

# Heathkit®

WINTER 1978



## **PERSONAL COMPUTERS**

that open up a whole new world of convenience and versatility.

## **STEREO COMPONENTS**

Find out how you can build the best sound around for less.

## **PROGRAMMABLE COLOR TV**

Change channels, rotate your antenna for best reception — automatically!

## **INSTRUMENTS**

For greater values and all your test and measuring needs.

## **AMATEUR RADIO**

There's more for the Ham at Heath

## **LEARN ELECTRONICS**

Faster, easier and for less cost with Heath self-instruction courses!

**PLUS** nearly 400 fun-to-build, money-saving electronic kits to help you make your "inside season" more fun, more practical and more creative!

## **SUPER TV SPECIAL!**

FREE TV Game with purchase of any Heathkit color TV! See pages 8-12.

SEE INDEX ON PAGE 2

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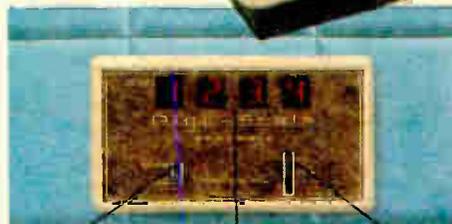
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## "Digi-Scale" Digital Readout Electronic Scale

**\$109<sup>95</sup>**  
Kit

*A TRUE solid-state electronic scale with strain-gauge transducer element like expensive laboratory scales*



Manual or auto turn-on    Bright red 4-digit LED display    Handy zeroing adjustment

Shows your weight in big, bright, computer-like LED's. Even with a 300-lb. capacity, it reads out to 2/10ths of a pound (or it can be wired to read out in kilograms). It's far more precise and easier-to-read than conventional dial scales or scales with digital readouts

and regular springs. Uses solid-state circuitry and a strain-gauge transducer element like those used in expensive electronic laboratory scales. A zeroing feature allows fine adjustments for accurate weighing of small items (weigh the baby, but not the blanket). Has handsome burled walnut-finish platform. Battery-operated, so it's safe to use even after a shower. The kit includes extra cable so you can place the readout at eye level, on a wall, anywhere it's convenient. Operates on six inexpensive "C" cells, not included. Platform size, 11½" x 11½" x 1½". Readout/control, 6" x 3½" x 1½".

Kit GD-1186, Shpg. wt. 9 lbs. .... **109.95**  
Factory assembled, adjusted GD-1186 — readout non-detachable. Reads pounds only.  
GDW-1186 ..... **139.95**

## HEATHKIT ELECTRONIC CENTERS ARE IN MAJOR MARKET AREAS COAST-TO-COAST



Visit the Heathkit Electronic Center (Units of Schlumberger Products Corporation) nearest you and see our Complete Product Line.

Parts and service available. (Retail prices on some products may be slightly higher.)

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# GD-1110 Electronic Home Pinball Machine

## \$629<sup>95</sup>

- LED scoring display
- Seven synthesized tunes
- "Skill" control for beginners and advanced players

That's right, the famous computer-controlled Bally Fireball in money-saving easy to build kit form. You've heard about this machine. It's the one you'll never grow tired of playing. Look at these unusual fun features: Scoring is displayed on a bright red LED readout and a computer synthesizer plays seven different tunes when extra scores or bonuses are won. The scores of up to four players are stored in the computer's memory and displayed automatically. The memory remembers each player's score and playfield configuration so you can tell who's champ. Ball return is automatic. Bonus balls are also awarded automatically.

A "skill" control allows you to program the machine for the beginner or the advanced player. The colorful playfield is the same size as a commercial machine. "Thumper Bumpers", "Slingshots" and player-controlled flippers give you plenty of ball action. Many of the components used in the GD-1110 are the same as used in commercial machines for outstanding reliability. A diagnostic check switch lets you test every function, even light bulbs, to make sure everything is working properly. The GD-1110 is not a toy but a sophisticated game designed to give your whole family years of fast-paced action right in your own home.

**Kit GD-1110, Shpg. wt. 166 lbs.  
Motor Freight ..... 629.95**

Automatic six-digit  
LED scoring

From one to four  
players can play

Commercial  
size 22" x 42"  
playfield



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5215 W. Fond du Lac 414-873-8250



The remote transmitter assembly for the ID-1290 and ID-1590 clamps easily to any TV antenna mast.

**\$99<sup>95</sup>**

## Stay "on top" of conditions with this five-function weather station

The Heathkit ID-1290 Weather Station monitors indoor and outdoor temperatures, barometric pressure, wind speed and direction — all with electronic accuracy and reliability. It's ideal for home or office, airport pilot lounges, anywhere accurate and instant weather information is needed.

The barometer lets you observe changes as small as 0.02 inches of mercury to indicate changing weather conditions. The thermometer is calibrated in two degree increments from -40 to +120°F and a switch selects indoor or outdoor readings. The windspeed indicator has two ranges — 0-30 mph or 0-90 mph, and 8 wind direction lights offer true 16-point resolution for precision readings.

The ID-1290's walnut-grained plastic cabinet can be hung vertically or horizontally; or used as a handsome and distinctive desk set with the stands included. The remote transmitter assembly (windcups, weather vane and outdoor temperature sensor) clamps onto any 1" to 1½" diameter TV antenna mast and is connected to the plaque

with optional 8-wire cable (below). Easy and enjoyable kit assembly makes the ID-1290 a great project for first-time builders too. Includes comprehensive weather book.

**Kit ID-1290, Shpg. wt. 9 lbs. . . . . 99.95**

**ID-1290 SPECIFICATIONS:** Wind Speed: 0-30 mph, ±2 mph; 0-90 mph, ±5 mph. Direction: 8-point readout over 360°. Temperature: 0° to +120°F, ±2°F (typ. IN-DOOR); -40° to +120°F, ±2°F (typ. OUTDOOR). Barometric Pressure: 29-31 inches of mercury within .05 inches, accurate up to altitudes of 10,000 ft. Operating Temperature: Receiver, -32° to 100°F; Transmitter, -40° to +120°F. Power requirement: 110-130 VAC, 50/60 Hz, 3.5 watts. Dimensions: Wall mount, 20½" W x 7" H x 2" D; Desk 20½" W x 7" H x 6¾" D. Net Weight: 7 lbs.

### 8-Wire cable for remote transmitters

**IDA-1290-1, 50 ft. cable, 2 lbs. . . . . 7.95**

**IDA-1290-2, 100 ft. cable, 4 lbs. . . . . 13.95**

**IDA-1290-3, 150 ft. cable, 6 lbs. . . . . 18.95**

## Digital Wind Speed and Direction Indicator

Outstanding accuracy and easy-to-read digital display make this kit a "must" for pilots, boaters — anyone whose activities are affected by the wind. Pick the two readout modes you want from the three available: miles or kilometers per hour, or knots. Switches select mode and front-panel lights show which is in use. Incandescent bulbs mark the 8 principal compass points, providing 16-point resolution. Uses same transmitter assembly and cable as above.

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

**ID-1590 SPECIFICATIONS:** Wind Speed: 0-99 in miles per hour, knots or kilometers per hour (choice of two). Response Threshold: 3 mph. Accuracy: ±1 digit or ±10%, whichever is greater. Direction Response Threshold: approx. 2 mph. Operating Temperature: Remote transmitter, -40 to +120°F; Receiver, 0 to 150°F. Power Requirement: 120 VAC, 50/60 Hz, 6.5 watts. Dimensions: Receiver, 2½" H x 7" W x 5" D; Remote transmitter, 30" boom.

## Digital Indoor/Outdoor Thermometer

Monitor indoor/outdoor (or any two temperatures) with a big, bright, ½" high digital readout. The readout includes plus and minus signs as well as indoor and outdoor indicator lights. Select Fahrenheit or Celsius and continuous readings of one temperature or alternate readings of both. The 10' indoor and 75' outdoor cables included let you place the temperature sensors just about anywhere for a variety of custom applications — home freezer, hot house, basement, swimming pool, almost any temperature. Black Cyclac® plastic case with teak-grain vinyl inserts.

**Kit ID-1390A, Shpg. wt. 4 lbs. . . . . 74.95**

**ID-1390A SPECIFICATIONS:** Temperature Range: Fahrenheit -40 to +120°; Celsius, -40 to +50°. Accuracy: Celsius, ±1°C from -15° to +50°C, ±2°C from -30° to -15°C. Fahrenheit, ±1°F from +20° to +120°F, ±2° from -30° to +20°F. Display: 2½-digit planar gas discharge with + and - sign. Power Requirement: 110-130 VAC, 60 Hz, 4 to 6 watts approx. Dimensions: 2½" H x 7" W x 5" D.



# Digital time for every budget and decor



**\$29<sup>95</sup>**

## New Budget-Priced Digital Alarm Clock with 24-hour Alarm and Snooze Button

The perfect beginner's kit and a super-reliable timepiece too! You'll enjoy building the GC-1107 and you'll always appreciate its accuracy. Big, bright digits glow pleasantly blue-green and display the correct time in either a 12- or 24-hour format of your choosing. Automatic dimming adjusts the 4-digit hours and minutes display to ambient light conditions. A convenient "snooze" switch lets you take 9-minute "catnaps" for as long as one hour. The 24-hour alarm lets you reset the alarm for next-day operation with the flip of a switch. The GC-1107 also features an AM/PM indicator, a power-failure indicator and an alarm-on indicator. The handsome wood grain cabinet measures just 2¼" H x 7" W x 4¾" D.

Kit GC-1107, Shpg. wt. 3 lbs. . . . . **29.95**

## Stylish pedestal/tabletop digital clocks ideal for home or office

**YOUR CHOICE  
NOW ONLY**

**\$49<sup>95</sup>**  
each



Originally  
**\$74<sup>95</sup>**



## Deluxe Digital Electronic Alarm Clock

You can show off the futuristic GC-1092A in one of two ways; by itself or on a pedestal base. The bright orange six digit display is a full half-inch high for easy reading.

You'll realize the GC-1092A is one of the world's finest timepieces the minute it wakes you with a gentle intermittent "beep." There are no switches or buttons to fumble for. Just touch the Heathkit "logo" on top of the case to turn off the alarm... electronically. If you activated the snooze cycle the night before, the GC-1092A will let you enjoy up to an hour of 7-minute catnaps. Even if the power is interrupted during the night, a built-in battery power supply keeps the alarm — and you — on time, without the display. When AC power is restored, the correct time will once again be displayed, no need to reset the clock. If you wire the GC-1092A for nickel-cadmium batteries, a built-in circuit keeps them at full charge.

Deluxe features, kit price — switch-selected 12 or 24-hour (military) time format; an AM indicator light lets you set the alarm for either 9 AM or 9 PM; an automatic light sensor dims the display in dark rooms so it won't keep you awake at night and a battery-saver switch disconnects the batteries when the clock is unplugged for extended periods. A "hold" switch makes it easy to time intervals or set the clock. The handsome low-profile case in luxurious brown tones is compatible with any decor. The removable pedestal base swivels for easy viewing from any angle. Plug-in IC's and color-coded wiring make it an enjoyable kitbuilding experience. Less batteries.

Kit GC-1092A, Shpg. wt. 5 lbs. . . . . **49.95**

## Deluxe Digital Calendar Clock

The GC-1092D is virtually identical to the GC-1092A except that it features a calendar display in place of the alarm functions. The GC-1092D not only brings you the time in hours, minutes and seconds in bright orange ½"-high 7-segment digits — it also automatically, or at a touch, brings you the date in four digits for the month and day. A switch selects 12 or 24-hour time format to suit your taste, and another switch lets you display time continuously or automatically display the date two seconds out of every ten. Or, simply touch the electronically-activated control on top of the case to call up the date display for approximately five seconds any time you want it.

Stand-by battery supply takes over instantly in case of a power interruption. It also features automatic control of display brightness — bright in brightly lit areas, dim in dimly lit areas — and a switch is provided for a continuously bright display if desired.

A "hold" switch on the bottom panel makes it easy to time intervals or set the clock. A built-in charging circuit keeps nickel-cadmium batteries at full charge or you can wire the GC-1092D for non-rechargeable standard batteries. Whether you use it at the office, or around your home, you'll love the GC-1092D. Less batteries.

Kit GC-1092D, Shpg. wt. 5 lbs. . . . . **49.95**

GC-1092A & GC-1092D SPECIFICATIONS — Power requirement: 120 VAC, 60 Hz, 7 watts. Accuracy with AC line: Determined by accuracy of power line frequency. Accuracy with battery: Depending on care in initial calibration, battery discharge curve, and temperature. Dimensions: 8¾" W x 4¾" D x 2½" H (4" H with pedestal). Display: 6 digits, 7 segment neon planar.

# Heathkit electronic digital "Super-Clock"

An electronic digital floor clock with full 3¼" high numerals  
in a modern, functional etagere cabinet

**\$149<sup>95</sup>**

- *Automatic dimming circuit adjusts to room light for a charming and pleasant glow*
- *Hour and minute read-out can be seen from anywhere in the room*
- *Optional electronic Westminster Chimes build in easy for an authentic, rich "Big Ben" sound*

Add elegance with a "space-age" touch anywhere in your home! The GC-1195 "super-clock" is housed in a stylish cabinet with four smoked glass shelves for plants, books or knick-knacks — and the cabinet is finished in handsome simulated walnut-veneer laminate with anodized aluminum corner pieces.

The 3¼" high clock digits glow brightly enough to be read even in daylight, and an automatic dimming feature adjusts them to diminishing room light for a charming, subtle display in dim or darkened rooms.

The clock displays hours and minutes, with the center colon pulsing each second. A special power failure indicator circuit pulses the display brightness to show that power has been interrupted and clock must be reset. Easy time setting is accomplished by readily accessible, easy-to-use fast and slow time advance switches located on the bottom of the clock chassis. For even more charm and "Old World" distinction, add our electronic clock chimes accessory (described below).

Kit GC-1195, Shpg. wt. 72 lbs. Mailable ..... **149.95**

GC-1195 SPECIFICATIONS: Display: 3¼" diffused incandescent readout. Format: 3½-digit (12-hour) time readout. Power requirement: 108-132 VAC, 50/60 Hz, 30 watts. 216-264 VAC, 50/60 Hz, 30 watts. Dimensions: 14" W x 9½" D x 60½" H. Net Weight: 48½ lbs.

## Westminster Chimes Accessory

**\$79<sup>95</sup>** *Authentic "Big Ben" chimes sound*

Builds into the GC-1195 or GC-1197 to provide rich, electronically synthesized "Big Ben" chimes: 4 notes on the ¼-hour, 8 notes on the ½-hour; 12 notes on the ¾ hour and the full 16-note passage and hour announcement on the hour. And you can even turn on a reassuring electronic "tick-tock". Has volume and pitch adjustment, sound-decay control, "tick-tock" volume control, built-in speaker.

Kit GCA-1195-1, Shpg. wt. 3 lbs. .... **79.95**



## Digital Electronic Shelf "Super Clock"

**\$99<sup>95</sup>** *Has the same great features as our Digital Floor Clock in a handsome Shelf Clock Case*

Uses the same electronics and display as the GC-1195 floor clock, but is housed in a good-looking walnut-veneer cabinet suitable for shelf, table or desk-top use. Accepts optional GCA-1195-1 electronic chimes. Specifications same as GC-1195 above, except dimensions are 6½" H x 12½" W x 6¼" D.

Kit GC-1197, Shpg. wt. 18 lbs. .... **99.95**





**SAVE \$15**

## Convenient and versatile AM/FM Digital Electronic Alarm Clock-Radio

**\$124.95**

- "Catnap" with the 7-minute snooze button
- Stay "on time", even if AC power fails thanks to the built-in "fail safe" circuit

Here's everything you need in a quality clock-radio — 24 hour set'n forget alarm, fine sound and style that fits anywhere — kitchen, bedroom, den, office. The GR-1075 all-electronic digital clock reads out the time in conventional 12-hour format with bright orange 7-segment Beckman digits. Displays AM or PM, too. A lighted decimal pulsates to indicate seconds and also shows that the alarm is properly set. Readout features automatic brightness control. The 24-hour alarm cycle can be set to wake you with a gentle pulsating, electronic "beep" (which can be changed in volume by the radio volume control)...or by the soft music from the FM or AM radio station of your

choice. The 7-minute snooze cycle feature is repeatable for up to an hour. Two 9-volt batteries (not supplied) take over during power interruptions and keep the clock counting, without the display — when power is restored the clock is "on time" and the alarm will go off at the set time. On the front panel are finger-flip switches for on/off; AM/FM selection; radio or electronic alarm; "wake-up" alarm set; "Snooze" cycle; plus volume and AM/FM tuning controls. Black plastic cabinet with brushed aluminum trim strip, and simulated walnut-grain vinyl end panels.

**Kit GR-1075, Shpg. wt. 10 lbs. . . . . Was 139.95, Now 124.95**

**GR-1075 SPECIFICATIONS:** FM Sensitivity: 5  $\mu$ V @ 30 dB quieting. AM Sensitivity: 300  $\mu$ V/M @ 20 dB quieting. Speaker: 3" x 5" oval. Power requirement: 120/240 VAC, 50, 60 Hz; 17 watts max.; clock, 7 watts. Dimensions: 4 1/4" H x 13 3/8" W x 8 1/8" D.

### 1 Heathkit AM/FM Portable Radio

Has AFC, AGC and big up-front speaker. Operates on six "D" cells (not included), or standard AC with the optional AC adapter below. Stitched leatherette carrying case with handle. 6 3/4" H x 8 3/4" W x 4" D.

**Kit GR-17, Shpg. wt. 5 lbs. . . . . 49.95**

**GRA-43-1, AC Adapter, Shpg. wt. 1 lb. . . . . 4.95**

### 2 Solid-State AM/FM Table Radio

Has AFC, built-in AM and FM antennas, rich-sounding 3 x 5" oval speaker. High-impact plastic case, 5 1/4" H x 10" W x 4 7/8" D. 120 VAC.

**Kit GR-48, Shpg. wt. 5 lbs. . . . . 47.95**

### 3 AM Pocket Portable Radio

A perfect kit for beginners. Handsome white and black plastic case, 4" H x 7 7/8" W x 2" D. Operates on 9-volt battery (not supplied).

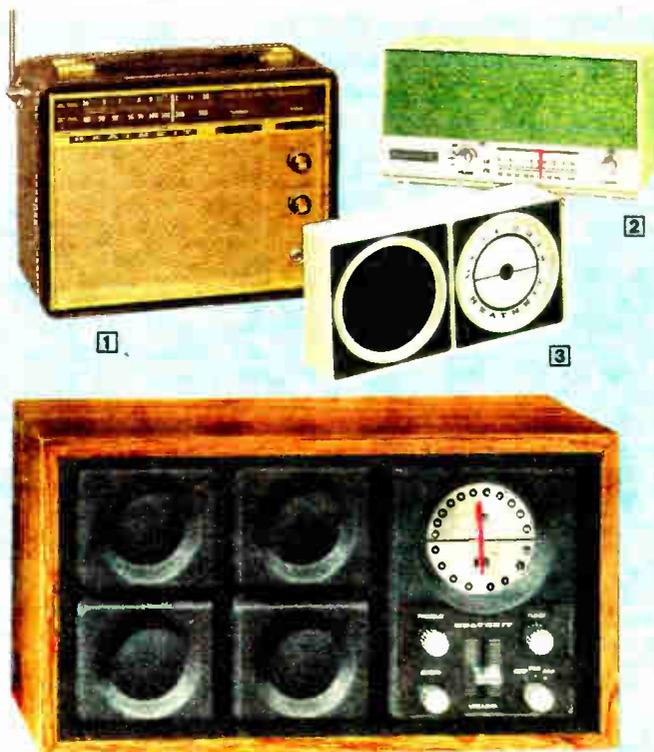
**Kit GR-1008, Shpg. wt. 2 lbs. . . . . 16.95**

## Deluxe Heathkit AM/FM Table Radio

An outstanding value, this compact and handsome table radio puts great sound anywhere you want it! Features quality solid-state circuitry, a sensitive AM/FM tuner and a full-range acoustic-suspension speaker. Its low-distortion amplifier (Power Output: 5 watts, minimum RMS, into 8 ohms with less than 1.0% total harmonic distortion from 60 Hz to 15 kHz) gives you a roomful of full-bodied sound. Separate bass and treble controls let you tailor the sound the way you like best. Handsome teak-grained vinyl-covered cabinet with molded front grille. Easy kit assembly, too, even for first-time builders.

**Kit GR-1085, Shpg. wt. 12 lbs. . . . . 99.95**

**GR-1085 SPECIFICATIONS:** FM: Sensitivity: 5  $\mu$ V. Selectivity: 60 dB. GENERAL: Power Requirement: 120/240 VAC, 50/60 Hz, 25 watts. Speaker: 4 1/2", 8 Ohm. Dimensions: 7" H x 13" W x 7 1/4" D.





**Only Heathkit TV offers custom mounting options**

Heathkit color TV's are sold without cabinets so you can do your own custom installation. Build into a wall, design your own console, etc.

**FREE! GD-1999 TV Game worth \$24.95 Free with your GR-2000. See page 12.**

Simulated TV Pictures



**GR-2000 SPECIFICATIONS:** Picture Tube: 25" (diagonal). Viewing Area: 315 sq. in. Deflection: Magnetic, 90 degrees. Focus: Electrostatic. Convergence: Magnetic. Antenna Input Impedance: VHF: 300 Ω balanced or 75 Ω unbalanced; UHF: 300 Ω balanced. Tuning Range: TV channels 2 through 83. (Preset any 16). Picture IF Carrier: 45.75 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: Output Impedance: 2200 Ω. Frequency Response: ±1 dB, 50 Hz to 15 kHz. Harmonic Distortion: Less than 1% at 1 kHz. Output Voltage: greater than 1.0V rms. Audio Output: Output Impedance: 4 Ω or 8 Ω. Output Power: 2 watts. Dimensions: 20 1/2" H x 29 1/2" W x 21 3/4" D. Power Requirements: 110 to 130 volts AC, 60 Hz, 200 watts. Net Weight: 112 lbs.

**Heathkit GR-2000 25" Diagonal Color TV offers outstanding performance and value**

**\$619<sup>95</sup>**

*This is the set that brought color TV into the digital age*

Simply touch a button on the front panel (or the optional remote control) and the sophisticated programmable digital counter sweeps up or down through any 16 pre-selected stations. And because the tuning is electronic, you eliminate noisy, unreliable turret tuners.

Even the channel numbers are displayed electronically, right on the screen. They can be adjusted to remain on the screen for up to 1 1/2 minutes or permanently if you choose. And you can recall them by changing the channel or by tapping the Volume on the remote control. Critics and owners have praised the GR-2000 for a bright, accurate color picture that seems to make programs "come alive." The picture tube provides outstanding brightness and sharpness thanks to its negative matrix and fully-illuminated phosphor dots.

The GR-2000's circuitry is some of the most sophisticated in the industry. It was the first TV to utilize a fixed IF filter which virtually eliminates adjacent-channel interference — especially important in urban areas crowded with stations. This advanced filter provides ideally-shaped bandpass and — unlike the "traps" used in most sets — it never requires

alignment. And the GR-2000 uses other advanced circuitry to assure superior performance — improved signal circuits for greater clarity and definition, DC-controlled contrast for reduced interference, an integrated circuit color amplifier for more precise, realistic tints, and an IC automatic gain control for excellent sensitivity, selectivity and noise rejection. You get a consistently excellent picture year after year.

The completely illustrated assembly manual makes it easy to feel the pride of "building it yourself." Almost all the circuitry mounts on plug-in printed circuit boards and factory-fabricated wiring harnesses minimize point-to-point wiring. You'll find that building a GR-2000 is enjoyable — and you'll be even prouder of its exceptional performance.

Because you build the set, you can service it. All the circuitry you need is built in — a digital-design dot generator, circuits for purity and convergence adjustments, vertical and horizontal centering circuits and a test meter. Much of the circuitry is accessible by pulling out the service drawer. You can keep your set in top condition with less inconvenience and expense. Shpg. wt. 147 lbs.

**Kit GR-2000, Motor Freight . . . . . 619.95**  
**Second Speaker for GR-2000. Fits in space**

on GR-2000 cabinets (where indicated). Includes all cables.

**GRA-2000-7, Shpg. wt. 2 lbs. . . . . 9.95**



**Digital Clock**

Shows time in hours, minutes and seconds in white numerals.

**Kit GRA-601, Shpg. wt. 1 lb. 35.95**

**Ultrasonic Remote Control**

Armchair control of on/off, color controls, digital readout and channels. Includes receiver for in-chassis mounting, hand-held transmitter. Operates up to 20 ft. from set.



**Kit GRA-2000-6, Shpg. wt. 4 lbs. . . . . 99.95**

**SPECIAL WARRANTY SERVICE PLAN FOR SOLID-STATE TV MODULES!**

If a component proves defective during the 90-day period, the modules will be serviced with no charge for parts or labor. If the problem is due to a construction error, the modules will be inspected and serviced at a charge of \$5.00 per module. After the 90 day warranty has expired, the module service fee is \$5.00 per module plus parts. All picture tubes warranted for two full years.

## GR-2000, 2001 Color TV Cabinets



**Contemporary cabinet.** Constructed of solids and veneers; oiled walnut finish. 28 $\frac{3}{4}$ " H x 48 $\frac{1}{4}$ " W x 20 $\frac{3}{4}$ " D. (24 $\frac{1}{4}$ " D including cup).  
GRA-602-25, Shpg. wt. 78 lbs. Motor Freight 174.95

**Compact contemporary cabinet.** Beautifully finished in luxurious oiled walnut finish. Fully assembled with cutout for one speaker. 34 $\frac{3}{4}$ " H x 33 $\frac{3}{4}$ " W x 20 $\frac{3}{4}$ " D. (24 $\frac{1}{4}$ " D including cup).  
GRA-608-25, Shpg. wt. 76 lbs. Motor Freight 139.95



**Mediterranean cabinet with doors.** Accepts 2 speakers. Dark oak finish. 29 $\frac{3}{4}$ " H x 48 $\frac{1}{4}$ " W x 23 $\frac{3}{4}$ " D. (26 $\frac{3}{4}$ " including cup).  
GRA-605-25, Shpg. wt. 125 lbs. Motor Freight 279.95



**Early American cabinet.** Twin speaker capability. Distressed maple finished. 31 $\frac{3}{4}$ " H x 47 $\frac{1}{4}$ " W x 20 $\frac{1}{2}$ " D. (24 $\frac{1}{4}$ " D including cup).  
GRA-603-25, Shpg. wt. 83 lbs. Motor Freight 184.95



**Mediterranean cabinet.** Accepts 2 speakers. Dark oak finish. Hardware features Antique Gold finish. 30 $\frac{3}{4}$ " H x 49 $\frac{1}{4}$ " W x 20 $\frac{3}{4}$ " D. (24 $\frac{1}{4}$ " D. incl. cup).  
GRA-604-25, Shpg. wt. 95 lbs. Motor Freight 184.95



For GR-900 Color TV Only. 30 $\frac{3}{8}$ " H x 48 $\frac{3}{4}$ " W x 20 $\frac{3}{4}$ " D. (23 $\frac{1}{2}$ " D with cup). Allow 10 weeks for delivery.  
GRA-404-25, 91 lbs. Motor Freight 199.95

## Antennas and accessories designed for better reception



### Antennas for Crisp Reception

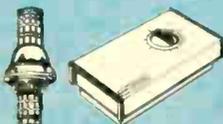
"Super Antenna". VHF-UHF-FM. 60 elements, F/B signal rejection: VHF Lo, 21 dB; hi, 22 dB; UHF, 22 dB. 190" boom. 105" turning radius. Includes removable FM blocking elements.

GD-1461, 300 ohms, less mast and cable.  
Shpg. wt. 17 lbs. Motor Freight 84.95  
75-ohm 89.95\*

Deluxe "Fringe" Antenna. Not shown. Excellent VHF/UHF reception in "weak signal" or fringe areas. 131" boom, 80" turning radius.

GD-1441, 300 ohm, less mast and cable.  
Shpg. wt. 25 lbs. 39.95  
75-ohm 44.95\*

\*Includes GD-298 and GD-1054 to convert to 75 ohms. Reg. \$8.90 - Only \$5 with antenna.



### Cornell-Dubilier Rotor System

Consists of control box and rugged outdoor rotor for dramatically improved TV and FM reception. The perfect match for your GR-2001 Television and optional GD-1184 Rotor control. Let your GD-1184 automatically control the GDP-1176 for optimum viewing enjoyment. Heavy-duty 1 rpm rotor has positive automatic stop, instant reverse. Supports antennas to 150 lbs. Lower mast clamp accepts  $\frac{7}{8}$ " to 2" dia. masts. Has solid-state control box for year after year reliability, 360° rotor control, plugs into AC outlet. Installation is quick and easy. Requires 5-wire cable (not supplied).

GDP-1176, Shpg. wt. 14 lbs. 59.95



### CB Trap Filter

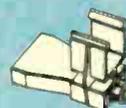
Cuts out unwanted CB interference to give you improved picture quality. Connects directly to TV antenna terminals on your set. 300 ohm impedance. No assembly is required.  
GD-1239, Shpg. wt. 1 lb. 6.95



### 75/300 Ohm Transformer-Splitter

Matches one 75 ohm coax cable to separate 300 ohm VHF and UHF leads. Has extremely low loss and is perfect for use with home cable TV installations. 82 channel. Has no-strip pre-attached leads for extra convenience.

GD-298, Shpg. wt. 1 lb. 4.95



### Matching Transformer

Converts 300 ohms to 75 ohms for coax. Use with your GD-1461 or GD-1441 to convert them to 75 ohm coax down-lead. Very low loss. 82 channel. The ideal starting point for conversion to your own in-home cable-TV system.

GD-1054, Shpg. wt. 1 lb. 3.95

### Coax Cable

100 feet of high quality low loss RG-59U coax cable. Use in conjunction with GD-298 and GD-1054. Comes complete with antenna boot and connectors (installed). Long life, weather resistant. Needs matching transformers at both ends.  
GD-328, Shpg. wt. 4 lbs. 10.95

## Carry Anywhere Black and White Portable TV

# \$179<sup>95</sup>

- 12 VDC or 120 VAC operation
- Exceptional 12" diag picture

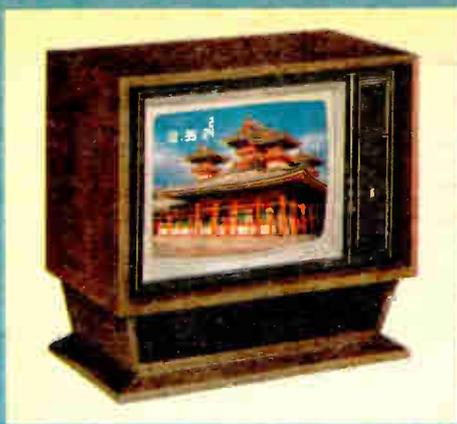
At home, the GR-104C plugs into a wall outlet. In your car, camper or boat, it works right from your 12-volt battery system. Outdoors, you can use it with its optional self-contained battery pack as a go-anywhere portable. Any way you use it, you'll get a crisp, clean, clear black-and-white picture of unsurpassed quality. Three video IF amplifiers provide superior gain and a 4-circuit VHF "memory" tuner brings in each VHF station with real precision. Has regulated power supply for drift-free operation, all-channel detent tuning, lighted channel indicators, telescoping antenna for VHF and a loop antenna for UHF. Rugged high-impact case with carrying handle for easy portability. Easy kit assembly with two circuit boards and a wiring harness. The VHF and UHF tuners are factory assembled and aligned. A battery-charging circuit is included with the optional Battery Pack. When the Battery Pack is connected to the TV Set and the line cord is plugged into an AC receptacle, the battery automatically begins to recharge as soon as the set is turned off.



Kit GR-104C, Shpg. wt. 35 lbs. 179.95  
Kit GRA-104-3, Optional Battery Pack, 10 lbs. 64.95

GR-104C SPECIFICATIONS: Picture Size: 74 sq. in. viewing area, 12" picture diagonal. Deflection: Magnetic, 110 degrees, 20 mm neck. Focus: electrostatic. Antenna Input Impedance: 300 ohm balanced. Tuning Range: VHF TV channels 2 through 13 (memory-type fine tuning). UHF TV channels 14 through 83. Picture IF Carrier: 45.75 MHz. Sound IF Carrier: 41.25 MHz. Sound IF: 4.5 MHz. Video Response: To 3.5 MHz. Audio Power Output: 500 mW into 24 ohm load. Power Requirement: 110-130 volts, AC, 48 watts; 12 volts DC at 24 watts. Overall Size: 11 $\frac{1}{2}$ " H x 15 $\frac{3}{4}$ " W x 9 $\frac{3}{4}$ " D.

# Home Entertainment from Heath!



## GR-2050 21" (Diagonal Measure) Color TV Kit

Has the same outstanding features and specifications as the GR-2000 but with 21" diagonal screen.

Kit GR-2050, with chassis, picture tube, one speaker. Shpg. wt. 122 lbs., Motor Freight .....579.95  
**GRA-2050-1**, Contemporary Cabinet, Shpg. wt. 74 lbs., Motor Freight .....134.95  
 Optional Remote Control  
 Kit **GRA-2000-6**, Shpg. wt. 4 lbs. ....99.95  
 Optional On-Screen Digital Clock  
 Kit **GRA-601**, Shpg. wt. 1 lb. ....35.95

GR-2050 SPECIFICATIONS: Same as GR-2000 pg. 97, except Picture Tube: 21" diagonal. Dimensions: 18 $\frac{1}{2}$ " H x 26 $\frac{1}{2}$ " W x 19 $\frac{1}{4}$ " D.



GR-500



GR-400  
Simulated TV Pictures

Both with **FREE** GD-1999! See below.

## Small Screen TV with Outstanding Features and Performance!

Both feature precision in-line gun color tubes with negative matrix screen for outstanding contrast and brightness. Have on screen channel display, automatic fine tune; and once contrast, brightness, color and tint controls have been set...a touch of the PPC button returns picture to perfection instantly! Also feature four tuner circuits, instant-on, hi-fi output jack, and speaker defeat switch.

Kit **GR-500**, less cabinet, Shpg. wt. 101 lbs., UPS .....539.95

**GRA-500-1**, walnut veneer table model cabinet (main illustration), 17 $\frac{1}{4}$ " H x 25 $\frac{1}{2}$ " W x 14" D (17" D including cup), Shpg. wt. 28 lbs., UPS .....51.95

Kit **GR-400** (less cabinet), Shpg. wt. 77 lbs., UPS .....484.95

**GRA-400-1**, walnut-veneer cabinet (16 $\frac{1}{2}$ " H x 24 $\frac{1}{2}$ " W x 12 $\frac{3}{4}$ " D), (15 $\frac{3}{4}$ " D including cup). Shpg. wt. 26 lbs., UPS .....39.95

**GRA-403-18**, roll-around cart. 22" H x 27" W x 15 $\frac{1}{2}$ " D. Shpg. wt. 17 lbs., UPS .....24.95

**GRA-601**, Digital Clock Accessory, Shpg. wt. 1 lb. ....35.95

GR-500, -400, SPECIFICATIONS: Deflection: Magnetic, 90 degrees. Focus: Electrostatic. Convergence: Magnetic. Antenna input impedance: VHF: 300  $\Omega$  balanced or 75  $\Omega$  unbalanced. UHF: 300  $\Omega$  balanced. Tuning range: TV channels 2 through 83. Picture IF carrier: 45.75 MHz. Color IF carrier: 42.17 MHz. Sound IF frequency: 4.5 MHz. Video IF bandwidth: 4.08 MHz at 6 dB down. HI-FI output impedance: 2200  $\Omega$ . Frequency response:  $\pm 1$  dB, 50 Hz to 15 kHz. Harmonic distortion: less than 1% at 1 kHz. Output voltage: greater than 1.0V rms. Audio output impedance: 8  $\Omega$ . Output power: 1 watt. Power requirement: 110-130 VAC, 60 Hz, 200 W.



**SAVE \$25!**

## GD-1999 Universal Color TV Game

For hours of fast-paced action connect the GD-1999 to your TV and name your game: Tennis, ice hockey, or handball for two or play one against the machine. The ball is always served off the face of the racquet and after 4 volleys ball speed automatically increases for added realism and excitement. The GD-1999 goes together in about an hour and the game board is fully assembled and tested. The unit is designed for permanent connection to your set and will not interfere with its normal operation. The two game controllers have 10 foot connecting wires so you can operate and reset the games from your favorite easy chair. FCC Type Approved.

Kit **GD-1999**, Shpg. wt. 3 lbs. .... Was 49.95 Now 24.95  
**FREE** with purchase of any Heathkit color TV! Specify GD-1999 and color TV model no. on order blank.



## Channel F — Video games you'll never tire of

Always a challenge, the exciting Fairchild Channel F is the one video game that doesn't grow obsolete. New challenges await by simply changing one Videocart™ cartridge (order below) for another. FCC Type Approved. Fully Assembled.

Model **GD-1240**, Unit only. Shpg. wt. 11 lbs. ....149.95

Videocart™ Channel F Game Cartridges

**GDA-1240-1**, Tic-Tac-Toe, Shooting-Gallery, Doodle, Quadra-Doodle, (1 player)

**GDA-1240-2**, Desert Fox Tank Battle (2 players), Shooting Gallery (1 player)

**GDA-1240-3**, Blackjack and Double-Blackjack (1 or 2 players)

**GDA-1240-4**, Spitfire, an exciting airplane dogfight (1 or 2 players)

**GDA-1240-5**, Spacewar, battling space-

ships (2 players)

**GDA-1240-6**, Math Quiz (Add & Subtract)

**GDA-1240-7**, Math Quiz (Mult. & Div.)

**GDA-1240-8**, Magic numbers logic games (1 player)

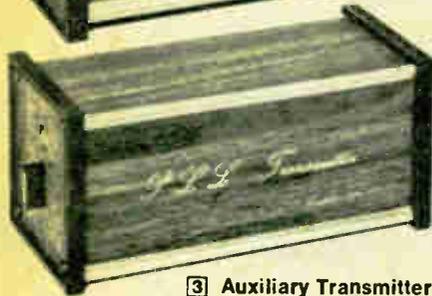
**GDA-1240-9**, Dragstrip (1 or 2 players)

**GDA-1240-10**, Maze Games (1/2 players)

**GDA-1240-12**, Baseball (2 players)  
 Each Cartridge, Specify Model No., Shpg. wt. 1 lb. ....18.95

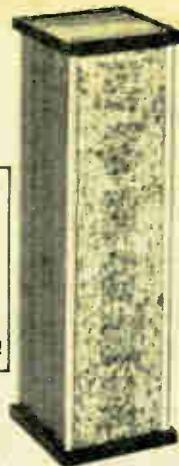


1 Central Processor

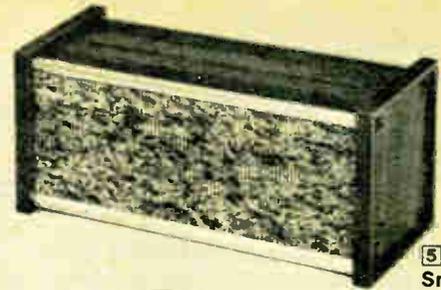


3 Auxiliary Transmitter

**SAVE!**  
Purchase the Central Processor and any two or more additional units (including GD-1156) and deduct 5% from the total price!



2 Ultrasonic Detector



5 Smoke/Fire Detector



4 Emergency Transmitter



6 On-Off Transmitter

## Heathkit "Total Security" Wireless Alarm Systems For Home or Business

**1 Central Processor Module.** The "heart" of the Heathkit wireless security system, the central processor responds to signals from any of the other modules (2 thru 6 described below) to sound the alarm. Has tamper-proof circuit that sounds alarm if AC power fails, penetrating built-in siren and outputs for external speaker and phone dialer. Time delay circuit and automatic reset provide added protection and convenience. With batteries. 4½" H x 10⅞" W x 6" D.  
Kit GDA-1158-1, Shpg. wt. 8 lbs. .... 179.95

**2 Ultrasonic Detector Module.** Protects an area up to 300 sq. ft. When any object enters the field, sends signal to Central Processor. Each unit plugs directly into AC outlet. Use as many as needed as long as areas covered do not overlap. 10⅝" H x 3¼" W x 3¼" D. Note: ultrasonics operate in the same frequency range as the Heath TV remote controls, so interference between the two is possible.  
Kit GDA-1158-2, Shpg. wt. 3 lbs. .... 84.95

**3 Auxiliary Transmitter Module.** Lets you add door/window switches, mat pressure switches and other sensors to the system. Switches

must be either all Normally Open or all Normally Closed. Transmits signals to Central Processor. 3¼" H x 7¼" W x 3¼" D.

Kit GDA-1158-6, Shpg. wt. 2 lbs. .... 47.95

**4 Emergency Transmitter Module.** Place anywhere you need them for total protection — lets you send a signal to Central Processor by simply pushing the button. Plugs into any AC outlet. 1¾" H x 5" W x 3¾" D.

Kit GDA-1158-4, Shpg. wt. 2 lbs. .... 36.95

**5 Early Warning Smoke/Fire Detector.** Use with GD-1158 Central Processor or by itself with its built-in speaker. Solid-state sensor detects gases generated before flames or intense heat begins. A built-in thermal switch also activates the alarm when the temperature exceeds 135° F (57°C). Has sensitivity control, "armed" light, automatic reset. 7¼" W x 3¼" H x 3¼" D.

Kit GDA-1158-5, Shpg. wt. 3 lbs. .... 84.95

**6 On/Off Transmitter Module.** Turns off Central Processor with a push of the button. Plugs into any AC outlet. To turn Processor on again, simply release the button. 1¾" H x 5" W x 3¾" D.

Kit GDA-1158-3, Shpg. wt. 2 lbs. .... 36.95

**Outdoor Speaker (Not shown).** Weatherproof speaker connects to Central Processor, sounds alarm outdoors so it can be heard through the neighborhood. All-weather design. Includes mounting hardware.  
GDA-1158-7, Assembled. Shpg. wt. 3 lbs. .... 24.95

### Informer® ultrasonic alarm



Sits on bookshelf or table, sounds alarm if an intruder enters its field of surveillance. Transmits ultrasonic signal up to 25 feet away for effective room protection. Triggers indoor or outdoor alarms, lamps, buzzers, etc. Has automatic reset, built-in time delay. 2⅝" W x 10⅞" H x 7½" D. For 120/240 VAC. See GDA-1158-2 note above.

Kit GD-39, Shpg. wt. 5 lbs. .... 54.95

GDA-39-1, Indoor buzzer alarm. 1 lb. .... 11.95

GDA-39-2, Outdoor Bell. Shpg. wt. 5 lbs. .... 29.95

### Low-cost photoelectric Lamp Switch

Turns lights on in the evening, off in the morning, gives your home a "lived in" appearance when you're away. For incandescent lamps up to 150 watts. Simply plug into AC outlet and adjust sensitivity. Great 1-evening get-acquainted kit too.

Kit GD-600, Shpg. wt. 2 lbs. .... 5.95

### Automatic Telephone Dialer brings help fast

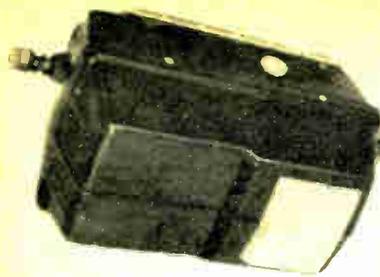


Perfect for vacation homes, warehouses, any remote location

**\$179<sup>95</sup>** | Our Lowest Price Ever!

The alarm to have for unattended areas or when you're away for an evening. Automatically dials a number you preselect — relatives, neighbors, etc., when alarm is triggered. Can be used with intrusion alarms, pressure switches, panic buttons, the GD-1158 security system, etc. Has automatic redial if line is busy, 3-digit location code, separate microphone. Battery-powered to operate if AC power fails. 4¾" H x 11" W x 6" D. With batteries. Check with phone company for installation requirements, if any.

Kit GD-1156, Shpg. wt. 7 lbs. .... 179.95



# New Heathkit Garage Door Opener now with improved electronics

Low As  
**\$174<sup>95</sup>**

- **Stop Fighting Heavy Garage Doors in Bad Weather**
- **Door instantly reverses and returns to full open if obstructed**

The GD-3309 garage door is an investment that really pays off in time and labor saved, convenience and extra security. Simply touch the button on the wireless transmitter in your car—your garage door opens automatically and the garage light turns on. Drive into the garage, touch the button again, and the garage door closes behind you. Has a powerful 1/3 hp motor that opens even the heaviest residential garage doors (up to 7 1/2' maximum height) with ease; responsive, self-lubricating screw drive. The adjustable slip clutch provides opening safety, stopping the door automatically if obstructed. When the door is closing, the important safety reverse feature takes over. If the door encounters ANY obstruction it stops and reverses instantly, and returns to full open position. Assembly is really easy, there's absolutely no soldering! Connecting leads are pre-cut and push-on connectors are already installed. A separate doorbell-type switch and 20' cable let you operate the unit from inside your house, or anywhere you may choose.

**Kit GD-3309A, Transmitter, Receiver, Mechanism.**

Shpg. wt. 45 lbs. Motor Freight ..... **174.95**

**Kit GD-3309B, Two Transmitters, Receiver, Mechanism.**

Shpg. wt. 46 lbs. Motor Freight ..... **189.95**

**Kit GDA-3309-1, Mechanism only.** Shpg. wt. 44 lbs. Motor Frt. . . **139.95**

**Kit GDA-3209-2, Adaptor for jamb and pivot doors.** 3 lbs. .... **11.95**

**GDP-3309, 1 Transmitter only.** Shpg. wt. 1 lb. .... **24.95**

**GDP-3319, 1 Transmitter, 1 Receiver.** (3-wire system) 1 lb. .... **49.95**

**GDP-3329, 2 Transmitters, 1 Receiver.** (3-wire system) 2 lbs. . . **64.95**

**GDA-3309-3, Power Transformer.** Allows use of new transmitter and receiver with any 2-wire system door openers and model 309 below. Shpg. wt. 1 lb. .... **5.95**

GD-3309 SPECIFICATIONS: Overall Size: 120" L x 12" H x 9" W. Motor: 117 VAC 1/3 HP. Open and Close Time: Approx. 12 seconds. Mounting Clearance: 3" above highest point of door travel. Safety Lamp: Delay circuit keeps lamp on 1 to 3 minutes. UHF TRANSMITTER: Powered by standard 9-volt battery. RF Frequency: 350 MHz. Useful Temperature Range: -50°F. to +140°F. UHF Receiver: Powered by 24 VAC from opener mechanism. Usable on any 3-wire mechanism or 2-wire with addition of GDA-3309-3. RF Frequency: 350 MHz.



## New factory assembled transmitter and receiver with latest circuitry

The fully assembled transmitter and receiver in the GD-3309 system incorporate the latest in solid-state electronics for improved security and reliability. The units are digitally coded with 250 code combinations, so you can set and change your own code anytime. The improved electronics provides greater immunity to external signals too—helps prevent false operation from other garage door openers, CB and Amateur transmitters, television, radios, etc. The transmitter and receiver units come fully assembled and ready to use. They are FCC approved and usable with standard NEC 3-wire systems.



## Up-Down Limiters

Permanently installed limiters let you adjust amount of door travel so door coasts smoothly to proper position, open or close.

## Build and install this "economy" chain-drive opener over the weekend



**\$134<sup>95</sup>**

- **Safety-Reverse Feature—Door instantly reverses and returns to full open if obstructed**
- **Factory-assembled transmitter and receiver and GDA-3309-3 Power Transformer**

A powerful quarter-horsepower chain-drive opener at a great kit price! Operates standard 7 1/2' track doors or jamb and pivot doors with GDA-3309-2 adaptor, or "California" style doors with GDA-309-3 Speed Reducer Adaptor. Self-locking, automatic reversing, Quick-release pin. Includes "doorbell" button & wire for manual door operation.

**Kit GD-309-C, Transmitter, Receiver, Mechanism, 49 lbs. .... 134.95**

**Kit GD-309-D, 2 Transmitters, Receiver, Mechanism, 49 lbs. .... 149.95**

**Kit GDA-309-1, Mechanism only, Shpg. wt. 42 lbs. .... 104.95**

**Kit GDA-309-2, Adaptor for jamb & pivot door, Shpg. wt. 2 lbs. . . 5.95**

**Kit GDA-309-3, Adaptor for vertical-opening**

**1-pc "California" style doors, Shpg. wt. 4 lbs. .... 11.95**

To order additional transmitters & receivers, see listing under GD-3309A and GD-3309-3 Transformer above.

NOTE: This economy opener is mailable—for lower shipping costs!

GD-309C SPECIFICATIONS: Overall Size: 123" L x 10" H x 8 1/2" W. Motor: 120 VAC 1/4 HP. Open and Closing Time: Approx. 9 sec. for 7' door. Control: Wall-mounted, doorbell-type pushbutton switch, or optional devices (transmitter-receiver, key switch, etc.). Safety: Door travel reverses instantly and returns to full open position when obstructed. Overhead Mounting Clearance: 2 1/2" above highest point of door travel. Safety Lamp: 60 watts. Automatically turns on when the door is fully open and stays on until door starts to close.

## Heathkit/Dana CS-1048 Electronic Speed Control

**SAVE \$15**

**\$69.95**

Was \$84.95

- Reduces driver fatigue
- Fits most domestic cars, vans and light trucks
- For both manual and automatic transmissions

Long distance drivers will really appreciate the CS-1048. It makes the most of famous Dana Corp. technology and a crystal clear Heath instruction manual for easy installation. Just accelerate to your desired cruise speed, press a button and the CS-1048 will electronically maintain it uphill or downhill. A touch on the brake pedal disengages the unit or the manual override may be used. A "memory" remembers the cruise speed and returns the vehicle to that speed, at the push of a button, after the brake has been applied to slow down.

Unlike most speed controls, the CS-1048 may be used on vehicles having manual as well as automatic transmissions. The only prerequisite for installation is that the vehicle have an open driveshaft as most American and many foreign cars do. (Not for front wheel drive or transaxle vehicles). You can remove it from one vehicle and reinstall it on another even if the two makes are different. It comes completely assembled so that only installation on the vehicle is necessary. Installation is comprised basically of four operations; mounting the control unit on the turn signal arm, installing the electronic control module under the

dash, connecting the vacuum servo to the throttle and mounting the speed transducer unit adjacent to the driveshaft.

The CS-1048 operates on 12 VDC, and weighs

less than 5 pounds total and the control unit is designed to mount inconspicuously on the turn signal arm within easy reach of the driver

**CS-1048, 7 lbs. . . . . Was 84.95, Now 69.95**

**NOTE:** While the CS-1048 comes fully assembled and tested, installation on the vehicle is necessary. Installation requires a certain amount of mechanical knowledge and proficiency. Modifications must be made to the throttle linkage and work must be performed under the vehicle to install the speed transducer unit. If you are uncertain of your abilities, you may wish to employ the services of a qualified auto mechanic.



## Heathkit GD-18 Deluxe Mobile Siren/PA

It's a 55 watt siren with automatic or manual "wail," a 20 watt PA to amplify your voice, or a radio call alert when you're away from your vehicle. Has push-to-talk mike. **NOTE:** Please check the required standards for mobile sirens in your area.

**Kit GD-18**, Shpg. wt. 6 lbs. . . . . **69.95**

**Assembled WD-5130**, siren/PA amp, Shpg. wt. 6 lbs. . . . . **109.95**

**Assembled GDA-18-1**, exterior horn, Shpg. wt. 10 lbs. . . . . **69.95**

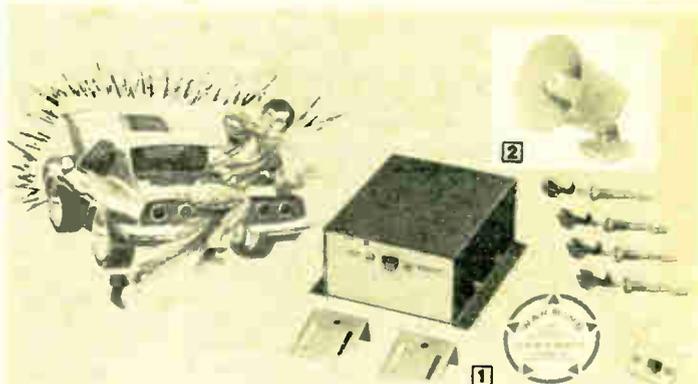
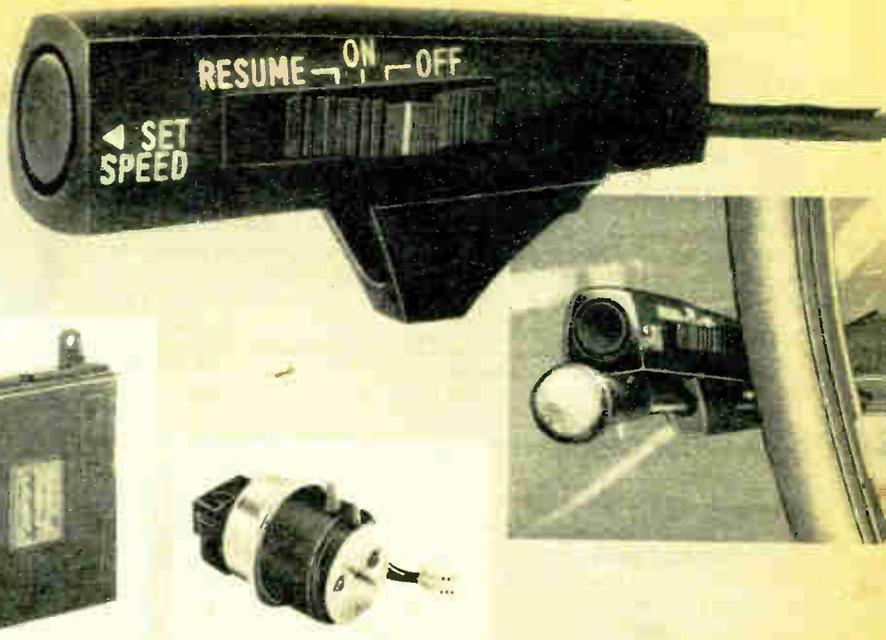
**Kit GDA-18-2**, concealed horn (requires 4½" x 4½" x 13" behind grille), Shpg. wt. 10 lbs. . . . . **69.95**

**Assembled WDA-5130-2**, concealed horn, Shpg. wt. 10 lbs. . . . . **89.95**

**SAVE \$7.95 on systems!** If purchased separately, 138.90

**GD-18A** (Kit GD-18 and Exterior Horn) Shpg. wt. 21 lbs. . . . . **126.95**

**GD-18B** (Kit GD-18 and Concealed Horn) Shpg. wt. 21 lbs. . . . . **126.95**



## Heathkit Mobile Security System

Ideal for cars with CB rigs, tape players, etc. Under-dash alarm set switch has a 5-15 second adjustable delay so you can enter or leave your car without sounding the alarm. An optional horn relay adapts the GD-1157 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 sounding the car horn. With all switches and hardware. Alarm unit, 2½" H x 4¾" W x 5" D. For 12 VDC negative ground only.

**1** **Kit GD-1157**, Shpg. wt. 3 lbs. . . . . **24.95**

**2** **Kit GDA-1157-1**, Optional Siren Accessory, 2 lbs. . . . . **21.95**

**Kit GDA-1157-2**, Optional Horn Relay (not shown).

Shpg. wt. 1 lb. . . . . **2.95**

## Easy-to-build Digital Readout Tachometer

Reads your engine's RPM, even in direct sunlight, on the 1/2"-tall numeric display. The readout shows 1st 2 digits, multiply by 100 for actual rpm. A dimmer control adjusts the brightness for safe nighttime driving. The CI-1079 operates with conventional ignition systems, capacitive discharge systems (like the Heathkit Model CP-1060), and factory electronic ignitions. For 4, 6, 8 cylinder 4-cycle engines; 2, 3, 4 cylinder 2-cycle engines; 2, 3, 4 rotor Wankels. Easy installation — simply connect the CI-1079 directly to the primary side of the ignition coil. For engines with magnetos or without access to the primary, order the optional inductive pickup below.

Kit CI-1079, Shpg. wt. 3 lbs. .... 59.95  
 Kit CIA-1079-1, inductive pickup, Shpg. wt. 1 lb. .... 6.50

CI-1079 SPECIFICATIONS: Power Requirement: 12 V, neg. gnd. only. Readout Accuracy: ±4% of reading, ±1 count. Update Time: 0.3, 0.2 or 0.15 seconds, depending on calibration point. Size: 1 7/8" H x 4 5/8" W x 4 3/4" D.

## Digital Car Clock with 20-hour Trip Timer

A totally electronic, totally reliable timepiece, typically accurate within one minute per month. Bright, easy-to-read 1/2" high numerals display the time in hours and minutes. A built-in elapsed timer displays elapsed time in minutes and seconds, for the first 20 minutes. After that, the elapsed time is displayed in hours and minutes up to 19 hours — 59 minutes. "Clock/ET" button lets you display either clock time or elapsed time, while the other function continues in the memory. Built-in AM or PM indicator. Includes all hardware required to mount the unit on or under the dash of your car, boat, camper, or motorcycle. Die-cast case.

Kit GC-1093, Shpg. wt. 3 lbs. .... 69.95

GC-1093 SPECIFICATIONS: Power Requirement: 10-17 VDC, neg. ground only. 300 mA max., display on. 30 mA max., display off. 4.5 volts minimum for clock memory. Accuracy: one min. per month, typical. Temp. Range: -30 to +60°C. Format: 12 hrs. with AM, PM and 20-hour rally timer. Dimensions: 1 7/8" H x 4 5/8" W x 4 3/4" D. Net Weight: 1 lb. 4 oz.

## Digital Electronic MPG Monitor/Speedometer

An important driving accessory for every car! The CI-1078 reads 0-99.9 miles-per-gallon and 0-99 miles-per-hour on bright amber-orange 1/2"-high digits. As a miles-per-gallon monitor it helps you save gas and money every time you drive, as an electronic speedometer it gives you a much more precise reading than conventional speedometers. Has a dimmer control to adjust the display for comfortable night driving, handsome die cast case with burl-grain vinyl insert. Includes all hardware for mounting in or under the dash, or on car's floor hump. **Please Note.** Ingenuity and good mechanical skill is necessary for transducer installation. You may wish to employ a qualified mechanic to install the transducers for you (fuel flow transducer installation involves cutting and removing a portion of the fuel line). Since every make and model of car is different, we cannot provide exact information for every car. The CI-1078 is not compatible with fuel injected engines or diesels. Heath cannot be responsible for damages, labor charges or replacement parts associated with transducer installation. When ordering, please specify make, model and year of your car. Be sure your car is included in the speed transducer listing below. We cannot provide information on other models.

**Note: The kits below differ only in the speedometer transducer supplied. Order the one that fits your car.**

CI-1078-1. For speedometer cable mounting on: '55-'68 Chrysler Corp. Cars. '55-'71 Chrysler Corp. trucks; '55-'68 GM cars (except Opel); '55-'71 GM trucks (except LUV); '55-'68 Ford cars; '55-'72 Ford Trucks (except Courier); '55-'71 American Motors Cars; '72-'77 Gremlin, Sportabout and Hornet; '55-'66-Studebaker; '55-'77 Jeep; '55-'77 English Ford. For Cruise Control mounting on '69-'77 Chrysler Corp. cars; '69-'77 GM cars (except Opel); '55-'77 Ford cars.

Kit CI-1078-1, Shpg. wt. 5 lbs. .... 109.95

CI-1078-2. For transmission mounting on: '69-'77 GM cars (except Opel); '72-'77 GM trucks (except LUV); '69-'77 Chrysler Cars except Colt and Cricket; '72-'77 Chrysler trucks.

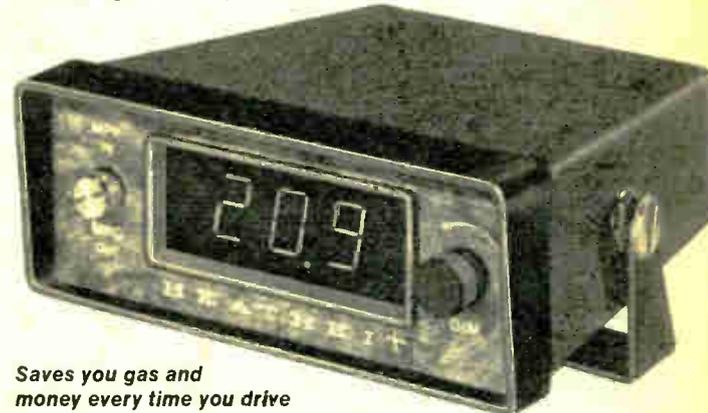
Kit CI-1078-2, Shpg. wt. 5 lbs. .... 109.95



Helps you find the best operating efficiency for your car or boat engine



Quartz-crystal timebase insures high accuracy



Saves you gas and money every time you drive

CI-1078-3. For transmission mounting on: All Opel cars; '72-'77 Audi; '55-'77 BMW; '55-'77 Mercedes; '55-'72 Saab; '55-'77 Volvo. For speedometer mounting on '55-'77 Porsche and VW.

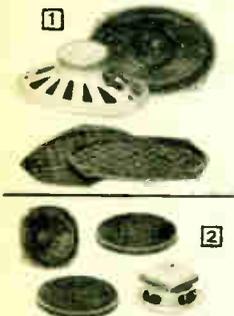
Kit CI-1078-3, Shpg. wt. 5 lbs. .... 109.95

CI-1078-4. For speedometer mounting on: '69-'77 Ford cars; '73-'77 Ford trucks (except Courier).

Kit CI-1078-4, Shpg. wt. 5 lbs. .... 109.95

CI-1078 SPECIFICATIONS: Display: 3 digits, gas discharge. 0-99.9 miles per gallon. 0-99 miles per hour. Controls: Front — mpg/mph pushbutton switch, display dimmer. Rear — update control, mph calibration, mpg calibration. Speed transducer: DC generator. Flow transducer: Photo resistor sensor measures fuel flow, 1.5 to 12 gallons per hour with accuracy ±3% of maximum flow rate. Electronics: Accuracy, ±2% of maximum reading. Temperature Range: 0-60° C operating, -40° to +70° C storage. Power requirements: 10 to 17 VDC at 500 mA; 13.5 to 17 volts required to meet specifications. Display unit dimensions: 1 7/8" H x 4 5/8" W x 4 3/4" D. Display unit weight: 2 lbs.

## Heathkit FM Car Stereo Tuner



### Put true hi-fi sound in your car

Offers the kind of performance you'd expect from a home system — less than 1% THD; frequency response  $\pm 1$  dB, 30 to 15,000 Hz; 3  $\mu$ V sensitivity; 60 dB selectivity; 40 dB nominal separation. Has phase-locked loop demodulator, muting circuit to eliminate noise between stations; AFC; stereo indicator light. Requires power amp. (below).

Kit **CR-1000A**, Shpg. wt. 7 lbs. .... **79.95**

Kit **CRA-1000-1**, Power amp., fits back of tuner, for 12V battery.

Shpg. wt. 3 lbs. .... **34.95**

**1** **CRA-1000-5**, 6" x 9" 4-ohm rear deck mount hi-fi speakers (including grilles and 24' speaker lead). Shpg. wt. 7 lbs. .... (pair) **23.95**

**2** **CRA-1000-2**, 4½" 4-ohm door-mount hi-fi speakers (including grilles, adapter plates for most speaker size openings and 24' speaker lead). Shpg. wt. 7 lbs. .... (pair) **17.95**

### Windshield Wiper Delay



Ideal safety accessory for driving in light mist and fog. Eliminates constant wiper arm movement when an occasional sweep is sufficient. Lets you vary the time between sweeps. Molded plastic case mounts on or under dash.

Kit **CH-1068**, Shpg. wt. 2 lbs. . . **17.95**

**CH-1068 SPECIFICATIONS** — Delay Interval: 5 to 30 seconds minimum. Sweeps interval: .5 to 10 seconds minimum. Input voltage: 13.8 volts DC,  $\pm 20\%$ . Positive or negative ground. Wiper System Compatibility: (Electric Only) GM: All single and two speed systems. Ford: Most small and intermediate models. Not compatible with full size models or '72-76 Torino, or Montego, '74-'76 Cougar. Chrysler: Single and two speed systems on small and intermediate models which do not use a motor reversing parking system. Ask dealer about your car's system. AMC: Single and two speed systems. Other models: Electric wipers which do not use a motor reversing parking system. NOTE: Heath does not supply automotive wiring diagrams for this unit.

### Emergency Strobe Light



Makes you visible so emergency help gets there quick! Just insert the adaptor plug provided into your car's cigarette lighter. A 12 ft. cord lets you place the flashing light in any spot on the car. Has non-marring magnetic base plate, highly visible flashing strobe with amber dome lens. High-impact plastic case is moisture and corrosion resistant, has storage for cable.

Kit **GD-1026**, Shpg. wt. 3 lbs. .... **34.95**

**GD-1026 SPECIFICATIONS**: Supply voltage range: 13.8 VDC  $\pm 20\%$ . Power consumption: 5 watts nominal. Flash voltage range: 450 VDC  $\pm 20\%$ . Flash repetition rate: greater than 1 per sec. Operational temperature range:  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .



**\$39.95**

Was **\$59.95**

Comfortable hand-contoured grip with trigger to operate voice or yelp.

Rectangular horn speaker for outstanding efficiency and voice or yelp sound projection

**SAVE!**

### 20-Watt Portable Megaphone/Yelp Alarm

The GD-1818 is a quality power megaphone for voice projection, with a built-in alarm that produces an attention-getting "yelp" sound. It's ideal for outdoorsmen, boat owners, fire and police departments, track and field coaches, etc. The noise-cancelling microphone amplifies your voice only with minimum background noise. Turning on the "yelp" switch produces a single downward wail each time you pull the trigger. A volume control sets the voice level. The GD-1818 can be wired for a continuous-tone, instead of the yelp sound, making it useful as a portable horn for boats, dune buggies, etc. Operates on eight "C" cells (not supplied). Rugged high-impact plastic case is spray resistant for use on water.

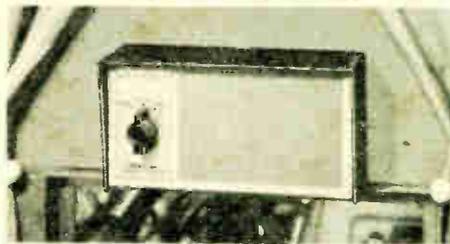
Kit **GD-1818**, Shpg. wt. 6 lbs. .... Was **59.95** Now **39.95**

**GD-1818 SPECIFICATIONS**: Power Output: 20 watts peak voice power. Yelp Alarm: single downward wail with automatic shutoff. Optional continuous tone selected during construction. Pilot Lamp: indicates Yelp or continuous tone. Power Source: 12 volts (eight "C" cells). Weight: 4 lbs. 12 oz. with batteries. Dimensions: Horn end, 8¾" W x 6¼" H, 14½" long overall.

### Cab-to-Camper Intercom

Includes Master, Remote and Cable

**\$35.95**



3-position switch on Master selects "Standby", "Monitor" or "Talk" modes. Remote can initiate calls and has "Radio" position to bring music into camper from cab radio. Requires 12 volt, 250 mA power source. Shpg. wt. 5 lbs.

Kit **GD-160**, Master, Remote & Cable ..... **35.95**

**GDA-160-1**, Accessory Plug. For quick disconnect when camper and cab are separated. Shpg. wt. 1 lb. .... **4.95**



Includes adaptor  
for use with  
GM HEI  
ignition systems



## Test gear to keep your car running great

### Heathkit CO-1015 Ignition Analyzer

**\$164<sup>95</sup>**

- Built-in rpm indicator
- Clamp-on inductive pickup for easy hookup
- Easier to use than meter type analyzers

Detects shorted spark plugs, bad ignition points, defective wiring, worn distributor parts, incorrect dwell angle, plus coil or condenser defects and transistor or capacitive discharge circuitry problems. Can be used with any standard, transistorized or capacitive discharge ignition system on four, six or eight-cylinder engines with distributors.

You select one of four different patterns — primary or secondary, in either parade or superimposed display. For detailed analysis, the horizontal sweep can be expanded 10 to 1, vertical sweep 2 to 1. The optional 12-volt inverter mounts permanently to the unit's rear panel, for portable or "on the road" tests. Includes adaptor for use with General Motors High Energy Ignition systems.

Kit CO-1015, Shpg. wt. 22 lbs. .... **164.95**

Kit COA-1015-1, 12-Volt Inverter, Shpg. wt. 3 lbs. .... **37.95**

**CO-1015 SPECIFICATIONS:** Power Requirement: 120/240 VAC, 60/50 Hz, 16 W. RPM Range: 400-5000. Cylinders: 3, 4, 6 or 8. Vertical Expand: Approx. 2 to 1. Horizontal Expand: Approx. 10 to 1. Sweep Length:  $\pm 5\%$  over entire RPM range. Intensity: Fixed. Presets: Focus, Astigmatism, Trigger Adjust, Tach Cal. Connection Cables: 12' pick-up clamp; ground and secondary clip leads extend 2' beyond pick-up clamp. Tachometer: 0-1000 RPM, 0-5000 RPM  $\pm 5\%$  of full scale. Dimensions: 7" H x 10½" W x 17½" D.

### Low-cost professional-grade Engine Analyzer

**\$79<sup>95</sup>**

- Color-coded meter for easy readings
- 3% accuracy on all ranges
- Complete with all leads and accessories

This professional-grade instrument tests conventional, magneto, transistorized, and most capacitive discharge ignition systems — both positive and negative ground, any voltage, on any 3, 4, 6 or 8-cylinder engine. Also tests storage battery, generator or alternator, voltage regulator, starter, distributor, ignition circuit (points, condenser and coil), accessories and all the electrical wiring.

No need to recalibrate the unit between functions — all you do is turn the rotary switch to the desired range and you're ready to test. Operates on 3 standard "C" batteries (not supplied). Has convenient carrying handle. Comes complete with all leads and accessories, ready to build quickly and use.

Kit CM-1050, Shpg. wt. 8 lbs. .... **79.95**

**CM-1050 SPECIFICATIONS:** Voltmeter Ranges: 0-3.2 V DC, 0-32 V DC,  $\pm 3\%$  of full scale. Ohm-meter: Two ranges: R x 1 (100  $\Omega$  center scale). R x 100 (10 k $\Omega$  center scale),  $\pm 3^\circ$  arc. Tachometer: Two ranges: 0-1200 rpm, 0-6000 rpm,  $\pm 3\%$  of full scale. Dwell Meter: Two ranges: 0-45° (on 0-60° scale), 0-60°,  $\pm 3\%$  of full scale. Amperes: -5 to +90 amperes DC,  $\pm 3\%$  of full scale. Spark Output: 0-50. Point Resistance: Good/Bad. Alternator: Good/Bad. Condenser: 0.22  $\mu$ F, 10%. Accuracy:  $\pm 3\%$  of full scale. Cables Supplied: Two 8' two-conductor test cables. One 2' alligator to alligator lead. One 2' alligator to push-on connector lead. One calibration cable. Accessories Supplied: 90-ampere shunt. 0.25  $\Omega$  resistor assembly. One insulation-piercing alligator clip. Two #10 solder lugs. (#14). Dimensions: 7½" H x 10½" W x 8¾" D.

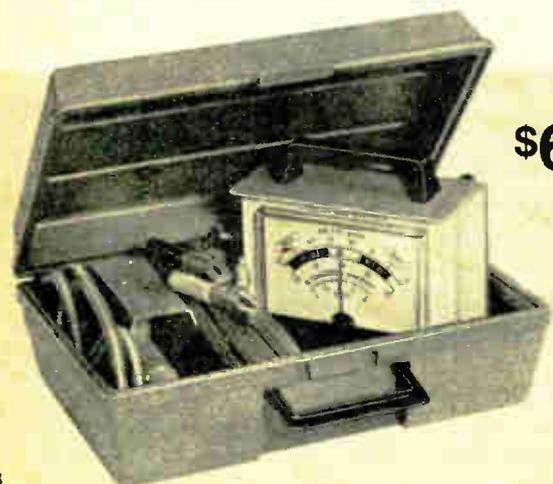
### Exhaust Gas Analyzer checks fuel efficiency

- Shows air-fuel ratio and percent of carbon monoxide
- Helps you tune-up your car for peak performance
- Includes all you need for fast and easy hookup

Monitors your car's exhaust for minimum air pollution and maximum efficiency by measuring thermal conductivity of the exhaust gases. Shows the air-fuel ratio, combustion efficiency and the percentage of carbon monoxide in the exhaust. The CI-1080 is essential when you're tuning up a car which must meet specific requirements for exhaust emissions, or when you simply want peak operating efficiency. Comes with all cables and tubing for easy connection.

Kit CI-1080, Shpg. wt. 6 lbs. .... **69.95**

**CI-1080 SPECIFICATIONS:** Meter Scales (3): 11.5-15.0 Air-Fuel Ratio, 70%-90% Combustion Efficiency, 0-8% Carbon Monoxide. Exhaust Type: From 4-cycle gasoline engines. Not for use with catalytic converters. Accuracy: Within 1 Air-Fuel Ratio depending on fuel used. Meter: 4½", 100-0-100  $\mu$ A. Connectors: Battery cord, 7 feet. Sensor cord, 21 feet. Exhaust flexible tube, 30 inches. Power Requirement: 6-volt or 12-volt car battery, less than 150 mA. Weight: 4 lbs., 12 oz.



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

# Do your own tuneups and save!



Super-bright xenon flash tube

Built-in meter measures distributor advance or engine RPM

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



**\$29<sup>95</sup>**



## CI-1096 Deluxe Timing Light with Built-in Advance Meter and Tachometer

Here's a really convenient, easy way to keep tabs on your car's engine timing and distributor advance functions. The CI-1096 incorporates a timing light, advance meter and tachometer in one compact, lightweight unit. Merely press the trigger to get a super-bright timing flash and a meter indication of distributor advance in degrees. Take your finger off the trigger and the meter indicates engine RPM. The 250° meter movement measures mechanical or vacuum advance up to 60° from 1500 to 4500 RPM and indicates engine speed to a maximum of 4500 RPM. Inductive pickup clips around the #1 sparkplug wire for quick connection. Powered directly from your car's battery or from a separate 12VDC power supply. Functions with all types of ignition systems.

Kit CI-1096, Shpg. wt. 3 lbs. . . . . **69.95**

CI-1096 SPECIFICATIONS: Useful Light Range: Up to 2 ft. in daylight. Triggering: Current pickup coil. Power Requirement: 12VDC battery or separate 12VDC power supply. Dimensions: 7¼" H x 2½" W x 11½" D.

## Deluxe Timing Light — brighter than daylight **\$34<sup>95</sup>**

Features a handy inductive pickup that clips directly around the #1 sparkplug wire without removing wire, using adapters, etc. (Recommended for GM-HEI and other systems, where high voltage may be present.) Has a super-bright xenon flash bulb that can be seen easily even outdoors. Can be hooked up while the engine is running, and won't interfere with other auto test equipment either. Comfortable pistol-grip handle, insulated blue-plastic housing. Polarity protected. Powered by your car's battery or a separate 12-volt supply. With all cables, pickup and clips.

Kit CI-1040, Shpg. wt. 3 lbs. . . . . **34.95**

CI-1040 SPECIFICATIONS: Useful Light Range: Up to 2 ft. in daylight. Triggering: Current pickup coil. Power Requirement: 12 VDC battery or separate 12 VDC power supply. Dimensions: 6½" H x 2" W x 10" L.



## Three-In-One Tune-up Meter

- Helps you keep your car in top shape
- Measures dwell, engine rpm and voltage
- Easy to use — just connect two leads to your engine
- Works with all factory-installed ignition systems

The CM-1073 combines a distributor cam dwell meter, an electronic tachometer and a direct-current voltmeter in a single, compact unit. Measures dwell angle on most 4-cycle, 3, 4, 6 and 8-cylinder engines. Shows engine RPM on two scales — 0-1500 RPM and 0-4500 RPM. Checks voltage from 0-20 volts.

Can be used with both 6 and 12-volt electrical systems with positive or negative ground, and with all new factory-installed solid-state and high-energy ignition systems. It has just two leads to connect to the engine and draws its power directly from car battery. Complete with leads, instructions and high-impact case. Easy kit assembly too.

Kit CM-1073, Shpg. wt. 4 lbs. . . . . **29.95**

CM-1073 SPECIFICATIONS: Dwellmeter: Three dwell scales: 3 cyl., 10-45 degrees; 4 cyl., 20-90 degrees; 6 cyl. & 3 cyl. x 2, 25-60 degrees. Tachometer: Two RPM ranges: Low range — 0-1500 RPM; High Range — 0-4500 RPM. Voltmeter: Direct reading scale, 0-20 VDC. Power Requirement: 10 mA approximate average current. Meter: 4½", 1 mA (100-degree movement). Accuracy: ±3% of full scale. Dimensions: 4¼" H x 8½" W x 7¼" D.

## Economy Solid-State Timing Light

Has the same fine features as CI-1040, but no inductive pickup. Flash can be seen in direct sunlight. Easy to use: connect one cable to battery, the other to spark plug. Insulated housing, polarity protected. With all cables. For all OEM Ignition systems.

Kit CI-1020, Shpg. wt. 3 lbs. . . . . **22.95**

CI-1020 SPECIFICATIONS: Useful Light Range: Up to 2 ft. in daylight. Power Required: 12 VDC battery or 12 VDC supply. Size: 6½" x 2" x 10".



ONLY **\$22<sup>95</sup>**

# Heathkit Pack-17 R/C—Uncompromised

Every Heathkit R/C product is the result of quality design and engineering by people who care about R/C. We were the first to use ceramic filters to help eliminate drift; the first to put 8-channels in a single, versatile and reliable unit; the first to give you the convenience of instant plug-in frequency change. Compare Heathkit R/C with top-of-the-line assembled models — you'll see why Heathkit R/C is your smartest buy!

HEATHKIT PACK-17™ R/C gives you the performance and reliability every RC'er wants — PLUS build it yourself kit value! The transmitters, receivers and servos have the quality and reliability you NEED for serious R/C competition; the positive-action control sticks are smooth and responsive; and the easy-to-handle transmitters are compact and comfortable. Heathkit R/C is easy and fun to build too — with a thorough and complete instruction manual that even shows you how to solder. Buy and build Heathkit R/C gear — it's the winning way to fly!

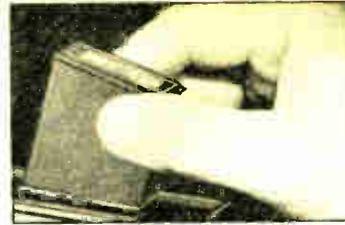
**NOTE: Amateur Radio License required for operation on 53 MHz band. Class C License required for operation on 27 and 72 MHz bands.**

- ① **5-Channel Dual-Stick Transmitter & 1 module.** 2-stick control of 4 channels, plus 1 aux. channel.  
Kit GDA-505-D, Shpg. wt. 6 lbs. .... **144.95**
- ② **5-Channel Single-Stick Transmitter & 1 module.** 1-hand control of 3 channels, throttle control with trim & 1 aux. channel.  
Kit GDA-505-S, Shpg. wt. 5 lbs. .... **154.95**
- ③ **8-Channel Dual-Stick Transmitter & 1 module.** Same as GDA-505-D, plus landing gear switch & 2 additional channels.  
Kit GDA-1205-D, Shpg. wt. 6 lbs. .... **154.95**
- ④ **8-Channel Single-Stick Transmitter & 1 module.** Same as GDA-505-S, plus landing gear switch & 2 additional channels.  
Kit GDA-1205-S, Shpg. wt. 6 lbs. .... **174.95**
- Receiver & 1 module (less batteries).  
Kit GDA-1205-2, Shpg. wt. 1 lb. .... **64.95**
- Receiver battery pack.  
Kit GDA-1205-3, Shpg. wt. 1 lb. .... **13.95**

## ⑦ 3-channel Pack-17™

Has the convenience and versatility of plug-in frequency change and it's the ONLY 3-channel system we know of that INCLUDES rechargeable batteries and an external charger so you fly with full power and uncompromised performance. Has 2-axis stick assembly, easy to handle transmitter with convenient strap for one-hand operation. An optional conversion pack lets you go 4 channels 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; ideal for use as trainer transmitter with GDA-1205 and GDA-505 systems. Specify frequency when ordering (see specs below).

- Kit GDA-1405-1, 3-ch. transmitter with 1 Module. 5 lbs. .... **89.95**
- Kit GDA-1405-3, 4-ch. conversion. 1 lb. .... **14.95**
- Kit GDA-1205-2, receiver with 1 Frequency Module. 1 lb. .... **64.95**
- Kit GDA-1205-3, receiver battery pack. 1 lb. .... **13.95**



Special-design plug-in frequency modules let you fly while the others are grounded! Instantly switch to any of 17 frequencies — and each module is perfectly matched so you get maximum RF output without alignment problems!

## Additional Frequency Modules

When ordering specify frequency desired (see list below).

**Transmit Module, Shpg. wt. 1 lb. .... 19.95**

**Receive Module, Shpg. wt. 1 lb. .... 13.95**

FREQUENCIES AVAILABLE (MHz): 26.995, 27.045, 27.095, 27.145, 27.195, 53.1, 53.2, 53.3, 53.4, 53.5, 72.08, 72.24, 72.16, 72.32, 72.40, 72.96, 75.640 MHz. (When ordering, specify transmit or receive.)

## SPECIAL 5-MODULE OFFER — SAVE \$15!

**5 Transmit and 5 Receive Modules Only \$154<sup>50</sup>**  
of your choice — specify frequencies Shpg. wt. 6 lbs.

⑤ **A FUN-FLY plane** designed for intermediate and advanced flyers. The high strength plastics used in construction make the Delthon lighter than comparably-sized balsa planes, but much more rugged. Has 46½" wingspan, 33½" body. Kit includes tank, wheels, all hardware. Does not need additional covering materials or paint. Ideal for use with all Heathkit R/C systems. With detailed manual.

Kit RP-1028, Shpg. wt. 6 lbs. .... **89.95**

⑥ **Thumb® Tach peaks performance.** Measures model engine rpm without physical connection to engine. Two ranges — 0-5000 and 0-25,000. Perfect for needle valve adjustment, selection of glow plugs, gears and props.

Kit GD-69, Shpg. wt. 1 lb. .... **26.95**



**\$17<sup>95</sup>**

**R/C Battery Monitor.** Expanded-scale voltmeter checks capacity (under load) of batteries. Has meter, connector for all Heathkit battery packs, alligator clips for Nicads. Pocket case.

Kit GD-1188, Shpg. wt. 1 lb. .... **17.95**

## Complete 3-channel Systems

Ideal for beginners, or as second systems for experienced flyers.

### System with miniature servos

Includes 3-channel transmitter and one frequency module, receiver and one frequency module, receiver battery pack, and two miniature servos.

If purchased separately, 228.65  
GDS-1405-1, 25 lbs. .... **189.95**

### System with subminiature servos

Includes 3-channel transmitter and one frequency module, receiver and one frequency module, receiver battery pack, and two sub-miniature servos.

If purchased separately, 228.65  
GDS-1405-2, 25 lbs. .... **189.95**

When ordering, specify module frequencies. Systems include batteries.

GDA-1205 AND GDA-505 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: GDA-1205, 8 channels (4 with trim), on/off, trainer button, GDA-505, 5 channels (4 with trim), on/off switch, trainer button. Power Supply: Internal 9.6V 500 mA 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.

GDA-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: ¾" H x 1¾" W x 1¾" D. Net Weight: 2 ozs.

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. Frequencies Available: 27 MHz (11 meters) — 26.995, 26.045, 27.095, 27.145 & 27.195. 53 MHz (6 meters) — 53.100, 53.200, 53.300, 53.400, 53.500. 72 MHz (4 meters) for R/C planes only — 72.080, 72.240, 72.400, 75.640. (All Models — 72.160, 72.320, 72.960. Dimensions: 9½" H x 3¼" W x 2¼" D.

**Save up to \$107.60 on complete 5 and 8-channel systems**

**5-Channel dual stick:** Includes transmitter and one frequency module, receiver and one frequency module, receiver battery pack, and four servos (choose miniature, subminiature or both). If purchased separately, up to 343.65.

GDS-505-D, Shpg. wt. 27 lbs. .... 264.95

**5-Channel single stick:** Includes transmitter and one frequency module, receiver and one frequency module, receiver battery pack, and four servos (choose miniature, subminiature or both). If purchased separately, up to 353.85.

GDS-505-S, Shpg. wt. 27 lbs. .... 264.95

**8-Channel dual stick:** Includes transmitter and two frequency modules, receiver and two frequency modules, receiver battery pack, and four servos (choose miniature, subminiature or both). If purchased separately, up to 387.55.

GDS-1205-D, Shpg. wt. 27 lbs. .... 299.95

**8-Channel single stick:** Includes transmitter and two frequency modules, receiver and two frequency modules, receiver battery pack, and four servos (choose miniature, subminiature or both). If purchased separately, up to 407.55.

GDS-1205-S, Shpg. wt. 27 lbs. .... 299.95

When ordering, specify module frequencies and type(s) of servos. All systems include batteries.

**SAVE EVEN MORE! Buy one of these Heathkit R/C systems with the exciting NEW Cessna Skyhawk 172 from Delta Products!**

Easy-to-build trainer plane includes Fox .25 RC engine, fuel tank, fuel line, machined aluminum mount, all wheels, even prop and hardware.



Cessna 172 Flight Pack

**\$74<sup>95</sup>**

Buy it with a Heathkit System and you're flying first class!

The Cessna 172 Skyhawk is an ideal trainer plane for the beginning R/C'er or as an excellent fun-fly ship for those with experience. Build it in 5 to 10 hours and it includes all needed accessories, all you need is fuel.

RP-1172, Cessna 172 Skyhawk Flight Pack only, Shpg. wt. 8 lbs. .... 74.95

**SAVE \$103.70! Five-Channel Dual-Stick System.** Same as system GDS-505-D plus Cessna Skyhawk Flight Pack. RPS-505-0, Shpg. wt. 20 lbs. .... 314.90

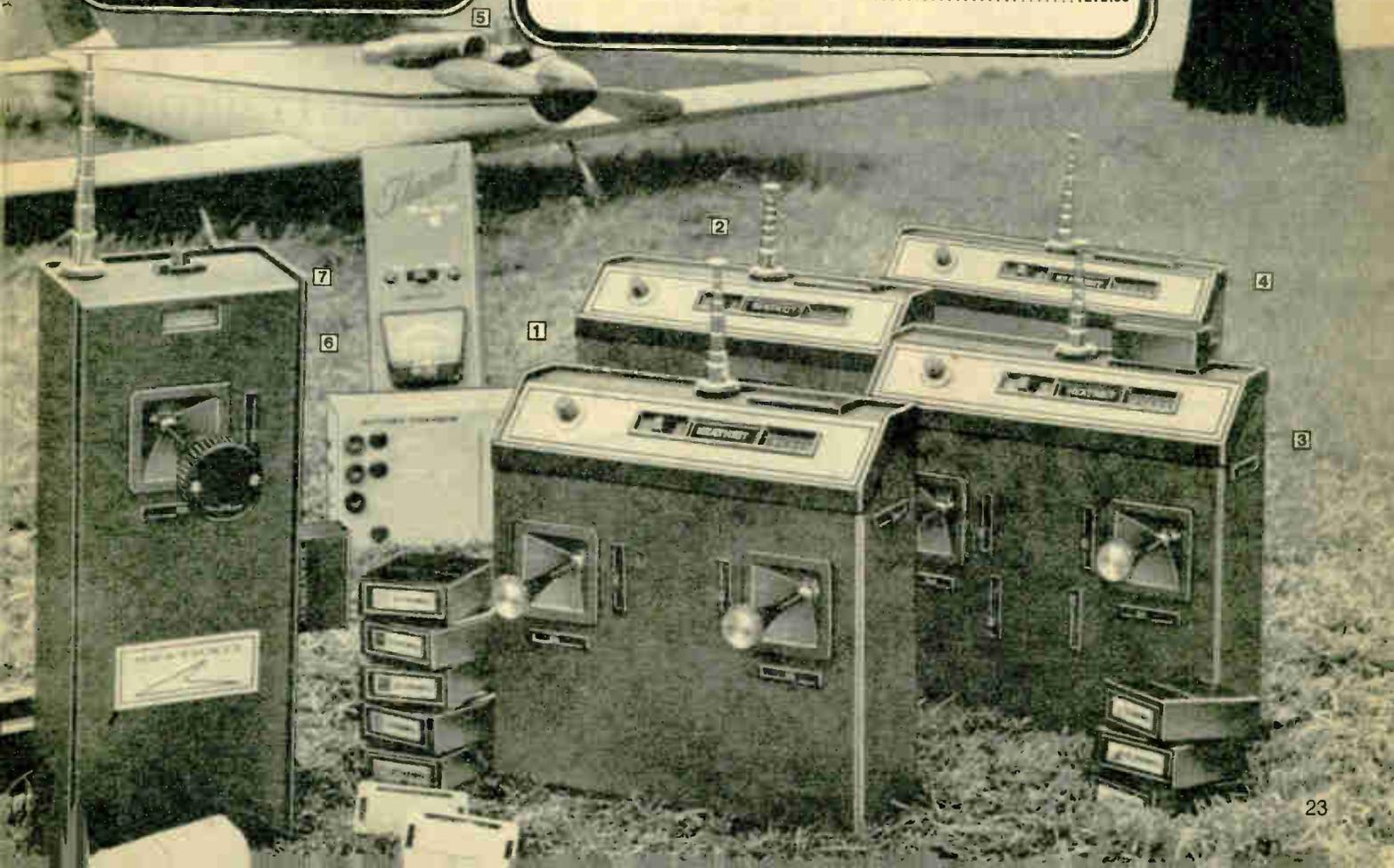
**SAVE \$113.70! Five-Channel Single-Stick System.** Same as system GDS-505-S plus Cessna Skyhawk Flight Pack. RPS-505-S, Shpg. wt. 19 lbs. .... 314.90

**SAVE \$112.60! 8-Channel Dual-Stick System.** Same as system GDS-1205-D plus Cessna Skyhawk Flight Pack. RPS-1205-0, Shpg. wt. 22 lbs. .... 349.90

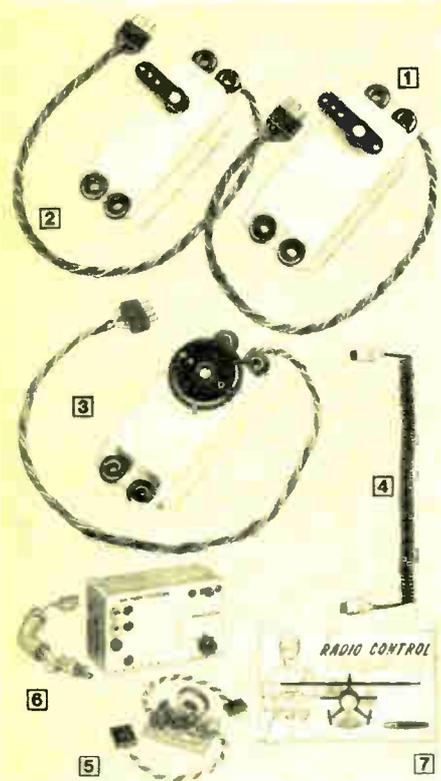
**SAVE \$132.60! 8-Channel Single-Stick System.** Same as system GDS-1205-S plus Cessna Skyhawk Flight Pack. RPS-1205-S, Shpg. wt. 22 lbs. .... 349.90

**SAVE \$53.80! 3-Channel System.** Same as system GDS-1405-1 plus Cessna Skyhawk Flight Pack. RPS-1405-2, Shpg. wt. 17 lbs. .... 249.90

**SAVE \$60.90! Deluxe 3-Channel System.** Same as system GDS-1405-1 plus Cessna Skyhawk Flight Pack and additional servo for complete 3-channel control. RPS-1405-3, Shpg. wt. 18 lbs. .... 272.85



# Servos and Accessories for Heathkit R/C



**1** Miniature Servo. For use with all Heathkit R/C systems.

Kit GDA-1205-4, Shpg. wt. 1 lb. . . . . 29.95

GDA-1205-4 SPECIFICATIONS: Input Signal: Pulse 1-2 msec. wide, 4 V P-P. Thrusts: 4 lbs. min. at rotor. Travel Time: 0.5 sec. Rotary Output Travel: 90° rotation. Temperature Range: 0°-160°F. Power Requirements: Battery — 4.8 VDC. Idle current — 15 mA maximum. Stall current — 450 mA; no load current, 80 mA. Gear Train Backlash: Less than .002". Mechanical Output: 1 rotary arm, 1 rotary wheel. Position Accuracy: 1.0%. Dimensions: 1 1/4" H x 3/4" W x 2 3/2" L (length includes mounting ears; height includes outputs). Net Weight: 1.75 ozs.

**2** Sub-Miniature Servo. For use with all Heathkit R/C systems.

Kit GDA-1205-5, Shpg. wt. 1 lb. . . . . 29.95

GDA-1205-5 SPECIFICATIONS: Power Requirements: Battery — 4.8 VDC. Idle current, 15 mA maximum. Stall current, 450 mA nominal; no load current, 80 mA. Mechanical Output: 1 rotary arm, 1 rotary wheel. Position Accuracy: 1.0%. Dimensions: 1 1/4" H x 3/4" W x 2 3/2" L (length includes mounting ears, height includes the outputs.) Net Weight: 1.25 ozs. Other specifications same as GDA-1205-4 above.

**3** High Torque Servo. For use with all Heathkit R/C transmitters and receivers. Features high power (torque) and fast transition (rotational speed). You can wire it to operate 90° or 180°. Heavy-duty gearing.

Kit GDA-1205-8, Shpg. wt. 1 lb. . . . . 29.95

GDA-1205-8 SPECIFICATIONS: Input Signal: Pulse 1-2 msec wide, 4 V p-p. Torque: 6 lbs. at outer hole. Travel Time: 0.4 sec. Rotary output travel: 90° or 180° rotation. Temperature range: 0-160° F. Power Requirements: Battery, 4.8 V. Idle current, 20 mA maximum. Stall current, 1000 mA. No load current, 150 mA. Mechanical output: 1 rotary arm, 1 rotary wheel. Position Accuracy: 1%. Dimensions: 1 1/4" H x 3/4" W x 2 3/2" L (length includes mounting ears, height includes outputs). Net Weight: 1.75 oz.

**4** Trainer link accessory. Six-foot coiled cord connects two GDA-1205 or 505 Transmitters for in-flight instruction — one unit is "master" with override, the other is "slave."

Kit GDA-1205-6, Shpg. wt. 1 lb. . . . . 11.95

**5** Servo Centering Standard. Calibrates all Heath Servos with variable pots to 1.4 millisecond pulse width standard. Eliminates recentering when changing control units. Included in all Pack-17 transmitters!

Kit GD-1189, Shpg. wt. 1 lb. . . . . 9.95

**6** Servo Simulator. Takes the place of both transmitter and receiver for making adjustments on all Heathkit servos, and a wide variety of others. Charges receiver and glow-plug batteries when plugged into 120 VAC.

Kit GD-1053, Shpg. wt. 2 lbs. . . . . 29.95

**7** Radio Control Handbook. Detailed information on the use and maintenance of Heathkit R/C gear. Get the most from Heath R/C gear, others too. GDA-1205-7 . . . . . 1.00

## Add realism and excitement to your model railroad

### Heathkit Transistorized Power Supply/Throttle

**\$84<sup>95</sup>** Get top performance from every engine in your line

The Heathkit RP-1065 makes an HO or N-gauge layout dramatically more realistic! Just operate the slide throttle control to make your engines gradually build up speed just like a real train or, at slow speeds, maintain realistic acceleration and braking. Braking is independent of the throttle and controlled by a five-position knob.

The RP-1065's load compensation circuitry prevents stalling out when climbing grades, even lets you precisely simulate a real train, slowing as it climbs, then accelerating as it goes down. Helps overcome side rod and gear train binding, tight spots in wheel bearings, even tight sections of track. Easily powers two HO or N-gauge engines — has built-in short protection with an indicator light and a time delay to prevent false triggering.

The RP-1065 goes together in just a couple of evenings, even if it's your first kit. There's just one circuit board to wire, and a plug-in IC simplifies assembly. Operates on 120 VAC. 4 3/4" x 9 1/2" x 8 1/2".

Kit RP-1065, Shpg. wt. 9 lbs. . . . . 84.95

24



### Special offer!

Order RP-1065 and RPA-1065-1 together, for only

**\$106<sup>95</sup>**

If bought separately, \$109.90

### Walk-Around Controller for RP-1065

Provides remote operation of Throttle, Brake position switch and Engine direction switch, from approx. 20-ft. away from RP-1065.

Kit RPA-1065-1, Shpg. wt. 3 lbs. . . . . 24.95

10-ft. Extension Cable. For operation to approx. 30-ft.

RPA-1065-2, Shpg. wt. 2 lbs. . . . . 8.95





Attractive, compact thermostat uses your present 2-conductor wiring.

**Control your home heat for BIG fuel savings!**

**Remember last winter's fuel bills? This Programmable Home Heating Control can help!**

- \$39<sup>95</sup>**
- Two programmable setbacks in a 24-hour period
  - Econ-Norm override switch for normal operation
  - Provides substantial fuel savings of 5-10%

The GD-1776 helps you conserve energy and save on fuel bills by automatically reducing room temperature during one or two pre-programmed periods. Temperature setback is adjustable up to 10°F. Temperature is returned to its normal level automatically. An ECON-NORMAL switch overrides the timer and returns your furnace to normal operation for weekends, parties etc.

The GD-1776 installs quickly and easily on any type of single-stage furnace. The replacement thermostat utilizes your existing 2-conductor wire. No extra thermostat wiring is needed. Certain combination heating/cooling systems may require the aid of a professional heating/air conditioning service if the installation presents unusual circumstances. Comes with 120 VAC power cord or can be "hard-wired" (check local electrical codes). Not intended for use with 2-stage systems.

Kit GD-1776, Shpg. wt. 5 lbs. .... 39.95

**GD-1776 SPECIFICATIONS:** Temperature Setback Range: 1 to 10°F. Number of Setback Periods: 2. Setback Duration: ½ hour, minimum, 23½ hours, maximum. Timer Dial: 24 hours. Controls: Timing, Setback. Power Requirement: 120 volts, 60 Hz, 10 watts. Furnace Control Current Rating: 1A @ 24 VAC maximum. Dimensions: Thermostat: 3¼" H x 4½" W x 1½" D. Control Unit: 4¾" H x 8" W x 2½" D.

**Ultra-convenient, efficient Ultra-sonic Cleaner**

**\$74<sup>95</sup>**

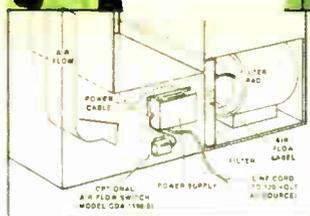
For those almost impossible cleaning chores. The Heathkit GD-1150 makes fast work of deep-cleaning watch parts, most jewelry, dentures,

any delicate items that could be harmed by scrubbing or abrasives. Simply fill the stainless steel tank with any safe detergent or solvent for the item to be cleaned. Place the object or objects in the tank, set the timer and that's it! You'll be amazed how quickly and easily your possessions come clean. Tank measures 6" L x 4" W x 2¾" D. Overall, 11" L x 5¾" W x 3¼" H. For 120 VAC.

Kit GD-1150, Shpg. wt. 4 lbs. .... 74.95



Control unit installs easily on any single-stage gas, oil or electric furnace.



**Electronic Air Cleaner for your home Furnace**

**\$189<sup>95</sup>** Installs on standard furnaces or air conditioners directly in place of present filter — usually without cutting or altering ductwork

Removes most dust, dirt, pollen and other allergenic contaminants so your whole family can breathe fresh, clean air. Helps remove smoke and reduce odors too. NOTE: Kits below differ in size of filter panel. Check your furnace's filter size/capacity before ordering. For two-zone homes, two filters may be used with a single power supply. CFM, cubic ft. per min.

Kit GD-1196-1, 20" x 25" x 2", 1000 CFM. Shpg. wt. 24 lbs. .... 189.95

Kit GD-1196-2, 20" x 20" x 2", 800 CFM. Shpg. wt. 24 lbs. .... 189.95

Kit GD-1196-3, 16" x 25" x 2", 800 CFM. Shpg. wt. 24 lbs. .... 189.95

Kit GD-1196-4, 16" x 20" x 2", 640 CFM. Shpg. wt. 24 lbs. .... 189.95

**Extra Filters.** Use order nos. above, with GDA prefix i.e., GDA-1196-1, 20" x 25" x 2" Filter only. Av. Shpg. wt. 10 lbs. .... each 109.95

**Accessory Air Flow Switch.** Required when GD-1196 is used with 240 VAC furnaces and air conditioning systems.

Kit GDA-1196-5, Shpg. wt. 2 lbs. .... 26.95

**GD-1196 SPECIFICATIONS:** Air Cleaning Efficiency: 70% nominal. Generated Ozone Concentration: 0.02 PPM maximum. Static Pressure Drop: 0.15 in. w.g. (clean filter). Power Supply Dimensions: 12" W x 8" H x 4" D. Power Requirement: 110-130 VAC, 60 Hz 25 watts max. Note: In some cases, a licensed electrician may have to make the electrical connections. Check with local building inspectors. Filter panels are 2" thick, so some adjustment in your present holding brackets may be required.



**Room-size Electronic Air Cleaner**

**\$159<sup>95</sup>**

**LAST CALL!**

The Heathkit GD-1003 cleans the air of 99% of airborne pollen and 95% of other contaminants... regardless of size or concentration. The GD-1003 easily cleans the air in a 400 sq. ft. room, and it can be carried from room

to room. Plugs into any 120 VAC electrical outlet. The two-speed fan is life-time lubricated for trouble-free operation. Everything's accessible for easy cleaning, too. A built-in safety interlock switch offers positive shock-hazard protection while cleaning, and against the inquisitive fingers of small children. Cabinet measures 15" H x 13½" W x 17¾" D.

Kit GD-1003, Shpg. wt. 55 lbs. .... 159.95

**3 EVENING KIT**  
Fast, Easy Assembly

**\$49<sup>95</sup>**



Changes tunes  
fast 'n easy

**1 Unique Programmable Doorbell**

A FUN to build and use kit that will brighten your home all year 'round! A one-octave C through C "keyboard" lets you program any tune up to 16 notes — celebrate the season, a birthday, an anniversary, a special party — whatever you like. Change notes by simply rearranging the leads. And installation is easy too — just wire between existing bell transformer and TD-1089. The TD-1089 is loud enough to be heard throughout most homes, but you can add extra speakers to spread the sound throughout the house. Easy assembly too, ideal for first-time builders.

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

**TD-1089 SPECIFICATIONS:** Power Requirement: 16 volts AC, 50/60 Hz, from standard doorbell transformer (not supplied) with 10 VA Rating. Tone Characteristics: Decaying, mellow. Speaker Size: 3" x 5" oval — 16 Ohm. Extra speakers can be added for a total of not less than 16 Ohms. Programming Matrix: 13 notes x 16 beats — same note up to 9 beats. Dimensions: 5 $\frac{3}{4}$ " H x 8 $\frac{5}{8}$ " W x 2 $\frac{3}{4}$ " D. Net Weight: Approx. 1 $\frac{1}{2}$  lbs. Power Drain: Idle, 6 watts, Maximum 12 watts.

**2 Freezer Alarm could save you money**

It signals if the freezer door is left open; and it signals if freezer temperature reaches 20°F even though the door is closed. The dual-alarm system uses both an audible "beep" and a flashing light. The alarm shuts off automatically when freezer temperature returns to about 10°F. Sensors install easily in any freezer; alarm box mounts anywhere with 20-ft. cable supplied.

Kit GD-1183, Shpg. wt. 2 lbs. . . . . **Was 15.95 Now 9.95**

**3 Mount-anywhere "touch-control" Light Switch with half-brightness position**

Gives you on-off switch control wherever you need it, without the bother and expense of extra outlets, wall boxes and rewiring. Simply plug your lamp (up to 150 watts incandescent only) into the control unit, plug the unit into an AC outlet. The remote touch-plate mounts anywhere and connects to the unit by an easily concealed wire. Then simply touch the plate briefly for half-bright, longer for full "on", and touch again for "off". Control unit 1 $\frac{1}{4}$ " x 2 $\frac{3}{8}$ " x 3 $\frac{1}{32}$ ". For 105-135 VAC, 60 Hz.

Kit GD-1187, Shpg. wt. 1 lb. . . . . **14.95**

**4 Heathkit Telephone Amplifiers can make your telephone system more useful**

Low As  
**\$54<sup>95</sup>**

- Talk and listen to calls "hands-free"
- Great for conference and family calls
- Includes connectors for easy installation

In performance, features and value, these two quality telephone amplifiers equal the finest you can rent or buy. To answer the phone, simply press the power button; to hang up press it again. Voice-activated circuitry instantly and silently switches the amplifier from talk to listen. A slide control adjusts the volume; a listen button lets everyone in the room hear both sides of a conversation, or lets you monitor the line while talking privately. The built-in microphone lets you talk from up to 10 feet away. To return the phone to normal operation, just turn the amplifier off. The GD-1112 requires an external phone to place calls, the GD-1162's built-in dial and ringer makes it a completely self-contained telephone. Both units operate on standard 9-volt battery (not supplied), or optional GRA-43-1 AC converter, order below. For easy installation, the GD-1112 includes a  $\frac{1}{4}$ " phone plug and 4-pin telephone plug; the GD-1162 has a 4-pin phone plug and, for business phones, a 15-pin dataphone connector. Both come with 6', 4-conductor cable. Each unit, 2 $\frac{1}{2}$ " H x 8 $\frac{1}{2}$ " W x 5 $\frac{3}{4}$ " D. Good-looking cabinet may be used on desk or wall-mounted.

Kit GD-1112, Amplifier, Shpg. wt. 3 lbs. . . . . **54.95**

Kit GD-1162, Amplifier with Dialer, Shpg. wt. 4 lbs. . . . . **74.95**

Kit GRA-43-1, AC Converter, Shpg. wt. 1 lb. . . . . **4.95**

**NOTE: Customer-owned equipment connected to telephone lines may be subject to local tariff.**

**SAVE \$6**



Use it as an extension phone!





# Action-packed Heathkit Automatic Scanning Monitors

## GR-1132 3-Band VHF/UHF Monitor

Monitor fire calls, police, ambulances, Amateur 2-meter FM, marine emergency vehicles, gov't weather stations, more. It automatically scans each channel, stopping on any signal, then resumes scan after broadcast. Priority feature — checks priority channel every 4 seconds. 4-pole crystal filter (for even better selectivity in crowded signal areas, order the optional 8-pole filter, right); channel lockout buttons; extra-large lighted channel indicators. Telescoping antennas for each band, provision for external antenna. Built-in speaker, volume and squelch controls. AC and 12 VDC power supplies. Order crystal certificates at right.

Kit GR-1132, Shpg. wt. 9 lbs. . . . . **139.95**

GR-1132 SPECIFICATIONS: Scanning Range: LO-VHF, any 10 MHz segment of 30-50 MHz frequency range. Hi-VHF, any 8 MHz segment of 146-174 MHz frequency range UHF, any 8 MHz segment of 450-500 MHz frequency range. Sensitivity: Lo and Hi VHF: 0.5  $\mu$ V or less for 12 dB SINAD. UHF: 0.7  $\mu$ V or less for 12 dB SINAD. Adjacent Channel Rejection: (30 kHz channel spacing) — 40 dB typ. (—55 dB typ. with optional 8-pole filter). Scan Rate: approx. 16 channels per second. Scan Delay: approx. 1/2 second. Priority Channel Check: approx. 4 seconds. Antenna Impedance: 50 ohms. Audio Output: AC operation, 1 watt; DC operation, 2 watts; less than 10% distortion. Power Requirement: 120 VAC, 60 Hz. 12 watts or 13.8 VDC, 300 mA squelched; 500 mA at full output. Dimensions: 3 $\frac{3}{8}$ " H x 8 $\frac{1}{2}$ " D x 11 $\frac{1}{8}$ " W. Net Weight: 5 lbs.



## 4-Band Shortwave — just right for the beginner

Tunes foreign broadcasts from all over the globe — amateur and CB radio bands — local and marine weather reports — ships at sea — plus standard AM. Features wide slide-rule tuning dial with logging scale; signal-strength tuning meter; built-in AM rod antenna plus connection for SWL antenna. Also has variable BFO for code reception, built-in speaker, front panel jack for external speaker or headphone, switched automatic noise limiting. Most parts mount on a single circuit board for easy step-by-step assembly.

Kit SW-717, Shpg. wt. 10 lbs. . . . . **79.95**

## GR-1131 Hi-Band VHF Scanning Monitor

If the emergency services in your area use the high-VHF band, this is the low-cost way to listen in! Monitor fire calls, police, ambulances, Amateur 2-meter FM, marine emergency vehicles, government weather stations and more. Other features same as GR-1132.

Kit GR-1131, Shpg. wt. 9 lbs. . . . . **89.95**

GR-1131 SPECIFICATIONS: Scanning Range: any 8 MHz segment of the 146-174 frequency range. Sensitivity: 0.5  $\mu$ V or less for 12 dB SINAD. Other specifications same as GR-1132 at left. Dimensions: 3 $\frac{3}{8}$ " H x 8 $\frac{1}{2}$ " D x 11 $\frac{1}{8}$ " W. Net Weight: 5 lbs.

See page 47 for the MR-1134 Marine Band Scanner.



## Outdoor Scanner Antenna

For VHF and UHF. Really helps improve reception. Covers all bands, VHF and UHF. For masts to 1 $\frac{1}{2}$ " diameter. SO-239 receptacle. GRA-1132-1, Shpg. wt. 2 lbs. . . . . **24.95**

## Accessories for all Scanners on this page

Mobile Mounting Bracket. GRA-1131-1, Shpg. wt. 1 lb. . . . . **4.95**

Crystal Certificate. You send to crystal mfr. with specific frequency. Crystal is returned postpaid. Order one for each frequency.

GRA-1100-1 . . . . . **each 4.95**

Optional 8-pole crystal filter. Improves selectivity for use in crowded signal areas.

GRA-1100-2, Shpg. wt. 1 lb. . . . . **9.95**

Note: Some states prohibit use of scanners in vehicles. Check with local authorities.

## Improve your SWL listening with these two low-cost additions

Long-wire SWL antenna. Really helps you pull in stations! 75' long wire with 30' lead-in, all insulators and hardware for easy setup. A must for serious listeners.

GRA-72, Shpg. wt. 2 lbs. . . . . **4.50**

Superex Headphones. These quality low-cost headphones are ideal for use with the Heathkit SW-717 SWL receiver and many others. Feature dual coils for excellent sensitivity, wide headband for comfortable listening. 600 ohms impedance.

GD-396, assembled. Shpg. wt. 1 lb. . . . . **5.95**

SW-717 SPECIFICATIONS: Frequency coverage: 550 kHz - 1500 kHz, 1.5 — 4 MHz. 4 — 10 MHz. 10 — 30 MHz. Meter: Indicates relative signal strength. Headphone Jack: Accepts low impedance headphone or external speaker. Loudspeaker: Built-in. Power Requirement: 120/240 VAC, 60/50 Hz, 8 W. Dimensions: 5 $\frac{1}{8}$ " H x 14 $\frac{1}{2}$ " W x 8" D.

# Our easiest-to-build Organ kit EVER!

Heathkit/Thomas Troubador

**\$1799<sup>95</sup>**

You SAVE up to 1/3 when you build it yourself!



The TO-1860 incorporates nine preassembled and tested circuit boards.

- **Easier assembly with preassembled sub-chassis and precut, color-coded wiring harnesses**
- **Easy to play even for a beginner**
- **Microprocessor-based for real versatility**

**You'll be playing in no time.** And enjoying every minute of it too. The TO-1860 is Heath's easy to build version of the fabulous microprocessor-based Thomas Troubadour. Quick-learn features like Color-Glo keys, color-coordinated music, one finger chords and chord memory make it easy even for the beginner.

**It's fun and easy to build!** Preassembled and tested modular circuit boards, wiring harnesses with built-in connectors, and no complex tuning procedures let you complete assembly in 30 hours or less. Nine preassembled and tested circuit boards comprise most of the electronics in the TO-1860. Color-coded, precut wiring harnesses plug directly into the circuit boards.

**You'll have the best organ value on the market.** The TO-1860 utilizes the latest "computerized" microprocessor technology to produce some of the best music you've ever heard. The cabinet has a glass music rack and comes fully-assembled of furniture-grade hardwoods. A matching padded bench with storage is included.

**Kit TO-1860, Shpg. wt. 256 lbs. Motor Freight ..... 1799.95**

**TO-1860 SPECIFICATIONS: VOICES & EFFECTS:** (Solo) — Flute 16' Flute 8', Flute 4', Trombone 16' (0), Trumpet 16', Bassoon 16', Diapason 8' (0), Clarinet 8', Oboe 8', Violin 8' (0), Mandolin (Preset), Banjo (Preset), Solo Sustain, Main Bright. (Accomp.) — Tuba Horn 8' (0), English Horn 8', Cello 8' (0), Flute 8', Flute 4'. (Pedal) Bass Flute 8'—16', Pedal Sustain. **SPEAKEASY FEATURES:** (Rhythm) — Waltz, Fox Trot, Swing, Rhythm & Blues, Rock, Polka, Samba, Bossa Nova, Rhumba. (Accomp. Presets) — Piano, Guitar, Banjo, Harpsichord, Presets Cancel. **Additional Features:** Fancy Fingers, Strum, Arpeggio, Fancy Foot, Walking Bass. **SOUND SYSTEM:** (2) Solid State Amplifier (Stereo System). (2) 12" Heavy Duty Speakers. **DIMENSIONS:** 37" High, 23" Deep, 43 1/2" Long. **NET WEIGHT:** 185 lbs.



## Deluxe Electronic Metronome

A necessary accessory for student and teacher alike. A front panel control turns the unit on and adjusts tempo from 40 to 210 beats per minute. Adjustable volume. A handy chart on cabinet bottom relates tempos in various time signatures to beats per minute. Cherry-finish birch cabinet. Easy 1 evening assembly. Requires two 9-V batteries (not supplied).

**Kit TD-17, Shpg. wt. 2 lbs. .... 19.95**

## Heathkit/Thomas Keyboard Kombo

**\$569<sup>95</sup>**

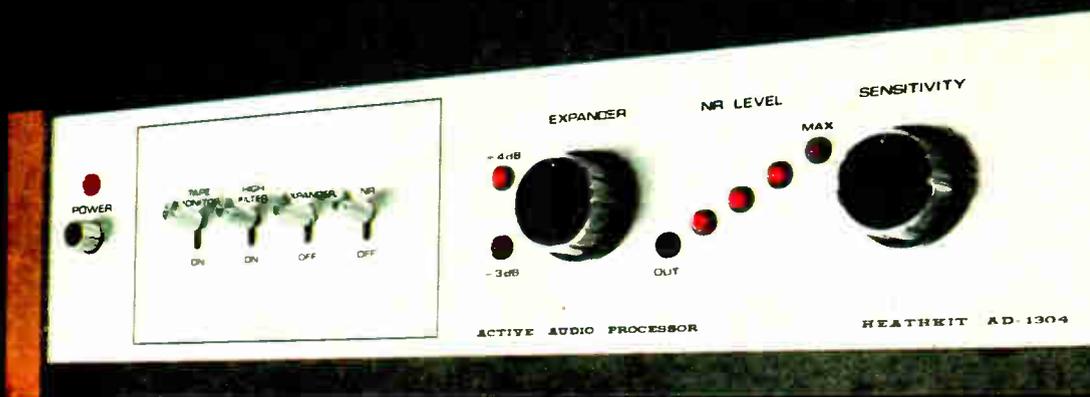
Create the sound of an entire musical group with one-finger

At the touch of a finger the TO-1102 accurately reproduces the sounds of 12 solo instruments (see specifications). As you play the solos, the TO-1102 automatically accompanies you with piano, guitar, banjo, harpsichord or flute rhythms and alternating bass notes. Variable slide controls for drum tempo and volume let you preset rhythms of Waltz, Fox Trot, Swing, Rock and Latin. Has 12 major and 12 minor chords. Fun to build and even more fun to play. Contemporary design cabinet is fully-assembled. Bench included.

**Kit TO-1102, Shpg. wt. 189 lbs. Motor Freight ..... 569.95**

**TO-1102 SPECIFICATIONS:** Solo Instruments: Flute, Clarinet, Trumpet, Violin, Accordion, Guitar, Piano, Banjo, Mandolin, Harpsichord, Vibes, Hawaiian Guitar, Accompaniment Instruments (Rhythm): Piano, Guitar, Banjo, Harpsichord and Flute: Tempos—Waltz, Fox Trot, Swing, Rock, Latin. Drum Controls: Tempo — Variable Slide; Volume — Variable Slide. Chords: 24 one-finger Chords, Memory Chord. Controls: Vibrato Cancel; Reverberation, variable slide; Keyboard Balance, variable slide. On-off switch with pilot indicator. Expression control. Headphone jack. Cabinet: Contemporary Design with Rosewood Finish. Sound System: solid-state amplifier with 12" heavy-duty Speaker. Dimensions: 34 1/4" H x 36" W x 21 1/4" D. Net Weight: 150 lbs.





## AD-1304 Active Audio Processor

**\$219<sup>95</sup>** Provides increased dynamic range and reduced noise from virtually ANY program source

**7 EVENING KIT**  
Fast, Easy Assembly

Most program sources such as tapes, records and radio broadcasts are compressed and noisy. The new Heathkit AD-1304 Active Audio Processor can reduce the noise and increase the dynamic range even if you own a "super system". Your music comes through with more realism and improved definition and backgrounds are quieter even at higher listening levels.

Three high-frequency dynamic filters work in conjunction with a threshold control to "discriminate" between noise and music for up to 10 dB of noise reduction. Front panel LED's indicate the amount of dynamic noise reduction taking place. The expander circuit provides up to 7 dB of dynamic range expansion to restore much of what was lost in the recording and broadcasting process. In all, the AD-1304 provides a 17 dB increase in dynamic range while your system maintains full frequency response and low distortion. A 7 kHz linear phase, 12 dB per octave rolloff high frequency filter is

provided for especially noisy source material.

The AD-1304 does not require a preprocessed input so it is compatible with any program source. It connects between the tape output and the tape monitor jacks on your receiver, preamp or integrated amplifier. Tape monitor facilities are built into the AD-1304 so you don't sacrifice your tape monitor capabilities.

**Kit AD-1304, Shpg. wt. 12 lbs. . . . . \$219.95**

**AD-1304 SPECIFICATIONS:** Rated Input: 200 mV. Input Impedance: 100K ohms. Gain: Expander off, 0 dB (unity)  $\pm 0.5$  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 rolloff. 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. Total Harmonic Distortion: 0.1% from 20 Hz to 20 kHz. Power Requirements: 120/240 VAC, 50/60 Hz, 15 watts. Dimensions: 17 1/2" W x 4 1/2" H x 8 1/8" D. Net Weight: 10 lbs.

## AD-1307 versatile Audio Control Center

- Dual meters accurately monitor power output
- Provides complete AC power and speaker switching
- Ideal for use in high-power audio-systems

The Heathkit AD-1307 is an outstanding audio control center that is useful for any component stereo system and especially recommended for systems using high-power amplifiers. It provides accurate power output monitoring for exact system balance, and complete AC switching facilities for the most sophisticated component setups. Lets you hook up one stereo amplifier to two sets of speakers, two stereo amplifiers (or a 4-channel amplifier) to four speakers. Uses the same output meters as the AA-1640. The meters are peak-responding with a log scale calibrated in both decibels and watts. Because they can respond to output peaks as short as a record click, they are extremely accurate and useful as overload indicators. A front panel monitor switch allows you to monitor the outputs of up to two amplifiers, you can even use a four-channel amplifier to "A-B" speaker systems. Four switched and four unswitched outlets (for a total of 1500 watts), a main power switch and a line cord capable of carrying up to 13 amps provide power switching for all the components in your system. There's a front panel headphone jack for conventional phones,



and a barrier-type terminal strip on the rear panel for convenient connection of electrostatic headphones. Easy kit assembly too.

**Kit AD-1307, Shpg. wt. 11 lbs. . . . . \$129.95**

**AD-1307 SPECIFICATIONS:** Meter Scale Calibration: -30 dB to +3 dB, 0.2 to 200 watts. (0 dB = 200 watts into 8 ohms.) Meter Circuit Type: Peak Responding. Meter Circuit Response Time: Less than 50  $\mu$ sec. Meter Circuit Fall Time: Greater than 0.5 sec. Power Requirement: 120 VAC, 50/60 Hz, 10 watts, 240 VAC, 50/60 Hz, 10 watts. Dimensions: 4 1/2" H x 17 1/2" W x 8 1/2" D. Weight: 8 lbs. (3.6 kg.)

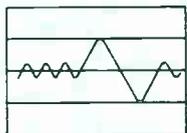


### Why you need a "Superamp"

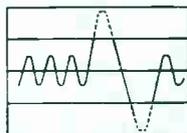
Many hi-fi systems need a "super-amp" like the AA-1640 for good scientific and musical reasons. As sounds become louder, the ear becomes less sensitive. For one sound to seem twice as loud as another (10 dB louder), requires *10 times* as much power. A 3 dB change is just noticeable, yet it requires twice as much power.

In an average-sized room, acoustic suspension speakers may require 20 watts per channel to produce a reasonable listening level — about 90 dB. But when a momentary musical peak of 10 dB comes along, your amplifier must try to produce 200 watts per channel.

Tone controls, loudness circuits, and equalizers make the same demands. And if your amp



unclipped



clipped

can't deliver that much power, it clips off the peaks of the signals. Clipping causes distortion and reduces the dynamic range — the contrast between loud and soft passages. Music sounds constricted, harsh and unreal. Clipping also produces harmonics which can actually damage your tweeters.

A high power amplifier can make a big difference. Its wider dynamic range lets more of the live-performance realism come through loud and clear. Perhaps the most striking difference you'll hear is the improved definition of music...solid bass free of "boom" and distinct note for note...accurate treble clearly defined and open.

If your music system uses low-efficiency acoustic suspension speakers, only a super-amp like the Heathkit AA-1640 can help them deliver their finest sound.

### AP-1615 Stereo Preamp/Control Center

*Perfect for use with AA-1640 or any high-quality stereo power amplifier*

The Heathkit AP-1615 offers the kind of specifications and features normally found on preamps costing much more. Harmonic and IM distortion are insignificant, less than 0.05%. And extremely wide dynamic range, 100 dB for all inputs, means that even the loudest and most complex musical passages come through with minimum distortion. If you need tone controls, the optional AD-1305 (right) offers far more versatility and precise tone adjustment than ordinary bass and treble controls. A relay instantly mutes the output when power is turned on or off to prevent "thumps." A sub-sonic filter eliminates the noise from turntable rumble or record warp. Has high-frequency filter, two phono inputs, aux. and tuner inputs, tape monitor, mono switch, headphone jack and front panel dubbing inputs and outputs. Handsome styling too, with brushed aluminum front panel, black metal top and solid walnut end panels. The AP-1615 is an easy kit to build. Parts mount on a single printed circuit board, and point-to-point wiring is kept to a minimum. Even if you're a first-time kit builder, you can build a better preamp than you probably thought you could afford.

Kit AP-1615, Shpg. wt. 12 lbs. . . . . **159.95**



AP-1615 SPECIFICATIONS: Input Sensitivity: Phono, 2 mV. Hi-Level (Tuner, Tape, Aux., Tape Mon and Tape Dub): 180 mV. Input Overload: Phono, over 100 mV. Hi-Level, over 10 V. Hum and Noise: Phono, -65 dB (2 mV input); Hi-Level -85 dB (180 mV input). Frequency Response: Phono,  $\pm 0.5$  dB, 30 Hz to 15 kHz. Hi-Level,  $\pm 2$  dB, 20 to 20 kHz. Rated Output: 1.5 V at rated sensitivity, Tape Output: 180 mV. Harmonic and IM Distortion: Less than 0.05% from 20 Hz to 20 kHz at 1.5 V output. Channel Separation: 50 dB at 1 kHz. Filters: Low, -3 dB at 15 Hz, -12 dB octave/slope. High, -3 dB at 7 kHz, -12 dB octave/slope. Power Requirement: 120/240 VAC, 60/50 Hz, 25 watts. Dimensions: 4½" H x 17½" W x 8½" D.

# For the true Audiophile-The Heath AA-1640



The electrical performance of the Heath AA-1640 makes comment superfluous. In every respect it ranks with finest high-power amplifiers on the market.

Julian Hirsch, *Stereo Review*  
May '75



## The Heathkit AA-1640 "Superamp"

**\$479<sup>95</sup>** 200 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.1% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ

For the purist Heath offers the AA-1640. This is an amplifier for the audiophile who desires the distinctive quality of component separates, wants maximum control, yet constantly strives for musical reproduction that is free from the imperfections and coloration so commonly found with low-priced systems. The AA-1640 features distinctive modern styling, excellent specifications and a unique incorporation of power and features that offers you the ultimate in musical reproduction and the maximum in system protection.

The AA-1640 utilizes a unique speaker protection system which does not connect your speaker at turn on until transients have decayed, and immediately disconnects speakers at turn off. It also features circuitry which disconnects speakers when dangerous DC voltages and very low frequencies are present and prevents them from reaching and damaging your expensive speaker systems.

The amplifier also features massive side mounted heat sinks. These heavily finned units provide maximum cooling and at the same time avoid the need for noisy cooling fans found on many other "super amps". Should overheating occur, thermal circuit breakers disconnect your speakers to prevent amplifier damage, and illuminate an LED to alert you of the situation.

The electronics found in the AA-1640 have but one purpose... the clean, flawless reproduction of musical information. Frequency response is flat within -1 dB from 7 to 50,000 Hz, total harmonic

distortion is infinitesimal, and with hum and noise inaudible at 100 dB below full output, you'll hear your music on a clean background of velvety silence.

The AA-1640's inputs feature a two transistor unity gain amplifier for impedance matching and to provide maximum preamp to amplifier signal transfer. The preamplifier circuit has a differential amplifier to keep DC output level at zero, and an eight device (per channel) push-pull configured class AB amplifier stage. And for extra protection, both channels employ "intelligent" speaker fusing and solid-state current limiting, to protect the output transistors should an external short circuit occur. The result of this painstaking design work is a power amplifier capable of reproducing both quiet passages and the thundering fortissimo of the grand finale all with equal ease and definition.

For added convenience and control add the optional peak-responding panel meters to your AA-1640. This pair of highly accurate indicating devices are so fast they can respond to peaks as short as a record click (making them excellent for overload indication). Both meters feature individual circuit boards, back-lighted scales, and calibration from -30 to +3 dB and 0.2 to 200 watts (into an 8 ohm load). The meters can be installed when your amplifier is assembled, or later. However, if you buy the meters at the time you purchase your amplifier, you'll save \$19.95.

Kit AA-1640, Less meters, Shpg. wt. 72 lbs. UPS only . . . . . 479.95

Kit AAA-1640-1, Output meters only, Shpg. wt. 3 lbs. . . . . 79.95

### MONEY-SAVER SPECIAL!

Buy the amp and meters together and SAVE 19.95.

Kit AAS-1640, Shpg. wt. 83 lbs., UPS . . . . . 539.95

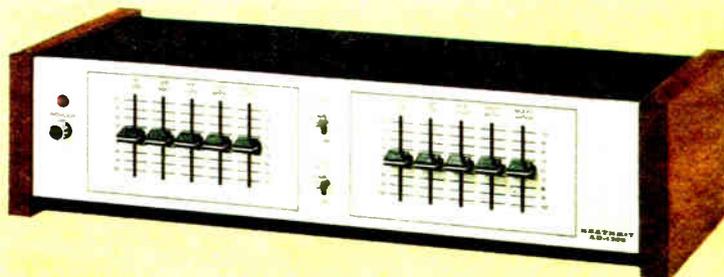
## AD-1305 5-band, 2-channel Audio Equalizer

*Offers more complete control than conventional bass and treble controls*

The AD-1305 is an audio equalizer offering complete tone control versatility with five slide controls for each stereo channel. It is designed for use with the AP-1615 at left, or any receiver or amplifier having a preamp output and power amp input, or tape monitor. Provides precise corrections in each portion of the frequency spectrum, without overlapping. A center detent allows exact "0" dB setting by-passing each band; a tone flat switch bypasses the equalizer entirely.

Compensates for room acoustics, differences in cartridges and speakers, even deficiencies in program sources. Can also be used with tape recorders to filter old or scratchy records or broadcasts before recording. Active bandpass filters with large, fully-shielded coils, ensure extremely low distortion. The AD-1305's own tape monitor lets it be used in a receiver's tape monitor circuit without losing monitor capability. The AD-1305 is a fun-to-build kit too, even for first-time builders. Parts mount on three circuit boards, and there's minimal point-to-point wiring, so assembly is fast and easy. Case with solid walnut end panels.

Kit AD-1035, Shpg. wt. 11 lbs. . . . . 129.95



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 1.5V 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. AC outlets: One switched, one unswitched. Power Requirement: 120/240 VAC, 60/50 Hz, 10 watts. Dimensions: 4 1/4" H x 17 1/2" W x 8" D.



## Affordable Hi-Fi from Heath

### Heathkit AR-1219 AM/FM Stereo Receiver

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

The new AR-1219 is a value that's hard to beat. It has the styling, features and performance of units costing much, much more. Brings you full fidelity AM, FM and stereo FM reception; also has inputs for magnetic phono and tape so you can have a complete and versatile home entertainment setup. Has power enough for solid bass even from inefficient speakers; advanced phase-locked-loop FM stereo circuit for wide stereo separation and minimum distortion; a factory assembled and aligned FM front end which assures  $2 \mu\text{V}$  sensitivity to really pull in FM stations.

Features include: tape monitor for professional-quality recordings with 3-head tape decks, pushbutton input and mode selection, speaker on-off button, stereo headphone

- $2 \mu\text{V}$  FM Sensitivity pulls in plenty of stations
- Pushbutton function selectors for easy operation
- Easy kit assembly

**\$199<sup>95</sup>**

jack, precision flywheel tuning with stereo indicator light. Inputs for a 75 or 300 ohm FM antenna and a built-in swivel-mounted AM antenna help you get the best reception even from weak stations. The extra-wide slide-rule tuning dial assures easy and accurate tuning for both AM and FM.

**Kit AR-1219, Shpg. wt. 18 lbs. . . . . 199.95**

AR-1219 SPECIFICATIONS: AMPLIFIER — Frequency Response:  $\pm 1$  dB, 7 Hz to 100 kHz. IM Distortion: less than 0.5%, full power; less than 0.2% at 1 watt. Hum and Noise: Phono, -60 dB; Tape, -65 dB. FM SECTION — Sensitivity:  $2 \mu\text{V}$ . Selectivity: 60 dB. Image Rejection: 50 dB. Stereo Separation: 40 dB typ., 35 dB minimum. — AM SECTION — Sensitivity:  $100 \mu\text{V}$  per meter. Selectivity: 40 dB. Power Requirement: 120/240 VAC, 60/50 Hz. Dimensions:  $3\frac{1}{8}$ " H x  $17$ " W x  $13$ " D.  
\*Rated IHF (Institute of High Fidelity) Standards.

### Save up to \$156.75

- Heathkit AR-1219 AM/FM Stereo Receiver
  - Two Heathkit AS-1342 Speakers
  - B-I-C 940 Automatic Turntable with Base and choice of Empire 2000E/III or Shure M91ED Stereo Cartridge
- ARS-130, Shpg. wt. 128 lbs. . . 419.95**



If purchased separately,  
**\$576.70**

Please specify cartridge when ordering

### System Savings up to \$194.70

- Heathkit AR-1500A AM/FM Stereo Receiver and walnut veneer case
  - Two AS-1342 Speakers
  - B-I-C 940 Automatic Turntable, base. Choice of Shure M91ED or Empire 2000E/III Cartridge
- ARS-122, Shpg. wt. 165 lbs., Mailable  
..... 639.95



### System Savings up to \$119.83

- Heathkit AR-1500A AM/FM Stereo Receiver and walnut veneer case
  - Two AS-1373 Speakers
  - Dual CS-1245 Automatic Turntable with Base and Choice of Shure M91ED or Empire 2000E/III Cartridge
- ARS-133, Shpg. wt. 202 lbs., UPS 947.87



## Our famous AR-1500A Stereo FM-AM Receiver gives you top performance for your audio dollar

**60 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.25% TOTAL HARMONIC DISTORTION FROM 20-20,000 Hz.**

The AR-1500A delivers the kind of clean, low-distortion power and excellent AM and FM performance others only talk about: Intermodulation distortion is an infinitesimal 0.1% at full power or at one watt. Frequency response extends from 9 Hz to 80,000 Hz, +0, -1 dB. Remember, these are guaranteed minimum specifications!

A factory-assembled FET front-end provides high sensitivity and excellent overload

characteristics. And fixed LC IF filters help keep stations separate. A phase-locked multiplex demodulator provides over 40 dB of midband FM stereo separation. Signal-strength and center-channel meters make tuning easy and accurate.

Pushbutton function selectors make function selection quick and easy. Two stereo headphone jacks are provided on the front panel. You can custom mount the receiver or order the optional walnut veneer case. Either way, it's one beautiful receiver at a beautiful, build-it-yourself price. Less case.

**Kit AR-1500A, Shpg. wt. 51 lbs. . . . . 429.95**  
**Walnut veneer case.**

**ARA-1500-1, Shpg. wt. 8 lbs. . . . . 27.95**



## \$329<sup>95</sup> AR-1429 AM/FM Stereo Receiver

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

Here's a medium-power stereo receiver with specs that you'll find only on units costing a great deal more. Take the incredibly low distortion figure of 0.1% for example: Sound so pure and clean you won't believe it costs so little. Consider these specs too: Phono hum and noise is -79 dB for 10 mV input, FM sensitivity is a low 1.8  $\mu$ V and stereo separation is 40 dB. A true complementary-symmetry power amplifier provides minimum distortion even at high power levels. Two 4-pole ceramic filters are used in the AM section for superb, distinct station selection. Two 8-pole ceramic filters in the FM section ensure excellent FM selectivity. An improved FM-PLL stereo demodulator provides excellent stereo reception with minimum distortion.

The AR-1429 also has the features of a high-priced unit. There are two high-level inputs, a magnetic phono input, pre-amp out/power-amp in jacks for audio accessories and a

tape monitor. Signal and tuning meters make tuning easy and accurate. For private listening, a headphone jack is provided on the front panel. You can also build and install the optional AD-1504 Dolby™ FM Module for the reduced noise and increased dynamic range of Dolbyized FM broadcasts.

Kit AR-1429, Shpg. wt. 32 lbs. . . . . 329.95

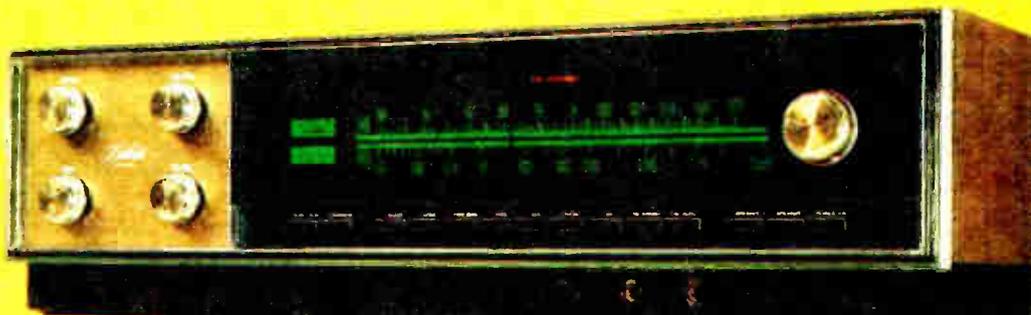
Kit AD-1504, Optional Dolby FM Module, Shpg. wt. 1 lb. . . . . 49.95

**AR-1429 SPECIFICATIONS: AMPLIFIER** — Frequency Response: -1 dB, 5 Hz to 45 kHz. Input Sensitivity: Phono, 2 mV; Aux., Tape and Tape Mon., 200 mV. Hum and Noise: Phono, -65 dB (-79 dB for 10 mV input); Aux., Tape and Tape Mon., -75 dB. FM SECTION — Sensitivity: 1.8  $\mu$ V\*. Selectivity: 65 dB. Image Rejection: 90 dB\*. Stereo Separation: 40 dB typ. at 1000 Hz. AM SECTION — Sensitivity: 10  $\mu$ V. Selectivity: 20 dB. Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 4 $\frac{3}{4}$ " H x 20" W x 13 $\frac{1}{2}$ " D.

\*Rated IHF (Institute of High Fidelity) Standards. Dolby is a trademark of Dolby Labs.

**AR-1500A SPECIFICATIONS: AMPLIFIER** — Frequency Response (1 watt level): -1 dB, 9 Hz to 80 kHz; -3 dB, from less than 5 Hz to 120 kHz. Intermodulation Distortion: Less than 0.1% at full power; less than 0.1% at 1 watt. Damping Factor: Greater than 60. Input Sensitivity: Phono, 1.8 millivolts; Tape, Aux., Monitors: 140 millivolts. Hum & Noise: Phono (10 millivolt reference), -63 dB. Tape and Aux. (0.25 volt reference), 75 dB. FM — Sensitivity: 1.8  $\mu$ V\*. Selectivity: 90 dB.\* Image Rejection: 100 dB.\* Capture Ratio: 1.5 dB.\* Channel Separation: 40 dB or greater at midfrequencies; 35 dB at 50 Hz; 25 dB at 10 kHz; 20 dB at 15 kHz. Harmonic Distortion: 0.5% at 1000 Hz with 100% modulation. 19 kHz and 38 kHz Suppression: 55 dB or greater. AM — Sensitivity: 50  $\mu$ V with external input; 300  $\mu$ V per meter with radiated input. GENERAL — Accessory AC Outlets: Two. One switched and one unswitched (240 watts). Power requirement: 120 or 240 volts, 60/50 Hz AC. 40 watts idling (zero output) and 356 watts at full output. Dimensions: Overall — 18 $\frac{1}{2}$ " W x 5 $\frac{1}{2}$ " H x 13 $\frac{1}{2}$ " D.

Rated IHF (Institute of High Fidelity) Standards.



AR-1500A Stereo AM-FM Receiver shown in optional walnut veneer case

### Big System Savings

- Heathkit AR-1429 AM/FM Stereo Receiver
- Two Heathkit AS-1342 Speakers
- B-I-C 940 Automatic Turntable with Base and Shure M91ED or Empire 2000E/111 Cartridge (specify)

ARS-131, Shpg. wt. 108 lbs. . . . . 528.51

If purchased separately,

\$706.70

Save

\$177.89



### Special System Savings

- Heathkit AR-1429 AM/FM Stereo Receiver
- Two Heathkit AS-1363 Speakers
- B-I-C 940 Automatic Turntable with Base and Shure M91ED or Empire 2000E/111 Cartridge (specify)

ARS-132, Shpg. wt. 171 lbs. . . . . 712.31

If purchased separately,

\$836.70

Save

\$124.39



# Our best stereo receiver ever—



## AR-1515 Digital AM/FM Stereo Receiver — a new standard in convenience and performance

From its half-inch tall LED frequency readouts to its extraordinarily low distortion, the Heathkit AR-1515 is the finest receiver Heath has ever designed. Unquestionably, it is one of the world's finest audio components.

**The AR-1515's digital readout** is far more accurate and easy to use than conventional dial-type tuning. Simply tune to the exact frequency you want. Signal-strength and center-channel meters then help you "zero in" on the strongest signal and lowest FM distortion. There's even an oscilloscope output to monitor multipath distortion.

**But digital readout is only the beginning.** With 1.8  $\mu\text{V}$  sensitivity, the FM section is one of the world's finest. The optional AD-1504 Dolby Module allows you to enjoy the reduced noise and increased dynamic range of Dolbyized FM broadcasts. The AM section is probably the finest in any receiver — dual-gate MOSFET's in the front end and a computer-designed 9-pole filter for outstanding selectivity without periodic realignment.

**The amplifier section meets the same high standards.** Harmonic distortion is an infinitesimal 0.08%! Frequency response is +0, -1 dB from 8 Hz to 45,000 Hz and +0, -3dB from 4 Hz to 80,000 Hz! That extra margin of performance assures clean, wide-range sound without audible strain or struggle on even the most complex musical passages. And you'll hear the music over a background of silence — hum and noise are 65 dB below full output in phono and 80 dB below full output on high-level sources.

**The amplifier section is also unmatched in convenience.** All the frequently-used controls — volume, input selector, stereo/mono switch, tuning — are on the front panel. The secondary controls (which clutter the front panels of many receivers) are concealed behind a hinged door — main and remote speaker switches, headphone jack, balance, bass and treble, FM muting and stereo blend, subsonic and high-frequency filters, tone-flat, dubbing inputs and outputs and more. All are convenient when you need them and out of the way when you

don't. Convenient indicator lights in the black-out section of the front panel instantly show the input you've selected and which switches are engaged. In the same functional way, the digits light only when listening to AM or FM and only the necessary tuning meters are illuminated — signal-strength only for AM, signal-strength and center-tune for FM.

**The bass and treble controls have been specially designed** to act primarily at the frequency extremes, allowing you to compensate for room acoustics and program deficiencies while maintaining smooth midrange response. For even greater versatility, the AR-1515's pre-amp out/amp in jacks allow it to be used with any high-quality audio equalizer, such as the Heathkit AD-1305.

**The AR-1515's styling is both elegant and functional.** The massive brushed extruded aluminum front panel is accented by an attractive, diecast Heathkit logo and by luxurious solid walnut end-panels.

**The AR-1515 is even easy to build!** Obviously the AR-1515 is a complex and sophisticated receiver, but its well thought out, modular design and color-coded wiring harnesses simplify assembly. There's even a separate test meter to double-check your work each step of the way. Finally, the illustrated, step-by-step assembly manual makes it easy for even a novice to assemble the AR-1515.

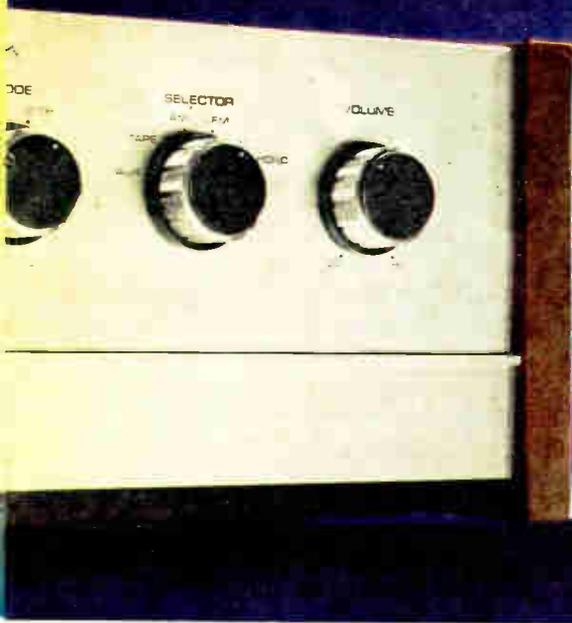
**The receiver of the future... today!** There's never been a receiver quite like the Heathkit AR-1515. It combines beauty, convenience, superb performance and value. And, in doing so, it redefines the state of the art. If you want the best for your audio system, it's the receiver you should own.

**Kit AR-1515, Shpg. wt. 47 lbs. ....569.95**

**Dolby FM Module.** Enjoy the reduced noise and increased dynamic range of Dolbyized FM broadcasts. Assembles and installs in one evening.

**Kit AD-1504, Shpg. wt. 1 lb. ....49.95**

# Heathkit AR-1515



The AR-1515 has everything you could want in a stereo receiver; precision digital read-out, incredibly low distortion, functionally elegant styling and much more!

*It's the only receiver at anywhere near this price that gives you digital frequency readout AND it provides performance equal to the finest separate components.*

Over three years ago we gave our engineers a challenge: to design a totally new stereo receiver. A component which would set new standards for the industry.

They succeeded. To the dedicated music-lover, the AR-1515 offers exceptional specifications — massive power combined with vanishingly low distortion, a superlative FM section and an AM section which truly deserves to be called "hi-fi".



A flip-down panel reveals the AR-1515's secondary controls.

Only **\$569<sup>95</sup>**

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

### And look at these other impressive specifications!

**AMPLIFIER** — Frequency Response: +0, -1 dB, 8 Hz to 45 kHz; +0, -3 dB, 4 Hz to 80 kHz. Intermodulation Distortion: less than 0.08% from 0.25 to 70 watts (full output). Damping Factor: Greater than 60. Input Sensitivity: Phono 1 & 2, 2 mV. Aux., Tape & Dub., 200 mV. Input Overload: Phono, greater than 100 mV. Aux., Tape & Dub., greater than 10 V. Hum and Noise: Phono (2 mV reference), -65 dB. Aux., Tape & Dub., (200 mV reference) -80 dB. FM (Monophonic): Frequency Response: ±1 dB, 20-15,000 Hz. Antenna: 75 or 300 ohm. Sensitivity: 1.8 μV\*. Selectivity: 100 dB\*. Image Rejection: 90 dB\*. Capture Ratio: 1.5 dB\*. AM Suppression: 65 dB\*. Harmonic Distortion: 0.3%. Intermodulation Distortion: 0.1%. Signal to Noise Ratio: 70 dB\*. Spurious Rejection: 90 dB\*. Mute Threshold:

0.5 μV variable; FM (Stereo). Channel Separation: 40 dB or greater at mid-frequencies; 35 dB at 100 Hz; 20 dB at 10 kHz. 20 dB (nominal) at 15 kHz. Harmonic Distortion: 0.35% with 100% modulation. 19 and 38 kHz Suppression: 60 dB. SCA Suppression: 60 dB. AM: Sensitivity: 5 μV with 50-ohm direct input. Selectivity: 20 dB at 10 kHz. AM Antenna: external static-shielded loop. Image Rejection: 70 dB at 600 kHz. 50 dB at 1400 kHz. GENERAL: Accessory AC Outlets: One switched and one unswitched. Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 21 1/2" W x 6 3/4" H x 15" D. Net Weight: 35.8 lbs. \*Rated IHF (Institute of High Fidelity Standards). Dolby is a trademark of Dolby Laboratories.

**Choose one of these carefully-matched AR-1515 systems for a lifetime of superb listening!**



Save up to \$134.39

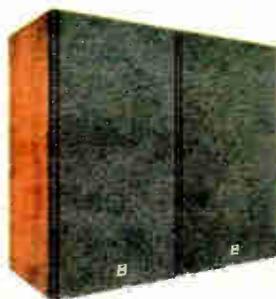
System Price  
**\$902<sup>31</sup>**



- Heathkit AR-1515 Stereo Receiver
- Two AS-1352 Speakers
- B-1-C 960 Turntable with Base and Choice of Shure M91ED or Empire 2000E/III Cartridge

ARS-125, Shpg. wt. 194 lbs.  
Motor Freight.....902.31

If purchased separately, up to  
**\$1036<sup>70</sup>**



Save \$62.99

System Price  
**\$1196<sup>81</sup>**



- Heathkit AR-1515 Stereo Receiver
- Two AS-1373 Speakers
- Dual CS-721 Turntable with Base, Dustcover and Shure V 15 III Cartridge

ARS-134, Shpg. wt. 195 lbs.  
Motor Freight.....1196.81

If purchased separately,  
**\$1259<sup>80</sup>**



AA-1506 Power Amplifier

AN-2016 Digital  
Tuner/Preamplifier

## Heathkit "Modulus" Stereo Tuner/Preamplifier

The AN-2016 Digital Tuner/Preamplifier is the "heart" of the Modulus system. Its sophisticated circuitry and exceptional versatility put you in complete command of your musical environment. And the AN-2016's matching amplifiers and optional plug-in modules let you "custom design" a system that's right for you. You can easily change or update your system to meet your changing needs. Add Dolby FM, a more powerful amplifier, convert to 4-channel, add SQ or CD-4 "build-in" modules—all at minimum cost and *without* obsoleting the AN-2016!

The tuner section of the AN-2016 is one of the most technologically advanced on the market. Four ½" tall LED digits display the broadcast frequency more accurately than a conventional tuning dial. TWO meters—signal-strength for fine tuning on both AM and FM, and center channel to indicate the point of lowest distortion on FM—give you outstanding tuning precision. And there are 'scope outputs so you can align your antenna for the lowest multipath distortion. Fully adjustable FM muting can be switched on or off from the front panel, and a phase-locked-loop stereo multiplex circuit assures wide stereo separation of 40 dB at 1000Hz. Even the AM section is one of the world's best—with dual-gate MOSFET's, a 9-pole LC filter and a static-shielded loop antenna (a Heath exclusive which provides exceptional freedom from noise and improved dynamic range) for AM reception that's real "hi-fi" quality.

The preamplifier inputs have overload characteristics and freedom from distortion that allow superb sound reproduction from any program source. On high-level inputs, the AN-2016 reaches full output with a signal of 170mV, yet it doesn't overload until 5 volts. The phono amplifier can be driven to full output with as little as 2 mV, but does not overload until the input reached 60mV! And total harmonic distortion is a mere 0.05% throughout the entire 20 Hz to 20,000 Hz frequency range.

Each channel's peak-responding meter has a full 40 dB dynamic range to follow the softest and loudest musical passages faithfully—quickly detects distortion-causing clipping or overload. Order yours now. It could be the last hi-fi system you'll ever buy.

Kit AN-2016, Shpg. wt. 39 lbs. .... 619.95

**CD-4 Demodulator Module.** Lets you play CD-4 discrete 4-channel records through the AN-2016. Includes calibration record. For use with CD-4 phono cartridge.

Kit AD-1507, Shpg. wt. 2 lbs. .... 89.95

**Dolby FM Module.** Provides the reduced noise and increased dynamic range of Dolbyized FM. Assembles, installs in one evening.

Kit AD-1504, Shpg. wt. 1 lb. .... 49.95

**SQ Decoder Module.** For 4-channel SQ material. Includes full-logic with variable blend enhancement for outstanding separation from tapes, records and FM.

Kit AM-1503, Shpg. wt. 2 lbs. .... 59.95

**AN-2016 SPECIFICATIONS: PREAMPLIFIER—Frequency Response:** -0.5 dB at 10 Hz and 30 kHz. **Total Harmonic Distortion:** less than 0.05% at 1.5 V into 20K ohms. **IM Distortion:** less than 0.05%. **Hum & Noise (unweighted):** phono, -75 dB ref. to 10 mV; high-level, -80 dB ref. to 0.25V. **Bass Control:** ±15 dB at 20 Hz nominal. **Treble Control:** ±12 dB at 20 kHz nominal. **Hi Filter:** -3 dB at 7 kHz ±1 kHz, 12 dB/octave. **Lo Filter:** -3 dB at 30 Hz ±2 Hz, 12 dB/octave. **Input Sensitivity (for 1.5 V output):** phono, 2/6 mV (switch selected). **Output Voltage:** 1.5 RMS. **FM TUNER—(Monophonic—Sensitivity:** 1.7 μV (IHF); 3.5 μV for 50 dB S/N. **Signal-to-Noise Ratio:** 68 dB at 1000 μV. **Selectivity:** greater than 100 dB. **Capture Ratio:** 1.3-dB. **Spurious Rejection:** greater than 90 dB. **IF Rejection:** greater than 100 dB. **Image Rejection:** greater than 90 dB. **Total Harmonic Distortion:** 0.3%. **IM**

**Distortion:** less than 0.1%. **AM Suppression:** 68 dB. **Antenna Inputs:** 300Ω balanced; 75Ω unbalanced. — **FM (Stereophonic)—Stereo Sensitivity:** 35 μV for 50 dB S/N. **Total Harmonic Distortion:** 1 kHz, 0.35%. **Stereo Separation:** 40 dB at 1 kHz; 20 dB at 15 kHz. **SCA Rejection:** 65 dB. **AM TUNER—Sensitivity:** 6 μV for 20 dB S+N/N. **Selectivity:** more than 60 dB at 20 kHz. **Signal-to-Noise Ratio:** more than 48 dB. **Harmonic Distortion:** less than 1.0% at 400 Hz. **Antenna:** external static-shielded loop. **GENERAL—Power Requirement:** 120/240 VAC, 60/50 Hz. **AC Convenience Outlets:** 2 switched, 2 unswitched (500 watts max.). **Dimensions:** approx. 6½" H x 19" W x 14½" D. †SQ is a trademark of CBS, Inc.; "Dolby" is a trademark of Dolby Labs and "CD-4" is a trademark of the Japan Victor Company.

## Matching power amplifier . . .

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

A perfect match for the AN-2016 in styling and performance—and you should also consider using it with other quality preamps. Just compare the specs—intermodulation distortion is less than 0.1% at full power and drops to a mere 0.05% at 0.1 watt. Frequency response is exceptionally wide and flat—down just 0.5 dB at 8 Hz and 45,000 Hz. And, with a damping factor of over 60, you can count on the AA-1506 to provide high definition bass response. Features pushbutton main and remote speaker switching, lighted power button.

Kit AA-1506,

Shpg. wt. 25 lbs. .... 199.95

### Modulus Stereo System

- Heathkit AN-2016 Modulus AM/FM Control Center
- Heathkit AA-1506 Stereo Power Amplifier
- Two Heath AS-1373 Speakers
- Dual 1245CS Turntable with base and your choice of Empire 2000E/III or Shure M91ED Stereo Cartridge

ARS-135, 215 lbs. Motor Freight ..... 1291.77  
Save up to 137.93. If purchased separately, 1,429.70





## New Aiwa Stereo Cassette Deck with Dolby® Noise Reduction and Remaining Tape Time Meter

**\$419<sup>95</sup>** Oil damped ejection and bias fine adjustor for LH tapes

The new Aiwa 6550 brings professional style recording within the reach of just about any audiophile's budget. It's got the latest features for the best in tape recording. Features like continuous readout of time remaining on tape puts an end to overrun and consequent tape waste and eliminates the worry of running out of tape in the middle of the recording process. There are separately selectable 3-position switches so that you get the proper bias and equalization from all types of tapes. A bias adjustment knob allows you to adjust the high frequency response on LH tapes for the best performance level. Shocks and vibration in the tape unit are kept to a minimum by the oil damped gears. The cassette cover lowers silently and smoothly at the push of a button. A high efficiency drive system keeps wow and flutter to a low 0.05% (WRMS). Two-step peak indicator lamps supplement the VU meters to display over-level input during the recording process. Other features include memory rewind mechanism, quick review/cue, Ferrite Guard Head, 3.4 mW headphone jack output and removable cassette cover.

The Aiwa 6550 is a front runner in cassette recording and deserves to be a part of every good stereo high fidelity system. Make it a part of yours.

ATP-1244, Shpg. wt. 25 lbs. . . . . **419.95**

AD-6550 SPECIFICATIONS: Frequency response: LH tape: 20-15,000 Hz; 30-13,000 Hz  $\pm 3$  dB. CrO<sub>2</sub> tape: 20-17,000 Hz; 30-15,000 Hz  $\pm 3$  dB. FeCr tape: 20-17,000 Hz; 30-15,000 Hz  $\pm 3$  dB. S/N ratio: 65 dB (Dolby-on, FeCr tape). Wow and flutter: 0.05% (WRMS). Fast forward and rewind time: 90 sec. (C-60 tape). Head: Ferrite Guard Head (FGH). Motor: 38-pulse FG servo motor. Input sensitivity/impedance: Mic: 0.3 mV/200 ohms-10K ohms. Line-in: 50 mV/50K ohms. DIN: 0.1 mV/K ohms/3K ohms. Output level/impedance: Line-out: 0.775V/50K ohms. DIN: 0.775V/50K ohms. Headphone: 3.4 mW/8 ohms. Power consumption: 10W. Power source: AC: 110-120V/220-240V (selectable with voltage selector) 50/60 Hz. Dimensions: 16 $\frac{1}{8}$ " W x 5 $\frac{1}{8}$ " H x 13" D. Weight: 16.5 lbs.

\*Dolby is a trademark of Dolby Laboratories Inc.



## New Aiwa Stereo Cassette Deck with Dolby® Noise Reduction System and streamlined "slant-front" panel

**\$219<sup>95</sup>** Super modern, easy-access design complements any stereo hi-fi system

The Aiwa AD-1250 is one of the most advanced stereo cassette decks available today. The inclined panel makes operation of controls and tape insertion a breeze. Features include an oil-damped cassette ejection system for smooth, noiseless ejection, large VU meters and LED peak indicator for precision recording levels on all types of material and, of course, Dolby noise reduction for greatly reduced tape hiss and background noise. Piano-type keys give a light but positive action. A mechanical pause key is separate from other keys for quick identification and operation. Separate 3-position bias and equalizer switches allow for optimum recording with conventional, CrO or FeCr tapes.

The performance of the AD-1250 is excellent too; frequency response is a full 30-16,000 Hz with standard tape, wow and flutter are less than 0.09% (WRMS) and signal to noise ratio is 60 dB (dolby-on with FeCr tape). The tape head is constructed of long-lasting ultra-hard permalloy famous for its frequency response characteristics and resistance to distortion. Add the AD-1250 to your hi-fi system today. It's an outstanding value and a superb performer at a sensational low price! Fully assembled.

ATP-1233, Shpg. wt. 17 lbs. . . . . **219.95**

AD-1250 SPECIFICATIONS: Frequency response: 30~14,000 Hz (LH tape). 30~16,000 Hz (CrO<sub>2</sub> tape). 30~16,000 Hz (FeCr tape). Head: Ultra-hard permalloy head. Fast forward and rewind time: 85 sec. (C-60 tape). Motor: DC servo motor. Input sensitivity/impedance: LINE: 50 mV/50K ohms. DIN: 0.1 mV/K ohm/3 K ohms. MIC: 0.3 mV/200~10 K ohms. Output level/impedance: LINE: 0.775 V/50 K ohms (OVU). DIN: 0.775 V/50 K ohms (OVU). HEADPHONE: 1 mW/8 ohms. Tape speed: 4.8 cm/sec. (1-7/8 ips). Wow and flutter: 0.09% (WRMS). S/N ratio: 60 dB (Dolby-on FeCr tape). Semiconductor: 2 ICs, 19 transistors, 12 diodes, 3 LEDs. Power consumption: 10W. Power source: 110~120 V/220~240 V (Selectable with voltage selector) 50/60 Hz. Track system: 4-track, 2-channel. Recording system: AC bias. Erasing system: AC erasure. Dimensions: 15 $\frac{1}{8}$ " W x 5 $\frac{1}{8}$ " H x 10 $\frac{1}{8}$ " D. Weight: 10.2 lbs.

\*Dolby is a trademark of Dolby Laboratories Inc.

## Your Personal Engraved Name Plate — A Special offer for Customers Who Order From This Catalog!



**\$150**  
for one

(\$1.30 each for 2 or more)  
(\$1.75 if purchased separately)

Separate purchase can only be made through your local Heathkit Electronic Center

What better way to show your pride in your finished kit? The handsome hand-engraved name plates feature a virtually indestructible silver-satin, brushed jeweler's finish on durable Metal Graphics™ Aluminum and self adhesive backing. You'll want one for every Heathkit product you own. Remember, your name plate order **must** accompany a regular kit order to get the lowest price.

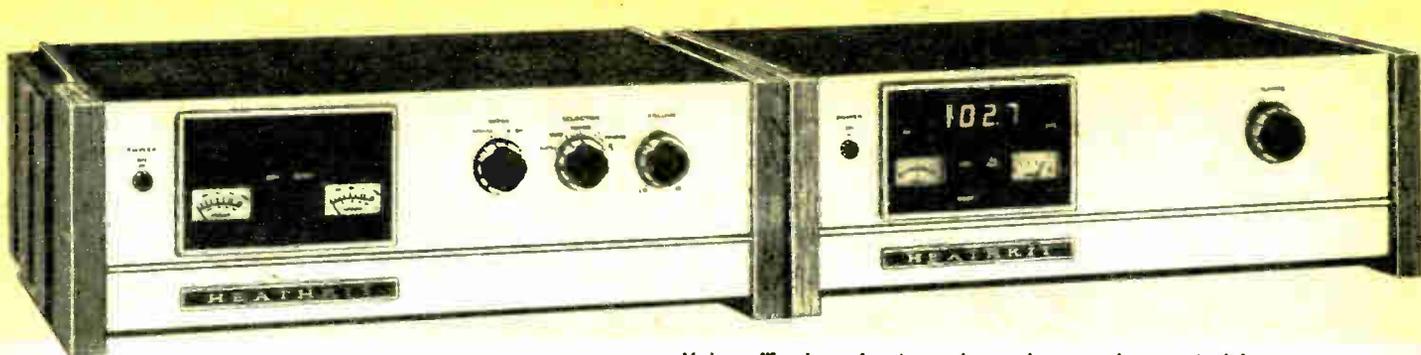
FILL IN THIS SPECIAL NAME PLATE ORDER FORM COMPLETELY AND BRING IT IN TO YOUR LOCAL HEATHKIT ELECTRONIC CENTER. PLEASE PRINT YOUR NAME PLAINLY IN CAPITAL LETTERS, USING A MAXIMUM 14 CHARACTERS (INCLUDING SPACES) IN THE BOXES PROVIDED BELOW.

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Please enter my order for \_\_\_\_\_ GDP-1225 name plates. The price is \$1.50 for one. \$1.30 each for two or more (including postage and handling to your Heathkit Electronic Center).

Name \_\_\_\_\_  
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State \_\_\_\_\_ Zip Code \_\_\_\_\_

CUT OUT ENTIRE FORM ON DOTTED LINE AND ATTACH TO YOUR KIT ORDER



Unique flip-down front panel reveals secondary controls!

### AA-1515 high-performance Stereo Amplifier

**\$31995**

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

The low-distortion power you need to drive most any speakers to "live performance" volume levels. Harmonic distortion is an amazing 0.08% over the 20-20,000 Hz range for exceptionally accurate music reproduction. Background noise is a full 65 dB down on phono inputs, 80 dB down on all other inputs. Has dual output meters calibrated in both watts and decibels over a 40 dB range for an accurate visual indication of amplifier output. The meters respond to peaks as short as a record click, making them useful as overload indicators. High and low filters help you get the best sound from old or worn records. Handsome cabinet with brushed aluminum front panel, solid walnut side panels. Easy kit assembly.

Kit AA-1515, Shpg. wt. 40 lbs. .... **319.95**

**AA-1515 SPECIFICATIONS:** Frequency Response: -1 dB, 8 Hz to 45 kHz; -3 dB, 4 Hz to 80 kHz. **IM Distortion:** less than 0.08% from 0.25 to 70 watts. **Damping Factor:** greater than 60. **Input Sensitivity:** Phono, 2 mV. Aux., Tuner, Tape Mon., Tape Dub., 150 mV. **Input Overload:** Phono, greater than 100 mV. All other inputs: greater than 10 volts. **Hum and Noise:** Phono, 65 dB. Tape, Tuner and Aux., 80 dB. **Power Requirement:** 120 or 240 volts; 60/50 Hz. **Dimensions:** 17½" W x 6½" H x 14¼" D. **Net Weight:** 27 lbs.

### AJ-1515 deluxe AM/FM Stereo Tuner

**\$39995**

*The tuner section from our AR-1515 Stereo Receiver featuring digital frequency readout and top performance—one of the finest tuners you can buy*

Digital frequency readout displays AM and FM broadcast frequencies far more accurately than tuners with conventional dials; its signal-strength and center-channel tuning meters help you "zero in" on stations for the finest reception. Built in the optional Dolby™ FM module to get the reduced noise and greater dynamic range of Dolbyized FM broadcasts now in many areas, too. Even the AM section can be called hi-fi. Just look at the specifications and you'll be impressed.

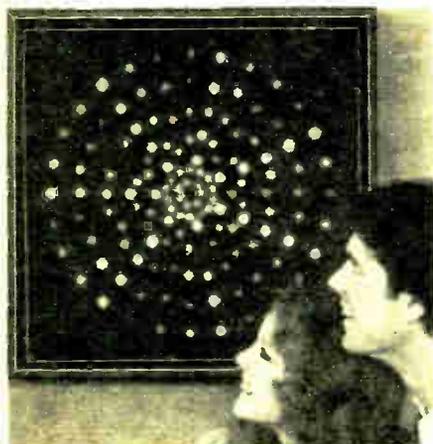
Kit AJ-1515, Shpg. wt. 27 lbs. .... **399.95**

Kit AD-1504, Optional Dolby FM Module. 1 lb. .... **49.95**

**AJ-1515 SPECIFICATIONS:** Frequency Response: ±1 dB, 20-15,000 Hz. Antenna: 300 ohm balanced, 75 ohm unbalanced. **Sensitivity:** 1.8 μV. **Selectivity:** Alternate Channel, 100 dB\*. **Image Rejection:** 90 dB\*. **IF Rejection:** 90 dB\*. **Capture Ratio:** 1.5 dB\*. **AM Suppression:** 65 dB\*. **Harmonic Distortion:** 0.3%. **Inter-modulation Distortion:** 0.1%. **Spurious Rejection:** 90 dB\*. **Signal-to-Noise Ratio:** 70 dB\*. **Stereo Channel Separation:** 40 dB at 1000 Hz, 35 dB at 100 Hz, 25 dB at 10 kHz, 20 dB at 15 kHz. **Stereo Harmonic Distortion:** 0.35%. **19 kHz and 38 kHz Suppression:** 60 dB. **SCA Suppression:** 60 dB. **Mute Threshold:** 0-5 μV (variable). **AM Sensitivity:** 5 μV. **Selectivity:** 20 dB. **Image Rejection:** 70 dB at 600 kHz, 50 dB at 1400 kHz. **IF Rejection:** 40 dB at 600 kHz, 60 dB at 1400 kHz. **Harmonic Distortion:** 3%. **Power Requirement:** 120 or 240 volts, 60/50 Hz, 30 watts. **Dimensions:** 17½" W x 6½" H x 14¼" D. **Net Weight:** 27 lbs.

\*Rated IHF (Institute of High Fidelity) Standards

Dolby is a trademark of Dolby Labs.



**A kaleidoscope of color for your parties and get-togethers!**

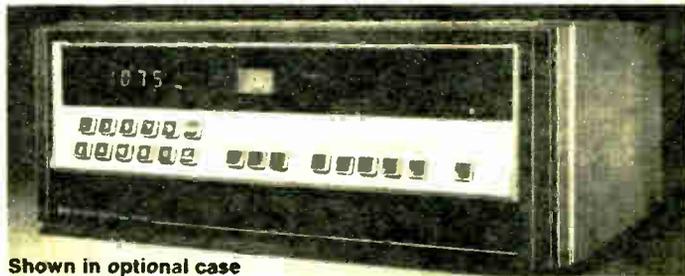
**\$8995**

*Music becomes bursts of colored light*

The TD-1006 Color Organ translates any kind of music into pulsing, whirling starbursts of color. Just connect the TD-1006 to the speaker leads of any sound source (except AM radio). The lights pulsate in time to the music creating spokes of color that seem to swirl. Just 4½" deep—even mount it on the wall. Walnut-grained vinyl-clad case, black-out front panel. 22¾" W x 22¾" H x 4½" D. For 120/240 VAC.

Kit TD-1006, Shpg. wt. 34 lbs. .... **89.95**

38



Shown in optional case

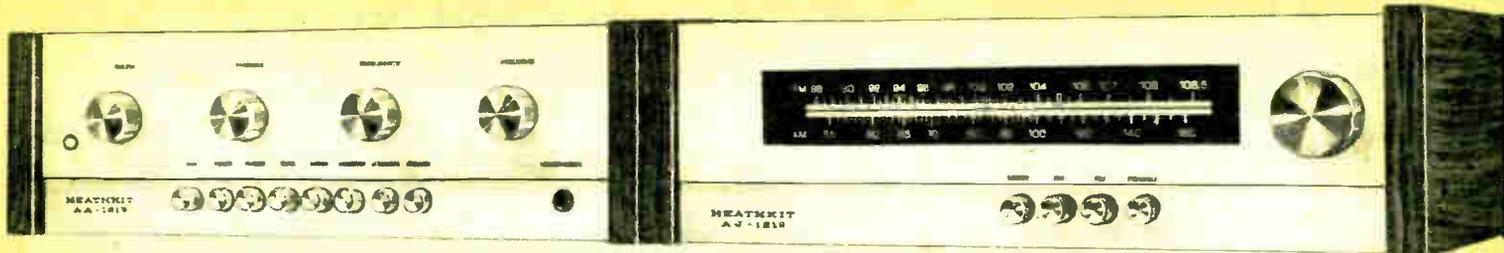
### AJ-1510A Digital FM Stereo Tuner

The most precise and accurate tuning system available today—digital readout and digital frequency synthesis. Convenient three-way tuning. Auto-Sweep count down from the top of the FM band; program it to stop only at stereo stations, or use the A, B and C buttons to select any of three stations programmed with computer-type punch cards.

Kit AJ-1510A, Shpg. wt. 25 lbs. .... **519.95**

Pecan Veneer Case. AJA-1510-1, Shpg. wt. 8 lbs. .... **28.95**

**AJ-1510A SPECIFICATIONS:** Antenna: 75 or 300 ohm. **Sensitivity:** Less than 1.8 μV. **Selectivity (alternate channel):** Greater than 95 dB. **Capture ratio:** Less than 1.5 dB. **Harmonic distortion:** Less than 0.3%. **IF rejection:** Greater than 95 dB. **Spurious rejection:** Greater than 90 dB. **STEREOPHONIC—Channel separation:** 1,000 Hz, 40 dB; 80 Hz, 25 dB; 10 kHz, 25 dB; 15 kHz, 20 dB. **Harmonic distortion:** 0.35%. **AUDIO OUTPUT—Audio output level: (fixed):** 1.2 V rms nominal (with 100% mod.). **GENERAL—Power Requirement:** 120/240 VAC, 60/50 Hz, 50 W.



## 1219 Series "Separates" — great sound at low cost!

**\$114.95**

### AA-1219 Stereo Amplifier

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

The AA-1219 has a host of "top of the line" features for operating convenience and versatility. Input level controls match the amplifier to your phono cartridge's output; tape monitor lets you listen as you record (with 3-head decks), positive pushbutton input selection, front panel stereo headphone jack, bass and treble controls, and much more. The kit building is fun and easy, too. Case with stained walnut-veneered end panels.

Kit AA-1219, Shpg. wt. 15 lbs. .... **114.95**

AA-1219 SPECIFICATIONS: Frequency Response:  $\pm 1$  dB, 7 Hz to 100 kHz. IM Distortion: less than 0.5% at full power; less than 0.2% at 1 watt. Hum and Noise: -65 dB. Power: 120/240 VAC, 60/50 Hz. Dimensions: 3 $\frac{1}{2}$ " H x 12 $\frac{3}{4}$ " W x 12" D.

**\$114.95**

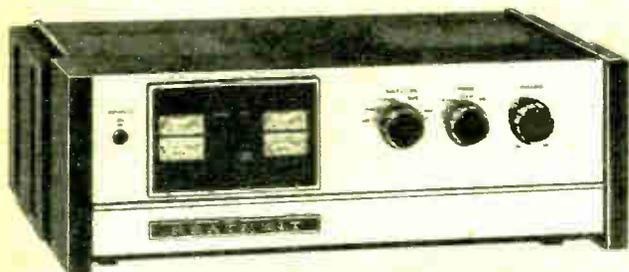
### AJ-1219 AM/FM Stereo Tuner

*Delivers crisp, clear AM and FM reception even on distant stations — offers excellent FM stereo separation with minimum distortion*

The new AJ-1219 has everything you'd expect to find in a tuner costing far more. The pre-assembled and aligned FM front end provides 2  $\mu$ V sensitivity with extremely low cross modulation and virtually no overload, even on strong signals. A phase-lock-loop multiplex circuit provides excellent stereo separation with minimum distortion. Handsome metal case with stained walnut-veneered end panels. If your budget is limited, but you still want outstanding performance, the AJ-1219 is the stereo tuner for you.

Kit AJ-1219, Shpg. wt. 12 lbs. .... **114.95**

AJ-1219 SPECIFICATIONS: FM Sensitivity: 2  $\mu$ V. Selectivity: 60 dB. Capture Ratio: 2 dB. AM Suppression: 50 dB. Stereo Channel Separation: 40 dB typ., 35 dB min. Power Requirement: 120/240 VAC, 60/50 Hz. Dimensions: 3 $\frac{1}{2}$ " H x 13" W x 11" D.



### AA-2015 deluxe 4-Channel Amplifier

35 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS WITH LESS THAN 0.25% TOTAL HARMONIC DISTORTION FROM 20-20,000 HZ

Discrete 4-channel amplifier version of AA-1515. Was \$419.95 in Spring 1977 Cat.

Kit AA-2015, Shpg. wt. 40 lbs. .... **199.95**

Kit AD-1507, Optional CD-4 Module. Shpg. wt. 2 lbs. .... **89.95**

Kit AM-1503, Optional SQ Module. Shpg. wt. 2 lbs. .... **59.95**

AA-2015 SPECIFICATIONS: Frequency Response: (at 1 watt): 0 dB to -1 dB, 7 Hz to 40 kHz. Intermodulation Distortion: Less than 0.2% from 250 mW to 35 watts. Damping Factor: greater than 50. Hum and Noise (Input shorted): Phono, -65 dB. High level, -75 dB. Power Requirement: 120/240 VAC, 60/50 Hz. Dimensions: 18" W x 6 $\frac{1}{4}$ " H x 14 $\frac{3}{4}$ " D. Net Weight: 31 lbs.

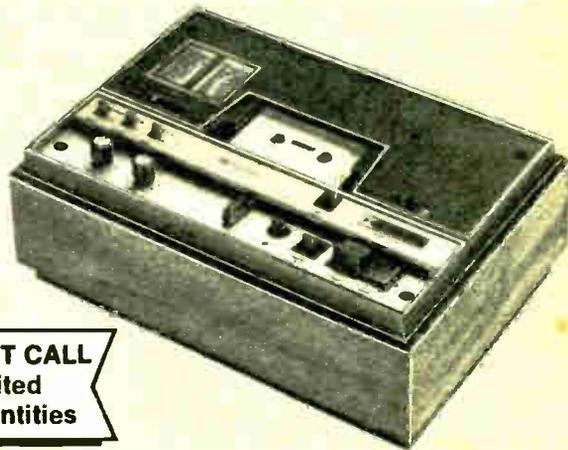
SQ is a trademark of CBS, Inc. CD-4 is a Trademark of Japan Victor Company.

### AA-18 Low-cost Solid-State Mono Amplifier



3.25 WATTS, MINIMUM RMS, INTO 8 OHMS WITH LESS THAN 1.5% TOTAL HARMONIC DISTORTION FROM 40-20,000 HZ. Has input for phono with ceramic cartridge, mono AM or FM tuner, or tape recorder. 2 $\frac{1}{2}$ " H x 7 $\frac{1}{4}$ " W x 5 $\frac{1}{4}$ " D. 120/240 VAC, 60/50 Hz.

Kit AA-18, Shpg. wt. 4 lbs. .... **28.95**



**LAST CALL**  
Limited  
Quantities

### Deluxe Stereo Cassette Deck with Dolby

Combines a performance-proven tape transport with Heath electronics and the famous Dolby Noise Reduction system. Has play, stop fast-forward rewind, eject controls; automatic end-of-tape shutoff; safety interlock, lots more. With 90-minute cassette.

Kit AD-1530, Shpg. wt. 20 lbs. .... **289.95**

ADA-1530-1, Dust Cover, Shpg. wt. 2 lbs. .... **6.95**

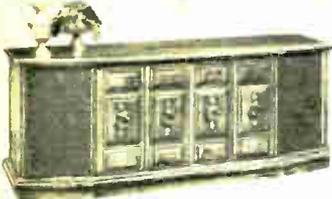
AD-1530 SPECIFICATIONS: Response: Regular (iron oxide) tape;  $\pm 3$  dB from 40 Hz to 12 kHz typical. CrO<sub>2</sub> (chromium dioxide) tape;  $\pm 3$  dB from 40 Hz to 14 kHz typical. Distortion: Tape dependent; electronics less than 0.2%. Hum and Noise: Dolby Switch OFF, -48 dB. Dolby Switch ON provides up to 10 dB additional noise reduction. Wow and Flutter: Less than 0.25% rms. Dimensions: 5 $\frac{1}{2}$ " H x 9 $\frac{1}{2}$ " D x 14" W. Power Requirement: 120 volts, 60 Hz, 15 W. Dolby is a Trademark of Dolby Labs.

# The best in stereo components and accessories

## SAVE AN EXTRA 5%

when you order a complete home hi-fi system from Heath Here's another way Heath helps you get more good sound for your money. Simply select 1) a receiver and a pair of speakers or 2) an amplifier, a pair of speakers and program source (tuner, turntable or tape deck). Add the costs of the individual components, then deduct 5%. The same 5% discount applies to any audio accessories you order with your system — remote or rear-channel speakers, cabinets, tape deck, turntable, audio scope or headphones. **NO LIMIT** — order as many accessories as you like and still get the 5% discount! Discount does not apply to featured systems, or **SALE-PRICED** systems on this page.

## Luxurious Mediterranean equipment cabinet



Assembled. Pecan finish solid oak trim. Ducted port enclosures, pre-cut 12" openings. 26 $\frac{7}{8}$ " H x 66" W x 9 $\frac{1}{4}$ " D. Changer Base: 5 $\frac{1}{2}$ " H x 18" W x 14" D. Shpg. wt. 193 lbs.

**AE-101**, Motor Freight ..... **289.95**  
**AEA-101-3**, slide-shelf accessory,  
 8 lbs. .... **29.95**



**\$144<sup>95</sup>**

**TM-1626 SPECIFICATIONS:** Frequency Response: 40-20,000 Hz,  $\pm 1$  dB. Distortion: 0.5% maximum. Hum: -80 dB at minimum volume. Hum & Noise: -50 dB from 20-20,000 Hz, all controls set at maximum. Input Sensitivity for 1.0 Volt Output: Mike (low-Z), 1 mV; Mike (high-Z), 14 mV; Aux., 150 mV. Input Overload: Mike -60 mV (low-Z), 900 mV (high-Z). Auxillary, 3.0 V. Mixer Bus, 200 mV. Input Impedance: Mike -110 $\Omega$  ohms (low-Z). 170k ohms (high-Z). Auxillary: 100k ohms. Mixer Bus: 3000 ohms. Output Impedance: 150 ohms. Power Requirement: 120/240 VAC, 60/50 Hz, 15 watts maximum. Dimensions: 5 $\frac{1}{4}$ " H x 16" W x 9 $\frac{3}{8}$ " D.

## 8-Track/4-Channel Player with 4 Speakers

Plays discrete 4-channel and stereo 8-track tapes, has SQ\* decoder for matrix 4-channel or enhanced stereo.

**ATS-1124, AT-1124 w/speakers**,  
 51 lbs. UPS ..... **99.95**  
**Kit AT-1124, Player/Amp Alone**,  
 Shpg. wt. 21 lbs. .... **Now 49.95**

**4.5 WATTS, MINIMUM RMS, PER CHANNEL INTO 8 OHMS AT LESS THAN 1.0% TOTAL HARMONIC DISTORTION FROM 50-15,000 HZ.**

**ATS-1124/AC-1120 SPECIFICATIONS:** **AMPLIFIER** — Response: 30-15,000 Hz,  $\pm 3$  dB. Hum & Noise -60 dB. FM Sensitivity: 5  $\mu$ V. Stereo Separation: 35 dB. AM - Sensitivity 300  $\mu$ V/m. **TAPE PLAYER** — Response: 50-10,000 Hz, +3, -5 dB. Separation: 30 dB at 1 kHz. **GENERAL** — Power Requirement: 120/240 VAC, 60/50 Hz. Dimensions: 4" high; 15" deep; 22" wide.

## Stereo/4-Channel Audio-Scope

Measure phasing and channel separation on stereo and 4-channel systems; signal-strength, FM center tune, multipath distortion on most tuners and receivers with multipath scope outputs. Has built-in audio oscillator for frequency response checks. With black metal cabinet, optional case below.



**Kit AD-1013**, Shpg. wt. 21 lbs. .... **259.95**  
**Walnut veneer case. ARA-1500-1**, Shpg. wt. 8 lbs. .... **27.95**

**AD-1013 SPECIFICATIONS FRONT PANEL** — Scope Input: Vertical Sensitivity: 25 millivolts P-P/cm. Input Impedance: 100 k $\Omega$ . Frequency Response: 5 Hz to 200 kHz  $\pm 3$  dB. Oscillator Output: 20 Hz to 20 kHz. Voltage Level: 2 mV to 3 volts (rms) (variable). Output Impedance: (front panel jack). Approximately 600 $\Omega$ . Callibrator Voltage: 1.0 volt P-P  $\pm 5\%$ . Total Harmonic Distortion: 1% or less. **REAR PANEL** — Oscillator Output Impedance: 6000 $\Omega$ . Multipath Input (Scope Horizontal and Scope Vertical) Sensitivity: 25 mV P-P/cm. Input Impedance: 100 k $\Omega$ . Left Front, Right Front, Left Back and Right Back Inputs: Sensitivity: 25 mV P-P/cm. Input Impedance: 100 k $\Omega$ . Frequency Response: 5 Hz to 200 kHz,  $\pm 3$  dB. 4-Channel Input: Sensitivity: 1 volt P-P/cm. Input Impedance: 5000 $\Omega$ . **GENERAL** — Triggered Sweep Generator: Range: 10 Hz to 100 kHz. Power Requirement: 120 or 240 volts AC, 60/50 Hz, 15 watts. Dimensions (overall): 5 $\frac{1}{2}$ " H x 18 $\frac{1}{2}$ " W x 13 $\frac{1}{2}$ " D.

## Stereo Mike Mixer — a hi-fi mixing console unmatched in versatility and value

The wide response (40-20,000 Hz,  $\pm 1$  dB) and low distortion (0.5%) of the solid-state TM-1626 will give you clean, life-like mixing capability. Each of the two outputs has its own master level control and meter and they can be switched for use in stereo or mono. The six inputs include two high-level auxiliary inputs for disc or tape sources, and four mike inputs which are switchable to high impedance or balanced or unbalanced low impedance, for use with any type of microphone. The fourth microphone input has a "pan" control to adjust its apparent location from left to right or anywhere in between. All six inputs can be individually switched to left, off, or right channel. Access to "Mix-Bus" permits paralleling added mixers for extra inputs and outputs. A pair of backlighted meters with two switch-selected ranges plus a pair of LED's with adjustable threshold show instantaneous peaks faster than any meter. Handsome in black with walnut stained veneer end panels. Build this quality mixer into your recording system now.

**Kit TM-1626**, Shpg. wt. 12 lbs. .... **144.95**

## AM/FM/8-Track Receiver w/speakers

Has a preassembled and aligned 8-track tape player that simply drops into the chassis. Quality AM and FM stereo sections. AS-1140 speakers described below.

**ACS-1120, AC-1120 with speakers**,  
 37 lbs. .... **119.95**  
**Kit AC-1120**, Shpg. wt. 23 lbs. .... **149.95**



**HIGH-EFFICIENCY SPEAKERS:** 4 $\frac{1}{2}$ " foam suspension speakers for use with any compact stereo system. 70-16,000 Hz response. Good-looking walnut-grain vinyl-clad enclosures. 12" H x 7" W x 6" D. 8 ohms impedance.  
**Kit AS-1140**, Shpg. wt. 16 lbs. .... **Pair 39.95**

**CERAMIC CARTRIDGE CHANGER.** 3-speed changer with molded vinyl base, dust cover, 45-rpm adaptor. Ceramic cartridge with diamond stylus. 7 $\frac{1}{4}$ " H x 15 $\frac{1}{4}$ " W x 14 $\frac{1}{4}$ " D.  
**ACP-1138**, Shpg. wt. 14 lbs. .... **44.95**  
**AD-1037**, Automatic 45-rpm adaptor  
 Shpg. wt. 1 lb. .... **1.95**



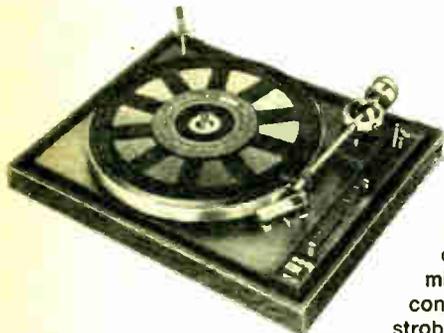
# Super-Buys on Heath-Recommended Turntables



only **\$389<sup>95</sup>**

## World-famous Accutrac® 4000 now in money-saving kit form from Heath

The turntable that lets you "program" individual cuts on your records in the order YOU want to hear them. Complete with base, built-in cartridge and wireless remote control! See back cover for details.



## B-I-C 960 belt-drive turntable **\$169<sup>95</sup>**

With Base and Cartridge

The same ultra-reliable design as the B-I-C 981 minus the electronic speed control, adjustable pitch and strobe. 33 $\frac{1}{3}$  and 45 rpm. Includes base and your choice of Empire 2000E/111 or Shure M91ED cartridge (specify). 15 $\frac{7}{8}$ " W x 12 $\frac{1}{8}$ " D x 4 $\frac{1}{8}$ " above board, 1 $\frac{1}{2}$ " below. If purchased separately, up to \$246.85.

ACP-1166, Shpg. wt. 11 lbs. Assembled ..... 169.95



## Dual CS-721 direct-drive automatic **\$369<sup>95</sup>**

With Base and Cartridge

One of the finest turntables available. Fully automatic single-play, electronic direct-drive motor, twin gimbal tonearm mounting, adjustable tonearm height, calibrated anti-skate, more. 33 $\frac{1}{3}$  and 45-rpm operation. CD-4 capability. With Shure V-15 Type III cartridge, base and dust cover.

ACP-1217, Shpg. wt. 25 lbs. Assembled ..... 369.95

### ACCESSORIES FOR B-I-C TURNTABLES

- ADP-1263, Solid oiled walnut base, Shpg. wt. 3 lbs. .... 16.95
- ADP-1164, Hinged dustcover, Shpg. wt. 4 lbs. .... 9.95
- ADP-1165, 45-rpm spindle, Shpg. wt. 1 lb. .... 3.95

NOTE: When ordering turntable, please specify cartridge and base model numbers on order blank.

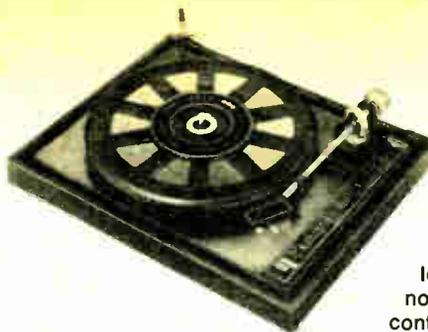
### Stereo Cartridges

Shure V-15 Type III. Famous for its excellent tracking and smooth, uncolored sound. For tonearms capable of tracking at  $\frac{3}{4}$  to 1 $\frac{1}{4}$  grams. See specifications at right.

AD-1059, Shpg. wt. 1 lb. .... 85.00  
With turntable purchase ..... 45.00

Audio-Technica AT-14Sa. Specially shaped and polished Shibata stylus for unparalleled quadrasonic CD-4 and stereo response. Lasts twice as long as elliptical! Specs at right.

ADP-1139, Shpg. wt. 1 lb. .... 85.00  
With turntable purchase ..... 45.00



## B-I-C 940 belt-drive turntable **\$129<sup>95</sup>**

With Base and Cartridge

A true B-I-C automatic turntable — with belt drive, low speed 24-pole synchronous motor, up to six-record continuous play. Has viscous-damped cueing, 12" platter, 33 $\frac{1}{3}$  and 45 rpm speeds, and CD-4 capability. Includes base and your choice of Empire 2000E/111 or Shure M91ED cartridge (specify). If purchased separately, up to \$206.85.

ACP-1161, Shpg. wt. 11 lbs. Assembled ..... 129.95



## B-I-C 981 with electronic speed control **\$209<sup>95</sup>**

With Base and Cartridge

B-I-C's newest and best! Unique "programming panel" permits automatic play of a single disc once or up to six times, or plays a six-record stack. Has 24-pole motor, strobe light with adjustable speed control, platter with cast strobe markings. 33 $\frac{1}{3}$  and 45 rpm speeds. With base, specify Empire 2000E/III or Shure M91ED. Add \$45 for Shure V-15 Type III or Audio-Technica AT-14Sa.

ACP-1243, Shpg. wt. 13 lbs. Assembled ..... 209.95



## Dual 1245 deluxe automatic **\$219<sup>95</sup>**

With Base, Dust Cover and Cartridge

Quality automatic has famous Dual features: full-size 12" platter,

6% pitch control and lighted strobe, continuous repeat switch, adjustable height cue control. Factory-assembled, includes Base, Dust Cover and Empire 2000E/III or Shure M91ED cartridge (specify).

ACP-1237, Shpg. wt. 18 lbs. Assembled ..... 219.95



Sennheiser HD-424 Headphones with patented Open-Air design. Super lightweight — a mere 6.5 ounces. 15-20,000 Hz response, less than 1.0% total harmonic distortion. 2000 ohms. 10-ft. coil cord,  $\frac{1}{4}$ " phone plug.

AHP-1193, Shpg. wt. 2 lbs. Assembled ..... 64.95

Model	Response (Hz)	Output	Separation	Stylus	Tracking	Price Alone	With Turntable
ADP-1062, Wt. 1 lb. Shure M91ED	20-20,000	5.0 mV	25 dB	Ellipt. 0.2 x 0.7	$\frac{3}{4}$ to 1 $\frac{1}{2}$ gr.	59.95	FREE
ADP-1147, Wt. 1 lb. Empire 2000E/111	20-20,000	4.5 mV	28 dB	Ellipt. 0.2 x 0.7	$\frac{1}{2}$ to 1 $\frac{1}{2}$ gr.	69.95	FREE
AD-1059, Wt. 1 lb. Shure V-15 Type III	10-25,000	3.5 mV	28 dB	Ellipt. 0.2 x 0.7	$\frac{3}{4}$ to 1 $\frac{1}{4}$ gr.	85.00	45.00
ADP-1139, Wt. 1 lb. Audio-Tech. AT-14Sa	5-45,000	2.7 mV	25 dB	Shibata	$\frac{3}{4}$ to 1 $\frac{3}{4}$ gr.	85.00	45.00



# Hear, See and Save the Difference with Heath!



## Heathkit 2-way bookshelf speaker system

*Budget-priced speaker system gives you BIG audio performance from a compact enclosure*

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

An excellent choice for low to medium priced music systems. Has an 8" woofer with a hefty 1 lb. ceramic magnet, 1 3/4" phenolic ring tweeter. The flat response characteristics of the AS-1332 provide clean, natural and well-balanced sound over its entire frequency range. Frequency range extends from 40-20,000 Hz and is a flat  $\pm 3$  dB from 50-18,000 Hz — the kind of performance you'd expect only in a far more expensive speaker. Can be driven by as little as 9 watts, but handles up to 50 watts. 3400 Hz crossover for smooth, even frequency distribution. Has individual fuses for woofer and tweeter; tweeter level control; factory-assembled walnut grain vinyl covered enclosure, three dimensional formed grille cloth. 19 1/2" H x 10 1/2" W x 8" D. 8 ohms impedance.

Kit AS-1332, Shpg. wt. 29 lbs. . . . . each 69.95

AS-1332 SPECIFICATIONS: Frequency Range (-10 dB): 40 Hz to 20 kHz. Frequency Response:  $\pm 3$  dB, 50 Hz to 18 kHz. Impedance: 8 ohms nominal. Recommended Amplifier Power: 9 watts min. to 50 watts (fused for larger amplifiers). Crossover Frequency: 3400 Hz (12 dB/octave). Dimensions: 19" H x 10 1/2" W x 8" D (without grille). Weight: 15 lbs.



## Heathkit deluxe 2-way bookshelf speaker system

*Handsome walnut-veneer cabinet with deluxe foam grille*

**\$109<sup>95</sup>**  
each

One of the best sounding speakers in its price range, with the "punch" you need for good sound levels from low and medium-power amplifiers. Has a wider frequency range and better response than our other two-way shelf systems. The special-design 10" woofer provides solid bass response and has enhanced midrange so the AS-1352 has the kind of smooth effortless sound you'd expect from an expensive three-way system. The 1 3/4" tweeter has phenolic ring suspension for superior dispersion. Frequency range extends from 30-20,000 Hz and is a flat  $\pm 3$  dB from 45-18,000 Hz for excellent overall performance. Has a flat/ - 3 dB high frequency switch, separately fused woofer and tweeter. Handsome factory assembled walnut-veneer cabinet with acoustical foam grille. 24" H x 13 1/2" W x 11" D. 8 ohms impedance.

Kit AS-1352, Shpg. wt. 55 lbs. . . . . each 109.95

AS-1352 SPECIFICATIONS: Frequency Range (-10 dB): 30 Hz to 20 kHz. Frequency Response:  $\pm 3$  dB, 45 Hz to 18 kHz. Impedance: 8 ohms nominal. Recommended Amplifier Power: 6 watts min. to 100 watts (fused for larger amplifiers). Crossover Frequency: 2800 Hz (12 dB/octave). Dimensions: 24" H x 13 1/2" W x 11" D. Weight: 38 lbs.



## Heathkit 2-way "mid-priced" bookshelf speaker system

*High efficiency and wide-response for good sound even from lower power amplifiers and receivers*

**\$84<sup>95</sup>**  
each

Provides a louder sound level than the AS-1332 with the same amount of amplifier power. Uses an 8" woofer and a 2x6" horn-type tweeter for smooth, wide-range sound with excellent high-frequency dispersion. Frequency range extends from 40-

16,000 Hz and is a flat  $\pm 3$  dB from 60-14,000 Hz. The crossover is at 2500 Hz (12 dB per octave) to minimize distortion and ensure smooth overall response. The woofer and tweeter are front mounted and the cabinet rails are kept low to minimize diffraction and dispersion problems. The horn tweeter can be mounted so you get the best high-frequency dispersion no matter whether you place the system horizontally or vertically — a Heath exclusive! A continuous tweeter level control lets you adjust the high-frequency response to suit your listening area. Each driver is individually fused for protection. Impedance is 8 ohms. With factory assembled walnut-finish vinyl-covered enclosure, handsome 3-dimensional grille cloth. 12" W x 22 1/4" H x 10 1/2" D. Easy 2-4 hour kit assembly — build a pair for great stereo!

Kit AS-1342, Shpg. wt. 32 lbs. . . . . each 84.95

AS-1342 SPECIFICATIONS: Frequency Range (-10 dB): 40 Hz to 16 kHz. Frequency Response:  $\pm 3$  dB, 60 Hz to 14 kHz. Impedance: 8 ohms nominal. Recommended Amplifier Power: 4 watts min. to 50 watts (fused for larger amplifiers). Crossover Frequency: 2500 Hz (12 dB/octave). Dimensions: 22 1/4" H x 12" W x 10 1/2" D. Weight: 20 lbs.



## Our lowest-priced three-way floor/shelf speaker system

*Offers full-range 3-way performance at the price of many two-way systems*

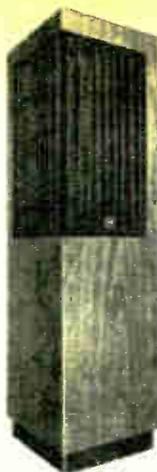
**SAVE \$69<sup>95</sup> on the pair!**

The AS-1363 is a full-range 3-way speaker system designed for use in moderately priced stereo systems or as rear-channel speakers in quadraphonic systems. It uses a 10" woofer, a 4 1/2" midrange speaker and a 1" dome tweeter for extremely smooth and clean overall response, with excellent high-frequency dispersion. The woofer-to-midrange crossover frequency is 750 Hz (6 dB/octave) to ensure a smooth-sounding midrange; while the midrange to tweeter crossover is 4000 Hz (6 and 12 dB/octave) to prevent the excessive cone excursions that cause distortion and breakup. Two-position midrange and tweeter switches let you adjust the AS-1363's sound to suit any listening room. Each driver is individually fused for protection. Impedance is 8 ohms. The factory-assembled cabinet features a handsome pecan-veneered Mediterranean finish and hardwood trim, with a decorative gold/black patterned grille cloth. 24 3/4" H x 14 1/4" W x 11 1/2" D.

Kit AS-1363, Shpg. wt. 55 lbs. each.  
UPS. . . . . Was 259.90/pr. Now 189.95/pr.

AS-1363 SPECIFICATIONS: Frequency Range (-10 dB): 30 Hz to 20 kHz. Frequency Response:  $\pm 3$  dB, 45 Hz to 18 kHz. Impedance: 8 ohms, 6 ohms minimum. Recommended Amplifier Power: 5 watts min. to 130 watts (fused for larger amplifiers). Crossover Frequencies: 750 Hz (6 dB/octave) and 4000 Hz (6 and 12 dB/octave). Controls: two-position switches for midrange and tweeter. Enclosure: Pecan-veneered 3/4" particle board, sealed, 1.45 cu. ft., filled with sound absorbent material. Dimensions: 24 3/4" H x 14 1/4" W x 11 1/2" D. Weight: 40 lbs.

## Versatile two-way column speaker system



Features **FLAT ENERGY RESPONSE** for superb sound throughout your listening room

**\$139<sup>95</sup>**  
each

One of the finest column speakers you can buy, at a surprisingly low kit form price! Has two 1" dome tweeters and two 6½" full-range drivers mounted in separate woofer-tweeter arrays on adjacent sides of the cabinet to maintain well-balanced sound. The woofers are located well above the floor, so bass response is solid and well-defined. There is no mid-bass boom or resonance, so mid-frequencies come through loud and clear. The tweeters deliver a full 10 to 20 dB more off-axis response than conventional tweeters for bright, clean highs — and their amazing 270° dispersion pattern maintains a well-balanced stereo image regardless of speaker placement. Has a nominal 4 ohms impedance, so most amplifiers will deliver up to TWICE their rated 8 ohm power. Separately fused woofers and tweeters, flat/-3 dB level control. Light walnut-vinyl finish on all four sides, simulated black slate top and acoustically transparent foam grille.

**Kit AS-1344,**  
Shpg. wt. 57 lbs. UPS ..... each 139.95

**AS-1344 SPECIFICATIONS:** Frequency Range (-10 dB): 35 Hz to 22 kHz. Frequency Response: ±3 dB, 55 Hz to 20 kHz. Impedance: 4 ohms minimum. Recommended Amplifier Power: 6 watts min. to 100 watts (fused for larger amplifiers). Crossovers: 4000 Hz mechanical (on woofer) and 12 dB/octave electrical on tweeter. Fuses: 1½-amp Slow-Blow for woofers, 1 amp regular for tweeter. Control: 2 position tweeter level, flat and -3 dB. Dimensions: 40" H x 11" W x 11" D. Weight: 45 lbs.

## Our best-selling three-way speaker system



Rivals the performance of speakers costing much more — innovative design and superb sound

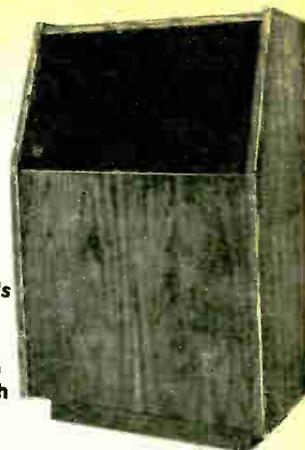
**\$159<sup>95</sup>**  
each

A truly outstanding floor/shelf speaker system, for use with even the finest components. The 10" woofer provides solid, well-defined bass. The 4½" midrange is isolated in 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 horizontal dispersion of a full 120° even at 12,000 Hz. All three drivers are flush mounted, and there are no "rails" around the cabinet to limit treble dispersion. For best stereo imaging, you can position the tweeter directly above the midrange whether you position the system vertically or horizontally — a Heath exclusive! Has individual fusing for each driver, two high-frequency controls to match response to your listening area. Fully assembled walnut-finish veneer cabinet with deluxe, acoustically transparent foam grille. 26" H x 14½" W x 11½" D. 8 ohms impedance.

**Kit AS-1373,**  
Shpg. wt. 68 lbs. UPS ..... each 159.95

**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: 11 watts min. to 200 watts. (fused for larger amplifiers). Crossover frequencies: 500 Hz (12 dB/octave) and 3000 Hz (12 dB/octave). Fuses: Woofer, 1½ amp Slow-Blow; midrange, ¾-amp Slow-Blow; tweeter, ½-amp regular. Controls: 3 kHz shelf/flat; 10 kHz rolloff/flat. Dimensions: 26" H x 14½" W x 11½" D, without 1¼" grille. Weight: 47 lbs.

## Our finest three-way speaker system



Offers the bass power and dynamic range you **NEED** for "live performance" sound levels with any music

**\$289<sup>95</sup>**  
each

Here's TRUE sonic excellence at a sensational low price! Combines a massive 15" slot-loaded woofer, two 4½" midrange speakers and three 1" tweeters in a precision-designed cabinet. Has dynamic range from below 30 Hz to above 20 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. The AS-1348 produces very high sound levels without distortion at ALL audible frequencies. Has individual fuses for woofer, midranges and tweeters, six-position attenuation controls. Fully assembled, sealed acoustic-suspension enclosure with walnut and oak veneer finish, acoustically transparent grille cloth. 38" H x 24" W x 15" D. 8 ohms impedance.

**Kit AS-1348,** Shpg. wt. 102 lbs.  
Motor Freight ..... **289.95**

**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: 8 watts min. to 250 watts (fused for larger amplifiers). Crossover frequencies: 500 Hz (12 dB/octave) woofer-to-midrange and 3000 Hz (6 and 12 dB/octave) midrange-to-tweeter. Fuses: Woofer, 1½-amp Slow-Blow; midrange, ¾-amp Slow-Blow; tweeter, 1-amp regular. Dimensions: 38" H x 24" W x 15" D. Weight: 100 lbs.

## Our lowest-priced bookshelf speaker system

**\$29<sup>95</sup>**  
each

True acoustic-suspension design for clean, well-balanced sound

An excellent performer at a low kit-form price! Has a high-compliance 4½" speaker for usable frequency response from 70 Hz to 16 kHz, ultra-compact assembled walnut-veneer enclosure. For use with amplifiers providing 2.5 to 20 watts. 8 ohms. Measures only 12" H x 7" W x 6" D.

**Kit AS-106,** Shpg. wt. 9 lbs. .... each 29.95



## SAVE AN EXTRA 5%

when you order a complete home hi-fi system from Heath Here's another way Heath helps you get more good sound for your money. Simply select 1) a receiver and a pair of speakers or 2) an amplifier, a pair of speakers and program source (tuner, turntable or tape deck). Add the costs of the individual components, then deduct 5%. The same 5% discount applies to any audio accessories you order with your system — remote or rear-channel speakers, cabinets, tape deck, turntable, audio scope or headphones. NO LIMIT — order as many accessories as you like and still get the 5% discount! Discount does not apply to featured systems, or SALE-PRICED systems on pages 32-36 and 40.

# Heathkit Music Accessories help you perform BETTER!

**1 25-watt Guitar Amplifier.** An excellent choice for the musician on the move! Powerful enough for good sound levels yet compact and light for easy portability. The rugged one-piece case with carrying handle houses a full control amplifier and a speaker system featuring two heavy-duty 12" woofers — takes plenty of power for day-in, day-out performance without breakup. Has two dual-input channels — one for accompaniment, microphone, etc.; the other for special effects. Features double-spring variable reverb and tremolo with variable rate and depth, a line reverse switch to minimize hum. Two footswitches permit hands-free control of reverb and tremolo. Compact and functional  $\frac{3}{4}$ " black vinyl-covered wood cabinet measures 28" W x 19 $\frac{3}{4}$ " H x 9" D. For 120/240 VAC, 60/50 Hz.

Kit TA-16, Shpg. wt. 61 lbs. . . . . **159.95**

**2 Deluxe Guitar Amplifier.** Fine-sounding instrument amplifier gives you professional performance features and a full 120 watts of EIA music power at a low build-it-yourself kit price. Has a switchable built-in harmonic modifier for that "fuzzy" sound; a special brightness switch to enhance high frequency presence. Separate bass and treble boost controls to adjust the sound the way you want to play it, a dual-spring-type variable reverb and a tremolo that's variable in both rate and depth to allow a wide variety of musical effects. A dual footswitch gives you hands-free on-off control of tremolo & reverb. Has three separate channels with two inputs for each channel — ideal for small groups. Can be used with guitar, bass guitar, electronic combo organ, microphone/phonograph. This is the amplifier you need for that truly great performance. Rugged  $\frac{3}{4}$ " black vinyl-covered wood cabinet, 27 $\frac{3}{8}$ " W x 6 $\frac{3}{4}$ " H x 14 $\frac{1}{2}$ " D. For 120/240 VAC, 60/50 Hz.

Kit TA-17, Shpg. wt. 50 lbs. . . . . **214.95**



**\$159<sup>95</sup>**

**Our most popular Guitar Amp/Speaker Kit offers top performance at a low price**



**\$214<sup>95</sup>**

**Deluxe Guitar Amplifier helps you perform like a "pro"**

## Professional-quality PA Equipment

**3 P.A. Control Amplifier.** Delivers 100 watts continuous power to two column speakers, has six fully mixable low-impedance inputs; each with bass, treble reverb-on-off and attenuation controls; complete filtering system for good sound. Add as many booster amps and speakers as you need for any audience coverage — even add more control amps for additional inputs. Rugged particle board case, 21 $\frac{1}{2}$ " W x 11 $\frac{1}{4}$ " H x 7" D. For 120/240 VAC, 60/50 Hz.

Kit TA-1620, Shpg. wt. 54 lbs. . . . . **429.95**

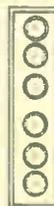
**4 Low-Distortion Booster Amplifier.** Use with the TA-1620 for even more power. Delivers 100 watts continuous to two column speakers. Matched in style and stackable with the TA-1620.

Kit TA-1625, Shpg. wt. 22 lbs. . . . . **179.95**

**5 PA Speaker Column.** Has six 8" full-range speakers response tailored for clean voice reproduction; an output jack for TA-1625 booster amp, or to connect two columns in parallel. With 50' cable, storage compartment. 14" W x 62" H x 10 $\frac{1}{4}$ " D. Shpg. wt. 112 lbs.

Kit TS-1630, Motor Freight . . . . . **179.95**

**LOWEST PRICES EVER! SAVE on both the individual pieces and the complete system!**



**SAVE on this complete PA system!**

**SAVE \$469<sup>85</sup>** Original Prices if **NOW**  
 purchased separately, \$969.80 **\$499<sup>95</sup>**

**Control Amplifier, Two Column Speakers and Booster Amp.**  
 TAS-1620, Shpg. wt. 277 lbs. Motor Freight . . . . . **499.95**

# Kits for Better Fishing



① \$99.95

## ① Heathkit Dual-Range Depth Sounder

Shows depth, type of bottom, schools and individual fish, submerged objects. A high-pitched "beep" alerts you to shoals or objects projecting above any preselected depth from 5 to 240 ft. Has switch-selected 0-60 and 0-240 ft. ranges. Fixed noise rejection; polarity protection, super-bright neon indicator. Gimbal mount, quick-disconnect power and transducer leads. Shpg. wt. 8 lbs.



② \$64.95

tection, super-bright neon indicator. Gimbal mount, quick-disconnect power and transducer leads. Shpg. wt. 8 lbs.

Kit MI-1031-1, with thru-hull transducer, 15' coax. . . . . 99.95

Kit MI-1031-2, with transom transducer, 25' coax. . . . . 99.95

## ② Heathkit Single-Range Depth Sounder

As above, single 0-240 ft. range, no alarm. Shpg. wt. 8 lbs.

Kit MI-1030-1, with thru-hull transducer and 15' coax . . . . . 64.95

Kit MI-1030-2, sounder with transom transducer and 25' coax . . 64.95

## ③ Heathkit Dual-Range Fish Spotter® Sounder

The Heathkit MI-2901 Fish Spotter® Sounder has adjustable audible alarm you set to sound off at any depth to 240 ft. Fish swimming between surface and preset depth will trigger alarm. Includes two switch-selected ranges (0-60' and 0-240') for sharper definition; noise rejection circuit; bright neon-flasher for precise depth reading. Rugged aluminum cabinet. Portable suction-cup transducer bracket. Powered by two 6-volt lantern batteries (not included).

Kit MI-2901, Shpg. wt. 8 lbs. . . . . 99.95

Kit MIA-2900-1, Scanning Transducer Bracket, Shpg. wt. 4 lbs. 19.95

MI-2901 SPECIFICATIONS: Accuracy:  $\pm 2\%$  with motor speed of 2400 rpm in the 0-60' range and with motor speed of 600 rpm in the 0-240' range. Sounding: Rate: 40 times per second on the 0-60' range. 10 times per second on the 0-240' range. Frequency: 200 kHz,  $\pm 5\%$ . Noise Rejection: Fixed at approximately 500 microseconds integration time. Power Requirement: 12 VDC. Dimensions: (Less Handle): 7" H x 6" W x 11" D.

④ Heathkit Economy Fish Spotter® Sounder: Similar to MI-2901 above, but with single range to 120-ft. Reads 240' max. Has bright neon indicator. No audible alarm.

Kit MI-2900, Shpg. wt. 8 lbs. . . . . 64.95

⑤ Heathkit Scanning Transducer Bracket: Designed for use with Heathkit MI-2901 and MI-2900 Fish Spotter® sounders. "C" clamp mounting. For 1 1/2" cylindrical transducer.

Kit MIA-2900-1, Shpg. wt. 4 lbs. . . . . 19.95



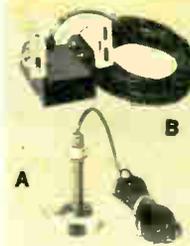
\$99.95

③ Dual-Range Fish Spotter®

④ Economy Fish Spotter®



⑤



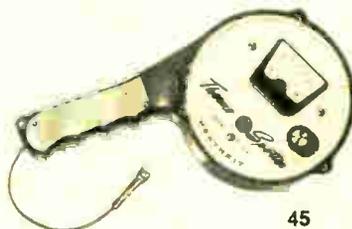
These depth sounders are available with either through-the-hull or transom-mount transducers. The transom mount unit (B) is recommended for high-speed craft with planing hulls. The through-the-hull transducer (A) is ideal for a permanent mount on larger boats.

MI-1030 and MI-1031 SPECIFICATIONS: Frequency: approx. 200 kHz. Accuracy: Within 2% of actual depth. Transducer: Barium titanate ceramic element encased in waterproof housing. Power requirement: 0-60' range, 225 mA @ 11-15 VDC (MI-1031 only), 0-240' range, 125 mA 11-15 VDC with one return pulse. Dimensions: 6 1/2" H x 5 3/4" W x 7 1/4" D.

## The Thermo Spotter® thermometer

Completely self-contained with submersible sensing element on a 100-ft. cable. Kit includes operations manual with fish temperature preference charts. Uses 1.5-volt penlight battery (not included).

Kit MI-104, Shpg. wt. 3 lbs. 29.95



45

# It's Heath for better boating!

## Heathkit Digital Depth Sounder

Lets you know depth of water below you from 2.5 to 199 ft.

Accurate depth readings at a glance. Dual-range digital display automatically reads depth in 0.1 foot increments from 2.5 to 19.9 feet and in 1 foot increments from 20 to 199 feet. A red light signals clearance of 10 feet or less. Single knob controls power on/off and brightness control. Rugged Cyclocac® case; gimbal mounting bracket; 15 feet cable for through-hull installation, 25 feet for transom mount.

Kit MI-101-1, With through-hull transducer, Shpg. wt. 7 lbs. . . . 159.95

Kit MI-101-2, With transom transducer, Shpg. wt. 6 lbs. . . . . 159.95

MI-101 SPECIFICATIONS: Accuracy:  $\pm 2\%$ ,  $\pm 1$  digit. Current drain: 300-500 mA. Power requirement: 10-17 VDC @ 500 mA. Dimensions: 2 1/4" H x 6 5/8" W x 8 1/2" D (less gimbal hardware).

**\$159<sup>95</sup>**

## Heathkit Digital Radio/Direction Finder

Digital readout pinpoints AM or beacon stations

Keeps you informed on the 190-410 kHz LW band and standard AM. It identifies stations with a digital frequency readout, and gives you a heading from its big easy-read azimuth ring marked in 2° increments! Has excellent sensitivity, lighted meter for accurate null indications, telescoping sense antenna for

an impressive bearing accuracy of  $\pm 3^\circ$ . Has front panel RF sensitivity control. Operates from 12 VDC system, or 6 "D" cells (not included). Battery-saver circuit cuts display off after 20 seconds, can be recalled instantly.

Kit MR-1010, Shpg. wt. 14 lbs. . . . . 219.95

MR-1010 SPECIFICATIONS: Sensitivity: Typically 30  $\mu$ V/m (LW) for 10 dB S+N/N. Selectivity: (6 dB points): 3 kHz (LW); 5 kHz (AM). Audio Output: 1 watt. Speaker: built-in 3x5". Current Drain: 450 mA (with display & meter); 110 mA (meter only); 30 mA (radio at typical listening level). Dimensions: 7 1/4" H x 11 1/2" W x 12" D.

## Midland 45-Channel VHF Marine Radiotelephone

Has full legal 25-watt transmitter output

Model 13-535. Here's a full feature radiotelephone that's right for any boat! Covers marine channels 6-28 and 65-88 for transceiver operation, receives marine channel 15 and both NOAA weather channels. Has 25 W/1 W power switch, squelch control, phase-locked-loop tuning, lots more! Includes

coiled-cord mike, mounting bracket, DC power cord.

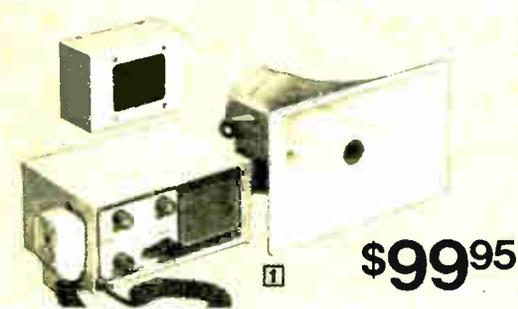
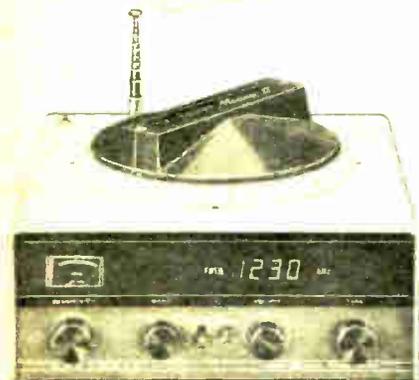
MWW-4501, Assembled.

Shpg. wt. 10 lbs. . . . . 399.95

A-S 8', 6 dB antenna with chrome ratchet base.

MWS-4511, Shpg. wt. 6 lbs. UPS . . . . 79.95

13-535 SPECIFICATIONS: Control: PLL synthesized with detent tuning. Connections: Microphone, external speaker, antenna, DC power. Power Source: 13.6 VDC (nominal) negative ground. Size: 3 3/4" H x 8" W x 10 1/2" D.



**\$99<sup>95</sup>**

**\$54<sup>95</sup>**

**1 Automatic Foghorn/Hailer.** Features a husky 55-watt amplifier; foghorn rate and duration controls; separate "listen" & "hail" gain controls. Includes low-profile weather-resistant deck horn, 20 ft. speaker cable, gimbal mount. Operates on 12 VDC power system, positive or negative ground. 4 3/4" H x 9 3/4" W x 9 1/4" D.

Kit MD-19A, Shpg. wt. 15 lbs. . . . . 99.95

Kit MDA-19-1, Optional remote speaker for intercom use.

Shpg. wt. 2 lbs. . . . . 11.95

**2 Economy Power Inverter.** Operates electric razors, lamps, other small appliances from 6 or 12-volt input. Supplies 117 VAC square wave with up to 175 watts continuous power rating. Not for high starting current or sine wave AC equipment. 25-amp fuse.

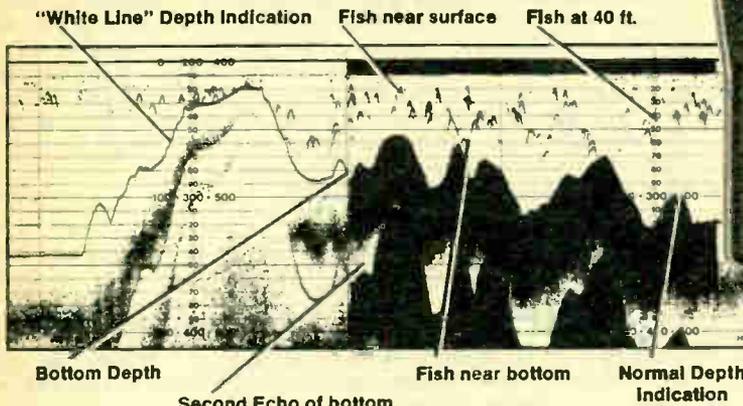
Kit MP-10, Shpg. wt. 8 lbs. . . . . 54.95

**3 Marine Electronics Handbook** — covers radios, codes, antennas, direction finders; clearly written. EDP-134 . . . . . 4.95

# Find fish faster and easier!



## The Heathkit Straight Line/White Line Depth Recorder



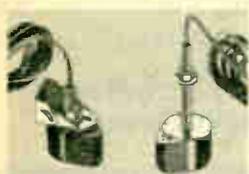
Actual MI-2910 recording  
made at Lake Mead, Nevada



**6 EVENING KIT**  
Fast, Easy Assembly

The Heathkit MI-2910 is one of the most useful boating and fishing accessories you can own. It helps you find the fish, and it provides a permanent record of the best spots and depths so you can find your favorite spots again and again easily. Its bottom recording accuracy also makes it a valuable navigation aid for following coast line depths and mapping lakes. Best of all, it's priced a lot lower than comparable recording depth sounders.

An on-off sensitivity control adjusts the MI-2910 to indicate the bottom and fish or other objects above it. The MI-2910 will clearly indicate schools of bait and small fish as well as individual large fish. Holes and dropoffs are clearly shown for lake mapping purposes too. The extra-wide-beam transducer covers a larger area of water than most conventional units, so you get a better and wider "picture" of what's below you. Its three ranges (5' to 200', 200-400', and 400-600') make it useful for virtually any lake or coastal area.



Available with through-the-hull or transom-mounted transducer.

Uses a straight line recording system for easier and more accurate chart reading and interpretation. A white line control lets you adjust the bottom indication to a fine line so objects or fish close to the bottom can be distinguished easily. A switch controlled marker puts a vertical line on the chart for easy reference marking. A roll of paper lasts approx. 13 hours for continuous charting. And the two-piece case opens easily for

convenient paper replacement.

The MI-2910 has two lamps to light the chart for easy operation at night. The weather-resistant case with gasket seals helps prevent water from getting in the recorder. A universal gimbal mount lets you install the MI-2910 just about anywhere, and remove it for theft protection and storage when not in use. With one roll chart paper.

**Kit MI-2910-1**, recorder with through-the-hull transducer and 30' cable, Shpg. wt. 17 lbs. .... **299.95**

Factory assembled and calibrated version of above  
**WI-2910-1**, Shpg. wt. 16 lbs. .... **424.95**

**Kit MI-2910-2**, recorder with transom mount transducer and 30' cable, Shpg. wt. 17 lbs. .... **299.95**

Factory assembled and calibrated version of above  
**WI-2910-2**, Shpg. wt. 16 lbs. .... **424.95**

**MIA-2910-1**, Two Rolls Chart paper, Shpg. wt. 2 lbs. .... **9.95**

**MI-2910 SPECIFICATIONS:** Power Requirement: 11-16 VDC at 1.6 amperes maximum. Depth Range: 5' to approx. 600'. Display: straight (vertical) line plotting on high contrast paper. Accuracy: better than 97% of indicated depth with belt motor speed at 320 rpm. Controls: Sensitivity control with power on-off switch. White line control with on-off switch. 0-200', 200-400' and 400' to 600' range switches. Marker pushbutton. Transducer: frequency, 50 kHz,  $\pm 4$  kHz. Beam Width: 35° at 3 dB. Cable length: 30 ft. Mounting: through-hull or transom. Chart Paper: Size, 3 1/4" x 50' with pre-marked depth scales. Take-up speed, approx. 3/4" per minute. Running time per roll: approx. 13 hours. Dimensions: less gimbal bracket, 11" W x 8" H x 7" D. Net Weight: less transducer 6 1/2 lbs.

**SAVE \$10**

## MR-1134 Marine-Band VHF Automatic Scanning Monitor

- **Priority channel selection**
- **Large, lighted channel indicators**
- **Automatic or manual channel selection**

Lets you automatically monitor up to 8 marine frequencies on the 156-163 MHz VHF marine band. Listen to weather frequencies, marine emergency channels, harbor instructions, fishing reports, ship-to-shore and ship-to-ship communications, more. Includes channel lockout, priority scanning and more. Manual scanning too, simply push the button for the channel you wish to monitor. A 4-pole crystal

filter provides good selectivity (for crowded signal areas, use the optional 8-pole filter on page 27). A built-in telescoping antenna brings in plenty of signals, there's also provision for an external antenna. Handsome blue and white marine styling, rugged splashproof case. AC or 12 VDC operation. Easy kit assembly and no-instrument alignment. Order crystal certificates from page 27.

**Kit MR-1134**, Shpg. wt. 9 lbs. .... **Was 99.95 Now 89.95**

**MR-1134 SPECIFICATIONS:** Scanning Range: any 8 MHz segment of the 146-174 MHz frequency range. Sensitivity: 0.5  $\mu$ V or less for 12 dB SINAD Adjacent Channel Rejection: -40 dB typ. (-55 dB typ. with optional 8-pole filter). Scan Rate: approx. 16 channels per second. Scan Delay: approx. 1/2 second. Priority Channel Check: approx. 4 seconds. Dimensions: 3 3/4" H x 8 1/2" D x 11 1/4" W. Net Weight: 5 lbs.

## Heathkit GD-348 Deluxe Metal Locator

This Heathkit metal locator really gets you in on the fun and excitement of treasure hunting — find coins, antiques, buried metal objects of any type, fast 'n easy.

**\$99<sup>95</sup>**

- Contoured pistol-grip and up-front controls for real operating convenience
- Lightweight, easy and FUN to use
- Easy PC board assembly

This Heathkit metal locator uses a sophisticated "induction balance" system — you don't hear anything until a piece of metal enters the field. Then the tone grows louder as you get closer to the object. Listen through the built-in speaker, optional headphones or use the front-panel meter to pinpoint your find. The GD-348 has null and ten-turn sensitivity controls conveniently located near the pistol grip handle. The shaft telescopes and the search coil folds flat for easy storage in suitcase or optional carrying case.

Kit GD-348, Locator only, Shpg. wt. 6 lbs. ....	99.95
GDA-48-1, 9-volt battery, Shpg. wt. 1 lb. ....	3.25
GD-396, 600-ohm Superex headphones, Shpg. wt. 1 lb. ....	5.95
GDA-348-1, carrying case, Shpg. wt. 2 lbs. ....	14.95

## 1 Heathkit 2-Station Intercom System

Master station accommodates up to two remotes. Remotes can initiate "private" calls to Master. Master can call either or both remote stations. Low-profile cabinets with plastic feet for surface use, holes for wall mounting. 3¾" H x 6" W x 5¾" D.

Kit GD-140, one Master, one Remote, Shpg. wt. 4 lbs. ....	39.95
Kit GD-120, one extra Remote, Shpg. wt. 2 lbs. ....	15.95
GDA-110-2, 100' 4-conductor cable, Shpg. wt. 3 lbs. ....	9.95

## 2 Indoor/Outdoor Intercom System

Master functions include "All Call," "Talk," "Dictate"... plus monitoring of up to four Remotes. Indoor Remotes can be rendered private to prevent monitoring. GD-110 and GD-120 are light green and measure respectively 4½" H x 8½" W x 6¾" D and 3¾" H x 6" W x 5¾" D. GD-130 has weatherproof crinkle finish. 5¾" H x 3¾" W x 2½" D.

Kit GD-110, Master Station, Shpg. wt. 5 lbs. ....	49.95
Kit GD-120, Indoor Remote, Shpg. wt. 2 lbs. ....	15.95
Kit GD-130, Outdoor Remote, Shpg. wt. 2 lbs. ....	12.95
GDA-110-2, 100' 4-conductor cable, Shpg. wt. 3 lbs. ....	9.95
GDA-110-4, 100' 2-conductor outdoor cable, Shpg. wt. 1 lb. ....	5.95

## SAVE \$8 First Alert™ Battery-Powered \$24<sup>95</sup> Early Warning Smoke Detector

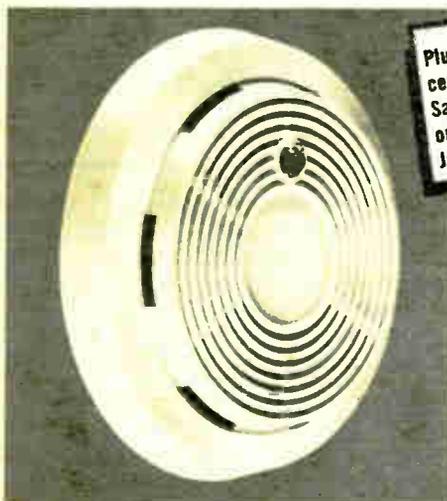
WAS \$32.95

- Ionization-type detector gives earlier warning
- Protects your home, family and property

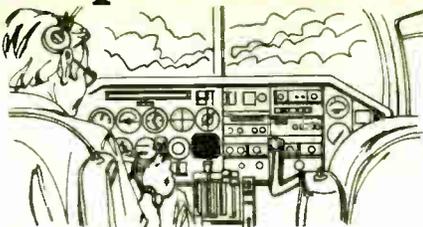
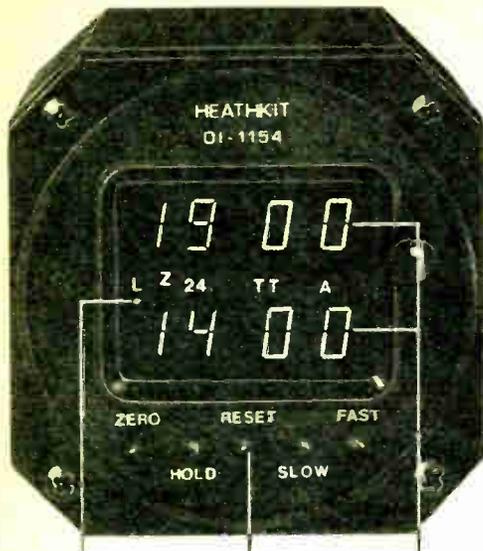
Plus mfr's rebate certificate! Save \$3 on 1, Save \$7 on 2. Save \$12 on 3 (Order between Jan. 1 & April 2.)

Protect yourself from tragedy! This performance-proven detector is already in millions of homes and it *SHOULD* be in yours. Detects fire in its first stage, when there's still time to protect your family from flames and suffocating smoke. Warns you before smoke or flames, by sounding its self-contained built-in alarm horn. This 85 decibel horn is powerful enough to awaken people sleeping soundly behind closed doors. Has dual-chamber detection for maximum reliability. Operates on its own internal battery (included!) that will last at least a year. If the battery needs replacement, a low-battery trouble signal acti-

vates and will sound an Intermittent beep for as long as a month. Battery operation makes installation easy too — just fasten to any ceiling or wall with the mounting screws and anchors that are included. Has automatic reset, built-in test switch to check operation before installation. 100% solid-state circuit. Temperature range: 0° to 112°F. Humidity Range: 20%-95% RH. The First Alert provides excellent area coverage. In most cases, two units will provide effective coverage for an average size home. First Alert may qualify you for an insurance discount — check with your agent. U.L. lsted. **GD-1414**, Shpg. wt. 2 lbs. Assembled . . . **24.95**



# High-accuracy, low-priced Aircraft Clock/Timer



**5 FUNCTIONS** • Indicates GMT, local time — times to 24 minutes and 24 hours, preset alarm too  
**\$139<sup>95</sup>**  
**SAVE \$20**  
 • FAA/PMA Approved, Meets DO-160 requirements

An important instrument for any pilot — gives you the accuracy and reliability you NEED for any flight timing function, at about HALF THE COST of competitive models! All timing functions are quartz-crystal controlled for exceptional accuracy. The upper 4-digit display shows 24-hour GMT or ZULU time; the lower display shows local time, 24-minute timer (displays minutes and seconds), total trip timer (24 hours max.); and an alarm

time that you have stored in the memory of the trip timer. This alarm time function is for fuel management or check point notification. A function switch selects the time shown on the lower display. Both clocks run continuously, the trip timer runs only when the aircraft's master power switch is on. Displays dim automatically for night flying. The OI-1154 fits a standard 3 1/8" instrument panel for easy mounting in most any aircraft.

**Kit OI-1154, 3 lbs. Was 159.95, Now 139.95**

**Note:** FAA approved for Cessna 172N, STC No. STC SA168GL (requires FAA Form 337). Field approval on FAA Form 337 required for other aircraft. Completed kit must be returned to a Heathkit Electronic Center or factory for DMIR inspection (at no additional charge), before installation by an A & P mechanic (or supervised pilot installation). Heath will also set adjustment for maximum accuracy. Meets DO-160 environmental requirements.

**OI-1154 SPECIFICATIONS:** Display Functions: (Top). 24 hour Zulu or GMT; (Bottom). 24 hour local, 24 minute timer (in minutes and seconds); 24 hour total trip time: 24 hour trip time alarm. Input Voltage: 14 VDC or 28 VDC. Input Current: 0.5 A max. (bright display). Crystal Oscillator Accuracy: Typical, less than ±1 minute per month. Initial, 0.004% at 25°C. Drift, ±0.003%, -20°C to +65°C. Aging, 0.002% per year. Dimensions: 3.3" x 3.3" x 6" deep.

Function selector with LED "moving dot" indicator. Easy-access pencil-tip pushbutton clock controls. 4-digit red LED displays with automatic dimming.

OI-1154 clock keeps running even with display "off".

## Programmable Digital Stopwatch—Unique and Useful!

### The world's most versatile stopwatch

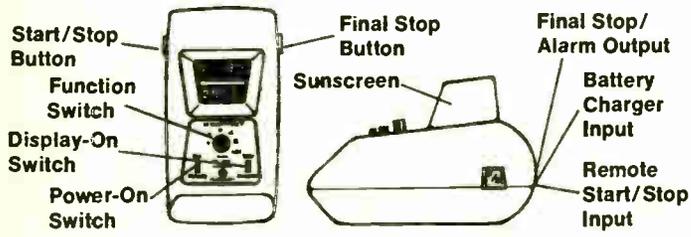
For features, versatility and accuracy, we don't think you can find a better stopwatch than our GB-1201! Two exclusive Heath PMOS IC counters and quartz crystal accuracy make it ideal for almost any timing job. Reads hours, minutes, tens and hundredths of seconds in a bright red digital readout that's easy to see in almost any light. We even include a sunscreen so you can read it in direct daylight! Includes pre-wired AC adapter/charger, rechargeable batteries, sunscreen, lanyard for wearing the GB-1201 around wrist or neck. Special modification instruction lets you convert the GB-1201 to read hundredths of minutes — perfect for car rallies and time studies.

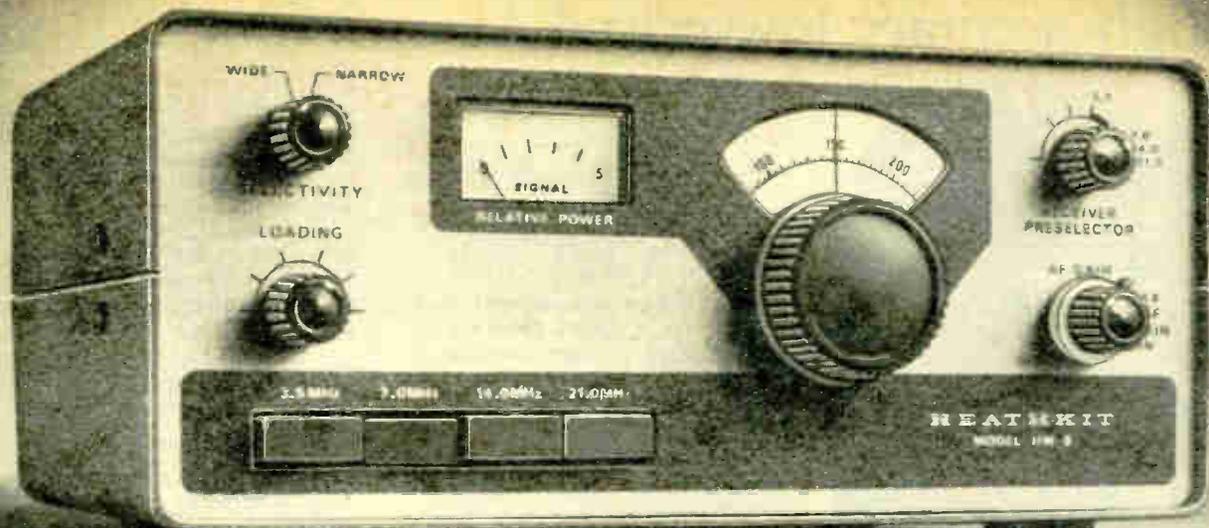
**Kit GB-1201, Shpg. wt. 2 lbs. . . . . \$9.95**  
**ICA-2009-1, Felt-lined Naugahyde® carrying case, wt. 1 lb. . . . . 4.95**

**GB-1201 SPECIFICATIONS:** Accuracy: ±0.006%, typically better than 0.003%. Instrument alignment provides higher accuracy. Battery Life: approx. 40 hrs. between charges with displays mostly off; approx. 4 hrs. with displays continuously on. Recharging: approx. 14 hours with power off. Temperature Range: -10° to +120°F. Dimensions: 5 1/8" H x 2 1/4" W x 2" D. Net Weight: approx. 8 oz.

### Look at these seven useful Functions!

- 1. Start/Stop Elapsed Time:** Times individual events while also counting total elapsed time from beginning of first event to end of last. Like having two stopwatches in one.
- 2. Sequential Timing:** Times and displays each part of event (i.e. each lap), while timing overall event. Compares lap times of participants — great for multilap races, navigation, horse training.
- 3. Total Activity Time:** Accumulates elapsed time for any series of events, while maintaining a separate count of total elapsed time including down time or breaks. Great for auto and plane trips, efficiency studies, ball games.
- 4. Split Time:** Displays cumulative time to each "split" point, while continuing to time overall event. For ski races, swim meets, sail boat committees.
- 5. Start/Stop Activity Time:** Shows separate times for each event or "leg", then totals all individual times. For trips, races, rallies.
- 6. Upcount to Preset Time:** For use with external alarms — counts up to pre-programmed times, then sends trigger pulse to alarm jack. Count can be interrupted and resumed at any point. Times can be transferred from other functions, or programmed by a digit-set method.
- 7. Downcount from Time:** Counts down from pre-programmed time to zero, then sends trigger pulse to alarm jack. For yacht racing, testing, officiating, pacing oneself in training. Time can be transferred from other functions, or programmed by a digit-set method.





## HW-8, It works the world on a couple of watts!

**\$139<sup>95</sup>**

- 0.2  $\mu$ V gives you readable signals
- 4 Band CW Operation
- Front panel Relative Power Meter

When was the last time you worked the coast, snagged a YV or exchanged reports with a DJ6...all with just three watts? If you've never tried it, you're in for some real excitement and challenge. It takes a good rig though, one with excellent performance and specifications, and probably the best QRP rig going is Heath's HW-8.

Look at the receiver. As little as 0.2 microvolts in at the antenna terminal gives you a readable signal. Hum and microphonics are minimal. Couple that with a tunable preselector, direct conversion with RF amplification, a balanced product detector followed by active audio processing, and you've got a hot little receiver that's going to dig in and dig out the stations you're chasing!

The transmit section's the same story...performance! You'll get a minimum of 3 watts in 80 through 20 and 2.5 in on 15. Each band is individually selected and crystal controlled heterodyne circuitry insures accurate frequency mixing. The HW-8's VFO features an MPF-105 FET in a temperature compensated Hartley configuration. This

design approach provides overall stability and covers the units 3.5-3.75; 7.0-7.25; 14.0-14.25; and 21.0-21.25 MHz operating ranges with excellent accuracy.

Operating convenience wasn't forgotten either. The HW-8 features an RF and AF gain control, solid state band switching and full break-in CW operation including, adjustable T/R delay. Operate your HW-8 from its optional AC supply or take it to the mountain top and run on batteries. HW-8 and QRP — it's your most exciting challenge.

**Kit HW-8, Shpg. wt. 6 lbs. . . . . 139.95**

**Kit HWA-7-1, AC Power Supply, Shpg. wt. 4 lbs. . . . . 17.95**

**HW-8 SPECIFICATIONS: TRANSMITTER** — DC Power Input: 3.5 watts (80 M); 3.0 watts (40 M); 3.0 watts (20 M); 2.5 watts (15 M). Frequency Control: built-in VFO. Frequency Stability: Less than 150 Hz/hour drift after 60 minute warm-up. Output Impedance: 50 $\Omega$ , unbalanced. Spurious & Harmonic Levels: -35 dB or better. Off-set Frequency: approx. -750 Hz, fixed on all bands. **RECEIVER** — Sensitivity: 0.2  $\mu$ V for readable signal; 1  $\mu$ V or less for 10 dB S+N/N. Selectivity: wide, -750 Hz @ -6 dB narrow, -375 Hz @ -6 dB. Audio Output Impedance: 1000 $\Omega$ , nominal. **GENERAL** — Frequency Coverage: 3.5-3.75 (80 M); 7-7.25 (40 M); 14-14.25 (20 M); 21-21.25 MHz (15 M). Frequency Stability: less than 100 Hz/hour drift after 30 min. warmup. Power Requirement: 12-16 VDC, 90 mA, receive; 430 mA, transmit. Dimensions: 9 $\frac{1}{4}$ " x 8 $\frac{1}{2}$ " x 4 $\frac{1}{4}$ ". Net Weight: 4 lbs.



### HD-1410 Solid State Electronic Keyer

**\$59<sup>95</sup>**

**3 EVENING KIT**  
Fast, Easy Assembly

- Selectable 10-35 or 10-60 wpm
- Adjustable paddle travel and tension

"Iambic" operation, self-completing dots and dashes and a precision feel combine in the HD-1410 to give you the perfect "fist". Operates from 120 VAC or 12 VDC and features built in speaker, adjustable side-tone and low profile styling. An excellent accessory for your SB-104A, HW-8 or HW-101. 3" H x 5" W x 7 $\frac{1}{2}$ " D.

**Kit HD-1410, Shpg. wt. 4 lbs. . . . . 59.95**

50



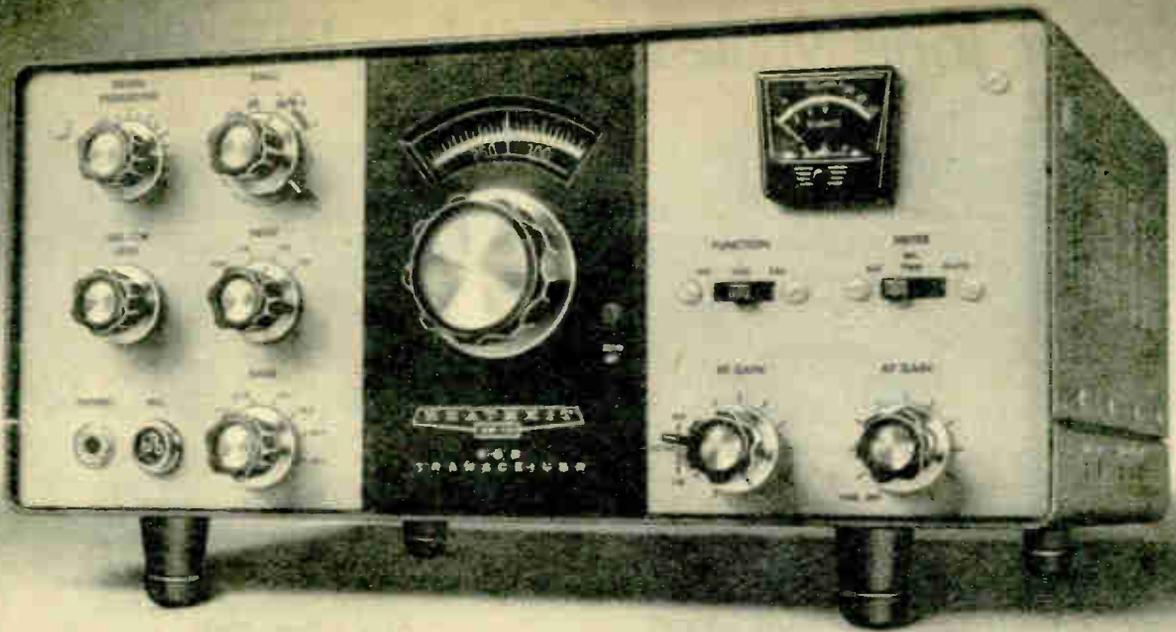
### Field Strength Meter for faster adjustments

**\$12<sup>95</sup>**

- Built-in and external antennas
- Front panel sensitivity control
- 1.8 to 250 MHz range

A must for ham, citizens band and marine radio operations. Makes transmitter and antenna (beams, dipoles, verticals etc.) adjustments quicker and more precise. Operates anywhere in the 1.8 to 250 MHz spectrum and is an ideal companion for your HW-8. 2 $\frac{5}{8}$ " H x 4 $\frac{1}{8}$ " W x 4 $\frac{3}{8}$ " D.

**Kit HD-1426, Shpg. wt. 2 lbs. . . . . 12.95**



## HW-101... Lets You Explore the World

**\$349<sup>95</sup>**

*The unbeatable price/performance leader... HW-101*

The Heath HW-101 gives you full coverage 80 through 10 meter operation at a price that's *unbeatable!* It's an excellent first rig for the Novice, yet you'll find it packed with the features and performance that every Ham will appreciate.

Look over its clean front panel styling...power up, flip the mode switch. Instantly you've got your choice of USB, LSB, or CW operation. Key the transmitter, VOX or PTT, and you command a high performance pair of 6146s that'll pump a clean 180 watts PEP in on phone or 170 watts in on CW. Spin the massive main tuning knob and a solid 36:1 Jackson drive opens the bands and lets you explore with ease. Up on 15 make the HW-101's fantastic  $0.35 \mu\text{V}$  sensitivity work for you. While on 80 and 40 you'll rapidly come to appreciate the 101's crystal IF filtering as it cuts away the QRM and lets you enjoy your QSOs. And if you've got a "sked" to make, with a net or your pal, switch in the 100 kHz calibrator and let it put your HW-101's FET VFO exactly where you want to be. The HW-101, it's an unbeatable deal at an unbeatable price.

Kit HW-101, Shpg. wt. 22 lbs. .... **349.95**

SBA-301-2, 400 Hz CW crystal filter, Shpg. wt. 1 lb. .... **32.50**

**HW-101 SPECIFICATIONS:** RECEIVER: Sensitivity:  $<0.35 \mu\text{V}$  for 10 dB S+N/N for SSB operation. SSB selectivity: 2.1 kHz min. @ 6 dB down; 7 kHz max. @ 60 dB down; (3.395 MHz filter). CW selectivity: (optional SBA-301-2 CW crystal filter); 400 Hz min. @ 6 dB down; 2.0 kHz max. @ 60 dB down. Output Impedance: 8 ohm speaker, and high impedance headphone. Power output: 2 watts with  $<10\%$  distortion. Spurious response: Image and IF rejection  $>50$  dB. TRANSMITTER: DC power input: SSB 180 watt PEP (normal voice, continuous duty cycle). CW 170 watts (50% duty cycle). RF power output: 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). Output impedance: 50 ohm to 75 ohm with  $<2:1$  SWR. Oscillator feed-through or mixer products: 45 dB below rated output; Harmonic radiation: 40 dB below rated output. Transmit-receive operation: SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. CW sidetone: Internally switched to speaker or headphone in CW mode. Approx. 1000 Hz tone. Microphone Input: High impedance with a rating of  $-45$  to  $-55$  dB. Carrier suppression: 45 dB down from single-tone output. Unwanted sideband suppression: 45 dB down from single-tone output at 1000 Hz reference. Third order distortion: 30 dB from two-tone output. RF compression (TALC\*):  $>10$  dB at 0.1 mA final grid current. GENERAL: Frequency coverage: 80-10 M amateur bands. Frequency stability:  $<100$  hertz per hour drift after 45 minutes warmup from normal ambient conditions.  $<100$  Hz for  $\pm 10\%$  line voltage variations. Modes of operation: Selectable upper or lower sideband (suppressed carrier) and CW. Dial calibration: 5 kHz. Calibration: 100 kHz crystal. Audio frequency response: 350 to 2450 Hz. Power requirements: 700 to 850 volts at 250 mA with 1% maximum ripple; 300 volts at 150 mA with 0.05% maximum ripple;  $-115$  volts at 10 mA with 0.5% maximum ripple; 12 volts AC/DC at 4.76 amps. (see fixed & mobile power supplies below). Cabinet dimensions:  $6\frac{1}{4}"$  H x  $14\frac{1}{4}"$  W x  $13\frac{3}{8}"$  D.

\*Triple Action Level Control.



### HP-13B Mobile Power Supply

**SAVE \$20**

Puts your HW-101 on the road. Circuit breaker protection. Shpg. wt. 7 lbs.

Kit HP-13B ..... Was 89.95 Now **69.95**

**HP-13B SPECIFICATIONS:** Input voltage: 12 to 16 VDC (neg. ground only). Input current: 25 amp, max. full load. High voltage output: 800 VDC, no load; 750 volts DC @ 250 mA. AC ripple: less than 1% @ 250 mA. Low voltage output: (high tap) 310 VDC, no load; 200 VDC @ 150 mA. (low tap) 265 VDC, no load; 250 VDC @ 150 mA. AC ripple: Less than 0.05% 150 mA. Fixed Bias:  $-130$  VDC @ 20 mA. Dimensions:  $7\frac{3}{4}"$  W x  $7\frac{3}{8}"$  L x  $2\frac{3}{8}"$  D. All voltages referenced at 13 VDC.

### Heathkit HP-23C Fixed Station AC Power Supply

**\$62<sup>95</sup>**

*Provides fixed station operation of your HW-101, older Heath transceivers, many others as well*

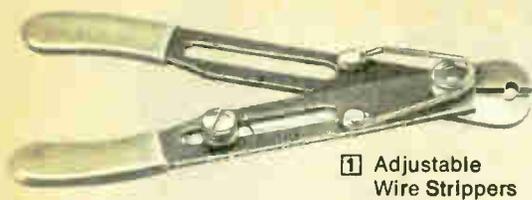
Provides the operating voltages for the HW-101 as well as those necessary for the operation of many older Heath transceivers. Has high voltage and two internally selectable low B+ taps. Also provides fixed bias and 12.6 filament voltage. The HP-23C features excellent bias supply filtering and extremely low ripple content on both high and low voltage outputs. Open chassis layout and design provides cool, efficient operation.

Kit HP-23C, Shpg. wt. 18 lbs. .... **62.95**

**HP-23C SPECIFICATIONS:** Power requirements: 120/240 VAC, 60/50 Hz, 350 watts maximum. High voltage output: 820 VDC no load; 700 VDC @ 250 mA  $\pm 10\%$ . AC ripple. Less than 1% @ 250 mA. Duty cycle: 150 mA continuous to 300 mA @ 50%. Low voltage output: (High tap) 350 VDC, no load; 300 VDC @ 150 mA  $\pm 10\%$ . (Low tap) 275 VDC, no load, 250 VDC @ 100 mA;  $\pm 10\%$ . Less than 0.05% AC ripple @ 150 mA, continuous duty to 175 mA. Fixed bias:  $-130$  VDC  $\pm 10\%$ , no load;  $-100$  VDC @ 20 mA. Filament voltage: 12.6 VDC @ 5.5 amps. Dimensions:  $9"$  L x  $4\frac{3}{4}"$  W x  $6\frac{3}{4}"$  H.



# Fine Tools Make Kitbuilding Even Easier



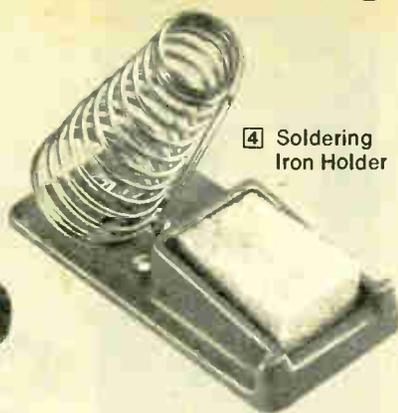
1 Adjustable Wire Strippers



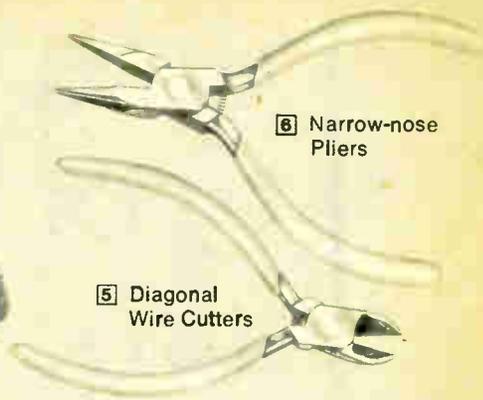
2 Shielded Cables



3 Desoldering Bulb



4 Soldering Iron Holder



6 Narrow-nose Pliers

5 Diagonal Wire Cutters

1 Adjustable Wire Strippers — Honed cutting edges cut and strip stranded or solid insulated wire. Positive adjustment can be preset for any wire size from #10 to #20 gauge. Quality spring steel. Plastic handles have spring action. Overall length 5 3/4".

Model 55BB ..... 2.49

2 Shielded Cables — Now available at all Heathkit Electronic Centers; shielded transmission cable for all amateur radio, citizens band and television needs. From Columbia Cable.

COL-198 RG 8/U Superflex ..... 29¢ per ft.

COL-188 RG 58 A/U Superflex ..... 09¢ per ft.

COL-755 RG 59 Superflex ..... 07¢ per ft.

COL-508 5 Wire Round Rotor ..... 11¢ per ft.

3 Desoldering Bulb — For quick and easy removal of solder. Place tip near melted solder, squeeze and release bulb. Zip — excess solder is removed.

Model ACP-303 ..... 2.50

Replacement Soldering Iron Tips (not shown)  
For your Heathkit/Weller Pencil-type iron.  
Screwdriver tip design.

Model ST-1 1/16" Wide ..... 1.50

Model ST-2 3/32" Wide ..... 1.50

Model ST-3 1/8" Wide ..... 1.50

Model ST-4 3/16" Wide ..... 1.50

4 Soldering Iron Holder — By Weller. Designed for the Heathkit/Weller pencil-type irons on page 45. Heavy base prevents tipping. Includes built-in sponge tray and sponge.

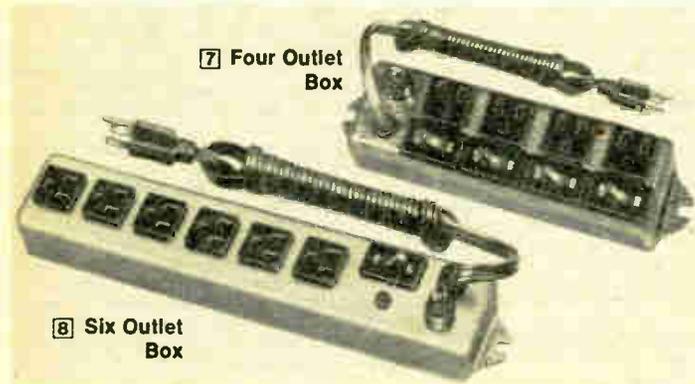
Model PH-60 ..... 6.95

5 Diagonal Wire Cutters — Semi-flush cut cuts at extreme tip. For very fine work (#20 gauge or smaller soft copper wire). Blue plastic handles. Overall length 4".

Model A97MS ..... 6.95

6 Narrow-nose Pliers — For precision pick-up, looping, twisting and bending of finest wire. Serrated tips give firm grip with minimum pressure. Blue plastic handles. Overall length 4 3/4".

Model A11DMS ..... 6.95



7 Four Outlet Box

8 Six Outlet Box

## Multi-Outlet Boxes let you put electrical outlets anywhere you need them

Put an end to those unsafe multi-plug adapters and tangles of extension cords with this versatile accessory. It's a must for the workshop, test or hobby bench, ham shack, just about anywhere. Gives you additional electrical outlets for real versatility in setting up equipment. Outlets are fuse-protected, grounded and individually-switched. Available in four and six outlet versions. Convenient mounting tangs make possible semi-permanent wall or floor mounting.

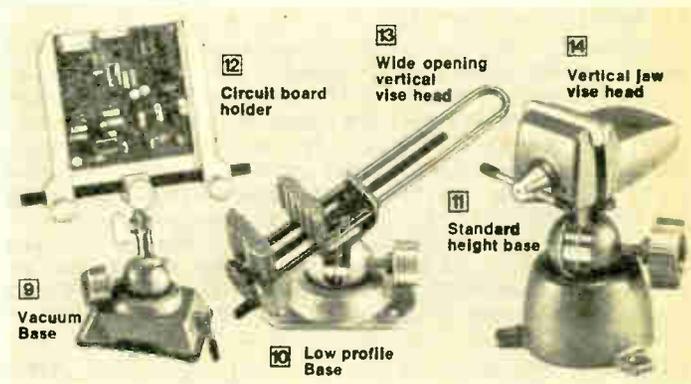
Use subject to local electrical zoning codes.

7 Four Outlet Box.

Model JB-60G ..... 12.95

8 Six Outlet Box.

Model JB-40G ..... 12.95



9 Vacuum Base

12 Circuit board holder

10 Low profile Base

13 Wide opening vertical vise head

11 Standard height base

14 Vertical jaw vise head

## PanaVise® and Positioners, the handiest kitbuilding tools ever

PanaVise® could easily be the most versatile tool you'll ever use. Holds just about anything at the angle that's best for the job. Leaves your hands free for soldering, positioning, assembly, etc.

9 Vacuum Base — Attaches securely to any smooth, non-porous surface with half-turn of mounting lever. Won't mar tabletop. 3 3/4" H, Base 5" x 4 1/4". Model 380 16.95

10 Low Profile Base — Positions work close to bench surface. Base permits flush mounting with edge of bench. 2 5/8" H, diameter 5". Model 305 ..... 11.95

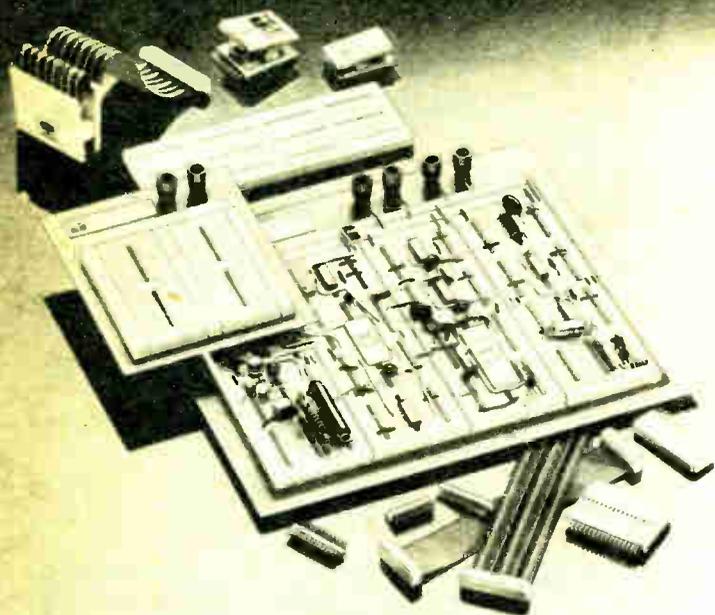
11 Standard Height Base — Designed for permanent installation. Has lugs for attachment to work surface. Model 300 ..... 11.95

12 Circuit Board Holder — Holds most any size circuit board. Spring loaded for quick change. Support tilts 220 degrees. Model 315 ..... 16.95

13 Wide Opening Vertical Vise Head — Holds bulkier items. Jaws open to 6 1/2". Neoprene pads are reversible and replaceable. Model 366 ..... 10.00

14 Vertical Jaw Vise Head — Nylon jaws open to 2 1/4 inches for firm grip. Won't mar object to be worked on. Model 303-1 ..... 10.00

# Computer Accessories



## Your Heathkit Electronic Center has a wide selection of devices to help you get the most from your computer

Whether you're expanding, experimenting, testing logic circuits, adding I/O devices to your system, or just about anything — your Heathkit electronic center has the computer accessories you need to do the job easier and faster. All these accessories are precision engineered and guaranteed to meet or exceed published specifications.

**IC Test Clips.** Provide full access to integrated circuit DIP leads with positive, non-shorting electrical connection and positive mechanical clamping to dual-in-line packages. Available in row-to-row dimensions of 0.3" for 14-pin DIP's; 0.3" for 16-pin DIP's; 0.5/0.6" for 24-pin DIP's and 0.5/0.6" for 40-pin DIP's.

**Ribbon Cable.** A variety of ribbon cable is available in four different configurations and assorted lengths: Open end to socket connector; open end to circuit card edge connector; open end to PCB connector; and socket connectors both ends.

**Terminal and Distribution Strips.** Breadboarding sockets with universal matrices of solderless plug-in tie points for quick solderless circuit build-up and check out. Accept components with leads up to 0.032" diameter. No special patch cords are required, and integral non-shorting instant-mount backing is included. Available in sizes from 12 four-point tie terminals to 128 five-point tie terminals.

**All-Circuit Evaluators.** Universal matrices of solderless plug-in tie points for fast, easy circuit buildup and evaluation. All include mounting boards, terminal strips and terminal binding posts. Available with capacity for up to 36 fourteen-pin DIP's.

**Headers.** Male and female headers for board-to-board interconnection. Female headers mate with matrices of 0.025" square or round posts on 0.1" centers. Male headers mate with single and dual-row female connectors.



# At Last!

## C-60 cassette copies in 2 minutes!

Now you can make instant REZOUND™ copies of your cassettes at any Heathkit Electronic Center

# FREE!

Simply purchase the low-cost Copy Cassettes™ listed below and you can make perfect monaural copies of any cassette tapes in just minutes. Copy both sides of the cassette at the same time and make up to three copies at once! Copy computer programs, seminars, lectures, language tapes, religious tapes, speeches, sales meetings, etc. It's easy and fast, and now at a savings that is too good to pass up!

The Government Law (Title 17 United States Code) has been amended by a recent Act of Congress, Public Law 92-140, protecting certain sound recordings against unauthorized duplication. It is an infringement of this law to copy any properly registered cassette designated with the copyright notice. (e.g. P 1972, Doe Records, Inc.). You are responsible for: (1) copyright infringements if any; (2) the loss of the cassette master during the cycle.

# \$2 OFF

at any Heathkit Electronic Center

- do it yourself and save
- unconditionally guaranteed perfect cassette copies . . . every time!

Apply this certificate towards any C-60, C-90 or C-120 monaural cassette copy. For cassette copying only.

	Regular Price	With Certificate
C-30	\$1.89	Does not apply
C-60	\$2.59	only \$0.59
C-90	\$3.39	only \$1.39
C-120	\$4.39	only \$2.39

Price includes REZOUND copy cassette

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Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Occupation \_\_\_\_\_

Must be filled out to be valid. 1 Certificate/person please.

Expires March 10, 1978

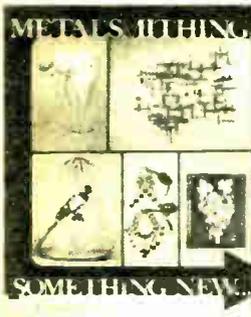
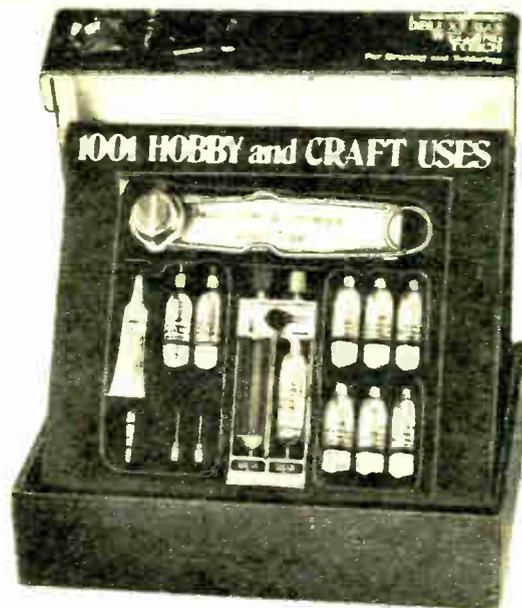
# NEW Microflame™ Miniature Torch

NOW ONLY **\$29<sup>95</sup>**

*Perfect for the metal-working hobbyist  
or the craftsman*

The Microflame miniature gas torch opens up a whole new world of enjoyment and creativity in a fun-filled new pastime; metalsmithing. Become an artist in your own right by making beautiful and decorative metal creations. The only limit is your imagination. Everything from intricate metal sculptures to the assembly of that beautiful brass locomotive is easily within your reach. You can turn otherwise worthless scraps of metal (like tin cans and coat hangers) into striking works of art. And temperatures of 5000°F give you enough capability for small soldering or brazing jobs around your home and apartment too. The kit contains: "Microflame Torch, 6 Micronox™ cylinders, 3 Butane cylinders, a spark lighter, 12 six inch (152 mm) long silver solder brazing rods and flux, a fireproof work surface and complete instructions. The heavyweight box is ideal for storage of supplies and accessories. Order yours now and get started in this fascinating hobby that has its practical side too.

- Model MIC-4000** ..... Was 35.95, Now 29.95  
**MIC-4190**, "Metalsmithing-Something New" book ..... 1.95  
**MIC-1100**, Jungle Elephant — metalsmith kit ..... 2.29  
**MIC-4130**, Tree — metalsmith kit ..... 3.95  
**MIC-4210**, Mushrooms — metalsmith kit ..... 2.95  
**MIC-1110**, Flying Ducks — metalsmith kit ..... 2.29  
**MIC-4110**, Flower Arrangement — metalsmith kit ..... 5.49



## Special Savings on Tiffany Lamp Kits

*Add the delicate hues of old world charm  
with colorful Tiffany Lamps from Heath*

Full leaded, stained-glass Tiffany Lamps add that perfect touch to just about any decor. With these superbly crafted kits, you can add a touch of that turn of the century charm to any room in the house. Each kit, whether it is one of the exquisite hanging lamps or the table lamp, contains all pieces necessary to put the kit together easily — all glass parts are pre cut and all lead strips are pre-channeled. The only special tool you'll need to put these lamps together is a soldering iron.

- ① Model 1672 ..... Was 56.00 Now 34.95  
 ② Model 2052 ..... Was 60.00 Now 39.95  
 ③ Model 1862 ..... Was 57.00 Now 34.95  
 ④ Model 1011 ..... Was 38.00 Now 24.95



# THE PRESIDENT'S CORNER



Dear Friends:

In the past couple of years, Heath has entered the educational field in a big way. Our Continuing Education Courses have been a great success. They are used by thousands of people... individually, in schools and training centers, and in many areas of industry where electronics education is necessary.

Heath has always been closely allied to the educational field. Every time you build a Heathkit product you learn by doing. Should you desire, you can gain important insight into circuits and applications by reading the informative "circuit description" section of each construction manual. This built-in education feature has always been an important part of the "intangible" benefits that make Heathkit products far more special than factory-made, mass produced products. This is in addition to pride and satisfaction you always get from your hand crafted quality product.

Heathkit Continuing Education Courses use many of the same proven methods found in Heathkit manuals. Step-by-step "programmed" instructions let you study and learn at a pace that suits you. Illustrations and diagrams let you easily visualize circuit paths and audio records are included with the courses to provide more "personalized" learning. Our optional breadboard/experimental trainers give you important "hands on" experience and provide practical applications of the

principles you're learning. Finally, our Certificate of Achievement and Continuing Education Units give you a tangible record of your accomplishments.

Heathkit Continuing Education Courses are constantly being updated and expanded. We have just introduced a new microprocessor course which takes you step-by-step through this incredible new computer technology. The course (EE-3401), along with its optional trainer, will provide you with an excellent background in computer design, operation and interfacing techniques. Coming soon will be more courses in computer operation and programming, and further expansion of our basic electronics courses.

In the past several years many people have joined the ranks of amateur radio operators. It is a privilege to operate amateur equipment, which is capable of sending a radio signal around the world or to the moon and back. To earn this privilege, you must pass a Federal Communication Commission test which provides assurance you will operate a high power transmitter without causing illegal interference. While the test is not all that difficult, we offer an Amateur Radio Novice Course which makes it easy to get started in this great hobby. The course is Model ER-3701 shown on page 92.

Whether you're learning electronics to increase your job potential, to expand your hobby, or just for the satisfaction that comes with self-education, we feel our Continuing Education Courses are far and away the best way to go. They're new, up-to-date and presented in a multi-media format that's interesting, effective and geared for self-paced learning. Read about them on pages 88-94.

Sincerely,  
*D. W. Nurse*  
D. W. Nurse  
President

### ATTENTION: GD-1380 TV Game Owners — LAST CALL

The GDA-1380-1 Target Accessory is available in limited quantities. Add two exciting games to your present GD-1380.

**GDA-1380-1**, Shpg. wt. 2 lbs. While they last ..... **ONLY \$9.95**

Copies of the Heathkit warranty or warranties for any other consumer product in this catalog costing more than \$15 can be obtained free of charge by writing the Heathkit Electronic Center nearest you, or the Director of Retail Operations, Schlumberger Products Corp., P.O. Box 167, St. Joseph, MI 49085.

## ORDER FORM / AGREEMENT

Ship to: Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

# USE THIS FORM WHEN ORDERING BY MAIL

(Store addresses on page 2-3)

Heath Revolving Charge # \_\_\_\_\_

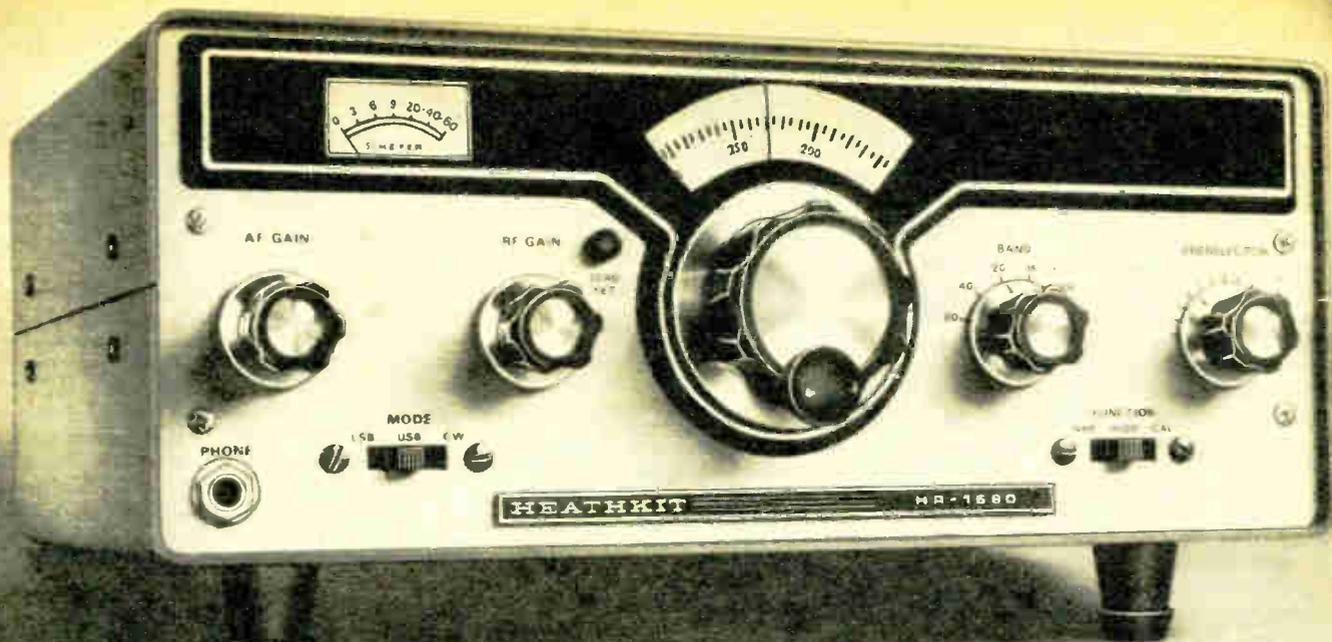
Qty.	Model #	Description	Cost Ea.	Total

\*Your order will be shipped via the most efficient way available. Call your nearest Heathkit Center for shipping charges (if any).

Credit plans available, see us for details

Total \_\_\_\_\_  
Less Allow \_\_\_\_\_  
Tax \_\_\_\_\_  
\*Shipping \_\_\_\_\_  
Amount Due \_\_\_\_\_

Check  M.O.  Charge



## HR-1680 High-performance SSB/CW Receiver

**\$219<sup>95</sup>**

- Excellent sensitivity
- No-instrument alignment
- Operates from 12 VDC or built in AC supply

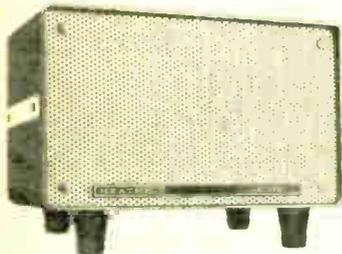
Heath's HR-1680 is an excellent choice for your first receiver. It's loaded with innovations and designs that make it an outstanding performer for not only the Novice but the seasoned amateur as well! Look at the facts. The HR-1680 covers 80, 40, 20, 15 and the lower 1 MHz of the 10 meter band and features a preselector tuned dual-conversion MOSFET front end. Less than 0.5  $\mu$  gives you a 10 dB signal plus noise over noise ratio and with that kind of performance you'll have no trouble digging out the "rare" ones or finishing your QSO "solid copy" ... even with a less than ideal antenna! The IF section blends a 4-pole crystal filter and MOSFET amplifier for razor sharp selectivity and gain, and dual crystal BFO oscillators and an IC product detector give the 1680 superior LSB and USB/CW per-

formance. Both RF and IF stages are AGC controlled to prevent QSB fading and blasting. In addition, the HR-1680 features individual crystal heterodyne oscillators for excellent stability, solid-state diode bandswitching, built in 100 kHz calibrator for precise calibration and alignment, and switchable wide/narrow active audio circuitry to precisely tailor your 1680's response for SSB or CW operation.

The massive front panel tuning knob is calibrated in 5 kHz increments and the 1680's built in FET VFO gives you extremely linear and accurate coverage of the receiver's overall operating range.

Assembly is simplified with only four circuit boards to construct and a rugged chassis, with open layout and design, minimizes heating and insures long lasting precision and stability. Operates from 12 VDC or internal AC supply and can be completely aligned without external instruments.

**Kit HR-1680, Shpg. wt. 14 lbs. .... 219.95**



**Matching station speaker enhances the performance of the HR-1680**

**\$22<sup>95</sup>**

The HS-1661 station speaker is styled to match the features and tailored to fit the performance of the HR-1680 receiver. The unit features 300-3000 Hz response for excellent single side band and CW reproduction, 4 ohm impedance, and comes complete with cable and plug. An outstanding value!

**Kit HS-1661, Shpg. wt. 5 lbs. .... 22.95**

**HR-1680 SPECIFICATIONS:** Frequency Coverage (MHz): 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-28.5, 28.5-29.0. Sensitivity: Less than 0.5  $\mu$ V for 10 dB S+N/N for SSB operation. IF Selectivity: 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down. Overall Audio Response: Wide; 2100 Hz minimum at 6 dB down, 7 kHz maximum at 60 dB down. Narrow; 250 Hz minimum at 6 dB down, 2.5 kHz maximum at 60 dB down (center frequency approx. 750 Hz). Overall Gain: Less than 1.5  $\mu$ V input for 0.25 watts audio output. Audio Output Power: 1.2 watts into a 4-ohm load at less than 10% THD. AGC Characteristic: Blocking level, 3 volts. Dynamic range, 120 dB. Time Constant, attack time less than 1 ms. Release time switch selectable at 100  $\mu$ s (CW) or 1 second (SSB). Intermodulation Distortion: -60 dB. Image Rejection: 50 dB or better. IF Rejection: 60 dB or better. Internally Generated Spurious Signals: Below 1  $\mu$ V equivalent antenna input except at 3.74, 21.2, 28.6 and 28.9 MHz. Frequency Stability: Less than 100 Hz per hour drift after 30 minutes warmup. Less than 100 Hz drift for 10% change in line voltage. Tuning Rate: Approx. 15 krz per turn. Dial Accuracy: Within 2 kHz after calibration at nearest 100 kHz marker. Muting: Shorted external ground at mute socket. Sidetone Input Level: 10 mV or greater (300 mV maximum). Dial Backlash: 50 Hz or less. IF Frequencies: First IF, 8.395-8.895 MHz; Second IF 3.395 MHz. Antenna Input Impedance: 50 ohms unbalanced. Temperature Range: -10°C to +50°C. Meter Calibration: 0 to S-9 + 60 dB. Power Requirement: 120 or 240 volts AC (60/50 Hz) 27 watts maximum or 11.5 VDC to 15 VDC at 0.75 amperes maximum. Dimensions: 12 3/4" W x 6 3/4" H x 12" D. Net Weight: 9 3/4" lbs.

# Novice Courses to help you get your Ticket!



You'll get your ticket and we'll **GUARANTEE** it! We're so confident, that if you fail to pass your Novice exam, after completing this course — we'll **REFUND** your money for the course text materials!

**SAVE \$4<sup>95</sup>** when you buy our Course and Code Practice Oscillator together!

only **\$32<sup>95</sup>** \$37.90 if purchased separately

*The ideal combination — study the course and get "hands-on" Code Practice*

Here's the outfit that will have you operating fast and easy. The HD-1416, described at right, is a fine little unit you'll appreciate even after you have your license; and our course is the fast, easy way to get your license.

ERS-3701, Shpg. wt. 8 lbs. . . . . 32.95  
Get 10% off (up to \$10.00) on any Heathkit Amateur Radio equipment. Simply attach copy of license and proof of ERS-3701 purchase within 90 days of licensing.



**BONUS GIFT CERTIFICATE** ➔

## Popular Code Courses (not illustrated)

**Ameco Junior Code Course.** LP record with 10 lessons from start to 8 words per minute. The course prepares you for Novice and Technician Code examinations with an FCC-type code exam, a code instruction booklet, and charts for recording accuracy.  
HDP-232, Shpg. wt. 2 lbs. . . . . 3.95

**Ameco Senior Code Course.** Contains everything above, plus twelve additional lessons to bring your code speed to 18 WPM. Prepares you for Amateur Novice, Technician, General and Conditional Code exams, as well as Commercial Second Class Telegraph Code exams.  
HDP-332, Shpg. wt. 2 lbs. . . . . 7.50

**Ameco Junior Cassette Code Course.** As above, cassette instead of LP.  
HDP-432, Shpg. wt. 1 lb. . . . . 4.95

**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.** A fast, simple and effective way to learn Code! Three LP records teach speed and comprehension using the famous "by the word" method.  
HDP-32, Shpg. wt. 2 lbs. . . . . 9.95

Same course as above, but on two cassettes instead of LP records.  
HDP-132, Shpg. wt. 1 lb. . . . . 9.95

## Novice Self Instruction Course . . . From the Hams at Heath

**\$24<sup>95</sup>** This deluxe course prepares you for the Amateur Radio Novice FCC exam, and provides you with helpful guidelines for setting up and operating your own station once you pass the exam. The course includes a programmed learning text, two audio cassettes to reinforce text material and provide Code practice, helpful aids for operating your station.

Course ER-3701, Shpg. wt. 7 lbs. . . . . 24.95  
ECP-3801 Cassette Recorder/Player. See page 102 for details.  
Shpg. wt. 6 lbs. . . . . 60.00

## Heathkit HD-1416 Code Practice Oscillator

Recommended for ER-3701 Amateur radio course at left! The unit operates from a single inexpensive 9-volt transistor battery (not supplied) and comes complete with telegraph key and phone jack. Has built-in speaker, volume and adjustable internal tone control.



**\$12<sup>95</sup>** Kit HD-1416, Shpg. wt. 2 lbs. 12.95

HD-1416 SPECIFICATIONS: Mode of Operation: Speaker or headphones. Tone Frequency: 200-800 Hz adjustable. Battery Required: 9-volt transistor battery equivalent Neda #1604 (not supplied). Headphones: 8-2000 ohms. Dimensions: 2 5/8" H x 4 1/2" W x 4 3/8" D.

## "TUNE IN THE WORLD WITH HAM RADIO"

Designed to prepare you for your Novice License. Includes a tape cassette with code speeds of up to five words per minute for easy practice, and an informative booklet with details on setting up a station, equipment, exams, etc. Produced by the ARRL, the official Amateur Radio organization.

HDP-1142, Shpg. wt. 2 lbs. . . . . 7.00



# HW-2036A, An improved version of our 2-meter industry standard



Shown with optional Micoder II Installed

**\$279<sup>95</sup>**  
with standard microphone

## 4 MHz of Synthesized Performance

The HW-2036A 2-meter transceiver has the same exciting features and specifications as the industry leading HW-2036... with one very important difference. Our new 2036A allows you a full 4 MHz of synthesized convenience over any portion of its 143.5 to 148.5 MHz operating range. And because of this significant improvement, you'll be enjoying additional performance capabilities in your mobile operations, and the extra flexibility of Amateur combined with CAP or MARS operation, without the time consuming necessity of VCO retuning. Best of all, we've done it all at the same low price that's made our HW-2036 a value leader.

## Now with synthesizer range extended to a full 4 MHz!

Two meters gets more exciting every day. With more and more mobile activity, auto-patching, hidden transmitter hunts, fantastic band openings, and newer more sophisticated repeater operations, you'll be missing out on a whole lot of fun and some really great conversations if you're stuck with a transceiver that just can't take another crystal pair.

With Heath's HW-2036A in your car or station you haven't got a problem. You're ready for all the action because the 2036A's phase locked synthesizer/VCO loop lets you operate any 4 MHz segment of the transceiver's 143.5 to 148.5 MHz operating range... with just the flip of a switch. That's right! When you want to QSY all you do is flip the convenient front panel lever switches and in less than the blink of an eye the synthesizer does the rest. With the HW-2036A you have your choice of simplex or standard  $\pm 600$  kHz split operation. Or pick your own offset in the unit's auxiliary position.

The synthesizer is locked to a precision 10 MHz time base for outstanding accuracy, has crystal controlled offsets, IC divide chain, and a unique NAND gate logic system which displays locked/unlocked status and inhibits out of band transmissions by pre-

venting transmitter key up.

The receiver features 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. Schmitt-trigger circuitry insures squelch action that's quick and sure, a front panel LED display alerts you instantly to channel activity, and just 0.5 microvolts in gives your HW-2036A up to 15 dB of quieting!

The HW-2036A's transmitter gives you a minimum of ten watts out. Signals are clean and harmonic and spurious components are 60 dB down within 20 MHz of carrier reference. Transmit audio quality is outstanding and deviation is continuously adjustable to 7.5 kHz maximum.

The HW-2036A also features sub-audible tone encoding (variable from 70 to 200 Hz), built in 5 and 11 VDC regulators, hash filter/regulator to eliminate ignition noise and alternator whine, and diode protection to prevent damage from connection to incorrect voltage polarity. Comes with gimbal-mount for mobile operation and may be ordered with the standard mike or you can

add \$20 and get it with our Reg. \$39.95 Micoder II for auto-patch operation.

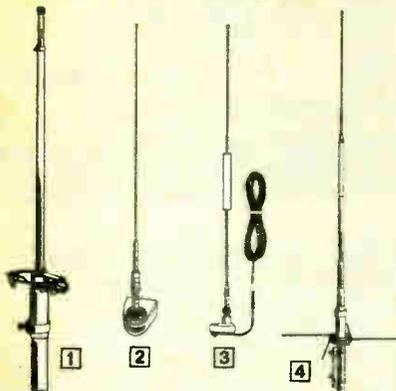
**Kit HW-2036A-1**, with reg. \$34.95 Micoder II. Shpg. wt. 12 lbs. .... **299.95**

**Kit HW-2036A-2**, with standard PTT mike. Shpg. wt. 12 lbs. .... **279.95**

**HW-2036A SPECIFICATIONS:** Receiver: Sensitivity: 0.5  $\mu$ V for 12 dB SINAD (or 15 dB of Quietening). Squelch Threshold: 0.3  $\mu$ V or less. Audio Output: 1.5 watts at 10% T.H.D. typically 2 watts. (5 kHz deviation). Image Rejection: -45 dB or greater. Spurious Rejection: -50 dB or greater. IF Rejection: -80 dB or greater. Internally Generated Spurious: Below 1  $\mu$ V equivalent. Bandwidth: 6 dB at 15 kHz min. and 60 dB at 30 kHz max. Modulation Acceptance: 7.5 kHz, min. Transmitter: Power Output: 10 watts min. at 25°C and 13.8 VDC, into a 50  $\Omega$  load. Harmonic & Spurious Output: -60 dB. Modulation: FM, 0 to 7.5 kHz, adjustable. Duty Cycle: 100% with infinite VSWR. Tone Encoder: 3 tones, 70 to 200 Hz, approx.  $\pm 700$  Hz deviation. Transmitter Offset: 0 (simplex), +600 kHz, +600 kHz with crystals supplied. Provision for one additional offset crystal. Maximum offset 1 MHz. General: Frequency Coverage: Any 4 MHz segment from 143.5 to 148.5 MHz. (Both receiver and transmitter must be aligned for the same 2 MHz segment.) Frequency increments: 5 kHz. Frequency Stability:  $\pm 0.0015\%$ . Operating Temperature Range: 15° to 125° F. (-10° to 50° C). Operating Voltage Range: 12.6 to 16 VDC (13.8 VDC nominal). Current Consumption: RX: 700 mA max. squelched. TX: 2.6 A max. at 13.8 volts. Dimensions: 2 3/4" high x 8 1/4" wide x 9 3/4" deep. Weight: 6.25 lbs.

## Quality base and mobile 2-Meter Antennas

Improve your 2-meter performance  
with one of these quality antennas

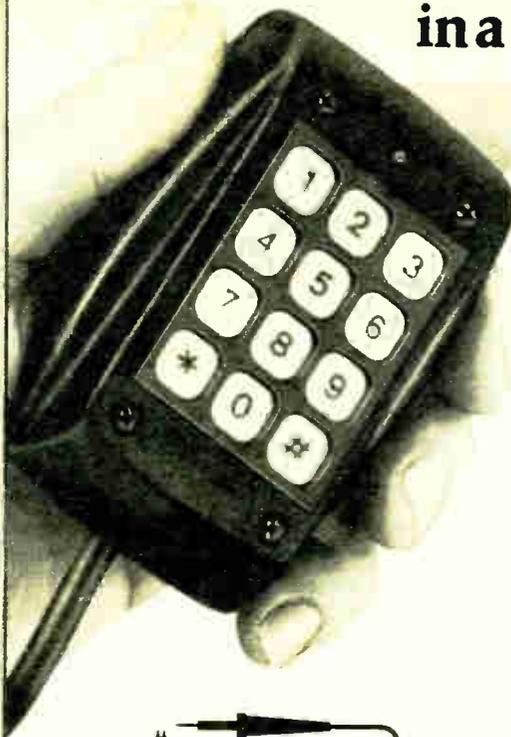


- 1** Standard gain fixed. Omnidirectional. 3.75 dB gain, 1.1:1 SWR, 135-175 MHz, 100 watts. 52 ohm feed with PL-259. Mounts to 1 1/4" masts. Less coax. Preassembled. HWA-202-11, 2 lbs. .... **19.95**
- 2** Standard gain mobile. 5/8" wavelength rear deck whip. 3.4 dB gain, 1.1:1 SWR. 100 watts, 47" radiator. 17" coax, connectors. HWA-202-3, 2 lbs. .... **21.95**
- 3** Super gain mobile. Phased 1/4 and 5/8 wave radiators. 5.2 dB gain. 200 watts; 6 MHz bandwidth; 1.1:1 SWR. Height 85". 17" RG-58U coax, connectors. HWA-202-9, 3 lbs. .... **39.95**
- 4** Super gain fixed. 6 dB gain. 140-150 MHz. 6 MHz bandwidth. 1.2:1 SWR. 1000 watts. SO-239 connector. 117" long. 4 radials; 21" alum. rod. For 1 3/4" mast. Less coax. HWA-202-10, 7 lbs. .... **59.95**

# New Micoder II, Mike and Auto Patch in a hand held package!

**\$39<sup>95</sup>**

- Single-chip crystal-controlled circuitry
- No-instrument alignment
- Self-powered



An excellent way to avoid the inconvenience and clutter of an "outboard" tone encoder is to install the new Heath HD-1984. On one side of this neat hand held package you'll find an electret condenser microphone of superior quality. Flip it over and the HD-1984's built-in keyboard is ready to give you instant auto-patch access.

The microphone section features excellent audio characteristics and its 300-3000 Hz response is tailored for clean voice transmission. New encoder circuitry features single chip, crystal referenced, tone generation, Zener diode voltage regulation and excellent overall accuracy and stability. To indicate internal circuits are working, Micoder II incorporates a handy LED display which lights each time the keyboard is depressed and indicates that a dual-tone signal is being generated.

The Micoder is completely self-contained and operates from its own 9-volt battery (not supplied). Comes complete with 6 foot coiled microphone cable and hanger clip. Single board assembly speeds construction and solid state circuitry means years of reliable performance. An ideal gift for every 2-meter enthusiast! Easy single-step NO-INSTRUMENT alignment! Can be used with any high-impedance mike input.

Kit HD-1984, Shpg. wt. 2 lbs. .... **39.95**

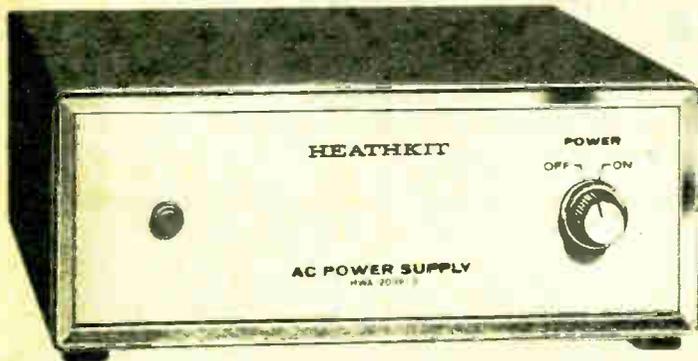
### 1 EVENING KIT

Fast, Easy Assembly

#### HD-1984 SPECIFICATIONS:

Operating Voltage: 9.0 VDC. Current Consumption: 12 mA. Battery Life: Approx. 6 months. Microphone Type: electret condenser. Output Level: 30 mV rms maximum. Frequency Response: 300-3000 Hz. Output Load: 10k min. Encoder Frequency Tolerance:  $\pm 1.5\%$ . Distortion: less than 5% (harmonic plus IM). Dimensions: 3 3/4" H x 2 5/8" W x 1 3/4" D. Weight: 8 oz. (including battery).

## Low-Cost HWA-2036-3, Clean Solid-State Regulation and Top Performance



Heath's HWA-2036-3 Power Supply was designed to be the perfect voltage source for your HW-2036, HW-202 and many other types of transceivers as well. The supply features a beefed up transformer

for higher current operation (up to 2.7 A, 40% duty cycle at 13.8 VDC), full wave rectification, and rugged construction for year after year reliability and performance.

Regulation, adjustable from 12.5 to 14.5 VDC, is accomplished by a Darlington pair and single chip IC circuitry. This solid-state control loop senses supply output, compares it to internal reference, and re-biases for correct voltage output.

The pass transistor is chassis mounted for cooler, more efficient operation and both transformer primary and regulated output are fused for optimum power supply protection. With Heath's excellent manual and illustration booklet, construction is a simple matter and you'll be ready to power up in no time!

Kit HWA-2036-3, Shpg. wt. 7 lbs. .... **39.95**

HWA-2036-3 SPECIFICATIONS: Output Voltage: 13.8 VDC regulated (Adjustable internally from approx. 10 to 15 VDC). Output Current: 2.7 amps, Intermittent, 20 minutes max. (1.8 amps continuous). Regulation: better than 1% from no load to full load. Ripple: better than 0.1% at 2.7 amps. Transistor, IC and Diode Complement: one 2N3055 Pass Transistor, one MPSU05 Driver Transistor, four 1N4002 silicon diodes, one 1N2071 silicon diode, one UA78GMT3C IC voltage regulator. Power Requirements: 110 to 130 VAC or 220 to 260 VAC, 60/50 Hz @ 80 watts full load. Dimensions: 3" H x 7 3/4" W x 10" D including switch and feet. Net Weight: 5 lbs.



## The new, improved Heathkit SB-104A—The Ultimate

From the moment you power up you'll begin to experience the excitement and convenience of SB-104A operation. Apply power and almost instantly six red digits are ready to display your operating frequency to within  $\pm 200$  Hz accuracy. Pushbutton select upper, CW or lower side band transmission, plug in your key, or opt for PTT or VOX operation and you're ready to experience broadbanded solid-state excitement.

Spin the main tuning knob and appreciate its feel as you smoothly move the 104A's temperature-compensated FET Hartley VFO up or down the band. And as you QSY, you'll quickly discover that the SB-104A's completely re-engineered front end receiver board really means business! Its circuitry is factory pre-assembled and tested, incorporates individual preselector filters for each band, features balanced first and second mixers, and plays a large part in the 104A's less than 0.5 microvolt sensitivity figure. The SB-104A's receiver features razor sharp crystal filtering, excellent IF selectivity, individual crystal controlled BFOs for USB, LSB and CW, and balanced mixer

product detection. Received audio quality is outstanding, precisely tailored for SSB and CW reproduction. And to make your QSOs more enjoyable, by reducing the nuisance of QSB, you can switch select either fast or slow AGC action.

When it comes to innovation, the SB-104A's transmitter section is second to none. You have a choice of 100 watts out for "barefoot" operation or, with the touch of a button, select one watt out and turn your 104A into Ham radio's most sophisticated QRP rig. Transmitter circuitry features quad op-amp audio processing on both phone-patch and microphone inputs, filter sideband generation, crystal controlled heterodyne oscillators for maximum frequency stability, and a unique ALC system to eliminate distortion-producing overdrive. Most importantly, the SB-104A utilizes driver and PAs in a broadbanded no tune push-pull configuration, diode biasing to prevent PA thermal runaway, and power regulating control circuitry to prevent damage under high SWR operating conditions. You spend your time operating instead of tuning!



## SB-104 A Specifications

### GENERAL:

**Frequency Coverage:** 3.5 MHz through 29.7 MHz amateur bands, 15 MHz WWV receive only.

**Frequency Stability:** Less than 100 Hz/30 min. drift after 30-min. warmup; less than 100 Hz drift for  $\pm 10\%$  change in primary voltage.

**Readout Accuracy:** Within  $\pm 200$  Hz  $\pm 1$  count.

### TRANSMITTER:

**RF Power Output:** High Power (50-ohm non-reactive load). SSB: 100 watts PEP  $\pm 1$  dB; CW: 100 watts  $\pm 1$  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:**  $5\frac{3}{4}$ " H x  $14\frac{1}{32}$ " W x  $13\frac{7}{8}$ " D.

## in Amateur Radio Technology

For extra operating 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.

Add the matching SB-614 Station Monitor, SB-634 Five-Function Console, SB-604 Speaker, SB-644A Remote VFO and the SB-230 1 kW Conduction-Cooled Linear and your SB-104A becomes the center of your ultimate station — ready to give you years of great QSOs, exciting DX and all around performance! Operates from a charging 12 VDC auto electrical system or the HP-1144 Power Supply.

**Kit SB-104A**, Shpg. wt. 29 lbs. .... **699.95**  
**Kit SBA-104-1**, Noise Blanker, Shpg. wt. 1 lb. .... **29.95**  
**Kit SBA-104-3**, 400 Hz CW crystal filter, Shpg. wt. 1 lb. .... **42.95**  
**Kit SBA-104-2**, Mobile mount,  
 Shpg. wt. 6 lbs. .... **Was 39.95 Now 32.95**

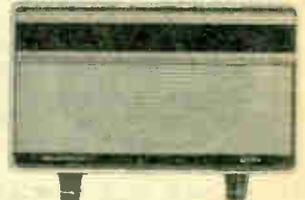
### SB-604 Station Speaker

Designed to match the SB-104A Transceiver. Cabinet is large enough to house the HP-1144 AC Power Supply, too. 5" x 7" oval speaker is response-tailored for SSB. Frequency response: 300-3000 Hz. Connector plug and cable are included. Dimensions:  $7\frac{1}{8}$ " H x  $10\frac{1}{8}$ " W x 14" D.

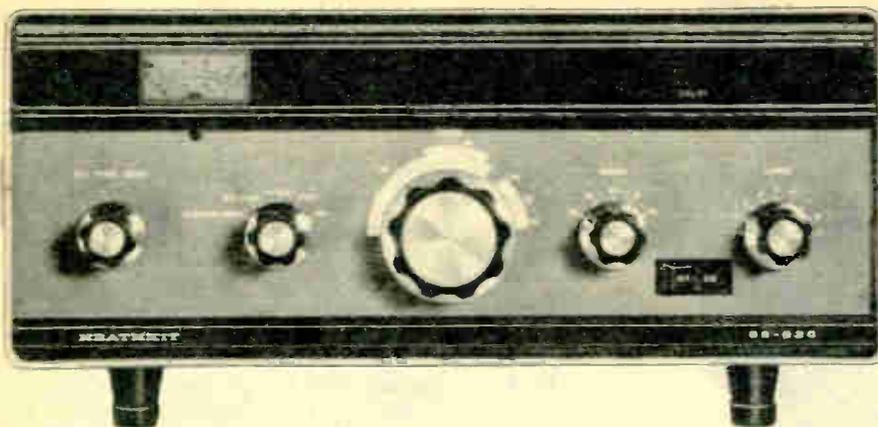
**Kit SB-604**, Shpg. wt. 8 lbs. ... **39.95**

### HP-1144 Fixed Station Power Supply

120 or 240 VAC operated supply provides 13.8 VDC required by SB-104A Transceiver. Full-wave bridge circuit has triple Darlington regulation with an IC which samples at the transceiver, compares and automatically maintains a fixed voltage — almost no change in voltage from no load to full load. Mounts inside SB-604 speaker cabinet.  
**Kit HP-1144**, Shpg. wt. 27 lbs. .... **99.95**



# Versatile Station Accessories for the 104's



## SB-230 1kW Conduction-Cooled Linear

The lowest cost conduction-cooled linear on the market. Uses a husky Eimac 8873 triode in proven, stable, grounded grid circuitry to deliver up to 1200 watts PEP SSB, 1000 watts CW input from less than 100 watts drive. It's also rated at 400 watts input for slow-scan TV and RTTY. And the final is completely en-

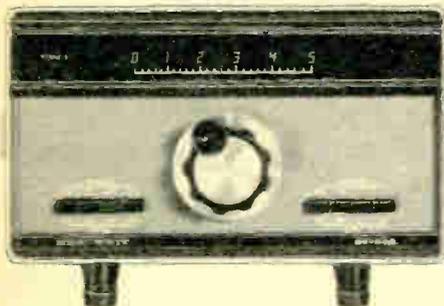
closed in a double-shielded compartment. Bandswitching is done with a single knob. . . . Load and Tune controls are clearly marked so you can return to a favorite operating frequency just by noting the control positions. A five-position switch, coupled with the back-lighted meter, indicates Relative Power, Plate

current, Grid current and plate High Voltage at a glance. Relative Power sensitivity is adjustable with the front panel knob.

Built-in safety features include microswitch interlocks on both the top and bottom to shut down primary power when cabinet shells are removed; a temperature monitored heat sink that shuts down the unit if temperature goes too high. Built-in delay circuit allows sufficient tube warmup. An Exciter light indicates the linear is running straight through, without amplification. The On-Off switch includes a circuit breaker for the primary side of the power transformer. And the cathode of the tube is fused.

Kit SB-230, Shpg. wt. 40 lbs. . . . . 469.95

**SB-230 SPECIFICATIONS:** Band Coverage: 80, 40, 20, 15 and 10 meter. Duty Cycle: SSB: continuous voice modulation; CW: continuous (max. key-down time 30 seconds); RTTY/SSTV: 50% (max. transmit time 10 minutes at 400 watts). Driving Power Required: less than 100 W. Third Order Distortion: -30 dB or better. Output Impedance: 50 ohms at 2:1 SWR max. Input Impedance: 52 ohms at 1.5:1 SWR max. Zero Signal Plate Current: 25 mA. Power Requirement: 120 VAC, 50/60 Hz, 14 A max. or 240 VAC, 50/60 Hz, 7 A max. Dimensions: 14 3/4" W x 16" D x 7" H. Net Weight: 33 1/2 lbs.

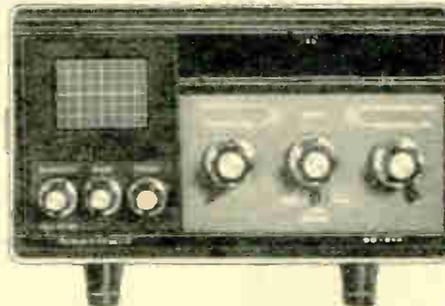


## SB-644A Remote VFO

Designed for use with the SB-104A. Provides split transmit/receive capability so necessary for "DX" and net operations. Multi-mode capability allows transceive operation with either the "644A" or the SB-104A. Use either of two crystal positions for fixed-frequency control. Use "644A" tuning scale for reference, exact frequency readout takes place in the SB-104A. Construction is a simple matter with just three printed circuit boards to assemble. And with rugged chassis construction, stability is insured. Makes your SB-104A even more versatile! Available March, 1978.

Kit SB-644A, Shpg. wt. 10 lbs. . . . . 134.95

**SB-644A SPECIFICATIONS:** Frequency Coverage: 5.0-5.5 MHz allowing 80, 40, 20, 15, 10 meter operation in the SB-104A. Frequency Stability: Less than 100 Hz drift per 30 min. after thirty minute warmup. Modes of Operation: Remote VFO Main VFO; Receive Remote/Transmit Main; Receive Main/Transmit Remote; Crystal frequencies (2) (crystals not supplied). Power Requirement: 11V and 13.6V at 500 mA supplied by SB-104A. Dimensions: 7 1/4" H x 10 1/4" W x 15 1/4" D. Net Weight: 6 1/2 lbs.



## SB-614 Station Monitor

Monitors transmitted SSB, CW, & AM signals up to 1 kW from 80-6 meters. Shows non-linearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration, parasitics and key clicks. Manual includes 40 CRT displays including: 21-transmit envelope patterns, 7-trapezoid patterns, 6-RTTY cross patterns (for proper shift, mark and space adjustment), and 6-CW patterns. Each set of displays includes informative explanations. Solid-state circuit, easy-to-build with a circuit board and wiring harness to simplify assembly.

Kit SB-614, Shpg. wt. 17 lbs. . . . . 169.95

**SB-614 SPECIFICATIONS:** RF SAMPLING SECTION: Power Limits: Exciter Input (50 -75 ohm) 10 to 340 watts; Antenna Input (50 -75 ohm) 10 to 1000 watts. Insertion Loss: Negligible. VERTICAL AMPLIFIER: Input Impedance: 1 Megohm shunted by 75 pf. Sensitivity: 60 mV rms/1/4" vertical deflection. Attenuator: 2-position; x1, 2 volts rms max. input; x10, 20 volts rms max. input. HORIZONTAL AMPLIFIER: Input Impedance: 1 Megohm shunted by 50 pf. Sensitivity: 50 mV rms/1/4" horizontal deflection. Power Requirement: 110-130 or 220-260 VAC, 60/50 Hz. DIMENSIONS: 7 1/4" H x 10 1/4" W x 15 1/4" D. Net Weight: 12 lbs.



## SB-634 Five-function Console

Adds real operating versatility to your station! Provides five of the necessary station functions every amateur needs. 24-hour digital clock; ten-minute ID timer; RF wattmeter with 200 or 2000 watt full scale ranges; SWR bridge with sensitivity control; phone patch that can be used manually or with VOX control. Wattmeter impedance is a nominal 50 ohms and Insertion loss is negligible. The phone patch provides at least 30 dB isolation between transmit and receive circuits. Input impedance is 600 Ω. Matches 3-16 Ω receiver outputs, and 600 Ω or hi-Z transmitter input.

Kit SB-634, Shpg. wt. 13 lbs. . . . . 199.95

**SB-634 SPECIFICATIONS:** CLOCK - Display: Six digits. Time Base: 24 hours. TIMER - Display: Three full digits. Time Interval: 10 minutes with automatic reset. Manual reset at any portion of 10-minute period. Signal: Visual only or both visual and aural. RF POWER/SWR METER - Frequency Range: 1.8 to 30 MHz. Wattmeter Accuracy: ±10% of full-scale reading. Power Handling Capability: 2000 watts (maximum). SWR Sensitivity: Less than 10 watts. Impedance: 50 ohm nominal. Connectors: UHF type SO-239. Power Requirement: 120/240 VAC, 60/50 Hz, 15 watts. DIMENSIONS: 7 1/4" H x 10 1/4" W x 15 1/4" D. Net Weight: 10 lbs.

# Heathkit Linears—Packed with Power and Features

The Heathkit SB-200 has a 1 kW kick that's great for SSB

**\$389<sup>95</sup>**



Put full 2 kW power in your station with the Heathkit SB-220

**\$499<sup>95</sup>**

## Heathkit SB-200 1 kW Linear Amplifier

- Complete 80 through 10 meter band coverage
- Fully shielded, fan-cooled amplifier compartment
- Circuit-breaker power supply protection

Delivers a full 1200 watts PEP input, 1 kW on CW. Requires only 100 watts drive, so it's ideal for use with most any popular transmitter or transceiver. And the SB-200 has the features you need for top performance.

The heavy-duty final amplifier tubes are fan-cooled for maximum tube life and completely shielded for excellent TVI protection. A pre-tuned cathode-input circuit provides maximum efficiency and low distortion. The ALC output provides automatic exciter control.

Has a built-in solid-state power supply with circuit breaker protection. The switchable front panel meter shows SWR, grid current, plate current, relative power and plate voltage. For extra operating convenience, an antenna relay automatically switches the antenna to the exciter input when the SB-200 is "off".

The sturdy yet lightweight construction of the SB-200 is achieved by using a heavy-gauge one-piece aluminum chassis that is partitioned for extra strength and isolation of components. The SB-200's clean, open chassis layout assures easy assembly.

Kit SB-200, Shpg. wt. 45 lbs. .... 389.95

**SB-200 SPECIFICATIONS:** Band coverage: 80, 40, 20, 15 & 10 meters. Maximum power input: 1200 watts P.E.P. SSB, 1000 watts CW. Driving power required: 100 watts. Duty cycle: SSB, continuous voice modulation; CW, 50% (key down time not to exceed 5 min.). Third order distortion: -30 db or better at 1000 watts P.E.P. Output impedance: 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. Input impedance: 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. Meter functions: 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. Front panel controls: Load; Tune; Band; Relative Power Sensitivity; Meter Switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. Tube complement: Two 572B/T-160-L (in parallel). Power requirement: 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.). Cabinet size: 14 1/2" W x 6 1/2" H x 13 1/2" D. Net weight: 35 lbs.

## Heathkit SB-220 2 kW Linear Amplifier

- High-efficiency pre-tuned broadband pi-input
- Zener-diode regulated power supply
- Front-panel current and voltage meters

The one that's making Amateur Radio history because it offers more features and performance for the price! Uses a pair of conservatively-rated Eimac 3-500Z's to deliver up to 2000 watts PEP SSB input. It can be loaded to a full 1 kW on both CW and RTTY. A broadband pre-tuned pi-input delivers maximum efficiency with low distortion over the complete 80-10 meter bands. And it requires just 100 watts drive!

Tune-up couldn't be easier! Just set the band-switch, set the CW-tune/SSB rocker switch to CW-tune position, adjust tune and load controls for maximum relative power. Push the switch back to SSB and you're "on" with up to a full 2 kW input! And you've got up to a full 1000 watts on CW or RTTY.

The power supply can be wired for 120 or 240 volts. Zener diode regulated operating bias reduces idling current for cooler running and extended tube life. There's built-in circuit breaker protection and a large, quiet-running fan. Other features include ALC to prevent overdriving, front-panel switch-selected monitoring of grid current, relative power and high voltage. Kit assembly is easy and enjoyable, too.

Kit SB-220, Shpg. wt. 64 lbs. .... 499.95

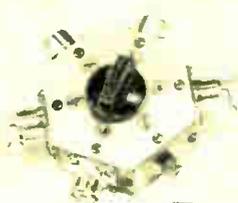
**SB-220 SPECIFICATIONS:** Band coverage: 80, 40, 20, 15 and 10 meters. Driving power: 100 W. Max. power input: SSB, 2000 W. PEP; CW, 1000 W.; RTTY, 1000 W. Duty cycle: SSB, Continuous voice modulation. CW, Continuous (maximum key-down 10 minutes). RTTY, 50% (maximum transmit time 10 minutes). Third order distortion: -30 dB or better. Input impedance: 52 ohm unbalanced. Output impedance: 50 ohm unbalanced; SWR 2:1 or less. Front panel controls: Tune, Load, Band, Sensitivity Meter Switch, Power, CW/Tune - SSB, Plate meter, Multi-meter (Grid mA, Relative Power and High Voltage). Rear panel: Line cord, circuit breakers (two 10 A). Antenna Relay (phono). ALC (phono). RF input (SO-239). Ground post. RF Output (SO-239). Tubes: Two Eimac 3-500Z. Power requirement: 120 VAC, 50/60 Hz at 20 amp. max. 240 VAC, 50/60 Hz, at 10 amp. max. Cabinet size: 8 1/4" H x 14 1/2" W x 14 1/2" D.



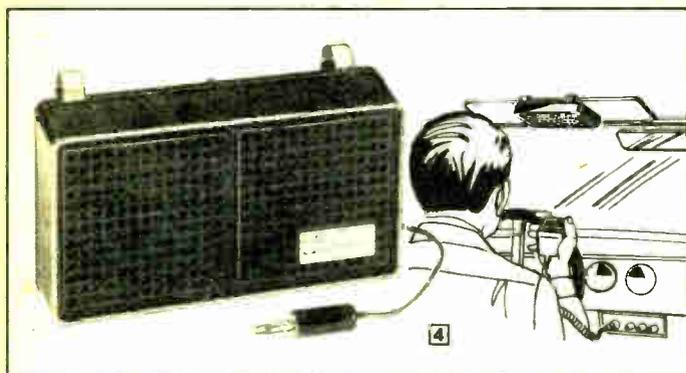
1



3



2



4

### 1 Heathkit Hybrid Phone Patch

Add the versatility of phone patch capability to your shack with Heath's HD-15. Individual receiver/transmitter line gain controls simplify adjustment and the HD-15's VU meter continuously monitors the unit's output. Interfacing with your system is a simple matter. Matches 3-16 ohm speakers and hi-Z or 600 ohm inputs. VOX or PTT operation. 2 $\frac{5}{8}$ " H x 9 $\frac{1}{4}$ " W x 3 $\frac{5}{8}$ " D.

Kit HD-15, Shpg. wt. 3 lbs. .... 39.95

### 2 Multiple Antenna Coax Switch

Heath's HD-1234 coax switch is the ideal termination for your "antenna farm". Switches up to 4 different antennas or use it to interconnect various pieces of gear around the shack. The HD-1234 handles RF up to 2 kW PEP, grounds all outputs not in use, and has an effective operating range to 250 MHz. Insertion losses are negligible and construction is simple and rugged.

Kit HD-1234, Shpg. wt. 1 lb. .... 11.95

### 3 Heathkit Mobile Speaker for improved audio

If you're going mobile or just want to add another speaker to the shack, the HS-24 is what you need. The unit features a 4" x 6" oval speaker and its 200 to 2000 Hz response is tailored for perfect speech reproduction. Voice coil impedance is 8 ohms and the 19 gauge steel cabinet will give you years of rugged performance. Includes gimbal mount. 6 $\frac{1}{2}$ " W x 4 $\frac{3}{4}$ " x 2 $\frac{1}{2}$ " D.

Kit HS-24, Shpg. wt. 4 lbs. .... 16.95

### 4 HDP-1228 Portable Twin Speaker

The HDP-1228 plugs directly into the external speaker jack of most transceivers, tape players, etc. It's ideal for visor mounting to overcome road and traffic noise, and it can be quickly unplugged and removed from the vehicle for theft protection. Constructed of tough, lightweight plastic, the HDP-1228 is a worthwhile addition to your vehicle's communications setup. Impedance, 16 ohms. 5 $\frac{3}{4}$ " W x 3 $\frac{1}{4}$ " H x 1 $\frac{1}{4}$ " D. Fully assembled.

HDP-1228, Shpg. wt. 1 lb. .... 9.95

### 5 Heath's Original "Cantenna"

It's the one accessory you can't do without! Use the "Cantenna" to avoid unnecessary interference during tune ups or install it on your bench. It's the ideal load for transmitter maintenance and alignment, and it's light enough for easy field portability. Handles up to 1 Kw of RF with VSWRs of less than 1.5:1 to 300 MHz and less than 2:1 to 400 MHz. 50 ohm impedance. Oil filled (oil not included).

Kit HN-31, Shpg. wt. 3 lbs. .... 16.95

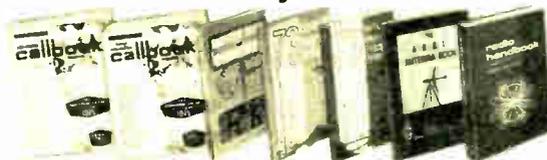


Only  
\$16<sup>95</sup>

5

The Heath  
"Cantenna"  
...It's the  
only dummy  
load you'll  
ever need!

### Excellent Books for your Amateur library



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73 Vertical, Beam and Triangle Antennas. EDP-181	5.50
ARRL Antenna Handbook. EDP-182	5.00
Radio Handbook. Offers comprehensive coverage of radio theory and operation. EDP-117	19.50

# Put it Together with Accessories from Heath

## Heathkit solid-state Dip Meter delivers more performance at big savings

Another Heath value triumph — a better dip meter at lower cost. The Colpitts oscillator covers 1.6 to 250 MHz in fundamentals with a MOS-FET 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  $\mu$ A meter movement for positive resonance indications. It includes a phone jack for modulation monitoring. It's smaller and lighter than others, too. Completely portable. 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. 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. Build it in one evening. Nearly everything mounts on two circuit boards. And when you finish, you'll have the bet dip meter around — for a lot less money.

Kit HD-1250, less battery, Shpg. wt. 3 lbs. .... 69.95

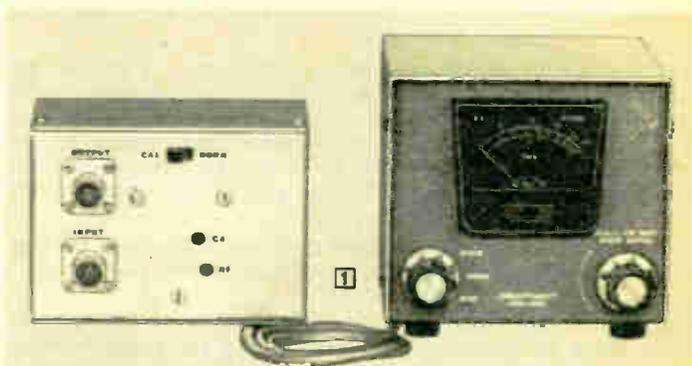


## 1 Heath HM-102 HF Wattmeter/SWR Bridge

This rugged in-line Wattmeter/SWR Bridge features dual power/SWR scales, easy calibration, and extra long interconnect cable to allow you to position the meter up to six feet from the detector/bridge. 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. .... 39.95

HM-102 SPECIFICATIONS: Frequency Range: 1.8 to 30 MHz. Wattmeter Accuracy:  $\pm 10\%$  of full-scale reading. Power Capability: 10 to 2000 watts. SWR Sensitivity: Less than 10 watts. Impedance: 50 ohm nominal. Connectors: UHF type SO-239. Dimensions:  $5\frac{3}{8}$ " H x  $2\frac{1}{4}$ " W x  $6\frac{1}{2}$ " D.



## 2 HM-2102 VHF Wattmeter/SWR Bridge

Features 6 or 2 meter operation, dual power/SWR scales and easy construction and calibration. Handles power to 250 watts and has nominal 50 ohm impedance.

Kit HM-2102, Shpg. wt. 4 lbs. .... 39.95

HM-2102 SPECIFICATIONS: Frequency Range: 50 MHz to 160 MHz. Wattmeter Accuracy:  $\pm 10\%$  of full-scale. \* Power Capability: To 250 W. SWR Sensitivity: Less than 10 W. Impedance: 50 ohms nominal. Connectors: UHF type SO-239. Dimensions:  $5\frac{1}{4}$ " W,  $5\frac{3}{4}$ " H and  $6\frac{1}{2}$ " D. \*Using a 50 $\Omega$  noninductive load.



## 3 Fully assembled Heathkit Desk Mike

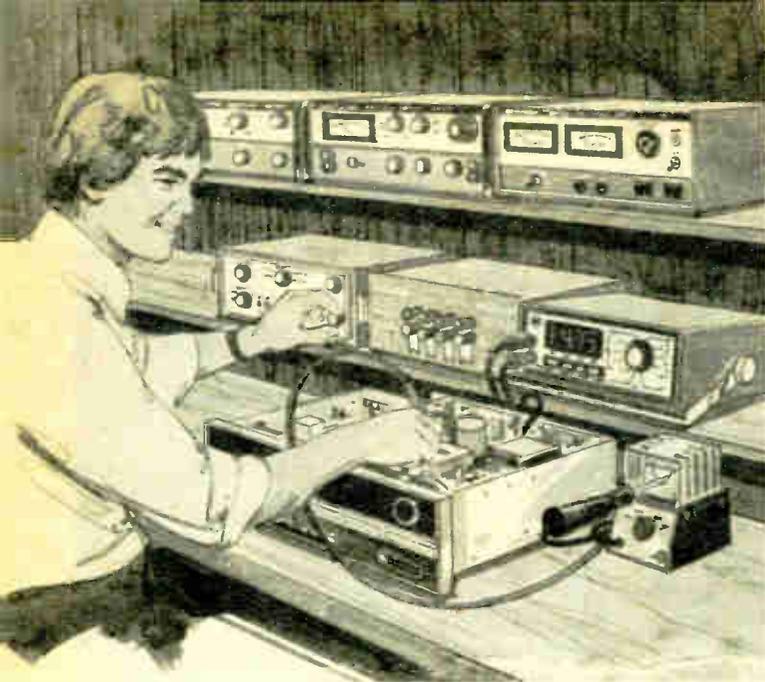
The Heath desk mike adds the professional touch to your station's operation. This Hi-Z dynamic microphone features 70-10,000 Hz response, VOX and grip-to-talk operation, and its rugged die-cast case, finished in grey and satin chrome, makes the HDP-121A the centerpiece at any operating position. Includes cables.

HDP-121A, Shpg. wt. 4 lbs. .... 44.95

## 4 Fully assembled Heathkit Mobile PTT Mike

For QSOs on the road you can't beat the GH-12A hand-held from Heath! The mike features a high impedance piezo-ceramic element, with 100 to 5000 Hz response, that's tailored for single sideband operation. Can be wired for PTT or both PTT and VOX operation. Comes complete with cable and mounting clip. Connector not included.

GH-12A, Shpg. wt. 1 lb. .... 13.95



Ask any service professional and he'll tell you... good test gear costs money. And the cost to equip today's up-to-date service operation? It can be astronomical! That's why we think it makes more and more sense to turn to Heath. Whether your business is Television, Audio, or Two-Way repair the story's the same. Heath makes the high performance instrumentation you need at prices you can really afford!

Our prices are low and we've kept them that way. Yet at the same time we've maintained the high standards of quality you've come to depend on.

Each kit you assemble represents thoughtful, proven design applications that are precision engineered to give you a test instrument that's both practical and precisely tailored to the critical needs of your electronics environment. That's why when it comes to reliability... you won't find better!

## Heath Test Equipment... The Best Performance For Your Dollar

We think that Heathkit test equipment makes good sense. And you should too! You've come to expect the best from Heath and over the years we've built quite a reputation for meeting your demands.

On the following pages you'll find a full line of test equipment. Everything from simple analog VOMs to sophisticated digital counters and all in a wide choice of functions and specifications that let you tailor your selections to the needs of your bench.

On pages 68 through 71 is a varied selection of oscilloscopes and accessories. For the service tech and hobbyist there are DC-5 MHz oscilloscopes ideal for audio and television servicing. And for the professional, the top-of-the-line, dual-trace DC-15 MHz IO-4510 will meet your needs.

If your requirements include a digital counter pages 72 and 73 offer the choice of the IM/SM-4100, good to 30 MHz, the IM/SM-4110 (110 MHz range), IM/SM-4120 (250 MHz range) or our high performance IM/SM-4130 with its incredible 1 GHz range!

For those beginning in electronics, or organizing your first bench, page 86 contains a full description of our new, economical, 5280 series of starter instrumentation. And for the service professional pages 84 and 85 offer CRT rejuvenators, Color and Dot Bar Generators, and a Post Marker/Sweep generator.

Looking further you'll find VTVM's, scope-calibrators, audio servicing gear, curve-tracers, bridges, accessories, and much more. It's the test equipment you've asked for with the performance to fit your needs, at prices you can afford.

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Complete descriptions, specifications and prices for many high performance assembled instruments: frequency counters, oscilloscopes, power supplies, function generators, TV and audio service equipment, multimeters, chart recorders, more.

See how easy it is to get more instrument value per dollar!



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Special savings on different  
products 52 times a year.

(products and/or prices  
may not be the same at all stores)

## IG-1275 Deluxe Lin/Log Swept Function Generator

**\$339<sup>95</sup>**

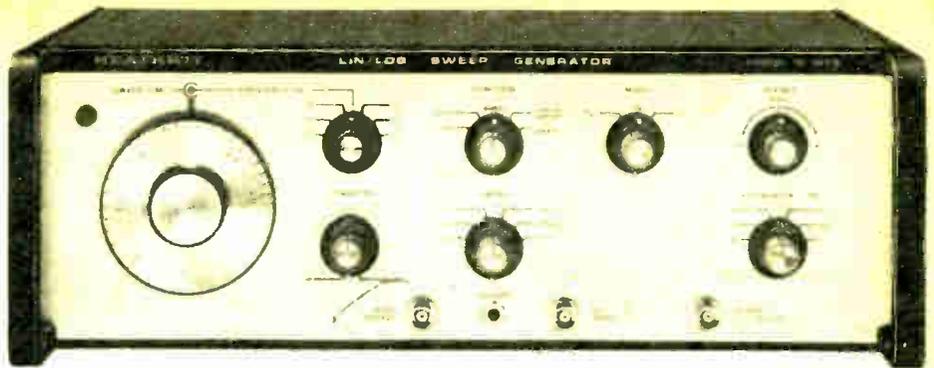
- Sine, square and triangle outputs
- CW, burst, linear and log sweeps
- Variable symmetry, variable offset, VCG input

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. Also has pen lift and chart control signals for use with Heath chart recorders and others. Six operational modes; Continuous output (CW); gated CW; a burst mode that completes a variable integral number of output cycles; linear and log sweeps for a 1000:1 sweep range. Stop and start frequencies are set independently; sweep modes can also be triggered externally providing one sweep for each trigger, and stops for an integral number of cycles. Other features include: A 50 dB switch attenuator variable between ranges; adjustable symmetry from 5% to 95%; analog, sweep and sweep gate outputs for convenient system control.

Kit IG-1275, Shpg. wt. 16 lbs. .... **339.95**

Factory assembled and tested version of above:

SG-1275, Shpg. wt. 16 lbs. .... **550.00**



## IG-1273 Function Generator

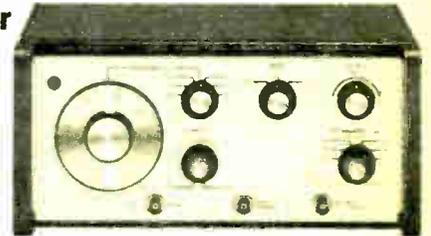
- Offers top performance at a budget price

Has the same fine features and specifications of the IG-1275 above, but does not offer swept-function capability.

Kit IG-1273,  
Shpg. wt. 12 lbs. . . **239.95**

Factory assembled and tested version of above:

Kit SG-1273, Shpg. wt. 14 lbs. .... **395.00**



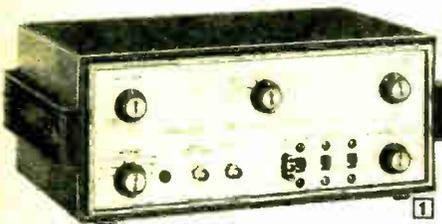
**IG/SG-1275 SPECIFICATIONS:** Output: 50-ohm source — short circuit protected.  $\pm 10$  volts open circuit.  $\pm 5$  volts into 50-ohm load. Output Flatness:  $\pm 0.1$  dB to 300 kHz.  $\pm 0.5$  dB to 3 MHz. Output Waveforms: Sine — Triangle — Square. Symmetry continuously variable 5% through 95% to 300 kHz. Frequency: 0.003 Hz through 3 MHz in 6 range steps on primary decade. Sine Distortion: Less than 1%.  $\times 10^1$ . Less than 0.5%,  $\times 10^2$ ,  $10^3$ ,  $10^4$ . Less than 0.75%,  $\times 10^2$ . Harmonics 30 dB down  $\times 10^4$ . Triangle Linearity: No deviation greater than 1% to 300 kHz\*. Square-Wave Rise and Fall: Less than 60 nS. Dial Accuracy:  $\pm 3\%$  of full scale. Attenuator: 0 to  $-50$  dB in 10 dB steps. Variable control 0 to  $-20$  dB. DC Offset: Signal plus offset, limited to  $\pm 10$  volts open circuit or  $\pm 5$  volts into 50-ohm load. Time Symmetry: Within 1% of full period through 300 kHz\*. Sweep Generator: 6 ranges, 10  $\mu$ s through 100 sec. Each range may be extended by 100 with the variable control. Sweep Output: Supplies 0 to 4.5-volt linear ramp at sweep generator rate from a 1000-ohm source. Sweep Gate Output Connector: Supplies high TTL level for duration of sweep or burst. Analog Out-

put Connector: Supplies 0 to 6 volts DC for 3 decade span. Less than 100-ohm source. Sync Output Connector: Supplies 1.5-volt (minimum) peak-to-peak signal from a 50-ohm source. Voltage Control Input Connector (VCO): 0 to  $\pm 5$  volts signal for a 3-decade span. 8 k $\Omega$  input impedance. External Trigger Input Connector:  $\pm$  (250 mV to 4 volts) with 10 k $\Omega$ . Triggers on positive slope. Operating Temperature: 0° to 40° C ambient. Power Requirements: 100 to 135 volts, 50–60 Hz, 20 watts maximum. Switch selectable for normal or low line. (200 to 270 volts, 50–60 Hz, switch selectable.) Fuse Requirements:  $\frac{3}{4}$ -ampere, slow-blow, 120/240 VAC operation. Dimensions: 15" wide, 11 $\frac{1}{2}$ " deep, 5 $\frac{3}{8}$ " high. 38.1 cm wide, 30.2 cm deep, 13.7 cm high.)

\*Applicable only on top decade of each frequency range.

\*NOTE: All specifications except those for swept functions also apply to IG/SG-1273 above.

The IG-1275 and IG-1273 require a triggered sweep oscilloscope for calibration.



**1 Stereo Generator** — Provides audio or composite stereo signal for multiplex adapter adjustments... RF carrier modulated by these signals for tuner & receiver adjustments... phase test function for subcarrier transformer adjustment... a variable level crystal-controlled 19 kHz pilot signal for checking receiver lock-in ranges... plus built-in sweep and marker signals for RF & IF alignment. With test leads.

Kit IG-5237. Shpg. wt. 11 lbs. .... **104.95**

**IG-5237 SPECIFICATIONS:** RF Signal frequency: 100 MHz adjustable by approx.  $\pm 2$  MHz. Pilot modulating frequency: 10 kHz  $\pm 2$  Hz. FM modulation: Left channel (stereo), right channel (stereo), Phase Test (left plus right channel in phase). Monophonic FM. Deviation: Adjustable to 75 kHz. Sweep rate: (used for RF and IF alignment) 60 Hz. Power requirement: 120/240 VAC, 50/60 Hz, 35 W. Dimensions: 5 $\frac{1}{2}$ " H x 13 $\frac{1}{2}$ " W x 9" D.

**2 Function Generator** — Generates highly accurate sine, square or triangle waveforms. 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 for each step for a total of 70 dB. A triggered oscil-

loscope is needed for calibration.

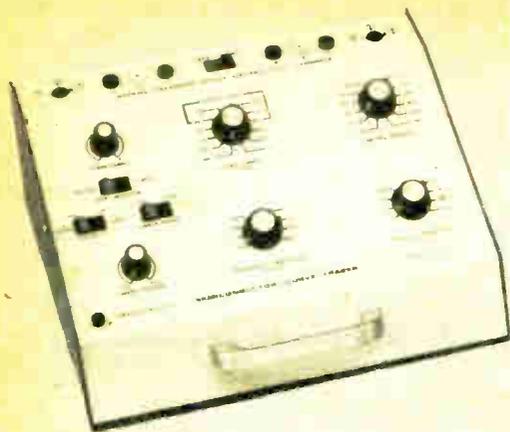
Kit IG-1271, Shpg. wt. 7 lbs. .... **119.95**

**Assembled SG-1271**, wired version of the IG-1271 in same attractive blue & white styling (not shown), Shpg. wt. 7 lbs. .... **195.00**

**IG-1271 SPECIFICATIONS:** Frequency accuracy:  $\pm 3\%$  of full scale on dial. Functions: Triangle waveform: Nonlinearity, 5% maximum. Symmetry within 10% of 50% duty cycle. Square waveform: 100 nanosecond maximum rise or fall time. Sine waveform: Harmonic distortion: 3% max., 5 Hz to 100 kHz. Power requirement: 135-130 volts or 210-260 volts, rms, 60/50 Hz, 15 watts max. Dimensions: 3" H x 7 $\frac{1}{4}$ " W x 8 $\frac{3}{8}$ " D (with handle removed). Net weight: 4.2 lbs.

**3 Precision RF Generator** — The IG-42 provides 100 kHz to 30 MHz signals with  $\pm 3\%$  adjustable frequency calibration. RF output voltage adjusts from 5 to 100,000  $\mu$ V in five attenuated steps, with 10:1 variable attenuation. Output can be modulated from 0-50% with 5% accuracy. 120/240 VAC, 60/50 Hz. 8 $\frac{1}{2}$ " H x 13" W x 7" D.

Kit IG-42, Shpg. wt. 15 lbs. .... **119.95**



## The only way to check semiconductor parameters is with your scope and this IT-3121 Curve Tracer

- Test bipolar transistors, diodes, SCR's, FET's, etc.
- Ideal for selecting specific devices for circuit design

Take the guesswork out of semiconductor testing with the Heathkit IT-3121 Curve Tracer. An invaluable tool for the designer, technician or the serious electronic hobbyist. Just connect the IT-3121 to any oscilloscope with horizontal sensitivity of 0.5 V/div. and vertical sensitivity of 1 V/div. and get an accurate display of operating parameters for virtually any discrete semiconductor. Devices such as bipolar transistors, diodes, SCRs, triacs, FETs, etc. can be inspected or tested for specific applications. Plug-in cables are supplied for fast, easy scope hookup. A calibration switch permits fast and accurate scope calibration. You can display fundamental parameters such as gain (beta), leakage, breakdown voltage, saturation, forward conduction voltage, output admittance, linearity, capacitance effects, temperature effects and others (see insets for typical displays). The extensive manual included in each kit tells how to interpret each display.

Kit IT-3121, Shpg. wt. 11 lbs. . . . . 109.95



**IT-3121 SPECIFICATIONS:** Sweep Voltage Ranges: 0-40 volts at 1 ampere max. 0-200 volts at 200 mA max. Sweep Voltage Sampling: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20 and 50 V/div.  $\pm 3\%$ . Sweep Current Sampling: 0.5, 1, 2, 5, 10, 50, 100 and 200 mA/div.  $\pm 5\%$ . Step Currents: 0.002, 0.005, 0.01, 0.02, 0.1, 0.2, 2, 5, and 10 mA/step,  $\pm 3\%$ ,  $\pm 250$  mA offset current max. Step Voltages: 0.05, 0.1, 0.2, 0.5, and 1 volt/step,  $+3\%$ ,  $\pm 5\%$  mA maximum offset voltage. Oscilloscope Requirements: Bandwidth to 20 kHz or greater. (DC-coupled oscilloscope is recommended). Power Requirement: 110 to 130 or 220 to 260 VAC. Dimensions: 4 1/2" H x 11 1/4" W x 10" D.



### 1 Add dual trace function to your oscilloscope

Gives any single beam scope with external trigger input dual-trace versatility. Simultaneous display of two separate input signals.

Kit ID-4101, Shpg. wt. 5 lbs. . . . . 49.95

**ID-4101 SPECIFICATIONS:** Signal Gain:  $>10$  times. Maximum input signal: 600 VDC or 600 VAC p-p. Input impedance: 1 megohm/50 pF. Maximum signal output: 8 V p-p. Output loading: 1000 ohm minimum. Power requirement: 120/240 V, 60/50 Hz, 6 W. Dimensions: 4 1/4" H x 10 3/4" W x 5 1/4" D.

### 2 Low-priced scope calibrator

Crystal controlled time base for scope calibration. Generates a square wave output in ranges from 1 kHz to 1 MHz. Output is at TTL levels and the 1 kHz output is adjustable from 0 to 4.7 V/pk. Requires 6 volt power supply.

Kit IOA-4510-1, Shpg. wt. 1 lb. . . . . 18.95  
68



### 3 Deluxe scope calibrator

The IG-4505 is a practical oscilloscope calibrator at a sensible price. It provides all the waveforms necessary for complete and accurate oscilloscope calibration. Good for scopes with up to 35 MHz bandwidths. An excellent value for the bench.

Kit IG-4505, Shpg. wt. 4 lbs. . . . . 49.95

**IG-4505 SPECIFICATIONS: TIME CALIBRATION:** Range: 0.5 sec. to 1  $\mu$ s square wave accurate to within 0.01%. Amplitude:  $\approx 200$  mV peak. Output: 50 ohms terminated cable. **VOLTAGE CALIBRATION:** Ranges: 1 mV to 100 V peak square wave. Accuracy: To within 2% with 1M $\Omega$  load referenced to 1 V position. Rise Time:  $\leq 2$   $\mu$ s. Frequency: DC, 2 Hz to 10 kHz. Power Requirement: 120-240 Volts AC, 60/50 Hz, 12 watts.

## Engineering Notes: (Oscilloscopes)

### Risetime: What it means

Risetime simply defined is the time necessary for a waveform to transit between 10% of its maximum voltage and 90% of its maximum voltage. While sounding somewhat complicated this value is simply determined, on a square wave for example, by connecting a fast rise square wave generator to an oscilloscope input, adjusting for a stable display (5-8 divisions in amplitude), and calibrating the scope's time base such that the full transition (minimum to maximum amplitude), or sloped portion of the squarewave may easily be seen. Once this procedure is accomplished measurements are taken and actual risetime is then calculated. For example, if our squarewave was adjusted to be 5 cm in amplitude, the transit time over the center 4 cm of the display would be the risetime.

It would seem reasonable to assume that risetime, or the measure of how fast an oscilloscope's circuits can react, would be related to its bandwidth. And indeed we find there is a definite relationship between the two. This relationship, expressed as a constant equal to risetime multiplied by the bandwidth, should have a value in the vicinity of 0.35. This constant represents the best trade off between risetime and overshoot. Keeping the above in mind, we therefore determine that an 10 MHz scope should have a risetime of about 35 ns, a 15 MHz scope about 24 ns and so on.

Now that we understand the risetime specification, let's investigate the errors that an oscilloscope can introduce when measuring risetimes of a circuit under test.

For example, let's say that we are measuring the risetime of a squarewave generator with a 24 ns risetime scope. Upon application we find that the displayed risetime is 31 ns. However, the correct value for the generator's risetime is yet to be determined. To make this computation we must take into account the scope's risetime and therefore we employ the following square root of sums of squares equation.

$$T_{rd} = \sqrt{T_{rg}^2 + T_{rs}^2}$$

In this example,  $T_{rd}$  is the displayed risetime,  $T_{rg}$  is the generator's risetime, and  $T_{rs}$  is the scope's risetime. Solving for  $T_{rg}$ :

$$T_{rg} = \sqrt{T_{rd}^2 - T_{rs}^2} = \sqrt{31^2 - 24^2} = 19.6 \text{ ns}$$

The results of this calculation clearly show that risetimes do not simply add together. And that for accuracy of measurement the scope's risetime must be taken into account when the unknown risetime approaches that of the scope's. In order to neglect the above formula your oscilloscope's risetime must be one third that of the unknown (for 5% accuracy) and one fifth (120 ns with a 24 ns scope) for measurements to within 2% accuracy.

In conclusion, the oscilloscope's risetime specification is an important one. It must be taken into account when measuring unknowns which approach the risetime of the measuring oscilloscope and may only be neglected when the unknown is five or more times that of the scope's risetime value.



## Heath has the VALUES in Oscilloscopes

**\$139<sup>95</sup>**

**The lowest priced auto-triggering oscilloscope anywhere! DC-5 MHz, 100 mV sensitivity**

Now you can have the most universal of all test instruments on your bench — the oscilloscope. The 4560's ability to display many types of voltage waveforms permits study of complex signals, such as those found in audio devices, television receivers, transmitters and other electronic equipment. It's ideal for service techs and hobbyists.

Operation couldn't be easier. In addition to the power switch, there are only nine switches and controls, for correct operation — even the first time. The large 8 x 10 cm screen makes for easy waveform measurements.

Auto-triggering provides automatic, positive locking of the displayed waveform. A stable display is assured for any frequency up to the full 5 MHz bandwidth. The uncalibrated sweep speed control provides continuous adjustment from 20 ms/cm to 0.2  $\mu$ s/cm.

The DC to 5 MHz vertical bandwidth is more than adequate for general design and service work. Maximum vertical sensitivity is 100 mV with a front panel switch for X1, X10 and X100 attenuation, AC or DC. Vertical input impedance is 1 megohm for low circuit loading. Up to 400 VDC can be applied directly without circuit damage, making it a great scope for student use. For phase and frequency measurements, an external horizontal input can be applied directly through the front panel input jack. It has 0.25 V/cm sensitivity with DC to 100 kHz bandwidth. Display stability is excellent because the low voltage supplies for the amplifiers and sweep circuit are zener regulated. The primary circuit of the power transformer is fused for protection from overload.

Easy assembly and operation, reliable, accurate performance, and low price make the IO-4560 the best instrument buy in years.

Kit IO-4560, Shpg. wt. 19 lbs. **139.95**

IO-4560 SPECIFICATIONS: VERTICAL CHANNEL: Input Impedance: 1 megohm. Sensitivity: 100 mV/cm. Maximum Input Voltage: 400 volts DC. Frequency Response: DC to 5 MHz  $\pm$ 3 dB. Attenuator: X1, X10, X100, AC or DC. HORIZONTAL CHANNEL: Input Impedance: 100 k $\Omega$ . Sensitivity: 0.25 volt/cm (uncalibrated). Frequency Response: DC to 100 kHz. TIME BASE: Sweep: 20 ms to 0.2  $\mu$ s/cm (uncalibrated). Trigger Mode: Automatic. GENERAL: CRT: 5DEP31F, 8 x 10 cm viewing area. Blue-green, medium persistence phosphor. 5" round, flat-face tube. Graticule: 8 x 10 cm. Power Requirements: 110-130 or 220-260 VAC. 60/50 Hz 35 watts. Dimensions: 8" H x 13" W x 17" D.

**\$199<sup>95</sup>**

**DC to 5 MHz Oscilloscope with complete triggering controls including TV coupling**

The Heathkit IO-4541 is a triggered scope with controls and features that are not found in other scopes in this price range. A stable triggering circuit is used for solid waveform displays (not the recurrent type sweep generator normally used in other scopes). Trigger controls include selection of normal or automatic modes, switch controlled AC or DC coupling and front panel input of external triggering signals. All front panel trigger controls are clearly labeled for "no mistake" operation. A special TV position on the trigger selector control allows for low frequencies to pass while rejecting the high frequencies, so the 4541 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  $\mu$ s/cm can be selected by the time/cm switch. A variable control provides for settings between steps. The horizontal amplifier will accept external inputs from DC to 100 kHz.

Vertical input sensitivity of 20 mV/cm and nine calibrated vertical attenuator positions, up to 10 V/cm, will accommodate a broad range of input signals. A variable gain control gives precise control between settings.

Both vertical amplifier and horizontal sweep circuit power supplies are regulated to provide stable voltages to all circuits under varying line voltage conditions. Partial mu-metal shielding helps reduce display error. Accurate measurements are easily made from the bright 8 x 10 cm screen.

Kit IO-4541, Shpg. wt. 23 lbs. **199.95**

Factory assembled and calibrated version of above.

SO-4541, Shpg. wt. 19 lbs. **350.00**

IO-4541 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz  $\pm$ 3 dB. Attenuator: 1, 2, 5 sequence, calibrated and variable. Rise Time: 70 ns. Overshoot: 5% at 1 kHz. Impedance: 1 M $\Omega$ /38 pF. Sensitivity: 20 mV/cm. SWEEP: Type: Triggered. Range: 200 ms to 0.2  $\mu$ s/cm, 7 steps plus variable. Trigger Source: Int/Ext/Line. Trigger Modes: AC/DC/TV; +/— Slope; Auto/Norm. HORIZONTAL: Sensitivity: .25 V/cm. Bandwidth: DC to 100 kHz. Impedance: 1 M $\Omega$ /50 pF. Ext. Horiz. Input: X1 and X10 attenuator. GENERAL: CRT: 5DEP31F, 8 x 10 cm, green, medium-persistence phosphor, 5" round, flat-face tube. Accelerating Potential: Approx. 1.5 kV. Graticule: Painted, 8 x 10 cm. Power Requirements: 110-130 VAC or 220-260 VAC, 50/60 Hz, 35 watts. Dimensions: 8" H x 13" W x 17" D.



**8 EVENING KIT**  
Fast, Easy Assembly

## Professional quality 10 MHz single trace scope offers outstanding features at a low price

**\$319<sup>95</sup>**

- Brighter trace for easier-to-see displays
- TV trigger position
- Fully regulated power supplies

Heath puts together engineering and solid state technology to come up with an unparalleled price/performance value, the IO-4555. This scope offers the features and performance that both the professional and hobbyist can appreciate and its 10 MHz bandwidth makes the IO-4555 ideal for applications in audio, digital and television servicing. Features include X-Y capability with matched X-Y attenuation, extra-bright trace, 11 step vertical and 19 position horizontal attenuators. Vertical sensitivity may be varied in calibrated, 1-2-5 sequence from 10 mV to 20 V/cm or continuously varied, between steps, to approximately 60 volts per centimeter. Horizontal time bases may be selected in calibrated 1-2-5 sequence from 0.2 sec/cm to 0.2  $\mu$ s/cm and the X5 magnifier makes it a simple matter to observe enlarged portions of displayed waveforms. AC, DC, and TV trigger modes make application of the IO-4555 to any test configuration a simple matter. Kit construction is straightforward, with circuit boards and wiring harnesses to simplify assembly, and Heath's performance engineered solid state circuitry insures years of trouble free performance. Put the IO-4555 on your bench today. Calibration requires a precise source of square waves such as IOA-4510-1 (with additional 6 volt power source) or IG-4505 on page 68.

**Kit IO-4555, Shpg. wt. 29 lbs. . . . . \$319.95**

**IO-4555 SPECIFICATIONS:** VERTICAL: Sensitivity: 10 mV/cm to 20 V/cm. Attenuator: 11 steps in 1-2-5 sequence. Variable attenuator: Continuous between steps to approximately 60 V/cm. Accuracy: Within 3% (10°C to 40°C). Vertical Response: DC Coupling: DC to 10 MHz (-3 dB) at 6 cm. AC Coupling: 2 Hz to 10 MHz (-3 dB) at 6 cm. Rise Time: 35 ns. Overshoot: less than 5%. Vertical Input: Impedance: 1M $\Omega$  shunted by 38 pF. Maximum Input: 400 volts peak combined AC and DC. Connector: BNC. HORIZONTAL: Ramp: 0.2 sec/cm to 0.2  $\mu$ s/cm. Positions: 19 steps in 1-2-5 sequence. Variable time base: Continuous between ranges to approximately 0.6 sec/cm. Accuracy: Within 3% (20°C to 30°C), 5% (10°C to 40°C). Magnifier: X5 (adds additional 2% to sweep accuracy). Trigger: Automatic: Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Mode: AC, DC, TV. Y Channel: same as vertical. X Channel: same as vertical, except response is limited to 1 MHz. Phase Shift: less than 8° at 1 MHz. Power Requirement: 105 to 130 VAC/210 to 260 VAC switch selected, 70 watts at 120 VAC (240 VAC). 6.9" H x 12.8" W x 19.3" L (without handle). Calibration requires a precise source of square waves such as IOA-4510-1 or IG-4505 on page 66.

## Lab-quality deluxe dual-trace oscilloscope features brighter trace and faster writing speed

**\$419<sup>95</sup>**

- Mu-metal shield eliminates error caused by electromagnetic interference
- Fully-regulated high voltage supply

The IO-4550 is an excellent choice for TV service, electronics experimentation and 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 for accurate measurements. Input channels are displayed, chopped or alternate, as selected by the time base switch. 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 digitally controlled time base provides automatic triggering, so no stability control is necessary and fewer adjustments are required. The fully regulated high voltage power supply assures operation to specifications on standard line voltages from 100 to 270 volts. Complete  $\mu$ -metal shielding helps prevent interference. Improved circuitry and just 4 printed circuit boards make the IO-4550 an easy kit to assemble. Calibration requires a precise source of square waves such as IOA-4510-1 (with additional 6 volt power source) or IG-4505 on page 68.

**Kit IO-4550, Shpg. wt. 27 lbs. . . . . \$419.95**

Factory assembled and calibrated version of above.

**SO-4550, Shpg. wt. 25 lbs. . . . . \$595.00**

**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 approximately 60 V/cm. Accuracy: Within 3%. Vertical Response: DC Coupling: DC to 10 MHz. AC Coupling: 2 Hz to 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 $\Omega$  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 approximately 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 $\Omega$  (approx.). Frequency Response: DC to 1 MHz. Connector: BNC. TRIGGER: Internal: Automatic: Adjustable over 10 divisions. Normal: Adjustable over 10 divisions. Slope Selection: + or -. External: Automatic: Adjustable over 0.8 V. Normal: Adjustable over 0.8 V. Slope Selection: + or -. Impedance: 1 M $\Omega$  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. Phase Shift: Less than 8° @ 100 kHz. Power: Voltage Range: 100-135 VAC/200-270 VAC switch selected, 70 watts at 120 VAC (240 VAC). 6.9" H x 12.9" W x 19.3" L (without handle).

**Dual-Trace, DC-15 MHz — the one you NEED  
for professional service, circuit-design and engineering —  
available fully assembled, or in money-saving kit form**



**Easy kit assembly and service — major circuitry is contained on 5 PC boards**



**TV Servicing — excellent for stage by stage troubleshooting**



**Lab Work — circuit design, testing components, checking assembly**

## Our finest oscilloscope does it ALL!

### Heathkit IO-4510 Dual-Trace Oscilloscope

**\$619<sup>95</sup>**  
Kit

- DC-15 MHz bandwidth with post-deflection accelerated CRT for high brightness
- Excellent 1 mV/cm input sensitivity
- 45 MHz typical triggering bandwidth

- Time base sweep to 0.1  $\mu$ s/cm; x5 sweep magnifier
- Y<sub>1</sub> and Y<sub>2</sub> trigger selection • X-Y capability

Professional scope performance at a low price — plus DC-15 MHz bandwidth, 1 mV/cm vertical sensitivity, time base to 0.1  $\mu$ s/cm and complete dual trace capability. Vertical input sensitivity of 1 mV/cm is provided over the entire bandwidth. With the 4510 and a X10 probe you can read waveforms to 10 mV, not the 50 or 100 mV found on other scopes.

The IO-4510 will typically trigger on signals up to 45 MHz and is guaranteed to 30 MHz. And there's no stability control needed with the digitally-controlled triggering circuits. In the automatic mode, a reference baseline is generated even when the trigger signal is absent. Choice of normal or automatic sweep uses any one of 20 time bases from 0.2 sec/cm to 0.1  $\mu$ sec/cm. Any sweep speed can be magnified five times. An externally generated horizontal signal can also be selected. Internal delay lines display of at least 20 nanoseconds of the pre-triggered waveform, insuring complete waveform display — mandatory for logic analysis.

The fully regulated power supplies provide stable voltages. An adjustable AC line switch is used to match the regulated power supplies to any common line voltage from 100 VAC to 280 VAC.

IO-4510 calibration requires precise source of square waves such as IOA-4510-1 or IG-4505 on page 68.

Kit IO-4510, Shpg. wt. 36 lbs. .... 619.95  
SO-4510, factory assembled & calibrated version of IO-4510, Shpg. wt. 28 lbs. .... 850.00

IO/SO-4510 SPECIFICATIONS — VERTICAL: Deflection Factor: Sensitivity: 1 mV/cm to 5 V/cm. Attenuator: 12 steps in 1-2-5 sequence. Variable: Continuous between steps to approx. 15 V/cm. Accuracy: Within 3% (20°C to 30°C), 5% (10°C to 40°C) referenced to 0.2 V/cm @ 25°C. Vertical Response: DC Coupling: DC to 15 MHz (-3 dB). AC Coupling: 2 Hz to 15 MHz (-3 dB). Rise Time: 24 nanoseconds. Overshoot: Less than 3%. Delay Line: Allows display of at least 20 ns of pretriggered waveform. Vertical Input: Impedance: 1 megohm shunted by approx. 40 pF. Maximum Input: 400 volts peak combined AC & DC. Connector: BNC. Vertical Modes: Single: Y<sub>1</sub> or Y<sub>2</sub> selected by vertical position controls. Dual: Chopped (200 kHz) or alternate automatically selected by Time Base switch. HORIZONTAL: Time Base: Ramp: 0.2 sec/cm to 0.1  $\mu$ sec/cm. Positions: 20 steps in 1-2-5 sequence. Variable: Continuous between ranges to approx. 0.6 sec/cm. Accuracy: Within 3% (20°C to 30°C), 5% (10°C to 40°C) referenced to 1 ms/cm @ 25°C. Magnifier: X5 (adds additional 2% to sweep accuracy). External: Sensitivity: 0.2 V/cm (approx.) Impedance: 200 kilohms (approx.). Polarity: Negative input causes right hand deflection. Frequency Response: DC to 1 MHz (-3 dB). Connector: BNC. TRIGGER: Internal: Automatic: Zero crossing  $\pm$ 0.5 volts. Normal: Adjustable over 8 divisions. Slope Selection: + or -. External: Automatic: Zero crossing  $\pm$ 0.2 volts. Normal: Adjustable over  $\pm$ 5 volts. Slope Selection: + or -. Impedance: 1 megohm shunted by approx. 30 pF. Connector: BNC. X-Y: Y Channel: Same as Vertical. X Channel: Same as Vertical, except response limited to 1 MHz and no delay line. Phase Shift: Less than 3° @ 100 kHz. GENERAL: CRT: Type: 6 x 10 cm spiral PDA. Acceleration Potential: 4 kV regulated. Phosphor: P31. Graticule: 6 x 10 cm illuminated, variable by front panel control. Power: Voltage Range: 100 to 140 VAC/200 to 280 VAC, switch selected, 75 watts. Internal Supplies: Fully regulated. Operating Temperature Range: 10°C to 40°C. Dimensions: 6.4" H x 12.9" W x 19.3" D (handle extended). Weight: 24 lbs.

# Counter Buying Tips

Frequency counters are bought based on specifications and features. Here are some tips on what the important specs are, and how to interpret them.

**Frequency Range.** This spec would seem to speak for itself, i.e., how high does the instrument count? Be sure that the advertised frequency range is no higher than that which is guaranteed by the logic manufacturer. All Heath counters are specified in this manner.

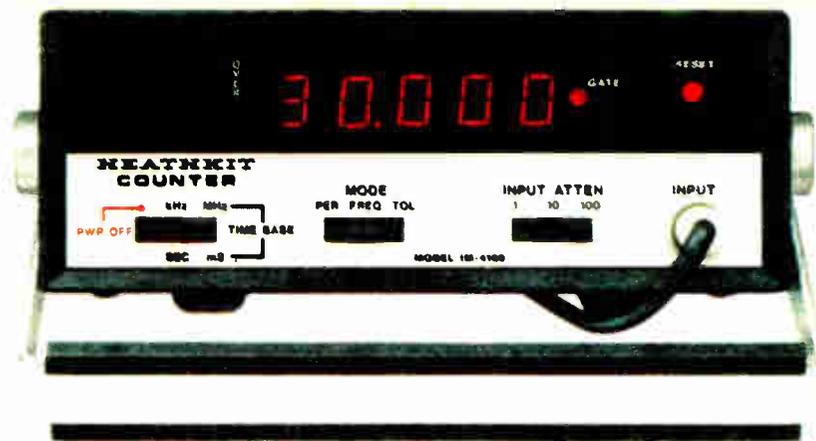
**Sensitivity.** Heath experience has determined that an input sensitivity of 15-25 mV is the best for most applications. Very low sensitivities (100 mV or higher) are often useless and high sensitivities (1 mV) can give false readings on noisy signals.

**Input Impedance.** Since the input impedance is both resistive and capacitive, you need to know both values. At high frequencies (above 110 MHz), the capacitive loading becomes the most important factor. At 500 MHz, 1 megohm shunted by 25 pF is actually a 12 ohm load. This is a VSWR of greater than 4, with a 50-ohm cable. At these frequencies, well-designed counters use as a close to a resistive 50 ohm input as practical to maintain a good VSWR. Heath counters GUARANTEE a VSWR of 1.5 to 1 up to 250 MHz, and less than 2.0 at 1 GHz.

**Accuracy.** This spec is given as time base accuracy  $\pm 1$  digit. Time base accuracy must include both aging rate and temperature stability to be meaningful. Some manufacturers hide errors of 25 ppm or more by omitting one or both of these factors. All Heath counters are specified with both aging rate and temperature stability to insure a true accuracy specification.

**Resolution** is determined by the number of digits and gate time. It is easy to be misled by simply considering the number of digits. Well-designed counters, like Heath's, always provide the proper number of digits and the proper gate times for resolution consistent with accuracy as defined above.

These considerations plus numerous other features, service and parts availability make Heath counters one of your best instruments buys!



## Our Lowest-Priced Counter

**Heathkit IM-4100 — Counts frequency to 30 MHz, period to 99.999 seconds, events to 99,999**

**\$139<sup>95</sup>** Gives you the performance you *NEED* for precision measurements with outstanding resolution and sensitivity

The Heathkit IM-4100 is an almost unbelievable counter value. It's a full five-digit frequency counter which also functions in period and totalize modes. It provides built-in input attenuation and 12-volt operation all in one compact package. The latest digital design and a stable 10 MHz crystal oscillator assure accuracy and precision on all measurements. Its excellent resolution makes it ideal for a variety of signal alignment applications.

As a frequency counter, the IM-4100 is guaranteed to 30 MHz with 1 Hz resolution. Sensitivity is 15 mV from 50 Hz to 30 MHz, 50 mV below 50 Hz.

In the period mode, it measures intervals up to 99.999 seconds. Using the millisecond time base, it resolves to 1  $\mu$ sec! This mode can be used for low frequency measurements with high accuracy. Just position the TIME BASE switch to mS and the MODE switch to PER. Then solve the equation  $f = 1/\text{period}$ , using the displayed value.

The totalize mode will add up (totalize) event pulses up to a count of 99,999. Pushing the RESET button starts the count at zero. An inhibit signal can stop the totalize

mode at any time, without loss of the displayed count.

The front panel attenuator switch allows the amplitude of input signals to be divided by 1, 10 or 100. The pushbutton RESET switch quickly resets the display to zero in any mode. Front panel display includes over-range indicator and a gate lamp.

A rear panel switch easily selects internal or external time base. The rear panel connector can be used as an input for an external time base signal, frequency ratio measurements, or as an output to check the internal 10 MHz time base, or to provide a convenient frequency standard of 1 MHz for bench use. The IM-4100 operates on 120/240 VAC, or 12-volt DC. DC power is applied through a rear panel connector (mating connector supplied).

The IM-4100 is an easy kit to build, with an open chassis layout, with circuit board construction to simplify assembly. Or you can order it factory assembled and tested.

**Kit IM-4100**, Shpg. wt. 6 lbs. . . . . **\$139.95**  
Factory assembled and tested version of above.

**SM-4100**, Shpg. wt. 6 lbs. . . . . **\$220.00**

### IM-4100 SPECIFICATIONS

**FUNCTIONS** — Frequency: 5 Hz to 30 MHz minimum. Period: 1  $\mu$ sec resolution to 99.999 sec. Totalize: 1-99,999 events. Sensitivity: 15 mV rms (50 mV, 5 Hz to 50 Hz). Period Pulse Width: 25 nsec minimum. Low Frequency Signal Risetime: 1 msec for signals less than 10 Hz. Input Impedance: 1 megohm shunted by less than 35 pF. Protection: 240 volts rms at 60 Hz. Attenuator: X1, X10, X100 fixed compensation. TIME BASE — Frequency: 10 MHz. Setability:  $\pm 1$  ppm. Temperature stability:  $\pm 10$  ppm, maximum 0° to 40° C ambient. Aging rate, 10 ppm per year. OSCILLATOR

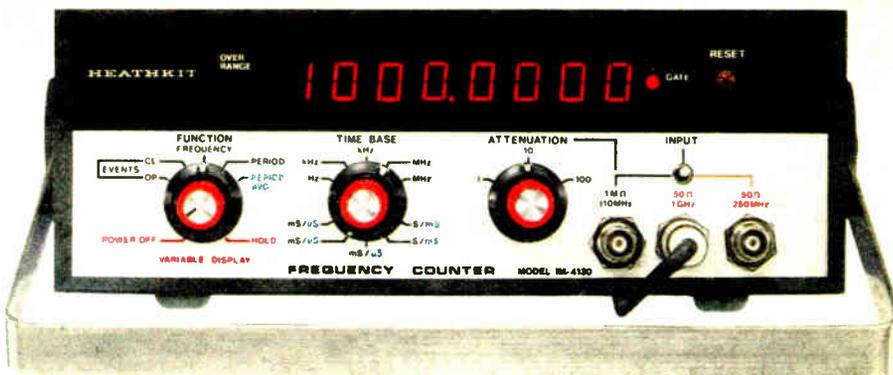
**CONNECTION** — External Input Frequency: DC to 20 MHz. External Input Sensitivity: TTL or 2.5 V rms from 50-ohm source. Internal Output: TTL signal at 1 MHz. **GENERAL** — Gate Interval: kHz-1 sec, MHz-1 msec. Manual Gate: DC control in events mode using external OSC input connector. Display Time: 200 msec plus gate interval. Power Requirement: 105-130 or 210-260 VAC (switch-selected). 60/50 Hz, (at 25 watts); or 9-14 VDC at 1.25 amperes. Dimensions: 2 3/4" H x 7 1/4" W x 10 1/2" D (less handle).



IM-4110 — 110 MHz input



IM-4120 — 110 and 250 MHz inputs



IM-4130 — 110 MHz, 250 MHz and 1 GHz inputs

## High-Performance Frequency Counters

- Frequency, Events, Period and Period Averaging
- Overrange and Gate Lamp Indicators

These frequency counters offer excellent flexibility, accuracy and resolution, PLUS features you simply won't find on others in this price range.

A switchable attenuator on the 110 MHz input provides accurate measurements of large amplitude signals. The time base switch selects the gate time and the resolution of the display. The 4120 and 4130 time bases are controlled by a high quality TCXO (temperature-compensated crystal oscillator) with a temperature stability of  $\pm 1$  ppm and an aging rate of  $< 5$  ppm/yr for excellent stability. (The 4110's crystal oscillator has stability of  $\pm 10$  ppm and an aging rate of  $< 10$  ppm/yr.)

Separate 50-ohm inputs are used for frequency ranges above 110 MHz to maintain low VSWR, while inputs below 110 MHz are

### 12-volt Converter for 4110, 4120 and 4130 Frequency Counters

Mounts inside counter cabinet, permits 12-volt mobile operation of 4110, 4120 and 4130. Can also be fitted with 12 rechargeable NiCad batteries (not included, order below).

**Kit IMA-4130-1**, Shpg. wt. 3 lbs. . . . . **64.95**  
Assembled version of above.

**SMA-4130-1**, Shpg. wt. 3 lbs. . . . . **100.00**

Set of 12 NiCad batteries.

**SMA-4130-2**, Shpg. wt. 4 lbs. . . . . **99.95**

**COMBO SPECIAL!** Save \$79.95! 12-volt converter kit and batteries together. If purchased separately, \$164.90.

**IMS-4130-1**, Shpg. wt. 8 lbs. . . . . **84.95**

1 meg shunted by less than 25 pF. There's a rear panel oscillator input/output jack for an external time base, frequency ratio measurements, or it can be used as a signal source for breadboarding, calibrating or marker applications.

These counters include additional functions — events, period and period averaging. In events OP, the counting circuit increments for each input pulse with the resulting counts displayed. Events CL stops the events count and displays the accumulated total.

In the period mode, the readout displays a single period of the signal.

In the period averaging mode, the counter displays the time of a single period based on a 1000-period average. This results in a more accurate and higher resolution measurement.

A 12-position handle rotates a full 360° for easy storage and mounting. Easy kit assembly and NO-INSTRUMENT calibration. Counters operate on 120/240 VAC (switch-selected), 12 VDC with IMA-4130-1 accessory at left, or portable battery operation with IMA-4130-1 and SMA-4130-2 batteries.

### IM-4110 5 Hz to 110 MHz Counter

Applications include CB, low-band AM and FM, AM and FM broadcast bands, musical instruments, video tape systems, crystals, etc. Has single 110 MHz input.

**Kit IM-4110**, Shpg. wt. 12 lbs. . . . . **199.95**

Assembled and tested version of above.

**SM-4110**, Shpg. wt. 10 lbs. . . . . **350.00**

### IM-4120 5 Hz to 250 MHz Counter

For above applications, plus marine and aircraft radios, 2-meter and 220 FM, general lab and research work, more. Has 5 Hz to 110 MHz and 5 MHz to 250 MHz inputs.

**Kit IM-4120**, Shpg. wt. 12 lbs. . . . . **349.95**

Assembled and tested version of above.

**SM-4120**, Shpg. wt. 11 lbs. . . . . **550.00**

### IM-4130 5 Hz to 1 GHz Counter

For virtually every counting application including 450 FM, Military uses and land mobile. Has three separate inputs—5 Hz to 110 MHz, 5 MHz to 250 MHz and 100 MHz to 1 GHz.

**Kit IM-4130**, Shpg. wt. 12 lbs. . . . . **549.95**

Assembled and tested version of above.

**SM-4130**, Shpg. wt. 10 lbs. . . . . **895.00**

	IM-4110	IM-4120	IM-4130
Frequency Range	5 Hz to 110 MHz	5 Hz to 250 MHz	5 Hz to 1 GHz
Inputs	5 Hz to 110 MHz	5 Hz to 110 MHz, 5 MHz to 250 MHz	5 Hz to 110 MHz, 5 MHz to 250 MHz, 100 MHz to 1 GHz
Input Sensitivity	25 mV RMS	25 mV RMS	25 mV RMS
Input Impedance	1 meg shunted by < 25 pF	50 ohms, VSWR less than 1.5:1 110 MHz, same as 4110	50 ohms, VSWR, less than 2:1 110 MHz, same as 4110 250 MHz, same as 4120
Protection	250 V (DC + peak AC) to 100 kHz	5 Vrms	5 Vrms
Time Base Freq.	10 MHz	4 MHz TCXO	4 MHz TCXO
Aging Rate	< 10 ppm/yr	< 5 ppm/yr	< 5 ppm/yr
Temp. Stability (0 to 40°C ambient)	$\pm 10$ ppm	$\pm 1$ ppm	$\pm 1$ ppm

OTHER IM-4110, 4120 AND 4130 SPECIFICATIONS — FUNCTIONS: Events: 1 to 99,999,999. Period Resolution, 0.1  $\mu$ S. Period Average, 1000 periods. Period Pulse Width, 100 nsec min. Low Frequency Signal Risettime, 1 msec to signals less than 10 Hz. Attenuation, (110 MHz input) x1, x10, x100 fixed compensation. TIME BASE: Setability,  $\pm 0.1$  ppm. OSCILLATOR

CONNECTION: External Input Frequency, 1 MHz. External Input Sensitivity, TTL or 2.5 Vrms for 50-ohm source. External Input Protection, -5 V peak to +10 V peak. Internal Output,  $> 1.5$  V p-p into 50 ohms at 1 MHz. TCXO Warmup, 10 minutes. GATE INTERVAL: Frequency, 1 mS to 10 S (4 mS to 40 S on 1 GHz input). Period, determined by period of input frequency.

Period Average, 1000 periods of input frequency. Display Time, 200 mS to 20 S including a count hold position. Power Requirements: 105-130 VAC or 210-260 VAC (switch-selected). 50-60 Hz at 35 watts; or 9-14 VDC at 2.5 A max. with IMA-4130-1 accessory. Dimensions: 10 1/4" W x 13 1/4" D x 4" H (less handle). Net Weight: 8 lbs.

# Power your bench with Heathkit Supplies

## Tri-Output Experimenter's Power Supply

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

*Three floating outputs can be connected in any combination for a wide variety of output voltage and current capability*

The IP-2718 offers both the functions and operational flexibility that make it an indispensable addition to the bench of the designer and experimenter. Features include a fixed 5VDC supply and two continuously variable 0-20 VDC supplies, each one completely isolated from the other.

The fixed 5 VDC source is ideal for digital experimentation and design and with a rating of 1.5 A there's enough current to handle any of today's many and varied logic devices. For greater versatility, the outputs of both 20 VDC supplies may be "strapped" in any combination to provide positive and negative voltages. These voltages may be applied with either a fixed reference or they may be allowed to "float" without reference level. There's also clutch-coupled tracking control to allow the two 20 VDC supplies to "track" each other at any specified voltage difference. This feature is ideal for analog circuits requiring both positive and negative voltages.

All three outputs are short-circuit proof and each is capable of automatic current limiting. As an extra feature, both 20 VDC supplies can be connected in parallel for higher through-the-load current operation. The front panel has a large, easy to read meter and its switchable functions allow the user to monitor both voltage and

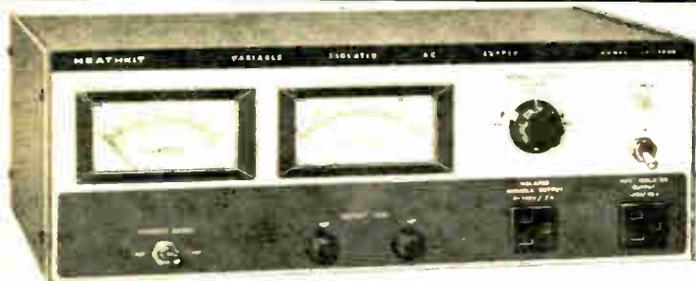


**3 EVENING KIT**  
Fast, Easy Assembly

current outputs from each of the three supplies. An outstanding value and excellent addition to any bench.

Kit IP-2718, Shpg. wt. 12 lbs. .... **89.95**  
Assembled SP-2718, Shpg. wt. 12 lbs. .... **195.00**

IP-2718 SPECIFICATIONS: Outputs: 5 volts DC  $\pm 5\%$  at 1.5 A. Two 0-20 VDC at 0.5A, continuously adjustable. Regulation: Load: less than 0.1% variation from no load to full load on 20-volt supplies; less than 2% variation from no load to full load on 5-volt supply. Line: less than 0.2% variation for line voltage change of 10 volts on 20 volt supplies; less than 0.15% variation for line voltage change of 10 volts on 5-volt supply. Power Requirement: 100-135 VAC or 200-270 VAC, 60/50 Hz, 100 watts full load. Dimensions: 4 1/2" H x 10 3/4" W x 9" D.



## Heathkit IP-5220 Variable Isolated AC Supply

**\$129<sup>95</sup>**

- Variable 0-140 VAC output
- 1 A & 3 A ammeter ranges for easy low-current readings
- Simultaneous metering of voltage and current output

This variable AC source provides complete isolation between the AC power line and any electrical equipment that is plugged into its front

panel variable output socket. The variable 0-140 volt output is useful anywhere a slow run-up of line voltage is needed. A full 360 volt-amperes of AC power is available at the front panel variable output socket. More than enough to operate equipment with large power requirements. And the IP-5220 is capable of supplying its full-rated output continuously. The IP-5220's ability to start from zero voltage is helpful when trying to locate circuit faults caused by high or low line voltage — or testing equipment with unknown power requirements. You simply monitor the output on the large voltmeter and ammeter as output voltage is increased. When excessive current is observed, power can be quickly and easily removed before components are damaged. Switch-selected 1A and 3A ranges are fused individually on the front panel. Fused variable output socket protects the IP-5220 and the circuit under test.

Kit IP-5220, Shpg. wt. 28 lbs. .... **129.95**

IP-5220 SPECIFICATIONS: Input Voltage: 120 V @ 60 HZ for specified output. Output Voltage: 0-140 V @ 60 Hz. Voltmeter Range: 0-150 VAC. Ammeter Ranges: 0-1 & 0-3 A, AC. Output Current: 3 A max. 10 A (direct line connection). Output Power: 360 Volt-Amperes maximum. Dimensions: 5.5" H x 15" W x 10.5" D.

## 1-15 VDC Regulated Supply

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 lets you control output voltage from another source.

Kit IP-2728, Shpg. wt. 5 lbs. .... **27.95**



IP-2728 SPECIFICATIONS: Ripple and Noise: Less than 5 mV. Current Output: 500 mA maximum continuous load. Current Limiting: Adjustable from 10 mA to over 500 mA. Transient Response: 25 microseconds. Output Impedance: 0.5 ohm or less to 100 kHz. Power Requirement: 120/240 VAC, 60/50 Hz, 15 W at full load. Dimensions: 4 3/8" H x 5 1/2" W x 5 3/4" D. Programming: AC or DC, 5000 ohm input resistance.

## 0-400 VDC General-Purpose Power Supply

Provides 0-400 VDC at 0-100 mA continuous (125 intermittent) with excellent line and load regulation. Has front panel voltage and current meters and built-in circuit protection. Binding posts are insulated from chassis.

Kit IP-2717, Wt. 19 lbs. ... **119.95**  
Assembled SP-2717 .... **230.00**



IP-2717 SPECIFICATIONS: Additional Outputs: 0 to -100 VDC at 1 mA variable bias voltage, 6.3 VAC at 4 amps., 12.6 VAC at 2 amps. (25 VA max. AC load), filament voltage. Regulation: Output variation less than 1% from no load to full load. Ripple: Less than 10 millivolts rms. Output Impedance: Less than 10 ohms, DC to 1 MHz. Meters: Voltmeter 0-400 V or 0-150 V; Milliammeter 0-150 mA. Power Requirement: 120/240 VAC, 60/50 Hz, 150 W max. Dimensions: 5 1/8" H x 13 3/4" W x 11" D.

# Dependable DC Supplies from Heath

## Heavy-Duty Power Supply/Battery Eliminator

**\$149<sup>95</sup>**

*Provides variable 9-15 volt output  
capable of 12 amps continuous,  
20 amps intermittent*

The Heathkit IP-2715 heavy duty power supply provides you with a clean, accurate voltage source necessary for the reliable service of Ham, Marine, and CB communications gear. In fact, the IP-2715 is ideal for any high current DC voltage application. Features include two easy to read front panel meters which permit the user to continuously monitor both current and voltage. Front panel adjustment allows continuously variable voltage selection from 9 to 15 VDC and a two position norm/standby switch removes voltage from the output binding posts. Output accuracy is assured by a zener diode which provides a fixed reference for accurate regulation of the output even under varying load conditions. Large double heat sinks, 4 output transistors and extra-large transformer insure accurate low ripple operation. An excellent addition to your bench.

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. Fuses: 7A, 3 AG slow-blow primary; 20A, 3 AG output. Power Requirements: 110-130 VAC, 7A or 220-260 VAC, 3.5 A, 60/50 Hz. Dimensions: 5 1/4" H x 11" W x 11" D.

## Lab Quality SP-2700 Series Power Supplies

These supplies provide a precise, accurate source of voltage and current for all your testing and design requirements. Both feature remote programming and voltage sensing; simplified front panel operation. Digital readout types have two decade auto-ranging for high resolution.

Kit IP-2710, 30V @ 3A analog, Shpg. wt. 34 lbs. .... **179.95**

Assembled SP-2710, 30V analog, Shpg. wt. 34 lbs. .... **320.00**

Kit IP-2711, 30V @ 3A digital, Shpg. wt. 36 lbs. .... **239.95**

Assembled SP-2711, 30V digital, Shpg. wt. 36 lbs. .... **395.00**

IP/SP-2700 SERIES SPECIFICATIONS: Max. Rated Output: IP/SP-2710 & 2711: 30V, 3A. Load Regulation: Voltage:  $\pm 0.05\%$  + 1 mV, Current:  $\pm 0.10\%$  + 3.5 mA. Line Regulation: Voltage:  $\pm 0.05\%$  + 1 mV. Current:  $\pm 0.10\%$  + 1 mA. Ripple & Noise: Voltage: 1 mV RMS; 0.03% of rated output, peak-to-peak. Voltage/Current Readout (Switchable): Analog: 3 1/2", 100°, meter. Digital: 3 1/2-digit (1999), two-decade, auto-ranging, digital meter. Readout Accuracy: Voltage: Analog  $\pm 3\%$  of rated output; Digital  $\pm 0.5\%$  of reading  $\pm 1$  count using lab standards,  $\pm 1.0\%$  of reading  $\pm 1$  count using built-in calibrator. Current: Analog  $\pm 3\%$  of rated output; Digital  $\pm 1.0\%$  of reading  $\pm 4$  count using lab standards,  $\pm 1.5\%$  of reading  $\pm 4$  count using built-in calibrator. Readout Response Time: (Digital): 2 seconds to within 5 counts. Stability at Output Terminals: Voltage:  $\pm (0.01\% + 1 \text{ mV})/\text{hr}$ . Current:  $\pm (0.05\% + 1 \text{ mA})/\text{hr}$ . Stability as Displayed (Digital): Voltage:  $\pm (0.1\% + 1 \text{ mV} + 1/2 \text{ count})/\text{hr}$ . Current:  $\pm (0.01\% + 1 \text{ mA} + 1/2 \text{ count})/\text{hr}$ . Operating Modes: Constant voltage, constant current, auto-series, auto parallel. Power Requirements: 120/240  $\pm 10/20$  VAC; 60/50 Hz, 2.0/1.0 Amps max. Overall Dimensions: 5.5" H x 15" W x 13.5" D. (NOTE: Specs measured in accordance with NEMA standards (PY1-1972) after 30-minute warmup period.)

### 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)	(all models)
						voltage: 0.05% + 1 mV	voltage: $\pm 0.05\%$
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	current: 0.10% + 3.5 mA	current: $\pm 0.10\%$ + 1 mA



*These quality supplies offer your choice of Analog or Digital Displays plus remote Current and Voltage programming!*

### Low-cost Strip Chart Recorder

Has 1 mV or 10 mV full-scale input (selected during assembly); twelve chart speeds from 5 sec./in. to 200 min./in. Power, servo and chart switches, coarse and fine zero controls, high impedance, floating input. Zener regulated reference voltage supply. Less than 1% error, full scale. For 120/240 VAC, 60/50 Hz. 6" H x 15" W x 9 1/2" D.



Kit IR-18M, Shpg. wt. 15 lbs. .... **214.95**

3 rolls chart paper (140 ft./roll) .....

IRA-18-1, Shpg. wt. 5 lbs. .... **11.95**

120 ft. roll chart paper. (For slow speeds.)

SU-445-17, 2 lbs. .... **4.75**

# High-performance Heathkit VOM's



**\$79<sup>95</sup>**

**Heathkit general-purpose VOM ideal for hobbyists or servicemen**

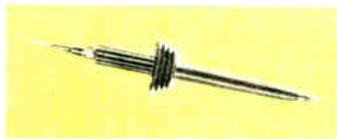
- Taut-band meter with diode and fuse protected movement
- Excellent for field work—accurate enough for engineering

Here's one of the many reasons why Heathkit VOM's are first on the list of professional technicians everywhere. The IM-105 is a high-accuracy VOM that's really designed to take it—rugged enough for bench and field work—and accurate enough for engineering, design and R&D work. It's the one to have if you're a hobbyist experimenter or service tech! It's an easy, enjoyable one-evening kit too—just build up two modular circuit boards and you have it. This highly versatile IM-105 gives you a low-friction, taut-band meter with diode & fuse protected movement. Fuse in-line with the input connector is removable from front for extra convenience. Less batteries.

Kit IM-105, Shpg. wt. 3 lbs. . . . . **79.95**  
Assembled SM-660, (less 5 KV ranges), Shpg. wt. 3 lbs. . . . . **94.00**

IM-105 SPECIFICATIONS: DC VOLTAGE RANGES: -0.25, 2.5, 10, 50, 250, 500, 1000 & 5000 V full scale. Accuracy:  $\pm 3\%$  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:  $\pm 4\%$  of full scale. Input resistance: 5000 ohms/V. Input capacity: Less than 20 pF. Frequency response: 2.5, 10, and 50 V ranges.  $\pm 5\%$ , 10 Hz to 100 kHz; 250, 500 V ranges:  $\pm 5\%$ , 10 Hz. DC CURRENT RANGES: -0.05, 1.0, 10, 100, 500 mA & 10 A full scale. Accuracy:  $\pm 3\%$  of full scale. Voltage drop: Approximately 0.25 V at full scale. RESISTANCE RANGES: -x1 (20 center scale), x10, x100, x1k, x10k. Accuracy:  $\pm 3$  degrees of arc. Source voltage: x1 through x1k ranges: 1.5 V x 10k range. 15 V. DECIBEL RANGES: (0 dB=1 mW in 600 ohms). -10 to +56 dB. Dimensions: 7" H x 5" W x 2 1/4" D.

## Heathkit Instrument Test Probes



**30 kV High Voltage Probes...**  
**IMA-100-10 Probe** multiplies DC ranges of any 10-megohm meter by 100. 1000 megohm input measures voltages as low as 1V in high-impedance circuits. Banana plug connector.

Kit IMA-100-10, Shpg. wt. 1 lb. . . . . **11.95**  
**IMA-100-11 Probe** provides X100 measurement for meters with 11-megohm input impedance. (Incl. probe resistance). Phone plug, ground clip.  
Kit IMA-100-11, Shpg. wt. 1 lb. . . . . **11.95**  
**Assembled SMA-100-11, Shpg. wt. 1 lb. . . . . 16.95**  
**IMA-1000-1 Probe** provides X1000 attenuation for meters with 1-megohm input impedance. Banana plug connector.  
Kit IMA-1000-1, Shpg. wt. 1 lb. . . . . **11.95**  
**76**



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

**Our low cost high performance Digital Multimeter**

- Solid-state design uses IC circuitry for a clear non blanking 2 1/2-digit display with auto decimal positioning
- Full-function capability includes AC voltage measurement up to 700 volts
- Ease of operation makes it a pleasure to use for both beginners and advanced technicians

Here's a low-cost, high performance DMM that hams, hobbyists and service techs have been waiting for. Its full-function capability even includes AC voltage measurements up to 700 volts. Has four overlapping AC & DC voltage & current ranges and five resistance ranges. And it's hard to find better accuracy at a price this low: 1% on DC volts, 1 1/2 % on AC volts and AC/DC current, and 1 1/2 % on resistance. Lighted front-panel indicators show overrange, + and - DC voltages and current at a glance.

A solid-state design uses IC circuitry for a clear non-blanking 2 1/2-digit display with automatic decimal positioning. Its ease of operation makes it a pleasure to use for both beginners and advanced technicians. The easy assembly makes it a great project for student electronics labs. And the exclusive Heath built-in calibration standards are all that's needed for initial and periodic adjustments.

Features overload protection on all ranges, 120 or 240 VAC operation, isolated floating ground, attractive heavy-duty case to withstand rugged use, universal banana jack inputs for easy testing of all types of electronic equipment.

Kit IM-1210, Shpg. wt. 5 lbs. . . . . **69.95**  
Factory assembled and calibrated version of above.  
**SM-1210, Shpg. wt. 5 lbs. . . . . 120.00**

IM-1210 SPECIFICATIONS: Functions: DC volts, DC current, AC volts, AC current, Ohms. 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 (50 Hz to 10 kHz); Ohms: 0-200, 2K, 20K, 200 K, 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  $\mu$ A. Ohms: 1 ohm. Display: 2 1/2-digit, 7-segment, planar, LED (light emitting diode) with overrange and negative-input indicators. Accuracy (Full Scale,  $\pm 1$  Digit): DC volts:  $\pm 1\%$ . DC current:  $\pm 1.5\%$ . AC volts:  $\pm 1.5\%$ . AC current:  $\pm 2\%$ . Ohms:  $\pm 1.5\%$ . Input Impedance: 1 megohm on all voltage ranges. 2.1-volt drop maximum on current ranges (except 2.5-volt drop on 2,000 mA range). Sample Rate: Line frequency. Display Settling Time: Less than 1.0 seconds on DC volts and DC current, and less than 3.0 seconds on AC volts, AC current, and ohms; to within 5 counts. Power Requirements: 100-135 VAC, 200-270 VAC 50/60 Hz, 8 watts. Fuse Requirements: Input: 3AG, 3-ampere. Line: 3AG, 1/4-ampere slow-blow. (1/4-ampere slow-blow for 240 VAC.) Dimensions (overall): 3.00" H x 8.69" W x 10.54" D. (7.62 cm high, 22.07 cm wide, 26.77 cm deep.) Weight: 3.3 pounds (1.5 kg). NOTE: Specifications are based on 30-minute warmup.

# Digital Multimeters for Accuracy and convenience



## Heathkit IM-2202 Portable Digital Multimeter

**\$199<sup>95</sup>**

*Great low price for a digital meter with these professional features and superb specifications*

Features 26 ranges—measures AC and DC volts, DC current and resistance. Has 100% overrange capability, separate voltage and current inputs for circuit protection. 2-volt full scale measurement on 1k, 10k and 1 meg ranges allow forward biased junction testing of semiconductor devices. Has 3½-digit display with leading zero suppression, automatic polarity indication and decimal placement. Assembly is not difficult, but previous kitbuilding experience is recommended. Operates on four rechargeable nickel-cadmium batteries (included), 110 or 220 VAC, or temporarily on four "C" cells.

**Kit IM-2202, Shpg. wt. 8 lbs. . . . . 199.95**

**IM-2202 SPECIFICATIONS:** DC VOLTAGE — Range/Input Impedance: 100.0 mV/10 M $\Omega$ , 1.000 V/500 M $\Omega$ , 10.00 V/10 M $\Omega$ , 100.0 V/10 M $\Omega$ , 1000 V/10 M $\Omega$ . Overload Capability: 300 V on 100 mV & 1V ranges; 1000 V on 10 V & 1000 ranges. Accuracy: Built-in references,  $\pm 0.5\%$ ,  $\pm 1$  digit. Laboratory standards,  $\pm 0.2\%$ ,  $\pm 1$  digit. AC VOLTAGE — Range/Input Impedance: 100.0 mV/10 M $\Omega$ -120 pF, 1.000 V/10 M $\Omega$ -120 pF, 10.00 V/10 M $\Omega$ -60 pF, 100.0 V/10 M $\Omega$ -60 pF, 750 V/10 M $\Omega$ -60 pF. Overload Capability: 250 V on 100 mV & 1 V ranges; 750 V on 10 V, 100 V & 750 V ranges. Accuracy: Built-in references,  $\pm 1.0\%$ ,  $\pm 3$  digits; 40 Hz to 1 kHz (except 40 Hz to 10 kHz on 100 m and ranges). Laboratory standards,  $\pm 0.5\%$ ,  $\pm 3$  digits; 40 Hz to 2 kHz on 750 range). DC CURRENT — Range/Voltage Drop: 100.0  $\mu$ A/100 mV, 1.000 mA/100 mV, 10.00 mA/100 mA/150 mV, 1000 mA/300 mV. Accuracy: Built-in references,  $\pm 0.5\%$ ,  $\pm 1$  digit (except  $\pm 1\%$ ,  $\pm 1$  digit on 1000 mA range). Laboratory standards,  $\pm 0.2\%$ ,  $\pm 1$  digit (except  $\pm 0.5\%$ ,  $\pm 1$  digit on 1000 mA range). Overload Protection: Input coupled through 3.0 Ampere fuse to shunt diodes for overloads above approximate 1.2 Volts. AC CURRENT — Range/Voltage Drop: 100  $\mu$ A/100 mV, 1.000 mA/100 mV, 10.00 mA/100 mV, 100.0 mA/150 mV, 1000 mA/300 mV. Accuracy: Built-in references,  $\pm 1.0\%$ ,  $\pm 3$  digits (except  $\pm 1.5\%$ ,  $\pm 3$  digits on 1000 mA range); 40 Hz to 10 kHz. Laboratory references,  $\pm 0.5\%$ ,  $\pm 3$  digits (except  $\pm 1.0\%$ ,  $\pm 3$  digits on 1000 mA range); 40 Hz to 10 kHz. Overload Protection: Input coupled through 3.0 Ampere fuse to shunt diodes for overloads above approximate 1.2 Volts. RESISTANCE — Range/Test Current: 100.0  $\Omega$ /1.0 mA, 1.000 k $\Omega$ /1.0 mA, 10.00 k $\Omega$ /0.1 mA, 100.0 k $\Omega$ /1.0  $\mu$ A, 1000 k $\Omega$ /10.  $\mu$ A. Accuracy: Built-in references,  $\pm 2\%$ ,  $\pm 1$  digit. Open-circuit Voltage: 12 VDC. Overload Protection: Positive input over-voltage protection by blocking diode to 400 volts; negative input over-voltage through 0.03 A fuse and shunt diode. GENERAL — Overrange Capability: 100% on all ranges except 1000 VDC & 750 VAC. Display: 1999 maximum; seven segment planar; 0.55" high digits. Display Rate: Approximately 5 per second, non-blinking. Normal Mode Rejection: 35 dB (line operation); extended on battery operation. Common Mode Rejection: 80 dB (line operation); extended on battery operation. Power Line Isolation: May be operated 1500 V above power line ground (during line operation). Operating Temperature Range: 10°C to 40°C. Power Requirement: 110 to 130 VAC, or 220 to 260 VAC (internal selectable); 60/50 Hz; 5 watts typical during charge. Size (overall including handle folded to rear): 3" H x 8¼" W x 8" D).

NOTE: Accuracy specifications of the IM-2202 depend on use of built-in references or laboratory standard references for calibration.

## Our finest 3½-digit Multimeter has the features you NEED for fast, easy and profitable service

**\$269<sup>95</sup>**

*One of the finest digital multimeters available anywhere — put it on your bench for professional service*

Our best digital multimeter. Displays voltage, current and resistance measurements on a large, bright tube display. Five voltage and five current ranges are used for both ac and dc. The full-scale voltage ranges are 200 millivolts to 1000 volts (500 volts maximum for ac) and the current ranges are from 200 microamperes to 2 amperes. The six resistance ranges are from 200 ohms to 20 megohms. Has automatic polarity indication and decimal positioning and over-range indication, lots more! The convenience, versatility and accuracy of this modern unit make it the perfect instrument for the laboratory, the service shop, or the ham shack.

**Kit IM-102, Shpg. wt. 9 lbs. . . . . 269.95**

**IM-102 SPECIFICATIONS:** DC VOLTMETER — 5 Ranges: 200 mV, 2V, 20V, 200V, 1000V. Input Impedance: Approx. 100 megohm on 200 mV, approx. 1000 megohm on 2 V, 10 megohm on all other ranges. Accuracy:  $\pm 2\%$   $\pm 1$  digit with furnished DC calibrator,  $\pm 0.1\%$   $\pm 1$  digit with lab calibration. Normal Mode Rejection: 35 dB minimum @ 60 Hz. Common Mode Rejection: 80 dB minimum with 1k unbalance @ 60 Hz. OHMMETER — 6 Ranges: 200 ohms with 1 mA test current, 2k with 100 $\mu$ A, 20k with 10 $\mu$ A, 200k with 10 $\mu$ A, 2M with 1 $\mu$ , 20M with 100 nA. Accuracy: With DC calibrator,  $\pm 0.5\%$   $\pm 1$  digit on 200, 2k, 20k, 200k ranges;  $\pm 1.5\%$   $\pm 1$  digit on 2M and 20M ranges. With lab calibration,  $\pm 0.5\%$   $\pm 1$  digit on 200 ohm range;  $\pm 0.25\%$   $\pm 1$  digit on 2k, 20k, 200k;  $\pm 1\%$   $\pm 1$  digit on 2M and 20M. AC VOLTMETER (Average responding, rms calibrated) — 5 Ranges: 20 mV, 2V, 20V, 200V, 1000V. Input Impedance: 1 megohm @ 150 pF. Accuracy: With DC calibrator,  $\pm 0.75\%$   $\pm 1$  digit for 40Hz-10kHz,  $\pm 1\%$   $\pm 1$  digit for 10kHz-20kHz on 200 mV and 2V ranges.  $\pm 0.75\%$   $\pm 1$  digit for 40Hz-5kHz,  $\pm 1.5\%$   $\pm 1$  digit for 5kHz-10kHz on 20V and 200V ranges;  $\pm 1.5\%$   $\pm 1$  digit for 40Hz-1.5kHz on 1000V range. DC AMMETER — 5 Ranges: 200 $\mu$ A, 2mA, 20mA, 200mA, 2A. Voltage Drop: 0.2V (nominal). Accuracy: With DC calibrator,  $\pm 0.5\%$   $\pm 1$  digit for 2A,  $\pm 3\%$   $\pm 1$  digit on all other ranges. With lab calibration,  $\pm 0.25\%$   $\pm 1$  digit for 2mA and 20mA;  $\pm 0.3\%$   $\pm 1$  digit for 200 mA;  $\pm 0.5\%$   $\pm 1$  digit for 2A. AC AMMETER (40Hz-10kHz) — 5 Ranges: 200 $\mu$ A, 2mA, 20mA, 200mA, 2A. Voltage Drop: 0.2 V (nominal). Accuracy: With DC calibrator,  $\pm 1.5\%$   $\pm 1$  digit on 2A,  $\pm 1\%$  on all other ranges. With lab calibration,  $\pm 0.75\%$   $\pm 1$  digit on 200 $\mu$ A,  $\pm 0.7\%$   $\pm 1$  digit on 2mA and 20mA;  $\pm 0.8\%$   $\pm 1$  digit on 200mA,  $\pm 1$  digit on 2A. GENERAL — Display: Maximum count, 1999. Overrange Indication: Automatic beyond 1999. Polarity Indication: Automatic "+" or "-". Display Rate: Approx 5 per second, non-blinking. Power Requirement: 120 or 240 VAC, 60/50 Hz, 8 W nominal. Power Line Isolation: May be operated 500 volts above power line ground (during line operation). Operating Temperature: 10°C-40°C. Size: 3" H x 7" W x 7.9" D.

NOTE: Accuracy specifications of the IM-102 depend on use of built-in references or laboratory standard references for calibration.

# Heathkit VTVM's—real precision and performance



## Heathkit IM-5228 Service Bench VTVM gives you "Pro" features at a low kit-form price

**\$57<sup>95</sup>**  
Kit

*A bench-type version of the IM-5218 with PLUS features that make it ideal for service and repair*

The one to have for day-in, day-out service and testing! The big 6" meter is really easy to read; separate 1.5 and 5 VAC scales make low voltage readings easy and accurate too. All calibration controls are conveniently adjustable from the front panel, so there's no need to remove the cabinet. Has the same outstanding features and performance specifications of the IM-5218 — 7 AC, DC and ohms ranges, 1% precision divider resistors, extended frequency response. All measurements are made with a single probe, and the ground test lead has an alligator clip for added convenience. Can be wired to operate from 120 or 240 VAC. Convert to solid-state with IMA-18-1, below.

Kit IM-5228, Shpg. wt. 6 lbs. .... **57.95**  
Assembled SM-5228, Shpg. wt. 7 lbs. .... **130.00**

**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:  $\pm 3\%$  of full scale. AC VOLTMETER — Ranges: 0-1.5, 5, 15, 50, 150, 500, 1500 rms scales. Frequency Response (5 V range):  $\pm 1$  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  $\mu$ A movement, polystyrene case. Battery: 1 1/2 V, "C" cell (not supplied). Power requirement: 120/240 VAC, 60/50 Hz, 10 W. Dimensions: 5" H x 12 1/4" W x 4 3/4" D.

**Extend range and applications of your IM/SM-5228, 5218 with these useful test probes.** Measure high voltage to 30 kV with the IMA/SMA-100-11 (page 76). For RF applications you can't beat the PK/PKW-3 RF Probe (page 81). Has a useful range from 1000 Hz to more than 100 MHz and is ideal for testing and alignment. Both probes are excellent values and the perfect addition to your service bench.

## Heathkit IM-5218 — Precision Measurement with our popular, low cost VTVM

**\$47<sup>95</sup>**  
Kit

*Make voltage and resistance tests on audio, TV, appliances, instruments, any tube or solid-state electronic equipment*

Features a single test probe that makes all measurements; seven practical AC, DC volts and ohms ranges; a precision 4 1/2" color-coded 200  $\mu$ A meter; and a convenient size for portability. 1% precision network resistors provide excellent accuracy; wide  $\pm 1$  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. Easy kit assembly or you can order the unit factory assembled and tested. Can be wired for 120 or 240 VAC operation. Converts easily to solid-state with IMA-18-1 below.

Kit IM-5218, Shpg. wt. 5 lbs. .... **47.95**  
Assembled SM-5218, Shpg. wt. 5 lbs. .... **120.00**

**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: 4 1/2", 200  $\mu$ A 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  $\pm 3\%$ , AC  $\pm 5\%$  of full scale. Frequency response:  $\pm 1$  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: 7 7/8" H x 4 1/4" W x 4 1/4" D.

**Convert your IM-5228, 5218, 18 or 28 to instant-on solid-state operation with the IMA-18-1.** Two solid-state devices plug directly into tube sockets. Provides instant-on service. Helps eliminate pointer-drift corrections.

IMA-18-1, Shpg. wt. 1 lb. .... **19.95**

# Heathkit Instruments give you more VALUE!



## Heathkit IO-4101 Vectorscope/Color Dot Bar Generator

**\$169<sup>95</sup>**

- Combines vectorscope and color bar generator
- RF output to 50,000 microvolts

Heath's IO-4101 Vectorscope/Color Dot Bar Generator is the serviceman's dream... two outstanding instruments in one economical low cost package.

The Vectorscope displays a ten "petal" lissajous figure to accurately represent the chroma signal being fed to the TV receiver's CRT. Lets you discover at a glance missing or weak colors or improper adjustment of the burst phase transformer, reactance coil, 3.58 MHz oscillator, bandpass transformer, or color demodulation angle.

The Color/Dot Bar functions are generated in 12 patterns and include; dots, crosshatch, vertical and horizontal lines, color bars, gray scale and purity. All patterns may be presented in either the familiar 9 X 9 display or in Heath's exclusive 3 X 3 format. In addition the IO-4101 features RF output variable to 50,000  $\mu$ v, tuning for channels two through six, plus or minus going video signals, front panel sync output, 4.5 MHz crystal controlled sound carrier, lead-piercing grid jacks and front panel gun shorting switches.

Kit IO-4101, Shpg. wt. 13 lbs. .... 169.95

**IO-4101 SPECIFICATIONS:** PATTERNS — Purity: Produces a snow-free raster. Dots\*: 9x8 (110 small dots.) 3x3 (9 dots). Crosshatch\*: 9x9 (11 vertical and 10 horizontal lines.) 3x3 (3 vertical and 3 horizontal lines.) Horizontal lines\*: 9x9 (10 horizontal lines.) 3x3 (3 horizontal lines.) Vertical lines\*: 9x9 (11 vertical lines.) 3x3 (3 vertical lines.) Color bars\*: 9x9 (ten standard color bars.) A visual fingerprint (voltage pattern) of all ten color bars in the form of a petal pattern is displayed for color circuit servicing. Gray scale: Provides a wide bar crosshatch pattern with six shades of brightness. **OUTPUT SIGNALS** — Video: Greater than  $\pm 1$  volt p-p composite signal for composite signal injection beyond the video detector. Sync: Greater than 3.5 volts p-p. Power requirement: 105-125 or 210-250 VAC, 60/50 Hz, 20 Watts. Dimensions: 9 1/4" H x 6 3/4" W x 1 1/2" D.

\*The number of dots, lines, and bars indicated for a 9x9 display is the number displayed if the receiver under test has no overscan.

## Low-cost, easy-to-use IT-3117 Tube Checker is perfect for your bench

**\$139<sup>95</sup>**

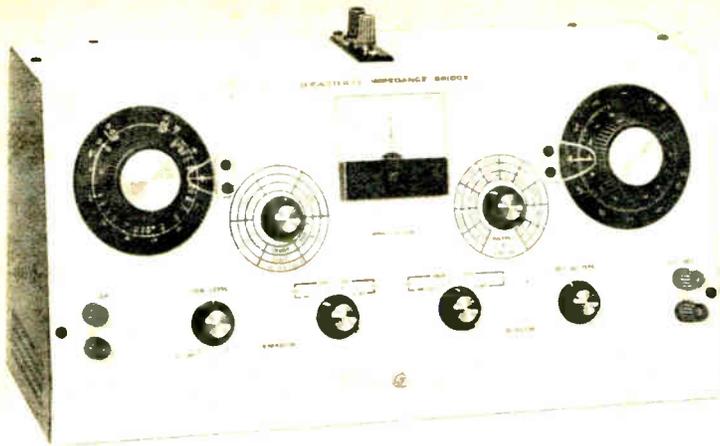
- Tests for emission and shorts
- Thumbwheel chart finds tube data fast
- Great for the Bench

An excellent addition to your bench is the Heath IT-3117 Tube Checker. It's perfect for a wide variety of radio and TV repair work and at this low price you can't afford to pass it up! Performs emission testing: indicating with a large front panel GOOD-?-BAD meter whether or not the tube under test is suitable for continued use or requires replacement. Short circuit tests: a glowing neon bulb quickly alerts you to internal tube element shorts or leakage. And Line test: allows you to check and adjust line voltage to insure that correct voltages are applied to tubes undergoing testing. The IT-3117 also features filament voltage, selectable in 19 steps, from 0.63 to 110 volts AC, plate connection for tubes with external anodes, and 11 sockets to accommodate such varying tube base varieties as 5-pin Nuvisitors, 9-pin Novars, 7-pin miniatures, 8-pin octals and more! Operation is simple. Just select your tubes data from the IT-3117's handy rolling chart (or supplement book), flip the indicated switches and perform your tests!

Kit IT-3117, Shpg. wt. 12 lbs. .... 139.95

**Updated Tube Chart Subscription Service** for all Heathkit Tube Checkers. Includes new data book plus two supplements per year for only \$6.85. Write Heath Tube Data Service, P.O. Box 377, Hewlett, Long Island, New York 11557.

**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. Meter: 1 mA BAD-?-GOOD scale, illuminated. Line Voltage Adjustment: Step type. Roll Chart Mechanism: Constant tension, free-rolling, thumbwheel operation, illuminated. Filament Voltage: 0.63, 1.4, 2, 2.35, 2.5, 3.15, 4.2, 4.7, 5, 6.3, 7.5, 9.45, 12.6, 19.6, 25, 32, 50, 70, 110 VAC. Element Test Voltages: 30, 100, 250 VAC. Power Requirement: 120 VAC, 50/60 Hz. Dimensions: 8 1/2" H x 13" W x 5 1/2" D.



## High-accuracy Impedance Bridge ideal for design and experimentation

**\$149<sup>95</sup>**

- Accurately measures resistance, capacitance and inductance
- Has sensitive, easy to read meter

Has four separate bridge circuits for accurate measurement of resistance, capacitance, low and high inductance, dissipation factor of capacitors and storage factor of inductors. Has sensitive direct reading 100-0-100 microammeter and easy-access front panel binding posts for quick and convenient test setup. Ideal for the experimenter and designer or any electronics professional. Easy to follow manual makes construction a simple matter. A great value. Requires headphones or scope for alignment.

Kit IB-3128, Shpg. wt. 11 lbs. . . . . **149.95**

IB-3128 SPECIFICATIONS: DC Measurements: Built-in power supply. Binding posts for external supply. Meter: 100-0-100 microampere meter. AC Measurements: Built-in 1000 Hz generator. Terminals on panel for external generator. Detector: Vacuum tube detector and amplifier, using built-in meter. Terminals for external detector. Resistance: 0.1 ohm to 10 megohm. Capacitance: 100 pF to 100  $\mu$ F. Inductance: 0.1 mH to 100 H. Dissipation Factor: (D) 0.002 to 1. Storage Factor: (Q) 0.1 to 1000. Accuracy: 1/2 % decade resistors used. Power Supply: Transformer and silicon rectifier. Power Requirements: 105-125 V. or 210-250 V., 60/50 Hz, 10 watts. Dimensions: 8" H x 17" W x 6" D.



## Precision laboratory-type decade resistance box for easy value substitution

**\$47<sup>95</sup>**

- Provides accurate resistance values
- Simple operation
- Easy kit assembly

The Heathkit IN-3117 Decade Resistance Box is an accurate laboratory-type instrument for use whenever precision resistors are required for an electrical measurement or circuit design.

The extensive range of available resistance values makes the IN-3117 invaluable as a variable multiplier or shunt, a variable substitution resistor, or as a leg for AC and DC bridges. Use in conjunction with the IN-3147 below for solving complex resistance and capacitance networks where large ranges of values are necessary. Covers 1 ohm to 999,999 ohms in 1-ohm steps.

Resistors are 1-watt, 0.5% tolerance. Features rugged case and binding posts for easy test set up. Whether you're a designer or experimenter the IN-3117 is a must for your bench.

Kit IN-3117, Shpg. wt. 3 lbs. . . . . **47.95**

IN-3117 SPECIFICATIONS: Range: 1 ohm to 999,999 ohms in 1-ohm steps. Resistors: precision, 0.5% accuracy, rating 1 watt. Minimum DC resistance: 0.025 ohm at terminals with all switches set at zero. Maximum current for each range: X1, 1000 ma. X10, 300 ma. X100, 100 ma. X1K, 30 ma. X10K, 10 ma. X100K, 3 ma. Dimensions: 5" H x 7 1/2" W x 6 3/4" D.

## 1 Capacitor Substitution Box

Helps you determine proper capacitance values without time-consuming calculations. Excellent for design or analysis of simple and complex RC and RCL networks. Provides switch selection of any of 18 EIA standard capacitors from 100 pF to 0.22  $\mu$ F. The special rotary switch incorporates make-before-break contacts that provide smooth changes in capacitance without "opening" or "shorting" the circuit under test. All capacitors are rated at 600 V except 3 lowest and 2 highest values are 500 & 400 V respectively. Accuracy is  $\pm$ 5% for values from 0.0001  $\mu$ fd through 0.00047  $\mu$ fd; and  $\pm$ 10% for 0.01 through 0.22  $\mu$ fd. The IN-3147 makes an excellent addition to the bench of the experimenter and designer. Easy kit construction, and excellent accuracy make it a great value. 3" H x 3" W x 6" D.

Kit IN-3147, Shpg. wt. 2 lbs. . . . . **14.95**

## 2 Resistor Substitution Box

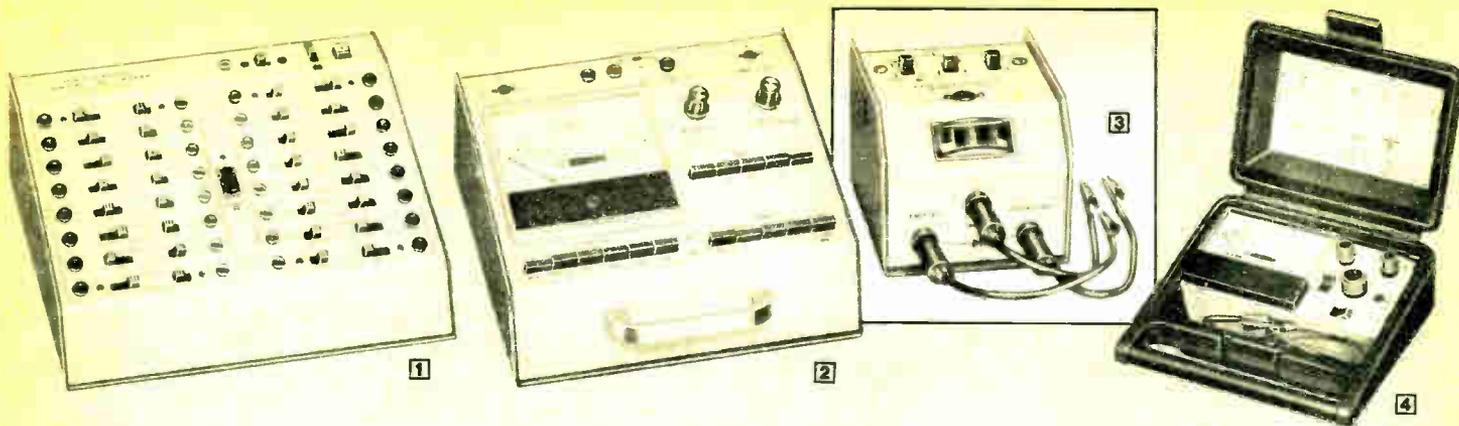
Gives you a rapid and flexible means of determining resistance values required in new electronic circuit design. Also lets you substitute resistance values directly in existing circuits during operation to determine the resistance value that will provide maximum circuit performance. Provides switch selection of any one of 36 EIA standard 10% 1-watt resistors from 15 ohms to 10 meg.

The "shorting type" switches with make-before-break action permit smooth selection of the resistance values without opening or shorting the circuit.

The IN-3137 is ideal for radio, television, and audio work — anywhere that unknown values of resistance need to be determined. It's an invaluable addition to your service bench and a practical, easy to build kit, too. 5 3/8" H x 3 1/8" W x 3" D.

Kit IN-3137, Shpg. wt. 2 lbs. . . . . **14.95**





### 1 Heathkit deluxe Digital IC Tester

A "must" for anyone working with digital IC's. Lets you determine functions of IC's, check operation against your own data sheets. Features a special high-quality "zero-force" insertion socket — the same as used in expensive production-line testers — lets you make thousands of insertions and extractions without worrying about bent pins. Exclusive "bounce-free," computer-type mercury stepping switch allows safe and easy "exercising" of multi-function IC's such as flip-flops. Has input-output jacks for each pin; neon indicators. Exceptionally easy to operate — 14- or 16-pin IC's can be installed in any position, switches and banana jacks allow each IC pin to be used as input or output. Ideal for use with the Heathkit Digital Techniques Program (page 91).

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 +5V. 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,  $\pm 5\%$ , 300 mA and 3.6 VDC, switch selected. Power Requirement: 100-135/200-270 VAC, 60/50 Hz, switch selected. Dimensions:  $4\frac{3}{8}$ " H x  $11\frac{3}{8}$ " W x  $9\frac{1}{4}$ " D.

### 2 High-accuracy FET/Transistor Tester

For quick, accurate tests of conventional (bipolar) 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), trans-conductance (Gm) and leakage directly. Other test functions listed below.

Kit IT-3120, Shpg. wt. 5 lbs. .... 59.95

IT-3120 SPECIFICATIONS: Out-of-Circuit Accuracy:  $\pm 5\%$  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  $I_{b1s}$ ,  $I_{b2s}$  and emitter current. Power Requirements: Two  $1\frac{1}{2}$  V cells, (alkaline for best performance, not supplied). Dimensions: 5" H x  $9\frac{3}{4}$ " W x  $8\frac{1}{4}$ " D.

### 3 Transistor/Diode Checker

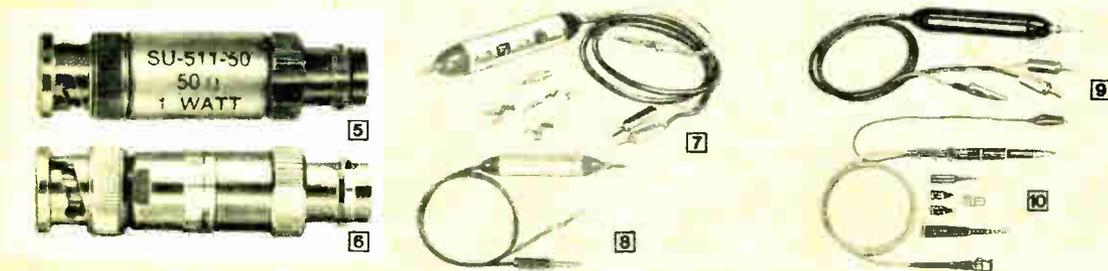
Check high and low power transistors (NPN & PNP) for shorts, leakage, opens and current gain, diodes for forward and reverse current, continuity. Uses two 1.5 V "C" cells, not supplied.  $3\frac{1}{8}$ " H x  $3\frac{1}{8}$ " W x  $3\frac{3}{4}$ " D.

Kit IT-3127, Shpg. wt. 2 lbs. .... 13.95

### 4 Deluxe Transistor Tester

For reliable in- or out-of-circuit tests. Reads DC Beta (gain) on two ranges, 2-100 and 20-1000. Measures out-of-circuit leakage, identifies NPN or PNP's. Low power — will not damage transistor or diode incorrectly connected. Not for high power or switching transistors.

Kit IT-3118, Shpg. wt. 4 lbs. .... 37.95



## Probes and Accessories for Heathkit test instruments

5 50-Ohm Termination for frequency counters and scopes. DC to 1 GHz; power rating, 1 watt. VSWR; 250 MHz, 1.2:1, 600 MHz, 2:1.

Assembled SU-511-50, Shpg. wt. 1 lb. .... 17.50

6 RF Fuse in UHF BNC-to-BNC connector. Prevents burnout. DC to 500 MHz range; 50 ohms; 12:1 VSWR (max.); insertion loss 1.80 dB max. at 500 MHz. With spare fuses.

Assembled SU-512-50, Shpg. wt. 1 lb. .... 50.00

7 Low capacitance scope probe provides direct or X10 attenuated operation; options for 3.3 or 1 megohm input resistance.

Kit PK-1, Shpg. wt. 1 lb. .... 7.95

8 RF probe for RF measurements from 1000 Hz to over 100 MHz; 11 meg input; 1000 VDC max. at tip; 90 V rms max.

Kit PK-3, Shpg. wt. 1 lb. .... 6.95

Assembled PKW-3, Shpg. wt. 1 lb. .... 9.95

9 Scope demodulator probe for distortion checks, RF & IF display. 30 V rms max., 500 VDC max. Banana plug/BNC wiring option.

Kit 337-C, Shpg. wt. 1 lb. .... 5.95

10 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.

Assembled PKW-105, Shpg. wt. 1 lb. .... 29.95

PKA-101-1 Accessory Pack. Includes three assembled tips, two 6-inch ground leads and one 12-inch ground lead for the PKW-101/104 only.

PKA-101-1, Shpg. wt. 1 lb. .... 10.95

Accessory cables... for inter-connecting scopes, counters, etc. All cable is RG-58/U, 50 ohm impedance. Shpg. wt. (each), 1 lb.

Assembled SU-501-1, 1 ft., BNC/BNC .... 10.00

Assembled SU-501-3, 3 ft., BNC/BNC .... 10.00

Assembled SU-501-6, 6 ft., BNC/BNC .... 10.00

Assembled SU-502-3, 3 ft., BNC/UHF .... 10.00

Assembled SU-503-3, 3 ft., BNC/Banana .. 10.00



## Deluxe AC Voltmeter for fast, easy audio service

- Linear scales for both volts and dB make readings easy and accurate
- High sensitivity 0-1 mV full-scale range for low-voltage measurements
- Wide dynamic range for less switching

The excellent frequency response and sensitivity of the IM-5238 allow measurement of amplifier and tuner outputs, power supply ripple, noise and much more. AC volts are measured in 12 ranges from 0-1 mV to 0-300 VAC. dB measurements can be made from -70 to +40 dBm in 12 ranges. The meter is calibrated to read standard dBm with up to 30 dB linearity, has pushbutton function switches, range selector and dB offset control.

**\$99<sup>95</sup>**  
Kit

Kit IM-5238, Shpg. wt. 8 lbs. .... 99.95

Factory assembled and calibrated version of above.  
SM-5238, Shpg. wt. 8 lbs. .... 170.00

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,  $\pm 2$  dB. 10 Hz to 500 kHz  $\pm 1$  dB, dB range, 10 Hz to 250 kHz  $\pm 1$  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,  $\pm 0.5$  dB at 1 kHz plus accuracy of calibration standard. Temperature Range: +10° C to +40° C. Power Requirement: 100-135 VAC, 200-270 VAC, 50/60 Hz, 20 watts. Dimensions: 5 5/8" W x 6 3/4" H x 10 7/8" D. Net Weight: 5.5 lbs.

## Put performance on your bench with this FET Multimeter

- Auto-polarity function for extra convenience
- LED display for voltage polarity
- High-Low volts/ohms functions for in, out-of circuit semiconductor checks
- Extended range for high accuracy

The IM-5225 is an FET multimeter capable of AC and DC voltage and current measurements in ranges from 0.1 to 1000 volts and 0.01 to 1000 mA. Seven ranges allow resistance measurements from 10 ohm to 10 megohm mid-scale. High and low voltage/ohms functions allow both in and out of circuit checks of semiconductor devices and resistance measurements. Features like continuous rotation range and 4-position pushbutton switches allow ease of operation and top dollar value. Add professional quality to your bench today!



**4 EVENING KIT**  
Fast, Easy Assembly

**\$129<sup>95</sup>**  
Kit

Kit IM-5225, Shpg. wt. 8 lbs. .... 129.95

Factory assembled and calibrated version of above.  
Kit SM-5225, Shpg. wt. 8 lbs. .... 195.00

IM/SM-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 0-0.1, 0.1, 1, 10, 100, 1000 milliamperes full-scale. AC Current: six ranges 0-0.1, 0.1, 1, 10, 100, 1000 milliamperes full-scale. Ohms: seven ranges X1, X10, X100, X10k, X100k, X1M. Power Requirements: 120/240 VAC, 50/60 Hz, 5 watts. Dimensions: 5 3/4" W x 6 7/8" H x 11 1/4" D. Weight: 5 3/4 lbs.



## Heathkit IM-5248 Intermodulation Distortion Analyzer **SAVE \$40**

**\$139<sup>95</sup>**  
Kit

- Measures distortion as low as 0.01%
- Built-in 60 Hz and 7000 Hz oscillators
- External oscillator inputs

This intermodulation distortion analyzer is designed for professional-quality audio servicing and testing. Features built-in AC voltmeter, excellent sensitivity and dB measurement capability.

Kit IM-5248, Shpg. wt. 14 lbs. .... Was 179.95 Now 139.95

Factory assembled version of above.  
SM-5248, Shpg. wt. 15 lbs. .... 360.00

IM/SM-5248 SPECIFICATIONS: IM METER: Ranges: 0.1 to 100% in a 1-3-10 sequence. Readable to 0.01% plus residual. Residual: Less than 0.01% with internal generators. Accuracy: 5% full scale. Input Impedance: 1 megohm. HF Sensitivity: 100 mV minimum. Oscillator Frequencies: 60 Hz (line syncable), and 7000 Hz. Generator Amplitude: Adjustable, 100 mV to 3 volts rms (50 mV to 1.5 volts into 600 ohms), with 60 Hz and 7000 Hz at a 4:1 ratio. Impedance and Bandwidths of External Oscillator Outputs: LF -51k ohms, 10 to 500 Hz. HF -18k ohms to 25k ohms; 2 kHz to 100 kHz. Impedance of Oscillator Outputs: 1000 ohms. Connectors: 5-way binding posts. AC VOLTMETER: 10 mV to 300 volts in a 1-3-10 sequence. Input Impedance: 1 megohm. Accuracy: 5% full scale. Frequency Response: 5 Hz to 1 MHz, 3 dB. Power Requirement: 100-135 VAC or 200-270 VAC switch selected, 60/50 Hz, 15 watts. Dimensions: 5 3/8" H x 15" W x 11 1/2" D.



## Heathkit IM-5258 Total Harmonic Distortion Analyzer

**\$239<sup>95</sup>**  
Kit

- Measures THD as low as 0.03%
- Perfect for optimum adjustment of hi-fi amplifiers and receivers

The Heathkit IM-5258 is a professional-grade total harmonic distortion (THD) analyzer. Its outstanding sensitivity and bandwidth permit measurement of THD levels as low as 0.03%, over a frequency range of 5 Hz to 100 kHz. The IM-5258 also functions as an AC voltmeter with 12 switch-selected ranges from 1 mV to 300 V full scale. Also has dB scale.

Kit IM-5258, Shpg. wt. 17 lbs. .... 239.95

Factory assembled version of above.  
SM-5258, Shpg. wt. 16 lbs. .... 450.00

IM/SM-5258 SPECIFICATIONS: Frequency Range: 5 Hz to 100 kHz in 5 ranges, 5-10 Hz, 10-100 Hz, 100-1000 Hz, 1-10 kHz and 10-100 kHz. Distortion Range: reads from 0.3% to 100% full scale in 6 ranges with a 1-3-10 sequence. Residual Distortion: 0.03% or less. Input Impedance: 1 megohm/70 pF maximum. Required Input Level: 316 mV for distortion measurements. Voltmeter: 1 mV to 300 V in 12 ranges with a 1-3-10 sequence. Accuracy: 5% of full scale. Output: 100 mV for full scale meter deflection. Power Requirement: 100-135 VAC or 200-270 VAC switch selected, 60/50 Hz, 12 watts. Dimensions: 5 3/8" H x 15" W x 11 1/2" D.



3 EVENING KIT  
Fast, Easy Assembly

SAVE \$40

## Heathkit IG-1272 Low-Distortion Audio Frequency Generator

**\$99<sup>95</sup>**  
Kit

- Super-low distortion
- Flat output across entire range
- Frequency from 5 Hz to 100 kHz

The Heathkit IG-1272 provides a low-distortion sine wave output over a frequency range from less than 5 Hz to 100 kHz. It's perfect for the testing requirements of the serious audiophile, audio service shop or the audio designer. Pushbuttons select the first three significant digits of the desired frequency and also control the frequency multiplier and output attenuator. The IG-1272 can also be operated in a continuously-variable frequency mode. A level meter on the front panel allows accurate monitoring of the output. A BNC output connector helps keep noise level approximately 70 dB below signal output level. A buffered sync signal, for use with an oscilloscope or frequency counter, is available at the rear panel BNC. Includes cable, BNC, and clip leads.

Kit IG-1272, Shpg. wt. 11 lbs. . . . . Was 139.95 Now 99.95

Factory assembled version of above.

SG-1272, Shpg. wt. 10 lbs. . . . . 250.00

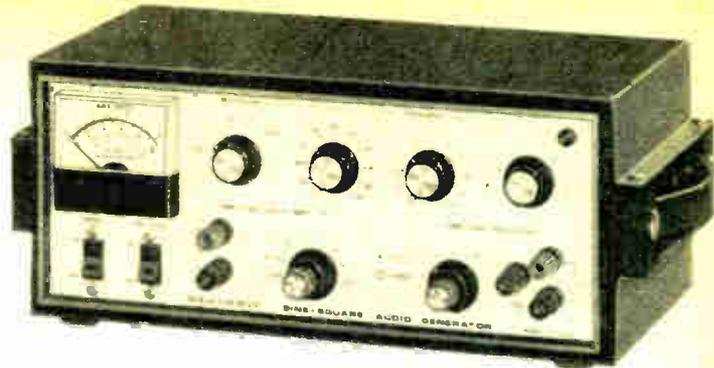
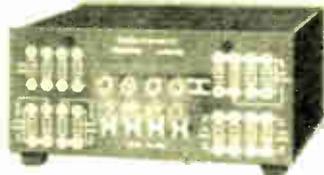
IG/SG-1272 SPECIFICATIONS: Output Voltage: 0.003 to 10 volts RMS. Output Load: 600 ohms. Hum and Noise: 0.01% or less. Frequency Range: 5 Hz to 100 kHz. Output Flatness (referenced to meter) Pushbutton Mode: Within  $\pm 1.1$  dB from 5 to 20 Hz; within  $\pm 0.2$  dB from 20 Hz to 100 kHz. Output Flatness (referenced to meter) Variable Mode: Within  $\pm 2.5$  dB from 10 Hz to 100 kHz. Frequency Accuracy: Pushbuttons;  $\pm 4\%$ ,  $\pm 1$  Hz, typical  $\pm 1.5\%$ . Variable: Depends on accuracy of counter being used. Distortion: 10 to 40 Hz: 0.1% or less. 40 Hz to 20 kHz: 0.04% or less. 20 kHz to 100 kHz: Rises to 0.1% at 100 kHz. Attenuation: Pushbutton combination selected, 10 to 70 dB. Attenuation Accuracy;  $\pm 0.2\%$  dB. Selector Accuracy;  $\pm 1$  Hz  $\pm 4\%$ . Power Requirement: 120 VAC or 240 VAC, 50 or 60 Hz. 10 watts maximum. Dimensions: 5 1/2" H x 11" W x 12 1/2" D. Weight: 9.5 lbs.

## Heathkit Audio Load

The ID-5252 is a must for audio service technicians, manufacturers, and the serious audiophile. It provides the correct loading required for audio amplifiers under test in accordance with manufacturers published specifications and the Institute of High Fidelity Manufacturers (IHFM). Eliminates "special order" load resistors for each amplifier you want to test. Provides audio loads of 2, 4, 8, 16 or 32 ohms. Jacks are provided for connecting a voltmeter, oscilloscope or other test instrument at the load in use. Includes test leads.

Kit ID-5252, Shpg. wt. 6 lbs. . . . . 49.95

ID-5252 SPECIFICATIONS: Available loads (all resistors 1% tolerance): four 8-ohm, 60 W; two 16-ohm, 120 W; one 32-ohm, 240 W; one 2-ohm, 240 W; one 8-ohm, 240 W. Reactance: Less than 10% at 100 kHz. Leads: four 3-ft. #12 gauge leads, spade lugs four jumper links. Dimensions: 4" H x 9" W x 9" D.



## Sine-square wave Audio Generator with frequency range to 100 kHz

**\$94<sup>95</sup>**  
Kit

- Sine wave output available from 1 Hz to 100 kHz with low distortion
- 5 Hz to 100 kHz square wave output with fast risetime ideal for audio response testing
- Outputs available simultaneously or independently

A highly versatile, low cost addition to any bench. The IG-5218 is 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.

Sine wave output, for amplifier gain and distortion measurement, is generated by a "differential amplifier" pair in conjunction with a frequency selective "notch filter". The product of this circuitry yields a clean output with a frequency range of 1 Hz to 100 kHz. Distortion levels are less than 0.1% from 10 Hz to 20 kHz. Eight switch-selected output ranges from 0.003 to 10 V are provided when operating into a high impedance (10 k ohm min.) external load. Six ranges from 0.003 to 1 V are available when operating into the internal 600 ohm load or external load. A meter monitors the sine wave output, and is conveniently calibrated in both volts and dB. Square wave output is available from 5 Hz to 100 kHz with peak-to-peak output levels of 0.1 and 10 V into a load of 2000 ohms or greater. Risetime is 50 nanoseconds, making the IG-5218 ideal for checking audio amplifier response or use as a trigger for digital circuitry testing.

Frequency is quickly and accurately selected using front panel switches for 0-100, 0-10, and x1, 10, 100 and 1000 multipliers. A separate vernier control is provided for the 0-1 range.

Other features include output available simultaneously or independently at 5-way banana jacks...switchable internal or external load...dual primary transformer for 120 or 240 VAC operation...built-in carrying handles for easy portability. Easy kit assembly, or you can order the unit factory tested and calibrated. Either way, you'll have a truly useful and versatile instrument for all your audio testing and service needs.

Kit IG-5218, Shpg. wt. 10 lbs. . . . . 94.95

Assembled SG-5218, wired version of the IG-5218 in black & white styling, Shpg. wt. 10 lbs. . . . . 195.00

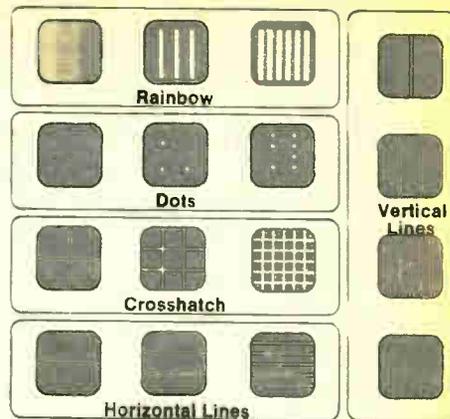
IG/SG-5218 SPECIFICATIONS: Sine Wave Output: Output voltage: 8 ranges, 0.003 to 10 V rms (full-scale) with 10 k ohm or higher external load. 6 ranges, 0.003 to 1 V (full-scale) with 600 ohm internal or external load. dB ranges: -62 dB to +22 dB, -12 dB to +2 dB on meter and -50 to +20 dB on amplitude 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 indications: Two voltage and one dB scale on meter. Output impedance: 10 V range: 0-1000 ohm, 3 V range: 800-1000 ohm; 1 V range and lower: 600 ohm. Meter accuracy:  $\pm 10\%$  of full scale with proper load termination. 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.

## "Shirt-Pocket" size portable color Alignment Generator

*Has the versatility you NEED for complete color TV alignment and convergence — plus a special battery saver circuit for added efficiency*

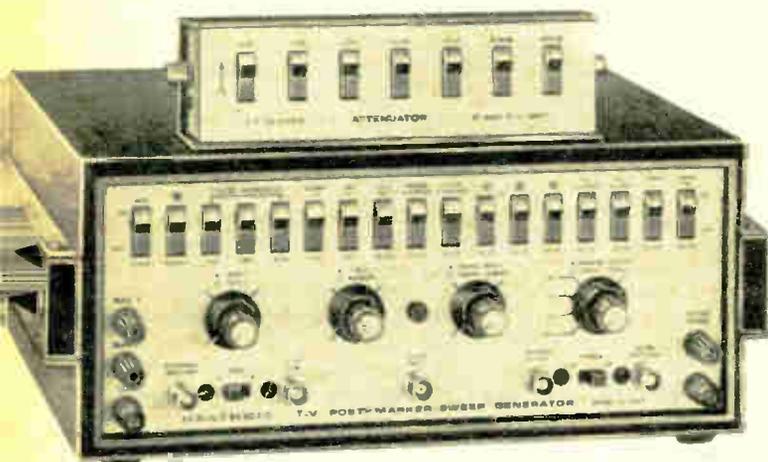
The IG-5240 offers outstanding performance, with crystal-controlled carrier and color oscillator for real precision, accuracy and stability. It's a versatile, low-cost service tool for hobbyist and technician alike. Simply connect its output cable to the VHF terminals of any color TV. The RF carrier 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" to conserve battery power. The unit uses two inexpensive 9-volt transistor batteries (NEDA #1604 or equivalent), which provide a minimum of 8 hours continuous operation. Less batteries.

**Kit IG-5240, Shpg. wt. 2 lbs. . . . . 69.95**  
**Factory assembled version of above.**  
**SG-5240, Shpg. wt. 1 lb. . . . . 100.00**



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

**IG/SG-5240 SPECIFICATIONS:** Chroma Carrier: 3563.795 kHz  $\pm 0.005\%$  crystal-controlled. Master Timer: 377.616 kHz  $\pm 0.005\%$  crystal-controlled. RF Carrier: Channel 4, 67.250 MHz  $\pm 0.01\%$  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 mA capacity (NEDA #1604). Dimensions: 5.4" L x 2.75" W x 1.15" D.



## Heathkit Post-Marker/Sweep Generator for easy, accurate, television alignment

**\$189<sup>95</sup>**

*Fifteen crystal-controlled markers are provided to make video and audio alignment a breeze*

The Heathkit IG-5257, TV Post-Marker/Sweep Generator offers the precision and stability that are necessary for exacting black and white or color television and FM receiver alignment. It's ideal for the bench of the service professional or home user and solid state design means reliable year after year performance.

The post marker generator provides markers that are sharp, well defined and will not alter or distort the response characteristics of circuits being aligned. Fifteen precise crystal controlled oscillators provide markers which greatly simplify alignment procedures. Four are for color bandpass adjustment, one is provided for FM receiver IF alignment and eight markers, from 39.75 to 47.25 MHz, make

television IF alignment fast and easy. In addition, video and audio carrier markers are provided for television channels 4 and 10.

Because any of the IG-5257's fifteen markers are selectable, as many as six markers may be simultaneously presented on an IF curve. Due to this unique multi-marker display, optimum bandpass shaping is easily attained.

The sweep generator circuits of the IG-5257 provide three linear ranges which cover the frequencies necessary for television and FM IF scope displays. Another feature of the IG-5257 is its diode modulator which combines outputs of both the post-marker and sweep generator to permit amplitude modulation of the video carrier by a low frequency sweep signal. This method of alignment, called Video Sweep Modulation (VSM), permits observation of the overall color bandpass response, including the effect of the video detector load circuitry.

Other features of the IG-5257 include a 400 Hz modulation tone which is extremely useful in checking out the alignment and adjustment of FM receivers and two variable voltage bias supplies which are capable of providing both positive and negative bias voltages. A multi step attenuator pad assures proper circuit impedance matching and avoids stage overload during alignment. Easy straightforward construction simplifies kit assembly and the rugged reliability of the Heath IG-5257 will make it a valued addition to your test instrumentation. Includes four coax cables, four test leads and a demodulation probe.

**Kit IG-5257, Shpg. wt. 16 lbs. . . . . 189.95**

**IG-5257 SPECIFICATIONS:** Marker frequency: 100 kHz. Marker frequencies, crystal-controlled: 3.08, 3.58, 4.08, and 4.50 MHz  $\pm 0.01\%$ . 10.7, 39.75, 41.25, 42.17, 42.50, 42.75, 45.00, 45.75, 47.25,  $\pm 0.005\%$ ; 67.25 and 193.25 MHz  $\pm 0.01\%$ . Modulation frequency: 400 Hz. Input Impedance: External Marker/Sweep, and Attenuator—75 ohms. Trace in—220 k ohms. Output impedance: Marker Output, Sweep Output, and Attenuator—75 ohms. Scope Vert.—1 k ohms. Bias voltage: Two individually adjustable supplies: Positive or negative polarity. Sweep frequency ranges: LO Band—2.5 to 5.5 MHz  $\pm 1$  dB. IF Band—39 to 49 MHz  $\pm 1$  dB. RF band—64 to 72 MHz  $\pm 1$  dB. Attenuator: Total of 70 dB in seven steps. Power requirement: 120 V, 60 Hz AC at 4.5 watts

## Heathkit IT-5230 CRT Tester/Rejuvenator brings old and worn TV Picture Tubes back to LIFE!

**\$99<sup>95</sup>**

- Tests *IN-LINE GUN* Color CRT's
- Individual meters for each color gun
- Clean and rejuvenate modes for each gun
- Heater/Cathode short indicator

The IT-5230 is a deluxe CRT rejuvenator/tester that is priced well within reach of any service shop. With it you can 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. To insure correct CRT restoration, a separate cleaning process is applied after rejuvenation to assure proper tube operation.

The IT-5230 is designed for portability and a transformer power supply assures reliable operation even at the low line voltages likely to be encountered in the field. A self-contained storage tray offers plenty of room for test cables and small tools.

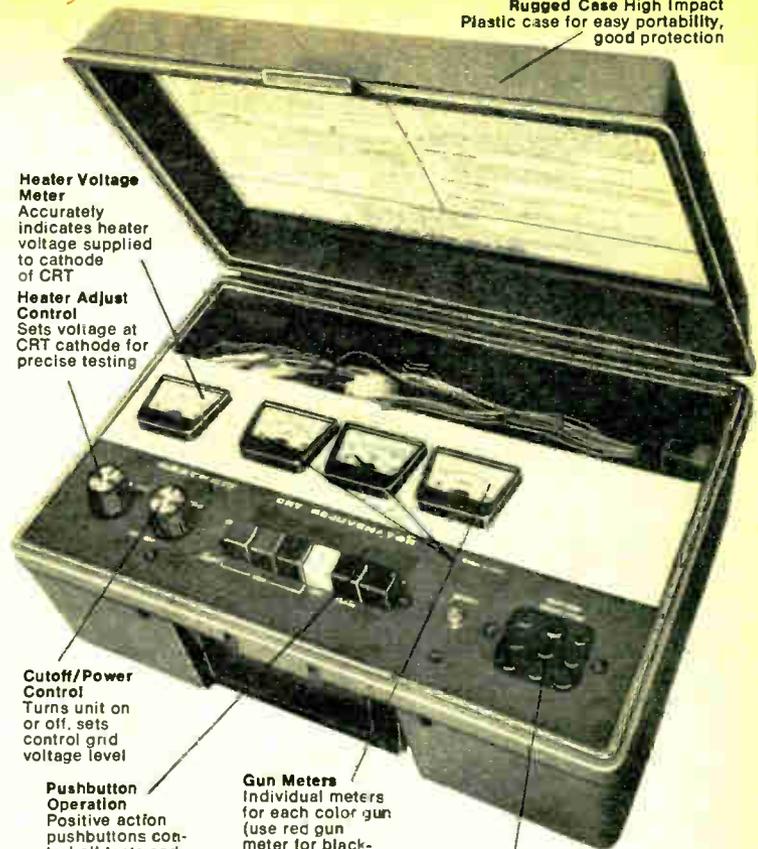
Kit IT-5230, Shpg. wt. 9 lbs. .... **99.95**

Factory assembled version of above.

ST-5230, Shpg. wt. 9 lbs. .... **195.00**

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. Test Cables Supplied: 4' heavy duty. Power Requirement: 105-135 VAC, 60/50 Hz (50 watts maximum at 60 Hz). Dimensions: 5.12" high x 10" deep x 13.5" wide.

Rugged Case High Impact Plastic case for easy portability, good protection



**Heater Voltage Meter**  
Accurately indicates heater voltage supplied to cathode of CRT

**Heater Adjust Control**  
Sets voltage at CRT cathode for precise testing

**Cutoff/Power Control**  
Turns unit on or off, sets control grid voltage level

**Pushbutton Operation**  
Positive action pushbuttons control all tests and processes for really easy operation

**Gun Meters**  
Individual meters for each color gun (use red gun meter for black-and-white tubes)

**Restore Indicator**  
Monitors current level—Rises to brilliant glow as CRT is rejuvenated

## Solid state color bar and dot pattern Generator for fast, easy TV servicing

**\$109<sup>95</sup>**

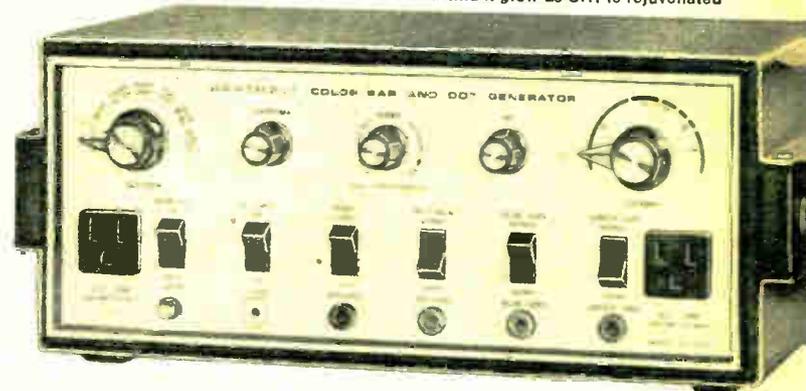
- Logic circuitry insures sharp stable alignment patterns
- Solid state crystal controlled time base

The Heathkit IG-5228 is THE choice for the television service professional who desires uncompromising quality in a color bar and dot generator. At the heart of the IG-5228 system is a highly stable crystal controlled Pierce oscillator which operates at a frequency of 190.08 kHz. Output from this standard is coupled to a divide chain and at various points signals are "picked" off and applied to logic circuits consisting of AND, NAND, NOR, and OR gates. The product of the divide and logic circuitry yields 12 highly stable and precise alignment patterns.

Dots, cross hatch, horizontal and vertical lines, color bars, and gray scale patterns are all front panel selectable and may be generated in either 3 X 3 or 9 X 9 displays. For added stability the IG-5228's horizontal and vertical sync circuits are crystal controlled. These circuits provide pulses which accomplish blanking and insure all alignment patterns are firmly "locked" on screen.

For added convenience sync signals and two 500 W AC receptacles are also available on the front panel. A big plus of the IG-5228 is its selectable, channel 2 through 6 RF output. This carrier may be utilized in either modulated or nonmodulated modes and is a real bonus in analysis of overall receiver performance. Patterns are available for servicing both black and white or color television receivers. The IG-5228 is a perfect addition to the bench of all television technicians and Heath engineering insures year after year reliability.

Kit IG-5228, Shpg. wt. 8 lbs. .... **109.95**



IG-5228 SPECIFICATIONS: Output signals: Video—Greater than  $\pm 1$  V peak-to-peak composite signal RF—Variable to 50,000  $\mu$ V output, channels 2 through 6. Sync.—Greater than 3.5 V peak-to-peak signal. Control Grids (3)—Individual red, blue, and green control grid signals for viewing chroma signal demodulator phase adjustments. Power supply: full wave zener diode regulated. Input—120/240 VAC, 60/50 Hz. Output—3.6 VDC, 300 mA, zener diode regulated. Dimensions: 5 1/2" H x 13 1/2" W x 8" D.

## Heathkit 40 kV High-Voltage Probe Meter



Makes TV tube voltage measurements fast and convenient. Measures DC voltages up to 40 kV with  $\pm 3\%$  accuracy. The on-off switch on the handle protects the meter

during hookup and when the probe is not in use. Easy operation, easy assembly. 1 1/2" H x 1 7/8" W x 15" D.

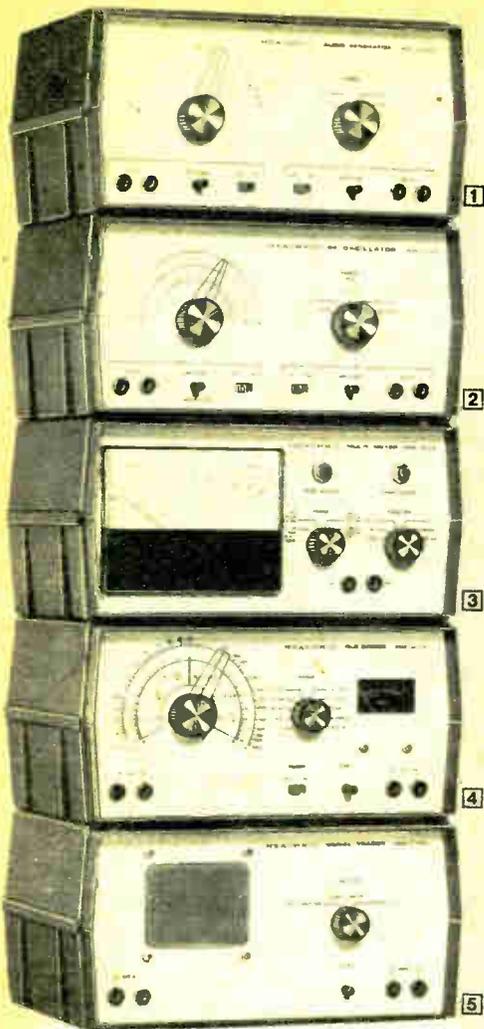
Kit IM-5210, Shpg. wt. 1 lb. .... **21.95**

# A Low Cost Start For Your Bench

**Really Save! Your first bench can cost even less.**

**Order the IPA-5280-1 and any three 5280 series instruments and you deduct 5% from the total price!**

**\$39<sup>95</sup>** Individual kit price



**1** The IG-5282 Audio Oscillator, an instrument useful in many test applications, features sine or square wave output and 10 Hz to 100 kHz frequency range in four bands. Use the IG-5282 for signal tracing or, with the appropriate associated equipment, conduct such tests as stage gain and distortion analysis or frequency response and harmonic distortion testing.

Kit IG-5282, Shpg. wt. 5 lbs. . . . . **39.95**

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 (not supplied) or the optional IPA-5280-1 Power Supply. Dimensions: 11" H x 5 3/4" W x 7 3/4" D. Net Weight: 3 1/4 lbs.

**2** If you're doing alignment work the ideal addition to your bench is Heath's IG-5280 RF Oscillator. This unit is suitable for alignment of tuned stages in AM, FM, and television receivers. Output is in five bands, from 310 kHz to 110 MHz and features an additional 100 to 220 MHz range using calibrated harmonics. Makes a versatile addition to your bench!

Kit IG-5280, Shpg. wt. 5 lbs. . . . . **39.95**

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 (not supplied) or IPA-5280-1 power supply. Dimensions: 11" W x 5 3/4" H x 7 3/4" D. Weight: 3 1/4 lbs.

**3** The IM-5284 Multimeter is one of the best price/performance values ever offered by Heath! This solid-state multimeter gives you 4 different functions, an easy to read panel meter and features AC and DC voltage measurement to 1000 volts. DC current is measured to 1000 mA full scale and ohmmeter function is divided into four ranges (X1, X100, X10K, and X1M $\Omega$ ). Rugged construction. Includes probes.

Kit IM-5284, Shpg. wt. 5 lbs. . . . . **39.95**

IM-5284 SPECIFICATIONS: DC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. AC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. DC Milliammeter: Ranges: 0-1, 0-10, 0-100, 0-1000 mA full scale. Ohmmeter: Ranges: X1, X100, X10k, X1M $\Omega$ . Power requirements: Two 9-volt batteries and 1 "C" cell (not supplied) or IPA-5280-1 Power Supply and 1 "C" cell. Dimensions: 11" W x 5 3/4" H x 7 3/4" D. Weight: 3 1/4 lbs.

**4** The Heath IB-5281 RCL Bridge is priced right for your pocket book and has the features that you can appreciate. Rugged solid state circuitry lets you easily determine unknown values of resistance (three ranges 10 $\Omega$  to 10M $\Omega$ ), inductance (three ranges 10  $\mu$ H to 10H), and capacitance (three ranges 10pF to 10 $\mu$ F). Easy single board assembly. With component clips.

Kit IB-5281, Shpg. wt. 5 lbs. . . . . **39.95**

IB-5281 SPECIFICATIONS: Resistance Ranges: 10 $\Omega$  to 10M $\Omega$  in three ranges. Inductance Ranges: 10 $\mu$ H to 10H in three ranges. Capacitance Ranges: 10 pF to 10 $\mu$ F 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 (not supplied) or IPA-5280-1 power supply. Dimensions: 11" W x 5 3/4" H x 7 3/4" D. Weight: 3 1/2 lbs.

**5** A great addition to your trouble shooting arsenal is the IT-5283 Signal Tracer. Features a dual function RF probe that lets you quickly trace and reveal stage and component failures in RF equipment. In its straight through position, you can trace all types of audio components and circuitry. Flip the IT-5283 to its audible ohmmeter position and easily trace signal flow through logic circuits.

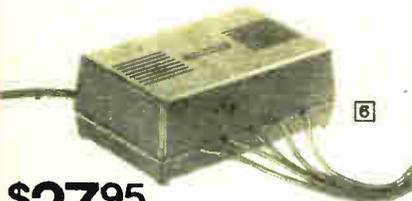
Kit IT-5283, Shpg. wt. 5 lbs. . . . . **39.95**

IT-5283 SPECIFICATIONS: Functions: Substitute speaker, AF signal tracing, RF signal tracing, Audible volt/ohmmeter. Speaker: 3" permanent magnet. Power Requirements: Two 9-volt batteries (not supplied) or IPA-5280 power supply. Cabinet Dimensions: 11" W x 5 3/4" H x 7 3/4" D. Weight: 3 1/4 lbs.

**6** The IPA-5280-1 Power Supply provides all voltages required by 5280 series equipment. Features full wave rectification, capacitor filtering and dual integrated circuit regulation to insure correct voltage output. Powers all five instruments simultaneously and has handy switch which allows operation from either 110 or 220 VAC outlets, without rewiring.

Kit IPA-5280-1, Shpg. wt. 3 lbs. . . . . **27.95**

IPA-5280-1 SPECIFICATIONS: Output Voltage: +9 and -9VDC  $\pm$  9%. Maximum Output Current: 100 milliamps. Integrated Circuit and Diode Complement: UA78, UA79 regulator IC. IN-4002 silicon diode. Power Requirements: 100 to 135 VAC or 200 to 270 VAC, 50/60 Hz, 7 watts maximum. Dimensions: 6" H x 3 3/4" W x 3" D. Fuse: 1/16-amp, 3AG, slow-blow primary. Net Weight: 2 lbs.



**\$27<sup>95</sup>**

## 5280 Series Value

Heath's 5280 series presents an excellent low cost way to assemble your first bench. Each instrument offers simplicity of construction, good performance, and important "hands-on" learning experience. Once completed, you'll have test gear that you can not only be proud of but also gear that really gets the job done! And since they're priced at just \$39.95 each, you won't find a better value.

**New**



**wff 'n proof  
think tank games**

**The emphasis is not on *what*  
to think, but *how* to think!**

WFF 'N PROOF games are games of logic and skill. They're a fun and exciting way to develop fundamental skills in the areas of logic, language, science and mathematics. Like chess, the problems generated in these games become increasingly difficult as the skill of the players develops.

**WFF 'N PROOF** — a 21-game kit that teaches logic and develops habits of careful reasoning. Beginning games can be played by six year olds. A great way to make learning fun! ..... **\$12.00**

**ON-SETS** — a 30-game kit that introduces mathematical set theory by encouraging the players to creatively devise ways of using fundamental mathematical concepts. These games can be easily enjoyed by young learners, math students and by heretofore bewildered parents. .... **\$9.00**

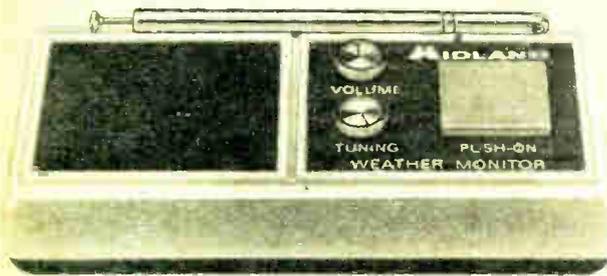
**ON-WORDS** — like other games in the WFF 'N PROOF series, ON-WORDS is actually several games ranging over a wide spectrum of difficulty, from levels of play appropriate for elementary school youngsters to the connoisseur of word puzzles and games. .... **\$6.00**

**QUERIES & THEORIES** — again, a series of games designed to assist the players in developing good questioning skills. An exciting way to teach that asking the right question is the most significant step in solving any problem. .... **\$12.00**

**PROPAGANDA** — an exciting game that teaches players not only *what* to think but *how* to think and how to get their ideas across to others. An intriguing game for teenagers and adults. .... **\$10.00**

**EQUATIONS** — a 5-game kit that puts excitement back into mathematics. The strategy and level of complexity are determined solely by the players. Ten-year olds will play the game at one level, adults at another. A fun way to build competence and positive attitudes towards mathematics. **\$9.00**

**New**



Only **\$11<sup>95</sup>**

**Portable VHF weather monitor — listen to  
official US Weather Service reports  
at the push of a button!**

This sensitive FM receiver picks up official reports and emergency weather broadcasts direct from the United States Weather Service on 162.40, 162.475 or 162.55 MHz. Just press the orange button for instant weather news. A great way to keep instantly informed of the changing weather situation in your area.

A fold-down telescoping antenna brings in signals from up to 40 miles away. Attractively styled in a two-tone ivory and brown cabinet with chrome accented walnut-grain faceplate. Powered by a 9 volt battery (included) so you can take your weather monitor with you everywhere.

**Model MID-901** ..... **\$11.95**

**Educational FUN  
for all  
AGES!**

**Steam  
Engine  
Kit**

**\$19<sup>95</sup>**

**SAVE  
\$10!**



**Miniature Steam Engine Kit**

Here's hours of fun for you and the kids; a real working replica of a fuel-fired steam engine. It's fun to watch and even more fun to operate. Just think of the fun you can have teaching the youngsters about steam propulsion. Great for science fairs, exhibits, etc. Safe too; solid fuel pellets are clean burning and easy to handle and store. All parts are constructed of top quality materials designed for years of use. The boiler is solid-brass beautifully nickel-plated. Measures 11½" x 14".

For even more fun, add the fully assembled scale operation machine shop consisting of a shaper, saw, forging hammer, drill press and milling machine. All machines are mounted on a solid wood base and connect to the power take off pulley of the steam engine.

**JEN-076, Steam Engine** ..... **Was 29.95 Now 19.95**

**JEN-100, Machine Shop (Assembled)** ..... **Was 39.95 Now 29.95**

**JEN-200, Extra Fuel** ..... **1.99**

# Heathkit Self-Instruction Electronics Courses

A truly effective way to learn electronics quickly

## The self-paced learning system designed to teach anyone about electronics

The people at Heath Company are experts in teaching complex subjects in a manner that just about anybody can understand. It's only natural that a company with years of experience should be the one to educate you in the exciting world of electronics. The Heath Continuing Education Series is designed to teach you everything you need to know about electronics technology in the shortest, simplest way possible. Thousands of people have already discovered the many advantages of the Heathkit learning method: Simple, straightforward instructions that take you step-by-step through the subject material *at your own pace*; crystal clear illustrations; audio records (or optional cassettes) to reinforce important concepts; hands-on experiments with electronic components and optional trainers; self-evaluation quizzes to gauge your progress; an optional final exam to test your overall comprehension; a Certificate of Achievement and award of Continuing Education Units when the final exam is successfully completed (passing grade 70%).

Heath's Self-Instruction Electronics Courses are complete self-contained learning systems. All you need is a record or cassette player, small hand tools and a VOM such as the IM-5284 on page 86. If you happen to have difficulty in understanding something, a complete staff of technical consultants is at your disposal just by dialing your phone or writing a letter. And one other important thing; The course and the trainer may qualify 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 compensation. In many instances, your employer may reimburse you in part or in total for taking these courses.

## Learning electronics has never been easier or more fun

Whether you're a total beginner or just brushing up, you'll enjoy these courses. And you'll appreciate the many benefits that come from an education in the dynamic field of electronics.

Read on and get started today in what could prove to be a whole new way of life.

Courses start as low as **\$24.95** (less trainer)

## Experimenter/Trainers for hands-on learning

It's an acknowledged fact that you learn by doing. That's why we've made available two optional Experimenter/Trainer kits. They're perfect for the projects and experiments you'll be doing with your courses. And after

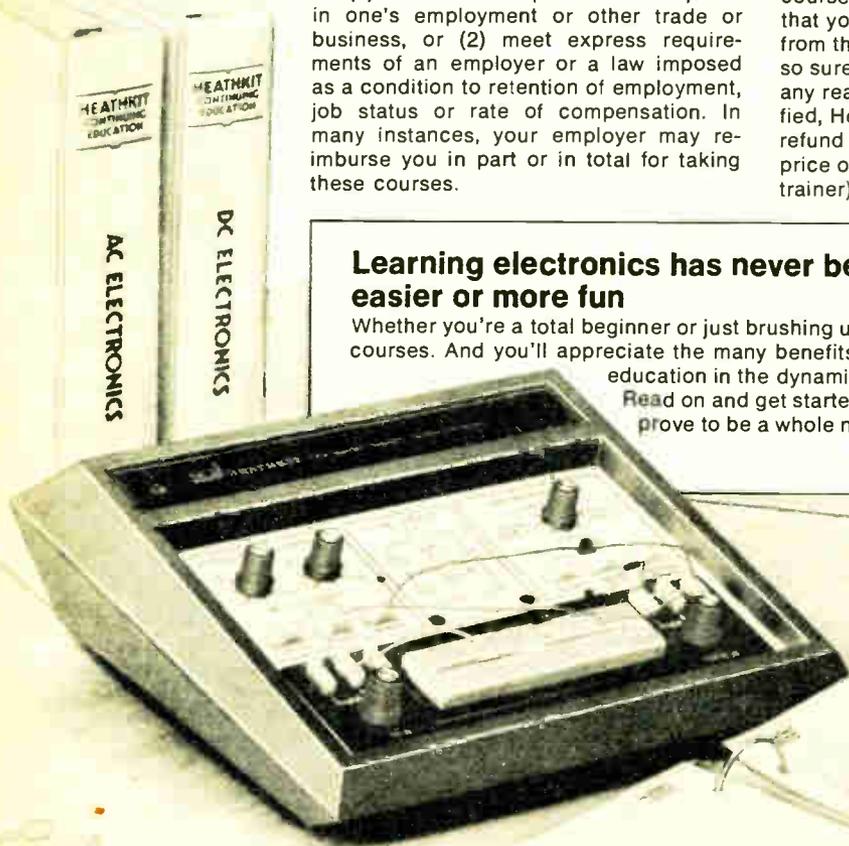
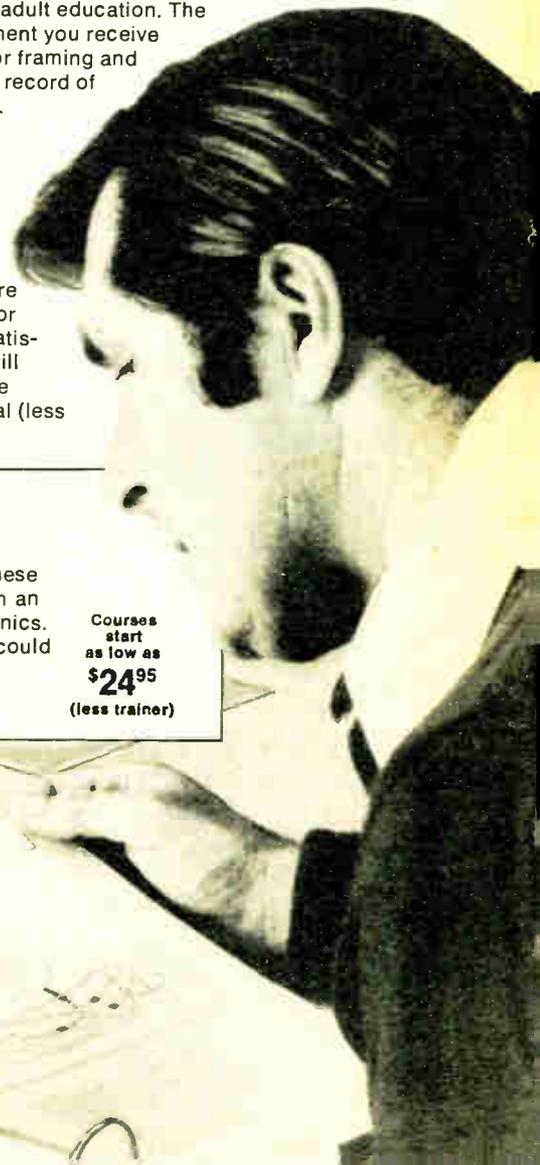
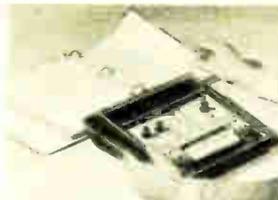
you've completed the courses, they're invaluable for "breadboarding" your own design projects.

## CEU's

After completing your course studies, you may choose to take the optional final exam. A passing grade of 70% or better on the exam earns you a Certificate of Achievement and Continuing Education Units (CEU's). CEU's are a nationally recognized means of acknowledging your participation in formal adult education. The Certificate of Achievement you receive is handsome enough for framing and serves as a permanent record of your accomplishments.

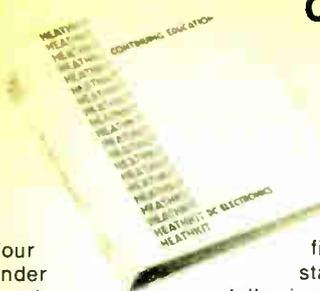
## Money-Back Guarantee

We're sure that you'll enjoy taking these courses and we know that you'll benefit from them as well. We're so sure, in fact, that if for any reason you're dissatisfied, Heath Company will refund the full purchase price of the text material (less trainer).



## Course 1: DC Electronics

A basic introduction to electrical fundamentals, theory and practice. You learn how to solve basic problems involving voltage, current, resistance and power; build and experiment with DC circuits of your own design; explain the relationship between voltage, current and resistance and much more.



Your first step on the way to a complete understanding of electronics, Course 1 covers the following: Electron theory; current flow; voltage; resistance; Ohm's Law; magnetism; electrical measurements; network theorems; inductance and capacitance. In addition to that mentioned above, you will learn the relationship between electricity and magnetism and you will be able to solve basic electronic problems involving current, voltage, resistance and power, convert from one metric prefix to another and work with powers of ten, build and experiment with basic DC circuits of your own design, explain the construction, operation and function of resistors, potentiometers, switches, fuses, relays, capacitors, inductors and batteries. You will also be able to use a multimeter to measure voltage, current and resistance, draw equivalent circuits using a diagram as a guide, and construct DC circuits from a schematic diagram. As you complete each section of the course, quizzes let you test your retention. Ultimately, you have a detailed knowledge of basic DC electronics in

just a very short time. Includes text, records and 56 electronic components for 20 experiments.

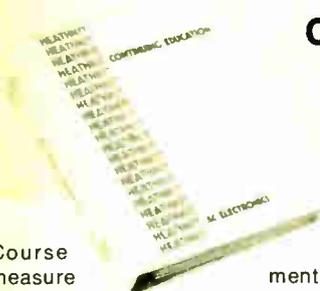
If you choose to take the optional final exam, a passing grade of 70% or better earns you 2.0 Continuing Education Units and a Certificate of Achievement. Course 1 paves the way for Heath's more advanced electronics courses and could very well open up a new world of opportunity for you. Get started today in an exciting field that is full of reward for the well-educated person. You won't be sorry you did.

ONLY  
**\$39<sup>95</sup>**

Course EE-3101, Shpg. wt. 6 lbs. .... 39.95  
 EEA-3101, Optional Cassettes\*,  
 Shpg. wt. 2 lbs. .... 6.95  
**SAVE \$9.95! EES-3101, Program with Kit Trainer.**  
 Shpg. wt. 18 lbs. .... 94.95

## Course 2: AC Electronics

Explains alternating current principles and theory. You'll learn how to analyze AC circuits containing resistance, capacitance and inductance; explain the operation of series and parallel resonant circuits; explain basic transformer and AC generator operation and more.



Course 2 covers AC fundamentals; AC measurements; capacitive circuits; inductive circuits; transformers and tuned circuits. In addition to that mentioned above, you will learn to explain the difference between AC and DC, describe the operation of a simple AC generator, explain basic transformer action, explain the operation of series and parallel resonant circuits, determine the average or effective value of an AC sine wave when its peak or peak-to-peak value is known, determine the frequency of an AC waveform when its period is known, explain how AC meters are used to measure current, power and voltage, analyze simple AC circuits that contain resistance or a combination of resistance, capacitance or inductance, describe the electrical properties of capacitance and inductance and more. Course

1 or equivalent knowledge is the prerequisite for this course. Includes text, records and 16 electronic components for 8 experiments.

If you choose to take the optional final exam, a passing grade of 70% or better earns you 1.5 Continuing Education Units and a Certificate of Achievement. With Course 2 completed, you have the basis for understanding the more complex areas of modern electronics.

ONLY  
**\$39<sup>95</sup>**

Course EE-3102, Shpg. wt. 6 lbs. .... 39.95  
 EEA-3102, Optional Cassettes\*,  
 Shpg. wt. 2 lbs. .... 6.95  
**SAVE \$9.95! EES-3102, Course with Kit Trainer.**  
 Shpg. wt. 18 lbs. .... 94.95

## Heathkit Basic Experimenter/Trainer Kit

For the Heathkit DC, AC, Semiconductor and Electronic Circuits courses — helps you perform each experiment quickly and easily. And after you finish the course, it's ideal for "breadboarding" your own design projects. Has solderless breadboarding sockets, 2-range variable sine and square wave (200-20,000 Hz) signal source, dual-variable power supplies for positive and negative voltages (both variable over 1.2 to 16 volts, 120 mA, both regulated and short-circuit protected), 1k and 100k linear potentiometers. Center tapped transformer provides 30 V rms, 60 Hz for line experiments. For 120 VAC, 60 Hz or 240 VAC, 50 Hz.

Kit ET-3100, Shpg. wt. 5 lbs. .... 64.95  
 ETW-3100, Factory Assembled Trainer. Shpg. wt. 5 lbs. .... 109.95

**\$64<sup>95</sup>**



\*Optional Cassettes duplicate material on records, but in convenient, easy-to-use cassette format.

## Course 3: Semiconductor Devices

The heartbeat of solid-state electronics; semiconductors. Learn about the technological revolution that reshaped the electronics world. When you've finished Course 3 you'll be able to name the primary advantages that semiconductors have over vacuum tubes; explain how most important semiconductors operate and how they are constructed; recognize the schematic symbols used to represent the wide variety of semiconductors now in use and a great deal more.

Learn how semiconductor devices are used in actual circuits

- Bipolar Characteristics
- FET's
- Thyristors
- IC's
- Optoelectronic Devices
- Fundamentals
- Diodes
- Zener Diodes
- Special Diodes
- Bipolar Transistor Operation

One of the most important of the Heathkit Self-Instruction Courses. Course 3 covers semiconductor fundamentals; diodes; Zener diodes; special diodes; bipolar transistor operation; bipolar characteristics; field effect transistors; thyristors; integrated circuits and optoelectronic devices. You'll learn in addition to what is mentioned above; how to describe the electrical characteristics of semiconductor materials, how to properly handle sensitive semiconductor materials, how to recognize the most commonly used semiconductor devices, and how to test various semiconductors for proper operation. Proceed step-by-step at the rate you establish a no pressure learning environment that lets you study when you have the time

and progress when you feel you're ready. We think it's one of the easiest ways to learn this challenging course. Prerequisites are Courses 1 and 2 (or equivalent knowledge). Included are texts, records and 27 electronic components for 11 experiments

If you choose to take the optional final exam, a passing grade of 70% or better earns you 3.0 Continuing Education Units and a Certificate of Achievement. The knowledge gained in Course 3 is invaluable to anyone interested in today's state-of-the-art electronics technology

ONLY  
**\$39<sup>95</sup>**

Course EE-3103, Shpg. wt. 6 lbs. .... **39.95**  
EEA-3103, Optional Cassettes\*,  
Shpg. wt. 2 lbs. .... **6.95**  
EES-3103, Course with Trainer,  
Shpg. wt. 18 lbs. .... **94.95**

SAVE ETS-3114. All four programs and Trainer.  
**\$29<sup>80</sup>** Shpg. wt. 31 lbs. .... **209.95**

## Course 4: Electronic Circuits

Teaches you basic transistor circuitry including amplifiers, oscillators, filters and pulse shapers; explains amplitude and frequency modulation; shows you how to construct transistor and integrated circuit amplifiers, oscillators and other common solid state circuits.

Explains the operation of all the most common solid-state electronic circuits

- Basic amplifiers
- Typical amplifiers
- Operational amplifiers
- Power supplies
- Oscillators
- Pulse circuits
- Modulation

Course 4 instructs you in the operation of all the most common solid state electronic circuits. You study basic amplifiers; typical amplifiers; operational amplifiers; power supplies; regulators; oscillators; pulse circuits; modulators and demodulators. In addition to that mentioned above, you will learn to analyze and design simple inverting and non-inverting amplifiers that use operational amplifiers, discuss the basics of oscillation and identify and describe the operation of commonly used LC, RC and crystal oscillators. You will learn about pulse circuits and multivibrators. Then you will study amplitude and frequency modulation including SSB. You will also

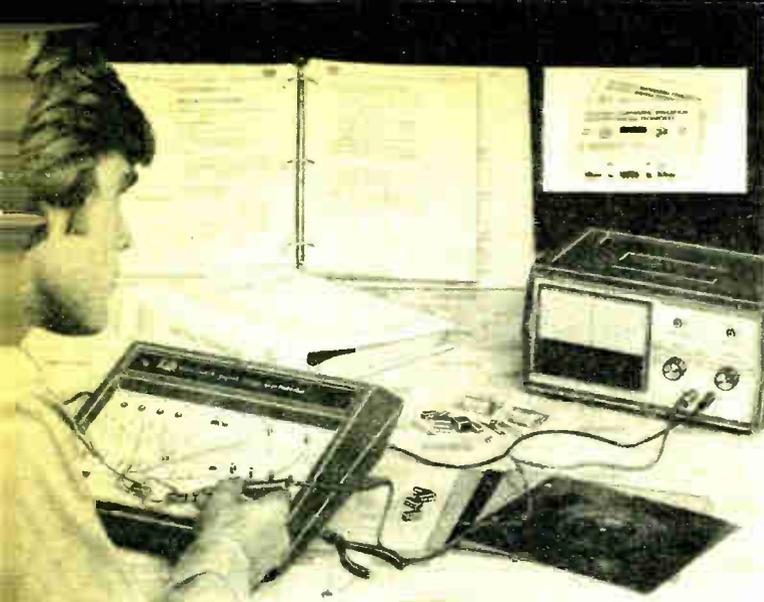
learn how to use a voltmeter and an oscilloscope to analyze the operation of electronic circuits. Course 4 brings all the theory of your first three courses together and shows you how it applies in actual circuit operation. Prerequisites are Courses 1 through 3 (or equivalent knowledge). Included are texts, records and over 110 electronic components for 18 experiments.

If you choose to take the optional final exam, a passing grade of 70% or better earns you 4.0 Continuing Education Units and a Certificate of Achievement.

ONLY  
**\$49<sup>95</sup>**

Course EE-3104, Shpg. wt. 8 lbs. .... **49.95**  
EEA-3104, Optional Cassettes\*,  
Shpg. wt. 1 lb. .... **6.95**  
EES-3104, Course with Kit Trainer,  
Shpg. wt. 14 lbs. .... **109.95**

\*Optional Cassettes duplicate materials on records, but in convenient, easy-to-use cassette format.



- **Introduction:** techniques and uses, binary numbers, digital codes.
- **Semiconductor Devices for Digital Circuits.**
- **Digital Logic Circuits:** AND gates, OR gates, NAND/NOR logic, etc.
- **Digital Integrated Circuits:** TTL, ECL, CMOS, NMOS, PMOS, how to choose.
- **Boolean Algebra.**
- **Flip-Flops and Registers:** latches, D & JK flip-flops, storage registers, applications.
- **Sequential Logic Circuitry:** binary, BCD modulo N, up/down, counters, dividers, shift registers.
- **Combinational Logic Circuits:** encoders, decoders, exclusive OR, comparators, multiplexers, ROM's, PLA's.
- **Digital Design:** combinational and sequential circuits, procedures.
- **Digital Applications:** counters, computers, microprocessors.

The basis for most modern electronic systems is digital techniques. Course 5 covers fundamentals and theory; uses; digital logic circuits; digital integrated circuits; Boolean algebra: flip flops and registers; sequential logic circuitry; combinational logic circuitry and digital design. You'll also learn to discuss the advantages of using digital techniques, to convert between binary and decimal number systems and to recognize the binary codes, discuss the operation and applications of binary and BCD counters, shift registers and other sequential logic circuits; use Boolean algebra to express logic operations and minimize logic circuits in design, name the major components used in implementing digital circuits and explain how they operate, explain the operation of flip-flops, design both combinational and sequential logic circuits for a given application from definition and concept to the selection of the integrated circuits and discuss the operation and application of digital counters in time and frequency measurements. The course covers in short, everything from TTL and CMOS to ROMs, PLAs, microprocessors and computers. Average completion time for Course 5 is 40 hours. A prior knowledge of electronics (such as the Heathkit Courses 1 thru 4) is required but the course can be successfully completed by those with math or science backgrounds. Includes texts, records and 44 electronic components for 24 experiments. The ET-3200 Digital Trainer is required for performing the experiments.

If you choose to take the optional final exam, a passing grade of 70% or better earns you 4.0 Continuing Education Units and a Certificate of Achievement. Digital Technology is being used today in everything from satellites to telephone communications to your home bathroom scale. Its future applications promise to be even more widespread. Learn about this fascinating aspect of ultra-modern electronics in our Digital Techniques Course.

# Digital Techniques

The most advanced of Heath's courses and the nucleus of future electronics; digital electronics. You'll learn the operation of digital logic circuits and the major applications of digital techniques in electronics. Everything from TTL and CMOS to ROMs, PLAs, microprocessors and computers. A *must* course for those who *must* be up to date.

ONLY \$49<sup>95</sup> Course EE-3201, Shpg. wt. 9 lbs. . . . . 49.95  
 EEA-3201, Optional Cassettes\*,  
 Shpg. wt. 2 lbs. . . . . 6.95

Note: Heath recommends the use of the IM-5284 multimeter (page 86) and an oscilloscope such as the IO-4541 (page 69) with this course.

\*Optional Cassettes duplicate material on records, but in convenient, easy-to-use cassette format.

## Versatile Digital Trainer

A must addition to your EE-3201 Digital Techniques course. The ET-3200 Trainer rounds out your education and provides the "hands-on" experience necessary for your proper understanding of digital devices and operations. Use the ET-3200



to perform all the experiments in the Heath Digital Techniques Course develop projects, build and test prototypes, verify circuit operation and check digital IC's. Has solderless breadboard sockets for experimentation and design, four binary data switches, 2 "no-bounce" switches to pulse logic circuits, 3-frequency pulse clock generator and 4 LED's for visual indication of logic states. The ET-3200 also contains three regulated power supplies with outputs of +12 VDC @ 100 mA, -12 VDC @ 100 mA and +5 VDC @ 500 mA. Each output features current limiting and is overload protected for safe operation. Breadboard sockets accommodate up to eight 14 or 16-pin dual-in-line ICs, also 24, 28, and 40-pin DIPs. For 120 VAC, 60 Hz.

Kit ET-3200, Shpg. wt. 6 lbs. . . . . 84.95  
 ETW-3200, Factory assembled, Shpg. wt. 6 lbs. . . . . 129.95

Save \$9<sup>95</sup>

\$124<sup>95</sup>

If purchased separately, \$134.90

SAVE when you order the Digital Techniques course with the ET-3200 Digital Trainer.

EES-3201, Course and Trainer Together, Shpg. wt. 20 lbs. . . 124.95

## Amateur Radio Novice License Course

From Heath — world leader in Amateur Radio Equipment — a self-instruction course guaranteed to help you get your Novice ticket! In fact, it's so effective that if you fail to pass your FCC exam after completing the course — we'll REFUND your money for the course text material!

**\$24<sup>95</sup>** *There's no better way to learn about Amateur Radio!*



Now — for CB'ers, electronic hobbyists, anyone interested in operating world-wide two-way Amateur radio equipment — Heath makes it easier than ever! This deluxe course prepares you for the Amateur Radio Novice FCC exam, and provides you with helpful guidelines for setting up and operating your own station once you pass the exam. The course includes a programmed learning text, two audio cassettes (see page 102 for cassette recorder player) to reinforce text material and provide Code practice, helpful aids for operating your station.

Course ER-3701, Shpg. wt. 7 lbs. .... 24.95

**\$32<sup>95</sup>**

SAVE \$4.95! ER-3701 and HD-1416 Code Practice Oscillator, plus 10% discount certificate (see pg. 57). If purchased separately \$37.90.

**SAVE \$4.95**

ERS-3701, Shpg. wt. 8 lbs. .... 32.95

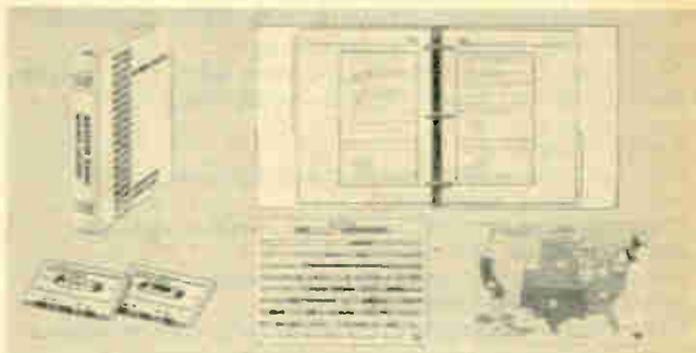


## New Effective soldering manual and kit

Heath's new EI-3133 Soldering Manual and Kit teaches you the techniques necessary for high reliability soldering in all electronics applications. Using a proven programmed instruction format, the text covers mechanical connection, tinning, temperature control and much more. And to give you "hands-on" experience for really effective learning, a handy practice kit has been included. Great for individuals or schools and industry and a great first kit-building experience. Requires soldering iron and small hand tools.

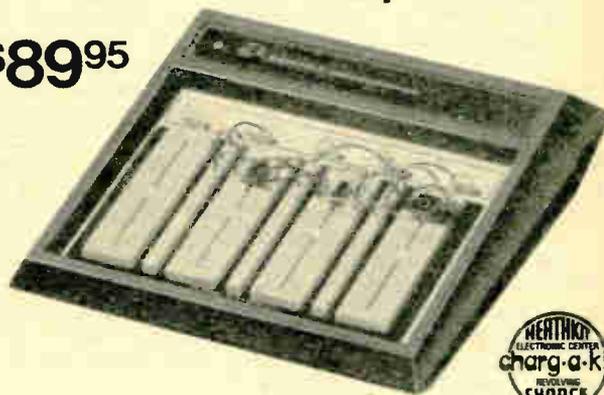
Course EI-3133, Shpg. wt. 2 lbs. .... 9.95

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## Convenient Laboratory Breadboard

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



Makes basic circuit designing a breeze. Solderless sockets and a built-in power supply makes hook-up and teardown quick and easy. It can even be used to test electronic components.

Kit ET-3300, Shpg. wt. 5 lbs. .... 89.95

Assembled ETW-3300, Shpg. wt. 6 lbs. .... 150.00

ET-3300 SPECIFICATIONS; OUTPUTS: +5 VDC @ 1.5 amps; +12 VDC @ 100 mA; -12 VDC @ 100 mA. REGULATION: Load. Less than 2% variation from no load to full load on all supplies. CURRENT LIMITING: Fixed current limiting of each supply at rated current provides short-circuit protection. POWER REQUIREMENT: 120/240 VAC 60/50 Hz 30 watts at full load. SIZE: 3½" H x 12" W x 12" D



## HEATHKIT SELF-INSTRUCTIONAL COMPUTER COURSES

These Heathkit self-instructional courses are designed to help you get the most from your computer investment, whether you buy your computer hardware from Heath or anywhere else. While many predeveloped software programs are available, the only way to realize the full value of your personal computer is to learn programming yourself. These courses use the PROVEN Heathkit individual learning techniques to give you a thorough understanding of programming, even if you have no prior knowledge or experience. They'll show you exactly how to make your personal computer system really personal!

### BASIC PROGRAMMING SELF-INSTRUCTIONAL COURSE

This course teaches you how to program your computer using the popular BASIC language. BASIC (Beginner's All-Purpose Symbolic Instruction Code) is essential for hobby and personal computing; it is also widely used in education and business. The course covers all formats, commands, statements and procedures plus the creative aspects of computer programming, so you can make practical use of it in solving problems and creating your own unique programs. Like other Heathkit self-instructional courses, it uses programmed instructions backed by

practical hands-on computer experiments and demonstrations to reinforce and personalize the text material. An optional final exam (passing grade 70%) brings you a Certificate of Achievement and 3.0 Continuing Education Units\* While the BASIC course is keyed to Heathkit computers, it is also equally applicable to any computer system using BASIC.

**EC-1100**, Shpg. wt. 6 lbs. .... **29.95**

\*Continuing Education Units (CEU's) are nationally recognized means of acknowledging participation in non-credit adult education.

### COMING SOON!

**8080 Programming.** Teaches you the machine and assembly language used with 8080-based computers. Shows you how to use the editor, assembler and debug software to create efficient programs. Ideal for the H8 and other 8080A based machines. Coming soon.

**LSI-11 Programming:** Shows you how to use editor, assembler, linker, debug and executive I/O software to create efficient programs. Applicable to H11 and most other Digital Equipment Corporation PDP-11 series computers.

Coming soon.

### APPLICATIONS SOFTWARE FOR YOUR H8

The H8 Digital Computer is supplied with complete systems software that provide you with everything you need to develop your own specific applications programs. However, you can make your computer immediately useful by using the programs below. These programs represent the beginning of a complete series of application software packages that will allow you to get immediate value from your computer system without a time consuming software development effort on your part. Described below are a series of game packages that make your computer an excellent source of entertainment and leisure time activities. These games are supplied on H8 compatible 1200 band audio cassettes.

**BIORHYTHM.** This popular applications program computes standard biorhythm information and plots sinusoidal curves of your physical, emotional, and intellectual characteristics over a given time period. The biorhythm program will show you your ups and downs and will tell you your good and bad days. It will help you plan

your activities. While this program is not a game, it is an entertaining activity that you and your friends and family will enjoy. The program runs under extended BASIC and requires 16K of RAM.

**PA-82**, Shpg. wt. 1 lb. .... **10.00**

**SPACE WAR.** This is perhaps the most popular computer game available. It allows you to guide, control and command the Starship Enterprise in its travels through the galaxy, fighting Klingons and solving a variety of problems. A truly challenging, sophisticated and entertaining computer game. Requires 24K RAM.

**PA-83**, Shpg. wt. 1 lb. .... **10.00**

**GAME SET #1.** This software package lets you play 8 popular computer games. These games include Craps, Orbit, Tic Tac Toe, Nim, Hexapawn, Hangman, Hmrabi, and Derby. 8K RAM or more is required. These games will provide hours of entertainment for you and your family.

**PA-84**, Shpg. wt. 1 lb. .... **10.00**

### COMPLETE COMPUTER LIBRARY

Microcomputer Dictionary and Guide (Matrix). Definitions and basic info on computers and related topics. EDP-218 ..... 17.95  
 Introduction to Microcomputers Vol. I (Osborne). EDP-224 ..... 7.50  
 Introduction to Microcomputers Vol. II (Osborne). Complete descriptions of all popular microprocessors. EDP-225 ..... 15.00  
 How to Buy and Use Minicomputers and Microcomputers (Sams). A fundamental text on operation. EDP-227 ..... 9.95  
 TV Typewriter Cookbook (Sams). Good text explaining I/O terminals, interfacing, etc. EDP-226 ..... 9.95  
 Bugbook III (E&L). Superior reference source on 8080 interfacing and programming. Includes experiments. EDP-231 ..... 16.00  
 Bugbook IIA (E & L). Serial I/O concepts and terminal interfacing. EDP-232 ..... 5.00  
 8080 Programming for Logic Design (Osborne). EDP-229 ..... 7.50  
 8080 Software Gourmet Guide and Cookbook (Scelbi). Excellent source for 8080 programs and subroutines. EDP-228 ..... 9.95  
 Practical Microcomputer Programming: 8080 (Northern Technology). Machine/Assembly programming. EDP-235 ..... 21.95  
 6800 Programming for Logic Design (Osborne). EDP-230 ..... 7.50  
 6800 Software Gourmet Guide and Cookbook (Scelbi). Excellent source of commonly used 6800 programs. EDP-233 ..... 9.95  
 6800 Microprocessor Applications Manual (Motorola). Comprehensive review of typical 6800 applications. EDP-244 ..... 25.00  
 M6800 Program Reference Manual (Motorola). EDP-245 ..... 3.00  
 Minicomputer Systems: Organization and Programming (Prentice-Hall). Emphasis on the PDP-11. EDP-238 ..... 17.95  
 PDP-11 Programming (Algonquin). A programmed instruction text teaching operation and programming of the PDP-11. EDP-239 5.00  
 The Minicomputer in the Laboratory (Wiley). Operation, programming and applications of PDP-11 computers. EDP-246 ..... 19.50  
 Assembly Level Programming (Lexington). EDP-236 ..... 14.95  
 101 BASIC Computer Games (DEC). A classic. Have fun with your computer. EDP-237 ..... 7.50  
 BASIC Software Library, Vol. I. Complete lists of BASIC applications, bookkeeping games, pictures (graphics). EDP-240 ..... 24.95  
 BASIC Software Library, Vol. II. Math, engineering, plotting and statistical programs in BASIC. EDP-241 ..... 24.95  
 BASIC Software Library, Vol. III. Advanced business applications programs in BASIC. EDP-242 ..... 39.95  
 BASIC Software Library, Vol. IV. Games and business applications programs in BASIC. EDP-243 ..... 9.95  
 BASIC Software Library, Vol. V. Games, graphics, and useful math programs in BASIC. EDP-251 ..... 9.95  
 Minicomputers: Structure and Programming (Hayden). EDP-260 ..... 13.95  
 BASIC Workbook (Hayden). EDP-261 ..... 5.50  
 Your Home Computer (Dymex). EDP-252 ..... 6.00  
 Home Computers: 210 Questions and Answers.  
 Vol. I. Hardware (Dillithium). EDP-253 ..... 8.95  
 Vol. II. Software (Dillithium). EDP-254 ..... 8.95  
 Some Common BASIC Programs (Osborne). EDP-255 ..... 7.50  
 How to Program Microcomputers (Sams). EDP-256 ..... 8.95

# New

## Microprocessor Course and Computer Trainer

If you're involved in scientific or electronic pursuits, microprocessors are becoming a way of life and a dominant factor in your success or failure. The EE-3401/ET-3400 course and accompanying trainer is the way to learn microprocessor operation and application techniques. EE-3401 uses proven self-instructional techniques to teach programming, interfacing and related topics. The ET-3400 Trainer provides the ideal platform for experimentation and later, your own prototyping and design. This is a learning package you can't afford to miss.

### 1 Learn Microprocessor Operation, Application and Interfacing

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

*Covers microprocessor basics, computer arithmetic, programming, interfacing and much more, requires knowledge of electronics equivalent to Heath's Digital Techniques Course*

Using Heath's proven self-instruction techniques, EE-3401 adopts a three phase approach to guide you, step-by-step, through the complexities and power of machine language programming, hardware I/O interfacing and microprocessor theory and design applications. Phase I, presented in 8 lessons, utilizes concise self-study texts to cover: Number systems and codes, micro-computer basics, computer arithmetic, introduction to programming, the 6800 microprocessor (part I), the 6800 microprocessor (part II), Interfacing the microprocessor, (part I), and interfacing the microprocessor (part II). Colorful audio and visual presentations are combined in Phase II's six lessons to further enhance your knowledge of such subjects as programming, designing with microprocessors and semiconductor memories. Phase III of EE-3401 provides 19 informative experiments through which valuable "hands-on" experience is gained. The ET-3400 Trainer is utilized and experiments are divided into programming and interfacing applications. Experiments cover program branches, address decoding, arithmetic and logic instructions and introduction to the peripheral interface adaptor and much more. EE-3401 comes complete with 62 electronic components including two 2112 256X4 RAM's, 1406 digital-to-analog converter, 741 and 301 op amps, and a variety of other microprocessor oriented devices. No additional components are necessary to carry out the experiments provided with this program. Upon passing the optional final exam (passing grade 70%) you will receive a Certificate of Achievement and 8.0 CEU's.

Course EE-3401, Shpg. wt. 10 lbs. .... 89.95

Save **\$9<sup>95</sup>**

**\$279<sup>95</sup>**

If purchased separately, \$289.90

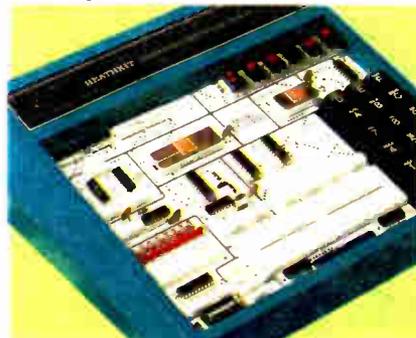
SAVE when you order the Microprocessor Course with the ET-3400 Microprocessor Trainer.

**ETS-3400, Course and Trainer Together,**

Shpg. wt. 16 lbs. .... 279.95



### 2 Digital Microprocessor trainer for experimentation and design



- Uses 6800 Micro-processor
- Built in 1k ROM monitor program
- 256 bytes of RAM
- Breadboarding socket for prototyping

**\$199<sup>95</sup>**

*Use with Course EE-3401 for an up-to-date computer education*

Functioning as a miniature digital computer, the ET-3400 Microprocessor Trainer has been designed to compliment your EE-3401 Microprocessor Course and provide an ideal platform upon which you may easily and enjoyably expand your knowledge of microprocessor programming and interfacing techniques. In addition, the ET-3400 provides you with plenty of breadboarding capability for experimentation, prototyping and system design.

The ET-3400 is based on the popular 6800 microprocessor and key features include: 1. A built-in 1k ROM monitor program for controlling unit operation. 2. 6 digit hexadecimal 7 segment LED display for address and data readout. 3. 17 key hexadecimal keyboard for entering programs, data and control of the unit. 4. 256 bytes of random access memory (RAM), expandable to 512 bytes with RAM's supplied in course. 5. Breadboarding socket for prototyping, interfacing and memory circuits. 6. 8 buffered binary LEDs for display of breadboard logic states. 7. 8 SPST DIP switches for binary input to breadboarded circuits. 8. +5, +12 and -12 VDC power supply outputs. 9. All microprocessor address, data, and control busses buffered and terminated on the front panel for ease of connection to prototyped circuits. 10. Provision for a 40 pin external connector for extending memory and I/O capability.

Trainer ET-3400, Shpg. wt. 6 lbs. .... 199.95

# Presenting Heathkit Computers—the Hardware/Software Systems you NEED to get up and running right!

The new value standard in personal computing systems featuring two powerful computers with exclusive Heath-designed software plus full documentation and service support

**Heath company** has been interested and involved in personal computing since we first marketed an analog computer system all the way back in 1957. This continuing interest, along with recent technological developments that have made personal computing systems a practical reality to the general public, has resulted in two "total design" computer systems that give you more power, performance and reliability for your computer dollar. The Heathkit computer systems give you everything you need to get up and running fast, with complete peripherals, I/O accessories, memory expansion and easy-to-use systems software, plus documentation that's the finest available anywhere.

**Total System Design!** The Heathkit computer line, both hardware and software, has been designed from the ground up to be a total computing system that meets the needs of both the beginning and advanced computer hobbyist. The two mainframes are based on performance-proven microcomputers, the 8080A and the LSI-11. These CPU's were chosen because of their world-famous performance, reliability and efficiency, and the tremendous amount of existing software, documentation and source materials that are available. The Heath-designed CRT terminal, paper tape reader/punch, and serial and parallel interfaces make total system setup fast and easy, and the Heath-designed software provided assures immediate usefulness and versatility.

**Superior Software!** Each Heathkit computer system is supplied with complete systems software to help you start writing your own programs right away. Software is the "heart" of any computer system, and because the Heathkit software has been designed specifically for the Heathkit hardware, you get a complete computer system of unparalleled efficiency, versatility and effectiveness!

**Superior Documentation!** Heath company is world-famous for the accuracy and clarity of its instruction manuals. The Heath computer line continues this well-deserved reputation. Assembly, operations and software manuals are written with easy-to-understand step-by-step instructions and full illustrations that leave nothing to chance or interpretation. Simply follow the instructions in the manual and you'll be up and running fast.

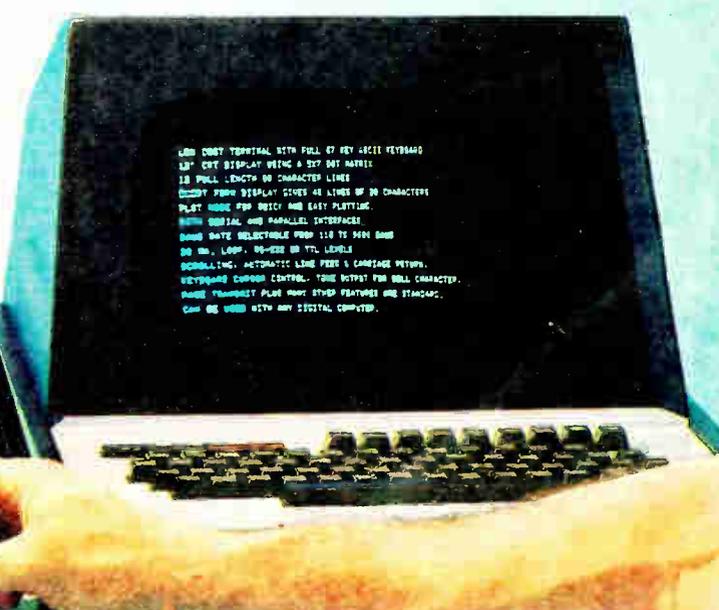
**Service and Support!** As in all Heathkit products, easy self-service and troubleshooting are definite benefits that can re-

sult in substantial cost-savings over the life of the product. These considerations, along with nationwide service and technical assistance at Heathkit Electronic Centers or the Heathkit factory, mean that you have the most reliable protection for your computer investment available anywhere.

**System Versatility!** Both Heathkit computers offer full expansion potential and adaptability to meet any application. Mass storage capability is available in both audio cassette and paper tape format on the H8 and in paper tape format on the H11. Additional memory expansion boards can be added to either unit, along with an expanding number of I/O devices.

**Continuing Development.** Heath will continue to design and develop new compatible products to make their computer systems even more valuable to you. Coming in the future will be — floppy disk storage, hard copy printer, additional memory and I/O interfaces and self-instructional courses in programming. All Heathkit computer users are eligible for HUG, the Heath User's Group. Heathkit H11 customers are also eligible to join DECUS™, the Digital Equipment Corporation User's Society.

We're confident you'll find the Heathkit computer line one of the most intelligent, sensibly developed and complete product lines available today. It offers you total versatility and expansion capability to go wherever your imagination and programming prowess takes you. And, in the Heathkit tradition, it offers the best price/performance and reliability combination you'll find anywhere.



```
LINE CRISP TERMINAL WITH FULL 87 KEY ASCII KEYBOARD  
LST CRT DISPLAY BEING A EXT 801 MATRIX  
18 FULL LENGTH 80 CHARACTER LINES  
SECOND PAPER DISPLAY SIZES 48 LINES OF 80 CHARACTERS  
PLOT MODE FOR QUICK AND EASY PLOTTING.  
WITH SERIAL AND PARALLEL INTERFACES  
BASE DATE SELECTABLE FROM 10 TO 9999 DATE  
DO IN. LOOP. W/USE UP TTL LEVELS  
SCROLLING, AUTOMATIC LINE FEED & CARriage RETURN.  
VERTICAL CURSOR CONTROL. THE INPUT FOR FULL CHARACTER.  
PAPER TRANSMIT PLUS MANY OTHER FEATURES AND STANDAC.  
CAN BE USED WITH ANY DIGITAL COMPUTER.
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HEATHKIT

# THE HEATHKIT H8 COMPUTER

The powerful, easy-to-use personal computer with the "intelligent" front panel featuring octal entry keyboard and digital readout — plus a fully wired and tested 8080A CPU and system software (BASIC, assembler, editor and debug) at no extra cost!

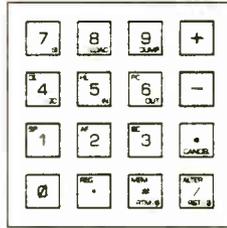
**\$395<sup>00</sup>**  
Kit

Requires at least one H8 memory board to operate

**6 EVENING KIT**  
Fast, Easy Assembly

The Heathkit H8 Computer is a powerful 8-bit machine based on the 8080A CPU. It's combination of unique features and low cost makes it an outstanding value among general purpose computers. Because of its expansion capabilities, it's a computer system you can stay with. Unlike many of the so-called low-priced "all-in-one" packaged systems, the H8 lets you add memory and peripherals to increase its power and versatility as you increase your programming prowess.

The 16-key front panel keyboard provides octal data entry giving you direct access to registers and memory, one-button program load and dump, and I/O keys for direct communication with any port. Because of this intelligent front panel, the H8 and a simple 4K of memory makes a ideal computer trainer.



The 9-digit octal readout gives you far more information than conventional computers. Memory, register and I/O port displays are continuously updated even while your programs are executing for direct monitoring of program activity.



Memory Display



Register Display



I/O Port Display

Complete front panel functions include display and alter of memory locations, display and alter of registers, dynamic monitoring of memory locations or registers, program execution control, automatic tape load and store through a built-in routine that permits one-button program loading or dumping, and write or read any I/O port.

The H8 is supplied with complete systems software in 1200 baud audio cassette form to get you up and running fast. Benton Harbor BASIC, HASL-8 2-pass absolute assembler, TED-8 line-oriented text editor, and BUG-8 terminal console debug program let you begin communicating with the H8 right away. See next page for a rundown of this powerful software.



Complete systems software included!

Other features of the H8 include: exclusive Heath-designed 50-pin fully buffered bus; mother board with positions for up to 9 plug-in circuit boards that accept the CPU, front panel memory, I/O and other accessory cards; built-in convection cooled power supply; built-in speaker for audible feedback and special effects; front panel status lights and more. The CPU board is fully wired and tested for easy system setup and kit assembly. The H8 is housed in a heavy-duty metal cabinet with modern, high-impact structural foam side panels. 16¼" W x 6½" H x 17" D. Switch-selected 120/240 VAC, 50/60 Hz. Requires at least one H8-1 memory board to operate.

Kit H8, Shpg. wt. 30 lbs. . . . . 395.00



**H8-1 Memory Board.** 8Kx8 memory card supplied with 4K memory, plugs directly into H8 bus. Features maximum storage capacity of 8192 8-bit words. Uses modern 4Kx1 static memory IC chips for easy assembly and service. Access time, less than 450 nS. With on-board regulators, heat sinks and full buffering. Expandable to 8K memory with H8-3 chip set below.

Kit H8-1, Shpg. wt. 2 lbs. . . . . 150.00

**H8-3 Chip Set.** Kit of eight 4K static memory IC's. Expands H8-1 to full 8K storage. With sockets.

Kit H8-3, Shpg. wt. 1 lb. . . . . 100.00

**H8-2 Parallel Interface.** Connects H8 to any parallel device such as a paper tape reader/punch (required for H10, page 101) or line printer. Has three independent parallel ports, each with 8 bits input and 8 bits output and universal handshaking capability. Compatible with all Heath software. 390 mS maximum transfer time. With diode-clamped inputs, buffered outputs and full interrupt capability.

Kit H8-2, Shpg. wt. 3 lbs. . . . . 160.00

**H8-5 Serial I/O and Cassette Interface.** Connects the H8 to serial devices such as the H9 video terminal (page 100) or the H36 DEC Writer II (page 102). Features jumper selectable data rate from 110 to 9600 baud, plus common input/output interfaces including 20 mA current loop and EIA RS-232C compatible levels. The cassette recorder interface permits use with the Heathkit ECP-3801, page 102. Uses the popular Byte/Manchester recording format but runs at 1200 baud.

Has control lines for remote start and stop of two cassette units to allow separate record and playback for easy program or file editing. Also has full interrupt capability. LED test circuit for easy board setup and overall system servicing. Fully compatible with all Heath software.

Kit H8-5, Shpg. wt. 3 lbs. . . . . 120.00

NOTE: Proper operation of the H8-5 is assured only if you use the Heath ECP-3801 cassette player/recorder and Heath-recommended recording tape (ECP-3802, page 101). Heath is not responsible for improper operation associated with other cassette units.

## Extended Benton Harbor BASIC

Extended Benton Harbor BASIC is an enhanced and more powerful version of the BASIC supplied with the H8 (see next page for description). It provides even faster operation and includes character strings, additional convenience commands and math functions, dynamic storage allocation, access to real time clock, keyboard interrupt processing, expanded error messages and recovery ability, LED display control and key pad support. A minimum of 12K memory is required to run this BASIC, 16K is preferred if full use is to be made of its capabilities.

H8-13 (1200 baud audio cassette) Shpg. wt. 1 lb. . . . . 10.00

H8-14 (fan fold paper tape) Shpg. wt. 1 lb. . . . . 10.00

## Paper Tape Systems Software

A paper tape version of the systems software supplied with the H8 computer. It consists of four fan fold paper tapes, one each for Benton Harbor BASIC, HASL-8 assembler, TED-8 editor, and BUG-8 debug. For use with the H10 paper tape reader/punch or other paper tape I/O equipment. See next page for complete software description.

H8-15, Shpg. wt. 1 lb. . . . . 20.00



Coming  
Soon!  
H8 Floppy  
Disk  
See page  
102

## The H8 software is the "heart" of your computer system

The software supplied with the H8 computer has a number of features that make it easier to use and more practical than other systems. Automatic "command completion" simplifies typing; dynamic syntax checking instantly alerts you to errors and a special user configura-

tion lets you really personalize your system. H8 software is memory efficient to give you more computing power for your memory dollar, has modular design for easy expansion, and is thoroughly documented for easy programming and maximum effectiveness.

### Software supplied with the H8 computer includes:

#### PANEL MONITOR (PAM-8).

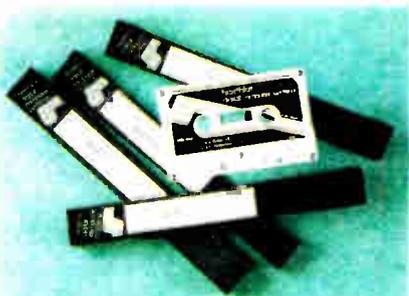
This ROM program monitor controls the front panel and permits you to load, execute and debug programs written in 8080 machine language. It provides memory contents display and alteration, register contents display and alteration, program execution control, self-contained bootstraps for one-button program loading and dumping, and port input and output routines.

**BENTON HARBOR BASIC.** This conversational programming language uses simple English statements and familiar algebraic equations to perform operations and solve problems. It is compact enough to run in the Heathkit H8 with limited memory, yet powerful enough to satisfy most problem-solving requirements. Requires a minimum of 8K memory. Extended Benton Harbor BASIC is also available, order from page 96.

**ASSEMBLY LANGUAGE (HASL-8).** This two-pass absolute assembler lets you create source programs using letters, numbers and symbols to generate efficient machine language code. It assembles the source program into a listing and an object program in binary format executable by the H8. A minimum of 8K memory is required.

**TEXT EDITOR (TED-8).** Converts the H8 computer and terminal into a powerful typewriter for generating text and editing. It prepares the source code for H8 assembly language, BASIC and other languages, and can be used to prepare reports, write letters and edit manuscripts. Requires a minimum of 8K memory.

**CONSOLE DEBUGGER (BUG-8).** This enhanced and extended version of the front panel monitor allows entry and debugging of user machine language programs via an external terminal. It features single or multiple stepping through programs, breakpointing, load and dump from tape storage. It requires 3K memory plus user program.



## Buy a complete computer system and SAVE!

You can choose a complete computer system consisting of the H8 computer, one major peripheral, plus memory and accessories, and deduct 5% from the purchase price (excluding shipping and handling charges). Choose one of the Heath-recommended systems below (which already have the discount calculated for you), or "roll your own" with system components you select!

**H8 System One:** The minimum recommended H8 system. Includes H8 computer, one H8-1 4K memory, H8-3 4K Chip Set, H8-5 Serial I/O and Cassette Interface, H9 Video Terminal and ECP-3801 Cassette Recorder/Player. If purchased separately, \$1375.00. **Heath System Price is \$1306.25.**

**H8 System Two:** A deluxe H8 System. Includes H8 Computer, Two H8-1 4K Memories, Two H8-3 4K Chip Sets, H8-5 Serial I/O and Cassette Interface, H9 Video Terminal, ECP-3801 Cassette Player/Recorder and H8-13 Extended BASIC in Cassette Form. If purchased separately, \$1635.00. **Heath System Price is \$1553.25.**

**HM-800 Manual Set.** Here's your chance to LOOK before you buy, and with no risk! The HM-800 manual set includes the complete assembly and operations manuals for the H8 Digital Computer, H8-1 memory card, H8-2 parallel interface; H8-3 4K Expansion Chip Set; H8-5 Serial I/O and Cassette Interface; H9 Video Terminal and H10 Paper Tape Reader/Punch. The complete H8 software documentation is also included! All in handsome 3-ring binder that's handy for reference and additional information. You can deduct the price of the manual set when you buy your H8.

**HM-800, Shpg. wt. 11 lbs. .... \$25.00**

# THE HEATHKIT/DIGITAL H11 COMPUTER

Two of the finest names in modern electronics, Heath and Digital Equipment Corporation (DEC) combine to bring you one of the world's first 16-bit computers priced within reach of the general public! Equivalent commercial versions of this powerful computer would cost \$1000's of dollars more!

**\$1350<sup>00</sup>**  
Kit

The Heath/DEC H11 combines the advanced, performance-proven hardware and software of the LSI-11 with Heath's expertise in kit design and documentation to bring you a personal computer of almost incredible power and versatility. Together with its total-system peripherals and complete systems software, you have a computing machine that will provide you with years of practical and effective service.

The H11 features an electrically superior bus with 38 high-speed lines for data, address, control and synchronization. Data and control lines are bidirectional, asynchronous, open-collector lines capable of providing a maximum data transfer rate of 833K words per second under direct memory access operation.

The fully assembled and tested KD11F board contains the LSI-11 CPU, a 4096 x 16 read/write MOS semiconductor memory, DMA operation; and it executes the PDP-11/40 instruction set with over 400 powerful instructions. Additional memory cards can be added to expand memory capacity up to 20K in the H11 cabinet (32K words total).

Has single-level, vectored automatic priority interrupt, real-time clock input signal line, ODT/ASCII console routine/bootstrap resident in microcode. The backplane card guide assembly holds the microcomputer and up to six I/O and memory modules. The backplane/card guides are fully compatible with all standard DEC LSI-11 accessories.

The H11 is supplied with versatile PDP-11 software (see next page for full description). This software is supplied in paper tape format and requires a minimum of 8K memory, with 12K to 16K total memory recommended for maximum capability. See software license agreement, next page. Rugged metal cabinet with high-impact plastic sides measures 19" W x 6½" H x 17" D. For 110/220 VAC, 50/60 Hz.

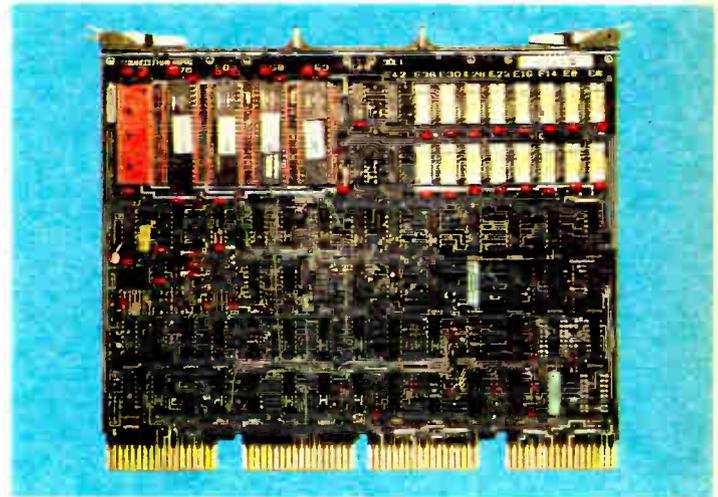
**Kit H11**, Shpg. wt. 34 lbs. . . . . **1350.00**

**H11-1 4K Memory Expansion Module:** Plugs into H11 backplane, adds 4K x 16-bit word capacity to H11 memory. Uses high-reliability 1Kx4 static MOS RAM chips. Access time is less than 500 nS. Has decode circuitry for operation on 4K address boundaries. Handle for easy removal and insertion. Compatible with PDP 11/03 and other LSI-11 backplane machines.

**Kit H11-1**, Shpg. wt. 2 lbs. . . . . **295.00**

**NOTE: DEC, DIGITAL, FOCAL AND PDP ARE REGISTERED TRADEMARKS OF DIGITAL EQUIPMENT CORPORATION.**

**H11-2 Parallel Interface:** General-purpose parallel interface featuring 16 diode-clamped latched data input lines, 16 latched output lines, 16-bit word or 8-bit byte data transfers. Has LSI-11 bus interface and control logic for interrupt processing and vectored addressing; control status registers compatible with PDP-11 software routines. Four control lines for output data ready, output data accepted, input data ready and input data accepted logic operations. Maximum data transfer rate, 90K words per second under program control. Maximum drive capability, 25-ft. cable. Plugs into H11 backplane, can be used with DEC PDP-11/03 and other LSI-11



**Fully Assembled and tested KD11F board**

backplane machines. Also compatible with TTL or DTL logic devices. The H11-2 is required for interfacing the H11 to the H10 Paper Tape Reader/Punch.

**Kit H11-2**, Shpg. wt. 2 lbs. . . . . **100.00**

**H11-5 Serial Interface:** Universal asynchronous receiver/transmitter serial interface module for use between LSI-11 bus and serial devices such as the Heathkit H9 video terminal (page 101) or LA36 teleprinter (page 102). Has optically isolated 20 mA current loop and EIA interfaces; selectable baud rates of 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800 and 9600. Plugs into H11 backplane, fully compatible with PDP 11/03 and other LSI-11 backplane machines. With all mating connectors.

**Kit H11-5**, Shpg. wt. 2 lbs. . . . **100.00**

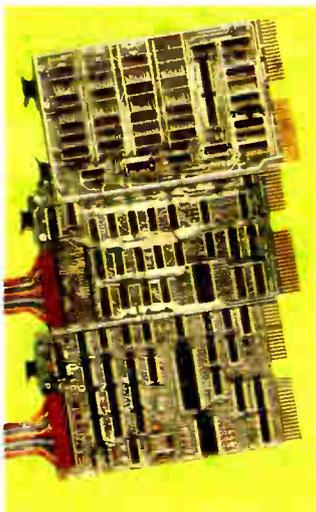
**H11-6 Extended Arithmetic Chip:** Adds powerful arithmetic instructions to the LSI-11, including fixed point multiply, divide and extended shifts plus full floating point add, subtract, multiply and divide. Helps minimize or eliminate arithmetic sub-routines, speeds up program execution and eases program development. Saves memory space too. 40-pin dual-inline package IC plugs into socket on KD11F board.

**H11-6**, Shpg. wt. 1 lb. . . . . **165.00**

**Manual Set for H11 Computer:** Includes complete assembly and operation manuals for the H11 Digital Computer, H11-1 4K memory board, H11-2 parallel interface, H11-5 serial interface, H9 CRT terminal, and H10 paper tape reader/punch. Also includes complete software documentation — monitor, editor, assembler, linker, BASIC, FOCAL and related software. In handsome 3-ring binder.

**HM-1100 Manual Set**, Shpg. wt. 12 lbs. . . . . **25.00**

**NOTE:** The price of the manual set can be deducted when you order an H11. Manuals are included with each kit.





**H11 Dual Floppy Disk!**  
**Coming Soon**  
 See page 102

**POWERFUL HEATH/DEC PDP-11 SOFTWARE AT NO EXTRA COST!**

The H11 includes a sophisticated software package that lets you get your computer up and running with practical programming capabilities. This paper tape based software would cost over \$1200 if purchased separately. A minimum of 8K memory is required to run the software. The programs include:

**ED-11.** Assists you in the creation and modification of ASCII source tapes, also used to write assembly language programs and for general text editing or word processing functions.

**PAL-11S.** Relocatable assembler converts ASCII source tapes into relocatable binary modules. This lets you create programs in small, modular segments for easier coding and debugging. These binary modules serve as inputs to LINK-11S.

**LINK-11S.** Link editor which links the modules created by the PAL-11S into a load module ready for execution on the H-11. The module is loaded into the H-11 via the Absolute Loader.

**Absolute Loader.** Loads absolute binary tapes into the H11 memory for execution.

**ODT-11X.** Lets you debug the programs which you have created. Permits modifying and controlling program execution "on the fly" for quick, efficient debugging.

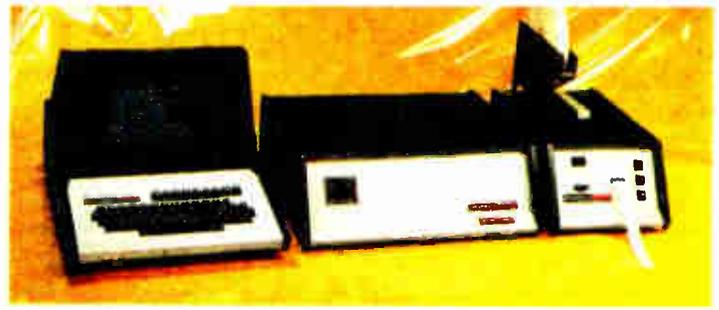
**IOX.** I/O executive program permits I/O programming without developing device-driving programs. Links to your programs using the LINK-11S. For use with high speed paper tape reader/punch and line printer.

**DUMP-AB and DUMP-R.** Lets you dump absolute binary contents of memory to the paper tape punch.

**BASIC.** DEC's powerful version of standard Dartmouth BASIC interpreter uses English-type statements and mathematical symbols to perform operations. Immediately translates, stores and executes the program. Includes string capability.

**FOCAL™.** DEC's own interpretive computer language which combines simplicity with computing power. Ideal for most scientific, engineering and math applications. FOCAL™ programs can be written and executed easily. Both 4K and 8K versions are included.

**Buy a complete H11 system and SAVE!** You can choose a complete computer system consisting of the H11 computer, one major peripheral, plus memory and accessories, and deduct 5% from the total price (excluding shipping and handling charges). See the Heath recommended systems below or "roll your own" with components YOU select!



**H11 System One:** The minimum recommended H11 System. Includes H11 Computer, H11-1 4K Memory (for a total of 8K memory), H11-2 Parallel Interface, H11-5 Serial Interface, H9 Video Terminal and H10 Paper Tape Reader/Punch. If purchased separately, \$2765.00. **Heath System Price is \$2626.75.**

**H11 SPECIAL SYSTEM OFFER!** A deluxe H11 system discounted even MORE than 5% to really save you money! Consists of H11 Computer, H11-1 4K Memory (for a total of 8K memory), H11-2 Parallel Interface, H11-5 Serial Interface, H10 Paper Tape Reader/Punch and H36 LA36 DEC Writer II. If purchased separately, \$3765.00.

**YOU SAVE \$265!** **Special System Price is \$3500<sup>00</sup>**  
**HS-11 Computer System.** Shpg. wt. 78 lbs. .... 3500.00

**HEATH/DEC Software License Agreement:**  
**This form MUST accompany your H11 computer order**

**CUSTOMER SUBLICENSE GRANT**  
 HEATH COMPANY (hereinafter referred to as HEATH) pursuant to a license agreement with Digital Equipment Corporation (hereinafter referred to as DIGITAL) does hereby grant to CUSTOMER a non-transferable and non-exclusive sublicense to use the Binary Software Program(s) PTSP-11 Paper Tape System, FOCAL/PTS Language Processor, BASIC/PTS Language Processor (hereinafter singularly and/or collectively referred to as "Soft-

ware;) on the following terms and conditions.  
 Software is furnished to CUSTOMER for use on a single CPU only and may be modified, or copied (with the inclusion of DIGITAL's copyright notice) only for use on such CPU. The CUSTOMER shall not provide or otherwise make available the Software or any portion thereof in any form to any third party without the prior approval of DIGITAL. Title to the ownership of the Software shall at all times remain with DIGITAL.

# THE HEATHKIT H9 VIDEO TERMINAL

**\$550<sup>00</sup>**  
Kit

*One of the lowest-cost ASCII terminals available anywhere — features a bright 12" CRT display with twelve 80-character lines, 67-key keyboard, all standard serial interfaces, plus a fully wired and tested control board and a wiring harness for simplified assembly.*

The H9 video terminal is a general-purpose peripheral designed for use with the Heathkit H8 or H11 computers. It provides keyboard input and a CRT for the convenient entry and display of computer programs and data. It can be used with any computer in dedicated stand-alone applications or in time-sharing systems.

**Character format** is standard upper case 5x7 dot matrix. The long form display is twelve 80-character lines. The short form display is forty-eight 20-character lines in four 12-line columns. An automatic line carry over feature executes line feed and return when line exceeds character count on both long and short-form displays. A built-in oscillator/speaker generates a 4800 Hz tone and serves as audible end-of-line warning.

**Auto-Scrolling** is featured in both long and short-form. In the long form, as the line enters at bottom, the top line scrolls off screen; in the short form, as the column enters from the right, the left column scrolls off screen. Auto-scrolling can be defeated with a front panel switch. The cursor mark indicates the next character to be typed for accurate positioning. Cursor controls include up, down, left, right and home. Serial data baud rates are selectable from 110-9600. Baud rate clock output and reader control are available on the rear panel connector.

The **erase mode** permits automatic full page erase or erase to end of line starting at cursor position. A transmit page function allows a full page to be formatted, edited and modified, then transmitted as a block of continuous data.

The **plot mode** permits graphs, curves and simple figures to be displayed. Plotting can be accomplished via the front panel keyboard or from external inputs.

The H9 **serial interface** provides EIA RS-232C levels, a 20 mA current loop and standard TTL levels. Parallel interfacing includes standard TTL levels, 8 bits input and 8 bits output and 4 handshaking lines for connection to H10.

**Ultra-compact size**, only 12½" H x 15½" W x 20¾" D, makes the H9 ideal for desktop or console applications. For 110 VAC, 60 Hz or 230 VAC, 50 Hz.

Kit H9, Shpg. wt. 50 lbs. . . . . \$550.00



**Long-form Display — Twelve 80-character lines**



**Short-Form Display — forty-eight 20-character lines in four columns**



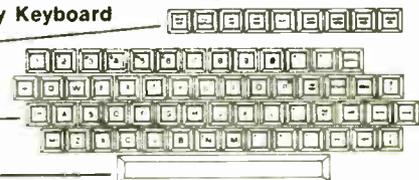
**Plot Mode — Curves, graphs and simple figures**

## Full ASCII 67-Key Keyboard

Function keys are positioned away from keyboard to prevent miskeying.

Typewriter keyboard for easy, more accurate input.

Wide, easy-to-use space bar aids accurate typing.



# THE HEATHKIT H10 PAPER TAPE READER/PUNCH

**\$370<sup>00</sup>**  
Kit

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damages arising out of or in connection with the use or performance of the Software licensed hereunder. This Sublicense Grant, the licenses granted hereunder and the Software may not be assigned by the CUSTOMER without prior written consent from DIGITAL. No right to reprint or copy the Software, in whole or in part, is granted hereby except as otherwise provided herein.

**HEATH COMPANY**

By \_\_\_\_\_

**CUSTOMER**

By \_\_\_\_\_





*A general-purpose mass storage peripheral designed for use with the H8 and H11 computers plus any other computer. Features a heavy-duty built-in power supply, totally independent punch and reader and a copy mode for fast, easy tape duplication.*

- Solid-state reader with stepper motor
- Precise ratchet/solenoid drive for high accuracy and consistent punching
- Totally independent punch and reader
- Copy mode for easy tape duplication
- Heavy-Duty Built-in power supply
- For Heathkit H8 and H11 computers, others too
- Styling matches H8 and H11 computers for total system design
- Includes 24-pin interface connector and mating cable

The H10 paper-tape reader/punch is a general-purpose mass storage peripheral using reliable low-cost paper tape. It's fully compatible and styled to match the H8 and H11 computers, and it works reliably with any other computer through a parallel interface. The H10 uses standard 1" wide roll or fan-fold 8-level paper tape. Standard punched

paper tape gives you the reliability, durability and trouble-free handling you need for effective mass storage of programs and data.

The reader reads tape up to a maximum rate of 50 characters per second. A full sensitivity adjustment on each channel permits any color, thickness, quality (oiled or unoled) paper tape to be used. Sensitive Darlington photo transistors and an incandescent lamp reader head provide reliable reading. The powerful stepper motor drive insures accurate tape positioning and movement.

The punch operates up to maximum speed of 10 characters per second. Ratchet/solenoid drive and solenoid control of punches provide high-accuracy and consistent punching.

Controls include power on-off, read and punch start. A feed control feeds blank tape through the punch for leader tape, a copy control provides fast, easy tape duplication.

Interfacing is provided by separate 8-bit parallel input and output buses with standard TTL logic levels and handshaking lines for both reader and punch. A rear panel 24-pin interface connector and mating cable are supplied.

Accessories include holder for roll paper tape, chad collector tray and collector box for fan-fold tape, 8" roll 900 ft. blank paper tape. Cabinet with metal top and rugged steel chassis, 12 $\frac{1}{2}$ " H x 9 $\frac{3}{4}$ " W x 19 $\frac{1}{2}$ " D. For 110-130 VAC, 60 Hz or 220-240 VAC, 50 Hz.

Kit H10, Shpg. wt. 29 lbs. . . . . 370.00

Three Rolls Blank paper tape, each 8" diameter, 900-ft. min.

H10-2, Shpg. wt. 5 lbs. . . . . 10.00

Three Boxes Fan-Fold Tape. Approx. 1000 ft. each.

H10-3, Shpg. wt. 5 lbs. . . . . 15.00



# Keyboard Printer Terminal

SENSATIONAL LOW  
MAIL-ORDER PRICE

**\$1550<sup>00</sup>**

Fully Assembled

*The famous LA36 DEC Writer II with true 30-cps throughput, variable-width forms handling, 128-character upper/lower case set, and extra-quiet operation. Fully assembled, factory tested and ready to use!*

The LA36 is an advanced technology teleprinter offering fast, reliable operation at one of the best price/performance ratios in the industry. It features a 7x7 dot matrix print head for crisp, clear character formation; switch selectable 10, 15 and 30 cps printing speeds; variable width forms handling from 3" to 14 $\frac{7}{8}$ " wide; adjustable left and right hand tractors for precise margin positioning; half or full duplex operation; ANSI-standard multi-key rollover and a typewriter-like keyboard.

Handles up to 6-part forms with a .020" maximum pack thickness. Print format is 132-column, with 10 characters per inch horizontal spacing and 6 lines per inch vertical spacing. Uses the entire 128 character ASCII upper/lower case set with 96 printable characters. A CAPS-lock key simplifies data entry. A parity check on output prints a replacement character, strappable to odd, even or none with mark or space. Also has last-character visibility feature.

The integral 20 mA current loop interface makes the LA36 compatible with both the H8 and H11 computers, as well as most other hobby and personal computers. Operates on 90-132 VAC or 180-264 VAC for reliable performance even under brown-out conditions. With connecting cable and integral stand for easy setup. Overall size, 27 $\frac{1}{2}$ " W x 33 $\frac{1}{4}$ " H x 24" D.

The H36 (LA36 DEC WRITER II) is shipped Motor Freight, prepaid to your nearest terminal within the Continental U.S. Include your phone number on order for notification of arrival. Arrangements for home delivery at extra charge at your option. NO C.O.D. ORDERS ACCEPTED.

H36 DEC Writer II ..... 1550.00

## Cassette Recorder/Player Mass Storage Peripheral

Heath-recommended cassette recorder for use with H8 computer and H8-5 serial I/O and cassette interface. Provides complete mass storage capability on easy-to-handle standard cassettes. Assembled and tested, not a kit.

ECP-3801, Shpg. wt. 4 lbs. .... 60.00

Heath-recommended high output, low noise, premium-grade audio recording tape. Pack of three 30-min. cassettes.

ECP-3802, Shpg. wt. 1 lb. .... per pack 6.00

NOTE: Proper operation of the H8-5 and H8 software is assured only with the use of the ECP-3801 cassette recorder/player and ECP-3802 tape. Heath does not assume responsibility for improper operation resulting from the use of other cassette units.

H36-1 Fan-fold Paper for H36. Standard 14 $\frac{7}{8}$ " x 11" white and green, single-part, lined paper. 3450 sheets per carton.

H36-1, Shpg. wt. 50 lbs. .... 35.00

H36-2 EIA Interface. Provides EIA RS232-C interface for LA36. 9-ft. cable with 25-pin data-set type connector is also supplied. (DEC designation, LAXX-KG). H36-2, Shpg. wt. 1 lb. .... 75.00

H36-3 Acoustic Coupler. Provides hookup to phone lines for time-sharing. Mounts in LA-36 with hardware provided. (DEC designation, LAXX-LM).

Kit H36-3, Shpg. wt. 10 lbs. .... 260.00



## H8, H11 FLOPPY DISK SYSTEMS — COMING SOON!

### H11 FEATURES

- Full Size Drives
- Single or Dual Configuration
- Standard Soft Sector Format
- 256K bytes storage per drive
- Controller/Interface compatible with H11, any LSI-11 based computer

### H11 OPERATING SYSTEMS TOO!

- Standard Heath Disk Operating System (HDOS) featuring full file capability and all software supplied with H11
- Advanced Heath Disk Operating System developed in coordination with DEC. Similar to RT-11. Includes BASIC and FOCAL.

H8 Floppy Disk. Single and Dual-Drive Mini-Floppy with Operating Systems Software.

Watch Future catalogs for announcements!

## HUG — The Heath User's Group

Get even more fun and excitement from your personal computer by joining the Heath User's Group (HUG). The group provides a newsletter, program library and puts you in contact with other Heath computer owners. Details are included with each computer and peripheral. H11 computer owners are also eligible for DECUS, the Digital Equipment Computer User's Society.



## Klima-Gro® Indoor Greenhouse

**\$299<sup>95</sup>**  
(less base)

*A miniature garden plot with electronically-controlled climate for your indoor plants*

Grow your own vegetables, herbs and ornamental plants year round in this magnificent indoor greenhouse. Klima-Gro gives your plants the perfect environment for optimum growth. Light and heat are controlled automatically by reliable solid-state electronic circuits. A built-in moisture sensor and meter tells you when to water your plants — no more guessing. A 24-hour timer regulates the internal light. Automotive type safety glass panels slide for easy access. Klima-Gro costs only pennies a day to operate, too. The electronic control panel is fully assembled — only mechanical assembly is required. 51" W x 26" D x 28" H.

Kit **GD-2225**, Shpg. wt. 98 lbs. (see shipping note below) . . . . . **299.95**

**GDA-2225-1**, Optional Base. 55 lbs. (see note below) . . . . . **79.95**

**Note:** If you purchase the Klima-Gro and optional base at the same time, shipping and handling for both items is only \$20.00. If you order them separately, shipping and handling is \$20 for each item. So you SAVE \$20 by ordering the Klima-Gro and base together. Shipping is via motor freight from Charlotte, Michigan. Include your phone number on order for notification of arrival. Arrangements for home delivery may be made at no extra charge in most cases. No COD orders accepted. Continental U.S. only.



## Automatic Telephone Answering System

**\$199<sup>95</sup>**

*Completely automatic—perfect for home or business*

The Record-a-Call® VOX 70 has all the features you need in an automatic telephone answering device. Voice actuation permits a caller to speak as long as desired. Other features include silent monitor, announce only, dictation capability, fast forward, rapid rewind, rapid erase, and more. 120 VAC powered. 9"x11<sup>7</sup>/<sub>8</sub>"x3<sup>3</sup>/<sub>8</sub>". Fully assembled.

**GDP-1227**, Shpg. wt. 12 lbs. . . . . **199.95**



## Fidelity Electronics Deluxe Chess Challenger™

**\$219<sup>95</sup>**  
(Assembled)

*Features three different levels of play for increased "competition" as you increase your skills, castling and en passant moves*

Here's the advanced version of the famous Chess Challenger computerized board that challenges you with its own moves and strategies. New features include three increasing levels of difficulty selected from the keyboard, programming the computer for the first move and pre-arranging the pieces for mid and endgame situations. The chess board has files and ranks designated in standard international chess notation too.

Has keyboard entry of moves including castling and en passant, a computer memory for position verification, and a digital display with four digit readout to indicate "to" and "from" positions. There are indicator lights for "check" when the computer puts you in check and "I lose" when the computer resigns.

The Chess Challenger is an ideal "trainer" for the beginning chess player. If you're an advanced player or expert, it's higher levels of difficulty will help you keep your game "in tune" and sharpen your skills. It's also an instant chess "partner" so you can play the game whenever you want. Includes complete board and keyboard, chess pieces and line cord. For 120 VAC, 60 Hz. Fully assembled and ready to use. Compact enough for easy portability. With full instructions.

**GD-1248**, Fully assembled. Shpg. wt. 6 lbs. . . . . **219.95**

**Standard Chess Challenger.** Has features similar to above, single level of play, no computer first-move. With chess pieces and full instructions. Ideal for beginners.

**GD-1235**, Fully assembled. Shpg. wt. 6 lbs. . . . . **149.95**

## Digital Thermometer

**\$49<sup>95</sup>** • Bright 4-digit display  
• Wide range of uses



A unique, extremely useful tool for home, office, laboratory or anywhere. Quick temperature reading is assured. A bright, easy-to-read four digit display provides temperature readings over a range from 32°F to 212°F. 1/10th degree increments. Special uses include:

tropical fish tanks, clinical uses, measuring, checking heating and air conditioning. Battery standard 9V battery. A flashing decimal warning. Fully assembled. Less battery. **GD-1226**, Shpg. wt. 2 lbs. . . . .

# Look at these SUPER-BARGAINS from Heath!



## **\$389<sup>95</sup>** The world-famous Accutrac® 4000 Turntable in kit form by Heath — build it yourself and SAVE!

- The world's ONLY "totally" programmable turntable
- Play individual cuts in the order you choose
- Repeat-play or skip individual cuts
- Includes wireless remote-control, base and cartridge
- No soldering — plug-in circuit boards and wires with all connectors for easy 2-3 hour assembly

The world-famous Accutrac 4000 turntable has established a new standard in state-of-the-art performance and convenience, and now Heath brings it to you in money-saving kit form. The Accutrac gives you total "computerized" control over how you play your records, and you can operate it from its own front panel controls, or from your easy chair with the wireless remote control included! Has superior turntable features too: precision direct-drive; die-cast, dynamically-balanced platter; tubular "S" shaped tonearm with electronically controlled cue, pause and muting, plus anti-skate. The built-in cartridge tracks at 3/4 to 1 1/2 grams, and provides a frequency response of 10 Hz to 24,000 Hz. Overall size, 18 1/2" W x 17 3/8" D x 6" H. Includes base, dust cover, wireless remote transmitter and receiver, built-in high performance cartridge.

Kit AL-1700. Shpg. wt. 55 lbs. Motor Freight . . . . .

9.95

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point provides a low battery

## Famous Sony Betamax™ 2-Hour Videocassette Recorder at BIG Savings!

Never miss a favorite TV program again! Record the shows you like in color or b&w for playback later, record when you're away with the optional timer, even record one show while watching another!

Now you can add a totally new dimension to your television viewing. Record and program any time you like. Just set the Betamax and your show is recorded (sound and picture) on the special 1/2" video tape cassette. Play it back with excellent sound and picture resolution whenever you're ready. The standard cassette will record up to two hours of programming. The optional Betamax Timer allows you to record at a preset time so you can capture your favorite show when you're not at home. Includes one 60-minute Videocassette.

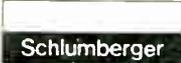
**Heath Special Offer!** Sony Betamax, Automatic Timer and TWC additional 2-Hour Videocassettes for the price of the Betamax alone! GDS-1230, Shpg. wt. 62 lbs. Motor Freight . . . Was 1260 Now 995.00

If purchased separately,

GD-1230, Betamax Alone. 55 lbs. Motor Freight Was 1260 Now 995.00

GDA-1230-1, Automatic Timer. Shpg. wt. 5 lbs. . . . . 48.00

GDA-1230-2, 2-Hour Videocassette Tapes. 1 lb. . . . . each 16.95



SCHLUMBERGER PRODUCTS CORPORATION  
ST. JOSEPH MI 49085

**BULK RATE  
U.S. POSTAGE  
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POSTMASTER: If undeliverable,  
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See index  
on page 2.

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