# Heathkit®

## Great Gift Ideas for Christmas, 1980

Big, bright LED digital readout

A perfect gift idea for Christmas

Handsome burled-grain platform



## Heathkit Digi-Scale is a real weight-loser's helper!

- Battery-operated — weigh with space-age accuracy anywhere
- Electronic mechanism delivers weights accurate to 2/10 pound

The Heathkit Digital Electronic Scale is an ideal companion — wherever you go. It's more accurate than mechanical scales costing much more, so dieters can accurately measure daily weight loss. Take this battery-operated scale anywhere. Weigh yourself immediately after exercising — or even after a shower! An electronic strain-gage mechanism eliminates mechanical weights and springs that can go out of adjustment. Rugged cast aluminum base means you can use the Digi-Scale on most carpeting, without affecting the readout accuracy. Choose readouts in pounds or kilograms. Custom mounting option places readout at eye level. Platform dimensions, 1.63" H x 11.63" W x 11.63" D.

**Accurately weighs smaller items**

Kit GD-1186, Shpg. wt. 9 lbs. . . . . . . . . . . . . **94.95**

Factory Assembled and Adjusted Electronic Digi-Scale. Non-detachable readout. Reads in pounds only, in increments of 2/10 pound.

GDW-1186, Shpg. wt. 9 lbs. . . . . . . . . . . . . **129.95**

**Weigh the baby without weighing the blanket**

GD-1186 SPECIFICATIONS: Resolution: 1 part in 3000. Accuracy: 1% or 1 count, whichever is greater. Repeatability: 0.5% of reading or 1 count. Overload Capacity: 50% of full capacity (Not damaged by weight up to 450 lbs.). Power Requirement: 6 "C" size dry cell or alkaline batteries (not supplied).

## FM Intercom for clear, reliable communications in your home
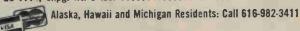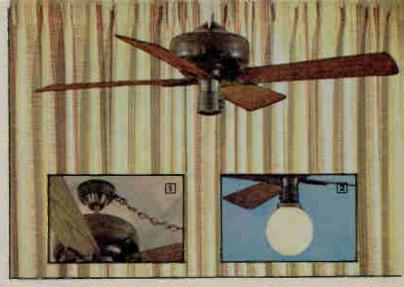
- Wireless — uses AC house wiring
- Phase-locked loop circuit assures quiet operation



Here's an intercom you can use anywhere indoors — from baby's room to laundry, from garage/workshop to kitchen — as long as the units are on the same AC power transformer. Just build, plug into an AC outlet and communicate. Pleasant call tone alerts other units. Transmit indicator lights in the talk mode. Dictate switch locks the station in talk mode for hands-free operation. Automatic squelch helps reduce noise when not in use. 3-inch speaker. For 120 VAC, 60 Hz. Dimensions, 3" H x 8.63" W x 5.75" D. Two stations required to operate; stations sold separately.

Kit GD-1114, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . . . . . . . . . . . **each station 49.95**

## Cut heating/cooling costs with this Casablanca® Fan

- Circulates stagnant air for even heating, quiet cooling
- Adds a distinctive decorative touch to any room

The Heathkit Casablanca Fan is the nostalgic, decorative way to keep heating and cooling costs down, and assure your comfort for every season of the year. The Casablanca Fan brings heat down from high ceiling areas during heating season. And it provides whisper-quiet cooling in your home, for just pennies a day, in cooling season — by circulating stagnant air.

With its fan motor finished in a warm baked-bronze enamel, the Heathkit Casablanca Fan features chain-pull or wall switch operation, variable speed adjustment from 100-140 revolutions per minute (rpm), and 52-inch-wide blades (tip to tip). Slow-Speed Accessory (GDA-1238-4, listed below), cuts fan speed for smaller rooms, lower ceilings. For an even more charming decorative effect, add the optional Swag-Chain or Light Kits, both listed below. For 120 VAC, 60 Hz. Not recommended for ceilings under 8 feet high.

Kit GD-1238A, Shpg. wt. 24 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **119.95**

Slow-Speed Accessory. Lowers speed of the Heathkit Casablanca Fan to 50-100 rpm. Ideal for smaller rooms.

GDA-1238-4, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **14.95**

1 Swag-Chain Kit. Mount your Casablanca Fan most anywhere. Includes 18" antique brass swag chain, sold electrical cord and hardware.
GDA-1238-1, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **14.95**

2 Decorative Light Kit. Adds Old World charm and dual purpose. Includes decorative glassware, glassware holder and mounting accessories.
Kit GDA-1238-2, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **16.95**

## Ultrasonic Cleaner for delicate jobs

FAST, EASY 2-EVENING KIT
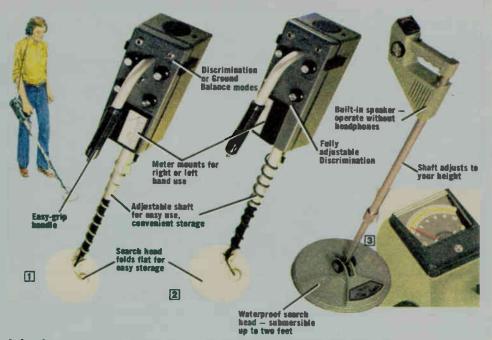
- Cleans safely
- Uses most any cleaning solution or detergent



The Heathkit Ultrasonic Cleaner makes short work of most hard-to-clean projects. Deep clean watch parts, most jewelry, dentures or any delicate item that could be damaged or otherwise harmed by hard scrubbing, harsh cleaners or abrasives. Just fill the stainless steel tank with any detergent or cleaning solution safe for the item to be cleaned. Place the object(s) in the tank, set the timer and the GD-1151 Ultrasonic Cleaner does the rest. Easy kit assembly — takes as little as two evenings. For 120 VAC, 60 Hz. Tank measures 6" L x 4" W x 2.38" D. Overall Dimensions, 4.63" H x 5.75" W x 11" L (including lid).

Kit GD-1151, Shpg. wt. 5 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **89.95**

Discrimination or Ground Balance modes

Built-in speaker — operate without headphones

Fully adjustable Discrimination

Shaft adjusts to your height

Meter mounts for right or left hand use

Adjustable shaft for easy use, convenient storage

Easy-grip handle

Search head folds flat for easy storage

① ② ③

Waterproof search head — submersible up to two feet

## Join the excitement of treasure hunting with a Heathkit Metal Locator

Search for old coins, artifacts, treasure — any metal object you want to find. Our finest Locator features a Very Low Frequency (VLF) Ground Balance Mode. You can use it anywhere for finding almost anything in any kind of soil — even in highly mineralized soil where conventional metal locators are useless. And our lowest-priced model uses an induction balance system to pinpoint your find. Order yours now and join the fun of treasure hunting.

### ① Groundtrack™ Metal Locator

Useable in most soil conditions. Our finest Metal Locator will give you hour after hour of fun-filled excitement. Whether searching for buried treasure, antique artifacts or old coins, you'll be a step ahead of the others because the Groundtrack's adjustable discrimination lets you look in areas where high "junk" makes conventional locators useless.

A fully-shielded search coil prevents false signals and is waterproof, so you can even look for buried metal in up to two feet of salt or fresh water. The GD-1290 features a sophisticated induction balance system so you hear nothing until a piece of metal enters the search field; then the tone grows louder as you approach the metal object.

Use the lightweight Groundtrack anywhere — it's lightweight — and the adjustable shaft telescopes for easy storage. Uses 6 AA cells (not included) — or with the optional GDA-1190-1 Nickel-Cadmium Battery Pack installed, you can recharge your Groundtrack at home or from your car lighter socket.

Kit GD-1290, Shpg. wt. 5 lbs. ............189.95
GDA-1190-1, Rechargeable Battery Pack, 2 lbs. 19.95

GD-1290 SPECIFICATIONS: Sensitivity: Locates dime at 4″ to 6″ typical, may be less depending on soil conditions, mode of operation and amount of discrimination selected. Method of Detection: Induction-balance circuit. Detector Output: Meter, speaker, phone jack. Dimensions: Search Coil: 6″ diameter. Extended Height: 45½″. Collapsed height: 22½″. Power Requirement: Six AA dry cells or alkaline, or optional rechargeable Nickel-Cadmium Pack (GDA-1180-1, see above). Net Weight: 3.4 lbs.

### ② Cointrack™ Metal Locator finds coins

The GD-1190 is designed for coinshooting. It features a search coil optimized for coin locating, and adjustable discrimination so good you'll be able to find treasure in areas where operation with other locators is all but impossible! Pushbutton tuning maintains maximum sensitivity. The 1190's waterproof head allows underwater searching.

The GD-1190 collapses for easy storage and transportation. And with its optional GDA-1190-1 Nickel-Cadmium Battery pack installed, you can recharge your Cointrack at home or in the field from your car's cigarette lighter socket. Can also be operated on six ordinary AA cells (not included).
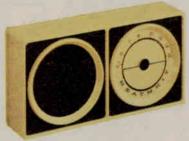
Kit GD-1190, Shpg. wt. 5 lbs. .............119.95
GOA-1190-1, Rechargeable Battery Pack, Shpg. wt. 2 lbs. ........................19.95
GDA-1190-2, Headphones for GD-1190 or GD-1290, Shpg. wt. 2 lbs. ........................11.95
GOA-1190-3, Carrying Case for GD-1190 or GD-1290, Shpg. wt. 1 lb. ........................11.95

GD-1190 SPECIFICATIONS: Sensitivity: Typically 4″ to 6″, may be less depending on coin size, amount of discrimination and soil material. Method of Detection: Off resonance type. Output: Meter, Speaker, Phone Jack. Dimensions: Search-Coil: 6″ diameter. Overall length: Shaft extended 45½″, collapsed 22½″. Power Requirement: Six AA Dry Cells or Alkaline, or GDA-1190-1 Rechargeable Nickel-Cadmium battery pack. Net Weight: 3.4 lbs.

### ③ Low-priced Induction Balance Locator

The GD-348 uses a sophisticated induction-balance system. Pinpoint finds through built-in speaker, optional headphones or use the front-panel meter. Null and ten-turn sensitivity controls let you adjust to find larger or smaller objects or to overcome ground effect. Shaft telescopes and search coil folds for easy storage. Less battery (order below).

Kit GD-348, Shpg. wt. 5 lbs. ...............79.95
GDA-48-1, 9-Volt Battery, Wt. 1 lb. ...........4.95
GD-396, 600-ohm Superex Headphones, 2 lbs. ...7.95

## Give one of these kits to a first-time builder

Kit building is fun...and it's easy. Our world-famous Heathkit instruction manuals guide you every step of the way — from unpacking the kit to plug in. But if you should have questions, technical help is as close as your phone. Everything you need, including plenty of solder, comes with your kit. Just add simple hand tools...and enjoy!

## Programmable Doorbell plays your favorite tune

**$49⁹⁵**

- New song book contains more than 50 songs — including songs of the season
- Program it to play favorite tunes up to 16 beats long
- Change tunes easily for any special season or day

This easy-to-build kit is fun for the whole family, too! It's great when guests play your favorite melody (or theirs) as they touch the door button. Use as many as 16 beats to program your tune. Change it whenever you wish...to celebrate a birthday, an anniversary, a season, your favorite team or a party. The song book with the kit gives simple directions for 50 different tunes, including many college songs. Or program your own. It's easy.

Changing tunes is easy, too — just rearrange the programming wires in the "Keyboard" behind the front-panel access door. Controls for the electronically synthesized sound also are located inside the front panel, so you can adjust volume or tone. You'll find this doorbell easy to build, even if you're a first-time kit builder. The thorough Heathkit instruction manual also explains installation. The Programmable Electronic Doorbell is loud enough to be heard throughout most houses, but you can add extra speakers in remote locations. Measures 5¾" H x 8⅝" W x 2⅝" D (14.6 x 21.9 x 6.7 cm). The Heathkit Electronic Doorbell is a great introduction to the fun and satisfaction of kitbuilding — and it will brighten your home all year 'round.

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

**TD-1089 SPECIFICATIONS: Speaker Size:** 3" x 5" oval, 16 ohms. Extra speakers can be added, up to a total of not more than 16 ohms. **Programming Matrix:** 13 notes x 16 beats. Same note, up to 9 beats. Now includes patch cord for more convenient programming. **Power Requirement:** 16 VAC, 50/60 Hz, 12 W max. (6 W idle). Power supplied by standard doorbell transformer with 10 VA rating (not supplied).

Greet guests with a favorite tune — up to 16 beats long

## Heathkit Portable Rechargeable Fluorescent Lamp puts light anywhere you need it

**$34⁹⁵**

FAST, EASY 2-EVENING KIT

- Rechargeable, so it's always ready — wherever you are
- Recharge from 120 VAC outlet — or use available 12 VDC adapter to charge from car or boat

Fishing, camping...or working in the attic, garden, or basement — the Heathkit Portable Rechargeable Light gives you bright, reliable illumination — without any bothersome line cords to get in your way.

Built-in rechargeable battery and a separate pre-assembled battery recharger eliminate the time-consuming inconvenience of buying expensive replacement batteries. Use the GD-1246A for hours, in most any environment. Then simply plug it in to an AC outlet in your home (or into your car's lighter socket, using the optional GDA-1246-1 12 VDC Adapter, listed below) to restore full power.

Wherever you need light, you can count on the Heathkit Portable Rechargeable Fluorescent Light. This easy-to-build kit measures 9⅜" H x 3⅛" W x 4⁹⁄₁₆" D (23.81 x 7.94 x 11.59 cm).

**Kit GD-1246A, Shpg. wt. 6 lbs. .............34.95**

**12 VDC Adapter for GD-1246A Rechargeable Light. Kit GDA-1246-1, Shpg. wt. 1 lb. .............4.95**

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

- Easy to install — sensor plate mounts anywhere for instant on-off control of lights or appliances
- No rewiring necessary — simply plug lamp or appliance into control unit, then plug unit into any AC outlet

FAST, EASY 2-EVENING KIT

## Remote Control Kit for lights, small appliances

Turn lights, appliances on/off with a touch. Plug lamp or appliance into control, plug control into any AC outlet. Remote touch plate mounts anywhere.

Use more than one touch plate — or use door knobs, rails or any other metal as a touch plate. Install switches throughout your home — without rewiring. Kitbuilding is fast, easy. 20 ft. wire included. 120 VAC, 60 Hz.

Touch-Control for incandescent lamps to 150 W. On, off, half-brightness. **Kit GD-1187, Shpg. wt. 1 lb. ....................................16.95**

Touch-Control for TV's to 225 W, fans to 180 W. Not for AM radios. 1⅞" H x 2⅜" W x 3⅝" L. **Kit GD-1287, Shpg. wt. 2 lbs. ....................17.95**

# Open the garage door from inside the car

**$179⁹⁵**

Quiet, dependable
screw-type mechanism

Powerful ⅓ hp motor
plus automatic 75 watt dome light

Save money by building, installing our Garage Door Opener. At night, or in bad weather, just touch a button in your car — and the garage door opens automatically and a light turns on. Separate switch, 20' cable lets you operate the unit from inside the garage. Screw-type opener features ⅓ hp motor that opens doors up to 7.5' high. FCC-approved, assembled transmitter, receiver use 256 code combinations — set, change your own code anytime. 12" H x 9" W x 120" L. For std. NEC 3-wire systems.

**Transmitter, Receiver and Door-Opener Mechanism.**
Kit GD-3309C, Shpg. wt. 57 lbs., Mtr. Frt. . . .179.95

**Two Transmitters, Receiver and Mechanism.**
Kit GD-3309D, Shpg. wt. 57 lbs., Mtr. Frt. . . .194.95

- Door can't be opened from outside
- For safety, reopens if obstructed during closing

Door-Opener Mechanism only.
Kit GDA-3309-1, Shpg. wt. 44 lbs., Mtr. Frt. . .149.95
Adapter for jamb and pivot doors.
Kit GDA-3209-2, Shpg. wt. 3 lbs. . . . . . . . . . . .9.95
GDP-3309A, One Transmitter only, 1 lb. . . . . .24.95
One Transmitter, One Receiver for 3-wire systems.
GDP-3319A, Shpg. wt. 1 lb. . . . . . . . . . . . . . .49.95
Two Transmitters, One Receiver for 3-wire systems.
GDP-3329A, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .64.95
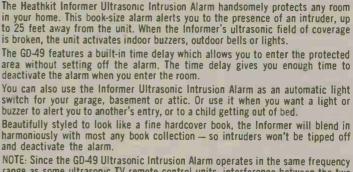
Use separate switch inside garage,
or transmitter in your car

Power Transformer allows use with 2-wire systems.
GDA-3309-3, Shpg. wt. 1 lb. . . . . . . . . . . . . . . .5.95

# Give the gift of security with the Informer® Ultrasonic Alarm

**$59⁹⁵**

The Heathkit Informer Ultrasonic Intrusion Alarm handsomely protects any room in your home. This book-size alarm alerts you to the presence of an intruder, up to 25 feet away from the unit. When the Informer's ultrasonic field of coverage is broken, the unit activates indoor buzzers, outdoor bells or lights.

The GD-49 features a built-in time delay which allows you to enter the protected area without setting off the alarm. The time delay gives you enough time to deactivate the alarm when you enter the room.

You can also use the Informer Ultrasonic Intrusion Alarm as an automatic light switch for your garage, basement or attic. Or use it when you want a light or buzzer to alert you to another's entry, or to a child getting out of bed.

Beautifully styled to look like a fine hardcover book, the Informer will blend in harmoniously with most any book collection — so intruders won't be tipped off and deactivate the alarm.

NOTE: Since the GD-49 Ultrasonic Intrusion Alarm operates in the same frequency range as some ultrasonic TV remote control units, interference between the two is possible. For 120/240 VAC, 50/60 Hz. Overall Dimensions, 10.88" H x 2.38" W x 7.5" D (27.64 x 6.04 x 19.05 cm).

Kit GD-49, Shpg. wt. 5 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .59.95
GDA-39-1, Indoor Buzzer Alarm for the Informer, Shpg. wt. 1 lb. . . . . . . . . .9.95
GDA-39-2, Outdoor Bell for the Informer, Shpg. wt. 5 lbs. . . . . . . . . . . . . . .26.95

- Ultrasonic waves "see" intruders up to 25 feet away
- Fits in with any collection of books
- Built-in delay for extra convenience
- Indoor Buzzer Alarm, Outdoor Bell available

# Security Dialer automatically calls for help

**$169⁹⁵**

Hook up to your security system, and our Telephone Security Dialer calls a friend, relative, neighbor or the police. Slide switches permit easy programming of desired number. 3-digit location code. Automatic redial if line is busy. Separate microphone let you listen in on secured area. Uses four 9-volt batteries (included). 4.75" H x 11" W x 6" D (12.07 x 27.94 x 15.24 cm).
Kit GD-1156, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .169.95

# Sanyo TV Camera, Monitor provide visual security

Sanyo VC-1600 High-Sensitivity Black-and-White TV Camera for remote monitoring. Also use with video recorders. 50' cable, connectors. 120 VAC, 60 Hz
GDP-1850, Assembled, Shpg. wt. 9 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . .259.95
GDP-1852, Mounting Bracket for Camera, Shpg. wt. 2 lbs. . . . . . . . . . . . . .19.95
Sanyo VM-4209 9" Diagonal Video Monitor. Use with camera above. 120 VAC
GDP-1851, Assembled, Shpg. wt. 17 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . .189.95
SAVE $49.95! Buy Sanyo Video Camera and Monitor together.
GDS-1850, Shpg. wt. 42 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .399.95

## Affordable Eye Spy™ Photobeam Alarm

When beam is broken, warning devices are activated. Use any 120 VAC alarm/light, up to 300 watts. Relay, 5.38"H x 4.38"W x 5.25"D. Mirror, 5"H x 4"W x 2.75"D.
Kit GD-1021, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . .15.95

Credit Card Orders Call TOLL-FREE: 800-253-0570

## NEW

## Minuteman II: keeps intruders out of your home or business — day or night

- Component system for total user flexibility
- Famous Delta Minuteman II System — now in kit form

No house, apartment or business is immune from burglary or vandalism. So what can you do to protect yourself, your loved ones and your property? One way to assure protection is by using Delta's Minuteman II Ultrasonic Alarm System.

Minuteman II is a complete security system: This space protection system uses harmless ultrasonic sound. Strategically placed, it will effectively protect your home or business. Or, if you feel the need for more security, it's expandable — because Minuteman II acts as a master control for other units you want to add. For example, you can add up to three Minuteman Sentinel Detectors — along with indoor/outdoor speakers, key-operated on/off switches, magnetic door contacts, window foil or any other closed circuit switch.

You get safe, portable protection: If you move, you can take your Minuteman II Alarm System with you. And because it operates on 15 VDC, there's absolutely no danger from high-voltage shocks.

Dependable security: Exclusive built-in safeguards prevent false alarms. And self-testing circuits allow you to assure continued, reliable operation.

Now available in affordable, easy-to-build kit form: The world's leader in electronic kits brings you the Delta Minuteman II Alarm System, exclusively in kit form, at prices designed to fit your budget. Easy kit assembly, with step-by-step Heathkit manuals. Separate components are described below.

### ① Control Unit/Detector runs Minuteman II alarm system

Master Control Unit/Detector protects up to 300 sq. ft. with ultrasonic sound. Controls on/off functions, entry/exit delays, alarm timer, test circuits. Powers external alarm speakers (GDA-1800-3, below right), can initiate a telephone call through the Heathkit GD-1156 Telephone Security Dialer (page 6). Includes plug-in power transformer and provisions for perimeter, supervised, closed circuit security (window foils, magnetic door contacts). Easy kit assembly. 120 VAC, 60 Hz. Dimensions, 3.75" H x 11" W x 6" D.

Kit GO-1800, Shpg. wt. 7 lbs. .................................189.95

### ② Minuteman Sentinel for additional protection

Slave ultrasonic detector protects up to 300 sq. ft. Includes 50' of 4-conductor wire for connection to GD-1800 Master. Requries GD-1800 for power, control. Dimensions, 3.25" H x 7" W x 3.25" D.

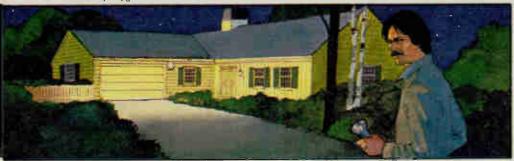Kit GDA-1800-1, Shpg. wt. 4 lbs. .................................64.95

### ③ Key Switch for remote alarm system control

Arm or disarm your Minuteman II Alarm System with this professional-looking key switch accessory. Includes loop-secure LED, to positively indicate armed and secure status — along with a special pick-resistant key and lock set. Requires GD-1800 Master Control Unit/Detector for power. Overall dimensions, 4.5" H x 2.75" W x 2" D (11.43 x 6.99 x 5.08 cm).

GDA-1800-2, Shpg. wt. 3 lbs. .................................29.95

### ④ All-Weather Speaker sounds loud wail indoors or outdoors

Produces up to 108 dB of high/low siren noise (measured at 10'). Suitable for indoor or outdoor installation. Includes 50 feet of wire for connection to GD-1800 Control Unit/Detector. Nominal impedance, 8 ohms. Up to 2 of these speakers may be driven from GD-1800. Overall dimensions, 5.75" H x 5.75" W x 6.75" D (14.61 x 14.61 x 17.15 cm).

GDA-1800-3, Shpg. wt. 3 lbs. .................................24.95



## NEW

## Security Light Control makes long, dark nights safer for you

$139⁹⁵

- Makes house safer at night, detects/deters intruders
- Automatically turns on lights when movement is detected

One of the most useful security devices you can buy — now available exclusively in kit form from Heath! The GD-3510 Security Light Control, by Colorado Electro-Optics, uses a passive infra-red sensor to turn on lights at night, when motion is detected.

When an intruder is detected, the GD-3510 surprises him with the most recognized deterrent to crime — light. The unexpected lighting makes the intruder think that he has been observed.

You can adjust the GO-3510's 25' x 25' range to automatically light driveway, walkways and steps — to help prevent accidents and light a warm welcome for visitors — as well as for yourself.

How does this revolutionary device work? The passive infra-red sensor detects changes in temperature, when accompanied by motion. It will not trigger on temperature changes without movement. When a warm-bodied object moves through the detection pattern, a relay turns on lights or devices (up to 500 watts). Unit automatically shuts off 4 minutes after all movement has ceased. Manual sensitivity control lets you adjust sensitivity to optimum level. Photo-transistor prevents unit from triggering during daylight.

Save energy, too. Night lighting is used only when needed — not all night long.

You'll enjoy this kitbuilding experience: The thorough Heathkit manual shows you how, step-by-step.

Wire yourself — or consult an electrician, when wiring to your 120 VAC, 60 Hz lighting system. Outdoor Sensor Unit Dimensions, 8.06" H x 5.25" W x 3" D.

Kit GD-3510, Shpg. wt. 3 lbs. .............139.95



Alaska, Hawaii and Michigan Residents: Call 616-982-3411

Thru-hull transducer

Transom mount transducer

# Get ready for the upcoming fishing season with these fine Christmas gifts for your boat

## ☐ Dual Range Depth Sounder finds fish, tells water depth

### $99.95

● Lets you navigate in unknown waters
● Tells water depth or depth of submerged objects down to 240'

This Dual Range Depth Sounder lets you safely explore unknown waters for fishing, scuba diving, or pleasure cruising. A high pitched beep alerts you to shoals or objects projecting above any preselected depth from 5' to 240'. Two selectable ranges, 0'-60' and 0'-240', insure accurate readings. Noise rejection circuit gives clear, precise readouts by blocking motor ignition interference. Unit has a corrosive-resistant Cylolac® case, and features bright neon lamp with sun shield to make depth reading easy day or night. Gimbal mounting and quick connecting power and transducer leads speed installation.

Kit MI-1031-1, with thru-hull transducer, 15' coax, Shpg. wt. 8 lbs. ......**99.95**
Kit MI-1031-2, with transom-mount transducer, 25' coax, Shpg. wt. 8 lbs. ..**99.95**
Single Range Depth Sounder — same as MI-1031, one range: 0'-240', no alarm.
Kit MI-1030-1, w/thru-hull transducer and 25' coax, Shpg. wt. 8 lbs. .....**69.95**
Kit MI-1030-2, w/transom-mount transducer and 25' coax, Shpg. wt. 8 lbs...**69.95**

## ☐ Heathkit Seeker™ shows where the fish are

Chart Recording Depth Sounder features an extra-wide transducer for greater coverage, giving you a wider picture of what's below. This means the Sounder marks more fish. Two lamps light chart for night trips. Easy to install gimbal mount. Operates on boat's 12-V system. One chart roll lasts 13 hours. Measures: 8" H x 11" W x 7" D. Comes with 1 roll of chart paper.

Kit MI-2910-1, with thru-hull transducer, 30' cable. 17 lbs. ...........**289.95**
Kit MI-2910-2, with transom-mount transducer, 30' cable. 17 lbs. ......**289.95**
MIA-2910-1, two rolls of chart paper. Shpg. wt. 2 lbs. ..................**9.95**
MIS-2910-1, Save $9.75! 12 rolls Chart Paper. If pur. sep., $59.70. 12 lbs...**49.95**

## ☐ Catch more fish with portable Fish Spotter™ Sounder

Take this light-weight, portable Fish Spotter™ Sounder on your next fishing trip. Detects fish swimming between the surface and any preset depth you choose up to 240'. Features two switch-selected ranges, 0'-60' and 0'-240', for better sensitivity. Noise rejection circuit eliminates engine ignition interference. Bright neon flasher with sun shade makes day or night reading effortless. Aluminum case holds sounder and water-tight transducer with suction-cup bracket. Runs on two 6-volt lantern batteries (not included). Measures: 7" H x 6" W x 11" D.

Kit MI-2901, Shpg. wt. 8 lbs. ....................................**109.95**
Kit MIA-2900-1, Scanning Transducer Bracket for MI-2901 & MI-2900. 4 lbs. ....................................**29.95**

## Don't get lost! Navigate with this Heathkit Radio Direction Finder

In William F. Buckley, Jr.'s book, "Airborne," the author reminisced that, "The most satisfactory radio direction finder I ever had was out of Heathkit."

Now you can safely venture out of sight of land or go for a night cruise with the Heathkit Radio Direction Finder. It gives you a fix on your position by tuning-in and finding the signal directions of long-wave beacon band (190 kHz to 410 gHz) or AM broadcast band (535 kHz to 1605 kHz) stations. Radio frequencies are shown on a bright, easy-to-read digital display that automatically adjusts to changing light conditions for easy day or night reading.

You can quickly locate the direction of station signals with the unit's lighted null meter, rotating rod and telescoping antenna. A big Azimuth ring marked in 2° increments (±3° accuracy) makes directional readings and compass headings fast and easy.

The MR-1010 runs off your boat's 12-15 VDC electri-

cal system or becomes quickly portable with six "D" cell flashlight batteries. To prolong battery life, digital display automatically fades off after 20 seconds, but can be instantly recalled with a touch of a button.

The unit is compact — measuring ¼" H x 11½" W x 12" D. It is housed in a rugged, white plastic cabinet with a blue and plastic front panel. Our famous step-by-step, no nonsense manual instructions makes this unit easy to build. The circuits are designed so you can align them without instruments or technical knowledge.

Kit MR-1010, Shpg. wt. 14 lbs. ............**259.95**

## Find those fish with Thermo Spotter®

Here's a handy device for your next fishing trip. It shows water temperature down to 100', so you can find the exact swimming level of your favorite aquatic dish. Simply lower the submersible sensor, press the meter button for the temperature readout, and check depth on cable. Fish temperature charts (included). Take-up reel case. Runs on 1.5 V AA battery (not included). 10¼" H x 5¾" W x 3¼" D.

Kit MI-104, wt. 3 lbs. ...**44.95**

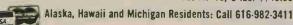## Power Inverter gives boat AC current

Take a blender or TV (up to 175 W) on your next cruise. Unit changes DC (12 or 6 V) current to 60 cycle AC. Not for high starting current or sine wave AC equipment.

Kit MP-10, 8 lbs. ..**49.95**

# Heathkit Digital Depth Sounder protects your boat and passengers

- Detects depth, from 2' to 499'
- Alerts you to unexpected changes in depth both audibly and visually
- Five alarm settings

Prevent costly boat repairs and personal injury with the new Heathkit Digital Depth Sounder. Automatic range selection constantly monitors water depths from 2' to 499'. Crystal oscillator in unit sends depth changes to display every .9 second. Display tells you depth in .1' increments from 2' to 9.9', and reads in 1' intervals from depths 10' to 499'. Automatic gain control self-adjusts the signal sensitivity for precise, accurate depth readings.

Five alarm settings warn you visually and audibly of unexpected depth changes at the following levels: 2', 4', 10', 20', and 40'. Built-in keel offset automatically subtracts (up to 7') the keel depth or other displacement hull depth, giving you the exact distance between the lowest point of your hull and the lake bottom. Three LCD display with backlighting informs you of water's depth day or night.

Made from non-corrosive, weather-resistant materials — stainless steel, plastic, and aluminum — for years of outdoor service. Back connector for adding MI-2917 or MI-2918 kits. Dim: 2½" H x 7.0" W x 5½" D.

Digital Depth Sounder with Thru-Hull Transducer. Kit MI-2916-1, Shpg. wt. 8 lbs. . . . . . . . . . . . **169.95**

Digital Depth Sounder with Transom-Mount Transducer. Kit MI-2916-2, Shpg. wt. 7 lbs., **159.95**

Digital Depth Sounder with Flush-Mount Transducer. Kit MI-2916-3, Shpg. wt. 8 lbs. . . . . . . . . . . . **179.95**

**MI-2916 SPECIFICATIONS:** Depth Ranges: 2.0' to 9.9' and 10' to 499'. Autoranging. Display: LCD with auto night light. Frequency: 200 kHz. Accuracy: ±.5% +1 count. External Control: Off-On switch. Alarm Settings: 2', 4', 10', 20', 40'. Internal Controls: Keel offset, 0' to 7'. Operating Temperature Range: 32°F to 122°F (0° to 50°C). Power Requirement: 10 to 17.7 VDC. Average Current: 25 mA. (110 mA with night light). Alarm: Audible and Visual.

Thru-Hull Transducer.

Flush-Mount Transducer for sailboats.

Transom-Mount Transducer for higher speed boats.

# Order one of these Heathkit Digital Remotes for your MI-2916 for added safety

## Heathkit Digital Remote Readout Station

- Independent alarms and depth settings
- Same type of display and accurate calibrations as the MI-2916

Place the Digital Readout Remote unit in your boat's cabin, flying bridge, or any other location on board. It provides an additional depth reading station that audibly and visually warns you of unexpected changes in depth. A 25' cable carries power and depth sounder signals from the MI-2916 above to the remote for accurate depth readings and easy placement.

This remote has the depth display characteristics, alarm settings, keel offset control, and all weather construction as the MI-2916 described above. However, the alarm and depth settings on this remote can be set independently from the depth warning and keel settings on MI-2916. Measures 2½" H x 7.0" W x 5½" D.

Kit MI-2917, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **119.95**

## Flush-mount Digital Remote for Sailboats

- Works off the MI-2916
- Adjustable keel offset for safe sailing in shallows

Slip this rugged, water-tight, flush mount remote into your bulkhead, and it will warn you of unexpected changes in depth through all kinds of sailing weather. It works off the MI-2916 and features a red warning light that flashes when the depth gets below the preset MI-2916 warning levels. Like the MI-2917 remote at left, this unit has a backlighted LCD digital display for easy reading day or night, and has an independent, adjustable keel offset (up to 7'). The remote features a diecast zinc 5" bezel to match standard bulkhead instrument panels. Slips into 4⅛" hole. Dimensions: 5" diameter x 4½" D.

Kit MI-2918, Remote with visual warning only, Shpg. wt. 4 lbs. . . . . . . . . **149.95**

Kit MIA-2918-1, Audible warning alarm for MI-2918, Shpg. wt. 1 lb. . . . . . . **19.95**

# 1 Digital Weather Computer — the gift that gives complete weather information every day

*Great Gift Idea!*

- Get instant weather reports: Indoor/outdoor temperatures, wind speed/direction, barometric pressure, even the current time and date — all right at your fingertips
- Stores past and present weather statistics for your location

The only one of its kind, the Heathkit Digital Weather Computer uses a real microprocessor to give you instant, accurate past and present weather data. For professional weather watchers, farmers, boaters, campers, science teachers — for anyone who needs to know about the weather, the Electronic Weatherman can help you forecast future weather activity.

Easy to use: A compact boom assembly mounts on your TV antenna mast and relays weather data to the computerized console indoors. The ID-4001's transmitter unit, with windcups and weathervane, features special infra-red sensing devices that are far more sensitive and reliable than old-fashioned mechanical reed switches or wipers.

Beautiful styling: The Weather Computer has a handsome walnut-trim cabinet. You get large, bright digital readouts for temperatures in degrees Fahrenheit or degrees Celsius, for wind speed and direction in miles and kilometers per hour or in knots, for barometric pressure in inches of mercury or millibars, and for time and date. It even calculates the wind chill factor.

Memory stores data: The Weather Computer stores the high and low temperatures, the maximum and minimum barometric pressures, peak and average winds, plus the time and date that each occurred. It calculates the rate at which barometric pressure changes, so you are alerted to storm fronts. You can even connect your own external battery to maintain the memory in case of power failure.

Order the Heathkit Digital Weather Computer today, kit or assembled. And you'll have your own reliable weather reports at the touch of a button. For 120/240 VAC. 7.25" H x 16" W x 6" D (18.42 x 40.64 x 15.24 cm). Cable for Kit ID-4001 must be ordered separately (below), in the length you require. Assembled IDW-4001 includes 100 feet of cable.

Kit ID-4001, Shpg. wt. 15 lbs. . . . . . . . . . . . . **389.95**

Factory Assembled and Tested Digital Weather Computer. Includes 100 feet of 8-wire cable.

IDW-4001, Shpg. wt. 22 lbs. . . . . . . . . . . . . **539.95**

ID/IDW-4001 SPECIFICATIONS: Digital Clock/4-Year Calendar: Time Accuracy: Determined by accuracy of AC line. No cumulative error. Wind Vector Accuracy: 5 percent or better. Direction Display Accuracy: ±11.26 percent (in degrees). Thermometer: Temperature Range: −40 deg. F to 158 deg. F (−40 deg. C to 70 deg. C). Accuracy: ±2 deg. F (±1 deg. C). Barometer: Pressure Range: 28.00 to 32.00 in. Hg/inches of mercury (981.9 to 1050 millibars). Accuracy: ±0.075 in. Hg/inches of mercury, ±0.01 in. Hg/deg. C. Operating Temperatures: Outdoor Assemblies, −40 deg. F to 158 deg. F (−40 deg. C to 70 deg. C); Unit, 50 deg. F to 95 deg. F (10 deg. C to 35 deg. C).

> The Electronic Weatherman can be interfaced with the H-8 Computer. For full details, write Heath's Technical Correspondence Department.
> 8-Wire Cable for ID-4001, 1290, 1590: IDA-1290-1, 50', 2 lbs. 7.95; IDA-1290-2, 100', 4 lbs. 14.95; IDA-1290-3, 150', 6 lbs. 21.95

# 2 Budget-priced Weather Station for instant, current reports

Whenever you need instant, electronically accurate weather information, the Heathkit ID-1290 Weather Station keeps track of indoor and outdoor temperatures, barometric pressure, wind speed/direction.

The high-accuracy thermometer reads indoor or outdoor temperatures precisely, in two-degree increments from −40°F to 120°F (−40°C to 49°C). Keep on top of changing conditions — the precision barometer indicates movements as small as 0.02 inches of mercury. Read wind speed from 0 to 90 mph, with precision 16-point resolution of wind direction.

Use the ID-1290 as a handsome desk set, or hang horizontally or vertically. Remote transmitter (windcups, weather vane, sensor) clamps to any 1 or 1½" diameter TV antenna mast, connects to cabinet with required 8-wire cable (below, left). 120 VAC, 50/60 Hz. Dimensions: Wall Mount, 7" H x 20.5" W x 2" D; Desk Mount, 7" H x 20.5" W x 6.75" D.

Kit ID-1290, Shpg. wt. 8 lbs. . . . . . . . . . . . . **129.95**

ID-1290 SPECIFICATIONS: Wind Speed Accuracy: ±2 mph, 0-30 mph range; ±5 mph, 0-90 mph range. Indoor and Outdoor Temperature Accuracy: ±2°F (±1°C). Barometric Pressure Accuracy: ±0.05 inches of mercury.

# 3 Keep on top of wind conditions with our Digital Wind Indicator

Outstanding accuracy and an easy-to-read digital display makes our Digital Wind Speed/Direction Indicator a must for pilots, boaters — anyone whose activities are affected by the wind.

Choose two readout modes from the three available (mph, kph or knots). Switches select mode; front panel lights show which mode is in use.

Wind direction indicator lights mark the eight principal compass points for 16-point resolution.

Includes remote transmitter. 120 VAC, 50/60 Hz. Cabinet Dimensions, 2.5" H x 7" W x 5" D (6.35 x 17.78 x 12.7 cm). Requires 8-wire cable (below, left).

Kit ID-1590, Shpg. wt. 7 lbs. . . . . . . . . . . . . **79.95**

ID-1590 SPECIFICATIONS: Wind Speed: 0-99 in miles per hour, kilometers per hour or knots (choice of two). Response Threshold: 3 miles per hour. Accuracy: ±1 digit or ±10 percent, whichever is greater. Direction Response Threshold: Approximately 2 miles per hour. Operating Temperatures: Transmitter, −40°F to 120°F (−40°C to 49°C); Receiver, 0°F to 150°F (−18°C to 65°C).

# 4 Know the temperature instantly with Indoor/Outdoor Thermometer
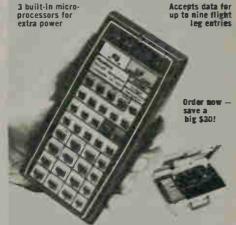
Monitor any two temperatures. Bright ½" high digital readout includes + and − signs, as well as indoor, outdoor indicator lights.

Select Fahrenheit or Celsius temperature readings, continuous readings of one temperature or alternate readings of both temperatures. The ID-1390 reads temperatures from −40 to 120°F (−40 to 50°C).

The 10' indoor, 75' outdoor cables, included with this easy-to-build kit, let you place sensors almost anywhere (freezer, basement, greenhouse). 120 VAC, 50/60 Hz. 2.5" H x 7" W x 5" D.

Kit ID-1390, Shpg. wt. 4 lbs. . . . . . . . . . . . . **6 .95**

ID-1390 SPECIFICATIONS: Temperature Accuracy: −30°F to 20°F, ±2°F; 20° to 120°F, ±1°F; −30°C to 15°C, ±2°C; 15°C to 50°C, ±1°C. Display: 2½-digit planar gas discharge with plus and minus signs.

# Save on Air Navigation Computer that helps make flying safer

3 built-in microprocessors for extra power

Accepts data for up to nine flight leg entries

Order now — save a big $30!

Save from Cat. 849 prices! To match its versatility, you would have to have an on-board computer! Accepts preflight data and vectors for up to 9 separate flight legs. Computes magnetic heading, ground speed, true air speed, time to next checkpoint, destination, and estimated time of arrival — all with single keystrokes. Computes inflight wind and updates ETAs in flight. Rechargeable batteries included. 1.75" H x 3.13" W x 6.38" D. Complies with FAA Advisory Circular No. 60-11.

Kit OC-1401, 3 lbs. Was $169.95, Now Only **139.95**

Save $75.00 on Assembled OC-1401.
OCW-1401, 4 lbs. Was $274.95, Now Only **199.95**

Save $5.00 on Custom Carrying Case Kit for OC-1401, accessories (inset above). Power supply recharges in 15 hours. Handy pocket for operating guide. 120 VAC. 3.13" H x 12.25" W x 8" D.
Kit OCA-1401-1, 5 lbs. Was $39.95, Now Only **34.95**

Save $20.00 on Assembled Custom Carrying Case.
OCW-1401-1, 5 lbs. . . . Was $74.95, Now Only **54.95**

Save on Leatherette Carrying Case for OC-1401.
OCA-1401-2, 1 lb. . . . . . Was $4.95, Now Only **3.95**

## Save $30 on high-accuracy, rugged Aircraft Clock/Timer

Save from Cat. 849 prices. GMT/Zulu time on upper display; local time, 24 min./24 hr trip timer, alarm for low fuel/checkpoint notification on lower display. 14/28 VDC. Fits std. 3⅛" panel mount. Kit must be returned for DMIR inspection before installation.
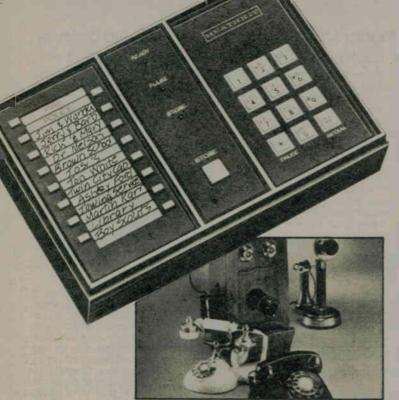
Kit OI-1154, 3 lbs. . . . Was $129.95, Now Only **99.95**

## Strobe Light/Beacon for added safety

Use as anti-collision beacon, replace std. 3¾" rotating beacon. Operates from 12 VDC neg. gnd. supply, draws 1.5 amps. Meets FAA Reg. 23.-1401. Kit must be returned for FAA/PMA certification before installation.

Kit OL-1155, Shpg. wt. 3 lbs. . . . . . . . . . . . **89.95**

## Respond fast in an emergency when speed counts with the Heathkit One-Button Phone Dialer

**$89<sup>95</sup>**

- Microprocessor-based unit stores up to 16 numbers
- Converts standard dial telephone to push-button model
- Can be used with push-button telephones, too!
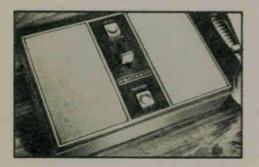
**A fire or other emergency** is no time to be looking for the fire department or police phone number. The Heathkit One-Button Phone Dialer comes to the rescue by dialing a vital number with the push of one button. And if the number is busy, the automatic re-dial feature lets you call the last number dialed with the push of a button. The One-Button Phone Dialer stores up to 16 full 15-digit phone numbers (enough for all access or area codes). So you can program emergency numbers and still have memory enough for numbers of frequently-called neighbors, businesses, friends and relatives.

**Easy programming** lets you change telephone numbers on your Dialer quickly. A special memory-save circuit maintains stored numbers if your electrical power should be interrupted (9V battery not included). The GT-1217 One-Button Phone Dialer converts any telephone into a push-button model compatible with both standard and Touch Tone® telephone service. Connection to any modular phone jack is easy, too. However, it cannot be used on party lines or pay telephones. The GT-1217 complies with all FCC interconnect regulations.

**Assembly is easy,** and so is operation and programming. Housed in an attractive 2" H x 8¾" W x 5¾" D case, the One-Button Phone Dialer features a convenient two-color, heavy-duty label that allows you to write in the numbers you have programmed. Want to change numbers? The label is easily eraseable. Designed for 120 VAC operation, this Dialer uses a low, low 2 watts of power.

**The famous Heathkit assembly manual** will guide you step-by-step from opening your package when it arrives to final plug-in. Even if you've never built anything before, you'll enjoy putting the One-Button Phone Dialer together.

**Kit GT-1217,** Shpg. wt. 3 lbs. ................................... **89.95**

## Talk or listen with both hands free when you build the Telephone Amp

**$44<sup>95</sup>**

- Talk without lifting the receiver
- Talk from up to 10 feet away

Save time! Work with your hands while you talk on the phone when you build the Heathkit Telephone Amplifier. To answer the phone, simply press the Power Button; to hang up, just press it again. A voice-activated switch changes instantly from talk to listen. Talk from up to 10 feet away from the phone. The Heathkit Telephone Amplifier requires an external phone for operation. It comes complete with ¼" diameter phone plug, 1¾" square four-pin phone plug and 6' of 4-conductor cable for easy installation. The Telephone Amplifier operates on one 9V battery (not included). This attractively styled unit measures 2½" H x 8½" W x 5¾" D.

**Kit GD-1112,** Shpg. wt. 3 lbs. ............. **44.95**
**Kit PS-2350,** 120 VAC Converter, 1 lb. ....... **4.95**
**Kit PS-2450,** 240 VAC Converter, 1 lb. ....... **14.95**
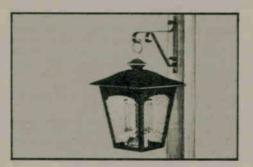
Customer-owned equipment connected to telephone lines may be subject to local tariff.

## This all-purpose Digital Thermometer gives super accurate temperatures

**$44<sup>95</sup>**

- High accuracy for medical use
- Get readings in just 10 seconds

Get fast, accurate temperatures for medical uses, photo processing, baby's bath and many other applications. The Digital Thermometer reads temperatures from +32° F to +230° F (0° C to +110° C) with ±0.2° F (±1° C) accuracy in the biomedical range and 0.5% accuracy overall. And it never needs calibration! Solid-state microprocessor technology gives you accurate, four-digit readings in as little as 10 seconds. This digital marvel weighs a mere 5½ ounces and fits comfortably in your hand for maximum versatility. A shock-resistant high-impact plastic case protects it from damage. Operates from one 9-volt battery (not included) for up to one year under normal use conditions. Features a flashing decimal low battery warning. Fully assembled, not a kit. The Digital Thermometer measures 2" H x 2½" W x 5" L. Resolution, 0.1° F or 0.1° C. Get your Digital Thermometer now.

**GD-1226,** Shpg. wt. 2 lbs. ............... **44.95**

## Keep the bugs from bugging you with the Electronic Flying Insect Killer

**$69<sup>95</sup>**

- Features a self-cleaning grid
- Protects up to ⅓ acre

The Heathkit Electronic Flying Insect Killer mounts anywhere outdoors, and looks handsome anywhere near pool, porch or patio. The ten-watt black light attracts flying insects to its electronically charged self-cleaning grid, where they are instantly and safely disposed of. The protective outer screen insures that hands will not accidentally touch the grid. The attractive flat black and brass-colored housing is corrosion-proof. The Electronic Flying Insect Killer operates for just pennies a day. So enjoy the great outdoors this year when you build the Heathkit Electronic Flying Insect Killer. For 120 VAC, this easy-to-build kit measures 16" H x 11" W x 11" D. And the famous Heathkit instruction manual will guide you every step of the way, assuring you of success even if it's your first kit. Order yours today and enjoy the outdoors more.

**Kit GD-2007,** Shpg. wt. 11 lbs. ............. **69.95**
**GDA-2007-1,** Mounting Bracket, Wt. 2 lbs. .... **3.95**

Credit Card Orders call TOLL-FREE: 800-253-0570.

## Zenith® AC/DC Portable Radio for AM/FM listening

**NEW** $37⁹⁵

- Assembled radio features excellent FM reception
- AGC on AM and FM smooths out signal variations
- Quality 3.5" speaker, tone control for rich, full sound — even outdoors
- AC or DC operation

Designed to provide years of dependable listening enjoyment, the Zenith Model R-70 Table Radio features solid-state design for low energy usage. 10 tuned circuits, 2 ceramic filters for excellent performance. Shadow Taupe/Black cabinet with bright aluminum chrome trim. Uses 120 VAC or 3 "C" cell batteries (not included). Dimensions, 5.75" H x 9" W x 2.75" D (14 6 x 22.9 x 7.0 cm).

GRZ-70, Factory assembled and tested, Shpg. wt. 4 lbs. . . . . . . . . . . . . .37.95

## Assembled, rich-sounding Zenith AM/FM Table Radio

**NEW**

$74⁹⁵

- Bass Booster tuned port enhances bass reproduction
- 5.25" speaker w/ 9-oz. magnet for full sound — or use your own speaker

Tuned RF stage, AFC, AGC, external antenna connection for great reception. Lighted, easy-to-see convex tuning dial. Slide bass, treble controls. Simulated Walnut cabinet, black grille. 120 VAC. 9.5" H x 16" W x 6.5" D.

GRZ-430, Factory assembled and tested, Shpg. wt. 14 lbs. . . . . . . . . . . . . .74.95

## Zenith Multi-band Radio keeps you in touch

**NEW** $99⁹⁵
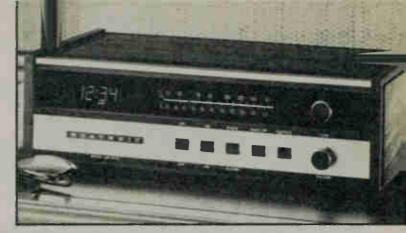
- Factory Assembled and Tested
- Covers AM, FM, Low/High/ UHF PSB, Aircraft bands
- AGC on AM, AFC on FM, Squelch for PSBs and Air
- AC or DC operation for true portability, versatility

Stay in touch with police, fire, aircraft — just about everything in town. Covers 30-50, 108-135, 144-174 and 450-470 mHz, as well as AM and FM. High-impact black cabinet. Includes convenient carrying strap. 8.88" H x 11.88" W x 3.88" D. Operates on 120 VAC or 4 "D" cells (not included).
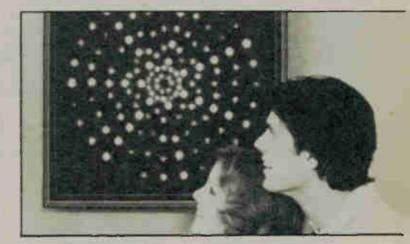
SWZ-1000, Factory assembled and tested, Shpg. wt. 6 lbs. . . . . . . . . . . . . .99.95

## Digital Alarm Clock Radio with rich AM/FM sound

- Stay on-time — even if your electrical power fails — thanks to the built-in fail-safe circuit
- Catnap with the 7-minute alarm delay button

Loaded with convenient features: 24-hour set-and-forget alarm, built-in 3" x 5" oval speaker for truly fine sound, and a style that fits anywhere. The GR-1075 displays time in the convenient 12-hour format. Shows AM and PM, too. A lighted decimal pulsates to indicate seconds, and also shows that the alarm is properly set The 24-hour alarm cycle can wake you with a gentle, pulsating electronic beep — or with soft music from the AM or FM radio station of your choice. High-quality electronics, along with 300 $\mu$V/M AM and 5 $\mu$V FM sensitivities, make sure you'll pull in a large selection of stations, day or night And for the sleepyhead, the clock's 7-minute alarm delay cycle will give you up to an hour of relaxing catnaps. Two 9-volt batteries (not included) take over during power failures and keep the clock counting perfect time. For 120/240 VAC, 50/60 Hz Dimensions, 4.5" H x 13.63" W x 8.13" D (11.43 x 34.62 x 20.65 cm).

Kit GR-1075, Shpg. wt. 10 lbs . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .149.95

## Musical Light Show adds to your sound system

- 140 lights pulsate in time with the music — every tune different!
- Bach to rock — your records and tapes never said so much before

The Heathkit Light Show adds exciting sights to your sound system. Just connect it to the speaker leads of any sound source (except AM radio). Without affecting the sound, active filters separate the audio signal into four frequency bands, each with 35 brilliantly colored lights — red for bass, blue for lower midrange, green for upper midrange and amber for treble (140 lights total). It's wild — the lights pulsate in time to the music, creating spokes of swirling color. Add new color and dimension to your sound system today. Buy the Heathkit Light Show. Operates on 120/240 VAC. Input is 1 volt RMS min. to 22 volts max. Line isolation provides protection. Dimensions, 22.75" H x 22.75" W x 4.5" D.

Kit TD-1006, Shpg. wt. 34 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .109.95

## Start enjoying clean, fresh air this Holiday season with our improved Electronic Air Cleaner

**NEW**

## Electronic Air Cleaner installs in any furnace for fresher air

### $189⁹⁵

- Automatic — works with your heating/air conditioning system
- Installs without changing ductwork

### $229⁹⁵

👆 **FAST, EASY 1-EVENING KIT**

*Great Gift Idea!*

- Now quieter than ever before
- Easier kit assembly
- Works for just pennies a day, helps cut home cleaning costs
- Portable — use in any room, up to 25' x 30', where you need clean air!

The new Heathkit GD-1297 Electronic Air Cleaner is the ideal way to keep your air fresh and clean, all year long — even in today's tighter, better-insulated living spaces. Cleaner air reduces the need for cleaning, painting and redecorating caused by air-borne pollution that stains and soils your home.

We've improved this popular product for better performance. A new squirrel cage fan lets you enjoy peace and quiet. Three speeds deliver enough air flow to quick-clean a room (250 cubic feet per minute), or as little as 100 cfm to maintain a constant supply of fresh air. Removable charcoal filter permits periodic replacement (see below). Electrostatic filter cleans easily in the dishwasher.

Simplified kit assembly features pre-built filter construction. And there's still no soldering! 120 VAC, 60 Hz. 26.5" H x 17.25" W x 13.5" D.
Kit GD-1297, Shpg wt 59 lbs . . . . . . . . . . . .**229.95**
GDA-1297-1, 4 Deluxe Casters, Shpg. wt. 2 lbs., **12.95**
LAST CALL on Casters for GD-1247 Cleaner. Not for GD-1297. GDA-1247-1, 1 lb. . . . . . . . . . . . . . . . .**8.95**
Replacement Charcoal Filter fits GD-1297 and GD-1247 Cleaners. GDA-1297-2, Shpg. wt. 2 lbs , **5.95**

Breathe clean, fresh air again. Removable filter is easy to clean; pads are a snap to replace. Installs on standard systems directly in place of present filters, usually without altering ductwork. For 2-zone homes, two filters may be used with single power supply. 120 VAC, 60 Hz. Power Supply Dimensions: 8" H x 12" W x 4" D (20.32 x 30.48 x 10.16 cm). Shpg. wt , 24 lbs each. NOTE: Installation may require service by qualified electrician. Check local building codes. Kits differ in filter panel size. Check filter size capacity before ordering.
Kit GD-1196-1, 20" x 25" x 2", 1000 cfm . . . .**189.95**
Kit GD-1196-2, 20" x 20" x 2", 800 cfm . . . . .**189.95**
Kit GD-1196-3, 16" x 25" x 2", 800 cfm . . . . .**189.95**
Kit GD-1196-4, 16" x 20" x 2", 640 cfm . . . . .**189.95**
Extra Filters: Use order nos. above, with GDA prefix e., GDA-1196-1, 20" x 25" x 2", Filter Only), Avg. Shpg. wt 11 lbs . . . . . . . . . . . . . . . . . . . .**each 99.95**
Accessory Air Flow Switch allows air to flow to automatically start cleaner. Required w, 24 VAC systems. For 120 VAC. Kit GDA-1196-5, 2 lbs. . . . . . . . . .**24.95**

## The Robertshaw Convertible Automatic Set-Back Thermostat works for you, not against you!

### $49⁹⁵

- Pays for itself in no time — helps you save up to 20% on heating and cooling bills
- Automatically adjusts temperature to fit your schedule
- Installs easily on most 24 VAC home heating systems

It makes good sense to replace your perfectly good thermostat with the new, assembled Robertshaw Convertible Automatic Set-Back Thermostat. Once set, it never wastes heating or cooling at night when sleeping, or while you're away. Automatically increases when you need it. Choose 1 or 2 energy-saving periods in a 24-hour time span. Self-charging, battery-powered timing device changes temperature from 1 to 10 degrees F at times you select. Uses same wiring as your old thermostat. Easy installation on 4 or 5-wire 24 VAC furnace control systems. Not for heat pumps. 3 38" H x 5.5" W x 2.13" D.
GDP-1369, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**49.95**

## Programmable Setback Thermostat can help save up to ⅕ on your home heating bill

### $39⁹⁵

- A low-cost way to keep winter fuel costs down
- Setback feature automatically reduces room temperature up to twice per day

✌️ **FAST, EASY 2-EVENING KIT**

The Heathkit GD-1776 Setback Thermostat automatically reduces room temperature during one or two pre-programmed periods each day. Temperature setback feature is adjustable, up to more than 10 degrees F, for periods of ½ hour minimum to 23½ hours maximum. When each setback period ends, temperature is automatically increased to normal levels. And the GD-1776's Econ/Normal switch can override the timer. For 120 VAC. NOTE: For use only with single-stage 24 VAC heating systems. Some installations may require service by a licensed electrician. Check local building codes.
Kit GD-1776, Shpg. wt. 5 lbs . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**39.95**

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Our best Pro-quality Ignition Analyzer helps you perform precision tune-ups

## $479⁹⁵

- Measures RPMs, dwell, voltage — performs ignition advance tests with optional timing light/advance meter

Provides the most asked-for features in an ignition analyzer of this quality. Rock-steady parade patterns are made possible by the latest design in inductive pickup circuitry and switch selection of cylinders — 4, 6 or 8. Dwell, RPM and voltage measurements are indicated on the big eight-inch meter.

Has two voltage ranges — 0-2V for corroded connections and point measurements, and 0-20V for battery condition and general distribution checks.

Cylinder buttons can be pushed in multiple numbers, so that banks of cylinders can be shorted out for carburetor balance and for display of one or more cylinders. Both parade and superimpose displays of primary or secondary waveforms, at two different amplitudes, are available on the 12" diagonal CRT.

High-temperature, oil and gas-resistant neoprene cables provide easy, positive connections to engine.

Assembly, operation are simple matters. For use with 4, 6 and 8-cylinder (4-cycle), or 2-rotor Wankel engines and standard, transistorized or C-D ignitions. Includes adapter for GM HEI Systems.

Kit CO-2600, Shpg. wt. 83 lbs. . . . . . . . . . . .479.95

Timing Light/Advance Meter. Plugs directly into CO-2600 Analyzer, provides a bright flash that can be seen — even in daylight. Built-in advance meter measures distributor advance to 60 degrees from 1500 to 4500 rpm. All cables included.

Kit COA-2600-4, Shpg. wt. 3 lbs. . . . . . . . . . .54.95

Alternator Test Adaptor for CO-2600 Analyzer.
COA-2600-2. Shpg. wt. 1 lb. . . . . . . . . . . . . .12.95

### Deluxe Scope Cart
Keeps CO-2600 at ideal viewing angle for easy readings. Rolls from place to place on casters.
COA-2600-3. 25 lbs. . . . .44.95

CO-2600 SPECIFICATIONS: For Use With: Standard, transistorized or capacitive-discharge ignition systems; 4, 6 or 8-cylinder, or 2-rotor Wankel engines. Signal Pickup: Direct for primary, inductive for parade trigger and capacitive for secondary. Tachometer Ranges: 1000, 3000, 6000 revolutions per minute (rpm). Voltmeter Ranges: 2, 20 VDC. Tachometer/Voltmeter Accuracy: ±3% of full scale on any range. Scope Vertical Expansion: Min. 2/1. Operating Temperature Range: 32-104 degrees F (0-40 degrees C). Power Requirement: 120/240 VAC. 50/60 Hz. Dimensions: 12.88" H x 25.25" W x 14.13" D (32.72 x 64.14 x 35.89 cm).

# Make tune-ups a snap with our budget-priced Ignition Analyzer

## $189⁹⁵

- Use on three, four, six or eight-cylinder engines
- Easier to use than meter analyzers
- Built-in tachometer for convenient measurements

Detects shorted plugs, bad points, defective wiring, worn distributor parts, incorrect dwell angle, coil/condenser defects and transistor/capacitive-discharge circuit problems. Select one of four different patterns — primary or secondary, in parade or superimposed displays. For detailed analysis, the horizontal sweep can be expanded 10 to 1, vertical sweep 2 to 1.

Use with any standard, transistorized, C-D ignition on 3, 4, 6, 8-cyl. engines w/distributors. Includes adapter for use with GM HEI Systems. Handbook illustrates typical engine waveforms. 120/240 VAC. 7" H x 10.5" W x 17.5" D.

Kit CO-1015, Shpg. wt. 22 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .189.95

12-Volt Inverter lets you operate CO-1015 from your car's 12 VDC lighter socket.
Kit COA-1015-1, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .34.95

CO-1015 SPECIFICATIONS: For Use With: 3, 4, 6 or 8-cyl. engines. Tachometer Ranges: 0-1000, 0-5000 rpm. Tachometer Accuracy: +5% of full scale. Cables: 12' pick-up cable; ground, primary, secondary leads extend additional 2'.

## 15-Amp Automatic Battery Charger revives dead batteries fast

50-amp boost quickly charges dead batteries. Front panel meter indicates charge rate current and full charge, or if boost charge is required. Turns off at full charge. Complete protection prevents damage to charger or battery. For use on 12 VDC, positive or negative ground batteries. Includes all cables. 120 VAC, 60 Hz. 6.13" H x 11.5" W x 7.75" D.

Kit GP-1044, Shpg. wt. 22 lbs. . . . . . .79.95

## Save $5.00 on Heathkit 10-Amp Automatic Battery Charger

Charges 12-volt batteries at a 10-amp rate, turns off automatically when battery is fully charged. Front panel meter monitors indicate rate of charge and full charge. Easy to use — just connect battery cables (included) to your car's battery terminals, plug charger into AC outlet. Safety circuit prevents sparking until proper hookup. For 12 VDC batteries. 120 VAC, 60 Hz. 5.5" H x 9" W x 6.38" D.

Kit GP-21, Shpg. wt. 13 lbs . . . . . . . . . . . . . . . Was $54.95, NOW ONLY 49.95

Credit Card Orders Call TOLL-FREE: 800-253-0570

## Heath/Dana Speed Control increases driving comfort, reduces fatigue on long car trips

$**89**95

- Maintains preset speed on uphill, downhill, and curves
- Save: Install it yourself with Heathkit instructions!

Accelerate car to desired speed, set the control, and the CS-2048 keeps car at preset speed. Tap the brake pedal, and the CS-2048 momentarily disengages for passing or slowing down. Then it returns to preset speed. For vehicles with manual and automatic transmissions. Includes our step-by-step instructions.

Kit CS-2048, Shpg. wt. 6 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **89.95**

CSA-2048-1. For front-wheel-drive cars not listed below or replacement parts. Kit contains magnet pair, adhesive and filament tape, plus instructions for installation and parts replacement. Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . **6.95**

CSA-2048-2. For '73-'75 Honda Civic, '75-'80 Honda CVCC or '77-'80 Honda Accord. Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **15.95**

CSA-2048-3. For '75-'80 Toyota Corollas. Shpg. wt. 2 lbs. . . . . . . . . . . . . . **15.95**

CSA-2048-4. For '73-'80 Toyota Corona, Celica, Crown, and Mark II, '75-'78 Toyota Pickup; '75-'77 Datsun 610/710, '77-'80 Datsun 810, '75-'80 Datsun 280-Z, ZX. Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **5.95**

CSA-2048-5. For the following fuel-injected cars: '76-'80 Volkswagen Rabbit, Dasher, Scirocco; '76-'80 Audi Fox. Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . **15.95**

CSA-2048-6. For '75-'80 Datsun B-210, '77-'80 Datsun F-10/310. Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **15.95**



**IMPORTANT NOTE:** Installing the CS-2048 requires some mechanical proficiency. If you are uncertain of your abilities, you may wish to employ a qualified auto mechanic to install the CS-2048.

Vacuum Servo attaches to throttle

Electronic control

## Low-cost Siren/PA system for emergency vehicles

Here's a budget priced, but reliable Siren and Public Address system for your community's volunteer emergency unit or rescue squad. It features a 55 watt siren with automatic or manual wail to accommodate different traffic situations in your community. A 20 watt Public Address system amplifies your voice for emergency public announcements and your radio calls for times when you're away from your vehicle. Push button low-noise microphone ensures clear voice reproduction.

Gimbal mount makes the GD-18 easy to install. Solid-state circuitry with temperature and voltage compensated stage provides years of reliable service. The GD-18 can be used with positive or negative ground vehicles.

The GD-18 can be fitted with two kinds of horns: an exterior horn for your marked vehicles, and a concealed horn that hides behind your vehicle's grille. Concealed horn requires 4½" H x 4½" W x 13" D clearance. Note: please check standards for mobile sirens in your area.

Kit GD-18, Shpg. wt. 6 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **74.95**
WD-5130, Siren/PA amp, assembled, Shpg. wt. 6 lbs. . . . . . . . . . . . . . . . **129.95**
GDA-18-1, Exterior horn, assembled, Shpg. wt. 10 lbs. . . . . . . . . . . . . . . . **89.95**
Kit GDA-18-2, Concealed horn, Shpg. wt. 10 lbs. . . . . . . . . . . . . . . . . . . . **89.95**
WDA-5130-2, Concealed horn, assembled, Shpg. wt. 10 lbs. . . . . . . . . . . . **109.95**



Concealed grille horn

Exterior mount horn

**SAVE $20**00

On these Siren/PA systems! If purchased separately, $164.90
GD-18A (Kit GD-18 and Exterior horn) Shpg. wt. 21 lbs. 144.90
GD-18B (Kit GD-18 and Concealed horn) Shpg. wt. 21 lbs. 144.90

## Exhaust Analyzer checks fuel efficiency
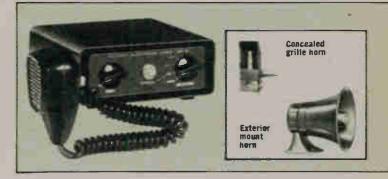


Now you can squeeze more power and performance out of every drop of gasoline you buy with the CI-1080 Exhaust Analyzer. By analyzing your car's exhaust, the CI-1080 measures air-to-fuel ratio and combustion efficiency. An easy-to-read meter on the CI-1080 tells you instantly whether your car's air-to-fuel ratio is unnecessarily too rich or too lean.

Besides measuring your car's air-to-fuel ratio and combustion efficiency, the meter also indicates the percentage of carbon monoxide in your exhaust. This percentage gives you a relative figure you can use to compare your exhaust emissions with the manufacturer's specifications and the EPA clean air standards of your state.

The CI-1080 is housed in a rugged, plastic case with foldaway handle for easy storage. The kit includes all necessary cables, tubing, and complete instructions for assembly and use.

Kit CI-1080, Shpg. wt. 6 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **89.95**


Alaska, Hawaii and Michigan Residents: Call 616-982-3411

## Ignition unit gives quicker starts in cold weather

Save wear and tear on your starter motor, battery, and nerves this winter with the CP-1060 Capacitive Discharge Ignition. It gives you faster starts in colder weather because your plugs get a stronger spark. Special solid-state circuits provide more voltage to heat and ignite your air-fuel mixture on cold, wet mornings.



Besides giving you faster starts in cold weather, the CP-1060 helps your car's engine burn its fuel more efficiently. By increasing the voltage to the plugs, more of the air-fuel mixture explodes in the cylinder — giving you added power and better acceleration.
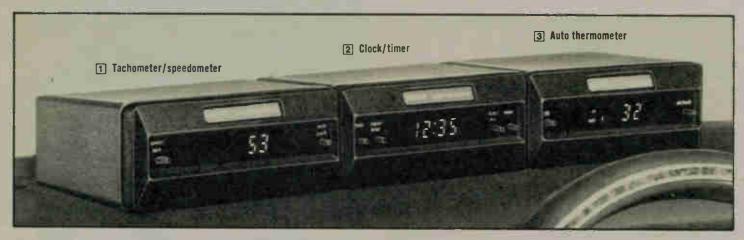
The CP-1060 also lets you drive more miles on a set of points. When connected to your ignition system, the CP-1060 relieves the points of heavy current demands, reducing high-current oxidation and pitting of point surfaces. Your points last longer — saving you point replacement costs, tune-up time, and money.

The CP-1060 is designed for conventional distributor ignition systems. It comes with our famous step-by-step instructions for assembly and installation.

Kit CP-1060, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **44.95**

1 Tachometer/speedometer    2 Clock/timer    3 Auto thermometer

# 1 Digital Speedometer/Tachometer gives you accurate speed and engine RPM instantly

More accurate than conventional speedometers, the CI-1265 constantly shows your car's speed up to 199 mph or kph. It's so sensitive, the CI-1265 records speed changes as little as 1 mph!

And you'll detect those changes day or night on the CI-1265's bright, easy-to-read, illuminated digital display. You'll appreciate your CI-1265 when you travel on roads outside the U.S. With a push of a button, it automatically converts from mph to kilometers per hour — so you can relax and not worry about speeding tickets or radar traps. Push another switch, and the CI-1265 becomes a tachometer. RPMs register in variations of 100, so you can immediately tell if your engine is purring smoothly.

The CI-1265 measures 1¹³⁄₁₆" H x 4¹¹⁄₁₆" W x 3⅛" D. It's made for 4, 6, or 8 cylinder, 4 cycle engines with spark ignitions (12 VDC neg. ground). Includes hardware and mounting brackets. Front-wheel-drive cars require CSA-2048-1 adaptor kit below.
Kit CI-1265-1, for cars without CS-2048 Cruise Control, Shpg. wt. 3 lbs. . . . 59.95
Kit CI-1265-2, for cars with CS-2048 Cruise Control, Shpg. wt. 3 lbs. . . . . . 49.95
Kit CSA-2048-1, Adaptor Kit for front-wheel-drive cars, 1 lb. . . . . . . . . . . . 6.95

# 2 Dependable Heathkit Digital Clock/Timer tells you the time with quartz precision

Now you can install a reliable clock, the GC-1415 Clock/Timer, in your car, boat, camper, or motorcycle (12 VDC, neg. gnd.—not approved for aircraft).

Automatic dimmer controls the brightness of easy-to-read clock face. It illuminates when you turn on the ignition, but fades off when your vehicle isn't running — conserving your battery power. Of course, the quartz crystal continues to vibrate, giving the correct time every time you start your car or boat.

The GC-1415 also has a timer, a real navigational aid on long trips by land or water. The timer acts like a stopwatch: it keeps track of hours and minutes up to 24 hours, or minutes and seconds up to 10 minutes. You can switch back and forth from clock to timer and hold either one without affecting clock's or timer's accuracy. Unit measures 1.8" H x 4.71" W x 3.12" D., compact enough to slip into or mount on many dashboards. Easy-to-follow manual instructions makes this unit fun to build and install in your car, boat, motorcycle, or recreational vehicle.
Kit GC-1415, Digital clock with timer, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . 39.95
Save 16% on Digital Clock without timer.
Kit GC-1406, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . Was $29.95, Now 24.95

# 3 Save $20 on Inside/Outside Auto Thermometer for monitoring inside and outside temperatures

Here's a nice device to have on hand in your car, motor home, camper, van, R-V, or boat. It measures temperatures from −20 deg. F to +140 deg. F, and −30 deg. C to +60 deg. C. Accuracy: ±3 deg., thanks to integrated chips in sensors and a dual-slope analog-to-digital converter in the unit.

Gives you control of inside climate — inside sensor keeps track of interior temperature, permitting you to adjust car's heat and air-conditioning units to insure driver and passenger comfort. Automatic dimmer switch for digital display tunes the fluorescent readout to changing light conditions.

Tells you what to expect outside — exterior sensor can alert you to freezing weather on long trips, warning you of possible hazardous road conditions such as freezing water on pavement. Fishermen note: because the sensors are submersible, they can be attached below boat's water line to read lake or river temperature.

Kit includes: Inside and outside sensors with 9½' cable for easy placement. Also contains sticky tape and gimbal mounting bracket to ease installation. Thermometer is designed with solid-state technology for long life, and years of trouble-free service.

Unit makes an ideal gift for families who take long trips, or the fisherman in the family. It's easy to build with our step-by-step instructions.

Mounts just about anywhere in car or boat. Fits on any dash — measures 3.12" H x 4.71" W x 3.12" D.
Kit CI-1525, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . Was $79.95, Now 59.95



$17 95 Kit

Delays wipers up to
30 seconds

# Heathkit Windshield Wiper Delay makes driving safer on hazardous drizzly, rainy days
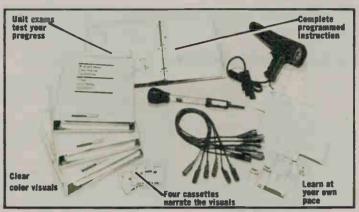
Wiper delay ends wiper switch fumbling on light misty days and helps keep your attention on the road. Solid-state circuitry lets you time wiper sweeps up to 30 seconds to handle drizzle and road spray from passing traffic. You can also set the delay to shorten sweep intervals down to .5 second for heavy snow and downpours.

Fits most single and 2-speed electric wiper systems on GMs, AMCs, Fords (except '72-'76 Montegos & Torinos, '74-'76 Cougars) and Chryslers (except those with motor reversing parking systems). Auto wiring diagrams must be obtained from car manual or through local car dealership.
Kit CH-1068, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 17.95

Credit Card Orders call TOLL-FREE: 800-253-0570

# Auto Electrical Systems and Ignition/Tune-up Programs can pay for themselves

Use these Programs to prepare for the National Institute for Automotive Servicing Excellence (N.I.A.S.E.) professional exams, or just to keep your car out of expensive repair shops. Not only could one repair job save you more than the cost of the Programs, but you'll also save money with a car that performs better — that's an important consideration in these times of high fuel costs. Our proven audio-visual techniques make learning easier and more interesting than ever. Optional experiments give you hands-on experience so you really learn how to make the actual repairs.

Unit exams test your progress

Complete programmed instruction

Clear color visuals

Four cassettes narrate the visuals

Learn at your own pace



Unit tests check your progress

Two cassette tapes narrate the visuals

Programmed instruction speeds learning

Shop projects let you practice on your own car

Two sturdy vinyl binders

Set of ignition test components

## Teaches you to repair today's complex automobile electrical systems

**WINNER**
Highest award of the Society for Technical Communications

## $79⁹⁵

- Prepares you for the NIASE Electrical Exam
- Learning is easier and more effective because you see and hear each step
- Four audio cassettes, programmed-instruction and experiments aid your learning

The **Automotive Electrical Systems Self-Instruction Program** is professionally designed and carefully organized for fast, efficient learning. You can move at your own pace, as fast or slowly as you choose. You'll learn:
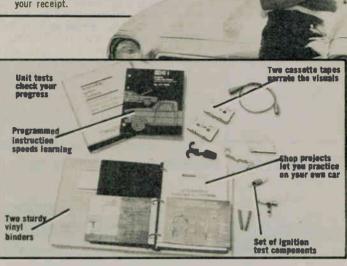
1. Basic Automotive Electrical Principles, including batteries, positive and negative charges, Ohm's Law, series and parallel circuits, and use of a VOM to measure voltage, current and resistance.

2. Automotive Starting System — how motors work, how to correct common starting problems, starter relay, solenoid and motor testing, voltage drop on starter motor, how to locate opens, shorts.

3. Automotive Charging System and operation of components such as voltage regulator and alternator, how to energize alternator field, test voltage regulator, and use an engine analyzer like the CM-1050 on page 17.

4. Accessory and Body Electrical Circuits that power the lights and accessories such as seat belt system, and instrument panel, determine if system can handle another accessory, and use wiring diagrams.

**Upon completing** the Automotive Electrical Systems Program, you'll have the knowledge, experience and confidence to correct almost any auto electrical problem that arises. You'll have the know-how you need to avoid repairs.

When you pass the optional final exam with a 70% or better score, you will earn 4.0 Continuing Education Units (CEUs) and a Certificate of Achievement. The Auto Electrical Program includes text, binders, four audio cassettes, clip leads, electrical components for optional experiments, and a professional hydrometer.
EAC-1, Shpg. wt. 23 lbs. ............................................79.95

NOTE: The programs on these two pages prepare you to pass the respective National Institute for Automotive Servicing Excellence professional auto mechanic certification exams. For more information on the exams, contact NIASE, 1825 K Street NW, Washington, OC 20006.

## Learn professional auto tune-up, even pass your NIASE exam with Ignition and Tune-up Program

## $79⁹⁵

- The most in-depth study available on GM, Ford and Chrysler electronic ignitions
- Have the fun and satisfaction of tuning it yourself
- Will more than pay for itself by freeing you from reliance on costly ignition tune-ups and repairs

The **EA-2000 Auto Ignition and Tune-up Program** uses audio-visual instruction and programmed learning for easy, enjoyable learning. The Program text and two cassettes are organized into eight units:

1. Ignition Fundamentals teaches four-stroke cycle, auto ignition system, dwell, timing.

2. Components covers coil and points, distributor, spark plugs, wires.

3. Instruments presents use of auto oscilloscope, tachometer timing light and dwell meter.

4. Tune-up covers a complete ignition tune-up and power balance.

5. GM Systems teaches you about General Motors ignitions.

6. Troubleshooting and tune-up of GM systems.

7. Ford and Chrysler Systems covers most ignitions for these two makers.

8. Troubleshooting and tune-up of Chrysler and Ford ignitions systems.

Score 70% on the optional final exam to earn 4.0 CEUs. Program includes jumper leads, ignition tester, universal coil adapter, spark plug adapter, ignition pliers, plug gauge/gapping tool, feeler gauge set, tune-up chart book, and 24" x 17" plug chart. Completion of shop projects requires engine analyzer like the CM-1050 on page 17, timing light like the CI-1096 on page 17, and ignition analyzer like the CO-2600 on page 18. Also useful is Instrument Package below.
EA-2000, Shpg. wt. 12 lbs. ...........................................79.95

High-quality **Small Accessory Auto Instruments**. Compression tester, vacuum pressure gauge and vacuum "T" fitting. EAC-2-1, 1 lb. ................14.95

Save $25.00 on your Ignition and Tune-up Program. Order it with the EAC-1 Auto Electrical Program (left) and EAC-2-1 Small Instruments (above). If purchased separately, $174.85.
EAS-2000, Shpg. wt. 32 lbs. ..........................................149.85

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

## Portable plug-in Fluorescent Light lets you get into cramped areas

**NEW**

Use in most any cramped area — attic, basement, car or anywhere else you can hang the trouble light from its swivel hook.

This assembled Trouble Light will provide plenty of light — even at night — so you can see your way through most any trouble. Just plug into any 120 VAC outlet — the long 25-foot line cord lets you get to most any hard-to-reach area. Costs less to operate, too — draws just 25 watts.
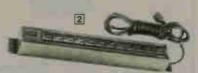
There's no walking back and forth to the wall to turn this light on — the starter switch is right in the handle. And the ballast box is part of the 3-conductor grounded wall plug assembly, so you don't have to drag ballast around.

With the Heathkit GDP-206 Fluorescent Trouble Light, you'll never have to be in the dark again. For 120 VAC. 26" L x 2.5" W x 2.5" D

GDP-206, Assembled, Shpg. wt. 4 lbs . . . . **19.95**

## Multi-Outlet Boxes eliminate messy extension cords



1 **NEW! Six-Socket Multiple Outlet Box** puts power where you need it. Has 6 three-hole outlets — five switched for killing power to equipment, one unswitched to leave clock running. Maximum 10 amp load. Includes fuse, fuse holder and 6-foot long cord. For 120 VAC.

Kit HD-1360, Shpg. wt. 2 lbs . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **12.95**

2 **Twelve-Socket Multiple Outlet Box.** Same as six-socket multiple outlet box described above, but has eleven switched outlets and one unswitched outlet to double your convenience while working in workshop or garage. With fuse, fuse holder and 12-foot long cord. For 120 VAC.

Kit HD-1274, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **17.95**

**Motor Speed Control** is ideal for any universal motor, rated 15 amps or less. Saves power, blades, bits. Use large drills on metal, at slow speeds, to keep motor cool. Not for use with Dremel tools. 120 VAC. 3.5" H x 3.25" x 6" D.

Kit GD-973A, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . **29.95**

## 3-D Binocular Magnifiers let you see sub-miniature objects

**NEW**

Save yourself from eye strain when kitbuilding, or when working with sub-miniature objects. The Heathkit GDP-201 Binocular Magnifiers provide close-up magnification, while leaving your hands free. These Binocular Magnifiers make objects appear two and a half times larger than normal. Focal distance is normally 8.5 inches (21.59 cm), but depends on user's vision. All parts American made. Ground glass lenses inserted in a durable plastic frame.

GDP-201, Assembled, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . **18.95**

## Heat-Controlled Solder Station for easier soldering



This Heath-recommended, transformer-powered Weller WTCPN Soldering Station has closed-loop control of the tip temperature. Also features heat shield, indicator lamp and sponge. Tip heats up to 700 deg. F (371 deg. C). Assembled.

GDP-1108, Shpg. wt. 5 lbs. . . . . . . **69.95**

Set of Replacement Tips for the Weller WTCPN Soldering Station (all rated at 700 deg. F — 371 deg. C). Set includes: $\frac{1}{16}$" screwdriver, $\frac{1}{8}$" screwdriver, $\frac{3}{16}$" screwdriver, $\frac{5}{64}$" long screwdriver and $\frac{1}{32}$" long conical tips.

GDP-1109, Shpg. wt. 1 lb. . . . . . . . **12.95**

## Three-Heat Soldering Iron Kit for kitbuilding versatility



Stand with metal case keeps the soldering iron secure. Three heat settings (high, medium and low) make the GH-17A Soldering Iron Kit ideal for most any electronic application. Soldering iron has 6-volt, 25-watt element — includes $\frac{3}{16}$" chisel tip. Six-foot long heavy-duty power cord. Grounded wall plug adds an extra measure of safety. For 120 VAC, 50/60 Hz. Draws only 24 watts maximum. Cabinet dimensions are 5.13" H x 3.56" W x 5.5" D (13.03 x 9.04 x 13.97 cm). Soldering iron, 8" L (20.32 cm).

Kit GH-17A, Shpg. wt. 5 lbs. . . . . . . . . . . . . . **39.95**

Credit Card Orders call TOLL-FREE: 800-253-0570

## Complete, quality Tool Set designed for the kitbuilder
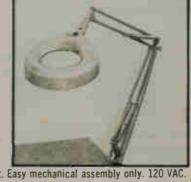
Just beginning your kitbuilding hobby? Here's a high quality Kitbuilder's Tool Set selected especially for your building enjoyment. You will receive a wire stripper/diagonal side cutter; small long-nose pliers; screwdriver; a Weller WP-25 soldering iron; nut driver; a soldering aid, and a generous supply of solder. The set comes packaged in its own, attractive carrying case with molded individual compartments for handy storage of each item. This top-line, Heath-recommended Tool Set is the ideal way to begin your kitbuilding hobby. It has everything you need to get started. Order yours today by phone for fastest delivery.

**GHP-1270, Shpg. wt. 3 lbs. . . . .34.95**

### Nut Driver Set — great building aid

Seven nut drivers in popular sizes for most kitbuilding projects: $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{11}{32}$", $\frac{7}{16}$", $\frac{1}{2}$".
**GDP-204, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .13.95**

[1] **PanaVise Circuit Board Holder.** Holds almost any size circuit board. Spring loaded for quick change. Tilts 220 degrees. Fits vacuum or standard base.
**GDP-1254, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .19.95**
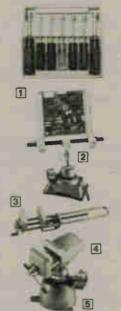
[2] **PanaVise Vacuum Base.** Attaches to any smooth, non-porous surface. Powerful rubber suction pad holds without marring. Perfect where permanent mounting is not practical. Height, $3\frac{3}{16}$". Base, 5" x $4\frac{1}{4}$". Use with GDP-1253, -1254, -1255.
**GDP-1252, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .19.95**

[3] **PanaVise Vertical Vise Head.** Holds bulkier items. Jaws open to $6\frac{1}{2}$". Pads replaceable.
**GDP-1255, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .15.95**

[4] **PanaVise Vertical Jaw Vise Head.** Nylon jaws open to $2\frac{1}{4}$" to provide a firm grip without marring.
**GDP-1253, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .16.95**

[5] **PanaVise Standard Height Base.** For permanent installation. Attaches securely to work surface with three lugs. Choose desired vise heads above.
**GDP-1251, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .13.95**

## This Illuminated Magnifier Kit makes kitbuilding easier

Easy-on-the-eyes fluorescent lighting and a 5" diameter 3 diopter lens combine to take the strain out of close work at your bench. The illuminated Magnifier clamps securely to any horizontal work surface. The extension arm is jointed for full 360° movement and a generous 45" reach for extra ease in adjusting the unit for awkward working angles. Bright, bright illumination is provided by an energy-stingy 22-watt T-9 Circline fluorescent tube (not included). The Heathkit Illuminated Magnifier is a must for the serious kitbuilder who takes real pride in his or her hobby, and wants to get maximum enjoyment. Easy mechanical assembly only. 120 VAC.
**Kit GDP-200, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . .69.95**

### Extension Lamp Kit for happy eyes

This bargain-priced kitbuilding aid will pinpoint bright illumination on your work area for greater ease and enjoyment. The convenient extension arm comes already assembled. All you do is attach socket, shade and cord. 34" reach, 360 degree sweep, vented shade, movable base clamp. Uses incandescent bulb (not included). Makes your kitbuilding easier.
**Kit GDP-202, Shpg. wt. 4 lbs. . . . . . . . . .24.95**

### Quality soldering irons for a "professional" kitbuilding job

[1] **Heath-recommended Weller 25-Watt Pencil Soldering Iron.** $\frac{1}{8}$" chisel tip. 860° heat.
**GDP-207, Shpg. wt. 1 lb. . . . . . . . . . . . . .13.95**

[2] **Solder/de-Solder Set.** Like above, but includes de-solder bulb for easy removal of components from circuit boards.
**GDP-1009, Shpg. wt. 1 lb. . . . . . . . . . . . . .17.95**

[3] **Wahl 25-W Pencil Iron for high-density boards.**
**GDP-1231, Shpg. wt. 1 lb. . . . . . . . . . . . . .7.95**

[4] **Heath-approved 40-W Iron.** Standard tip.
**GDP-1105, Shpg. wt. 1 lb. . . . . . . . . . . .7.95**

## Order a book along with your kit and learn more about the world of electronics

**Transistor Substitution Handbook.** Replacements for over 19,000 American and foreign bipolar transistors. Includes computer-selected and manufacturers-recommended replacements. Handy reference. 544 pages.
**EDP-175 . . . . . . . . . . . . . . . . . . . . . . . . . . . .5.95**

**The 555 Timer Applications Source Book.** Explains the 555 timer and 556 dual timer. Includes 17 simple experiments to give you a basic practical knowledge in using the 555 timer. Good source book. 160 pages.
**EDP-249 . . . . . . . . . . . . . . . . . . . . . . . . . . . .6.95**

**The TTL Data Book.** Design and specification data, pin outs, test data and applications of transistor-transistor logic. Indexes are designed for ease of circuit selection. Section on IC sockets and interconnection panels is handy reference for the design engineer. 832 pages. **EDP-220 . . . . . . . . . . . . . . . . . . . . .7.50**

**Electrical Soldering.** Excellent book for beginners and good review for technicians. Functions and requirements of soldering equipment for manufacturers. 144 pages. **EDP-178 . . . . . . . . . . . . . . . . . .3.95**

**Tube Substitution Handbook.** Lists 12,000 replacements for all types of American and foreign receiving, picture tubes. Tube basing diagrams. 112 pages.
**EDP-174 . . . . . . . . . . . . . . . . . . . . . . . . . . .3.95**

**TTL Cookbook.** What transistor-transistor logic is, how it works, how to use it. From basic to advanced designs, gate and timer circuits, clocked logic, JK and D-type flip-flops, etc. Practical applications such as digital counter, electronic stopwatch, voltmeter, tachometer. Includes projects. 336 pages.
**EDP-183 . . . . . . . . . . . . . . . . . . . . . . . . . . .8.95**

**Building and Installing Electronic Intrusion Alarms.** Written for both the novice installing his own system or for the technician planning to enter the lucrative field of security electronics. Includes electromechanical television, proximity alarms, telephone attachments, and auto protection alarms. 128 pages.
**EDP-135 . . . . . . . . . . . . . . . . . . . . . . . .4.50**

(See book-ordering information on page 52).

## Mini-speakers for big sound in small places



**$59.95 each**

Enjoy true high-fidelity sound in your home or car with space-saving LS-ONE 2-way speakers. These 8-ohm speakers feature a 4" long woofer, a 1" soft dome tweeter, and a 100 to 20,000 frequency response. Each speaker handles up to 40 watts peak. Each speaker measures 7.13" H x 4.5" W x 4.56" D. Sold in pairs only.

ASP-1442, Assembled, 12 lbs. . . . . . . . pair 119.90

Universal Mounting Brackets to mount a pair of LS-ONEs in your car or truck for that full listening sound. Designed for underdash, rear deck, or rear package mounting.

ASA-1442-1, Shpg. wt. 3 lbs. . . . . . . . . . pair 16.50

## High-efficiency 2-way reflex speaker for lower-power audio systems

Provides excellent high-fidelity music reproduction, yet requires a comparatively low-powered amplifier to efficiently drive it. For normal operation, as little as five watts of continuous power per channel — or as much as 25 watts per channel — can properly drive the AS-1342. This medium-sized speaker can be placed in just about any position — vertically or horizontally, at any point 12 inches or more above the floor. Wherever you place it, the AS-1342 has a good 60 to 14,000 Hz frequency response. And a continuous tweeter level control lets you adjust the output level of the 2-inch by 6-inch horn-type tweeter to suit the acoustics of almost any listening room.

Buy the perfect complement to your low-power stereo system today. 8 ohms impedance. Dimensions, 22.25" H x 12" W x 10.5" D.

Kit AS-1342, Shpg. wt. 32 lbs., UPS . . . . each 89.95
SAVE $9.95 when you buy the pair!
Kit AS-1342-2, Shpg. wt. 78 lbs., UPS . . pair 169.95

## 2-way Sound Column — designed for omnidirectional sound



Here's a speaker that sounds outstanding, no matter where you sit in the room. Two 6.5-inch full-range drivers and two 1-inch dome tweeters are mounted in separate arrays on adjacent sides of the cabinet, to produce omnidirectional sound.

The woofers are located well above the floor, so bass response is solid and well-defined. With no mid-bass boom or resonance, mid-range frequencies come through loud and clear. The tweeters deliver a full 10 to 20 dB more off-axis response for bright, clean highs. Tweeter level controls let you tailor sound to each particular setting. Only 4 ohms impedance, so most amps deliver up to TWICE their rated 8-ohm power. Handles 5-100 watts/channel. 40" H x 11" W x 11" D.

Kit AS-1344, Shpg. wt. 57 lbs., UPS . . . . each 149.95
Save $19.95 when you buy the pair!
Kit AS-1344-2, Shpg. wt. 122 lbs., UPS . . pair 279.95

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● ACP-1467 (B·I·C Micro 350)



● ACP-1466 (Dual 714Q)

Whatever you're looking for in a turntable or changer — and whatever your budget — we have a turntable or changer from the B·I·C and Dual lines that's exactly what you're looking for.

An unbeatable combination of quality and price, our selection of B·I·C changers provide more quality and features for your audio dollars.

Dual designs turntables and changers for one purpose — to provide the finest sound available from your records. Dual turntables and changers are built to exacting specifications and provide uncompromising performance for years to come.

## Whatever your audio system, we have the turntable/changer and cartridge that fits your needs
Choose from these quality turntables and changers. Base, dust cover included.

| MODEL | FUNCTION | DRIVE | RUMBLE DIN-B (dB) | WOW AND FLUTTER, WRMS (%) | MFR.'S SUGG. PRICE | HEATH PRICE |
|---|---|---|---|---|---|---|
| Dual 714Q ACP-1466, 22 lbs. | Auto-stop only, DC quartz PLL control | DC Genius | −78 | 0.015 | $479.95 | 449.95 |
| Dual 622 ACP-1465, 19 lbs. | Single play, auto start/stop, continuous repeat | DC Direct | −75 | 0.03 | $319.95 | 299.95 |
| Dual 1264 Chgr. ACP-1464, 17 lbs. | 1 to 6 records, cont. repeat, anti-resonance filter | Belt | −70 | 0.04 | $275.00 | Save $75.00! 199.95 |
| B·I·C Micro 350 ACP-1467, 14 lbs. | MicroMass Tonearm, 1-6 records, repeat play, auto shut-off | Belt with pitch control | −64 | 0.08% | $229.95 | Save $110.00 119.95 |

## Sound better with a famous-brand cartridge. Save to $85.00 when ordering with turntable/changer.

| MODEL | RESPONSE (Hz) | OUTPUT | SEPARATION | STYLUS | TRACKING FORCE | MFR.'S PRICE | HEATH PRICE | WITH TURNTABLE |
|---|---|---|---|---|---|---|---|---|
| Shure V-15 Type IV ADP-1259, 1 lb. | 10-25,000 | 4.0 mV | 25 dB | Elliptical 0.2 x 0.7 | ¾ to 1¼ gm. | $165.00 | 109.95 | 89.95 |
| Audio-Tech. AT-14SA ADP-1139, 1 lb. | 5-45,000 | 2.7 mV | 25 dB | Shibata | ¾ to 1½ gm. | $150.00 | 85.95 | 69.95 |
| Audio-Tech. AT-30E ADP-1294, 1 lb. Needs preamp like AP-1800 (page 26) | 15-25,000 | 0.28 mV | 25 dB | Elliptical 0.3 x 0.7; | 1.4 to 2.0 gm. | $135.00 | 79.95 | 69.95 |
| Shure V-15 Type III ADP-1059, 1 lb. | 10-25,000 | 3.5 mV | 25 dB | Elliptical 0.2 x 0.7 | ¾ to 1¼ gm. | $101.00 | 89.95 | 69.95 |
| Shure M95HE ADP-1258, 1 lb. | 20-20,000 | 4.7 mV | 25 dB | Hyperelliptical Nude Diamond | ¾ to 1½ gm. | $97.50 | 65.95 | 44.95 |
| Empire 2000E/III ADP-1147, 1 lb. | 20-20,000 | 4.5 mV | 28 dB | Elliptical 0.2 x 0.7 | ¾ to 1½ gm. | $85.00 | 59.95 | 19.95 |

Stretch your Christmas audio dollar with this turntable/cartridge price special. Choose a B·I·C or Dual Turntable from us, and you can select a Shure, Audio-Tech, or Empire cartridge with stylus at a specially reduced price. You receive a substantial price break off the manufacturer's suggested retail price. Order your turntable or changer today, and take advantage of this turntable/cartridge money-saving combination.

## Keep your records clean and static-free



The Disckit™ by Discwasher keeps your records and phono cartridge clean, for better sound and longer life. Includes record brush, fluid, anti-static pistol, test light, precision stylus cleaner.

ADP-1298, Shpg. wt. 4 lbs. . . . . . . . . . . . . . 49.95

Credit Card orders call TOLL-FREE: 800-253-0570

# Get truly beautiful sound from this three-way floor/shelf speaker system

## $189⁹⁵ each
- A great first-time kit
- Custom-build for placement on either shelf or floor

A truly outstanding speaker system for the best component systems. Get solid, well-defined bass from a 10" woofer. The 500 Hz woofer-midrange crossover minimizes IM distortion and insures smoothness. The 4.5" midrange has its own polyester-damped subenclosure to prevent distortion caused by woofer vibrations and reflections. The 1" dome tweeter provides excellent power handling and definition, and features full 120-degree horizontal dispersion, even at 12,000 Hz.

All of the drivers in the AS-1373 Speaker System are flush-mounted, with no rails around the baffle to limit dispersion of high frequency sound. And for the best possible stereo imaging, the tweeter can be positioned directly above the midrange driver, whether you decide to position the speaker system horizontally or vertically.

While the AS-1373 can be used with almost any audio amplifier, a high-power amplifier like the new Heathkit AA-1800 (shown on page 94) reveals this speaker system's awesome dynamic range and clarity. Two high-frequency switches let you match high-frequency response to your particular listening environment. And each driver is individually fused for extra protection.

A fully assembled walnut-finish veneer cabinet with deluxe, acoustically transparent foam grille, make this speaker system look as good as it sounds.
Kit AS-1373, Shpg. wt. 68 lbs., UPS . . . . . . . . **189.95**
Save $19.95 when you buy a pair.
Kit AS-1373-2, Shpg. wt. 141 lbs., UPS . . . . . **359.95**

AS-1373 SPECIFICATIONS: Frequency Range (−10 dB): 30 Hz to 22 kHz. Frequency Response: +3 dB, 40 Hz to 20 kHz. Impedance: 8 ohms. Recommended Amplifier Power: 10 watts min. to 200 watts (fused for larger amplifiers). Crossover Frequencies: 500 and 3000 Hz (12 dB/octave). Fuses: Woofer, 1.25 amp slow-blow; Midrange, 0.75 amp slow-blow; Tweeter, 0.5 amp regular. Switches: 3 kHz shelf/flat, 10 kHz rolloff/flat. Dimensions: 26" H x 14.5" W x 12.125" D (66.04 x 36.83 x 30.80 cm).

# High-power three-way speaker system — ideal for disco and rock music

## $349⁹⁵ each
- Extra-wide dynamic range
- Massive 15" slot-loaded woofer
- Handles up to 200 watts

Designed for use with the finest stereo components, the AS-1348 offers the bass power and extra-wide dynamic range you need to reproduce any type of music realistically. It combines a massive 15" slot-loaded woofer, two 4.5" midrange speakers and three 1" dome tweeters in a precision-designed cabinet. Has frequency range from below 22 Hz to above 22 kHz. The woofer is mounted in the rear of the cabinet to improve low-frequency response. The two midrange drivers radiate directly forward for excellent presence and realism. The three tweeters face forward, angle right and angle left for high-frequency response with outstanding dispersion.

While most conventional speaker systems produce maximum sound levels only at upper bass and midrange frequencies, this speaker system produces very high sound levels, without distortion at ALL audible frequencies. This makes the AS-1348 ideally suited for rock and disco music, which produce high sound levels.

Three switches provide 14 combinations of attenuation and response shaping that adjust response characteristics to any listening area. A fully assembled acoustic-suspension enclosure features a walnut and oak veneer finish. Acoustically transparent grille cloth is removable for extra convenience.

This fine three-way speaker system is a kitbuilding experience that will bring you years of enjoyment.
Kit AS-1348, 110 lbs., Mtr. Frt. . . . . . . . . . . . **349.95**
Save $39.95 when you buy a pair of AS-1348s.
Kit AS-1348-2, 220 lbs., Mtr. Frt. . . . . . . pair **659.95**

AS-1348 SPECIFICATIONS: Frequency Range (−10 dB): 22 Hz to 22 kHz. Frequency Response: +3 dB, 28 Hz to 20 kHz. Impedance: 8 ohms nominal. Recommended Amplifier Power: 10 to 200 watts (fused for larger amplifiers). Crossover Frequencies: 500 Hz (12 dB/octave) and 3000 Hz (6 and 12 dB/octave). Fuses: Woofer, 1.5 amp slow-blow; Midranges, 0.375 amp slow-blow; Tweeters, 1 amp regular. Dimensions: 38" H x 24" W x 15" D (96.52 x 60.96 x 38.10 cm).

# Save $50 per pair! Linear phase speaker system with reduced diffraction

## $199⁹⁵ each
- Aligned drivers for minimum transient distortion
- Rich rosewood veneer cabinet
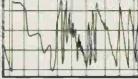
Heath engineering has designed the ultimate linear phase speaker system — and now, we make the ASX-1383 an even better value! Structural foam baffle aligns speaker elements, reduces distance between drivers to improve imaging and realism. Contoured surfaces reduce diffraction for smooth frequency, phase response.

Specially selected 10" woofer, 5" midrange and 1" soft dome tweeter, with constant-voltage crossover network, for flat response and linear phasing. Cabinet is made of rich matched Brazilian rosewood veneers, with a charcoal black, acoustically transparent grille.

Compare with other speaker systems. You'll agree that they match up in every respect — and beat their prices. Sold in matched pairs only.

Graph at left shows phase response of a non-aligned speaker system. Graph at right shows how our linear phase Speaker System makes sound arrive at your ears — at the same time — to reduce distortion.

Kit ASX-1383, Shpg. wt. 114 lbs.,
Motor Freight . . Pair Was $449.90, NOW ONLY **399.90**
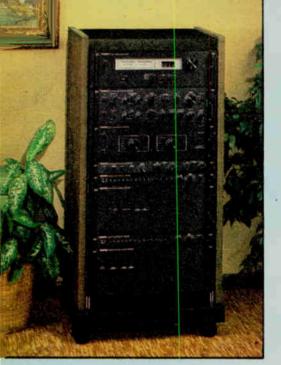
ASX-1383 SPECIFICATIONS: Frequency Range (−10 dB): 30 Hz to 30 kHz. Impedance: 8 ohms. Recommended Amplifier Power: 10 to 200 watts (fused for larger amplifiers). Crossover Frequencies: 750 Hz, 4000 Hz. Fuses: Separate fuses for woofer, midrange and tweeter. Dimensions: 36" H x 13.5" W x 13.25" D (96 x 34.3 x 33.7 cm).

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

## This Christmas Season, move up to the unique sound of Heathkit Pro-Series High-Fidelity Components and recommended Accessories

The sound of Heathkit Pro-Series High-Fidelity Components is unique because each component is developed with a "listening awareness." This means we design and engineer these components with your listening tastes and environment in mind.

Two examples of this "listen awareness" engineering in the Pro-Series are the AJ-1600 tuner (below) and the new AD-1702 Variable Electronic Crossover. The AJ-1600 tuner has a special wide/narrow IF selector and attenuated antenna. These features were incorporated into the tuner because we found that FM reception is affected by the number of stations in your area, and the distance between the tuner's antenna and the station transmitter.

The new AO-1702 Variable Electronic Crossover (p.

28) was developed because most speakers have passive crossovers that cause impedance variance and alignment problems in the drivers. The AO-1702 has special filter elements that eliminate these problems, making it possible for you to play your system at live performance loudness levels — without the distortion or bass break-up.

These are just two examples of the "listening awareness" engineering that make the Pro-Series unique. You'll find this engineering concept threading through the descriptions that follow. Whichever component or components you select, we think you'll appreciate the special care we've taken in designing and developing them. After all, they were designed with you in mind.



## ① Digital FM/AM Tuner gives you clearer station reception

Here's a sensitive digital AM/FM stereo tuner, with less than 0.1% harmonic distortion, that will make a perfect gift for the audio buff in your family. It features two front panel meters and a lighted digital display for quick, accurate tuning. A gyro-fly wheel tuning knob makes changing from one station to another effortless. And each station comes in strong and clear with this tuner's sensitivity of 1.8 μV mono, its signal/noise ratio of 75 dB and 45 dB stereo separation.

A special wide/narrow IF switch lets you adjust the bandwidth from wide to narrow for minimum interference in crowded station areas. Also, an attenuated antenna allows you to pick up stations with nearby transmitters without the usual noise and static. A multipath switch lets you monitor multipath distortion. This lets you place your FM antenna in a spot where multipath distortion is low.

Five-gang FM front end and FM IF/Stereo Demodulator boards are factory assembled and tested to shorten kitbuilding time. Open chassis layout and wiring harnesses also speed assembly. Dimensions: 5¼" H x 19" W x 14" D.

Kit AJ-1600, Shpg. wt. 25 lbs. . . . . . . . . . . . . **399.95**
AJA-1600-2, Dolby FM Noise Reduction Module,
Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . .**49.95**
Save $10.00 from Cat. 849 on this Oak-Finish Cabinet.
AEA-1800-2, 6 lbs. . . . . **Was $39.95, NOW ONLY 29.95**

AJ-1600 SPECIFICATIONS: FM: Frequency Response: 20-15,000 Hz, +0.5 dB. Antenna Inputs: 75 or 300 ohms. Sensitivity: 1.8 μV (10.3 dBf) usable; 2.5 μV (13.2 dBf @ 50 dB signal to noise). Selectivity: Wide, −40 dB; Narrow, −80 dB. S/N Ratio: Stereo, 75 dB. Image Rejection: 100 dB. Capture Ratio: 1.2 dB. Stereo Separation: 45 dB at 1000 Hz. Harmonic Distortion: Stereo, 0.1% at 1 kHz. AM: Sensitivity: Ext. Antenna, 30 μV; Radiated, 250 μV/meter. Selectivity: Alt. Channel, −70 dB. Image Rejection: 70 dB. Power Requirement: 120/240 VAC, 50/60 Hz.

## ② Versatile Heathkit AP-1800 Pro-Series Stereo Preamplifier

Here's a preamp for the audio person on your list who is into the latest audio cartridges for their turntables. It has phono inputs for three turntables: two for turntables with magnetic cartridges, and one for turntables fitted with moving coil cartridges like the Audio-Technica AT-30E. A selectable cartridge capacitance helps give the phono audio signal a flatter frequency response for a warmer, richer sound. The AP-1800 also has a built-in infrasonic filter to reduce the polluting rumble and low frequency noise emitted from turntables.

The AA-1800 gives you more control over your treble and bass. For each channel, it features separate tone controls, turnover points, and a continuous loudness compensation control for a smooth, flat response at all volume levels. In addition to these controls, the AP-1800 has a tape-copy function selector for tape-to-tape recording. Dimensions: 5.22" H x 19" W x 11.25" D.

Kit AP-1800, Shpg. wt. 27 lbs. . . . . . . . . . . . .**349.95**
AEA-1800-2, Oak-Finish Cabinet,
Shpg. wt. 6 lbs. . . . . . . . . . .**Was $39.95, NOW 29.95**

AP-1800 SPECIFICATIONS (IHF-A-202): Phono Input Sensitivities: Moving Coil: 33, 67, 130 μV; High-level, 67 mV. Hum and Noise: Moving Coil phono, −70 dB; Magnet phono, −75 dB; High-level, −85 dB. Input Impedance: Moving Coil, 100 ohms; Magnet phono, 47K ohms; High-level, 50K ohms. Frequency Response: Phono (RIAA), +0.2 dB, 20 Hz to 20 kHz; High-level, +0, −0.2 dB, 20 to 20 kHz. Total Harmonic Distortion: High level: 0.02%; phono: .03%. Crosstalk: −90 dB. Stereo Separation: 50 dB at 1 kHz.

## ③ Graphic Output Indicator

This unit, with its 30 LEDs, helps safeguard your stereo components and speakers by giving you a visual read-out of your amplifier or preamp output. Two rows of 15 LEDs (one row for each channel) give you an instant picture of your system's output, warning you of dangerous peak loads that can harm your system or blow your tweeters.

The AO-1701 accurately monitors your system's output with a wide dynamic range of 50 dB. A peak hold/average button allows you to make precise, low distortion recordings off broadcasts, records, and tapes.

Kit AD-1701, Shpg. wt. 15 lbs. . . . . . . . . . . .**159.95**
AEA-1800-3, Solid-Oak Panels,
Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . .**14.95**

## ④ Proven Heathkit AA-1600 Pro-Series Stereo Amplifier

**125 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.05% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ**

If you're planning to move up to high power amplifiers, then the AA-1600 is one you should consider. It has the power, the clean amplification, and the safety features that even the most finicky audiophiles demand — and at an affordable price.

Power — This amplifier packs a mighty 125 watts per channel of power to take full advantage of the latest wide dynamic range speakers like our AS-1373s and ASX-1383s. It has the power to deliver all of your music without clipping — even at high volume levels.

Clean Amplification — The AA-1600 amplifies your favorite broadcasts, tapes, and records with clarity and unobtrusive distortion — Hum and Noise are a full 100 dB down, with Total Harmonic Distortion less than 0.05% and Transient Intermodulation Distortion less than 0.05%.

Safety Features — Our AA-1600 has fused B+ and B− power supply lines to each channel, along with rugged output devices that eliminate the need for disipation limiters which can cause tweeter damaging clicks and pops.

Plus, the AA-1600 features an 8-second speaker delay switch to protect your speakers from sudden turn-on and turn-off thumps and pops.

Fast and Easy to Build — Minimal point-to-point wiring and clean, open chassis layout make assembling this unit easy. Amplifier and power supply circuit boards are assembled, tested and adjusted to ease kitbuilding and ensure performance to specifications.

Kit AA-1600, Shpg. wt. 51 lbs. . . . . . . . . . . . .**329.95**
AEA-1800-1, Oak-Finish Cabinet,
Shpg. wt. 5 lbs. . . . . . . . . . . . . . . . . . . . . . . . .**29.85**

AA-1600 SPECIFICATIONS: Frequency Response: +1 dB, 7 Hz to 50 kHz; −3 dB, 5 Hz to 100 kHz (1 watt). Intermodulation Distortion (SMPTE): Less than 0.05%, from 250 mW to 125 watts. TIM (Leinonedn, Otalo and Curl): 0.05%. Damping Factor: Greater than 50. Hum and Noise: 100 dB below 125 watts. Stereo Separation: 70 dB min. Input Impedance: 20K ohms. Input Sensitivity: 1.5 volts. Power Requirement: 120 VAC, 60 Hz. Dimensions: 7⅞" H x 19" W x 13" D (18.01 cm x 48.26 cm x 33.02 cm). Net Weight: 38.5 lbs.

Credit Card Orders Call TOLL-FREE: 800-253-0570

## ⑤ Get better recordings with the B·I·C T-4M Cassette Deck

B·I·C's T-4M Two-Speed Metal-Compatible Tape Deck, with Dolby™ NR, lets you hear every bell, every note in your Christmas music — and all your other music. It features a frequency response of 20-23,000 Hz, on metal tape, at 3¾ ips — with a S/N ratio of 71 dB, Dolby in (20-20,000 Hz with S/N of 68 dB at 1⅞ ips, Dolby in).

With other features including three-head configuration, pitch, bias and equalization controls, you'll get more music, less distortion, and cleaner sound out of your taping efforts. Power Req: 120/240 VAC, 50/60 Hz. Measures 6⅞" H x 17⅝" W x 10⅛" D.
ATP-1484, Shpg. wt. 22 lbs. . . . . . . . . . . . . . .**699.95**
Optional Rack Mount to affix ATP-1484 on Pro-Series rack.
ATA-1484-1, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .**24.95**

## Heathkit Pro-Series Rack combines beauty, convenience

This rack, with its walnut veneered side panels, adds taste to any listening room. Its contemporary design not only looks good, but is also functional.

You can put all your stereo components in one portable floor-saving space — eliminating messy, tangling wires. All components are within easy reach for adjustment and inspection.

The rack holds your amplifier, tuner graphic output indicator, and preamp, plus a turntable. It comes with dividers for storing records and a top shelf for your turntable. Locking swivel casters make it easy to move the rack for quick changes in listening room setups. Compatible with standard 19" EIA panels in any height. Dimensions: 43½" H x 21½" W x 18" D.
Kit AE-1705, Shpg. wt. 74 lbs. . . . . . . . . . . . .**249.95**

## New Audio-Technica AT-30E Cartridge with replaceable stylus

Here's a moving coil cartridge that features a special stylus assembly which holds the moving coils, yet doesn't penalize the cartridge's tracking ability or level output. If the stylus becomes worn or damaged, the entire moving system, coils and all, is simply unplugged and replaced.

This sensitive cartridge has a nude elliptical diamond stylus measuring 0.3 mil. x 0.7 mil., a stereo separation of 25 dB at 1 kHz., and a frequency response of 15-20,000 Hz. (Note: requires AP-1800 or similar moving coil preamp.) Mfr.'s price, $125.00.
ADP-1294, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . .**79.95**
With turntable or changer from page 24 . . . . .**59.95**

### Optional Pro-Series Wood Cabinets

Heathkit Pro-Series Audio Components are also available with optional oak-finish wood cabinets. These fine cabinets are listed and sold separately for each Heathkit Pro-Series Component.

## Pro-Series Variable Electronic Crossover gives you better control of your drivers

**NEW**

**$179⁹⁵**
- Lets you add a subwoofer and another amplifier for more bass
- Crossover can be frequency scaled up to 6 kHz

With the AD-1702 Variable Electronic Crossover, you can more effectively split the audio band for biamp, triamp, and subwoofer applications in your system. By splitting the audio band in two without the impedance variance or alignment problems of passive crossovers, the AD-1702 gives you more accurate crossover alignments for lower distortion and better response.

In subwoofer applications, the AD-1702 allows you to add an amplifier and subwoofer for more bass. It features six selectable crossover points at 40, 60, 80, 100, 125, or 150 Hz for your subwoofer needs. Switchable 6 dB/octave and 18 dB/octave slopes give you a flat response at crossover points. An infrasonic filter blocks out record warp noise to your subwoofer.

In biamp and triamp applications, the AD-1702 gives you more control of your drivers. You can play music at live performance volume levels without the distortion normally found in single amplifier systems. Manual instructions show you how to frequency scale the selectable crossover points up to 6 kHz for biamp or triamp system applications (for triamping, two AD-1702s are required).

Back panel features include upper and lower stereo outputs, mono (L+R) for center channel subwoofer systems, and mono (L,−R) outputs for bridging into a center subwoofer system. The unit fits any EIA Standard Rack. Includes handles.

Kit AD-1702, Shpg. wt. 15 lbs. (Available December) .................**179.95**
AEA-1800-3, Solid-Oak End Panels, Shpg. wt. 2 lbs. ....................**14.95**

AD-1702 SPECIFICATIONS. Crossover (−3 dB): 40, 60, 80, 100, 125, or 150 Hz with 6 dB/octave or 18 dB/octave slopes, +5%. Bass Level Control: ±15 dB. A-weighted Signal to Noise Ratio: 80 dB. Frequency Response: 20 Hz to 20 kHz, +0 to −0.2 dB. Upper Frequency Gain: 0 dB to +.25 dB. Infrasonic Filter: (−3 dB): 15 Hz Butterworth High Pass (switched) 18 dB/octave. Separation: 60 dB. Input Impedance (1 kHz): 50 kilohms. Maximum Output: 8 volts rms. TIM: Less than .03%. THD: Less than 0.01%. Power Requirement: 120/240 VAC, 50/60 Hz. 12 Watts. Dimensions: 1.75″ H x 19.25″ W x 13″ D.

## Pro-Series High-Power Amplifier prevents clipping on wide dynamic range music sources

**NEW**

**$599⁹⁵**
- Better dynamic range with a 2.5 dB headroom increase
- Patent-pending speaker protection

**250 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.025% TOTAL HARMONIC DISTORTION FROM 20 HZ TO 20,000 HZ**

The wider dynamic range of new sources demands more power and headroom to faithfully reproduce the full sound spectrum. Without that power, musical peaks get clipped, the dynamic range gets chopped.

The AA-1800 has the power to scrupulously reproduce all of your music. It provides a full 250 watts per channel to stay with your music all the way, from soft to loud passages. And the AA-1800 does this without introducing noise into your music. Hum and noise is a full −85 dB down, with a TIM of less than 0.03%.

A patent-pending speaker protection safeguards your speakers from damaging input signals. Special voltage overload and high frequency cut-off circuits, a thermal circuit breaker, and a turn-on, turn-off delay circuit also protect your speakers from destructive voltages. Massive heat sinks cool the electrical circuits without noisy fans! The AA-1800 mounts on any EIA Standard 19″ rack. Includes handles.

Kit AA-1800, Shpg. wt. 75 lbs. ....................................**599.95**
AEA-1800-1, Oak-Finish Cabinet, Shpg. wt. 5 lbs. ......................**29.95**

AA-1800 SPECIFICATIONS: Frequency Response: 20 Hz to 20 kHz, +0 to 0.2 dB; 3 hz to 100 kHz, +0 to 1.0 dB (at 1 watt). Total Harmonic Distortion plus noise: Less than 0.025% from mW to 250 Watts. IM Distortion (SMPTE): Less than 0.02% from 250 mW to 250 Watts. TIM (DIM 100): Less than 0.03% (3.18 kHz square wave and 15 kHz sine wave mixed 4 to 1, f(c)=100 kHz, measured at rated output. Hum and Noise: (A-weighted): 85 dB between 1 watt. Full Power Trip Frequencies of Speaker Protection Circuit: Less than 16 Hz, more than 30 kHz. Low Frequency Damping Factor: Greater than 100. Input Sensitivity: 110 mV (for 1 watt at 8 ohms). Input Impedance: 20 kilohms, shunted by less than 50 pF. Channel Separation: 60 dB min., 20 Hz to 20 kHz. Power Requirement: 120 VAC, 60 Hz, 1200 Watts. Dimensions: 7″ H x 19″ W x 17.75″ D. Net Weight: 50 lbs. (22.68 kg).

## Pro-Series Active Audio Processor boosts dynamic range, reduces noise and tape hiss
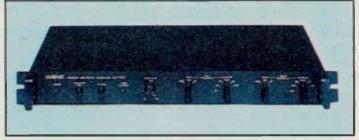
**NEW**

**$249⁹⁵**
- Increase dynamic range up to 17 dB
- Applies processing before or after tape recording

Get rid of that annoying noise and hiss in your records, tapes, and radio broadcasts with the AD-1706 Active Audio Processor. It reduces high frequency noise and increases your source's dynamic range up to 17 dB. With its single ended design, the AD-1706 requires no preprocessing.

Three dynamic filters inside the AD-1706 remove noise and hiss injected into your music by poor record pressings and non-aligned magnetized tape particles. In fact, the filters will sift out a full 10 dB of noise and hiss. You enjoy your music more because you hear the first noise jump out from a background of total silence. A dynamic range expander adds up to 7 dB of dynamic range expansion, replacing the dynamic range lost during recording and broadcasting. Ten front LEDs tell you exactly how much noise reduction or expansion the AD-1706 is adding to your music. A built-in tape monitor lets you apply processing before or after recording.

Kit AD-1706, Shpg. wt. 18 lbs. ....................................**249.95**
AEA-1800-2, Oak-Finish Cabinet, Shpg. wt. 6 lbs. ......................**29.95**

AD-1706 SPECIFICATIONS: Rated Input: 200 mV. Input Impedance: Expander on, −4 dB to +4 dB (dependent on program level and control setting). Frequency Response: 20 Hz to 20 kHz. High Filter: −3 dB, 7 kHz, 12 dB/octave roll off, linear phase. Noise Reduction: 3 dB typical at 2 kHz, 10 dB typical between 4 kHz and 15 kHz. Sensitivity: 500 μV for notch to open. Hum and Noise: −70 dB, 20 Hz to 20 kHz (200mV reference). Channel Separation: 50 dB at 1 kHz (5 kilohm input termination). Output Impedance: 500 ohms. Input Overload: 5 VRMS minimum at 1 kHz. Total Harmonic Distortion: 0.1% from 20 Hz to 20 kHz. Power Requirement: 120/240 VAC, 50/60 Hz, 15 Watts. Dimensions: 5.75″ H x 19″ W x 14″ D (14.6 cm H x 48.3 cm W x 35.6 cm D). Net Weight: 12.5 lbs. (5.7 kg).

**Credit Card Orders Call TOLL-FREE: 800-253-0570**

## The AR-1650 puts control of your music in your hands

### $759⁹⁵
Silver Panel

**125 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.05% TOTAL HARMONIC DISTORTION FROM 20 TO 20,000 HZ**

- 1.8 μV sensitivity for clear FM reception
- 80 dB FM signal/noise ratio for wide dynamic range

**Clean FM reception:** The AR-1650's 1.8 μV sensitivity pulls in your favorite station loud and clear. Its five-gang FM tuning capacitor rejects unwanted signals, giving you cleaner FM reception and minimal interference. A special narrow band switch blocks unwanted neighboring station signals for cleaner station reception in cities with many radio stations.
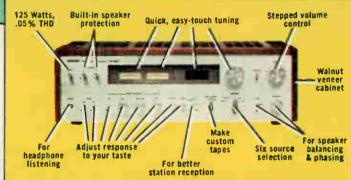
**Precise, on-the-nose tuning:** There's no guessing or fidgeting when you tune in your favorite FM or AM station on the AR-1650. A blue vacuum fluorescent four-digit display lets you tune in to the exact frequency of your station. And you can change from one station to the next quickly and effortlessly with the flywheel tuning knob. A center-tune meter and signal strength meter allow you to home in on your FM station's signal for the best possible reception with the greatest stereo separation and lowest distortion and noise.

**Complete control of your music:** The AR-1650 lets you hear your music just the way you like. You can adjust the frequency response across the full 20-20,000 HZ frequency range, with the bass, midrange, and treble controls. Or if you want to listen to a tape or record with the lowest frequency distortion, just flip the tone flat switch to bypass the tone control circuits.

**A receiver you can build on:** The AR-1650's 125-watt power amplifier, with a −90 dB hum and noise rating, gives you more music and less noise from audio sources. You can plug in two turntables, two auxiliary sources, and two tape-decks. The tape monitor control enables you to record from deck one to deck two, while monitoring deck two.

**Built-in speaker protection:** Fused B+ and B− power supply buses for each channel eliminate the need for dissipating limiters that can cause tweeter-damaging pops and clicks. Turn-on delay and thermal-circuit breakers further protect your speakers from damage and expensive repairs.

**Choice of styles:** You can choose between natural aluminum or black anodized aluminum front panel. Either one will match a listening room's decor with their walnut veneer cabinets and straight-line design.

**Easy to assemble:** Like all Heathkit projects, the AR-1650 comes with our famous easy-to-read, step-by-step instruction manual. To speed assembly and ensure performance to specifications, the amplifier, tuner, and IF multiplex circuit boards are factory assembled and tested. Takes about ten evenings to assemble.

Kit AR-1650S, Silver Front Panel, Shpg. wt. 66 lbs. .................759.95
Kit AR-1650B, Black Front Panel, Shpg. wt. 66 lbs. .................779.95
Kit AJA-1600-2, Optional Dolby NR Module, Shpg. wt. 1 lb. .............49.95



The AR-1650 is the finest Heathkit stereo receiver ever! We've designed new versatility into this receiver — including capabilities to accept more sources, drive two separate sets of speaker systems — and a unique tape monitoring system!

**AR-1650 SPECIFICATIONS: FM Section:** Mono/Stereo; Usable Sensitivity, 1.8 (10.3)/3.5 (16.1) μV (dBf). 50 dB Sensitivity: 2.5 (13.2)/36 (36.1) μV (dBf). S/N: 80/73. THD @ 65 dBf and 1 kHz: .1/.1%. Freq. Resp: 20 Hz to 15 kHz, +0.5 dB. Selectivity: Wide, 40 dB; Narrow, 80 dB. **AM Section:** Ext. Ant./Radiated Sensitivity: 30 μV/250 μV/M, S/N: 50/40 dB. **Amp. Section:** Input Sensitivity: 0.67 mV phono, 67 mV Aux. Maximum Input Signal: 150 mV phono, 10 V Aux. Freq. Resp: 20 Hz to 20 kHz +0 −.02 dB. IM Distortion: 0.05% TIM: 0.05%. Power Req: 120/240 VAC, 50/60 Hz. Dim: 7″ H x 21¾″ W x 16⅞″ D.



### Save on AR-1650 Component Combinations!

Great gift idea! Order AR-1650 Receiver, a pair of AS-1373 speakers (p. 25) and a Dual 714Q Direct-Drive Turntable (p. 24).

ARS-1650-SA, Silver, 239 lbs.
SAVE $280.00! ......NOW ONLY 1289.85
ARS-1650-BA, Black, 239 lbs.
SAVE $320.00! ......NOW ONLY 1289.85

# Here's a Stereo Receiver with a digital readout for Dad!

**$399⁹⁵** 70 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.08% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ

- Enough power to drive high power speakers
- LED digital readout for on-the-nose tuning
- Stylish hide-away control panel
- An excellent component for your recreation or family room

You get full rich stereo sound from the AR-1515 Stereo Receiver's 70 watts per channel and stereo FM channel separation of 40 dB. And that sound will be true and clean with a total harmonic distortion less than 0.08% and an intermodulation distortion of less than .1%. You get more music, less noise from program sources because the AR-1515's hum and noise are 65 dB below full output in phono, and 80 dB below full output in high level sources such as open reel decks and cassette decks.

The AR-1515 allows you to select your favorite FM and AM stations with digital accuracy. Four half-inch tall LED readouts and vernier drive tuning let you turn to FM or AM stations faster and more accurately than pointer-dial tuning indicators. Signal strength and center channel meters help you zero-in on your station's frequency for the strongest possible reception with the lowest distortion.

With an FM sensitivity of 1.8 $\mu$V and a selectivity of 100 dB, you'll enjoy the full stereo sound of your station's music, without fading or fluttering interference from other nearby FM stations.
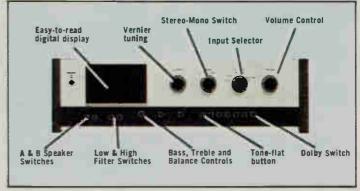
You'll get a cleaner AM sound out of the AR-1515, too. Its AM section's dual-gate MOS Field, Effect Transistors and a computer-designed 9-pole filter give you a better processed signal for a clearer AM sound. And with the external shielded loop AM antenna, you can home-in on your AM station's signal for the best possible signal.

Another nice feature of the AR-1515 is the hide-away control panel. A tilt-down brushed aluminum panel keeps the secondary controls out of sight and out of the reach of children. It's not only practical, but also stylish.

AR-1515 is easy to build — even for the first-time kit builder. Its modular design and color-coded wiring harness simplify and speed assembly. We've even included a separate test meter so you can quickly and easily double-check each step of your work all the way. Our simple, easy-to-read, illustrated instruction manual guides you through every assembly step, from unpacking to final plug-in.

Kit AR-1515, Shpg. wt. 47 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **399.95**
Kit AD-1504, Dolby FM Noise Reduction Module, Shpg. wt. 1 lb. . . . . . . . . **44.95**

Add the AA-1515's low-distortion power needed to drive speakers to live performance volume levels. Same specs as the AR-1515 amplifier section below, except IM is less than .08%. Power Requirement: 120/240 VAC. Measures: 6⅛" H x 17½" W x 14¼" D.

Kit AA-1515, Shpg. wt. 40 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **279.95**

AR-1515 SPECIFICATIONS: Amplifier: Frequency Response: +0, −1 dB, 8 Hz to 45 kHz: +0, −3 dB, 4 Hz to 80 kHz. IM: Less than 0.1%, .25 to 70 watts. Damping Factor: Greater than 60. Input Sensitivity: Phono 1 & 2, 2 mV: Aux., Tape & Dub, 200 mV. Hum and Noise: Phono (2 mV ref.), −65 dB; Aux., Tape, Dub (200 mV), −80 dB. FM Sensitivity: 1.8 1 $\mu$V IHF. Selectivity: 100 dB IHF. Image Rejection: 90 dB IHF. Stereo Separation: 40 dB or greater at mid frequencies. AM Sensitivity: 5 $\mu$V with 50 ohm direct input. Selectivity: 20 dB at 10 Hz. Power Requirements: 120/240 VAC, 50/60 Hz. Dimensions: 6¾" H x 21½" W x 15" D.

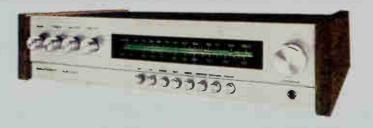# The AR-1219 AM/FM Stereo Receiver — an ideal gift for the office or college dormitory

**$229⁹⁵** 15 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN .5% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ

- Puts big stereo sound quality into your office or home
- Pulls in your favorite FM and AM stations loud and clear

Make your office or den more pleasant this Christmas season with the AR-1219 AM/FM Stereo Receiver. It brings big stereo sound quality without the colorations or imperfections of most low-cost stereo systems. With an ear-pleasing 15 watts per channel and total harmonic distortion less than 0.5%, you can work and listen to your favorite music — FM or AM broadcast, tapes, or records.

You can pull in your favorite FM station with the AR-1219's 2 $\mu$V FM sensitivity. And with a stereo separation of 40 dB typical between channels, you can enjoy the distinct stereo sound of your FM station's music. Or if you prefer to listen to AM, you can pick up your station loud and clear with the AR-1219's AM sensitivity of 100 $\mu$V per meter. A precision flywheel makes changing from one station to another fast and easy.

Inputs are provided for turntables with magnetic cartridges, cassette decks and open reel decks. A headphone jack allows you to plug in your headphones and enjoy your music privately.

It's easy to assemble. Three printed circuit boards, a wiring harness, and an open chassis layout let you put this unit together fast.

Kit AR-1219, Shpg. wt. 18 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **229.95**

AR-1219 SPECIFICATIONS: Amplifier: Frequency Response: +1 dB, 7 Hz to 100 kHz. IM: Less than 0.5%, full power; less than 0.2% at 1 W. Damping Factor: Greater than 30. Input Sensitivity: Phono, 2 mV; Tape, 190 mkV. Hum and Noise: Phono, −60 dB; Tape, −65 dB. FM Sensitivity: 2 $\mu$V IHF. Selectivity: 60 dB IHF. Image Rejection: 50 dB IHF. Stereo Separation: 40 dB typical, 35 dB minimum. Signal to Noise Ratio: 65 dB (65 dB). Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 3⅞" H x 17" W x 13" D.

Credit Card Orders Call TOLL-FREE: 800-253-0570

# The AR-1429 AM/FM Receiver — more for your audio dollar

## $299⁹⁵

**35 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.1% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ**

- Medium-power receiver with specs usually found only on more expensive units
- 1.8 μV FM sensitivity, 40 dB separation
- More features — PLL FM demodulator, tape monitor, Dolby NR-capable

Get big stereo sound quality: Here's an intermediate AM/FM stereo receiver that faithfully brings the warm, rich sound out of your favorite stereo music. Its 35 watts per channel, with less than 0.1% total harmonic distortion, gives you the low-distortion sound you usually find in larger, more expensive stereo receivers. And with AR-1429's frequency response of 20-20,000 Hz, you hear all your music — the lows through the highs.

Sensitive FM/AM tuning sections: The AR-1429's FM section features a sensitivity of 1.8 μV, a stereo separation of 40 dB, and two 8-pole ceramic filters for excellent FM selectivity. An improved FM PLL (phased lock loop) stereo demodulator provides clean stereo reception with minimum distortion. In the AM section, the AR-1429 has a sensitivity of 10 μV and 20 dB selectivity, and features two 4-pole ceramic filters for distinct station selection.

A receiver you can build an audio system on: Not only does the AR-1429 give you big stereo sound quality, it also gives you a solid start in building your component stereo system. Two high-level inputs for magnetic cartridge inputs and pre-amp out/power-amp in jacks let you add the audio accessories you want. With a phono hum and noise down a full −79 dB for a 10 mV input, you can connect fine turntables like the Dual turntables on page 24. A tape monitor lets you record and play your favorite albums or broadcasts with metal-capable cassette decks, such as the T-2M metal compatible cassette deck on page 32. You can also add the optional AD-1504 Dolby NR Module for the reduced noise and increased dynamic range of Dolby FM broadcasts now offered by many stations. Add a pair of speakers like our AS-1342s on page 24, and you'll have a beautiful stereo system for your family room or living room.

Complete control of your music: The AR-1429 has the controls you need to tailor the music from FM radio, tapes or records to your tastes. Bass, treble, and balance controls help you adjust the high and low frequencies to your room's acoustics. A loudness switch allows you to hear the full spectrum of your music — even at low volume levels. And a tone flat switch bypasses the tone control circuits so you can make recordings or listen to your music without any frequency response colorations.

Timeless styling: Like the electronics inside, the AR-1429's cabinet is designed to give you years of enjoyment. Its clean, straight line design will be in style for a long, long time. The sleek, low profile design, measuring 4¾" H x 20" W x 13½" D, makes the AR-1429 a perfect receiver for anyplace where you want full stereo sound, but just don't have the room for bulky stereo equipment. And the brushed aluminum front panel with the solid walnut end panels makes the AR-1429 an eye-pleasing addition to your listening room, fitting nicely into any furniture decor.

Easy to build: Modular circuit boards and color-coded wiring simplify and speed assembly. Like all Heathkit electronic kits, this one comes with an easy-to-read, easy-to-follow assembly manual that takes you step-by-step from unpacking to final assembly. You'll enjoy your favorite music on the AR-1429, knowing your hands and Heathkit audio engineering have put together a receiver that offers you more for your audio dollar. Order one today, and start building yourself a stereo system that you'll appreciate for years to come.

Kit AR-1429, Shpg. wt. 32 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **299.95**

Optional Dolby FM Noise Reduction Module.
Kit AD-1504, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **44.95**

AR-1429 SPECIFICATIONS: Amplifier: Frequency Response: −1 dB, 5 Hz to 45 kHz. Damping Factor: 60. Input Sensitivity: Phono, 2 mV; Aux. Tape and Tape Mon., 200 mV. Hum and Noise: Phono, −65 dB (−79 dB for 10 mV); Aux., Tape and Tape Mon., −80 dB. Phono RIAA* Equalization: +1 dB (30 to 20 kHz). FM Section: Sensitivity: 1.8 μV* (10.3 dBf) usable, 4.0 μV (17 dBf @ 50 dB signal to noise). Selectivity: 65 dB. Capture Ratio*: 1.8 dB. AM Suppression*: 48 dB. Image Rejection: 90 dB*. Stereo Separation: 40 dB, typ. at 1 kHz. Frequency Response: 1 dB from 20-15,000 Hz. AM Section: Sensitivity: 10 μV. Selectivity: 20 dB. Power Requirement: 120/240 VAC, 50/60 Hz. *Rated IHF (Institute of High Fidelity) Standards.

## Heathkit amplifier and tuner — great Christmas gifts for first-time kit builders

### Your Choice $149⁹⁵

**15 WATTS MINIMUM RMS, INTO 8 OHMS WITH LESS THAN 0.5% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ**

Tuck this audio amplifier under the Christmas tree: The AA-1219 Amplifier features the same specifications found in the amplifier section of the AR-1219 Receiver (see opposite page). Dual bass, treble, and volume controls enable you to adjust both channels simultaneously. Unit also has balance control, phono, tape, tuner, auxiliary, tape monitor, and tape output jacks. Headphone jack lets you listen to your favorite record or program without disturbing other persons in the room. Styled to match the AJ-1219 tuner.

Kit AA-1219, Shpg. wt. 15 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .149.95

### Give the budget-priced AJ-1219 Tuner

- Features 2 μV FM sensitivity

If you're on a tight budget, but still want a tuner that will give you good AM/FM reception, then order the AJ-1219 Tuner. The AJ-1219's preassembled and aligned FM front end provides 2 μV sensitivity with extremely low cross modulation and no overload, even on strong FM signals. A PLL (phase lock loop) multiplex circuit gives you a 40 dB typical, 35 dB minimum separation for that full, rich stereo sound. Unit features pushbutton band selection, lighted dial and stereo indicator. Comes in handsome metal case with stylish walnut veneer panels.

Kit AJ-1219, Shpg. wt. 12 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .149.95

VISA  Alaska, Hawaii and Michigan Residents: Call 616-982-3411

## Heathkit solid-state mono amplifier



- Takes just one evening to assemble

### 3.25 WATTS, MIN. RMS, INTO 8 OHMS WITH 1.5% THD FROM 40-20,000 HZ

The AA-18 amplifier takes the signal from a record player with ceramic cartridge, a tape player, or mono AM or FM tuner and cleanly amplifies it. Walnut-colored metal case. Fits on table-top. 120/240 VAC, 60/50 HZ. Measures 2⅝" H x 7¹¹⁄₁₆" W x 5⁵⁄₁₆" D.
Kit AA-18, Shpg. wt. 4 lbs. . . . . . . . . . . . . .**29.95**

## Last call on Stereo Mike Mixer



- Helps you mix studio-quality recording tapes

Great for taping audio-visual presentations, public address announcements, auditions, or personal use. Four mike and two auxiliary inputs allow you to mix music with voice. 60 dB gain permits use with 150 or 47K ohm mike. For 120/240 VAC, 50/60 Hz. Case with walnut-veneer panels. Measures: 5³⁄₁₆" H x 16" W x 9⅞" D.
Kit TM-1626, Shpg. wt. 12 lbs. . . . . . . . . .**179.95**

## New T-2M Tape deck takes metal tapes



- Gives you added frequency response

B·I·C's 2 speed cassette deck with Dolby N.R. goes from 1⅞ ips (30-18,000 Hz freq. resp., S/N of 62 dB with Dolby NR on) to 3¾ ips with a freq. resp. of 30-21,000 Hz and a S/N of 66 dB. With wow and flutter at 0.04% at 3¾ ips (0.06% at 1⅞ ips), six position bias & equalizer controls, you can match the T-2M to specs of non-metal & metal tapes. 120/240 VAC, 60/50 Hz. 6" H x 16¾" W x 9¼" D. Assembled.
ATP-1482, Shpg. wt. 15 lbs. . . . . . . . . . .**329.95**

## T-4M Metal Compatible Cassette Deck



- Distinguish highs and lows better
- 71 dB S/N
- Save $100

B·I·C's T-4M two speed cassette deck records/plays metal tapes. Three-head design offers off the tape monitoring. Separate tach-feedback capstan motor insures steady tape speed for studio quality recordings. Dolby NR reduces noise. Multiplexer filter switch for recordings off FM broadcasts. (see p. 27 for details).
ATP-1484, 22 lbs. . . .Was $799.95, Now 699.95
ATA-1484-1, Rack Mount, 2 lbs. . . . . . . . .**24.95**

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## ① Active Audio Processor cleans stereo's sound, boosts dynamic range

$**199**⁹⁵
- Sifts-out background noise and tape hiss, while it expands dynamic range

Tape decks and phono cartridges not only send your music to the amplifier, but also the annoying background noise and hiss. And some of the dynamic range gets strangled during the broadcasting and recording process of your music. The AD-1304 is designed to overcome these two problems.

First, it has three dynamic filters to strain out noise and hiss, without injuring your music. In fact, the AD-1304 will eliminate 10 dB of high frequency noise when there's no program material between 4 Hz and 15 kHz.

Second, the AD-1304 contains a separate expander section. This restores some of the dynamic range lost during broadcasting and taping. You get an increase of 7 dB, so your ears will catch the light sound of a brush sweeping a drum, or a full crescendo of a symphony orchestra.

And you can easily control both filters and the expander with finger slide controls and LED indicator lights located on the front panel. Unit connects between tape output and tape monitor jacks on most stereos.

With the AD-1304's three dynamic filters to wipe out hiss, and its dynamic range expander, the AD-1304 is a practical component to add to your stereo system. The brushed aluminum front panel and the solid walnut side panels also make the AD-1304 a stylish addition to your stereo system.

It's easy to build with our famous step-by-step instructions that are easy-to-read and understand. Order this kit today and get the most out of your system.
Kit AD-1304, Shpg. wt. 12 lbs. . . . . . . . . . . .**199.95**

AD-1304 SPECIFICATIONS: Rated Input: 200 mV. Input Impedance: 100K ohms. Gain: Expander off, 0 dB (unity) ±0.5 dB. Expander on, −3 dB to +4 dB. Frequency Response: +0, −0.2 dB from 20 Hz to 20 kHz. High Filter: 7 kHz, 12 dB/ octave roll off. Noise Reduction: 10 dB typical between 4 kHz and 15 kHz. Hum and Noise: −70 dB, 20 Hz to 20 kHz. Channel Separation: 50 dB at 1 kHz. Output Impedance: 500 ohms. Input Overload: 5 volts (RMS). Total Harmonic Distortion: 0.1% from 20 Hz to 20 kHz. Power Requirement: 120/240 VAC. 50/60 Hz, 15 watts. Dimensions: 4½" H x 17½" W x 8⅛" D.

## ② 5 Band, 2 Channel Audio Equalizer enhances frequency response

$**134**⁹⁵
- Tailors your treble, mid-range, and bass to fit your musical tastes

Room furniture, phono cartridges, tapedecks, and speakers sometimes smother your music's frequency response unintentionally. Result: you can't quite hear those cymbals clash in the background, or the bass overrides the voice of your favorite singing artist.

Our AD-1305 Audio Equalizer eliminates that problem. Five individual controls for each channel lets you enhance your highs through your lows, step by step, from 30 Hz to 32 kHz with no overlapping. So you'll hear those sizzling cymbals, that thundering bass, and the crispness of your vocalist's voice Everytime, all the time.

And the AD-1305 plugs into any receiver or amplifier equipped with a pre-amp output and power amp input, or tape monitor.

It's fun to build, and first-time kit builders will appreciate how the parts mount onto three simple circuit boards. Price includes case with solid walnut side panels and a brushed aluminum front panel.
Kit AD-1305, Shpg. wt. 11 lbs. . . . . . . . . . . . .**134.95**

AD-1305 SPECIFICATIONS: Input Impedance: 100k ohms. Output Impedance: 100 ohms. Rated Output: 1.5 V rms. Overload: 5 V rms. Signal-to-noise ratio: 90 dB below 1.5 V. Total Harmonic Distortion: 0.05% from 20 Hz to 20 kHz at 1.5 V output. IM Distortion: 0.05% at 1.5 volts. Frequency Control Range: (separate controls for each channel), 30-125 Hz, 125-500 Hz, 500-2000 Hz, 2000 Hz to 8 kHz, 8 kHz − 32 kHz. Overall Gain (flat): Zero dB (unity gain). Slope of Filters: 12 dB per octave. Power Requirement: 120/240 VAC, 60/50 Hz. Dimensions: 4⁵⁄₁₆" H x 17½" W x 8" D.

Credit Card Orders Call TOLL-FREE: 800-253-0570

# When it comes to computers, Heath won't leave you out in the cold

More than a slogan: It's Heath's total commitment to give you extra value for your computer dollar. Now with more software, more peripherals, more accessories — Heath offers one of the most complete and innovative computer lines anywhere. You get more versatility and flexibility — at affordable prices.

On selecting a computer: Do you want built-in peripherals for convenience, or the flexibility to design your own system? Can you expand memory power as your skills grow? How good is the software? Is it compatible with existing software? Will the manufacturer stand behind the computer? You can be sure of the answers when you select Heath.

## Choose from three very different computers for different people:

For convenience — the All-In-One H-89. If you're more interested in running software than in hardware and software development, the H-89 gives you a complete, balanced computer system in one package. It's powerful and very cost-competitive, with a personality that a first-time computer user will find comfortable. 100K of floppy disk capability is built-in. And you can now expand to 64K RAM and more than 2 megabytes of on-line storage. More on page 34.

For flexibility — the H-8. If you're interested in developing hardware or write physical I/O routines in Assembly language, the H-8 is for you. Its versatile bus-oriented architecture, 64K RAM capacity, expandability and hardware front panel position it as the right choice. See page 36.

For DEC™ compatibility — the 16-bit H-11A. If you need a computer for scientific uses, real-time systems or similar applications, and DEC PDP-11V03 hardware and software capability is significant, the H-11A is your choice. We offer a large selection of compatible hardware and software. See page 38 to learn more about the DEC compatible H-11A Computer.

## Heath introduces new software to meet your growing needs:

New operating systems let you use Heath's greatly-expanded on-line storage capabilities. Standard CP/M™ revolutionizes the world of Heathkit Computer Systems! One of the world's most popular operating systems, you can now take advantage of the hundreds of programs written with the ORG-0 version of CP/M. We offer BASIC™, FORTRAN™ and COBOL™ Languages, all specially designed for CP/M. A BASIC Compiler is also available. See pages 47 and 48.

UCSD Pascal is now available. This powerful system features excellent responsiveness to changing needs, clear readability and a large program library.

We've updated HDOS (the Heath Disk Operating System) for use with H-47 and 3-drive H-17 systems. Operating under HDOS, Microsoft's BASIC and FORTRAN Programming Systems bring these powerful languages to Heathkit Computer users.

Heath offers more languages — 3 versions of BASIC, Assembly, FORTRAN, and COBOL. With all these languages, you can run thousands of existing programs. And even more languages are coming soon!

SOFTSTUFF™ offers an expanding selection of software tools at affordable prices. Many new programs now — scores more on the way. For value and performance, SOFTSTUFF is good stuff. See page 50.

New applications programs include word processing, office aids and many others. See pages 45 and 48.

HUG (the Heath Users' Group) keeps you informed of new programs, as well as new Heathkit computer developments. Heathkit Computer owners can join HUG, which shares an extensive program library. See page 51 for full details.

Expand to over 2 megabytes of on-line storage with the new H-47 Floppy Disk System. Heath's first dual-sided, double-density 8-inch disk system offers more than eight times the on-line storage capacity of its predecessors. See page 40.

Heathkit Accessories — including new wire wrapping products, memory, interfacing and others — make your computer more useful. See page 35, 40 and 41.

You get complete, accurate documentation. Assembly, operating and instruction manuals are fully detailed.

Possible tax credit: ask your tax adviser about possible credits and deductions for business and investment uses of Heath Computers.

You get the convenience of one-stop shopping. Our complete computer line is available here in the Heathkit Catalog.

And we won't leave you out in the cold. Heath provides complete support after the sale. Expert technical advice is always available by phone, letter or in person. And the service specialists at Heath can help you keep your Heathkit Computer System working right.

# The Heathkit All-In-One Computer: extra convenience in a compact unit — new 64K RAM capacity, built-in video terminal, built-in floppy, greatly expanded software selection — all at an affordable price

**Only**
## $1695.00
for H-89

- 16K RAM standard, expandable to 64K
- Two Z-80 microprocessors — one for computer, one for video terminal
- Professional-style keyboard, 12-key numeric keypad
- Easy-to-read, 12-inch CRT displays up to 2000 characters
- Runs all Heath H-8 disk software

Are you looking for all the computing power and built-in peripherals you need — but your budget doesn't allow for extravagance? The Heathkit All-In-One Computer has the power, peripherals and convenience you need, for little more than "bare-bones" models.

This easy-to-operate 8-bit computer features separate Z-80 microprocessors for the computer and video terminal. Computer never has to share processing power with terminal, so the All-In-One can perform a variety of high-speed tasks.

The professional video terminal displays up to twenty-four 80-character lines (1,920 characters) at any one time. The terminal also features a special-purpose, non-scrolling 25th line, software-controlled.

The typewriter-format professional keyboard controls all terminal functions. The keyboard prints the entire ASCII set, upper and lower cases — along with 33 special graphics symbols for extra flexibility.

Select data rates up to 9600 through the keyboard. Direct cursor addressing lets you insert or delete characters anywhere on the screen. Control all 32 terminal functions from keyboard or computer. Reverse video lets you emphasize any portion of the screen by reversing white on black.

Designed in calculator format, the 12-key numeric keypad makes entering arithmetic programs faster and easier than before. Shifted functions give you control to make insertions or deletions.

You get more memory power. 16K of random access memory (RAM) is supplied. Built-in diagnostics make memory checks faster and easier. And we've expanded memory capacity — up to 64K RAM (using CP/M — 56K using HDOS) with accessories, so you can expand to meet your advanced computing needs.

The built-in floppy disk system gives you up to 100K bytes of on-line data storage capacity. You get fast, accurate access to data. You'll be able to load programs in seconds, update data fast. And the disk drive is factory assembled for easier kitbuilding.

If you need even more on-line storage, buy the H-77 5" Floppy Disk System. Designed for the All-In-One, the H-77 can give you up to 300K bytes on-line. (3-drive systems require Heath Disk Operating System, Ver. 1.6, HDOS, Ver. 2.0 (page 46) or Standard CP/M (page 47) Operating Systems.)

For maximum data storage — over 2 megabytes on-line — select the new H-47 8" Floppy Disk System. This dual-sided, double-density, dual-drive floppy disk system makes your All-In-One more versatile than ever before. (Requires WH-88-47 Interface, H-88-7 ROM Kit — sold on page 35; HDOS Ver. 2.0 or CP/M Operating Systems, sold on pgs. 46 and 47.)

You get H-8 compatibility. All Heath H-8 disk software runs on All-In-Ones with floppy disk storage.

Choose from our widest software selection ever! New HDOS (Ver. 2.0) and Standard CP/M operating systems — new SOFTSTUFF™ tools — new word processing software — new applications programs — and the Heath Users' Group, with over 500 applications and utility programs (pages 45-51).

You get more flexibility. A Serial Interface (p. 35) lets you use peripherals (with software). Cassette interfacing is standard on kit versions.

Save when you buy — and ask your tax adviser about possible tax credits. Requires HDOS, CP/M or similar operating system for normal operation.

Kit H-89, Shpg. wt. 78 lbs. . . . . . . . . . . . . .**1695.00**

Assembled All-In-One Computer with floppy, 48K RAM and serial I/O. Does not include cassette I/O.
WH-89-CA, 54 lbs. Mtr. Frt. . . . . . . . . . . . . .**2895.00**

H-88 All-In-One Computer, without floppy.
Kit H-88, Shpg. wt. 61 lbs. . . . . . . . . . . . . . .**1295.00**

Dust Cover for All-In-One. HCA-5-89, 1 lb. . . .**14.00**

H-89/WH-89-FA/H-88 SPECIFICATIONS: Clock: 2.048 mHz. Video Terminal: High-resolution CRT with P4 phosphor. Keyboard: 80 keys. Cursor: Blinking, non-destructive underline or block. Cursor Controls: Up, down, left, right, home, CR, LF, back space and tab. Cursor Addressing: Relative and direct. Tab: Standard eight-column tab. Refresh Rate: Same as AC line frequency. Edit Functions: Insert and delete character or line. Erase Functions: Erase from beginning of line, erase to end of line, erase from beginning of page, erase to end of page, erase line, erase page. Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 13" H x 17" W x 20" D.

## The H-89 All-In-One — more computer than the competition

| BRAND | TWO MICRO-PROCESSORS? | PROFESSIONAL SCREEN SIZE? | COMPLETE KEYBOARD? | BUILT-IN VIDEO DISPLAY? | ALL-IN-ONE CONSTRUCTION? | BUILT-IN FLOPPY? | STANDARD CP/M AVAILABLE? | 64K MEMORY CAPACITY? | PRICE* |
|---|---|---|---|---|---|---|---|---|---|
| Heath H-89 | YES (Two Z-80s) | YES 25 lines 80 char. | YES 80 keys, upper and lower cases, includes numeric keypad | YES High-resolution CRT | YES | YES | YES | YES | $1695 |
| Apple II | NO (Single 6502) | NO 25 lines 40 char. | NO (48 keys, no key rollover) | NO External TV or monitor | NO 5 pieces | NO (Extra) | NO | YES | $2170 |
| TRS-80 Model I Level II | NO (Single Z-80) | NO 16 lines 64 char. | NO (Upper case only, no control keys, no keypad entry) | NO Non-integral medium resolution CRT | NO (6 pieces) | NO (Extra) | NO | NO (48K) | $1945 |

*For systems with B/W video display, one 5¼" floppy disk drive, 48K RAM — as of 9/9/80. Does not include software.

## Design an All-In-One Computer System for your needs

We've opened up whole new worlds of capability, performance and software selection for All-In-One Computer owners.

With the All-In-One's uncommon flexibility, you can configure your own custom computer system.

Use this handy chart to select the memory, peripherals and accessories you need.

| Memory: | Mass Storage: | Interfacing: | Peripherals (require H-88-3 Interface) |
|---|---|---|---|
| 64K (CP/M — 56K HDOS) Expansion Set H-88-16 requires 48K RAM H-88-7 ROM Kit | Cassette ECP-3601A not for systems using H-47 Floppy | ROM Set for H-47, H-88-16, H-88-7 | Printer H-WH-14, H-24, WH-34, WH-44K WH-54 |
| 16K Chip Set H-88-2 can expand memory to 48K RAM — standard with WH-89 model | Floppy H-47 8" — requires WH-88-47 Interface H-88-7 ROM Kit | H-47 Interface WH-88-47 | Modem WH-13 |
| | | Serial 2-port H-88-3 | |
| | H-77 WH-87 (5.25" — requires H-88-3 and models) H-88-6 (see description, page 35) | Serial/Cassette for H-89, WH-89-CA H-88-5 | |

## Add even more versatility to your All-In-One Computer

**$595⁰⁰ Kit**

- Additional data storage capacity, easier copying of programs
- Each drive installs vertically to take up less space
- Build in 2 evenings

Designed especially for the All-In-One Computer, the H-77 Floppy Disk System gives you all the storage and programming capacity you need for most applications. When you use the H-77 with your All-In-One, you have room for up to three disk drives. You can mount operating system and program disks at the same time, for rapid access to programs and data. And because the H-77 is designed to work with the All-In-One, you'll have a harmonious system.

The storage media for the H-77 is the standard, hard-sectored 40-track diskette. Measuring just 5.25 inches in diameter, each floppy disk offers access to 100K bytes of program and data storage.

Disk drives install vertically, so the H-77 takes up less space. And each drive is factory assembled and tested, for easier kitbuilding.

You get the flexibility to add as much data storage capability as you need. You can add the H-77 to your H-89, or to your H-88 (with the optional H-88-4 Disk Drive) for two-drive capability and 200K bytes of on-line data storage. The H-77 comes with a diskette storage box which fits into the second drive housing, so your system looks neat and efficient.

Dr, for 3-drive capability and 300K bytes of on-line

storage, add the H-17-1 Second Drive to your H-77. For instant three-drive capability, the factory assembled and tested WH-87 — which includes two disk drives — can be used in place of the H-77/H-17-1. (NOTE: 3-drive systems require HDOS, Ver. 1.6, HDOS, Ver. 2.0 (HOS-817-1) or CP/M Operating System (HOS-817-2) — see pages 46 and 47.)

Expand the capability of your All-In-One today. No modification needed for use with All-In-One Computers purchased from this catalog. H-88-6 is recommended to connect H-77 with existing All-In-Ones.
Kit H-77, with one drive, 25 lbs. . . . . . . . . . . **595.00**
Dual-Drive Floppy Disk System Kit.
H-87, with two drives, 28 lbs. . . . . . . . . . . . **895.00**
Assembled Dual-Drive Floppy Disk System. No modification necessary to use with All-In-One Computers purchased from this catalog. Requires H-88-6 for connection to existing All-In-Ones.
WH-87, Shpg. wt. 28 lbs. . . . . . . . . . . . . . . **1195.00**
Backplate Modification Kit. Cables, junction box to connect WH-87 and future accessories to existing All-In-One Computers. Not required, but may be used to connect H-77 to existing All-In-Ones.
H-88-6, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . **50.00**

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H-77/WH-87 SPECIFICATIONS: Diskette Size: 5.25 inches. Diskette Type: Single-sided, single-density. Number of Tracks per Diskette: 40. Number of Sectors per Track: 10. Formatted Bytes per Sector: 256. (Diskettes not included.) Spindle Motor Speed: 300 revolutions per minute (rpm), +1 percent. Data Transfer Rate: 128 kilohertz. Motor Start Time: 1 second. Operating Temperature Range: 32 to 104 degrees F (0 to 40 degrees C). Power Requirement: 120/240 VAC, 50/60 Hz. Overall Dimensions: 8.625" H x 8.875" W x 15" D (21.9 x 22.5 x 38.1 cm). Net Weight: 22.5 lbs. (10.2 kg).

# Get immediate programming versatility and plug-in flexibility — with the popular, budget-pleasing Heathkit H-8 Computer

**Only**

## $299⁰⁰ Kit

- Fully-buffered bus has 7 plug-in positions for memory and I/O
- Heavy-duty power supply handles full complement of memory, I/O devices
- Over 2 megabytes of on-line data storage now available
- Built-in ROM monitor to control front panel program
- Fully supported with expanding software library, enhanced capabilities

The Heathkit H-8 — the computer that grows as you grow. With its 7 positions for plug-in modules, you can put together any combination of memory, interfacing and accessories. And our expanding selection of peripherals, accessories, operating software and applications software gives your H-8 Computer unmatchable versatility.

Novices can use the H-8 as a computer trainer. The 16-key front panel keyboard provides octal data entry, direct access to registers and memory, one-button program load and dump, and input/output keys to communicate directly with any port. And you can directly monitor program activity with the nine-digit front panel octal readout, which provides much more information than conventional computers.

The features we pack into the H-8 Computer mean extra value to you. A special heavy-duty power supply lets the H-8 handle up to 64K of memory (including interfacing). And our engineers have designed efficient convection cooling into the H-8.

The CPU board, including the 8080A chip, clock, systems controller and ROM monitor, is fully assembled, wired and tested for easier kit assembly and faster system setup. An exclusive Heath 50-pin fully-buffered bus gives you more room for memory and interfacing. The built-in speaker gives you audible feedback and special effects. Front panel lights keep you up to date on status. With all these features and more, the H-8 is an excellent choice to be the heart of your computer system.

Heathkit floppy disk systems, sold separately, provide greater flexibility. The H-17 (page 37) provides up to 100K bytes of on-line data capacity. Add a second drive to expand capacity to 200K bytes. And now, with the new H-17-3 Modification Kit, you can add a third floppy disk drive to your present H-17, expanding on-line data capacity to 300K bytes.

**Expand to over 2 megabytes on-line!** The new H-47 Floppy Disk System, our 8-inch, dual-sided, double-density system, brings the H-8 Computer into the megabyte age of data storage. See page 40.

You get total freedom to design a system that meets your specific needs. Start with an H-8 System Package — kit or assembled (below, left). Or design your own H-8 system from an expanding selection of peripherals and accessories — including additional memory and data storage, video terminals, color graphics, printers, a music synthesizer system and a modem.

**Choose from an expanding software library.** We continue to support the H-8 with new, more versatile operating systems — a new version of the Heath Disk Operating System (HDOS) and Standard CP/M™. More languages, too — Microsoft's BASIC™, FORTRAN™, COBOL™ and BASIC Compiler.

Many new applications programs are being introduced — including problem-solvers for home, hobby and business. And the Heath Users' Group maintains over 500 programs — from business accounting and personal budgeting to computer-aided instruction, exciting games — even weather forecasting! Turn to pages 45-51 for the full story.

**Get the flexibility you need — at a budget-pleasing price.** Requires at least 4K memory (p. 41).

Kit H-8, Shpg. wt. 30 lbs. . . . . . . . . . . . . . . . . .**299.00**
WH-8, Assembled Computer, 30 lbs. . . . . . . .**399.00**
PAMGO ROM. Boot up w/1 or 3 buttons, instead of 11.
H-8-9, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . .**20.00**
Extended Configuration Option. Required to run H-47 Floppy Disk System or CP/M Operating System with H-8 Computer. Includes replacement front panel read-only memory (ROM).
HA-8-8, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . .**65.00**
Oust Cover for H-8. HCA-5-8, 1 lb. . . . . . . . . .**14.00**
Look at the Manuals — with no risk. Manuals for H-8, H-8-4 Interface, H-14 Printer, WH-8-16 Memory Board, H-19 Terminal. When you order the H-8 Computer, deduct $30.00 from the purchase price (excluding shipping and handling charges).
HM-800, Shpg. wt. 11 lbs. . . . . . . . . . . . . . . . .**30.00**
NOTE: Product manual also included with each kit.

**H-8/WH-8 SPECIFICATIONS: Microprocessor:** 8080A. **Monitor:** In on-board 1K x 8 ROM. Octal addresses, data input and display from the front panel. **Monitor Functions:** Memory display and alter, register display and alter, memory load and dump, single instruction execution, program execution, port input and output. **Clock:** 2.048 mHz. **Interrupts:** Seven, priority vectored. **Power Supplies:** +8 VDC at 10 amperes maximum, regulated to +5 VDC on each circuit board; +18 VDC at 500 milliamps, regulated to +12 VDC and −5 VDC on the CPU circuit board. **Chassis Capacity:** Seven locations on the mother circuit board for memory or interfacing cards. Four memory cards maximum. One bus expansion maximum. **Operating Temperature:** 32 degrees F to 104 degrees F. **Power Requirement:** 120/240 VAC, 50/60 Hz. **Dimensions:** 6.5" H x 16.25" W x 17" D (16.51 x 41.28 x 43.18 cm).

## How to configure a Heathkit H-8 Computer System

With 7 plug-in positions for memory and I/O, your H-8 Computer System can grow as your needs grow. You can expand to 64K of memory, and up to over 2 megabytes of on-line data storage. You'll find that the tremendous benefits provided by our many new products is well worth your hard-earned computer dollar.

| | | | |
|---|---|---|---|
| **Memory:** (4 cards, up to 64K) | | | Wired 16K WH-8-16 |
| **Mass Storage:** | | Cassette ECP-3801A (requires H-8-5 Interface) | Floppy: H-17 (5.25" — requires minor modifications, HA-8-8) Ext Configuration to run CP/M; H-47 (8" — requires HA-8-8, WH-8-47) |
| **Interfacing:** | Wired H-47 Interface with 2 Serial Ports WH-8-47 | Serial/Cassette 1-port H-8-5 | Serial 4-port H-8-4 · Parallel 3-port H-8-2 |
| **Peripherals:** | Terminal H-9, H-19 (requires H-8-4, H-8-5 or WH-8-47) | Color Display GDZ-1320 (requires HA-8-3 Board) | Printers H/WH-14, WH-24, WH-44K, WH-54 (requires H-8-4 or WH-8-47) · Modem WH-13 (requires H-8-4, H-8-5 or WH-8-47) |

# Instant access and increased data storage capacity — yours with the H-17 Floppy Disk System

## $575.00 Kit

- Up to 300K bytes of on-line data storage (using accessories) — with instant access to any program
- Take advantage of all the new disk-based H-8 software programs
- Assembled and tested drive system

Make your H-8 Computer System a total versatility system — with the H-17 Floppy Disk System. With the H-17, you get the data storage capacity you need to load programs quickly. Store hundreds of programs on a single disk and have rapid access to any one of them, anytime you need it.

The H-17 provides up to 100K bytes of on-line data storage (up to 300K bytes with additional drives — order at right). Data is stored on standard, hard-sectored 40-track diskettes — just 5.25 inches in diameter. Disks are easier to handle — and load — than paper tape or cassettes.

The H-17 includes a single disk drive, a disk interface/controller circuit board which plugs directly into the H-8's mainframe, and a built-in power supply. Because the H-17 Floppy Disk System is especially designed for the H-8 Computer, you get a harmonious computer system that interfaces properly and runs smoothly.

> See the expanding line of systems and applications software for the Heathkit H-8 Computer — including the complete new line of SOFTSTUFF™ software tools, new utility programs and the Heath Users' Group software library, with more than 500 useful programs. Turn to pages 45-51.

The H-17 uses the famous Siemens 82 single-drive system, a performance-proven 5.25-inch floppy disk drive which provides accurate high-speed access to data. The assembled Siemens drive performs much better than most equivalent drive systems.

For more data storage area, add the optional H-17-1 Second Drive and make your H-17 a more versatile dual-drive floppy disk system. With two drives, you'll have up to 200K bytes of program and data storage area. You'll be able to run operating system and program disks at the same time.

If you need even more on-line data storage capacity, buy the new H-17-3 Three-Drive Modification Kit, which includes one disk drive. Add this kit to your H-17 to get up to 300K bytes of on-line storage — 50% more than on previous versions. With the H-17-3, your H-17 can provide even more versatility.

To use the H-17 Floppy Disk System effectively, you need an H-8 Computer with at least 16K of Random Access Memory (RAM), as well as a Heathkit disk-based operating system, sold on pages 46 and 47.

Your choice of operating systems include: HOS-817-1 Heath Disk Operating System (HDOS), a new issue (Ver. 2.0) which now supports 8-inch drives and 3-drive systems; and HOS-817-2 Standard CP/M, one of the most popular operating systems for microcomputers — with hundreds of existing utility and applications programs available worldwide.

Kit includes one blank 5.25-inch floppy diskette.
Kit H-17, with one drive, 28 lbs. . . . . . . . . . . 575.00

Factory Assembled and Tested H-17 Floppy Disk System. Comes with the same extra-value features found on the kit version above. W/one drive.
WH-17, Shpg. wt. 28 lbs. . . . . . . . . . . . . . . . 645.00

**NEW** Three-Drive Modification Kit. Make your H-17 a 3-drive system, with up to 300K bytes on-line — 50% more than previously available. Enjoy even more programming flexibility and versatility. Includes new sheet metal, fan and power supply components, 3-drive cable. Easy kit assembly. Requires H-17 or WH-17 Floppy Disk System.
Kit H-17-3, Shpg. wt. 8 lbs. . . . . . . . . . . . . . . 79.00

Optional Second or Third Drive adds versatility to your H-17. Run operating system and program disks simultaneously. Up to 200K bytes of on-line storage.
H-17-1, Assembled, Shpg. wt. 5 lbs. . . . . . . . 325.00

Dust Cover for H-17 Floppy Disk System.
HCA-5-17, 1 lb. . . . . . . . . . . . . . . . . . . . . . . . 14.00

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H-17/WH-17 SPECIFICATIONS: Storage Media: 5.25-inch, hard-sectored diskette. Number of Tracks per Diskette: 40. Number of Sectors per Track: 10. Formatted Bytes per Sector: 256. Drive Type: Siemens Model 82. Track Seek Time: 30 milliseconds. Random Sector Access Time: Less than 250 milliseconds. Power Requirement: 120/240 VAC, 50/60 Hz, 75 watts. Dimensions: 6.25" H x 13.5" W x 13.5" D (15.89 x 34.29 x 34.29 cm).

# DEC®-compatible educational/science computer for laboratory and scientific applications — available at a price you can afford

Only
**$1195⁰⁰** Kit

- DEC half-size KD11-HA (LSI-11/2) CPU
- Full compatibility with DEC PDP-11/03 — at a fraction of the cost
- Choose from a wide variety of DEC-compatible software programs
- Room for up to 56K bytes (28K words) of memory
- Plug-in flexibility — with seven plug-in positions for memory and interfacing
- Rugged, long-life construction
- 16-bit computing power

Designed with full DEC LSI-11 compatibility, the Heathkit H-11A Computer offers the versatility and flexibility you need to perform DEC programs and real-time laboratory applications.

The H-11A uses the same microprocessor, memory I/O and operating system as the DEC LSI-11, and runs all software designed for the DEC PDP-11/03. You can choose from a vast selection of practical programs to run your home more efficiently, to reduce the clerical costs of your business and to process all types of data more efficiently than before.

The 16-bit vs. 8-bit issue: Your choice of a 16-bit or 8-bit computer depends upon your needs. If you're a professional who needs full DEC compatibility, the 16-bit H-11A is your choice. The H-11A has adequate computing power, even for the more complex and sophisticated jobs that you will be tackling later.

The H-11A features the physically smaller KD11-HA Microcomputer Module (a half-size LSI-11/2 microprocessor). That makes the Heathkit H-11A identical to the DEC PDP-11/03, but at a fraction of the cost. There's no on-board memory, so the KD11-HA Microcomputer Module gives you more flexibility to match your ROM, RAM and interfacing requirements to your particular needs.

This smaller configuration allows you to put more computing versatility into the H-11A by providing an extra plug-in slot for additional memory or I/O interfacing. The H-11A's total of seven plug-in slots lets you add any combination of ROM, RAM and interfacing, up to a maximum memory capacity of 56K bytes. And full compatibility with the LSI-11 family means you can combine components from both the LSI-11 and LSI-11/2 families.

Features of the KD11-HA Microcomputer Module include a PDP-11/34 instruction set, a raw computer speed of 380 nS microcycle time, resident firmware debugging (ODT) and ASCII console routines, as well as single and double operand instructions. With the KD11-HA Microcomputer Module, you set the capabilities you need for effective system configurations.

The extra-value features built into the H-11A Computer ensure longer life and greater return on your computer investment. A switching power supply uses less electricity than other power supplies, which saves money. And it generates less heat than other supplies, which prolongs the life of the H-11A. The H-11A Computer features a rugged steel chassis and an extra-thick backplane to help ensure long, reliable performance.

Available in economical, easy-to-build kit form — or in factory assembled and tested form, the basic Heathkit H-11A Computer includes a handsome cabinet, a heavy-duty power supply, and a backplane that includes the bus and a fully-assembled CPU board. You can add your selection of optional memory and I/O accessories to the mainframe.

Learn by building it yourself. What better way is there to get to know your computer than by building it yourself? The Heathkit H-11A Computer lets you understand it better. You can build it yourself

and benefit from the knowledge — and the savings. Like all Heathkit computers, the H-11A comes with an easy-to-follow assembly and operation manual. When you build it yourself, you can also perform more of the service steps yourself, to keep your computer in top operating form. A nationwide network of Heathkit service centers are ready to help you with technical advice and expert service.

Whether you buy a full Heathkit H-11A Computer System or the computer itself, compare the price of the Heathkit H-11A with comparable 16-bit computers. Buy this DEC compatible Heathkit computer and find out why the combination of advanced design and quality components make the Heathkit H-11A Computer one of the best 16-bit computer values anywhere. For 120/240 VAC, 50/60 Hertz, 200 watts maximum power consumption. Dimensions, 6.5" H x 19" W x 17" D (16.5 x 48.3 x 43.2 cm).

Kit H-11A, Shpg. wt. 43 lbs. . . . . . . . . . . . . .1195.00

Factory Assembled and Tested H-11A Computer. WH-11-UL, Shpg. wt. 37 lbs. . . . . . . . . . . . . 1995.00

Modification Kit for H-11/H-11A Computers. This special modification kit places the line time clock switch on the front panel for easier access. It's easy to assemble, and includes an entirely new front panel.

Kit 830-35, Shipping charges prepaid . . . . . . .53.50

Look over the Manuals before you buy. Complete assembly and operation manuals for the Heathkit H-11A Computer, the H-11-2 Parallel Interface, the H-11-5 Serial Interface and the H-9 Video Terminal.

Get a first-hand look at the accurate, easy-to-follow Heathkit assembly manuals that take you step-by-step, from unpacking to final plug-in. Know your H-11A Computer System inside out — before buying. And when you do buy the H-11A Computer, we'll deduct the price of this manual set.

HM-1100 Manual Set, Shpg. wt. 12 lbs. . . . . .30.00

DEC, DIGITAL and PDP are registered trademarks of Digital Equipment Corporation.



H-11A/WH-11A SPECIFICATIONS: Central Processing Unit: Uses DEC KD11-HA CPU. Word Length: 16 bits. Instruction Set: PDP-11/03. Memory: Directly addresses 32K. I/O Addressed: 28K to 32K. RAM/ROM: 0 to 28K. Backplane: Eight 2-wide module slots. Power Supply: Overcurrent and overvoltage protected, switching regulator. Internal fan for cooling. Power Requirement: 120/240 VAC, 50/60 Hz, 200 watts maximum. Power Outputs: +5 VDC at 15 amperes max., and +12 VDC at 3 amperes maximum. Dimensions: 6.5" H x 19" W x 17" D (16.5 x 48.3 x 43.2 cm).

## Configure your own H-11A Computer System

With seven plug-in positions for memory and I/O, you can design a Heathkit H-11A Computer System to meet your exact needs. Choose from a full selection of memory, interfacing and peripherals to complement your H-11A Computer. And with full DEC compatibility, you can be sure to get full use from all H-11A hardware and software.

**Memory:** (Max. 30K words)
- Wired 4K WH-11-1
- Wired 16K WHA-11-16

**Mass Storage:**
- Floppy H/WH-27

**Interfacing:**
- Serial H-11-2
- Parallel H-11-5

**Peripherals:**
- Video Terminals H-9, H/WH-19
- Printers H/WH-14, WH-24, WH-34 (DEC)
- Modem WH-13

Credit Card Orders Call TOLL-FREE: 800-253-0570

Shown with optional
830-35 LTC Switch

## H-27 Floppy Disk gives much faster access to data and information

$1995.00 Kit

- Full compatibility with DEC RX01 (PDP-11V03) system
- Z-80 microprocessor-based controller
- Uses larger 8" floppy disks with greater capacity
- Dual-drive system for more on-line storage — up to ½ Meg bytes
- Fast 6 mS head step time

The Heathkit H-27 Floppy Disk System gives you dual-drive versatility, with a total of ½ Meg bytes of on-line program and data storage area — enough room for most of your general-purpose application needs. The H-27 stores data and information on 8-inch floppy disks, which are compatible with equipment using the IBM 3740 format.

The Z-80 microprocessor-based disk controller in the Heathkit H-27 Floppy Disk System provides an average data access time of 250 milliseconds. This means you will have very fast access to data.

You get full compatibility with DEC and RXV11 RX01 (PDP-11/03 and PDP-11V03) hardware and software when you use the Heathkit H-27 Floppy Disk System. This gives you the capability of using the hundreds of application programs written by users of the DEC PDP-11, one of the most popular microcomputers. Performance-proven hardware and software bases, including the Heathkit H-11A Computer, provide outstanding computer power.

See the full line of software for the H11A Computer, including the FORTRAN language, on pages 46 and 47.

While compatible with the DEC systems, the H-27 Floppy Disk System gives you even more. A built-in self-test diagnostic, which operates during power-up, protects existing programs on your disks. A mechanical interlock prevents accidental damage to data and information — if the floppy disk is not seated properly, the door will not close and the H-27 Floppy Disk System will not operate. A write-protect function protects important files and programs from being inadvertently written over. And a reformatting procedure gives you the capability of initializing a diskette with the standard IBM 3740 format.

A single-board bootstrap/interface circuit uses just one backplane slot on the Heathkit H-11A Computer, leaving more space for memory and I/O additions to your Heathkit H-11A Computer System. The H-27 Floppy Disk System measures 7.75" H x 18" W x 20" D. It operates on 120 or 240 VAC, 60 Hz power, and draws a maximum of 240 watts. To use the full capabilities of the HT-11 Operating Systems Software, which is designed for used with the Heathkit H-27 Floppy Disk System, you need a Heathkit H-11A Computer with at least 16K words of memory.

Kit H-27, Shpg. wt. 93 lbs., Motor Freight . . **1995.00**

Assembled WH-27 Dual-Drive Floppy Disk System.
WH-27, Shpg. wt. 69 lbs., Motor Freight . . . **2595.00**

Package of 5 Blank 8-Inch Floppy Disks for the Heathkit H-27 Floppy Disk System, supplied in standard IBM 3740 format.
HCS-62, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . **25.00**

H-27/WH-27 SPECIFICATIONS: Diskette: 8-inch. Capacity (8-bit bytes, IBM 3740 format): 256,256 bytes per diskette; 3,328 bytes per track; 128 bytes per sector. Recording Surfaces Per Diskette: One. Tracks Per Diskette: 77 (0-76 or 0-114[8]). Sectors Per Track: 26 (1-26 or 1-32[8]). Bit Density: 3200 bpi at inner track. Track Density: 48 tracks per inch. Recording Technique: Double frequency. Data Transfer Rate: Diskette to Controller Buffer: 4 µS/data bit (250k bps). Track-To-Track Move: 6 mS/track maximum. Head Settle Time: 15 mS maximum. Rotational Speed: 360 rpm, ±2.5%; 166 mS/revolution nominal. Average Access: 250 mS, calculated as follows: Seek (77 tracks/8.3) x Settle (3 mS + 15 mS) + Rotate (166 mS/2) = Total (250 mS). Temperature: Operating: 59 deg. F to 90 deg. F (15 deg. C to 32 deg. C) ambient. Maximum Temperature Gradient: 20 deg. F/hr (11.1 deg. C/hr). Non-Operating: −30 deg. F to +140 deg. F (−35 deg. C to +60 deg. C). Diskette Non-Operating: −30 deg. F to +125 deg. F (−35 deg. C to +52 deg. C). Humidity: Operating: 77 deg. F (25 deg. C) maximum wet bulb; 36 deg. F (2 deg. C) minimum dew point, 20 to 80% relative humidity. Non-Operating: 5 to 98% relative humidity (no condensation). Diskette Non-Operating: 10 to 80% relative humidity. Power Requirement: 120/240 VAC, 60 Hz, 240 watts maximum. Interface Module Power Requirement: 5 VDC, 1 amp typical, 1.5 amps maximum. Dimensions: 7.75" H x 18" W x 20.75" D (20.32 x 45.72 x 52.71 cm). Net Weight: 61 lbs. (27.67 kilograms).

## Heathkit peripherals help your computer do more than ever before

### 1 Create color graphics with your H-8 Computer

**$395⁰⁰** Uses advanced TI-9918 Color Video Generator — connects to GDZ-1320 (below), other video devices accepting composite NTSC signals. Programmable Sound Generator makes most any desired sound. Eight A/D conversion channels for up to 4 X-Y joystick consoles (not included); joystick inputs support games w/up to 4 players. Socket for AMD-9511 Arithmetic Processor Chip (not supplied). Demonstration software on 5.25" disk; more software under development. Proper operation guaranteed only when used with Heath memory boards — or other boards using fully static single-supply ROMs. Available late December.

HA-8-3, Shpg. wt. 8 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**395.00**

### 2 Add Zenith color video to your computer system

**$399⁹⁵**
Assembled

- 13-inch (diagonal) color video display
- Accepts composite color video signal from computers, VCRs, cameras

The Zenith Color Video Display is the ideal complement for the HA-8-3 Color Graphics Board, any VCR or color camera. Accepts composite NTSC video, Hi-Z audio inputs. RCA phono jack for video, miniature phone jack for audio, built-in audio amplifier/speaker. 120 VAC, 60 Hz. 14" H x 20.25" W x 14.75" D.

GDZ-1320, Assembled, Shpg. wt. 44 lbs. . . . . . . . . . . . . . . . . . . . . . . . .**399.95**

### 4 Move up to over 2 megabytes on-line!

**NEW $2595⁰⁰** Kit
- The H-47 — our first 8" disk system
- Supplied with two disk drives
- Fully compatible with Heathkit 5.25" systems — supported with HDOS and CP/M™

A quantum leap in capability and performance for Heathkit computer systems! Over 2 megabytes of on-line data and program storage: With the H-47, Heathkit computer systems join the megabyte age of data storage. Each 8-inch floppy disk can hold over 1 million bytes of data. Because the H-47 is supplied with two disk drives, this means you can have over 2,000,000 bytes of data on-line at any one time — more than 6 times our previous maximum capability.

Less than half the access time: 191 mS — compared to the 490 mS time of currently available disk systems for the H-8 and All-In-One.

Move up to new software capabilities: With the H-47, you can now run new HDOS and CP/M Operating Systems — opening the door to thousands of useful programs. And you can transfer data between 8" and 5.25" disks at any time.

Includes 40-conductor flat cable for connection to H-8, All-In-One. Requires

WH-8-47 Interface and HA-8-8 Extended Configuration Option for H-8; WH-88-47 Interface, H-88-6 Backplate Modification Kit and H-88-7 ROM for All-In-One.

Kit H-47, Shpg. wt. 87 lbs. Available late December . . . . . . . . . . . . . . .**2595.00**
WH-47, Assembled Floppy Disk System, Shpg. wt. 66 lbs. . . . . . . . . . . .**3500.00**
Wired H-47 Interface with 2 RS-232C Serial Ports, for H-8.
WH-8-47, Shpg. wt. 2 lbs., Available early December . . . . . . . . . . . . . . . .**235.00**
HA-8-8, Extended Configuration Option for H-8, Shpg. wt. 1 lb. . . . . . . . . . .**65.00**
Wired H-47 Interface for All-In-One Computer. WH-88-47, 2 lbs. . . . . . . .**195.00**
H-88-6, Backplate Modification Kit for All-In-One Computers, 2 lbs. . . . . .**50.00**
H-88-7, Replacement ROM for All-In-One Computers, 1 lb. . . . . . . . . . . . . .**55.00**

H-47 SPECIFICATIONS: Number of Tracks per Surface: 77. Recording Density: Outer Track, 1836 BPI single — 3672 BPI double; Inner Track, 6536 BPI. Track Density: 48 tracks per inch. Data Transfer Rate: Rotational Speed: 360 rpm, ±2.5%. Average Rotational Latency: 83.3 mS. Average Seek Time: 78 mS. Head Settle Time: 15 mS. Average Access Time: 191 mS, including settle. Power Requirement: 120/240 VAC, 50/60 Hz, 204 Watts. Overall Dimensions: 10.2" H x 18.9" W x 18" D.

### 3 Professional Video Terminal with full features

Only
**$675⁰⁰** Kit
- Z-80 microprocessor-based, prints full ASCII set with complete keyboard, numeric keypad
- DEC VT-52™ software-compatible

Exceptional capabilities now: 32 functions can be controlled from keyboard or computer. A 12-key pad allows fast entry of math programs. Keyboard-selectable baud rates to 9,600. Eight user-function keys give you extra flexibility.

Displays the entire ASCII character set (upper and lower case) — as well as 33 graphics characters, which can be arranged for a variety of effects. Prints 24 80-character lines (with software-controlled 25th line). Direct addressing lets you make corrections or edit, anywhere on the screen.

The H-19's ROM listing is now available (p. 45) to help you understand how this powerful, versatile video terminal operates — or to allow you to alter its personality and cursor control protocols to match those of other terminals.

Even more on the way: By early 1981, you'll be able to convert your H-19 into an H-88 All-In-One Computer. 120/240 VAC, 50/60 Hz. 13" H x 17" W x 20" D.

Kit H-19, Shpg. wt. 54 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**675.00**
WH-19, Assembled Video Terminal, Shpg. wt. 43 lbs. . . . . . . . . . . . . . . . .**995.00**
NEW! ROM Listing for H-19. HOS-1-SL, 11 lbs. . . . . . . . . . . . . . . . . . . . . .**195.00**
NEW! Dust Cover for H-19. HCA-5-89, 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . .**14.00**
NEW! Fabric Anti-Glare CRT Filter. HCA-4, Shpg. wt. 1 lb. . . . . . . . . . . . . .**19.95**
NEW! Plastic Anti-Glare CRT Filter. HCA-3, Shpg. wt. 1 lb. . . . . . . . . . . . . . .**8.95**

Credit Card Orders Call TOLL-FREE: 800-253-0570

# H-11A Accessories and Interfacing gives you added flexibility

**Assembled 4K Memory Expansion Module.** Plugs into backplane, adds 4K x 16-bit word capacity to memory. Uses reliable 1K x 4 static MOS RAM chips. Access time, less than 500 nS. Decode circuitry to operate on 4K address boundaries. Handle for easier installation/removal. Assembled, tested.
WH-11-1, Assembled, Shpg. wt. 2 lbs. .............................95.00

**Assembled 16K Memory Expansion Module.** 16K dynamic MOS Random Access Memory (RAM) on a 5" x 8.5" board. On-board refresh, 570 nS cycle time, 250 nS access time. Fully expand memory with only two of these expansion modules. Maximum memory capacity of the H-11A Computer is 28K words.
WHA-11-16, Shpg. wt. 2 lbs. .......................................480.00

**Extended Arithmetic Chip** adds powerful mathematical instructions to any LSI-11 Computer. Instructions include fixed point multiplication, division and extended shifts. Also includes full floating point addition, subtraction, multiplication and division operations. This extended arithmetic chip minimizes the need for subroutines and saves memory space in your computer.
H-11-6, Shpg. wt. 1 lb. .............................................190.00

**Serial Interface.** Use this interface between the bus of any LSI-11 Computer and serial peripherals (like video terminals and line printers). EIA or optically isolated 20 mA current loop interfaces are available. Baud rates between 50 and 9600 are selectable. This serial interface is fully compatible with PDP-11V03 Computers, as well as other LSI-11 machines. It plugs directly into the LSI-11 backplane. Includes mating connectors. To interface the WH-24-1/TI-810 Teleprinter to the H-11A, order WHA-11-5 Interface (page 41).
Kit H-11-5, Shpg. wt. 2 lbs. .......................................105.00
WH-11-5, Assembled, Shpg. wt. 1 lb. ...............................150.00
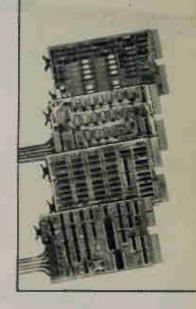
**Adapter Cable for H-11-5 Serial Interface.** This fully assembled cable provides EIA interfacing between the H-11-5 Serial Interface and other peripherals.
WH-11-51, Assembled and Tested,
Shpg. wt. 1 lb. ..................15.00

**Parallel Interface.** Provides 32 latched input/output lines, 16-bit word transfers and an LSI-11 interface, as well as control logic for interrupt processing and vectored addressing. Control status registers are compatible with PDP-11 software routines. Includes four control lines, data ready and accepted operations. Maximum data transfer rate is 90K words per second. Drives cable up to 25 feet long. Compatible with TTL and DTL devices.
Kit H-11-2, Shpg. wt. 2 lbs. .....95.00

**Factory Assembled and Tested Parallel Interface for H-11A.**
WH-11-2, Assembled, 1 lb. .....150.00

**NEW! Wire Wrapping Board for H-11A.** Design custom circuits. High capacity for sophisticated circuits. Punched, etched double-sided board with room for 32 16-pin IC sockets (also 38 14-pin, or other combinations). With card extractor, hardware. See H-8-10 for full description. Uses HCA-6, HCA-7 below.
H-11-10, Shpg. wt. 1 lb. ..........................................30.00

# H-8 Accessories, Interfacing give your computer more capability



## Accessories expand the world of your H-8

**Boot up faster with PAMGO ROM.** Boot with 1 button on power-up/3 on reboot, instead of the usual 11. 2708-compatible masked, programmed ROM is exactly like the H-8 front panel ROM — except that on power-up or reset, it sets the program counter to a 030 000 split octal default address. PAMGO ROM makes booting up a breeze.
H-8-9, Shpg. wt. 1 lb. ..............................................20.00

**Extender Board** lets you operate your H-8 with accessory boards outside card cage. Allows easy access for servicing, prototyping or debugging.
HA-8-1, Shpg. wt. 1 lb. .............................................40.00

**Music Synthesizer System.** Board connects to stereo system with two shielded cables (included). True D/A converter provides excellent 27.5-3300 Hz frequency response, up to 9 harmonics. 4-part harmony (voices) in stereo. Enter any song, right from conventional sheet music — even if you've never read music before. Documentation shows how to get maximum enjoyment. Software on 5.25" disk. Requires min. 24K memory, H-17 Floppy, terminal.
HA-8-2, Assembled, Shpg. wt. 3 lbs. ...............................159.00

**Color Graphics Board.** Includes TI-9918 Color Video Display Generator — the most advanced available. Connects to GDZ-1320 (preferred-p. 40), VTR video input or UHF TV RF Modulator. Contains AY-3-8910 Programmable Sound Generator, capable of making nearly any sound desired for your game or other application.
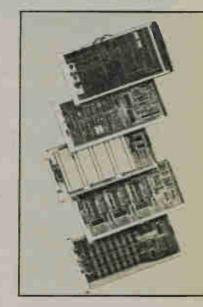
Eight channels of A/D conversion for up to 4 X-Y joystick consoles (not included). Each console has 4 bits of parallel I/O for switches, LEDs. Socket provided for AMD-9511 Arithmetic Processor Chip (not supplied). Permits extremely rapid floating point, trigonometric and transcendental computations — as well as hardware multiplication/division of both integer and floating point numbers.

Demonstration software supplied on 5.25" disk; additional software to be offered by SOFTSTUFF™ in near future. Due to use of wait states and 18 VDC power requirement, proper operation guaranteed only when used with Heath memory boards — or other boards using fully static single supply RAMs. Available late December.
HA-8-3, Shpg. wt. 3 lbs. ...........................................395.00

**Wired H-47 Disk Interface with 2 RS-232C Serial Ports** interfaces H-8 with H-47, as well as line printers, video terminals and other serial devices.
WH-8-47, Assembled, Shpg. wt. 2 lbs., Avail. early Dec. ...........235.00

**Extended Configuration Option** allows H-8 to run with H-47 and/or CP/M.
HA-8-8, Shpg. wt. 1 lb. .............................................65.00

**16K Wired Memory Board** expands memory power. Assembled, tested, factory burned-in to eliminate memory problems.
WH-8-16, Assembled, 2 lbs. ....299.00

**4-Port RS-232C Serial Interface w/modem** controls. One port switch-programmable for 20 mA loop. Software programmable baud rate. Solderless addressing, vector interrupt jumpers. Connector for DCE, DTE modes. W/WH-8-41 Cable.
Kit H-8-4, Shpg. wt. 2 lbs. ......175.00
WH-8-4, Assembled, 3 lbs. ......250.00
WH-8-41, Adapter Cable, 1 lb. ....15.00

**Serial/Cassette Interface.** 1200 baud, with 1 serial port for ctrl. terminal. NOTE: Not to connect H-8 to H-14.
Kit H-8-5, Shpg. wt. 3 lbs. .......95.00
WH-8-5, Assembled, 2 lbs. ......120.00
WH-8-51, Adapter Cable, 1 lb. .....15.00

**Parallel Interface.** 3 ports, each w/8 bits I/O, universal handshaking.
Kit H-8-2, 3 lbs. ..............150.00

**Circuit Design Breadboard Card.** Custom design analog, digital circuits. Includes 5 VDC power supply. Reusable.
Kit H-8-7, 2 lbs. ...............90.00



## Design, build custom circuits for your H-8

**H-8 Wire Wrapping Board.** Greater capacity than H-8-7. Punched, etched board accepts 80 16-pin, 96 14-pin sockets (also 14, 16, 24, 40-pin types). Accepts 3 50-pin flat cable connectors. W/bus connectors, heat sink, 5V regulator, misc. hdwe. Uses HCA-6, HCA-7.
Kit H-8-10, Shpg. wt. 1 lb. .......................................29.95

**Wire Wrapping Kit.** With wire wrapping tool, 50 ft. roll of wire, pre-cut wire in 1"-4" lengths (50 wires per package), pre-stripped 1" on both ends.
Kit HCA-6, Shpg. wt. 1 lb. ........................................12.95

**Wire Wrapping Socket Kit.** Total of 36 three-level wire wrapping sockets (12# 14-pin, 10# 16-pin, 8# 18-pin, 3# 20-pin, 2# 24-pin, 1# 40-pin).
Kit HCA-7, Shpg. wt. 1 lb. ........................................29.95

## Low-cost, microprocessor-based Line Printer provides hard copy
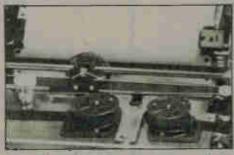
**NOW SAVE**
**$100⁰⁰**
on assembled
model

- Packed with extra features you won't find on comparably priced line printers
- Use with most any computer — communicates via RS-232C or 20 mA loop interfacing

The Heathkit H-14 Line Printer brings hard-copy value and performance comparable to units costing $1000 to $1500 — for hundreds of dollars less. Hard copy provides added convenience in reading, editing, debugging and modifying your computer programs. The H-14 can also provide handy printed copies of address lines, lists or other data you need for any of your personal or business applications.

The H-14 prints the standard 96-character ASCII set (upper and lower case) on a 5 x 7 dot matrix print head. Uses readily available 0.5-inch nylon inked ribbon on 2-inch spools. Maximum throughput rate is 75 cps, with selectable 80, 96 or 132 character line length. 6 lines per inch spacing, 8 lines per inch software selectable. 110-4800 baud rates. Adjustable width sprocket feed handles edge-punched fan-fold paper from 2.5" to 9.5" wide, with a maximum thickness of 0.006 inch.

Whatever your computer system, the H-14 Line Printer provides extra value and performance — at a price that won't break your budget. Connects to most computers with std. RS-232C serial interface or 20 mA current loop. Handshaking provided by busy control signal. Includes 25-pin male EIA connector, matching paper catch. 120/240 VAC, 50/60 Hz. 4.80" H x 18.33" W x 14.33" D. Requires HDOS or CP/M for H-89, H-88-18 software for H-88, HDOS, CP/M, H-8-18 or HC-8-14



Sharp printout, low payout: The Heathkit H-14 Line Printer is one of the lowest-cost microprocessor-based line printers available today

software for H-8, HT-11 software for H11A (p. 46).

**Kit H-14**, Shpg. wt. 30 lbs .......... **595.00**

**Save $100 on Assembled Printer**
**WH-14**, 27 lbs .... Was $895.00, **NOW ONLY 795.00**

H-14/WH-14 SPECIFICATIONS: Printing Speed: Initial time per full line is approximately 1.75 seconds on 60 Hz power line, 2.1 seconds on 50 Hz power line. Avg. throughput approx. 40 cps w/96 char. line. Print head temp. controlled by varying print speed. Characters: impact prints 5.11" high characters. Format: 80, 96 or 132 cpl (96 cpl software selectable only). Forms Handling: Sprocket feed with adj. widths, 2.5"/sec. slewing rate. Form depth selectable from 0.0210" to 0.1365". Ribbon System: Standard typewriter ribbon w/automatic reversing mechanism. Panel LED Indicators: Power on/off, print head temp. Operator Controls: Power on/off, on/off line, feed/reverse feed, top of form, wide characters. Internal Controls: 120/240 VAC, 50/60 Hz operation, baud rate selection.



## WH-24-1/TI-810 — get more in a printer without spending more

**$1695⁰⁰**

- Optimized bi-directional printing system
- Assembled unit includes BOTH upper and lower case

Make a big impact on both your printing and your printer costs. Optimized 150 cps bi-directional printing minimizes printhead travel time, maximizes efficiency. Vertical and horizontal tabbing help produce maximized data, regardless of format.

Receive data at speeds from 110 to 9600 baud. Programmable forms length, wide carriage handle multiple-part forms from 3" to 15" wide. A 9 x 7 dot matrix font prints clearer characters of an original, and produces up to five high-quality copies.

Once a form has been engaged by the tractor drives, alignment can be made at the main control panel. Adjustments for forms thickness can be made by use of the printhead-to-platen adjustment while printing.

The WH-24-1 has both rear and bottom paper/forms loading for convenience.

Self-testing capabilities verify the WH-24-1's electronic and electromechanical capabilities. Includes upper and lower cases. 120/240 VAC, 50/60 Hz. 8" H x 25.75" W x 20" D. Needs WHA-11-5 Serial I/O Card for use with H-11/H-11A Computers only; not required for other Heathkit Computer Systems.

**WH-24-1**, Shpg. wt. 66 lbs. Mtr. Frt ...... **1695.00**
**WHA-11-5**, Serial I/O Card for H-11 and H-11A Computers, Shpg. wt. 1 lb ............... **150.00**

WH-24-1 SPECIFICATIONS: Printing: Technique: Seven-wire matrix, impact. Speed: 150 characters per sec., 64 lines per min. (at 132 chars./line), up to 450 lines per min. (at 10 chars./line). Character Set: 64-character ASCII. Characters Per Inch: 10. Format: Up to 132 chars./line max. (6 or 9 lines/inch (separator or software selectable). Forms Handling: Tractor feed with adjustable widths, 5 in./second (127 mm/second) slewing rate. Panel Indicators: Power on/off, on line/off line, error, paper out LEDs. Operator Controls: Power on/off, on line/off line, forward and reverse feed, feed line and form feed, tab reset. Communications: Interfacing: EIA Std. RS-232C Serial Interface. Baud Rates: 110, 150, 300, 1200, 2400, 4800, 9600. Parity: Odd, even, ignore. Operating Temp. Range: 37 to 104 deg. F (5 to 40 deg. C). Operating Humidity Range: 5 to 90% (no condensation).

Credit Card Orders Call TOLL-FREE: 800-253-0570

## Compact, versatile DECwriter Desktop Teleprinter

**$1195⁰⁰**

- Terminal/printer includes many convenience features
- Fully assembled and tested
- Clearly prints the full 128-character ASCII set
- True 30 cps print speed

The WH-34/LA-34 DECwriter IV Teleprinter sets new standards for convenience. Its keys are sculptured and arranged like a typewriter keyboard. And snap-in cartridge ribbons mean easier changes and no mess.

This 300 baud, 30 cps desk-top terminal can print at burst speeds up to 45 cps. An alternate 110 baud/10 cps speed is keyboard-selectable. The terminal operates full duplex, with optional local echo. A 9 x 7 dot matrix impact printhead clearly prints the full 128-character ASCII set, upper and lower case. Adjustable character width from 10 to 16.5 cpi, with adjustable 6-12 lines/inch vertical spacing.

Use VIEW mode for last character visibility. Off-line set-up mode lets operator select performance parameters from keyboard or computer. The WH-34/LA-34 DEC writer IV includes RS-232C Serial Interface, start-up supply of ribbon, paper.

**WH-34**, Assembled, 40 lbs. . . . . . . . . . . . . . . **1195.00**
**WHA-34-2**, Tractor Feed, Shpg. wt. 3 lbs. . . . . **150.00**

WH-34 SPECIFICATIONS: Character Size: 9 x 7 dot matrix, upper and lower case. Character Set: Full 128-character ASCII set. Format: 10, 12, 13.2 or 16.5 characters/inch horizontal spacing, keyboard selectable — up to 132 characters/line max.; 2, 3, 4, 6, 8 or 12 lines/inch vertical spacing, keyboard selectable. Forms Handling: Standard typewriter platen. Optional WHA-34-2 Tractor Feed available. 5 in./sec. slewing rate. Communications: Code: ANSI Std. Bit Structure: Bit Serial: 1 start, 7 data, 1 parity, 1 stop bit at 110 and 300 baud. Interfacing: EIA Std. RS-232C Serial Interface; compatible w/Bell 103J, equivalent modems. Parity: Odd, even, mark or space — switch-selectable. Power Requirement: 120 VAC, 60 Hz. Dimensions: 7" H x 22" W x 15.5" D.

NEW! Universal Floor Stand fits all printers on this page. Raises printer to desk level for easier operation. Includes paper rack.
**HCA-2**, Shpg. wt. 28 lbs. . . . . . . . . . . . **99.00**

## Letter-quality printing for word processing systems

**SAVE $300**
NOW ONLY
**$2995⁰⁰**

- Diablo 1640 KSR Printer/Terminal features daisy wheel quality
- Includes full ASCII keyboard for even more versatility
- Pre-assembled for fast setup

Designed for applications that require a serial printer and terminal, such as data communications or word processing, the Diablo 1640 KSR combines the latest in microelectronic technology with its proven daisy wheel printing mechanism.

Terminal features professional typewriter-style Hall-effect keyboard, with full upper/lower case ASCII set. Bi-directional printing for 45 cps max. print speed. Set horizontal, vertical tabs in any position. Top of form control, forward/reverse paper motion. Two-color/graphics capabilities with 1/120" horizontal, 1/48" vertical motion. RS-232C Interface, 256-byte buffer accept data at 110-1200 baud rates; compatible with Bell 102, 113, 212, equivalent modems.

Also features ETX/ACK protocol, ribbon out, paper out and cover open sensors, self-testing and host program control through escape sequences.

Includes friction platen, power supply, operator control panel, HCS-22 Print Wheel (Elite 12 with unslashed zero), HCS-51 Film Ribbon. 120/240 VAC. 9.25" H x 23.5" W x 15.75" D.

**WH-44K**, Assembled. 72 lbs.,
Mtr. Frt. . . . . . . Was **$3295.00**, NOW ONLY **2995.00**

Bi-Directional Tractor Feed Accessory for WH-44K/WH-54 Printers. Dual tractors allow moving paper backward through printer for much better registration in word processing, forms preparation, graphics.
**HCA-1**, Shpg. wt. 8 lbs. . . . . . . . . . . . . . . . . . **259.00**

WH-44 SPECIFICATIONS: Print Wheel: Interchangeable 96-character plastic daisy wheel. Format: Line length adjustable to 13.1" maximum (132 characters at 10 pitch, 158 characters at 12 pitch). Forms Handling: Adjustable forms width to 15.5 in. (39.3 cm) maximum, form thickness selectable to 27/1000 in. (0.0686 cm) maximum.

Turn to page 44 to see the complete selection of print wheels and ribbons for the Diablo 1640 and 630 Printers

## Now you can buy Diablo™ printing quality at a lower price!

**NEW**

**$2495⁰⁰**

- Assembled Diablo 630 RO, without keyboard, features same daisy wheel printing quality as the 1640

Another value-packed breakthrough in letter-quality printers! Diablo has developed a printer with the same great daisy wheel quality as the 1640 RO in Catalog 850 — and we offer it for hundreds less!

The WH-54/Diablo 630 RO Printer has 50% fewer moving parts than its predecessor, the WH-44/1640 RO — so you get more reliability. The 630 RO prints the same standard 96-character ASCII set, both upper and lower case — at speeds up to 35-40 cps maximum.

**Software-compatible** with Diablo 1640/1650 series — uses same ribbons, printwheels, tractor feed accessories.

**Uses both metal and plastic printwheels** — so you can take advantage of the added durability of metal in high-production word processing systems.

This state-of-the-art product uses efficient bi-directional printing for maximum output. RS-232C Serial Interface with 256-byte print buffer runs at 110-1200 baud rates, compatible with many Bell modems.

Includes friction platen, power supply, operator control panel, HCS-22 Print Wheel (Elite 12 with unslashed zero) and HCS-51 Film Ribbon. For 120/240 VAC, 50/60 Hz. Overall Dimensions, 9.25" H x 23.5" W x 15.75" D (23.5 x 59.69 x 40.0 cm). Available mid-November, in limited quantities.

**Assembled and Tested Diablo 630 RO Printer.**
**WH-54**, Shpg. wt. 65 lbs., Motor Freight . . . **2495.00**

WH-54 SPECIFICATIONS: Printing Speed: 35-40 characters per second (cps) maximum. Print Wheel: Accepts both metal and plastic 88, 92 and 96-character daisy wheels. Forms Handling: Adjustable forms width to 15.5" (39.3 cm) maximum; form thickness selectable to 27/1000 inch (0.0686 cm) maximum. Communications: Interfacing: EIA Standard RS-232C Serial Interface; compatible with Bell 102, 113, 212 and equivalent modems. Baud Rate Selection: 110, 300, 600 or 1200 baud. Diablo is a trademark of Xerox Corporation.

## Space-saving Computer Work Station organizes your computer system



- Gain attractive, rugged operating efficiency. The PD-11 Computer Work Station organizes your computer system components in less space

**$295⁰⁰** Organizes your system in less space — yet all components are easily accessible. Designed to Heath specifications, the 60" x 30" easy-to-clean Formica™ desk top places terminals at a comfortable height for seated operators. Lower shelves hold the computer and disk systems (except H-47, H-77). Upper shelf measures 8.5" H x 20" W x 19.75" D (21.59 x 50.80 x 50.17 cm), while lower shelf is 7" H x 20" W x 19.75" D (17.18 x 50.80 x 50.17 cm).

Rugged steel legs and sheet metal shelving last under constant use. Locking casters make it easy to roll the work station from place to place, prevent your computer system from rolling away by accident.

The PD-11 Work Station keeps your operator comfortable and efficient — and makes an attractive addition to your office. Partially assembled; not a kit.
PD-11, Shpg. wt. 95 lbs., Mtr. Frt., FOB El Segundo, CA ............... 295.00

## Versatile *CAT* Modem — ideal for any phone

Designed especially for small computer systems, the Cat Acoustic Modem by Novation lets your computer talk to other computers over standard telephone lines. Also communicates with any Bell 103 compatible modem. Many practical—and fun applications. Data exchange occurs at any speed up to 30 characters per second, via standard RS-232C interface. Selectable originate and answer modes, LED display of unit status and special acoustic self-testing. Operates off standard 120 VAC line. Fully assembled and tested. Order yours today.
WH-13, Shpg. wt. 3 lbs. ...................................... 175.00

## Multi-Function Calculator for computer hobbyists



**$59⁹⁵**

- Great gift idea for students
- Special memory, logic operations
- Factory assembled and tested

Designed especially for the computer hobbyist, this fully assembled Texas Instruments Pocket Programmer/Calculator features fast conversions between octal, decimal and hexadecimal number systems; special logic operations for computer applications; three-key independent memory and fifteen levels of parentheses to handle complicated calculations; constant mode to simplify repetitive calculations; and an easy-to-read 8-digit LED display. Lightweight and compact enough to fit in your shirt pocket, this Texas Instruments product is ideal for any computer-related application. Rechargeable battery and 120 VAC adapter/charger are included with this fully assembled and tested calculator. Overall Dimensions, 5.5" H x 3" W x 1.25" D (13.97 x 7.62 x 3.18 cm).
PC-11, Shpg. wt. 2 lbs. .......................................... 59.95

## Cassette Recorder for data storage

Fully assembled General Electric® Cassette Recorder/Player features separate volume and tone controls, pushbutton selection of record, play, rewind, fast forward, stop, tape eject. Built-in counter locates specific information quickly. Built-in microphone, quality speaker for general use.
ECP-3801A, Shpg. wt. 4 lbs. .............. 60.00

Heath-recommended premium-grade audio tape.
ECP-3802, Three 30-Min. Cassettes, 1 lb. .... 6.00

## Choose from a full line of computer system supplies for highest-quality system performance



### Choose from these Diablo printwheels

Courrier 10 (Diablo 38100), Pica w/slashed zero.
HCS-20, Shpg. wt. 1 lb. ................. 8.00
Courrier 72 (D. 38107), Pica w/unslashed zero.
HCS-21, Shpg. wt. 1 lb. ................. 8.00
Elite 12 (D. 38102), Elite w/unslashed zero.
HCS-22, Shpg. wt. 1 lb. ................. 8.00
General Scientific (Diablo 38141). Greek letters, superscripts, math symbols.
HCS-23, Shpg. wt. 1 lb. ................................. 8.00
APL-10 (Diablo 38150). Special set for APL language. HCS-24, 1 lb. ....... 8.00
OCR-A (Diablo 38144). ANSI Std. OCR Type A font. HCS-25, 1 lb. .......... 8.00
Prestige Elite Legal 12A (Diablo 38105). Elite w/legal symbols, incl. ©, ® and ™
HCS-26, Shpg. wt. 1 lb. ................................. 8.00
Courrier Legal 10 (D. 38104). Pica w/legal symbols. HCS-27, 1 lb. ........ 8.00

### Ribbons for clear printouts



NEW! Ribbon for H-14 Line Printer. Also fits ASR-33 printers. HCS-52, 1 lb. . . Pkg. of 3, 8.00
Cloth Ribbons for the WH-44 Diablo Printer.
HCS-50, Shpg. wt. 1 lb. ....... Pkg. of 3, 18.00
Film Ribbons for the WH-44 Diablo Printer.
HCS-51, Shpg. wt. 1 lb. ....... Pkg. of 3, 18.00
Ribbon for the WH-24/TI-810 Bi-Directional Line Printer and the H-36/LA-36 DECwriter II. Long-lasting, top-quality ribbon makes dark, crisp impressions.
HCS-53, Shpg. wt. 1 lb. ................................. Pkg. of 3, 15.00
Ribbon Cartridges for the WH-34 DECwriter IV Computer Teleprinter. Eliminates messy ribbon changes. When old ribbon wears out, simply remove old cartridge and insert new ribbon cartridge.
HCS-54, Shpg. wt. 1 lb. ................................. Pkg. of 3, 25.00
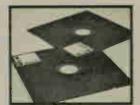
### Top-quality printer paper



NEW! Premium 8.5" x 11" Paper. For all printers sold by Heath. 2800 sheets of premium, one-part fan-fold paper, approx. 20 lb. high-quality bond.
HCS-1, Shpg. wt. 28 lbs. .............. 30.00
Standard 8.5" x 11" Paper. Recommended for the H-14 Line Printer. 3200 sheets of standard, one-part fan-fold paper, approx. 15 lb. bond.
HCS-2, Shpg. wt. 31 lbs. ......................................... 30.00
14.875" x 11" Paper for WH-24, WH-34, H-36 and WH-44 Printers. Box contains 3200 fan-fold sheets of white/green lined paper.
HCS-3, Shpg. wt. 47 lbs. ......................................... 35.00

### Floppy disks for mass storage



5.25" Diskettes. For all Heath 5" systems, North Star, some others. Hard sectored. 40/35 tracks.
HCS-61, Pkg. of 5, 1 lb. .............. 20.00
8" Single-Density, Single-Sided Diskettes. For H-27, virtually all systems using 8" soft sector disks. IBM 3740 std. format. Pkg. of 5.
HCS-62, Shpg. wt. 2 lbs. .............. 25.00
8" Double-Density, Single-Sided Diskettes for H-47.
HCS-64, Pkg. of 10, Shpg. wt. 2 lbs. ............................. 60.00
8" Double-Density, Double-Sided Diskettes for H-47.
HCS-65, Pkg. of 10, Shpg. wt. 2 lbs. ............................. 70.00

### Paper tape storage supplies for your computer system

Three 900-foot rolls of Blank Paper Tape. Each roll is eight inches (20.32 cm) in diameter. Paper tape is 1" (2.54 cm) wide. Just load the roll of tape onto your paper tape punch/reader — and you're ready to begin programming.
HCS-10, Shpg. wt. 5 lbs. ......................................... 10.00

# H-11A Operating Software, FORTRAN Language help you run more efficiently

- Makes programming your H-11A Computer easier
- Designed to run with your H-27 Floppy Disk System

Operating System Software for the H-11A Computer/H-27 Floppy Disk System. The HT-11 System Software Package lets you immediately enjoy the full benefits of the H-11A Computer and the H-27 Floppy Disk System. You get:

**EXPAND, ASEMBL AND CREF:** EXPAND, the system's expansion program, makes the first pass over a source program containing macros, applying a user's macro definition — or one from the system library — each time the source program references a macro. EXPAND writes the program source, with macros expanded, to its output file. Expanded programs, or programs originally without macros, undergo two passes by ASEMBL. This Assembly Language processing program outputs a single relocatable binary object file, and can also produce an assembly listing with symbol table. CREF, the system's cross-reference program, appends an index of symbol usage to the assembly listing, when specified as part of the assembly output. These programs support the entire PDP-11 instruction set, as well as several pseudo-operators.

**EDIT:** A text editor to create or modify ASCII source files, so they can be used as input to other system programs, such as the assembler or BASIC Controlled by user commands from the keyboard, EDIT reads ASCII files from a storage device, makes specified changes and writes ASCII files to a storage device — or lists them on a terminal or line printer.

**LINKER:** Converts object modules produced by the HT-11 assembler, or the FORTRAN compiler, into a run-time format suitable for loading and execution. Services include: relocation of code, linking of global references, and the creation of a runable program file for use by the rest of the system.

**LIBRARIAN:** Creates and maintains libraries of subroutines for use by the linker. Each library is a file containing a library header, library director (or entry point table), and one or more object modules. The contents of the library are determined by the user's needs. The object modules may be routines repeatedly used in a program, routines used by more than one program, or routines which are related and simply gathered together for ease in usage.

**PIP:** The Peripheral Interchange Program is the file maintenance and transfer utility program of the HT-11 Operating System. PIP is used to transfer files between any of the HT-11 devices, merge and delete files from these devices, and list, zero and compress device directories. It also has commands for moving, copying and renaming files.

**ODT:** The HT-11's On-line Debugging Technique aids in debugging user programs by providing commands to display and alter the state of a running program. From the keyboard, the user interacts with ODT and the object program to print the contents of any location for examination or alteration; run all or any portion of an object program, using the breakpoint feature; search the object program for specific bit patterns; search the object program for words which reference a specific word; calculate offsets for relative addresses; and fill a single word, block of words, byte or block of bytes with a designated value.

**BASIC INTERPRETER:** Offers access to the HT-11's I/O system and file structure through the BASIC language. Extensions to the standard BASIC language include variable-length strings, sequential files, virtual memory arrays, chaining and overlay capability. A desk calculator mode can perform once-only calculations or serve as an aid in debugging programs.

**MISCELLANEOUS PROGRAMS:** DUMP prints the contents of files in any of several useful formats. SRCCOM compares two ASCII files, then prints a summary of their differences — useful when editing two versions of the same program.

Minimum requirements include an H-11 or H-11A Computer with at least 16K words of main memory, a console terminal and interface, the H-27 Floppy, controller and interface.

HT-11, Shpg. wt. 12 lbs. .............................................350.00

**FORTRAN Language for the HT-11.** Binary software features complete ANSI Standard 1966 FORTRAN IV with extensions for increased speed. Some extensions include: relaxation of statement ordering, use of expressions nearly anywhere, direct access I/O, TYPE ACCEPT and PRINT I/O statements, ENCODE and DECODE statements, END and ERR parameters, random number generator and more.

HT-11-1, Shpg. wt. 9 lbs. ...........................................250.00

**NOTE:** The HT-11 Operating System and HT-11-1 FORTRAN are compatible only with the H-11/H-11A Computer and the H-27 Floppy. To obtain this software, the Customer Software Sublicense Grant on page 45 (including make, model and serial number of your CPU) must be signed and returned with your order.

# Heath Disk Operating System (HDOS) updated for 3-drive and 8-inch disk systems

- Versions available for both 5.25" and 8" systems
- Updates supplied free of charge for one year

Now, the Heath Disk Operating System (HDOS) is more versatile, more useful than ever before! Now available on either 5.25-inch or 8-inch floppy diskettes, HDOS is specially engineered to help get your H-17 or H-47 Floppy Disk System up and running fast.

With Version 2.0 of HDOS, the device driver for directory devices (such as floppy disks) are now disk-resident, instead of internal (Example: SY.DVD). And you get all of these additional features with HDOS.

**Extended Benton Harbor BASIC™, Version 6:** An easy-to-learn, easy-to-use conversational language. Features strings and files, numeric data with over six digits of accuracy, free format programs and conditional statements.

**ASM Assembly Language — a NEW 2-pass absolute 8080 assembler,** which now includes a cross-reference feature. Create source programs using letters, numbers and symbols to generate efficient machine language code. Assembles source program into listing and object program in executable binary format;

**EDIT Text Editor,** which converts your computer and terminal into a powerful typewriter for generating text/editing. It prepares source code for Assembly Language and can help prepare reports, write letters and edit manuscripts;

**DBUG Console Debugger,** an enhanced and extended version of the front panel monitor which allows entry and debugging of machine language programs via an external terminal. Features single/multiple stepping through programs, breakpointing, load/dump from tape storage (user program required);

**PIP** — a file utility to copy, concatenate or transfer files between devices;

**INIT** — to format new or magnetically damaged diskettes;

**SYSGEN** — a utility program which writes the Heath Disk Operating System onto a newly formatted diskette;

**TEST** — a diagnostic utility which assists in checking out and maintaining your Heathkit Floppy Disk System.

HDOS features fully dynamic non-contiguous allocation and de-allocation, for fast and efficient use of disk space. Its structure consists of a resident nucleus with two non-resident relocatable overlays, plus non-resident relocatable device drivers for efficient memory utilization. Utilities are included to make the system usable in a 32K single-drive computer system, although two floppy disk drives are highly recommended — and may be required for operation of some other software products, used in conjunction with the Heath Disk Operating System.

The Heath Disk Operating System, Version 2.0, is provided on either a 5.25" or 8" floppy diskette. Both the 5.25" and 8" versions are identical, except for media (Code is identical on 5.25" and 8" versions, and each version supports both the H-17 and H-47 Floppy Disk Systems).

Heath Disk Operating System (HDOS), supplied on a 5.25" floppy diskette.
HOS-817-1, Shpg. wt. 5 lbs. .....................................150.00
Heath Disk Operating System (HDOS), supplied on an 8" floppy diskette.
HOS-847-2, Shpg. wt. 4 lbs. .....................................150.00

# Useful H-8/H-88/H-89 Cassette Software

- Form a solid base for future computer programming
- Supplied on audio cassettes, in 1200 baud form

**Cassette Operating Software:** Designed especially for Heathkit 8-bit computers used with cassette data storage, this operating software helps you get ready to program easily and quickly — with features that make it easier to use and more practical than other operating systems:

Automatic command completion simplifies typing; dynamic syntax checking instantly alerts you to errors; and a special user configuration lets you personalize your system.

This cassette software includes: **Extended Benton Harbor BASIC™ Language.** An easy-to-learn, easy-to-use conversational computer language. This enhanced version of Dartmouth BASIC includes strings and files. It provides even faster operation and includes character strings, additional convenience commands and math functions, dynamic storage allocation, access to 2 mS clock, keyboard interrupt processing, expanded error messages and recovery ability, LED display control and keypad support for your computer system.

Extended Benton Harbor BASIC features numeric data with over six digits of accuracy, and Boolean values which permit logical operations. It also features

Credit Card Orders Call TOLL-FREE: 800-253-0570

## Digital Research's CP/M — the industry standard disk operating system

**NEW**

- Hundreds of applications programs now available
- Especially configured for Heath computer systems

CP/M by Digital Research — THE industry standard disk operating system — is used by over 200 hardware manufacturers, OEMs and distributors. CP/M is the choice of over 100,000 computer users — and many software vendors. The result: there are more languages, more utilities and more applications programs for CP/M than for any other microcomputer disk operating system.

And now, the latest Standard (ORG-0) revision of CP/M — Version 2.2 — is available for Heath computer systems! This version supports all 5″ and 8″ Heath disk systems, allowing for concurrent operation and automatic density selection. It also supports all Heath printers and hard copy terminals.

You get full source code for hardware drivers — including disk drivers — so you can customize to fit your unique configuration. IOBYTE allows device assignment, permits switching between hard copy/CRT terminals, or between several printers, without rebooting. Special configuration utility permits changes to ease operation — such as setting disk step rate, or selecting echo/cursor backup operation for backspace and delete keys — without reassembling.

Additional features, such as the implementation of the BIOS as a disk resident relocatable file, make this one of the best available implementations of CP/M. CP/M includes three operating system modules (BIOS, BDOS, CCP), plus utilities. The BIOS — supplied in source code and object code — contains all hardware-level I/O code, and is unique to Heath. The BDOS is the resident nucleus, with all file level and logical I/O code. Its physical I/O is performed via calls to the BIOS. The BDOS features fully dynamic allocation and deallocation of physically non-contiguous files. The CCP is the transient monitor, which provides command level communications between the operator and CP/M. Space used by CCP is available to user programs during normal operation.

Utilities include a two-pass absolute 8080 assembler, a text editor, an 8080 debugger w/traced execution/disassembly, file dump, system generation/relocation, utilities to display file sizes/disk usages, set file flass (read only and/or system), assign physical/logical devices, display system parameters, copy files between devices, and convert intel HEX files into memory images.

Other software available for CP/M, from Heath and other software suppliers, includes the BASIC, FORTRAN, COBOL, Pascal, "C", ALGOL, PL/1, FORTH and APL computer languages — as well as spoolers, sort-merge utilities, word processing systems, mailing list systems, general ledger, payroll, receivables, payables and inventory systems. Games and other utilities are also available.

CP/M requires 32K RAM, one or more disk drives for practical operation (2 drives recommended). H-8 systems require HA-8-8 Extended Configuration Option; H-89 systems require H-88-7 ROM Kit. Includes Digital Research documentation and supplement until mid-Jan., 1980. Heath documentation will be automatically supplied to registered purchasers when available. Also includes support and updates for one year. All versions of CP/M are identical, except for media. For Heath computer systems only.

HOS-817-2, on 5″ diskette, Shpg. wt. 4 lbs. ........................150.00
HOS-847-2, on 8″ diskette, Shpg. wt. 4 lbs. ........................150.00

## UCSD Pascal™ Operating System extends your computer's capabilities

**NEW**

- Growing in popularity, can run on many computers
- Modular design makes programming easier

Why UCSD Pascal? Because this popular operating system is now custom-configured for Heath computer systems! Pascal's rapidly-growing usage has sparked a rapid growth in compatible software. Many companies are making major software commitments, based on Pascal. The Department of Defense has adopted a version of Pascal as its standard language for new program development.

Computer users are choosing Pascal for solid reasons: Its clear readability, with powerful structure and data types, makes it easy and fun to use. And because of its popularity and power, UCSD Pascal from Softech MicroSystems will not become obsolete as your computer system becomes more advanced.

Modern electronic equipment is being designed in a modular fashion. That means you only need find and replace a malfunctioning module to repair the entire device. UCSD Pascal operates on the same principle: Modular design makes each UCSD Pascal program more flexible to accommodate changing needs — and more reliable when run — than a program written in BASIC.

UCSD Pascal is more versatile: Programs written for one computer can run on another — often without recompilation. And UCSD Pascal can be used on many systems, not just one — because its programs are compiled into universal P-code, which can be run on any microcomputer with a resident interpreter.

Heath's UCSD Pascal Operating System includes these modules:

**OPERATING SYSTEM** — an interactive operating system with disk file handling capabilities, run-time support routines and block I/O service routines;

**PASCAL COMPILER** — a fast, one-pass compiler for producing universal P-code;

**INTERPRETER** — an efficient, compact interpreter for running P-code;

**EDITORS** — A powerful, screen-oriented editor that runs in both programming and text-editing mode — AND a character-oriented editor with a wide variety of commands for context editing with hard copy terminals;

**FILER** — this utility manipulates, keeps track of disk files;

**ASSEMBLER** — a conditional macro-assembler for your microprocessor, that produces code which can be linked with your Pascal program;

**LINKER** — for link-editing Pascal object code, assembly code modules;

**SYSTEM LIBRARY** — a collection of frequently used utilities.

UCSD Pascal requires a minimum of 48K RAM and two disk drives. Each version, including manual and diskette, is for use only with Heath computer systems, as described below. Supported by both seller and Softech Microsystems. Updates not supplied free of charge — will be available at prices set by Softech Microsystems. Bugs fixed free or at nominal cost (at seller's option).

UCSD Pascal Operating System, on five 5.25″ diskettes for All-In-One and H-8/H-17 systems. Available in early December.
HOS-817-3, Shpg. wt. 8 lbs. ........................................295.00
UCSD Pascal Operating System, for H-11A/H-27 Systems. Supplied on 8″ IBM single-density, soft sector diskettes. Available in December.
HOS-1127-3, Shpg. wt. 8 lbs. ......................................295.00

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free format programs, enhanced expression capabilities, mathematical functions and conditional statement facilities.

Extended Benton Harbor BASIC is compact enough to run in a Heath computer with minimal memory — yet powerful enough to satisfy most problem-solving requirements. The interpretive structure of BASIC offers excellent facilities for the correction of programming errors. It uses advanced techniques to perform intricate manipulations and to express problems more efficiently.

HASL-8 Assembly Language, a two-pass absolute assembler that lets you create source programs using letters, numbers and symbols to generate efficient machine language code. The letters, numbers and symbols used are meaningful — because they are abbreviated in English statements.

This language can assemble the source program into a listing of the source code and the machine instructions, which is especially useful for program documentation and provides you with a method for detecting program errors. Or it can assemble an object program — a binary image of the source code, which contains the machine instructions used in executing the program.

Some of the special features of HASL-8 Assembly Language include binary production by command, on the second pass — to a specified output device or directly to memory; recognition of five operators (plus, minus, *, /, unary −), and recognition of four token operand expressions (integers, symbols, character strings, origin symbol).

Also included are: the TED-8 Text Editor, which converts your computer and terminal into a powerful typewriter for generating and editing text. It prepares the source code for HASL-8 Assembly Language and can be used to prepare reports, write letters and edit manuscripts. TED-8 features 16 commands for text editing versatility, terminal control of output and input operations, command completion and command error analysis;

The BUG-8 Console Debugger, an enhanced and extended version of the front panel monitor, which allows the entry and debugging of user machine language programs via an external terminal. This device features either single or multiple stepping through programs, insertion of breakpoints, load and dump of user programs from/to tape storage. BUG-8 can also display or alter the contents of a selected memory location or any 8080 register;

A minimum of 8K of Random Access Memory (RAM) is required to run this operating system. This cassette operating system requires an H-8-5 Serial I/O and Cassette Interface to load with H-8. Interfacing is standard with H-88, H-89. H-88-5 Cassette Interface is required for use of this software with WH-89 Assembled All-In-One Computers.

Cassette Operating System Software for the Heath H-8 Computer.
H-8-18, Shpg. wt. 11 lbs. ..........................................30.00
Cassette Operating System for All-In-One Computers.
H-88-18, Shpg. wt. 5 lbs. ..........................................30.00

## More languages — so your computer system can do more for you!

Each language offers more flexibility — and more versatility. Write your own programs with surprising ease — and execute programs just as easily, too. We'll even keep your language current, by supplying updates free of charge, for one full year — when you sign and return the registration card enclosed with each software package.

## Popular MICROSOFT™ BASIC Language Interpreter

As low as
**$150⁰⁰**

- Extra features make programming easy
- Many math, algebra and trigonometry functions
- Now available for both HDOS and CP/M systems

MICROSOFT BASIC is one of the most versatile languages available for the personal computer. Scores of practical utilities and applications programs are written in this BASIC. This version is especially written for use with Heath 8-bit computer systems, including the H-8, H-88 and H-89 Computers.

Capabilities include: Direct access to CPU ports and memory locations; an IF-THEN-ELSE control structure, which allows more highly-structured programming — including editing during programming and random or sequential filing capabilities; mathematical and logical operators: and a DEF statement, which allows user-defined functions which are not listed as intrinsic functions.

You also get many extended features: program edit facilities, including insertion, deletion, character change and search capabilities: file management facilities, which include random files, sequential files and file manipulation;

Powerful string processing functions, including LEFT, RIGHT, MID, ASC, CHR and concatenation; extended statements, operators, functions and commands which are not available in most other BASICs — ERASE to eliminate arrays from a program, LINE INPUT to add lines to string variables without delimiters, SWAP to exchange the values of two variables, the TRON and TROFF debugging aids which help trace the execution of program instructions, and WIDTH to set the width of the terminal printing line;

Automatic line numbering and renumbering; branching, loops and subroutines to change the order of program line execution in various ways; PRINT USING for control of output formats; ON ERROR command for error trapping routines.

MICROSOFT BASIC includes double precision floating point number and double precision mathematics, as well as algebraic and trigonometric capabilities.

This software package requires a Heath computer system with a minimum of 32K RAM — as well as either HDOS or CP/M, as indicated below.

MICROSOFT BASIC, Ver. 4.7, supplied on 5.25-inch diskette. For HDOS systems.
H-8-21, Shpg. wt. 3 lbs. .............................................. **150.00**

MICROSOFT BASIC, Ver. 5.1, supplied on 5.25-inch diskette. For Heath CP/M systems only. Requires Sublicense Grant (p. 45).
HMS-817-1, Shpg. wt. 5 lbs. ......................................... **175.00**

MICROSOFT BASIC, Ver. 5.1, supplied on 8-inch diskette. For Heath CP/M systems only. Requires Sublicense Grant (p. 45).
HMS-847-1, Shpg. wt. 5 lbs. ......................................... **175.00**

## Speed up programming with BASIC Compiler

**$250⁰⁰**

- Compiled programs run faster, use less space
- Includes many useful utility programs

The MICROSOFT BASIC Compiler eliminates time-consuming interpretation when you run a program. First, compile your program through this BASIC compiler. It converts each line of the program into machine code — the language your computer understands. You'll find that it runs much faster.

Another advantage: compiled programs occupy less space in memory.

The MICROSOFT BASIC Compiler includes many utility programs to make compiling easier: The MACRO-80 Relocating Assembler converts Assembly Language programs into source code for the LINK-80 Editor, the LINK-80 Linkage Editor converts relocatable libraries and modules into runnable load modules, the useful LIB-80 Library Manager allows you to build your own libraries of relocatable modules.

Requires a minimum of 40K bytes RAM, dual-drive floppy capability, Heath's CP/M Operating System (page 47) and Sublicense Grant (p. 45). For Heath computer systems only.

BASIC Compiler, on 5.25" disk. HMS-817-4, 5 lbs. ................... **250.00**
BASIC Compiler, on 8" disk. HMS-847-4, 5 lbs. ..................... **250.00**

## Powerful MICROSOFT FORTRAN™ System

**$195⁰⁰**

- Powerful ANSI-66 FORTRAN IV Language Compiler
- Macro-Assembler, Linkage Editor, Cross-Reference Generator
- Linkable library of math, I/O, utility routines

With more power to help your computer system do more, the MICROSOFT FORTRAN Programming System features these versatile components:

1. The unique FORTRAN-80 Compiler, which uses the powerful ANSI-66 FORTRAN IV Computer Language;
2. A Cross-Reference Generator (CREF);
3. The MACRO-80 Relocating Assembler;
4. The LINK-80 Linkage Editor;
5. The MICROSOFT FORTRAN Library, filled with floating point mathematical routines — plus I/O and utility routines;
6. Sample FORTRAN-80 and MACRO-80 Assembler source programs.

Each of the components in the MICROSOFT FORTRAN Programming System help you create more powerful, more versatile programs:

The MICROSOFT FORTRAN-80 Compiler is a true native-code compiler which supports the full ANSI-66 FORTRAN IV Language, except for complex numbers. This allows you to take advantage of the large base of applications programs already written in the FORTRAN Language.

A microprocessor-based FORTRAN development package, which generates relocatable object modules, is included with the compiler. You can link these modules, using the LINK-80 loader, and generate an absolute file.

This compiler also includes many extensions to increase system utility and efficiency — and it performs some object code optimization. An option to list generated object code in 8080 Assembly Language is available.

The MICROSOFT MACRO-80 Relocating Assembler is an 8080/Z-80 assembler, with complete facilities for macro development. It generates relocatable object modules for use with the MICROSOFT LINK-80 Linkage Editor. It accepts Intel 8080 and Zilog Z-80 mnemonics, features macros and conditional assembly, and will generate a sorted cross-reference listing — when used with the CREF Cross-Reference Generator (included).

The LINK-80 Linkage Editor, included with this programming system, converts relocatable libraries or modules (such as those produced by MICROSOFT FORTRAN, BASIC, COBOL and Pascal languages — as well as by the MICROSOFT MACRO-80 Relocating Assembler and Digital Research's PL/I Compiler) into runnable load modules for direct execution or disk storage.

Capabilities of this linkage editor include options to specify prommable code, and ability to separately specify origin address for code, data segments. Absolute symbol table listing of generated load module may be obtained.

MICROSOFT'S FORTRAN Library includes all FORTRAN mathematical, I/O and utility functions. Using the FORTRAN Library, you can perform a multitude of functions — absolute values, truncation, remainders, maximum values, minimum values, conversion, transfer of signs, positive differences, exponentials, logarithms, sines, cosines, hyperbolic tangents, arctangents and square roots.

The library contains arithmetic routines, conversion subroutines and subprogram linkages. Special functions are provided (INP, CALL OUT, PEEK, CALL POKE and subprogram linkages), which allow for more sophisticated programming.

Routines in the MICROSOFT FORTRAN Library may be called by — and linked with — mathematical programs created by the MACRO-80 Assembler.

The versatile MICROSOFT LIB-80 Library Manager, included with CP/M versions of the MICROSOFT FORTRAN Programming System, allows the building of your own libraries of relocatable modules.

MICROSOFT FORTRAN is one of the most powerful, sophisticated and impressive programming systems available to microcomputer users. Put it to work today.

This programming system requires a minimum of 40K bytes of Random Access Memory (RAM), dual-drive floppy disk capability, and either the HDOS or CP/M Operating Systems (as listed below).

MICROSOFT FORTRAN Programming System, supplied on 5.25-inch floppy diskette. For use with HDOS systems.
H-8-20, Shpg. wt. 4 lbs. ................................................ **150.00**

MICROSOFT FORTRAN Programming System, supplied on 5.25-inch floppy diskette. For Heath CP/M systems only. Requires Sublicense Grant (p. 45).
HMS-817-2, Shpg. wt. 5 lbs. ......................................... **195.00**

MICROSOFT FORTRAN Programming System, supplied on 8-inch floppy diskette. For Heath CP/M systems only. Requires Sublicense Grant (p. 45).
HMS-847-2, Shpg. wt. 5 lbs. ......................................... **195.00**

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## MICROSOFT COBOL™ Programming System — popular, powerful, business-oriented

**AS LOW AS**
**$395⁰⁰**
- The most popular business-oriented language
- Most Level-I features, many Level-II extras
- Multitude of extra-value utilities

COBOL has always been the number one language for large business data processing systems. MICROSOFT'S COBOL-80 Language System, Version 4.0, makes this powerful and versatile language practical for use on your Heath H-8, H-88 or H-89 Computer System.

MICROSOFT COBOL-80 far exceeds the minimum specifications of ANSI-74 COBOL, and has so many Level-II features and optional modules that you can easily use COBOL programs written for large computer systems (Minimum required by ANSI Standard is Nucleus, Table Handling and Sequential I/O, at full Level-I implementation):

| MODULE | IMPLEMENTATION LEVEL |
|---|---|
| Nucleus | Level-I plus these Level-II features: |

CONDITIONS — Level 88 conditions with value series or range; use of logical AND/OR/NOT in conditions; use of algebraic relational symbols ($>$, $=$); implied subject, or both subject and relation, in relational conditions; sign test; nested IF statements; parentheses in conditions.

VERBS — Extensions to ACCEPT and DISPLAY for formatted screen handling; ACCEPTance of data from DATE/DAY/TIME; STRING and UNSTRING statements; COMPUTE with multiple receiving fields; PERFORM VARYING.

IDENTIFIERS — Mnemonic names for ACCEPT or DISPLAY devices; procedure names consisting of digits only; qualification of names (in procedure division statements only).

| | |
|---|---|
| Table Handling | Level-I some Level-II features |
| Sequential I/O | Level-I, most Level-II features |
| Relative I/O | Level-I, some Level-II features |
| Indexed I/O | Level-I, some Level-II features |
| Interprogram Communication | Level-I |
| Library | Level-I |
| Communication | None |
| Debugging | Special extensions to ANS-74 Standard providing convenient trace-style debugging |
| Report Writer | None |
| Segmentation | Level-I |
| Sort/Merge | None now; Level-II implementation will be available by late 1981, as an extra-cost option |

In addition, MICROSOFT COBOL has important extensions which make COBOL easier to use in a microcomputer environment:

Extended debugging facilities, featuring special extensions to the ANSI-74 Standard which make debugging more convenient;

And advanced screen handling facilities, which permit easy forms handling on CRT terminals with cursor control (like the H-19 on page 40).

COBOL is the ideal language for business data processing and many other tasks which consist primarily of processing disk files and data bases.

MICROSOFT COBOL can typically handle a 600-1000 line program, in a computer system with 48K of Random Access Memory (RAM).

This programming system includes MACRO-80 Assembler, LINK-80 Linkage Editor, LIB-80 Library Manager, MICROSOFT COBOL Library and Run-Time Software.

Requires at least 48K RAM, dual-drive floppy (H-47, page 40, recommended for applications involving large disk files), Heath CP/M Operating System (see page 47) and Customer Software Sublicense Agreement (page 45). For Heath computer systems only. Available in December.

**MICROSOFT COBOL, supplied on 5.25-inch floppy diskette.**
HMS-817-3, Shpg. wt. 5 lbs. .................................................. 395.00
**MICROSOFT COBOL, supplied on 8-inch floppy diskette.**
HMS-847-3, Shpg. wt. 5 lbs. .................................................. 395.00

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## NEW — CP/M™ software expands capabilities

With the introduction of the Heath-compatible Standard CP/M Operating System (page 47), we're proud to offer these three compatible utility programs. Each includes full documentation and free updates for one year after purchase, when the registration card enclosed with each software package is signed and returned.

### MAC makes it easier to assemble programs

**$85⁰⁰**
- Uses full Intel-compatible macro definitions
- Full documentation, diskette with macro libraries
- Fully compatible with CP/M's ASM Assembly Language

MAC is Digital Research's optional Macro Assembler, for use with Heath CP/M. Fully compatible with CP/M's ASM Assembly Language, MAC has macros which makes writing Assembly Language programs easier.

Many features are specifically designed for the sophisticated Assembly Language programmer, such as: Additional conditional assembly operators; title and page pseudo-operands; full Intel-compatible macro definitions, including recursive macro calls and disk macro libraries. And MAC also has the ability to generate a SID-compatible symbol table file for use in debugging.

The 168-page manual is practically a textbook on macro assemblers. And the MAC diskette contains a variety of useful macro libraries for performing disk I/O, assembling Z-80 op codes and performing other useful tasks.

Requires H-8 or H-89 with floppy capability, as well as Heath CP/M. For Heath computers only. Both versions identical, except for media. Available December.
HDR-817-1, with 5.25" diskette, Shpg. wt. 2 lbs. ......................... 85.00
HDR-847-1, with 8" diskette, Shpg. wt. 2 lbs. ............................ 85.00

### DESPOOL provides multi-tasking printer operation

**$50⁰⁰**
- Perform 2 tasks at the same time with your computer
- Print one file, while working on another
- Quick set-up, easy to use

Have you ever had a mountain of work to finish — but you have to wait, because your computer is printing a file through your line printer? Wait no more! DESPOOL gives your system maximum efficiency — by allowing it to do both tasks at the same time! Print one program through your line printer, while continuing to use the assembler, editor, BASIC or an applications program.

When you want the multi-tasking option, just load DESPOOL into memory. DESPOOL takes up very little memory space. When you're ready to use DESPOOL, just type CONTROL-F, wait for the spooler prompt and type the file name — DESPOOL will instantly return your terminal to the previous program, while printing the specified file through your line printer.

DESPOOL requires a Heath H-8 or All-In-One Computer System with floppy disk capability, and the Heath Standard CP/M Operating System. Available December.
HDR-817-3, with 5.25" diskette, Shpg. wt. 2 lbs. ......................... 50.00
HDR-847-3, with 8" diskette, Shpg. wt. 2 lbs. ............................ 50.00

### Advanced SID/ZSID Debugging Utility for CP/M

**$125⁰⁰**
- Get both SID (8080-compatible) and ZSID (Z-80-compatible) — at substantial savings!
- Use with MAC Macro Assembler, other Digital Research/MICROSOFT products

The SID/ZSID Debugging Utility is an advanced version of CP/M's DDT Debugging Utility. While maintaining all DDT features, SID/ZSID allows the use of the names used at the source level, instead of addresses, in dumping and modifying memory, setting breakpoints and making patches to your program using Assembly (symbolic) Language instead of numeric values.

SID/ZSID also contains advanced features — the ability to draw histograms, showing the execution frequency of a group of subroutines, maintaining pass counts and providing a trace-back of the execution path to selected breakpoints.

SID/ZSID requires the MAC Macro Assembler above, Digital Research's Linkage Editor, or the LINK-80 Linkage Editor, to create the table file used for symbolic references. It functions in a DDT-type mode without symbol file (histogram, traceback and other advanced features will still function). Requires Heath CP/M. Both versions identical, except for media. Available in December.
HDR-817-2, with 5.25" diskette, Shpg. wt. 2 lbs. ......................... 125.00
HDR-847-2, with 8" diskette, Shpg. wt. 2 lbs. ............................ 125.00

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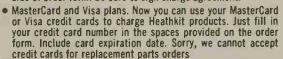
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- Note: Quantity discounts apply to single models only, not combination orders, special offers, or systems.

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- MOTOR FREIGHT ITEMS — Items indicated Motor Freight exceed weight or size limitations of UPS or Parcel Post. Examples are TV's, organs, some speaker systems, garage door mechanisms, antennas, etc. They are shipped with freight charges collect. If one item on your order is Motor Freight, all items will be shipped Motor Freight. Consult your local motor freight carrier for charges and type of service available in your area before ordering.
- APO/FPO Shipments — Use the following Zones to estimate costs: West Coast — Zone 8; East Coast — Zone 5; Miami — Zone 6. PAL (Airlift Military) carries packages by air transport for a fee of $1.00 per package plus postage. Parcel must weigh less than 30 lbs. and not exceed 60" in length and girth.
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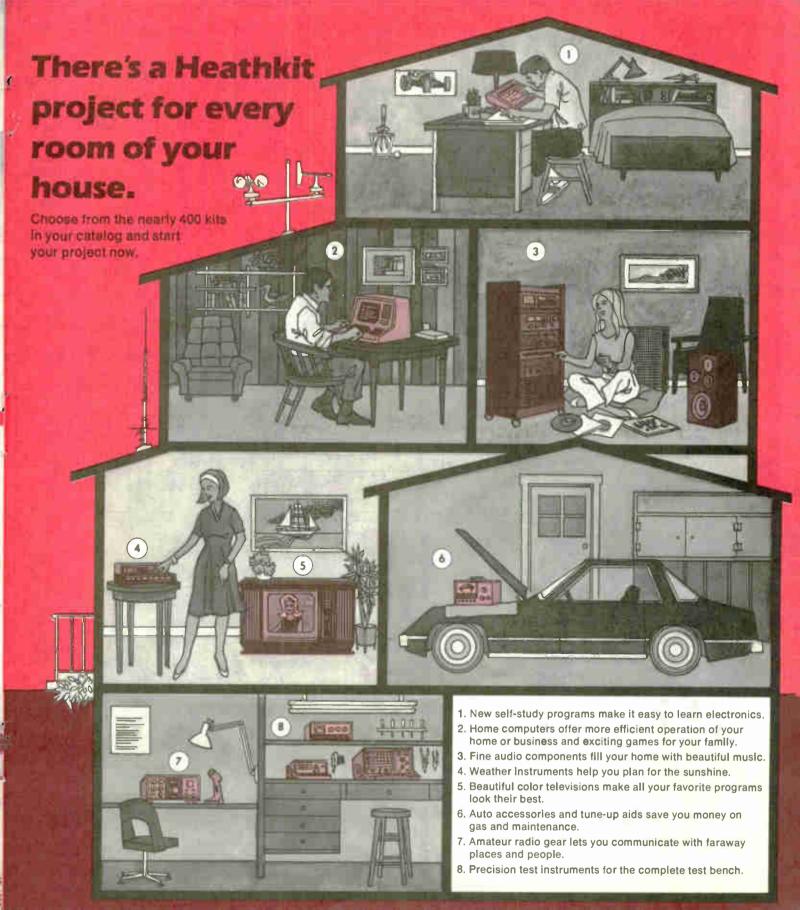
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| 3 | 1.45 | 1.53 | 1.73 | 1.86 | 2.04 | 2.24 | 2.61 | 3.22 | 3.31 | 4.90 | 5.12 |
| 4 | 1.56 | 1.65 | 1.82 | 2.00 | 2.23 | 2.50 | 3.00 | 3.94 | 4.07 | 5.79 | 6.02 |
| 5 | 1.66 | 1.77 | 1.92 | 2.14 | 2.43 | 2.77 | 3.39 | 4.66 | 4.82 | 6.68 | 6.91 |
| 6 | 1.71 | 1.84 | 2.01 | 2.28 | 2.62 | 3.03 | 3.78 | 5.39 | 5.58 | 7.57 | 7.81 |
| 7 | 1.76 | 1.90 | 2.11 | 2.41 | 2.82 | 3.29 | 4.17 | 6.11 | 6.34 | 8.46 | 8.71 |
| 8 | 1.80 | 1.97 | 2.20 | 2.55 | 3.02 | 3.56 | 4.56 | 6.83 | 7.10 | 9.34 | 9.60 |
| 9 | 1.85 | 2.03 | 2.29 | 2.89 | 3.21 | 3.82 | 4.95 | 7.55 | 7.86 | 10.23 | 10.50 |
| 10 | 1.89 | 2.10 | 2.40 | 2.83 | 3.41 | 4.08 | 5.34 | 8.27 | 8.61 | 11.11 | 11.40 |
| 11 | 1.94 | 2.20 | 2.54 | 3.00 | 3.65 | 4.42 | 5.73 | 9.00 | 9.37 | 12.00 | 12.30 |
| 12 | 2.03 | 2.31 | 2.68 | 3.11 | 3.77 | 4.57 | 6.12 | 9.71 | 10.13 | 12.89 | 13.20 |
| 13 | 2.12 | 2.42 | 2.83 | 3.29 | 3.96 | 4.72 | 6.41 | 10.43 | 10.89 | 13.78 | 14.09 |
| 14 | 2.20 | 2.53 | 2.97 | 3.46 | 4.18 | 4.94 | 6.62 | 11.15 | 11.65 | 14.67 | 14.99 |
| 15 | 2.29 | 2.63 | 3.11 | 3.64 | 4.42 | 5.22 | 6.80 | 11.87 | 12.40 | 15.55 | 15.88 |
| 16 | 2.37 | 2.75 | 3.25 | 3.82 | 4.64 | 5.50 | 6.94 | 12.60 | 13.16 | 16.44 | 16.79 |
| 17 | 2.46 | 2.86 | 3.39 | 3.99 | 4.87 | 5.78 | 7.15 | 13.32 | 13.92 | 17.33 | 17.69 |
| 18 | 2.54 | 2.97 | 3.54 | 4.17 | 5.10 | 6.07 | 7.35 | 14.04 | 14.68 | 18.21 | 18.58 |
| 19 | 2.63 | 3.08 | 3.68 | 4.35 | 5.33 | 6.35 | 7.54 | 14.76 | 15.44 | 19.11 | 19.48 |
| 20 | 2.71 | 3.18 | 3.81 | 4.52 | 5.55 | 6.63 | 7.88 | 15.48 | 16.19 | 19.99 | 20.37 |
| 21 | 2.81 | 3.29 | 3.95 | 4.70 | 5.78 | 6.91 | 8.23 | 16.21 | 16.95 | 20.88 | 21.27 |
| 22 | 2.89 | 3.40 | 4.09 | 4.87 | 6.01 | 7.19 | 8.57 | 16.93 | 17.71 | 21.77 | 22.17 |
| 23 | 2.98 | 3.52 | 4.23 | 5.05 | 6.24 | 7.48 | 8.91 | 17.65 | 18.47 | 22.65 | 23.07 |
| 24 | 3.06 | 3.63 | 4.38 | 5.23 | 6.46 | 7.76 | 9.26 | 18.37 | 19.23 | 23.54 | 23.97 |
| 25 | 3.15 | 3.73 | 4.52 | 5.40 | 6.70 | 8.03 | 9.60 | 19.08 | 19.98 | 24.42 | 24.86 |
| 26 | 3.23 | 3.84 | 4.66 | 5.58 | 6.92 | 8.32 | 9.95 | 19.81 | 20.74 | 25.31 | 25.76 |
| 27 | 3.32 | 3.95 | 4.80 | 5.75 | 7.15 | 8.60 | 10.29 | 20.53 | 21.50 | 26.21 | 26.66 |
| 28 | 3.40 | 4.06 | 4.94 | 5.94 | 7.37 | 8.88 | 10.64 | 21.25 | 22.26 | 27.09 | 27.55 |
| 29 | 3.49 | 4.17 | 5.09 | 6.11 | 7.61 | 9.17 | 10.98 | 21.97 | 23.02 | 27.98 | 28.46 |
| 30 | 3.58 | 4.27 | 5.22 | 6.28 | 7.83 | 9.44 | 11.33 | 22.69 | 23.76 | 28.86 | 29.35 |
| 31 | 3.67 | 4.39 | 5.36 | 6.46 | 8.06 | 9.72 | 11.67 | 23.42 | 24.52 | 29.75 | 30.25 |
| 32 | 3.75 | 4.50 | 5.50 | 6.64 | 8.29 | 10.01 | 12.01 | 24.14 | 25.28 | 30.64 | 31.15 |
| 33 | 3.84 | 4.61 | 5.64 | 6.82 | 8.52 | 10.29 | 12.36 | 24.86 | 26.04 | 31.52 | 32.04 |
| 34 | 3.92 | 4.72 | 5.78 | 6.99 | 8.74 | 10.58 | 12.70 | 25.58 | 26.80 | 32.42 | 32.94 |
| 35 | 4.01 | 4.82 | 5.93 | 7.16 | 8.98 | 10.85 | 13.05 | 26.30 | 27.55 | 33.30 | 33.83 |
| 36 | 4.09 | 4.93 | 6.07 | 7.34 | 9.20 | 11.13 | 13.39 | 27.03 | 28.31 | 34.19 | 34.74 |
| 37 | 4.18 | 5.04 | 6.21 | 7.52 | 9.43 | 11.42 | 13.74 | 27.75 | 29.07 | 35.08 | 35.64 |
| 38 | 4.26 | 5.16 | 6.35 | 7.70 | 9.65 | 11.70 | 14.08 | 28.47 | 29.83 | 35.96 | 36.53 |
| 39 | 4.36 | 5.27 | 6.49 | 7.87 | 9.89 | 11.98 | 14.43 | 29.18 | 30.59 | 36.85 | 37.43 |
| 40 | 4.44 | 5.37 | 6.63 | 8.04 | 10.11 | 12.26 | 14.77 | 29.90 | 31.34 | 37.73 | 38.32 |
| 41 | 4.53 | 5.48 | 6.77 | 8.23 | 10.34 | 12.54 | 15.11 | 30.63 | 32.10 | 38.63 | 39.22 |
| 42 | 4.61 | 5.59 | 6.91 | 8.40 | 10.57 | 12.82 | 15.46 | 31.35 | 32.86 | 39.52 | 40.12 |
| 43 | 4.70 | 5.70 | 7.05 | 8.58 | 10.80 | 13.11 | 15.80 | 32.07 | 33.62 | 40.40 | 41.02 |
| 44 | 4.78 | 5.81 | 7.19 | 8.75 | 11.02 | 13.39 | 16.15 | 32.79 | 34.38 | 41.29 | 41.92 |
| 45 | 4.87 | 5.92 | 7.33 | 8.92 | 11.25 | 13.67 | 16.49 | 33.51 | 35.13 | 42.17 | 42.81 |
| 46 | 4.95 | 6.03 | 7.48 | 9.11 | 11.48 | 13.95 | 16.84 | 34.24 | 35.89 | 43.06 | 43.71 |
| 47 | 5.04 | 6.14 | 7.62 | 9.28 | 11.71 | 14.23 | 17.18 | 34.96 | 36.65 | 43.95 | 44.61 |
| 48 | 5.13 | 6.25 | 7.76 | 9.46 | 11.93 | 14.52 | 17.52 | 35.68 | 37.41 | 44.84 | 45.50 |
| 49 | 5.22 | 6.36 | 7.90 | 9.63 | 12.17 | 14.80 | 17.87 | 36.40 | 38.17 | 45.73 | 46.41 |
| 50 | 5.30 | 6.46 | 8.03 | 9.81 | 12.39 | 15.07 | 18.21 | 37.12 | 38.92 | 46.61 | 47.30 |
| Add'l lbs. | .08 lb. | .10 lb. | .13 lb. | .18 lb. | .22 lb. | .27 lb. | .34 lb. | .72 lb. | .75 lb. | .88 lb. | .89 lb. |

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| Zip Code Prefixes | Zone | Zip Code Prefixes | Zone | Zip Code Prefixes | Zone | Zip Code Prefixes | Zone | Zip Code Prefixes | Zone | Zip Code Prefixes | Zone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 006-009 | 8 | 260-261 | 3 | 363-369 | 5 | 476-477 | 4 | 598-599 | 7 | 820-822 | 5 |
| 010-069 | 5 | 262-278 | 4 | 370-386 | 4 | 478 | 3 | | | 823-826 | 6 |
| 070-089 | 5 | 279 | 4 | 387 | 5 | 479-489 | 2 | 600-609 | 2 | 827 | 5 |
| 090-099 | 5 | 280-283 | 4 | 388 | 4 | 490-491 | 1 | 610-619 | 3 | 828-832 | 6 |
| | | 284-285 | 5 | 389-397 | 5 | 492 | 2 | 620-623 | 4 | 833 | 7 |
| 100-108 | 5 | 286-293 | 4 | | | 493-495 | 1 | 624-628 | 3 | 834 | 6 |
| 109 | 5 | 294-295 | 5 | 400-406 | 4 | 496-499 | 3 | 629-668 | 4 | 835-838 | 7 |
| 110-119 | 5 | 296-297 | 4 | 407-409 | 4 | | | 669-679 | 5 | 840-847 | 6 |
| 120-123 | 4 | 298-299 | 5 | 410-412 | 4 | 500-516 | 3 | 680-687 | 4 | 850-864 | 7 |
| 124-126 | 5 | | | 413-422 | 4 | 520-524 | 3 | 688-693 | 5 | 865-884 | 8 |
| 127-128 | 4 | 300-303 | 4 | 423 | 3 | 525 | 3 | | | 890-898 | 7 |
| 129 | 4 | 304 | 5 | 424-426 | 4 | 526-528 | 3 | 700-722 | 5 | | |
| 130-152 | 4 | 305-307 | 4 | 427-432 | 4 | 530-534 | 2 | 723-727 | 4 | 900-921 | 8 |
| 153 | 3 | 308-329 | 5 | 433-436 | 2 | 535-539 | 3 | 728-768 | 5 | 922-928 | 7 |
| 154-160 | 4 | 330-334 | 6 | 437-457 | 3 | 540 | 4 | 769 | 4 | 930-934 | 8 |
| 161 | 4 | 335-338 | 5 | 458 | 3 | 541-546 | 3 | 770-779 | 5 | 935 | 7 |
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| 164-165 | 3 | 340 | 6 | 463-464 | 2 | 549 | 3 | 790-792 | 6 | 961 | 7 |
| 166-199 | 4 | 350-352 | 5 | 465-466 | 1 | 550-566 | 4 | 793-799 | 6 | 962-976 | 8 |
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Copies of the Heathkit warranty or warranties for any other consumer product in this catalog costing more than $15 may be obtained free of charge by writing the Manager of Marketing Services, Heath Company, Benton Harbor, MI 49022.

# The President's Corner

Dear Friends:

Have you noticed that compared to several years ago you are now more apt to watch a TV program with educational value? In many similar ways the increased interest in adult education has manifested itself and continues to grow by leaps and bounds. Our self-study continuing educational programs, for example, became popular immediately. Many people complete a program just for the pleasure of increasing their knowledge, while others desire to stay abreast of the latest developments in technology for job advancement opportunity.

The introduction of the microprocessor-based small computer made a new self-instructional tool available. While we offer both kit form and factory-assembled microcomputers, the hands-on experience of constructing your own hardware is highly recommended for those who desire a full understanding of computing. There is also a big savings.

The small computer in the home is becoming the center of the family's educational activity. You can learn computer architecture, interfacing and programming concepts. Software is available for technical problem solving, financial business use, word processing, communications and entertainment. We will introduce many more software packages in the next few months.

Along with the surge in adult education, I must admit that the younger generation entering a technical university today is often better educated than their grandparents were after graduation. Perhaps that's the reason for our thirst for more learning — we are doing our darndest just to keep up. I claim my children have an advantage, as they have a smarter grandfather than I did.

*D. W. Nurse*  President, Heath Company

# The most powerful programming language is yours with the Assembly Language Program

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- Use your computer system's entire capacity
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- Execute your computer programs much faster

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- BASIC is the easiest of all programming languages to write
- Now BASIC has become one of the easiest languages to learn
- Hundreds of computer programs are available in BASIC

Assembly Language is the most powerful language that can be used on any computer. Anything that can be done in any other language can be done in Assembly. It's a true programming language, not just a convenient notation for machine code. The use of labels, computed operands, comments and assembler directives allows creation of a source code that is adaptable to the system and easily read. No need for programmed memory; no time wasted interpreting. So your programs run much faster.

You can use your computer system's memory more efficiently when you use Assembly Language. It stores more data in less space because codes are shorter and more explicit. By using computed origin statements and other assembler directives, you can make an Assembly Language program operate wherever the computer has space. The use of meaningful labels for subroutines, along with as many remarks or comments as you desire, make a program listing quite readable in Assembly Language.

One of the most important and useful requisites of a programming language is that it be flexible, not dependent upon specific addresses and hardware of the computer. In an Assembly Language program, hardware specifications can be made at the beginning of the program and referred to symbolically through the rest of the program. In this way, changes can be located together — easily.

The Heathkit/Zenith Assembly Language Self-Instruction Program teaches you to program your computer in Assembly. You learn the details at your own pace, using a special 400-page text designed for self-study. An exercise workbook provides hands-on experience with programming exercises — you perform each exercise on your own computer. To perform the optional experiments, which are necessary to gain full benefit from the Assembly Language Program, you must have a computer. This Program is designed for computers using the popular 8080/8085 microprocessor series and Z-80 CPU. This includes the Heathkit H-8, H-88 and H-89 Computers.

The Assembly Language Program includes text, workbook and a special Reference Placard with all 244 assembly instructions for easy reference. The other side of the Placard contains the ASCII code chart.

Passing the optional final examination with a score of 70 percent or better will earn you a Certificate of Achievement and 6.0 Continuing Education Units (CEUs). Classroom version of the Assembly Language Program is listed on page 82.

EC-1108, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . .49.95

More computer programs are written in BASIC than any other computer language. It's the easiest computer language to write — and the easiest to learn. BASIC uses familiar English words, which cause the computer to perform standardized operations. When a number of these words are strung together to form a program, the computer performs each of the specified operations in turn to complete the task the operator desires. When you know BASIC, you can adapt and run hundreds of existing programs to meet your specific needs. You can exchange computer programs with others. And you can write your own original computer programs.

This course covers all BASIC Language versions, formats, commands, statements and procedures, plus special problem-solving tips you can use when you write your own programs. This program is divided into 14 easy-to-follow programmed instruction segments which will teach you all of the standardized words and the operation that each word causes the computer to perform. You will get a grasp of the tools of BASIC Language programming, including numbers, statements, functions, loops, lists, arrays and strings.

You will understand the importance of proper syntax in BASIC programming, and why the computer needs another program to interpret the words it reads and perform the desired operations. It also teaches you the creative aspect of writing a computer program. Using the tools you learn, you'll participate in the decision-making factors that are part of writing a meaningful computer program. You will learn useful techniques, such as how to define and plan a program, how to format and write it, and how to adapt existing programs to suit your needs.

The course material includes a programmed instruction text explaining BASIC, a special workbook of programming instructions, and experiments you can perform on your own computer. Also included are handy reference cards for Benton Harbor BASIC Statements, ASCII number codes, BASIC direct command statements and a reference chart for math and Boolean algebra operations. Passing the optional final exam with 70% or better will earn you a Certificate of Achievement and 3.0 CEUs.

While the BASIC program is keyed to Heathkit computers, it's equally applicable to any computer system using BASIC. Classroom version on p. 82.

EC-1100, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . .39.95

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College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades earned on this exam. See further information on page 71, and check with your college first, to determine its policy.

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How To Select a Computer: How to define your data processing requirements. Shows you how to put together the computer system that's right for you, including the right combination of hardware, peripherals and software.

The program includes a 160-page self-instruction text with three appendices. Two audio cassettes are included to reinforce the text material. Completion of the optional final exam with 70% or better will earn you 1 CEU and a Certificate of Achievement.

A computer is a big investment. Our Computer Concepts for Small Business Program is a small investment to get the understanding you need to make an informed decision.

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The **Heathkit/Zenith Personal Computing Program** is divided into five easy-to-understand units, which explain different parts of the personal computing system and put the system into perspective, so you can make an informed decision. Among the many things you will learn:
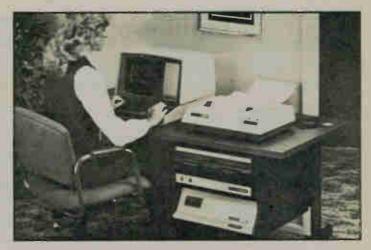
**The Fundamentals of Computers:** You'll examine the types of problems that can be solved by a computer, and how to apply the capabilities of a computer to your specific problems. You'll find out how computers "understand" electronic data. Then, you will learn how to convert written words into electronic data.

**Computer Hardware:** When you complete this section, you won't be intimidated by long lists of specifications when you shop for computer system components. You'll be able to easily and simply compare different computers — because you will understand how each performs.

**Interfacing:** You'll learn how the computer communicates with other components. You will also be able to distinguish between analog and digital data.

**Personal Computing Systems:** You will learn how to evaluate various types of small computer systems, by understanding how different combinations of components function.

**Computer Software:** When you read this section, you'll learn about the different types of computer software, and how each can solve different problems.

**Instructing the Machine:** The final section shows you how you can control the computer system, by introducing you to BASIC Language Programming.

You don't need an extensive math, electronics or computer background to learn about personal computing with our program. The easy-to-read text, supported and reinforced by three audio cassettes, makes personal computing clear and understandable to most individuals with high school backgrounds.

Upon completion, pass the optional final exam with a 70% or better score, and earn 1 CEU and a Certificate of Achievement.

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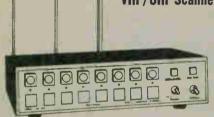Kit H-9, Shpg. wt. 50 lbs. . . . . . . . . . . . . . . . .299.95
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GDP-1425, Gas Detector, Shpg. wt. 3 lbs. . . . .39.95

### Ultrasonic Auto Intrusion Alarm is on duty when you're away from your automobile

Protect your automobile and its contents with ultrasonic sound. This alarm detects any interior motion and sounds your vehicle's horn. It's designed for use on cars, trucks, vans, motor homes, cruisers, etc. Very easy assembly and installation. 1⅜" H x

4¾" W x 3⅜" D. The Ultrasonic Auto Intrusion Alarm operates from the power of your car's 12-V battery. Optional horn relay kit adapts cars without relay. Order yours now while supplies last.
Kit GO-1558, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .49.95
Kit GOA-1558-1, Horn Relay Kit, Shpg. wt. 1 lb. . .4.95

### Mobile Security System protects your car and its contents against theft

Protect your car and valuables against theft with the Heathkit Mobile Security System. When an intruder tries to enter your car, the Mobile Security System sounds the horn, scaring off the thief while alerting passersby to the situation. An optional horn relay adapts the kit to cars whose horns do not use a relay or use a plug-in relay. Optional siren accessory provides attention-getting "yelp" sound instead of car horn. Includes all switches and hardware. Alarm unit measures 2⅛" H x 4¾" W x 5" D. For use only with automobiles having 12 VDC negative ground. The thorough, step-by-step Heathkit instruction manual makes assembly and installation of the Mobile Security System a breeze. Order yours now, because supplies are limited. Don't be disappointed.
Kit GD-1157, Shpg. wt. 3 lbs. . . . . . . . . . . . . . .29.95
Kit GDA-1157-2, Optional Horn Relay, 1 lb. . . . .2.95

### Handy Heathkit Cab-to-Camper Intercom provides reliable communications

When you're rolling down the highway in your camper and there's somebody in the back, nothing beats this handy Cab-to-Camper intercom for talking with your passengers. No more distracting yelling or notes or hand signals — just good, clean audio. The Master unit for your cab features a 3-position switch for selecting "Standby," "Monitor" or "Talk" modes. The Remote can initiate calls to the cab, and even has a "Radio" position for bringing music or news into the camper from your cab radio. No separate batteries required — draws power from 12 VDC car/truck system. Order soon!
Kit GD-160, Master, Remote and Cable, Shpg. wt. 5 lbs. . . . . . . . . . . . . . . . . . . . . . . . .19.95
GDA-160-1, Accessory Plug. Allows quick disconnect when camper and cab must be separated. Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . .4.95

### Trap Filter keeps CB from ruining TV, FM

CBers ruining your TV or FM listening pleasure? This is the most effective single device to cut out CB interference. Assembled. 300 ohm impedance.
GD-1239, 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . .6.95

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Build your own test bench—and save—with our 5280 Series

The 5280 Series of test instruments is designed for the beginning hobbyist, student or service-man. It's an excellent way to assemble a truly versatile test bench, without spending a lot of money. The 5280 Series will let you work on many types of electrical and electronic equipment. Whether you're doing service work or just experimenting, each 5280 Series instrument represents real value for your test equipment dollar.

## ① Multimeter for volts/ohms/DC current

The Heathkit IM-5284 high performance Solid State Multimeter gives you 4 different functions and a large easy-to-read panel meter. Features include AC and DC voltage measurement to 1000 volts and DC current measurement to 1000 mA full scale. The ohmmeter function is divided into four ranges, X1, X100, X10k, and X1MΩ. Power requirements are met by internal batteries or by the optional IPA-5280-1 power supply and 1 "C" cell. Includes test probes.

Kit IM-5284, Shpg. wt. 5 lbs. . . . . . . . . . . . . . .42.95

IM-5284 SPECIFICATIONS: DC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: ±3% of full scale. AC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: ±5% of full scale. DC Milliammeter: Ranges: 0-1, 0-10, 0-100, 0-1000 mA full scale. DC Input Resistance: 10 megohms. AC Input Resistance: 1 megohm. Ohmmeter: Ranges: X1, X100, X1k, X1MΩ. Power requirements: Two 9-volt batteries and 1 "C" cell or IPA-5280-1 Power Supply and 1 "C" cell. Dimensions: 5¾" H x 11" W x 7¾" D (14.6 cm H x 27.9 cm W x 19.7 cm D).

## ② RF Oscillator for radio/TV alignment

This unit, which includes probes, is suitable for use in alignment of tuned stages in AM, FM, and television receivers. Output is divided into five bands, from 310 kHz to 110 MHz, and features an extra 100 to 220 MHz band of calibrated harmonics. An added feature of the IG-5280 is its 1000 Hz audio output. This signal, available at a front panel jack, is ideal for tracing and isolation of circuit defects in receiver audio stages and also serves as a source of internal AM modulation. Includes test leads.

Kit IG-5280, Shpg. wt. 5 lbs. . . . . . . . . . . . . . .42.95

IG-5280 SPECIFICATIONS: RF Output: Frequency Range: 310 kHz to 110 MHz in five bands, 100 MHz to 220 MHz on harmonics. Output voltage: 100 mV approx. Internal Modulation: 1000 Hz. AF Output: Frequency: 1000 Hz. Output Voltage: 2.0 volts rms (open circuit). Power Requirements: Two 9-volt batteries of IPA-5280-1 power supply. Dimensions: 5¾" H x 11" W x 7¾" D.

## ③ Sine/Square Wave Audio Oscillator

The IG-5282 Audio Oscillator is an instrument that you'll find useful in many audio test applications. Frequency output is in four ranges, from 10 Hz to 100 kHz, in either sine or square wave modes. Use the IG-5282 as an audio signal source during signal tracing or, with the appropriate associated equipment, use the sine wave output for audio stage gain and distortion analysis. If you're interested in determining frequency response, you'll find the IG-5282's square wave output ideal for your purposes (with appropriate associated equipment). Construction is rugged and assembly time is greatly reduced by single circuit board assembly. A great addition for your test bench.

Kit IG-5282, Shpg. wt. 5 lbs. . . . . . . . . . . . . . .42.95

IG-5282 SPECIFICATIONS: Frequency Output: 10 Hz to 100 kHz in four ranges. Sine Wave Output Voltage: 0-3 volts rms. Square Wave Output Voltage: 0-3 volts peak. Power Requirements: Two 9-volt batteries or the optional IPA-5280-1 Power Supply. Dimensions: 5¾" H x 11" W x 7¾" D (14.6 cm H x 27.9 cm W x 19.7 cm D).

## ④ RCL Bridge ideal for design work

The IB-5281 RCL Bridge is priced right for your pocket book and has the features that you can appreciate. Solid-state circuitry lets you easily determine unknown values of resistance, inductance and capacitance. Resistance is indicated in three ranges from 10Ω to 10MΩ, inductance in three ranges from 10 μH to 10H and capacitance, also in three ranges, from 10 pF to 10 μF. Easy single circuit board construction speeds assembly. Housed in a tough 5280 Series cabinet. With component clips.

Kit IB-5281, Shpg. wt. 5 lbs. . . . . . . . . . . . . . .42.95

IB-5281 SPECIFICATIONS: Resistance Ranges: 10Ω to 10MΩ in three ranges. Inductance Ranges: 10 μH to 10H in three ranges. Capacitance Ranges: 10 pF to 10 μF in three ranges. Oscillator Frequencies: 1 kHz, 10 kHz, 100 kHz. External Standard Range: 1:1 to 10:1. Power Requirements: two 9-volt batteries, or IPA-5280-1 power supply. Dimensions: 5¾" H x 11" W x 7¾" D.

## ⑤ Signal Tracer for audio circuits

If you have been waiting to add an audio signal tracer to your bench because the price was just too high...look again. The IT-5283 Signal Tracer makes a great, low-priced addition to your trouble-shooting arsenal. A diode-equipped RF probe (furnished with the kit) lets you quickly trace radio and television receiver and transmitter circuits to reveal component and stage failures. When you flip the probe to its straight through (DC) position, you are able to locate defective circuitry in all types of audio components and systems with ease. By placing the IT-5283 in the audible position, the Signal Tracer emits a tone that changes in frequency depending on the test point voltage or resistance, thereby allowing you to easily trace signal flow through logic circuits to isolate problems.

Kit IT-5283, Shpg. wt. 5 lbs. . . . . . . . . . . . . . .42.95

IT-5283 SPECIFICATIONS: Functions: Substitute speaker, AF signal tracing, RF signal tracing, Audible volt/ohm-meter. Speaker: 3" permanent magnet. Power Requirements: Two 9-volt batteries and/or IPA-6280 power supply. Cabinet Dimensions: 5¾" H x 11" W x 7¾" D (14.6 cm H x 27.9 cm W x 19.7 cm D).

## 5280 Series 120/240 VAC Power Supply

Not shown. Provides all voltages required by 5280 Series instruments from 120 or 240 VAC, can power all five instruments simultaneously.

Kit IPA-5280-1, Shpg. wt. 3 lbs. . . . . . . . . . . .24.95



Use our top-value starter test instruments to set up your test bench, using the IPA-5280-1 Power Supply to power your 5280 Series instruments

## Tri-Output Power Supply is ideal for design or experimentation

This Tri-Output Power Supply combines fixed 5 VDC output with two continuously adjustable 0-20 VDC outputs for circuit designs requiring more than one voltage supply. The outputs of the two 20 V supplies and the 5 V output can be interconnected in any combination. Measures 4½" H x 10¾" W x 9" D.

Kit IP-2718, Shpg. wt. 12 lbs. .....................................**99.95**
SP-2718, Factory assembled and tested, Shpg. wt. 12 lbs. ............**185.00**

IP/SP-2718 SPECIFICATIONS: **Outputs:** 5 VDC @ 1.5A; A & B; 0-20 VDC @ 0.5A. **Regulation:** Load: less than 0.1% variation from no load to full load on 20V supplies; less than 3% variation from no load to full load on 5V supply. Line: less than 0.2% variation for line voltage change of 10V on 20V supplies; less than 0.15% variation for line voltage change of 10V on 5V supply. **Power Requirement:** 120/240 VAC, 60/50 Hz, 100W full load.

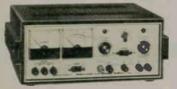## You'll like this Heavy-Duty Power Supply/Battery Eliminator

This Heavy Duty Power Supply provides you with a clean, accurate voltage source necessary for the reliable service of Ham, CB and Marine communications gear. It's ideal for any high current DC voltage application. Two easy-to-read front panel meters monitor both current and voltage. Continuously variable voltage selection from 9 to 15 VDC. Zener diode assures output accuracy.

Kit IP-2715, Shpg. wt. 31 lbs. .....**149.95**

IP-2715 SPECIFICATIONS: **Output Voltage:** variable from 9-15 VDC. **Output Current:** 12 amps continuous, 20 amps intermittent (per derating curve in manual). **Ripple:** less than 1% at full load. **Regulation:** less than 2% variation from no load to full load. **Power:** 120 VAC, 7A or 240 VAC, 3.5 A, 60/50 Hz. **Dimensions:** 5¼" H x 11" W x 11" D.

## Put this 0-400 VDC general-purpose Power Supply on your bench

Provides 0-400 VDC at 0-100 mA continuous (125 intermittent) with excellent line and load regulation. Features front panel voltage and current meters, and built-in circuit protection. Binding posts are insulated from chassis. 120/240 VAC. 5⅛" H x 13¼" W x 11" D.

Kit IP-2717, Shpg. wt. 19 lbs. ...**139.95**
SP-2717, Factory assembled & tested, wt. 19 lbs. ...................**210.00**

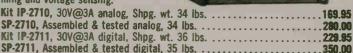## Variable Isolated AC Supply gives you more service versatility

Provides complete isolation between the AC power line and any electrical equipment plugged into its front panel variable output socket. Full 360 volt-amps of AC power is available. Continuous full-rated output capability. Ability to start from zero voltage is helpful in trying to locate circuit faults. Switch-selected 1 A and 3 A ranges are individually fused. 5.5" H x 15" W x 10.5" D.

Kit IP-5220, Shpg. wt. 28 lbs. ....................................**139.95**

## General-purpose Power Supplies to fill your service needs

Accurate source of voltage and current for all your testing and design requirements. Both feature remote programming and voltage sensing.
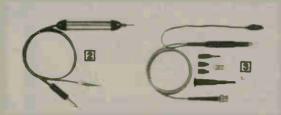
Kit IP-2710, 30V@3A analog, Shpg. wt. 34 lbs. ....................**169.95**
SP-2710, Assembled & tested analog, 34 lbs. ......................**280.00**
Kit IP-2711, 30V@3A digital, Shpg. wt. 36 lbs. ....................**229.95**
SP-2711, Assembled & tested digital, 35 lbs. ......................**350.00**

### SP-2700 Series Model Specifications

| Model | Readout | Maximum Rated Output | | Readout Range | | Regulation | |
|---|---|---|---|---|---|---|---|
| | | Voltage | Current | Voltage | Current | Load | Line |
| IP/SP-2710 | Analog | 30V | 3.0A | 0 to 30 | 0 to 3.0 | (all models) voltage: 0.05% + 1 mV current: 0.10% + 3.5 mA | (all models) voltage: ±0.05% + 1 mV current: ±0.10% + 1 mA |
| IP/SP-2711 | Digital | 30V | 3.0A | 0.00 to 19.99 20.0 to 30.0 | .000 to 1.999 2.00 to 3.00 | | |

## Versatile continuously variable 1-15 VDC Regulated Supply

This supply is perfect for servicing, testing or designing transistor radios, portable tape recorders and other low-voltage solid-state devices. Continuously adjustable 1-15 VDC at 500 mA output, 500 mV line and load regulation and fully adjustable current limiting. AC or DC programming capability. 120/240 VAC. 4⅜" H x 5½" W x 5¾" D.

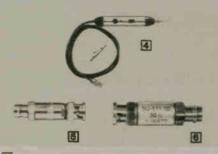Kit IP-2728, Shpg. wt. 5 lbs. ....................**28.95**

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**1** **New Test Lead Set.** 2000 V rms, 20 amp max. Includes 1.5 meter black and red cables each terminated by two 4mm shielded plugs, red sprung hook, red prod, black shrouded croc clip.
PKW-200, Shpg. wt. 1 lb. ..................**14.95**

**2** **RF Probe** provides RF voltage measurement for any 10 or 11 megohm DC input voltmeter. Linear frequency response from 1000 Hz to over 100 MHz. Includes 10 MΩ banana plug, 11 MΩ phone plug.
Kit PK-3A, Shpg. wt. 1 lb. ...................**9.95**
PKW-3A, Assembled & Tested, 1 lb. ...........**14.95**

**3** **Combination X1, X10 Scope Probe.** Has 2-position multiplier for X1 and X10 probe tip. DC to 15 MHz (X1) and DC to 80 MHz (X10) bandwidths. X10 risetime. 4.0 nS. Compensation range of 15-50 pF. Includes probe with 3-position slide switch, 4½ ft. cable.
PKW-105, Assembled & tested, Shpg. wt. 1 lb...**29.95**

**4** **Low capacitance Scope Probe Kit** for direct or X10 attenuated operation; features options for 3.3 or 1 megohm input resistance. Banana plug/BNC wiring option.
Kit PK-1, Shpg. wt. 1 lb. ...................**9.95**

**5** RF Fuse in UHF BNC-to-BNC connector. DC to 500 MHz; 50 ohms; 1.2:1 SWR (max.); insertion loss 1.80 dB max. at 500 MHz. SU-512-50, 1 lb. .......**50.00**

**6** 50-Ohm Termination. DC to 1 GHz; 1 W. SWR. 250 MHz, 1.2:1, 600 MHz, 2.1.
SU-511-50, 1 lb. ..........................**19.00**

**Accessory Cables.** For interconnecting scopes, counters, etc. All cable is RG-58/U, 50 ohm impedance.
SU-501-3, 3 ft., BNC/BNC, assembled, 1 lb. ....**7.50**
SU-503-3, 3 ft., BNC/Banana, assembled, 1 lb. ..**7.50**

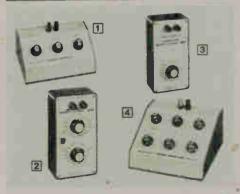Credit Card orders call TOLL-FREE: 800-253-0570.

## High-performance Heathkit Curve Tracer tests semiconductors quickly, easily

Connect the IT-3121 to an oscilloscope with horizontal sensitivity of 0.5 V/div. and vertical sensitivity of 1 V/div. and horizontal gain. Then inspect bipolar transistors, diodes, SCRs, triacs, FETs, etc. for specific applications. Extensive manual tells how to interpret displays. Extra leads included.

**Kit IT-3121, Shpg. wt. 10 lbs.** . . . . . . . . . . . . **119.95**

IT-3121 SPECIFICATIONS: Sweep Voltage Ranges: 0-40 V at 1 amp. max. 0-200 V at 200 mA max. Sweep Voltage Sampling: .1-50 V/div. ±3%. Sweep Current Sampling: .5-200 mA/div. ±3%. Sweep Dissipation Resistors: 0-1M at ±10%. Step Currents: .002-10 mA/step, ±3%, +250 nA offset current max. Step Voltages: .05-1 volt/step, ±3%, ±%5 mA max. offset voltage. Calibration Source: 9 V ±2% in 1 V steps. Polarity: PNP and NPN (P Channel-N Channel). Oscilloscope Requirements: Bandwidth to 20 kHz or greater. (DC-coupled oscilloscope is recommended). Power Requirement: 120/240 VAC. Dimensions: 4½" H x 11¼" W x 10" D.
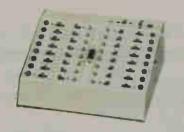


**1** **Decade Capacitance Box** functions as a wide-range capacitor for design work. Covers 100 pF to 0.111 µF in 100 pF increments. Rated 400 VDC.
Kit IN-3127, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .26.95

**2** **Resistor Substitution Box** provides switch selection of 36 10% tolerance, 1-watt resistors from 15 ohms to 1 megohm.
Kit IN-3137, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .17.95

**3** **Capacitor Substitution Box** provides switch selection of 18 EIA standard capacitors from 100 pF to 0.22 µF. All capacitors are rated at 600 VDC except the three lowest and two highest values, which are rated at 500 and 400 V respectively.
Kit IN-3147, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .17.95

**4** **Decade Resistance Box** is variable multiplier/shunt, variable resistor, or arm with AC and DC bridges. Covers 1 Ω to 999,999 Ω in 1-ohm steps.
Kit IN-3117, Shpg. wt. 3 lbs. . . . . . . . . . . . . . .49.95



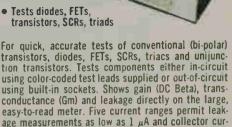## This deluxe Heathkit Digital IC Tester is designed to save you checking time

Quality "zero-force" insertion socket, exclusive "bounce-free," mercury stepping switch, input-output jacks for each pin, neon indicators. Install 14- or 16-pin ICs in any position. Ideal for use with Digital Techniques Program (page 73). A "must" for anyone working with digital integrated circuits.

**Kit IT-7400, Shpg. wt. 6 lbs** . . . . . . . . . . . . . .**79.95**

IT-7400 SPECIFICATIONS: Pull-up Resistors: externally connected, with patch terminals. Patch Terminals: one at each pin. Selector Switches: two at each terminal, one for +5, step, or off; the other for gas discharge or ground. Gas Discharge: allows direct driving of neon indicator lamp for high voltage decoder driver. Power Supply: 5 VDC regulated, ±5%, 300 mA and 3.6 VDC, switch selected. Power Requirement: 120/240 VAC, 60/50 Hz.



## Take this portable Transistor/Diode Checker with you anywhere

Checks high and low power transistors (NPN and PNP) for shorts, opens, leakage and current gain, diodes for forward and reverse current; tests continuity. Uses two 1.5 V "C" cells (not included). 3⅛" H x 3⅛" W x 3¾" D.
**Kit IT-3127, 2 lbs.** . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**12.95**



## High-accuracy Heathkit Impedance Bridge gives you easier, better measurements

The Heathkit IB-3128 Impedance Bridge features four separate bridge circuits to give you more accurate measurement of resistance, capacitance, low and high inductance, dissipation factor of capacitors and quality factor of inductors. It also has a direct reading 100-0-100 microammeter, front panel binding posts for easier test setups, a built-in DC power supply and a 1000 Hz AC generator. The kit requires headphones or an oscilloscope for alignment. For 120/240 VAC, 50/60 Hz. The IB-3128 is a quality instrument that belongs on your test bench. It's an easy-to-build kit, too.

**Kit IB-3128, Shpg. wt. 11 lbs** . . . . . . . . . . . .**159.95**

IB-3128 SPECIFICATIONS: Detector: Vacuum tube detector and amplifier, using built-in meter. Terminals for external detector. Resistance: 0.1 ohm to 10 megohms. Capacitance: 100 pF to 100 µF. Inductance: 0.1 mH to 100 H. Dissipation Factor: (D) 0.002 to 1. Storage Factor: (Q) 0.1 to 1000. Accuracy: 0.5% decade resistors used. Dimensions: 8" H x 17" W x 6" D.

## High-accuracy FET/Transistor Tester lets you test in- or out-of-circuit
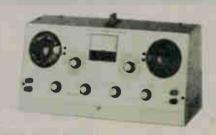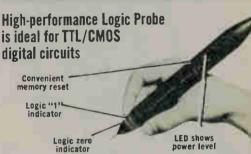


● Tests diodes, FETs, transistors, SCRs, triads

For quick, accurate tests of conventional (bi-polar) transistors, diodes, FETs, SCRs, triacs and unijunction transistors. Tests components either in-circuit using color-coded test leads supplied or out-of-circuit using built-in sockets. Shows gain (DC Beta), transconductance (Gm) and leakage directly on the large, easy-to-read meter. Five current ranges permit leakage measurements as low as 1 µA and collector currents as high as 1 ampere. Push-button function switches; battery testing circuit.

**Kit IT-3120, Shpg. wt. 5 lbs.** . . . . . . . . . . . . . .**69.95**

IT-3120 SPECIFICATIONS: Out-of-circuit Accuracy: ±5% for DC beta and leakage. In-Circuit Accuracy: indicates good or bad transistor, FET, diode, SCR or triac. Diode Test: Tests for forward conduction and blocking. Unijunction Transistor Test: Measures, $I_{eb_2}s$, $I_{b_2b_1}s$ and emitter current. Power Requirement: Two 1½ V alkaline cells (not supplied). Dimensions: 5" H x 9⁷⁄₁₆" W x 8⅛" D.

## High-performance Logic Probe is ideal for TTL/CMOS digital circuits



Convenient memory reset
Logic "1" indicator
Logic zero indicator
LED shows power level

Detects and indicates high and low logic levels in TTL or CMOS circuitry. Detects logic signals to 100 mHz, polarity and presence of single pulses as short as 10 nSec. Memory indicator shows any transition in logic level. Includes power leads, mini-clips and ground clip. ¾" H x 1" W x 9¼" L.
**Kit IT-7410, Shpg. wt. 1 lb.** . . . . . . . . . . . . . .**39.95**



## High quality instrument Test Probes

30 kV High-Voltage Probe multiplies DC ranges of any 10-megohm meter by 100. 1000 megohm input.
Kit IMA-100-10, Shpg. wt. 1 lb. . . . . . . . . . . .11.95

30 kV High-Voltage Probe. Provides x100 measurement for meters with 11-megohm input (including probe resistance). Phone plug, alligator ground clip.
Kit IMA-100-11, Shpg. wt. 1 lb. . . . . . . . . . . .11.95

30 kV Probe provides x1000 attenuation for meters with 1-megohm input impedance.
Kit IMA-1000-1, Shpg. wt. 1 lb. . . . . . . . . . . .11.95

# Heathkit TV service instruments save you time and money

## Low-Cost CRT Tester/Rejuvenator brings your old and worn TV picture tubes back to life — even in-line gun types!

Test, clean and rejuvenate almost all current CRT's including in-line-gun types. Positive action pushbuttons control all tests and processes for easy operation. Individual guns can be cleaned, tested and rejuvenated by using the front panel pushbuttons. And separate meters for each gun allow easy tracking of the individual grid currents. The main power control also sets control grid voltage level. A separate heater voltage meter allows monitoring of the heater voltage supplied to the cathode of the CRT. An indicator lamp gives visual confirmation of CRT short-circuits and the visual display restore indicator glows brighter as the rejuvenating current is increased. A separate cleaning process is applied after rejuvenation to assure proper tube operation. With 4' heavy-duty test cable.

Kit IT-5230, Shpg. wt. 9 lbs. ....................................119.95
Factory Assembled Version of above.
ST-5230, Shpg. wt. 9 lbs. ......................................160.00

IT-5230 SPECIFICATIONS: Sockets Supplied: 14-pin for 90° color tubes; 13-pin for in-line color tubes; 8-pin for black-and-white tubes; 7-pin for black-and-white tubes. Heater Supply Voltage: Variable from 2 volts to 12 volts at 1 ampere. Power Requirement: 120/240 VAC (ST-5230: 120 VAC.) Dimensions: 5.12" H x 13.5" W x 10" D.



## Portable Color Alignment Generator for in-the-field service

The IG-5240 offers outstanding performance, with crystal-controlled carrier and color oscillator for real precision, accuracy and stability. Its convenient "shirt-pocket" size makes it the one to take along for in-the-field service calls every time. It's a versatile, low-cost service tool for hobbyists, too. The IG-5240 is really easy to operate. Simply connect its output cable to the VHF terminals of any color TV. The RF carrier frequency is calibrated for channel 4. An "on" pushbutton turns the IG-5240 on, four program slide switches select any of the 16 displays available. A color level control adjusts the color intensity of the three color patterns. A special "battery saver" timing circuit turns the display "off" automatically after a minimum of five minutes "on". This conserves battery power and lets you get the most efficient operation from your batteries. The unit uses two inexpensive 9-volt transistor batteries for a minimum of 8 hours continuous operation. For features, convenience and versatility, we don't think you can find a better color alignment generator than the IG-5240. Put this truly portable color alignment generator in your service shop today!

Kit IG-5240, Shpg. wt. 2 lbs. ....................................69.95
SG-5240, Factory assembled version of above. Shpg. wt. 1 lb. ...........95.00

IG/SG-5240 SPECIFICATIONS: Chroma Carrier: 3563.795 kHz ±0.005% crystal-controlled. Master Timer: 377.616 kHz ±0.005% crystal-controlled. RF Carrier: Channel 4, 67.250 MHz ±0.01% crystal-controlled. RF Output Level: 5000 $\mu$V min. into 300 ohms. Video Modulation: 50% (approx.) On-Time Interval: 5 minutes min. OFF pushbutton can override time out. Power Requirement: Two 9-volt transistor batteries; with 180 mAH capacity (NEDA #1604). Dimensions: 5.4" L x 2.75" W x 1.15" D.

## ① Color Bar and Dot Pattern Generator for easy service

Provides 12 patterns plus a clear raster for purity adjustments, and patterns are available in the exclusive Heath 3x3 display or the familiar 9x9. Has RF output for channels 2 through 6, variable up to 50,000 $\mu$V, variable plus and minus going video, front panel gun shorting switches and lead piercing grid jacks, front panel sync output, 4.5 MHz sound carrier oscillator, two 500W AC receptacles. For 120/240 VAC, 50/60 Hz. 5½" H x 13½" W x 8" D.
Kit IG-5228, Shpg. wt. 8 lbs. ....................................134.95

## ② Versatile combination Vectorscope/Color Generator

Accurately shows the chroma signal being fed to the CRT to indicate missing or weak colors, proper adjustment of the burst phase transformer, 3.58 MHz oscillator, reactance coil, bandpass transformer, color demodulation angle. Provides 12 patterns plus a raster for purity adjustments in 9x9 or 3x3.
Kit IO-4101, Shpg. wt. 13 lbs. ....................................189.95

Easy to use and accurate — makes color TV service a breeze.

# Heathkit TV/radio test equipment gives you top quality

## Get world-famous Heathkit reliability in a high-quality Yoke/Flyback Tester — and spend a lot less money — with the new portable IT-5235

**$89⁹⁵**

- Simple good/bad ring test checks yokes, flybacks and coils
- Quick, reliable measurement of drive signals in horizontal circuits
- Portable and lightweight with easy one-knob tuning

Why spend twice as much for a comparable model when you can get world-famous Heathkit quality at an affordable price? The new IT-5235 Yoke/Flyback Tester offers simple and reliable performance in a portable, lightweight package designed for TV service technicians.

A dynamic good/bad ring test checks horizontal and vertical windings of yokes, flybacks, horizontal linearity coils, efficiency coils and general mid-frequency (10 to 100 kHz) coils. Testing can be conducted in or out of circuit. You can get measurements of drive signals in horizontal circuits, as well
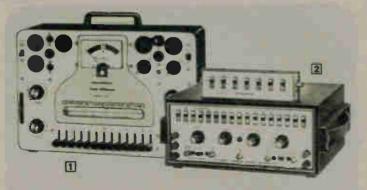
as focus and anode voltage measurements with the optional IMA-100-10 High-Voltage Probe (listed below).

Use the IT-5235 on solid-state and tube-type TV's anywhere! It's lightweight (just 6 pounds) and portable, and can be operated on 110 or 240 VAC. One-knob tuning with color-coded controls, jacks and inputs provide easy, accurate measurements. Calibration requires only an oscilloscope. Test leads and convenient storage compartment included.

Kit IT-5235, Shpg. wt. 8 lbs. . . . . . . . . . . . . . .89.95
IMA-100-10, High-Voltage Probe, 1 lb. . . . . . . .11.95

IT/ST-5235 SPECIFICATIONS: Yoke/Flyback Accuracy: ±1 ring at 10 mark on highest reading range. Drive Voltage Scales: 0-30 V P-P AC, 0-300 V P-P AC. Drive Voltage Accuracy: ±5% of full scale, 100 Hz to 200 kHz. High-Voltage Scales: 0-10 k VDC, 0-40 k VDC. High-Voltage Accuracy: ±3% of full scale (including optional IMA-100-10 HV probe). Dimensions: 6⅞" H x 5¾" W x 10¾" D.

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[1] **Low-Cost Heathkit Tube Checker.** Essential for radio-TV servicing! Tests tubes on the basis of total emission, for shorts, leakage, open elements, and filament continuity. Has good/bad indicator to show relative quality, neon bulb indicator for filament continuity and leakage or shorts between elements.
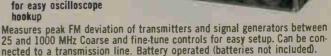**Kit IT-3117, Shpg. wt. 12 lbs.** . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .159.95

IT-3117 SPECIFICATIONS: Sockets: 4-pin, 5-pin, 6-pin combination and pilot light. 7-pin miniature, octal, loctal, 10-pin miniature, 9-pin novar, 9-pin miniature, 12-pin compactron, 5-pin nuvistor, 7-pin nuvistor. Power Requirement: 120 VAC, 50/60 Hz. Dimensions: 8½" H x 13" W x 5½" D.

[2] **Deluxe Post Marker/Sweep Generator.** The IG-5257 makes receiver alignment fast and easy. It features 15 selectable markers, carrier markers for channels 4 and 10, a diode modulator for Video Sweep Modulation, a 400 Hz tone for FM receiver alignment.
**Kit IG-5257, Shpg. wt. 16 lbs.** . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .229.95

IG-5257 SPECIFICATIONS: Marker frequency: 100 kHz. Marker frequencies, crystal-controlled: 3.08, 3.68, 4.08, and 4.50 MHz ±0.01%. 10.7, 39.75, 41.25, 42.17, 42.50, 42.75, 45.00, 45.75, 47.25, ±0.005%; 67.25 and 193.25 MHz ±0.01%. Modulation frequency: 400 Hz. Input Impedance: 75 ohms. Trace in — 220 k ohms. Output impedance: 75 ohms. Scope Vert. — 1 k ohms. Bias voltage: Positive or negative polarity. Sweep frequency ranges: LO Band — 2.5 to 5.5 MHz ±1 dB. IF Band — 39 to 49 MHz ±1 dB. RF band — 64 to 72 MHz ±1 dB. Attenuator: Total of 70 dB in seven steps.

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## FM Deviation Meter helps check FM transmitters

**$149⁹⁵ Kit**

- Measures peak deviation of transmitters and signal generators
- Easy-to-read, easy-to-operate, accurate to ±3 percent
- Two front panel jacks for easy oscilloscope hookup

Measures peak FM deviation of transmitters and signal generators between 25 and 1000 MHz Coarse and fine-tune controls for easy setup. Can be connected to a transmission line. Battery operated (batteries not included).

Kit IM-4180, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . .149.95
SM-4180, Assembled and Tested, Shpg. wt. 6 lbs. . . . . . . . . . . . . .250.00
Kit IMA-4180-1, Battery Charger/Eliminator, 2 lbs. . . . . . . . . . . . . .29.95
SMA-4180-1, Assembled and Tested, Shpg. wt. 2 lbs. . . . . . . . . . . . .40.00

IM/SM-4180 SPECIFICATIONS: Deviation Ranges: 0-2, 0-7.5, 0-20 and 0-75 kHz peak. Accuracy: ±3% of full scale. Input Impedance: 50 ohms. Maximum Safe Input: 5 volts. Scope Output: 13 mV/kHz peak. Dimensions: 5" H x 10⅜" W x 7⅜" D.

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## High-Voltage Probe Meter for fast, easy TV Tube Measurements

Makes TV high voltage measurements fast and convenient. It's lightweight, portable and measures DC voltages up to 40 kV with ±3% accuracy. Easy operation and assembly.
Kit IM-5210, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .22.95

**[1] Solid-State Taut-Band FET VOM.** Provides the input characteristics and measuring capabilities of a VTVM with the versatility and portability of a VOM. The 4½" taut-band meter is diode-protected for outstanding ruggedness and reliability. Has 9 AC and DC voltage ranges; 6 current ranges; seven resistance ranges and 9 dB ranges. Extra-wide frequency response is useful for audio measurements and in many other applications where conventional VOMs can't be used. Easy kit assembly.

**Kit IM-1104,** Shpg. wt. 4 lbs. ..............**114.95**

IM-1104 SPECIFICATIONS. Frequency Response: 0.1 to 30 volt ranges, ±5%, 20 Hz to 20 kHz, ±5%, 20 Hz to 50 kHz, 100-300 volt ranges, ±5%, 20 Hz to 10 kHz, ±5%, 20 Hz to 20 kHz, 1000 volt range, ±1%, 20 Hz to 1 kHz. DC VOLTAGE RANGES: 0.1, 0.3, 1, 3, 10, 30, 100, 300, 1000 V. Accuracy: ±2% of full scale. AC VOLTAGE RANGES: 0.1, 0.3, 1, 3, 10, 30, 100, 300, 1000 V. Accuracy: ±3% full scale. DC MILLIAMETER: 0-0.1, 0.1, 1, 10, 100, 1000 mA. Accuracy: ±2% to 100 mA, ±3% to 1000 mA. AC MILLIAMETER: Same as DC mA, accuracy, ±3% to 100 mA; ±4% to 1000 mA. OHMMETER: Rx10, Rx100, Rx1000, Rx10K, Rx100K (10 ohm center scale), Rx1M (10 megohm center scale). dB: (0 dB = 1 mW into 600 ohms) −40 to −18, −30 to −8, −20 to +2, −10 to +12, 0 to +22, +10 to +32, +20 to +42, +30 to +52, +40 to +62. Operating Temperature: 0 to 50° C. Batteries (not supplied): one 1.5 V D-cell (NEDA #13), four 1.5 V AA cells (NEDA #15). Dimensions: 6.35" H x 4.95" W x 2.25" D.

**[2] General-Purpose VOM for easy service.** The IM-105 is a high-accuracy VOM that's really designed to take it. Accurate enough for engineering, design and R & D work, the IM-105 features a low-friction, taut-band meter with diode and fuse-protected movement. Calibrated controls, DC polarity reversal switch, front panel ohms adjustment plus a strong, truly dropable case. Less batteries.

**Kit IM-105,** Shpg. wt. 3 lbs. ..............**69.95**

IM-105 SPECIFICATIONS: DC VOLTAGE RANGES: −0.25, 2.5, 10, 50, 250, 500, 1000 & 5000 V full scale. Accuracy: ±3% of full scale. Input resistance: 20,000 ohms/V full scale. AC VOLTAGE RANGES: −2.5, 10, 50, 250, 500 V, 1 kV & 5 kV full scale. Accuracy: ±4% of full scale. Input resistance: 5000 ohms/V. Input capacity: Less than 20 pF. Frequency response: 2.5, 10, and 50 V ranges, ±5%, 10 Hz to 100 kHz; 250, 500 V ranges: ±5%, 10 Hz. DC CURRENT RANGES: −0.05, 1.0, 10, 100, 500 mA & 10 A full scale. Accuracy: ±3% of full scale. RESISTANCE RANGES: −x1 (20 center scale), x10, x100, x1k, x10k. Accuracy: ±3 degrees of arc. DECIBEL RANGES: (0 dB = 1 mW in 600 ohms), −10 to +56 dB. Dimensions: 7" H x 5" W x 2¼" D.

**[3] Quality FET Multimeter.** Measures AC and DC volts, current and resistance. Features auto-polarity for added convenience, high and low voltage/ohms functions for in-and out of circuit checks of semiconductor devices and resistance measurements.

**Kit IM-5225,** Shpg. wt. 8 lbs. ..............**129.95**
**SM-5225,** Assembled, 8 lbs. ..............**185.00**

IM-5225 SPECIFICATIONS: DC Volts: nine ranges 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, and 1000 full-scale. AC Volts: nine ranges 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, and 1000 volts full-scale. DC Current: six ranges 0-.01, 0.1, 1, 10, 100, 1000 milliamperes full-scale. AC Current: six ranges 0-.01, 0.1, 1, 10, 100, 1000 milliamperes full-scale. Ohms: seven ranges X1, X10, X100, X10k, X100k, X1M. Power Requirement: 120/240 VAC, 50/60 Hz, 5 watts. Dimensions: 6⅝" H x 5⅝" W x 3¼" D.

**[4] Deluxe AC Voltmeter.** Has excellent frequency response and sensitivity high-accuracy measurements. And it's one of the only instruments around to feature linear scales for both volts and decibels!

**Kit IM-5238,** Shpg. wt. 8 lbs. ..............**89.95**
**SM-5238,** Assembled, Shpg. wt. 8 lbs. ......**160.00**

IM/SM-5238 SPECIFICATIONS: Voltage Range (full scale): 1 millivolt to 300 volts AC, 12 ranges. Decibel Range: −70 dB to +40 dB, 12 ranges in 10 dB steps with variable offset. Input: 10 megohms, 30 pf, negative input grounded to chassis. Frequency Response: Voltage Range, 10 Hz to 1 MHz, ±2 dB, 10 Hz to 500 kHz ±1 dB, dB range, 10 Hz to 250 kHz ±1 dB. Outputs: DC proportional to input volts, 1 volt full scale, DC proportional to log of input volts, 3 volts full scale. AC amplified output, 1 volt peak, full scale. Scales: 0-10 volts; 0-3.16 volts; −20 to +10 dB. Accuracy: Voltage Ranges, 4% of full scale at 1 kHz plus accuracy of calibration standard. dB ranges, ±0.5 dB at 1 kHz plus accuracy of calibration standard. Power Requirement: 100-135 VAC, 200-270 VAC, 50/60 Hz, 20 watts. Dimensions: 6⅝" H x 5⅝" W x 10⅝" D.

**[5] Lin/Log Swept Function Generator.** The IG-1275 is a reliable lab-grade function generator that provides sine, square and triangle waveforms PLUS swept-function waveforms for convenient frequency response tests. This Lin/Log Swept Function Generator also has pen lift and chart control signals, for use with Heathkit chart recorders and others. The IG-1275 provides a 50 dB switch attenuator, variable between ranges, adjustable symmetry from 5 percent to 95 percent, and analog sweep and sweep gate outputs for convenient system control. Start and stop frequencies are set independently; sweep modes can also be triggered externally.

**Kit IG-1275,** Shpg. wt. 15 lbs. ..............**299.95**

IG/SG-1275 SPECIFICATIONS: Output: 50-ohm source − short circuit protected, ±10 volts open circuit, ±5 volts into 50-ohm load. Output Flatness: ±0.1 dB to 300 kHz, ±0.5 dB to 3 MHz. Frequency: 0.003 Hz through 3 MHz in 6 range steps on primary decade. Sine Distortion: Less than 1%, X10¹, Less than 0.5%, X10², 10³, 10⁴, Less than 0.75%, X10⁵. Harmonics 30 dB down, X10⁶. Triangle Linearity: No deviation greater than 1% to 300 kHz.* Square-Wave Rise and Fall: Less than 60 nS. Sweep Generator: 5 ranges, 10 µs through 100 sec. Sweep Output: Supplies 0 to 4.5-volt linear ramp at sweep generator rate from a 1000 ohm source. *Applicable only on top decade of each frequency range. The IG-1275 requires a triggered sweep oscilloscope for calibration. Power Requirement: 100 to 135 volts, 50-60 Hz, 20 watts maximum, 200 to 270 volts, 50-60 Hz, switch selectable. Dimensions: 5⅝" H x 15" W x 11⅝" D.



- **Easy to Operate**
  front panel controls
- **Short-circuit-proof output amplifier**
- **Rugged case with carrying handle**

# performance, high reliability and build-it-yourself value
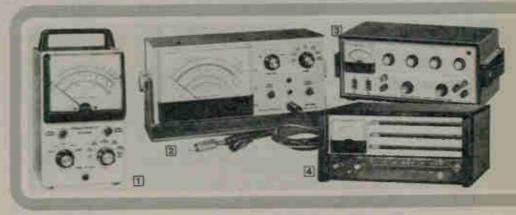
[1] **Popular, low cost VTVM.** A single test probe that makes all measurements; seven practical AC, DC volts and ohms ranges; a precision 4½" color-coded 200 μA meter. 1% precision network resistors provide excellent accuracy; wide ±1 db, 25 Hz to 1 MHz frequency response permits a variety of AC measurements. Measures both rms and p-p AC volts. Separate full-scale ranges for 1.5 and 5 volts makes low-voltage readings really easy; ideal for work with solid-state and latest digital equipment. Can be wired for 120 or 240 VAC.

Kit IM-5218, Shpg. wt. 5 lbs. . . . . . . . . . . . . **59.95**
SM-5218, Assembled, Shpg. wt. 5 lbs. . . . . . **75.00**

IM/SM-5218 SPECIFICATIONS: Meter Scales: DC & AC (rms): 0-1.5, 15, 50, 150, 500, 1500 V full scale. AC Peak-to-Peak: 0.4, 14, 40, 140, 1400, 4000 V full scale. Resistance: 10 ohm center scale x1, x10, x100, x1000, x10k, x100k, x1 meg. Measures 1 ohm to 100 megohms. Meter: 4½", 200 μA movement. Input Resistance: 11 megohms (1 megohm in probe) on all DC ranges; 1 megohm shunted by 35 pF on all AC ranges. Circuit: Balanced bridge (push-pull) using twin triode. Accuracy: DC ±3%, AC ±5% of full scale. Frequency Response: ±1 dB, 25 Hz to 1 MHz (600 ohm source). Battery Requirements: 1.5 V, size "C" cell (not supplied). Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 7⅜" H x 4¹¹⁄₁₆" W x 4¼" D.

[2] **Pro-feature bench VTVM.** Bench-type version of IM-5218. All calibration controls are conveniently adjustable from the front panel. 120 or 240 VAC.

Kit IM-5228, Shpg. wt. 6 lbs. . . . . . . . . . . . . . **69.95**
SM-5228, Assembled, Shpg. wt. 7 lbs. . . . . . **120.00**

IM/SM-5228 SPECIFICATIONS: DC VOLTMETER — Ranges: 0-1.5, 5, 15, 50, 150, 500, 1500 V full scale; up to 30,000 V with accessory probe. Input Resistance: 11 megohm (1 megohm in probe) on all ranges; 1100 megohms with accessory probe. Circuit: Balanced bridge (push-pull) using twin triode. Accuracy: ±3% of full scale. AC VOLTMETER — Ranges: 0-1.5, 5, 15, 50, 150, 500, 1500 rms scales. Frequency Response (5 V range): ±1 dB 25 Hz to 1 MHz (800 ohm source, referred to 60 Hz). Accuracy: 5% of full scale. Input Resistance & Capacitance: 1 megohm shunted by 40 pF measured at input terminals (200 pF at probe tip). OHMMETER — Ranges: Scale with 10 ohm center, X1, X10, X100, X1000, X10k, X1 meg. Measures 0.1 ohm to 1000 megohms with internal battery. Meter: 6", 200 μA movement, polystyrene case. Battery: 1½V, "C" cell (not supplied). Power Requirement: 120/240 VAC, 60/50 Hz, 10 W. Dimensions: 5" H x 12¾" W x 4¼" D.



[3] **Sine-square wave Audio Generator.** Ideal for gain and frequency response measurements in audio amplifiers, as a signal source for harmonic distortion measurements or as an external modulator for RF signal generators. A meter, calibrated in both volts and dB, monitors the sine wave output.

Kit IG-5218, Shpg. wt. 10 lbs. . . . . . . . . . . . **99.95**
SG-5218, Assembled, 10 lbs. . . . . . . . . . . . **185.00**

IG/SG-5218 SPECIFICATIONS: Frequency Range: 1 Hz to 100 kHz. Sine Wave Output: Output Voltage, 8 ranges, 0.003 to 10 V rms full-scale with 10 k ohm or higher external load. 6 ranges, 0.003 to 1 V full-scale with 600 ohm internal or external load. dB Ranges: -62 dB to +22 dB, -12 dB to +20 dB on amplitude switch in 10 dB steps. +2 dB max. into 600 ohm load. (0 dB = 1 mW in 600 ohm). Output Variation: +1 dB 10 Hz to 100 Hz. Output Impedance: 10 V range: 0-1000 ohm, 3 V range: 800-1000 ohm, 1 V range and lower; 600 ohm. Square Wave Output: Output voltage (peak-to-peak) 0-1; 1, 10 V into 2000 ohm load or higher. Output Impedance: 0.1 and 1 V ranges: 52 ohm. 10 range: up to 220 ohm. Power Requirement: 105-125 or 210-250 VAC, 60/50 Hz, 6 watts. Dimensions: 5½" H x 13¼" W x 7" D.

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PKW-4, Wired Replacement Probe for IM-5228, 5218, 18 or 28. Wt. 1 lb. . . . . . . . . . . . . **10.95**
Convert your IM-5228, 5218, 18 or 28 to instant on solid-state operation.
IMA-18-1, Wt. 1 lb. . . . . . . . . . . . . . . . **19.95**

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[4] **IG-1272 Audio Frequency Generator.** The Heathkit IG-1272 provides a low-distortion sine wave output over a frequency range from less than 5 Hz to 100 kHz. Pushbutton select first 3 significant digits of desired frequency; also control frequency multiplier. Perfect for the serious audiophile, audio service shop or audio designer.

Kit IG-1272, Shpg. wt. 11 lbs. . . . . . . . . . . . **159.95**
SG-1272, Assembled, 10 lbs. . . . . . . . . . . . **170.00**

IG/SG-1272 SPECIFICATIONS: Output Voltage: 0.003 to 10 volts RMS. Output Load: 600 ohms. Hum and Noise: 0.01% or less. Frequency Accuracy: Pushbuttons: ±4%, ±1 Hz, typical ±1.5%. Variable: Depends on accuracy of counter being used. Attenuation: 10 to 70 dB. Power Requirement: 120 VAC or 240 VAC, 50 or 60 Hz, 10 watts maximum. Dimensions: 5½" H x 11" W x 12½" D.



## Versatile, low-cost Heathkit 1 Hz-1 MHz Function Generator

Generates highly accurate sine, square or triangle waveforms over a frequency range of 1 Hz to 1 MHz. The frequency multiplier and front panel tuning control set any frequency fast and easy. The output amplifier supplies a 10 volt (p-p) signal into a 50 ohm load. A calibrated step attenuator adjusts from 0 to 50 dB (10V p-p to 30 mV p-p) in 10 dB steps. An attenuator control provides up to 20 dB additional attenuation. A trigged scope is necessary for calibration.

Kit IG-1271, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . **134.95**
Assembled Version of the IG-1271.
SG-1271, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . **195.00**

IG-1271 SPECIFICATIONS: Frequency Range: 1 Hz to 1 MHz. Functions: Triangle Waveform: Nonlinearity, 5% maximum. Symmetry within 10% of 50% duty cycle. Square Waveform: 100 nanosecond maximum rise or fall time. Symmetry within 10% of 50% duty cycle. Sine Waveform: Harmonic distortion; 3% max, 5 Hz to 100 kHz. Attenuator: 0 to 50 dB in 10 dB steps. 0 to 20 dB minimum variable. ±1 dB accuracy. Output: 10 volts peak-to-peak into 50 ohms. ±1.5 dB flatness from 0.1 Hz to 1 MHz. 50 ohms impedance ±5%. Power Requirement: 105-130 volts or 210-260 volts, rms, 60/50 Hz, 15 watts max. Operating Temperature: 0 to 40°C. Dimensions: 3" H x 7¼" W x 8¾" D (with handle removed).

## Solid-State portable VOM is ideal for fast checks

**SAVE over 11%**
- Value-priced
- Easy-to-build

Our lowest-priced portable VOM is ideal for car buffs, boaters, campers — any away-from-the-bench situation. Has four AC, DC and ohms ranges for most common measurements, high impedance to minimize circuit loading, wide frequency response for audio measurements. A special 1½-volt ohmmeter is ideal for checking semiconductors. Function switch gives you both AC and DC readings without changing test lead connections. Less batteries.

Kit IM-5217, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . Was $44.95, Now **39.95**

IM-5217 SPECIFICATIONS. DC VOLTMETER: Ranges: 0-1.5, 0-15, 0-150, 0-500 volts full scale. Input Resistance: 10 megohms on all ranges. Accuracy: ±3% full scale. AC VOLTMETER: Ranges: 0-1.5, 0-15, 0-150, 0-500 volts full scale. Input Resistance: 1 megohm on all ranges. Input Capacitance: approx. 100 pF (40 pF on 500-volt range). Accuracy: ±5% full scale. Frequency Response: 1 dB, 10 Hz to 1 MHz. OHMMETER: Rx1, Rx100, Rx10K, Rx1M (10 ohms center scale). Meter: 4½", 100 μA, 100 degree movement. Batteries: (not supplied): two 9-volt, one 1.5 V "C" cell. Dimensions: 5⅜" H x 9⅜" W x 9" D.

63

# Our low cost, high performance Digital Multimeter

$69.95 Kit

- Features full overload protection on all ranges
- Designed for operation on either 120 or 240 VAC

Full-function capability includes AC voltage measurements up to 700 volts. Has four overlapping AC & DC voltage and current ranges, and five resistance ranges. Features overload protection on all ranges, isolated floating ground, universal banana jack inputs for easy testing of electronic equipment.

Kit IM-1210, Shpg. wt. 5 lbs. .................................................. **69.95**
SM-1210, Factory assembled and calibrated, Shpg. wt. 5 lbs. .......... **120.00**

IM-1210 SPECIFICATIONS: Ranges: (Full-Scale): DC volts: 0-2, 20, 200, 1,000 V; DC current: 0-2, 20, 200, 2,000 mA; AC volts: 0-2, 20, 200, 700 V rms (50 Hz to 10 kHz). AC current: 0-2, 20, 200, 2,000 mA rms (60 Hz to 10 kHz). Ohms: 0-200, 2K, 20K, 200K, 2M ohms. Overrange: 25% on all functions, within maximum input limits. Maximum Input: 3 amperes into AC or DC mA, and Ohms (fuse protected). 700 VAC rms into Volts (except 2V range: 250 VAC rms). 1000 VDC into Volts (except 2V range: 350 VDC). "—" input may be floated 1000 VDC (700 VAC) above earth ground. Resolution (Low Range): Volts: 10 mV. Current: 10 μA. Ohms: 1 ohm. Accuracy (Full Scale, ±1 Digit): DC volts: ±1%. DC current: ±1.5%. AC volts: ±1.5%. AC current: ±2%. Ohms: ±1.5%. Input Impedance: 1 megohm on all voltage ranges. Power Requirement: 120/140 VAC, 50/60 Hz, 8 watts. Dimensions: 3.0" H x 8.69" W x 10.54" D.
NOTE: Specifications based on 30-min. warmup.

New Test Lead Set. 2000 Vrms, 20 A max. 1.5m black & red cables, each terminated by 2-4mm shielded plugs, red sprung hook & prod, black croc clip. PKW-200, 1 lb. .......... **14.95**

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## 3½-digit auto-ranging Multimeter

$289.95

- Automatically selects proper range
- Input protection on all functions prevents overloads

Automatic range selection; high accuracy; five AC and DC voltage ranges to 1000 volts; five AC and DC current ranges to 2000 mA, and 10 resistance ranges (low-voltage and high-voltage) up to 20 megohm. Basic DC accuracy is ±0.2%; Basic AC accuracy is ±0.4% when calibrated to laboratory standards. 120/240 VAC, or optional battery pack (order below). 3.1" H x 7.5" W x 11" D.

Kit IM-2212, Shpg. wt. 10 lbs. .................. **289.95**
IMA-2212-1, Optional Rechargeable Battery Pack, 4 lbs. .................. Was $39.95, Now **19.95**

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## Save $20 on 26-Range Digital Multimeter

$199.95

- Lightweight, compact and highly accurate for in-the-field use
- Use on either 120 or 240 VAC

100% overrange capability, separate voltage and current inputs for circuit protection. 2-volt full scale measurement on 1k, 10k and 1 meg ranges allows forward biased junction testing of semi-conductor devices. 3½-digit display with leading zero suppression, automatic polarity indication. 3" H x 8¼" W x 8" D.
Kit IM-2202, 8 lbs. ..... Was $219.95, Now **199.95**

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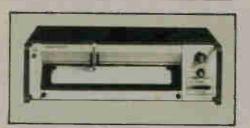
## Save $50 on this accurate, reliable Strip Chart Recorder for your laboratory

$289.95 Kit

- Less than 0.5% error
- Rear panel connector for total remote control of recorder

Digital chart drive provides 10 chart speeds, English or metric. Four calibrated input spans. Remote capability, pushbutton chart advance, electric pen lift, switchable input filter.
Kit IR-5204, 22 lbs ..... Was $339.95, Now 289.95
SR-204, Assembled and tested, 22 lbs. ..... 465.00
Dual-pen Lab-quality Recorder. Uses ONLY pens listed with IR-5207 below. SR-206, Assembled and tested, Shpg. wt. 39 lbs. .................. 1450.00
Pens for IR-5204/SR-204 Recorder. Nylon tip.
SU-406-92, Red Pen, Wt. 1 lb. .................. 3.00
SU-406-93, Blue Pen, Wt. 1 lb. .................. 3.00
Chart Paper for IR-5204/SR-204, SR-206. All 120'.
Inch-calibrated with 0.1" divisions, 0-100 R to L.
SU-445-17, Shpg. wt. 2 lbs. .................. 4.75
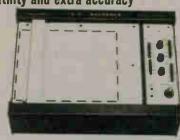
Centimeter-calibrated, offset 4 cm on R, 0-100 R to L.
SU-445-18, Shpg. wt. 2 lbs. .................. 4.75
Centimeter-calibrated, 2 cm division, 0-250 R to L.
SU-445-21, Shpg. wt. 2 lbs. .................. 4.75

IR-5204/SR-204 SPECIFICATIONS: Chart Width: 10 inches (25 cm with optional metric drive). Chart Speeds: 10, 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01 in/min (cm/min with metric conversion installed). Balance Time: 0.5 sec for full scale (filter out). Overshoot: Less than 1% of full scale. DC Input Ranges: 10 mV to 100 V full scale (12.5 mV to 125V full scale, metric). Max. Common Mode Input Voltage: 400 V. Power: 120/240 VAC, 50/60 Hz. Dimensions: 5½" H x 17⁹⁄₃₂" W x 12¾" D.

## Precision X-Y Chart Recorder gives you extra versatility and extra accuracy

Accurate to ±0.5% of full scale. Features adjustable line frequency filtration, electric pen lift to zero coordinates, complete front VAC, 50/60 Hz. 5⅝" H x 17⅝" W x 12¼" D.
Kit IR-5207, Shpg. wt. 28 lbs. .................. 479.95
SR-207, Assembled and tested, 30 lbs. ..... 795.00
Disposable Nylon Tip Pens for IR-5207/SR-207.
Red Pen for chart speeds under 1 in/inch.
SU-205-6, 1 lb. .................. 3.00
Blue Pen for chart speeds over 1 in/inch.
SU-205-7, 1 lb. .................. 3.00

Kit

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## Professional-quality Distortion Analyzers

Measures THD as low as 0.03% from 5 Hz to 100 kHz with 5% accuracy. Features auto-null control. 120/240 VAC. 5¼" H x 15" W x 11½" D.
Kit IM-5258, 17 lbs. .................. 229.95
Intermodulation Distortion Analyzer. As above but measures IMD instead of THD. Kit IM-5248, 14 lbs., 119.95
SM-5248, Assembled/tested, 15 lbs. ....... 190.00

## Rugged Heathkit Bi-Directional Wattmeter

Covers 100-1000 MHz. 30, 75, 300 W forward; 3, 7.5, 30 W reflected without slugs, elements. 5% accuracy forward. N-type coax connectors, N to PL-259 adapters. 4½" H x 4¼" W x 4⅝" D. Requires 9V batt. (not incl.).
Kit IM-4190, 3 lbs. ...... 99.95
SM-4190, Assembled/tested, 3 lbs. .................. 120.00

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Our finest scope—the IO-4235 Deluxe DC-35 mHz Oscilloscope

**$949⁹⁵ Kit**

## No other oscilloscope offers performance like this at such a low price:

- Dual-trace capability for simultaneous monitoring of two separate signals
- Single-sweep function to observe random signals
- Triggering to twice the specified vertical bandwidth
- Vertical delay lines to observe the leading edge of input signals
- Less than 10 nS rise time for complex fast-rise signals
- Sweep speeds from 50 nS/cm to 0.2 S/cm, plus 5 times expansion, for effective sweep speed of 10 nS/cm at the highest sweep rate
- Smooth rolloff for observation of signals above 50 MHz
- Algebraic ADD can invert either channel to observe differential signals
- Unique TV coupling triggers alternate fields for a steady display of VITS
- 8x10 cm mesh CRT with internal graticule for parallax-free measurements
- 10 kV post-acceleration voltage for our brightest scope display

## This deluxe delayed-sweep dual-trace oscilloscope is one of the most versatile oscilloscopes anywhere!

- Ideal for measuring and observing virtually any type of waveform, from simple sine wave signals of high-fidelity components and television to highly complex waveforms of state-of-the-art devices
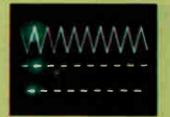
The Heathkit IO-4235 is the most advanced oscilloscope we've ever developed! Nearly 10 man-years of development have produced a scope which is unmatched in performance, features and quality in its price range. You can compare the sophistication and versatility of the IO-4235 with other scopes that cost hundreds of dollars more.
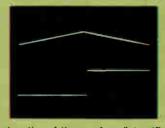
This laboratory-quality oscilloscope fulfills the requirements of the service technician, electronics designer and serious hobbyist. It's the perfect addition to your service desk, at a price you can afford.

The IO-4235's delayed-sweep circuit uses a separate time base to generate a faster sweep, which displays a selected portion of the normal waveform. The start and length of the delayed sweep are user-controlled, so any given portion of the normal waveform can be displayed at a much higher rate.

The 8 x 10 cm mesh CRT features 10 kV post acceleration voltage — 2½ times greater than any other scope we've offered — to give you greater writing speeds and a truly bright display. And the CRT has an internal graticule for parallax-free measurements.

The IO-4235 also has fully-regulated power supplies, a front panel 1-volt square wave output, a variable hold off control and much, much more. Calibration requires a precise source of square waves like the Heathkit IG-4505 (see page 69), and a DC voltmeter.

Kit IO-4235, Shpg. wt. 52 lbs. .................................. 949.95

Factory assembled and tested version of above.
SO-4235, Shpg. wt. 38 lbs. .................................. 1295.00

The delayed sweep takes the user selected portion of the waveform (intensified portion in the left picture) and magnifies it the desired number of times for closer examination (right picture).

IO-4235 SPECIFICATIONS: VERTICAL: Sensitivity: 2 mV/cm to 10 V/cm, 12 steps in 1-2-5 sequence. Variable: continuous between steps to approx. 30 V/cm. Accuracy: within 3% (20°C to 30°C); 5% (10°C to 50°C), referred to 1 V/cm. Vertical Response: DC coupling, DC to 35 MHz (−3 dB). AC Coupling, 1 Hz to 35 MHz. Rise Time: 10 nS. Overshoot, less than 3%. Delay Line, allows display of at least 20 nS of pre-triggered waveform. Vertical Input: Impedance, 1 meg shunted by 30 pF. Vertical Modes: $Y_1$, $Y_2$, $Y_1$ and $Y_2$ chopped, $Y_1$ and $Y_2$ alternate, algebraic add ($\pm Y_1$ $\pm Y_2$). HORIZONTAL: Time Bases: Ranges, 0.2 S/cm to 50 nS/cm. Positions, 21 steps in 1-2-5 sequence. Variable: continuous between ranges to approx. 0.6 S/cm. Accuracy, within 3% (20°C to 30°C); 5% (10°C to 40°C) referred to 1 mS/cm. EXTERNAL: Sensitivity: approx. 0.1 V/cm. Impedance: 1 meg. Polarity: positive input causes right hand deflection. Frequency Response: DC to greater than 2 MHz (−3 dB). TRIGGER: Source, ±channel $Y_1$, ±channel $Y_2$, ±line, ±external. Coupling: AC, DC, AC Fast, TV (flip-flop). Modes: automatic baseline, normal, single-sweep. Hold Off: variable, including an "A" ends "B" position. External Trigger: Sensitivity: 100 mV at 50 MHz. Power Requirement: 120/240 VAC, 85 watts. Dimensions: 7¾" H x 13¾" W x 19¾" D (without handle).

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## This laboratory-quality Dual-trace, DC-15 MHz Oscilloscope gives you unmatched versatility and value

### $589⁹⁵

- Offers greater bandwidth
- Internal delay lines for complete waveform display

The Heathkit IO-4510 offers greater band and versatility at a low price. Vertical input sensitivity of 1 mV/cm over the entire bandwidth lets you read a x10 probe or waveforms to 10 mV — not 50 or 100 mV, as on other scopes.

Typically triggers on signals greater than 45 MHz and is guaranteed to 30 MHz, with only 1 cm deflection. Digitally-controlled trigger circuits, so no stability control is needed.

Use either normal or automatic sweeps, with 20 time bases to choose from. Internal delay lines insure the start of a horizontal sweep before the beginning of the vertical signal, insuring complete waveform display. And fully regulated power supplies ensure stable voltages. Calibration requires precise source of square waves (see IG-4505 below).

Kit IO-4510, Shpg. wt. 36 lbs. ............589.95

IO-4510 SPECIFICATIONS: VERTICAL: Sensitivity: 1 mV/cm to 5 V/cm in 12 steps. Variable: Continuous to approx. 15 V/cm. Rise Time: 24 nS. Overshoot: Less than 3%. Impedance: 1 megohm shunted by approx. 40 pF. HORIZONTAL: Time Base: Ramp: 0.2 sec/cm to 0.1 μ sec/cm in 20 steps. Variable: Continuous between ranges to approx. 0.6 sec/cm. External Sensitivity: Approx. 0.2 V/cm. External Impedance: Approx. 200 kilohms. Power Requirement: 120/240 VAC, 75 watts. Dimensions: 6.4" H x 12.9" W x 19.3" D (handle extended).

## Dual-Trace DC-10 MHz Scope is ideal for TV service, design work

An excellent choice for TV service, electronics experimentation and design, the IO-4550 features brighter trace and faster writing speed.

### $399⁹⁵

- MU-metal shield eliminates error caused by electromagnetic interference
- Features fully-regulated high voltage supply
- Just four printed circuit boards mean easy assembly

If you are looking for a Dual-Trace Oscilloscope to round out your test bench, look no farther. The Heathkit IO-4550 is an excellent choice for TV and general servicing, digital experimentation and electronic design. Its extra-bright trace allows easy reading even in high ambient light; its two vertical input channels have a maximum sensitivity of 10 mV/cm to give you accurate measurements.

To maximize ease of operation, input channels are displayed, chopped or alternate, as selected by the time base switch — automatically! Exacting X-Y operation assures you of precise phase measurements. A trigger select switch and level control allow the time base to be precisely triggered at any point along the positive or negative slope of the signal.

The 4550's digitally controlled time base provides automatic triggering, so no stability control is necessary and fewer adjustments are required. This high-quality Dual-Trace Oscilloscope also allows you to determine the frequency of a waveform.

Improved circuitry and just four printed circuit boards with plug-in IC's make the IO-4550 an easy kit to assemble. Calibration requires a precise source of square waves such as IG-4505 Deluxe Calibrator or IOA-4510-1 Calibrator (below).

Kit IO-4550, Shpg. wt. 27 lbs. ..........399.95
SO-4550, Factory assembled and calibrated, 25 lbs ............................650.00

IO/SO-4550 SPECIFICATIONS: VERTICAL: Deflection Factor: Sensitivity: 10 mV/cm to 20 V/cm. Attenuator: 11 steps in 1-2-5 sequence. Variable: Continuous between steps to approx. 60 V/cm. Accuracy: Within 3%. Vertical Response: DC Coupling: DC-10 MHz. AC Coupling: 2 Hz-10 MHz. Rise Time: 35 ns. Overshoot: Less than 5%. VERTICAL: Deflection Factor: Sensitivity: 10 mV/cm to 20 V/cm. Attenuator: Vertical Input: Impedance: 1 M n shunted by 38 pF. Maximum Input: 400 V. HORIZONTAL: Time Base: Ramp: 0.2 s/cm to 200 ns/cm. Positions: 19 steps in 1-2-5 sequence. Variable: Continuous between ranges to approx. 0.6 s/cm. Accuracy: Within 3%. Magnifier: X5 (adds additional 2% to sweep accuracy). External: Sensitivity: 0.1 V/cm (approx.). Impedance: 100 k Ω (approx.). Frequency Response: DC to 1 MHz. Connector: BNC. TRIGGER: Internal: Automatic: Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Slope Selection: + or —. Impedance: 1 M Ω shunted by 40 pF. Connector: BNC. X-Y: Y Channel: Same as vertical. X Channel: Same as vertical except response is limited to 1 MHz. Power: 120/240 VAC switch selected, 70 watts. Dimensions: 6.9" H x 12.9" W x 19.3" D.

## High quality accessories to make your scope even more versatile
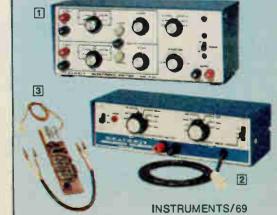
[1] Scope Switch for dual-trace capability. Gives any single-trace scope with external trigger dual-trace versatility. Simultaneous display of two separate input signals for comparison, observing phase relationships or other uses. Also use as impedance coupler, preamp or square wave generator in experimental circuits. Sync output on each channel locks sweep to either signal. DC coupling adds versatility. The inexpensive way to get dual-trace.

Kit ID-4101, Shpg. wt. 5 lbs. .............54.95

[2] Deluxe Calibrator for oscilloscopes to 35 MHz bandwidth. A practical oscilloscope calibrator at a sensible price. Provides all the waveforms necessary to adjust sweep speeds, vertical calibration, delay line terminations, high-frequency compensation and attenuator compensation for oscilloscopes with bandwidth up to 35 MHz. Round out your test bench today with an accurate source of square waves — order the Heathkit IG-4505 Deluxe Calibrator for complete scope versatility.

Kit IG-4505, Shpg. wt. 4 lbs. .............49.95

[3] Low-priced Scope Calibrator for IO-4510 and IO-4530. Easy-to-build, easy-to-use crystal-controlled time base for oscilloscope calibration. Provides everything you need to accurately calibrate your IO-4510 or other scope to 15 MHz. Draws operating power from IO-4510 or external 6V source.

Kit IOA-4510-1, Shpg. wt. 1 lb. ...........14.95

# Better quality and value...because you build them yourself





## $279<sup>95</sup> Kit — Heathkit DC to 5 MHz Oscilloscope offers dual-trace versatility at a single-trace price!

The Heathkit IO-4205 brings you controls and features not usually found in other scopes in this price range, plus dual-trace versatility! The dual-trace feature is essential for the sophisticated servicing required by many of today's modern electronic devices. It lets you compare two signals simultaneously for input-output comparisons, checking phase relationships and other timing functions. This dual-trace feature combined with the IO-4205's DC to 5 MHz bandwidth and excellent vertical input sensitivity of 10 mV/cm let you use it for nearly all waveform applications.

A stable triggering circuit is used for solid waveform displays — not the recurrent type sweep usually found on other scopes in this price range. A special TV position on the trigger selector control allows low frequencies to pass while high frequencies are rejected, so the IO-4205 will easily trigger on the vertical component of a complex TV signal. Any one of seven calibrated time bases, from 200 mS/cm to 0.2 μS/cm, can be selected with the time/cm switch.

Vertical input sensitivity is 10 mV/cm, and 11 calibrated attenuator positions, up to 20 V/cm, will accommodate a wide range of input signals.

Accurate measurements can be easily made on the bright, easy-to-read 8 x 10 cm CRT screen. The fully-regulated low-voltage power supply provides accurate voltage and current even under varying line and load conditions. Power consumption is only 50 watts! Partial mu-metal shielding helps eliminate display errors caused by stray magnetic fields.

The dual-trace capability of the IO-4205 makes it ideal for any comparison or timing functions on solid-state digital equipment. Its easy-to-operate controls and front panel inputs make it one of the most versatile oscilloscopes you'll find anywhere. And when you build it yourself, you get the economy of kit value, too! Dimensions: 8" H x 13" W x 17" D.

Kit IO-4205, Shpg. wt. 29 lbs. .................................... 279.95

SO-4205, Assembled and tested, Shpg. wt. 20 lbs. ................. 450.00

## $199<sup>95</sup> Kit — Heathkit professional DC-5 MHz Oscilloscope that's priced right for the hobbyist, too!

- 10 mV/cm vertical input sensitivity — ideal for most applications
- Built-in calibration circuitry
- Your choice of internal or external time bases for more versatility
- High-brightness CRT for easy reading, even on complex signals
- Fully-regulated low-voltage power supply for stability
- Partial mu-shielding to reduce display errors

The IO-4105 DC-5 MHz Single-Trace Oscilloscope puts professional capabilities on your bench at a price you can afford! A stable triggering circuit is used for solid waveform displays. And the IO-4105 can trigger on the vertical component of a television signal — thanks to a special feature of the trigger selector control that allows low frequencies to pass while high frequencies are rejected.

Either internal or external time bases can be used with the IO-4105. Internal time bases can either be variable or in one of seven steps from 0.2 μS/cm to 200 mS/cm. External inputs from DC to 1 MHz are accepted by the horizontal amplifier. Excellent sensitivity — 10 mV/cm — combined with attenuation up to 20 V/cm in 11 calibrated steps — mean the IO-4105 accepts a wide range of input signals. And accurate control between settings is accomplished by a variable gain control. A bright, easy-to-read CRT screen provides clear displays.

The IO-4105 draws only 50 watts, and can operate on 120/240 VAC. A fully-regulated low-voltage power supply ensures accurate voltage and current — even under varying conditions. And partial mu-metal shielding helps eliminate display errors caused by stray magnetic fields.

The versatility and professional design of this scope make it ideal for virtually any single-trace scope application.

Kit IO-4105, Shpg. wt. 31 lbs. .................................... 199.95

SO-4105, Assembled and tested, Shpg. wt. 19 lbs. ................. 375.00

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IO-4205 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz, —3 dB. Sensitivity: 10 mV/cm. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 nS. Overshoot: <5% at 1 kHz. Impedance: 1 megohm/38 pF. SWEEP: Type: Triggered. Range: 200 mS to 0.2 μS in 7 steps, plus variable. Trigger Source: $Y_1/Y_2$ External/Line. Trigger Modes: AC/DC/TV/+/— Slope/Auto/Normal. HORIZONTAL: Sensitivity: 0.1 V/cm. Bandwidth: DC to 1 MHz. Impedance: 1 megohm/50 pF. External Horizontal Input: X1 and X10 attenuator and variable. GENERAL: CRT: 5DEP31F, 8 x 10 cm viewing area, blue-green medium persistance phosphor, 5" round flat-face tube. Accelerating Potential: approximately 1.6 kV. Graticule: screened, 8 x 10 centimeters. Power Requirement: 120/240 VAC, 50/60 Hz, 50 watts. Dimensions: 8" H x 13" W x 17" D.

IO-4105 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz, —3 dB. Sensitivity: 10 mV/cm. Attenuator: 1-2-5 sequence, calibrated and variable. Rise Time: 70 nS. Overshoot: <5% at 1 kHz. Impedance: 1 megohm/38 pF. SWEEP: Type: Triggered. Range: 200 mS to 0.2 μS in 7 steps, plus variable. Trigger Source: $Y_1/Y_2$ External/Line. Trigger Modes: AC/DC/TV/+/— Slope/Auto/Normal. HORIZONTAL: Sensitivity: 0.1 V/cm. Bandwidth: DC to 1 MHz. Impedance: 1 megohm/50 pF. External Horizontal Input: X1 and X10 attenuator and variable. GENERAL: CRT: 5DEP31F, 8 x 10 cm viewing area, blue-green medium persistance phosphor, 5" round flat-face tube. Accelerating Potential: approximately 1.6 kV. Graticule: screened, 8 x 10 centimeters. Power Requirement: 120/240 VAC, 50/60 Hz, 50 watts. Dimensions: 8" H x 13" W x 17" D.

# Education that's right for you: Heathkit/Zenith Self-Instruction Programs

You save time and money when you choose a self-instruction program from Heathkit/Zenith Educational Systems. You save time because each subject is presented in bite-sized bits to help you learn more efficiently, with ease and enjoyment. You save money because you pay far less than a comparable adult education or vocational school course. But lower cost does not mean a sacrifice in quality — Heathkit/Zenith Programs use the latest multi-media techniques. And, technical consultants are on duty to answer your questions by phone or letter.

Such attention to detail and concern for the student are why thousands of Heathkit/Zenith Programs are used by individuals, schools, business and government. Heathkit/Zenith Programs combine proven techniques to help you succeed.

Saving time and saving money, while learning just as much — that's why courses from Heathkit/Zenith Educational Systems are your wisest choice.

Programmed learning texts make Heathkit/Zenith Self-Instruction Programs more effective. Read at your own pace in easy-to-understand, step-by-step segments. No facet of the material is omitted and nothing is assumed. Self-test reviews throughout the text let you check your progress, too, for complete understanding.

Audio-visual aids speed your learning of subject material. Large, illustrated visual materials make the text more interesting and effective. And audio aids for many programs make your learning even easier.

Heathkit/Zenith Educational Systems offers a full line of self-instruction Programs for you, including the Electronics Fundamentals Series, five complete programs that form a complete foundation in electronics, the new Electronics for Hobbyists Program, described below, Digital Techniques and Microprocessor Programs, including the new Introduction to Microprocessors Program on page 78, a series of five Advanced Electronics Programs and Math Programs ranging from metric conversion to algebra, trig and statistics.

Besides the Programs in this section, see Automotive Programs on page 21, Ham Radio on page 92 and Computer Related Programs on pages 54 and 55.

You learn best by doing, so optional experiments in Heathkit/Zenith Programs help you get a better grasp of many concepts. Our optional Electronic Trainers, for use with our Electronics Program, give you actual hands-on experience with components and circuitry. And later, the Trainers can serve as ideal experimental units so you can do your own breadboarding and circuit design work.

Score at least 70 percent on the optional final exam and earn a Certificate of Achievement plus Continuing Education Units, which certify non-credit adult education. Some of our programs prepare you for professional examinations and for CLEP (the College Level Examination Program), which enables you to earn college credit outside the classroom.

The Heathkit/Zenith Guarantee: If, for any reason, you are dissatisfied with our Programs, we will refund the price of the text material (less Trainer).

IMPORTANT TAX NOTE: All Heathkit/Zenith Educational Systems Programs and Trainers may qualify you for a Federal tax deduction. Treasury Regulation 162-5 permits an income tax deduction for educational expenses undertaken to: (1) maintain or improve skills required in one's employment or other trade or business; or (2) meet express requirements of an employer or a law imposed as a condition to retention of employment, job status or rate of pay

# Electronics for Hobbyists — made simple with this Heathkit/Zenith Program

## $59⁹⁵

- Approved by the Electronic Industries Association (EIA)
- Optional experiments offer practical hands-on experience

**NEW**

Learn about the electronics you have day-to-day contact with. Understand the basic concepts that make home and hobby electronic products work — so you can gain more enjoyment from them.
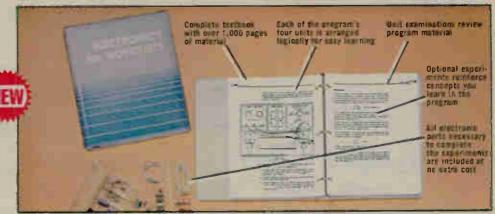
With the Electronics for Hobbyists Self-Instruction Program, you'll be able to understand those do-it-yourself electronic projects in popular magazines. While not as extensive as the Electronic Fundamentals Series, Electronics for Hobbyists provides a good introductory background.

No prerequisite is required to start. You proceed at your own pace, so you can take the time to thoroughly digest each concept. The program is arranged in a logical manner, so it's easier for you to learn.

Electronics for Hobbyists is divided into seven units, each covering a part of the foundation that electronics is built upon. The easy-to-understand text material is backed up by examinations at the end of each unit — as well as by 26 optional experiments, which provide hands-on experience with electronic devices.

When you successfully complete the program, you will be able to:

1. Define voltage, current, resistance and power.
2. Find the value of voltage, current, resistance and power, when two of the above are known.
3. State the basic law of magnetism.
4. Define Direct and Alternating Current.
5. Explain the operation of a transformer.
6. Define inductance, henry, mutual inductance, inductive reactance and impedance.
7. Explain the operation of diodes, transistors and ICs.
8. Properly use a voltmeter, ammeter and ohmmeter.
9. Explain the operation of rectifiers, filters, power supplies, amplifiers and oscillators.
10. Explain the operation of digital circuits.
11. Understand logic elements, flip-flops, counters, shift registers, clocks and one-shots.
12. Explain how a digital computer operates.
13. Understand the relationships between computers, programming and software.
14. Understand the major electronic hobbies, experimentation and construction, shortwave listening (SWL), amateur radio, radio control models (R/C), personal computing and high-fidelity audio.

Score 70% or better on the optional final exam, and earn a Certificate of Achievement and 4.0 CEUs.

Included with the Program are a complete text in two binders, and electronic components for completing the 26 experiments. The ET-3100 Trainer (page 72) is helpful for completing the experiments.

EE-3140, Shpg. wt. 11 lbs. . . . . . . . . . . . . . . . 59.95

Complete textbook with over 1,000 pages of material

Each of the program's four units is arranged logically for easy learning

Unit examinations review program material

Optional experiments reinforce concepts you learn in the program

All electronic parts necessary to complete the experiments are included at no extra cost

# Our DC Electronics Program is the interesting, efficient way for you to build a solid foundation
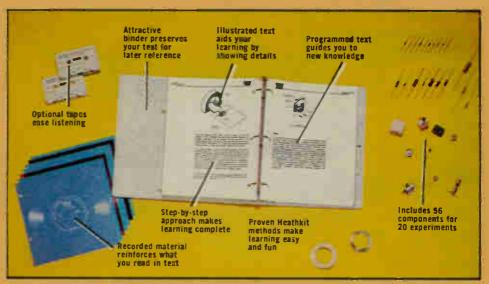
**$44⁹⁵**
- Your key to the fascinating world of electronics is this proven, complete DC Electronics Program

The Heathkit/Zenith DC Electronics Self-Instruction Program is your first step on the way to a complete understanding of electronics. You are introduced to the fundamentals of current, voltage, resistance, magnetism, Ohm's Law, electrical measurements, inductance and capacitance. This Program will take you through each new concept step by step to give you a solid foundation in electronics. Audio-visual treatment reinforces learning so you retain what you learn.

Hands-on experiments help you understand by giving you practical proof that the theory really works. You will acquire a detailed knowledge of DC electronics in a very short time. A knowledge of high school mathematics is assumed in the Program, however it even includes a review of the math you need, should you require a refresher. When you have successfully completed DC Electronics, you will be able to accomplish the following:

1. Solve problems of current, voltage, resistance and power
2. Explain current, voltage, resistance and power.
3. Discuss the relationship between electricity and magnetism.
4. Using a schematic diagram as a guide, construct DC circuits with resistors, relays, switches, lamps, batteries and capacitors
5. Given a wiring diagram of a circuit, draw an equivalent schematic.
6. Use a multimeter to measure current, voltage and resistance.
7. Work with powers and convert metric prefixes of ten.
8. Explain the construction, operation and purpose of resistors, potentiometers, switches, fuses, relays, capacitors and inductors.



Attractive binder preserves your text for later reference
Illustrated text aids your learning by showing details
Programmed text guides you to new knowledge
Optional tapes ease listening
Step-by-step approach makes learning complete
Proven Heathkit methods make learning easy and fun
Includes 56 components for 20 experiments
Recorded material reinforces what you read in text

9. Use safety procedures for both you and your test equipment
10. Build and experiment with DC circuits of your own design

Should you choose to take the optional final exam for DC Electronics, a passing grade of 70% or better will earn you 2.0 Continuing Education Units (a nationally-recognized way of acknowledging participation in non-credit adult education courses), and a Certificate of Achievement

The DC Electronics Program includes a comprehensive text housed in its own attractive, sturdy vinyl binder, records containing the audio material, and the 56 electronic components necessary to perform the 20 experiments that are part of the Program. The optional ET-3100 Experimenter/Trainer is required for use in completing the experiments in order to gain full benefit from the Program. Optional cassette tapes duplicate the material on records in convenient, easy-to-use cassette form. This Program is a complete introduction to the fascinating field of electronics, and will form a solid foundation for your advancement in the world of electronic knowledge. You owe it to yourself to gain this knowledge,

and there's no better time to begin learning.
**EE-3101,** Shpg. wt. 7 lbs. .................**44.95**
Save $10.00! **EES-3101,** Includes EE-3101 and ET-3100 Kit Trainer 13 lbs. .............**109.90**
**EEA-3101,** Optional Cassettes, Wt. 1 lb. ......**9.95**
**Spanish Language DC Electronics Learning Program.** (Less EB-6101 30 Parts for experiments. See pg 82). **EE-3101-S,** Shpg. wt. 7 lbs. ...............**54.95**

**NEW** College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades earned on this exam. Check with your college first, to determine its policy. See page 71 for details.
**ECC-3101,** Shpg. wt 1 lb. ................**25.00**

## Money-Back Guarantee
All self-instruction programs carry a complete guarantee of satisfaction. If you are dissatisfied with the program, return all program materials and your receipt for a full refund

# Gain more from Electronics Programs with the Experimenter/Trainer



Make it easy to perform experiments or breadboard circuits

**$74⁹⁵**
- Get hands-on experience building circuits, doing program experiments
- Use it later for "breadboarding"

Designed for use with the DC, AC, Semiconductor, Electronic Circuit and Test Instruments Programs. Features solderless breadboarding sockets for ease of component substitution, 2-range variable sine and square wave (200-20,000 Hz) signal source, dual-variable power supplies for positive and negative voltages (1.2 to 16 volts, 120 mA), 1 k and 100 k linear potentiometers. A center tapped transformer provides 30 volts rms, 60 Hz for line experiments. Get it with a program and save.
Kit **ET-3100,** Shpg. wt. 6 lbs. .............**74.95**
Kit **ET-3100S,** Trainer with Spanish manual, Shpg. wt. 5 lbs .....................**79.95**
**ETW-3100,** Factory assembled Trainer, Shpg. wt. 6 lbs. .....................**134.95**

# Learning Dictionary is a complete short course in electronics



Having the language of electronics compiled in handy dictionary form is reason enough to put this book on your reference shelf. Better yet, the Heathkit Learning Dictionary includes a compendium of 16 topic outlines that turns this Dictionary into a low-cost self-instructional course. Each topic outline lists related terms, making your Dictionary an effective learning tool. 832 pages.
**EB-1010,** Shpg. wt 3 lbs. ..........**14.95**

# Give yourself a thorough grounding in AC Electronics using proven methods of learning

## $49⁹⁵

• The logical arrangement of this program will help you master AC electronics easily and enjoyably

AC Electronics covers the fundamentals and theory of alternating current in an easy-to-understand manner. Programmed instruction material teaches you a little bit at a time so you aren't overwhelmed by new concepts. Upon completion you will be able to:

1. Explain the difference between AC and DC.
2. Describe the operation of AC generators.
3. Determine average, peak, peak-to-peak, and effective values of an AC sine wave, and analyze its frequency, period and phase; then measure these values using an oscilloscope.
4. Use AC meters to measure current, voltage and power.
5. Analyze AC circuits which contain resistance.
6. Understand and describe capacitance and capacitive reactance.
7. Analyze AC circuits with capacitance or capacitance and resistance.
8. Understand mutual inductance, self-inductance and inductive reactance.
9. Analyze series and parallel resonant circuits.
10. Analyze AC circuits with inductance or inductance and resistance.
11. Determine the current, voltage and power relationships at the inputs and outputs of both ideal and practical transformer circuits.



Sturdy vinyl binder holds your AC Program

Programmed instruction helps you learn fast

Comprehensive text takes you step-by-step

Optional audio cassettes duplicates records

Recorded material reinforces the text material

Each new bit of knowledge is explained clearly

You learn at your own pace to suit your learning

Components are included for conducting the program experiments

12. Analyze and design RC, RL and LC filters.
13. Understand construction and characteristics of capacitors, inductors and transformers.

Scoring 70% or better on the optional final exam will earn you a Certificate of Achievement and 1.5 CEU's. The DC Program or equivalent knowledge is a desirable background. Included are a text and vinyl binder, records, and 16 electronic components for completing experiments. The ET-3100 Trainer is required to complete the experiments. Optional Cassettes duplicate records.

EE-3102, Shpg. wt. 7 lbs. .................49.95

Save $10.00! EES-3102, Includes EE-3102 and ET-3100 Kit Trainer, 13 lbs. .............114.90

EEA-3102, Optional Cassettes, Wt. 1 lb. ......9.95
Spanish Language AC Electronics Program. (Less EB-6102-30 Parts for experiments. See page 82.)

**NEW** College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades. Check with your college first. See page 71 for details.
ECC-3102, Shpg. wt. 1 lb. .................25.00

# Advance to a knowledge of solid-state electronics with the Semiconductor Devices Program

## $49⁹⁵
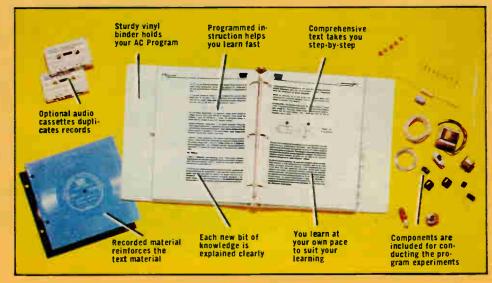
• Semiconductors have reshaped the world of electronics. This program brings you up to date

No education in electronics would be complete without including solid-state technology. The Semiconductor Devices Program teaches you all about this comparatively-recent development. Audio aids help emphasize the comprehensive text material. And you get hands-on experience with the interesting experiments that are part of the program.

This course covers fundamentals, diodes, zeners, bi-polar transistor operation and characteristics, FET's, thyristors, IC's and opto-electronics. Included are texts, records and 27 electronic components for 11 different experiments. The ET-3100 is required to complete the experiments. To gain full benefit, the DC and AC Electronics Programs or equivalent knowledge is recommended. If you take the optional final exam and score 70% or better, you will receive a Certificate of Achievement and 3.0 CEUs. The optional Cassettes (listed right) duplicate the records included with the program.

Upon completion of the Semiconductor Devices Program you will be able to:

1. Describe the electrical characteristics of semiconductors.
2. Name the primary advantages of semiconductor devices over vacuum tubes.
3. Explain how the most important semiconductor devices operate.
4. Describe how semiconductors are constructed.



Optional cassettes aid comprehension

Protective binder houses your Semiconductor Program

Illustrated text explains all facets of the subject

Proven learning techniques speed mastery

Vinyl records supplement the text material

Programmed learning is one of the most effective techniques

Heathkit Self-Instruction is the fast way to learn

Experiments with components round out your knowledge

5. Use semiconductor components properly to prevent damage.
6. Recognize semiconductor packages and their schematic symbols.
7. Design your own circuits using semiconductors.
8. Test various semiconductor devices.

EE-3103, Shpg. wt. 6 lbs. .................49.95
SAVE $10.00! EES-3103, Includes EE-3103 and ET-3100 Kit Trainer. 11 lbs. ..............114.90

EEA-3103, Optional Cassettes, Wt. 1 lb. ......9.95
Spanish Language Semiconductor Devices Program. Direct translation of this famous program. (Less EB-6103-30 Parts for experiments. See page 82).
EE-3103-S, Shpg. wt. 6 lbs. ..............54.95

**NEW** College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades. Check with your college first. See page 71 for details.
ECC-3103, Shpg. wt. 1 lb. .................25.00

VISA Alaska, Hawaii and Michigan Residents: Call 616-982-3411

# Electronic Circuits Program applies all your knowledge to actual modern circuit operation

$**59**$95

• Apply the electronic knowledge you have learned to practical circuits used everyday

This Program shows you how to apply all the theory of your first programs in actual circuit operation. You should first complete DC and AC Electronics and Semiconductor Devices, or have equivalent knowledge. For experiments you must have an oscilloscope like the Heathkit IO-4105 on page 68, and the ET-3100 Trainer on page 70. Scoring 70% on the optional final exam will earn you a Certificate of Achievement and 4.0 CEUs. Upon completion you will be able to:
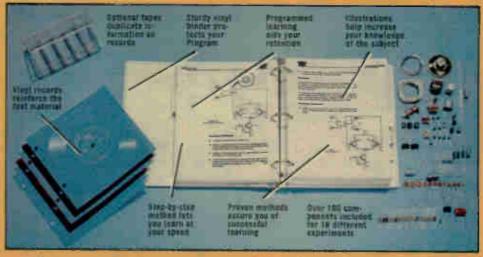
1. Identify basic amplifier circuits and describe their operation.
2. Discuss DC amplifiers, audio amplifiers, video amplifiers, intermediate frequency amplifiers, and RF amplifiers.
3. Explain operational amplifiers, differential amplifiers, comparators, active filters.
4. Analyze and design simple inverting and noninverting amplifiers.
5. Explain power supply rectifiers, filters, and regulation circuits.
6. Identify commonly used LC, RC, and crystal oscillators.
7. Explain pulse shapers, multivibrators, Schmitt triggers, sawtooth generators, IC timers.
8. Understand AM, FM, heterodynes, modulation, and detection.



9. Construct, experiment with the above transistor and IC circuits.
10. Use a voltmeter and an oscilloscope to analyze electronic circuits.

The Electronics Circuits Program includes text, an attractive vinyl binder, records and over 100 electronic components for 18 experiments. Optional tapes duplicate the material on records in convenient, easy-to-use cassette format.

As with all Heathkit/Zenith Self-Instruction Programs, the ones on this page carry a complete money-back guarantee of satisfaction.
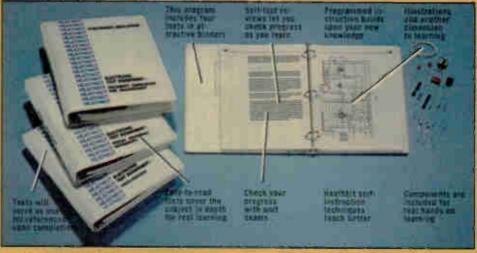
If, for any reason, you are not satisfied with either Electronic Circuits or Test Equipment, simply return all program materials (less Trainer) along with your receipt for a complete refund.

EE-3104, Shpg. wt. 7 lbs. ............... 59.95

Save $10.00! EES-3104, Includes EE-3104 and ET-3100 Kit Trainer, 13 lbs. ............... 124.98

EEA-3104, Optional Cassettes, Shpg. wt. 1 lb. . 9.95

**NEW** College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades. Check with your college first. See page 71 for details.

ECC-3104, Shpg. wt. 1 lb. ............... 25.00

# Learn instrument operation, applications and specification with Electronic Test Equipment

$**59**$95

• This Program gives you a solid foundation in a wide variety of modern electronic test instruments

Understand how to use electronic test equipment. This comprehensive Program provides you with excellent background, plus the ability to operate test instruments. It covers analog and digital meters, oscilloscopes, frequency generation and measurement, and special measuring instruments. The Basic Electronics Programs (EE-3101 through EE-3104) and Digital Techniques (EE-3201) or equivalent knowledge are necessary background to benefit fully. Upon completion you will be able to:

1. Use analog and digital meters to make electrical measurements.
2. Explain the operation of integrating and nonintegrating.
3. Use an oscilloscope in electronic testing and servicing.
4. Explain operation of single and dual trace scopes, including sampling and storage types.
5. Understand operation and use of the three most popular passive frequency meters and four most popular active frequency meters.
6. Use a dip meter to calculate the value of an unknown inductor.
7. Understand the operation and use of electronic counters.



8. Use appropriate bridge circuits to measure resistance, capacitance, inductance, and impedance.
9. Determine beta, leakage values of transistors and transconductance and leakage values of FETs using a transistor tester.
10. Understand curve tracers, spectrum analyzers and logic probes.

The Test Instrument Program includes four texts in attractive vinyl binders and electronic components for experiments. A digital meter, analog meter, oscilloscope, frequency generator and frequency counter, as well as the ET-3100 Trainer are required to complete the experiments. See pages 57 through 70 for Heathkit test equipment. If you take the optional final exam, a passing grade of 70% will earn you 6.0 CEUs, plus a Certificate of Achievement.

EE-3105, Shpg. wt. 18 lbs. ............... 59.95

Save $10.00! EES-3105, Includes EE-3105 and ET-3100 Kit Trainer, 24 lbs. ............... 124.90

**NEW** College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades. Check with your college first. See page 71 for details.

ECC-3105, Shpg. wt. 1 lb. ............... 25.00

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Digital Techniques: everything from logic to ROMs — even an introduction to microprocessors

## $74.95

- The Heathkit/Zenith Digital Techniques Program enables you to study tomorrow's technology today

Using tried and tested self-instruction techniques, you can learn all about the latest advances in electronics. Learn at your own pace, with the freedom to cover the material quickly, or to review those areas that need re-emphasis. And, as with all Heathkit programs, your money will be refunded if you are not completely satisfied.
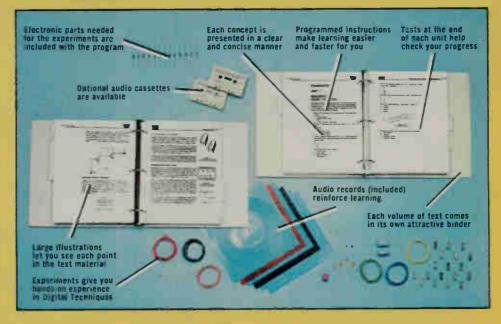
The Advanced Digital Techniques Program is a comprehensive treatment of the subject, beginning with fundamentals and theory, and guiding you through digital logic circuits, Boolean algebra, flip-flops and registers, sequential logic circuits, combinational logic circuitry and digital design.

This well-organized approach to the subject of Digital Techniques combines the printed word and recorded sound for ease of learning, as well as greater comprehension and retention. It even incorporates programmed learning. As you complete each step-by-step section, hands-on experiments and tests will further aid your understanding of Digital Techniques.

You'll be getting the knowledge you need, at a fraction of the cost of a comparable college or technical school course on the subject. You'll be interested to know, in fact, that several American universities — as well as a federal agency — utilize this program.

This expertly-designed program shows you how to design digital circuitry for virtually any modern electronic application. It assumes a prior knowledge of electronics the DC, AC, Semiconductors and Electronic Circuits programs or equivalent knowledge.

When you have successfully completed the Digital Techniques Program, you will be able to:

1. Understand the advantages and benefits of using digital techniques in electronics.
2. Name the major applications of digital techniques in electronics.
3. Convert between the binary and decimal number systems, and recognize the most commonly-used binary codes
4. Name the major components used in implementing digital circuits, and explain how they operate.

5. Understand digital logic gates.
6. Identify the more commonly used integrated circuit families used in digital equipment and discuss their operation.
7. Use Boolean algebra to express logic operations and minimize logic circuits in design.
8. Understand the operation of flip-flops
9. Understand the operation and application of binary and BCD counters, shift registers and other sequential logic circuits
10. Name the most frequently used combinational logic circuits and explain their operation.
11. Design both combinational and sequential logic circuits for a given application, from definition and concept of the circuit to the selection of the integrated circuits
12. Understand the operation and application of digital counters in the measurement of both time and frequency.
13. Understand how a digital computer is organized, and how it operates
14. Understand microprocessors, explain their operation and applications

The Program includes a comprehensive text in two vinyl binders, records (or optional cassettes), and 44 electronic components for performing the 24 experiments The ET-3200 Trainer is required to perform the experiments Also recommended are a multimeter like the IM-5284 (page 57) and single-trace oscilloscope like the IO-4105 (page 70).

Upon completion — if you pass the optional final examination with a grade of 70 percent or better, you'll earn 4.0 CEUs and a Certificate of Achievement. If you are not satisfied with the program, return all materials (less trainer) for a refund.

EE-3201, Shpg. wt. 9 lbs. . . . . . . . . . . . . . . . . .**74.95**

SAVE $15.00! Buy the Digital Techniques Program and the ET-3200 Trainer Kit together. $164.90 if purchased separately.

EES-3201, Shpg. wt. 14 lbs. . . . . . . . . . . . . . . .**149.90**

EEA-3201, Optional Cassettes*, Shpg. wt. 1 lb . .**9.95**

**(NEW)** College-Level Examination, recognized by American Council on Education Many colleges grant credit for acceptable grades. See the information on page 71, and check with your college first.

ECC-3201, Shpg. wt. 1 lb . . . . . . . . . . . . . . . .**25.00**

*Optional cassettes duplicate material on records.

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## Use this versatile Electronic Trainer to get maximum benefit from the Digital Techniques Program
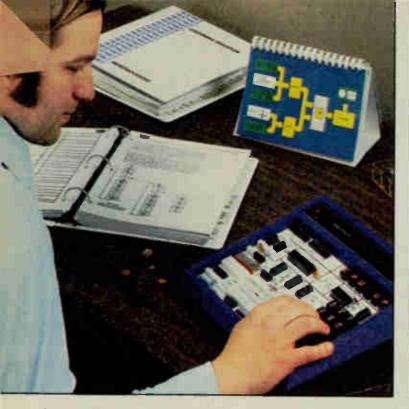
Learn by doing. Use the Heath/Zenith ET-3200 Electronic Trainer for the Digital Techniques experiments. Also build and test prototypes, verify circuit operation and check digital integrated circuits. Solderless breadboard sockets aid experimenting and design. They take up to eight 14-pin or 16-pin dual in-line ICs; also 24, 28 and 40-pin DIPs. Has four binary data switches, two no-bounce switches to pulse logic circuits, three-frequency pulse clock generator and four LEDs for visual indication of logic states.
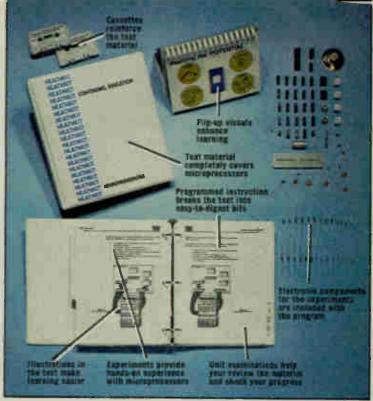
Regulated power supplies produce + 12 VDC at 500 mA, −12 VDC at 100 mA and +5 VDC at 500 mA — all current-limited and overload-protected for greater safety. The ET-3200 Trainer is compatible with all commonly-used IC logic families, including RTL,

TTL, CMOS, ECL, NMOS, PMOS and Linear. The trainer can be wired for either 120 VAC or 240 VAC use.

Kit ET-3200, Shpg. wt. 6 lbs . . . . . . . . . . . . . .**89.95**

Factory Assembled and Tested ET-3200 Trainer, ETW-3200, Shpg. wt. 6 lbs . . . . . . . . . . . . . .**149.95**

ET-3200/ETW-3200 SPECIFICATIONS: DATA SWITCHES: States: +5 V or 0 V. Maximum Current: 10 mA, each switch. Outputs: Four terminals, one for each switch. LOGIC SWITCHES: Type: Momentary contact, spring-loaded. Circuit: Two flip-flop latches for contact bounce buffering. Output States: Complementary, +5 V and +0.2 V. CLOCK: Output Frequency: 1 Hz, 1 kHz, 100 kHz. ±20%. Duty Cycle: 45%. Output Voltage: 5 V peak-to-peak. Overall Dimensions: 3.5″ H x 12.13″ W x 11.75″ D (8.90 x 30.80 x 29.80 cm).

# Learn about microprocessors, microcomputers, interfacing and programming with this program

## Microprocessor Program completely covers the subject

**WINNER**
International Award of Distinction — Society of Technical Communicators

With the Microprocessor Self-Instruction Program from Heathkit/Zenith Educational Systems, you'll learn about microprocessors, microcomputers and programming in a complete, efficient and well-organized way. You'll learn microprocessor basics, computer arithmetic, programming, interfacing, perform optional experiments and more. Our proven multimedia approach, featuring programmed learning and audio-visual aids, will help you learn quickly.

The Microprocessor Program's concise self-study texts, colorful audio-visual presentations and optional hardware experiments make microprocessor theory, design and application simpler to understand.

Start by learning or reviewing the basics about number systems and codes. Then, apply that knowledge as our program takes students step-by-step through computer arithmetic, introductions to programming, explanation and examination of the 6800 microprocessor, and a study of interfacing and I/O operations.

The Microprocessor Program is organized into 10 learning units:

**UNIT 1: NUMBER SYSTEMS AND CODES.** Covers decimal, binary, octal, hexadecimal number systems; conversions and binary codes, positional notation.

**UNIT 2: MICROCOMPUTER BASICS.** Covers terms and conventions, computer words, executing a program, addressing.

**UNIT 3: COMPUTER ARITHMETIC.** Covers Binary addition, subtraction, multiplication and division; two's complement arithmetic; Boolean operations — AND, OR, Exclusive-OR, INVERT.

**UNIT 4: INTRODUCTION TO PROGRAMMING.** Covers branching, conditional branching, algorithms, additional instructions.

**UNIT 5: THE 6800 MICROPROCESSOR — PART 1.** Covers architecture, instruction set and addressing modes.

**UNIT 6: THE 6800 MICROPROCESSOR — PART 2.** Covers stack operations, subroutines, input/output (I/O) operations and interrupts.

**UNIT 7: INTERFACING — PART 1.** Covers interfacing fundamentals; interfacing with random access memory (RAM), interfacing with displays.

**UNIT 8: INTERFACING — PART 2.** Covers interfacing with switches; the Peripheral Interface Adapter (PIA), using the PIA.

**UNIT 9: PROGRAMMING EXPERIMENTS.** Covers experiments with binary/decimal, hexadecimal/decimal, and straight line programs; arithmetic and logic instructions, branches, additional instructions, new addressing modes, arithmetic operations, stack operations and subroutines.

**UNIT 10: INTERFACING EXPERIMENTS.** Covers memory circuits, clock, address decoding, data output, data input, Peripheral Interface Adapters, key matrix and parallel-to-serial conversion, digital-to-analog and analog-to-digital conversion.

Units 1 through 6, as well as Unit 9, assume no prior knowledge of electronics. Units 7, 8 and 10 assume a knowledge of electronics equivalent to the Heathkit/Zenith Digital Techniques Program (EE-3201, page 75).

It's not all book work — we get right down to the nuts and bolts of practical applications by giving you 19 different and fascinating experiments to perform.

The Program comes with 62 electronic components required to complete the experiments. These components include two 2112 256 x 4-bit RAMs, 6820 PIA interface chip, 1406 digital-to-analog converter, 741 and 301 op-amps, and a variety of other microprocessor-oriented devices. The optional ET-3400 Trainer (page 77) is required for completing the experiments.

If you choose to take the optional final examination, a passing grade of 70 percent or better will earn you 8.0 CEUs and a Certificate of Achievement.

EE-3401, Shpg. wt. 12 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**99.95**

**SAVE $20.00!** Order the EE-3401 Microprocessor Program and ET-3400 Microprocessor Trainer Kit together. If purchased separately, $299.90.
ETS-3400, Shpg. wt. 19 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **ONLY 279.90**

**SAVE $70.00!** Order the EE-3401 Microprocessor Program, the ET-3401 Microprocessor Trainer Kit, the ETA-3400 Trainer Accessory Kit and the ETA-3400-1 3K Chip Set together. If purchased separately, $496.90.
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Optional Slides duplicate the audio-visual flip charts.
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**NEW** College-Level Examination, recognized by American Council on Education. Many colleges grant credit for acceptable grades. See details on page 71, and check with your college first.
ECC-3401, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**25.00**
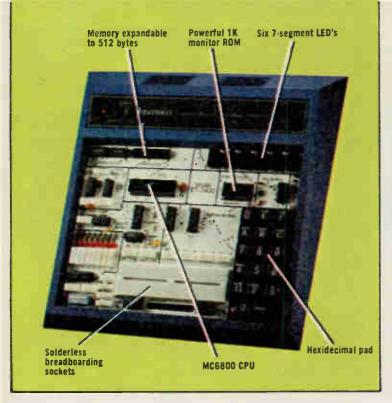
Optional 35mm Filmstrip. Same as slides above, in filmstrip form.
EE-3401-2, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**20.00**

See page 82 for classroom version of the EE-3401 Microprocessor Program.

Credit Card Orders Call TOLL-FREE: 800-253-0570

Memory expandable to 512 bytes · Powerful 1K monitor ROM · Six 7-segment LED's

Solderless breadboarding sockets · MC6800 CPU · Hexidecimal pad



Shielded 110V section · Standard RS232 connector for terminal · Kansas City standard audio cassette I/O

Heath/Pittman Tiny BASIC ROM

Terminal monitor ROM

Connector cable for ET-3400

Add up to 4K user RAM

The ETA-3400 Microprocessor Trainer Accessory converts the ET-3400 Microprocessor Trainer to a full personal computer system.

## Learn computer architecture, interfacing and programming concepts with the Heathkit Computer Trainer

The ET-3400 Computer Trainer is designed for use with the EE-3401 Microprocessor Self-Instruction Program on page 76. Once you complete the EE-3401 experiments, add the ETA-3400 Trainer Accessory and a terminal such as the H-9 or H-19 for a complete system.
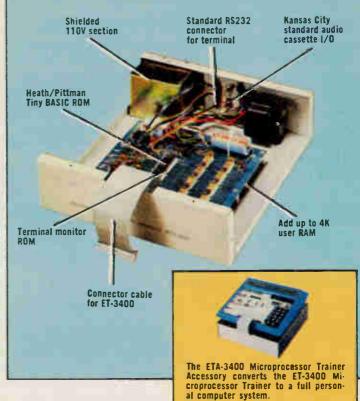
Functioning as a miniature digital computer, the ET-3400 Microprocessor Trainer is used with the experiments in the EE-3401 Self-Instruction Program. The ET-3400 features a built-in 1K ROM monitor program for controlling unit operation. It also has a 6-digit hexadecimal 7-segment LED display for address and data readout. The 17-key hexadecimal keyboard permits you to access memory location to examine contents, then step fowrard or backward from that memory location to examine more memory locations, to change a memory location, to examine and/or alter any of the MC6800 CPU's internal registers, to set break points for program debugging, or to reset the CPU. The flexible instruction set of the MC6800 permits relative addressing, and makes use of two accumulators.

The ET-3400 has 256 bytes of random access memory (RAM) built-in and is expandable to 512 bytes with the RAM's supplied in the EE-3401 Self-Instruction Program. It also features 8 buffered binary LED's for display of breadboard logic states, 8 SPST DIP switches for binary input to breadboarding circuits, and a breadboarding socket for prototyping, interfacing and memory circuits. All microprocessor address, control and data busses are buffered and terminated on the front panel for ease of connection to prototyped circuits. There's also provision for a 40-pin external connector to expand memory and I/O capacity. The Heathkit ET-3400 Microprocessor Trainer features built-in $+5$, $+12$ and $-12$ volt power supplies. Power requirement: 120/240 volts, 60/50 Hz, 30 watts maximum. The unit measures 3½" H x 12⅛" W x 11¾" D.

All of the programming and hardware interface experiments supplied with the EE-3401 Microprocessor Self-Instruction Program are implemented on the ET-3400 Trainer. While designed primarily for use with the EE-3401 Program, the Trainer is a flexible, general purpose training unit and microprocessor breadboard. It can be used in many other applications that require a low-cost microprocessor-based software development system or as a design aid for developing special interfaces. Team it up with the ETA-3400 Trainer Accessory (description at right) for real computing power.

Kit ET-3400, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 199.95
ETW-3400, Factory assembled and tested, Wt. 6 lbs. . . . . . . . . . . . . . . . . 279.00

## The ET-3400 Accessory turns Microprocessor Trainer into a complete system

When you add the ETA-3400 Trainer Accessory, you turn your ET-3400 Microprocessor Trainer into a complete computer system. The Accessory provides you with more computing power — an additional 1K bytes of memory — so you are able to run longer and more sophisticated programs through your ET-3400 Trainer. The Accessory's memory can even be expanded to 4K bytes by adding the optional 3K Chip Set (ET-3400-1). Order the Chip Set from the listing below.

A serial I/O with EIA or 20 mA loop format in the Accessory allows you to hook up a terminal such as the H-9 (page 54) or H-19 (page 40), or a 20 mA ASCII teletype machine. It also provides an audio cassette interface enabling you to store programs on convenient audio cassettes. The ROM monitor/debugger program lets you implement the standard Trainer monitor functions through the external terminal. Memory locations can be examined or changed, break points can be initiated, and program debugging can be accomplished with a single instruction step feature.

A Tiny BASIC interpreter is provided in ROM allowing you to program using BASIC (see the EC-1100 BASIC Self-Instruction Program on page 54). Tiny BASIC features 26 variables (A-Z), integer math, 15 BASIC statements and two functions: random and user. User function allows you to run machine code routines from BASIC — the same machine code routines you learn to write in the EE-3401 Self-Instruction Program.

The ETA-3400 Accessory connects to the Trainer by means of a 40-pin ribbon cable supplied. Parts required to modify the Trainer are included. Since this modification changes the clock frequency of the Trainer, the experiments in the Microprocessor Self-Instruction Program using timing loops will be changed. It is recommended that all of the EE-3401 experiments be completed before adding this modification kit. The cabinet of the Accessory measures 3" H x 11" W x 12" D. Power requirement: 120/240 VAC, 60/50 Hz, 11 watts.

As with all Heathkit electronic kits, our step-by-step instruction manual even includes directions on soldering for the first-time builder.

Kit ETA-3400, Shpg. wt. 8 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 150.00
EWA-3400, Factory assembled and tested, Wt. 8 lbs. . . . . . . . . . . . . . . . . 250.00
ETA-3400-1, Optional 3K Chip Set, Wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . 47.00
NOTE: A terminal such as the H-9 (page 54) or H-19 (page 40) is required to use the BASIC and monitor software with the Trainer Accessory.

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

# Heathkit Programs make learning electronics easier



Heathkit Advanced Electronics Self-Instruction Programs eliminate the legwork for you. They come complete with components so you can perform tried and tested experiments based on an easy-to-understand text. So, learning is faster, more fun... and more economical, too. Large, illustrated visual materials make learning even more effective. And the optional Heathkit ET-3300 Electronic Trainer gives you actual hands-on experience with the electronic components and circuits discussed in the Advanced Electronics programs. Whether you are a technician/engineer interested in self-improvement, a student seeking advanced electronics knowledge, or a hobbyist interested in new electronic developments, these programs are designed to meet your needs in the most economical way.

## Learn about Op Amps, one of today's most important ICs



A 385-page text, reinforced by test questions and experiments, teaches you how to measure and compute common op amp parameters; how to design basic op amp linear circuits; how to design integrator and differential circuits; and how to design and predict the performance of op amp constant current sources; as well as current-to-voltage and voltage-to-current converters. Even the popular Norton and BiFET op amps are covered. Components are included for conducting experiments. Desirable options for the experiments are the ET-3300 Lab Breadboard (below), and an oscilloscope like the Heathkit IO-4105 (page 70), a multimeter like the Heathkit IM-1104 (page 62), and a frequency generator like the IG-1271 (pages 72-74) or equivalent makes Op Amps easier. 3.0 CEUs.

| | |
|---|---|
| EE-101, Shpg. wt. 5 lbs. | 39.95 |
| Kit ET-3300, Breadboard, wt. 6 lbs. | 89.95 |
| ETW-3300, Assembled Breadboard, 6 lbs. | 149.95 |
| SAVE $10.00! EES-101, Program with Kit Breadboard, Wt. 11 lbs. | 119.90 |

## This in-depth program makes learning Active Filters easy



A 300-page text helps you learn to design active filters with op amps, to plot and predict frequency responses, to design and breadboard first-order low-pass and high-pass filters, to design second-order and high-order filters, bandpass and state variable filters. It's helpful to complete EE-101 (above), or have equivalent knowledge first. Desirable are the ET-3300 Breadboard (at right) or the ET-3100 Trainer (page 72) (NOTE: The ET-3100 cannot be used with the other Advanced Programs), an oscilloscope like the IO-4105 (page 70), a multimeter like the IM-1104 (page 62) and a frequency generator like the IG-1271 (page 63). 70% or better on the optional final exam earns you 3.0 CEUs.

| | |
|---|---|
| EE-102, Shpg. wt. 5 lbs. | 29.95 |
| Kit ET-3300, Breadboard, Shpg. wt. 6 lbs. | 89.95 |
| ETW-3300, Assembled Breadboard, Shpg. wt. 6 lbs. | 149.95 |
| SAVE $10.00! EES-102, Program and Breadboard, Wt. 11 lbs. | 109.90 |

## Our newest program introduces you to the IC Timer



This new Heathkit Program helps you learn common IC timers, how each works, what they do and where to use them. You'll learn to use them for logic functions, in output drive circuits, time-delay relay circuits, wide-range pulse generators, voltage/frequency converters, freewheeling, power-fail oscillators, sine-wave/square-wave oscillators, universal appliance timers, speed alarms, burglar alarms, alarm indicators, power monitor error detectors, phase-locked loops and precise clock sources. Included are a 348-page text and parts for the optional experiments. Also useful for the experiments are the ET-3300 Breadboard (below), an oscilloscope like the IO-4105 (page 70) and a multimeter like the IM-1210 (page 64). It's helpful to complete EE-3201 Digital Techniques (page 75) or equivalent. 3.0 CEUs.

| | |
|---|---|
| EE-103, Shpg. wt. 5 lbs. | 39.95 |
| Kit ET-3300, Breadboard, Shpg. wt. 6 lbs. | 89.95 |
| ETW-3300, Assembled Breadboard, 6 lbs. | 149.95 |
| SAVE $10.00! EES-103, Program and Breadboard, Wt. 11 lbs. | 119.90 |

## Learn Phase-Locked Loops with this self-instruction program



You need to know about phase-locked loops to understand many state-of-the-art electronic devices. PLLs are widely used in television and FM receivers, CB and 2-meter transceivers. So this extensive 268-page self-instruction text helps you learn the general principles of PLLs and their building blocks — the phase detector, loop filter and voltage-controlled oscillator. Optional experiments at the end of each unit give you hands-on experience with PLLs. Necessary parts are included. Also helpful are the optional ET-3300 Breadboard (below), a DC voltmeter like the IM-5284 (page 57) and a single-channel oscilloscope like the IO-4105 (page 70). To get more from the program, we recommend a dual-channel scope like the IO-4205 (page 70) and an audio signal generator like the IG-5218 (page 63). Passing the optional final exam with 70% or better will earn you 3.0 CEUs.

| | |
|---|---|
| EE-104, Shpg. wt. 5 lbs. | 49.95 |
| Kit ET-3300, Breadboard, Shpg. wt. 6 lbs. | 89.95 |
| ETW-3300, Assembled Breadboard, 6 lbs. | 149.95 |
| SAVE $10.00! EES-104, Program and Breadboard, 13 lbs. | 129.90 |

## The Lab Breadboard makes learning electronics easier

Ideal for performing the experiments in the Programs on this page, or use it to do your own experimenting, to test electronic components, or to design prototype circuits.



$89.95 Kit

The Heathkit ET-3300 Laboratory Circuit Breadboard is a great convenience tool for electronics learning or circuit design. Solderless sockets make breadboarding easier and simpler. Sockets are designed to accommodate any size dual in-line integrated circuit package. Reliable built-in power supply provides +5 VDC (±4%), +12 VDC (variable) or −12 VDC (±2%) power to the Breadboard, with fixed current limiting of each supply at rated current providing protection against shorts. Desirable with EE-101, EE-103 and EE-104. Can be used with EE-102. 120/240 VAC, 60/50 Hz. 3.5" H x 12" W x 12" D.

| | |
|---|---|
| Kit ET-3300, Shpg. wt. 6 lbs. | 89.95 |
| Fully Assembled Laboratory Circuit Breadboard. ETW-3300, Shpg. wt. 6 lbs. | 149.95 |

79

## Learn to design, build printed circuits — build two useful practice kits

**$64⁹⁵**

- Copy PC board designs from magazines or design your own circuit boards
- Includes all necessary materials

Have you ever wanted to build a useful electronic kit, using plans you see in one of the hobbyist magazines? Are you interested in designing your own boards, or modifying existing designs? Would you like to expand your employees' or students' electronics knowledge? Heathkit/Zenith makes it easier — and includes TWO useful electronic kits to make an outstanding bargain!

The course teaches you how to make printed circuit boards, using both the direct pattern and photographic methods. You'll learn about circuit board materials, layout, preparing artwork, image transfer and assembly.

No previous training is needed. And the self-teaching text teaches you a little bit at a time, so you won't be overwhelmed by new concepts.

Upon completion of this course, you will be able to:

1. Explain the properties of different types of PC board materials.
2. Understand the processes used in manufacturing printed circuit boards.
3. Design a circuit board layout, considering all circuit requirements.
4. Prepare direct pattern artwork, positive and negative photographic artwork, one and two-sided camera artwork.
5. Explain the processes used in producing automated artwork.
6. Transfer images from artwork to the circuit board.
7. Assemble printed circuit boards, using the manual assembly method, manual soldering and conformal coating.
8. Understand how printed circuit boards are assembled automatically, using automatic insertion machines and wave soldering.

In the experiments, you'll actually make the circuit boards for two home electronic kits, which you'll build during the course. All materials necessary to complete the kits and experiments are included. An etch-resist pen, rub-on transfers, art tape, etchant and plastic bags are provided to make PC boards by the direct pattern method. And you get a positive pattern, clear acetate and photographic developer to make circuit boards by the photographic method.



Professionally-designed text covers every step in designing and building PC boards

Etch-resist pen, etchant, photographic developer — everything you need to make your own PC boards is included

Clear illustrations give you precise instructions on designing and building printed circuit boards

You'll make these useful Heathkit products — the GD-600 Photoelectric Lamp Switch Kit and the GD-1287 Touch Switch Kit for appliances

When you complete the course, you'll have two useful Heathkit products: The GD-600 Automatic Lamp Switch turns lamps (up to 150 Watts) on at dusk, off at dawn to give your house a lived-in look while you're away. And the GD-1287 Touch Control Switch lets you turn TVs (to 225 W), fans (to 180 W) on and off with just a light touch — and no rewiring.

Pass the optional final exam with a score of 70% or better, and earn 2.0 CEUs and a Certificate of Achievement. Not available outside Continental U.S.

EI-3134, Snpg. wt. 7 lbs. .............................................. **64.95**

## Now anyone can learn Basic Electricity with this Heathkit/Zenith Course

**$29⁹⁵**

- No previous knowledge needed — learn about basic electrical principles with proven Heathkit/Zenith programmed instruction methods
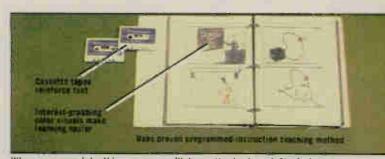
Now, you can start right from the beginning with the new Heathkit/Zenith EE-3100 Basic Electricity Course. No previous electronics education is needed for this Course, which uses effective audio/visual teaching methods to introduce you to electricity and electronics. And the Basic Electricity Course can serve as a valuable introduction to the Heathkit/Zenith Basic Electronics Series (EE-3101 through 3105, pages 72 through 74).

Programmed-instruction text, supported by clear color visuals and two audio cassettes, teaches you each concept on a step-by-step basis to build a solid foundation. And a specially-written workbook, with unit review examinations, reinforces the learning process. The text and workbook work together, to help you learn — and remember — each concept.



Cassette tapes reinforce text

Interest-grabbing color visuals make learning easier

Uses proven programmed-instruction teaching method

When you complete this course, you'll know the basics of Ohm's Law, power, series and parallel circuits, electromagnetism, direct and alternating current, generators and meters in an easy, interesting way.

Upon completion, pass the optional final examination with a score of 70% or better and you'll earn 1.0 CEU, plus a Certificate of Achievement.

EE-3100, Shpg. wt. 3 lbs. ........................................ **29.95**

## Learn to solder the correct way with this low-cost Course



**$15⁹⁵**

- Great introduction to kitbuilding — even includes a practice kit

The Heathkit Soldering Course teaches the proper techniques for high-reliability soldering in electronics applications. Whether for industrial training use, kitbuilding or experimenting, this self-instruction program, including an instruction manual and kit, is the perfect way to learn or brush up on soldering skills.

Using the proven programmed-instruction format, the step-by-step text begins with mechanical connection and progresses through tinning, tempera-

ture control, different types of solder, the advantages and disadvantages of various irons, guns and tips — and even includes a section on desoldering.

To give you real hands-on experience, a handy practice kit complete with circuit board, components and solder is included. When you complete this first kitbuilding experience, you will have a two-transistor light oscillator that you built yourself.

The Heathkit Soldering Course is ideal for individuals, industry and schools. Requires a soldering iron and small hand tools (see pages 22 and 23 for our complete line of soldering aids).

EI-3133, Shpg. wt. 2 lbs. ................. **15.95**

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Audio tutorial self-instruction teaches you math with cassettes, printed visuals, practice exercises



Each unit has self-contained workbook

Proven Heathkit learning techniques guide you to success

EM-4 Algebra Program contains eight audio tapes

Sturdy vinyl binders house tapes and workbooks

## Math Tutorials for Science and Technology

Twelve programmed workbooks give a review of fundamentals you need every day. The program covers arithmetic and signed numbers, powers and roots, scientific notation, units and rounding, graphs, ratios and proportions, algebra, solving equations, triangle trigonometry, vectors, probability and statistics. Passing the optional final exam with a score of 70% or better will earn you 4.0 CEUs and a Certificate of Achievement.

EM-1, Shpg. wt. 9 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **39.95**

## Now it's easier than ever to Think Metric, U.S.A.

Learning the metric system is fun and easy with Think Metric, U.S.A. The most common system of weights and measures, the metric system will soon become the official system in the U.S. The material is presented in a three-ring binder and includes an audio cassette that reinforces the text material. Passing the optional final exam with 70% or better earns you 1.0 CEU and a Certificate of Achievement.

EM-2, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **19.95**

## The organized way to learn college level algebra

Algebra Fundamentals reviews basic algebraic skills. Text and seven cassettes cover integer arithmetic, substance of algebra, proportional reasoning, graphs, divisions and multiples, fractions, roots, real numbers. Pass optional final exam for 2.5 CEUs and Certificate of Achievement.

EM-3, Shpg. wt. 6 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **49.95**
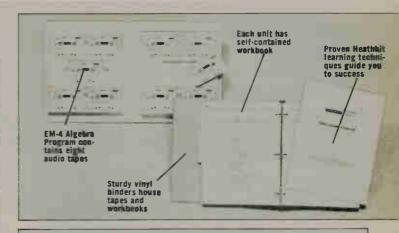
Algebra consists of eight units, workbook and 10 cassettes covering polynominal arithmetic, factoring, algebraic functions, exponents and radicals, linear equations, inequalities, quadratic equations and inequalities in one variable, probability, sets and operations. Pass the optional final exam for 3.0 CEUs and Certificate of Achievement.

EM-4, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **49.95**

Intermediate Algebra includes text and nine audio cassettes. Covers functions, relations and inverses, graphs and variation, linear relations, quadratic relations, systems of equations and inequalities, determinants, logarithms, sequences and series. 3.5 CEUs and Certificate.

EM-5, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **49.95**

Save $10.00 on your Algebra education. Order all three Programs — Algebra Fundamentals, Algebra and Intermediate Algebra — for a complete education in Algebra fundamentals. If purchased separately, $149.85.

EMS-345, Shpg. wt. 20 lbs. . . . . . . . . . . . . . . . . . . . . . . . **Only $139.85**

## Learn the fundamentals of trigonometry

Learn first-year college trigonometry in depth. Supplement what you learn in school — or prepare for the CLEP Trig exam, where you can earn college credit for learning outside the classroom. The Trigonometry Program includes binders for the text and the nine cassette tapes. Requires successful completion of EM-5 Intermediate Algebra (left) or equivalent knowledge. Basic knowledge of geometry is helpful, too. Covers circular functions, graphs of circular functions, identities and proofs, inverse functions, conditional equations, right triangle trigonometry, solution of right triangles, polar coordinates and parametric equations, vectors and complex numbers. Pass the optional final exam for 4.0 CEUs and Certificate of Achievement.

EM-6, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **49.95**

## Learn the professional way to analyze data

Descriptive Statistics and Probability Distributions includes seven unit-text in binder and seven cassette tapes. Precede with EM-3 or equivalent. 3.0 CEUs.

EM-7, Shpg. wt. 6 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **49.95**

Inferential Statistics Program covers sampling, hypothesis testing, t, f and chi square distribution, linear correlation and regression. 3.5 CEUs.

EM-8, Shpg. wt. 8 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **59.95**

Save $10.00 on your Statistics education. Order EM-7 and EM-8 Programs together. If purchased separately, $109.90.

EMS-78, Shpg. wt. 14 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **99.90**

## Quality Cassette Tape Recorder/Player
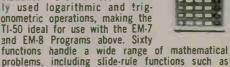


The ECP-3801A Cassette Tape Recorder/Player is recommended for use with any of the Heathkit educational programs containing audio cassettes. Easy-to-reach pushbuttons control play, rewind, fast forward, stop, eject and record functions. The ECP-3801A also features a built-in condenser microphone so you can make your own recordings or give dictation. A built-in three-digit counter with reset button lets you find specific information accurately and quickly. Factory assembled and tested; not a kit.

ECP-3801A, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . **60.00**

## Advanced TI-50 Scientific Calculator



The powerful Texas Instruments TI-50 Slimline Scientific Calculator puts advanced capability and quality in an attractive package. It's a powerful scientific calculator with statistics — and the most commonly used logarithmic and trigonometric operations, making the TI-50 ideal for use with the EM-7 and EM-8 Programs above. Sixty functions handle a wide range of mathematical problems, including slide-rule functions such as roots, powers, reciprocals, logarithms and trig (in degrees, radians or grads). Assembled and tested.

EMA-10, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . **39.95**

## Powerful TI Programmable 59 Calculator



The Texas Instrument TI-59 Programmable Calculator is ideal for use with the mathematics programs on this page, or for computer or electronic design applications. It offers the most advanced features available in a hand-held calculator anywhere. Computer-like power and versatility with subroutines, looping, editing capabilities. Solid State Software™ modules expand capability and flexibility. Includes a master library of 25 prewritten applications programs. Assembled and tested.

EMA-20, Shpg. wt. 7 lbs. . . . . . . . . . . . . . . . **249.95**
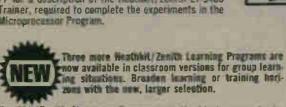
# Teachers, training directors — Heathkit/Zenith Learning Programs available in classroom versions to fit custom training needs

Now you can apply famous Heathkit/Zenith Learning Programs to your own training needs. The programs below have been reformatted for more flexible classroom use. The teacher uses the instructor's guide to add his/her experience and guidance, providing fully rounded training.

The programs are organized in three separate publications, each designed for greater student and teacher convenience. The student text is the core of the learning material. The student workbook, with its examinations and laboratory experiments, is keyed to the text. The instructor's guide helps the teacher present the material in orderly fashion.

In addition, separate parts packs contain all the necessary components for implementing the workbook experiments. To complete the experiments in DC and AC Electronics, Semiconductor Devices, Electronic Circuits and Test Instruments, the ET-3100 Trainer, described on page 72, is useful. Experiments for the Digital Techniques Program require the ET-3200 Trainer, featured on page 75. Turn to page 77 for a description of the Heathkit/Zenith ET-3400 Trainer, required to complete the experiments in the Microprocessor Program.

**NEW** Three more Heathkit/Zenith Learning Programs are now available in classroom versions for group learning situations. Broaden learning or training horizons with the new, larger selection.

Heathkit/Zenith Classroom Programs are the ideal answer for industry, government and schools who want to cover subject matter efficiently at minimum cost. These programs use multi-media instruction — a variety of teaching methods, such as self-study textbooks, instructor's guides, programmed instruction, audio-visual reinforcement, self-checking examinations, kits and hands-on experiments — all designed for fast, thorough mastery of the subject matter.
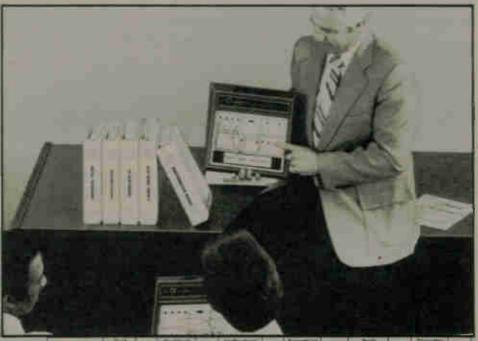
**Application oriented** — with just the right amount of theory and a maximum emphasis on real-world use, Heathkit/Zenith Classroom Programs incorporate the most recent, up-to-date technical material available.

**Free brochures**, information and price schedules on each Heathkit/Zenith Classroom program are available at your local Heathkit Electronic Center *Units of Veritechnology Electronics Corporation (for the Heathkit Electronic Center nearest you; then turn to page 22 for addresses and telephone numbers). Just step in or call your local Heathkit Electronic Center for full details on Heathkit/Zenith Classroom Programs.

# Heathkit Amateur equipment puts more fun in your Ham Radio hobby

Whether you're a newcomer to Amateur Radio or a veteran of many years in the field, your best choice is Heathkit Amateur Radio Equipment. Building your own transceiver and accessories helps you learn more about the latest advancements in electronics. You build state-of-the-art transceivers like the popular SB-104A HF Transceiver and the exciting VF-7401 2-Meter FM Digital Scanning Transceiver. And does Heathkit Amateur Radio Equipment perform? Just ask any Ham who has built and operated Heathkit Amateur Radio Equipment. Or listen to the large number of Heathkit Transceivers on the air. Now that's convincing proof that Heathkit Amateur Radio Equipment is the way to start... and continue in Ham Radio. So get more enjoyment and satisfaction from your amateur radio hobby... with the complete line of amateur radio equipment and accessories from the more than 200 Hams at Heath.

## Back by popular demand...and just in time for Santa to give — the completely solid-state Heathkit SB-104A HF Transceiver

Get all the features you want in a solid-state transceiver — a clean 100 watts out on all bands, instant QSY, digital readout...even a display of your own call sign on the front panel. The moment you power up your SB-104A, six digits display your operating frequency to within ±200 Hz. Pushbutton select CW, upper or lower sideband transmission, plug in your key, or choose PTT or VOX operation, and you're ready for broadband solid-state excitement.

The receiver front end of the 104A is factory preassembled and tested, incorporating individual preselector filters for each band. That, along with balanced first and second mixers, gives you sensitivity of less than 0.5 uhv.

The transmitter section lets you choose 100 watts out for "barefoot" operation or, with the touch of a button, one watt out to turn your 104A into Ham Radio's most sophisticated QRP transceiver. Transmitter circuitry features quad op-amp audio processing, filter sideband generation, crystal-controlled heterodyne oscillators for maximum frequency stability, and a unique ALC system to eliminate distortion-producing overdrive. Most importantly, the 104A utilizes driver and PA transistors in a broadband, no-tune push-pull configuration, diode biasing to prevent PA thermal runaway, and power regulating control circuitry to prevent damage under high SWR. For extra performance, add 400 Hz CW selectivity with the optional SBA-104-3 Crystal Filter, or cut ignition noise by installing the SBA-104-1 Noise Blanker. The SB-104A operates from a charging 12 VDC auto electrical system, or the PS-1144 Power Supply described below. Make sure Santa puts the SB-104A under your tree this year.

Kit SB-104A, Shpg. wt. 32 lbs. ............................ 669.95
Kit SBA-104-1, Noise Blanker, Shpg. wt. 1 lb. ........... 28.95
Kit SBA-104-3, 400 Hz Crystal Filter, Shpg. wt. 1 lb. ... 42.95

### Look at these super SB-104A Specifications!

Frequency Coverage: 3.5 MHz through 29.7 MHz Amateur bands (80 through 10 meters), 15 MHz WWV receive only. Frequency Stability: Less than 100 Hz/30 min. drift after 30 min. warmup, less than 100 Hz drift for ±10% change in primary voltage. Readout Accuracy: Within ±200 Hz ±1 count. TRANSMITTER: RF Power Output: High Power (50-ohm non-reactive load), SSB: 100 watts PEP ±1 dB; CW: 100 watts ±1 dB. Low Power SSB: 1 watt PEP (minimum), CW: 1 watt (min.). Output Impedance: 50 ohms, less than 2:1 SWR. Carrier Suppression and Unwanted Sideband Suppression: −50 dB down from 100 watt single-tone output at 1000 Hz reference. RECEIVER: Sensitivity: 0.5 for 10 dB S+N/N for SSB. Selectivity: 2.1 kHz minimum at −6 dB, 5 kHz max. at −60 dB. (2:1 nominal shape factor). CW Selectivity: with accessory CW filter Selectable 2.1 kHz/400 Hz. IM Distortion: −65 dB min., −57 dB typ. with noise blanker. Image Rejection: −60 dB min. Dimensions: 5¾" H x 14⅝" W x 13⅛" D.

## Matching accessories to complete your SB-104A Station
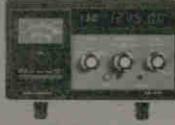
[1] Matching Speaker     [2] Remote VFO     [3] Station Monitor     [4] Station Console

### [1] Matching Speaker and Power Supply

SSB response-tailored 5" x 7" oval speaker. 300-3000 Hz frequency response. Connector plug and cable included. Dimensions: 7½" H x 10½" W x 14" D. Large enough to house the PS-1144 Power Supply.
Kit SB-604, Shpg. wt. 8 lbs. ................... 38.95

120/240 VAC Supply provides 13.8 VDC required by SB-104A. Full-wave bridge circuit has triple Darlington regulation to maintain fixed voltage.
Kit PS-1144, Wt. 27 lbs. ..................... 99.95

### [2] Remote VFO gives you added capability

Provides split transmit/receive capability for DX, net operation. Multi-mode capability allows transceiver operation with either VFO or SB-104A. Two crystal positions for fixed-frequency control. VFO reference tuning scale, SB-104A displays exact frequency. 7½" H x 10½" W x 15½" D. Easy assembly.
Kit SB-644A, Shpg. wt. 10 lbs. ............... 129.95

### [3] See your signal with Station Monitor

Monitors SSB, CW & AM signals to 1 kW from 80-6 meters. Shows nonlinearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration parasitics, key clicks. Manual shows 40 CRT displays (21 transmit envelope patterns, 7 trapezoid patterns, 6 RTTY cross patterns, 6 CW patterns). 120/240 VAC 7½" H x 10½" W x 15½" D.

Kit SB-614, Shpg. wt. 17 lbs. ............... 189.95
HDP-3622, 3-ft. Coax w/conn. Shpg. wt. 1 lb. 4.95

### [4] Station Console adds real versatility

Features 24-hour, 6-digit clock, 10-minute ID timer w/automatic reset, RF wattmeter w/200/2000 watt ranges, SWR bridge w/sensitivity control, manual/VOX controlled phone patch. Phone patch provides at least 30 dB isolation. Input impedance is 600 ohms. Impedance is 50 ohm. 1.8 to 30 MHz range. 120/240 VAC. Metal cabinet measures 7½" H x 10½" W x 15½" D.

Kit SB-634, Shpg. wt. 13 lbs. ............... 189.95
HDP-3622, 3-ft. Coax w/conn. Shpg. wt. 1 lb. 4.95

Credit Card Orders Call TOLL-FREE. 800-253-0570

# Heathkit HW-101-the best buy in Ham Radio today - over 29,000 sold throughout the world

**$399⁹⁵**

- Full 80 through 10 meter Amateur band coverage
- USB, LSB, CW, PTT and VOX operation on all bands
- 0.35 μV receiver sensitivity digs out weak signals
- 180 watts PEP input, 170 watts CW

The Heathkit HW-101 is the economical, value packed way to put yourself on the bands. And with the kind of performance this transceiver has to offer, you'll find it hard to believe you're operating on a budget. Full coverage of all the bands, 80 through 10, lets you enjoy the total spectrum of ham radio operation. Operate PTT or VOX on upper or lower sideband or select CW transceive — they're all there, the options you'd expect to find on a transceiver that's always top notch.

You get outstanding receiver performance. The HW-101's 0.35 μV sensitivity on SSB brings in weak stations loud and clear. The high quality crystal IF filter keeps signals separate. Image and IF rejection of better than 50 dB help bring you world-wide receiving that's clean, clear and crisp. And when you add the optional 400 Hz CW filter to your 101, your copy will be arm chair all the way.

There are a lot more features. A fast acting AGC circuit prevents fading and blasting. There's front panel metering to show you signal strength, plate current, and relative power out. And to make sure you're always right on frequency and inside the band, the HW-101's built in 100 kHz calibrator is ready for reference at the flick of a switch.

The HW-101's transmitter section is a top performer too. Triple action level control prevents distortion-producing overdrive to keep your signal clean. And power? With a rugged pair of reliable 6146s for finals, the HW-101 punches 180 watts PEP in on phone and 170 watts in on CW. Frequency stability is better than 100 Hz per hour after 45 minutes warmup, with less than 100 Hz variation for a 10% line voltage variation. An FET VFO provides excellent thermal stability for heavy-duty operating without excessive heat buildup. The HW-101 is the transceiver to start with and stay with. You can work CW with your Novice License, and go to phone when you upgrade to General. And when you're ready to go the legal limit, by adding the SB-201 or -221 Linear Amplifiers (see page 87) to your station, the HW-101 Transceiver will make the perfect exciter.

Easy to assemble circuit boards and color coded wiring harnesses speed assembly. And when it comes time for alignment, you'll really appreciate the wide-open layout of the HW-101's rugged chassis design. Look over the features and compare price with performance; it's easy to see the Heathkit HW-101 is ham radio's best buy. Requires Heathkit Model PS-23 power supply.

Kit HW-101, Shpg. wt. 22 lbs. ................................... 399.95

SBA-301-2, 400 Hz CW Crystal Filter, Shpg. wt. 1 lb. .................. 44.95

**Fixed Station AC Power Supply.** See page 88 for details.
Kit PS-23, 17 lbs. ............................................... 64.95

Kit HS-1661, Matching Speaker, 5 lbs. ........................... 29.95

HW-101 SPECIFICATIONS: RECEIVER: Sensitivity: <0.35 μV for 10 dB S+N/N for SSB operation. SSB Selectivity: (optional SBA-301-2 CW filter); 400 Hz. min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. Spurious Response: Image and IF rejection >50 dB. TRANS-MITTER: DC Power Input: SSB 180 W PEP (normal voice, cont. duty cycle). CW 170 W (50% duty cycle). RF Power Output: 100 W on 80 thru 15 M; 80 W on 10 M (50 non-reactive load). Output Impedance: 50 to 75 with <2:1 SWR. Harmonic Radiation: 40 dB below rated output. Mike Input: High impedance. Carrier Suppression: 45 dB down from single-tone output. Unwanted Sideband Suppression: 45 dB. Third Order Distortion: 30 dB from two-tone output. GENERAL: Frequency Coverage: 80-10 M amateur bands. Frequency Stability: <100 Hz per hour drift after 45 minutes warmup from normal ambient conditions. <100 Hz for ±10% line voltage variations. Modes of Op: USB, LSB, CW, tune. Dial Calibration: 5 kHz. Calibration: 100 kHz crystal. Power Requirements: 700 to 850 V at 250 mA with 1% maximum ripple; 300 V at 150 mA with 0.05% maximum ripple; −115 V at 10 mA with 0.5% maximum ripple; 12 V AC/DC at 5.76 amps. (See power supplies on pg. 93). Dimensions: 6¾" H x 14¾" W x 13⅜" D.

## For best performance — matching speaker for HW-101, HR-1680

**$29⁹⁵**

- Features a big 5" x 7" oval speaker
- An easy-to-build kit
- Rugged, lightweight aluminum cabinet
- Response tailored for SSB and CW

The Heathkit HS-1661 Speaker is designed to match the HW-101 Transceiver (above), and the HR-1680 Receiver on page 85, as well as many older Heathkit transceivers and receivers. It features a big 5" x 7" oval speaker with a 3.16 oz magnet offering 300 to 3000 Hz frequency response for best SSB and CW reception. The green, spatter-finish cabinet is constructed of rugged, lightweight aluminum, and measures 6⅝" H x 9" W x 5⅝" D. The easy-to-build kit includes necessary cable and solder.

Kit HS-1661, Shpg. wt. 5 lbs. ................................ 29.95

86

# Tied to one band? Use dipole or long wire 80 through 10 meters with the Heathkit 2 kW Antenna Tuner

## $149⁹⁵

- Accepts both balanced and unbalanced feed lines
- Continuously variable inductor gives you exact matching
- Even write in band settings on the eraseable front panel

You'll like the way the Heathkit SA-2040 2 kW Antenna Tuner helps you radiate more of your signal by maximizing power transfer from your transmitter to your antenna. It helps you reduce TVI, too. This low-priced, full-featured Tuner gives you the versatility of using a built-in 4:1 balun for balanced feedlines, or unbalanced feedlines, or long wires.

A continuously variable inductor — from 3.5 MHz to 30 MHz — gives you an infinite number of impedance settings, assuring precise antenna matching, and makes the SA-2040 ideal for MARS operation or the recently approved new band allocations. A convenient counter on the front panel indicates inductor settings. The Heathkit manual includes a chart giving you high-, mid- and low-band settings on each HF band, plus a full page logging scale for recording intermediate settings. Write your most frequently used settings on the SA-2040's eraseable front panel.

Silver-plated straps and roller contact assembly minimize RF loss at high frequencies. And large ceramic feed-through insulators withstand high voltage RF. This Tuner can handle up to 2000 watts PEP on SSB, and 1000 watts on CW. SO-239 connectors allow incorporation into your 50 Ω system.

This easy-to-build kit is a two-evening project. And when you've tightened the cover, personalize your Tuner with stick-on numerals and letters that let you add your own call sign to the front panel. The rugged black metal cabinet measures 5⅛" H x 14¹⁵⁄₁₆" W x 13⁷⁄₁₆" D. Compare this Tuner with the competition — match power handling capabilities, features and price. You'll see why the SA-2040 is your best buy.

Kit SA-2040, Shpg. wt. 15 lbs. .................................. 149.95
HDP-3622, 3-ft. RG8U jumper with PL259 connectors, Wt. 1 lb. ......... 4.95

Large ceramic insulators are designed to handle 2000 watts PEP

Heavy duty capacitors are easy to build and service

Continuously variable inductor means a perfect match every time

SA-2040 SPECIFICATIONS: Frequency Coverage: 3.5-30 MHz. Power Input Capability: Full legal limit. Input Impedance: 50 ohm at match. Impedance Transformation: 4:1 (balance-to-unbalanced); balun. Output Impedance: Wide Range. Cabinet Dimensions: 5⅛" H x 14¹⁵⁄₁₆" W x 13⁷⁄₁₆" D (36.8 x 14.6 x 35.2 cm).

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# AC Power Supplies for your Heathkit or other make Amateur Radio gear

## ① AC Supply for most 2-meter transceivers

- Power mobile transceiver plus amplifier to add VHF capability at your home QTH

The Heathkit PS-1175 supplies the necessary voltage and current to power the VF-7401 2-meter transceiver/HA-202A amplifier combination for most other makes of VHF mobile equipment from a standard 120 or 240 VAC outlet for base station operation. Output voltage of the PS-1175 is internally adjustable between approximately 12 and 14.5 volts DC. A Darlington circuit provides exceptionally high gain for excellent regulation. The supply is fused for overload protection, and comes with 3-wire line cord. The easy-to-assemble kit even includes a generous supply of solder. Order your PS-1175 Power Supply now and start getting double duty from your mobile transceiver.

Kit PS-1175, Shpg. wt. 15 lbs. .............. 69.95

PS-1175 SPECIFICATIONS: Output Voltage: 13.8 VDC regulated (internally adjustable from approx. 12 to 14.5 VDC). Output Current: 10 amperes intermittent, 10 minutes max. (5 amperes continuous). Load Regulation: less than 1% at 10 amperes. Ripple: less than 0.5% at 10 amperes. Power Requirement: 120 VAC, 50/60 Hz at 4 amperes, 240 VAC, 50/60 Hz at 2 amperes. Dimensions: 5¹⁄₄" W x 6¼" H x 11" D.

## ② Here's the Supply to power HF equipment

- Here's the ideal power supply for your HW-101 or older Heathkit transceiver

The Heathkit PS-23 Power Supply will provide the operating voltages for the popular HW-101 Transceiver, as well as those necessary for the operation of many older Heathkit transceiver models and other types of Amateur Radio equipment. It has high voltage and two internally selectable low B+ taps. It also provides fixed bias and 12.6 filament voltage. The PS-23 features excellent bias supply filtering, plus extremely low ripple content. A circuit breaker in the primary circuit provides overload and short circuit protection. Instructions are included for either 120 or 240 VAC wiring. This easy-to-assemble kit will have you on the air in no time. And will give you many years of service.

Kit PS-23, Shpg. wt. 17 lbs. ................ 64.95

PS-23 SPECIFICATIONS: High voltage output: 820 VDC no load; 700 VDC @ 250 mA ±10%. AC ripple. Less than 1% @ 250 mA. Low voltage output: (High tap) 350 VDC, no load, 300 VDC @ 150 mA ±10%, (Low tap) 275 VDC, no load, 250 VDC @ 100 mA, ±10%. Less than 0.05% AC ripple @ 150 mA, continuous duty to 175 mA. Fixed bias: −130 VDC ±10%, no load, −100 VDC @ 20 mA. Power requirement: 120/240 VAC, 50/50 Hz, 350 watts maximum. Dimensions: 6¼" H x 4¼" W x 9" L.

# Tri-Bander's easy-to-follow assembly manual gets you on the air quickly

- Gives you 8.3 dB actual gain over a dipole on 10, 15 and 20 meters
- Famous Heathkit step-by-step instructions make it ideal for Field Day/club uses

If you've ever built a beam, you'll really appreciate the step-by-step Heathkit assembly manual that comes with the SA-7040 4-Element Tri-Band Yagi. The manual even shows you how to optimize performance for CW, HiPhone or LoPhone portions of each band. And once you've assembled this compact beam, you'll love its performance. Three active elements and separate, matched Hy-Q traps on each band give you an excellent 8.3 actual gain over a dipole on 10, 15 and 20 meters. Front-to-back ratio is 25 dB for minimum interference. A separate 10-meter reflector assures correct monoband spacing. Energy transfer is more efficient thanks to a VSWR of less than 1.5:1 at resonance on each band. Beta Match for tapered impedance, DC ground. The 7010 accepts full legal power, and feeds with 52-ohm coax. Boom length is 15'10", with a 31-foot longest element. Turning radius is 17'5". Wind load area is 5.8 sq. ft. Move up to the SA-7010.

Kit SA-7010, Shpg. wt. 45 lbs. . . . . . . . . . . . .**219.95**

## ① Cushcraft 11-element 2-Meter Yagi

Features 11.3 dB forward gain, a 20 dB front-to-back ratio. Gamma match tuning for minimum SWR. Feeds directly with 52-ohm coax. 1000 watts. Designed for vertical polarization and cut for 146-148 MHz Amateur FM. Boom length, 144"; longest element, 40"; turning radius, 72". Assembly required. Mfr's sugg. price $36.95.

HDP-1470, Wt. 6 lbs. . . . . . . . . . . . .Our price, **31.95**

## ② Cushcraft ATV-5 for DX capability

A vertically-polarized, omni-directional antenna designed to provide complete CW and SSB coverage of the 80 through 10 meter Amateur bands. It features specially designed high Q traps optimized for wide operating bandwidth. SWR is 1.5:1 or less at resonance on each band. The ATV-5 may be used with any transmitter or transceiver employing nominal 50-ohm input. Accepts full legal power. Built-in coax connector takes the PL-259 on your feedline. Height is 28'4" on CW, 24'9" on phone. For maximum performance in limited space. Assembly required.

HDP-1473, Shpg. wt. 10 lbs. . . . . . . . . . . . . . .**99.95**

## ③ Alliance HD73 Heavy Duty, Dual-speed Rotator completes your antenna system

Couple the Alliance HD73 with the Heathkit SA-7010 Ti-Band Yagi (above) to achieve real DX success. For antennas with up to 10.7 sq. ft. wind load area. For masts 1⅜" to 2½" OD. For 120 VAC, 60 Hz. Uses 6-cond. cable or 8-cond. cable listed below.

HDP-1295, Shpg. wt. 19 lbs. . . . . . . . . . . . . . .**119.95**
IDA-1290-1, 50-ft. 8-cond. cable, 2 lbs. . . . . . . .**7.95**
IDA-1290-2, 100-ft. 8-cond. cable, 4 lbs. . . . . .**14.95**
IDA-1290-3, 150-ft. 8-cond. cable, 6 lbs. . . . . .**21.95**

## Superflex RG-8/U 52-Ohm Coaxial Cable

(Not shown). 11-gauge center foam polyethylene dialectric, 92% copper braided shield. PL-259 connectors installed each end.

HDP-3620, 100-ft., Shpg. wt. 11 lbs. . . . . . . . .**29.95**
HDP-3621, 50-ft., Shpg. wt. 6 lbs. . . . . . . . . . .**19.95**
HDP-3622, 3-ft., Shpg. wt. 1 lb. . . . . . . . . . . . . .**4.95**

## ④ "W2AU" Balun for a better match

Reduces TVI, balances antenna current distribution for maximum gain. Guards your antenna's feed point from the weather. Protects your equipment from lightning. For use with dipoles, vees, quads, yagis. Rated for full legal power. Comes assembled. Includes instructions. Impedance ratio of 1:1.

HDP-3615, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . .**14.95**

## ⑤ Coax Switch takes up to four antennas

Choose from up to four antennas or interconnecting equipment. Handles 2 kW PEP to 250 MHz. 50 ohms. Grounds all outputs not in use.

Kit HD-1234, Shpg. wt. 1 lb. . . . . . . . . . . . . . .**12.95**
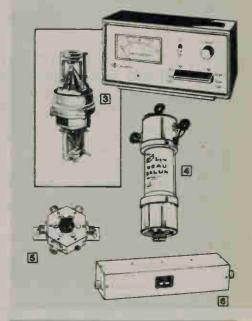
## ⑥ Barker and Williamson Low-pass Filter
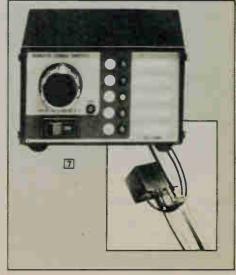
70 dB attenuation reduces TVI. Insertion loss less than 0.3 dB. 160-10 meters. 50 Ω. Full power.

HDP-3700, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . .**29.95**
HDP-3622, 3-ft. Coax w/connectors, 1 lb. . . . . .**4.95**

## ⑦ Change antennas in seconds, save coax with the Heathkit Remote Coax Switch

Turn the knob on the SA-1480 Remote Coax Switch. Whirr! A bright LED shows which of up to five antennas you have selected. Saves money, too, replacing five expensive coax feedlines from station to antennas with just one. Accepts signals to 150 MHz. Rated for full power. 50-70 ohm input impedance. Almost no insertion loss — less than 2 dB at 100 MHz. Silver-plated switch contacts reduce insertion loss. Special shielded, weatherproof switch housing protects switch. Grounding position for lightning protection. Includes U-bolt mounting assembly. Control Box is 3⅜" H x 5³⁄₁₆" W x 5¼" D. Remote Unit: 8¼" H x 4⅝" W x 7½" D. Use the eight-wire cable listed below.

Kit SA-1480, Shpg. wt. 8 lbs. . . . . . . . . . . . . . .**89.95**
IDA-1290-3, 150-ft. 8-cond. cable, 6 lbs. . . . . .**21.95**
IDA-1290-2, 100-ft. 8-cond. cable, 4 lbs. . . . . .**14.95**
IDA-1290-1, 50-ft. 8-cond. cable, 2 lbs. . . . . . . .**7.95**

# Reliable, money-saving Amateur Radio accessories

**For VHF use**

Factory-assembled and calibrated sensor can be mounted in housing or separately

The HM-2140 boasts ±5% average forward power accuracy

**For HF use**

## HM-2141 Dual Meter VHF Wattmeter lets you monitor forward and reflected power simultaneously between 50 and 175 MHz

$**79**95

- Dual meters ● ±7.5% Forward power accuracy
- Direct reading SWR ● Reads PEP or average power

The Heathkit HM-2141 VHF Dual Wattmeter gives you instant power readings. It measures forward and reflected average power, forward and reflected peak envelope power (PEP) and Standing Wave Ratio (SWR) between 50 MHz and 175 MHz. Simultaneous readings of transmitted output up to 30/300 watts forward and 10/100 watts reflected power make antenna tuning a snap. Average forward accuracy is ±7.5%. Reads SWR directly from 1.1 to 3:1. Factory-assembled and calibrated sensor for reliable performance. Operates on 9 V battery (not included) or on 120 VAC with the optional GRA-43-1 converter below.

Kit HM-2141, Shpg wt 5 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .79.95
PS-2350, AC Adapter for HM-2141, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . .4.95
HDP-3622, 3 ft. coax with connectors Shpg. wt. 1 lb . . . . . . . . . . . . . . . .4.95

HM-2141 SPECIFICATIONS: Frequency Range: 50 to 175 MHz. Insertion SWR: less than 1.05:1. Accuracy (full scale): 30 W and 300 W (FWD), 100 W (REF), ±7.5%, (AVG), 10 W (REF), ±10% (AVG). Dimensions: 4¼" H x 7½" W x 6⅛" D.

## HM-2140 Dual HF Wattmeter reads forward and reflected power to help you operate your low band station more effectively

$**79**95

- Reads PEP or average power ● Direct reading SWR
- Factory-assembled and calibrated sensor

Handy Wattmeter installs in your transmission line to measure forward and reflected power for frequencies between 1.8 and 30 MHz. It measures transmitter output up to 200/2000 watts PEP in the forward direction and up to 50/500 watts reflected. Has dual meters for forward and reflected power and SWR. ±5% forward power accuracy for precision measurements. High and low power ranges and a factory assembled and calibrated sensor insure accurate readings. Reads SWR directly from 1.1 to 3:1. Also reads PEP or Average power. Operates on 9-volt battery (not included) or 120 VAC with converter below.

Kit HM-2140, Shpg. wt 3 lbs . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .79.95
PS-2350, AC Adapter for HM-2140. Shpg. wt. 1 lb . . . . . . . . . . . . . . . . . .4.95
HDP-3622, 3-ft. coax with connectors. Shpg. wt. 1 lb. . . . . . . . . . . . . . . . .4.95

HM-2140 SPECIFICATIONS: Frequency Range: 1.8 to 30 MHz. Insertion SWR: less than 1.05:1. Accuracy (full scale): 200 W and 2000 W (FWD), 500 W (REF), ±5%, 50 W (REF), ±7.5%. Dimensions: 4¼" H x 7½" W x 6⅛" D.

## Solid-state Electronic Code Keyer with selectable word speed

Your CW transmissions will be 100% copy with the HD-1410, because sending code is easy, whether you're operating base or portable. The dot and dash paddles travel and tension are easily adjustable. When the two paddles are treated as one, the HD-1410 operates like a single-paddle keyer with dot and dash memories. Iambic operation forms most characters with reduced wrist movement. Dots and dashes are self-completing and always in proper proportion. During construction, you select the speed range you want — 10 to 35 words a minute or 10 to 60 words per minute. Operates on 120 VAC or 12 VDC. Adjustable side-tone frequency, built-in speaker, headphone jack. A special weighted cabinet helps keep the HD-1410 stable to prevent sliding or fumbling. Its low-profile styling and compact size won't block other controls. 3" H x 5" W x 7½" D. An easy-to-build kit

Kit HD-1410. Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .54.95

## Value-packed, solid-state Dip Meter covers 1.6 to 250 MHz

The perfect gift — a better dip meter at lower cost. The Colpitts oscillator covers 1.6 to 250 MHz in fundamentals with a MOSFET paraphase amplifier and hot-carrier diodes for more sensitivity and a better dip. It uses a Q-multiplier for greater detector sensitivity and a responsive 150 μA meter movement for positive resonance indications. It includes a phone jack for modulation monitoring. It's smaller and lighter than others, too. Whether you're checking resonant frequencies, adjusting traps, looking for parasitics, or using it as a signal generator, the HD-1250 is designed to go anywhere. It fits your hand and thanks to its solid-state design and 9-volt battery operation it's ready to use instantly wherever you are. Easy to build, too — usually just a single evening. The custom molded gray carrying case protects the meter and the 7 color-coded, pre-adjusted plug-in coils in transit, and makes a handy storage place.

Kit HD-1250, less battery, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . . . . . . . . .64.95

# Reliable, money-saving Amateur Radio accessories for your Ham station



## ① Cantenna™ Dummy Load kills QRM

Helps you avoid unnecessary interference during tune ups. Ideal for transmitter maintenance and alignment. Handles up to 1 kW of RF with VSWRs of less than 1.5:1 up to 300 MHz, and less than 2:1 to 400 MHz 50 Ω. Oil filled (oil not included).

Kit HN-31, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . . .**19.95**
HDP-3622, 3' coax w/PL259 conns., 1 lb. . . . . .**4.95**

## ② Micoder™ II dials up repeaters

Replace your old mike with the Heathkit Micoder II Microphone/Auto Patch Encoder. Its 300-3000 Hz response is tailored for clean voice transmission. Up to 30 mV rms maximum output for full modulation. Push-to-talk bar for convenient one-hand use. Accurate and stable tones for phone calls through repeaters equipped for autopatch. Operates on one 9V battery (not supplied) or power from transceiver. Use with most transceivers having a high-impedance input. Includes 6' coiled cord, hanger clip. 3¾″ H x 2⅝″ W x 1¾″ D.

Kit HD-1984, Shpg. wt. 1 lb. . . . . . . . . . . . . . .**44.95**

## ③ Instant power at your fingertips

The Twelve-Socket Multiple Outlet Box provides additional electrical outlets for your equipment in Amateur station, workshop, basement or garage. Features 11 3-hole outlets for killing power to equipment, and 1 unswitched for clock or memory-save. Includes fuse holder, fuse and 12' cord. Handles 10A maximum load. 120 VAC.

Kit HD-1274, Shpg. wt. 4 lbs. . . . . . . . . . . . . . .**17.95**

## ④ Get the Six-socket Multi-Outlet Box

As above, but 6 3-hole outlets — 5 switched and 1 unswitched 10A max 6-foot cord 120 VAC

Kit HD-1360, Shpg. wt. 2 lbs. . . . . . . . . . . . . .**12.95**

## ⑤ Frequency Spectrum Chart for your wall

This colorful addition to the wall of your Amateur station measures a big 31″ W x 22¼″ H It's a full-color, graphic breakdown of the radio frequency spectrum. Comes to you rolled in a mailing tube.

HDP-1495, Shpg. wt. 1 lb . . . . . . . . . . . . . . . . . .**4.95**

## ⑥ Add Phone Patch to your Ham station

The Heathkit HD-15 Phone Patch adds versatility to your station. Individual receiver/transmitter line gain controls simplify adjustment. The HD-15's VU meter continuously monitors the unit's output and lets you adjust for maximum null depth to produce maximum isolation between the telephone line and your station. Matches 3-16 Ω speakers, hi-Z or 600 Ω inputs. PTT operation. 2⅝″ H x 9¼″ W x 3⅝″ D.

Kit HD-15, Shpg. wt. 3 lbs. . . . . . . . . . . . . . . . .**44.95**

## ⑦ Build the HF Wattmeter/SWR Bridge

Features dual power/SWR scales, easy calibration. Operates over the 1.8 to 30 MHz range with minimal insertion loss and a nominal impedance of 50 ohms.

Kit HM-102, Shpg. wt 3 lbs. . . . . . . . . . . . . . . .**49.95**

HM-102 SPECIFICATIONS: Frequency Range: 1.8 to 30 MHz. Wattmeter Accuracy: ±10% of full-scale reading. Power Capability: 10 to 2000 watts. SWR Sensitivity: Less than 10 watts. Impedance: 50 ohm nominal. Con-

nectors: UHF type SO-239. Dimensions: 5¹⁵⁄₁₆″ H x 2¼″ W x 6½″ D.

Kit HM-2102 (not shown), same as above, except 50-160 MHz and 25 to 250 watts. 4 lbs. . . . . . . . .**49.95**
HDP-3622, 3' coax w/PL259 conns., 1 lb. . . . . .**4.95**

## ⑧ Meter for fast, accurate adjustments

Relative Field Strength Meter makes transmitter adjustments quicker and more precise. Provides visual indication that transmitter is radiating a signal, helps tune transmitter for maximum output. Covers 1.8 to 250 MHz. 2⅝″ H x 4⅛″ W x 4⅜″ D.

Kit HD-1426, Shpg. wt. 2 lbs. . . . . . . . . . . . . . .**12.95**

## ⑨ Need a new PTT Mike for your Mobile?

Fully assembled Mobile PTT Mike features a high impedance piezo-ceramic element. 200-5000 Hz response. and peak response frequency of 2300 Hz. Sensitivity: −55 +3 dB below 1 volt per microbar at 1000 Hz Includes cable, mounting clip. Connector not included.

HDP-1340, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . .**14.95**

## ⑩ Desk Mike upgrades your station

Fully assembled Heathkit Desk Mike with VOX and PTT. This Hi-Z Dynamic Microphone features 70-10,000 Hz response, VOX and grip-to-talk operation. Has rugged die-cast case, grey and satin chrome finish The PTT switch can be mounted on the base or handle of the mike. Cables included. See photo page 86.

HDP-121A, Shpg. wt. 4 lbs. . . . . . . . . . . . . . . . .**54.95**

# Get your ticket and get on the air — faster and easier — with the Heathkit Novice License Program

**$39⁹⁵**

Here's a self-instruction program that's guaranteed to help you get your Novice ticket and talk to the world! This deluxe learning program prepares you for the new Amateur Radio Novice FCC exam, and provides you with helpful guidelines for setting up and operating your own station once you pass the exam. When you have completed the Novice License program, you will be able to send and receive the Morse code accurately at the rate of five words per minute, and to pass a 20-question, multiple-choice written test from the FCC.

Note: This Program prepares you for the latest FCC examinations. We guarantee it.

At the end of each module, a multiple choice exam checks your understanding and retention of the material. After Module 9, two practice exams and a final exam styled after the actual FCC exam give you test-taking experience to make the actual thing a breeze. And, by successfully passing the optional final exam with a grade of 75% or better, you will earn 1.0 CEU and a Certificate of Achievement.

The Novice License Program includes two audio cassette tapes to aid you. The first contains an introduction to Amateur Radio, an explanation of RST signal reporting, a review of circuit components, and a review of practical circuits. The second tape teaches you the Morse code in letter groups and then helps you bring your code speed up to five words per minute.

In addition, you will receive a set of Operating Aids, plus an attractive 31" x 22" Frequency Spectrum Chart and matching U.S. Call Area Map for display on the walls of your Ham "shack." All materials in this Program are packaged in an attractive vinyl binder for convenient reference.

This Program is guaranteed to help you get your license. If you fail to pass your FCC Novice exam after completing the course, we will REFUND your money. Simply return the program materials, along with your receipt and a copy of your rejection notice from the FCC.

So... if you have been putting off getting your Novice ticket because of fear of the code test or the written exam, the Heathkit Novice License Program is the answer. It contains everything you need.

ER-3701, Shpg. wt. 7 lbs. ................39.95
Kit HD-1416, CW Oscillator (see below)
Wt. 2 lbs. ...........................13.95

# The Heathkit General Class Amateur Radio Program helps you move up to the thrill of voice communications

**$49⁹⁵**

- Open new doors to the full range of Amateur Radio experiences. Leave the crowded Novice or CB bands behind. Earn your Technician or General Class License with the Heathkit ER-3702 General Class Amateur Radio Program.

Note: This Program prepares you for the latest FCC examinations. We guarantee it.

Move up to General Class and get all the added privileges — more frequencies to operate on, plus voice transmission, RTTY, SSTV, satellites, and more that you're missing as a Novice or CBer.

This Program provides extra code practice to bring your code speed up to 15 words per minute. Since the FCC requires only 13 wpm to pass the General exam, the extra "two-word edge" gives you the confidence to pass the exam with flying colors.

An informative text takes you through the subjects covered on the new FCC written test. It concentrates on the information needed to pass the exam, so you don't get bogged down learning information that won't be covered by the FCC.

A simulated FCC written test gives you test-taking experience, and allows you to review problem areas so you'll be more prepared for the actual exam. Once you pass your General exam, send us a copy of your new license or FCC notification of passing to receive 5.0 CEU's and a Certificate of Completion.

Your General License Program includes:

- Complete text
- Log Book
- T.V.I. Booklet
- Simulated exams
- Two vinyl binders
- Code workbook
- FCC Form 610
- Two code tapes
- World Call Map
- FCC exam schedule
- FCC rules and regulations

The Program is arranged in 10 units:

1. Ham Radio Operation
2. Direct Current
3. Alternating Current
4. Active Devices
5. Electronic Circuits
6. Measurements
7. Transmitters
8. Receivers
9. Antennas
10. Practice Exams

The General Class License Program carries the same guarantee as the ER-3701 Novice Program above.
ER-3702, Shpg. wt. 24 lbs ...............49.95

The Heathkit General License Program leaves nothing to chance. It's designed to help you get your license in a way that's organized, fun and easy. This Program is so good that we guarantee you'll get your license. So trade in your key for a microphone today.

# Build up your code speed with this handy CW Oscillator

**$13⁹⁵**
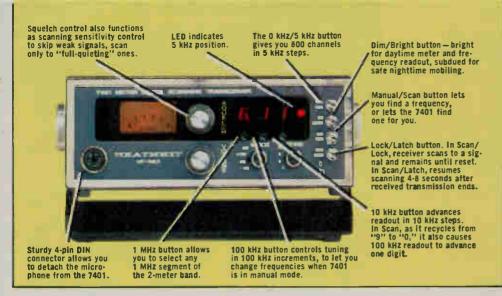
Get your speed up and pass your FCC exam with this handy Practice CW Oscillator. It features a telegraph key, phone jack and built-in speaker, plus volume and tone controls. And once you get your license, the HD-1416 can serve as a side tone oscillator for any transmitter using grid block keying. The cabinet measures 2⅜" H x 4½" W x 4¼" D. It operates on a single 9 V transistor battery (not included). This easy-to-build, first-time kit even includes solder, as do all Heathkit electronic kits.

Kit HD-1416, Shpg. wt. 2 lbs ...................13.95

## Get a money-saving start in Amateur Radio today!

**SAVE $8⁹⁵**

This money-saving package can help you get started in the exciting world of Amateur Radio. Why delay?

We want to help you get started in Amateur Radio by saving you money on the ER-3701 Novice License Program (above) and the HD-1416 Code Practice Oscillator (at left) when you purchase them together. And to save you even more, we include a certificate good for a 10% discount on your first purchase of up to $100 worth of Amateur gear from the Heathkit catalog. If purchased separately, the CW Oscillator and Novice Program would cost you $53.90.

ERS-3701, Shpg. wt. 9 lbs. ...........44.95

Squelch control also functions as scanning sensitivity control to skip weak signals, scan only to "full-quieting" ones.

LED indicates 5 kHz position.

The 0 kHz/5 kHz button gives you 800 channels in 5 kHz steps.

Dim/Bright button — bright for daytime meter and frequency readout, subdued for safe nighttime mobiling.

Manual/Scan button lets you find a frequency, or lets the 7401 find one for you.

Lock/Latch button. In Scan/Lock, receiver scans to a signal and remains until reset. In Scan/Latch, resumes scanning 4-8 seconds after received transmission ends.

10 kHz button advances readout in 10 kHz steps. In Scan, as it recycles from "9" to "0," it also causes 100 kHz readout to advance one digit.

Sturdy 4-pin DIN connector allows you to detach the microphone from the 7401.

1 MHz button allows you to select any 1 MHz segment of the 2-meter band.

100 kHz button controls tuning in 100 kHz increments, to let you change frequencies when 7401 is in manual mode.

# Give the Amateur on your list the ultimate gift: the VF-7401 2-Meter FM Digital Scanning Transceiver!

## $339<sup>95</sup>

$339⁹⁵ with PTT microphone

- Continuously adjustable, 15-watt output
- Band scan capability 1 MHz at a time — front panel selectable
- 800-Channel synthesized capability
- Preprogrammed power-up on your favorite channel
- Microphone is detachable

If you have one or more repeaters in your reception area, you need the Heathkit VF-7401 2-Meter FM Digital Scanning Transceiver. You can't effectively monitor one or more repeaters, plus simplex frequencies, without a scanning transceiver like the VF-7401. And never again will you have to search through a repeater guide on the highway. The VF-7401 will find all of the local activity for you, because this exciting Transceiver scans the entire 2-meter band in 1 MHz segments. When it finds an active channel, it stops! It stays on the active channel, when you select the Scan/Lock Mode, until you reset it. Or, set your VF-7401 in the Scan/Latch mode, and it will resume scanning when the received transmission ends.

You can adjust the receiver to stop scanning for "full-quieting" signals only. Or, open up the squelch when there are 2-meter band openings. Your VF-7401 will find that "2-meter DX" for you without the tedious task of flipping through channels one by one. Naturally, your VF-7401 lets you change frequencies manually, too. Three small front panel switches allow you to select manually any desired frequency at the scan rate. Once you have the frequency you want, you may also offset it by a separate 5 kHz switch.

Your VF-7401 will "power-up" on the frequency of your choice. While building your transceiver, you program in any simplex or repeater frequency. Then, every time you turn it on, before it begins to scan, that frequency is monitored first. Besides simplex, your VF-7401 has +600 kHz, −600 kHz and 1 MHz offsets. It can accommodate any 2-meter amateur band offset combination, even MARS and CAP.

The VF-7401 is a continuously adjustable, 15-watt (nominal), solid-state, narrow-band FM transceiver. Featuring a hot receiver, it incorporates a double-tuned front end with MOSFET RF amplification, dual-conversion, 8-pole crystal IF filtering for perfect bandpass shaping and outstanding adjacent channel selectivity, IC limiting, Quad detection and excellent audio quality. An improved synthesizer eliminates the need for a panel-mounted syn lock light. Power amp tuning and output power level adjustment are both accessible from the rear panel without removing the case. Also added — a sturdy SO-239 antenna connector, plus chassis-mounted power and external speaker jacks.

Your VF-7401 has a detachable microphone with rugged 4-pin DIN connector. And if you choose the optional Micoder™ II Microphone/Auto Patch Encoder (described on page 91), stop worrying about when your mike battery is going to run down. The Micoder II draws its power directly from the VF-7401. Also included is a handy gimbal-mount bracket for mobile installation. The Transceiver requires a 13.8 V, 3 amp continuous, 4 amp intermittent, power source such as a charging automobile electrical system, or the optional VFA-7401 AC Power Supply described on page 94.

Kit VFS-7401-1, Transceiver and Micoder II, Shpg. wt. 12 lbs. . . . . . . . . . **359.95**
Kit VFS-7401-2, Transceiver and PTT Microphone, Shpg. wt. 12 lbs. . . . . . **339.95**

VF-7401 SPECIFICATIONS: Receiver: Sensitivity: 0.5 μV for 12 dB SINAD (or 15 dB of quieting). Squelch Threshold: 0.3 μV or less. Audio Output: 1.5 watts at less than 10% THD; 2 watts maximum output (typical). Image Rejection: −50 dB or greater. Spurious Rejection: −50 dB or greater. IF Rejection: −80 dB or greater. Internally Generated Spurious Signals: Below 1 μV equivalent. Bandwidth: 6 dB at 15 kHz minimum and 60 dB at 15 kHz minimum and 60 dB at 30 kHz maximum. Modulation Acceptance: 6.5 kHz minimum. Transmitter: Power Output: 15 watts nominal to a 50 Ω <0° (resistive) load at 25° C and 13.8 VDC. Harmonic and Spurious Output: −60 dB. Modulation: FM, 0-7 kHz, adjustable. Duty Cycle: 100% with VSWR of less than 10:1. Tone Encoder: 3 tones 70 to 200 Hz, approx. 700 Hz deviation. Transmitter Offset: −600 kHz, +600 kHz, +1 MHz (AUX). General: Freqency Coverage: Any 4 MHz segment from 143.5 to 148.5 MHz. Frequency Stability: +.0015%. Operating Temperature Range: +15° F to +125° F (−10° C to +50° C). Operating Voltage Range: 12.6 to 16 VDC (13.8 VDC, nominal). Current Consumption: Receive Mode: 550 mA max., squelched; 750 mA max., full rated audio. Transmit Mode: 4A max. at 13.8 VDC. Dimensions: 2¾" H x 7¼" W x 10¼" D (7.0 x 18.4 x 26.0 cm).

# Code Courses and Reference Books to help you get more from Amateur Radio

**Ameco Junior Cassette Code Course.** This tape cassette course presents 10 lessons of Morse Code instruction. It begins with letters of the alphabet, numerals, punctuation. Increases code speed progressively, finally taking you through eight words-per-minute, more than enough to qualify you for the FCC Novice or Technician class license code requirement of five words-per-minute.
HDP-432, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . **4.95**

**Ameco Senior Code Course.** Two 33 RPM long-playing records. 22 lessons take you from an introduction to the code through 18 words-per-minute.
HDP-332, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . **7.50**

**Ameco Senior Cassette Code Course.** As above, cassettes instead of LP's. HDP-532, Shpg. wt. 1 lb. . . . . . . . . . **8.95**

**"By the Word" Code Course.** Two audio cassettes teach you code using world-famous "by the word" method. Begins with simple material at 13 words-per-minute, then increasing in complexity, not speed.
HDP-132, Shpg. wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . **9.95**

**Amateur Radio License Study Guides.** Makes getting your license easy; also serves as a convenient reference.
GENERAL, EDP-123 . . . . . . . . . . . . . . . . . . . . . . . . . . **7.95**
ADVANCED, EDP-124 . . . . . . . . . . . . . . . . . . . . . . . . . **6.95**
EXTRA, EDP-125 . . . . . . . . . . . . . . . . . . . . . . . . . . . . **5.95**

**US Callbook.** Complete listing of Radio Amateurs in all US call areas and territories; SSTV, AMSAT, OSCAR users; Great Circle Bearings, more. 1070 pages.
EDP-126 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **16.95**

**DX Callbook.** Complete listing of foreign Amateurs, addresses, postal rate charts, call zone maps, world time conversion chart, world QSL bureaus, more. 900 pages.
EDP-127 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **15.95**

**1980 Edition. ARRL Radio Amateur's Handbook.** Up to date electronics theory and application. 538 pages.
HDP-293 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **10.00**

**73 Dipole Antennas.** Description, construction of 73 different dipole and long-wire antennas. 160 pages
EDP-180 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **4.95**

**ARRL Antenna Handbook.** Antennas, transmission lines, propagation, antenna design. 336 pages.
EDP-182 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **5.00**

(See page 52 for book ordering information)

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

## This AC Supply is the perfect gift for your 7401

**$42⁹⁵**

- Operate your Heathkit VF-7401 from your home QTH, in addition to mobile operation
- Provides 13.8V, 3A continuous, 4A intermittent
- Rugged, reliable construction for years of service
- Matches the VF-7401's "military" styling and color

Don't leave 2-meter fun in the car — take your VF-7401 2-Meter FM Digital Scanning Transceiver into the house with you when you have the Heathkit VFA-7401-1 AC Power Supply at your home QTH. The VFA-7401-1 is the perfect match-up for your 7401 Transceiver (see previous page). It provides well-regulated, low voltage, DC power from an AC power outlet so you can put your 7401 on the air from your home amateur station, as well as on the highway.

The VFA-7401-1 is an easy-to-build kit, so you can get it up and running quickly. And you can wire it to operate from either a 12D-volt or 240-volt 50/60 Hz AC power line. It will maintain output regulation within 1.5%.

Designed primarily to provide the 13.8 VDC required by the VF-7401, this supply may also be used with most other equipment requiring +13.8 VDC at a maximum of 3A continuous, 4A intermittent.

Rugged and reliable, this Power Supply is designed to match the VF-7401 in the popular, attractive "military" styling and color. It will be a great addition to your station ... and will give you many years of dependable service.

**Kit VFA-7401-1, Shpg. wt. 7 lbs. ..................................42.95**

VFA-7401-1 SPECIFICATIONS: Output Voltage: 13.8 VDC regulated (Adjustable from approximately 12 to 15 VDC). Output Current: 4.0 amperes for 20 minutes (40% duty cycle). 3.0 amperes continuous. Output Regulation: Better than 1.5% from no load to full load (3.0 amperes). Output Ripple: Less than 2 mV peak-to-peak. Power Requirement: 120 VAC or 240 VAC, 50/60 Hz, at 85 watts (full load). Overall Dimensions: 3¹⁄₁₆" H x 7¼" W x 9⁷⁄₈" D (7.8 x 18.4 x 25.1 cm).

## Heathkit 40-Watt Amplifier increases your range

**$54⁹⁵**

- Work those repeaters you've been hearing but can't access; put extra punch in your 2-meter signal. You can do it with this rugged 40-Watt Amplifier. The more than 200 Hams at Heath have designed it to meet and surpass FCC specs for harmonic and spurious radiation, too.

Tied to your repeater? Missing the fun of "2-meter DX" because of a weak signal? The Heathkit HA-202A 40-Watt Amplifier delivers a solid 40 watts minimum for just 10 watts in. And it draws only 7 amperes maximum from your car's charging system. Features an antenna changeover relay and sensing circuitry for completely automatic T/R switching. Tuned input/output circuits keep spurious radiation low. Special emitter ballasted configuration withstands VSWR's of up to 3:1. Internally adjustable to cover any 1.5 MHz portion of the 143-149 MHz band. Final alignment requires VTVM, wattmeter or SWR bridge. Mount it almost anywhere in your car, or team it with the PS-1175 Power Supply on page 88 for a better signal from your home QTH. Includes SO-239 connectors for easy hookup.

**Kit HA-202A, Shpg. wt. 4 lbs. ....................................54.95**
**HDP-3622, 3-ft. RG8U jumper with PL259 connectors, 1 lb. ...........4.95**

HA-202A SPECIFICATIONS: Power Output: 20W @ 5W in. 40W @ 10W in. 50W @ 15W in. Impedance: 50 Ω nominal. Input VSWR: 1.5:1 maximum. Maximum Stable VSWR: 3:1. Harmonic and Spurious Radiation: −60 dB or better. Standby current: 1 mA. Power Requirement: 12-16 VDC, 7A maximum. Dimensions: 3" H x 4¼" W x 5½" D.

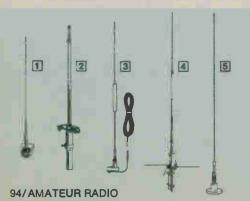## Heathkit 10-Watt Amp gives you hand-held clout

**$39⁹⁵**

- Your 2-meter hand-held will be able to compete with "the big boys" once you add this compact 10-Watt Amplifier. It's designed to meet or surpass the latest FCC specifications for harmonic and spurious radiation, too.

Don't take a back seat when it comes to increasing the range of your 2-meter hand-held. The Heathkit HA-201A 2-Meter Amplifier will get your hand-held into your favorite repeater full-quieting every time, because it delivers up to a full-bodied 10 watts for a mere 1½-watt input. Or get 8 watts for just 1 watt in. It's ideal for use with the Heathkit VF-2031 on page 95.

The HA-201A features fully automatic operation with solid-state transmit/receive switching. It incorporates tuned input and output for maximum efficiency and reduced spurious emissions, and meets or surpasses FCC requirements for spurs and harmonics. It has been designed, also, to withstand infinite VSWR load without failure. Your HA-201A kit includes a dummy load and RF detector, as well as SO-239 connectors for easy hookup. A VTVM is necessary for tune-up. And the Amplifier requires a 12-16 VDC power source for operation. Features a rugged metal cabinet.

**Kit HA-201A, Shpg. wt. 2 lbs. ....................................39.95**

HA-201A SPECIFICATIONS: Power Output (at 13.6 VDC input): 8W @ 1W in; 10W @ 1.5W in. Input/Output Impedance: 50 Ω. Power Requirement: 12-16 VDC, 2.2 A maximum. Dimensions: 2¾" H x 5⁵⁄₆" W x 5⅛" D.

## Assembled 2-meter antennas to radiate more of your signal

[1] **Hustler Standard Gain 2M Mobile Antenna.** ⅝ wavelength rear deck whip. 3.4 dB gain, 1.1:1 SWR. Handles 100 watts. 47" radiator. 17' coax, connectors included. Antenna removable from mount.
**HWA-202-3, Shpg. wt. 2 lbs. ..............23.95**

[2] **Cushcraft AR-2 Ringo Standard Gain Fixed Antenna.** 135-175 MHz. Omnidirectional. 3.75 dB gain, 1.1:1 SWR. 100 watts. Ω feed with PL259. Less coax. Mfr's suggested list price, $24.95.
**HWA-202-11, Shpg. wt. 2 lbs. ......Our price, 19.95**

[3] **Hustler CGT-144 Super Gain 2M Collinear Mobile Antenna.** Phased ¼ and ⅝ wavelength radiators. 5.2 dB gain. 1.1:1 SWR; to 200 watts; Height 85". 17' RG58/U coax, connectors included.
**HWA-202-9, Shpg. wt. 3 lbs. ...............39.95**

[4] **Hustler GG-144 Super Gain Fixed Antenna.** Covers 140-150 MHz. 6 dB gain. 6 MHz bandwidth. 1.2:1 SWR. 1 kW. SO-239 connector. 117" tall. 4 radials of 21" aluminum rod. For 1¾" mast. Less coax.
**HWA-202-10, Shpg. wt. 7 lbs. ..............79.95**

[5] **Cushcraft 2-Meter Mobile Magnetic-Mount Antenna.** ⅝ wave. 3 dB gain. Covers 145-148 MHz. Includes PL259 connector, cable. Preassembled.
**HDP-1472, Shpg. wt. 3 lbs. ...............29.95**

Credit Card Orders Call TOLL-FREE: 800-253-0570

## SAVE $10. $189.95 buys it all in a 2-meter Hand-Held

**$189⁹⁵**

- Includes everything you need — even 146.94 MHz crystal
- Rechargeable nickel-cadmium Battery Pack & AC Charger
- "Rubber duckie" antenna, phone jack and earphone
- Single crystal duplex or simplex capability

Carry 2-meter action with you wherever you go with the great Heathkit VF-2031. You get a minimum of 2 watts out, more than enough to put you into your local repeater full quieting every time. The signal is clean, too. Careful design and plenty of internal shielding insure stability and put spurs a full 60 dB down. Single crystal transmit and receive circuitry covers 8 of your favorite channels. You can choose simplex, or duplex with a ±600 kHz split at the flip of a switch. With separate built-in microphone and speaker, adjustable deviation, and performance-designed FM engineering, what your VF-2031 says and hears is always crisp and clean. Sensitivity? Less than 0.5 μV quiets the VF-2031's hot receiver section a full 20 dB. Volume and squelch are fully adjustable, too. The VF-2031 covers 143.5 to 148.5 MHz. The VF-2031 comes complete with a "rubber duckie" antenna and a crystal for 146.94 MHz operation. A built-in phone jack with earphone is included. A universal BNC output connector gives you a wide choice in antenna selection. To give your VF-2031 even more flexibility, add the optional VFA-2031-3 Encoder and enjoy the versatility of instant auto-patch accessing. Includes a long-life rechargeable nickel-cadmium battery pack. When the charge runs low, slip the VF-2031 into the Drop-in Charger, also included. Transceiver measures 9⅛" H x 3₃⁄₁₆" W x 1⅞" D.

Kit VF-2031, Shpg. wt. 5 lbs. . . . . . . . . . . . . . . . Was $199.95, NOW ONLY 189.95
Fitted Holster-style Carrying Case. VFA-2031-2, Shpg. wt. 1 lb. . . . . . . . . .17.95
Crystal Certificates. Specify frequency, send to mfr. Crystal returned postpaid. Order one for each crystal needed. VFA-2031-4, Postpaid . . . . . . . . . . . . . . .6.95
Auto Patch Encoder. Make phone calls through repeaters with auto-patch inputs. VFA-2031-3, Wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .34.95
Continuous Tone Encoder. Access most repeaters using your 2031. VFA-2031-5, Wt. 1 lb. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .34.95
External Microphone. PTT MIC with coiled cord plugs into VF-2031 so you can transmit without removing unit from holster. Kit VFA-2031-6, 1 lb. . . . . . .29.95
10-Watt Amplifier. Description on page 94. Kit HA-201A, Wt. 2 lbs. . . . . . .39.95

## 4-Band Shortwave Receiver — the beginning kit builder's introduction to the world of shortwave listening and build-it-yourself fun

**$99⁹⁵**

- Covers 550 kHz to 30 MHz in four bands
- Built-in AM antenna, connection for external antenna
- Built-in speaker plus headphone/external speaker jack
- The perfect, practical introduction to kit-building

This Christmas, if you're looking for a great first-time electronic kit to give someone — or simply a great low-priced shortwave receiver — search no more. The Heathkit SW-717 is the one to give. It's an ideal introduction to the fun and fascination of electronic kit construction. And from the moment the final screw is tightened and the receiver turned on, it will begin bringing many exciting years of shortwave listening enjoyment.

The SW-717 offers complete coverage all the way from 550 kHz through 30 MHz in four bands. With it the shortwave listener can tune in foreign broadcasts from all over the globe, amateur and CB radio bands, local and marine weather reports, ships at sea, plus the standard AM broadcast band.

This 4-Band Receiver features a wide slide-rule tuning dial with logging scale; bandspread tuning for easy separation of crowded stations; a variable BFO for code reception; built-in speaker, and a front panel jack for external speaker or headphone like the GD-396 Superex phones described below. Other features include switchable automatic noise limiting; a signal-strength tuning meter, and a built-in AM rod antenna plus a connection for an SWL (shortwave listening) antenna such as the GRA-72 listed below.

Solid-state circuitry is used throughout the SW-717. Most of the components are mounted on a single printed circuit board, both for ease of assembly and for reliability of performance. The built-in power supply is transformer-operated from either 120 VAC or 240 VAC, and uses four silicon diodes in a full-wave bridge circuit. Once construction is completed, the receiver can be aligned without the need for instruments.

The SW-717 manual also includes instructions for operation, and a reception guide listing bands, frequencies, zones and times of best shortwave reception. Easy-to-follow instructions and careful engineering make this a gift the recipient will be proud of building.

Kit SW-717, Shpg. wt. 10 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .99.95
Long-wire SWL Antenna. Really helps pull in distant stations. 75-foot copper long wire with 30-foot lead-in, all insulators and hardware for easy setup. GRA-72, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .7.95
Superex Headphones. Ideal for use with the SW-717 and other shortwave receivers, as well as the HW-8 Transceiver on page 85. Shown in the photo above, the Superex Headphones feature dual coils for excellent sensitivity, wide headband for comfortable listening. 600 ohms impedance. GD-396, Fully assembled, Shpg. wt. 2 lbs. . . . . . . . . . . . . . . . . . . . . . . . . . .7.95

SW-717 SPECIFICATIONS: Frequency Coverage: Band A — 550 kHz-1500 kHz, Band B — 1.5-4 MHz, Band C — 4-10 MHz, Band D — 10-30 MHz. Meter: Indicates relative signal strength. Headphone Jack: Accepts low impedance headphones or external speaker. Loudspeaker: Built-in. Controls: Volume with on/off switch; Mode (AM, Standby & CW); BFO; Main Tuning; Bandspread Tuning; ANL on/off. Power Supply: Transformer operated; full-wave bridge rectifier. Power Requirement: 120/240 VAC, 60/50 Hz, 8 watts. Dimensions: 5⅓" H x 14½" W x 8" D.

## Choose our patented Heathkit Pack-17™ R/C system for a gift that gives years of family enjoyment

Heathkit Pack-17 R/C is a radio control system you can grow with as your interest and ability in R/C modeling increase. So unique that we hold a patent on it, Heathkit Pack-17 R/C gives you a choice of 17 different transmit and receive modules. With this capability of instant frequency change, you don't have to wait when someone else is on your channel. Rechargeable nickel-cadmium batteries save you money. And Heathkit Pack-17 R/C gear can be used with every kind of R/C model. So start right by starting with the one you can grow with — Heathkit Pack-17 R/C.

### ① For real value and real control, choose the Heathkit 5-Channel Dual Open-Gimbal Stick R/C Transmitter

This exciting Heathkit 5-Channel Dual Open-Gimbal R/C Transmitter gives you dual-stick control of four R/C channels (with ratchet or spring return, as you prefer) plus a switch-activated auxiliary channel for retracts or other switched functions. Since you build it yourself, you can tailor stick to channel to suit your needs by interchanging throttle and elevator controls between right and left sticks. The latest design open-gimbal sticks provide you with smoothness and control you'll really appreciate as you run your models through their paces. Performance-proven circuitry will provide you with years of reliable, trouble-free operation. Famous Heathkit plug-in module capability means you can change frequencies in an instant. The value-packed Heathkit GDA-1919-1 Transmitter includes your choice of one plug-in frequency module — specify the frequency you want from the list at the top of column one on the next page (no model number needed). Nickel-cadmium batteries and charger are included to save you money. The comprehensive Heathkit step-by-step instruction manual assures easy kitbuilding and do-it-yourself service, to save you more. For even greater savings, order your GDA-1919-1 Transmitter as part of a complete Heathkit R/C system from the next page.

Kit GDA-1919-1, Shpg. wt. 4 lbs. ............................... **129.95**

### ② Up-date your older model Heathkit R/C Transmitter with this Open-Gimbal Conversion Kit

Here's good news for owners of Heathkit GD-1205-D and GD-505-D R/C Transmitters. You can now get the convenience and control of open-gimbal stick R/C with this easy-to-install conversion kit. The GD-1419 Kit includes two sticks.
Kit GD-1419, Shpg. wt. 1 lb. ..................................... **37.95**

### ③ Top-of-the-line 8-Channel Dual Open-Gimbal Transmitter

This Heathkit top-of-the-line 8-Channel R/C Transmitter gives you open-gimbal stick convenience, too! Two control sticks and a retractable landing gear switch provide control of five servos. Three auxiliary controls allow control of three more servos. Four trim tabs allow you to make fine adjustments to the first four channels, without changing stick position. It includes your choice of one plug-in frequency module from the 17 frequencies listed on the opposite page (specify frequency wanted when ordering — no model number needed). This kit includes a money-saving rechargeable 9.6 volt nickel-cadmium battery pack and recharger. To save even more, order your 8-Channel R/C Transmitter as part of a complete system from the next page. This easy-to-build kit comes with complete step-by-step instructions, and all the solder you need.

Kit GDA-1205-OG, Shpg. wt. 5 lbs. ............................... **149.95**

GOA-1205 AND GDA-1919-1 SERIES SPECIFICATIONS: TRANS. — RF Frequency: crystal controlled, all bands. Frequency stability: within ±.005% on 27 MHz; within ±.002% on 53 MHz; 72 MHz. Temp. Range: 0 to 160°F. RF Output Circuit: pi network. RF Input Power: at least 500 mW. Modulation: on-off carrier keying. Approx. Current Drain: 100 mA on all bands. Controls: GOA-1205, 8 channels (4 with trim), on/off, trainer button; GDA-1919-1, 5 channels (4 with trim), on/off switch. Power Supply: Internal 9.6V 500 mAH Ni-Cad. battery. Rechargeable simultaneously with receiver battery at 35 to 40 mA from 120 volt power line. Dimensions: 7" H x 7" W x 2" D. Net Weight: 2½ lbs., with battery. GOA-1205-2 SPECIFICATIONS: RECEIVER — Local Oscillator Operating Frequency: crystal-controlled, all bands. Temperature Range: 0 to +160°F. Sensitivity: 5 μV or better. Selectivity: 6 dB down at ±4 kHz; 30 dB down at ±9 kHz. Current Drain: 10 mA. Intermediate Frequency: 453 kHz. Power Supply: 4.8 V battery pack (GDA-1205-3). Controls: On/off switch. Dimensions: 5/8" H x 1¾" W x 1¾" D. Net Weight: 2 ozs.

### ④ Now get a 3-Channel Transmitter with rechargeable batteries

The convenience and versatility of plug-in frequency change, and it's the only 3-Channel Transmitter we know of that includes rechargeable nickel-cadmium batteries and an external charger. So you can fly with full power and uncompromised performance. This 3-Channel Pack-17 outfit features a 2-axis stick assembly, and easy-to-handle Transmitter with a convenient strap for one-hand operation. An optional conversion pack lets you go 4-channel by adding another channel to the stick. All three stick channels have trim control, the 4th channel is controlled by a thumb tab. Compatible with all Heathkit servos. Includes one frequency module of your choice (when ordering specify frequency from list on next page — no model number needed).
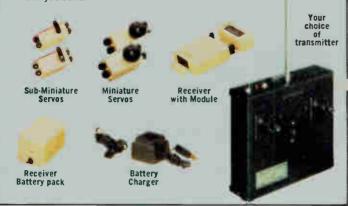
Kit GDA-1405-1, Shpg. wt. 5 lbs. ............................... **89.95**
Kit GDA-1405-3, 4-Ch. Conversion, Shpg. wt. 1 lb. .................. **14.95**

GDA-1405-1 SPECIFICATIONS: TRANSMITTER — RF Carrier Frequency: One frequency, crystal-controlled on 27 MHz, 53 MHz or 72 MHz bands. Operating Temperature: 0°-160°F. Controls: 3 channels (two with trim); ON-OFF switch. Optional fourth channel. Power Supply: Internal 9.6V, 500 mA hours, nickel-cadmium battery. Rechargeable simultaneously with receiver battery at 35-40 mA from external charger. Dimensions: 9½" H x 3¹¹⁄₁₆" W x 2¼" D (24 cm H x 9.5 cm W x 5.7 cm D).

# Kits that your whole family will enjoy for years



## The ASPEN™ Pinball Game — spend less for stay-at-home family fun

### $499⁹⁵

- Save up to $100 from similar models
- SCHUSSRING™ high-action field adds arcade-like excitement
- Electronic memory keeps score for up to four players as fast as you can rack up points
- Easy to assemble — playing field and circuit boards are pre-assembled so you can begin playing quickly

Put all the fast, action-packed excitement of a pinball arcade into your family room with the Heathkit/Brunswick® ASPEN Home Pinball Game. This full-sized pinball game features a SCHUSSRING high-action field with 18 scoring areas. Follow the regulation pinballs as they rack up points in almost no time. Double and triple scoring add to the fun and excitement, too.

A thumper bumper, two jet kickers, three rollover switches, three spin gates, three target switches and six rubber band switches keep the action fast and feverish. A free ball lane can help you score more points. Two independently operated flippers keep you in maximum control of each pinball. An adjustable tilt sensing mechanism stops action on the ball in play when you tilt the field. And seven musical melodies play at the beginning and end of each game, at bonus scores and when the game field is tilted.

The ASPEN Pinball Game features a microprocessor-based electronic memory that keeps score for up to four players in each five-ball game. The memory also tells you which player is shooting, which ball is in play and when the game is over, with a bright digital display.

Build the ASPEN yourself — in as little as two evenings — and save up to $100 from similar assembled models. All you need are tools normally found in the home. A complete Heathkit manual takes you, step-by-step from assembling the colorful particle-board cabinet to enjoying your first game.

To make your kitbuilding experience even easier, the ASPEN's circuit boards and playing field are factory assembled and tested.

The ASPEN is designed for years of trouble-free fun. An easy-to-read operation manual and two built-in diagnostic tests make servicing simple.

Buy the ASPEN today — enjoy all the fun and excitement of a pinball arcade. For 120 VAC, 60 Hz only. Dimensions, 59½" H x 25" W x 49½" D.

Kit GD-1210, 141 lbs., Mtr. Frt. . . . . . . . . . . **499.95**

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## The Heathkit Programmable Darkroom Timer — one of the most versatile available

State-of-the-art electronics mean our Darkroom Timer can handle most any processing situation

### $124⁹⁵

- Programmable memory holds up to nine process steps
- Auto-step sequencing automatically controls your entire process
- Convenient Litetouch™ control panel

The Heathkit PT-1500 Darkroom Timer is one of the most versatile darkroom timers available anywhere. This 4-digit timer is microprocessor-controlled for maximum accuracy.

The PT-1500's programmable memory can hold times for up to nine process steps and one enlarger step. Auto-step sequencing automatically loads the timer so you're ready for the next step.

If you use the optional Auxiliary Outlet to connect the timer to an external device (such as a color drum), the Auxiliary Outlet is turned on during countdowns in the Process mode. Enlarger and safelight outlets are toggled so one goes on when the other goes off.

Four alarm settings mark time in 1, 30 or 60-second intervals (selectable in any combination), or once at the end. The four-digit LED display times to 99 minutes, 59 seconds or 999.9 seconds. When not in use, the PT-1500 functions as a 12-hour clock.

Unlike other timers, the PT-1500's sturdy aluminum case includes a Lite-touch™ keyboard panel with waterproof seal that's impervious to darkroom chemicals. And a display switch turns off the LEDs and keyboard backlighting without affecting countdowns or memory.

Control start or focus switch with our optional Single Foot Switch, or control both start and focus switches with the optional Dual Foot Switch.



Kit PT-1500, Shpg. wt. 5 lbs. . . . . . . . . . . . .124.95
Optional Auxiliary Outlet.
PTA-1500-3, Shpg. wt. 1 lb. . . . . . . . . . . . . . .13.95
Optional Single Foot Switch.
PTA-1500-1, Shpg. wt. 1 lb. . . . . . . . . . . . . . . .9.95
Optional Dual Foot Switch.
PTA-1500-2, Shpg. wt. 3 lbs. . . . . . . . . . . . . .24.95

PT-1500 SPECIFICATIONS: Switched Outlets: Enlarger, 1000 watts max.; Safelight, 100 watts max. (Enlarger and Safelight outlets not recommended for inductive loads); Optional PTA-1500-3 Auxiliary Outlet, 100 watts max. Alarm Settings: End of interval, every second, every 30 seconds, every 60 seconds. Timing Accuracy: Determined by accuracy of AC line frequency. No cumulative error. Power Requirement: 120/240 VAC, 50/60 Hz, 1009 watts max. with switched outlet. Dimensions: 3⅛" H x 9¼" W x 5⅞" D (7.9 x 23.5 x 14.9 cm).



## Model Railroad Power Supply/ Throttle for railroading realism

The Heathkit RP-1065 makes an HO or N-gauge layout dramatically realistic. Just operate the slide throttle control to make your engines gradually build up speed just like a real train, maintain realistic acceleration and braking at slow speeds, and stop gradually. The RP-1065's DC compensation circuit prevents stalling out when climbing grades, and helps overcome train and track obstacles. Powers two HO or N-gauge engines, has two auxiliary outputs for switch machines, signals and building lights. Rugged metal case. 120 VAC, 50/60 Hz. 4¾" H x 9½" W x 8½" D.

Kit RP-1065, Shpg. wt. 9 lbs. . . . . . . . .79.95
Walk-Around Remote Control for RP-1065.
Kit RPA-1065-1, Shpg. wt. 3 lbs. . . . . . .22.95
Save — Buy RP-1065/RPA-1065-1 together.
RPS-1065, Shpg. wt. 19 lbs. . . . . . . . . .99.95

# For a memorable holiday this year give your family the beautiful-looking, beautiful-sounding Heath/Thomas Organ

Beautiful music is within your budget's reach with the TO-2130 — Thomas' most popular organ. Build it yourself, in six evenings, and save compared to assembled models. Then, it's easy for your entire family to make rich, beautiful music with the TO-2130. Color-Glo keys and a complete playing guide show you the way. Single-finger chords let you add other accompaniment. Twelve chords and ten voices give you the exciting sound of a complete orchestra.

## $999⁹⁵

- Build it yourself and save compared to assembled models
- Rich, beautiful sound — 12 chords, 10 voices

Everyone in your family can play — and enjoy — the Heathkit/Thomas TO-2130 Organ right away. Quick-learn features such as Color-Glo keys, color-coordinated music, rhythm, one-finger chords and an easy-to-follow instruction manual make the TO-2130 easy ... and a real delight to play — even for youngsters or grownups who have never made music before!

Advanced electronics design puts an entire orchestra at your fingertips. Single-finger chords leave your hands free to add other musical accompaniment, while the convenience of your TO-2130's Memo-Chord lets you convert any of the 12 single-finger Speak-Easy chord keys into any one of a dozen different major chords. Memo-Chord not only selects and memorizes the correct chord and bass pedal notes, but even holds them until you press another chord key.

The Color-Glo keys light up to help you identify chords and keys, so anyone can begin playing immediately without need for previous musical training. Music in the instruction booklet is color-coordinated to the Color-Glo keys, making the TO-2130 such a breeze to play, even the kids can learn in no time.

You can register any of five Solo Voices, separately or in combination, for brilliant musical effects. Four Accompaniment Voices provide beautiful harmonic backgrounds. And the TO-2130's Fancy Voice combines with the Solo Voices to yield even more special musical effects.

Use the Fancy Foot pre-programmed pedal to add a distinctive professional quality to your musical arrangements. The Fancy Foot feature creates a rhythmic bass pedal pattern for each rhythm pattern you choose.

Orchestral Presence produces a vibrant string ensemble effect by itself. Or add the tremulants feature with one or more of the Solo Voices to add brilliance to your music. And, your TO-2130 even lets you add one or more of the Accompaniment Voices to Orchestral Presence to create a rich, full orchestral sound that will have you playing like a professional musician.

The TO-2130's Organ Ensemble feature creates an orchestral chorus effect, while an Expression Pedal lets you add color and dimension to your music by controlling the overall sound output.

It's easy to build the TO-2130, too — you can begin making beautiful music in as little as six evenings. A completely detailed Heathkit assembly manual, shows you every step of the way, from start to finish.

Making beautiful music was never easier. The TO-2130's cabinet and matching padded bench are attractively hand-crafted in a walnut veneer finish.

Kit TO-2130, 201 lbs., Motor Freight . . . . . . **999.95**

TO-2130 SPECIFICATIONS: KEYBOARDS: Solo: 37 keys, C2 through C5; Accompaniment: 37 keys, C2 through C5; Pedals: 13, C1 through C2. VOICES: Solo: Flute, Trombone, Oboe, Violin; Accompaniment: Melodia, Horn (piano when rhythmic), Diapason (guitar when rhythmic), String (harpsichord when rhythmic); Pedal: Flute (combination 16' and 8'). RHYTHMIC PATTERNS: Waltz, Foxtrot/Swing, Rock, Latin. POWER AMPLIFIER: 30 watts RMS. SPEAKER: 8 ohm permanent magnet type (headphone jack for private listening provided). POWER REQUIREMENT: 120 VAC, 50/60 Hz, 125 W. DIMENSIONS: 37" H x 39" W x 21½" D (94 x 99 x 55 cm).

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## The Heathkit Electronic Metronome is the ideal aid for music students and teachers

### $19⁹⁵

- Adjustable tempo between 40 and 210 beats per minute for more efficient practice
- Handsome cherry finish birch cabinet with non-marring felt feet

When a student (and parents) invest a great deal of time, energy and money in music lessons, it makes sense to practice efficiently. The Heathkit Electronic Metronome is designed for exactly that purpose. This handsome addition to the music room maintains a steady beat so the student can practice at the correct tempo. The Electronic Metronome's tempos can be adjusted between 40 and 210 beats per minute with the convenient front panel control. And volume can be adjusted, too, with a rear panel control. The Electronic Metronome even includes a handy chart that goes on the bottom of the cabinet, so the musician can relate the number of beats per minute to tempos in different time signatures. It's the practical way to practice.

As attractive as it is practical, the Heathkit Electronic Metronome is housed in a handsome cherry finish birch cabinet with non-marring felt feet. Easy, one-evening assembly makes it an ideal kit for the beginning builder. As with all Heathkit electronic kits, this one comes with an easy-to-follow, step-by-step instruction manual. And the kit even includes all the solder you will need. The Electronic Metronome operates on two 9 volt batteries (not included). It measures 6¾" H x 3¾" W x 4" D.

Kit TO-1257, Shpg. wt. 2 lbs . . . . . . . . . . . . . . . . . . . . . . .**19.95**

## The Heathkit GR-2001 Computer TV System — for a gift your whole family will enjoy

**Eight programming pushbuttons let you sequence the GR-2001 to change channels and rotate your antenna (with optional GD-1184 Rotator) at times you preselect! Above the pushbuttons, backlit nomenclature indicates the current operating mode of the programmer.**

## Full computerization gives you a magnificent 25″ diagonal color picture

Now you can pre-program your color TV for an entire evening's viewing, and then just sit back, relax and watch one of the best color pictures you've ever seen. It's possible with the Heathkit GR-2001 Computer TV System — one of the finest and most advanced color television sets you can buy anywhere. This fully-computerized, programmable set means you'll never again miss another favorite show because you forgot to change channels. The optional GD-1185 Programmer automatically changes to the right channel at the right time. You can program as many as 16 separate channel changes in each of two 12/24-hour viewing periods.

For even greater automatic operation, the optional GD-1184 Antenna Rotator Control lets you rotate your outdoor antenna to get the best reception. You can select up to 8 separate antenna direction headings, with up to three stations on each heading.

In addition to all of this programming convenience, the GR-2001 is one of the best performing 25″ color television sets on the market today. Dozens of circuit innovations and refinements help produce one of the most vivid, accurate, bright and sharp color pictures you have ever seen. The 25″ diagonal rectangular picture tube is fully shielded to maintain better color purity, and features a black matrix screen. The phase-locked loop vertical and horizontal oscillators provide a picture so rock-steady and adjustment-free we've eliminated conventional horizontal and vertical hold controls. And the audio circuitry has been improved over that of comparable sets to provide you with true high-fidelity sound, with 50 Hz to 15 kHz frequency response (+1 dB) for added TV viewing enjoyment.

The GR-2001 is easy to build, too. Comprehensive,

fully-illustrated manuals guide you through the step-by-step kit assembly. Modular circuit boards and pre-built wiring harnesses minimize point-to-point wiring for building ease. And famous Heathkit self-service features like a built-in dot generator, centering and convergence circuits, and a test meter, will really help you save money on service during the long life of your set.

Our custom-installation option lets you build your GR-2001 into a wall, mount it in your own custom cabinet or order one of our beautifully constructed cabinets on the next page.

Your investment will be returned with year after year of trouble-free performance. Less cabinet. Includes chassis, picture tube and one speaker.

Kit GR-2001, 146 lbs., Motor Freight ......**769.95**

Second Speaker for GR-2001. Fits in space on GR-2001 cabinets where indicated. With all cables.

GRA-2000-7, Shpg. wt. 2 lbs. ...............**9.95**

GR-2001 SPECIFICATIONS: Deflection: Magnetic, 90°. Focus: Electrostatic. Convergence: Magnetic. Picture IF Carrier: 45.74 MHz. Sound IF Carrier: 41.25 MHz. Color IF Subcarrier: 42.17 MHz. Sound IF Frequency: 4.5 MHz. Video IF Bandwidth: 4.08 MHz, at 6 dB down. HI-FI Output: Frequency response: +1 dB, 50 Hz to 15 kHz. Output Voltage: Greater than 1.0 V RMS. Audio Output: 4 Ω or 8 Ω. 2 Watts. Tuning Range: TV channels 2 through 83. Power Requirement: 120 VAC, 60 Hz, 200 W. NTSC only.

8-Channel Tuning System Accessory for your GR-2001. The GRA-2001-9 Tuning System Accessory adds 8 additional channels to your GR-2001's random-access tuning system to give you complete, 24-channel viewing versatility.

Kit GRA-2001-9, Shpg. wt. 1 lb. .............**9.95**

GD-1185 Programmer. Change channels automatically at times you select, up to 16 changes in two 12/24-hr. periods. Requires GRA-601 Clock (described below) to operate. Front-panel keyboard and on-screen readout make it easy to enter time and channel.

Kit GD-1185, Shpg. wt. 8 lbs. .............**159.95**

GRA-2001-6 Remote Control. Turn set on/off, adjust volume and tint, scan channels up/down, operate optional programmer up to 20 feet from your GR-2001.

Kit GRA-2001-6. Shpg. wt. 4 lbs. ...........**99.95**

On-Screen Digital Clock. Displays time in hours, minutes and seconds in 12 or 24-hour formats on screen. 1″ high digits can be adjusted with channel numbers to remain on permanently or automatically reappear at approximately selected intervals.

Kit GRA-601, Shpg. wt. 1 lb. ...............**29.95**

Automatic Antenna Rotor Control. Turns antenna to get strongest signal on each channel automatically. Accepts up to 3 channels for each of 8 directions.

Kit GD-1184, Shpg. wt. 6 lbs. .............**64.95**

Rotor Motor. Requires 5-wire cable (not supplied).

GDA-1184-1, Shpg. wt. 11 lbs. .............**39.95**

### Save more by getting an entire system

Save $59.90 on GR-2001 System with GD-1185 Programmer and GRA-601 Clock. $959.85 if purchased separately.

GRS-2001, 175 lbs., Motor Freight ...**899.95**

Save $64.85 on GR-2001 with Programmer, Clock and GD-1184 Rotor Control.

GRS-2002, 187 lbs., Motor Freight ...**959.95**

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Double your savings on the set that brought color TV into the digital age

### DON'T MISS SPECIAL SAVINGS

A color picture you'll be proud to show off to your friends — and savings you'll be proud to take to the bank! The GR-2000A will bring more enjoyment to your family's TV viewing.

This 25" diagonal Color TV has electronic tuning which scans through preset channels; digital on-screen channel display; black matrix picture tube for extra-bright and sharp pictures; fixed IF filter which virtually eliminates adjacent channel interference and never needs alignment; automatic gain control.

Get even more savings — and enjoyment — by ordering the GRA-601 On-Screen Clock and GRA-2000-6 Remote Control (right). Save 20% when ordering with a GR-2000A (excluding shipping, handling).

The GR-2000A has famous Heathkit built-in service features — dot generator, purity and convergence circuits, vertical and horizontal centering circuits and a test meter. Kit assembly is easy, too — with factory-assembled wiring harnesses to minimize point-to-point wiring. Custom-mount in a wall or your own cabinet — or save 20% on a fine furniture cabinet when ordered with a GR-2000A (excluding shipping and handling — see below). 20.13" H x 29.13" W x 21.75" D.

Kit GR-2000A, Shpg. wt. 147 lbs.,
Motor Freight .... **Was $669.95, NOW ONLY 569.95**
Second Speaker for GR-2000 Color TV. Fits in most GR-2000 cabinets where indicated. Includes cables.
GRA-2000-7, Shpg. wt. 2 lbs. ............. **9.95**

## On-Screen Digital Clock

Shows time in hours, minutes and seconds right below on-screen channel display.
Kit GRA-601.
Shpg. wt. 1 lb. ..**29.95**
When purchased with GR-2000A TV .....**ONLY 23.96**

## Remote Control for GR-2000

Turn on/off, control volume/color/tint, chg. channels from easy chair.
Kit GRA-2000-6, 4 lbs. ......**99.95**
With GR-2000A purchase **ONLY 79.96**

GR-2000 SPECIFICATIONS: Picture Tube: 25" (diagonal). Viewing Area: 315 sq. in. Deflection: Magnetic, 90 deg. Antenna Input Impedance: VHF, 300 ohms balanced or 75 ohms unbalanced; UHF, 300 ohms balanced. Tuning Range: Channels 2 through 83 (Preset any 16). High-Fidelity Output: Impedance: 2000 ohms. Frequency Response: +1 dB, 50 Hz to 15 kHz. Harmonic Distortion: Less than 1% at 1 kHz. Output Voltage: Greater than 1.0 VRMS. Audio Output: Impedance: 4 or 8 ohms. Output Power: 2 watts. Power Requirement: 120 VAC, 60 Hz, 200 watts.

## Make your Heathkit TV look good — and save 20% when you order with the GR-2000A Color TV

Mediterranean Cabinet. Dark oak finish, simulated wood-grain trim combine to make a cabinet as sharp as your Heathkit Color picture. Accented by antique gold hardware. Accepts 2 speakers. Fully assembled. 30.31" H x 49.94" W x 23.94" D, with cup.
GRA-604-25, 82 lbs., Motor Freight ........**219.95**
With purchase of GR-2000A TV .......**ONLY 175.96**

Contemporary Cabinet makes your TV a sight to behold. Constructed of wood solids and veneers. Oiled walnut finish. Dual speaker capability. Comes assembled, finished. Dimensions, 28.38" H x 46.82" W x 23.63" D (72.09 x 18.43 x 60.02 cm), with cup.
GRA-602-25, 66 lbs., Motor Freight ........**199.95**
With purchase of GR-2000A TV ......**ONLY 159.96**

Compact Contemporary Cabinet is solidly constructed of quality wood solids and veneers. Beautifully finished in luxurious oiled walnut. This cabinet comes fully assembled. Equipped with cutout for one speaker. 34.38" H x 20.63" W x 24.13" D, with cup.
GRA-608-25, 65 lbs., Motor Freight ........**159.95**
With purchase of GR-2000A TV .......**ONLY 127.96**

Alaska, Hawaii and Michigan Residents: Call 616-982-3411

## 19″ and 21″ Diagonal Measure TVs for super color

[1] This outstanding Color Television kit brings you all the technical excellence and quality design of our famous GR-2000 on page 101, but in the popular 21″ diagonal size. It uses the same optional on-screen clock and remote control as the GR-2000 and it has the same bright, accurate color picture. Modular circuit boards and color-coded wiring harnesses keep point-to-point wiring to a minimum. Built-in service features and adjustment circuits.

Kit GR-2050, with chassis, picture tube, one speaker, 122 lbs. Mtr. Frt. ...**549.95**
GRA-2050-1, Contemporary Cabinet. 28⅝″ H x 30½″ W x 22¹⁄₁₆″ D (with cup).
74 lbs. Mtr. Frt. .................................................**169.95**
Kit GRA-2000-6, Optional Remote Control, wt. 4 lbs. ....................**99.95**
Kit GRA-601, Optional On-Screen Digital Clock, wt. 1 lb. ...............**29.95**

**Save $20.** GRA-2050 TV and GRA-2050-1 Cabinet together.
GRS-2050, 179 lbs. ............**Purchased separately $719.90, Now only 699.90**

[2] GR-500 19″ Diagonal Measure Color TV has in-line gun color tube, on-screen channel display, hi-fi output. Avoid future repair bills with trouble-shooting meter included.

Kit GR-500, less cabinet, 99 lbs. UPS ...............................**499.95**
GRA-500-1, Walnut veneer table model Cabinet (shown), 17¼″ H x 25½″ W x 17″ D (including cup), 31 lbs. UPS ...................................**44.95**
GRA-403-18, Roll-around Cart. Shpg. wt. 17 lbs. ......................**21.95**
GRA-601, Digital Clock Accessory, Shpg. wt. 1 lb. ....................**29.95**

**1** Your favorite shows will look even better on the super sharp screen of the GR-2050

**2** Great color on this negative matrix screen

Simulated TV pictures

## Zenith Recorder, antennas and accessories for more viewing enjoyment

III modes — to 5 hours in Beta III. Audio Dub adds music/narration later. Accepts optional camera or monitor. Includes remote, transformers, cables. 120 VAC, 55 W.

Includes five free GDZ-9700-4 Tapes (if pur. sep., an $89.75 value).
GDZ-9700S, Assembled/tested,
58 lbs. ..........**Was $1239.75, Now only 1150.00**

| Videotapes | Beta II | Beta III | Wt. | Price |
|---|---|---|---|---|
| GDZ-9700-5 (L-820) | 3½ hrs. | 5 hrs. | 1 lb. | 20.95 |
| GDZ-9700-4 (L-750) | 3 hrs. | 4½ hrs. | 1 lb. | 17.95 |
| GDZ-9700-3 (L-500) | 2 hrs. | 3 hrs. | 1 lb. | 14.95 |

"Super Antenna" 60-element VHF-UHF-FM antenna is real signal-grabber. 171″ boom, 109″ turning radius. Weather-protected finish. Includes removable FM blocking elements. Less mast and cable.
GD-1461, 300 ohms, 17 lbs., Mtr. Frt. ........**79.95**
GDS-1461, 75 ohms, 16 lbs., Mtr. Frt. ........**84.95**
"Deluxe Fringe Antenna." 28-element. VHF/UHF. 131″ boom, 80″ turning radius. Less mast and cables. All-weather construction.
GD-1441, 300 ohms, Shpg. wt. 10 lbs. ........**39.95**
GDS-1441, 75 ohms, Shpg. wt. 12 lbs. ........**44.95**

Cornell-Dubilier Rotator System. Heavy-duty auto-rotator system features control box and mast-mount rotator. Pinpoints your outdoor antenna on the station for greatly improved TV and FM. Heavy-duty 1 rpm rotator has positive automatic stop, instant reverse. ½″ diameter ball thrust bearing supports antennas to 150 lbs. Lower mast clamp takes ⅞″ to 2″ diameter masts; removable for direct mounting on tower's rotator plate. Lifetime lubricated bearings. 360° rotator control. 120 VAC. Requires 5-wire cable (not supplied). Improve your TV viewing for more stay-at-home enjoyment.
GDP-1176, Shpg. wt. 14 lbs. ..............**64.95**

75/300 Ohm Transformer-Splitter. Matches one 75 ohm coaxial cable to separate 300 ohm VHF and UHF leads. 82 channel. Has no-strip, pre-attached leads.
GD-298, Shpg. wt. 1 lb. ...................**4.95**

Matching Transformer. Converts 300 ohms to 75 ohms for coax. 82 channels.
GD-1054, Shpg. wt. 1 lb. ..................**3.95**

Coaxial Cable. 100 ft. of high-quality coaxial cable with both antenna boot and connectors installed. 75 ohm.
GD-328, Shpg. wt. 4 lbs. .................**12.95**

**Programmable Zenith Video Director lets you record up to four different channels over a 14-day period — up to five hours of your favorite TV shows!**

Increase your television viewing pleasure with the exciting Zenith Video Director. Record shows while away, record while watching, or record one and view another. Remote Video Action Control edits unwanted scenes...during recording...from your easy chair. Stop tape for "freeze action." Speed Search locates scenes at 10 times normal speed. Reverse it for "instant replay." Or view at three times normal speed. Record/play in Beta II or Beta
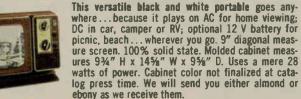
## Smart 13″ Diagonal Zenith System 3 Color Portable TV

**NEW**

Now the best Zenith ever...is even better! This 13″ diagonal portable features Tri-Focus Picture Tube for the sharpest picture in Zenith history. Triple-plus chassis has modular design, few inter-connections and is cooler running for longer life. Color Sentry corrects the picture 30 times per second...automatically. Light Sensor adjusts picture to ambient light. Electronic Power Sentry voltage regulating and other energy-saving features combine for 25% less average energy use than comparable previous model. Space Command® 800 Remote Control allows control from across the room. 13¾″ H x 20⅛″ W x 14⅞″ D.
GRZ-1325, Assembled and tested, 44 lbs. .............................**439.95**

## Famous Zenith quality in an AC/DC/Battery portable TV

**NEW**

This versatile black and white portable goes anywhere...because it plays on AC for home viewing; DC in car, camper or RV; optional 12 V battery for picnic, beach...wherever you go. 9″ diagonal measure screen. 100% solid state. Molded cabinet measures 9¾″ H x 14⅝″ W x 9⅝″ D. Uses a mere 28 watts of power. Cabinet color not finalized at catalog press time. We will send you either almond or ebony as we receive them.
GRZ-92, Assembled and tested, 17 lbs. .............................**109.95**
GRZ-92-1, Rechargeable battery pack, 9 lbs. .........................**49.95**
GRZ-92S, Save $10.00. TV & battery pack, 33 lbs. .....................**149.90**

Credit Card Orders Call TOLL-FREE: 800-253-0570

# Be ready for the big games and specials with a new big-screen projection TV—and get our $79.95 screen stand free!

## $2195⁰⁰

*Great Gift Idea!*

Thrill your family and friends! The first Heathkit Color Television Projection System has a sharp, clear picture that's 8 times larger than the one you now watch*—and famous Heathkit dependability!

- Now available for immediate delivery
- Three-tube projection for a brighter, more lifelike picture
- 6-foot diagonal high-reflectivity, washable viewing screen for a big, bright, lifelike image
- Full 5 watts of clear, low-distortion sound
- Single antenna input for better reception
- Fast and easy kitbuilding experience
- Built-in adjustments for easy self-servicing

There's nothing better than the Heathkit Screen Star Color Television Projection System for bringing the theater-like realism of sporting events, movies and entertainment specials into your living room.

When you choose the Screen Star, you get more performance for your TV dollar. Three-tube projection gives you a brighter, more vivid color picture and provides a wider viewing angle from the screen. Both the high-resolution picture tubes and quality-crafted lenses are the finest available, giving you state-of-the-art color reproduction. Each tube beams its image through its own 127mm f1.0 lens to give you a beautiful color picture.

Three-tube projection and highest-quality f1.0 lenses combine to beam a brighter, clearer color picture.

The Screen Star uses state-of-the-art technology to bring you a breathtaking big-screen picture! (Simulated TV picture)

This image is projected onto a 6-foot diagonal, high-reflectivity viewing screen. The durable, washable screen can be mounted on any wall (brackets provided). Or to make your screen free-standing and portable, use the GRA-4000-1 Screen Stand — included with your GR-4000 (a $79.95 value).

The Screen Star's electronics provide a lifelike image for years to come! Automatic Fine Tuning (AFT) and an exclusive Heath LC filter keep your picture in tune from channel to channel. In fact, the IF amplifier never needs realignment. Special black level clamps help faithfully reproduce every scene, whether it's outdoor sun or moonlight. These clamps maintain accurate brightness levels. Bridge-type power supplies and a ferro-resonant power transformer maintain constant brightness and picture size — even during voltage brownouts.

One antenna connection means clearer reception with less troublesome interference. An internal UHF/VHF splitter and complete shielding of the tuners make the GR-4000 ideally suited for cable TV. (If you don't have cable, get the best reception of TV stations in your area with the antennas, rotors and accessories on the opposite page.)

The special video input/output panel, with an auxiliary 120 VAC outlet, lets you directly connect a video cassette recorder like the Zenith Video Director (opposite page). Direct connection means higher-quality video.

Hear true high-fidelity sound: The Screen Star's audio system produces a full 5 watts of sound — as beautiful, rich, clear and distortion-free as the picture. Listen through the large 6" x 9" speaker. Or use the external speaker jack or the VCR audio output jack to connect to your stereo system for even better sound.

All projector controls are easy to find: Illuminated indicators instantly tell you which of the 82 UHF and VHF channels you're tuned to. Convergence adjustments and focus controls are on top of the chassis.

Move the Screen Star from room to room: Smooth-rolling casters let you move the projector anywhere — store it out of the way, when not in use. And with the Screen Stand, the lightweight screen can be moved with the same ease.

Heath's easiest-to-build color TV: Picture tube, yoke, lens units, high-voltage supply and tuners are factory assembled and adjusted for easier kitbuilding.

Spend less on service bills: Complete self-servicing manual shows you how to service the GR-4000. Built-in self-service features make maintenance and repair faster, simpler. Convergence controls are conveniently located on upper chassis. Built-in crosshatch generator, test meter make kitbuilding and servicing easier. Complete technical support is always available. And a 90-day limited warranty covers all parts.

Order the Screen Star Color TV Projection System today. Your television viewing will never be the same again.

GRS-4000, w/Screen Stand, 210 lbs., Mtr. Frt. . . . . . . . . . . . . . . . . . . . . . .**2195.00**
Screen Stand for GR-4000 Color Television Projection System.
GRA-4000-1, 20 lbs., Motor Freight . . . . . .**FREE WITH PURCHASE OF GR-4000 TV**
Purchased separately . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .**79.95**

GR-4000 SPECIFICATIONS: Antenna Impedance: 75 ohms coaxial, with internal UHF/VHF splitter. Tuning Range: UHF Channels 14 through 83, VHF Channels 2 through 13. AFT Pull-In Range: 0.7 to −1.8 mHz. Audio Output: 5 Watts at speaker and external 8 ohm speaker jack. Total Harmonic Distortion: Less than 0.5%. Video IF Bandwidth: 4.08 mHz at 6 dB down. Video Cassette Recorder Facilities: 1 Volt composite video in/out at 75 ohms, 0.75 VRMS audio in/out at 600 ohms. Projector Distance from Screen: Approximately 98 inches (249 cm). Power Requirement: 120 VAC, 60 Hz. Projector Dimensions: 28" H x 16.25" W x 32" D (71.12 x 41.28 x 81.28 cm). Screen Dimensions: 45" H x 60" W (114.3 x 152.4 cm). (*If your present TV is 25" diagonal or smaller.)