-EK (50 lbs.) **\$2999.00**

Accessories:

- 40MB 28 ms Winchester Disk Drive.** Includes cables. Formats at 44MB. Assembled HWD-4028 (4 lbs.) ... **\$659.95**
- 2MB Memory Upgrade Kit.** Limited availability. Assembled Z-605-1 (1 lb.) **\$1399.00**
- 80MB Winchester Disk Drive.** Requires Z-417-2 cable when installing in floppy-only models (formats at 72MB). Assembled ZD-800 (9 lbs.) **\$1999.00**
- Winchester Cable.** Required for the installation of the first Winchester hard disk drive. Assembled Z-417-2 (1 lb.) **\$20.00**
- 5.25" 360K Disk Drive**
Assembled Z-207-7 (5 lbs.) **\$199.00**
- 5.25" 1.2MB Disk Drive**
Assembled ZD-12 (5 lbs.) **\$250.00**
- Color Video Card.** Features two ports and automatic switching between MDA, CGA, VGA, EGA and Hercules graphics. Assembled HVB-550 (3 lbs.) **\$599.00**
- 1.4MB 3.5" Disk Drive.** Requires ZCA-14 (below). Assembled ZD-14 (3 lbs.) **\$219.00**
- ZCA-14 Cable.** Includes mounting hardware. Assembled ZCA-14 (1 lb.) **\$29.00**
- Winchester Upgrade Kit.** Allows installation of an optional 20MB 65 ms hard disk drive. Disk has plated recording media for maximum durability and data integrity, plus automatic head lifters to prevent head damage even during power outages. Cables included. Assembled HWD-20-AT (3 lbs.) **\$239.00**
- 80287 Numeric Co-Processor**
Assembled Z-416-C (1 lb.) **\$375.00**



HS-386 Desktop Computer with optional video display

New low price on the most powerful computer kit ever

SKILL LEVEL 1 This powerful, 80386-based micro-computer, with superb high-resolution graphics, includes bonuses like MS-DOS, Diagnostix, a Partnership Pack, described on page 53, and Integrated 7+ software. High reliability is ensured, because every 80386 microprocessor in our HS-386s is 100% tested for all functions.

The HS-386 is perfect for windowing operations, software development, CAD/CAM, desktop publishing, large spreadsheets and networking. In addition, you can run most PC and AT compatible software, and at 16 MHz, software will run two to three times faster than on 8 MHz AT computers.

You get a dual port video card capable of operating your VGA, EGA, CGA, TTL or Zenith's new FTM monitor (page 64). You also get a dual disk controller card that operates two 5.25" or 3.5" floppy drives and two hard disk drives.

The HS-386 comes with zero wait state technology - 1MB RAM expandable to 16MB, serial and parallel communication ports for printers and modems, plus a deluxe keyboard. The HS-386 uses 115/230 VAC, 50/60 Hz. An alternate AC line cord is required for 230 VAC operation. Dimensions are 6.5" H x 21" W x 16.5" D.

HS-386 Desktop Computer. Equipped with 1MB RAM, video card and 1.4MB 3.5" disk drive. Includes MS-DOS, Diagnostix, Integrated 7+ software, a Partnership Pack, Windows and printer cable.
Kit HS-386-C
(62 lbs.) Was \$3349.00 Now **\$2999.00**

Includes Integrated 7+. This menu-driven applications package contains a spreadsheet as easy as 1-2-3, a word processor, relational database manager, database merging, graphics, terminal emulation and PC-to-PC communications. A super value!

Other Configurations:

ZBV-3339-EQ Desktop Computer
Equipped with 1MB RAM, VGA video, 1.2MB 5.25" floppy drive and a 40MB hard drive. Includes MS-DOS and Microsoft Windows 386.
Assembled ZBV-3339-EQ
(51 lbs.)..... **\$5499.00**

ZBV-3340-EQ Desktop Computer
Equipped with 1MB RAM, VGA video, 1.2MB 5.25" floppy drive and a 80MB (unformatted capacity) hard drive. Includes MS-DOS and Microsoft Windows 386.

Assembled ZBV-3340-EQ
(51 lbs.) **\$6399.00**

Accessories:

HUG-386 Upgrade Kit. Allows you to convert your H-248 series computer to a full H-386.

Kit HUG-386 (13 lbs.) **\$2999.00**

HUG-386-C Upgrade Kit with Dual HD/FD Controller Card. For H-241 and floppy-only H-248 models.
Kit HUG-386-C (13 lbs.) **\$3149.00**

Attention current and prospective Heath Users Group (HUG) members, H-241, H-248 kit builders: You may be entitled to a substantial discount on your HUG-386 or HUG-386-C. Call HUG for details: 616-982-3838.

3.5" 1.4MB Disk Drive
Requires ZCA-14 (below).
Assembled ZD-14 (3 lbs.) **\$219.00**

ZCA-14 Cable. Includes mounting hardware.

Assembled ZCA-14 (1 lb.) **\$29.00**

5.25" 1.2MB Disk Drive
Assembled ZD-12 (5 lbs.) **\$250.00**

5.25" 360K Disk Drive
Assembled Z-207-7 (5 lbs.) ... **\$199.00**

Winchester Upgrade Kit. Allows installation of an optional 20MB 65 ms hard disk drive. Disk has plated recording media for maximum durability and data integrity, plus automatic head lifters to prevent head damage.
Assembled HWD-20-AT
(3 lbs.) **\$239.00**

STANDARD	80386 Microprocessor	1MB RAM	Single 1.4MB 3.5" disk drive	Monochrome/color capability	Monitors
TO EXPAND ADD	Z-416-2 80287 Numeric Co-Processor	Z-505 1MB Memory Expansion Board	Z-207-7 360K 5.25" disk drive	At the back panel connect	ZCM-1490-Z ZMM-149 A/P ZCM-1390-A ZVM-1380-C ZVM-1470-G
	Z-516 80387 Numeric Co-Processor	Z-515 4MB Memory Expansion Board	or ZD-12 1.2MB 5.25" disk drive		
		Z-525 Cache Memory Board	or ZD-14 1.4MB 3.5" disk drive		
			or HWD-20-AT 20MB hard disk drive		
			or HWD-4028 40MB hard disk drive		
			or ZD-800 80MB hard disk drive		

80MB Winchester Hard Drive. Requires Z-417-2 cable when installing in floppy-only models (Formats at 72MB). Assembled ZD-800 (1 lb.) ... **\$1999.00**

40MB 28ms Winchester Hard Drive Includes cables. Formats at 44MB. Assembled HWD-4028 (4 lbs.) **\$659.95**

80386 Upgrade. For Z-248 computers. Assembled ZUS-386 (12 lbs.) **\$2999.00**

High-Speed Cache Memory Card 64K RAM. Assembled Z-525 (3 lbs.) **\$599.00**

1MB Memory Expansion Board Fully populated, with enable/disable EMS memory. Limited availability. Assembled Z-505 (3 lbs.) **\$799.00**

4MB Memory Expansion Board Fully populated, with enable/disable EMS memory. Limited availability. Assembled Z-515 (3 lbs.) **\$2999.00**

80287 10 MHz Numeric Co-Processor Assembled Z-416-2 (1 lb.) **\$525.00**

80387 16 MHz Numeric Co-Processor Assembled Z-516 (1 lb.) **\$1199.00**

Color Video Card. Contains two ports and automatic video switching between MDA, CGA, VGA, EGA and Hercules graphics. Allows you to run VGA/EGA/CGA software on the new FTM monitor. Assembled HVB-550 (1 lb.) .. **\$599.00**

Winchester Hard Drive Cable Required for the installation of the first Zenith Winchester hard disk drive. Assembled Z-417-2 (1 lb.) **\$20.00**



The Z-159 enhanced desktop personal computer system

Get high-performance from this low-cost alternative system that delivers enough power to run an entire business.

The Z-159 operates at 8 MHz or 4.77 MHz with zero wait state technology, making it a much faster system. PC-compatible, this system lets you select from virtually the full range of 16-bit software written for the IBM PC.

More and more applications are pushing memory limits, and the Z-159 counters with EMS capability. This allows memory to be expanded to 1.2MB right on the main board. If additional memory is needed, three more EMS memory cards (Z-315) can be added to bring RAM up to 5MB.

In addition, the Z-159 offers high resolution monochrome video with a Hercules-compatible video card. Resolution is 720 x 350.

Other features of the Z-159 Zenith computer include four open expansion slots, depending on the model, serial and parallel ports, the MS-DOS operating system and a socket for an optional 8087 numeric co-processor.

Switch selectable 115/230 VAC, 50/60 Hz operation. An alternate AC line cord is required for 230 VAC. Dimensions are 6.25" H x 16" W x 16.5" D.

Configurations:

Z-159 Model 2 Computer: equipped with 640K RAM plus 128K EMS logic, two 5.25" 360K floppy disk drives and an 84-key keyboard. Assembled ZDH-1211-DE (42 lbs.) **\$1599.00**

Z-159 Model 3 Computer: equipped with 640K RAM plus 128K EMS logic, one 5.25" 360K floppy disk drive, one 20MB Winchester hard disk drive and an 84-key keyboard. Assembled ZDH-1217-DE (43 lbs.) **\$2199.00**

Accessories:

Winchester Upgrade Kit. Allows installation of a 20MB Winchester hard disk drive. Kit HWD-20 (4 lbs.) **\$299.00**

8087 Numeric Co-Processor Assembled Z-316-8 (1 lb.) **\$285.00**

Expansion Memory Board. The board comes with EMS logic chips installed and 256K RAM. Empty sockets may be filled with 256K RAM to a maximum of 1.2MB RAM. Assembled Z-315 (2 lbs.) **\$229.00**

Technical Manual TM-159 (3 lbs.) **\$25.00**



Credit card orders call TOLL-FREE 24 hours a day:

1-800-253-0570

STANDARD	8088 Microprocessor	640K RAM	Winchester disk drive option	Hercules-Compatible Video Board	Monitors
TO EXPAND ADD	Z-316-8 8087 Numeric Co-Processor	Z-315 Memory Expansion	HWD-20 20MB Winchester hard disk drive	At the back panel connect	ZVM-135 ZVM-1240 ZVM-1330
<p>Z-159 Enhanced Personal Computer pictured above with optional video display monitor</p>					

After just one short evening of kit building fun, you'll have a powerful laptop computer that outperforms most desktop PCs.

HS-2860 12 MHz laptop computer. Less than 11 lbs. without battery.



If you know how to use a Phillips screwdriver, you have what it takes to assemble our first laptop computer.

Save \$200 on Heath's first kit 286 laptop computer

SKILL LEVEL 1 Fully PC and AT compatible, the Heathkit HS-2860 incorporates a 12 MHz zero wait state 80286 processor that speeds through data to give you answers fast. And, with 1MB of standard RAM (expandable to 2MB), your system can handle even the longest spreadsheets or databases.

The HS-2860 comes standard with one 1.4MB 3.5" disk drive (able to read/write lower density disks), giving you the versatility to add another internal storage device when needed.

You can sit and work for hours looking at the crisp and clear 640 x 400 pixel CGA resolution Supertwist LCD screen. In addition, a removable battery pack provides up to six hours of continuous operation - keeping your screen bright even during the longest work sessions. Other features include the Expanded Memory Specification (EMS), Power Management system, parallel port, serial port, CGA RGB video port and an external floppy drive jack. Dimensions are 3.07"H x 12.2"W x 15.4"D.

Configurations:

Heathkit HS-2860: Equipped with 1MB RAM, one 1.4MB 3.5" floppy drive, 4.0 A/hr NiCd battery, and a 110/120 VAC (auto switching), 50/60 Hz AC adapter/charger. Includes MS-DOS, Integrated 7+, Diagnostix and MS-Windows.
Kit HS-2860 (31 lbs.) Was \$2999.00 Now **\$2799.00**

SupersPort 286 Model 20: Equipped with 1MB RAM, one 1.4MB 3.5" floppy drive, 20MB hard disk, MS-DOS, 4.0 A/hr NiCd battery, and a 110/220 VAC (auto switching), 50/60 Hz AC adapter/charger.
Assembled ZWL-200-2 (32 lbs.) **\$4999.00**

Accessories:

1MB RAM Expansion Card. Configurable for EMS or extended memory. Assembled ZA-180-66 (1 lb.) **\$1299.00**

1.4MB 3.5" Floppy Disk Drive

Assembled HA-2860-1 (3 lbs.) **\$159.00**

20MB Hard Disk Drive

Assembled HA-2860-2 (3 lbs.) **\$679.00**

40MB Hard Disk Drive

Assembled HA-2860-4 (3 lbs.) **\$799.00**

Numeric Keypad. Detachable and features 24 keys.

Assembled ZA-3034-NP (3 lbs.) **\$129.00**

More accessories for all SupersPort computers:

2.2 A/hr Battery Pack. SupersPort only.

Assembled ZA-180-57 (3 lbs.) **\$159.00**

4.0 A/hr Battery Pack

Assembled ZA-180-65 (3 lbs.) **\$289.00**

1200 Baud Internal Modem. SupersPort only.

Assembled ZA-181-19 (2 lbs.) **\$299.00**

2400 Baud Internal Modem

Assembled ZA-181-24 (3 lbs.) **\$449.00**

Expansion Box. Includes three PC/XT slots and is AC powered.

Assembled ZAS-3034-EB (10 lbs.) **\$499.00**

Auto Cigarette Lighter Adapter

Assembled ZA-181-7 (1 lb.) **\$19.00**

Carrying Case. Includes pocket.

Assembled ZA-180-62 (3 lbs.) **\$59.00**

Monitor Stand

Assembled ZA-180-67 (5 lbs.) **\$49.00**

5.25" External Disk Drive. Includes cable and

110 VAC adapter.

Assembled ZAS-180-54 (8 lbs.) **\$399.00**

Take to the road with the new SupersPort laptop computer

Zenith has put desktop performance into a 640K RAM IBM PC/XT compatible laptop package. The SupersPort boasts a high speed 80C88 16-bit processor that can run at either 4.77 MHz or 8 MHz, allowing you to adjust to clock dependent software.

Easily transportable, the SupersPort Model 2 comes with two 720K 3.5" disk drives that deliver extremely fast read/write times. In addition, the SupersPort Model 20 comes with one 720K 3.5" disk drive and a 20MB hard disk.

The SupersPort's crisp, 640 x 200 pixel backlit Supertwist LCD screen displays 80 x 25 characters of text. Other advanced features include a RGB video port, parallel port, serial port, 2.2 A/hr NiCd battery and 110/220 VAC, 50/60 Hz AC adapter/charger. Dimensions are 3.07"H x 12.2"W x 15.4"D.

Configurations:

SupersPort Model 2: Equipped with two 720K 3.5" floppies. Assembled ZSS-184-1 (34 lbs.) **\$2399.00**

SupersPort Model 20: Equipped with one 720K 3.5" floppy and a 20MB hard disk. Assembled ZSW-184-2 (34 lbs.) **\$3599.00**

Accessories:

1MB RAM Expansion Card. Includes EMS. Assembled ZA-180-63 (1 lb.) **\$999.00**

Numeric Keypad. Detachable and features 24 keys. Assembled ZA-180-39 (3 lbs.) **\$99.00**

8 MHz SupersPort with a carrying weight of less than 11 lbs.



Take along the TurbosPort 386 at less than 15 lbs.



Zenith portable 80386 computer with sharp Page White display

The TurbosPort 386 is a 80386-based portable computer that features

Zenith's new Page White display. Combining fluorescent backlighting with a new generation of LCDs, Page White produces a contrast ratio of 20 to 1.

Behind the screen of the TurbosPort 386 you'll find a 12 MHz central processor with zero wait states, a 1.4MB/720K 3.5" floppy drive, a 40MB hard drive rated at 28 milliseconds access time and 2MB of standard system RAM (with 3MB maximum potential). However, if you need more than 3MB of RAM, you can add PC/XT compatible cards to an optional three-slot external expansion box. In addition, you can extend battery operation with the TurbosPort's Power Management system.

Configurations:

TurbosPort 386 Model 40 Computer: Equipped with 2MB of RAM, one 1.4MB/720K 3.5" floppy, 40MB hard drive, video adapter cable and a high capacity battery. Includes MS-DOS. Assembled ZTC-3034-EB (38 lbs.) **\$7999.00**

TurbosPort 386 Model 40M Computer: Equipped with 2MB of RAM, one 1.4MB/720K 3.5" floppy, 40MB hard drive, 2400 baud auto-sync modem, video adapter cable and a high capacity battery. Includes MS-DOS. Assembled ZTC-3034-MO (38 lbs.) **\$8499.00**

Accessories:

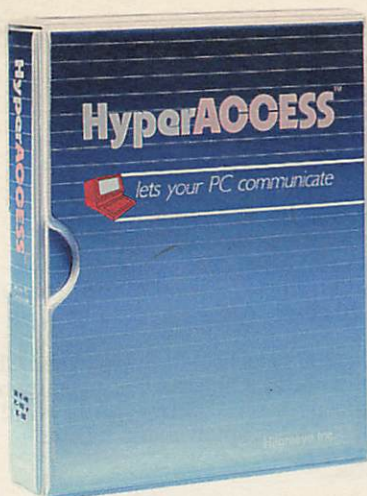
1MB Memory Upgrade. Service installed only. Assembled ZA-3034-ME (1 lb.) **\$1299.00**

Numeric Keypad. Detachable and features 24 keys. Assembled ZA-3034-NP (2 lbs.) **\$129.00**

Expansion Box. Includes three PC/XT slots and is AC powered. Assembled ZA-3034-EB (11 lbs.) **\$449.00**

2400 Baud Auto-Sync Modem. Service installed only. Assembled ZA-3034-AS (1 lb.) **\$599.00**

Carrying Case Assembled ZA-3034-CS (4 lbs.) . **\$79.00**



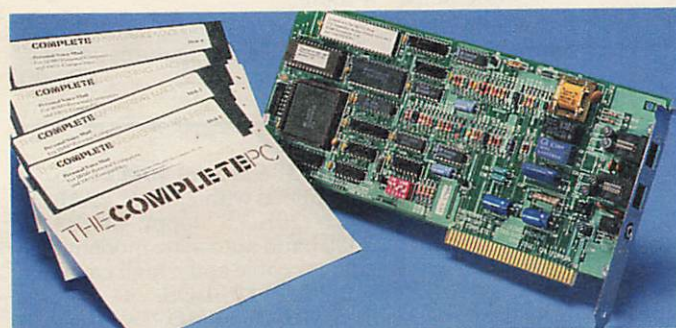
Powerful Hyper-ACCESS software

Discover the world of telecommunications with Hyper-ACCESS terminal software from Hilgraeve Inc.

Whether you're new to telecommunications or a full-time user, you'll appreciate the easy-to-use on-screen menus and the ability to automate any of the program's procedures or create custom menus.

An included startup program gets you up and running quickly, and an on-screen tutorial takes you step-by-step through some of the software's advanced features.

In addition, you can emulate most popular terminals, operate modems up to 19.2K baud and even act as a host computer. Hyper-ACCESS also uses DOS commands for your convenience.
PM-160 For the IBM PC and compatibles. (3 lbs.) ... **\$149.00**
PM-160-3 For 3.5" drives. (2 lbs.) **\$149.95**



The complete answering machine card

The Complete Answering Machine lets you combine your personal computer with your telephone to digitally store voice messages.

The answering machine requires an IBM PC, XT, AT or compatible, a hard disk, a DSDD disk drive, 384K RAM, MS-DOS 2.1 or higher operating system, a standard telephone line with an RJ-11 or RJ-14 connection, and a touch-tone telephone.
Assembled PD-500 (2 lbs.) **\$349.99**



Save \$100 on the complete fax machine board

The Complete Fax (CFAX) board lets you send and receive Group III facsimile machine messages with your MS-DOS PC.

In addition, with CFAX's unique background software you won't have to interrupt the program you're currently using just to operate your fax.

CFAX requires an IBM PC, XT, AT or compatible, a DSDD disk drive, a hard disk, MS-DOS 2.1 or higher, 384K RAM and a touch-tone telephone.

Assembled PD-510 (2 lbs.) Was \$499.00 Now **\$399.00**



The complete hand scanner

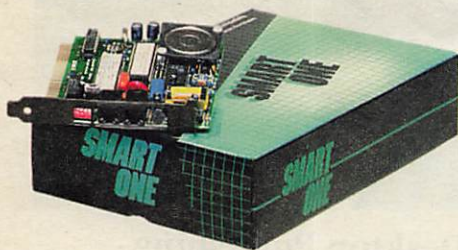
Now you can input 2 1/2" wide images at 200 dots per inch directly into your computer at Group III fax standards with the Complete Hand Scanner. In addition, with the included Soft Stationary software you can scale, crop or rotate scanned images to meet your particular graphic need. The hand scanner requires an IBM PC, XT, AT or compatible, a DSDD disk drive, 384K RAM, MS-DOS 2.1 or higher operating system and a hard disk.

Assembled PD-520 (2 lbs.) **\$249.95**



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570

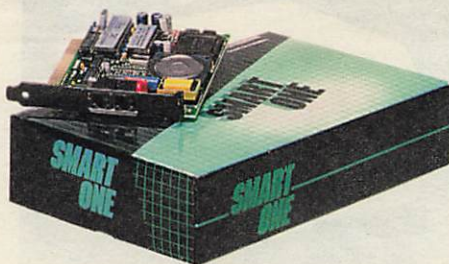


1200 bps modem card

Designed on a short card, the Smart One 1200 baud modem gives you the convenience of internal installation, without sacrificing a full expansion slot.

Packaged with Bitcom version 3.5A communications software, the SO-1200 is compatible with the Hayes AT command set and operates at 300 or 1200 baud. Additionally, the Smart One features Auto answer/Auto dial and installs in the IBM PC, XT, AT or compatibles.

Assembled SO-1200 (2 lbs.) .. \$79.95



2400 bps modem card

You don't have to give up valuable desk space with the Smart One 2400 baud internal modem. Designed on a 4" x 5" card, the SO-2400 installs in a short or long expansion slot inside your PC.

Hayes compatible, the Smart One operates at 300, 1200 or 2400 baud and features Auto dial/Auto answer. The SO-2400 works on the IBM PC, XT, AT and compatibles, and includes Bitcom version 3.5A communications software.

Assembled SO-2400 (2 lbs.) . \$159.95

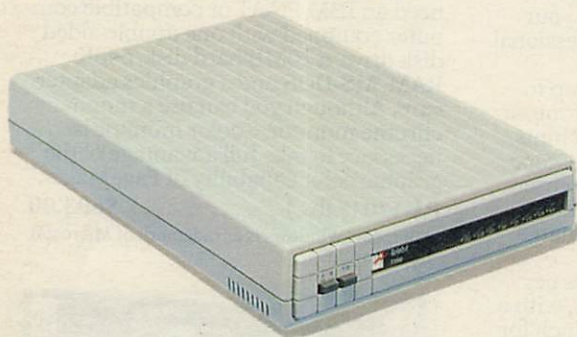


300/1200 bps pocket modem

If you have an IBM, IBM compatible or a Macintosh, you can get all the features of a full-size modem in a fraction of the space. The Pocket Modem features surface mount technology, 28-character memory and a configuration profile that's stored in non-volatile memory so you don't need any dip switches. Hayes compatible, the Pocket Modem runs on a single 9-volt battery and includes a battery eliminator for 110 VAC power operation. 1.3" H x 2.5" W x 5" D.

Assembled MO-5500 Modem for IBM (4 lbs.) \$159.95

Assembled MO-7500 Modem for Macintosh (2 lbs.) \$149.95



High-speed 18K baud modem

Telebit Corp. used innovative multi-carrier technology to create its TrailBlazer modem. The TrailBlazer provides error-free data transmission over ordinary telephone lines at speeds of up to 18,000 bits per second, 15 times faster than other commonly used modems.

Works with any asynchronous device with a serial RS-232 interface. Besides 18K bps, this modem also operates at speeds of 300, 1200 and 2400 bps. The TrailBlazer automatically recognizes the speed of the modem at the other end and sets its speed accordingly.

Other features include automatic error detection and correction, Hayes command set compatibility and FCC Class B compliance. Recommended for 3COM networks. 120 VAC.

Assembled T-2SAA (9 lbs.) \$1349.00



LAST CALL on 2400 baud modem

Now get a full-featured 2400 baud modem for less than a 1200 baud modem. Upload and download files faster and save on costly phone time. Plus this modem uses a specially designed signal processor that provides a better overall bit rate performance over varying telephone line conditions.

Featuring Auto dial/Auto answer and full duplex at all speeds, the PD-2424 is completely compatible with the Hayes AT command set. Asynchronous operation at 2400, 1200, 600, 300 and 110 bps, and synchronous operation at 2400, 1200 and 600 bps is possible. Meets all CCITT and Bell phone system requirements. Phone line compatibility is guaranteed with pulse or tone dial. Also stores a telephone number in memory automatically. Connects to any standard phone line using the included RJ11C phone cable. Requires a data cable.

Assembled PD-2424 (4 lbs.) Last Call! \$169.95



new CrystalPrint WP is ideal for home or office

One of the best values in word processing printers available, CrystalPrint WP from Qume brings page printing within the reach of most PC users. With its Diablo 630 emulation, the CrystalPrint WP is ready to print letters, contracts, legal briefs, reports and more.

Faster than most other printers, the CrystalPrint WP speeds through jobs at six pages per minute letter size, equivalent to 2,000 words per page. That's eight times faster than the average daisy wheel printer, without the annoying printer noise that usually disturbs the office environment. And, with a footprint of 15.7" W x 13.4" D, the unit is amazingly compact. Standard fonts are Courier Medium and Courier Bold, easily legible and appropriate for professional looking documents.

Fully supported by virtually all popular IBM PC-compatible word processing software, the WP includes 128K of resident memory to meet a variety of business needs. And, printed at a resolution of 300 x 300 dots per inch, documents have a professional appearance.

The WP is equipped with Casio Computer Company's liquid crystal shutter engine (LCS), which makes it a less complicated printer than its laser-based counterparts. Small, smart and affordable, this ideal personal printer uses 117 VAC, 60 Hz; 220/240 VAC, 50 Hz. CrystalPrint WP comes complete with drum and toner sets. The drum set is rated at 10,000 page life, the toner set at 6,000 page life. Includes parallel interface.

Assembled QMS-570
(11 lbs.) \$1399.00

Accessories:

Qume CrystalPrint WP Drum Set
Assembled PR-20 (3 lbs.) \$129.95

Qume CrystalPrint WP Toner Set
Assembled PR-21 (5 lbs.) \$99.95

new Qume's CrystalPrint Series II adds memory and fonts

The CrystalPrint Series II is a small, compact desktop printer that is 50 percent smaller and 30 percent lighter than the leading laser printer, making it an ideal addition to your work area even when space is at a premium. And, this liquid crystal shutter page printer fully emulates the Hewlett-Packard LaserJet Series II, making it a perfect choice for desktop publishing applications.

The CrystalPrint Series II offers excellent resolution and character sizes up to 48 points. This means that when you're working on a publication, you have the freedom to create the visual impact you need. In addition, with a maximum of 16 fonts per page, your documents will take on that professional typeset look.

The Series II can download up to 48 Hewlett-Packard compatible fonts at once, and includes three internal fonts each giving you portrait and landscape capabilities: Courier Medium, Courier Bold and Line Printer. Internal character sets include US, ASCII, Roman 8 and more.

Print speed is a fast six pages per minute for letter size documents, with a resolution of 300 x 300 dots per inch for clear, easy-to-read pages. Includes serial and parallel interfaces, and drum and toner sets.

Assembled QMS-560
(11 lbs.) \$1999.00

Accessories:

Qume CrystalPrint Drum Set
PR-20 (3 lbs.) \$129.95

Qume CrystalPrint Toner Set
PR-21 (5 lbs.) \$99.95

9' printer cable

Use this standard centronics parallel interface cable with any of the printers shown on these pages.

Assembled HCA-53 (2 lbs.) .. \$30.00

Desktop Publishing for the PC from Aldus

PageMaker is a desktop publishing tool that's easy enough for the beginner, yet comprehensive enough for the skilled designer. Use PageMaker to integrate text and pictures created with popular word processing and graphics applications like Word, WordStar, Write, Draw, AutoCAD and PC Paint.

Use PageMaker too as an electronic layout board where you can paste up text and graphics on your computer's video monitor. You'll be able to edit text, change type styles and type size, resize graphics and reposition anything to make the page look the way you want, then print your page out on a laser or dot-matrix printer.

PageMaker runs under Microsoft Windows* and requires a mouse. You need an IBM PC AT or compatible computer equipped with one double-sided disk drive, a 20MB hard disk, 640K RAM, MS-DOS and a graphics adapter card. Although you can use a monochrome monitor, a color monitor is necessary to take full advantage of the graphic color capability of PageMaker.

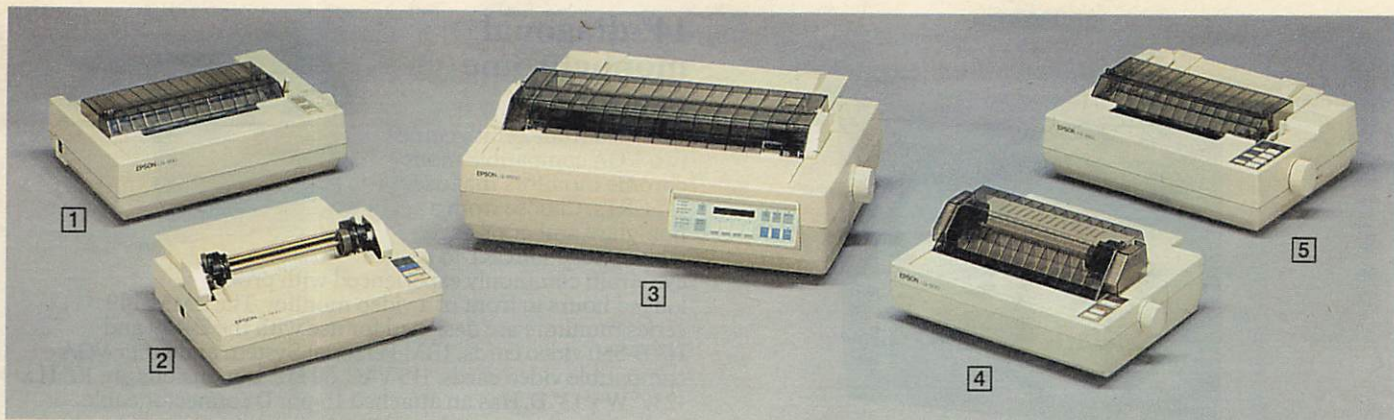
PA-120 (7 lbs.) \$695.00

*Microsoft Windows is a trademark of Microsoft Corporation.



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LQ-850 80-column dot matrix printer

1 The Epson LQ-850 features a fast 264 cps in high-speed draft mode and 88 cps in letter quality mode, making it an ideal printer for small businesses and corporate offices. Two built-in letter quality fonts (Roman and Sans Serif), two font module option slots, a 6K buffer, a sharp 24-pin printing head, push tractor feed and envelope printing are additional features. Dimensions are 5 $\frac{3}{8}$ "H x 17"W x 14 $\frac{1}{8}$ "D.

Assembled LQ-850

(23 lbs.) \$649.95

Assembled LQ-1050 Epson 136-Column Wide Carriage Printer. 5 $\frac{3}{8}$ "H x 23 $\frac{1}{8}$ "W x 14 $\frac{1}{8}$ "D. (30 lbs.) .. \$1099.00

Economical LX-800 for home or office

2 The 9 pin, 80-column Epson LX-800 is full in features yet low in price. Jobs print at 180 cps elite draft and 30 cps elite near letter quality. From the front panel you can customize documents with your choice of Roman or Sans Serif fonts at the push of a button. Other features include a 3K buffer, standard pull tractor, automatic single sheet load and a parallel interface. Dimensions are 3 $\frac{3}{8}$ "H x 15 $\frac{3}{8}$ "W x 12"D.

Assembled LX-800

(15 lbs.) \$229.95

LQ-2550 24-pin wide letter quality printer **new**

3 This high performance Epson printer gives you an extremely fast 400 cps in draft mode and 133 cps in letter quality mode, with a maximum column width of 136 characters. Print single sheets, envelopes, short forms and even six part forms. The SelecType control panel features a 20 character LCD for programming macros and selection of seven different fonts, micro adjustment, paper selection, gap adjust settings and more. Push feed tractor, 8K input buffer, 360 x 360 graphics density. Dimensions are 7 $\frac{3}{4}$ "H x 26 $\frac{5}{8}$ "W x 20 $\frac{1}{2}$ "D.

Assembled LQ-2550

(58 lbs.) \$1399.00

LQ-500 for quality conscious users

4 An economical 80-column, 24 wire dot matrix printer, the Epson LQ-500 offers superior features such as 180 cps draft and 60 cps elite letter quality print speeds. Other fine features include standard friction feed and pull tractor, automatic single sheet loading, two standard fonts – selectable from the front control panel, and a parallel interface. Dimensions are 5 $\frac{1}{2}$ "H x 15 $\frac{3}{8}$ "W x 12 $\frac{1}{2}$ "D.

Assembled LQ-500

(20 lbs.) \$449.95

FX-850 narrow carriage dot matrix printer **new**

5 Advanced paper-handling capabilities and high speed performance make this Epson printer an excellent choice. With standard push feed tractor, friction feed and optional cut sheet feeder, the FX-850 handles virtually any type of paper, up to 80 columns wide. Prints 264 cps in high-speed draft mode, 54 cps in near letter quality mode. 8K memory buffer, 3 print fonts, 240 x 216 dots per inch graphics resolution. Dimensions are 6"H x 18"W x 14 $\frac{1}{4}$ "D.

Assembled FX-850 (25 lbs.) \$499.95

Assembled FX-1050 Epson 136-Column Wide Carriage Printer. 6"H x 24 $\frac{7}{8}$ "W x 14 $\frac{1}{4}$ "D. (36 lbs.) ... \$729.95



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Replacement ribbons for all our Epson printers

Model No.	PPA-225-1	PPA-230-1	PPA-243-1	PPA-246-1	PR-100	PR-125
Compatibility	FX-80, FX-85, FX-86, LX-800	FX-286E, FX-1050	LQ-1000, LQ-1050	LQ-500, LQ-850, FX-850	EX-800, EX-1000	LQ-2550, LQ-2500
Weight	1 lb.	1 lb.	1 lb.	1 lb.	1 lb.	1 lb.
Price	\$8.99	\$14.99	\$14.99	\$8.99	\$8.99	\$14.99



14"-diagonal CRT flat technology monitor

The ZCM-1490-Z color monitor from Zenith represents a giant leap forward in video display technology. Its new flat tension mask screen produces a brilliant image not found in a conventional CRT, and colors remain true even at high intensities. You'll enjoy dramatically improved contrast for jet blacks, more pronounced highlights and softer colors. In addition, the perfectly flat tube virtually eliminates glare, reducing eye strain. And because the screen is flat, you can take accurate measurements as well as high quality photographs directly off the screen. The ZCM-1490-Z is capable of resolutions up to 640 x 480 at a 31 kHz scan rate.

The ZCM-1490-Z is designed to work with the video from the Z-449 and HVB-550 video cards, or the output from the IBM Personal System 2 computer and other VGA compatible video cards. The monitor can display software written for popular standards including CGA, MDA/Hercules, EGA and Advanced EGA. Dimensions are 12½" H x 14¾" W x 15½" D. FCC Class B, UL and CSA approved. Uses 115/230 VAC, 50/60 Hz. Includes ZCM-1400-1 Tilt/Swivel Base.

Assembled ZCM-1490-Z (45 lbs.) \$999.00

EGA-class 14"-diagonal CRT monochrome monitor

This Zenith monitor features automatic selection of either CGA or EGA scanning frequency, non-glare green-phosphor CRT, graphics resolution of up to 640 x 350 pixels in EGA mode, built-in tilt and swivel stand and easily accessible operator controls. Accepts RGB, RGBI or RGBrgb signals through an attached 40" cable with a 9-pin D connector. Uses 115/230 VAC, 50/60 Hz and has dimensions of 10" H x 11" W x 12½" D.

Assembled ZMM-1470-G (24 lbs.) \$299.00



14"-diagonal monochrome monitors

Also from Zenith come two VGA compatible monochrome monitors that use 14" CRTs. Choose from a non-glare amber or page white phosphor CRT to reduce eye strain commonly experienced with prolonged hours in front of a video monitor. The ZMM-149 series monitors are designed for use with the Z-449 and HVB-550 video cards, IBM Personal System and other VGA compatible video cards. 115 VAC, 60 Hz. Dimensions are 10" H x 12¾" W x 13" D. Has an attached 15-pin D connector cable.

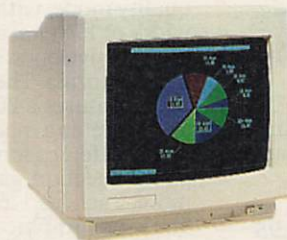
Assembled ZMM-149-A Amber CRT (21 lbs.) \$299.00

Assembled ZMM-149-P Page white CRT (21 lbs.) . . . \$299.00



13"-diagonal color monitor

Switch selectable to monochrome amber or green, this large non-glare 13" CRT allows high resolution up to 640 x 480 for high quality graphics displays. Zenith's 31 kHz ZCM-1390-Z RGB monitor accepts video signals from computers equipped with the Z-449 and HVB-550 video boards, IBM



Personal System 2 computers or other VGA compatible video cards. FCC Class B, CSA and UL approved. Uses 115/230 VAC, 50/60 Hz and has dimensions of 13" H x 14¼" W x 15" D. A 15-pin D connector cable is attached.

Assembled ZCM-1390-Z (36 lbs.) \$699.00

Accessory:

Tilt/Swivel Base ZVM-1300-1 (4 lbs.) \$30.00

A medium-resolution color monitor with a 13"-diagonal CRT

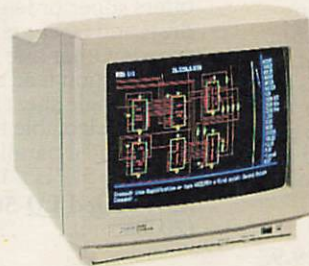
Get vivid reds, bright blues and true green on the ZVM-1330 RGBI-only video monitor. Designed to work with CGA compatible video cards, it sup-

ports up to 16 colors including brown. The monitor displays 25 lines of 80 characters and up to 640 x 240 pixels on a non-glare screen. Accessible controls include power on/off, brightness, contrast, focus and horizontal and vertical controls. The monitor comes with an attached 40-inch 9-pin video cable. Uses 115 VAC/60 Hz and has dimensions of 12⅞" H x 14⅜" W x 15" D.

Assembled ZVM-1330 (34 lbs.) \$649.00

Accessory:

Tilt/Swivel Base ZVM-1300-1 (4 lbs.) \$30.00



Color monitor with sound



This Zenith monitor delivers a crisp, clear, high resolution display plus excellent sound reproduction. The 13" diagonal screen, with its 25 lines of 80 characters, exhibits intensely clear text and impressive 640 x 240 pixel graphics. A unique *green only* switch enables easier reading of monochrome text on a black background.

Compatible with both composite video and RGB direct drive outputs. Uses 115 VAC. 13³/₄" H x 15¹/₄" W x 15¹/₄" D.

Assembled ZVM-135 (39 lbs.) \$599.00

Accessory:

H/Z and IBM PC Cable ZVM-135-2 (1 lb.) \$25.00

All Zenith monitors that use dual 115/230 VAC require an alternate AC line cord for 230 VAC operation.



Monochrome video monitor

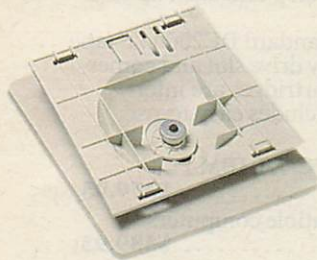
Save on Zenith's first class monochrome monitor, the ZVM-1240. TTL compatible with an amber screen and 9-pin D-type video output connector,

the ZVM-1240 uses 115 VAC and has dimensions of 10" H x 11³/₄" W x 12⁵/₈" D.

Assembled ZVM-1240 (17 lbs.) \$169.95

Accessory:

RCA to RCA Cable. ZVM-121-1 (1 lb.) \$5.00



Tilt and swivel base

Position HVM-1220-A, ZVM-1220-A, ZVM-1230-A, ZVM-1240 and ZMM-149-A/P monitors to a better working angle for your viewing comfort.

Assembled ZVM-1200-1 (2 lbs.) \$25.00



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Join thousands of other Heath/Zenith computer users who have purchased one of the most popular computers on today's market. Advantages of HUG membership include access to HUG's software library, discount prices on computer products, plus a one-year subscription to REMark, the magazine written by and for Zenith and Heath computer users.

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To join HUG and receive 12 issues of REMark, along with three journals listing all available HUG software, order REM-1000-NM. Your cost is only \$22.95. To renew your membership, order REM-1000-RM and get 12 more issues for only \$19.95. Use your VISA, MasterCard or American Express. Fill out and mail the coupon below to Heath/Zenith User's Group, P.O. Box 217, Benton Harbor, MI 49022-0217. Or, call TOLL-FREE 24 hours a day 1-800-253-0570.

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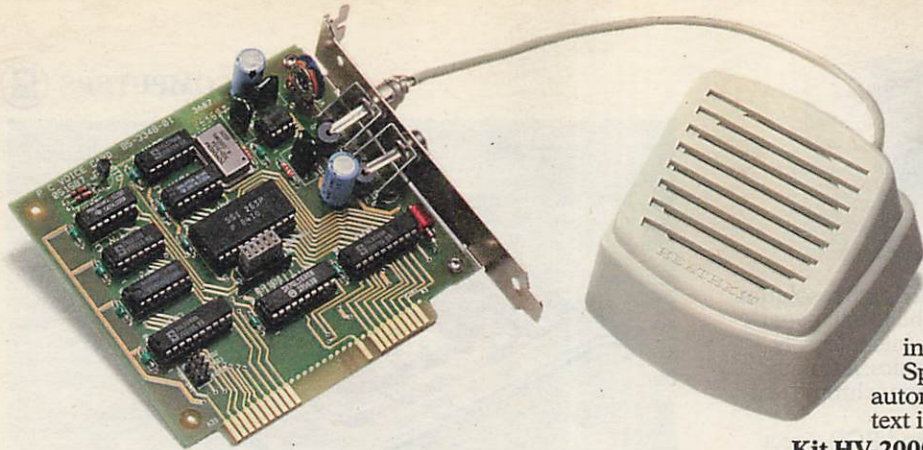
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Signature _____

NAME _____

STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____



amateur radio application, add a voice to sent and received RTTY messages using a TNC like our HK-232 on page 41. The voice card will enable your computer to vocalize any ASCII text that is received through a serial port at baud rates from 150 to 38.4K. In addition, there's even an exception file for those special pronunciations.

The Computer Voice Card works on IBM PC/AT, PC/XT and compatibles. Included voice software lets you easily interface to DOS and high level languages. Speaker options can be enabled or disabled automatically at computer boot-up and/or as text is being spoken.

Kit HV-2000 (2 lbs.) \$89.95

Specifications: **SPEECH ATTRIBUTES:** Modes: 2, Immediate and Transitioned Inflection. **Number of Phonemes:** 64. **Phoneme Durations:** 4. **Speech Rates:** 16. **Inflection (Pitch) Levels:** 4096. **Transitioned Inflection Levels:** 32. **Transitioned Inflection Rates:** 8. **Musical Pitch Frequencies:** 49 (4 octaves). **Amplitude Settings:** 16. **Vocal Tract Filter Frequencies:** Over 250. **Articulation Rates:** 8. **UNIQUE WORD EXCEPTION FILE:** Number of Words: 100 maximum. **Size of File:** 2048 bytes maximum. **ELECTRICAL:** **Computer Interface:** Standard 62-finger PC bus card. **Line Output:** 10k ohms. **Speaker Output:** Approximately 500 mW into 8 ohms. **Power:** 5 volts DC at 275 mA max., 12 volts DC at 10 mA (obtained from PC bus). **PHYSICAL:** **Size:** Half card.

Add a voice to your computer

SKILL LEVEL 1 Give your computer a distinctive voice or voices with the Computer Voice Card. You can add vocal prompts to batch files or have your computer speak the contents of any text file, including WordStar. With the voice card installed, you can have your computer tell stories to children or conduct sing-alongs. The applications of this card are extensive, including, for example, making a computer more accessible or easier to use by the visually impaired.

The Computer Voice Card plugs into an expansion slot and receives data off of the bus. That information is converted by a synthesizer into an audio signal and amplified. The signal is then reproduced by an included external speaker into words, sentences, sound effects or music.

Extensive software, which is included, makes this the easiest-to-use, most versatile speech synthesizer you can buy. Special terminal emulator software that enables you to add a voice to modem communications is also included. Or, for an

Smart Watch adds time and date

Add battery-backed time to your computer with the Smart Watch 10-year clock/calendar – without using an expansion slot. Includes software for displaying time and date, and setting DOS time. Use with floppy or Winchester drive computers. For use on Heath/Zenith 150 series PCs.

CB-5063-50 (3 lbs.) \$59.00

Winchester backup tape drive

SKILL LEVEL 1 If your work depends on what's on your disk drive, you shouldn't start another file before adding a Winchester backup tape drive to your computer. Our kit 40MB streaming tape drive provides you with reliable backup of Winchester hard disks and floppy drives. Set to operate automatically at regular intervals or stop and back up your work whenever you choose.

Both models use the industry standard DC2000 1/4" tape cartridge. The unit fits in a 3.5" floppy drive slot and comes with adapters for a 5.25" slot. Data cartridges are interchangeable between both models. Includes easy-to-use menu-driven backup software.

Kit HBT-40-XT For Heath/Zenith PC, XT, IBM PC, XT and compatibles. (4 lbs.) \$379.95

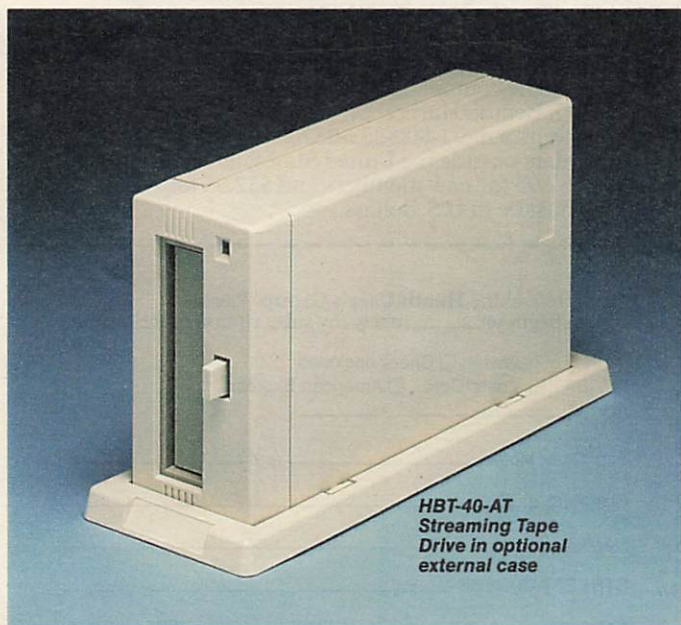
Kit HBT-40-AT For AT or AT compatible computers. (4 lbs.) \$389.95

Kit HBT-40-H4 External mounting kit for H-40 series computers. (3 lbs.) \$199.95

Kit HBT-40-HZ For use with any desktop PC with 2-port floppy controller. (3 lbs.) \$199.95

Kit HBT-40-SD For IBM or compatible systems with 4-port floppy controller. (3 lbs.) \$139.95

HBT-40-1 40 MB Tape Cartridge. (1 lb.) \$24.95



HBT-40-AT
Streaming Tape
Drive in optional
external case



Standby power system now with extra capacity

The 520ES UPS (Uninterruptible Power Source) keeps your computer going when it's hit by unexpected AC power disruptions. You'll work with greater confidence, knowing that your data is protected from line surges, spikes, noise, voltage sags, brownouts and blackouts.

The 520ES typically trips in four ms at 103 VAC to supply 520 VA (360 watts) of power to advanced PCs and workstations for 10 to 15 minutes. This power system works with IBM and compatibles, and includes four AC outlets. Uses 120 VAC, 60 Hz. 6.6" H x 4.7" W x 14.2" D.

Assembled APC-520-ES
(26 lbs.) . . . Was \$629.00 Now **\$599.95**

Assembled PM-800 800 VA UPS.
Includes six AC outlets. 120 VAC, 60 Hz. (58 lbs.) **\$999.00**

Assembled PM-1200 1200 VA UPS.
Same as above. (79 lbs.) **\$1399.00**



Our industrial keyboard operates under the harshest conditions

If your work environment demands the most out of your equipment, then we have the answer with the Heath/Zenith Computer-Based Instruments industrial keyboard. Completely PC, XT and AT compatible, with a convenient switch to make the adjustment, the SWA-4300 features the enhanced 101-key format for easy operation. In addition, the *Caps*, *Num* and *Scroll Lock* keys include LED indicators that illuminate during operation.

No need to worry about accidental spills shorting out your system, because the industrial keyboard is entirely splash-proof due to its ferrite-core switch. And, our keyboard's small footprint, measuring only 17.4" wide, allows for easy rack mounting. Includes a 3-foot coiled cord expandable to 6 feet.

Assembled SWA-4300
(5 lbs.) **\$250.00**



Enhanced keyboard from Zenith Data Systems

You'll simplify keying and reduce typing errors when you replace your old 84-key keyboard with this new 101-key board from Zenith Data Systems.

As a starter, Zenith has increased special function keys from 10 to 12 and moved them above the alpha numeric keys. Cursor and screen control keys are now separated from the keypad, and *Print Screen*, *Pause* and *Scroll Lock* are grouped together in the upper right hand corner.

Accessory ROMs are needed for different computer replacements. ROMs for other Heath/Zenith PCs are listed in the keyboard installation instructions.

Assembled ZKB-2 (6 lbs.) . . \$149.00

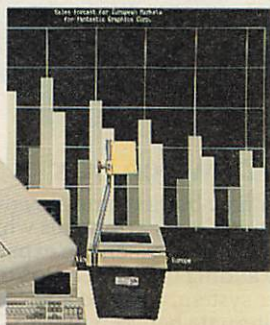
Accessories:

ROM Upgrade for H/Z-200 Computers ZCA-10 (1 lb.) . . . \$24.80

ROM Upgrade for H/Z-159 Computers ZCA-11 (1 lb.) . . . \$12.80



Simulated image



Simply place Data Display on any transmissive overhead projector, then hook the display to the RGB or composite video port of an IBM or compatible computer. Crisp images in 640 x 200 dot resolution will appear on the screen before you. One of the beauties of Data Display is that it allows for on-the-spot manipulation of your data. This means you can dazzle your audience by re-configuring a graph or a spreadsheet according to the needs of the moment. Plus, Data Display's true aspect ratio keeps the exact proportions of your charts and graphs.

A supertwist LCD panel provides high contrast, even in normal room lighting. And, a highly efficient fan and air flow system with infrared heat shield guarantees consistent screen quality without dark spots. Convenient on-board controls are easily accessible.

The complete Data Display package contains both DB9 and composite video cables, AC/DC transformer and Presentation Partner software for leading dynamic meetings.

Use this amazing presentation aid on the road as well as at the office, in CAD/CAM applications and in the classroom. Approximately 1 ft. square, it weighs only 3 lbs. Once you see what a difference Data Display makes, you'll never want to present your facts without it. Uses 120 VAC, 60 Hz.

Assembled A-200 (7 lbs.) \$1199.00

Project CGA level video from your computer screen

Give the video presentation of a lifetime with the amazing Data Display from Computer Accessories Corporation. Only seconds after you turn on your computer, the charts, graphs and spreadsheets you've worked on for weeks appear in high resolution before the eyes of your audience.



Printer buffer saves computer time

^{SKILL}_{LEVEL} The Heathkit Printer Buffer lets you use your computer while a document is printing. It accepts data as fast as your computer can send it with serial baud rates up to 38.4K and parallel rates to 100,000 CPS. Data is then stored in 64K of memory, equal to 21 typewritten pages, expandable to 512K, the equivalent of 168 typewritten pages.

Both serial and parallel ports allow you to connect more than one computer and printer. This means files can be accepted from both computers, then sent to separate printers at the same time. Or send files to your choice of printer. Priority print means you can interrupt printing, print a priority document, then reprint the interrupted document. Even print up to 99 copies of a particular file.

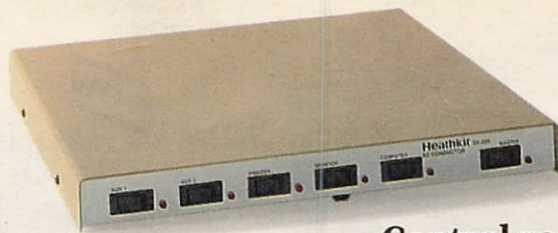
Through self diagnostics, the Printer Buffer checks its own memory each time you turn it on. And, to prevent memory overload, a front panel display shows remaining free memory. This two evening kit operates on 108-132 VAC, 60 Hz.

Kit SK-203 (5 lbs.) **\$199.95**

Accessories:

9 Pin to 9 Pin Serial I/O Cable for AT compatible computers. HCA-85 (1 lb.) **\$20.00**

2 Meter Cable with IBM parallel connectors on both ends. HCA-84 (1 lb.) **\$30.00**



Control your computer and peripherals from one convenient power director

^{SKILL}_{LEVEL} Add convenience and protection to your computer system with the Heathkit AC Conductor. Simply plug the AC line cords of your equipment into the conductor, then control the power to each from the conductor's front panel. Power switches are there in front of you, easy to control.

The AC Conductor filters line voltage and helps shield your equipment against power line spikes, thanks to a protective MOV device. A 15 amp fused line adds protection against excessive loads.

Plug up to five pieces of equipment into the conductor: computer, monitor, printer, desk lamp, plus one more of your choice. A flip of the master switch and all five turn on. Or turn on each individually. Separate LEDs show you what's on and what's not.

An additional convenience is the turntable base. You'll be able to rotate your monitor to the most comfortable viewing angle, giving you convenience and protection without losing valuable desk space.

Assemble the AC Conductor in one evening. Its dimensions are 1¾"H x 13½"W x 14"D.

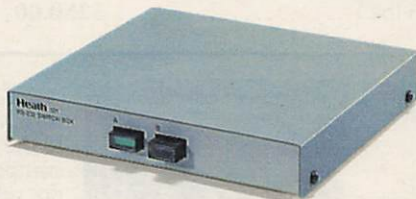
Kit SK-209 (11 lbs.) **\$49.95**



Monitor shows what your AC line is doing

^{SKILL}_{LEVEL} Keep track inexpensively of an important part of your system, the AC power line. With the Heathkit AC Line Monitor, you'll be able to monitor voltage sensitive equipment such as computers, communications gear and medical apparatus. Eight LED indicators show voltage from 95 to 130 VAC in five volt steps. Plus, a separate fault LED lights if the voltage falls below 90 VAC, and a separate spike LED lights if a voltage transient occurs. Dimensions are 3⅝"H x 2⅜"W x 1¼"D.

Kit SK-211 (1 lb.) **\$29.95**



RS-232 switch box

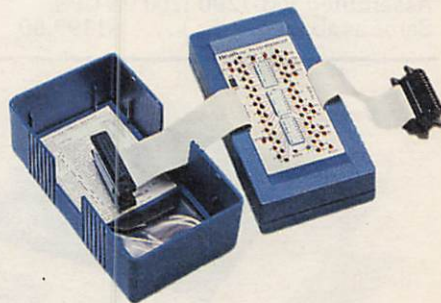
^{SKILL}_{LEVEL} Eliminate bothersome plugging and unplugging of peripherals while you save on the cost of expensive expansion ports. By adding the Switch Box to your computer system, you'll be able to instantly alternate between two RS-232 devices with the press of a button – and without touching a cable.

Use the Switch Box to direct the output from a single computer serial port to either of two peripheral devices, or to share one peripheral, such as a printer. In less than one evening you can put together this inexpensive solution to major hardware purchases.

Kit PMK-121 (3 lbs.) **\$49.95**

Accessory:

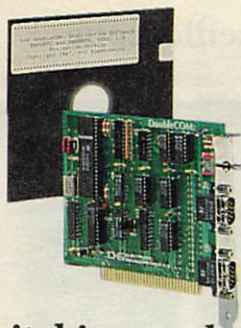
2 Meter Cable with IBM connectors at both ends. HCA-84 (1 lb.) **\$30.00**



Breakout box saves time

^{SKILL}_{LEVEL} In one evening you can build a valuable time saver, the Heathkit Breakout Box. It will provide you with access to all 25 lines of RS-232C cable linking computer system devices. Twelve LEDs monitor key signal lines while 23 lines can be switch disabled, then cross connected. Built-in dual DTE and DCE gender connectors eliminate the need for adapter cables and connectors, and two AA batteries power the line monitoring LEDs, though they're not needed for the unit to operate. Five jumper wires are included.

Kit PMK-130 (2 lbs.) **\$79.95**



A/B switching card

DoubleCOM: is a serial I/O card with an on-board electronic A/B switch. Its purpose is to simplify serial interface connections between your computer and such peripherals as printers, modems and plotters.

PC family compatible, DoubleCOM: allows you to operate more than one serial peripheral from one of the two standard PC serial ports. All it takes is a simple keyboard command to access the peripheral you need – and, without exiting the application program you're using. No more need to reach behind your computer to swap cables or switch back and forth using the A/B box.

Add another DoubleCOM: for an expanded system. For systems using PC-DOS, and MS-DOS Version 2.0 or later. **Assembled DC-1000 (1 lb.) ... \$149.95**

Kraft gameport adapter

Add this Kraft gameport board to your PC, XT, AT or compatible computer and plug in one or even two joysticks. Simply insert the card into an open expansion slot and set the mode switch to the type of machine being used. Includes installation and setup instructions.

Assembled K82-44-1 (1 lb.) .. \$29.99



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570

SAVER! Purchase DC-1000 DoubleCOM: (at left) along with any serial item in this catalog and save \$50.00. Serial items include all external modems on page 61 and plotters sold through our computer sales line at 1-800-253-0570. To order, list both model numbers and prices, then take a \$50.00 allowance on your order.



Gravis MK VI

This easy-to-handle joystick for Heath/Zenith, IBM compatibles and Apple PCs features a pistol-grip stick with integrated fire button, two programmable fire buttons and an extra-long 72" cable.

Assembled PP-402 For IBM compatibles. (2 lbs.) \$39.95

Assembled PP-450 For Apple IIe and IIc. (2 lbs.) \$39.95

Heath/Zenith Computers & Electronics Centers* from coast to coast

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503-684-1074

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6318 Roosevelt Blvd.
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412-935-8555

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58 East 7200 South
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Top notch people put Heath in a class of its own

People like Roger Brockway help differentiate Heath Company from other instrument manufacturers. A 30-year veteran at Heath, Roger manages our instrument engineering department. With the help of an expert team, he's responsible for the engineering of oscilloscopes, meters, counters, generators and related products in our instrument line.

There's one thing for sure you can say about Roger: *No one* can persuade him to design a product that's not up to Heath standards.

"When a new product is defined, my department has a number of things to do," says Roger. *"Of course we have to design circuitry and mechanical parts that do the required job. But it's also important that we design for ease of use, safety and reliability. We must see to it that our products provide the honest value that Heath is known for. And, we apply exactly the same standards to products manufactured for us by outside vendors."*

"We often reject products for reasons of safety or accuracy," continues Roger. *"When we offer a product, we not only check to see that it meets all our specifications, we also check to see that those specifications define a useful product that meets the reasonable expectations of our customers."*

As Roger says, our instruments *"work right, look right, feel right and do a useful job."* And, you know they've passed the Roger Brockway test of excellence when you buy them from Heath.



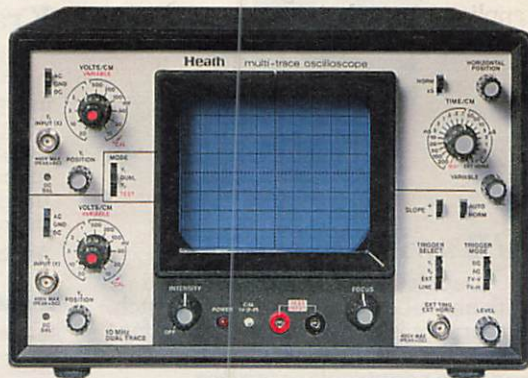
Roger Brockway in front of his 1935 Ford pickup. Just one of the several cars he's restored.

A hobbyist's dual trace 10 MHz oscilloscope with lab-grade accuracy

SKILL LEVEL 3 This dual trace 10 MHz oscilloscope kit is made to precisely display a wide range of waveforms such as those encountered by electronics engineers and research scientists. Outstanding features such as a fast 35 ns rise time, triggered sweep and excellent 10 mV sensitivity make this scope a versatile high tech tool. Yet its low price makes it affordable for the service technician's bench or hobbyist's work shop.

Kit IO-4210
(38 lbs.) \$329.95

Specifications: **VERTICAL: Deflection Factor:** Sensitivity: 10 mV/cm to 20 V/cm. Attenuator: 11 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 60 V/cm. Accuracy: Within 3% (10°C to 40°C). **Vertical Response:** DC Coupling: DC to 10 MHz (-3 dB) at 6 cm. AC Coupling: 2 Hz to 10 MHz (-3 dB) at 6 cm. Rise Time: 35 ns. Overshoot: Less than 5%. **Vertical Input:** Maximum: 400 V peak combined AC and DC. **Vertical Modes:** Display: Y1, Y2 or Test. **HORIZONTAL: Time Base:** Ramp: 0.2 s/cm



to 200 ns/cm. Positions: 19 steps in a 1-2-5 sequence. Variable: Continuous between ranges to approximately 0.6 s/cm. Accuracy: Within 3% (20°C to 30°C). **External:** Sensitivity: 0.1 V/cm (approximately). Frequency Response: DC to 1 MHz (-3 dB). **TRIGGER: Internal:** Automatic and Normal: Adjustable over 10 divisions. Slope Selection: + or -. **GENERAL: CRT:** Graticule: 8 x 10 cm. **Power:** 108 to 132 VAC, 60 Hz. **Dimensions:** 7" H x 12 7/8" W x 19 1/4" D. **Weight:** 22 lbs.

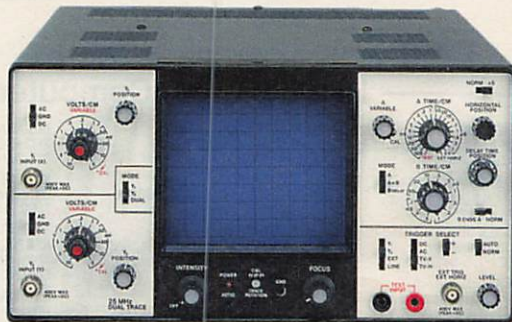
Our best kit scope, an outstanding performer at an affordable price

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

This scope features a variety of operating and triggering modes including X-Y operation. A special test function displays the characteristic I-V curve of components like transistors and diodes for a quick check of suspect parts.

Kit IO-4225 (28 lbs.) \$499.95

Specifications: **VERTICAL: Display Modes:** Y1, Y2, Dual (Alt/Chop selected by Time/Cm switch. Chop frequency is approximately 200 kHz.). **CHANNELS Y1 AND Y2: Deflection Factor:** Sensitivity: 5 mV/cm to 10 V/cm. 11 steps in a 1-2-5 sequence. Variable: Continuous between steps to approximately 30 V/cm. Accuracy: Within 3%. **Vertical Response:** DC Coupling: 5 mV/cm to 10 V/cm, DC to 25 MHz. AC Coupling: 5 mV/cm to 10 V/cm, 10 Hz to 25 MHz. Rise Time: 16 ns or less.



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

Dual trace 25 MHz oscilloscope

Meet a broad range of applications in design, testing and servicing of both analog and digital circuits and equipment with this precision scope. It features alternate triggering, trace magnification and an 8 x 10 cm internal graticule. This is a professional quality scope designed for use by technicians, hobbyists, engineers and others requiring stable and reliable information that only a scope can supply.

Assembled SO-4226
(22 lbs.) \$429.95

Specifications: **VERTICAL DEFLECTION:** Deflection Factor: 5 mV to 5 V/div \pm 3%; 10 steps in 1-2-5 sequence with variable control. **Bandwidth (at -3 dB):** DC: DC to 25 MHz. AC: 10 Hz to 25 MHz. **Rise Time:** Approx. 14 ns. **Overshoot:** Less than 3%. **Input Impedance:** 1 M Ω shunted by 25 \pm 3 pF. **Maximum Input:** 400 V P-P, or 200 V (DC + AC peak). **Operating Modes:** CH1, CH2, DUAL and ADD. **Chop Frequency:** Approx. 250 kHz. **HORIZONTAL DEFLECTION:** Sweep



Mode: AUTO, NORMAL and SINGLE. **Sweep Time:** 0.2 μ s to 0.5 s/div; 20 steps in 1-2-5 sequence with variable control and X-Y mode. **Magnification:** X10. **Sweep Time Accuracy:** 3%. **Linearity:** 3%. **X-Y MODE:** Sensitivity: Same as CH1 vertical axis. **Frequency Response:** DC to 1 MHz (-3 dB). **TRIGGER:** Source: CH1, CH2, LINE and EXT. **Coupling:** AC, HF REJ, TV and DC. **Polarity:** + or -. **Mode:** AUTO, NORM and SINGLE. **INTENSITY MODULATION (Z-axis):** Input Voltage: 3 V P-P or higher (bright at negative-going input). **GENERAL:** Calibration Voltage: 2 V P-P \pm 2%, 1 kHz square wave (positive-going). **Power:** 100/117 VAC; 60 Hz. **Dimensions:** 6 1/2" H x 12 1/2" W x 17" D. **Weight:** Approx. 15 1/2 lbs.

Dual trace 50 MHz oscilloscope

For critical applications the advanced 50 MHz scope comes packed with features, including delayed sweep, to make your job easier. This scope is an outstanding value for hobbyists, technicians and engineers.

Assembled SO-4251
(22 lbs.) \$749.95

Specifications: **VERTICAL DEFLECTION:** Factor: 5 mV to 5 V/div \pm 3%; 10 steps in 1-2-5 sequence with variable control. **Magnify:** X5. **Bandwidth (at -3 dB):** DC: DC to 50 MHz. AC: 10 Hz to 50 MHz. **Rise Time:** Approx. 7.0 ns. **Overshoot:** Less than 3%. **Max. Input:** 400 V P-P, or 200 V (DC + AC peak). **Operating Modes:** CH1, CH2, DUAL and ADD. **Chop Frequency:** Approx. 250 kHz. **HORIZONTAL DEFLECTION:** Modes: A, INT, B and B TRIG'D. **A SWEEP:** Time: 0.2 μ s to 0.5 s/div; 20 steps in 1-2-5 sequence with variable control and X-Y mode. **Magnify:** X10. **Sweep Time Accuracy:** 3%. **B SWEEP:** Delay System: Continuous and triggered delay. **Sweep Time:** 0.2 μ s to 9.5 ms/div. **Sweep Time**



Accuracy: 3%. **Delay Time:** 2 μ s to 5 ms/div. **Delay Time Accuracy:** 4%. **Delay Jitter:** 0.0001 or less. **X-Y Sensitivity:** Same as CH1 vertical axis. **Frequency Response:** DC to 2MHz (-3 dB). **EXT HOR Mode:** Trace swept by signal applied to EXT IN terminal. **TRIGGER:** Source: CH1, CH2, LINE and EXT. **Coupling:** AC, HF REJ, TV and DC. **Polarity:** + or -. **Modes:** AUTO, NORM and SINGLE. **INTENSITY MODULATION (Z-axis):** Input Voltage: 3 V P-P or higher (bright at negative-going input). **GENERAL:** Calibration Voltage: 2 V P-P \pm 2%, 1 kHz square wave (positive-going). **Power:** 100/117 VAC. **Dimensions:** 6 1/2" H x 12 1/2" W x 17" D.

Choosing a good oscilloscope

Bandwidth is important and you probably need more of it than you think you do. Here's why: An oscilloscope's bandwidth specifies the frequency at which amplitude is down by 3 dB, or about 30% of true voltage. In addition, distortion usually consists of harmonic multiples of the fundamental frequency, and the low pass characteristic that's unavoidable part of oscilloscope design will do a fine job of apparently cleaning up the distortion. A good rule is that you need a bandwidth of at least five times the highest frequency of signal you want to look at.

As important as bandwidth is, it isn't everything. Pulse response is just as important. A common design shortcut is to allow a large amount of pulse distortion in order to get an artificially high bandwidth figure, since many buyers ask only about bandwidth. The simplest specification to qualify response is overshoot. About 3% is considered very good; 5% is quite satisfactory.

Oscilloscopes with excessive overshoot have another unpleasant failing: Sensitivity is not constant over the useful range of the scope. You'll find dips and peaks in sensitivity well below the bandwidth of the instrument if the scope has excessive overshoot or ringing.

Stable triggering to frequencies beyond the bandwidth of the instrument is necessary, and not always present in less expensive oscilloscopes. A poorly designed trigger circuit may have unwanted resonant circuits in its input (caused by lead inductances and the like). These circuits can cause "holes" where, at certain frequencies, the scope won't trigger at all.

Delayed sweep operates like a horizontal zoom function. It lets you identify a small area of the trace and then expand it greatly. This is very handy, for example, if you want to examine the risetime of one pulse out of a long train of pulses.

If you have questions about our assembled or kit oscilloscopes, give our technical consultants a call during regular business hours. The number is 616-982-3315. They'll be glad to help you select the right instrument for your application.



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570



Precision scope calibrator

Keep your scope up to specs at all times. The IG-4244 provides all the accuracy you'll need for making critical scope adjustments and calibrations.

Kit IG-4244 (6 lbs.) \$199.95

Specifications: **TIME OUTPUT SIGNAL:** Range: 0.5 s to 10 ns square wave in a 1-2-5 sequence. **Accuracy:** 0.015%. **Amplitude:** 0.5 s to 20 ns - 100 mV to 1 V peak. 10 ns - 100 mV to 0.5 V peak. **Rise Time:** <1 ns. **VOLTAGE OUTPUT SIGNAL:** Ranges: 1 mV to 100 V peak square wave in a 1-2-5 sequence. **Accuracy:** Within 1% into a ≥ 1 M Ω load when calibrated with an external voltmeter. **Rise Time:** <5 μ s. **Frequency:** Approximately 1 kHz. **SINE WAVE OUTPUT SIGNAL:** Frequency: Approximately 1 kHz. **Amplitude:** Approximately 1 volt peak-to-peak. **GENERAL:** Power Requirements: 120/240 VAC, 50/60 Hz.



Heathkit component tracer simplifies troubleshooting

Part signal generator and part curve tracer, our component tracer uses patented display circuitry to help you quickly track down faulty components.

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

The Component Tracer gives an instant electronic evaluation of active and passive devices. Two sets of colored leads are included.

Kit IT-2232 (15 lbs.) \$259.95

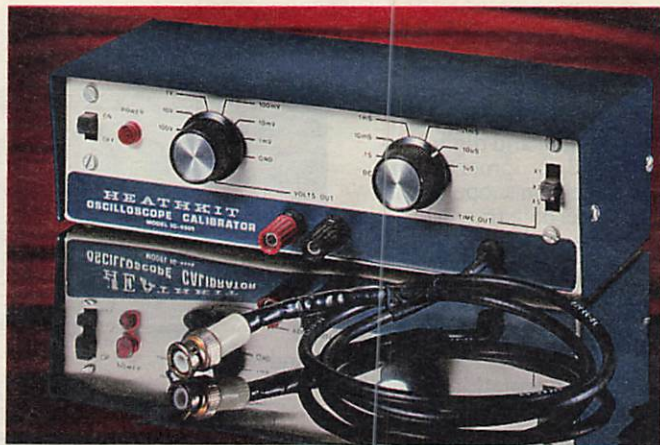
Specifications: **Display Mode:** Channel A, Channel B, Dual. **Channel A:** Solid line trace. **Channel B:** Dotted line trace. **Test Voltages:** 5 V and 50 V P-P. **Current Limits:** 5 V P-P at 5 mA; 50 V P-P at 0.5 mA. **CRT:** 3RP1A, round 3", flat face. **Accelerating Potential:** 1.2 kV. **Power Requirements:** 120/240 VAC, 50/60 Hz, 22 watts. **Dimensions:** 4" H x 10" W x 12 1/2" D. **Weight:** 8 1/2 lbs.

Economical scope calibrator

In two evenings build this crystal controlled, fast-rise square wave generator. It provides you with the accurate time and amplitude signals you'll need to calibrate most Heathkit and other oscilloscopes.

Kit IG-4505 (4 lbs.) \$69.95

Specifications: **TIME SIGNAL:** Range: 0.5 s to 1 μ s square wave in a 1-2-5 sequence. **Accuracy:** 0.01%. **Amplitude:** Approx. 200 mV peak. **Rise Time:** ≤ 4 ns. **Overshoot:** $\leq 3\%$. **Output:** 50 Ω terminated cable. **VOLTAGE SIGNAL:** Ranges: 1 mV to 100 V peak square wave. **Accuracy:** Within 2%. **Rise Time:** ≤ 2 μ s. **Frequency:** DC, 2 Hz to 10 kHz in a 1-2-5 sequence. **GENERAL:** Power: 120/240 VAC, 50/60 Hz. **Dimensions:** 2 3/4" H x 9 1/8" W x 4 1/4" D.



Value leader universal frequency counter with digital display

Our new frequency counter is a value leader that offers a lot of frequency range for the money. Engineers, hams and others will find the SM-2440 suitable for their needs and their budgets. One feature particularly attractive for hams is that the SM-2440 will count frequencies in the 1296 amateur band. It even reaches a maximum frequency of 1300 MHz.

In addition to its high frequency range, this counter features a ± 10 PPM time base accuracy, ± 1 count. Plus, it offers period and totalize, big extras that only come with a true "universal" counter. Also, units of measurement (kHz,

MHz) are indicated on the front panel by bright LED indicators.

Assembled SM-2440 (5 lbs.) \$399.95

Specifications: **Features:** 8 digits; low-pass filter, 2-position attenuator, remote start-stop, display hold. **FREQUENCY: Channel A Range:** kHz Mode: 5 Hz to 10 MHz. MHz Mode: 5 Hz to 100 MHz. **Channel B (Prescaled) Range:** 80 MHz to 1.3 GHz. **Accuracy:** ± 10 PPM time base accuracy, ± 1 count. **Channel A Resolution:** kHz Mode: 0.1 Hz to 100 Hz, switch-selectable in four decade steps. MHz Mode: 1 Hz to 1000 Hz, switch-selectable in four decade steps. **Channel B Resolution:** 10 Hz to 10 kHz, switch-selectable in four decade steps. **Display:** Input signal frequency with decimal point positioned by gate switches. Units of measurement (kHz, MHz) indicated on front panel by LED indicators.



A versatile universal digital counter

SKILL LEVEL 3 This top-of-the-line digital counter lets you adjust commercial transmitters to within FCC specs. It features a 512 MHz frequency range and oven-housed crystal for .2 ppm time base accuracy. Build in four evenings.

Kit IM-2420 (9 lbs.) \$299.95

Assembled SM-2420 (9 lbs.) \$389.95

Accessory:

Telescopic Antenna

Assembled SMA-2400-1 (1 lb.) . . \$9.95

Specifications: **FREQUENCY MEASUREMENT:** Range: Input A, 5 Hz to 50 MHz. Input B, 40 MHz to 512 MHz. **Sensitivity:** 25 mV RMS (4 to 15 mV RMS typical). **Display Resolution:** Input A, 0.1 Hz to 10 Hz. Input B, 1 Hz to 1000 Hz. **PERIOD MEASUREMENT:** Input: Input A only. Range: 5 Hz to 10 MHz. **Display Resolution:** 100 ns to 0.1 ms in decade steps. **RATIO B/A MEASUREMENT:** Input Frequency Limits: Input A, 5 Hz to 25 MHz. Input B, 50 MHz to 512 MHz. **Effective Range:** From 1.6 to 1.024 x 10⁸. **OSCILLATOR:** Frequency: 10 MHz. **Crystal Aging Rate:** <1 ppm/yr. **Stability:** ±0.2 ppm, 0° to 40°C. **GENERAL:** Power: 120/240 VAC, 50/60 Hz. **Dimensions:** 4½" H x 10" W x 12½" D.

Accurate digital frequency counter

SKILL LEVEL 2 Put accurate and dependable frequency measurement capability on your workbench at an affordable price. The easy-to-operate IM-2410 features a crystal-controlled time base for ±10 ppm long term accuracy. An 8-digit display always shows the measurement in MHz with resolution as small as 1 Hz. Use the telescopic antenna for indirect frequency checks. Two-evening build time.

Kit IM-2410 (6 lbs.) \$149.95

Accessory:

Telescopic Antenna

Assembled SMA-2400-1 (1 lb.) . . \$9.95

Specifications: **Frequency Ranges:** 10 Hz to 50 MHz. 20 MHz to 225 MHz. **Sensitivity:** 10 Hz to 50 MHz range: 25 mV RMS maximum (10 mV typical) from 10 Hz to 30 MHz and 50 mV RMS maximum from 30 MHz to 50 MHz. 20 MHz to 225 MHz range: 25 mV RMS maximum (10 mV typical). **Input Impedance:** 1 MΩ shunted by ≤24 pF. **Input Protection:** 150 VAC up to 100 kHz, derated to 5 VAC from 160 MHz to 225 MHz. **Internal Time Base Frequency:** 3.58 MHz. **Stability:** ±1 ppm. **Temperature Stability:** ±10 ppm from 0°C to 40°C. **Gate Time:** 1 second or .1 second, switch selectable. **Power Requirements:** 108 VAC to 132 VAC or 216 VAC to 264 VAC. 50 to 60 Hz. 25 watts maximum. **Dimensions:** 3¾" H x 7¼" W x 9½" D.



512 MHz frequency counter

SKILL LEVEL 2 An ideal compact and portable frequency counter for checking mobile car, boat and airplane transmitter frequencies. A seven-digit LED display gives 10 Hz resolution in the low 50 Hz to 50 MHz range and a 100 Hz resolution in the high 40 MHz to 512 MHz range.

Kit IM-2400 (3 lbs.) \$149.95

Accessories:

Telescopic Antenna

Assembled SMA-2400-1 (1 lb.) \$9.95

120 VAC Battery Eliminator/Charger

Assembled PS-2404 (1 lb.) \$7.95

Specifications: **INPUTS:** **Sensitivity:** 25 mV RMS guaranteed (10 mV RMS typical). **Input Protection:** 150 V RMS to 100 kHz derated to 10 V RMS at 50 MHz on low range, 5 V RMS on high range. **GENERAL:** **Gate Time:** 1 second or 0.1 second (switch selected). **Power:** Five 1.2 volt nickel-cadmium batteries (included) or external battery-charger/eliminator. **Dimensions:** 15½" H x 3¾" W x 8¾" L.

Choosing a good frequency counter

Frequency range is the first specification to consider in selecting a frequency counter. Note that we use the term "range" rather than bandwidth. The difference is important. Frequency counters count accurately up to a certain range limit, then start miscounting, rather than rolling off gradually the way oscilloscopes do.

The next major specification to consider is time base accuracy. This is determined by the quality of the time base crystal and by the circuitry used to control its environment. Plus or minus 10 ppm yields a time base error of no more than 1000 Hz at 100 MHz, which is quite adequate for many situations. However, if you want to calibrate transmitters to FCC commercial specifications, you'll want a 1 ppm or better instrument. As a general rule, 1 ppm is adequate for broadcast transmitters and commercial two-way radios... though you should check FCC regulations for exact requirements. Also remember that time base errors add to other counter errors.

Our frequency counters have carefully designed front end amplifiers so they can be used over a wide range of input voltages. Inferior counters may require a strong signal in order to lock on, and may double count or give other peculiar results if they're driven with a signal even slightly above the minimum. Very inexpensive counters sometimes lack front-end amplifiers altogether, requiring that they be driven with logic level signals.

Some top quality counters offer functions in addition to frequency. For instance, you can use the period function (the inverse of frequency) to gain additional significant digits (resolution) when the signal frequency is too low to measure accurately in the frequency mode. These top quality counters, usually called "universal counters," give you the opportunity for wider applications because of added functions such as period, frequency ratio and count totalize.

If you have questions about our assembled or kit frequency counters, call our technical consultants during regular business hours at 616-982-3315. They'll be happy to help you.

All-purpose 2 MHz swept function and pulse generator

The SG-1274 Swept Function Generator is a general purpose signal source with a broad range of service, design, hobby and research applications. Outputs include sine, square, triangle, pulse and ramp signals. Frequency range extends from 0.02 Hz to 2 MHz in 7 pushbutton ranges. Other features include variable and fixed attenuators, duty cycle control, variable DC offset control, signal inversion, internal and external sweep and TTL pulse outputs. The compact cabinet saves space on your workbench and can be stacked to save you even more room.

Assembled SG-1274 (6 lbs.) \$199.95

Specifications: **Waveform:** Sine, Square, Triangle, Pulse. **Frequency:** 0.02 Hz-2 MHz in 7 ranges. **Scale Error:** $\pm 5\%$ of full scale. **Output Impedance:** 50 ohms $\pm 10\%$. **Output:** 5 mV P-P (min.) to 20 V P-P (max.) continuously variable into an open circuit. **Attenuator:** 0 dB-20 dB. **DC Level:** +10 V to -10 V (open), continuously variable with zero offset SW. **Duty Cycle:** 20%-80% continuously variable with 50 - 50 calibrated SW. **Total Harmonic Distortion:** <1% from 10 Hz to 200 kHz (of sine wave). **Input Impedance:** 10 Ω $\pm 10\%$. **Square Wave Rise/Fall Time:** <100 ns. **Pulse:** >3 V P-P (open). **Rise/Fall Time:** <25 ns. **Sink:** 20 TTL. **VCF:** 0 to ± 10 V. **Control frequency to 100:** 1 min. **Sweep. SWEEP CHARACTERISTICS:** **Internal:** Linear. **Sweep Rate:** 0.5 Hz (2 sec. period) to 50 Hz (20 ms period, continuously variable). **Sweep Width:** Variable from 1:1 to 100:1. **Power:** 100/120/220/240 VAC ($\pm 10\%$), 50/60 Hz. **Dimensions:** 2 1/2" H x 9 1/2" W x 7 1/2" D (6.4 x 24 x 19 cm) **Weight:** 3 3/8 lbs. (1.4 kgs).



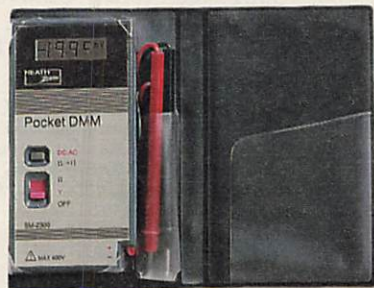
Affordable sine and square wave generator

3 SKILL LEVEL This 1-100 kHz signal generator supplies high quality sine waves for accurate testing of audio amplifiers, and clean square waves for checking digital instruments and frequency responses.

Kit IG-5218 (10 lbs.) \$199.95

Specifications: **SINE WAVE OUTPUT:** Internal Load: Internal 600 Ω load available on 0.003, 0.01, 0.03, 0.1, 0.3 and 1.0 volt ranges. **dB Ranges:** -62 to +22 dB (-12 to +2 dB on meter; -50 to +20 dB in eight 10 dB switch positions.) +2 dB

maximum into 600 Ω load. **Output Variation:** ± 1 dB from 10 Hz to 100 kHz. **Output Indication:** 2 voltage scales and 1 dB scale on front panel meter. **Output Impedance:** 10 volt range; 0-1000 Ω . 3 volt range; 800-1000 Ω . 1 volt range and lower; 600 Ω . **Meter Accuracy:** $\pm 10\%$ of full scale with proper load termination. **Distortion:** Less than 0.1% from 10 Hz to 20 kHz. **SQUARE WAVE OUTPUT:** **Frequency Range:** 5 Hz to 100 kHz. **Output Impedance:** 52 Ω on 0.1 V and 1.0 V ranges. Up to 220 Ω on 10 V range. **Rise Time:** Less than 50 nanoseconds. **GENERAL:** **Frequency Selection:** First 2 significant figures on 0-100 and 0-10 switches each in 10 steps. Third figure on continuously variable 0-1 control. **Multiplier switch;** X1, X10, X100, X1000. **Frequency Error:** $\pm 5\%$ of first and second digit. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5 3/8" H x 13 1/4" W x 7" D.



new Compact DMM fits in your shirt pocket

Our pocket Digital Multimeter (DMM) is an easy-to-use test instrument with a 3 1/2-digit LCD display for readings to 1999. You can make DC voltage, AC voltage and resistance measurements. In addition, the SM-2300-A has an audible continuity and diode checking system. Even has over-range and battery low indicators. Battery included.

Assembled SM-2300-A (1 lb.).. \$24.95

Specifications: **DC VOLTS:** Ranges (5): 200 mV to 500 V (max.). **Input Resistance:** 11 M Ω (approx.). **Accuracy (± 4 digits):** 200 mV: $\pm 2.0\%$; 2 V: $\pm 0.7\%$; 20 V-500 V: $\pm 1.3\%$. **AC VOLTS:** Ranges (4): 2 V to 500V (max.). **Input Resistance:** 11 M Ω (approx.). **Accuracy (± 8 digits):** 2 V-500 V: $\pm 2.3\%$ (40-500 Hz). **RESISTANCE:** Ranges (6): 200 Ω to 20 M Ω . **Open Circuit Voltage:** <0.45 V. **Accuracy (± 4 digits):** 200 Ω -2000 k Ω : $\pm 2.0\%$; 2 M Ω -10 M Ω : $\pm 5.0\%$; 10 M Ω -20 M Ω : $\pm 10\%$. **CONTINUITY/DIODE CHECK:** **Open Circuit Voltage:** 1.5 V (approx.).



Benchtop 3½-digit LED full-function DMM

This push-button ranging meter features diode and internal battery test, blanking, polarity and overrange indicators, built-in battery charger and auto decimal point location. Input protected and test leads included.

Kit IM-2260 (5 lbs.) \$139.95

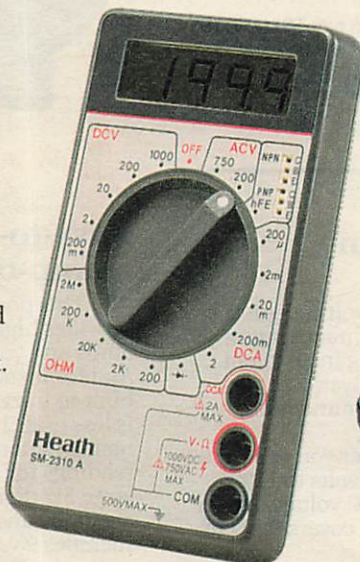
Specifications: **VOLTAGE RANGES:** DC: 2V, 20V, 200V, 1000V. **Basic Accuracy:** ±(0.5% of reading + 1 count). AC: 2V, 20V, 200V, 750V. **Basic Accuracy:** ±(1.0% of reading + 3 counts). **Frequency Response:** 40 Hz to 1 kHz, ±0.5%. **Input Impedance:** 10 megohms. **CURRENT RANGES:** 2 mA, 20 mA, 200 mA, 2000 mA, 10 A. **Basic Accuracy DC:** ±(1.5% of reading + 1 count). AC: ±(2.0% of reading + 1 count). **OHMS RANGES:** 2 kΩ, 20 kΩ, 200 kΩ, 2000 kΩ, 20 MΩ. **BASIC ACCURACY:** ±(0.25% of reading + 1 count). **Power:** Heath PS-2404 120 VAC Adaptor (p. 73) or six 1.5 volt batteries. **Dimensions:** 3" H x 8½" W x 11" D. **Weight:** 2¾ lbs.

LAST CALL on pocket size digital meter

With all the measuring capability you'll need for home or shop jobs, this compact meter includes 3½-digit LCD display for readings to 1999 and diode test. Overload protected on all ranges. Features new transistor hFE test.

Assembled SM-2310-A (1 lb.) Last Call! \$29.95

Specifications: **DC VOLTS:** Ranges: 200 mV, 2 V, 20 V, 200 V, 1000 V. **Resolution:** 100 μV, 1 mV, 10 mV, 100 mV, 1 V. **Accuracy:** 200 mV-1000 V ±(0.5%rdg + 2dgt). **Input Impedance:** 1 MΩ. **DC CURRENT:** Ranges: 200 μA, 2 mA, 20 mA, 200 mA, 2 A. **Resolution:** 100 nA, 1 μA, 10 μA, 100 μA, 1 mA. **Accuracy:** 200 μA-200 mA ±(0.75%rdg + 2dgt), 2A ±(1.2%rdg + 2dgt). **AC VOLTS:** Ranges: 200 V, 750 V. **Resolution:** 100 mV, 1 V. **Accuracy:** 200 V-750 V @ 45Hz-450Hz ±(1.2%rdg + 5dgt). **Input Impedance:** 450 kΩ. **RESISTANCE:** Range: 200Ω, 2KΩ, 20KΩ, 200KΩ, 2MΩ. **Resolution:** 0.1Ω, 1Ω, 10Ω, 100Ω, 1KΩ. **Accuracy:** 200Ω ±(0.75%rdg + 4dgt), 2KΩ-200KΩ ±(0.75%rdg + 2dgt), 2MΩ ±(1.0%rdg + 2dgt).



3½-digit DMM with capacitance

A single rotary switch enables fast and convenient selection of voltage, current and resistance ranges plus capacitance ranges. This compact DMM also checks a transistor's hFE. Liquid crystal display with large, easy-to-read numbers, aut polarity, autozero, low battery warning, and diode and audible continuity checks are features of this compact instrument. Overload protection is provided and a tilt-stand bail allows better viewing. Safety-designed test leads are included.



Kit IM-2320 (5 lbs.) \$74.95
Assembled SM-2320 (1 lb.) \$89.95

Specifications: **VOLTS DC:** Ranges: 200 mV, 2V, 20V, 200V, 1000V. **Resolution:** 100 μV. **Accuracy:** ±(0.5% of reading + 1 digit). **Input Impedance:** 10 MΩ. **VOLTS AC:** Ranges: 200 mV, 2V, 20V, 200V, 750V. **Resolution:** 100 μV. **Accuracy:** ±(1.25% of reading + 4 digits). **Input Impedance:** 10 MΩ/100 pf. **AMPS DC:** Ranges: 200 μA, 20 mA, 200 mA, 10 A. **Resolution:** 0.1 μA. **Accuracy:** ±(1.0% of reading + 1 digit), except for ±(2.0% of reading + 3 digits) on 10 A range. **AMPS AC:** Ranges: 20 mA, 200 mA, 10 A. **Resolution:** 10 μA. **Accuracy:** ±(1.5% of reading + 3 digits), except for ±(2.5% of reading + 4 digits) on 10 A ranges. **OHMS:** Ranges: 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ. **Resolution:** 0.1Ω. **Accuracy:** ±(0.75% of reading + 1 digit), except for 200Ω and 20 MΩ ranges. **CAPACITANCE:** Ranges: 2 nF, 20 nF, 200 nF, 2 μF, 20 μF. **Resolution:** 1 pF. **Accuracy:** ±(2.0% of reading + 4 digits). **Power:** One 9V battery (not included). **Dimensions:** 7" H x 3¾" W x 1¼" D. **Weight:** 11.9 ozs.

Heath DMM from FLUKE

This deluxe multimeter features a unique dual digital and analog bar-graph display.

You'll get the resolution of costlier 4½-digit meters, and features such as touch-hold function and continuity checker with beeper.

Assembled SM-77 (3 lbs.) \$139.95

Accessories:

Soft Carrying Case

SMA-77-1 (1 lb.) \$12.95

Holster Case SMA-77-2 (1 lb.) \$12.95

Specifications: **DC VOLTS:** Ranges: 320 mV, 3.2 V, 32 V, 1000 V. **Max. Sensitivity:** 0.1 mV. **Basic Accuracy:** ±(0.3% reading + 1 digit). **Input Impedance:** 10 MΩ. **AC VOLTS:** Ranges: 3.2V, 32 V, 320V, 750 V. **Max. Sensitivity:** 1 mV. **Input Impedance:** 10 MΩ/50 pf. **OHMS:** Ranges: 320Ω, 3200Ω, 32 kΩ, 320 kΩ, 3.2 MΩ, 32 MΩ. **Max. Sensitivity:** 0.1Ω. **AC/DC AMPS:** Max. Reading: 10 A. **Max. Sensitivity:** 0.1 mA. **POWER:** Single standard 9-volt battery (included).



Our own PC logic analyzer

SKILL LEVEL This versatile test instrument is another Heath exclusive. Use it to troubleshoot or verify the proper operation of a wide variety of circuits containing sequential and/or combinational logic. And with the included specific software, this analyzer is fully keyboard configurable and menu driven. The Logic Analyzer can check a 16-bit wide data bus or 16 separate logic test points in circuits with clock speeds up to 10 MHz. Display acquired data on screen in state or timing displays including hex/octal and ASCII equivalents, an address relative to triggering and other information. Also, save this data to disk for later examination or comparison. Software is included for use with PC compatible

computers equipped with an RS-232 card, color graphics card, single 5.25" disk drive and 128K RAM minimum, an HCA-85 cable and MS-DOS Version 2.0 or later. The IC-1001 is also usable with terminals or computers running terminal emulation software. Powered by an included 120 VAC wall cube. Dimensions are 1 3/4" H x 9 1/4" W x 8 1/2" D.

Kit IC-1001 (4 lbs.) \$279.95

Accessory:

Cable HCA-85 (1 lb.) . . \$20.00



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570



Rugged vacuum tube voltmeter

SKILL LEVEL This vacuum tube voltmeter is a favorite with service technicians as a versatile troubleshooting instrument. It's more tolerant of an overload than a digital multimeter and more accurate than a VOM.

On the wide 6" meter you can accurately measure \pm DC voltages from 1.5 volts to 1500 volts within \pm 3% of 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 seven ranges. A zero center and dB scale add versatility.

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 battery.

Kit IM-5228 (6 lbs.) \$129.95

Specifications: **DC VOLTMETER: Ranges:** 0-1.5, 5, 15, 50, 150, 500, 1500 volts full scale. **Input Resistance:** 11 megohms on all ranges. **Accuracy:** \pm 3% of full scale. **AC VOLTMETER: Ranges:** 0-1.5, 5, 15, 50, 150, 500, 1500 RMS scales (0.353 of peak-to-peak). **Frequency Response (5 V range):** \pm 1 dB 25 Hz to 1 MHz (600 Ω source, referred to 60 cps). **Accuracy:** \pm 5% of full scale. **Input Impedance:** 1 megohm shunted by 40 pF measured at input terminals (200 pF at probe tip). **OHMMETER: Ranges:** Scale with 10 Ω center X1, X10, X100, X1000, X10K, X100K, X1 Meg. Measures 0.1 Ω to 1000 megohms with internal battery. **POWER:** 120/240 VAC, 50/60 Hz. **DIMENSIONS:** 5" H x 12 3/4" W x 4 3/4" D. **WEIGHT:** 5 lbs.

Power line monitor

SKILL LEVEL The IM-2203 Line Voltage Monitor warns you of problem-causing AC line conditions by displaying the line voltage at any AC electrical outlet. AC voltage is displayed on a 3-digit LED display with a basic accuracy of 1.5%.

If the line voltage falls below a value that you set, or is completely interrupted, a fault LED indicator lights to alert you of line voltage problems. You can adjust the fault threshold over a 90 to 120 VAC range. A front panel reset button cancels the fault indicator.

Kit IM-2203 (3 lbs.) \$39.00



Easy-to-operate clamp-on ammeter

This pocket size clamp-on meter provides high accuracy in measuring AC amps and volts plus a resistance scale. And for instant continuity checks, a built-in buzzer sounds when resistance is less than 2 kohms. In addition, this handy meter features data hold display readings for all functions and ranges, a large 3 1/2 digit LCD display, 1.0% basic accuracy and a black and red probe set. Includes 9 volt battery.

Assembled SM-2208 (1 lb.) . . \$59.95

Specifications: **AC VOLTAGE: Ranges:** 750 V, 200 V. **Accuracy:** \pm (1.0% of reading + 3 digits) from 45 Hz to 400 Hz. **AC CURRENT: Ranges:** 200 A, 300 A. **Accuracy (50/60 Hz):** \pm (2.0% of reading + 1 digit). **RESISTANCE: Range:** 2000 ohms. **Accuracy:** \pm (1.0% of reading + 1 digit). **Other Features:** Automatic polarity, over range indication, automatic zero, low battery indication. **Dimensions:** 1" H x 2 1/2" W x 7 3/8" L.

This easy-to-build EPROM eraser saves you time and money

SKILL LEVEL 1 This fast, one-evening kit cuts memory device costs by letting you use EPROMs again and again. You can even salvage some from certain types of discarded equipment. The ID-4803 EPROM Eraser will erase all 24, 28 and 40 pin ultraviolet erasable integrated devices.

Just place them on the unit's locking, non removable tray — it can hold up to seven ICs — and insert the tray into the eraser. A lamp-on indicator tells you when the unit is in operation. A safety interlock system prevents accidental exposure to ultraviolet rays if the unit is opened during the erasing process.

The EPROM Eraser is compact, easy to operate and easy to build using ordinary kit building tools.

Kit ID-4803-H (4 lbs.) \$59.95

Specifications: **Erase Time:** 3 minutes per watt-second of erase energy specified by manufacturer. **Capacity:** Seven 24-pin, six 28-pin or four 40-pin IC's. **Typical Tube Life:** 3000 hours. **Power:** 120 VAC, 60 Hz. **Dimensions:** 2½" H x 3¼" W x 13¼" L.



Erase up to seven integrated circuits at a time with the ID-4803-H



A CRT tester for every TV shop

SKILL LEVEL 1 Increase your profits 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.

From the front panel precisely set CRT heater voltages. Also check for shorts, gassy tubes and tube life expectancy. Each gun is individually controlled and monitored on its own grid current meter.

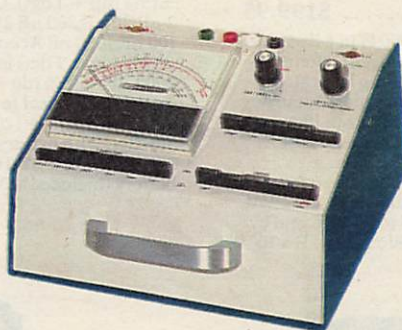
Kit IT-5230 (9 lbs.) \$199.95

Accessory:

CRT Socket Adapter uses universal clip leads to hook up and test CRTs with known basing configurations.

Kit ITA-5230-1 (1 lb.) \$29.95

Specifications: **Sockets (type supplied):** 14-pin for 90 color tubes. 13-pin for inline-gun color tubes. 8-pin for B&W tubes. 7-pin for B&W tubes. **Case:** Molded plastic. **Heater Supply Voltage:** Variable from 2 to 12 volts at 1 amp. **Power:** 120/240 VAC, 50/60 Hz. **Test Cable:** 4 foot, heavy duty. **Dimensions:** 5½" H x 13½" W x 10" D.



Semiconductor checker

SKILL LEVEL 1 Use this portable tester to see the actual operating characteristics of transistors, diodes, FETs, SCRs, triacs and UJTs. Pushbutton type range, mode and function switches assure easy, consistent operation. Two-color front panel features black lettering for conventional (bipolar) transistors and red lettering for FETs. Takes two quick evenings to assemble.

Kit IT-3120 (5 lbs.) \$99.95

Specifications: **DC Beta Ranges:** 1 to 50, 5 to 250, 10 to 500, 50 to 2500 and 100 to 5000. **Collector Currents:** 1 mA, 5 mA, 10 mA, 50 mA, 100 mA, 500 mA and 1 A. **G_m:** 0 to 50,000 μmhos. **Leakage Current Ranges:** 0 to 100 μA, 0 to 1 mA, 0 to 10 mA, 0 to 100 mA and 0 to 1 A. **Out-of-Circuit Accuracy:** ± 2%, ± 2% arc for DC beta and leakage. **In-Circuit Accuracy:** Indicates good or bad. **Diode Test:** Tests for forward conduction and reverse leakage (out-of-circuit). **SCR and Triac Tests:** Test for proper conduction and blocking. **Unijunction Transistor Test:** Measures I_{b2b}, I_{b2b}is and Emitter Current (out-of-circuit). **Power:** Two 1.5 volt D batteries (not included).



Decade resistance kit

SKILL LEVEL 1 The Heathkit Decade Resistance Kit is an accurate laboratory-type instrument that supplies a wide range of resistance values for use in electrical measurements. Use it whenever you need an accurate variable multiplier or shunt, substitute resistor, or as an arm for DC and AC bridges. A one-evening kit that will supply any resistance value from 1 to 999,999Ω in 1Ω steps.

Kit IN-3117 (3 lbs.) \$69.95

Specifications: **Resistors:** Precision, ½% accuracy, 1 watt. **Max Current:** X1 = 1000 mA, X10K = 300 mA, X100 = 100 mA, X1K = 30 mA, X10K = 10 mA, X100K = 3 mA. **Dimensions:** 5" H x 7½" W x 6¾" D.



Credit card orders call TOLL-FREE 24 hours a day:

1-800-253-0570



Digital LC bridge

To verify that a 10 pF capacitor or 10 mH inductor is precisely what it is supposed to be, you need the Digital LC Bridge. This versatile instrument verifies capacitors and inductors, plus checks the associated dissipation or loss factor.

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 and voltage curves.

Kit IT-2240 (11 lbs.) \$199.95

Specifications: **INDUCTANCE: Ranges:** 200 μ H to 2000 H in 8 decade steps. **Accuracy:** (± 4 counts) $\pm [0.5\% (L) + 1.5\% (L) \times D + 0.5 \mu\text{H}]$ for readings from 10 to 2000 counts when the Bridge is calibrated using laboratory standards. **CAPACITANCE: Ranges:** 200 pF to 2000 μ F, 8 decades. **Accuracy** (± 2 counts) $\pm [0.5\% (C) + 1.5\% (C) \times D + 0.5 \text{ pF}]$ for readings from 10 to 2000 counts when the Bridge is calibrated using laboratory standards. **DISSIPATION: Range:** 000 to 1999, limited to $D \times \mu\text{F} = 1000$ on 2000 μ F range. **Accuracy** (± 20 counts) $\pm 3\%$ for value displays greater than 200 counts. **GENERAL: Overvoltage Protection:** Input protected against ± 20 VDC/VAC (5 seconds maximum), or capacitor up to 2000 μ F charged to 50 VDC and by an internal 1-ampere fuse. **Power:** 120 VAC, 60 Hz. **Dimensions:** 3 $\frac{3}{4}$ " H x 10" W x 12 $\frac{1}{2}$ " D. **Weight:** 6 $\frac{1}{2}$ lbs.

Versatile RLC bridge

This general-purpose instrument lets you check the values of unknown or obliterated resistors, capacitors and inductors.

Front panel terminals are provided for components under test and for an external standard. The stackable cabinet includes a storage compartment.

Kit IB-5281 (5 lbs.) \$89.95

Specifications: **Resistance Ranges:** 10 Ω to 10 M Ω in three ranges. **Inductance Ranges:** 10 μ H to 10 H in three ranges. **Capacitance Ranges:** 10 pF to 10 μ F in three ranges. **Oscillator Frequencies:** 1 kHz, 10 kHz. **External Standard Range:** 1:1 to 10:1. **Power:** Two 9-volt transistor batteries (not included) and/or IPA-5280-1 Power Supply (page 79). **Dimensions:** 5 $\frac{3}{4}$ " H x 11" W x 7 $\frac{3}{4}$ " D. **Weight:** 3 $\frac{1}{2}$ lbs.

Our customers write...

"I have just completed a Heathkit frequency counter. [It] definitely deserves praise. The kit was exceptionally well engineered. All parts fit beautifully."

Stacie Lynn Bledsoe
Selah, Washington



3 $\frac{1}{2}$ -digit handheld LCR meter

You get more ranges to cover more capacitors, inductors and resistors with this compact, digital LCR meter. And you get the accuracy you would expect from a full-size bench model. The SM-2255 even takes the dissipation factor into account, like our LC Bridge shown at left.

The SM-2255 features an easy-to-read 3 $\frac{1}{2}$ -digit LCD display, fast rotary switch range selection, plus a compact design. The LCR meter comes with test leads, 9 volt battery, spare fuse and operator's manual.

Assembled SM-2255 (2 lbs.) \$159.95

Specifications: **RESISTANCE: Ranges:** 20 Ω , 200 Ω , 2 k Ω , 20 k Ω , 200 k Ω , 2 M Ω , 20 M Ω . **Resolution:** 0.01 Ω , 0.1 Ω , 1.0 Ω , 10 Ω , 100 Ω , 1 k Ω , 10 k Ω . **Accuracy:** 20 Ω : $\pm (2\% \text{ rdg} + 2 \text{ dgt})$; 200 Ω to 2 M Ω : $\pm (0.5\% \text{ rdg} + 1 \text{ dgt})$; 20 M Ω : $\pm (3\% \text{ rdg} + 1 \text{ dgt})$. **INDUCTANCE: Ranges:** 200 μ H, 2 mH, 20 mH, 200 mH, 2 H, 20 H, 200 H. **Resolution:** 0.1 μ H, 1.0 μ H, 10 μ H, 100 μ H, 1.0 mH, 10 mH, 100 mH. **Accuracy:** for $D < .5$: 200 μ H: $\pm (3\% \text{ rdg} + 1 \text{ dgt})$; 2 mH to 200 mH: $\pm (2\% \text{ rdg} + 1 \text{ dgt})$; 2 H, 20 H: $\pm (3\% \text{ rdg} + 1 \text{ dgt})$; 200 H: $\pm (5\% \text{ rdg} + 1 \text{ dgt})$. **CAPACITANCE: Ranges:** 200 pF, 2 nF, 20 nF, 200 nF, 2 μ F, 20 μ F, 200 μ F, 2000 μ F. **Resolution:** 0.1 pF, 1 pF, 10 pF, 100 pF, 1 nF, 10 nF, 100 nF, 1000 nF. **Accuracy:** 200 pF: $\pm (3\% \text{ rdg} + 1 \text{ dgt})$ for $D < .1$; 2 nF to 2 μ F: $\pm (2\% \text{ rdg} + 1 \text{ dgt})$ for $D < .5$; 20 μ F, 200 μ F: $\pm (3\% \text{ rdg} + 1 \text{ dgt})$ for $D < .5$; 2000 μ F: $\pm (5\% \text{ rdg} + 1 \text{ dgt})$ for $D < .1$. **DISSIPATION: Range:** 0 to 19.99. **Accuracy** (typical for $D < .5$): $\pm (2\% \text{ rdg} + [3 + (200/\text{value})] \text{ dgt})$ for L value; $\pm (2\% \text{ rdg} + [2 + (200/\text{value})] \text{ dgt})$ for C value. **GENERAL: Display:** 3 $\frac{1}{2}$ -digit with battery low indicator. **L, C Test Method:** 1000 Hz sine wave on 200 pF/ μ H to 2 μ F/H ranges; 120 Hz on others. **Power:** Single 9-volt battery (included). **Dimensions:** 6 $\frac{1}{8}$ " H x 3 $\frac{1}{2}$ " W x 1 $\frac{1}{8}$ " D.



Audio frequency signal generator

Use this generator's sine and square wave outputs as a signal source for harmonic distortion measurements, as an external modulator for RF generators or in tests of audio amplifiers for gain or frequency response. You can also use the square wave output to trigger digital instruments. Sine and square wave levels are independently adjustable from 0-3 volts, although frequencies .10Hz-100Hz, are identical. Use both signals simultaneously or independently.

The Audio Generator is housed in a 5280 series instrument cabinet, which means it's stackable with other instruments in the 5280 line to save you space in your test center. The cabinet also includes a convenient storage compartment.

Kit IG-5282 (5 lbs.) \$79.95

Specifications: **Frequency Output:** 10 Hz to 100 kHz in four ranges. **Sine Wave Voltage:** 0 to 3 volts RMS. **Square Wave Voltage:** 0 to 3 volts peak. **Power:** Two 9-volt transistor batteries (not included) and/or IPA-5280-1 Power Supply (page 79). **Dimensions:** 11" H x 5 $\frac{3}{4}$ " W x 7 $\frac{3}{4}$ " D. **Weight:** 3 $\frac{1}{2}$ lbs.



Regulated high voltage power supply

Use this power supply to test new ideas and circuits in stereo vacuum tube amplifiers and amateur radio gear. Or, power any circuit up to 400 volts DC with this well regulated variable-output high voltage power supply.

Separate panel meters allow you to accurately monitor current and voltage. Built in is a 0 to -100 volt DC tube bias supply. Separate 6.3 and 12.6 VAC heater filament voltages are readily available from front panel binder posts. And the heater voltages can be left on while the high voltage is disabled by a front panel switch.

Kit IP-2717-A (19 lbs.) \$199.95

Assembled SP-2717-A
(20 lbs.) \$299.95

Specifications: **B+ VOLTS: Voltage:** 0 to 400 volts DC, regulated. **Current:** 0 to 100 mA continuous, 125 mA intermittent. **Regulation:** Output variation less than 1% from no load to full load. **Ripple:** Less than 10 mV RMS. **C- VOLTS: Voltage:** 0 to -100 volts DC at 1 mA. **FILAMENT VOLTS: Voltage:** 6.3 VAC at 4 amperes or 12.6 VAC at 2 amperes. **GENERAL: Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 5½" H x 13¾" W x 11¼" D. **Weight:** 16 lbs.

Our most economical power supply

In less than three and a half hours you can put together a truly handy power supply. With variable 1- to 15-volt DC output, this power supply is useful in many digital and analog circuit applications. Even use it as a substitute for batteries when checking out portable equipment. Programming terminals on the rear of the cabinet let you use an AC or DC voltage from another source to control output voltage of this power supply.

Kit IP-2728 (5 lbs.) \$49.95

Specifications: **Load Regulation:** Less than 50 mV, no load to full load. **Ripple and Noise:** Less than 5 mV. **Current Output:** 500 mA max. **Current Limiting:** Adjustable 10 mA to over 500 mA. **Power:** 120/240 VAC, 50/60 Hz. **Dimensions:** 4¾" H x 5½" W x 5¾" D. **Weight:** 3¼ lbs.



Triple output DC supply

This supply furnishes the vast majority of power requirements for almost any test and measurement application. It lets you monitor voltage or current without tying up a multimeter. A special built-in tracking circuit maintains the voltage difference between supplies when you're working with operational amplifier circuits.

Kit IP-2718 (12 lbs.) \$139.95

Assembled SP-2718
(12 lbs.) \$200.00

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

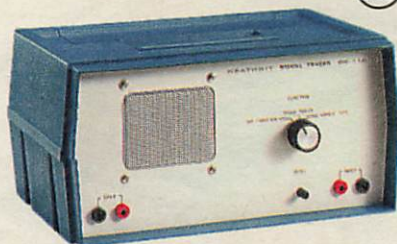


Low-cost RF oscillator

The IG-5280 provides AM modulated or unmodulated RF signals in five overlapping bands. Use its wide frequency range to align receivers covering the AM, FM, television, longwave and shortwave broadcast bands. Includes an easy-to-read dial scale. The one kHz RF modulator also serves as a convenient audio signal source. The cabinet of the IG-5280 is stackable and features a handy storage compartment.

Kit IG-5280 (5 lbs.) \$89.95

Specifications: **RF OUTPUT: Frequency:** 310 kHz to 110 MHz in five bands. 100 MHz to 220 MHz using calibrated harmonics. **Voltage:** Approx. 100 mV RMS. **Internal Modulation:** 1 kHz. **AF OUTPUT: Frequency:** 1 kHz. **Voltage:** Approx. 2 volts RMS. **GENERAL: Power:** Two 9-volt transistor batteries (not included) and/or IPA-5280-1 Power Supply (at right). **Dimensions:** 5¾" H x 11" W x 7¾" D. **Weight:** 3¼ lbs.

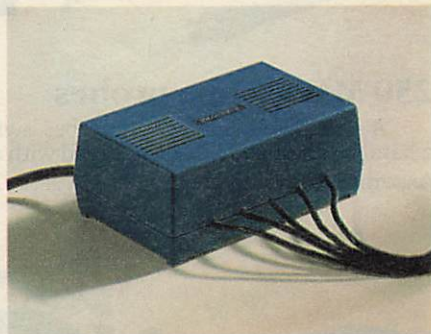


Signal tracer

An effective tool for quickly tracing signals in radio and TV receivers. Lets you check voltages and resistance by simply listening to an audible tone. Also lets you detect faulty RF or IF stages, even isolate faulty components.

Kit IT-5283 (5 lbs.) \$59.95

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



5280-series DC supply

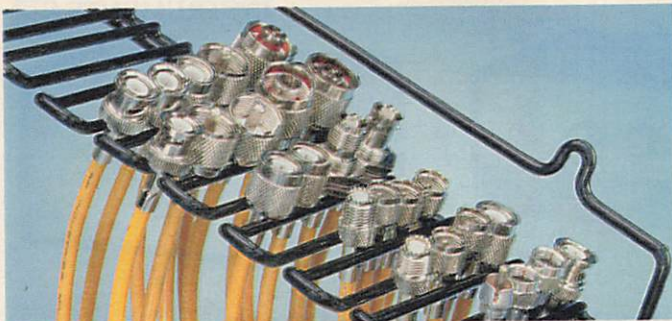
This power supply simultaneously furnishes DC power to all the 5280-series instruments on these two pages. The unit can be wired to operate on 120 or 240 VAC. 6" H x 3¾" W x 3" D.

Kit IPA-5280-1 (3 lbs.) \$39.95



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570



Our coax adapter cables now include F and RCA connectors

Solve frustrating coax connection problems with this convenient adapter cable assortment. Connect BNC to BNC, BNC female, UHF, mini UHF, N, TNC, F or hook clips. Connect RCA to RCA, F, BNC or UHF. Connect N to UHF, N or TNC. Connect UHF to UHF, mini UHF to mini UHF, F to F, BNC female to BNC female or TNC to TNC. Twenty cables in all help you make almost any connection. And, the cables come in high visibility yellow for easy identification. Two handy storage racks keep your cables neatly organized.

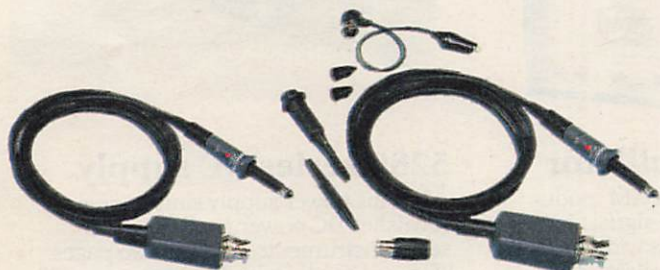
Assembled HCA-5001 (5 lbs.) Was \$99.95 Now \$69.95



250 MHz scope probes

A set of two modular 10X probes, switchable 1X/10X, with a bandwidth of 250 MHz. Packaged with accessory tips.

Assembled P-250-2 (1 lb.) \$99.95



350 MHz scope probes

A set of two modular 10X probes with a bandwidth of 350 MHz. Packaged with a full complement of accessory tips.

Assembled P-350-2 (1 lb.) \$99.95



Deluxe 10:1 and direct 1:1 combination probe

For all frequency counter and scope uses from DC to 10 MHz in 1X position, DC to 100 MHz in the 10X position.

Assembled PKW-105 (1 lb.) \$37.95

Assembled IOA-3220-1 Pouch with two probes. (1 lb.) \$69.95



Oscilloscope probe

SHILL
LEVEL This low-capacitance scope probe is useful in tracing waveforms in TV circuits without causing signal distortion. Has switchable 1X and 10X positions. Use the 10X position for minimum capacitive loading of the circuit, the 1X position for maximum sensitivity.

Kit PK-1 (1 lb.) \$17.95

Match a probe to your scope's capability

Scope Bandwidth (MHz)	PKW-105 or IOA-3220-1 100 MHz	P-250-2 250 MHz	P-350-2 350 MHz	
25	24.3	24.9	24.9	Approx. Bandwidth of Scope and Probe
50	44.7	49.0	49.5	
100	70.7	92.8	96.2	
200	89.4	156.2	173.6	

Scope Test Probe Chart



Credit card orders call TOLL-FREE 24 hours a day:

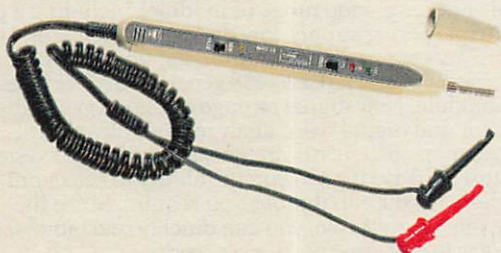
1-800-253-0570



We've enhanced our deluxe connector kit with F and RCA adapters

Make different types of coaxial connector adapters with gold plated pins and Teflon insulation. Just screw the required connector to one of the interfaces. No crimping or soldering is needed. In just seconds you'll have that special coaxial connection you require. Kit contains male and female N, F, RCA, BNC, UHF, SMA, TNC and mini UHF connectors. A handsome, padded, zippered case is included with your deluxe kit to protect your connectors and to keep them looking new after years of service.

Assembled HCA-3001 (2 lbs.) Was \$99.95 Now \$79.95



TTL/CMOS logic probe

This probe evaluates circuits and isolates faulty components, checks out TTL and CMOS circuits up to 20 MHz.

Assembled ST-7420 (1 lb.) Was \$29.95 Now \$17.95

Specifications: **Input Impedance:** 1 Megohm. **LOGIC THRESHOLDS:** **TTL:** Low, $0.8V \pm 0.2V$ DC; High, $2.3V \pm 0.2V$. **CMOS:** Low, 30% of circuit Vcc; High, 70% of circuit Vcc. **GENERAL:** Controls: Threshold select (TTL or CMOS), Pulse/Memory, Pulse LED (Yellow) Flashing Time: 500ms. **Power Supply Protection:** $\pm 20V$. **Supply Voltage Range:** 5V-15V.

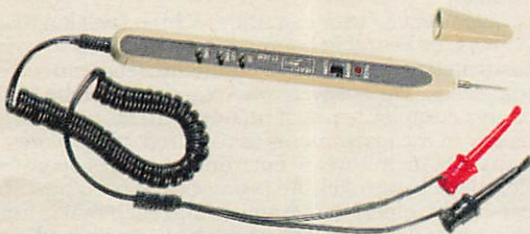


Logic probe

SKILL LEVEL This quick-checking logic probe detects and indicates high and low logic levels in 5 VDC TTL circuits up to 100 MHz and 15 VDC CMOS circuits up to 80 MHz. Indicator lights located at the tip of the probe show high or low logic levels. Power is provided to the logic probe from the circuit under test through 34" leads. An additional detachable ground clip is included for high frequency operation.

Kit IT-7410 (1 lb.) \$39.95

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

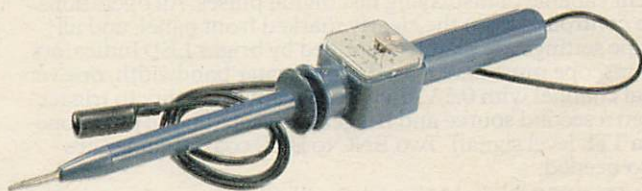


Digital pulser probe

Inject substitute logic pulses into circuits for quick problem evaluation.

Assembled ST-7430 (1 lb.) Was \$29.95 Now \$17.95

Specifications: **Sync Input Impedance:** 1 meg. **Pulse Width in Pulser Output:** 10 μ s at 100 mA load. **Pulse Width in Pulser Output:** 0.5 and 400 PPS. **Output Current:** Pulse Mode: 100 mA sink or source max. 90% Pulse Mode: 20 mA sink or source max. **Supply Voltage:** 5 to 15 volts.



All-in-one 40 kV probe

SKILL LEVEL With this one probe you can measure voltages up to 40,000 with an accuracy of $\pm 3\%$ in any negative ground circuit. Measurements are read directly from a built in meter.

CAUTION: We value you as a friend. Please follow all safety practices when measuring high voltages.

Kit IM-5215 (2 lbs.) \$44.95

Turn your personal computer or scope into a 50 MHz digital storage scope



Computer oscilloscope

SKILL LEVEL 3 The IC-4802 Computer Oscilloscope turns a PC into a powerful dual trace 50 MHz digital storage oscilloscope. All scope functions are controlled from the computer keyboard. Display one or two channels on a graphic 8 x 10 division graticule. On-screen menus show all scope functions. Automatically obtain readouts of voltage, time and frequency at any point on a waveform. Even store waveforms on a floppy disk for later analysis or comparison. You'll need a null-modem cable to connect the IC-4802 to your Heath/Zenith, IBM PC or compatible computer equipped with an RS-232 port, CGA graphics card, 5.25" disk drive, 128K RAM and using MS-DOS Version 2.0 or later. GW-BASIC required only for customizing.

Kit IC-4802 Computer Oscilloscope (10 lbs.) \$299.95

Assembled SC-4802 Fully assembled and calibrated (11 lbs.) \$395.00



Digital memory oscilloscope

SKILL LEVEL 3 In addition to the capabilities of the IC-4802, this digital scope enables you to upgrade a low-bandwidth, single channel bench scope to a powerful dual trace 50 MHz storage instrument capable of displaying fast digital pulses. All operations are controlled from the clearly marked front panel, and all scope settings are plainly identified by bright LED indicators. 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). Two BNC to BNC coaxial cables are also needed.

Kit ID-4850 Digital Memory Oscilloscope (11 lbs.) \$339.95

Assembled SD-4850 Fully assembled and calibrated (11 lbs.) \$495.00

Specifications: for IC-4802 and ID-4850: **VERTICAL: Deflection Factor:** Sensitivity: 5 mV/div to 5 V/div; 10 steps in a 1-2-5 sequence. **Vertical Response:** 5 mV to 5 volts/div. Rise Time: 7 ns or less. Overshoot: Less than 5%. **Maximum Input:** 125 volts peak combined AC and DC. **HORIZONTAL: Time Bases Ranges:** 20 s/div to 10 ns/div in a 1-2-5 sequence. **Maximum Sampling Rate:** Real Time: 100 KS/S. Equivalent Time: 5 GHz. **GENERAL: Vertical Resolution:** 8 bits (1 part in 256). **Record Length:** 512 samples. **Interface:** RS-232C. **Baud Rate:** 110 to 9600 baud (selected by internal jumper). **Power:** 120 VAC, 60 Hz. **Dimensions:** 4 1/2" H x 12 1/2" L x 10" W. **Weight:** 8 lbs.

Get low cost production testing with the Heath/Zenith computer-based instrument system

Traditionally, high volume production testing has been accomplished with very expensive automatic test equipment (ATE). Large companies can absorb these high costs, but what about the small manufacturer whose total annual production doesn't begin to justify such price tags for testing? Or the manufacturer whose products undergo frequent production changes - requiring costly and time-consuming adjustments to the programming of their expensive ATE equipment? The Heath/Zenith Computer-Based Instruments Group has the answer with a complete line of assembled computer-based instruments (CBI) that let you expand your industrial and laboratory measuring and testing capabilities.

Add modules as your needs change

The Heath/Zenith SW-3020 Computer-Based Instrument System (pictured on page 83) is a fully integrated, computer-controlled testing and data acquisition system. The system with its array of modular, lab-grade digital and analog test and measurement instruments, can be either rack mounted or used on the work bench. A separate expansion chassis with its own power supply houses a wide range of modules including a programmable triple power supply, low distortion oscillator, 11 MHz function generator, digital multimeter, universal counter, prototyping module, and a IEEE-488 general purpose interface bus (GPIB) module. New digital storage oscilloscope, digital word generator and digital word analyzer modules that also plug into the expansion chassis are now available. The system is cost effective because it gives you the ability to select only those modules with the capabilities you require. Since the modules are interchangeable, you can quickly rearrange setups or add modules to suit your particular needs.

Easy-to-use, menu-driven software

Under the Versatile Instrument Operating Software (VIOS) umbrella, all instruments are controlled from an IBM PC/AT compatible computer such as the SWS-3000 (pictured on page 83). The software allows a user with no programming knowledge whatsoever to manually set up and take measurements from the various instruments just as if the tests were being performed manually. During this process, the PC *learns* the steps and is then able to repeat them automatically under program control.

A more experienced user can utilize a high level language such as BASIC, C or Pascal in conjunction with VIOS to write more sophisticated and interactive automatic test sequences to meet specific needs. The software package gives you the flexibility to set up a complex series of interactive tests using as many, or as few of the instruments as required. VIOS works under an easy-to-use, menu-driven environment that's operated with simple, single keystrokes. All prompts and messages appear in clear, easily understood English, and each major function includes a help/learn selection which allows immediate system access for even the novice user.

More information is only a phone call away

For a free color brochure detailing the complete line of assembled Heath/Zenith computer-based instruments, including the SW-3000 Industrial Computer, the SW-3010 Industrial EGA Color Monitor and the SDS-5000 digital storage oscilloscope, call 616-982-3721 or write to Heath/Zenith Computer-Based Instruments Group, Dept. 599-980, Benton Harbor, MI 49022.



ATE System

Data Acquisition

Test and Measurement

Process Control

1 SW-3010 Industrial Color EGA Monitor. A rack mountable 13" monitor featuring 15.75 kHz CGA and 21.85 kHz EGA modes.

2 SWS-3000 Industrial AT Computer. Environmentally protected and rack mountable. 20 MB hard drive and 6 open slots.

3 SW-3020 Expansion Chassis. Holds up to seven instrument modules, providing an interface to each device.

4 16- and 32-bit Digital Logic Analyzers. Speed-up product development and testing.

5 Computer and Digital Memory Oscilloscopes. See page 82 for information.

6 SDS-5000 Digital Storage Oscilloscope. Dual 20 MHz A to D converters capture two channels simultaneously without reducing the digitizing rate.

7 Instrument Modules. Affordable instruments allow you to perform test and measurement tasks easily, quickly and cost-effectively.

8 Data Acquisition and Control Modules. Automate the instrumentation process of data acquisition, test, measurement and control with PCI modules.

Data acquisition and control for all of your information gathering needs

The new personal computer instrumentation (PCI) system from the Heath/Zenith Computer-Based Instruments Group consists of modules that perform data acquisition, test, measurement and control. The PCI system's modular design offers you the flexibility to design a system that will exactly meet your particular needs – saving you time and money. And, as your requirements change, you can add or delete modules to solve your data acquisition problems.

PCI modules are perfect control devices

With the use of a personal computer and PCI modules, you can gather critical data from temperature probes, strain gauges, flow meters, displacement transducers and other sensors. The data can then be stored, analyzed or even used to trigger a controlled response, such as cooling a liquid if it rises above a predetermined level. The applications are endless for chemical processing, electrical and electronic design, aerospace, automotive, geological studies and a variety of other high technology fields.

FREE System Configuration Planner™

When you call or write for further information, you'll receive Heath/Zenith's new System Configuration Planner.

By following the logical layout, in just a few minutes you can determine which components are needed to perform the data acquisition or control functions you require. In addition, you'll also receive the Data Acquisition Products Handbook, which gives you detailed technical information on all the PCI products. To receive your information package call 616-982-3721 or write to Heath/Zenith Computer-Based Instruments Group, Dept. 599-980, Benton Harbor, MI 49022.

FREE INFORMATION

The Heath/Zenith Computer-Based Instruments Group wants to send you information on how to simplify your instrumentation tasks. To receive more information on the computer-based instrument line, call 616-982-3721 or write to Heath/Zenith Computer-Based Instruments Group, Dept. 599-980, Benton Harbor, MI 49022.

Begin and continue your electronics training with Heathkit/Zenith Educational Systems learning programs

Prepare for job advancement or simply learn about electronics for your own enjoyment...all in the relaxed atmosphere of your own home. Our award-winning individual learning programs are designed so you can gain the skills you want and need at a pace that works for you, without the pressure of scheduled exams and projects.

Deadlines are yours alone

The only deadlines you'll have to worry about are those you set for yourself. Whether you want to learn electronics for fun and personal enrichment or for job training or retraining, you'll find the self-paced system one you can tailor to your own needs. Do your learning in the evening when you're comfortably settled in at home, or pick up your text and take it with you when you travel. When you learn is up to you.

Learning that's time and cost effective

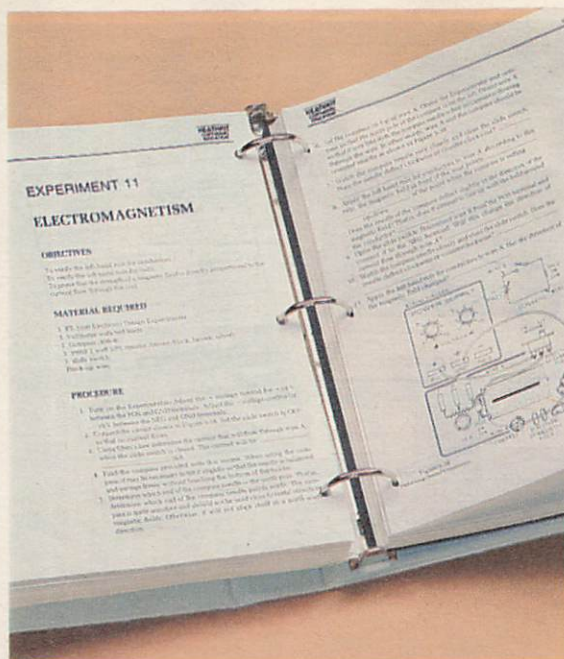
There's no need to pay for courses that don't interest you. We offer a topic-specific approach to learning that means *you* decide what you want to know - without the need to follow a lengthy curriculum. Our self-paced instructional programs are time effective and cost effective because *you're* in charge of your learning.

Learn as quickly or as slowly as you want. Whiz through a chapter that's easy for you, or review a more challenging chapter as many times as you'd like. You'll achieve the goals you set for yourself at your convenience...and at a cost that's hard to beat.

Licensed and accredited

As a school, we're licensed by the state of Michigan. We're also accredited by the National Home Study Council and the Council on the Continuing Education Unit. This means that for each course you take, you'll receive a certificate of completion to recognize your achievement. You'll also receive valuable Continuing Education Units (CEUs). Many employers and professional organizations recognize these units as evidence of personal advancement and continued job-related training.

Courseware



As pioneers in individual learning, we structure our courses in a format that has proven most successful for the home learner. Each is the equivalent of a complete classroom course and is written in a relaxed, conversational style that's easy to follow. Math is kept to a minimum and where it's used, it's carefully explained.

Step-by-step learning

Our texts all begin with a list of objectives for the entire course, followed by a course outline and a complete parts list with diagrams. Each course is broken down into units, with unit objectives and a list of activities to check off as you complete them. Every few pages you'll find a programmed review with questions to test your learning over those pages and to reinforce your understanding of that material. And, we give you the correct answers immediately so you can check yourself as you go.

Hands-on reinforcement

Each unit includes hands-on experiments on the recommended trainer. You'll learn by building circuits, making measurements, troubleshooting and modifying circuit parameters.

Following each unit is a summary of highlights, and an exam with multiple choice questions concludes each unit. Once you've completed an exam, we give you the answers, each of which includes enough explanation to reinforce the correct response in your mind.

Complete testing and transcript service

After completing a course, you're ready for the final exam, which comes in a sealed packet along with your text. Mail the exam back to us when you're finished. We'll grade it for you and send you a certificate of completion when you pass with a grade of 70% or better.

Plus, we retain your records through our record-keeping and transcript service so you can request a transcript of your Continuing Education Units at any time.

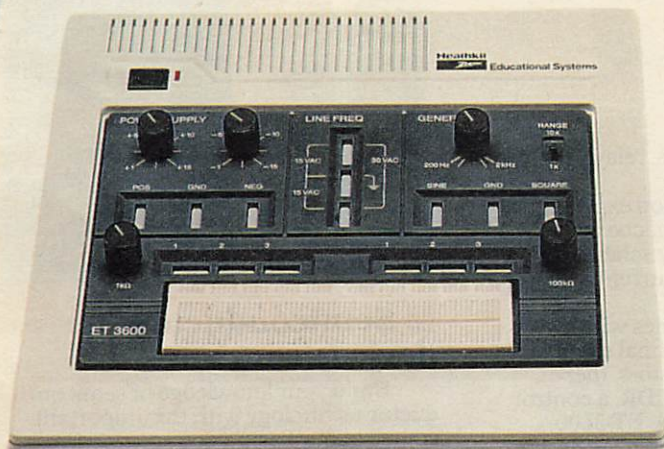
Expert design teams

Our learning packages are created by expert design teams. Learning specialists along with design engineers and product managers work together to design trainers, courses, parts packages and any audio visual support. Each component goes through several evaluation and review stages, including the evaluation of outside consultants who review the materials before we publish and manufacture them in final form.

Our money-back guarantee

If you're not completely satisfied with the course you order, we'll be happy to send you another in its place. Or, if you prefer, we'll refund the purchase price when you return the course along with your original receipt.

Hardware



Our learning systems are much more than just textbooks. In fact, each course series interfaces with a specific training device to provide you the hands-on experience you need in each subject area. These trainers reinforce the text material and give you the chance to perform the course experiments.

Sturdy and reliable

Our extremely flexible trainers are meant to be tinkered and experimented with. And, because we design them for classroom students, they're rugged, safe and reliable...meant to withstand any learning environment. They include removable breadboards so you can connect electrical components without soldering. This lets you construct a variety of circuits...and assemble and disassemble them as often as you like.

Choose an assembled or a kit trainer

You can buy our trainers as assembled units or as kits. Choose the assembled unit if you can't wait to get started. Choose the kit trainer for significant cost savings and for the satisfaction of building it yourself and knowing more about how your trainer actually works. Our kit trainers are rated Skill Level 2, which means a certain amount of soldering is involved.

To build your kit trainer, in addition to pliers and screwdrivers, you'll need a pencil soldering iron, diagonal cutters and wire strippers. Nut drivers, a nut starter and a desoldering bulb may also be useful.

Continue to learn

The fun of hands-on learning doesn't end when you complete a course series. Your trainer will still be useful to you for your own experiments as you continue to learn, whether it's for your own satisfaction or for advancement on your job.

The expertise of Heath/Zenith

When you learn with us you're supported by the expertise of a major computer and electronics manufacturer, in business for over 40 years. In addition, you're supported by our more than 40 years of publishing experience, producing the manuals for our kit products and courses for the individual and the classroom learner.

And, when you study with us, you'll use the same courses and hardware that numerous corporations and government agencies around the country use for in-house training programs. Likewise, hundreds of high schools, community colleges and technical/vocational schools across the country use our classroom courses for training and retraining their technical students. With our individual learning courses you know you're learning the same material you'd find in the classroom... without the schedules and demands of a fixed academic program.

Guaranteed success

As we say in our Heathkit Pledge, "We won't let you fail." Our courses are written according to the most advanced individual learning design, and our kit trainers are supported by our world-famous assembly manuals. If you should run into a hitch while you're building your kit, our technical consultants are only a phone call away, at 616-982-3980 during regular business hours.

Where do I start?

If you're a newcomer to electronics, turn to page 86, our Basic Electronics series. This series will give you the background you need to move on to any of the more advanced topics. Under our DC Electronics course you'll find an introductory special: the course plus the ET-3600 Analog Trainer for only \$129.90. Once you complete the DC course, you'll be ready



for AC Electronics. Semiconductor Devices and Electronic Circuits...all of which use the ET-3600 Analog Trainer.

If you're already knowledgeable in basic electronics, look through the Education section of the catalog and find your areas of interest. In most cases, you'll find you can jump right into any topic that interests you, without further prerequisites.

Basic electronics

We recommend the following course sequence in the Basic Electronics series:

- 1 DC Electronics
- 2 AC Electronics
- 3 Semiconductor Devices
- 4 Electronic Circuits



1 Fundamentals of DC electronics course

This first course in our basic electronics series requires no previous electronics background. DC Electronics teaches you how to define and solve basic electronics problems related to current, voltage, resistance and power. You'll learn about the construction, operation and purpose of electronic

devices such as resistors, relays, motors and generators.

Twenty-one hands-on experiments give you practical experience constructing DC circuits, drawing schematic diagrams and measuring current, voltage and resistance.

DC Electronics comes with an all-inclusive 554 page text, final exam and parts package with resistors, thermistors, capacitors, an LDR, a control and more. You'll need the ET-3600 Analog Trainer, shown on page 88, and a multimeter to perform the course experiments. Earn 2.0 CEUs.

EE-3101-A (6 lbs.) **\$39.95**

\$AVER! Includes EE-3101-A DC Electronics and ET-3600 Analog Trainer.

Save \$30 over buying each separately.

EES-3101-C (12 lbs.) **\$129.90**

Audio Visual Package contains two lecture audio tapes and illustrated workbook.

EAA-3101-A (2 lbs.) **\$19.95**



2 Fundamentals of AC electronics course

After completing DC Electronics, you're ready for the theory and application of alternating current. In this second course in the series, you'll learn the differences between AC and DC and between reference ground and earth ground. You'll understand capacitance, inductance, impedance and how their related devices are formed.

Nine course experiments range from measuring AC voltages to designing a resistive load. You'll analyze both AC sine waves and a variety of AC circuits, determine transformer turns ratios and perform important calculations involving impedance, current, voltage and power ratios. When you've completed the course, you'll know how to convert to power from quantities such as horsepower, watts and current, and how to draw a block diagram complete with current requirements for the electrical loads in your home. For the course experiments you'll need the ET-3600 Analog Trainer (shown on page 88), a multimeter and an oscilloscope.

The 547 page text comes complete with parts package, including resistors, capacitors, an inductor, an audio transformer, a lamp and an alignment tool. Earn 1.5 CEUs when you successfully complete the final exam.

EE-3102-A (7 lbs.) **\$39.95**

Audio Visual Package contains two lecture audio tapes and illustrated workbook.

EAA-3102-A (2 lbs.) **\$19.95**

3 Semiconductor devices course

Build your knowledge of semiconductor technology with this important course in our basic electronics series. Both theory and practice are integral parts of the course.

As part of the hands-on learning, Semiconductor Devices teaches how to handle semiconductor components properly and how to test semiconductor devices. You'll analyze DC circuits and use semiconductors in practical circuits. In addition, you'll familiarize yourself with semiconductor schematic symbols and packages, devices and transistors. Plus, you'll work with linear and digital components, semiconductor construction and semiconductor device operation, and observe firsthand the characteristics of a variety of amplifiers. All in twelve practical experiments.

The 486 page course in a heavy three ring binder includes final examination and experiments part package. Resistors, capacitors, diodes, transistors, an LED, a lamp and an IC are included in the parts package.

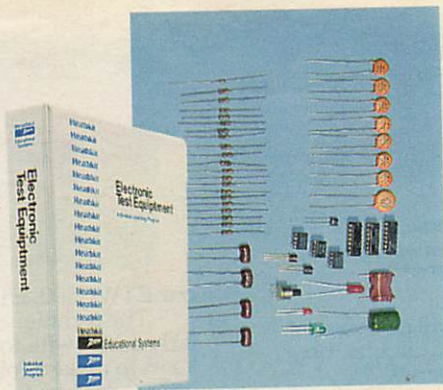
Before taking Semiconductor Devices you should complete DC Electronics and AC Electronics, or have equivalent knowledge. A multimeter and the ET-3600 Analog Trainer (shown on page 88) are essential for performing the course experiments. Earn 3.0 CEUs when you successfully complete the final exam.

EE-3103-A (6 lbs.) **\$59.95**

Audio Visual Package contains two lecture audio tapes and illustrated workbook.

EAA-3103-A (2 lbs.) **\$19.95**





4 Electronic circuits course

The fourth course in the series, Electronic Circuits, will give you new insights into the electronic products you use every day. Seven units cover concepts such as bias, oscillation, amplitude and frequency modulation and their relation to amplifiers, comparators, active filters and pulse shapers.

Fascinating hands-on experiments give you the chance to analyze simple electronic circuits. From there, you'll move into circuit construction as you build transistor and integrated circuit amplifiers, oscillators, active filters and more. Nineteen exciting experiments in all. To analyze circuit operation, you'll need a multimeter and an oscilloscope. Course experiments use the ET-3600 Analog Trainer, shown on page 88.

Included with the 714 page self-instruction text is a complete parts package with over 100 parts. Included are resistors, controls, capacitors, inductors, diodes, transistors, ICs, an audio transformer, a stabistor, a speaker, a lamp, a crystal and an alignment tool. Everything you need to complete the experiments.

Optional audio tapes along with a carefully illustrated workbook add to your learning. You'll receive 4.0 Continuing Education Units when you successfully complete the final exam.

EE-3104-A (7 lbs.) \$69.95

Audio-Visual Package contains two lecture audio tapes and an illustrated workbook.

EAA-3104-A (2 lbs.) \$19.95

Electronic test equipment course

Electronic Test Equipment is designed for the person who wants to become proficient with bench and field equipment. It teaches you to take measurements using digital and analog meters, voltmeters, ammeters, ohmmeters and oscilloscopes.

Beyond the basics, you'll study in depth the oscilloscope, oscilloscope circuits, the cathode ray tube and concepts such as sensitivity, delayed sweep and dual trace. You'll also gain a solid understanding of the curve tracer, basic spectrum analyzer, logic tester, digital logic probe, transistor tester, audio generator, RF generator and function generator.

We teach you to recognize sources of error in electronic counter readings,



Electronics communications course

This course gives you a detailed look into the principles of electronics communications. It explores with you the technologies of transmitters and antennas, frequency and time division multiplexing, transmission lines, electromagnetic radiation and propagation.

In study material and hands-on experiments, the 472-page comprehensive

increase the frequency range of electronic counters and design and construct RF impedance matching pads. You'll also check output frequency and amplitude calibration of a signal generator and the bandwidth, vertical gain and time base calibration of your oscilloscope.

To perform the 15 exciting experiments, you'll need a digital multimeter, an analog meter, oscilloscope, frequency generator and frequency counter. This course also uses the ET-3600 Analog Trainer shown on page 88.

We recommend completion of our Basic Electronics series, plus EE-3201-A Digital Techniques – or equivalent knowledge – before taking Electronic Test Equipment.

This 822-page comprehensive study in test instruments comes with a complete parts package containing resistors, capacitors, diodes and all the components required for the course experiments. Earn 6.0 Continuing Education Units when you successfully complete the final exam.

EE-3105-A (9 lbs.) \$69.95

Audio-Visual Package contains two lecture audio tapes and an illustrated workbook.

EAA-3105-A (2 lbs.) \$19.95

text covers topics including amplitude, angle and pulse modulation. You'll actually build an AM transmitter, a balanced modulator, an AM detector, an FM transmitter and an FM receiver.

To perform the seven course experiments you'll need the ET-3600 Analog Trainer described on page 88, a multimeter and an oscilloscope. We recommend that you complete our Basic Electronics series or have equivalent knowledge before taking Electronics Communications.

To reinforce your learning, our Electronics Communications Audio-Visual Package provides you with two lecture tapes and an illustrated workbook you can refer to as you listen to the tapes. You'll receive 2.0 Continuing Education Units when you successfully complete the final exam.

EE-3106-A (7 lbs.) \$64.95

Audio-Visual Package contains two lecture audio tapes and an illustrated workbook.

EAA-3106-A (2 lbs.) \$19.95



Credit card orders call TOLL-FREE 24 hours a day:

1-800-253-0570



ET-3600
analog trainer



Shown with optional
backpack

Analog trainer

The convenient and powerful ET-3600 will give you hands-on experience with practical electronic circuits. Use it in conjunction with our Basic Electronics series.

A key feature of this new trainer is the removable solderless breadboard that accepts up to #20 solid wire and the leads of almost any standard electronic component. The ET-3600 includes variable, regulated positive and negative 15 VDC power supplies with short-circuit and overload protection, 15 and 30 VAC sources and a frequency generator up to 20 kHz with sine wave and square wave outputs. And, circuits are solderless for easy circuit building. Operates on 120/220 VAC, 50/60 Hz. 4¼" H x 12" W x 11⅜" D.

Kit ET-3600 (6 lbs.) \$119.95

Assembled ETW-3600 (6 lbs.) \$199.95

Accessory:

Extra Breadboard Block

Assembled ETA-3600-1 (1 lb.) \$19.95



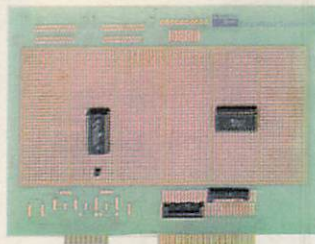
Accessory backpack

The Accessory Backpack will give you years of reliable performance for bench testing, experimenting and learning with Heathkit trainers and courses. Mount it directly onto the ET-3600 Analog Trainer and the ET-3700 Digital Techniques Trainer. The backpack includes programmable, positive and negative 1.2-15 VDC power supplies for powering analog, linear and CMOS circuits, in addition to a 5 VDC power supply for TTL logic circuits. A 3½ digit digital voltmeter allows AC and DC voltage measurements up to 500 volts, DC current measurements up to 200 mA and resistance measurements up to 2 meg. Another feature of the backpack is fused, high-impedance voltmeter input that gives maximum circuit protection and minimum circuit loading. Construction is easy with most components mounted on two circuit boards. Included are a quality loudspeaker and connectors for accepting experiment modules from Heathkit courses.

Kit ET-3567 (6 lbs.) \$119.95

Assembled ETW-3567 (6 lbs.) \$199.95

Wire wrap module new

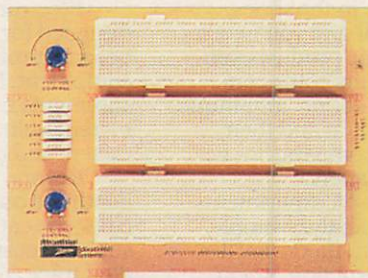


With our new Wire Wrap Module you'll get the experience you need to build real-world prototype circuits. This double-sided circuit board is designed for use with the ETW-3567 Accessory Backpack and

our ETW-3800, ETW-3700 and ETW-3600 electronic trainers.

The techniques you'll learn in wire wrapping are particularly useful with today's complex electronic circuits. You'll learn to make strong, durable connections even though there's little space between terminals. In fact, the connections will last for years, yet you can easily remove them if necessary.

Assembled ETB-6000 (2 lbs.) \$39.95



Breadboard experiment module

This module is ideal for designing and experimenting with prototype circuits that extend beyond the physical capacities of the ET-3600 and ET-3700 circuit design trainers.

The module slides into the Accessory Backpack to add more breadboarding capabilities to your trainer. The solderless sockets in the three large 640-hole breadboards accept solid wire up to #20, along with the leads of most common electronic components. The ETB-3300 also gives you access to +5 VDC power supplies, variable positive and negative 1.2-12VDC power supplies and the internal trainer speaker.

Assembled ETB-3300 (2 lbs.) \$99.95



Electronic circuits experiment module

The ETB-6104 Experiment Module gives you hands-on experience with electronic circuitry. Fifty on-board experiments

in the student lab manual explore such topics as biasing schemes; common emitter, base and collector amplifiers; and differential, tuned and complimentary power amplifiers.

Use the ETB-6104 with the ETW-3600 Analog Trainer and the ETW-3567 Accessory Backpack. A digital multimeter, included with the Accessory Backpack, and a dual trace oscilloscope are also required. The experiment module is designed to supplement our Basic Electronics series.

Assembled ETB-6104 (1 lb.) \$199.95

Accessories:

Student Lab Manual EB-6104-71 (3 lbs.) \$12.95

Administrator's Guide EB-6104-52 (1 lb.) \$9.95



Data communications and networks course

This course describes the concepts, terminology, equipment and techniques that make up today's data communications systems. Centered on computer communications, Data Communications and Networks highlights digital and analog signaling techniques, terminals and codes, modulation and multiplexing, and transmission media telephone networks. You'll also get an overview of current digital data networks, communication protocols and phone circuits, as well as communication channels for both analog and digital transmissions.

From there you'll see the big picture as we detail the telephone system's use in data communications. You'll learn

about the electrical connections of digital data communication equipment to the network. Plus you'll become familiar with the standards that specify the interfaces between pieces of digital equipment.

Uniting the theoretical with real-world applications, we show you how data networks are used by the consumer. You'll also study transmission errors and how they are corrected. Because security is an important concern, we give you the chance to analyze the major security issues involved, and describe how these systems may be protected from unauthorized access.

The text starts with a review of electronic communications principles, then builds on the foundation through our step-by-step, integrative learning method. To perform the included course experiments, you'll use everything from capacitors, resistors, transistors and integrated circuits to male and female connectors and telephone cables – which are also included.

To better understand this course you should have already completed course EE-3201-A Digital Techniques, EE-3102-A AC Electronics and EE-3101-A DC Electronics or have equivalent knowledge. To perform the 11 experiments you'll need the ET-1000 Circuit Design Trainer below, a multimeter and a dual trace oscilloscope.

Earn 7.0 Continuing Education Units when you pass the final exam.

EE-8090 (11 lbs.) **\$99.95**
SAVER! Includes EE-8090 Data Communications and Networks plus the ET-1000 Circuit Design Trainer. Save \$50 over buying them separately. **EES-8090** (25 lbs.) **\$269.90**

Analog/digital circuit design trainer

SKILL LEVEL Our solderless double breadboard trainer is a regular minilab for learning the basic techniques of circuit design. With it you'll get practical hands-on experience designing, building and testing prototype circuits. Use the ETW-1000 to perform experiments in passive, transistor, analog and digital circuit design. And after designing and building your own circuits, use the trainer to troubleshoot your designs.

The ET-1000 includes a built-in function generator for producing sine, square, triangle and pulse waveforms from 1 Hz to 100 kHz in five switch-selectable ranges. Pulse widths for each of the ranges are 2 milliseconds, 200, 20 and 2 microseconds, and 200 nanoseconds, respectively.

The trainer also has variable and regulated positive and negative DC power supplies. Output voltages are +5 volts DC @ 1A and + and -12 volts DC @ 500 mA, all regulated. Other voltages include +1.2 to +20 volts DC @ 150-500 mA and -1.2 to -20 volts DC @ 150-500 mA, both variable and regulated, plus 15 and 30 VAC from a 60 Hz center-tapped transformer.

For load regulation, there's a +5 volt DC supply with better than ±2%, a +12 and -12 volt DC supply better than ±1%, and a variable +20 and -20 volt DC supply better than ±2%. All power supplies are short-circuit and overload protected.

Double breadboards have solderless sockets for quick, easy circuit assembly and testing. Purchase an optional removable breadboard for greater flexibility. Connector blocks allow solderless connections between parts and wires, and a logic probe detects and indicates low and high logic levels.

Other features include two "no bounce" logic switches with complementary +5 and +0.2 volt DC output states, variable



1K and 100K ohm resistors, eight switches for selecting logic lows or highs, and eight LED logic-state indicators.

The Analog/Digital Circuit Design Trainer is listed by Underwriters' Laboratory (UL) and certified by the Canadian Standards Association (CSA), which means it meets all product safety standards. A compact 4¾"H x 15¾"W x 10¾"D, this trainer weighs only 8.4 lbs. Uses 105-130 volts or 210-260 volts RMS at 50/60 Hz.

Kit ET-1000 (14 lbs.) **\$219.95**
Assembled ETW-1000 (13 lbs.) **\$299.95**
 Accessory:
Extra Removable Breadboard ET-1000-1 (1 lb.) ... **\$29.95**



Digital techniques course

Learn the fundamentals and theory of digital logic, including number systems, the design

and application of modern digital circuitry and the skills necessary for designing both combinational and sequential logic circuits for virtually any modern application. Included are components for performing all experiments. Our Basic Electronics series will give you the necessary background for the course. Earn 4.0 CEUs.

EE-3201-A (7 lbs.) **\$99.95**

SAVER! Get both EE-3201-A and the ET-3700 Digital Trainer. Save \$50 over buying them separately.

EES-3201-C (17 lbs.) **\$169.90**

Audio Visual Package includes two audio cassette tapes and illustrated workbook. **EEA-3201-A** (2 lbs.) **\$19.95**

Digital circuits experiment module

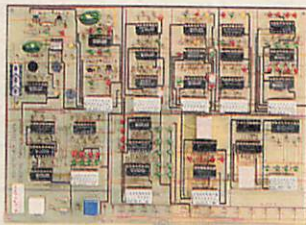
Designed to reinforce text materials of Digital Techniques, this module provides visual demonstrations of digital electronics concepts and theories applied to real life circuits.

Troubleshooting exercises and experiments are prewired for substantial time savings. Use the ET-3700 Digital Trainer and ET-3567 Accessory Backpack with the experiment module. The module slides right into the backpack. Open inputs and outputs let you design and build circuits other than those illustrated in the manual.

ETB-6201 Experiment Module (2 lbs.) **\$149.95**

EB-6201-52 Administrator's Guide (1 lb.) **\$9.95**

EB-6201-71 Student Lab Manual (1 lb.) **\$12.95**



Operational amplifiers course

This detailed study investigates op-amp parameters, basic op-amp linear circuits, integrator and differentiator circuits and more. Learn about current/voltage and voltage/current converters, generators, active filters and bipolar FET op-amps, plus

single supply operation and nonlinear signal processing circuits. You'll need a background in basic electronics. The 386 page text comes with parts for performing the 36 experiments. Use with the ETW-3300-B or ET-3600 trainer, or the ET-3657 Backpack and ETB-3300 Experiment Module, an oscilloscope, multimeter and frequency generator. Earn 3.0 CEUs.

EE-101 (5 lbs.) **\$49.95**



A trainer for digital techniques

Use this digital trainer to quickly and efficiently design and experiment with digital electronic circuits. It helps you apply course material in a practical way through experiments and by building and testing prototypes.

The trainer features three built-in, regulated power supplies which furnish positive and negative 12 VDC and positive 5 VDC voltages to power both digital and linear circuits. In addition, it supplies a line-frequency square wave (60 or 50 Hz); complementary clock signals of 1 Hz, 1 kHz and 100 kHz; logic and data switches to control input levels and four LED logic-state indicators to visually monitor logic states and transitions.

The Digital Trainer is designed to accept the ET-3567 Backpack Accessory, which extends the trainer's capabilities and allows you to experiment with optional modules.

Kit ET-3700 (6 lbs.) **\$119.95**

Assembled ETW-3700 (6 lbs.) **\$199.95**

Plug-in breadboard trainer

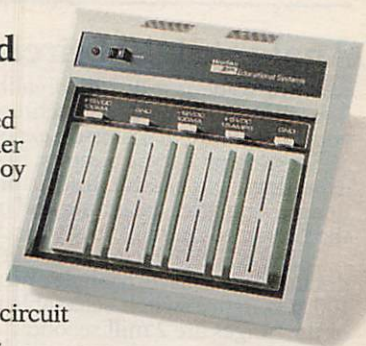
If you've ever tack-soldered an experimental circuit together to see what happens, you'll enjoy the convenience of a plug-in breadboard trainer. It provides several circuit building conveniences that save you from most of the common annoyances you run across in circuit building and experimentation.

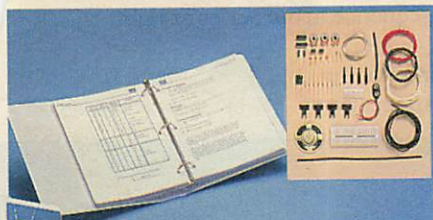
The trainer comes with seven solderless circuit boards, enough room for larger and more complex circuits. For fast circuit assembly and easy circuit modification, sockets are designed to accept up to #20 (0.032") solid wire and most common component leads. Socket spacing is arranged to accommodate any size dual, in-line integrated circuit package. And it's all powered by three self-contained power supplies.

You won't have to worry about mess, parts confusion, tangled wires or connections that come unsoldered. You'll be able to concentrate on important things such as your circuit and what its doing.

Output voltages available at power sockets are +5 volts DC ($\pm 4\%$) at 1.5 amps, +12 volts DC at 100 mA, and -12 volts DC at 100 mA. All supplies are short-circuit protected. Requires 120 VAC, 60 Hz power. UL listed. 3 1/2" H x 12" W x 12" D.

Assembled ETW-3300-B (6 lbs.) **\$194.95**





Fiber optics course

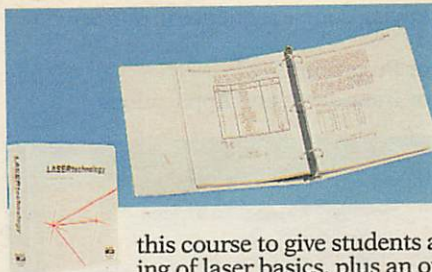
Our five-unit course in fiber optics gives a

thorough understanding of this important technology. Study begins with the nature of light and principles of the transmission medium, then goes on to explore fiber types, the active devices used to generate and detect fiber optic transmission light, and laser emissions and principles associated with the injection laser diode used in fiber optic circuits. When you've completed the course, you'll be thoroughly familiar with the electromagnetic spectrum. You'll understand fiber optic interconnection devices and be able to compare them in cost and performance.

Hands-on experiments let you construct a modulated source driver circuit, a fiber optics receiver circuit and an actual operational fiber optic link. You'll closely examine the requirements of the various types of links and learn which components best fulfill certain requirements. Use the ET-3700 Digital Trainer, an oscilloscope, a multimeter and common hand tools with the experiments.

We recommend you complete EE-3101-A DC Electronics and EE-3102 AC Electronics or have equivalent knowledge before taking Fiber Optics. A complete parts package is included with the course. Earn 3.0 CEUs on successful completion.

EE-4201 (6 lbs.) \$99.95



Laser technology course

We've designed this course to give students a thorough understanding of laser basics, plus an opportunity to practice the technology. Laser Technology covers such topics as how laser light is generated and how it can be modulated, which characteristics it has in common with ordinary light and how each component contributes to the overall operation of the laser. You'll learn the effects and potential hazards of laser light and study the effects of infrared radiation.

Fifteen course experiments cover such topics as transmitting and reproducing sound over a laser beam and measuring radiometric light. You'll experiment with irradiance, diffraction and interference, beam diameter, critical angle and focal length, and with Fresnel Reflection, polarization and light and data transmission. Course experiments are performed with the ETS-4200 Laser Trainer System.

Basic electronics and algebra are recommended prerequisites for Laser Technology. The course comes complete with exams and parts package. Earn 3.0 CEUs.

EE-110 (7 lbs.) \$99.95

Laser trainer system

Our exciting laser trainer system is designed for use with EE-110 Laser Technology. Used in all course experiments, the system features a Helium Neon (HeNe) gas laser that generates an intense, easy-to-see red light with a wavelength of 632.8 nm. With an output power of 0.4-0.9 mW, the beam has a diameter of 1/ePTS 0.49 mm, a divergence of 1.64 mrad and random polarization. And, you can modulate the beam up to 10% for voice experiments.

The system includes a receiver/monitor for receiving the beam and measuring the relative power of the signal, and a built-in detector, audio amplifier and speaker. Also included are a tripod mount and signal input jacks for use with an external source. UL and CSA listed, requires 120 VAC, 60 Hz 15 watts power.

Kit ETS-4200 (12 lbs.) \$279.95

Assembled EWS-4200-A (5 lbs.) \$395.00

SAVER! Purchase both EE-110 Laser Technology and ETS-4200 Laser Training System and save \$30.

EES-110 (32 lbs.) \$349.90



Trainer



Receiver



Our customers write...

After six hours of soldering, poking, bending...I was finished. With eager anticipation, I plugged it in, turned it on...and it worked! A brilliant ruby red dot shone on the lab wall. It was beautiful... No one can quite describe the feeling you get from building one of these kits!"

High school senior, Bill Grove, Brasstown, NC on building the Laser Trainer (from Monitoring Times, September 1988)

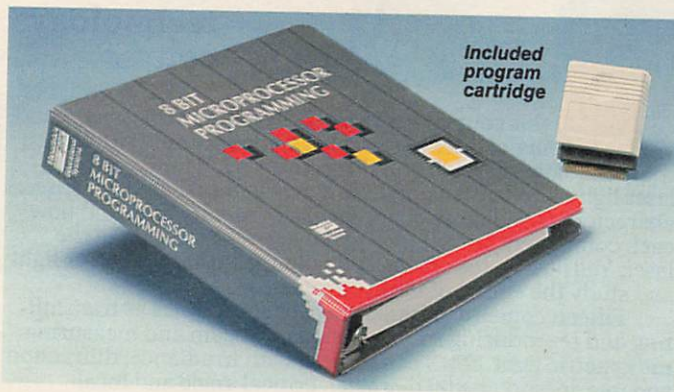
Microprocessing

We recommend the following course sequence in our newest Microprocessing series:

- 1 8-Bit Microprocessor Programming
- 2 8-Bit Microprocessor Interfacing and Applications

We recommend this sequence in our series at right:

- 1 Microprocessors
- 2 Microprocessor Interfacing
- 3 Microprocessor Applications



1 8-bit microprocessor programming course teaches fundamentals

Written expressly for the beginner in 8-bit microprocessor programming, this comprehensive course focuses on programming the MC6811 as representative of the Motorola 6800 family. Microcomputer basics and essential terminology begin the course. Hands-on experiments, including use of the ETW-3800 Microprocessor Trainer shown below, give you valuable practice. Plus, you'll save time with the included program cartridge. With it you can load over a dozen lengthy experiment programs in only seconds. Earn 6.0 CEUs.

EE-3810 (3 lbs.) \$99.95

SAVER! Includes EE-3810 8-Bit Microprocessor Programming, plus ETC-6811 CPU Module and ETW-3800 Microprocessor Trainer described below. Save \$45.95 over buying items separately. **EES-3810** (11 lbs.) \$749.00

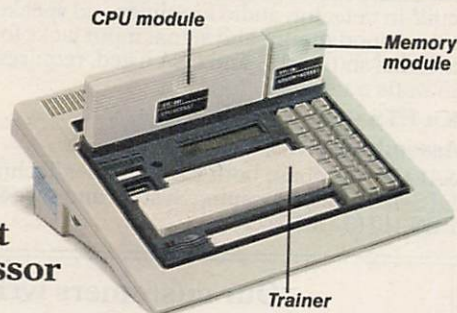
2 8-bit microprocessor interfacing and applications course

8-Bit Microprocessor Interfacing and Applications picks up where 8-Bit Microprocessor Programming leaves off. Like its companion course, this material reflects the latest in microprocessor technology.

The course includes chapters on serial and data communications, memory, temperature and optical sensing, control devices and circuits, and microprocessor applications.

Also included are 19 activity-packed experiments, plus the components necessary to perform them. You'll work step by step to the point where you can actually interface a microprocessor to the outside world. Use this exciting course with our Microprocessor Trainer described below. Earn 8.0 CEUs when you successfully complete the final exam.

EE-3820 (7 lbs.) \$99.95



Rugged 8-bit microprocessor trainer

Built to withstand the most rigorous use and abuse in the classroom and the laboratory, our ETW-3800 Microprocessor Trainer gives students and technicians actual hands-on experience with 8-bit microprocessors. It will remain current for years thanks to its separate plug-in cartridge. This unique design combines the microprocessor, RAM, ROM and buffer circuitry all into a single plug-in cartridge which means the trainer can be used with many of the latest 8-bit processors. The CPU module is based on the Motorola 6811, one of the most widely used in industry today.

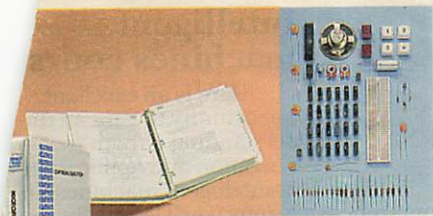
Our Microprocessor Trainer is easy to use. It features a highly readable 40 character LCD, a 21 key keypad with a special help key, and advanced software. In addition, built-in short circuit protection, current-limiting resistors, an easily accessible external fuse, recessed connector blocks that can't break off and a high-impact ABS case all make this trainer a tough one to damage.

An additional feature is the RS-232 interface that allows you to use the trainer with a terminal, even download S HEX files from a computer. Plus, a built-in sonic logic probe lets you check high, low or pulse signals both visually by means of LEDs and audibly through high and low tones. Use the trainer with the optional ETW-3567 Accessory Backpack (shown on page 88) for prewired experiment boards. You'll save the time you once used for setup and wiring.

Comes with 26K of user available RAM and operates at a clock frequency of 921 kHz. Requires 120 VAC, 60 Hz.

Assembled EWS-6811 (8 lbs.) \$695.00

Accessory:
Memory Module stores lengthy MPU programs for future use.
ETC-128 (2 lbs.) \$59.00



1 Microprocessors course

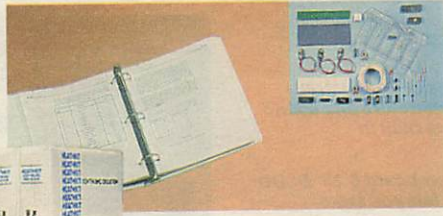
Winner of an international award from the Society for Technical Communication, this first course in our traditional microprocessing series teaches the fundamentals of 8-bit microprocessors, microcomputers and machine level programming.

Microprocessors begins with a review of computer number systems and codes, and continues with terms and conventions, programming instructions, writing and executing programs, and computer arithmetic. Your study will include valuable details about the 6800/6808 microprocessors, architecture, instruction sets, addressing modes, stack operations and much more.

The course devotes 150 pages to programming experiments and 110 pages to hardware interfacing experiments. Use either the ET-3400 or ET-3400-A Microprocessor Trainer in conjunction with these experiments. A multimeter and oscilloscope are also required.

To benefit from the course, you'll need prior experience with digital techniques, found in our EE-3201-A course. Earn 8.0 CEUs when you pass the final exam.

EE-3401-A (10 lbs.) **\$99.95**
SAVER! Save \$60 when you buy both EE-3401-A Microprocessors and the ET-3400-A Microprocessor Trainer.
EES-3401-A (17 lbs.) **\$299.90**



2 Microprocessor interfacing course

Once you've learned microprocessor fundamentals, you're ready to move on to interfacing techniques and advanced microprocessors.

Our Microprocessor Interfacing covers the 6800 family, including the powerful 6809, and continues to the 68000 processor. Eleven units explore such topics as advanced peripheral interfacing (PIA), analog conversion, serial data communications, memory devices and programmable timers.

Ten course experiments give you hands-on experience with display multiplexing, I/O control and handshaking using the PIA, analog-to-digital conversion and ADC interfacing. Other experiments give you the chance to perform parallel-to-parallel conversion using the 6850 ACIA, serial standard conversion, 2716 EPROM programming and ROM/EPROM interfacing. And you'll have actual experience with 6840 PTM input and output, as well as 6809 software operation. To complete the experiments, you'll need the ET-3400 or ET-3400-A Microprocessor Trainer.

We recommend that you complete EE-3401-A Microprocessors before beginning Microprocessor Interfacing, or have equivalent knowledge. You'll earn 7.0 CEUs when you successfully complete the final exam.

EE-3402 (11 lbs.) **\$99.95**



3 Microprocessor applications course

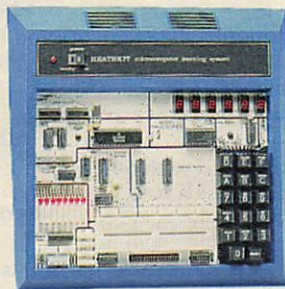
Microprocessor Applications is designed to give advanced students an understanding of how a digital microprocessor can control events in an analog world. The course covers microprocessor applications in the consumer market and in business and industry, plus it looks into changes the future may bring in microprocessor applications.

Study includes microprocessor sensors and transducers, temperature, light, position, motion, force, pressure and flow. The course also covers microprocessor control of devices and circuits, digital-to-analog conversion techniques and analog signal conditioning.

The 13 hands-on experiments let you construct a microprocessor-controlled digital multimeter and a thermometer, plus a microprocessor/stepper motor interface with a control circuit, and a programmable digital frequency synthesizer. You'll need the ET-3400 or ET-3400-A Microprocessor Trainer, a VOM and an oscilloscope to perform the experiments.

Before you begin Microprocessor Applications, we recommend that you complete the two previous courses in this series or have equivalent knowledge. Earn 8.0 CEUs when you successfully complete the final exam.

EE-3405 (10 lbs.) **\$99.95**



8-bit microprocessor trainer

SKILL LEVEL 3 Our versatile, low cost Microprocessor Trainer is designed to give you hands-on experience with microprocessor operation, programming and applications. This flexible, general purpose training unit and microprocessor breadboard can also be used as a miniature digital computer for experiments in our microprocessor course series.

Built around the popular 6808 microprocessor unit, the Microprocessor Trainer includes 512 bytes of user-accessible RAM and a 1 KByte monitor ROM. The large, solderless breadboard gives you the opportunity to build prototype logic circuitry, and the

17-key hexadecimal-based keypad and six 7-segment LED display digits make entering and troubleshooting experimental programs easy.

Built-in +5 VDC at 1.5 amps and ±12 VDC at 50 mA power supplies furnish power to the internal circuitry and breadboard area with sufficient reserve to power related course experiments. Requires 120 VAC, 50/60 Hz at 30 watts maximum power. 3½" H x 12½" W x 11¾" D. Build our Microprocessor Trainer or buy it assembled.

Kit ET-3400-A (7 lbs.) **\$259.95**
Assembled ETW-3400-A
(6 lbs.) **\$399.95**



Electronically synthesized voice, temperature and sound sensors are built in

Optional on-board 5.25" DSD disk drive lets you store programs and retrieve data

Optional multi-jointed arm lifts 1 lb. in any direction

Two-wheel dual servomotor drive system pulls up to 26 lbs.

Built-in 360° sonar and light scanner

HERO 2000®

The first of the next generation of training robots, HERO 2000 will help you explore the related technologies of robot automation programming, electronics for automation, intelligent machines and robotics.

Programmability

HERO 2000 features advanced programmability. Its 16-bit 8088 master microprocessor runs user programs along with eleven 8-bit peripheral microprocessors. This means you can simultaneously operate the robot's sensory and manipulative functions. For easy programming, HERO 2000 offers direct text-to-speech conversion. BASIC is stored in the 64K ROM, and this training robot can even write its own BASIC program.

Expandability

Besides having amazing computational abilities, HERO 2000 features 24K of RAM, expandable up to 576K with the use of three optional 192K RAM expansion boards.

Other expansion features include 12 circuit card slots, two RS-232 DCE ports configured for a terminal and printer, and a cassette port for storing programs on standard cassette tapes.

You're in control

You'll be able to access ROM routines and perform movements from the top-mounted hexadecimal keypad or the optional wireless remote control console. The remote console features a typewriter-type ASCII keyboard, 80 character LCD display, and teaching pendant controls. The console permits wireless control and programming of all functions up to 100 feet away. You can even use it as a radio data link between a computer and the robot. HERO 2000 requires either the remote console or a computer terminal for programming and checkout routines.

HERO 2000 includes sixteen head-mounted LED status indicators (eight are user definable) which show you the function the robot is performing. And with three power modes, it can operate up to six days on its included single 24 amp-hour battery. A 120 VAC charger is also included with this intelligent and versatile robot trainer.



Intelligent machines course

Here is an excellent opportunity to gain an understanding of both the operation and application of intelligent machines. In

five comprehensive units you'll learn what machine intelligence is, what makes up an intelligent machine system and how a system makes decisions. You'll learn how to communicate with an intelligent machine and pick up important information about input/output operations, sensory input devices, intelligent machine interface devices, motion and robots with their components, characteristics, programming and uses in CAD/CAM.

You'll need a HERO 2000 with arm and remote console to perform the 15 experiments. And to gain the most from the course, you should have a background in AC and DC electronics, semiconductors, digital techniques and BASIC programming language.

Intelligent Machines includes a comprehensive text, experiment parts, robot program and exams. Earn 3.0 CEUs on successful completion of the final exam.

EE-1900 (8 lbs.) \$69.95

HERO 2000 Robot without arm.

Kit ETS-19-C (108 lbs.) \$1995.95

SAVER! Save over \$500 when you buy the HERO 2000 Robot with arm and remote control, ET-19-14 Experimenter Board, ET-19-51 Demonstration ROM, and courses EE-1900 Intelligent Machines and EE-1901 Electronics for Automation.

Kit ETS-19-A (191 lbs.) \$2995.00

Accessories:

Articulated Arm with Controller. Gripper includes full wrist action, sense of touch, accurate repeatability.

Kit ETS-19-1 (22 lbs.) \$699.95

75.43 MHz Remote Control

Kit ETS-19-35 (10 lbs.) \$499.95

75.67 MHz Remote Control

Kit ETS-19-36 (10 lbs.) \$499.95

Robot Carrying Cart

Assembled ET-19-3 (19 lbs.) \$99.95

Auto-Docking Accessory allows HERO 2000 to dock with its charger when low battery is detected.

Kit ET-19-5 (3 lbs.) \$149.95

Experimenter Board for conducting experiments and testing your own circuits. Assembled ET-19-14 (2 lbs.) \$99.95

Demonstration ROM. Over a dozen programs show versatility of electronically synthesized voice and sensors.

Assembled ET-19-51 (1 lb.) \$29.95

192K Static RAM Expansion Board with 64K RAM installed. Will accept two additional 64K RAM chip sets.

Assembled ETW-19-15 (2 lbs.) \$99.95

64K RAM Chip Set

Assembled ETA-19-15 (1 lb.) \$49.95

360K Disk Drive with MS-DOS operating system. Requires ETW-19-15 Expansion Board with minimum 128K RAM installed. Assembled ETW-19-6 (7 lbs.) \$399.95



Electronics for automation course

This course teaches the concepts and operating principles of the electronics, sensory devices and control circuits used in automated systems. You'll see how everything comes together

in vision systems and tactile sensing systems.

Thirteen experiments give hands-on experience with temperature, position, proximity sensing, motor speed measurement, opposed optical scanning and much more, all done with the HERO 2000 arm, remote console and experimenter card. This course requires a background in AC and DC electronics, semi-conductors, digital techniques and BASIC language programming. Comes with text, parts package and exams. Earn 6.0 CEUs.

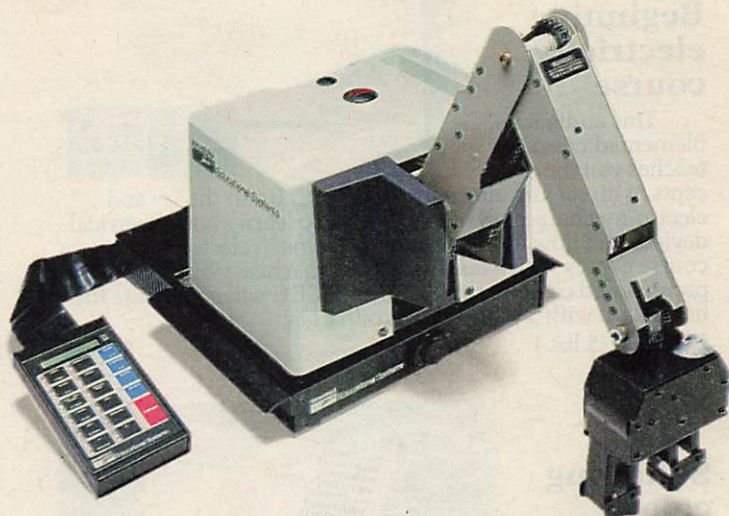
EE-1901 (11 lbs.) \$99.95

Programming and interfacing course

This course is an effective way to learn about both the hardware and software of the automation trainer and various robotic subsystems. In six units you'll look at HERO 2000's features, characteristics and monitor ROM, plus speech synthesis, motor movement, sensory systems and interfacing.

Programming and Interfacing includes 17 experiments performed on the HERO 2000 with arm and remote. To take the course, you should be familiar with BASIC programming language. Comes with text, parts package and exams. Earn 6.0 CEUs when you successfully complete the final exam.

EB-1950 (5 lbs.) \$59.95



Robot arm trainer

SKILL LEVEL 3 Designed to simulate the operation of full-scale industrial robots, our Robot Arm Trainer is a highly effective learning aid that's simple to understand and operate. This trainer features five axes of motion, including wrist pitch and roll for precise pick and place movements. The arm can lift 1 lb., with a gripper force of up to 3¾ lb. And, our patented sense-of-touch gripper is programmable to exert specific amounts of force.

An on-board 8-bit CPU and six slave microprocessors control simultaneous operation of the trainer's functions so there's no need for an external computer. Six closed-loop DC servomotors move the arm accurately and smoothly through all its axes. This closed-loop system monitors both speed and position of each servomotor and reports to the controlling microprocessor.

Menu-driven software leads you through the operations, eliminating the need for constant reference to manuals. You can program the trainer to perform tasks with up to 50 steps and even link tasks to create larger application programs. And, you'll find it easy to simulate real industrial applications thanks to our trainer's repeatability and accuracy.

We've included an emergency stop switch to make the robot arm safe for beginners and trainees. This top-mounted switch interrupts the trainer instantly without aborting the task in progress. And, built-in software limits prevent damage to the trainer if it's commanded to exceed its physical limitations.

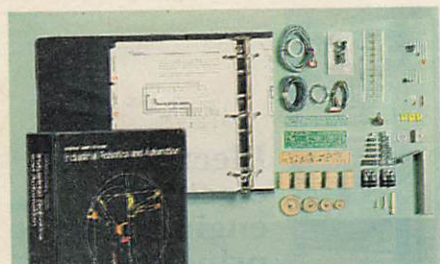
Included are 48K Bytes RAM, 32K Bytes ROM and a Z80A control CPU operating at 4 MHz. The Robot Arm Trainer also includes an industrial-type teaching pendant with a 17-key membrane pad and 16-character LCD readout, a built-in RS-232 port so you can interface with a terminal or external computer, and an 8-channel status port for sending and receiving data signals. Learn the fundamentals of robotics in industry as you turn your understanding of robotics theory into hands-on experience.

Kit ETS-19-32 (52 lbs.) \$995.00

Assembled EWS-19-32 (100 lbs.) \$1995.00

Accessory:

Cassette Interface for storing programs on standard cassette tapes. ETW-19-31 (1 lb.) \$99.95



Industrial robotics and automation course

Learn about the physical and operating characteristics of a robot, servo control systems and the components of hydraulic and pneumatic power supplies, along with comparisons of these systems to an electrical power system.

You'll learn, too, the applications for sensing/control/feedback devices used by a robot, and you'll program a typical robot and workstation. To take Industrial Robotics and Automation, you should be familiar with BASIC programming language. Experiments are performed on the Robot Arm Trainer. Earn 4.0 CEUs when you successfully pass the final exam.

EE-1903 (8 lbs.) \$79.95

Introductory courses

Beginning electricity course

This audio supplemented course teaches you the concepts of direct and alternating current, circuit theory and electro-mechanical systems. You'll also learn about electrical devices and how to solve basic problems in electricity. The course comes with a text/workbook in a heavy binder and prerecorded cassette tapes. Earn 1.0 CEU when you pass the final exam with a score of 70% or higher.

EE-3100 (5 lbs.) \$24.95



Soldering course

Learn professional soldering theory and techniques at home with this hands-on course. Everything you need to know about soldering, including the chemistry of soldering, proper soldering iron size and the cleaning and tinning of the iron is included. The course comes with a comprehensive, well illustrated text that's easy to read. And, all the parts you'll need to practice the techniques come with the course.

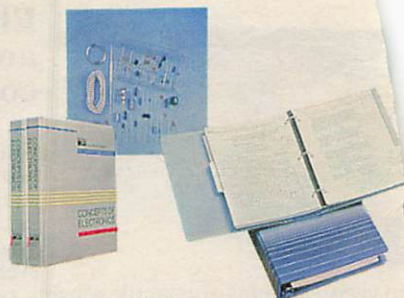
EI-3133 (3 lbs.) \$19.95



Concepts of electronics course

This is an ideal course if you're just starting out in the field of electronics. You'll learn about the properties of electricity and the operation of various electronic devices and circuits. Plus, the included hands-on experiments will give you a more complete understanding of the concepts. Concepts of Electronics comes in a three-ring binder and includes a complete parts package. For the experiments, you'll need the ET-3600 or ET-3300 trainer. Earn 4.0 CEUs when you successfully complete the final exam.

EE-3140-A (9 lbs.) \$54.95



Credit card orders call TOLL-FREE
24 hours a day:

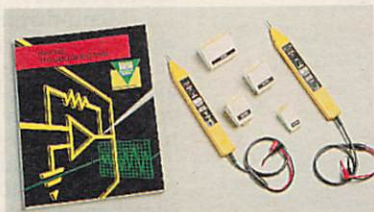
1-800-253-0570



Heathkit electronics dictionary

The Heathkit Electronics Learning Dictionary defines more than 20,000 current terms unique to electronics and closely related fields. Frequent illustrations are clearly captioned to enhance the written definitions. Also included are tables of international measurements, schematic symbols and the Greek alphabet.

EB-1010 (3 lbs.) \$14.99



Digital troubleshooting and equipment course

Learn to diagnose, isolate and repair defective digital equipment with this important new Heath course, written especially for engineers, technicians and scientists.

The course teaches the troubleshooting practices and test equipment applications for troubleshooting and repairing digital circuits in both newly constructed equipment and equipment that's been used in the field.

Included are a high precision logic pulser and logic probe, and four clip-on IC test connectors.

ETI-7510 (2 lbs.) \$69.95



Electrical and electronic engineering principles

This guide furnishes handy reference to the most common quantities, units, symbols, definitions, formulas and circuit diagram symbols used in the field of electrical and electronic engineering. Ideal for students and staff in colleges, polytechnics and universities, technicians and engineers in industries involved in electrical and electronic engineering. Chapters cover DC circuit theory and analysis, alternating currents and voltages, induction motors, complex waveforms, logarithmic ratios, attenuators and more.

EB-1030 (1 lb.) \$14.95

Classroom version courses

All of our individual learning programs are also available in classroom versions. Whether you're a college, technical school or corporate training instructor, these courses come with all the teaching support materials you need. Each course includes a textbook, student workbook and parts pack. For most courses you'll also get an instructor's guide containing learning objectives, course outline, exams and answer keys.

The chart below lists all of our classroom courses by category, with course name and all applicable model numbers and prices, including those for trainers and optional audio cassettes. The choice is yours.



	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.)	11.95	EB-6140-50	9.95	ETW-3600	199.95	EB-6140-30	29.95	NOT USED	
	Concepts of Electricity	EB-3100	21.95	EB-3100-40	11.95	EB-3100-50	9.95	ETW-3600	199.95	EB-3100-30	34.95	NOT USED	
Basic Electronics	DC Electronics	EB-6101-A	21.95	EB-6101-41 (1 lb.)	11.95	EB-6101-51	9.95	ETW-3600	199.95	EB-6101-31 (2 lbs.)	24.95	EEA-3101-A	19.95
	AC Electronics	EB-6102-A (3 lbs.)	21.95	EB-6102-41	11.95	EB-6102-51 (2 lbs.)	9.95	ETW-3600	199.95	EB-6102-31	19.95	EEA-3102-A	19.95
	Semiconductor Devices	EB-6103-A (3 lbs.)	21.95	EB-6103-41	11.95	EB-6103-51	9.95	ETW-3600	199.95	EB-6103-31	19.95	EEA-3103-A	19.95
	Electronic Circuits	EB-6104-A	21.95	EB-6104-41	11.95	EB-6104-51	9.95	ETW-3600	199.95	EB-6104-31	34.95	EEA-3104-A	19.95
	Test Instruments	EB-6105 (4 lbs.)	21.95	EB-6105-40	11.95	EB-6105-50	9.95	ETW-3600	199.95	EB-6105-30	29.95	EEA-3105-A	19.95
	Electronic Communications	EB-6106	21.95	EB-6106-40 (1 lb.)	11.95	EB-6106-50	9.95	ETW-3600	199.95	EB-6106-30	34.95	EEA-3106-A	19.95
	Digital Techniques	EB-6201-A (3 lbs.)	24.95	EB-6201-41	11.95	EB-6201-51	9.95	ETW-3700	199.95	EB-6201-31	34.95	EEA-3201-A	19.95
	Digital Techniques Additional Experiments	NOT USED			EB-6201-71 (1 lb.)	12.95	EB-6201-52	9.95	ETW-3700	199.95	NOT USED		NOT USED
Data Communications and Networks	EB-8090 (5 lbs.)	24.95	EB-8090-40 (1 lb.)	11.95	EB-8090-50	9.95	ETW-1000 (13 lbs.)	299.95	EB-8090-30	19.95	NOT USED		
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	399.95	EB-6401-31	64.95	NOT USED	
	Microprocessor Interfacing	EB-6402 (5 lbs.)	24.95	EB-6402-40 (1 lb.)	11.95	EB-6402-50	9.95	ETW-3400-A	399.95	EB-6402-30	64.95	NOT USED	
	Microprocessor Applications	EB-6405 (3 lbs.)	24.95	EB-6405-40	11.95	EB-6405-50	9.95	ETW-3400-A	399.95	EB-6405-30 (2 lbs.)	54.95	NOT USED	
	8-Bit Microprocessor Programming	EB-6810	24.95	EB-6810-40	12.95	EB-6810-50	10.95	EWS-6811	695.00	EB-6810-30	49.95	NOT USED	
	8-Bit Interfacing Applications	EB-6820	24.95	EB-6820-40	12.95	EB-6820-50	10.95	EWS-6811	695.00	EB-6820-30	74.95	NOT USED	
	Advanced 16-bit Microprocessors	EB-8088 (4 lbs.)	24.95	EB-8088-40	11.95	EB-8088-50	9.95	ETW-100 (33 lbs.)	799.00	EB-8088-30	59.95	NOT USED	
Advanced Electronics	Operational Amplifiers	EB-601	21.95	EXPERIMENTS IN TEXT		EB-601-50	9.95	ETW-3300-B	194.95	EB-601-30	24.95	NOT USED	
	Optoelectronics	EB-605	21.95	EB-605-40 (1 lb.)	11.95	EB-605-50	9.95	ETW-3300-B	194.95	EB-605-30	29.95	NOT USED	
	Laser Technology	EB-610	21.95	EB-610-40 (1 lb.)	11.95	EB-610-50	9.95	EWS-4200-A (5 lbs.)	395.00	EB-610-30 (3 lbs.)	39.95	NOT USED	
	Electro-optics	EB-611	21.95	EB-611-40 (1 lb.)	11.95	EB-611-50	9.95	ETW-3300-B	194.95	EB-611-30 (2 lbs.)	79.95	NOT USED	
Robotics and Automation	Intelligent Machines	EB-1900	21.95	EB-1900-40 (1 lb.)	11.95	EB-1900-50	9.95	ETW-19-A (147 lbs.) Mtr. Frt.	4499.95	EB-1900-30 (2 lbs.)	39.95	NOT USED	
	Electronics for Automation	EB-1901	21.95	EB-1901-40 (1 lb.)	11.95	EB-1901-50	9.95			EB-1901-30	69.95	NOT USED	
	Industrial Robotics and Automation	EB-1903	21.95	EB-1903-40	11.95	EB-1903-50	9.95	ETS-19-32	995.00	EB-1903-30	64.95	NOT USED	
	HERO 2000: Programming and Interfacing	EB-1950 (5 lbs.)	59.95	NOT USED				ETW-19-A (147 lbs.) Mtr. Frt.	4499.95	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.)	1995.00	EB-1801-30 (2 lbs.)	44.95	NOT USED	
	HERO 1 Advanced Experiments	EB-1802 (1 lb.)	24.95	NOT USED						NOT USED			
Computer Servicing	Computer Fundamentals	EB-2001 (3 lbs.)	21.95	EB-2001-40	11.95	EB-2001-50	9.95	ETW-100 (33 lbs.)	799.00	EB-2001-30	39.95	NOT USED	
	Computer Peripherals	EB-2002	21.95	EB-2002-40 (1 lb.)	11.95	EB-2002-50	9.95	ETW-100 (33 lbs.)	799.00	EB-2002-30	39.95	NOT USED	
	Computer Maintenance	EB-2003	21.95	EB-2003-40 (1 lb.)	11.95	EB-2003-50	9.95	ETW-100 (33 lbs.)	799.00	EB-2003-30	29.95	NOT USED	
CAD	AutoCAD	EB-609 (6 lbs.)	39.95	NOT USED		EB-609-50	9.95	NOT USED		NOT USED		NOT USED	
Applied Physics	Mechanisms: Fundamentals of Mechanical Devices	EW-4300	24.95	EW-4300-40	17.95	EW-4300-50	10.95	ET-4400	649.00	NOT USED		NOT USED	

Computer courses and software



Microcomputer professor tutorial

Become your own computer consultant with this thorough tutorial on personal computer systems.

You'll soon be able to make informed decisions about purchasing the right computer, peripherals such as printers and modems, and software to address your particular needs. You'll learn to do a computer purchasing needs assessment and relate

these needs to software and hardware requirements, choose the proper location for your computer system, identify and troubleshoot hardware and software problems and perform routine preventative maintenance.

The course is designed especially for the beginner. Also included are an MS-DOS Version 3.0 Quick Reference Guide, a 3.5" and a 5.25" experiment disk, two needs-assessment worksheets and two sets of 10 disk labels. You'll need a Heath/Zenith, IBM or compatible PC using the MS-DOS operating system. Receive 2.0 CEUs on successful completion.

EC-1123 (5 lbs.) **\$29.95**



C programming course includes software

In this exciting course written for the novice programmer, you'll become familiar with the powerful language of C, its structure and statements. The course concentrates primarily on C's structure and syntax, leaving

system programming theory to more advanced courses.

More intricate in syntax and capabilities than languages such as BASIC, FORTRAN, Pascal and COBOL, C is quickly becoming the preferred language of computer scientists, electrical engineers and others who work closely with computer

operating systems such as MS-DOS, UNIX/XENIX and OS/2. In addition, less technically oriented programmers will enjoy C's free yet concise style. And, this carefully paced course will let you grasp C in small segments.

Included with the course is Ecosoft's C Compiler and Editor software. This \$59.95 value comes absolutely free with the C Programming course. To use the software, you'll need a Heath/Zenith or IBM compatible with at least 384 kilobytes of RAM (a hard disk drive is recommended though not required), a copy of PC- or MS-DOS version 2.0 or later and at least one 5.25" floppy disk drive.

You should be familiar with one or more high-level programming languages and the basic commands of PC- or MS-DOS, and have a feel for structured, or modular, programming principles. Earn 3.0 CEUs on successful course completion.

EC-1124 (3 lbs.) **\$99.95**



Artificial intelligence and expert systems fundamentals course

Business managers, engineers and technicians will gain a broad understanding of artificial intelligence (AI), its development and its future from this introductory course. How AI differs from conventional computing, advantages and disadvantages of AI and how it applies to problem solving are only a few of the topics covered.

A large part of the course focuses on expert systems. You'll study benefits and negative aspects, how expert systems are applied in control, diagnosis and planning, and the 10 steps in creating a system, including computing the ROI, selecting a development tool and designing the system. You'll see how AI is applied in robotics and computer vision and look into knowledge representation from deductive and inductive reasoning to propositional logic.

This course also gives you an understanding of natural language processing and voice recognition, how natural language processing programs work and how they apply to real

world situations – from natural language interfaces and language translation to grammar analysis and abstracting. How speech recognition is applied, classifications of speech recognizers and how speech recognition systems work are topics also covered.

Included with this easily readable two-volume course are experiments on two 5.25" floppies. With them you'll perform 13 different experiments designed to introduce you to the field of AI software. Plus, you'll benefit from a two-disk demonstration of Texas Instrument's PC Easy expert systems program. You'll need a Heath/Zenith PC or compatible equipped with 512 KB RAM and one disk drive. To profit from the course you should have a general knowledge of computer operation and BASIC programming language. On successful completion you'll earn 6.0 CEUs.

EC-1126 (6 lbs.) **\$69.95**



Credit card orders call TOLL-FREE
24 hours a day:

1-800-253-0570



MS-DOS* course

This exciting course is written expressly for users of MS-DOS 3.0 and its derivatives such as PC-DOS 3.0. Starting at a beginner's level, the course moves to the advanced use of the first step toward assembly language programming.

MS-DOS and the Debugger, the

To perform the 33 included experiments, you'll need an MS-DOS-based computer. Minimum recommended memory is 56K. We recommend two floppy disk drives so you can easily perform the experiments.

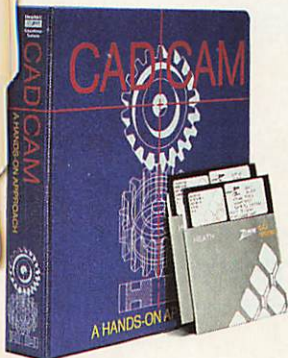
Course objectives include using DOS commands to ac-

complish appropriate work tasks, recovering from common disk errors, creating and using subdirectories to organize data, and creating and using batch files. In addition, you'll learn to use the Edlin editor; understand the uses of input/output redirection, plan and use a hard disk system, examine and change files and disk data with Debug, and more.

Clear objectives introduce each unit, explaining what you will accomplish. And review questions conclude each section so you can evaluate your progress and identify any problem areas, with answers provided for self-checking. A final exam tests your overall knowledge. Included are both a 5.25" and a 3.5" program disk. 4.0 CEUs are awarded on successful completion.

EC-1121-A (6 lbs.) **\$59.95**

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



CAD/CAM course

With this exciting computer-aided design (CAD) and computer-aided manufacturing (CAM) course you'll gain much-needed information about the advancements in tools and in techniques that are rapidly occurring in the manufacturing environment. You'll study the workstation concept, hardware, software, the cost parameters associated with CAD/CAM, numerically controlled machinery, data communications and intelligent machines.

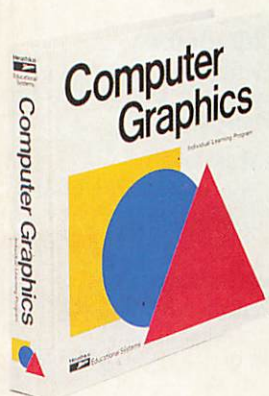
You'll also learn about robotics, factory management and manufacturers' automated protocol. Other related areas you'll be interested in include advanced CAM systems, local area networks, process planning and material requirements planning.

But the highlight of your learning will be the seven on-disk experiments. For these, you'll use the included AutoCAD software to make and modify CAD drawings, create symbols, zoom in to show microscopic detail and zoom out for a macroscopic overview – the perfect way to develop skills in computer-aided design.

The experiments require a Heath/Zenith or IBM PC compatible computer equipped with 256K RAM, two 5.25" disk drives and CGA or Hercules video capability.

You get all this, plus 6.0 CEU credits when you pass the included final exam.

EES-109 (12 lbs.) **\$49.95**



High resolution graphics course

Written for both the beginner and experienced programmer, this course presents a broad overview of the exciting world of computer graphics.

Computer Graphics comes with programming experiments and solutions on a 5.25" floppy disk, written in Microsoft BASIC. With them, you'll draw lines and figures using pixels, use advanced color graphics commands, merge text with

graphics, animate graphics, learn how to photograph on-screen graphics using ordinary camera equipment and learn to control the video screen of your computer.

For the experiments, you'll need an H/Z-100, a Heath/Zenith PC or an IBM PC equipped with a color graphics card. You'll also need Microsoft BASIC (ZBASIC or GW-BASIC version 1.0 or 2.0), or BASICA for an IBM PC. We provide sketching worksheets with acetate overlays.

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