

Heathkit®

PRACTICAL PROJECTS FOR YOUR KITBUILDING FUN!

FALL 1978

NEW! TWO-WAY WIRELESS
INTERCOM—See page 2.



NEW! COMING SOON!
LINEAR PHASE SPEAKER SYSTEM



NOW...

OUR COMPUTERS ARE FULLY
ASSEMBLED AND TESTED—AS
WELL AS IN MONEY-SAVING
KIT FORM

See pages
64-75.

NEW! WORLD'S FIRST TRUE
HAND-HELD AIRCRAFT
NAVIGATION COMPUTER
See back cover.



NEW!

A FLOPPY DISK

SYSTEM FOR OUR H8 COMPUTER—See page 69.





OUR COMPANY POLICY AND MY PERSONAL PLEDGE: "WE WON'T LET YOU FAIL"

"If you have any hesitation at all about attempting your first Heathkit project, take my word . . . you can do it! We won't let you fail!"

HANDCRAFTED BY
JOHN JONES

**Personalized
Engraved
Name Plate**

**HURRY!
OFFER EXPIRES
IN 30 DAYS!**

It may be revolutionary, but...in these days of mass-produced mediocrity, Heath re-introduces Quality. And Craftsmanship. And above all, Pride.

That's why we'll send you a FREE personally engraved Name Plate to place on your first Heathkit project - because we know you'll be proud of it!

I'm not one of those people who always wants to turn back the clock and go back to "the good old days," but I do feel strongly that we Americans have lost a great deal of the pride of craftsmanship that was one of the things that made our nation strong!

That's what Heath is all about. And that's our design approach for every new Heath project we offer.

Every week, when our designers and engineers meet, we look at their ideas together. We don't think of our products as a "full line," where we have to have an expensive model, a medium-priced model and a budget model; we look at what's available in the market place and decide if we can create a product that's either completely unique, or simply a better value.

Only when we agree that a product makes sense for our customers as well as for ourselves do we put a design team on it. And we check their progress regularly, to make sure they're on target. So by the time they've finished, we know we've got a good thing going. But the job's still far from finished.

The next step is to create the Assembly Manual that goes with it. And, as anyone who's ever built a Heathkit product can tell you, our Manuals are the finest, clearest, easiest-to-follow set of instructions ever!

Each of our kits is pre-tested. Each one is assembled again and again by our own people. Not just engineers, but writers...sales people...our top executives. And we're not satisfied until we're sure the kit is 100% foolproof. That's why we can say...

We won't let you fail!

We know what we've built into a kit and the Assembly Manual. So we know that if you follow one-step-at-a-time, you can do it and do it right! And once you do, you'll know what we mean when we talk about Quality. And Craftsmanship. And Pride.

Because you'll feel a very real pride in the quality product that you have hand-crafted yourself, you'll want to attach your Personally Engraved Name Plate right up front. Pride. That's what the Heath Company is all about!

Sincerely,

D.W. Nurse, President



Use your BankAmericard/VISA or Master Charge at Heath

841-100

YOUR HEATHKIT 90-DAY LIMITED WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you - anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery

at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. We are not responsible for incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
Benton Harbor, Michigan 49022



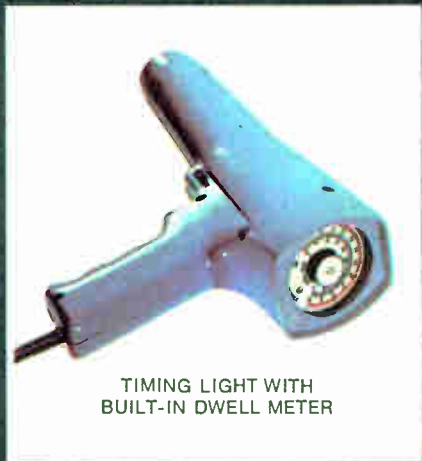
Put yourself in the picture with one of these Value-Packed Heathkit Projects.



COMPLETE PERSONAL COMPUTER SYSTEMS



"COMPUTERIZED" PROGRAMMABLE TV



TIMING LIGHT WITH BUILT-IN DWELL METER



DIGITAL BATHROOM SCALE



SCANNING MONITORS



MODULUS STEREO SYSTEM



DIGITAL FLOOR CLOCK WITH CHIMES

Explore the world of "do-it-yourself" electronics with HEATH!



FREQUENCY SYNTHESIZED 2-METER TRANSCEIVER



ELECTRONICS SELF-INSTRUCTION PROGRAMS AND TRAINERS



Heathkit/Dana CS-2048 Electronic Speed Control Makes Long Distance Driving More Comfortable

\$74⁹⁵

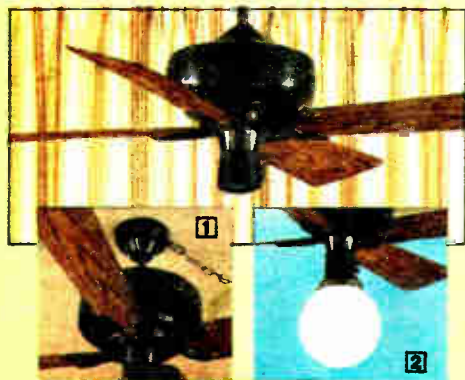
- Reduces driver fatigue
- Fits most domestic cars, vans and light trucks
- For both manual and automatic transmissions

Long distance drivers will really appreciate the CS-2048. It makes the most of famous Dana Corp. technology and a crystal clear Heath instruction manual for easy installation. Just accelerate to your desired speed, press the set button and the CS-2048 will electronically maintain the speed uphill or downhill. Holding the set button decreases speed (RETARD) and sets new cruise speed; holding the resume button lets you accelerate for passing and then resumes previous cruise speed when released. 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-2048 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 ve-

hicles). 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-2048 operates on 12 VDC (negative ground only), 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-2048, 7 lbs. **74.95**

NOTE: While the CS-2048 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.



Casablanca® Ceiling Fan

\$99⁹⁵

- Adjustable speed
- Money saving kit-form

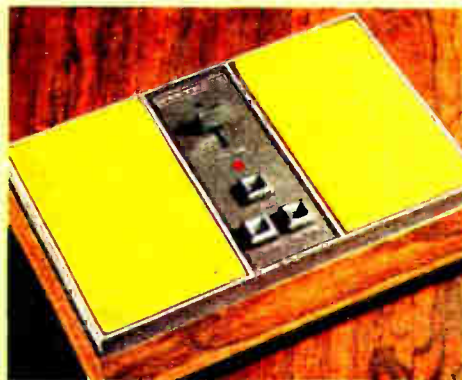
Bring back the nostalgia of the good-old-days with our GD-1238 Casablanca Fan. This delightful fan offers the perfect "decorator's" touch to the family room, porch, or patio and at the same time brings whisper-quiet cooling to your home, for just pennies a day. Can also be used to bring heat down from high ceiling areas during heating season. With its fan motor done in a warm baked bronze enamel, the GD-1238 features chain pull switch operation, variable speed adjustment from 145 to 180 rpm, and 52 inch blades (tip to tip). Each blade is dynamically balanced for vibration free cooling, and all are finished in a convincing simulated wood grain. For an even more charming effect add the optional Lamp or Swag-Chain kits. Fan and optional lamp can be operated independently.

Kit GD-1238, Shpg. wt. 24 lbs. **99.95**

Slow-Speed Accessory. Lowers fan speed to 50-100 rpm. Ideal for smaller rooms, lower ceilings. GDA-1238-3, 1 lb. **14.95**

1 Swag-Chain Kit. Mount your Casablanca fan most anywhere. Includes: 18' antique brass swag chain, gold electrical cord, and all necessary hardware. GDA-1238-1, 3 lbs. **14.95**

2 Light Kit. Adds old world charm and dual purpose to your fan. Includes glassware, glassware holder and required mounting accessories. GDA-1238-2, 3 lbs., **15.95**



Deluxe FM Wireless Intercom

\$44⁹⁵

Operates through your
present house wiring

Here's a two-way intercom you can use anywhere indoors — as long as the units are on the same AC power transformer. Simply plug each unit into an AC outlet and you're ready to communicate. Order as many as you like for complete communications — solid-state circuitry consumes so little power you can even leave them on all the time at very low cost. Phase locked loop circuitry provides quiet, clear operation. Automatic squelch assures noise-free operation; a pleasant call tone alerts other units. A dictate switch locks the intercom in the "talk" mode for hands-free operation or monitoring of baby's room. A transmit indicator lights when the unit is in the talk mode. A large 3" speaker and up to ¾ watts audio output assures clean, clear voice transmission. Handsome high-impact plastic cabinet, 8½" W x 3" H x 5¾" D, may be wall mounted.

Kit GD-1114, Shpg. wt. 3 lbs. **44.95**

GD-1114 SPECIFICATIONS: Power Requirements: 120 VAC, 15 volts, 60 Hz. Power Consumption: (standby), less than 2 watts; (talking), less than 5 watts. Switches: Talk, Call, Dictate. Controls: Volume and Squelch. Audio Output Power: 700 mW with less than 10% total harmonic distortion.

Unique, Money-Saving Electronic Kits!

Digital Readout Electronic Scale offers "space age" convenience

\$99⁹⁵
Kit

- Shows your weight far more precisely than dial scales
- Electronic Reliability — no springs, weights or pins to go wrong
- Rugged, moisture-proof die-cast aluminum housing

The Heathkit Digi-Scale is a digital readout "weighing machine" that shows your weight in big, bright, computer-like LED's. Even with a 300-lb. capacity, it reads out to 1/10th 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, and you can order it at a low kit-form price or factory assembled and tested.

The "weighing machine" uses solid-state circuitry and a strain-gauge transducer element like those used in expensive electronic laboratory scales. There are no mechanical weights or springs to go out of adjustment and affect readings.

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 with durable, moisture-proof cast aluminum housing. 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 1⅝". Readout/control, 6" x 3½" x 1½".

Kit GD-1186, Shpg. wt. 10 lbs. 99.95

Factory assembled and adjusted GD-1186. Readout non-detachable. Reads in pounds only in increments of ⅓ of a pound.

GDW-1186, Shpg. wt. 9 lbs. 139.95

GD-1186 SPECIFICATIONS. Display: 4-digit, ½" high LED. Low-Battery LED. Display Update Rate, approx. 1 second. Full Scale: 300 pounds (136 kilograms). Resolution: 1 part in 3000. Accuracy: 1% or 1 count, whichever is greater. Repeatability: 0.5% of reading or 1 count. Overload Capacity: 50% of full capacity. (Not damaged by weight up to 450 lbs.) Power Requirement: 6 "C" type dry cell or alkaline batteries (not supplied).

LED Readout Can Be Read From Up to 10-ft. Away

Handsome Die-Cast Aluminum Platform with Burled Walnut Finish

Digital Display Circuit Board with Plug-in IC's and LED's for Easy Kit Assembly

A to D Converter Circuit Converts Analog (Input) Voltage to Digital Form

Strain Gauge Transducer Element Similar to Those Used in Expensive Laboratory Scales

The world-famous Accutrac® 4000 Turntable in kit form by Heath — build it yourself and SAVE!

\$379⁹⁵
Kit

- The world's ONLY "totally" programmable turntable
- Play individual cuts in the order you choose
- Repeat-play or skip individual cuts
- 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! The remote control transmitter has a range of up to 30 ft. so you can operate the Accutrac from anywhere in your room.

Has superior turntable features too: precision direct-drive; die-cast, dynamically-balanced platter; tubular "S" shaped tonearm with electronically controlled cue, pause and muting, anti-skate and individual 5% variable pitch control for each speed. The built-in cartridge tracks at ¼ to 1½ grams, and provides a frequency response of 10 Hz to 24,000 Hz. Overall size, 18½" W x 17⅝" D x 6" H. Includes base, dust cover, wireless remote transmitter and receiver, built-in high performance cartridge. Kit assembly of the AL-1700 is really easy, with a comprehensive step-by-step assembly manual, plug-in circuit boards and wires with all connectors attached. Typical assembly time is just 2-3 hours, and there's absolutely NO soldering! The remote transmitter and receiver are fully assembled too. The AL-1700 is a great way to get a real build-it-yourself bargain from Heath! Order yours today. Kit AL-1700, Shpg. wt. 27 lbs. 379.95

AL-1700 SPECIFICATIONS: Turntable Speeds: 33⅓ and 45-rpm, electronic speed change. Variable Pitch Controls: 5% Range, individual control for each speed. Build-up Time: Within 2 seconds to full speed. Wow and Flutter: less than 0.03 WRMS (DIN 45507). Rumble: Better than -70 dB (DIN 45535B), better than -50 dB (DIN 45539A). Cartridge Type: low-mass induced magnet. Output: 3.5 mV/5.5 cm/sec. Channel Separation: 28 dB. Stylus Tip: 0.0003x0.0007" elliptical diamond. Power Requirements: 120 VAC, 50/60 Hz.



The AL-1700 Includes a Remote Transmitter and Receiver So You Can "Program" It Right From Your Easy Chair! It's One of the Most Modern and Convenient Turntables We've Seen Anywhere!

Get in on Kitbuilding Fun and

Our budget-priced super-accurate Digital Clock is an ideal choice for your first kit!

\$27⁹⁵

- "Snooze" feature lets you catnap up to an hour
- Power failure indicator tells you to reset clock

Now a pleasant electronic "beep" can start your day out right — and at a very low price! The clock features a pleasant blue-green display that automatically adjusts to ambient light conditions and is easily wired to give you the time in either a 12- or 24-hour format. Also, in addition to hours and minutes, the GC-1107 indicates AM and PM, tells you when the alarm is set, and alerts you if the clock has been shut off during power interruptions. The alarm on/off switch is easily accessible at the rear of the 1107's cabinet. And if you're the type who hates to face the sunrise, the "snooze" feature, also accessible on the rear panel, will allow you to take 9-minute catnaps for up to an hour if you choose! A Slow switch and Fast switch let you advance the time for easy, accurate setting. And to avoid accidental bumping, or the curiosity of children's little fingers, both switches plus the Time-Alarm switch have been recessed into the base of the GC-1107's mounting cabinet.

The GC-1107 has a built in speaker so you'll easily hear its alarm, is styled in a handsome simulated wood-grain finish that fits any decor, and at this low price, is really a bargain. 2¼" H x 7" W x 4¾" D.

Kit GC-1107, Shpg. wt. 3 lbs. 27.95

Unique Programmable Doorbell lets you welcome guests with your favorite tune

\$44⁹⁵

- An exciting, FUN way to greet your friends
- Program your favorite tune up to 16 notes

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. Handsome brown plastic cabinet with gold color trim and tan fabric panels.

Kit TD-1089, Shpg. wt. 3 lbs. 44.95

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:** 5¾" H x 8¾" W x 2¾" D. **Net Weight:** Approx. 1½ lbs. **Power Drain:** Idle, 6 watts, Maximum 12 watts.

1 AM Pocket Portable Radio. A pocket portable and a practical first kit that will give you first rate performance. Take it camping, to the beach, use it around the house. The GR-1008 will give you musical enjoyment wherever you are. And it's fast and easy to build — an ideal way to introduce someone else (or yourself) to kitbuilding! The GR-1008 features a rugged black and white case with the look of today and with its built-in 3½" speaker you'll get fine sound even at high volume. 4" H x 7¾" W x 2" D. Operates on 9-volt battery (not supplied).

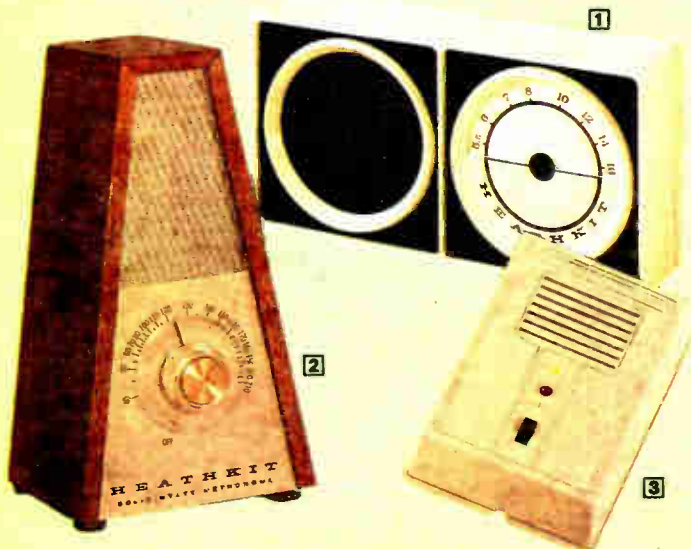
Kit GR-1008, Shpg. wt. 2 lbs. 16.95

2 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. 17.95

3 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. Battery operated so it keeps working even if AC power fails. Operates on two standard "C" cells (not supplied). 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. Other applications are described in the manual.

Kit GD-1183, Shpg. wt. 2 lbs. 14.95



Satisfaction with one of These Practical Projects

Touch Control Switches give you remote on-off control of lights or small appliances

- Sensor Plate mounts anywhere for instant on-off control
- Touch-Control light switch features half-brightness position
- Multiple touch plates can be attached to the same wire

These touch-control switches are among the most convenient and practical kits we've ever offered — they give you on-off switch control wherever you need it, without the bother and expense of extra outlets, wall boxes, or rewiring. They consist of a control unit and a touch plate. Simply plug the lamp or appliance into the control unit, and plug the control unit into an AC outlet. The remote-touch plate mounts anywhere and connects to the control unit by an easily concealed wire. We supply 20-ft. of wire, or you can use your own for longer runs. You can use more than one touch-plate too — or use any other metal — door knob, rail, etc. as a touch plate. Control unit, 1 $\frac{1}{4}$ " x 2 $\frac{3}{4}$ " x 3 $\frac{1}{32}$ ". For 105-135 VAC, 60 Hz. Both feature single board construction for fast and easy assembly.

Touch-Control Light Switch. For incandescent lamps up to 150 watts. Features half-brightness position to save energy and increase bulb life. Simply touch the plate for half-on, longer for full-on, touch again for off. Static protected.

Kit GD-1187, Shpg. wt. 1 lb. 12.95

Touch-Control Appliance Switch. For televisions to 225 watts, fans and blowers to 180 watts, incandescent lamps and heaters to 300 watts maximum. Circuit is static protected and unit can be plugged into any standard outlet. Not for use with AM radios.

Kit GD-1287, Shpg. wt. 2 lbs. 15.95

1 Low-cost photoelectric Lamp Switch

Great low-cost "insurance". Turns lights on in the evening, off in the morning — automatically. Helps discourage burglars while you're away from home by giving your home a "lived-in" appearance. Just plug it into any wall outlet, adjust the sensitivity and the GD-600 does the rest. For incandescent lamps up to 150 watts. A great 1-evening kit.

Kit GD-600, Shpg. wt. 1 lb. 5.95

2 Tabletop Lamp Dimmer provides precision lighting

Set the mood for any activity with just the right amount of light — smoothly adjusts the brightness of table or floor lamps up to 300 watts. Eliminates annoying burned-out elements in 3-way bulbs, even helps bulbs last longer. Build several and create the decorator's touch, in lighting, in every room of your home. For 120 VAC. Makes a great heat-control, too, for pencil-type soldering irons used in circuit board work. Installing ICs, etc. Measures 3 $\frac{1}{4}$ " H x 3 $\frac{1}{4}$ " W x 3 $\frac{1}{4}$ " D.

Kit GD-1018, Shpg. wt. 2 lbs. 7.95

3 Heathkit Code Practice Oscillator. Fun to build and use! Most components mount on a single circuit board for easy assembly. 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. Once you get your license, the HD-1416 can serve as a side tone oscillator for any transmitter using grid block keying. Plastic cabinet matches Heathkit "SB" series.

Kit HD-1416, Shpg. wt. 2 lbs. 9.95

4 Informer® self-contained Ultrasonic Alarm. The Heathkit GD-39 Ultrasonic Intrusion Alarm sits quietly on bookshelf or table until something or someone invades its field of surveillance. Then "The Informer" can activate indoor buzzer alarms, outdoor bells, table or floor lamps... to alert you to the possible presence of an intruder as far as 25 ft. from the unit. Any movement that affects that transmitted signal in the room is perceived by the receiver, and the lamp outlet is triggered, turning on table or floor lamps. Approximately 30 seconds later, the alarm outlet is triggered, activating indoor or outdoor alarms. Built-in time delay between light and alarm allows you to enter room and deactivate the "Informer" without triggering the audible alarm. You can set the lamp and alarm for automatic reset after 25 seconds or have audible alarm continue to sound until manual reset. 2 $\frac{3}{8}$ " W x 10 $\frac{1}{8}$ " H x 7 $\frac{1}{2}$ " D. For 120/240 VAC.

Kit GD-39, Shpg. wt. 5 lbs. 49.95

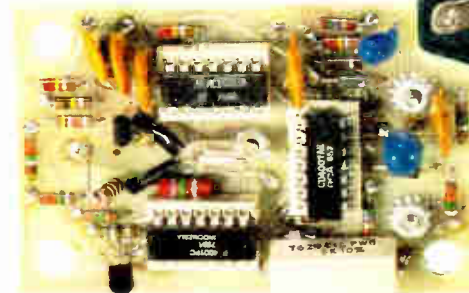
GDA-39-1, indoor buzzer alarm, Shpg. wt. 1 lb. 9.95

GDA-39-2, outdoor bell, Shpg. wt. 5 lbs. 26.95

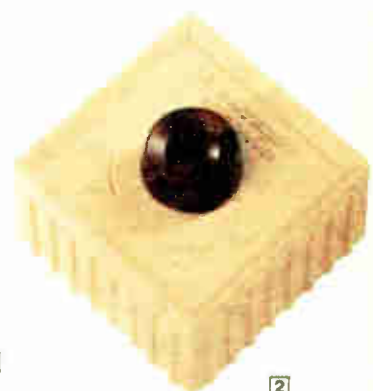
NOTE: Since the GD-39 operates in the same frequency range as some Ultrasonic TV Remote Controls, interference between the two is possible.

only
\$12⁹⁵
Light Switch

1 EVENING KIT
Fast, Easy Assembly

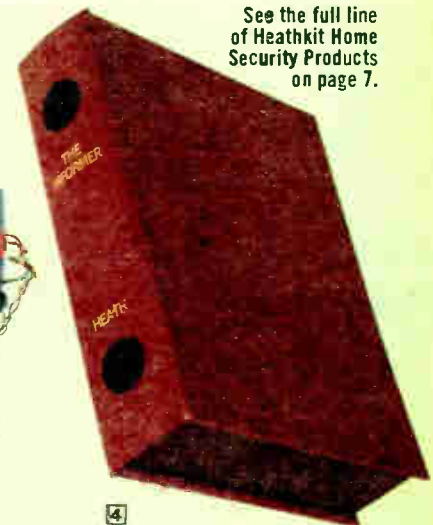


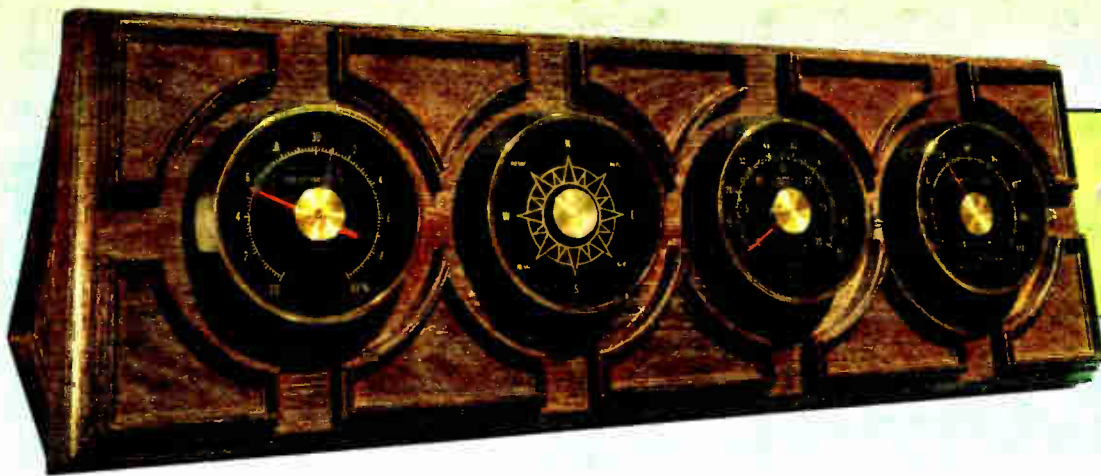
Single Circuit Board
Assembly Cuts
Construction Time



The HD-1416 is recommended for use with the Amateur Radio Novice License Course. See page 17 for details.

See the full line of Heathkit Home Security Products on page 7.





- Reads barometric pressure
- Shows wind speed and direction
- Reads indoor and outdoor temperature
- Handsome wood-grain plastic cabinet

Stay "on top" of conditions with this easy-to-read five-function weather station

\$94⁹⁵

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 (right). Easy and enjoyable kit assembly makes the ID-1290 a great project for first-time builders too. Includes comprehensive weather book, remote transmitter assembly.

Kit ID-1290, Shpg. wt. 9 lbs. 94.95



1



2



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, $\pm 2^\circ\text{F}$ (typ. INDOOR); -40° to -120°F, $\pm 2^\circ\text{F}$ (typ. OUTDOOR). Barometric Pressure: 29-31 inches of mercury within 0.02 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

Use to connect remote-transmitter assemblies to ID-1290 or ID-1590 below. Cable is well-insulated for excellent weather resistance.

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

1 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. Includes transmitter assembly as above. Use cable above.

Kit ID-1590, Shpg. wt. 7 lbs. 69.95

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 $\pm 10\%$, 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.

2 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 Cyclolac® plastic case with teak-grain vinyl inserts.

Kit ID-1390A, Shpg. wt. 4 lbs. 69.95

ID-1390A SPECIFICATIONS: Temperature Range: Fahrenheit -40 to +120°; Celsius, -40 to +50°. Accuracy: Celsius, $\pm 1^\circ\text{C}$ from -15° to +50°, $\pm 2^\circ\text{C}$ from -30° to -15°. Fahrenheit, $\pm 1^\circ\text{F}$ from +20° to +120°F, $\pm 2^\circ$ 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.



Our Wireless Security System gives your home just the protection it needs

REALLY SAVE! Purchase the Central Processor and any two or more additional units and deduct 5% from the total price!

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. 159.95

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. 74.95

Auxiliary Transmitter Module. (Not Shown). 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. 39.95

3 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 3¼" D. Kit GDA-1158-4, 2 lbs. 29.95

4 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. 7¾" W x 3¼" H x 3¼" D.

Kit GDA-1158-5, Shpg. wt. 3 lbs. 74.95

On/Off Transmitter Module (Not Shown). 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 3¼" D. Kit GDA-1158-3, Shpg. wt. 2 lbs. 29.95

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. 3 lbs. 19.95

5 Automatic Telephone Dialer. 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. 169.95



Eye Spy™ Photobeam Relay. Consists of light source, mirror assembly and a photocell controlled relay which is activated whenever the reflected light beam is broken. Warning devices of lamps plugged into the photocell are then activated. Works up to 25 ft. from reflecting mirror. Electronics, 5⅝" H x 4⅝" W x 5¼" D. Mirror Assembly, 5" H x 4" W x 2¼" D.

Kit GD-1021, Shpg. wt. 3 lbs. 14.95



Heathkit Two-Way Telephone Amplifier

To answer the phone, just press the Power Button; to hang up, press it again. Voice-activated circuitry instantly switches from talk to listen. An easy-to-use slide control adjusts the listening volume. Pressing the Listen button disables the built-in microphone, but still lets you monitor the line. That makes it a perfect hold but-

ton and more. When you talk through the handset of an external phone, pressing the Listen button allows others in the room to hear both sides of the conversation. The built-in microphone lets you talk from up to 10-ft. away. The GD-1112 requires an external phone for operation and includes a ¼" diameter phone plug and a 1¾" square four-pin phone plug for easy installation. Operates one 9-volt battery (not supplied) and comes with 6' of 4-conductor cable. 2½" H x 8½" W x 5¾" D. Good-looking plastic cabinet may be used on desk or wall-mounted.

Kit GD-1112, Amplifier, Shpg. wt. 3 lbs. 49.95

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

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

Heathkit Intercoms add Convenience

The GD-140 Master station (AC operated) accommodates up to two Remotes. The GD-110 indoor-outdoor intercom (battery operated) accommodates up to four. Both can call either or all stations and Remotes can be rendered private to prevent monitoring. GD-140 Master measures 3¼" H x 6" W x 5¼" D. GD-120 measures 3¼" H x 6" W x 5¼" D. GD-110 Master is 4½" H x 8½" W x 6¾" D. GD-130 has weatherproof finish and measures 5¾" H x 3⅞" W x 2⅞" D. Less batteries.

Kit GD-140, Master, GD-120 Remote. Shpg. wt. 4 lbs. 39.95

Kit GD-110, Master Station. Shpg. wt. 5 lbs. 47.95

Kit GD-120, Indoor Remote. (not shown) For 140, 110. 2 lbs. 14.95

Kit GD-130, Outdoor Remote. (not shown) For 140, 110. 2 lbs. 9.95

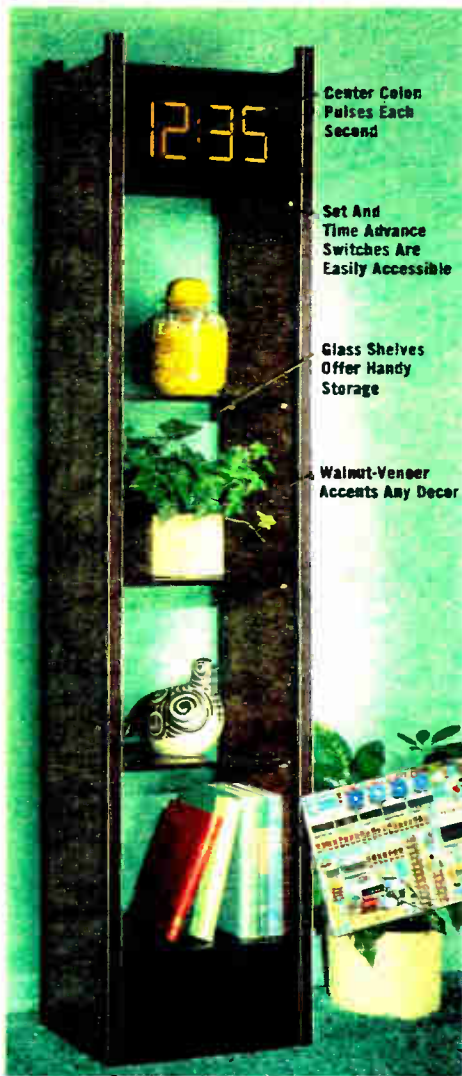
GDA-110-2, 100-ft. 4-conductor cable. For GD-110. 3 lbs. 9.95

GDA-110-4, 100-ft. 2-conductor outdoor cable. For GD-140. 1 lb. 4.95



Electronic Accents For Your Home From Heath

These easy and fun-to-build kits add a colorful and practical touch to just about any home decor!



Heathkit Digital Electronic "Super-Clock" in a full 5' high modern etagere cabinet

\$169⁹⁵

- Automatic dimming circuit adjusts to room light for a charming pleasant glow
- Hour and minute readout can be seen from anywhere in the room

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.

The GC-1195 is an excellent and truly useful selection for the first time kit builder. The manual is clearly written and guides you step-by-step through construction in a manner which is both easy to understand and easy to follow. Even if you've never soldered before you'll find no need for concern.

That's because the manual also includes an informative discussion and diagrams, demonstrating proper soldering technique and the way to correctly place and mount electronic components.

The GC-1195 is a handsome addition to most any decor, and a great conversation piece. For even more charm and "Old World" distinction, add our electronic clock chimes accessory (described below).

Kit GC-1195, Shpg. wt. 72 lbs. 169.95

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.



Electronically Synthesized Westminster Chimes Accessory

\$69⁹⁵

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 annunciation 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. 69.95

Digital Electronic "Super-Clock" in a handsome shelf case

\$89⁹⁵

- Adds a distinctive touch!

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. 89.95



Turn your music into a dazzling light show

The TD-1006 Color Organ adds exciting sights to your sound system. Just connect the TD-1006 to the speaker leads of any sound source (except AM radio). Without affecting the sound, active filters separate the audio signal into four frequency bands, each with 35 brilliantly colored lights — red for bass, blue for low-midrange, green for upper-midrange and amber for treble (140 lights total). The lights pulsate in time to the music creating spokes of color that seem to swirl. Input is 1

volt RMS min. to 22 volts RMS max. Line isolation provides source protection. 22¾" W x 22¾" H x 4½" D, can even be wall mounted. For 120/240 VAC.

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

Deluxe Heathkit AM/FM Table Radio

4 EVENING KIT
Fast, Easy Assembly

- Full range speaker
- Sensitive AM/FM tuner

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. For 120/240 VAC, 50/60 Hz. 7" H x 13" W x 7¼" D.



Kit GR-1085, Shpg. wt. 12 lbs. 89.95

Don't Miss the Fun of Treasure Hunting!

What'll be your first find — historical relics? valuables? or maybe Spanish Doubloons? Build your Heathkit Metal Locator and see!



1 The Exciting Heath "Cointrack" Our Finest Metal Locator!

\$149⁹⁵ • Search coil optimized for "coin-shooting"
• Adjustable discrimination • Pushbutton tuning

The GD-1190 is the finest Metal Locator Heath has ever produced! Designed with the "coin-shooter" in mind, it features a search coil optimized for coin locating, and adjustable discrimination so incredibly good you'll be finding "treasure" in areas where high "junk" content makes operation with other locators all but impossible! Pushbutton tuning maintains maximum sensitivity — effortlessly. And for shallow water searching, the 1190's waterproof head won't leave you out of the action. Weight is minimal and to cut fatigue even more, an adjustable shaft is provided for maximum comfort. The 1190 collapses for easy storage and transportation. And with its optional GDA-1190-1 Nickel-Cadmium battery pack installed, you can recharge the 1190 at home, or in the field from the cigarette lighter of your car! Or it operates on six ordinary AA cells (not included). An outstanding value.

Kit GD-1190, Shpg. wt. 5 lbs. 149.95
GDA-1190-1, Nickel-Cadmium Battery Pack, Shpg. wt. 2 lbs. 16.95
GDA-1190-2, Headphones, Shpg. wt. 2 lbs. 9.95
GDA-1190-3, Carrying Case, Shpg. wt. 2 lbs. 9.95

NOTE: Discriminating-type metal locators are vastly superior to other types in locating coins in "junky" areas. However, this capability can be greatly diminished in highly mineralized or very wet soil.

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

2 Heathkit GD-348 finds buried metal objects of any type

\$89⁹⁵ • Contoured pistol-grip and up-front controls
for real operating convenience
• Lightweight and economical

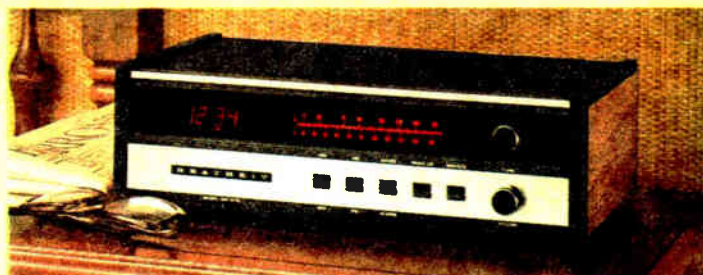
The GD-348 uses a sophisticated "induction-balance" system so you don't hear anything until a piece of metal enters the search field. Then the tone grows louder as you get closer to your quarry. You may listen through its built-in speaker, optional headphones or use the front-panel meter to pinpoint 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. The GD-348 is a fast, enjoyable kitbuilding project, too.

Kit GD-348, Shpg. wt. 6 lbs. 89.95
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. 11.95

Versatile AM/FM Digital Electronic Alarm Clock-Radio

\$119⁹⁵ • Stay "on time", even if AC power fails thanks to the built-in "fail safe" circuit
• "Catnap" with the 7-minute snooze button

Here's everything you need in a quality clock-radio! 24 hour set'n forget alarm, built in 3" x 5" oval speaker for truly fine sound, and style that fits anywhere. The GR-1075 displays time in the conventional 12-hour format. Shows AM and PM too. A lighted decimal pulsates to indicate seconds and also shows that the alarm is properly set. The 24-hour alarm cycle can wake you with a gentle pulsating, electronic "beep" or with soft music from the FM or AM radio station of your choice. High quality electronics and 5 µV FM and 300 µV/M AM sensitivities make sure you'll "pull-in" a large selection of stations day-or-night. And for the sleepyhead, the clock's 7-minute snooze cycle will give you up to an hour of relaxing catnaps. Two 9-volt batteries (not supplied) take over during power interruptions and keep the clock counting. When power is restored the GR-1075 will be right on time!



The front panel features 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 end panels. For 120/240 VAC, 50/60 Hz operation. 4½" H x 13½" W x 8¾" D.

Kit GR-1075, Shpg. wt. 10 lbs. 119.95

Kit and Assembled Products from Heath for

Build The Heathkit Garage Door Opener for Year-Round Safety and Convenience



Low As
\$169⁹⁵



- 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. 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). 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 anywhere you may choose.

Kit GD-3309C, Transmitter, Receiver, Mechanism.	
Shpg. wt. 57 lbs. Motor Freight	169.95
Kit GD-3309D, Two Transmitters, Receiver, Mechanism.	
Shpg. wt. 57 lbs. Motor Freight	184.95
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.	9.95
GDP-3309A, 1 Transmitter only. Shpg. wt. 1 lb.	24.95
GDP-3319A, 1 Transmitter, 1 Receiver. (3-wire system) 1 lb.	49.95
GDP-3329A, 2 Transmitters, 1 Receiver. (3-wire system) 2 lbs.	64.95
GDA-3309-3, Power Transformer. Allows use of new transmitter and receiver with 2-wire system door openers. 1 lb.	5.95

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 256 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. They are FCC-approved and usable with standard NEC 3-wire systems.

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:** 310 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.

Unique Heath-recommended electronic products for your home. Most are fully assembled



1 Deluxe three-level Chess Challenger

The Chess Challenger is an ideal "trainer" for the beginning chess player. If you're an advanced player or expert, its 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. The Chess Challenger matches your moves against the strategies of the computer. Features 3 levels of increasing difficulty, computer first move, and piece arrangement for end and mid-game situations. Has keyboard entry of moves including castling and enpassant, memory for position verification, and digital display to indicate "to" and "from" positions. Indicator lights for "check" and "I lose". For 120 VAC, 60 Hz.

GD-1248, Assembled, Full instructions.
Shpg. wt. 6 lbs. 199.95

2 Checker Challenger

An ultimate partner for any checker player. Checker Challenger features 4 levels of play from basic to expert, random computer responses that vary every game, selection of offense or defense, verification of checker positions. You can even change levels of play during the game! You can also set up problem situations for the computer to solve. For 120 VAC, 60 Hz.

GD-1256, Assembled, full instructions.
Shpg. wt. 5 lbs. 129.95

3 First-Alert™ Smoke Detector

Detects fire in its first stage, when there's still time to protect your family from flames and suffocating



Priceless safety
you can easily
afford

SAVE \$5!
Mir's rebate certificate
included with every
FirstAlert™ you buy.
Good thru Dec. 31, 1978.

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 activates and will sound an intermittent beep for as long as a month. Has automatic reset, built-in test switch to check operation before installation. 100% solid-state circuit. Temperature range: 0° 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. listed.

GD-1414, Shpg. wt. 2 lbs. Assembled 17.95

REAL Home Improvement!



Programmable Home Heating Control

The GD-1776 helps you conserve energy and save up to 20% on fuel bills by automatically reducing room temperature during one or two preprogrammed periods. Has adjustable temperature set-back to more than 10° for periods of ½ hour minimum to 23½ hours

maximum. Heat is returned to its normal level automatically. An ECON-NORMAL switch overrides the timer and returns your furnace to normal operation. 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. Some local codes may require "hard-wiring" of the primary (120 VAC) power source by a licensed electrician. Not intended for use with 2-stage systems.

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

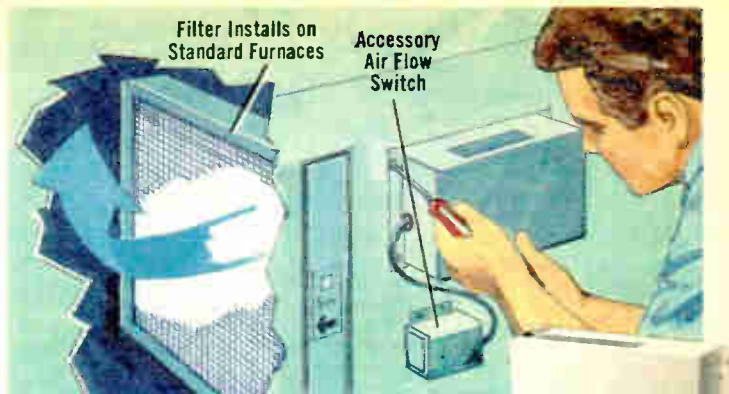


Ultra-convenient Ultra-sonic Cleaner

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! 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. 69.95



This Furnace Electronic Air Cleaner helps you maintain a healthy home by preventing "stale" air

Power Supply Mounts Most Anywhere

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. Power Supply, 12" W x 8" H x 4" D. For 110-130 VAC. 25 watts max.

Kit GD-1196-1, 20" x 25" x 2", 1000 CFM. Shpg. wt. 24 lbs. 179.95

Kit GD-1196-2, 20" x 20" x 2", 800 CFM. Shpg. wt. 24 lbs. 179.95

Kit GD-1196-3, 16" x 25" x 2", 800 CFM. Shpg. wt. 24 lbs. 179.95

Kit GD-1196-4, 16" x 20" x 2", 640 CFM. Shpg. wt. 24 lbs. 179.95

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 99.95

Accessory Air Flow Switch. For 120 VAC outlet, required with 240 VAC systems.

Kit GDA-1196-5, Shpg. wt. 2 lbs. 24.95

and all are specially discount-priced to make them exceptional values!



Never miss another important call!

4 Automatic Telephone Answerer

The Record-a-Call® VOX 70 has all the features you need in an automatic telephone answering device. Records on a standard-size cassette tape. Voice actuation permits a caller to speak as long as desired without time limits on the recorder. Other features include silent monitor (only the caller's voice is heard), announce only (gives message to caller and hangs up), dictation capability, fast forward, rapid rewind, rapid erase, and more. 120 VAC powered. 9" x 11¾" x 3¾". Fully assembled.

GDP-1227, Shpg. wt. 12 lbs. 199.95

5 Digital Thermometer

A unique, extremely useful tool for the home, office, laboratory or anywhere a quick temperature reading is needed. A bright, easy-to-read four digit LED display



Reads Fahrenheit or Celsius!

play provides temperature readout over a range from 32°F to 212°F (or switch to read 0-100°C) in 1/10th degree increments. Power is supplied by a standard 9V battery. A flashing decimal point provides a low battery warning. Fully assembled. Less battery.

GD-1226, Shpg. wt. 2 lbs. 39.95

6 Klima-Gro® Indoor Greenhouse

Klima-Gro gives your plants the perfect environment for optimum growth. Light and heat are controlled automatically. A built-in moisture sensor and meter tells you when to water your plants—no more guessing. 24-hour timer regulates the internal light. The electronic control panel is fully assembled—only mechanical assembly is required. 51" W x 26" D x 28" H.



Kit GD-2225, 98 lbs. (see note below) 279.95
GDA-2225-1, Optional Base. 55 lbs. 69.95

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 can 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. Continental U.S. only.

Our easiest-to-build Organ kit EVER!

The Computerized Heathkit/Thomas Troubadour Organ

\$1749⁹⁵

- Save up to 1/3 when you build it yourself
- Microprocessor based for real versatility
- Easy to play even for a beginner

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 to play even for the beginner. 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. 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 1749.95
TOA-1860-1, Demo Record & Information Packet, Shpg. wt. 1 lb. 1.00

TO-1860 SPECIFICATIONS: VOICES & EFFECTS: (Solo) — Flute 16', Flute 8', Flute 4', Trombone 16' (O), Trumpet 16', Bassoon 16', Diapason 8' (O), Clarinet 8', Oboe 8', Violin 8' (O), Mandolin (Preset), Banjo (Preset), Solo Sustain, Main Bright. (Accomp.) — Tuba Horn 8' (O), English Horn 8', Cello 8' (O), 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.



The Heathkit/Thomas Keyboard Kombo lets you play like a "pro" with simple one-finger chords!

\$549⁹⁵

- Headphone jack for private practice
- Built-in 12" heavy-duty speaker
- Handsome Rosewood finish cabinet
- 12 solo instrument voices
- 5 accompaniment instruments
- Minor and expression pedals
- Rhythm and drum accompaniment



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 549.95

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.

Quality Music and PA Amplifiers at really low kit prices

[1] 25-Watt Guitar Amplifier. Features a full-control amplifier and speaker system with two heavy-duty 12" woofers; double-spring variable reverb and tremolo, dual foot switches for hands-free control of reverb and tremolo. 3/4" black vinyl-covered wood cabinet measures 28" W x 19 3/4" H x 9" D. For 120/240 VAC, 60/50 Hz.

Kit TA-16, Shpg. wt. 61 lbs. 189.95

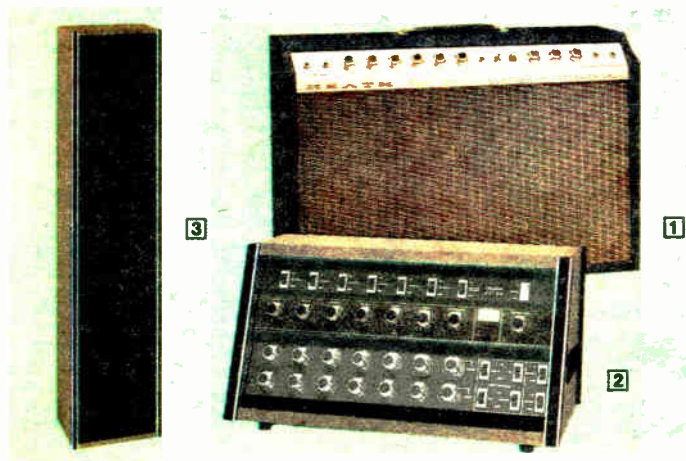
[2] PA Control Amplifier. Delivers 100 watts to two column speakers. Has six low-impedance inputs, each with bass, treble, reverb on-off and attenuation controls. Add booster amps and speakers for any audience coverage. 21 1/2" W x 11 1/4" H x 7" D. For 120/240 VAC, 60/50 Hz.

Kit TA-1620, Shpg. wt. 54 lbs. 399.95

Booster Amplifier for TA-1620. (Not shown). 100 watts. Stackable with TA-1620. Kit TA-1625, Shpg. wt. 22 lbs. 159.95

[3] PA Speaker Column. Has six 8" full-range speakers, output jack for TA-1625 booster amp. With 50' cable. 14" W x 62" H x 10 1/4" D.

Kit TS-1630, Shpg. wt. 112 lbs. Motor Freight 169.95



GET BIG SAVINGS on These Complete 3, 5 and 8-Channel R/C Systems!



Battery Charger

Your Choice of
Transmitter

Transmitter Module

Battery Pack

Receiver with Module

Sub-Miniature
Servos

Miniature
Servos

Buy the Cessna 172 Flight Pack with a Heathkit System and you're flying first class!

Easy to-build trainer plane has 48" wingspan, includes Fox .25 RC engine, fuel tank, fuel line, machined aluminum mount, all wheels, even prop and hardware.

Complete 3-Channel Systems: Ideal for beginners, or as second systems for experienced flyers. Systems include 3-channel transmitter and one frequency module, receiver and one frequency module, receiver battery pack and batteries, and your choice of servos. If purchased separately, \$212.75.

GDS-1405-1, with miniature servos. 25 lbs. 179.95
GDS-1405-2, with sub-miniature servos. 25 lbs. 179.95

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 311.65.

GDS-505-D, Shpg. wt. 27 lbs. 249.95

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 321.65.

GDS-505-S, Shpg. wt. 27 lbs. 249.95

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 353.55.

GDS-1205-D, Shpg. wt. 27 lbs. 284.95

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 373.55.

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

High-quality Heathkit Servos, Receivers and Batteries

SERVO COMPARISON CHART	Min. 1205-4	Sub-Min. 1205-5	Hi-Torque 1205-8
Idle Current (max.)	15 mA	15 mA	20 mA
No Load Current	80 mA	80 mA	150 mA
Stall Current (nom.)	450 mA	450 mA	1000 mA
Thrust	4 lb.	4 lb.	6 lb.
Travel Time	0.5 sec	0.5 sec	0.4 sec
Rotary Travel	90°	90°	90° or 180°
Dimensions (HxWxL*)	1 5/8 x 1 3/4 x 2 1/2"	1 1/4 x 1 1/4 x 2 1/2"	1 5/8 x 1 3/4 x 2 1/2"
Net Weight	1.75 oz.	1.25 oz.	1.75 oz.

*H includes outputs, L includes mounting ears

All servos: For use with all Heath R/C systems. Power Requirement: 4.8 VDC. Position Accuracy: 1%. Mechanical Output: 1 rotary arm, 1 rotary wheel. Input Signal: Pulse, 1-2 msec. 4V P-P. Temperature Range: 0° to 160° F. Backlash: <0.002".

Kit GDA-1205-5, Sub-Min. Servo. Shpg. wt. 1 lb. 26.95
Kit GDA-1205-4, Miniature Servo. Shpg. wt. 1 lb. 26.95
Kit GDA-1205-8, Hi-Torque Servo. Shpg. wt. 1 lb. 26.95
Kit GDA-1205-2, Receiver with 1 Frequency Module. 1 lb. 59.95
Kit GDA-1205-3, Receiver Battery Pack. 1 lb. 11.95

ture, subminiature or both). If purchased separately, up to 373.55.

GDS-1205-S, Shpg. wt. 27 lbs. 284.95

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 \$84.70! **Five-Channel Dual-Stick System.** Same as system GDS-505-D plus Cessna Skyhawk Flight Pack. RPS-505-D, Shpg. wt. 27 lbs. 299.90

SAVE \$94.70! **Five-Channel Single-Stick System.** Same as system GDS-505-S plus Cessna Skyhawk Flight Pack. RPS-505-S, Shpg. wt. 25 lbs. 299.90

SAVE \$91.60! **8-Channel Dual-Stick System.** Same as system GDS-1205-D plus Cessna Skyhawk Flight Pack. RPS-1205-D, Shpg. wt. 27 lbs. 334.90

SAVE \$111.60! **8-Channel Single-Stick System.** Same as system GDS-1205-S plus Cessna Skyhawk Flight Pack. RPS-1205-S, Shpg. wt. 27 lbs. 334.90

SAVE \$45.80! **3-Channel System.** Same as system GDS-1405-1 plus Cessna Skyhawk Flight Pack. RPS-1405-2, Shpg. wt. 24 lbs. 239.90

SAVE \$49.80! **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. 25 lbs. 262.85

Heathkit Accessories make your hobby more fun!

Receiver Flight Pack Special! Ideal for outfitting second aircraft or updating your present plane. Includes receiver, battery pack, and your choice of four miniature or sub-miniature servos. Specify module frequency and type of servo. SAVE \$24.75 over reg. sep. items prices. Kit GDS-1205-F, Shpg. wt. 21 lbs. 154.95

Radio Control Handbook. (Not shown.) Detailed information on use and maintenance of Heathkit R/C gear. GDA-1205-7 1.00
See page 49 for book ordering information.

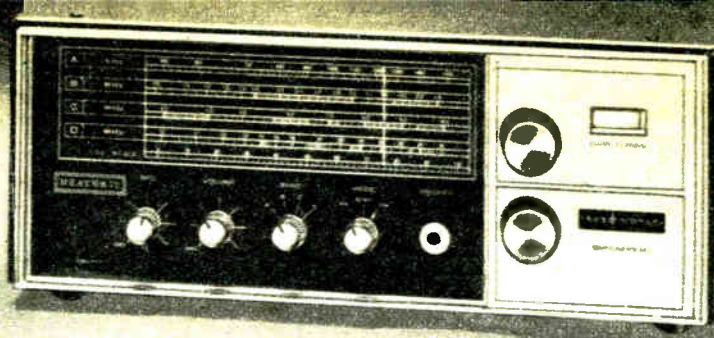
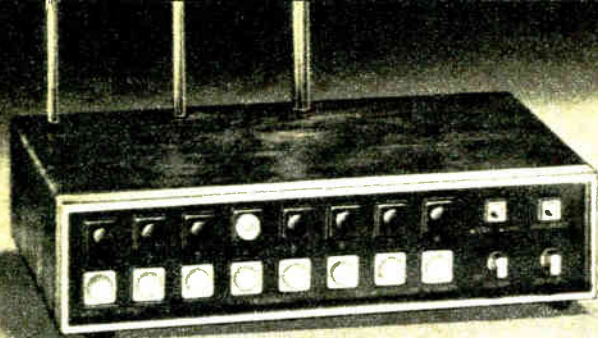
◀ **Thumb® Tach** peaks performance. Measures model engine rpm without physical connection to engine. 0-5000 and 0-25,000 rpm ranges. Ideal for needle valve adjustment, selection of glow plugs, gears and props. Kit GD-69, Shpg. wt. 1 lb. 27.95

R/C Battery Monitor. Expanded scale voltmeter checks capacity (under load) of batteries. Has meter, connector for all Heath battery packs, alligator clips for Nickel-Cadmium batteries. Pocket case. Kit GD-1188, Shpg. wt. 1 lb. 14.95

Servo Centering Standard (Not shown). Calibrates Heath servos to 1.4 msec pulse standard. Eliminates recentering when changing control units. Included in all Pack-17 transmitters.

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





There's a world of excitement waiting for you locally...or around the world

SAVE \$10! GR-1132 3-Band VHF/UHF Scanner

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, below): 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 below.

Kit GR-1132, Shpg. wt. 9 lbs. Was 129.95 Now 119.95

Kit GR-1131, Same as above except VHF (146-174 MHz) only, Shpg. wt. 9 lbs. 79.95

Scanner Antenna. VHF & UHF. For masts 1½" dia. SO-239 receptacle.

GRA-1132-1, Shpg. wt. 2 lbs. 22.95

GRA-1131-1, Mobile Mounting Bracket, Shpg. wt. 1 lb. 3.95

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

GRA-1100-2, 8-pole crystal filter, Shpg. wt. 1 lb. 9.95

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 µV or less for 12 dB SINAD. UHF: 0.7 µV 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. ½ 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: 3¼" H x 8½" D x 11¼" W. Net Weight: 5 lbs.

Personalize your kits with this Engraved Name Plate

\$1.30 each for
2 or more



Personalize each Heathkit project you complete with one of these handsome, engraved name plates. Each is done in a silver-satin finish on durable aluminum and is self-adhesive backed for easy application.

To order, simply complete form below and include with any regular kit order from this catalog.

PLEASE PRINT YOUR NAME PLAINLY IN CAPITAL LETTERS USING THE MAXIMUM 14 CHARACTER (INCLUDING SPACES) BOXES PROVIDED BELOW.

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Please ship ___ GDP-1225 Name Plates as shown below at \$1.50 for one. \$1.30 each for two or more (including postage and handling). Name Plates are shipped 1st class mail under separate cover. My total remittance of \$ ___ is included with the regular Heathkit order form (p. 49) attached.

Name _____
Address _____
City _____
State _____ Zip Code _____

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

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. 77.95

Long-wire SWL antenna. Really helps pull in stations. Wire, lead-in, insulators, and hardware all included. GRA-72, Shpg. wt. 2 lbs. 4.50

Superox Headphones. Low-cost and ideal for use with the SW-717. 600 ohms. GD-396, Fully Assembled, Shpg. wt. 2 lbs. 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: 5½" H x 14½" W x 8" D.

Amateur Radio Code Courses on Records or Cassettes

"Tune In The World With Ham Radio" a complete course with code cassettes and license manual. Produced by the ARRL. HDP-1142, Shpg. wt. 2 lbs. 7.00

Ameco Junior Code Course. LP with 10 lessons to 8 words-per-minute. HDP-232, Shpg. wt. 2 lbs. 3.95

Ameco Junior Cassette Code Course. As above, cassette instead of LP. HDP-432, Shpg. wt. 1 lb. 4.95

Ameco Senior Code Course. Two LP's with lessons to 18 words-per-minute. HDP-332, Shpg. wt. 2 lbs. 7.50

Ameco Senior Cassette Code Course. As above, cassettes instead of LP's. HDP-532, Shpg. wt. 1 lb. 8.95

"By the Word" code course. 3 LP's teach speed using "by the word method". HDP-32, Shpg. wt. 2 lbs. 9.95

Same as above but on 2 cassettes instead of LP records. HDP-132, Shpg. wt. 1 lb. 9.95



Heathkit Programmable Digital Stopwatch

Features start/stop elapsed time, sequential timing, total activity time, and much more!

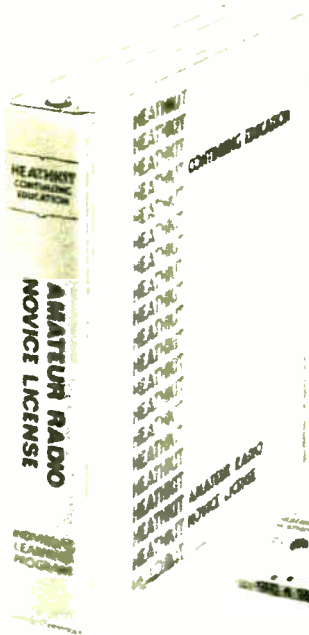
For features, versatility and accuracy, we don't think you can find a better stopwatch than our GB-1201! Two exclusive Heath PMOS IC counters and quartz crystal accuracy make it ideal for almost any timing job. Reads hours, minutes, tens and hundredths of seconds in a bright red digital readout that's easy to see in most any light. We even include a sunscreen so you can read it in direct daylight! Seven functions time any event: Start/stop elapsed time, sequential timing, total activity time, split time, start/stop activity time, upcount to a preset time, downcount from time.

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. 5½" H x 2¼" W x 2" D.

Kit GB-1201, Shpg. wt. 2 lbs. 84.95

ICA-2009-1, Felt-lined Naughahyde® carrying case, Wt. 1 lb. 3.95

Amateur Radio Novice License Program



From Heath — world leader in Amateur Radio Equipment — a self-instruction program 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 material — we'll REFUND your money for the program material.

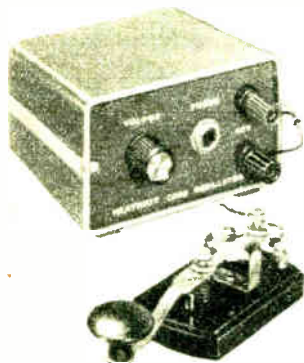


There's no better way to get your license. We guarantee it!

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 program 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. Covers rules and regulations, radio phenomena, operating procedures, emission characteristics, electrical principles, circuit components, practical circuits, antennas and transmission lines and radio communications practices.

Helpful station operating aids include a wall-size frequency spectrum chart and a call area map of the United States, a glossary of common abbreviations, twelve most common Q signals, instructions for making your own antenna, lots more! The program includes a programmed text and three audio cassettes to personalize and reinforce the text material.

Program ER-3701, Shpg. wt. 6 lbs. **29.95**



Heathkit HD-1416 Code Practice Oscillator

\$9.95 The low-cost, FUN way to learn Code!

Recommended for ER-3701 Amateur radio course above! 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. Once you get your license, the HD-1416 can serve as a sidetone oscillator for any transmitter using grid block keying. Kit HD-1416, Shpg. wt. 2 lbs. **9.95**

HD-1416 SPECIFICATIONS: Mode of Operation: Speaker or headphones. Tone Frequency: 290-800 Hz adjustable. Battery Required: 9-volt transistor battery equivalent Neda #1604 (not supplied). Headphones: 8-2000 ohms. Dimensions: 2 $\frac{3}{8}$ " H x 4 $\frac{1}{2}$ " W x 4 $\frac{3}{8}$ " D.

Amateur Radio is a Truly Exciting Hobby — and Heath is the way to start and stay with it!

Amateur Radio is a hobby everyone can enjoy. It provides you with world-wide two-way radio communications right from your home, car or boat. Every time you "work" your equipment, transmitting and receiving, it's a new, exciting adventure. You make friends from different countries and cultures, enjoy working and experimenting with electronic equipment, develop your technical and mechanical skills. It's also a practical and convenient means of local two-way communications — keep in touch with other Amateurs right in your area for community news and information.

It's easy to become an Amateur too. An elementary knowledge of radio theory, operating procedures, and code is all that's required. Passing a simple exam administered by the FCC gets you your license. And a low-cost transceiver (like our HW-8, page 22) gets you operating. In fact, the FCC has recently taken steps to make Amateur radio licenses even easier to get. The code test has been simplified for the novice ticket, there is no longer any fee, and tests are administered by mail.

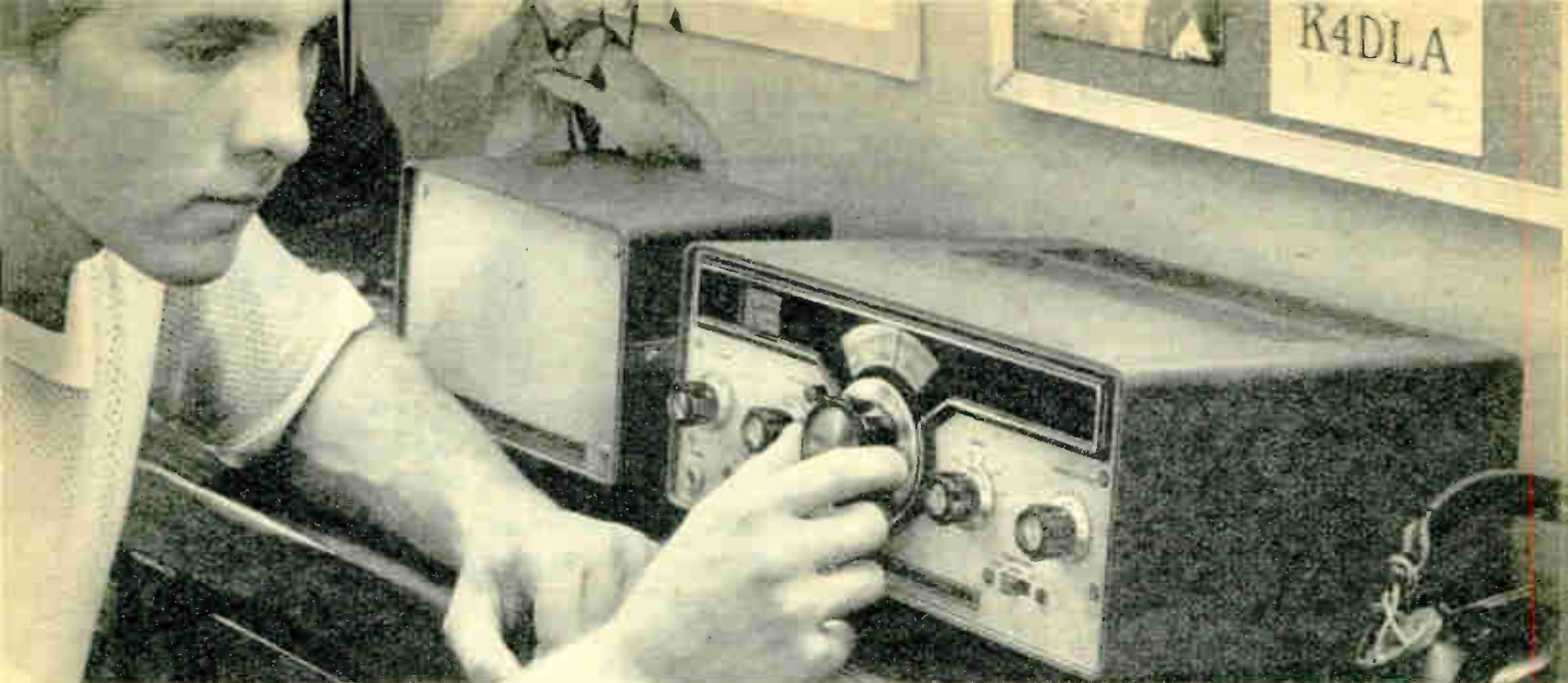
Naturally, we think starting and pursuing your hobby with Heathkit equipment is the best way to do it. That's because our complete line of Amateur Radio equipment can provide everything you need, from a basic Code Practice Oscillator all the way to a sophisticated station. It's easy and fun-to-build, you learn about circuitry and operation as you put your equipment together, and you'll probably save money over comparable assembled units.

SAVE \$4.95 When You Order the Program and Code Oscillator Together

Here's an ideal combination to help you get your ticket. Our Code Practice Oscillator described at left and our program described above will get you operating fast and easy. And we even include a Bonus Gift Certificate good for 10% off (up to \$10) on any Heathkit Amateur Radio Equipment. Simply enclose a copy of your license and proof of ERS-3701 purchase within 90 days of licensing. \$39.90 if purchased separately.

ERS-3701, Shpg. wt. 8 lbs. **34.95**





HR-1680 High-performance SSB/CW Receiver

\$199⁹⁵

- 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 covers 80, 40, 20, 15, and the lower 1 MHz of the 10 meter band and features a preselector tuned dual-conversion front end. Less than $0.5 \mu\text{V}$ gives you a 10 dB signal plus noise over noise ratio and a 4-pole crystal filter and MOSFET amplifier gives the IF section excellent selectivity and gain. Both RF and IF stages are AGC controlled to prevent 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.

Assembly is simplified with only four circuit boards to construct and a rugged chassis minimizes heating and insures long lasting precision and stability. Operates from 12 VDC or internal AC supply. Can be aligned without external instruments.

Kit HR-1680, Shpg. wt. 14 lbs. **199.95**

7 EVENING KIT
Fast, Easy Assembly

Novice kitbuilders will really appreciate the HR-1680's open chassis layout and easy-to-follow step-by-step assembly.

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 $0.5 \mu\text{V}$ 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. 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 μs (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 $1 \mu\text{V}$ 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 kHz per turn. Dial Accuracy: Within 2 kHz after calibration at nearest 100 kHz marker. Dial Backlash: 50 Hz or less. 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 $\frac{3}{4}$ " W x 6 $\frac{3}{4}$ " H x 12" D. Net Weight: 9 $\frac{3}{4}$ lbs.

Unique and Useful Accessories for your Amateur Radio Station

Heathkit MICODER™ II Mike/Auto Patch


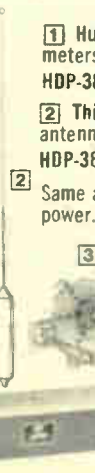
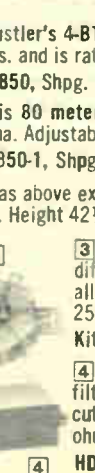
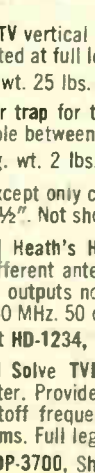
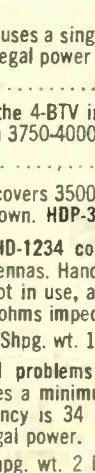
An excellent way to avoid the inconvenience and clutter of an "outboard" tone encoder is to install the new Heath HD-1984. On one side of this neat hand held package you'll find an electret condenser microphone of superior quality. Flip it over and the HD-1984's built-in keyboard is ready to give you instant auto-patch access.

The microphone section features excellent audio characteristics and its 300-3000 Hz response is tailored for clean voice transmission. Encoder circuitry features single chip, crystal referenced, tone generation, Zener diode voltage regulation and excellent overall accuracy and stability.

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. Easy single-step NO-INSTRUMENT alignment! Can be used with any high-impedance mike input. 3 $\frac{3}{4}$ " H x 2 $\frac{5}{8}$ " W x 1 $\frac{3}{4}$ " D.

Kit HD-1984, Shpg. wt. 1 lb. **34.95**

18

-  Hustler's 4-BTV vertical uses a single 50 Ω feedline, covers 10-40 meters, and is rated at full legal power on SSB & CW.
HDP-3850, Shpg. wt. 25 lbs. **89.95**
-  This 80 meter trap for the 4-BTV installs directly on top of the antenna. Adjustable between 3750-4000 kHz. Full legal power.
HDP-3850-1, Shpg. wt. 2 lbs. **29.95**
-  Same as above except only covers 3500 to 3750 kHz. Takes full legal power. Height 42 $\frac{1}{2}$ ". Not shown. HDP-3850-2, Shpg. wt. 2 lbs., **29.95**
-  Heath's HD-1234 coax switch switches up to 4 different antennas. Handles up to 2 kW PEP, grounds all outputs not in use, and has an operating range to 250 MHz, 50 ohms impedance.
Kit HD-1234, Shpg. wt. 1 lb. **10.95**
-  Solve TVI problems with this rugged low-pass filter. Provides a minimum of 70 dB attenuation and cutoff frequency is 34 MHz. For 10-160 meters. 50 ohms. Full legal power.
HDP-3700, Shpg. wt. 2 lbs. **29.95**

Reliable, Money-Saving Accessories from Heath

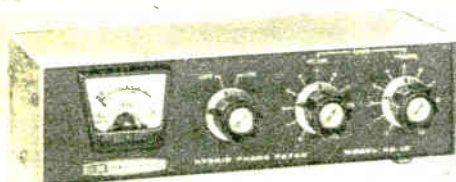
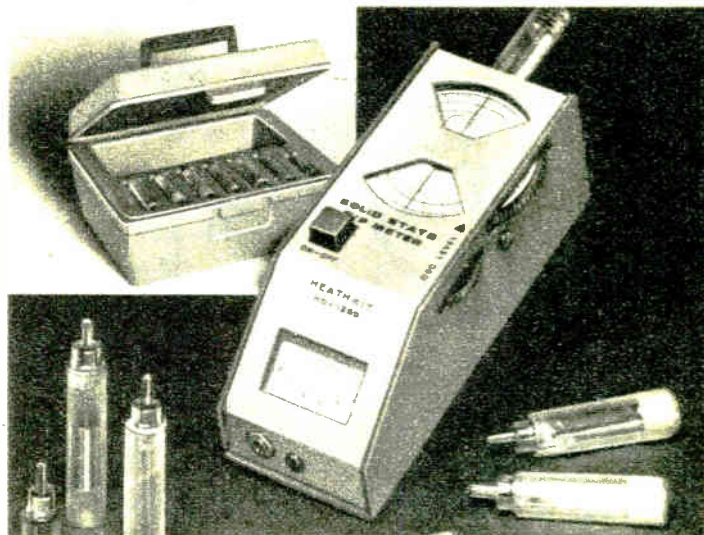
Add more versatility to transceivers and separates with these handy, low-cost accessories

Heathkit solid-state Dip Meter delivers more performance at big savings

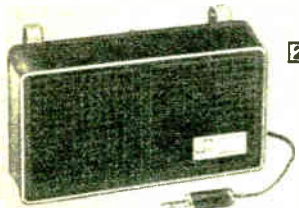
Another Heath value triumph—a better dip meter at lower cost. The Colpitts oscillator covers 1.6 to 250 MHz in fundamentals with a MOSFET paraphase amplifier and hot-carrier diodes for more sensitivity and a better dip. It uses a Q-multiplier for greater detector sensitivity and a responsive 150 μ A 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 parasites, 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.

The kitbuilding is really easy too, usually just a single evening. Nearly everything mounts on two circuit boards and there's minimal point-to-point wiring. And when you finish, you'll have the best dip meter around—for a lot less money. Kit HD-1250, less battery, Shpg. wt. 4 lbs. 59.95



1



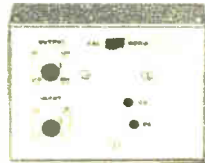
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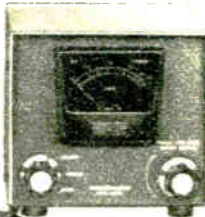
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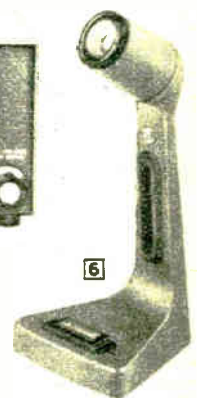
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6



5



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. PTT operation. 2 $\frac{1}{2}$ " H x 9 $\frac{1}{4}$ " W x 3 $\frac{5}{8}$ " D. Kit HD-15, Shpg. wt. 3 lbs. 37.95

2 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. 5 $\frac{3}{4}$ " W x 3 $\frac{3}{4}$ " H x 1 $\frac{1}{4}$ " D. Fully assembled. HDP-1228, Shpg. wt. 1 lb. 9.95

3 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. 14.95

4 Heath's Original "Cantenna". 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. 17.95

5 Field Strength Meter for fast adjustments. Makes transmitter 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. 11.95

6 Fully assembled Heathkit Desk Mike. 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. 39.95

7 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. 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. 37.95

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 1C watts. Impedance: 50 ohm nominal. Connectors: UHF type SO-239. Dimensions: 5 $\frac{1}{4}$ " H x 2 $\frac{1}{4}$ " W x 6 $\frac{1}{2}$ " L

Kit HM-2102, As above, 50-160 MHz range. (6 or 2 meters). Shpg. wt. 4 lbs. 37.95



Shown with optional Micoder II Installed

HW-2036A-The Standard for Mobile 2-Meter Transceivers

\$269⁹⁵
with standard microphone

- True digital frequency synthesis
- 0.5 μ V receiver sensitivity
- 8-pole crystal IF filter

Two meters gets more exciting every day. With more and more mobile activity, autopatching, 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 on 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 ± 600 kHz split operation. Or pick your own offset (1 MHz maximum) 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 preventing 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. \$34.95 Micoder II for auto-patch operation.

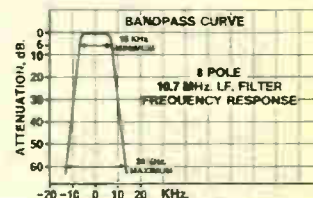
Kit HW-2036A-1, with reg. \$34.95 Micoder II. Shpg. wt. 12 lbs. 289.95

Kit HW-2036A-2, with standard PTT mike. Shpg. wt. 12 lbs. 269.95

20



Front Panel Lever Switches Select Any Frequency in Any 4 MHz Segment of the HW-2036A's 143.5 to 148.5 MHz Operating Range.



An 8-pole IF Crystal Filter greatly reduces adjacent channel interference for clear, static-free transmission and reception.

HW-2036A SPECIFICATIONS: Receiver: Sensitivity: 0.5 μ V for 12 dB SINAD (or 15 dB of Quieting). Squelch Threshold: 0.3 μ 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 μ 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 Ω 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. ± 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 4 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 7/8" deep. Weight: 6.25 lbs.

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 offers a full 4 MHz of synthesized operation over any portion of its 143.5 to 148.5 MHz range. And because of this significant improvement, you'll be enjoying additional performance and flexibility without the time consuming necessity of VCO retuning. Best of all, we've done it all at the same low price that made the HW-2036 such a value leader.

Add extra punch to any 2M transceiver



Features SO-239 connectors

These units meet new FCC specs for harmonic and spurious radiation



Get more power from your handheld transceiver

Features SO-239 connectors

Heathkit 40 Watt 2M Amplifier

Delivers solid 40W minimum for 10 watts in. Draw just 7A max. from your car battery. Has antenna changeover relay and sensing circuitry for completely automatic T/R switching, tuned input/output circuits provide low spurious radiation. Special emitter ballasted configuration — withstands VSWR's of up to 3:1. Covers any 1.5 MHz portion of the 143-149 MHz band. Final alignment requires VTVM, wattmeter or SWR bridge. Mounts just about anywhere. Now with SO-239 connectors for easy hookup!

Kit HA-202A, Shpg. wt. 4 lbs. 59.95

HA-202A SPECIFICATIONS: Power Output: 20W @ 5W in. 30W @ 7.5W in. 40W @ 10W in. 50W @ 15W in. Impedance: 50 ohms nom. Power Requirement: 12-16 VDC, 7 A max. Dimensions: 3" H x 4 1/4" W x 5 1/2" D.

2M Amplifier for Handhelds

For anyone who wants extra output at low cost, the HA-201A delivers up to 10 watts for a 1 1/2 watt input. 8 watts for a 1 watt input — ideal for use with any low-power 2-meter transceiver. Features fully automatic operation, solid-state transmit/receive switching, tuned input and output for maximum efficiency and reduced spurious emissions. Withstands infinite VSWR load without failure. Includes dummy load and RF detector. Easy 1 to 2 hour assembly. VTVM needed for tuneup. 12-16 VDC. Now with SO-239 connectors for easy hookup!

Kit HA-201A, Shpg. wt. 2 lbs. 34.95

HA-201 SPECIFICATIONS: Power Output: (at 13.6 VDC input): 8 W @ 1 W in; 10 W @ 1.5 W in. Power Input (rf drive): 1-3 W. Input/Output Impedance: 50 ohms. Power Requirement: 12-16 VDC. 2.2 A maximum. Dimensions: 5 1/8" L x 3 3/8" W x 2 3/4" H.

AC Power Supply for HW-2036A



Supplies the necessary voltage and current to power your HW-2036A 2-meter transceiver from a standard AC outlet for base station operation. Has 120/240 VAC wiring options, fused overload protection. With all cables for easy hookup and 3-wire line cord. Compact metal case.

Kit HWA-2036-3, 7 lbs. 37.95

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). Dimensions: 3" H x 7 1/4" W x 10" D (including switch and feet).

New Accessory Power Supply for HW-2036A and HA-202A



The HP-1175 supplies the necessary voltage and current to power the HW-2036A and HA-202A 2-meter amplifiers from standard 120 VAC or 240 VAC outlets for base station operation. Has 120/240 VAC wiring options, fused overload protection. With cables and 3-wire line cord.

Kit HP-1175, Shpg. wt. 15 lbs. 59.95

HP-1175 SPECIFICATIONS: Output Voltage: 13.8 VDC regulated (internally adjustable from approx. 12 to 14.5 VDC). Output Current: 10 amperes intermittent, 10 minutes max. (5 amperes continuous). Dimensions: 5 1/8" H x 6 3/4" W x 11" D (incl. switch and feet).

High-Performance 2-Meter Antennas

1 Cushcraft's 11 element yagi. Features 13.2 dB forward gain, a 28 dB front-to-back ratio, and gamma match tuning for minimum SWR. Feeds directly with 52Ω coax. 146-148 MHz. Assembly required.

HDP-1470, Shpg. wt. 6 lbs. 29.95

2 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. 17.95

3 Standard gain mobile. 5/8" wavelength rear deck whip. 3.4 dB gain, 1.1:1 SWR. 100 watts, 47" radiator. 17" coax, connectors.

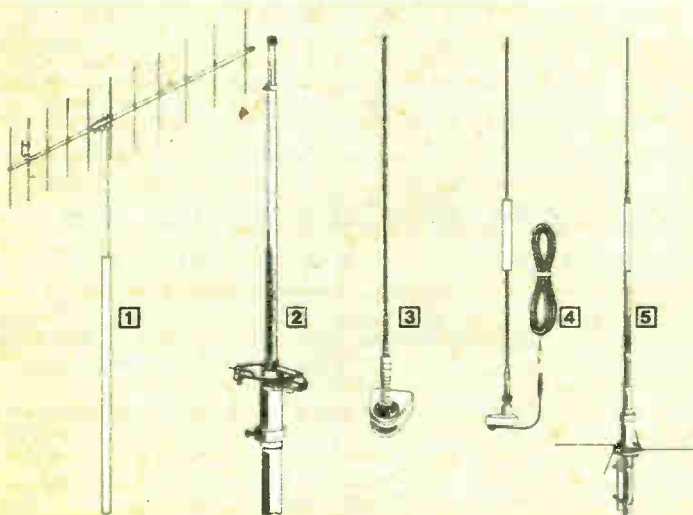
HWA-202-3, 2 lbs. 19.95

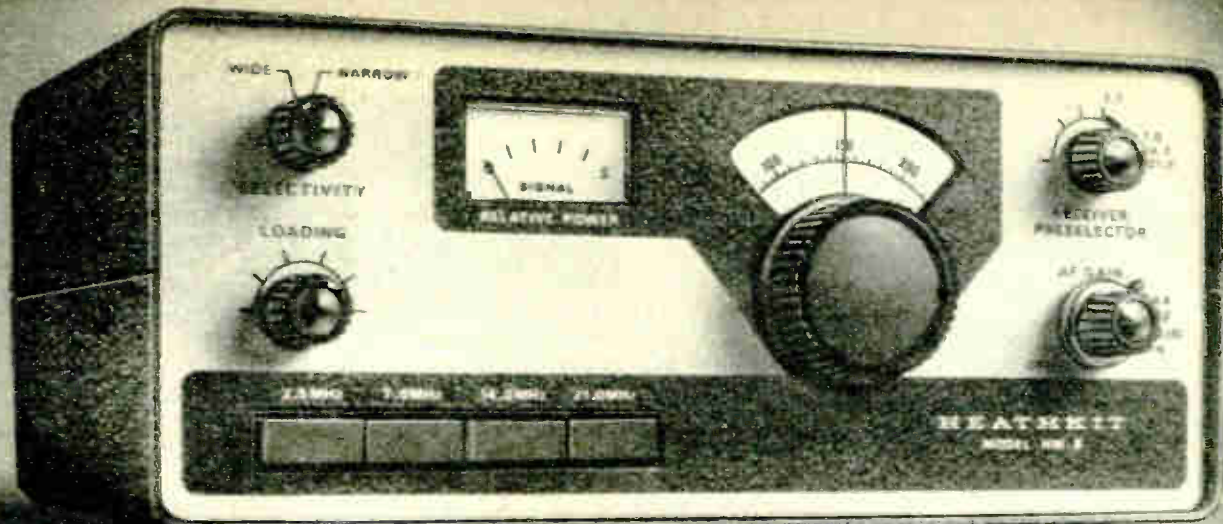
4 Super gain mobile. Phased 1/4 and 5/8 wave radiators. 5.2 dB gain. 200 watts; 6 MHz bandwidth; 1.1:1 SWR. Height 85". 17" RG-58U coax, connectors.

HWA-202-9, 3 lbs. 37.95

5 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. 69.95





HW-8 -- It works the world on a couple of watts!

\$129⁹⁵

- 0.2 μ V gives you readable signals
- 4 Band CW Operation
- Front panel Relative Power Meter

When was the last time you worked the coast, snagged YV or exchanged reports with a DJ6... all with just three watts in? 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 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 unit's 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 semi 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.

The HW-8 is an easy and enjoyable kit to build, too, most parts mount on a single printed circuit board, and there's minimum point to point wiring. Now's the time to get into the fun and excitement of low-power CW operation. Order your HW-8 today!

Kit HW-8, Shpg. wt. 6 lbs. 129.95

Kit HWA-7-1, AC Power Supply. Operates your HW-8 from standard 117 VAC house current. Ideal for fixed station use. Shpg. wt. 4 lbs. 15.95

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 Ω , unbalanced. Spurious & Harmonic Levels: -35 dB or better. Offset Frequency: approx. -750 Hz, fixed on all bands. **RECEIVER** — Sensitivity: 0.2 μ V for readable signal; 1 μ V or less for 10 dB S+N:N. Selectivity: wide, -750 Hz @ -6 dB narrow, -375 Hz @ -6 dB. Audio Output Impedance: 1000 Ω , nominal. **GENERAL** — Frequency Coverage: 3.5-3.75 (80 M); 7.0-7.25 (40 M); 14.0-14.25 (20 M); 21.0-21.25 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.



Improve your CW sending with this solid-state Electronic Code Keyer

\$49⁹⁵

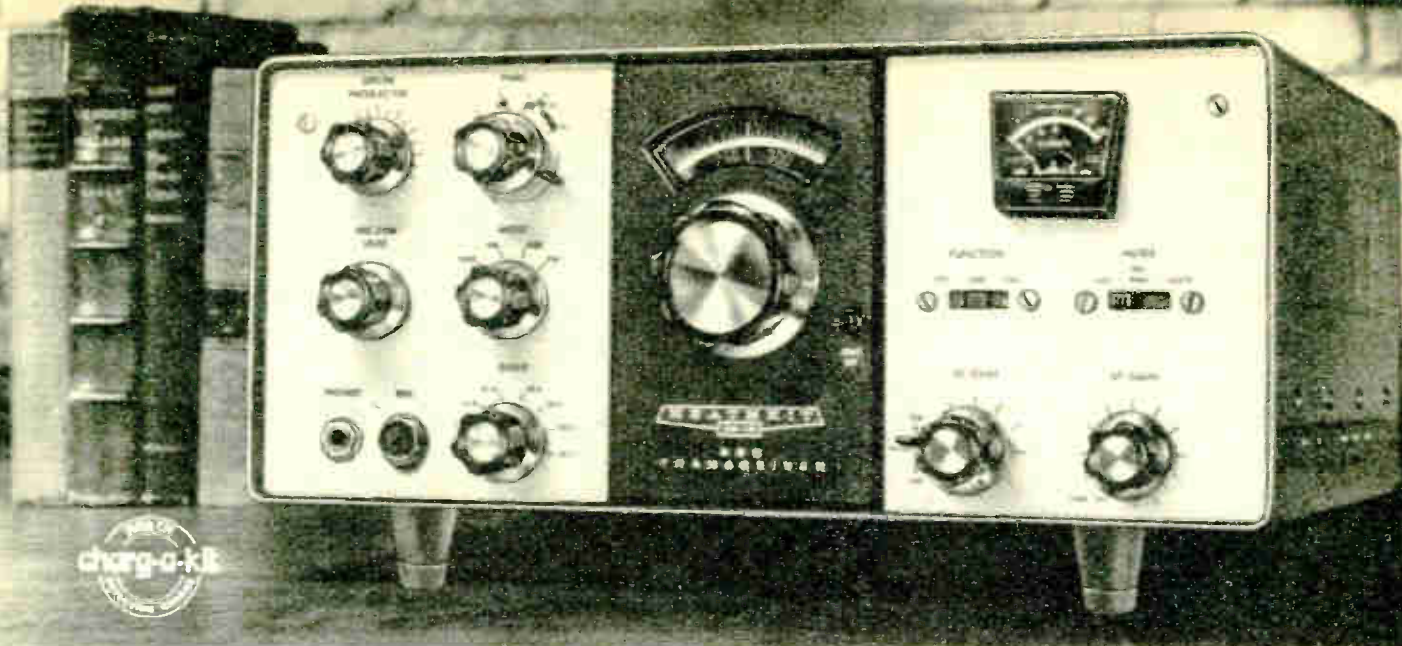
- Selectable 10-35 or 10-60 wpm
- Adjustable paddle travel and tension
- Operates 120 VAC or 12 VDC
- Weighted cabinet for stability

Sending code's easy with the HD-1410 whether you're operating base or portable. The dot and dash paddles travel and tension are easily adjustable. When the two paddles are treated as one, the HD-1410 operates like a single-paddle keyer with dot and dash memories. Iambic operation forms most characters with reduced wrist movement. Dots and dashes are self-completing and always in proper proportion. During construction, you select the speed range you

want — 10 to 35 words per minute or 10 to 60 words per minute. Operates on 120 VAC or 12 VDC. Adjustable sidetone frequency, built-in speaker, headphone jack. Styled to match our famous "SB" line.

A special weighted cabinet helps keep the HD-1410 stable to prevent sliding or fumbling. Its low-profile styling and compact size let you use it with most any rig without blocking other knobs and controls.

Kit HD-1410, Shpg. wt. 4 lbs. 49.95



HW-101...Lets You Explore the World on a Budget

\$369⁹⁵

The unbeatable price/performance leader in SSB Transceivers

The Heath HW-101 gives you full coverage 10 through 80 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 μ 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.

Kit assembly is easy and fast with an open chassis layout, uncrowded circuit boards and a color-coded wiring harness. Special "switch boards" with built-in wafer switches help eliminate intricate wiring to greatly simplify assembly. The HW-101, it's an unbeatable deal at an unbeatable price.

Kit HW-101, Shpg. wt. 22 lbs. **369.95**
SBA-301-2, 400 Hz CW crystal filter, Shpg. wt. 1 lb. **34.95**



Heathkit HP-13B Mobile Power Supply to put your HW-101 on the road

This Power Supply gives you all the necessary operating voltages for mobile use of SSB transceivers. It has high, low and fixed bias voltages, also switches filament voltage for equipment with which

it is used, features relay control of all primary power and has individual circuit breaker protection. Built to stand up to many years of rugged mobile use.

Kit HP-13B, Shpg. wt. 7 lbs. **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 .05% @ 150 mA. Fixed bias: -130 VDC @ 20 mA. Dimensions: 7 $\frac{3}{4}$ " W x 7 $\frac{3}{4}$ " L x 2 $\frac{3}{8}$ " D. All voltages referenced at 13 VDC.

HW-101 SPECIFICATIONS: RECEIVER: Sensitivity: <0.35 μ 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 2460 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.



Fixed-Station AC Power Supply

Provides the operating voltages for the HW-101 as well as those necessary for the operation of many other 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.

Kit HP-23C, Shpg. wt. 19 lbs. **57.95**

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 VAC @ 5.5 amps. Dimensions: 9" L x 4 $\frac{3}{4}$ " W x 6 $\frac{1}{4}$ " H.

Heathkit Linears—Packed with Power and Features



Due to the recent FCC ruling and subsequent ban on the sale of linear amplifiers capable of operation between 24 and 35 MHz, we will no longer be able to offer either the SB-200 or 220 amplifiers for sale. However, we are presently in the process of redesigning them and should have replacement models available this Fall.

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 on phone and 1 kW in on CW. The amplifier requires only 100 watts drive, so it's ideal for use with most any of the popular transmitters or transceivers. And to insure top performance, the SB-200 is loaded with the kinds of features you need!

The SB-200's heavy-duty final amplifier tubes are fan-cooled for maximum tube life and completely shielded to insure excellent TVI protection. A pretuned cathode-input circuit provides maximum drive efficiency and easier alignment. And to prevent distortion producing overdrive, the amplifier provides an ALC output for automatic exciter control.

The SB-200 has a built-in solid-state power supply which features full circuit breaker protection. A switchable multi-function 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 component isolation. The amplifier's clean open chassis layout assures easy assembly and provides maximum efficiency for year-after-year dependability. A fine addition to any station. Watch future catalogs for the soon-to-be-announced replacement model for the SB-200 amplifier. Model SB-201.

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 $\frac{3}{8}$ " W x 6 $\frac{5}{8}$ " H x 13 $\frac{3}{8}$ " 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 Heath SB-220 is the one that's making Amateur Radio history because it offers more features and performance than all the rest. It features a pair of conservatively rated Eimac 3-500Z's which deliver up to a full 2000 watts PEP input on phone and can be loaded to 1 kW in on both CW and RTTY. A broadband pre-tuned pi-input delivers maximum efficiency with extremely low distortion over the entire 80-10 meter bands. Just 100 watts of exciter drive is all that is required to drive the amplifier to full output.

With an SB-220, tune-up couldn't be easier! Just select the band you wish to operate, set the CW-tune/SSB rocker switch to the CW-tune position, adjust both tune and load controls for maximum relative power out—and you're ready to go. Ready with the kind of signal that always catches the new DX, gets your traffic through, and provides reliable year-after-year communications performance.

The SB-220's power supply can be easily wired for either 120 or 240 VAC operation. Zener diode regulated operating bias reduces idling current for cooler running and extended tube life. The amplifier incorporates built-in circuit breaker protection and a large, quiet-running fan provides maximum tube cooling. Other features include ALC to prevent distortion producing overdrive; front-panel switch-selected monitoring of grid current, relative power, and high voltage. There's also a separate meter for measuring final amplifier plate current.

Kit assembly is easy and enjoyable. Watch future catalogs for the soon-to-be-announced replacement model for the SB-220 amplifier. Model SB-221.

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 $\frac{3}{4}$ " H x 14 $\frac{7}{8}$ " W x 14 $\frac{1}{2}$ " D.



The Heath SB Series—Excellence In Amateur Radio!

Charting New Paths. Reaching for new horizons is exciting. It is also exacting, demanding high discipline to achieve realistic results. It was in such an atmosphere — free thinking balanced by realism — that the Heath amateur radio engineers created the SB series of equipment.

That these Heath engineers reached a new design plateau is evident in the sophistication and technological advancement displayed by the amateur radio products found on the following pages. You'll find significant advances in the state-of-the-art which are destined to be of consequence for years to come, combined with performance, convenience, and exceptional value.

Tough Design Goals. When product plans for this series were being outlined, there were 10 basic features requested. 1. All solid-state design, including final amplifiers. 2. Digital frequency display with 100 Hz resolution (± 200 Hz accuracy). 3. Receiver section to cover all bands without preselector tuning. 4. Superior receiver cross mod./intermod. performance. 5. Transmitter section to deliver rated power 80-10 meters without tuning. 6. Power output to be 100 watts plus a QRP level, on all bands. 7. Improved operating convenience. 8. Modularized circuitry. 9. Improved "buildability" and serviceability. 10. A system of solid-state accessories to include: noise-blanker; remote VFO; station console with digital clock, timer, wattmeter, SWR bridge, and phone patch and monitor scope.

Receiver Design Philosophy. The first concept to be overturned in the design of what has become the world's finest no-tuning receiver, was the elimination of the traditional preselector tuned RF section. In its place has evolved a unique broad band dual conversion front end consisting of computer formulated 3-pole bandpass filters, diode-array double-balanced first and second mixers, and a selective 6-pole IF filter.

As a result of these innovative design approaches the SB-104A requires no front end tuning, displays minimal cross-mod. and intermod. problems, and has excellent overall sensitivity figures.

Digital Frequency Display Design. An important part of the convenience of the SB series is the digital display. For this reason, a great deal of effort was made in evaluating various types such as incandescents, fluorescents, gas-discharge, LED, and liquid crystals on the basis of brightness and contrast (visibility), interface, power consumption, and esthetics. The winner was the Beckman planar gas-discharge display. They are large and can be read in direct sunlight in portable and mobile environments.

The display is driven by a frequency counter of the common decade type with one major difference...it is programmable. The programmable counter counts the premix injection frequency and is programmed to start below zero by the amount of the

BFO frequency. The programming of the three frequencies (USB, LSB, CW/TUNE) is done by a diode matrix. Interface is standard BCD logic.

VFO Design. With digital readout, stringent requirements for VFO linearity are no longer necessary. This permits the use of a kit design rather than a pre-built LMO. Aside from obvious cost advantages, equally important is the absence of any "black box" mysteries...this is a VFO you can service yourself just like the rest of the circuits. The accepted solid-state VFO design underwent rigorous testing of specifications for load, power, packaging, frequency, and a computer program was used to tailor its environmental performance.

Transmitter Design. Being entirely solid-state, the SB-104A has some interesting devices in it, like a DC-controlled quad op amp IC that is the entire transmitter audio section, and a 2-watt PEP driver device that is used for output in the QRP mode. But the most interesting in design, and the longest in development, was the solid-state final amplifier. It features rugged, emitter-ballasted transistors which have been specifically designed for SSB applications. These devices, combined with careful attention to linearity throughout the design, have resulted in an output which is extremely clean. The devices are protected against antenna shorts and opens or any other high VSWR situations by a directional coupler in the antenna circuit which generates an ALC voltage. The design of the final amplifier dictates very conservative operating parameters; this fact coupled with efficient protection circuitry indicates the final devices should have almost unlimited life.

Modularity Improves "Buildability", Maintenance, Service. The modular design of the SB-104A not only makes it easier to build, it also minimizes the chance of building error and greatly improves maintenance and service procedures. Nearly all circuit components mount on plug-in circuit modules or cards. Each card performs a specific function. This separation of function allows rapid troubleshooting to the card level; an extender card facilitates repair while the unit is operational.

Mechanically, the transceiver is uncomplicated and rugged, with metalwork that is easily assembled. Separate top and bottom shells give easy access to circuit cards and harness connections. All circuit cards are glass epoxy to provide the greater rigidity necessary for plug-in types and the greater adhesion of circuit foils which makes soldering less critical.

The styling speaks for itself. An evolution of many ideas with inputs from those who know the meaning of operating convenience and beautiful functionalism.

In Total. No effort has been spared, no compromise made in designing the SB series system. It is modern, timeless equipment. We believe it to be the best available today, ready to serve you for all of tomorrow, with levels of performance previously unattainable.

Heathkit's SB-104A - A Technological Triumph offering

Bright 6-Digit Display Reads Frequency to ± 200 Hz

Smooth Action Drive for Virtually Backlash Free Tuning

Quick Selection of All Bands Plus WWV

Solid-State PA Gives You 100 Watts Out on All Bands

Broadbanded Circuits Eliminate Pretuning

Choose USB, LSB, or CW. There's Even a Low Power Position for 1-Watt QRP Operation!

Preassembled and Tested Front-End Circuit Boards

Lighted ALC/Relative Power/S Meter

Rugged Chassis Features Slot Insertion of Boards for Easy Removal and Replacement

Unique Call Letter Display Area

Push-Button Function Selection

Complete your SB-104A with this Station Speaker and Power Supply that goes in it!



Matching the SB-104A's looks and tailored to meet its performance, the SB-604 houses a built-in 5" x 7" oval speaker and has plenty of room left over for installation of the optional HP-1144A AC power supply. Frequency response is excellent and you'll find it ideal for the reproduction of SSB's 300-3000 Hz voice characteristics. Includes connector plug and cable.

Shpg. wt. 8 lbs.
Kit SB-604 39.95

Designed to operate from 120 or 240 VAC line voltage, the HP-1144A Power Supply provides the 13.8 VDC required to operate the SB-104A transceiver. It features a full-wave bridge circuit, Darlington regulation and an integrated circuit which samples, compares, and automatically maintains a fixed voltage output. To insure excellent regulation voltage is sampled at the load end of the power cable. This compensates for loss across both fuse and cable and insures correct voltage and current is supplied whether under no load or full load conditions. Over-voltage "crowbar" protection. Mounts in SB-604 cabinet.

Kit HP-1144A, Shpg. wt. 27 lbs. 89.95

HP-1144A SPECIFICATIONS: Output Voltage: 13.8 VDC regulated (Adjustable from approximately 11 to 16 VDC). Maximum Output Current: 20 amperes, intermittent, 8 amps continuous. Power Requirement: 110 to 130 VAC @ 6A or 220 to 260 VAC @ 3A, 50-60 Hz maximum. Dimensions: 5½" H x 9½" W x 10¼" D. Regulation: Less than 2% output voltage variation from no load to 20 amperes. Ripple: Less than 1% at 20 amperes. Fuses: 7-amp, 3AG, slow-blow primary. 20-amp, 3AG, output. Net Weight: 23 lbs.

SB-644A Remote VFO adds real versatility

Lighted Indicators for Transmitter/Receiver and Crystal Functions Easy-to-read Slide-Rule Scale Smooth Action Drive for Minimum Tuning Backlash



Styled to match and designed to make the SB-104A even more versatile, the SB-644A remote VFO provides external frequency control and the split transmit/receive capability so necessary for effective DX chasing and efficient net operations.

It features the same convenient push-button control found on the 104A and offers 5 modes of operation including: crystal-controlled transmit and receive; transceive from the remote VFO; transmit on remote-receive on main; receive on remote-transmit on main; and remote bypassed. The SB-644A covers 5-5.5 MHz, is fully buffered, powered by the SB-104A, and mechanically sound. Frequency stability is excellent with drift less than 100 Hz per 30 minutes of operation (after 30 minutes warmup). An excellent addition to your SB-104A station.

Kit SB-644A, Shpg. wt. 10 lbs. 119.95

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: 7½" H x 10¼" W x 15¼" D. Net Weight: 6½ lbs.

True State-of-the-art Amateur Radio design!

\$699⁹⁵

- Broadband technology eliminates the need for pre-tuning
- Readout accuracy within ± 200 Hz
- 100 watts out on all bands



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 ± 200 Hz accuracy. Pushbutton select CW upper, or lower sideband 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 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!

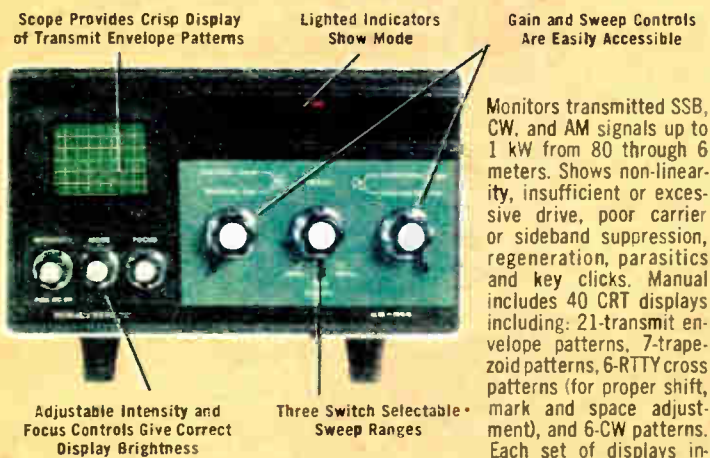
For extra operating performance, add 400 Hz CW selectivity with the optional SBA-104-3 crystal filter or cut ignition noise by installing the SBA-104-1 noise blander.

Add the matching SB-614 Station Monitor, SB-634 Five-Function Console, SB-604 Speaker and SB-644A Remote VFO 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. 32 lbs.	699.95
Noise Blander for SB-104A.	
Kit SBA-104-1, Shpg. wt. 1 lb.	26.95
400 Hz CW Crystal Filter for SB-104A.	
Kit SBA-104-3, Shpg. wt. 1 lb.	39.95
Mobile Mounting Bracket for SB-104A.	
Kit SBA-104-2, Shpg. wt. 6 lbs.	Was 36.95 Now 29.95

SB-104A SPECIFICATIONS: 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 ± 200 Hz ± 1 count. TRANSMITTER — RF Power Output: High Power (50-ohm non-reactive load). SSB: 100 watts PEP ± 1 dB; CW: 100 watts ± 1 dB. Low Power SSB: 1 watt PEP (minimum); CW: 1 watt (min.). Output Impedance: 50 ohms, less than 2:1 SWR. Carrier Suppression and Unwanted Sideband Suppression: -50 dB down from 100 watt single-tone output at 1000 Hz reference. RECEIVER — Sensitivity: 0.5 for 10 dB S+N, N for SSB. Selectivity: 2.1 kHz minimum at -6 dB, 5 kHz max. at -60 dB. (2:1 nominal shape factor). CW Selectivity: (with accessory CW filter) Selectable 2.1 kHz/400 Hz. IM Distortion: -65 dB min.; -57 dB typ. with noise blander. Image Rejection: -60 dB min. Dimensions: 5 3/4" H x 14 1/2" W x 13 7/8" D.

SB-614 Station Monitor accurately checks your signal



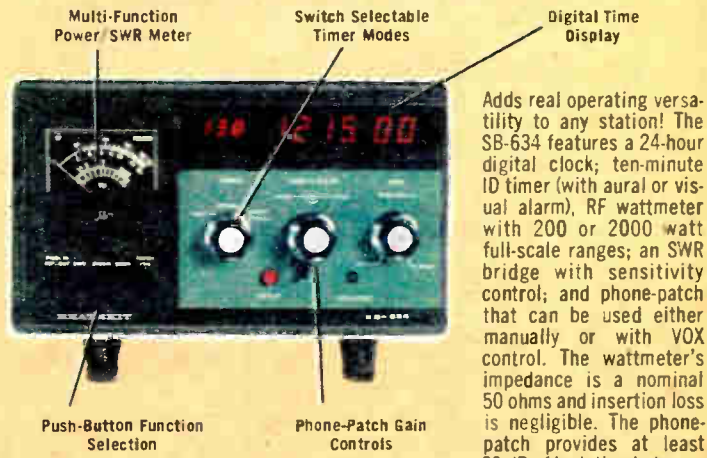
Monitors transmitted SSB, CW, and AM signals up to 1 kW from 80 through 6 meters. Shows non-linearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration, parasitics and key clicks. Manual includes 40 CRT displays including: 21-transmit envelope patterns, 7-trapezoid patterns, 6-RTTY cross patterns (for proper shift, mark and space adjustment), and 6-CW patterns. Each set of displays includes informative explanations.

Assembly of the SB-614 couldn't be easier and an open chassis layout and fully shielded CRT insures cool, efficient operation and excellent display stability. Manual includes complete instruction for station installation.

Kit SB-614, Shpg. wt. 17 lbs. 169.95

SB-614 SPECIFICATIONS: RF SAMPLING SECTION: Power Limits: Exciter input (50 -75 ohm) 10 to 300 watts; Antenna input (50 -75 ohm) 10 to 1000 watts. Insertion Loss: Negligible. VERTICAL AMPLIFIER: Input Impedance: 1 Megohm shunted by 75 pf. 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 helps you run efficiently



Adds real operating versatility to any station! The SB-634 features a 24-hour digital clock; ten-minute ID timer (with aural or visual alarm), RF wattmeter with 200 or 2000 watt full-scale ranges; an SWR bridge with sensitivity control; and phone-patch that can be used either manually or with VOX control. The wattmeter's impedance is a nominal 50 ohms and insertion loss is negligible. The phone-patch provides at least 30 dB of isolation between

transmit and receive circuits. Phone-patch input impedance is 600 Ω . Matches 3-16 Ω receiver outputs, and 600 Ω or h-Z transmitter inputs. The SB-634 is easy to assemble and provides the final touch of station excellence.

Kit SB-634, Shpg. wt. 13 lbs. 189.95

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: $\pm 10\%$ 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.

Here's why Heathkit hi-fi is the "sound" choice

There are a lot of reasons for making Heathkit hi-fi equipment a part of your music system. For instance, what if something goes wrong with a component? It happens. With your personal involvement as the kitbuilder and your Heathkit manuals, chances are pretty good you'll be able to find and correct the problem yourself — quickly and easily! That means you won't have to suffer those repair bills and long delays you've heard your neighbors complaining about!

Engineering — another big consideration. When it comes to Heath design, excellence is evident throughout. And it should be, because we've had years of experience in creating and building some of the finest high-fidelity components ever available.

Consider also performance to specifications. At Heath we don't play statistical games bent on puffing up important ratings like power, sensitivity, signal to noise ratio, etc. We use accurate, conservative measurement techniques to insure that the numbers we give you are honest ones. For instance, unless otherwise stated, Heathkit specifies hum and noise referenced to the unit's rated sensitivity. Many manufacturers specify hum and noise referenced to a 10 mV level (often without telling you). Since most preamp inputs are around 2 or 3 mV, this gives a highly inflated figure which can be misleading: i.e., the AP-1615 has a hum and noise figure of 65 dB at 2.2 mV input. Using the 10 mV reference, the hum and noise figure would be 78 dB! This same real credibility is typical of every other specification we quote.

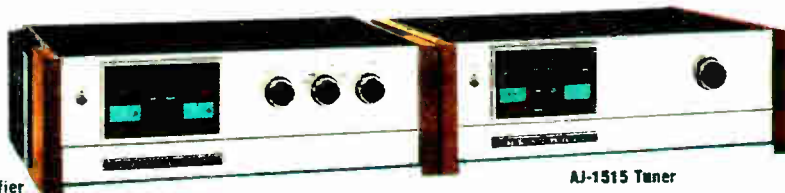
There are a lot of other reasons for buying and building Heath audio components but perhaps the most convincing is the experience of building one yourself!

Save on our hi-fi system discounts

You can save an additional 5% by ordering a complete hi-fi system from Heath. 1) choose a receiver and a pair of speakers or 2) an amplifier, pair of speakers and a program source such as a turntable, tuner or tape deck, add up the total cost and deduct 5%. Now the "sound" choice is even more economical! Look over our entire selection of components, turntables, speakers and accessories on pages 28-38.

High-performance Amplifier

AA-1515
Stereo Amplifier



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

The AA-1515 is the amplifier section of the AR-1515 receiver. It gives you 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 indi-

cators. 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. 299.95

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: $17\frac{1}{2}$ " W x $6\frac{1}{8}$ " H x $14\frac{1}{4}$ " D. Net Weight: 27 lbs.



The AR-1515—Engineering

\$579⁹⁵

Only extraordinary concepts and engineering efforts could produce an outstanding receiver like the AR-1515 — digital frequency readout, power for nearly any speaker system and performance to please the ear of the most exacting listener

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

Deluxe Stereo Tuner

The AJ-1515 is an AM/FM stereo tuner that reflects true engineering excellence. A bright digital frequency display makes tuning a precise yet simple matter and 1.8 μ V FM sensitivity assures high quality reception even in fringe areas. Selectivity is outstanding and both harmonic and intermodulation distortion figures are extremely low. AM performance? So clean you'll find it hard to believe you aren't listening to FM programming. For even better FM performance add the optional AD-1504 Dolby™ FM Module. Cabinet with brushed aluminum front panel, solid walnut side panels. Styled to match AA-1515 amplifier at left.

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

Kit AD-1504, Dolby Module, 1 lb. 39.95

AJ-1515 SPECIFICATIONS: Frequency Response: ± 1 dB, 20-15,000 Hz. Antenna: 300 ohm balanced, 75 ohm unbalanced. Other specs same as tuner section of AR-1515. Power Requirement: 120 or 240 volts, 60/50 Hz. 30 watts. Dimensions: $17\frac{1}{2}$ " W x $6\frac{1}{8}$ " H x $14\frac{1}{4}$ " D. Weight: 27 lbs.



Excellence in Every Aspect and Truly Outstanding 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.

The AR-1515's digital readout is far more accurate than 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 μ 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.

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, -3 dB 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 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. Convenient indicator lights on the front panel show the input you've selected. The digits light only when listening to AM or FM and only the neces-

sary tuning meters are illuminated — signal-strength only for AM, signal-strength and center-tune for FM.

The bass and treble controls act primarily at the frequency extremes to compensate for room acoustics and program deficiencies while maintaining smooth midrange response. And the AR-1515's preamp out/amp in jacks allow it to be used with any 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.

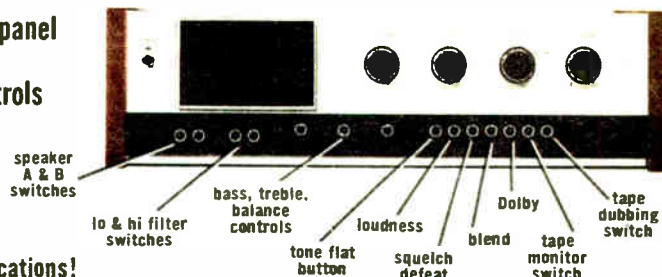
The AR-1515 is even easy to build! Obviously the AR-1515 is a complex and sophisticated receiver, but its well thought out, modular design and color-coded wiring harnesses simplify assembly. There's even a separate test meter to double-check your work each step of the way. Finally, the illustrated, step-by-step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

Kit AR-1515, Shpg. wt. 47 lbs. 579.95

Dolby FM Module. (See page 31 for description.)

Kit AD-1504, Shpg. wt. 1 lb. 39.95

The unique AR-1515 front panel has a flip-down door to reveal secondary controls



Look at these superb specifications!

AR-1515 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: \pm 1 dB, 20-15,000 Hz. Antenna: 75 or 300 ohm. Sensitivity: 1.8 μ V*. 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 μ V variable. **FM (Stereophonic):** 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 μ V 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: 21½" W x 6¾" H x 15" D. Net Weight: 35.8 lbs.

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

Our Famous Heathkit "Modulus"

The music system designed to change with your changing needs



\$599⁹⁵

Combines a deluxe stereo FM-AM tuner with a superb 2/4-channel preamplifier for unlimited versatility

The AN-2016 Digital Tuner/Preamplifier puts you in command of your musical environment. With its matching amplifier and optional plug-in modules you can "custom design" a music system to satisfy your every listening need!

The tuner section of the AN-2016 is one of the most technically advanced on the market. Four 1/2" tall LED's display the broadcast frequency far more accurately than a conventional tuning dial. TWO tuning meters: signal-strength for AM and FM, and center channel for FM give you outstanding tuning precision. A phase-locked loop stereo multiplex circuit assures wide FM stereo separation of 40 dB at 1000 Hz. Even the AM section features dual-gate MOSFET's, a nine-pole LC filter and static-shielded loop antenna for AM reception that's real hi-fi quality.

The preamplifier section of the AN-2016 has 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 170 mV, 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 reaches 60 mV.

Has peak-responding output meters for each chan-

nel, full bass, treble and balance controls, lighted function pushbuttons, more. Make the Modulus the "heart" of your custom music system.

Kit AN-2016, Shpg. wt. 39 lbs. 599.95

CD-4 Demodulator Module. Lets you play CD-4 discrete 4-channel records through the AN-2016.

Kit AD-1507, Shpg. wt. 2 lbs. 79.95

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

Kit AD-1504, Shpg. wt. 1 lb. 39.95

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. 49.95

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 0.25 V. Input Sensitivity (for 1.5 V output): phono, 2.6 mV (switch selected). **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 In-

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. Features pushbutton main and remote speaker switching, lighted power button. Unique plug-in speaker connectors help eliminate phasing problems.

Kit AA-1506, Shpg. wt. 25 lbs. 179.95

puts: 300Ω balanced; 75Ω unbalanced. FM (Stereo) — 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. **AM TUNER** — Sensitivity: 6 μV for 20 dB S/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. Dimensions: approx. 6 1/2" H x 19" W x 14 1/2" 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.



\$399⁹⁵

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. 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 (Stereo) — Channel Separation: 40 dB or greater at midfrequencies. Harmonic Distortion: 0.5% at 1000 Hz with 100% modulation. AM — Sensitivity: 50 μV with external input. Image Rejection: 70 dB at 600 kHz; 50 dB at 1400 kHz. IF Rejection: 70 dB at 1000 kHz. Power Requirement: 120 or 240 volts, 60/50 Hz AC. Dimensions: Overall — 18 1/2" W x 5 1/8" H x 13 7/8" D.

The deluxe AR-1500A Stereo FM-AM Receiver — A Super Hi-Fi Value

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 the others only talk about: it's easily one of the best performers in its price range! A factory-assembled FET front end provides high sensitivity and excellent overload characteristics. Fixed LC filters help keep stations separate. A phase-locked loop multiplex demodulator provides over 40 dB of mid-band stereo separation. Signal-strength and center-channel tuning meters make tuning easy and accurate. Has pushbutton function selectors, TWO stereo headphone jacks, full controls and more. You can custom mount the receiver or order the handsome optional walnut veneer case.

Kit AR-1500A, Shpg. wt. 51 lbs. 399.95

ARA-1500-1, Walnut Veneer Case. Shpg. wt. 8 lbs. 24.95

Here's Great Sound at a Great Low Price!



AR-1429 AM/FM Stereo Receiver offers top performance at a low kit form price

\$329⁹⁵

Superb performance in an intermediate receiver: 1.8 μ V sensitivity; 40 dB stereo separation; 65 dB hum & noise.

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. It provides enough low-distortion power for most any listening area. And specifications that mean TRUE professional performance!

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 μ V and stereo separation is 40 dB. The circuit designs reflect the outstanding performance too. 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 and pre-amp out/power-amp in jacks for audio accessories. A tape monitor lets you make professional style recordings. All controls are placed on the front panel for convenience and the planetary-drive tuner smoothly moves a lighted pointer to the station you desire. The attractive log tuning scale has large, easy to read numbers and "blacks-out" when the power is off. Signal and tuning meters make tuning easy and accurate. For private listening, a head-

phone 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 the Dolbyized FM broadcasts now offered by many stations.

The AR-1429 with its solid walnut end panels is a beautiful addition to any decor. Kit assembly is easy with modular circuit board construction and color-coded wiring harnesses. You'll find it hard to beat the AR-1429 without spending a lot more money.

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

Kit AD-1504, Optional Dolby FM Module, Shpg. wt. 1 lb. **39.95**

AR-1429 SPECIFICATIONS: AMPLIFIER — Frequency Response: -1 dB, 5 Hz to 45 kHz. Damping Factor: 60; Input Sensitivity: Phono, 2 mV; Aux. Tape and Tape Mon., 200 mV. Hum and Noise: Phono, -65 dB (-79 dB for 10 mV input); Aux., Tape and Tape Mon., -75 dB. Input Overload: Phono, 90 millivolts; Aux., Greater than 10V; Tape, Greater than 10V; Tape Mon., Greater than 10V. Phono RIAA* Equalization: ± 1 dB (30 Hz to 20 kHz). Input Impedance: Phono, 47 k Ω ± 5 percent and 100 pF; Aux., 50 k Ω ± 20 percent and 100 pF; Tape, 50 k Ω ± 20 percent and 100 pF; Tape Mon., 50 k Ω ± 20 percent and 100 pF. **FM SECTION** —

Sensitivity: 1.8 μ V* (10.3 dBf) usable, 4.0 μ V (17 dBf @ 50 dB signal to noise). Selectivity: 65 dB. Capture Ratio*: 1.8 dB; AM Suppression*: 48 dB; Image Rejection: 90 dB*. Stereo Separation: 40 dB, typ. at 1000 Hz. Frequency Response: ± 1 dB from 20 to 15,000 Hz. **AM SECTION** — Sensitivity: 10 μ V. Selectivity: 20 dB. Power Requirement: 120/240 VAC, 50/60 Hz. Dimensions: 3 $\frac{3}{4}$ " H x 20" W x 13 $\frac{1}{2}$ " D.

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

AA-18 Mono Amplifier

3.25 WATTS, MINIMUM RMS, INTO 8 OHMS WITH LESS THAN 1.5% TOTAL HARMONIC DISTORTION FROM 40-20,000 Hz.

A low-cost way to monaural sources. Use the AA-18 with a record player having a ceramic cartridge, a tape player, a monophonic AM or FM tuner or any signal input of at least 250 millivolts. If you have an efficient 8-ohm speaker, you'll be surprised at the volume the AA-18 will deliver. And it will be "clean sound" too.

Kit AA-18, Shpg. wt. 4 lbs. **27.95**



Synthesized Digital FM Stereo Tuner

SAVE **\$126⁹⁵** **\$399⁹⁵**

Includes Pecan-Veneer Case at no extra charge!

The AJ-1510A offers fantastic 0.005% tuning accuracy with digital frequency synthesis and digital readout. Three-way tuning; use the front panel keyboard to enter frequency, auto-sweep from the top of the band downward stopping at each listenable station (or only stereo stations) or program it to stop at any of three preselected stations. AJ-1510A was \$499.95. Pecan Veneer Case was \$26.95!

Kit AJS-1510A, Tuner with Case. 33 lbs. **399.95**



AJ-1510A SPECIFICATIONS: Antenna: 75 or 300 ohm. Sensitivity: Less than 1.8 μ V. 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. Stereo channel separation: 1,000 Hz, 40 dB; 80 Hz, 25 dB; 10 kHz, 25 dB; 15 kHz, 20 dB. Audio output level: (fixed): 1.2 V rms nominal (with 100% mod.). Power Requirement: 120/240 VAC, 60/50 Hz, 50 W.



The AR-1219 - "Expensive" Performance - Low Kit Price

\$189⁹⁵

A low cost receiver with expensive looks and features — the right choice for your first system

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

Low price — expensive performance

Hard to believe — yes. But when it comes to giving you performance at an economical price the AR-1219 is hard to beat! That's because we've taken years of audio engineering experience and packed them into designing a simple, low-cost receiver that really performs!

Just 15 watts per channel, but careful engineering of the AR-1219's amplifier section has made sure that the annoying colorations and imperfections, evident in most low cost systems, just aren't there! Intermodulation distortion is less than 0.5% at full power and less than 0.2% at 1 watt. Hum and noise? — imperceptible. —60 dB for phono, and 65 dB down for tape. And with its channel separation of 55 dB, you'll be assured of a spacious stereo performance no matter which program source you may select.

Impressive Features Too!

But impressive specifications aren't all the AR-1219

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



Budget-priced AA-1219 Stereo Amplifier

An economical basis for your stereo system, the AA-1219 features the same excellent specifications found in the amplifier section of the AR-1219 Receiver. Intermodulation distortion is less than 0.5% at full power and less than 0.2% at 1 watt. Phono hum and noise are —60 dB, channel separation 55 dB — specifications truly deserving the term "high fidelity". The amplifier matches the styling of the

32

has to offer. There are also plenty of operating features which really add up!

Bass, treble, balance and volume controls aid selectivity in the precise control of your musical environment. Each is large enough to be adjusted easily and all exhibit a solid, expensive feel. For private listening there's a headphone jack and speaker disconnect switch. And, for extra convenience, a tape-monitor switch.

The AR-1219's uncluttered rear panel offers open and easy access to all inputs and outputs. Speaker connections are clearly labeled to avoid confusion. And it is here too, that you find a swivel-mounted antenna for AM listening and connections for an external 75- or 300-ohm FM antenna. For extra convenience and control, the rear panel also offers the user two accessory AC sockets (one switched, one unswitched).

High performance tuners

Rounding out the AR-1219 are two tuner sections which exhibit performance and specifications almost unheard of in receivers in this price class. AM sensitivity is 100 μ V per meter and FM — 2 μ V. Channel separation is typically 40 dB and quality ceramic filters in the IF section improve FM selectivity. An extra-wide slide rule dial assures easy and accurate tuning for both AM and FM. And a stereo pilot lamp

alerts you to stereo FM reception.

The AR-1219 is easy to build even for a first-time builder — and alignment can be performed without the aid of instruments. Metal case with brushed aluminum front panel and stained walnut-veneer end panels.

Kit AR-1219, Shpg. wt. 18 lbs. **189.95**

These specifications prove — when it comes to economical performance the AR-1219 comes out on top every time!

AR-1219 SPECIFICATIONS: AMPLIFIER — Frequency Response: ± 1 dB, 7 Hz to 100 kHz. **IM Distortion:** less than 0.5%. full power; less than 0.2% at 1 watt. **Damping Factor:** Greater than 30. **Input Sensitivity:** Phono: 2 millivolts; Tape: 190 millivolts; Tape Monitor: 190 millivolts. (NOTE: Input sensitivity is the rms input voltage needed to obtain 15 watts of output power per channel into 8 Ω loads.) **Input Overload:** Phono: Greater than 75 millivolts; Tape: Greater than 2.5 volts; Tape Monitor: Greater than 2.5 volts. **Hum and Noise:** Phono, —60 dB; Tape, —65 dB. **FM SECTION — Sensitivity:** 2 μ V*. **Selectivity:** 60 dB*. **Image Rejection:** 50 dB*. **Stereo Separation:** 40 dB typ., 35 dB minimum. **Signal to Noise:** 65 dB (65 dB). **AM SECTION — Sensitivity:** 100 μ V per meter*. **Selectivity:** 40 dB. **Power Requirement:** 120/240 VAC, 60/50 Hz. **Dimensions:** 3 $\frac{7}{8}$ " H x 17" W x 13" D.

*Rated IHF (Institute of High Fidelity) Standards.

AJ-1219 AM/FM Stereo Tuner

The 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 μ 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-veneer 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. **119.95**

AJ-1219 SPECIFICATIONS: FM Sensitivity: 2 μ 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 $\frac{7}{8}$ " H x 13" W x 11" D.

AJ-1219 tuner (right) and its rear panel features two AC outlets (switched and unswitched), phono and tuner inputs, tape, tape monitor, and tape out jacks for outstanding recordings with both cassette and reel-to-reel decks!

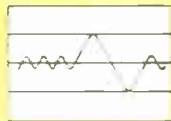
Kit AA-1219, Shpg. wt. 15 lbs. **119.95**

AA-1219 SPECIFICATIONS: Frequency Response: ± 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 $\frac{7}{8}$ " H x 12 $\frac{3}{4}$ " W x 12" D.

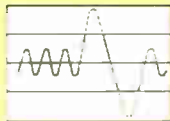
Why you need a "Superamp"

Many audio 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 (20 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



unclipped



clipped

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 amplifier is unable to 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 the tweeters of your speaker system.

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 your music... solid bass free of "boom" and distinct note for note... accurate treble clearly defined and open.

If you have top-quality, low-efficiency acoustic-suspension speakers, a "super-amp" like the Heathkit AA-1640 can help them deliver their finest sound.



For the true Audiophile — The Heath AA-1640 Stereo Amplifier

\$429⁹⁵
Less Meters

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

The AA-1640 is an amplifier for the audiophile who constantly strives for musical reproduction free from imperfection and coloration. It features distinctive styling, excellent specifications, and a unique combination of power and features which offer 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 them at turn-off. It also disconnects speakers when dangerous DC voltages and very low frequencies are present and prevents them from reaching and damaging your expensive speaker systems. The electronics found in the AA-1640 have but one purpose — clean, flawless reproduction of musical information. The amplifier inputs provide optimum matching and maximum preamplifier-to-power amplifier signal transfer. 8 output devices per channel and massive side mounted heat sinks develop maximum power and efficient cooling without need of noisy fans. Both channels are fused and current — limited for protection, should an external short occur.

The result of these painstaking efforts is an amplifier capable of reproducing both quiet passages and thundering fortissimos — all with equal ease and definition. Frequency response is flat within -1 dB from 7-50,000 Hz, total harmonic distortion infinitesimal, and hum and noise inaudible.

For more precise control add the optional peak-responding panel meters to your 1640. Sensitive enough to respond to peaks as short as a record click, the meters feature backlighted scales, and calibration from -30 to +3 dB and 0.2 to 200 watts (into an 8 ohm load).

Install the meters after assembly or save \$39.95 by purchasing them with your amplifier.

Kit AA-1640, Less Meters, Shpg. wt. 72 lbs.
UPS only **429.95**

Kit AAA-1640-1, Output meters,
Shpg. wt. 3 lbs. **59.95**

OTHER AA-1640 SPECIFICATIONS: Frequency Response: -1 dB, 7 Hz to 50 kHz; -3 dB, 5 Hz to 100 kHz. Inter-modulation Distortion: less than 0.1% from 0.25 to 200 watts. Damping Factor: greater than 50. Hum and Noise: Less than 400 μ V or 100 dB below full output. Channel Separation: 50 dB, min. Input Impedance: 50k ohms. Input Sensitivity: 1.5 V. Net Weight: 58 lbs. Dimensions: 19" W x 7 1/4" H x 18" D. Power Requirement: 120 VAC, 60 Hz only.

The perfect Stereo Preamplifier for your AA-1640

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. For tonal balance, the optional AD-1305 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



AP-1615 Stereo Preamplifier

\$129⁹⁵



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. **129.95**

AP-1615 SPECIFICATIONS: Input Sensitivity: Phono, 2 mV. Hi-Level 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. Channel Separation: 50 dB at 1 kHz. Power Requirement: 120 240 VAC, 60, 50 Hz, 25 watts. Dimensions: 4 1/2" H x 17 1/2" W x 8 1/2" D.



Active Audio Processor reduces noise, expands range

\$199⁹⁵

7 EVENING KIT
Fast, Easy Assembly

Improves the sound of any hi-fi system — reduces background noise and extends dynamic range of most source material — without introducing distortion or coloration to the signal source

Much of the background noise heard in recorded music has its origin in the recording and manufacture of the record (or tape) or during the broadcast process. Even the finest high fidelity systems are not immune to this noise and it is virtually impossible to eliminate completely. The Heathkit AD-1304 can, however, eliminate much of the noise. Specifically, it is designed to both eliminate high frequency noise and add 7 dB of dynamic range expansion to any program source.

A separate expander section accounts for 7 dB of dynamic range expansion. Of the expander circuit, the January 1978 issue of High Fidelity said: "... the expander circuit in the Heath rates high marks in comparison with other single-band expanders. It gives a subtly enhanced dynamic range that sounds quite natural while remaining unobtrusive in operation." 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. For inherently noisy material such as 78-rpm recordings, AM radio or 8-track tapes, a high-filter switch on the front panel activates a 7 kHz, linear phase, 12 dB per octave filter.

LED's on the front panel indicate the amount of noise reduction and dynamic range expansion taking place and front panel controls allow for visually adjusting the thresholds of both the expander and the noise reducer. This method of adjusting the thresholds is quicker and easier than other units which rely on "by-the-ear" adjustments. The AD-1304 connects between the tape output and tape monitor jacks on most types of receivers, preamplifiers and integrated amplifiers. Tape monitor facilities are provided on the back panel of the AD-1304 so that the tape monitor function is not lost. Make the AD-1304 a part of your system today.

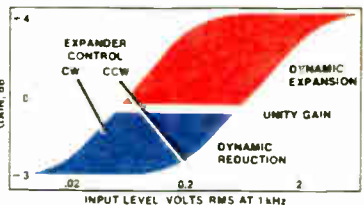
Kit AD-1304, Shpg. wt. 12 lbs. 199.95

Expander Circuit Board
5 kHz Control Circuit Board
9 kHz Control Circuit Board
13 kHz Control Circuit Board

Each Noise Reduction Circuit board operates in its own separate portion of the audio spectrum and is individually triggered to permit filtering in only those frequency bands needed to provide the best sound while maintaining overall frequency response. The dynamic range is boosted and enhanced by the expander circuit board.

The front-panel LED's provide an easy-to-read indication of the AD-1304's operation. -3 dB and +4 dB LED's indicate the expander's gain. When both are equal intensity, gain is unity. Noise Reduction Level LED's indicate the relative amount of noise reduction. All four "on" indicates maximum reduction, while the green LED (lower left) indicates no noise reduction.

Graph shows typical expander gain vs. input level. Shaded area indicates -3 dB and +4 dB limits. Gain varies with position of the Expander Control.



AD-1304 SPECIFICATIONS: Rated Input: 200 mV. Input Impedance: 100K ohms. Gain: Expander off, 0 dB (unity) ± 0.5 dB. Expander on, -3 dB to +4 dB. Frequency Response: +0, -0.2 dB typical between 4 kHz and 15 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: 17½" W x 4½" H x 8¾" D. Net Weight: 10 lbs.



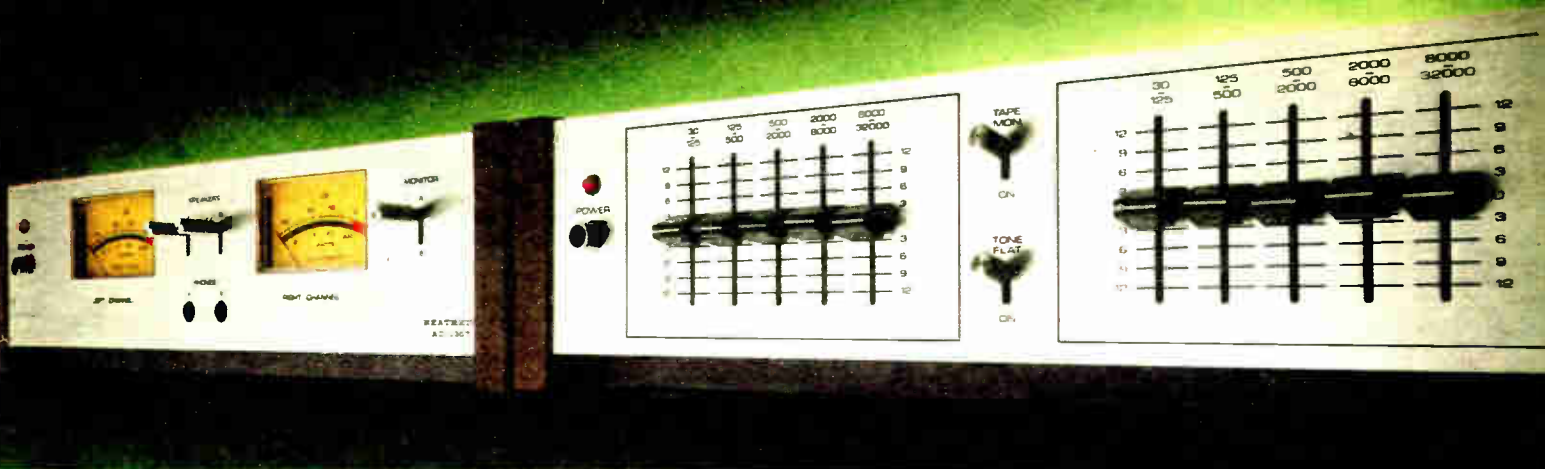
\$139⁹⁵

Versatile Stereo Mike Mixer Console

Wide frequency response and low distortion give you clean, life-like mixing capability. Each of the TM-1626's two outputs has its own master level control and meter 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. 60 dB gain permits use with most 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. Case with walnut-veneer end panels.

Kit TM-1626, Shpg. wt. 12 lbs. 139.95





Deluxe Audio Control Center provides output monitoring and speaker control for high-powered amplifiers

\$119⁹⁵

- Peak responding meters monitor power
- Lets you connect two different speaker systems
- Extra headphone jacks

Many stereo hi-fi systems, especially those with medium to high power capabilities, need what the AD-1307 provides; accurate power output monitoring for exact speaker balancing and one-button control of major AC-powered auxiliary components. Peak-responding meters calibrated in both decibels and watts react instantly to outputs as brief as a record click. Because of their quick response and extreme accuracy, these meters are uniquely useful as overload indicators. Their expanded scales let you read from just a few tenths of a watt — up to 200 watts. The output meters provided with most types of receivers and amplifiers fall short of these abilities and are therefore limited in usefulness. A switch on the front panel allows you to monitor the outputs of either of two amplifiers.

Barrier-type terminal strips on the rear panel allow you to hook up one stereo amplifier to two sets of speakers, two stereo amplifiers (or one 4-channel amp) to four speakers, a monophonic amplifier to one or more speakers, and even a pair of electrostatic headphones. Conventional stereo headphones plug into two jacks on the front panel. Four switched and four unswitched AC outlets (with a total of 1500 watts) provide flexible power control of the individual components in your system.

Kit AD-1307, Shpg. wt. 11 lbs. **119.95**

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 μ 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 $\frac{1}{2}$ " H x 17 $\frac{1}{2}$ " W x 8 $\frac{1}{2}$ " D. Weight: 8 lbs. (3.6 kg.)

5-band, 2-channel Audio Equalizer lets you control the entire frequency spectrum for exacting system response

\$119⁹⁵

- Gives you precise tone control
- Compensates for poor room acoustics
- Use as a scratch filter for old recordings

The AD-1305 Audio Equalizer offers complete tone control versatility with five slide controls for each stereo channel. It is designed for use with the AP-1615 preamp, 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 bypassing 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-1305, Shpg. wt. 11 lbs. **119.95**

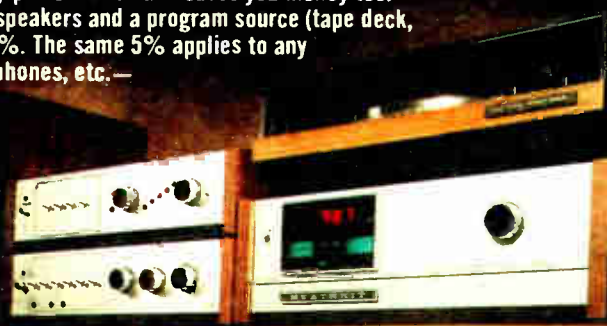
AD-1305 SPECIFICATIONS: Input Impedance: 100k ohms. Output Impedance: 100 ohms. Rated Output: 1.5 V rms. Overload: 5 V rms. Signal-to-Noise Ratio: 90 dB below 1.5 V. Total Harmonic Distortion: 0.05% from 20 Hz to 20 kHz at 1.5 V output. IM Distortion: 0.05% at 1.5 volts. Frequency Control Range: (separate controls for each channel), 30-125 Hz, 125-500 Hz, 500-2000 Hz, 2000 Hz to 8 kHz, 8 kHz-32 kHz. Overall Gain (flat): Zero dB (unity gain). Slope of Filters: 12 dB per octave. AC outlets: One switched, one unswitched. Power Requirement: 120/240 VAC, 60/50 Hz, 10 watts. Dimensions: 4 $\frac{1}{2}$ " H x 17 $\frac{1}{2}$ " W x 8" D.

Buy a complete Heathkit Audio System and Save a big 5%

Buying a complete Heathkit hi-fi system ensures well-balanced, complementary performance and saves you money too. Simply select (1) a receiver and a pair of speakers; or (2) an amplifier, pair of speakers and a program source (tape deck, tuner or turntable). Add the costs of the individual components, then deduct 5%. The same 5% applies to any audio accessories you order with your system — extra speakers, cabinets, headphones, etc. — **NO LIMIT!** It's just another way Heath gives you great sound for your money!

Figure the savings

You've chosen your ideal system, now add up the cost of the individual units (excluding shipping and handling charges). From this total, deduct 5% and that's your system savings.



Buy a pair of speakers and SAVE!

Heath makes it easier than ever for you to get a great deal on speakers for your stereo. Order them by the pair and save! And, no matter what speaker you choose, you'll get the great sound and easy assembly that make Heathkit speakers your BEST choice!

Compound-Curved Baffle
Soft-Dome Tweeter



5" Midrange
10" Woofer



There's a Heathkit Speaker System for Every

COMING SOON! A New State-of-the-art LINEAR PHASE 3-way Speaker System

LOOK FOR PRICING AND AVAILABILITY
IN OUR CHRISTMAS CATALOG!

- Designed for minimum transient distortion — an improvement in sound reproduction you can really HEAR

The ASX-1383 uses the same revolutionary design principle found in speakers costing up to \$1000 and more. This linear phase design aligns each driver's radiating surface in the same plane so that the entire sound output — bass, treble and midrange frequencies — reaches your ears at the same time. The result is a clarity and richness of sound and reproduction of transients (which is what music is) that you simply have to hear to believe.

Another contribution to the ASX-1383's great sound is its unique compound curved baffle. This curved baffle eliminates edges and corners which can produce defraction, which causes transient distortion and ragged frequency response. The result is a spaciousness and open sound combined with outstanding stereo dispersion and stereo imaging. You'll get great sound and excellent stereo definition no matter where you sit in your listening room.

The drivers used in the ASX-1383 provide full frequency response with excellent dynamic range. The ASX-1383 uses a 10" high-compliance long-throw woofer, a 5" high compliance long-throw midrange and a soft-dome high-compliance 1" tweeter. The soft-dome tweeter provides the smoothest high frequency response of any tweeter we've seen. A linear phase, constant-voltage crossover network distri-

butes frequencies smoothly and evenly without altering the system's phase response. The speaker elements are arranged for minimum line height (the entire distance from woofer voice coil to tweeter voice coil) to approximate a single-point sound source for increased dispersion and sound realism at all frequencies. This ensures good sound and stereo imaging regardless of listening position. Each speaker is individually fused for protection.

The ASX-1383 has been designed to look as great as it sounds too. The cabinet is select Brazilian rosewood veneer with a center-book-matched front panel for an elegant look in any decor. A charcoal black "acoustically transparent" grille cloth complements the cabinet. The ASX-1383 will be sold in matched pairs only for under \$600. We believe they're the finest speakers you can buy at any price!

ASX-1383 SPECIFICATIONS: Frequency Range (—10 dB): 30 Hz to 30 kHz. Frequency Response: ± 3 dB, 40 Hz to 25 kHz. Impedance: 8 ohms. Recommended Amplifier Power: 10 watts minimum to 200 watts (fused for larger amplifiers). Crossover Frequencies: 750 Hz, 4000 Hz. Fuses: Woofer, 1 amp slow-blow; midrange, 1/2-amp slow-blow; tweeter, 1/2-amp regular. Dimensions: 36" H x 13 1/2" W x 13 1/4" D. Weight: 50 lbs.

2-way Sound Column Speaker System with omnidirectional sound pattern

\$139⁹⁵ each \$239⁹⁵ pair

Here's a speaker that will sound just as outstanding no matter where you sit in the room. Two 1" dome tweeters and two 6 1/2" full-range drivers are 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 place-

ment. 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, 57 lbs. UPS each 139.95
Kit AS-1344-2, 122 lbs. UPS pair 239.95

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: 1 1/2-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.

High-Efficiency 2-way Speaker System ideal for smaller music systems

\$69⁹⁵ each \$129⁹⁵ pair

The AS-1342 doesn't need much amplifier power to provide great sound so if you have a small system, this is the speaker for you. Uses an 8" woofer and a 2x6" horn-type tweeter that can be mounted for best high-frequency dispersion whether you place the system horizontally or vertically — a Heath exclusive! A 12 dB per octave crossover minimizes 36

distortion and insures smooth response. Has a continuous tweeter level control. Factory-assembled walnut-finish vinyl-covered enclosure with 3-dimensional grille cloth.

Kit AS-1342, Shpg. wt. 32 lbs. UPS each 69.95
Kit AS-1342-2, Shpg. wt. 78 lbs. UPS 129.95

AS-1342 SPECIFICATIONS: Frequency Range (—10 dB): 40 Hz to 16 kHz. Frequency Response: ± 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 3/4" H x 12" W x 10 1/2" D. Weight: 20 lbs.

Listening Need and Budget!

Our best-selling 3-way Speaker System for shelf or floor use

\$159⁹⁵ each
\$299⁹⁵ pair

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 driv-

er, 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 11¾" D. 8 ohms impedance.

Kit AS-1373, 68 lbs. UPS 159.95

Kit AS-1373-2, 141 lbs. UPS pair 299.95

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, 1¼ 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 11¾" D, without 1¼" grille. Weight: 47 lbs.



Our "High-Power" 3-way Speaker System with massive 15" slot-loaded woofer

\$289⁹⁵ each
\$539⁹⁵ pair

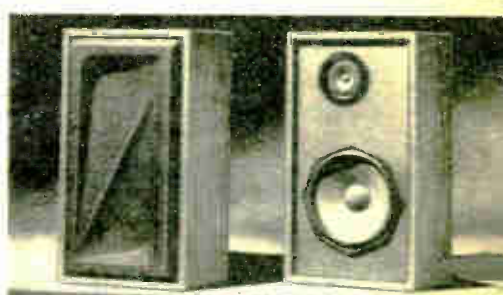
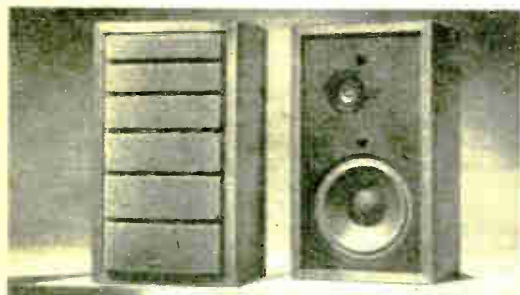
Designed for use with the finest stereo components, the AS-1348 offers the bass power and extra wide dynamic range you want to reproduce any kind of music realistically. Combines a massive 15" slot-loaded woofer, two 4½" midrange speakers and three 1" tweeters in a precision-designed cabinet. Has dynamic 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. While most conventional speaker systems produce maximum sound levels only at upper bass and midrange frequencies, the AS-1348 produces very high sound levels without distortion at ALL audible frequencies. Has individual fuses for woofer, midranges and

tweeters, 14 position attenuation controls for adjusting response characteristics to any listening area. Fully assembled, acoustic-suspension enclosure with walnut and oak veneer finish. Acoustically transparent grille cloth is removable. The AS-1348 does justice to the finest stereo systems in both sound and appearance. That's why they're our finest speakers. 38" H x 24" W x 15" D, 8 ohms impedance.

Kit AS-1348, 110 lbs. Motor Freight 289.95

Kit AS-1348-2, 220 lbs. Motor Freight 539.95

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.



Quality 2-way Speaker System

The AS-1352 has better frequency response and a wider frequency range than most other two-way shelf systems. The 1¼" tweeter has phenolic ring suspension for superior dispersion. 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 13½" W x 11" D. 8 ohms impedance.

Kit AS-1352, 55 lbs. UPS each 99.95

Kit AS-1352-2, 116 lbs. UPS pair 179.95

Full-range 3-way Speaker System

The AS-1363 is a full-range 3-way speaker system that uses a 10" woofer, a 4½" midrange speaker and a 1" dome tweeter. Two-position midrange and tweeter switches let you adjust the AS-1363's sound to suit any listening room. Impedance is 8 ohms. The factory-assembled cabinet features a handsome pecan-veneered Mediterranean finish and hardwood trim. 24¾" H x 14¼" W x 11½" D.

Kit AS-1363, 55 lbs. UPS each 119.95

Kit AS-1363-2, 128 lbs. UPS pair 219.95

Low-priced 2-way Speaker System

An excellent choice for low to medium priced music systems or use them as extension speakers. Has an 8" woofer with a hefty 1 lb. ceramic magnet and a 1¼" phenolic ring tweeter. Can be driven by as little as 9 watts, but handles up to 50 watts. Has individual driver fuses and tweeter level control for high frequency adjustments. Factory-assembled walnut-grain vinyl-covered enclosure.

Kit AS-1332, 29 lbs. UPS each 54.95

Kit AS-1332-2, 63 lbs. UPS 99.95

World-famous Accutrac® 4000

in money-saving kit form. (see page 3)

The turntable that lets you "program" individual cuts on your records in the order YOU want to hear them.



SAVE on these fully-assembled-ready-to-play changers and turntables by famous manufacturers!

1 B-I-C 960 Belt-Drive Changer. The same ultra-reliable design as the B-I-C 981 minus the electronic speed control, adjustable pitch and strobe. 33½ and 45 rpm. Includes base and your choice of Empire 2000E/111 or Shure M91ED cartridge (specify). 15½" W x 12¼" D x 4¼" above board, 1½" below. If purchased separately, up to \$246.85.

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

2 B-I-C 940 Belt-Drive Changer. A true B-I-C automatic changer — with belt drive, low speed 24-pole synchronous motor, up to six-record continuous play. Has viscous-damped cueing, 12" platter, 33½ 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

3 B-I-C 981 with electronic speed control. B-I-C's newest and best changer! 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. 33½ and 45 rpm speeds. With base, specify Empire 2000/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

4 Dual 1245 Deluxe Automatic Turntable. Quality automatic changer 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

5 Dual 721 Direct-Drive Automatic Turntable. One of the finest turntables available. Fully automatic single-play, electronic direct-drive motor, twin gimbal tone-arm mounting, adjustable tonearm height, calibrated anti-skate, more. 33½ 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 389.95

ACCESSORIES FOR B-I-C TURNTABLES

ADP-1263, Simulated wood-grain plastic 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

ADA-39-2, 45-rpm spindle for 1249 only. Shpg. wt. 1 lb. 9.95

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

Top-Quality Stereo Cartridges from Heath

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	¾ to 1½ 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	½ to 1½ 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	¾ to 1¼ gr.	85.00	45.00
ADP-1139, Wt. 1 lb. Audio-Tech. AT-14Sa	5-45,000	2.7 mV	25 dB	Shibata	¾ to 1¼ gr.	85.00	45.00

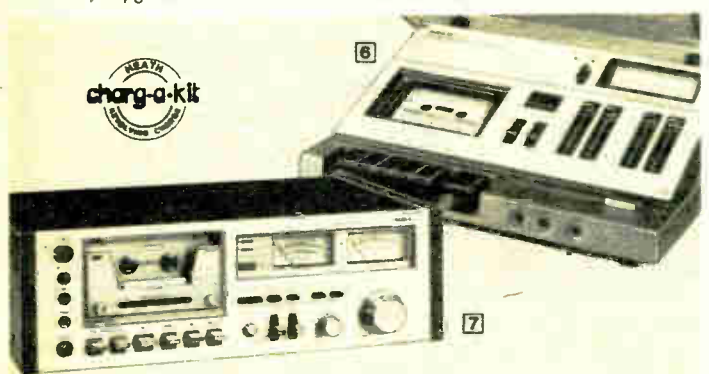
6 Aiwa AD-1250 cassette deck with Dolby®. Ultra-modern design and the features you need for top-quality recordings including an oil-damped cassette ejection system for smooth, noiseless ejection, large VU meters and LED peak indicator for precision recording levels on all types of material and, of course, 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, CrO₂ or FeCr tapes.

ATP-1233, Fully assembled. Shpg. wt. 17 lbs. 239.95

7 Aiwa 6550 deluxe cassette deck with Dolby®. If you're looking for professional features in a cassette deck, then the Aiwa 6550 is for you. Features continuous readout of time remaining on tape, separately selectable 3-position switches for proper bias and equalization from all types of tapes. Shocks and vibration in the tape unit are kept to a minimum by the oil damped gears. 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.

ATP-1244, Fully assembled. Shpg. wt. 25 lbs. 439.95

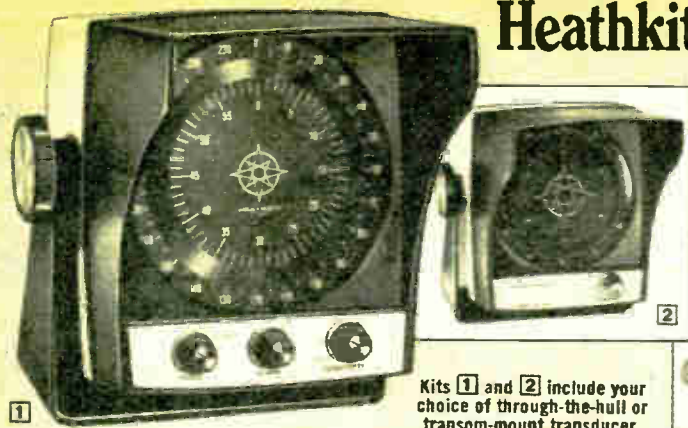
Dolby is a registered trademark of Dolby Labs.



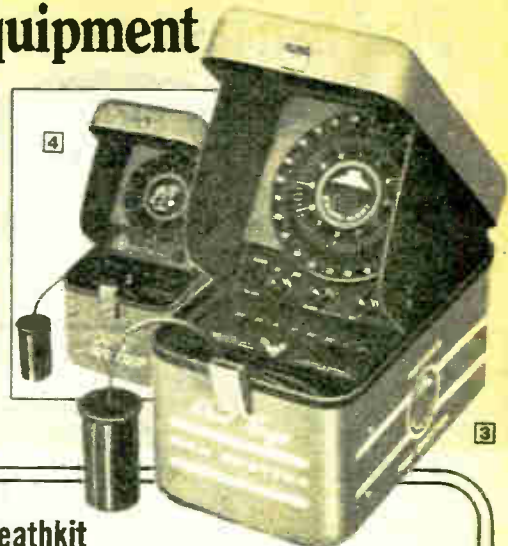
Deluxe Scotch® Master™ Series Cassettes

Stock No.	Master Series	Type of Bias	Playing Time	Shpg. Wt.	Pkg. of 4
ADP-1904	MI-C90	Normal	90 min.	1 lb.	15.95
ADP-2604	MII-C60	CrO ₂	60 min.	1 lb.	13.95
ADP-2904	MII-C90	CrO ₂	90 min.	1 lb.	17.95
ADP-3604	MIII-C60	FeCr	60 min.	1 lb.	13.95
ADP-3904	MIII-C90	FeCr	90 min.	1 lb.	17.95

Heathkit Marine Equipment For Better Boating!



Kits 1 and 2 include your choice of through-the-hull or transom-mount transducer.



1 Dual-Range Depth Sounder with Depth Alarm

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; electronically controlled motor; fixed noise rejection; polarity protection; super-bright neon indicator. Cylolac case with glare-free bezel and sun shield. Gimbal mount, quick-disconnect power and transducer leads. Shpg. wt. 8 lbs.

Kit MI-1031-1, with thru-hull transducer, 15' coax. 89.95

Kit MI-1031-2, with transom transducer, 25' coax. 89.95

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 69.95

Kit MI-1030-2, sounder with transom transducer and 25' coax 69.95

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: 6½" H x 5¾" W x 7¾" D.

3 Heathkit Dual-Range Fish Spotter® Sounder with Alarm

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; bright neon-flasher for precise depth reading; noise rejection circuitry to eliminate engine ignition interference. Rugged aluminum cabinet. The transducer features a barium titanate ceramic element encased in a durable waterproof housing. Portable suction-cup transducer bracket. Powered by two 6-volt lantern batteries (not included).

Kit MI-2901, Shpg. wt. 8 lbs. 89.95

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

MI-2901 SPECIFICATIONS: Accuracy: ±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, ±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. 69.95

Heathkit Scanning Transducer Bracket (Not shown)

Designed for use with Heathkit MI-2901 and MI-2900 Fish Spotter® sounders. "C" clamp mounting. For 1½" cylindrical transducer.

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

Here's Why Heathkit Marine Equipment Belongs on Your Boat!

Heathkit Marine Equipment is designed for outstanding reliability, low cost and top performance. The depth sounders above provide easy-to-read and accurate indications of water bottom and fish or objects in between. Our digital depth sounder below provides a bright digital readout and the Thermo-Spotter is ideal for finding water temperatures at different levels. Our chart recording depth sounder (next page) lets you maintain a record of the bottom on easy-to-read chart paper; the Radio Direction Finder, Marine Scanner and Fog-horn Alarm are all necessary accessories that further enhance your boating safety and pleasure.

Heathkit Digital Depth Sounder with Alarm

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 Cylolac® 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. 149.95

Kit MI-101-2, With transom transducer, Shpg. wt. 6 lbs. 149.95

MI-101 SPECIFICATIONS: Accuracy: ±2%, ±1 digit. Current drain: 300-500 mA. Power requirement: 10-17 VDC @ 500 mA. Dimensions: 2¼" H x 6¾" W x 8½" D (less gimbal hardware).

Thermo Spotter® Thermometer



Shows you the water temperature at any depth up to 100-ft. and the fish temperature charts indicate the kinds of fish likely to be there. 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. ... 34.95

Find fish faster and easier!



The Heathkit Straight Line/White Line Depth Recorder

"White Line" Depth Indication

Actual MI-2910 recording
made at Lake Mead, Nevada

Fish near surface

Fish at 40 ft.



Bottom Depth

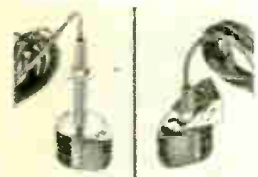
Second Echo of bottom

Fish near bottom

Normal Depth Indication

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.

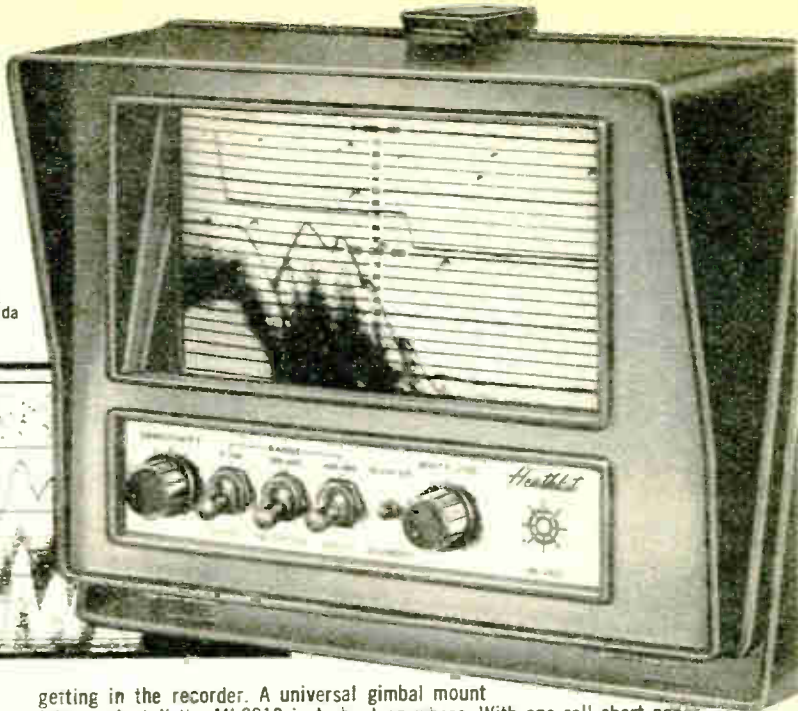
An on-off sensitivity control adjusts the MI-2910 to indicate the bottom and fish or other objects above it. It will clearly indicate schools of bait and small fish as well as individual large fish. Holes and dropoffs are clearly shown for lake mapping purposes too. The extra-wide-beam transducer covers 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.

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

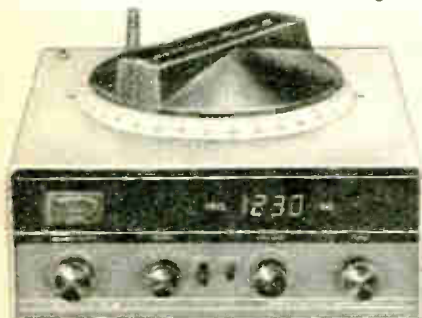


getting in the recorder. A universal gimbal mount lets you install the MI-2910 just about anywhere. With one roll chart paper.

- Kit MI-2910-1, recorder with through-the-hull transducer and 30' cable, Shpg. wt. 17 lbs. 289.95
 Factory assembled and calibrated version of above.
 WI-2910-1, Shpg. wt. 16 lbs. 399.95
 Kit MI-2910-2, recorder with transom mount transducer and 30' cable, Shpg. wt. 17 lbs. 289.95
 Factory assembled and calibrated version of above.
 WI-2910-2, Shpg. wt. 16 lbs. 399.95
 MIA-2910-1, Two Rolls Chart paper, Shpg. wt. 2 lbs. 9.95
SPECIAL OFFER — SAVE \$9.75! 12 Rolls Chart Paper. If pur. sep., \$59.70.
 MIS-2910-1, Shpg. wt. 12 lbs. 49.95

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, ± 4 kHz. Beam Width: 35° at 3 dB. Cable length: 30 ft. Mounting: through-hull or transom. Chart Paper: Size, 3 3/4" x 50' with pre-marked depth scales. Take-up speed, approx. 3/4" per minute. Dimensions: less gimbal bracket, 11" W x 8" H x 7" D. Net Weight: less transducer 6 1/2 lbs.

This Heathkit Digital Radio Direction Finder makes navigation easier



"It has the best antenna rose of all the units tested, being of greater precision and set at an angle to facilitate easy reading."

SEA Magazine, Aug. 1977

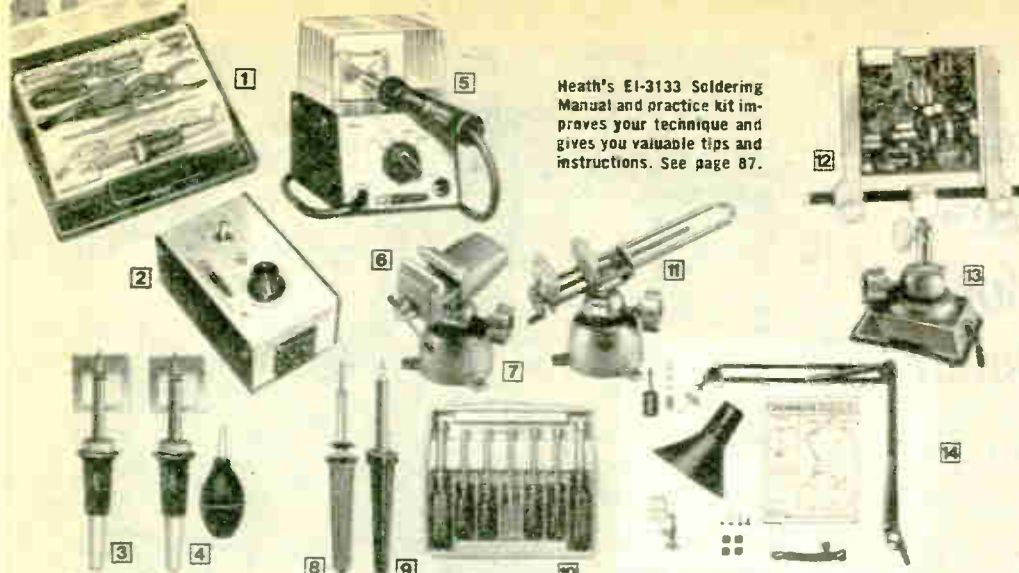
Bring your boat into the digital age with the unique Heathkit MR-1010. Big, bright digits show you the frequency to which it's tuned. That means you can identify most AM stations without waiting for an ID — even where the band is crowded. On the beacon band, you can dial to the exact frequency you want, even if the transmitter is in its "off" cycle. And the highly sensitive receiver even zeroes in on weak stations — if it's in range, you'll hear it loud and clear.

The MR-1010 is easier to use than conventional RDFs. The displays are easy to read even in direct sunlight. And for maximum safety and convenience, they dim automatically at night. Finding your bearings is easy, too, thanks to the big azimuth ring marked in 2° increments and a generous 7-inch rod antenna. A lighted meter provides accurate null indications and a control adjusts meter sensitivity for weak or strong stations. The telescoping sense antenna eliminates 180° ambiguity. Overall, bearing accuracy is an impressive $\pm 3^\circ$.

Versatile 2-way power options. The MR-1010 is designed to be used with your boat's 12 VDC electrical system — or it becomes completely portable with its own built-in power source consisting of 6 "D" cell flashlight batteries (not included). To prolong battery life, the digital readout display automatically shuts off after approximately 20 seconds — but can be recalled instantly at the touch of a front-panel switch.

Kit MR-1010, Shpg. wt. 14 lbs. 199.95

MR-1010 SPECIFICATIONS — Bands: 190-410 kHz (LW); 535-1605 kHz (AM). Sensitivity: Typically 30 μ V/m (AM); 60 μ V/m (LW) for 10 dB S+N/N. IF Frequency: 453 kHz. Selectivity (6 dB points): 3 kHz (LW); 5 kHz (AM). Readout Accuracy: ± 2 kHz. 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.



Heath's EI-3133 Soldering Manual and practice kit improves your technique and gives you valuable tips and instructions. See page 87.

Heath-approved tools to make your kitbuilding faster and easier

- 1** NEW! Kitbuilders' Tool Set. Includes wire stripper; diagonal side cutter; small long-nose pliers; three screwdrivers (3/8", 1/2", 3/4"); Weller WP-25 soldering iron; nutdriver; nut starter; soldering aid; and solder. Model GHP-1270, Shpg. wt. 3 lbs. 27.95
- 2** Motor Speed Control. Ideal for use with any universal motor with rating of 15 amps or less. (Not for use with Dremel tools). Kit GD-973A, Shpg. wt. 2 lbs 19.95
- 3** Heath-approved Weller 25-Watt Pencil Soldering Iron. 1/4" chisel tip develops 860° heat. Model GDP-207, Shpg. wt. 1 lb. 7.95
- 4** Heath Solder/de-Solder Set. Weller 25-watt pencil iron develops 860°. Includes de-solder bulb. GDP-1009, Shpg. wt. 1 lb. 9.95
- 5** 3-Heat Soldering Iron Kit. Stand with metal cage keeps iron secure. 3 ranges. Six foot power cord. 120 VAC. Kit GH-17A, Shpg. wt. 5 lbs. 27.95
- 6** Vertical Jaw Vise Head—For most hobby applications. Nylon jaws open to 2 1/4". GDP-1253, Shpg. wt. 2 lbs. 9.95
- 7** Standard Height Base—Designed for permanent installation. Three mounting lugs let you attach it securely to the work surface. Choose desired vise head from three styles listed. GDP-1251, Shpg. wt. 2 lbs. 11.95

- 8** Soldering Iron For Close Work. Wall 25-watt pencil soldering iron for work on high-density boards. 3-wire cord. For 120 VAC. GDP-1231, Shpg. wt. 1 lb. 6.95
- 9** Heath Approved Soldering Iron for use on high-density circuit boards. 25 watts. Pencil tip. GDP-1105, Shpg. wt. 1 lb. 7.95
- 10** Heathkit Nut Driver Set. 3/16", 1/4", 3/8", 1/2", 5/8", 3/4" and 1/2" sizes. Model GDP-204, Shpg. wt. 2 lbs. 11.95
- 11** Vertical Vise Head—Holds bulkier items—model parts, chassis, etc. Jaws open to 6 1/2". Neoprene pads are reversible and replaceable. GDP-1255, Shpg. wt. 2 lbs. 9.95
- 12** Circuit Board Holder. Holds most any shape or size circuit board. Spring loaded for quick change. Tilts 220 degrees. GDP-1254, Shpg. wt. 2 lbs. 16.95
- 13** Vacuum Base—Attaches securely to any smooth, non-porous surface. Powerful rubber suction pad holds without marring tabletop. Overall height 3 3/4". Base dimensions 5" x 4 1/4". GDP-1252, Shpg. wt. 2 lbs. 16.95
- 14** Extension Lamp Kit. Extension arm comes assembled. You attach socket, shade and cord. 34" reach, 360° sweep; vented shade, and movable base clamp. Less bulb. Kit GDP-202, Shpg. wt. 4 lbs. 16.95

Heat Controlled Solder Station

New Weller WTCPN soldering station is transformer powered and features "closed loop" control of tip temperature. Has heat shield, indicator lamp, and sponge. With 700°F tip.



GDP-1108, Shpg. wt. 5 lbs. 39.95

Set of Replacement Tips for above (all 700°F)
Set Includes: 1/4" Screwdriver, 3/4" Screwdriver, 3/8" Screwdriver, 1/2" Long Conical, 3/4" Long Screwdriver.

GDP-1109, Shpg. wt. 1 lb. 9.95

Illuminated Magnifier

Fluorescent lighting and 5" diameter 3 diopter lens take the strain out of close work at your bench. Requires 22-watt T-9 Circline Fluorescent tube (not included).



Kit GDP-200, Shpg. wt. 7 lbs. 42.95

Electronic Darkroom Timer



Control your enlarger in two switch-selected ranges — up to 99 seconds in 1 second steps or up to 9.9 seconds in 0.1 second steps. Automatically turns the safe light off when printing and a time/focus switch turns the safelight off when focusing. 2% repeatability. 3 1/4" H x 6 5/8" W x 6 1/2" D.

Kit PT-15, Shpg. wt. 4 lbs. 36.95



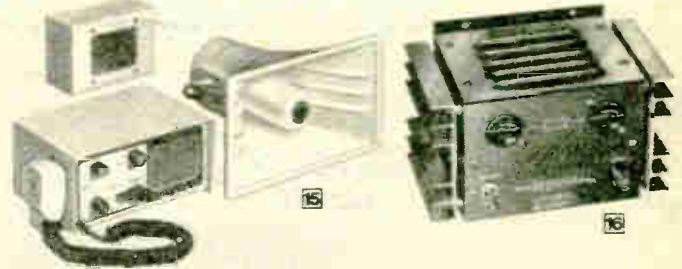
MR-1134 Marine-Band VHF Automatic Scanning Monitor

- Priority channel selection
- Large, lighted channel indicators

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 16). A built-in telescoping antenna brings in plenty of signals, there's also provision for an external antenna. AC or 12 VDC operation. No-instrument alignment. Order crystal certificates from page 16.

Kit MR-1134, Shpg. wt. 9 lbs. 49.95

MR-1134 SPECIFICATIONS: Scanning Range: any 8 MHz segment of the 146-174 MHz frequency range. Sensitivity: 0.5 µV 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 3/4" W. Net Wt. 5 lbs.



15 Automatic Foghorn/Hailer. Features a husky 55-watt amplifier; foghorn rate and duration controls; separate "listen" & "hail" gain controls. Includes weather-resistant deck horn, 20 ft. speaker cable, gimbal mount. 12 VDC pos. or neg. ground. Kit MD-19A, Shpg. wt. 15 lbs. 119.95

Kit MDA-19-1, Optional remote speaker for intercom use. Shpg. wt. 2 lbs. 12.95

16 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. 49.95

Heathkit Test Equipment... More Performance— More Reliability for your Instrument Dollar!

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 — and with our special 5% discount offer, they're an even better buy! 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...and price...you won't find better!

Save Even More With This Great 5% Discount Offer!

Here's the way to outfit your bench with famous Heath precision instruments and save a lot of money too! Simply buy one instrument from any three of the categories shown at right (three instruments minimum) and deduct 5% from the total price! If you're outfitting a complete bench and need more than three instruments you can buy as many as you like — as long as three of your instruments are from three different categories — and you can still deduct 5% from the total price! This discount even applies to any accessories — probes, connectors, cables, etc. — you want to buy. Sorry, this additional discount does not apply to the 5280 series instruments on pages 54 and 55.



Heath's professional quality test equipment lets you outfit your bench for any application. And every Heathkit instrument is backed by our world famous reputation for design and engineering excellence. Update your lab or test bench today with these quality instruments from Heath!

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IT-3121	IG-1273	IM-5225	IO-4555	IP-2717
IT-5230	IG-1275	IM-5228		IP-2718
	IG-4101	IM-5238		IP-5220
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Digital Multimeters for accuracy and convenience



1

High Performance Digital Multimeters for Every Budget and Application



2

3

1 Our low cost, high performance IM-1210 Digital Multimeter

\$67⁹⁵
Kit

- Solid-state design uses IC circuitry for a clear non blanking 2½-digit display
- Full-function capability includes AC voltage measurement up to 700 volts

Here's a low-cost, high performance DMM for hams, hobbyists and service techs. Its full-function capability includes AC voltage measurements up to 700 volts. Has four overlapping AC & DC voltage & current ranges and five resistance ranges. The IM-1210 is a very low-cost way to get all the accuracy and convenience of a true digital multimeter.

Kit IM-1210, Shpg. wt. 5 lbs. **67.95**
Factory assembled and calibrated version of above.
SM-1210, Shpg. wt. 5 lbs. **110.00**

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 (60 Hz to 10 kHz); Ohms: 0-200, 2K, 20K, 200K, 2M ohms. Overrange: 25% on all functions, within maximum input limits. **Maximum Input:** 3 amperes into AC or DC mA, and Ohms (fuse protected), 700 VAC rms into Volts (except 2V range: 250 VAC rms), 1000 VDC into Volts (except 2V range: 350 VDC). "-" input may be floated 1000 VDC (700 VAC) above earth ground. **Resolution (Low Range):** Volts: 10 mV. Current: 10 µA. Ohms: 1 ohm. **Accuracy (Full Scale, ±1 Digit):** DC volts: ±1%. DC current: ±1.5%. AC volts: ±1.5%. AC current: ±2%. Ohms: ±1.5%. **Input Impedance:** 1 megohm on all voltage ranges. 2.1-volt drop maximum on current ranges (except 2.5-volt drop on 2,000 mA range). **Power Requirement:** 100-135 VAC, 200-270 VAC 50, 60 Hz, 8 watts. Dimensions (overall): 3.00" H x 8.69" W x 10.54" D. Weight: 3.3 pounds (1.5 kg). **NOTE:** Specifications are based on 30-minute warmup.

2 Our Portable Digital Multimeter

\$189⁹⁵

- Automatic polarity indication
- Has 3½ digit display

Features 26 ranges — measures AC and DC volts, DC current and resistance. Has 100% overrange capability, separate voltage and current inputs for circuit protection. Battery or portable operation.

Kit IM-2202, Shpg. wt. 8 lbs. **189.95**

IM-2202 SPECIFICATIONS: **DC VOLTAGE — Overload Capability:** 300 V on 100 mV & 1V ranges; 1000 V on 10 V & 1000 ranges. **Accuracy:** Built-in references, ±0.5%, ±1 digit. Laboratory standards, ±0.2%, ±1 digit. **AC VOLTAGE — Overload Capability:** 250 V on 100 mV & 1 V ranges; 750 V on 10 V, 100 V & 750 V ranges. **Accuracy:** Built-in references ... ±1.0%, ±3 digits; 40 Hz to 1 kHz (except 40 Hz to 10 kHz on 100 m and ranges). Laboratory standards ... ±0.5%, ±3 digits; 40 Hz to 2 kHz on 750 range). **DC CURRENT — Range/Voltage Drop:** 100.0 µA/100 mV, 1.000 mA/100 mV, 10.00 mA/100 mA/150 mV, 100.0 mA, 300 mV. **Accuracy:** Built-in references ... ±0.5%, ±1 digit (except ±1% ±1 digit on 1000 mA range). Laboratory standards ... ±0.2% ±1 digit (except ±0.5%, ±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 µA/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 ... ±1.0%, ±3 digits (except ±1.5%, ±3 digits on 1000 mA range); 40 Hz to 10 kHz. Laboratory references ... ±0.5%, ±3 digits (except ±1.0%, ±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 Ω/1.0 mA, 1.000 kΩ/1.0 mA, 10.00 kΩ/0.1 mA, 100.0 kΩ/1.0 µA, 1000 kΩ/10. µA. **Accuracy:** Built-in references ... ±2% ±1 digit. **GENERAL — Overrange Capability:** 100% on all ranges except 1000 VDC & 750 VAC. **Normal Mode Rejection:** 35 dB (line operation); extended on battery operation.

tion. **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.

3 Our Finest 3½ Digit Multimeter

\$259⁹⁵

- Automatic + or - polarity indication
- Rugged enough for professional use

Our best digital multimeter. Displays voltage, current and resistance on a large, bright display.

Kit IM-102, Shpg. wt. 9 lbs. **259.95**

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:** ±2% ±1 digit with furnished DC calibrator, ±0.1% ±1 digit with lab calibration. **OHMMETER — 6 Ranges:** 200 ohms with 1 mA test current, 2k with 100µA, 20k with 10µA, 200k with 10µA, 2M with 1µ, 20M with 100 nA. **Accuracy:** With DC calibrator, ±0.5% ±1 digit on 200, 2k, 20k, 200k ranges; ±1.5% ±1 digit on 2M and 20M ranges. With lab calibration, ±0.5% ±1 digit on 200 ohm range; ±0.25% ±1 digit on 2k, 20k, 200k; ±1% ±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, ±0.75% ±1 digit for 40Hz-10kHz, ±1% ±1 digit for 10kHz-20kHz on 200 mV and 2V ranges; ±0.75% ±1 digit for 40Hz-5kHz, ±1.5% ±1 digit for 5kHz-10kHz on 20V and 200V ranges; ±1.5% ±1 digit for 40Hz-1.5kHz on 1000V range. **DC AMMETER — 5 Ranges:** 200µA, 2mA, 20mA, 200mA, 2A. **Voltage Drop:** 0.2V (nominal). **Accuracy:** With DC calibrator, ±0.5% ±1 digit for 2A, ±3% ±1 digit on all other ranges. With lab calibration, ±0.25% ±1 digit for 2mA and 20mA; ±0.3% ±1 digit for 200 mA; ±0.5% ±1 digit for 2A, AC AMMETER (40Hz-10kHz) — 5 Ranges: 200µA, 2mA, 20mA, 200mA, 2A. **Voltage Drop:** 0.2 V (nominal). **Accuracy:** With DC calibrator, ±1.5% ±1 digit on 2A, ±1% on all other ranges. With lab calibration, ±0.75% ±1 digit on 200µA, ±0.7% ±1 digit on 2mA and 20mA; ±0.8% ±1 digit on 200mA; ±1 digit on 2A. **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.

Heathkit Instrument Test Probes

IMA-100-10 Probe multiplies DC ranges of any 10-megohm meter by 100.

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.

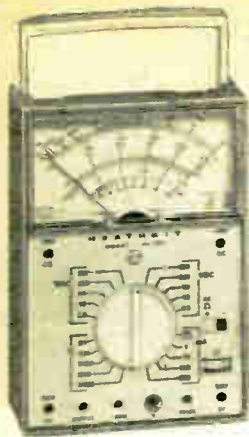
Kit IMA-100-11, Shpg. wt. 1 lb. **11.95**

Assembled SMA-100-11, Shpg. wt. 1 lb. **17.95**

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**

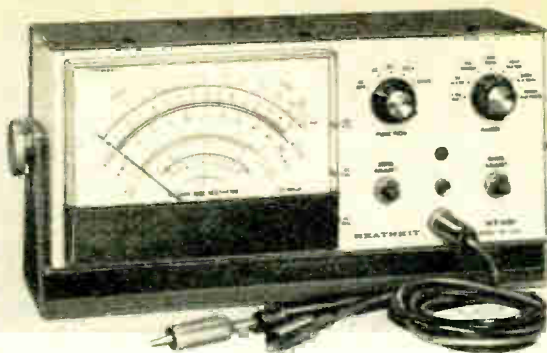
High-performance Heathkit VOM's



1



2



3

1 General-purpose VOM for easy service

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! 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: ± 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.

2 Popular, low cost VTVM

A single test probe that makes all measurements; seven practical AC, DC volts and ohms ranges; a precision 4 1/2" color-coded 200 μ A meter. 1% precision network resistors provide excellent accuracy; wide ± 1 db, 25 Hz to 1 MHz frequency response permits a variety of AC measurements. Measures both rms and p-p AC volts. Separate full-scale ranges for 1.5 and 5 volts makes low-voltage readings really easy, ideal for work with solid-state and latest digital equipment. Can be wired for 120 or 240 VAC.

Kit IM-5218, Shpg. wt. 5 lbs. 44.95
Assembled SM-5218, Shpg. wt. 5 lbs. 110.00

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 μ 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: ± 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 3/8" H x 4 1/8" W x 4 1/4" D.

PKW-4, Wired Replacement Probe for IM-5228, 5218, 18 or 28. Shpg. wt. 1 lb. 8.95
Convert your IM-5228, 5218, 18 or 28 to instant-on solid-state operation with the IMA-18-1. Helps eliminate pointer-drift corrections. IMA-18-1, Shpg. wt. 1 lb. 19.95

4 Deluxe AC Voltmeter

Has excellent frequency response and sensitivity high-accuracy measurements. And it's one of the only instruments around to feature linear scales for both volts and decibels!

Kit IM-5238, Shpg. wt. 8 lbs. 89.95
Assembled SM-5238, Shpg. wt. 8 lbs. 160.00

IM/SM-5238 SPECIFICATIONS: Voltage Range (full scale): 1 millivolt to 300 volts AC, 12 ranges. Decibel Range: —70 dB to +40 dB, 12 ranges in 10 dB steps with variable offset. Input: 10 megohms, 30 pF, negative input grounded to chassis. Frequency Response: Voltage Range, 10 Hz to 1 MHz, ± 2 dB. 10 Hz to 500 kHz ± 1 dB, dB range, 10 Hz to 250 kHz ± 1 dB. Outputs: DC (proportional to input volts), 1 volt full scale. DC (proportional to log of input volts), 3 volts full scale. AC (amplified output), 1 volt peak, full scale. Scales: 0-10 volts; 0-3.16 volts; —20 to +10 dB. Accuracy: Voltage Ranges, 4% of full scale at 1 kHz plus accuracy of calibration standard. dB ranges, ± 0.5 dB at 1 kHz plus accuracy of calibration standard. Power Requirements: 100-135 VAC, 200-270 VAC, 50/60 Hz, 20 watts.

3 Pro-feature bench VTVM

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. Has the same outstanding features and performance specifications of the IM-5218. 120 or 240 VAC.

Kit IM-5228, Shpg. wt. 6 lbs. 54.95
Assembled SM-5228, Shpg. wt. 7 lbs. 120.00

IM/SM-5228 SPECIFICATIONS: DC VOLTMETER — Ranges: 0-1.5, 5, 15, 50, 150, 500, 1500 V full scale; up to 30,000 V with accessory probe. Input Resistance: 11 megohm (1 megohm in probe) on all ranges: 1100 megohms with accessory probe. Circuit: Balanced bridge (push-pull) using twin triode. Accuracy: $\pm 3\%$ of full scale. AC VOLTMETER — Ranges: 0-1.5, 5, 15, 50, 150, 500, 1500 rms scales. Frequency Response (5 V range): ± 1 dB 25 Hz to 1 MHz (800 ohm source, referred to 60 Hz). Accuracy: 5% of full scale. Input Resistance & Capacitance: 1 megohm shunted by 40 pF measured at input terminals (200 pF at probe tip). OHMMETER — Ranges: Scale with 10 ohm center, X1, X10, X100, X1000, X10k, X1 meg. Measures 0.1 ohm to 1000 megohms with internal battery. Meter: 6", 200 μ 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.

5 Quality FET Multimeter

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. Features auto-polarity for added convenience, high and low voltage/ohms functions for in and out of circuit checks of semiconductor devices and resistance measurements.

Kit IM-5225,
Shpg. wt. 8 lbs. Was \$119.95 Now \$99.95
Assembled SM-5225, Shpg. wt. 8 lbs. 185.00

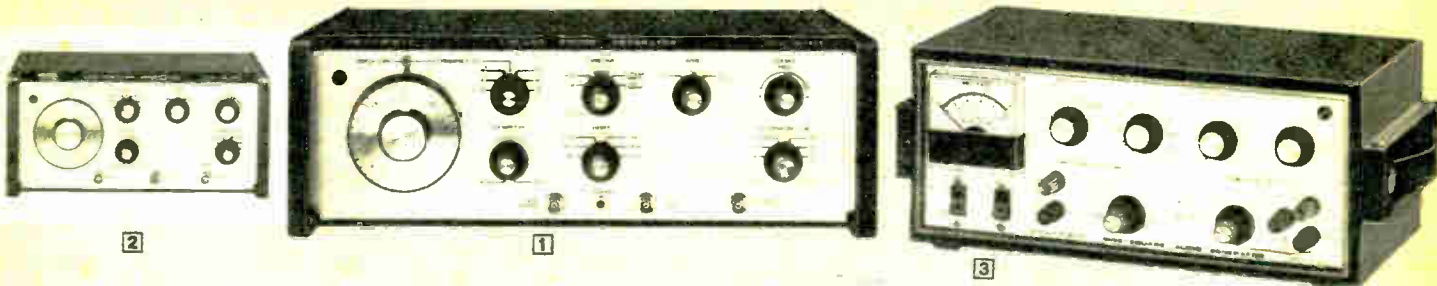
IM/SM-5225 SPECIFICATIONS: DC Volts: nine ranges 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, and 1000 full-scale. AC Volts: nine ranges 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, and 1000 volts full-scale. DC Current: six ranges 0-0.1, 0.1, 1, 10, 100, 1000 milliamperes full-scale. AC Current: six ranges 0-0.1, 0.1, 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 1 1/4" D. Weight: 5 3/4 lbs.



SAVE
\$20

4

Choose the Generator for your Servicing Need!



1 Lin/Log Swept Function Generator

The IG-1275 is a reliable lab-grade function generator that provides sine, square and triangle waveforms PLUS swept-function waveforms for convenient frequency response tests. 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; linear and log sweeps over a 1000:1 sweep range. Start and stop frequencies are set independently; sweep modes can also be triggered externally. 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. See specifications at right.

Kit IG-1275, Shpg. wt. 15 lbs. 319.95

Factory assembled and tested version of above:
SG-1275, Shpg. wt. 16 lbs. 530.00

2 IG-1273 Function Generator

Same features and specifications of the IG-1275 above, but does not offer swept-function capability.

Kit IG-1273, Shpg. wt. 15 lbs. 229.95

Factory assembled and tested version of above:
Kit SG-1273, Shpg. wt. 11 lbs. 370.00

4 Harmonic Distortion Analyzer. 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.

Kit IM-5258, Shpg. wt. 17 lbs. 229.95

Factory assembled version of above.
SM-5258, Shpg. wt. 16 lbs. 430.00

IM/SM-5258 SPECIFICATIONS: Frequency Range: 5 Hz to 100 kHz in 5 ranges. Distortion Range: reads from 0.3% to 100% full scale in 6 ranges. 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. 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 $\frac{3}{8}$ " H x 15" W x 11 $\frac{1}{2}$ " D.

5 Intermodulation Distortion Analyzer. This intermodulation distortion analyzer is designed for professional-quality audio servicing and testing.

Kit IM-5248, Shpg. wt. 14 lbs. 139.95

Factory assembled version of above.
SM-5248, Shpg. wt. 15 lbs. 340.00

IM/SM-5248 SPECIFICATIONS: IM METER: Ranges: 0.1 to 100%, 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

IG/SG-1275 SPECIFICATIONS: Output: 50-ohm source—short circuit protected. ± 10 volts open circuit. ± 5 volts into 50-ohm load. Output Flatness: ± 0.1 dB to 300 kHz. ± 0.5 dB to 3 MHz. Frequency: 0.003 Hz through 3 MHz in 6 range steps on primary decade. Sine Distortion: Less than 1%. $\times 10^1$. Less than 0.5%, $\times 10^2$, 10^3 , 10^4 . Less than 0.75%. $\times 10^5$. 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. Attenuator: 0 to -50 dB in 10 dB steps. Variable control 0 to -20 dB. Time Symmetry: Within 1% of full period through 300 kHz*. Sweep Generator: 6 ranges, 10 μ s through 100 sec. 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 Output 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 ± 5 volts signal for a 3-decade span. 8 k Ω input impedance. External Trigger Input Connector: \pm (250 mV to 4 volts) with 10 k Ω . Triggers on positive slope. Power Requirements: 100 to 135 volts. 50-60 Hz, 20 watts maximum. (200 to 270 volts; 50-60 Hz, switch selectable.) Dimensions: 15" wide, 11 $\frac{7}{8}$ " deep, 5 $\frac{3}{8}$ " high.

*Applicable only on top decade of each frequency range. The IG-1275 and IG-1273 require a triggered sweep oscilloscope for calibration.

minimum. Oscillator Frequencies: 60 Hz (line syncable), and 7000 Hz. Impedance and Bandwidths of External Oscillator Outputs: LF—51k ohms, 10 to 500 Hz. HF—18k ohms to 25k ohms; 2kHz to 100 kHz. Impedance Oscillator Outputs: 1000 ohms. Connectors: 5-way binding posts. AC VOLTMETER: 10 mV to 300 volts. 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 $\frac{3}{8}$ " H x 15" W x 11 $\frac{1}{2}$ " D.

6 IG-1272 Audio Frequency Generator. The Heathkit IG-1272 provides a low-distortion sine wave output over a frequency range from less than 5 Hz to 100 kHz.

Kit IG-1272, Shpg. wt. 11 lbs. 129.95

Factory assembled version of above.
SG-1272, Shpg. wt. 10 lbs. 230.00

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 ± 1.1 dB from 5 to 20 Hz; within ± 0.2 dB from 20 Hz to 100 kHz. Output Flatness (referenced to meter) Variable Mode: Within ± 2.5 dB from 10 Hz to 100 kHz. Frequency Accuracy: Pushbuttons; $\pm 4\%$, ± 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: 10 to 70 dB. Power Requirement: 120 VAC or 240 VAC, 50 or 60 Hz. 10 watts maximum. Dimensions: 5 $\frac{1}{2}$ " H x 11" W x 12 $\frac{1}{4}$ " D. Weight: 9.5 lbs.

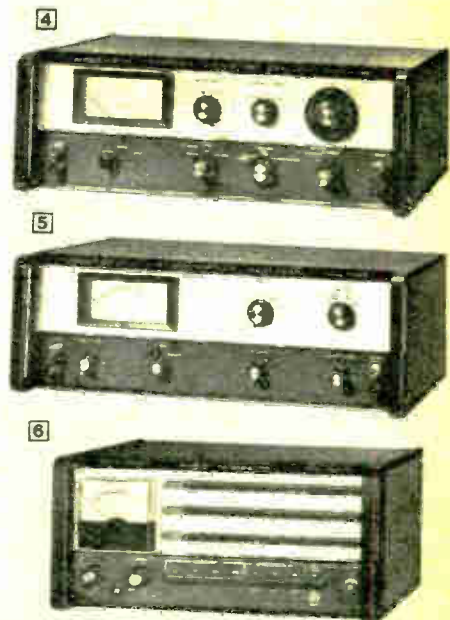
3 Sine-square wave Audio Generator

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. A meter, calibrated in both volts and dB, monitors the sine wave output.

Kit IG-5218, Shpg. wt. 10 lbs. 89.95

Assembled SG-5218, wired version of the IG-5218 in black & white styling, Shpg. wt. 10 lbs. 185.00

IG/SG-5218 SPECIFICATIONS: Sine Wave Output: Output voltage: 8 ranges, 0.003 to 10 V rms (full-scale) with 10k ohm or higher external load. 6 ranges, 0.003 to 1 V (full-scale) with 600 ohm internal or external load. dB ranges: -62 dB to +22 dB. -12 dB to +20 dB on amplitude switch in 10 dB steps. +2 dB max. into 600 ohm load. (0 dB = 1 mW in 600 ohm). Output variation: ± 1 dB 10 Hz to 100 Hz. Output 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: 105-126 or 210-250 VAC, 60/50 Hz, 6 watts.



Versatile Test Equipment for faster, easier servicing



1 FM 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. Also has switch selection of 400 Hz, 1 kHz, 5 kHz, 19 kHz, 38 kHz and one of two SCA frequencies. With test leads.

Kit IG-5237, Shpg. wt. 11 lbs. 99.95

IG-5237 SPECIFICATIONS: RF Signal frequency: 100 MHz adjustable by approx. ± 2 MHz. Pilot modulating frequency: 10 kHz ± 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: 5½" H x 13½" 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 (10P 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 oscilloscope is needed for calibration.

Kit IG-1271, Shpg. wt. 7 lbs. 109.95

Assembled SG-1271, wired version of the IG-1271 in same attractive blue & white styling (not shown), Shpg. wt. 7 lbs. 185.00

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: 105-130 volts or 210-260 volts, rms, 60/50 Hz. 15 watts max. Dimensions: 3" H x 7¼" W x 8¾" D (with handle removed). Net weight: 4.2 lbs.

3 Precision RF Generator

The IG-5242 provides 100 kHz to 30 MHz signals with $\pm 3\%$ adjustable frequency calibration. RF output voltage adjusts from 5 to 100,000 μ V in five attenuated steps, with 10:1 variable attenuation. For 120/240 VAC, 60/50 Hz. 8½" H x 13" W x 7" D.

Kit IG-5242, Shpg. wt. 15 lbs. 119.95

4 Audio Load

Provides the correct loading required for audio amplifiers under test in accordance with manufacturers published specifications and the Institute of High Fidelity Manufacturers (IHFM). 4" H x 9" W x 9" D.

Kit ID-5252, Shpg. wt. 6 lbs. 44.95

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 jugs, four jumper links.

5 High-accuracy Impedance Bridge. Has four separate bridge circuits for accurate measurement of resistance, capacitance, and low & high inductance, dissipation factor of capacitors and storage factor of inductors. Has direct reading 100-0-100 microammeter, front panel binding posts for easy test setups. Requires headphones or scope for alignment.

Kit IB-3128, Shpg. wt. 11 lbs. 139.95

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 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 μ F. Inductance: 0.1 mH to 100 H. Dissipation Factor: (D) 0.002 to 1. Storage Factor: (Q) 0.1 to 1000. Accuracy: ½ decade resistors used. Power Supply: Transformer and silicon rectifier. Power Requirements: 195-125 V, or 210-250 V., 60/50 Hz. 10 watts. Dimensions: 8" H x 17" W x 6" D.

6 Lab-type Decade Resistance Box. The IN-3117 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.

Kit IN-3117, Shpg. wt. 3 lbs. 44.95

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 7½" W x 6¾" D.

7 Capacitor Substitution Box. Helps you determine proper capacitance values without time-consuming calculations. Provides switch selection of any 18 EIA standard capacitors from 100 pF to 0.22 μ F. All are rated at 600 V except 3 lowest and, 2 highest values are 500 & 400 V respectively. 5½" H x 3¾" W x 3" D.

Kit IN-47, Shpg. wt. 2 lbs. 10.95

8 Resistor Substitution Box. Provides a rapid and flexible means of determining resistance values in electronic circuits. Provides switch selection of any one of 36 EIA standard 10% 1-watt resistors from 15 ohms to 10 meg. Hi/lo switch. 5½" H x 3¾" W x 3" D.

Kit IN-37, Shpg. wt. 2 lbs. 10.95

9 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 9¾" D.

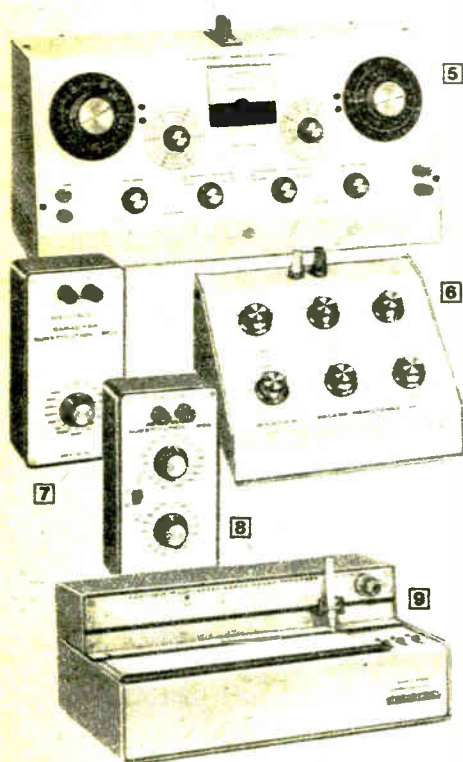
Kit IR-18M, Shpg. wt. 15 lbs. 199.95

3 rolls chart paper (140 ft./roll).

IRA-18-1, Shpg. wt. 5 lbs. 10.95

120 ft. roll chart paper. (For slow speeds.)

SU-445-17, 2 lbs. 4.75



New High-Performance Logic Probe

The IT-7410 is a low-priced logic probe equal to units costing twice as much and more!

\$39.95
Kit

- TWO indicator lights for clear readings
- Shows TRUE Logic Levels Even at High Frequencies

The HeathKit IT-7410 detects and indicates both high and low logic levels in TTL or CMOS digital circuitry. It also indicates the polarity and presence of signal pulses as short as 10 nsec duration, and shows intermediate or "bad" logic levels.

Simply touch the probe tip to an IC pin to observe the following conditions: Both indicators off shows open circuit or abnormal level (between thresholds). The low (white) indicator on shows constant logic ZERO. The high (red) indicator on shows constant logic ONE. Both indicators flash at a 5 Hz or lower rate to show signal pulses. One indicator flashing shows normal to abnormal logic levels. A separate manually reset memory indicator is lit whenever any transition in logic levels occurs.

The probe is equipped with 34" power leads with strain relief and color-coded mini-clips: detachable

high-frequency ground clip. The unit is powered by the circuit under test, or a separate regulated DC power supply. Available Sept., 1978.

Kit IT-7410, Shpg. wt. 1 lb. 39.95
Factory assembled and tested version of above.
ST-7410, Shpg. wt. 1 lb. 64.95

IT-7410 SPECIFICATIONS: DC Threshold Levels (switch-selected): TTL Logic ZERO (V), .8 \pm .15 @ 5 VDC. TTL Logic ONE (V): 2.1 \pm .25 @ 5 VDC. CMOS Logic ZERO (%), 30% \pm 10% of supply voltage. CMOS Logic ONE, 70% \pm 19% of supply voltage. Input Impedance: 400k ohms parallel with 10 pF. Response Limits: TTL or CMOS at 5 VDC: Single pulse or pulse train, 10 nS minimum. Squarewave, 100 MHz maximum. CMOS at 15 VDC: Single pulse or pulse train, 10 nS minimum; squarewave, 80 MHz maximum. Memory Indicator (LED), turns on with any change of either logic level indicator. Manually reset after turnon. Probe Input Protection: \pm 50 VDC, continuous, \pm 175 VDC (124 VAC) 5 seconds. Power Leads Protection: -25 VDC, continuous, +25 VDC (17 VAC) 1 minute. Power Requirements: 4.75 to 5.5 VDC at 75 mA maximum (TTL), 4.75 to 15 VDC at 115 mA maximum (CMOS). Operating Temperature Range: 10° to 40°C (50° to 104°F). Net Weight: 8 oz. Dimensions: 3/4" H x 1" W x 9/4" L.



Rugged Bi-Directional Wattmeter for VHF-UHF communications

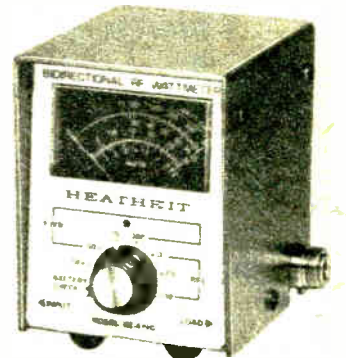
The IM-4190 is a professional quality bi-directional wattmeter designed to inexpensively meet the needs of the RF Communications Technician. Covering the 100 MHz to 1 GHz spectrum, without costly "slugs" or elements, it's ideal for use in Two-Way service/repair or for operation and maintenance of VHF and UHF communications equipment. It may be used in applications to 300 watts. Power is measured on three forward scales (30, 75, and 300 watts) and three reflected scales (3, 7.5, and 30 watts). The 4190 is capable of withstanding full power overloads on both of its lower scales without causing damage to the meter movement!

The wattmeter is equipped with N-type coax connectors to insure low high-frequency insertion loss, features extremely rugged construction, and because

of its size and metal D-ring for belt attachment, is ideal for tower antenna tuning and alignment procedures. Comes with N to PL-259 adaptors. Requires 9-volt battery (not supplied).

Kit IM-4190, Shpg. wt. 3 lbs. 109.95
Factory assembled and Tested
SM-4190, Shpg. wt. 3 lbs. 185.00

IM/SM-4190 SPECIFICATIONS: Power Ranges: Forward: 30, 75, and 300 watts, full scale. Reflected: 3, 7.5, and 30 watts, full scale. Frequency Range: 100 MHz to 1 GHz. Impedance: 50 ohms. Accuracy: \pm 5% of full scale (30, 75 and 300 watt ranges), \pm 7.5% of full scale (3, 7.5, and 30 watt ranges). Size: 4.5" H x 4.25" W x 4.625" D. Power Requirement: 9-volt battery, NEDA 1604.



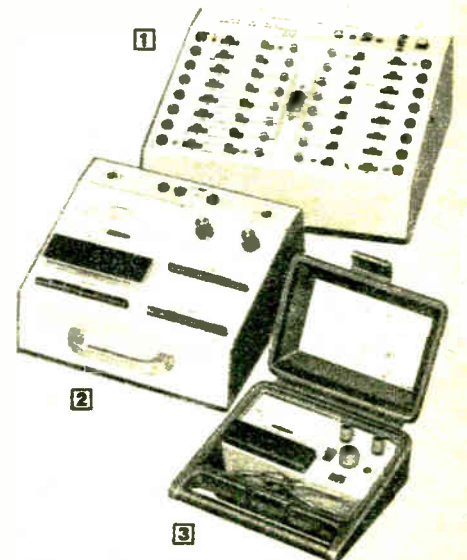
1 Deluxe Digital IC Tester. A "must" for anyone working with digital IC's. Lets you determine functions of IC's, check operation against your own data sheets. Features a special high-quality "zero-force" insertion socket — the same as used in expensive production-line testers — lets you make thousands of insertions and extractions without worrying about bent pins. Exclusive "bounce-free," 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 Digital Techniques Program (page 87).
Kit IT-7400, Shpg. wt. 6 lbs. 74.95

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. Dimensions: 4 3/8" H x 11 3/8" W x 9 3/4" D.

2 High-accuracy FET/Transistor Tester. For quick, accurate tests of conventional (bi-polar) transistors, diodes, FETs, SCRs, triacs and unijunction transistors. Tests components either in-circuit using color-coded test leads supplied or out-of-circuit using built-in sockets. Shows gain (DC Beta), trans-conductance (Gm) and leakage directly.
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 1/2 V cells, (alkaline for best performance, not supplied). Dimensions: 5" H x 9 3/4" W x 8 3/8" D.

3 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. 34.95



Here's how to place your order

HOW TO ORDER KIT MANUALS

See how easy kitbuilding really is — choose the product you want, then order the manual first. Be sure to send manual orders on a separate sheet of paper. Manuals are \$3 each except for the following: color TV's, organs, H9, H10, SB-104A, HW-101, AN-2016A, AR-1515, AA-1640, AJ-1510A, AR-1500A, and ET series, which are \$7 each. Individual H8 and H11 manual sets, which include books for assembly, operation software, all memory boards and interfaces, are \$15 each set. Add 50¢ postage and handling for each manual ordered. Simply write Heath Company, Manual Dept., Benton Harbor, MI 49022.

MONEY-BACK MANUAL OFFER. We'll deduct the price of the manual when you buy the kit. Simply include manual invoice with your order.

TERMS

- **Heath Revolving Charge Plan.** No money down. Up to two years to pay. Two convenient monthly payment plans available. Down payments are encouraged to reduce your monthly payments and finance charges. Follow instructions on the reverse side of order blank. Be sure to sign charge agreement.
- **Commercial Accounts.** Net 30-day terms available to well-rated companies.
- **Educational Accounts:** Net 30-day terms available to Patterson listed educational institutions. Authorized purchase order is required.
- **Note:** All credit orders subject to Heath Credit approval.

SPECIAL SHIPPING INFORMATION

- **NON-MAILABLE ITEMS** — Items indicated Motor Freight exceed weight or size limitations. Examples are TV's, organs, some speaker systems, garage door mechanisms, etc. These are shipped with freight charges collect. Check with your local carrier for charges before ordering.
- **APO/FPO SHIPMENTS** — Use the following Zones to estimate costs — West Coast, Zone 8; East Coast, Zone 5. PAL (Airlift Military) carries packages by air transport for a fee of \$1 per package plus postage. Parcel must weigh less than 30 lbs. and not exceed 60" in length and girth.
- **SAM:** Parcel must weigh less than 15 lbs. and not exceed 60 in. length and girth. Be sure to check with your local postmaster for exceptions to certain APO or FPO numbers.

SPECIAL INFORMATION ON QUANTITY ORDERS

- **Commercial, Educational, and Industrial Sales:** For quotations on 10 or more of any Heath product, kit or wired, write or phone Marketing Services Department, 616-982-3454.
- **Contract Sales:** For orders of 250 or more of any Heath product, kit or wired, write or phone Contract Sales Department, 616-982-3519. Private labeling, custom packaging, or design modifications can be made to meet your specific needs.

- **Special Educational Product Discount:** A 15% discount is provided on any order for 10 or more of Heath EE model series (10% on ET model series) educational products. For quantities of 100 or more, including special versions of these educational products to fit a particular teaching situation, contact Contract Sales Department.
- Note:** Quantity discounts apply to single models only — not combination orders, special offers, or systems.

HEATH PHONE DIRECTORY FOR ASSISTANCE AND INFORMATION

Replacement Parts Orders:

Please have Heath part no. available when you call

616-982-3571

International Sales 616-982-3512

General Office (non-order calls) 616-982-3200

Computer Sales and Information 616-982-3285

Heath Computer Users Group (HUG) 616-982-3463

TECHNICAL ASSISTANCE

- R/C, Audio, Electronic Organs 616-982-3310
- Amateur Radio 616-982-3296
- Test Equipment, Weather Instruments, Home Clocks 616-982-3315
- Television 616-982-3307
- Aircraft, Appliances, Automotive, Marine, Scanners' Security, General Products 616-982-3496
- Computers 616-982-3309

8:00 A.M. to 12:00 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays only

BY PHONE: Use the Heathkit "Hotline" — (616) 982-3411 anytime, day or night, 7 days a week. It's fast, convenient and your order will be shipped to you promptly.

BY MAIL: Use the order form on the facing page. Fill out your order completely with model no., description and price exactly as shown in the catalog. Give your address with full details including Zip and phone number.

ZONE CHART: Your zone is indicated by the first three numbers of your Zip Code.

Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone	Zip Code Prefixes	Zone
006-009	8	260-261	3	370-386	4	478	3	600-609	2	823-826	6
010-068	5	262-278	4	387	5	479-489	2	610-619	3	827	5
070-089	4	279	5	388	4	490-491	1	620-623	4	828-832	6
090-099	5	280-283	4	389-397	5	492	2	624-628	3	833	7
		284-285	5			493-495	1	629-668	4	834	6
100-108	5	286-293	4	400-406	4	496-499	3	669-679	5	835-838	7
109	4	294-295	5	407-409	4			680-687	4	839-847	6
110-113	5	296-297	4	410-412	3	500-516	4	688-693	5	850-854	7
120-123	5	298-299	5	413-422	4	520-524	3			855-884	6
124-126	5			423	3	525	4	700-722	5	890-898	7
127-128	4	300-303	4	424-426	4	526-528	3	723-727	4		
129	5	304	5	427-432	3	530-534	2	728-768	5	900-921	8
130-152	4	305-307	4	433-436	2	535-539	3	769	6	922-928	7
153	3	308-329	5	437-457	3	540	4	770-778	5	929-934	8
154-160	4	330-334	6	458	2	541-546	3	779-789	6	935	5
161	3	335-338	5	460-462	3	547-548	4	790-792	5	936-960	8
162-163	4	339	6	463-464	2	549	3	793-799	6	961	7
164-165	3	350-352	4	465-466	1	550-566	4			962-976	8
166-199	4	354	5	467-469	2	567	5	800-803	5	977-978	7
		355-359	4	470-472	3	570-572	4	804-805	6	980-987	7
200-232	4	360-361	5	473	2	573-588	5	806-807	6	988-994	8
233-237	5	362	4	474-475	3	590-597	6	808-816	6	995-999	8
238-259	4	363-369	5	476-477	4	598-599	7	820-822	5		

RATE CHART

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

Note: Blue Label Service Area Zone A covers: CT, ME, MA, NH, NJ, RI and VT. Zone B covers: AZ, CA, CO, FL, ID, MT, NE, NM, OR, WA, WY, UT.

Heath Shipping and Handling Charges (Mailable items only)

Shpg. Wt.	Zone								BLUE LABEL AIR SERVICE CHARGE	
	Zone 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone A	Zone B
1	\$1.20	\$1.27	\$1.39	\$1.58	\$1.64	\$1.72	\$1.81	\$1.74	\$1.28	\$1.28
2	1.35	1.39	1.56	1.72	1.84	1.98	2.22	2.12	1.74	1.81
3	1.45	1.53	1.73	1.86	2.04	2.24	2.61	2.21	2.34	2.34
4	1.56	1.65	1.82	2.00	2.23	2.50	2.92	2.69	2.99	2.99
5	1.66	1.77	1.92	2.14	2.43	2.77	3.39	3.18	3.39	3.39
6	1.71	1.84	2.01	2.28	2.62	3.03	3.78	3.66	3.92	3.92
7	1.76	1.90	2.11	2.41	2.82	3.29	4.17	4.15	4.45	4.45
8	1.80	1.97	2.20	2.55	3.02	3.56	4.56	4.63	4.98	4.98
9	1.85	2.03	2.29	2.69	3.21	3.82	4.95	5.12	5.51	5.51
10	1.89	2.10	2.39	2.83	3.41	4.08	5.34	5.60	6.03	6.03
11	1.94	2.17	2.50	3.00	3.65	4.42	5.73	6.09	6.56	6.56
12	1.98	2.22	2.56	3.09	3.77	4.57	6.12	6.57	7.09	7.09
13	2.02	2.27	2.63	3.17	3.89	4.72	6.41	7.06	7.62	7.62
14	2.05	2.32	2.69	3.25	3.99	4.86	6.62	7.54	8.15	8.15
15	2.09	2.36	2.74	3.33	4.09	4.99	6.80	8.03	8.67	8.67
16	2.13	2.41	2.80	3.40	4.19	5.11	6.98	8.51	9.20	9.20
17	2.16	2.45	2.85	3.47	4.28	5.23	7.15	9.00	9.73	9.73
18	2.20	2.49	2.92	3.54	4.37	5.34	7.31	9.48	10.26	10.26
19	2.23	2.53	3.04	3.63	4.49	5.45	7.47	9.97	10.79	10.79
20	2.27	2.58	3.16	3.78	4.58	5.60	7.62	10.45	11.31	11.31
21	2.30	2.68	3.29	3.94	4.88	5.85	7.76	10.94	11.84	11.84
22	2.37	2.77	3.41	4.09	5.08	6.07	7.90	11.42	12.37	12.37
23	2.45	2.86	3.53	4.24	5.28	6.33	8.03	11.91	12.90	12.90
24	2.52	2.95	3.65	4.39	5.47	6.58	8.16	12.39	13.43	13.43
25	2.59	3.04	3.77	4.54	5.67	6.82	8.28	12.88	13.95	13.95
26	2.67	3.14	3.89	4.70	5.87	7.06	8.49	13.36	14.48	14.48
27	2.74	3.23	4.01	4.85	6.06	7.31	8.79	13.85	15.01	15.01
28	2.82	3.32	4.13	5.00	6.26	7.55	9.09	14.33	15.54	15.54
29	2.89	3.41	4.25	5.15	6.46	7.79	9.39	14.82	16.07	16.07
30	2.96	3.50	4.37	5.30	6.65	8.03	9.68	15.30	16.59	16.59
31	3.04	3.60	4.50	5.46	6.85	8.28	9.98	15.79	17.12	17.12
32	3.11	3.69	4.62	5.61	7.05	8.52	10.28	16.27	17.65	17.65
33	3.19	3.78	4.74	5.76	7.25	8.76	10.58	16.76	18.18	18.18
34	3.26	3.87	4.86	5.91	7.44	9.01	10.88	17.24	18.71	18.71
35	3.33	3.96	4.98	6.06	7.64	9.25	11.17	17.73	19.23	19.23
36	3.41	4.06	5.10	6.22	7.84	9.49	11.47	18.21	19.76	19.76
37	3.48	4.15	5.22	6.37	8.03	9.74	11.77	18.70	20.29	20.29
38	3.56	4.24	5.34	6.52	8.23	9.98	12.07	19.18	20.82	20.82
39	3.63	4.33	5.46	6.67	8.43	10.22	12.37	19.67	21.35	21.35
40	3.70	4.42	5.58	6.82	8.62	10.46	12.66	20.15	21.87	21.87
41	3.78	4.52	5.71	6.98	8.82	10.71	12.96	20.64	22.40	22.40
42	3.85	4.61	5.83	7.13	9.02	10.95	13.26	21.12	22.93	22.93
43	3.93	4.70	5.95	7.28	9.22	11.19	13.56	21.61	23.46	23.46
44	4.00	4.79	6.07	7.43	9.41	11.44	13.86	22.09	23.99	23.99
45	4.07	4.88	6.19	7.58	9.61	11.68	14.15	22.58	24.51	24.51
46	4.15	4.98	6.31	7.74	9.81	11.92	14.45	23.06	25.04	25.04
47	4.22	5.07	6.43	7.89	10.00	12.17	14.75	23.55	25.57	25.57
48	4.30	5.16	6.55	8.04	10.20	12.41	15.05	24.03	26.10	26.10
49	4.37	5.25	6.67	8.19	10.40	12.65	15.35	24.52	26.63	26.63
50	4.44	5.34	6.79	8.34	10.59	12.89	15.64	25.00	27.15	27.15
Add'l lbs.	.07 lb.	.09 lb.	.12 lb.	.15 lb.	.19 lb.	.24 lb.	.29 lb.	.48 lb.	.52 lb.	

IMPORTANT: 1. Shipping weights listed for model numbers shipped in more than one carton have been adjusted to provide correct postage.



TO: HEATH COMPANY, BENTON HARBOR, MICHIGAN 49022: REVOLVING CHARGE SECURITY AGREEMENT

I hereby purchase the total amount of merchandise listed on the reverse side plus shipping charges and tax, if any, less down payment, if any, plus the **FINANCE CHARGE** which, in lieu of being added to this contract in total as of the date hereof will be added monthly on the previous month's ending balance of my account before deducting payments and credits or adding purchases made during the current billing period. **FINANCE CHARGE** will be assessed on the balance according to the following schedule or in accordance with the laws of the State of my residence which ever is the lesser.

Account Balance Amount: ALL BALANCES. Periodic Percentage Rate: 1 1/2 %

ANNUAL PERCENTAGE RATE: 18%

The minimum **FINANCE CHARGE** assessed will be 50¢ on any small balances. If within 30 days from my billing date I pay the full outstanding balance shown on my statement, no **FINANCE CHARGE** on such balance, will be charged on any subsequent statement. The highest level of my balance reflected by the payment chart will govern my monthly payment, beginning 30 days from the cycle closing date shown on the statement, until such time as the total unpaid balance of each purchase is fully paid (minimum \$10). Regular or Extended Terms are the two plans available for my use. To use the extended plan, the balance of my account must be at least \$500.00. The amount of my monthly installment is determined from charts below.

REGULAR REVOLVING CHARGE

Charge up to:	\$150	200	250	300	350	400	450	500
Pay Monthly:	\$10	15	20	25	30	35	40	45

EXTENDED REVOLVING CHARGE

Charge up to:	\$600	700	900	900	1000	1100	1200	1300	1400	1500
Pay Monthly:	\$30	35	40	45	50	55	60	65	70	75

Add \$5 per month for every \$100 or fraction thereof over \$1500.

I hereby grant to the above named creditor a security interest in all goods purchased until the purchase price and **FINANCE CHARGE** have been paid in full. I will not sell, transfer possession of, remove or encumber the property without your written consent. The account may be declared in default and the matters regarding default, right to cure (if any) and acceleration of account balances will be governed by the consumer protection laws of the state of my residence. My installments shall be applied as follows. In case of items purchased on different dates, the first purchase shall be deemed first paid for. In case of items purchased on the same date, the lowest price shall be deemed first paid for. We intend to obtain a consumer report in connection with the processing of your credit application. Upon request you will be informed of the name and address of the consumer reporting agency that furnished the report. You may inspect your report by contacting the reporting agency that made it. Subsequently consumer reports may be obtained from time to time in connection with the maintenance of your account.

NOTICE TO BUYER: 1. Do not sign this agreement before you read it or if it contains blank spaces. You are entitled to a copy of the agreement you sign. 2. The other side of this page is part of this contract. Notice: See accompanying statement for important information regarding your rights to dispute billing errors.

3. NOTICE: ANY HOLDER OF THIS CONSUMER CREDIT CONTRACT IS SUBJECT TO ALL CLAIMS AND DEFENSES WHICH THE DEBTOR COULD ASSERT AGAINST THE SELLER OF GOODS OR SERVICES OBTAINED PURSUANT HERETO OR WITH THE PROCEEDS HEREOF. RECOVERY HEREUNDER BY THE DEBTOR SHALL NOT EXCEED AMOUNTS PAID BY THE DEBTOR HEREUNDER.

TYPE OF ACCOUNT <input type="checkbox"/> INDIVIDUAL <input type="checkbox"/> JOINT	Sign here _____ Date _____ (Customer's Signature)	Check Revolving Charge Plan Desired <input type="checkbox"/> Regular <input type="checkbox"/> Extended
	Sign here _____ Date _____ (Spouse's Signature) If Joint Account	

FILL IN IF YOU ARE A NEW ACCOUNT, OR IF YOUR PREVIOUS ACCOUNT HAS BEEN PAID UP FOR 12 MONTHS OR MORE.

CREDIT APPLICATION TO: HEATH COMPANY, BENTON HARBOR, MICHIGAN 49022

Former Account No. _____

IMPORTANT: Please fill in completely.

Omissions and errors cause delays

SIGN REVOLVING AGREEMENT

ACCOUNT To Be In The Name Of	AGE	No. of Dependent Children
First _____ Initial _____ Last _____		
Present Residence: Address — Street _____	Area Code + Phone Number _____	
City _____ State _____ Zip _____	How Long _____ YRS _____ MO	
<input type="checkbox"/> OWN <input type="checkbox"/> RENT <input type="checkbox"/> BOARD <input type="checkbox"/> MARRIED Monthly Rent or Mortgage Payments \$ _____ <input type="checkbox"/> UNMARRIED <input type="checkbox"/> SEPARATED	TYPE OF ACCOUNT <input type="checkbox"/> INDIVIDUAL <input type="checkbox"/> JOINT Social Security Number _____	
Former Address If Less Than 3 Yrs. At Present Address	How Long _____ YRS _____ MO	
Street _____ City _____ State _____ Zip _____		

COMPLETE FOR PERSON REQUESTING ACCOUNT:

Employer's Name (Give Firm's Full Name) _____	How Long _____ YRS _____ MO	Position _____	Salary (Monthly) \$ _____	Business Phone _____
Employer's Address _____	(Child support, alimony and separate maintenance optional.) Other Income — Source(s) _____			Amount (Monthly) \$ _____
Former Employer — Name-Address _____	Position _____	How Long _____ YRS _____ MO	Salary (Monthly) \$ _____	
Bank — Branch Address _____	City _____	State _____	Zip _____	<input type="checkbox"/> Check <input type="checkbox"/> Loan <input type="checkbox"/> Savings

CREDIT REFERENCE: (Give Merchants, Firms, or Finance Companies with whom you do or have done business)

Firm Name	Address — Street, City, State	Account No.	Balance

Name Nearest Relative Not At Your Present Address _____	Relationship _____	Relative's Address _____
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COMPLETE FOR SPOUSE IF JOINT ACCOUNT REQUESTED:

Spouse's Full Name (First, Initial, Last) _____	Age _____	Social Security Number _____
Employer's Name (Give Firm's Name) _____	Employer's Address _____	Business Phone _____
How Long _____ YRS _____ MO	Position _____	Salary (Monthly) \$ _____
Bank — Branch _____	<input type="checkbox"/> Check <input type="checkbox"/> Savings <input type="checkbox"/> Loan	

WHEN ORDERING, BE SURE TO REMOVE ENTIRE PAGE.

THE PRESIDENT'S CORNER



Dear Friends,

I enjoyed reading a letter recently from one of our customers, who gave his age as 82 and said he had just completed the three basic electronics individual-learning programs in our Heathkit Continuing Education Series and that he did so just for the fun of learning. Isn't that great! There is something appealing about the words "Continuing Education" as it rightfully implies that we continually learn something new every day of our lives.

Whether it's for fun, to satisfy a natural curiosity or to increase job skills, self education has become recognized as a highly effective method of education. Our Heathkit individual learning programs are self-paced and written in such an interesting style you will look forward

Visit our Factory Store in Michigan. There's a Heath Customer Center right alongside our production facility on Hilltop Road in Saint Joseph, Michigan. Next time you're in the area, stop in and take advantage of our MAIL ORDER PRICES, IMMEDIATE DELIVERY and expert SERVICE! Store hours are 9 AM to 5 PM Monday through Friday and 9 AM to 4 PM on Saturdays. And while you're there, why not take a guided tour of our plant? It's fun, educational and you'll see firsthand how the best electronic kits in the world are made. Tours are given Monday through Friday, at 10 AM and 1:30 PM from May 30 to Sept. 1. (special group tours may be arranged upon written request). From Interstate 94, take Exit 27, Niles Ave. north to Hilltop Road. Take Hilltop Road west to Heath Company (2 blocks west of Cleveland Ave.).

Copies of the Heathkit warranty or warranties for any other consumer product in this catalog costing more than \$15 may be obtained free of charge by writing the Manager of Marketing Services, Heath Company, Benton Harbor, Michigan 49022.

to each successive chapter and subject. In addition we offer the unique benefit of providing the hardware for experiments to support our text materials — knowing there's no substitute for "hands-on" experience. As valued kitbuilding customers you've had an important hand in leading us to the concept of self-paced individual learning programs. And your communications have helped us develop our subjects. I want to tell you, we are grateful for your interest and suggestions.

We have several new and different educational programs coming along in the near future. We'll be looking for your continued response, and we always welcome your ideas and suggestions, so please write.

Sincerely,

David Nurse, President

P.S. May I refer you to page 81 where the courses we offer are described. I can promise you they offer the same personal satisfaction as building a Heathkit product.

P.P.S. Please don't let a possible interruption of mail deliveries keep you from enjoying the kit you want. Remember you can phone your order anytime, day or night, 7-days a week, using our Hotline number, (616) 982-3411. Your order will be shipped immediately by U.P.S. or motor freight.

ATTENTION: COMMUNICATIONS TECHNICIANS

Heath Company has entry level positions open for electronic technicians to trouble-shoot and repair factory assembled radio gear and customer-wired kits. Knowledge and experience with communications electronics is essential in these positions. All positions are in St. Joseph, Michigan and require relocation. Send applications or resumes to:

Heath Company
Benton Harbor, MI 49022
ATTN: Ken Smith, Technical Rec.

We are an Equal Opportunity Employer M/F.

ATTENTION — CS-1048 OWNERS WITH FORD CARS. In addition to the recent modification, we have an important safety modification for Ford owners only. Contact the Heath Parts Department.

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

IN CASE OF ERRORS OR INQUIRIES ABOUT YOUR BILL

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

1. If you want to preserve your rights under the Act, here's what to do if you think your bill is wrong or if you need more information about an item on your bill:

a. Do not write on the bill. On a separate sheet of paper write (you may telephone your inquiry but *doing so will not preserve your rights under this law*) the following:

- Your name and account number (if any).
- A description of the error and an explanation (to the extent you can explain) why you believe it is an error.

If you only need more information, explain the item you are not sure about and, if you wish, ask for evidence of the charge such as a copy of the charge slip. Do not send in your copy of a sales slip or other document unless you have a duplicate copy for your records.

iii. The dollar amount of the suspected error.

iv. Any other information (such as your address) which you think will help the creditor to identify you or the reason for your complaint or inquiry.

b. Send your billing error notice to the address on your bill which is listed after the words: "Send Inquiries to:"

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

2. The creditor must acknowledge all letters pointing out possible errors within 30 days of receipt, unless the creditor is able to correct your bill during that 30 days. Within 90 days after receiving your letter, the creditor must either correct the error or explain why the creditor believes the bill was correct. Once the creditor has explained the bill, the creditor has no further obligation to you even though you still believe there is an error, except as provided in paragraph 5 below.

3. After the creditor has been notified, neither the creditor nor an attorney nor a collection agency may send you collection letters or take other collection action with respect

to the amount in dispute; but periodic statements may be sent to you, and the disputed amount can be applied against your credit limit. You cannot be threatened with damage to your credit rating or sued for the amount in question, nor can the disputed amount be reported to a credit bureau or to other creditors as delinquent until the creditor has answered your inquiry. However, you remain obligated to pay the parts of your bill not in dispute.

4. If it is determined that the creditor has made a mistake on your bill, you will not have to pay any FINANCE CHARGES on any disputed amount. If it turns out that the creditor has not made an error, you may have to pay FINANCE CHARGES on the amount in dispute, and you will have to make up any missed minimum or required payments on the disputed amount. Unless you have agreed that your bill was correct, the creditor must send you a written notification of what you owe; and if it is determined that the creditor did make a mistake in billing the disputed amount, you must be given the time to pay which you normally are given to pay undisputed amounts before any more FINANCE CHARGES or late payment charges on the disputed amount can be charged to you.

5. If the creditor's explanation does not satisfy you and you notify the creditor *in writing* within 10 days after you receive his explanation that you still refuse to pay the disputed amount, the creditor may report you to credit bureaus and other creditors and may pursue regular collection procedures, but the creditor must also report that you think you do not owe the money, and the creditor must let you know to whom such reports were made. Once the matter has been settled between you and the creditor, the creditor must notify those to whom the creditor reported you as delinquent of the subsequent resolution.

6. If the creditor does not follow these rules, the creditor is not allowed to collect the first \$50 of the disputed amount and FINANCE CHARGES, even if the bill turns out to be correct.

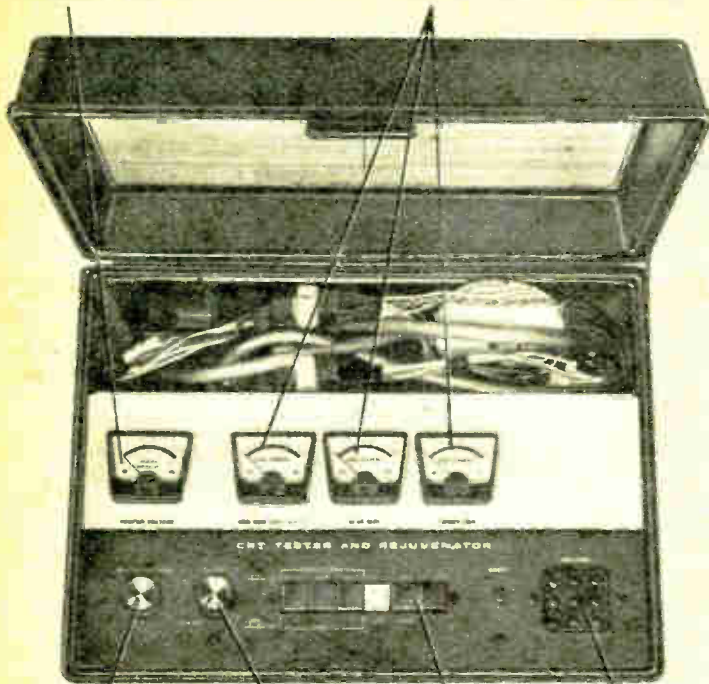
7. If you have a problem with property or services purchased with a credit card, you may have the right not to pay the remaining amount due on them, if you first try in good faith to return them or give the merchant a chance to correct the problem. There are two limitations on this right:

- You must have bought them in your home state or if not within your home state within 100 miles of your current mailing address; and
- The purchase price must have been more than \$50.

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

Heater Voltage Meter. Accurately indicates heater voltage supplied to cathode of CRT

Gun Meters. Individual meters for each color gun (use red gun meter for black-and-white tubes)



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.

Restore Indicator. Monitors current level — Rises to brilliant glow as CRT is rejuvenated

Heathkit IT-5230 CRT Tester/Rejuvenator brings old and worn TV Picture Tubes back to LIFE!

\$89⁹⁵
Kit

- Test, clean and rejuvenate even IN-LINE GUN Color CRT's
- Individual meters monitor grid current 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. **89.95**

Factory assembled version of above.

ST-5230, Shpg. wt. 9 lbs. **185.00**

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.

1 Solid state color bar and dot pattern Generator for fast, easy TV servicing

\$99⁹⁵

- Logic circuitry insures sharp stable alignment patterns
- Solid state crystal controlled time base

Provides 12 patterns plus a clear raster for purity adjustments, and patterns are available in the exclusive Heath 3x3 display or the familiar 9x9. Has RF output for channels 2 through 6, variable up to 50,000 μ V, variable plus and minus going video, front panel gun shorting switches and lead piercing grid jacks, front panel sync output, 4.5 MHz sound carrier oscillator, two 500W AC receptacles.

Kit IG-5228, Shpg. wt. 8 lbs. **99.95**

IG-5228 SPECIFICATIONS: Output signals: Video — Greater than ± 1 V peak-to-peak composite signal. RF — Variable to 50,000 μ 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, 500 mA, zener diode regulated. Dimensions: 5½" H x 13½" W x 8" D.

2 Combination Vectorscope/Color Generator adds real versatility to your service bench

A really versatile instrument for color TV servicing! The vectorscope accurately shows the chroma signal being fed to the CRT to indicate missing or weak colors, proper adjustment of the burst phase transformer, 3.58 MHz oscillator, reactance coil, bandpass transformer, color demodulation angle. The color generator provides 12 patterns plus a raster for purity adjustments in the standard 9x9 display or the exclusive Heath 3x3 format. Has tuning for channels 2-6, RF output variable to 50,000 μ V, plus or minus going video signals, front panel sync output, lead-piercing grid jacks, and front panel gun shorting switches.

Kit IO-4101, Shpg. wt. 13 lbs. **169.95**

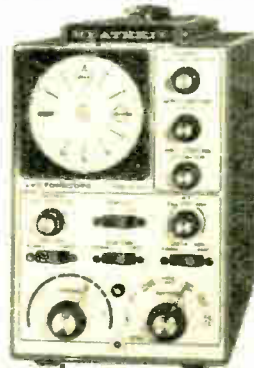


1

2

Combines a Vectorscope and a Color Bar Generator for Fast, Easy and Thorough Color TV Servicing

\$169⁹⁵



Instruments-Outstanding Value!

Here's shirt pocket television servicing that's affordable!
Versatile, Portable Color Alignment Generator

\$64⁹⁵
Kit

- 16 different displays at the flip of a switch
- Push-button on with built-in battery saver
- Solid-state reliability

From Heath, a truly portable color alignment generator with the versatility you NEED for complete color TV alignment and convergence. The IG-5240 offers outstanding performance, with crystal-controlled carrier and color oscillator for real precision, accuracy and stability. Its convenient "shirt-pocket" size makes it the one to take along for in-the-field service calls every time, and you'll find yourself using it every day in the shop! It's a versatile, low-cost service tool for hobbyists, too.

The IG-5240 is really easy to operate. Simply connect its output cable to the VHF terminals of any color TV. The RF carrier frequency is calibrated for channel 4. An "on" pushbutton turns the IG-5240 on, four program slide switches select any of the 16 displays available. A color level control adjusts the color intensity of the three color patterns.

A special "battery saver" timing circuit turns the display "off" automatically after a minimum of five minutes "on". This conserves battery power and lets you get the most efficient operation from your batteries. The unit uses two inexpensive 9-volt transistor batteries (NEDA #1604 or equivalent), which provide a minimum of 8 hours continuous operation.

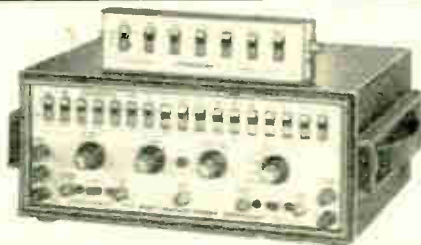
For features, convenience and versatility, we don't think you can find a better color alignment generator than the IG-5240. Put it in your service shop today!

Kit IG-5240, Shpg. wt. 2 lbs. **64.95**
Factory assembled version of above.
SG-5240, Shpg. wt. 1 lb. **95.00**

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 μ 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.

Heath's Post-Marker/
Sweep Generator
for faster easier TV
alignment

\$189⁹⁵



The IG-5257 makes receiver alignment fast and easy. It features 15 selectable markers, video and audio carrier markers for channels 4 and 10, and a diode modulator for Video Sweep Modulation. Other features include a 400 Hz tone for FM receiver alignment, and a multi-step attenuator pad to assure proper impedance matching and to avoid stage overloading.

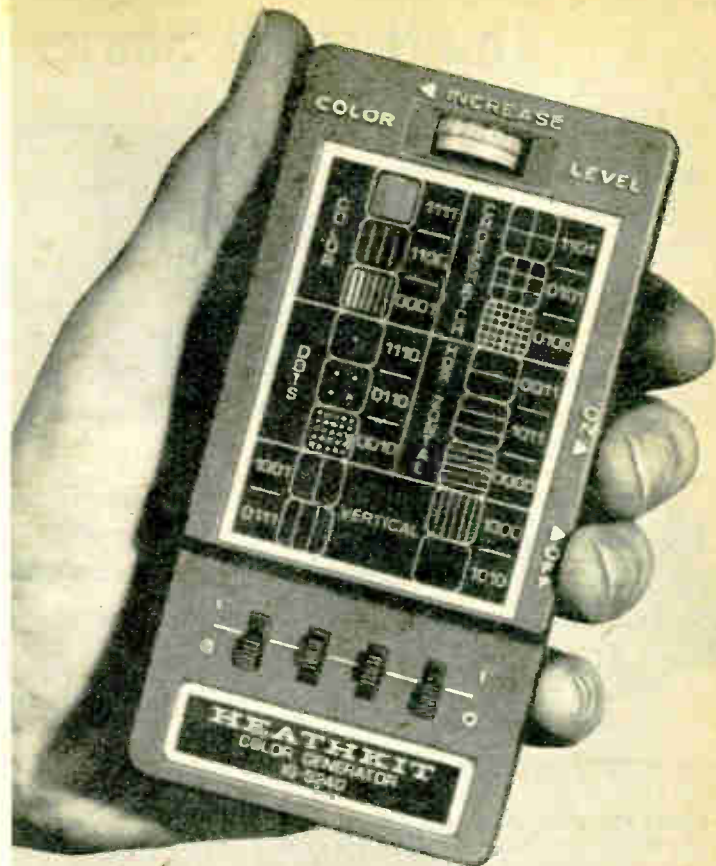
Kit IG-5257, Shpg. wt. 16 lbs. **189.95**

IG-5257 SPECIFICATIONS: Marker frequency: 100 kHz. Marker frequencies, crystal-controlled: 3.08, 3.68, 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 ± 1 dB. IF Band—39 to 49 MHz ± 1 dB. RF band—64 to 72 MHz ± 1 dB. Attenuator: Total of 70 dB in seven steps. Power requirement: 120 V, 60 Hz AC at 4.5 watts.

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. **19.95**



This low-cost Heathkit
Tube Checker is
the right addition
to your service bench
\$129⁹⁵



Perfect for a wide variety of TV
and radio repair work. Performs
emission tests, short tests, and
has adjustable line voltage.

Kit IT-3117, Shpg. wt. 12 lbs. **129.95**

Updated Tube Chart for all Heathkit Tube Checkers. Includes up-to-date data book for only \$6.95. 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, 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.



This Heathkit "Starter" Test Bench Offers you Top Value,

Here's the Easiest and Best Way to Put Together Your First Test or Hobby Bench and Save!

YOUR CHOICE

only \$37⁹⁵ each

Individual Kit Price



Put this versatile sine and square wave Audio Oscillator on your bench for fast and easy audio servicing

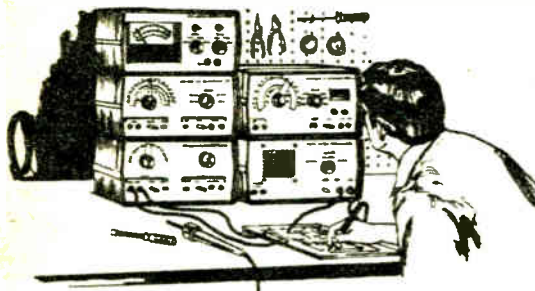
The IG-5282 Audio Oscillator is an instrument that you'll find useful in many audio test applications. Frequency output is in four ranges, from 10 Hz to 100 kHz, in either sine or square wave modes. Use the IG-5282 as an audio signal source during signal tracing or, with the appropriate associated equipment, use the sine wave output for audio stage gain and distortion analysis. If you're interested in determining frequency response, you'll find the IG-5282's square wave output ideal for your purposes (with appropriate associated equipment). Construction is rugged and assembly time is greatly reduced by single circuit board assembly. A great value and an important addition to your bench.

Kit IG-5282, Shpg. wt. 5 lbs. 37.95

This quality RF Oscillator can help you do a wide variety of radio and television alignment work

If you're doing radio alignment work the ideal addition to your bench is the Heath IG-5280 RF Oscillator. This unit, which includes probes, is suitable for use in alignment of tuned stages in AM, FM, and television receivers. Output is divided into five bands, from 310 kHz to 110 MHz, and features an extra 100 to 220 MHz band of calibrated harmonics. An added feature of the IG-5280 is its 1000 Hz audio output. This signal, available at a front panel jack, is ideal for tracing and isolation of circuit defects in receiver audio stages and also serves as a source of internal AM modulation. Construction is simple and the IG-5280 makes a versatile addition to your bench.

Kit IG-5280, Shpg. wt. 5 lbs. 37.95



Heath's 5280 Series of test instruments is designed for the beginning serviceman, hobbyist or student. It's an excellent low-cost way to assemble a truly versatile test bench that will let you work on all types of electrical and electronic equipment. Whether you're doing hi-fi servicing, working on television equipment, or just experimenting, each 5280 Series instrument represents real value.

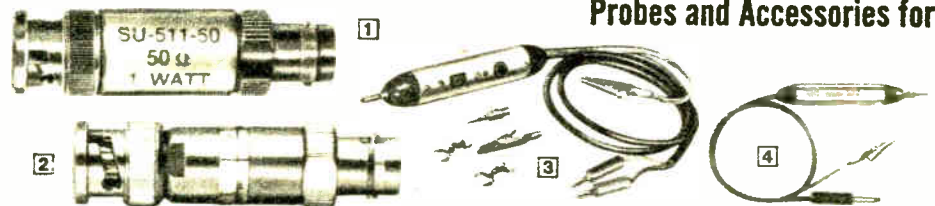
The 5280 Series is an experience in kitbuilding too. Each of these instruments is designed for easy, step-by-step kit assembly, so you not only wind up with a reliable, quality instrument, you can also get "hands-on" experience while you're building them. And once they're completed, you'll have test gear that you can not only be proud of, but gear that performs to get the job done!

We're even offering the 5280 Series with a big 5% Discount!

To make you really want to get started right away, we'll make the deal even better. Simply order the IPA-5280-1 Power Supply (see description at right on page 55) and any three of the 5280 instruments to start your bench. Then you can deduct a big 5% discount from the total price. It's our way of saying "thank you" for buying from Heath, and another way of giving you top value for your money!

IG-5282 SPECIFICATIONS: Frequency Output: 10 Hz to 100 kHz in four ranges. Sine Wave Output Voltage: 0-3 volts rms. Square Wave Output Voltage: 0-3 volts peak. Power Requirements: Two 9-volt batteries or the optional IPA-5280-1 Power Supply. Dimensions: 11" H x 5 3/4" W x 7 3/4" D. Net Weight: 3 1/4 lbs.

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 or IPA-5280-1 power supply. Dimensions: 11" W x 5 3/4" H x 7 3/4" D. Weight: 3 1/4 lbs.



Probes and Accessories for

1 50-ohm Termination for frequency counters and scopes. DC to 1 GHz; power rating, 1 watt. VSWR: 1.2:1, 600 MHz, 2:1.

Assembled SU-511-50, Shpg. wt. 1 lb. 15.00

2 RF Fuse in UHF BNC-to-BNC connector. Prevents burnout. DC to 500 MHz range; 50 ohms: 1.2:1 VSWR (max.); insertion loss 1.80 dB max. at 500 MHz. With spare fuses.

Assembled SU-512-50, Shpg. wt. 1 lb. 45.00

3 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. 8.95

4 RF probe for RF measurements from 1000 Hz to over 100 MHz; 11 meg input; 1000 VDC max. at tip; 90 V rms max.

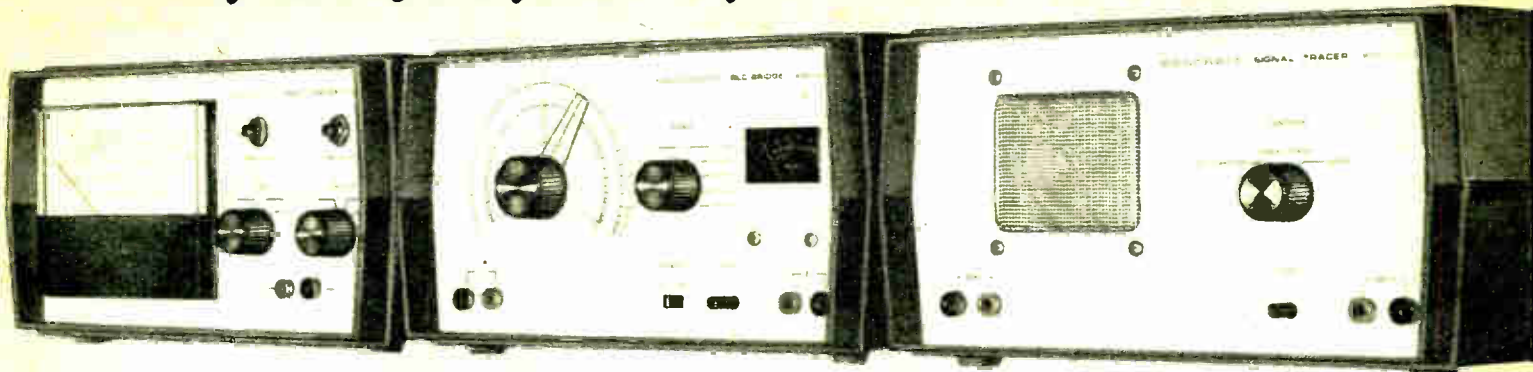
Kit PK-3, Shpg. wt. 1 lb. 6.95

Assembled PKW-3, Shpg. wt. 1 lb. 8.95

5 Scope demodulator probe for distortion checks, RF & IF display. 30 V rms max., 500 VDC



Reliability and Quality at Really Low Prices!



This low-cost high-performance Multimeter lets you measure volts, ohms and DC current

The IM-5284 represents one of the best price/performance values ever offered by Heath. This high performance solid state multimeter gives you 4 different functions and a large easy-to-read panel meter that insures your measurements are on the dot. Features include AC and DC voltage measurement to 1000 volts and DC current measurement to 1000 mA full scale. The ohmmeter function is divided into four ranges, X1, X100, X10k, and X1M Ω . Power requirements are met by internal batteries or by the optional IPA-5280-1 power supply and 1 "C" cell. Includes test probes.

Kit IM-5284, Shpg. wt. 5 lbs. 37.95

IM-5284 SPECIFICATIONS: DC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: $\pm 3\%$ of full scale. AC Voltmeter: Ranges: 0-1, 0-10, 0-100, 0-1000 volts full scale. Accuracy: $\pm 5\%$ of full scale. DC Milliammeter: Ranges: 0-1, 0-10, 0-100, 0-1000 mA full scale. DC Input Resistance: 10 megohms. AC Input Resistance: 1 megohm. Ohmmeter: Ranges: X1, X100, X1k, X1M Ω . Power requirements: Two 9-volt batteries and 1 "C" cell or IPA-5280-1 Power Supply and 1 "C" cell. Dimensions: 11" W x 5 $\frac{3}{4}$ " H x 7 $\frac{3}{4}$ " D. Weight: 3 $\frac{1}{2}$ lbs.

This RCL Bridge is the one you need for experimentation and design work for all kinds of circuits

If you've been waiting to add an RCL bridge to your bench because the price was just too high... look again. The Heath IB-5281 RCL Bridge is priced right for your pocket book and has the features that you can appreciate. A tough 5280 series cabinet houses the solid-state circuitry that lets you easily determine unknown values of resistance, inductance and capacitance. Resistance is indicated in three ranges from 10 Ω to 10M Ω , inductance in three ranges from 10 μ H to 10H and capacitance, also in three ranges, from 10 pF to 10 μ F. Easy single circuit board construction speeds assembly. With component clips.

Kit IB-5281, Shpg. wt. 5 lbs. 37.95

IB-5281 SPECIFICATIONS: Resistance Ranges: 10 Ω to 10M Ω in three ranges. Inductance Ranges: 10 μ H to 10H in three ranges. Capacitance Ranges: 10pF to 10 μ 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, or IPA-5280-1 power supply. Dimensions: 11" W x 5 $\frac{3}{4}$ " H x 7 $\frac{3}{4}$ " D. Weight: 3 $\frac{1}{2}$ lbs.

This Signal Tracer is a basic instrument for troubleshooting work in radio and TV audio circuits

A great addition to your trouble shooting arsenal is the IT-5283 Signal Tracer. A diode equipped RF probe (furnished with the kit) lets you quickly trace receiver and transmitter circuits to reveal component and stage failures. Flip the probe to its straight through (DC) position and you can easily locate defective circuitry in all types of audio components and systems. In the audible ohmmeter position, the IT-5283 changes tone depending on the test point voltage or resistance and allows you to easily trace signal flow through logic circuits. Turn the IT-5283 off and its speaker is connected to two panel jacks which allow you to use it as a handy bench test speaker.

Kit IT-5283, Shpg. wt. 5 lbs. 37.95

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 and/or IPA-5280 power supply. Cabinet Dimensions: 11" W x 5 $\frac{3}{4}$ " H x 7 $\frac{3}{4}$ " D. Weight: 3 $\frac{1}{2}$ lbs.

Heathkit Test Instruments



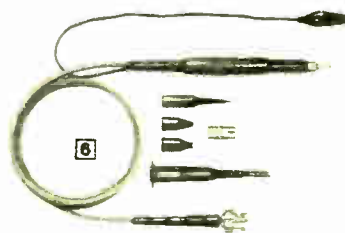
max. Banana plug/BNC wiring option.

Kit 337-C, Shpg. wt. 1 lb. 5.95

5 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. 27.95

PKA-101-1 Accessory Pack. Includes three assembled tips, two 6-inch ground leads and one



12-inch ground lead. For use with the PKW-101 and PKW-104 probes only.

PKA-101-1, Shpg. wt. 1 lb. 5.95

Accessory cables...for inter-connecting scopes, counters, etc. All cable is RG-58/U. 50 ohm impedance. Shpg. wt. (each), 1 lb.

Assembled SU-501-3, 3 ft., BNC/BNC 7.50

Assembled SU-501-6, 6 ft., BNC/BNC 7.50

Assembled SU-503-3, 3 ft., BNC/Banana 7.50

The IPA-5280-1 Power Supply provides proper voltage for all 5280 Instruments

(Not shown.) Provides all voltages required by 5280 series equipment. Features full wave rectification, capacitor filtering and dual integrated circuit regulators 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. 24.95

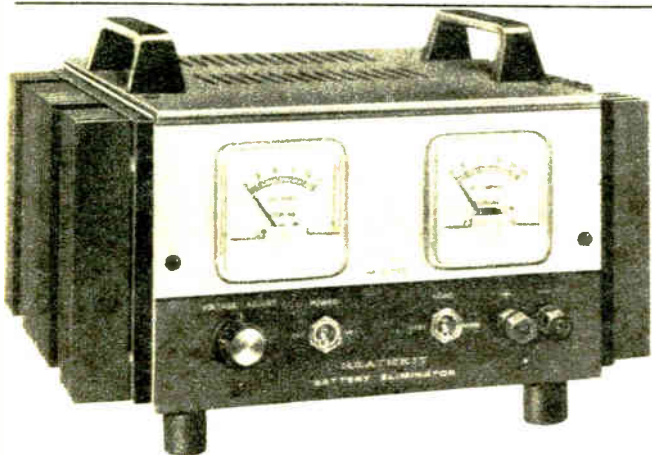
IPA-5280-1 SPECIFICATIONS: Output Voltage: +9 and -9 VDC $\pm 9\%$. Maximum Output Current: 100 milliamps. Integrated Circuit and Diode Complement: UA78, UA79 regulator IC, 1N4002 silicon diode. Power Requirements: 100 to 135 VAC or 200 to 270 VAC, 50/60 Hz, 7 watts maximum. Dimensions: 6" H x 3 $\frac{1}{4}$ " W x 3" D. Fuse: $\frac{1}{4}$ -amp, 3AG, slow-blow primary. Net Weight: 2 lbs.

For even faster service, use the
Heath "Hotline"
(616) 982-3411
anytime day or night

Power your bench with these quality AC and

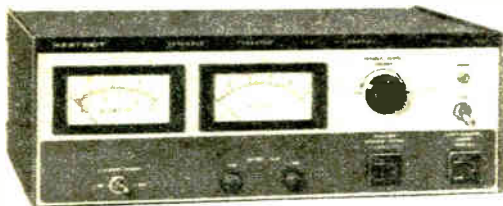


IP-2718 SPECIFICATIONS: Regulation: Load: less than 0.1% variation from no load to full load on 20-volt supplies; less than 2% variation from no load to full load on 5-volt supply. Line: less than 0.2% variation for line voltage change of 10 volts on 20 volt supplies; less than 0.15% variation for line voltage change of 10 volts on 5-volt supply. Power Requirement: 100-135 or 200-270 VAC, 60/50 Hz, 100 watts full load. Dimensions: 4½" H x 10¾" W x 9" D.



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 Requirement: 110-130 VAC, 7A or 220-260 VAC, 3.5 A, 60/50 Hz. Dimensions: 5¼" H x 11" W x 11" D.

Heathkit IP-5220 Variable Isolated AC Supply



\$119⁹⁵

Provides 0-140 VAC
Variable Output

Provides complete isolation between the AC power line and any electrical equipment that is plugged into its front panel variable output socket. The 0-140 VAC is useful anywhere a slow run-up of line voltage is needed — locating circuit faults caused by high or low voltage or testing equipment with unknown power requirements. A full 360 volt-amperes of AC power is available at the front panel variable output socket. Switch-selected 1A and 3A ranges are fused individually on the front panel. Also has fused variable output socket.

Kit IP-5220, Shpg. wt. 28 lbs.119.95

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.

Tri-Output Experimenter's Power Supply

\$89⁹⁵
Kit

Three Floating outputs can be connected in any combination for a wide variety of output voltage and current capability

Now you can combine a fixed 5 VDC output with two continuously adjustable 0-20 VDC outputs for circuit designs requiring more than one voltage supply. It's one of the lowest cost, most versatile power supplies you'll find anywhere. The outputs of the two 20 VDC variable supplies and the fixed 5 VDC output can be interconnected in any combination to provide both positive and negative voltages with a fixed reference, or they can be allowed to "float" at no reference level. A clutch-coupled control allows the two 20 VDC supplies to "track" each other at any specified voltage difference — ideal for analog circuits requiring both a positive and negative voltage. The fixed 5 VDC at 1.5 A is useful for digital circuits.

All outputs are short-circuit proof, with automatic current limiting. They can be operated independently, in series or in parallel. A switchable front panel meter monitors all outputs.

Kit IP-2718, Shpg. wt. 12 lbs.89.95

Assembled SP-2718, Shpg. wt. 12 lbs.185.00

Heavy-Duty Power Supply/Battery Eliminator

\$139⁹⁵

Provides variable 9-15 volt output capable of 12 amps continuous, 20 amps intermittent

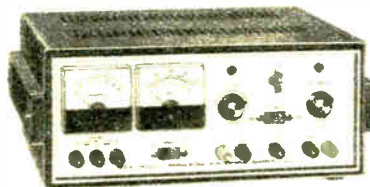
The Heathkit IP-2715 heavy duty power supply provides you with a clean, accurate voltage source necessary for the reliable service of Ham, Marine, and CB communications gear. In fact, the IP-2715 is ideal for any DC voltage application where high-current capability is necessary.

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 for precision selection of power for the unit under test and a two position norm/standby switch removes voltage from the output binding posts. Excellent output accuracy is assured by a zener reference diode which automatically regulates to maintain fixed output even under varying load conditions.

Large double heat sinks provide good heat dissipation for long use without damage to transistors, 4 output transistors and an extra-large transformer insure accurate low ripple operation. Kit assembly is easy and fast with printed circuit boards and a wiring harness to minimize point-to-point wiring. Use the IP-2715 on your bench for all your communications servicing. You'll find it to be one of the most useful service instruments you can own.

Kit IP-2715, Shpg. wt. 31 lbs.139.95

Heathkit 0-400 VDC General-Purpose Power Supply



\$119⁹⁵
Kit

This versatile 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 to allow positive or negative high voltage and bias operation. The IP-17 is versatile enough for the service technician or experimenter and makes a great general purpose supply for the laboratory too.

IP-17 is versatile enough for the service technician or experimenter and makes a great general purpose supply for the laboratory too.

Kit IP-2717, Shpg. wt. 19 lbs.119.95

Assembled SP-2717, Shpg. wt. 19 lbs.210.00

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: 5¼" H x 13¾" W x 11" D.

DC Supplies



2700 Series Power Supplies

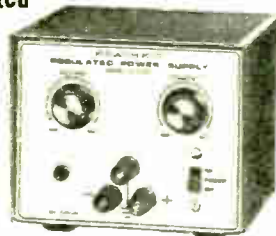
These power supplies offer you a choice of digital or analog readout. Digital models have 3½ digit display two-decade auto-ranging to provide high resolution. The analog supplies use a highly legible meter with ±3% accuracy at rated output. Each supply can be operated in either a constant voltage or current mode. Both function independently of each other and voltage may be controlled from the front panel or through rear panel programming terminals. Each has remote programming and voltage sensing capabilities also. A full dissipative regulator in these supplies allows indefinite short circuit operation with no damage. Output is protected against accidentally applied voltages and is isolated from the chassis for floating, negative ground or positive ground operation.

IP-2710, 30V @ 3A analog, 34 lbs. 169.95
 Assembled SP-2710, 30V analog, 34 lbs. 300.00
 Kit IP-2711, 30V @ 3A digital, 36 lbs. 229.95
 Assembled SP-2711, 30V digital, 36 lbs. 370.00

IP/SP-2700 SERIES SPECIFICATIONS: Max. Rated Output: IP/SP-2710 & 2711: 30V, 3A. Load Regulation: Voltage: ±0.05% +1 mV, Current: ±0.10% +3.5 mA. Line Regulation: Voltage: ±0.05% +1 mV, Current: ±0.10% +1 mA. Ripple & Noise: Voltage: 1 mV RMS; 0.03% of rated output, peak-to-peak. Voltage/Current Readout (Switchable): Analog: 3½", 100°, meter. Digital: 3½-digit (1999), two-decade, auto-ranging, digital meter. Readout Accuracy: Voltage: Analog ±3% of rated output; Digital ±0.5% of reading ±1 count using lab standards, ±1.0% of reading ±1 count using built-in calibrator. Current: Analog ±3% of rated output; Digital ±1.0% of reading ±4 count using lab standards, ±1.5% of reading ±4 count using built-in calibrator. Readout Response Time: (Digital): 2 seconds to within 5 counts. Operating Modes: Constant voltage, constant current, auto-series, auto parallel. Power Requirement: 120/240 ±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 (PYI-1972) after 30-minute warmup period.)

1-15 VDC Regulated Power Supply

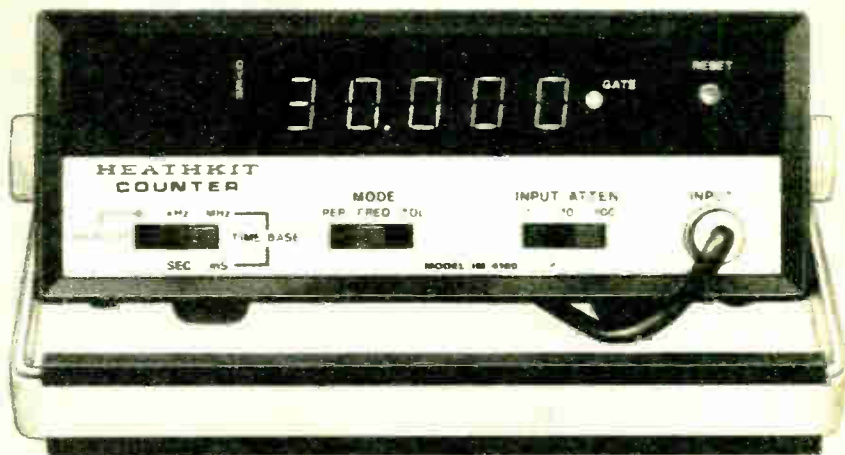
\$26⁹⁵



Perfect for servicing, testing or designing transistor radios, portable tape recorders and other low-voltage solid-state devices. Continuously adjustable from 1-15 VDC at 500 mA output. Has 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. 26.95

Our Lowest-Priced Frequency Counter



The Heathkit IM-4100 is a frequency counter and much more – Counts frequency to 30 MHz, period to 99.999 seconds, events to 99,999

\$129⁹⁵
Kit

- Big 5-digit display is bright and easy to read
- 10 MHz crystal timebase ensures accuracy and precision
- Can be used with external timebase for special applications
- Operates from 120/240 VAC or 12 VDC for portability
- Pushbutton reset switch resets display to zero

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 μsec! 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 overrange 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. 129.95

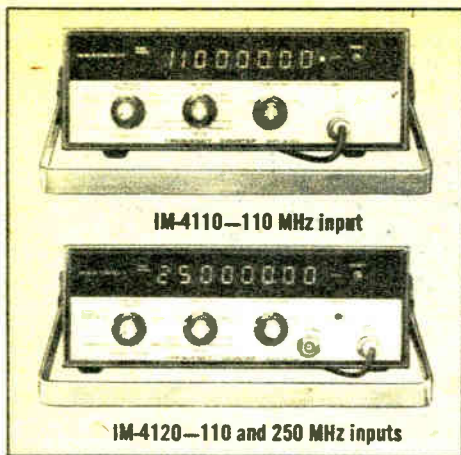
Factory assembled and tested version of above.

SM-4100, Shpg. wt. 6 lbs. 210.00

IM-4100 SPECIFICATIONS:

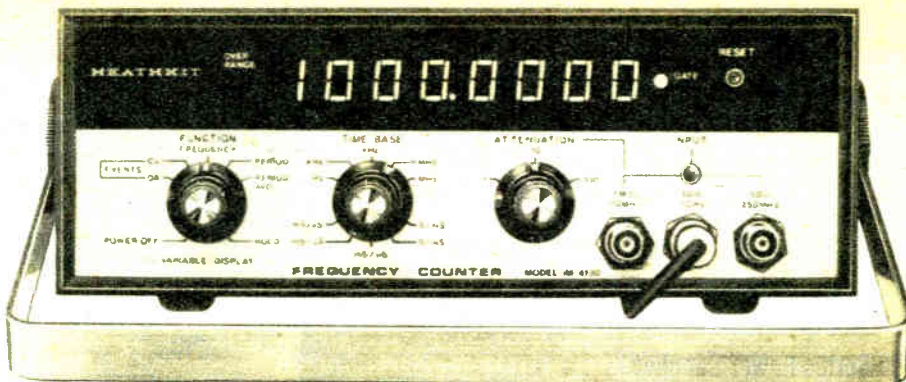
FUNCTIONS — Frequency: 5 Hz to 30 MHz minimum. Period: 1 μsec resolution to 99.999 sec. Totalize: 1-99,999 events. Sensitivity: 15 mV rms (50 mV, 5 Hz to 50 Hz). Period Pulse Width: 25 nsec minimum. Low Frequency Signal Risettime: 1 msec for signals less than 10 Hz. Input Impedance: 1 megohm shunted by less than 35 pF. Protection: 240 volts rms at 60 Hz. Attenuator: X1, X10, X100 fixed compensation. TIME BASE — Frequency: 10 MHz. Setability: ±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: 2¾" H x 7¼" W x 10½" 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

Heathkit High-Performance Frequency Counters

As low as **\$199⁹⁵**
Kit

- Frequency, Events, Period and Period Averaging
- Bright Red LED 8-Digit Readout
- Optional 12-Volt and Battery Operation
- Overage and Gate Lamp Indicators

These Heathkit counters give you the accuracy and reliability you NEED for frequency measurement on radio transmitters, hi-fi components, test instruments, any counting job! They 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 divides the input signal x1, x10 or x100 to facilitate 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 ± 1 ppm and an aging rate of < 5 ppm/yr for excellent stability. (The 4110's crystal oscillator has stability of ± 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 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.

The counters feature rugged metal cases with non-marring front panels and a 12-position handle which rotates a full 360° for easy storage and mounting. The counter circuitry operates completely free of the case for easy service too. 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. **330.00**

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. **329.95**

Assembled and tested version of above.

SM-4120, Shpg. wt. 10 lbs. **530.00**

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. **865.00**

Add mobile or portable operation with this 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) to allow portable operation for in-the-field counting.

Kit IMA-4130-1, Shpg. wt. 3 lbs. **29.95**

Assembled version of above.

SMA-4130-1, Shpg. wt. 3 lbs. **50.00**

Set of 12 NiCad batteries.

SMA-4130-2, Shpg. wt. 4 lbs. **89.95**

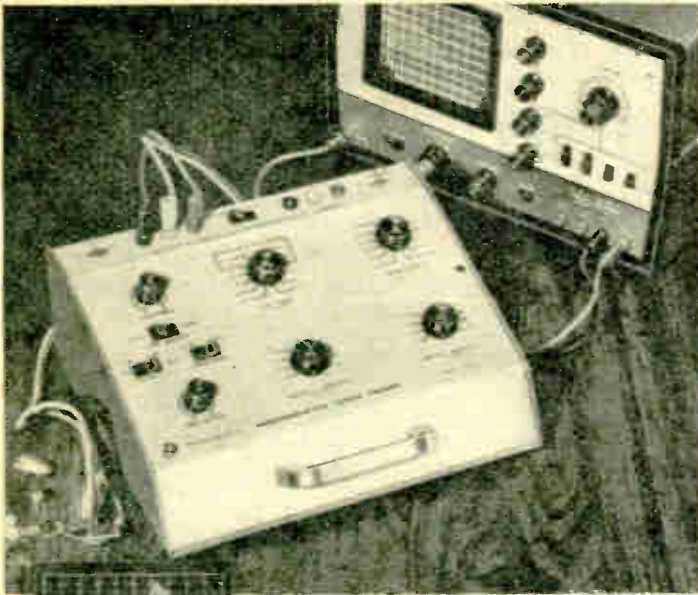
OTHER IM-4110, 4120 AND 4130 SPECIFICATIONS: FUNCTIONS: Events: 1 to 99,999,999. Period Resolution, 0.1 μ S. Period Average, 1000 periods. Period Pulse Width, 100 nsec min. Low Frequency Signal Risetim, 1 msec to signals less than 10 Hz. Attenuation, (110 MHz input) x1, x10, x100 fixed compensation. TIME BASE: Setability:

± 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. 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 $\frac{1}{4}$ " W x 13 $\frac{1}{4}$ " D x 4" H (less handle).

	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)	± 10 ppm	± 1 ppm	± 1 ppm

Make your Oscilloscope more versatile with these Instruments



The fast, easy way to check semiconductor parameters is with your oscilloscope and the IT-3121 Curve Tracer

- Test bipolar transistors, diodes, SCR's, FET's, etc.
- Lets your oscilloscope display gain (beta), leakage, breakdown voltage, saturation, and more.
- Ideal for sorting and inspection uses, 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 adjustable horizontal gain, 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.

Low profile styling and the sloped front panel permit the Curve Tracer to sit in front of most oscilloscopes without blocking the CRT. A convenient handle provides portability. Extra leads (included) allow you to test large devices or make in-circuit tests. The versatility, accuracy, and reliability of this test instrument will make it a valuable addition to your work bench for years to come.

Kit IT-3121, Shpg. wt. 10 lbs. 99.95

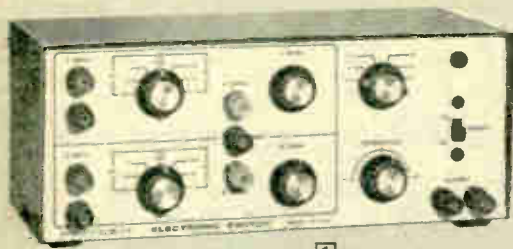
IT-3121 SPECIFICATIONS: Sweep Voltage Ranges: 0-40 volts at 1 ampere max. 0-200 volts at 200 mA max. Sweep Voltage Sampling: .1, .2, .5, 1, 2, 5, 10, 20 and 50 V/div. $\pm 3\%$. Sweep Current Sampling: .5, 1, 2, 5, 10, 50, 100 and 200 mA/div. $\pm 3\%$. Sweep Dissipation Resistors: 0, 10, 50, 100, 500, 1000, 5000, 10k, 50k, 100k, 500k, 1 meg $\pm 10\%$. Step Currents: .002, .005, .01, .02, .1, .2, 2, 5, and 10 mA/step, $\pm 3\%$, ± 250 nA offset current max. Step Voltages: .05, .1, .2, .5, and 1 volt/step, $+3\%$, $\pm 5\%$ mA maximum offset voltage. Calibration Source: 9 volts $\pm 2\%$ in 1 volt steps. Polarity: PNP and NPN (P Channel-N Channel). 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.

Unijunction Transistor under test showing region of negative resistance (R_{bb}) can also be displayed.

Thermal Runaway. Other displays for bipolar transistors include saturation (V_{ce(sat)}), leakage (I_{ceo}) and (I_{ces}), output admittance (h_{oe}), beta (h_{FE}) and (h_{fe}), linearity, and breakdown.

Field Effect Transistor Breakdown.

A typical Field Effect Transistor display showing drain current versus drain voltage. Also displays FET pinchoff, transconductance and breakdown.



1

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. Dimensions: 4 1/4" H x 10 3/8" W x 5 1/4" D. Kit ID-4101, Shpg. wt. 5 lbs. 44.95

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 loading: 1000 ohm minimum. Power requirement: 120/240 V, 60/50 Hz, 6 W.

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. 1 kHz TTL output adjustable 0-4.7 V/pk. Requires 6 V supply.

Kit IOA-4510-1, Shpg. wt. 1 lb. 14.95



2



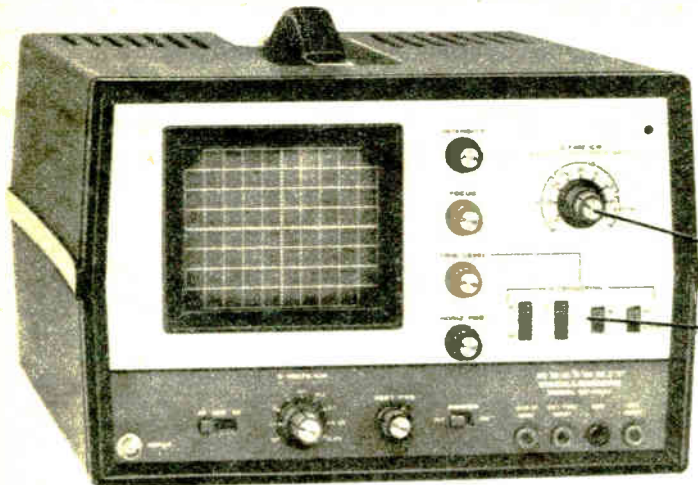
3

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.

Kit IG-4505, Shpg. wt. 4 lbs. 47.95

IG-4505 SPECIFICATIONS: TIME CALIBRATION: Range: 0.5 sec. to 1 μ s square wave accurate to within 0.01%. Amplitude: ≈ 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 Ω load referenced to 1 V position. Rise Time: ≤ 2 μ s. Frequency: DC, 2 Hz to 10 kHz. Power Requirement: 120-240 Volts AC, 60-50 Hz, 12 watts.

Economical Multi-Purpose Oscilloscopes



DC to 5 MHz oscilloscope featuring complete control functions — great for TV and audio servicing and repair

\$189⁹⁵
Kit



7-position variable time base locks up waveforms fast

Versatile, selectable triggering — including a special TV position, easily matches the IO-4541 to most service situations

An economical scope for pro and hobbyist

What are his requirements? What kind of features does the professional and the serious hobbyist need in an oscilloscope? When we were satisfied with the answers, we designed a scope perfect for service and repair — the Heathkit IO-4541.

The IO-4541 is an economical triggered scope which gives you features and performance not found in others in this price range. A stable triggering circuit is used to "lock up" solid waveform displays (not the recurrent sweep generator type found in many other scopes). The 4541's full set of triggering controls include: normal or automatic modes; switch-controlled AC or DC coupling; and front panel input of external triggering sources. There's even a special TV position, which, when selected, allows low frequencies to pass while rejecting the high — making it very easy for the IO-4541 to trigger on the vertical component of a complex video signal. All front panel trigger controls are clearly labeled for "no mistake" operation.

The IO-4541's horizontal amplifier accepts external inputs from DC to 100 kHz and you may switch select any one of seven calibrated time bases, 200 milliseconds per centimeter to 0.2 microseconds per centimeter, from the scope's front panel. In addition a variable control provides uncalibrated time base settings between steps.

A vertical input sensitivity of 20 millivolts per centimeter and nine calibrated vertical attenuator positions, up to 10 volts per centimeter, will accommodate a broad range of input signals, and a variable gain control gives precise control between settings.

To make measurements easier, a precisely ruled 8 x 10 centimeter graticule serves as a faceplate to cover the IO-4541's CRT. A bright, blue-green, medium persistence phosphor insures an easy to read display and to minimize the possibility of display error the cathode ray tube features partial mu-metal shielding.

To improve stability under varying line conditions, the IO-4541 incorporates 3 different power supplies and two power transformers. One supply acts as a voltage doubler and provides the necessary voltage for the CRT. The other two are full wave bridge configured and supply both regulated and unregulated voltages to the scope's circuit boards and amplifiers.

The IO-4541's flush mounted handle allows you to stack the instrument and avoid the crowding so common on many service benches. In addition, the scope's durable, lightweight cabinet gives the unit a sleek modern appearance and easy-to-carry portability.

Easy to build and offering excellent sensitivity, the IO-4541 proves to be the ideal choice for TV and audio servicing and repair, hobby and experimenter work. When you've checked the features, considered the performance, and compared it with the others, it's easy to see why the rest just don't measure up!

Kit IO-4541, Shpg. wt. 23 lbs. **189.95**

Factory assembled and calibrated version of above.

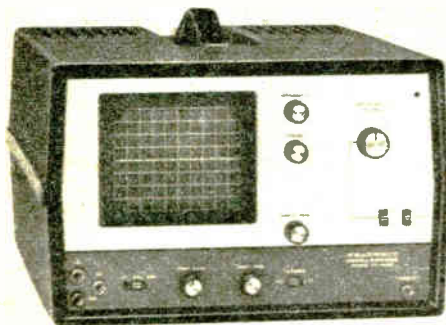
SO-4541, Shpg. wt. 19 lbs. **330.00**

IO-4541 SPECIFICATIONS: VERTICAL: Bandwidth: DC to 5 MHz ± 3 dB. Attenuator: 1, 2, 5 sequence, calibrated and variable. Rise Time: 70 ns. Overshoot: 5% at 1 kHz. Impedance: 1 M Ω /38 pF. Sensitivity: 20 mV/cm. SWEEP: Type: Triggered. Range: 200 ms — .2 μ s, 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 Ω /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.

The Heathkit IO-4560 — it's the lowest priced auto-triggering oscilloscope anywhere!

\$129⁹⁵

- Full 5 MHz bandwidth
- Auto triggering
- Excellent for the hobbyist
- Extremely economical



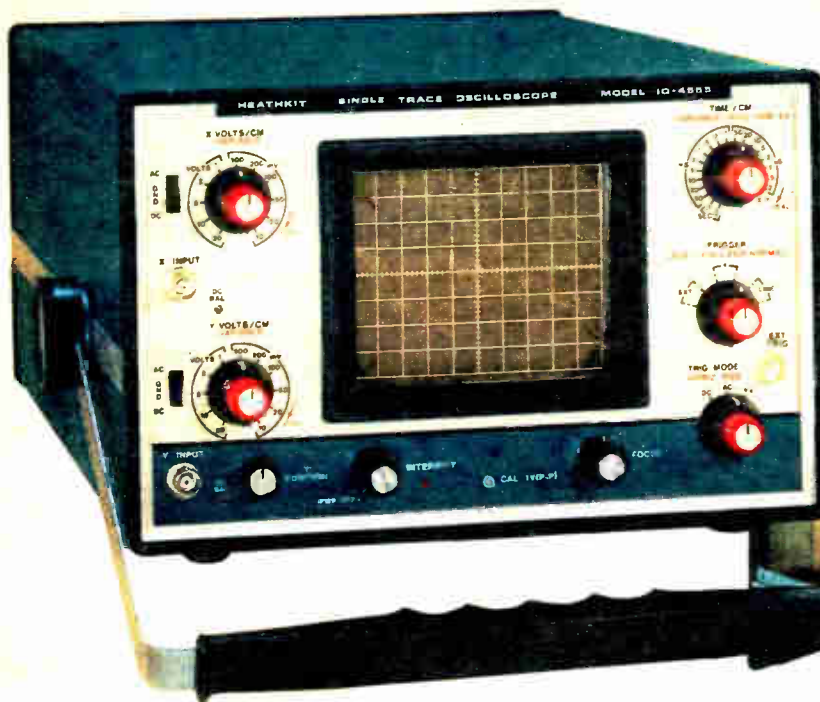
IO-4560 SPECIFICATIONS: VERTICAL CHANNEL: Input Impedance: 1 megohm. Sensitivity: 100 mV/cm. Maximum Input Voltage: 400 volts DC. Frequency Response: DC to 5 MHz ± 3 dB. Attenuator: X1, X10, X100, AC or DC. HORIZONTAL CHANNEL: Input Impedance: 100 k Ω . Sensitivity: 0.25 volt/cm (uncalibrated). Frequency Response: DC to 100 kHz. TIME BASE: Sweep: 20 ms to 0.2 μ 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.

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 μ 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. Vertical input impedance is 1 megohm for low circuit loading. 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. And the primary circuit of the power transformer is fused for protection from overload.

Kit IO-4560, Shpg. wt. 19 lbs. **129.95**

Professional-Quality 10 MHz Single-Trace Oscilloscope



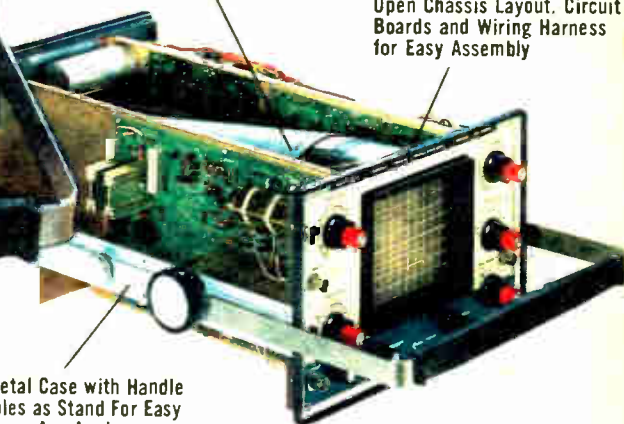
\$329.95



- Brighter Trace provides easier-to-see displays
- AC, DC and TV trigger modes for outstanding versatility
- Fully regulated power supplies for stable operation

5" Round CRT has P-31 Phosphor for Exceptionally Bright, Easy-to-Read Trace

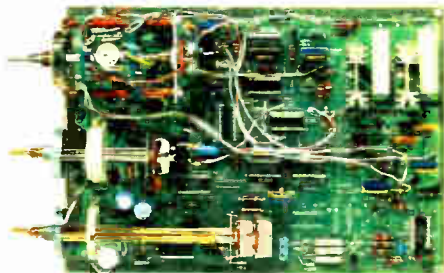
Open Chassis Layout, Circuit Boards and Wiring Harness for Easy Assembly



Rugged Metal Case with Handle That Doubles as Stand For Easy Viewing From Any Angle

Modular Circuit Boards provide Easy Access for Service and Troubleshooting

Horizontal Circuit Board Features IC's to Control AC, DC and TV Triggering Circuits — All IC's are Socketed for Easy Removal and Replacement Should the Need Occur



Shop and compare! You'll find the IO-4555 to be one of the best values around!

Heath puts together outstanding engineering and latest 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 it ideal for applications in audio, digital and television servicing.

The 4555 is one of the few single trace scopes available with two input channels. The Y-input has a maximum sensitivity of 10 mV with an 11-position attenuator to set deflection from 10 mV/cm to 20 V/cm. For true XY operation, a calibrated X-input is provided with maximum sensitivity of 20 mV. Its calibrated 3-position attenuator can be switched through three AC or DC ranges from 20 mV/cm to 2 V/cm.

High or low frequency waveforms can be observed easily since the 4555's horizontal time bases can be switched in a calibrated 1-2-5 sequence from 0.2 sec/cm to 0.2 μ S/cm. An electronic X5 magnifier makes it easy to observe enlarged portions of waveforms.

The trigger circuits are digitally controlled, requiring only a Level control and a Slope switch. In the automatic mode, the IO-4555 triggers at the zero crossing point. In the normal mode, the level control is adjustable over the complete 8 cm span. Various trigger signals can be selected: a sample of the vertical input signal, a sample of the line voltage or an externally applied trigger signal. In the TV trigger coupling mode, the 4555 can be easily triggered on the vertical portion of a complex TV signal.

A calibrated 1-volt peak-to-peak signal is provided through a front panel connector for easy probe compensation, vertical amplifier calibration and comparison. Front panel display controls include Intensity, Focus, Vertical and Horizontal Position. An additional control, accessible through the rear panel, adjusts Astigmatism. Internal switches are used to match the regulated power supplies to conventional line voltages from 105 volts to 260 volts AC.

Kit construction is straightforward, with circuit boards and wiring harnesses to simplify assembly, and Heath's performance-engineered solid-state circuitry assures years of trouble-free operation. The IO-4555 is one of the most versatile and practical instruments you can own, an investment that will really pay off in time and trouble saved. Put it on your bench today!

Kit IO-4555, Shpg. wt. 29 lbs. 329.95

IO-4555 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 Input: Impedance: 1 meg shunted by 38 pF. Maximum Input: 400 V. HORIZONTAL: Time Base: 0.2 S/cm to 0.2 μ S/cm. Positions: 19 steps in 1-2-5 sequence. Variable: Continuous between ranges to approx. 0.6 S/cm. Accuracy: within 3%. Magnifier: X5 (adds additional 2% to sweep accuracy). TRIGGER: Internal: Automatic: adjustable over 10 divisions. Normal: adjustable over 10 divisions. Slope Selection: + or -. Sensitivity/Bandwidth: 1 cm deflection — DC, auto & normal: DC to 20 MHz. AC, auto & normal: 20 Hz to 20 MHz. TV, auto & normal: 20 Hz to 1 kHz. 1.5 cm deflection: DC, auto & normal: DC to 20 MHz. AC, auto & normal: 20 Hz to 20 MHz. TV, auto & normal: 20 Hz to 2 kHz. External: Automatic: adjustable over 0.8 V. Normal: adjustable over 0.8 V. Slope Selection: + or -. Sensitivity/Bandwidth: 0.5 V external trigger level: DC, auto & normal: DC to 20 MHz. AC, auto & normal: 20 Hz to 20 MHz. TV, auto & normal: 20 Hz to 1 kHz. 1 volt external trigger level: DC, auto & normal: DC to 20 MHz. AC, auto & normal: 20 Hz to 20 MHz. TV, auto & normal: 20 Hz to 2 kHz. Impedance: 1 meg shunted by 40 pF. X-Y: Y Channel, same as vertical. X-Channel, same as Vertical, except response is limited to 2 MHz. Phase Shift: less than 8° at 1 MHz. GENERAL: CRT: 5" round. Phosphor: P31. Graticule: 8x10 cm. Voltage Range: 105-130 VAC 210 to 260 VAC switch-selected, 70 watts. Internal Supplies: fully regulated. Operating Temperature Range: 10° C to 40° C. Dimensions: 6.9" H x 12.9" W x 19.2" D (without handle).

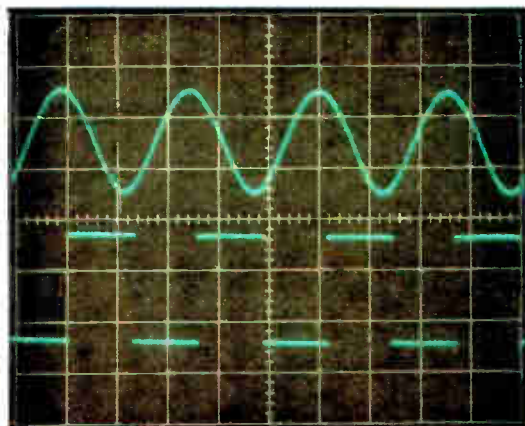
Dual-Trace DC to 10 MHz Oscilloscope



\$399⁹⁵
Kit



- A complete mu-metal shield is used in the 10-4550 to eliminate display error caused by electromagnetic interference
- The fully-regulated high voltage supply allows accurate operation over widely-varying line voltages
- All IC's are socketed for easy servicing and troubleshooting



Dual-trace versatility for advanced applications — digital design, X-Y phase measurements, as well as TV service and more.

Features brighter trace and faster writing speed...

Here's how extensive engineering research in the Heath lab pays off for our customers. The 10-4550 brings you truly professional performance and specifications... at a price that will let you get it onto your bench for a lot less than other scopes with similar features.

Its broad case of applications is sure to make the 10-4550 appealing to anyone with a scope interest. Use it for TV and general electronics servicing, digital experimentation... even for your electronic design efforts. The biggest news about the 10-4550 is that it features a brighter trace and faster writing speed than other 10 MHz scopes at a similar price... in fact, it's the brightest 10 MHz scope we've ever offered, so you're assured of an easy-to-read trace, even in high ambient light.

To maximize operational ease, input channels are displayed, chopped or alternate, as selected automatically by the Time Base switch. Exacting X-Y operation assures you of precise phase measurements.

The 4550's digitally-controlled time base circuitry provides automatic triggering, so no stability control is necessary and fewer adjustments are required. It also lets you determine the frequency of a waveform.

The 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 trigger signal. Various trigger signals can be selected. These include a sample of Channel Y1 or Channel P2 input signals, an externally applied trigger signal, or a sample of the line voltage. The Trigger Mode switch controls the trigger input bandpass. A special TV position cuts off unwanted high frequency signals. This is especially useful when you want to trigger on TV vertical frame signals.

The fully regulated high voltage supply assures operation to specifications on standard line voltages from 100-270 volts. And a mu-metal shield prevents interference from stray magnetic fields.

Improved circuitry and only four epoxy glass printed circuit boards, with plug-in IC's, make the 10-4550 an easy-to-assemble kit. Establish a new standard for your test bench today... order the 10-4550. Calibration requires a precise source of square waves such as 10A-4510-1 or 1G-4505, see page 70.

Kit 10-4550, Shpg. wt. 27 lbs. 399.95
 SO-4550, factory assembled & calibrated
 version of 10-4550, Shpg. wt. 25 lbs. 565.00



The 10-4550 has the accuracy and reliability that are so important for the TV or general serviceman. It also has features that you simply won't find on comparably-priced oscilloscopes. It's the scope you need!

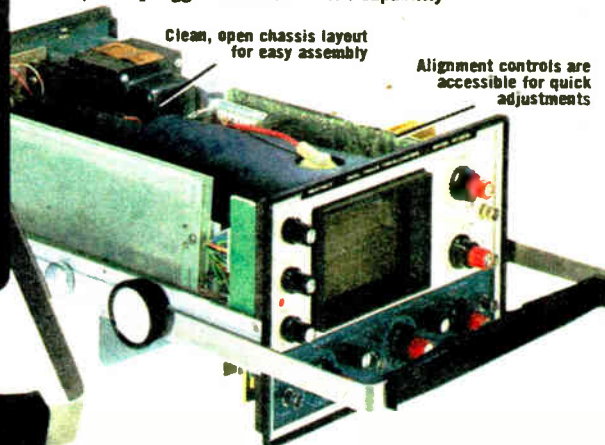
10-4550 SPECIFICATIONS: VERTICAL: Deflection Factor: Sensitivity: 10 mV/cm to 20 V/cm. Attenuator: 11 steps in 1-2-5 sequence; Variable: Continuous between steps to approximately 60 V/cm. Accuracy: Within 6%. Vertical Response: DC Coupling: DC to 10 MHz. AC Coupling: 2 Hz to 10 MHz. Rise Time: 35 ns. Overshoot: Less than 5%. Vertical Input: Impedance: 1M Ω 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 Ω (approx.). Frequency Response: DC to 1 MHz. Connector: BNC. TRIGGER: Internal: Automatic: Adjustable over 10 divisions; Normal: Adjustable over 10 divisions; Slope Selection: + or -. External: Automatic: Adjustable over 0.8 V. Normal: Adjustable over 0.8 V. Slope Selection: + or -. Impedance: 1 M Ω shunted by 40 pF. Connector: BNC. X-Y: Y Channel: Same as Vertical. X-Channel: Same as vertical except response is limited to 1 MHz. Phase Shift: Less than 8 $^\circ$ @ 100 kHz. GENERAL: CRT: Type: 5" round. Acceleration Potential: 1.8 kV regulated. Phosphor: P-31. Graticule: 8 x 10 cm. Power: Voltage Range: 100-135 VAC/200-270 VAC switch selected, 70 watts at 120 VAC (240 VAC). Internal Supplies: Fully regulated. Operating Temperature: 10 $^\circ$ C to 40 $^\circ$ C. Dimensions: 6.9" H x 12.9" W x 19.3" (without handle).

Our Finest Dual-Trace Oscilloscope does it ALL!

\$629⁹⁵
Kit



- 0C-15 MHz bandwidth with post-deflection accelerated CRT for high brightness
- Vertical delay lines let you view leading edge of pulses
- Excellent 1 mV/cm input sensitivity
- 45 MHz typical triggering bandwidth
- Time base sweep to 0.1 μ s/cm; X5 sweep magnifier
- Y₁ and Y₂ trigger selection • X-Y capability



The IO-4510 is the one you need for professional service, circuit design, and engineering work. Buy it fully assembled or in money saving kit form.

Heathkit IO-4510 Dual Trace Oscilloscope

Vertical input sensitivity of 1 mV/cm is provided over the entire bandwidth. With a x10 probe waveforms to 10 mV can be read — 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 with only 1 cm deflection. And, there is 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. Complete triggering controls are provided with choice of AC, ACF or DC coupling. The ACF (coupling) mode is provided to reject low-frequency components of the trigger waveform for accurate scope triggering. A trigger select allows triggering at any point on the vertical signal. For added convenience the 4510 offers you the ability to select a trigger signal from either channel Y₁ or Y₂ via a front panel switch.

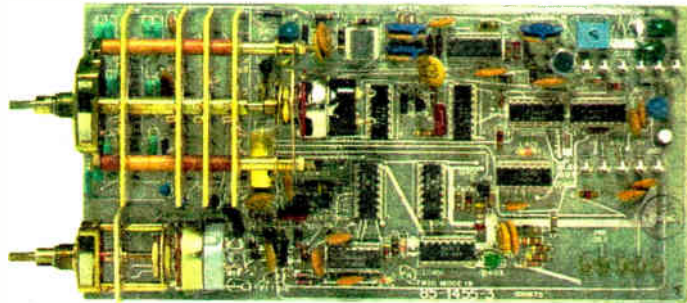
You have a choice of normal or automatic sweep, and can use any one of 20 time bases from 0.2 sec/cm to 0.1 μ sec/cm. Any sweep speed can be magnified five times. With the IO-4510 you can also select an externally generated horizontal signal.

Internal delay lines insure the start of a horizontal sweep prior to the beginning of the vertical signal. The IO-4510 guarantees display of at least 20 nanoseconds of the pre-triggered waveform, insuring complete waveform display — mandatory for logic analysis.

Fully regulated power supplies provide stable voltages regardless of the varying line voltage conditions. An adjustable AC line switch is easily accessible and is used to match the regulated power supply to any common line voltage from 100 to 280 VAC. The 4 kV regulated post-acceleration potential of the CRT insures display brightness.

All major circuitry is located on five circuit boards for easy assembly and troubleshooting. Push on connectors permit fast removal of any board. Even the CRT can be removed and replaced in a matter of minutes. IO-4510 calibration requires a precise source of square waves such as IOA-4510-1 or IG-4505 on page 59.

Kit IO-4510, Shpg. wt. 36 lbs. **629.95**
S0-4510, factory assembled & calibrated, Shpg. wt. 28 lbs. **810.00**



Completely solid-state, the IO-4510's Time Base circuit board incorporates a unique mix of amplifiers and logic devices to guarantee you rock-solid operation.

IO/S0-4510 SPECIFICATIONS — VERTICAL: Deflection Factor: Sensitivity: 1 mV/cm to 5 V/cm in 12 steps. 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. Vertical Modes: Single: Y₁ or Y₂ 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 μ sec/cm in 20 steps. 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.). Frequency Response: DC to 1 MHz (–3 dB). **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. X-Y: Y Channel: Same as Vertical. X Channel: Same as Vertical, except response limited to 1 MHz and no delay line. X-Y Phase Shift: Less than 3° @ 100 kHz. **GENERAL:** CRT: Type: 6 x 10 cm spiral PDA. 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. 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.



Here's how to get a big 5% System Discount on Heathkit Computers and Peripherals

Simply choose the H8 or H11 and one major peripheral plus any I/O devices and accessories you need for a complete custom computer system. Then you can deduct 5% from the total price (excluding shipping and handling charges). Note: because the H17 Floppy Disk Systems already carry discounts, they cannot be included in this 5% discount offer.



Heathkit "Total System"

The value standard in personal computing systems featuring two powerful computers with better software, full documentation and service support from the Heath Company.

Heathkit computers and peripherals are designed to give the computer user, whether beginner or advanced, the most value and versatility for the money. Each unit, computer or peripheral, is an advanced product offering substantial benefits over competitive products. And now, with floppy disk storage available for the H8 (coming soon for the H11), these Heathkit computer systems rank with the finest computer products available anywhere at any price!

Personal computing is the exciting new hobby that's sweeping the country. Using a computer for games, educational and practical applications has proven itself to be stimulating, creative, educational and satisfying. Programming a computer to do things for you is not only interesting and challenging, it's FUN!

What's more, your personal computer doesn't have to be just a game-player. There are literally hundreds of applications you can program it for — checkbook balancing, keeping track of savings, charting stocks, budget planning, taxes, etc. — use it in your home for awhile and you'll be amazed at what it can do. Any data storage and retrieval application can be done faster, more accurately and more efficiently when it's done by a computer.

The business applications of computers are obvious too — payroll accounts, sales records, inventory control, accounting and bookkeeping operations, etc. Computers help you increase efficiency, streamline your operation, and save you time AND money by doing many time-consuming routine procedures with lightning speed.

Owning and using a computer can also be an exciting learning experience. You learn how to solve problems, how to program, and simply how computers work. Knowledge of this kind can really pay off because computers are being used everywhere and their application is



Personal Computers- the ones you can start with and stay with!

becoming even more widespread as low-cost mini- and microcomputers are incorporated into new devices.

Using Heath computer equipment to start and pursue your computer hobby is the really smart thing to do. We have everything you need to go from learning programming (our Microprocessor program and computer trainer, pages 88-89) to a full 16-bit machine with complete peripherals. The computer products are offered either fully assembled and tested or in money-saving, easy-to-build kit form. And every Heathkit computer product is backed by the resources of Heath Company — full service facilities, comprehensive step-by-step instruction manuals and complete technical consultation.

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 computing prowess take you. And, in the Heathkit tradition, it offers the best price/performance and reliability combination you'll find anywhere.



**HUG® — The Heath User's Group
Keeps You in Touch and Up to Date**

The Heath User's Group puts you in contact with other Heath computer owners and keeps you up to date on Heath products. There's an informative newsletter, a complete program library and exchange, new product information and hardware/software ideas. Membership in HUG is a useful way to get the maximum benefit from your Heathkit Computer System.

Here's what you get:

- 1 year subscription to the quarterly newsletter
- Software library allowing you to submit programs and obtain programs submitted by others. There is a small fee for program duplication.
- An attractive 3-ring binder to hold newsletters, software documentation and other materials.
- Program submission forms • Software library catalog

Dues are \$14.00 per year, and must be paid in full (no bank cards or Heath revolving charge). Full details are included with every Heathkit computer product. H11 owners are also eligible for membership in DECUS, see page 71 for details.

BASIC Programming Self-Instructional Program teaches essential computer language

- Essential for personal computing
- Uses programmed instructions backed by "hands-on" experiments

*Continuing Education Units (CEU's) are a nationally recognized means of acknowledging participation in non-credit adult education.

This program 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. 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 this BASIC Course is keyed to the Heathkit H8 Computer, it is also applicable to any computer system using BASIC.

EC-1100, Shpg. wt. 7 lbs. 39.95





THE HEATHKIT H8 PERSONAL COMPUTER

\$379⁰⁰
Kit

Requires at least one H8-1
Memory Board to operate

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!

6 EVENING KIT
Fast, Easy Assembly

- Built-in extended ROM monitor controls front panel program
- Heavy-duty power supply handles to 65K memory
- Exclusive Heath 50-line fully-buffered bus has positions for up to 9 plug-in circuit boards
- Built-in speaker provides audible feedback for keyboard entry
- Convection cooled power supply — no fan needed
- Includes BASIC, assembler, editor and debug software

The Heathkit H8 computer is the ideal choice for personal or hobby computing. Its combination of unique features and low cost make it an outstanding value among general-purpose computers, and, thanks to Heath's exclusive design, it is one of the most versatile. It is easy-to-build, and simple to operate. And while it is an ideal entry level machine, it provides the expansion capability that allows you to build it into a powerful general-purpose computer system. The H8 lets you start small and increase its power and versatility as you increase your programming prowess.

The H8, with the addition of 4K of memory, makes an ideal computer trainer. Its 16-key front panel keyboard provides octal data entry and gives you direct access to registers and memory, one-button program load and dump, and input/output keys for direct communication with any port. Its 9-digit octal readout provides far more information than conventional computers — memory, registers and I/O port displays are updated even while programs are running for direct monitoring of program activity.

With the addition of more memory peripherals and interfaces, the H8 can become even more powerful and versatile, allowing you to write highly sophisticated and practical programs. And because the H8 is based on the world-famous 8080A CPU, the amount of existing software (programs) from both Heath and other sources makes it one of the most immediately practical computers you can own.



The H8 is complete with superior Heathkit documentation and complete systems software to get you up and running fast and easy.

See the following pages for complete descriptions of H8 peripherals and accessories, and our exciting new Floppy Disk System.

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.

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. It features the 8080A chip, clock, systems controller, ROM monitor and full bus buffering. Seven vectored interrupts are available for quick response to I/O requests.

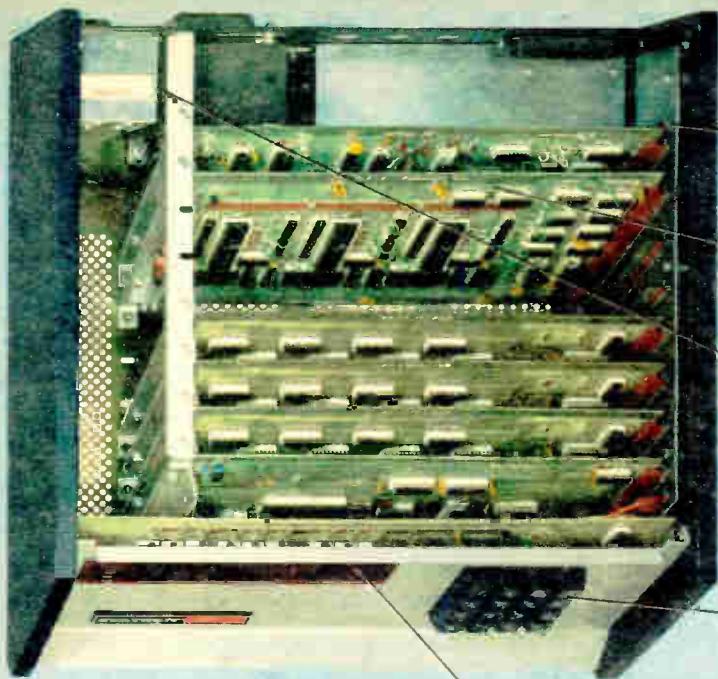
The H8 is housed in a heavy-duty metal cabinet with modern, high-impact structural foam side panels. 16¼" W x 6½" H x 17" D. Switch-selected 120/240 VAC, 50/60 Hz. Requires at least one H8-1 memory board to operate.



Software is supplied in audio cassette form and is also available on diskettes and paper tape.

Order the H8 and accessories from page 68.

FOR FASTEST SERVICE — USE THE HEATHKIT HOTLINE!
(616) 982-3411 day or night



Here's the "inside" story on the H8 Computer — just look at these unique features!

The unique Heath-designed 50-pin bus is implemented on a heavy-duty printed circuit board with copper-foil bus lines. The 9-position mother board is complete with all connectors. The bus lines are fully buffered to eliminate noise and crosstalk, and "glitch-free" to prevent timing problems.

Modular circuit boards slide into the H8 mainframe for easy memory and I/O expansion and easy access for servicing. The boards are in a semi-vertical position with unconfined heat sinks to enhance convection cooling and improve heat dissipation.

Heavy-duty power supply, rugged steel chassis and securely mounted and braced circuit boards make the H8 a truly reliable and long-life machine.



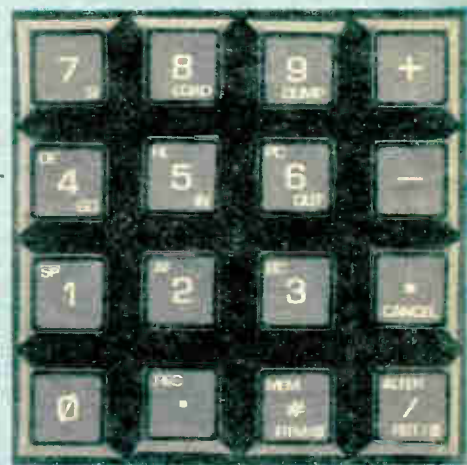
Memory Display



Register Display



I/O Port Display



The H8 Computer "tells" you about operations

The H8's "intelligent" front panel provides the most informative display of any personal computer we've seen. All displays are continuously updated even while your program is executing, giving you instant access to registers and memory for direct monitoring of program activity. The memory display shows memory location and contents using 6 digits for address and 3 digits for data. The register display shows CPU-register contents using 6 digits for data and 2 digits for register identification. The I/O port display shows I/O port data and location using 3 digits for data and 3 digits for port address.

One of the most useful front panels available anywhere!

The unique front panel keyboard makes the H8 one of the most powerful and sophisticated low-cost general-purpose computers available. It provides direct access to registers and memory even while programs are running; one-button load and dump for fast, easy system startup; a single instruction key for "stepping" through programs for easy debugging, program evaluation and learning; and input/output keys for communicating directly with any port.

The software supplied with the H8 makes it "ready" for your programming!

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 configuration lets you 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 1K 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 90.

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 a minimum of 4K memory plus user program.

H8 Accessories, Software and Manual Set

Order your H8 Computer and Accessories from the listings below. See previous pages for a complete description of the H8.

Kit H8, Shpg. wt. 30 lbs. **379.00**

Assembled and tested version of H8.

WH8, Shpg. wt. 30 lbs. **475.00**

NEW! WH8-16 16K Wired Memory Board for H8. Lets you expand the H8 to the full capacity of the 8080A CPU (65K). Available Sept. 15th. Fully assembled and tested.

WH8-16, Shpg. wt. 2 lbs. **395.00**

H8-1 8K 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. **125.00**

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. **85.00**

H8-2 Parallel Interface. Connects H8 to any parallel device such as a paper tape reader/punch. 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.

Kit H8-2, Shpg. wt. 3 lbs. **150.00**

H8-5 Serial I/O and Cassette Interface. Connects the H8 to serial devices such as the H9 video terminal (page 74) or the H36 DEC Writer II (page 73). 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 73. 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 capability. LED test circuit for easy set servicing.

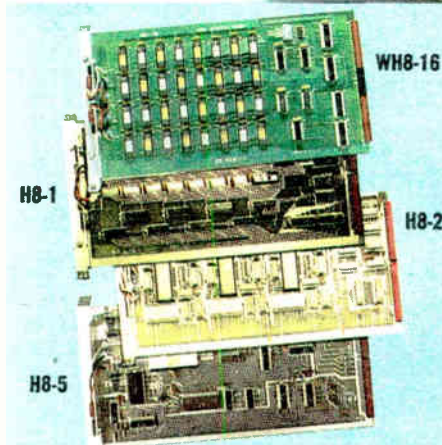
Kit H8-5, Shpg. wt. 3 lbs. **125.00**

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 73). Heath is not responsible for improper operation associated with other cassette units.

Extended Benton Harbor BASIC With Files: An enhanced and more powerful version of the BASIC supplied with the H8. 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. Complete files capability lets you store and retrieve data records and programs. Minimum of 12K memory is required to run this BASIC, 16K is preferred if full use is to be made of its capabilities.

HC8-13 (1200 baud audio cassette) Shpg. wt. 1 lb. **20.00**

Paper Tape Systems Software: A paper tape version of the systems software supplied with the H8. Four fan fold paper tapes. **H8-15**, Shpg. wt. 1 lb. **20.00**



Extended Benton Harbor BASIC in paper tape form: Similar to HC8-13 at left but without files.

H8-14, Shpg. wt. 1 lb. **10.00**

HM-800 Manual Set. Here's your chance to LOOK before you buy, and with no risk! Includes complete assembly and operations manuals for the H8, H8-1, H8-2, H8-3, H8-5, H9 and H10. The complete H8 software documentation is also included! All in a handsome 3-ring binder. You can deduct the price of the manual set when you buy your H8.

HM-800, Shpg. wt. 11 lbs. **25.00**

Note: Individual product manuals are included with each kit.

Applications Software for the H8

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, Hmrahi, 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**

NOTE: Above applications software is in 1200 baud audio cassette form.

How to Configure your H8 System to fill your needs now...and in the future!



Because of the great flexibility of the H8 and its ease of expansion, there are many ways to configure it. You can start with the H8 and a single memory

card (H8-1). This will give you the minimum workable system and can be an ideal computer trainer. Or you can purchase the H8 with full expansion capability (the WH8-16 or four 8K cards, H8-1 with H-3 chip sets), and a variety of I/O interfaces. For data and program storage you can select our floppy disk system (next page); cassette recorder/player (page 73) or our paper tape reader/punch (page 73). Terminals available include our H9 video terminal (page 74) and the H36 DEC Writer II (page 73).

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).

The WH17 Floppy Disk System Makes Your H8 a Real "Pro"!



Shown with optional second drive

\$675⁰⁰ Assembled with single drive



Rugged and Reliable Fully Assembled WANGCO model 82 Disk Drive Unit offers Totally Reliable and Dependable Mechanical and Electrical Operation for Years of Trouble-Free Service.



The WH17 INCLUDES the Interface/Disk Controller Circuit Board — An Extra Cost Option with Most Other Units.

NOTE: The H8 Computer Requires at Least 16K of RAM to Use the WH17 Floppy Disk and its Operating System.

The unique diagnostic supplied with the WH17 includes: a drive speed test to check floppy rpm; a general test to verify total system operation including R/W; a media test to examine disk for defects; and a seek time test to vary the seek time to determine the most reliable speed and efficient operation.

Complete Operating Instructions Are Included in a Handsome and Rugged Three-Ring Binder

Expanded, Hard-Sector 40-Track Diskette Contains All Software Programs



The WH17 Floppy Disk System is the peripheral that will make your H8 a true professional system! You'll be able to, load programs in seconds instead of minutes, update files and data virtually instantly, and have storage and program access that's far faster and more efficient than paper tape or cassette storage!

The new WH17 floppy disk system is the one you've been waiting for. It makes the H8 a thoroughly sophisticated, completely versatile computer that gives you the storage and programming capacity you NEED for virtually any application! With this floppy disk system, you can load programs instantly so you're up and running fast; you can store literally hundreds of programs on a single disk so you have lots of storage space and immediate access to all your programs; and you can update files instantly and efficiently to save time. Floppy disk storage is far more versatile and reliable than paper tape or cassette storage systems; it truly makes the H8 a "total versatility" computer system.

Designed exclusively for use with the H8, the WH17 has been "systems" engineered to deliver a fully assembled package including: a disk drive, and interface disk/controller circuit board, and built in power supply. The WH17 is one of the few disk drive systems on the market to INCLUDE the interface/disk controller circuit board at no extra charge! The controller circuit board plugs directly into the H8's mainframe and with the addition of the optional second drive you'll have optimum dual-drive versatility.

The storage media for the WH17 is the standard, hard-sectored 40-track diskette. Measuring just 5.25" in diameter, each disk offers access to better than 102K bytes of available program and data storage area.

The drive system used in the WH17 is the famous WANGCO Model 82, a performance-proven drive providing accurate high-speed data access. Specifications of this drive include a conservative 30 mS maximum track-step time and typical random sector access times of less than 250 mS. These figures are considerably better than most equivalent competitive drives.

The WANGCO 82 drive system is supplied fully assembled and tested. It's backed by extremely reliable mechanical and electrical operation. The complete floppy disk drive unit is also fully assembled and tested. With single blank diskette.

WH17, Factory assembled and tested. Shpg. wt. 28 lbs. **675.00**

H17-1, Optional Second Drive for WH17, Shpg. wt. 4 lbs. **295.00**

H17-2, Pkg. of 5 Diskettes, Shpg. wt. 1 lb. each **25.00**

DUAL-DRIVE COMBO OFFER — SAVE \$95.00! WH17 Floppy Disk, H17-1 Second Drive, and H8-17 Operating System. If purchased separately, \$1070.00.

WHS-171, Shpg. wt. 53 lbs. **975.00**

SINGLE-DRIVE COMBO OFFER — SAVE \$80.00! WH17 Floppy Disk plus H8-17 Operating System. If purchased separately, \$775.00.

WHS-170, Shpg. wt. 42 lbs. **695.00**

WH17 SPECIFICATIONS: Storage Media: 5.25" hard-sectored 40-track diskette. Drive Type: WANGCO Model 82. Track Seek Time: 30 ms maximum. Random Sector Access Time: Less than 250 milliseconds. Power Requirement: 120/240 VAC, 50/60 Hz. 75 watts. Dimensions: 13.5" W x 6.25" H x 13.5" D.

Here's the complete Operating Systems Software for the WH17 Floppy Disk System

The Operating Systems Software for the WH17 Floppy Disk System includes a diskette containing the standard H8 software plus a unique diagnostic for optimum system setup and evaluation. This software includes extended Benton Harbor BASIC with strings and files; a 2-pass absolute assembler that generates efficient machine language codes; a text editor to prepare source code for BASIC and other languages; a console debugger for easy debugging of user machine language programs via an external terminal; and a full set of disk utility programs for convenient file manipulation. Special features of this operating software include Dynamic File Allocation which automatically keeps free space available to permit unlimited file size and prevent squeezing of disks. It also prevents estimating or predeclaring file size before writing to provide more efficient use of file space. Special facilities support running and backup of single-drive configurations to permit copying and transferring between disks even with a single-drive system. Device independence permits direct communication between any program and any device for added flexibility. A file utility program allows two kinds of wild cards for fast, easy bulk manipulation of files. The software is supplied on a standard diskette. With comprehensive operations and instruction manual.

H8-17, Shpg. wt. 12 lbs. **100.00**



Now Available Fully
Wired or in Kit Form

Heathkit/DEC H11 16-Bit Computer

\$1295⁰⁰
Kit

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!

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.

What is The H11?

The H11 is Heath's top-of-the-line computer.

The H11 is designed for the serious computer hobbyist. It is the world's most powerful hobby computer. It offers the advance hobbyist the power and potential to implement more sophisticated applications. Most hobbyists discover that their problem solving and programming capabilities grow quickly as they learn more about the computer. Before long, many advanced hobbyists simply run out of computing power. Their small low cost system may be inadequate to produce the performance required by some advance applications. The H11 is the computer that meets the demand for superior performance in hobby applications. When you buy the H11 you buy virtually unlimited potential.

The H11 is also useful in education, industry and small business. Its computing power and expansion capability make it ideal for such applications. The H11 is for those who want commercial performance at hobby prices.

The Heathkit H11 is virtually identical to DEC's famous PDP-11/03 microcomputer. It features the popular LSI-11 (KD11F) microcomputer. The performance of the H11 is identical to DEC's PDP-11/03 but at a fraction of the cost. In addition, complete software is supplied with the H11. This software is worth over \$1,000 when purchased separately for the DEC PDP-11/03. The H11 is clearly a spectacular hardware/software value.



The H11 is complete with superior Heathkit documentation and versatile systems software

The 16 Bit vs. 8 Bit Issue

To the first time computer buyer and to many advanced users, the question of the value of a 16 bit computer over an 8 bit computer frequently arises. Should you purchase an H11 or an H8? Your choice of a 16 bit or 8 bit computer depends upon your needs. If you are a beginner with simple applications, the H8 is your best choice. If you are an advanced hobbyist with demanding applications, the H11 is clearly your best choice. The H11 has adequate computer power not only for simple applications but for the more complex and sophisticated jobs that you will be tackling later. It is also the best choice for commercial and industrial applications. In buying the H11, you are purchasing ultimate immediate performance and future potential.

The H11 Mainframe

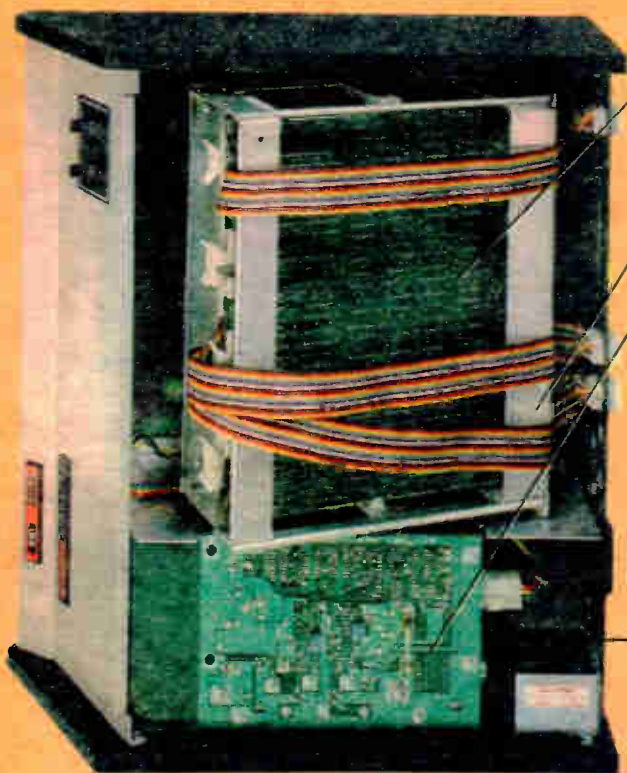
A basic H11 computer is supplied with an attractively styled cabinet, a heavy duty power supply, a back plane incorporating DEC's famous LSI-11 or Q Bus and the powerful KD11F CPU board fully assembled and tested. This board contains the LSI-11 computer and 4K dynamic RAM. Complete systems software is also supplied in paper tape form. To this mainframe you will need to add the various memory and I/O accessories that will configure your H11 to your specifications. The H11 back plane with the KD11F board in place contains 6 plug-in slots for memory and I/O cards. 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. 43 lbs. 1295.00
WH11, Factory Assembled and tested version of above.
Shpg. wt. 43 lbs. 1595.00

Order memory expansion modules and interface accessories from page 72.

NOTE: H11 owners are eligible for membership in the Digital Equipment Computer User's Society (DECUS). This organization provides useful symposia, newsletters, program library and other useful information to help you get the most from your LSI-11 computer.

Here's the "Inside Story" on the H11!



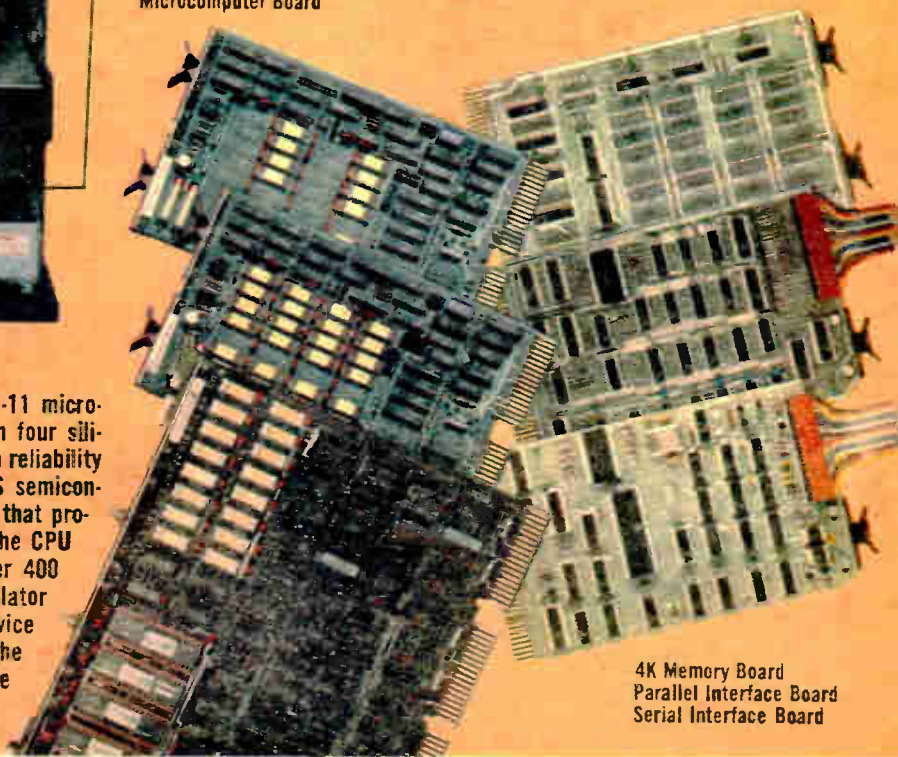
Card cage with backplane accommodates up to six accessory cards in addition to LSI-11. The card cage swings up for easy access and service even while the H11 is operating. Accessory boards slide directly into card guides with all connectors supplied.

Rugged steel chassis and extra-thick backplane with heavy, solid connectors for added strength and years of superior performance.

Compact, efficient switching power supply uses less power to operate and generates less heat than conventional supplies. Overvoltage and overcurrent/short circuit protection, along with automatic power-up and power-down sequencing, provide high reliability and long life operation.

Built-in quiet-running fan provides efficient cooling and prevents heat buildup.

16K Memory Board
32K Memory Board
Microcomputer Board



4K Memory Board
Parallel Interface Board
Serial Interface Board

Fully Wired and Tested KD11F Board

The "heart" of the H11 computer is the standard DEC LSI-11 microcomputer board. The 16-bit CPU functions are contained in four silicon gate N-channel MOS LSI integrated circuit chips for high reliability and superior performance. The 4096-by-16 read/write MOS semiconductor memory is composed of LSI 4K dynamic RAM chips that provide fast access time and require little operating power. The CPU executes the powerful PDP-11/40 instruction set with over 400 instructions. There are no separate memory I/O or accumulator instructions, so you can manipulate data in peripheral device registers as easily and flexibly as in memory registers. The LSI-11 board is supplied fully wired and tested to facilitate kit assembly and provide greater reliability.

Software supplied with the H11 includes:

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.

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 tapes into the H11 memory for execution.

ODT-11X. Lets you debug the programs which you have created. Permits modi-

fying and controlling program execution "on the fly".

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 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.

H11 Accessories, Software and Manual Set

Order your H11 from page 70, order the accessories and interfaces you need for a custom-designed computer system below.

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.

Kit H11-1, Shpg. wt. 2 lbs. **225.00**
WH11-1, Assembled version of above, 2 lbs. **275.00**

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.

The H11-2 is required for interfacing the H11 to the H10 Paper Tape Reader/Punch.

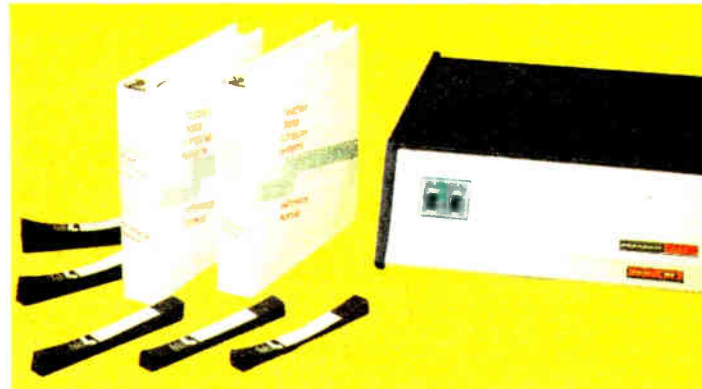
Kit H11-2, Shpg. wt. 2 lbs. **95.00**
WH11-2, Assembled version of above, 2 lbs. **150.00**

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 74) or H36 DEC Writer II (page 73). Has optically isolated 20 mA current loop and EIA interfaces; selectable baud rates of 50 to 9600. With all mating connectors.

Kit H11-5, Shpg. wt. 2 lbs. **105.00**
WH11-5, Assembled version of above, 2 lbs. **150.00**

NEW! WH11-16 16K Memory Module. Provides 16K dynamic MOS random access memory on a 5x8½" board. Has on-board refresh, 570 nS cycle time and 250 nS access time. Fully Assembled and tested. Shpg. wt. 1 lb. **995.00**

NEW! WH11-32K. Identical to 16K memory above, but with 16 additional IC's containing an additional 16K of memory. Fully assembled and tested. Shpg. wt. 1 lb. **1995.00**



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 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 H11 CPU board.

H11-6, Shpg. wt. 1 lb. **159.00**

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.

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 Software;) 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.

DIGITAL AND HEATH JOINTLY AND SEVERALLY DISCLAIM ALL IMPLIED WARRANTIES WITH REGARD TO THE SOFTWARE LICENSED HEREUNDER, INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS; and any stated express warranties are in lieu of all obligations or liability on the part of either DIGITAL or HEATH for damages, including but not limited to special, indirect or consequential 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 _____

William E. Johnson

Customer's Signature



Configure your H11 System to fit your needs.

To use the H11, additional memory and I/O interfaces must be added. The minimum configuration consists of 4K memory and the H11-5 serial interface to an external video or hard copy terminal. The H11-2 parallel interface is required to connect the H11 to the H10 paper tape reader/punch. These two interface cards occupy two of the available 6 slots in the backplane. This leaves four additional slots for memory expansion. With the new modules available, you can easily expand to the full 32K word capability of the H11. With 4K of memory you can write simple programs in machine language. The FOCAL interpreter also runs in 4K. To run the other computer software, including BASIC, assembler, editor and others, at least 8K of memory is required. 12K to 16K of memory is recommended depending upon your applications.

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!

NOW MASTER NEW SKILLS

National Technical Schools of Los Angeles offers three home study courses in its Microcomputer Division. These courses are fully integrated, self-teaching programs which include not only Heath equipment, but specially prepared NTS lesson materials. The courses are designed to help students develop a more thorough understanding of electronic principles and theory leading into service, repair and troubleshooting of microcomputer equipment. These are fully accredited diploma courses which are career oriented.

Course 1 MASTER COURSE IN MICROCOMPUTERS

This course is designed for the person who wants a comprehensive program starting with basic electronics and concluding with the study of microprocessors and software programming. (High school math skills required.)

Course 2 MICROPROCESSOR TECHNOLOGY

All the material and equipment in this course is included in Course 1. It is designed for the student who does not wish to go beyond the study of the H8 computer; (video terminal not included). No experience required. High school math skills essential.

Course 3 MICROCOMPUTER PROGRAMMING

This is an advanced program, and all material and equipment in this course is also included in Course 1. This Course begins where Course 2 leaves off and is designed for the student who already has a microcomputer and wishes to add a video terminal. It includes the study of microprocessors and BASIC software.

EQUIPMENT INCLUDED IN YOUR COURSE TUITION



COURSE SUMMARIES DETAILED ON OTHER SIDE • ACCREDITED MEMBER: NATIONAL HOME STUDY COUNCIL
NATIONAL TECHNICAL SCHOOLS 4000 SOUTH FIGUEROA ST. LOS ANGELES, CA 90037

Cut along this dotted line, fill in coupon completely, enclose your payment, and mail in stamped envelope to National Technical Schools. A copy will be returned to you promptly.

Dept. 777-098

ENROLLMENT APPLICATION

Gentlemen: Please enroll me in the course I have chosen, as described herein. I will make my payments indicated in Payment Plan which I have checked. I understand I am entitled to complete instruction, all materials and services of this course, as I progress with my studies. All materials sent to me are mine to keep. I may advance as fast as my time will permit, limited only by the payments I have made. I will be allowed up to 4 years to complete my course should I need that much time. I understand NTS wishes to keep its courses up-dated, therefore courses and equipment are subject to change without notice.

I have read and understood all the information and general terms and conditions of enrollment on both sides of this agreement.

PLEASE PRINT SIGN YOUR FULL NAME HERE

(First Name) (Middle) (Last Name) (Age)

(Address)

(City) (State) (Zip)

CHECK THE COURSE & PAYMENT PLAN YOU WANT

- | | |
|--------------------------|---|
| <input type="checkbox"/> | 1 MASTER COURSE IN MICROCOMPUTERS |
| Plan A | <input type="checkbox"/> \$75.00 down \$60.00 per mo. Total: \$2,775.00 |
| Plan B | <input type="checkbox"/> \$100.00 down \$100.00 per mo. Total: \$2,528.00 |
| Plan C | <input type="checkbox"/> \$2,401.00 Cash (Save \$374.00) 90 |
| <input type="checkbox"/> | 2 MICROPROCESSOR TECHNOLOGY |
| Plan A | <input type="checkbox"/> \$50.00 down \$50.00 per mo. Total: \$1,650.00 |
| Plan B | <input type="checkbox"/> \$1,490.00 Cash (Save \$160.00) 91 |
| <input type="checkbox"/> | 3 MICROCOMPUTER PROGRAMMING |
| Plan A | <input type="checkbox"/> \$50.00 down \$50.00 per mo. Total: \$1,350.00 |
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If you are enrolling under the Veterans Readjustment Benefits Act of 1966, please check here

NATIONAL TECHNICAL SCHOOLS

TECHNICAL-TRADE TRAINING SINCE 1905
Resident and Home-Study Schools
4000 South Figueroa St. Los Angeles Calif 90037

COURSE CONTENT SUMMARIES

Course 1 MASTER COURSE IN MICROCOMPUTERS

Preliminary training will cover basics, solid-state devices and fundamentals of computer and digital logic circuitry. Further instruction will explain microprocessor technology and micro-computer operations.

You will develop your skills and knowledge of digital test equipment by building and using a digital probe, a digital multimeter and the NTS Compu-trainer. This Compu-trainer will clearly show you how computer circuits are designed, how they perform "logic decisions" and how they function to solve problems. Integrated circuitry is fully explained and demonstrated.

Continuing further into today's new generation of microprocessor systems, you will assemble, test and program on a Heath 4K Memory microcomputer with a CRT Terminal and Keyboard. Comprehensive instruction will demonstrate how to apply 8080A Machine Language Programming.

Then, with the aid of the on-line CRT Video Terminal, you will be able to interface and control input/output data formats—then proceed to more advanced programming languages.

By implementing both "hands-on" troubleshooting techniques plus related software applications—the NTS Microcomputer Graduate is able to achieve an important "total systems" concept about microcomputer operations and related repairs.

Course 2 MICROPROCESSOR TECHNOLOGY

This course includes approximately two-thirds of the material in

Master Course #1. Preliminary training includes transistor application, power supplies and cassette tape recorders, then advances you into diode, transistor and current-mode logic circuit theory. Emphasis will be placed upon TTL and MOS IC's.

Step-by-step training will show you how to test solid state devices and analyze integrated circuits, plus the internal operation of microprocessors, peripheral equipment interfacing and micro-computer programming. You will also learn about interfacing as related to the 8080 Central Processing Unit. Using Assembly Language Programming Manual, you will learn how to program your microcomputer and apply full-performance techniques.

You build the Heath H8 computer with 4K Memory the same NTS Compu-trainer as described in Course 1, the digital logic probe and the digital multimeter.

Course 3 MICROCOMPUTER PROGRAMMING

Graduates of this NTS course will develop the skills to handle software programs and language processors. This course begins with the study of computer software and flow-charting. You'll discover how to maximize the features of a microcomputer, such as control transfers, program storage and macro definitions. You'll be exposed to practical examples of basic programming, loops and utilization of these structures to develop complex program control sequences. This course includes the Heath H9 Video Display Terminal as shown in this catalog.

Cut along this dotted line, fill in coupon completely, enclose your payment, and mail in stamped envelope to National Technical Schools. A copy will be returned to you promptly.

TUITION CREDIT INFORMATION

Payment Plan	A (Time Payment Tuition Price) Deferred Payment Price	B Cash Price	C Less Cash Down Payment	D Amount Financed (Unpaid Balance Of Cash Price)	E Finance Charge	F Annual Percentage Rate %	G Amount And Number Of Monthly Payments*	H Plus Final Payment	I Total Monthly Payments
1	MASTER COURSE IN MICROCOMPUTERS				Contains 120 Lessons/32 Kits				
A	\$2,775.00	\$2,401.00	\$ 75.00	\$2,326.00	\$374.00	8%	45 @ \$60.00	—	\$2,700.00
B	2,528.00	2,401.00	100.00	2,301.00	127.00	5%	24 @ 100.00	1 @ \$28.00	2,428.00
2	MICROPROCESSOR TECHNOLOGY				Contains 95 Lessons/19 Kits				
A	\$1,650.00	\$1,490.00	\$50.00	\$1,440.00	\$160.00	8%	32 @ \$50.00	—	\$1,600.00
3	MICROCOMPUTER PROGRAMMING				Contains 30 Lessons/12 Kits				
A	\$1,350.00	\$1,240.00	\$50.00	\$1,190.00	\$110.00	8%	26 @ \$50.00	—	\$1,300.00

You have the right to pay off in advance the full amount due, and to obtain a partial refund of the finance charge, if any, provided herein, computed on the rule of "78s":

*Monthly payments are due each 30 days after date of enrollment.

Heathkit H10 Paper Tape Reader/Punch

Gives You the Reliability, Durability and Trouble-Free Handling You Need for Effective Mass Storage of Programs and Data

\$350⁰⁰

- Reader with stepper motor for accurate positioning
- Copy control for fast, easy tape duplication
- Ratchet/solenoid drive for high accuracy
- 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 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 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 1/2" H x 9 3/4" W x 19 1/2" D. For 110-130 VAC, 60 Hz or 220-240 VAC, 50 Hz.

Kit H10, Shpg. wt. 29 lbs. 350.00

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

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.

Uses Standard 1/2" Wide Roll or Fan-Fold 8-Level Paper Tape

Reserve your WH27 Floppy Disk System for the H11 Now and SAVE \$200!

**DUAL-DRIVE,
Z80 BASED**

The WH27 Floppy Disk System will be available factory assembled in our next catalog.

Here's your chance to get advance-order savings on the new floppy disk system for the H11 — and what a floppy it is! At a price that's a lot less than comparable systems on the market, here's what you'll get: dual-drive versatility for a total of 512K bytes of program and data storage. Head motion of 6 mS for super-fast data access time. IBM 3740 8" disk format. A Z80 microprocessor-based controller for top speed and efficiency. Full compatibility with DEC® RX01® (PDP-11/03) hardware and software. Unique features include a built-in self-test on power-up; a mechanical interlock to prevent disk damage; a write-protect function and reformatting procedure. The software for the WH27, sold separately, includes BASIC with files capability, utilities including a macro-assembler, text editor and others. The WH27 operating system requires at least 8K words of memory, with 16K recommended to use its full capabilities.

WH27 Floppy Disk Alone 2495.00

HT-11 Operating System 250.00

HT-11-1, Fortran for HT-11 Operating System 150.00

WHS-27 Floppy with HT-11 Operating System Reg. Price 2595.00

WHS-27 Floppy with HT-11 Operating System. Advance Order Price 2395.00

Systems will ship in late October. This special advance offer good thru Oct. 15, 1978. Reserve your WHS-27 Floppy Disk System Now and SAVE \$200!

THE HEATHKIT H9 VIDEO TERMINAL

\$550⁰⁰
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, or any digital computer. 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 an 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.

The **PC control board** is fully assembled and tested for added reliability and simplified kit assembly. A wiring harness complete with connectors helps reduce time-consuming point-to-point wiring.

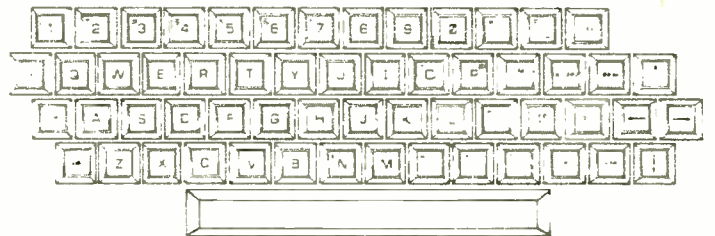
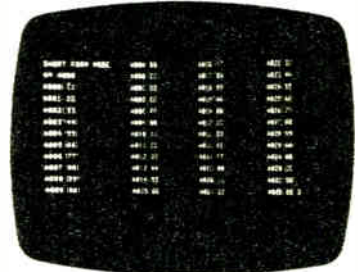
Ultra-compact size, only 12½" H x 15½" W x 20¾" D, makes the H9 ideal for desktop or console applications. For 110 VAC, 60 Hz or 230 VAC, 50 Hz.

Kit H9, Shpg. wt. 50 lbs. 550.00
WH9, Assembled and Tested Version of Above. Shpg. wt. 50 lbs. 675.00

Long-Form Display—Twelve 80-Character Lines with Automatic Scrolling—New Line Enters at Bottom, Top Line Scrolls Off-Screen.



Short Form Display—Forty-Eight 20-Character Lines in Four Columns—As new Column Enters Screen from Left, Left Column Scrolls Off-Screen.



The ASCII 67-key keyboard on the H9 offers many convenient features. The function keys are positioned away from the keyboard to prevent miskeying; the typewriter-style keyboard allows easy, more accurate input; and the extra-wide, easy-to-use spacer bar helps aid accurate typing.

LA36 DEC Writer II Printer Terminal For "Hard-Copy" Computer Readout

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!

SENSATIONAL LOW
MAIL-ORDER PRICE

\$1495⁰⁰



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 14¾" wide; adjustable left and right hand tractors half or full duplex operation; ANSI-standard multi-key rollover and a typewriter-like keyboard. It prints 10 characters per inch horizontal spacing and 6 lines per inch vertical spacing. The integral 20 mA current loop interface makes the LA36 compatible with both the H8 and H11 computers, as well as most others. With connecting cable and integral stand. Overall size, 27½" W x 33¾" 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 may be made at no extra charge in most cases. NO C.O.D. ORDERS ACCEPTED.

H36 DEC Writer II, For 120 VAC, 60 Hz. 1495.00
H36J DEC Writer II, For 220 VAC, 50 Hz. 1495.00
H36-1 Fan-fold Paper for H36. Standard 147½" x 11" white and green, single-part, lined paper. 3450 sheets per carton. H-36-1, Shpg. wt. 47 lbs. 30.00
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. 65.00
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. 250.00
H36-4, Ribbon Accessory, Shpg. wt. 7 lbs. 15.00



Heath's Complete Computer Library — the latest on computers, programming and microprocessors

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Bugbook III (E&L). Superior reference source on 808C interfacing and programming. EDP-231 15.00
Bugbook IIA (E&L). Serial I/O concepts and terminal interfacing. EDP-232 5.00
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8080 Software Gourmet Guide and Cookbook (Scelbi). EDP-228 10.95
Practical Microcomputer Programming: 8080 (Northern Technology). EDP-235 21.95
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M6800 Program Reference Manual (Motorola). EDP-245 3.00
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The Minicomputer in the Lab. (Wiley). EDP-246 19.50
Assembly Level Programming (Lexington). EDP-236 . 14.95
101 BASIC Computer Games (DEC). EDP-237 7.50
BASIC Software Library, Vol. I. BASIC applications, book-keeping games, pictures (graphics). EDP-240 24.95
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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
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BASIC Workbook (Hayden). EDP-261 5.50
Your Home Computer (Dymax). EDP-252 6.00
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Some Common BASIC Programs (Osborne). EDP-255 . 8.50
How to Program Microcomputers (Sams). EDP-256 8.95
8080A/8085 Assembly Language Programming (Osborne). EDP-262 7.95
Step-by-Step Introduction to 8080 Microprocessor Systems (Dilithium). EDP-263 7.95
8080 Microcomputer Experiments (Dilithium). EDP-264 13.95
BASIC Software Library Vol. VI (Sci. Res.) EDP-265 . 49.95
BASIC Software Library Vol. VII (Sci. Res.). EDP-266 39.95
The 8080A Bugbook (Sams). EDP-267 9.95
DIGITAL Microcomputer Handbook (DEC). EDP-268 . 20.00
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Microprocessor Interfacing Technology (Sybex). EDP-270 7.95
Practical Microcomputer Programming for the 6800 (Northern Tech.). EDP-271 21.95
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See page 80 for special book ordering information.

The Ignition Analyzer That Can Pay For Itself!

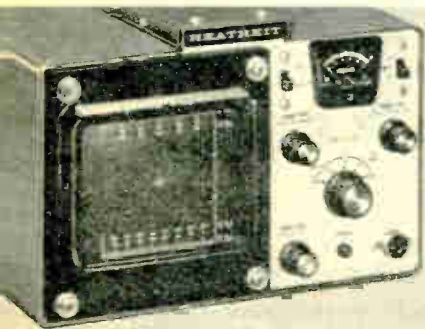
Whether you use it at home or in your auto repair shop, the CO-2600 pays off in substantial savings of time and money. Save when you build it yourself, save when you keep your cars running at top performance and efficiency!



Companion Timing Light

Deluxe timing light and distributor advance meter designed specifically for use with the CO-2600. Measures advance to 60°.

Kit COA-2600-4, Shpg. wt. 3 lbs. 47.95



Versatile Heathkit Ignition Analyzer

\$169⁹⁵

- Built-in rpm indicator
- Clamp-on inductive pickup for easy hookup

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 adapter for use with General Motors High Energy Ignition systems.

Kit CO-1015, Shpg. wt. 22 lbs. 169.95

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

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 10 $\frac{1}{2}$ " W x 17 $\frac{1}{2}$ " D.

Deluxe Ignition Analyzer

\$399⁹⁵

- Pushbutton Selection of Individual Cylinders
- Parade, Superimpose, and Individual Patterns
- Solid-State Construction

Designed for the auto hobbyist yet perfect for the professional garage operation, the Heath CO-2600 provides the most asked for features in an ignition analyzer of this quality.

Rock steady parade patterns are made possible by the latest design in inductive pickup circuitry and switch selection of number of cylinders — four, six or eight. Dwell measurements are indicated on the big eight-inch meter.

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

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

Rugged high-temperature oil and gas resistant neoprene cables provide easy, positive connections to engine. Includes adaptor for GM HEI ignition systems. For use with 4, 6, or 8-cylinder (4-cycle) or 2-rotor Wankel engines and standard, transistorized or C-D ignition systems. With Heath's excellent manuals to guide you, you'll find assembly and operation of the CO-2600 to be a simple matter. Use with optional timing light below for a complete, economical home tuneup center.

Kit CO-2600, Shpg. wt. 83 lbs. 399.95

COA-2600-2, Alternator Test Adaptor. Shpg. wt. 1 lb. 5.95

COA-2600-3, Scope Cart. Shpg. wt. 25 lbs. 34.95

Kit COA-2500-1, Low-cost Timing Light for CO-2600 only. 19.95

CO-2600 SPECIFICATIONS: For Use With: Standard, transistorized, or C-D ignition systems. 4, 6, or 8-cylinder (4-cycle), or 2-rotor Wankel engines. Signal Pickup: Direct for primary, inductive for parade trigger, and capacitive for secondary. Tachometer and Voltmeter Accuracy: $\pm 3\%$ of full scale on any range. Scope Vertical Expand: Minimum 2 to 1. Operating Temperature Range: 32°F to 104°F. Tachometer: 1000 rpm, 3000 rpm, or 6000 rpm. Voltmeter: 2 or 20 VDC. Power Requirements: 110/130 or 220/260 VAC 50/60 Hz. Weight: 53 lbs. Dimensions: 12 $\frac{7}{8}$ " H x 25 $\frac{1}{4}$ " W x 14 $\frac{1}{8}$ " D.



Low-Cost Engine Analyzer

\$74⁹⁵

- Works with any ignition system
- Tests accessories and all electrical wiring

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. Operates on 3 standard "C" batteries (not supplied). Has convenient carrying handle. Comes complete with leads and accessories.

Kit CM-1050, Shpg. wt. 8 lbs. 74.95

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 Ω center scale), R x 100 (10 Ω center scale), $\pm 3\%$ 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 μ 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 Ω resistor assembly. One insulation-piercing alligator clip. Two #10 solder lugs. (#14). Dimensions: 7 $\frac{1}{2}$ " H x 10 $\frac{1}{2}$ " W x 8 $\frac{3}{4}$ " D.

Keep your car in top shape all year 'round



\$29⁹⁵

With Inductive Pickup



\$64⁹⁵

Built-in meter measures distributor advance or engine RPM



Deluxe Timing Light — brighter than daylight

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. 6½" H x 2" W x 10" L.

Kit CI-1040, Shpg. wt. 3 lbs. **29.95**

Kit CI-1020, As above, no inductive pickup. 3 lbs. **19.95**

Hanson Basic Tester Set (not shown)

Helps you keep your car in top shape! Includes Model 714 Remote Starter Switch, Model 715 Deluxe Compression Tester, Model 709 Vacuum/Fuel Pump Tester. CGP-1036, Assembled. Shpg. wt. 2 lb. **11.95**

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 12 VDC power supply. Functions with all types of ignition systems.

Kit CI-1096, Shpg. wt. 3 lbs. **64.95**

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.



Three-In-One Tune-up Meter

\$26⁹⁵

- Helps you keep your car in top shape
- Measures dwell, engine rpm and voltage
- Easy to use — just connect two leads
- 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. 4¼" H x 8½" W x 7¼" D.

Kit CM-1073, Shpg. wt. 4 lbs. **26.95**

Exhaust Gas Analyzer

Monitors your car's exhaust system for minimum air pollution and maximum efficiency by measuring thermal conductivity of exhaust gases. Shows air-fuel ratio, combustion efficiency and % of carbon monoxide. With all cables and tubing for easy connection. For 6-V or 12-V car battery.

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





New Universal Small Engine Tune-up Meter

ONLY \$44⁹⁵

Available late September, 1978

Works with ANY Ignition-Type Engine INCLUDING Briggs & Stratton

Ideal for garden tractor, lawn mower, motorcycle, snowmobile, out-board motors, small cars, etc. Tests volts, ohms, dwell & continuity on 1 to 4 cylinder, 2 & 4 cycle engines. Built-in tach, snap-on pickup. Less batteries. Has large color-coded meter, self-contained carrying case for easy portability. Available late September.

Kit CM-2045, Shpg. wt. 4 lbs. **44.95**

CM-2045 SPECIFICATIONS: Voltmeter: 0-20 V DC. Ohmmeter: 0 to 100 kΩ (10 kΩ center scale). Tachometer: Two ranges: 0-3000 rpm, 0-15000 rpm. Dwell Meter: Four scales: 1 cylinder, 90°-360°; 2 cylinder, 40°-180°; 3 cylinder, 30°-120°; 4 cylinder, 20°-90°. Power: three 1.5 V "C" batteries. Dimensions: 9¼" H x 9¾" W x 5¼" D.

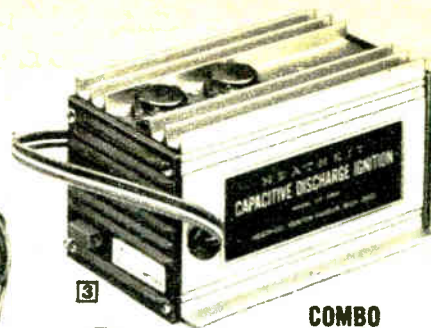


1

Keep your car battery at full charge for faster and easier starts in any weather!



2



3



COMBO SPECIAL!
See details below.

Easy-To-Build, Money-Saving Auto Accessories from Heath

1 15-Amp Automatic Battery Charger with Quick-start Booster

Charges 12-volt car battery at 15-amp rate, boosts at 50-amp rate for quick start when battery is dead. Use on negative or positive ground. Meter monitors battery to indicate charge rate, current, and full charge. Circuit breaker protection. Kit GP-1044, Shpg. wt. 22 lbs. 64.95

GP-1044 SPECIFICATIONS: Charge Rate at 120 VAC (primary): Boost, 50 amperes (max. 1 minute). Normal, 15 amps. Shuts off automatically after battery is fully charged. Output Voltage: Shuts off when voltage at terminal reaches 14.5 V. Power Requirement: 110-130 VAC, 60 Hz. Size: 6½" H x 11½" W x 7¾" D.

2 10-Amp Automatic Battery Charger

Keeps your car battery at full charge for easier starts. Better performance! Won't operate unless correctly connected, can't over-charge the battery. Protection circuit shuts unit when battery fully charged. Easy to use — just connect the cables to 12-volt battery terminals and plug into AC outlet. Kit GP-21, Shpg. wt. 13 lbs. 39.95

GP-21 SPECIFICATIONS: Charge Rate: 10 amperes maximum at 120 VAC line. Output Voltage: Between 13.2 VDC and 13.6 VDC. Power Requirement: 105-130 VAC, 60 Hz. Dimensions: 5½" H x 9" W x 6¾" D.

3 Deluxe Capacitive Discharge Ignition System

Get up to 50,000 miles between tuneups on cars, trucks, inboards, I/O & out-board marine engines with 12V battery/distributor/coil negative ground systems. Delivers a larger, more precisely-controlled spark to the plugs to better burn the air-fuel mixture. Reduces problems caused by point bounce and wear. Further extends plug life and the tune-up interval. External override button switches to conventional system. Build it in a couple of hours, install in less than that. 3½" H x 3¾" W x 6" D.

Kit CP-1060, Shpg. wt. 3 lbs. 34.95

Breakerless Ignition Adaptor for CD Ignition Systems. (Not shown.) Develops a timing signal that isn't subject to mechanical problems of point wear and bounce. Replaces the points of all pre-1975 GM V-8 engines, and all AMC V-8s with external dwell adjustment (not for others). Designed for operation only with Capacitive Discharge Ignition Systems such as the CP-1060 or similar units.

Kit CP-1051, Shpg. wt. 2 lbs. 24.95

SPECIAL COMBO OFFER! SAVE \$14.95!

CPS-1060, CP-1060 Ignition and CP-1051 Adaptor Together, Shpg. wt 6 lbs. 44.95

Protect your Car Accessories with this Mobile Security System



New Ultrasonic Automobile Intrusion Alarm

Protect your automobile and its contents with this reliable alarm. Simply move the slide switch to the ARM position or remove the security plug and your GD-1558 is on duty. An alarm delay gives you plenty of

time to enter and disarm the GD-1558 when you're ready to use your car. When unauthorized entry occurs, the GD-1558 waits 10 seconds and then begins sounding the horn. The kit is very easy to assemble and installation requires just three connections. Installation requires car with horn relay. (Optional GDA-1558-1 below). Only 4¾" W x 3¾" D x 1¾" H, operates from your car's 12-volt battery.

Kit GD-1558, Shpg. wt. 2 lbs. 44.95

Kit GDA-1558-1, Horn Relay Kit, Shpg. wt. 1 lb. 2.95



2

2 Kit GDA-1157-1, Optional Siren Accessory, 2 lbs. 19.95

GDS-1157, GD-1157 and Siren Together, 12 lbs. If pur. sep., \$39.90 34.95

Kit GDA-1157-2, Optional Horn Relay, 1 lb. 2.95

Ideal for cars with CB rigs, tape players, etc. Under-dash alarm set which 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. 19.95

Highway 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 a flash rate of better than 1 per second, amber dome lens. High-impact plastic case is moisture and corrosion resistant, has storage for cable. For 12 VDC.

Kit GD-1026, Shpg. wt. 3 lbs. 29.95



Cab-to-Camper Intercom

Provides reliable two-way communications from cab to camper. 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 29.95

GDA-160-1, Accessory Plug. For quick disconnect when camper and cab are separated. Shpg. wt. 1 lb. 4.50

Auto Accessories For Your Pleasure and Convenience



Concealed horn



Exterior horn



Heathkit FM Car Stereo Tuner — the finest sound around!

Offers the kind of performance you'd expect from a home system. Requires power amplifier (below) for operation.

Kit CR-1000A, Shpg. wt. 7 lbs.	69.95
Kit CRA-1000-1, Power Amp (fits back of tuner) 3 lbs.	29.95
CRA-1000-2, 4 1/2" Door Speakers (not shown), 7 lbs. (pair)	14.95
Combo Offer! FM Stereo Tuner and Power Amp together — you save \$29.95. If purchased separately, \$99.90. A great, money saving offer!	
Kit CRS-1000A, Shpg. wt. 17 lbs.	69.95

Heathkit Deluxe Mobile Siren/PA Systems

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 standards for mobile sirens in your area.

Kit GD-18, Shpg. wt. 6 lbs.	64.95
Assembled WD-5130, siren/PA amp, Shpg. wt. 6 lbs.	99.95
Assembled GDA-18-1, exterior horn, Shpg. wt. 10 lbs.	67.95
Kit GDA-18-2, concealed horn (requires 4 1/2" x 4 1/2" x 13" behind grille), Shpg. wt. 10 lbs.	67.95
Assembled WDA-5130-2, concealed horn, Shpg. wt. 10 lbs.	84.95
SAVE \$10.95 on systems! If purchased separately, 132.90	
GD-18A (Kit GD-18 and Exterior Horn) Shpg. wt. 21 lbs.	121.95
GD-18B (Kit GD-18 and Concealed Horn) Shpg. wt. 21 lbs.	121.95



Windshield Wiper Delay Kit

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. Great for driving in mist or fog.

Kit CH-1068, Shpg. wt. 2 lbs. 15.95

CH-1068 SPECIFICATIONS — Delay interval: 5 to 30 seconds minimum. Sweeps interval: 5 to 10 seconds minimum. Input voltage: 13.8 volts DC, ±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.

Fully Assembled Clarion Car Stereo Components

1 Clarion In-Dash 8-track Stereo

With its combination 8-track tape player and AM/FM stereo receiver, the PE-618A features an FET front end for improved FM performance, digital track selector and FM stereo indicator display, and a handy local/distance switch for optimum FM reception. A small chassis and universal installation kit lets you easily mount the PE-618A in the dash in most cars. 7 1/8" W x 2" H x 4 3/4" D. Mfr's suggested list price, \$161.95.

CRP-1266, Shpg. wt. 5 lbs. 109.95

2 Clarion In-Dash Cassette Stereo

The PE-666A puts the convenience and fidelity of cassette stereo in your car. Featuring a combination AM/FM stereo receiver and cassette tape system, this musical performer has fast forward/rewind controls, automatic reverse for continuous play, and a sensitive FET front end in the FM section for improved reception and enjoyment. 7 1/8" W x 2" H x 5 1/2" D. Mfr's suggested list price, \$239.95.

CRP-1267, Shpg. wt. 6 lbs. 169.95

3 Clarion Graphic Equalizer/Power Booster

Give your music a boost and tailor its sound to the acoustic environment of your car with Clarion's 100-EQB-2 graphic equalizer and power booster. Hooks up to most tuners and tape players, features 15 watts RMS output per channel and five individual slider controls to let you precisely adjust each of five frequency bands from 30 through 15,000 Hz, to suit your individual taste. Also has front/rear fader control. 6 3/4" W x 2 1/2" H x 6" D. Mfr's suggested list price, \$109.95.

CAP-1264, Shpg. wt. 4 lbs. 89.95

4 Clarion Three-Way Car Stereo Speakers

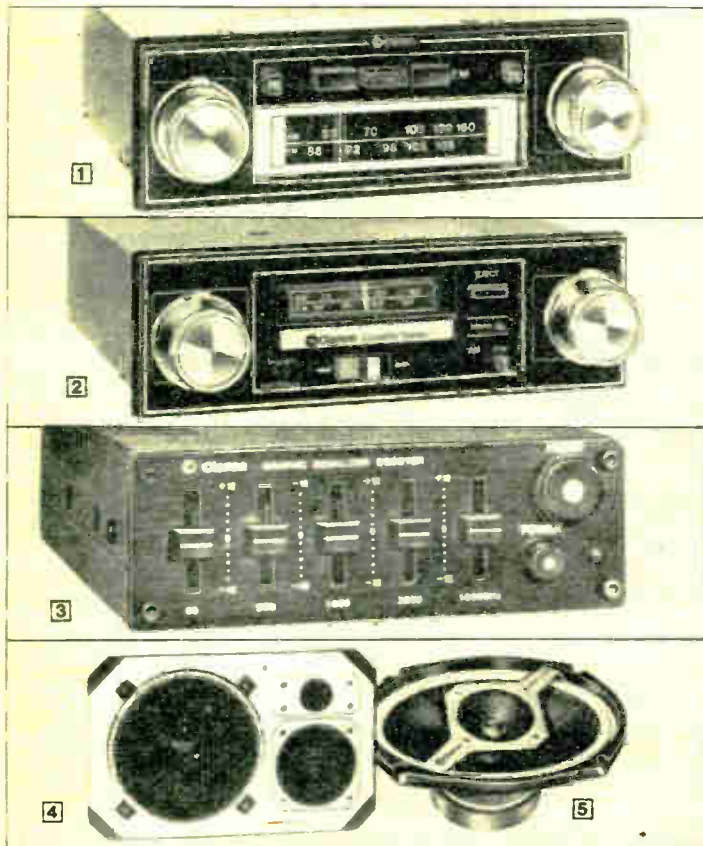
For the finest sound in car stereo add Clarion's "Six Pack" to the rear deck of your car! The speaker features a 5" woofer, 2 1/2" mid-range, and 1" tweeter for beautifully transparent 3-way sound. Includes open mesh grill covers. Mfr's suggested list price, \$126.95.

CSP-1262, SK-99 & grill, Shpg. wt. 10 lbs. Pair 89.95

5 Clarion Two-Way Car Stereo Speakers

These two-way coaxial speakers feature a 6" x 9" woofer and 3" center mounted tweeter. Speakers install flush in the rear deck of your car and have handsome open mesh grills for optimum sound quality. Mfr's suggested list price, \$67.95.

CSP-1261, SK-88 & grill, Shpg. wt. 10 lbs. Pair 49.95





LAST CALL
Limited
Quantities

Digital Readout Auto Accessories for Driving Efficiency

Easy-to-build Digital Readout Tachometer

Reads engine RPM, on $\frac{1}{2}$ "-tall digits. A dimmer control adjusts the brightness. The CI-1079 operates with conventional ignition systems, capacitive discharge systems, 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. For engines with magnetos or without access to the primary, order the optional inductive pickup below. $1\frac{1}{8}$ " H x $4\frac{3}{8}$ " W x $4\frac{3}{4}$ " D. 12 VDC neg. grd.

Kit CI-1079, Shpg. wt. 3 lbs. 49.95

Kit CIA-1079-1, Inductive pickup, Shpg. wt. 1 lb. 5.95

Digital Car Clock with 20-hour Trip Timer

Bright, $\frac{1}{2}$ "-high numerals display the time in hours and minutes. 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. Die-cast base. $1\frac{1}{8}$ " H x $4\frac{3}{8}$ " W x $4\frac{3}{4}$ " D. For 12 VDC neg. grd.

Kit GC-1093, Shpg. wt. 3 lbs. 64.95

Digital Miles per-Gallon Monitor/Speedometer

Helps you save gas and money. Reads 0-99.9 miles per gallon and 0-99 miles per hour. Note: You may wish to have a qualified mechanic install the transducers for you. Be sure your car is included in the list below. We cannot supply 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 Couriers); '55-'71 American Motors cars; '72-'78 Gremiin. Sportabout and Hornet; '55-'66 Studebaker; '55-'78 Jeep; '55-'78 English Ford. For Cruise Control mounting on '69-'78 Chrysler Corp. cars; '69-'78 GM cars (except Opel); '55-'78 Ford cars.

Kit CI-1078-1, Shpg. wt. 5 lbs. 99.95

CI-1078-2. For transmission mounting on: '69-'78 GM cars (except Opel); '72-'78 GM trucks (except LUV); '69-'78 Chrysler cars except Colt and Cricket; '72-'78 Chrysler trucks. Kit CI-1078-2, Shpg. wt. 5 lbs. 99.95

CI-1078-3. For transmission mounting on: All Opel cars; '72-'78 Audi; '55-'78 BMW; '55-'78 Mercedes; '55-'72 Saab; '55-'78 Volvo. For speedometer mounting on '55-'78 Porsche and VW.

Kit CI-1078-3, Shpg. wt. 5 lbs. 99.95

CI-1078-4. For speedometer mounting on: '69-'78 Ford cars; '73-'78 Ford trucks (except Courier).

Kit CI-1078-4, Shpg. wt. 5 lbs. 99.95

Complete Heath Reference Library

TELEVISION

Home TV-FM Antennas. How to professionally design and install an antenna system. Includes cabling information, impedance matching, more.

EDP-186 6.50

The Complete Handbook of Video-cassette Recorders. EDP-258 5.95

Radio TV Handbook. GDP-315 11.95

TEST EQUIPMENT

Handbook of Practical Electronic Tests and Measurements. EDP-137 17.95

101 Ways to Use Your VOM/VTVM. Covers equipment checks AC and DC voltage, DC current, ohm-meter, signal tracing, alignment and color TV. EDP-150 4.50

Understanding and Using the Oscilloscope. Functions, circuits, inputs, waveforms, etc. EDP-139 5.95

101 Ways to Use Your Oscilloscope. EDP-149 4.95

How to use Vectorscope/Oscilloscopes and Sweep-Marker Generators. Troubleshooting and alignment techniques; how to isolate defective ICs and transistors. Much more. EDP-142 5.95

How to Use Color TV Test Instruments. EDP-138 5.95

SHORTWAVE LISTENING

99 Ways to Improve your Shortwave Listening. Antennas, receivers, accessories, troubleshooting, etc. EDP-155 4.50

Shortwave Listener's Handbook. Covers basic equipment, modifications for better listening, receiver characteristics, antennas, schedules and reception reports. Lists major shortwave stations by country and frequency. EDP-196 4.90

SECURITY

Building and Installing Electronic Intrusion Alarms. EDP-135 4.50

The Electronic Invasion. Electronic snooping explained. EDP-203 5.95

ELECTRONIC DEVICES and CIRCUITS

The TTL Data Book. Specifications, pin outs, test data, applications. EDP-220 4.95

TTL Cookbook. What TTL is, how it works and how to use it. EDP-183 8.95

IC Op-Amp Cookbook. Theory of operation, applications. EDP-184 12.95

Tube Substitution Handbook. Lists 12,000 replacements for all types of tubes. EDP-174 2.95

Transistor Substitution Handbook. Substitutions for 100,000 bipolar transistors. EDP-175 4.50

The 555 Timer Applications Source Book with experiments. EDP-249 6.95

MODELS/RADIO CONTROL

Advanced Radio Control. Planes, cars, boats, rockets, etc. EDP-158 4.95

Radio Control Handbook. Covers most control systems. EDP-159 6.95

AMATEUR RADIO

Amateur Radio License Study Guides — make getting any radio license easy — serve as a convenient reference.

NOVICE, EDP-122 5.95

GENERAL, EDP-123 7.95

ADVANCED, EDP-124 5.95

EXTRA, EDP-125 5.95

101 Questions and Answers About Amateur Radio — introduction for beginners, valuable reference for veterans. EDP-118 2.95

ARRL Amateur's Handbook. Up to date electronics theory and application. Covers all facets of Amateur operations. Tube data, construction projects, antenna theory, SSB etc. HDP-293 8.50

Radio Handbook. Comprehensive radio theory and practice for hams. EDP-117 19.50

Amateur Tests and Measurements. EDP-119 5.50

US Callbook. Complete listing of Amateurs in all US call areas and territories. More. EDP-126 14.95

DX Callbook. Complete listing of foreign Amateurs, addresses, postal rate charts, call zone maps. EDP-127 13.95

73 Dipole Antennas. EDP-180 4.95

73 Vertical and Beam Antennas. EDP-181 5.50

ARRL Antenna Handbook.

EDP-182 5.00

REFERENCE/GENERAL

How to Build and Use Electronic Devices. Guide to using op-amps and other electronic devices. EDP-202 9.95

ABC's of Soldering. EDP-178 3.95

Reference Data for Radio Engineers.

EDP-176 30.00

Radio Operator's License Question and Answer Manual. What you need to know to get a license. EDP-193 7.95

Metal Detector Handbook.

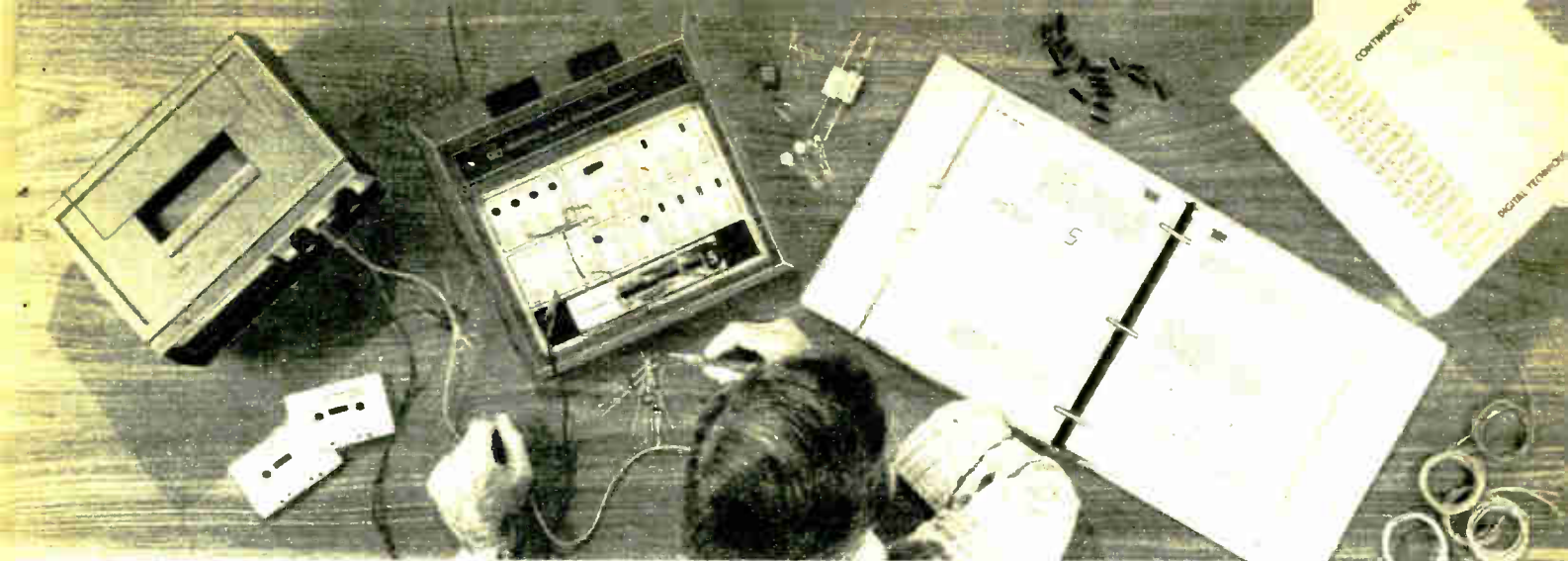
Basics of metal detection, techniques, etc. EDP-222 9.50

How to Build Metal/Treasure Locators.

EDP-257 3.95

BOOK ORDERING INFORMATION

There is a \$10 minimum order for a BOOK ONLY purchase. No minimum on books purchased with kits. Do not calculate postage on book orders, just add 50¢ for each book to the postage column on the order blank. Do not use zone chart for book orders. See page 75 for our complete listing of informative computer and microprocessor books.



HEATHKIT CONTINUING EDUCATION

The revolutionary, low cost way to learn electronics quickly and effectively

There's never been a better, faster, lower cost way to learn electronics than these Heathkit Programs!

Learning electronics could very well be the most important step you'll ever take, so, naturally, there are many factors to consider in choosing your method of learning. If you're like most people, you don't have the time for conventional learning institutions. Needless to say, they are also very costly. The Heathkit Continuing Education Series was conceived with these factors in mind to make learning electronics more convenient and affordable for everyone. Thousands of people just like you are finding out what makes Heathkit learning programs so tremendously successful. Simple, easy-to-use and EFFECTIVE!

Among the many reasons for the wide acceptance of these programs is their simplicity. Each learning program is simply and logically arranged for easy, step-by-step "programmed" learning. No facet of the material is omitted and nothing is assumed. Each program includes everything you need for successful completion and a high degree of understanding. Audio records (or optional cassettes) reinforce the text material and an optional final exam lets you test your overall comprehension. Truly, there's never been a learning method like it.

Get "Hands-on" experience for a better understanding of electronics

Learning electronics and being able to apply what you've learned are, of course, the goals you seek to achieve with the Heathkit Continuing Education Series. For that reason, we have spared no effort in assuring your complete comprehension. Our optional Electronic Trainers perfectly illustrate the Heath approach to learning. Specifically designed for use with each program, these trainers give you actual "hands-on" experience with electronic components and circuitry. It's an acknowledged fact that you learn best by doing and the trainers let you do exactly that. You get a better grasp of circuit concepts and perform the program projects quicker and easier as well.



Solderless connectors on the trainer panel make hookup of the components supplied with the program quick and neat. Built-in power supplies and signal sources provide convenient operation. The trainers are available in both kit and assembled form. If you choose the kit version of the trainer, you gain valuable experience during its assembly. The trainer kit is easy to assemble and its light weight and small size let you move and place it just about anywhere.

When you've finished the program, the trainer still serves as the ideal device for breadboarding circuits of your own design. We highly recommend these trainers as supplements to the Heathkit Individual Learning Programs. A record (or cassette) player is needed to play the audio portion of the material. A VOM for measuring voltages is also needed, and an oscilloscope is required for some of the experiments in the Digital Techniques Program.

A Word On CEUs and the Heath Guarantee

If you elect to take the optional final exam and score 70% or better, you will receive a Certificate of Achievement and be awarded Continuing Education Units (CEUs). CEUs are a nationally-recognized way of acknowledging participation in non-credit adult education. We're so confident you'll be happy with any program you order, we even give you a full money-back guarantee. If for any reason you are dissatisfied with these programs, Heath Company will refund the full purchase price of the text material (less trainer).



IMPORTANT NOTE

All the Continuing Education Programs and trainers 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.

Heathkit Continuing Education Series Cont'd

The programs in the Heathkit Continuing Education Series provide you with a detailed understanding of each subject and prepare you to continue into the next program. By the time you complete them, you will have a thorough overview of modern electronics.

The Continuing Education Programs are economical too. The first four use the same trainer so you can get a complete education in fundamental electronics for less than \$230, a substantial savings over courses offered at night schools, community colleges, etc. (See our package price on page 85). The advanced programs, Digital Techniques and Microprocessors, require separate trainers, but they still cost less than competitive courses.

The AC and DC electronics programs are well-suited for beginners. They are also ideal for training field service personnel, or maintenance and production technicians in the basics of electronic equipment. They can provide fundamental information for those peripherally involved with electronics processes, too. For example, a chemical engineer who requires a basic background in the electronics systems used in chemical processing.

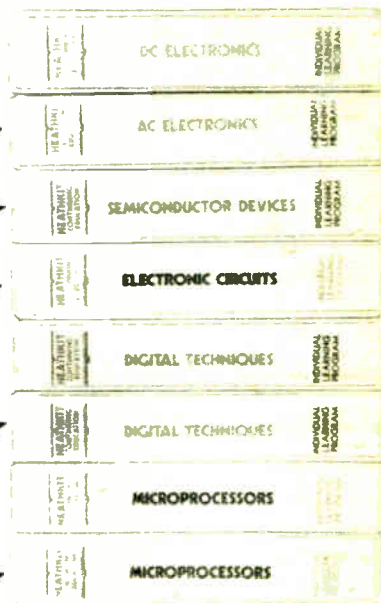
The Semiconductor Devices program is designed for the engineer or technician who is already familiar with basic electronics. It gives you the opportunity to refresh your knowledge of solid-state electronics and to learn the newest technologies like integrated circuits and optoelectronics.

The Electronic Circuits Program assumes completion of the first three programs or equivalent knowledge. It is ideally suited for design engineers who wish to learn the most efficient or easiest way to design actual circuits using the latest electronic components.

The Digital Techniques and Microprocessor Programs give you the very latest in electronic information. They assume a high degree of competence (such as that provided by the four preceding programs) and provide state-of-the-art knowledge of digital design and techniques. This knowledge is essential for an understanding of modern electronics, especially microprocessor and computer systems. The Microprocessor Program makes use of what you've learned in the preceding programs to teach you programming, interfacing, computer arithmetic, etc. The available Microprocessor Trainer helps assure your comprehension of this captivating subject.

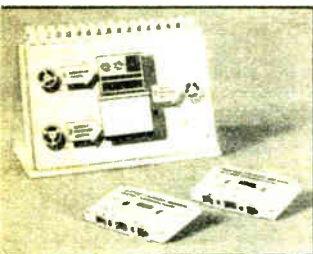
Recommended Order

The Heathkit Self-Instruction Programs are Designed to let you Progress from DC Electronics to AC Electronics to Semiconductor Devices to Electronic Circuits. These are the Four Basic Programs. For Advanced Study, The Digital Techniques Program Provides the Background for the Microprocessor Program.



SPECIAL NDTE DN CEU's. The Continuing Education Units and Certificates of Achievement awarded with each program are issued only on completion of the optional final examination. Therefore, only one set of CEU's and Certificate are issued with each program sold. Your hard work and achievements are thus protected from unauthorized duplication and the integrity of your completed program is maintained.

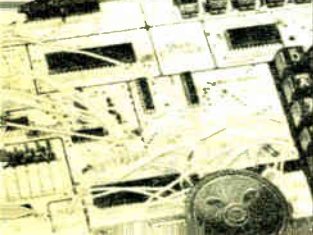
Here's how easy it is to use these self-instruction programs The Unit Activity Guide lets you check off each step as you complete it



Cassette Tapes (or Records) Provide Audio Instruction on Individual Subjects and Visual Aids Help You Follow the Material



"Hands-on" Experience is Gained by Using the Optional Trainers and Performing Specific Experiments as Directed by the Guide



Experiments are Set Up in a Logical Progression So You Learn Additional Information As You Complete Each One

A TYPICAL UNIT ACTIVITY GUIDE

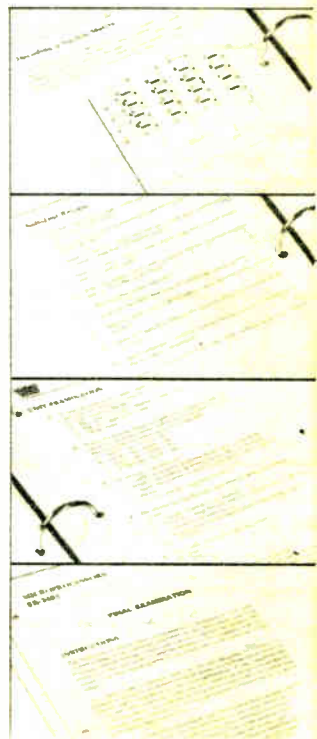
- Play Cassette Tape Section "Designing with Microprocessors."
- Read Section on Interfacing with Switches.
- Complete Self-Test Review Questions 1 through 11.
- Read Section on the Peripheral Interface Adapter (PIA).
- Complete Self-Test Review Questions 12 through 20.
- Read Section on Using the PIA.
- Complete Self-Test Review Questions 21 through 28.
- Perform Interfacing Experiments 5 through 9.
- Play Cassette Tape Section "Comparing Microprocessors."
- Complete Unit Examination.
- Check Examination Answers.
- Complete Final Examination (optional).
- Mail Final Examination in the envelope provided (optional).

Clearly Written, Informative Text is Presented in Easy-to-Read and Follow Format

Frequent Self-Test Reviews Let You Check Your Progress As You Read the Text

Unit Examinations Check Your Knowledge of Information Contained in Each Unit of Study

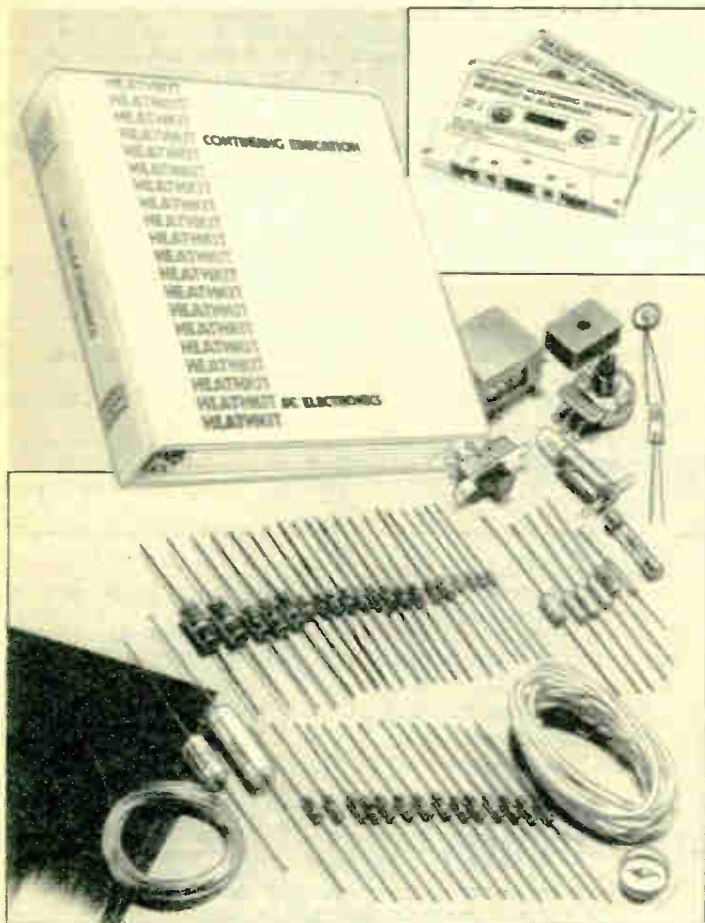
The Optional Final Examination Checks Your Overall Knowledge of the Entire Subject



HEATHKIT CONTINUING EDUCATION

Begin your education with DC Electronics

The basis for a complete understanding of electronics



The first of the incredibly effective Heathkit Continuing Education Series and the foundation on which all the following programs are built.

DC Electronics is the first step you'll take toward understanding the fascinating world of electronics. As you would expect, the DC Electronics Program is simply and logically arranged and assumes no prior electronic knowledge. It begins at basic electron theory and goes on in detail with nothing omitted. Everything you need for successful completion and a high degree of understanding is included. The only other materials needed are a record or cassette player, a few basic hand tools and a VOM. Progressing at your own established pace, you learn in an unhurried environment free from pressure. And learning is easy too with simple, step-by-step "programmed" instructions. Audio aids help emphasize the text material and an optional final exam lets you test your overall comprehension.

Essentially, DC Electronics covers current, voltage, resistance, magnetism, Ohm's Law, electrical measurements, DC circuits, inductance and capacitance. In short, a complete foundation in basic electronics. Included are texts, records, and electronic components for 20 different experiments. Cassette tapes that duplicate the material on the records are optionally available. The average completion time for DC Electronics is 30 hours. A knowledge of high school math is assumed and an appropriate review of such material is included.

What you'll learn

The measure of any learning endeavor is of course, the new knowledge and abilities you gain as a result of your studies. When you have successfully completed DC Electronics, you will be able to accomplish the following:

1. Solve basic electronic problems involving current, voltage, resistance, and power.
2. Explain the relationship between current, voltage, resistance, and power.
3. Discuss the relationship between electricity and magnetism.
4. Using a schematic diagram as a guide, construct DC circuits with components such as resistors, relays, switches, lamps, batteries, and capacitors.
5. Given a wiring diagram of a circuit containing components such as resistors, relays, switches, lamps, batteries, and capacitors, draw an equivalent schematic diagram.
6. Use a multimeter to measure current, voltage and resistance.
7. Convert from one metric prefix to another and to work with powers of ten.
8. Explain the construction, operation, and purpose of resistors, potentiometers, switches, fuses, relays, capacitors, inductors, and batteries.
9. Demonstrate basic safety procedures designed to protect you and your test equipment.
10. Build and experiment with basic DC circuits of your own design.

Course EE-3101, Shpg. wt. 6 lbs.	44.95
EEA-3101, Optional Cassettes*, Shpg. wt. 2 lbs.	6.95
SAVE \$9.95! EES-3101, Program with Kit Trainer. Shpg. wt. 18 lbs.	99.95
ECP-3801, Cassette Recorder/Player, Shpg. wt. 4 lbs.	60.00

Basic Experimenter/Trainer provides hands-on learning experience

For the DC, AC, Semiconductor and Electronic Circuits programs — helps you perform each experiment quickly and easily. And after you finish the program, 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. Available as an easy-to-build kit or in factory-assembled and tested form.

Kit ET-3100, Shpg. wt. 5 lbs. 64.95

ETW-3100, Factory Assembled Trainer.

Shpg. wt. 6 lbs. 99.95

ET-3100/ETW-3100 SPECIFICATIONS: POWER SUPPLIES:
Positive Supply Output: 1.2 to 15 volt DC, continuously variable. Load Regulation: Better than 1%, no load to full load. **Current Output:** 100 mA with short circuit protection. **Negative Supply Output:** -1.2 to -15 volts DC, continuously variable. Load Regulation: Better than 1%, no load to full load. **Current Output:** 100 mA with short circuit protection. **GENERAL: Power Requirements:** 105-130 volts or 210-260 volts RMS, 50-60 Hz, 7 watts maximum. **Dimensions:** 12 $\frac{1}{8}$ " wide x 11 $\frac{3}{4}$ " deep x 3 $\frac{1}{2}$ " high. **Net Weight:** 4 lbs.

For Fastest Service
 Use The Heathkit "Hot Line"
 (616) 982-3411
 Anytime day or night



HEATHKIT CONTINUING EDUCATION

Your Second Step; AC Electronics

Continue learning the
fundamentals of electronics



Once you've mastered DC Electronics, you'll move on to the next phase of what comprises the nucleus of electronics technology; AC Electronics.

With basic DC theory and operation behind you, you'll eagerly progress to this, the second of the Heathkit Continuing Education Series. AC Electronics covers the fundamentals and basic theory of alternating current in a simple, straightforward manner that can be easily understood. Included is everything you need for thorough, no-compromise learning. The only other materials you need are a record or cassette player, a few basic hand tools, a VOM (such as the Heathkit IM-5284, page 54) and the ET-3100 Trainer (listed on page 83).

Included are texts, records and 16 electronic components for 8 different experiments. If you choose to take the optional final exam and score 70% or better, you will receive a Certificate of Achievement and 1.5 Continuing Education Units.

When you have successfully completed AC Electronics, you will be able to accomplish the following:

1. Explain the difference between ac and dc.
2. Describe the operation of a simple ac generator.
3. Determine the average or effective value of an ac sine wave when its peak or peak-to-peak value is known.
4. Determine the frequency of an ac waveform if its period is known or vice-versa.
5. Explain how ac meters can be used to measure current, voltage, and power.
6. Analyze simple ac circuits which contain resistance.
7. Describe the electrical property of capacitance and explain how capacitors are formed.
8. Analyze ac circuits which contain capacitance or a combination of capacitance and resistance.
9. Describe the electrical property of inductance and explain how inductors are formed.
10. Analyze ac circuits which contain inductance or a combination of inductance and resistance.
11. Explain the basic transformer action.
12. Determine the current, voltage, and power relationships at the inputs and outputs of both ideal and practical transformer circuits.
13. Analyze ac circuits which contain resistance, capacitance, and inductance.
14. Explain the operation of series and parallel resonant circuits.

AC Electronics, EE-3102, Shpg. wt. 6 lbs. 44.95
 EEA-3102, Optional Cassettes*, Shpg. wt. 2 lbs. 6.95
 ECP-3801, Cassette Recorder/Player, Shpg. wt. 6 lbs. 60.00
 SAVE \$9.95! EES-3102, Program with Kit Trainer, Shpg. wt. 18 lbs. 99.95

HEATHKIT CONTINUING EDUCATION

Step Four; Electronic Circuits

Learn the Operation of Most
Common Electronic Circuits

Brings the knowledge you've gained in the first three programs to bear on the latest circuits used in solid-state electronics

This program covers the operation of common solid-state electronic circuits: basic amplifiers, typical amplifiers, operational amplifiers, power supplies, regulators, oscillators, pulse circuits, modulators and demodulators. It shows you how to analyze and design simple inverting and non-inverting amplifiers; the basics of oscillation and the operation of commonly used LC, RC and crystal oscillators. You learn about pulse circuits and multivibrators and study amplitude and frequency modulation including SSB. Learn how to use a voltmeter and oscilloscope to analyze the operation of electronic circuits. This program brings all the theory of your first programs together and shows you how it applies in actual circuit operation. Prerequisites are AC and DC Electronics and Semiconductor Devices (or equivalent knowledge). Included are texts, records, and 110 electronic components for 18 different experiments.

If you choose to take the optional final exam and score 70% or better, you will receive a Certificate of Achievement and 4.0 Continuing Education Units.

When you have completed this course, you will have the following skills and knowledge. You will be able to:

1. Identify basic transistor amplifier circuits, describe their operation, and list the characteristics of each.

2. Discuss direct current amplifiers, audio amplifiers, video amplifiers, intermediate frequency amplifiers, and radio frequency amplifiers, including their application in practical electronic systems.
3. Explain the operation of differential amplifiers, comparators, summing and difference amplifiers, and active filter circuits.
4. Analyze and design simple inverting and non-inverting amplifiers that use operational amplifiers.
5. Identify and explain the operation of power supply rectifiers, filters, and regulation circuits.
6. Discuss the basic principles of oscillation, identify and describe the operation of commonly used LC, RC, and crystal oscillators.
7. Demonstrate a knowledge of pulse shapers, multivibrators, the Schmitt trigger, and ramp generators.
8. Explain amplitude and frequency modulation, the heterodyne principle, and modulation and detection circuits.
9. Construct transistor and integrated circuit amplifiers, oscillators, active filters, and pulse-shaping circuits; power supplies and power supply regulation circuits; and a basic amplitude modulation and demodulation system.
10. Use voltmeter and oscilloscope to analyze electronic circuit operation.

Electronic Circuits, EE-3104, Shpg. wt. 8 lbs. 54.95
 EEA-3104, Optional Cassettes*. Shpg. wt. 1 lb. 6.95
 ECP-3801, Cassette Recorder/Player, Shpg. wt. 6 lbs. 60.00
 SAVE \$9.95! EES-3104, Program with Kit Trainer, Shpg. wt. 14 lbs. 109.95

**HEATHKIT
CONTINUING
EDUCATION**

Semiconductor Devices Learning Program

The discovery that revolutionized
the world of electronics



A fascinating subject necessary for anyone going on in their study of electronics — the devices that reshaped every aspect of the industry

No education in electronics would be complete without including solid-state technology. Semiconductor Devices teaches you all about this comparatively-recent development that is prevalent in nearly everything electronic. Audio aids help emphasize the text material and you get hands-on experience with the interesting experiments. An optional final exam lets you test your overall comprehension.

Semiconductor Devices covers semiconductor fundamentals, diodes, zeners, bipolar transistor operation and characteristics, FET's, thyristors, IC's and optoelectronics. Included are texts, records and 27 electronic components for 11 different experiments.

Prerequisites for the Semiconductor program are the first two Heathkit Continuing Education Programs (DC and AC Electronics) or equivalent knowledge. If you choose to take the optional final exam and score a passing grade of 70% or better, you will receive a Certificate of Achievement and 3.0 Continuing Education Units.

When you have successfully completed the Semiconductor Program, you will be able to accomplish the following:

1. Describe the electrical characteristics of semiconductors.
2. Name the primary advantages that semiconductor devices have over vacuum tubes.
3. Explain how the most important semiconductor devices operate.
4. Describe how semiconductor devices are constructed.
5. Use semiconductor components properly without exceeding their maximum ratings or damaging them with improper handling procedures.
6. Recognize the most commonly used semiconductor packages and their schematic symbols.
7. Design your own circuits using semiconductor devices.
8. Test various semiconductor devices to determine if they are functioning properly.

Semiconductors, EE-3103, Shpg. wt. 6 lbs.	44.95
EEA-3103, Optional Cassettes*, Shpg. wt. 2 lbs.	6.95
ECP-3801, Cassette Recorder/Player, Shpg. wt. 6 lbs.	60.00
SAVE \$9.95! EES-3103, Program with Kit Trainer, Shpg. wt. 18 lbs.	99.95



SAVE \$29.80 When You Order All Four Programs and Trainer Kit Together for a Complete Basic Electronics Education

Our complete Basic education program will give you a thorough overview of modern electronics. Here's What you get:

1. DC Electronics Program. With records, texts and 56 electronic components for 20 different experiments.
2. AC Electronics Program. With records, texts and 16 electronic components for 8 different experiments.
3. Semiconductor Devices Program. With records, texts and 27 electronic components for 11 different experiments.
4. Electronic Circuits Program. With records, texts and over 110 electronic components for 18 different experiments.
5. Heathkit basic Experimenter/Trainer Kit for "hands-on" learning.

Lets you do all the experiments in the four programs.
If purchased separately, \$254.75.

ETS-3114, All four programs and trainer kit, Shpg. wt. 42 lbs. 224.95

Advanced Digital Techniques Learning Program

Teaches fundamentals, logic circuits, design applications, microprocessors, more

Learn the operation of digital logic circuits and the major applications of digital techniques in electronics. Covers everything from TTL and CMOS to ROM's, PLA, microprocessors and computers.

The Digital Techniques program covers fundamentals and theory, digital logic circuits, digital integrated circuits, Boolean algebra, flip-flops and registers, sequential logic circuits, combinational logic circuitry and digital design. It shows you how to design digital circuitry for virtually any modern electronic application. The program assumes a prior knowledge of electronics, (either the four basic Heathkit programs or equivalent) however it can be completed by technically oriented people with a math or science background. Includes text, records and 44 electronic components for 24 experiments. The ET-3200 Digital Trainer is required to perform the experiments. Heath also recommends the IM-5284 multimeter (page 54) and an oscilloscope such as the IO-4541 (page 60) is necessary for some experiments.

If you choose to take the final exam, a passing grade of 70% or better earns you 4.0 Continuing Education Units and a Certificate of Achievement.

When you have successfully completed the Digital Techniques Program, you will be able to accomplish the following:

1. Discuss the advantages and benefits of using digital techniques in electronic equipment.
2. Name the major applications of digital techniques in electronics.
3. Convert between the binary and decimal number systems and recognize the most commonly used binary codes.
4. Name the major components used in implementing digital circuits and explain how they operate.
5. Explain the operation of digital logic gates.
6. Identify the more commonly used integrated circuit families used in digital equipment and discuss their operation, characteristics, and features.
7. Use Boolean Algebra to express logic operations and minimize logic circuits in design.
8. Explain the operation of flip-flops.
9. Discuss the operation and application of binary and BCD counters, shift registers and other sequential logic circuits.
10. Name the most frequently used combinational logic circuits and explain their operation.
11. Design both combinational and sequential logic circuits for a given application from definition and concept to the selection of the integrated circuits.
12. Discuss the operation and application of digital counters in time and frequency measurements.
13. Explain how a digital computer is organized and how it operates.
14. Discuss microprocessors, explain their operation and give examples of their applications.

Digital Techniques, EE-3201, Shpg. wt. 9 lbs. **59.95**
 EEA-3201, Optional Cassettes*, Shpg. wt. 2 lbs. **6.95**
 ECP-3801, Cassette Recorder/Player. Shpg. wt. 4 lbs. **60.00**
SAVE \$9.95. EES-3201, Program with Kit Trainer. Shpg. wt. 20 lbs. 129.95



Solid-state Electronic Trainer for the Digital Techniques Program

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 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. The power supplies and circuitry of the ET-3200 are compatible with most of today's commonly-used integrated circuit logic families including: RTL; DTL; TTL; CMOS; ECL; NMOS; PMOS; Linear. For 120 VAC, 60 Hz.

Kit ET-3200, Shpg. wt. 6 lbs. **79.95**

ETW-3200, Assembled and tested version of above, Shpg. wt. 6 lbs. **119.95**

ET-3200 SPECIFICATIONS: DATA SWITCHES: States: +5 volts or 0 volts. Maximum Current: 10 mA, each switch. **Outputs:** 4 terminals, one for each switch. **LOGIC SWITCHES:** Type: Momentary contact, spring loaded. **Circuit:** Two flip-flop latches for contact bounce buffering. **Output States:** Complementary, +5 volts and +0.2 volts. **CLOCK:** Output Frequency: 1 Hz, 1 kHz, 100 kHz; $\pm 20\%$. **Duty Cycle:** 45%. **Output Voltage:** 5 volts peak-to-peak. **POWER REQUIREMENT:** 105-130 volts or 210-260 volts rms, 50-60 Hz, 15 watts maximum. **Fuse:** $\frac{1}{2}$ -ampere, slow-blow. **DIMENSIONS:** 12 $\frac{1}{2}$ " wide x 11 $\frac{1}{2}$ " deep x 3 $\frac{1}{2}$ " high. **NET WEIGHT:** 4 lbs.



Classroom Versions of our Electronics Learning Programs-Ideal For College or High School Courses and Industry Training Programs



**Heathkit
Learning
Publications**



Student Text Contains Comprehensive Coverage of Course Materials, Self-Test Questions and Programmed Instruction Reviews

Student Workbook Contains Detailed Chapter Examinations Keyed to Text and Laboratory Experiments

Instructor's Guide Contains Complete Course Outlines, Objectives, and Guide to Final Exam Preparation

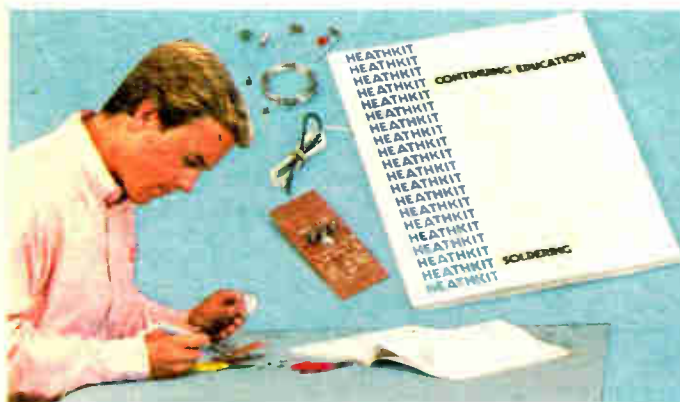
The famous Heathkit electronics learning programs have been completely reformatted for classroom use. Using the instructor's guide, the teacher can add to the information in the program material his own experience and guidance to give the student a fully rounded learning experience. The programs are ideal for classroom use in schools, industry seminars or adult education classes. They provide a very economical method of developing professional materials for classroom use.

The programs are broken down into three separate publications for student and teacher convenience. The student text is the core of the learning material. The student workbook with its exams and laboratory experiments, is keyed to the text. The instructor's guide provides outlines to help present the material in an orderly fashion.

Along with the publications, separate parts packages contain the electronic components needed to implement the workbook experiments. These parts are required for the experiments in the learning programs. To complete the experiments in DC and AC Electronics, Semiconductor Devices and Electronic Programs, the ET-3100 Trainer is required. For the Digital Techniques Program, the ET-3200 Trainer is required.

Quantity discounts are available on the programs below. Free brochures are also available detailing the course objectives and outlines. Contact Heath Company for discount schedule.

Program	Text		Workbook		Instructors' Guide		Parts	
	Shpg. wt. 2 lbs.	Price	Shpg. wt. 2 lbs.	Price	Shpg. wt. 1 lb.	Price	Shpg. wt. 1 lb.	Price
DC Electronics	EB-6101	17.95	EB-6101-40	7.95	EB-6101-50	8.95	EB-6101-30	15.95
AC Electronics	EB-6102	17.95	EB-6102-40	7.95	EB-6102-50	8.95	EB-6102-30	9.95
Semiconductor Devices	EB-6103	17.95	EB-6103-40	7.95	EB-6103-50	8.95	EB-6103-30	9.95
Electronic Circuits	EB-6104	19.95	EB-6104-40	8.95	EB-6104-50	8.95	EB-6104-30	21.95
Digital Techniques	EB-6201	24.95	EB-6201-40	10.95	EB-6201-50	8.95	EB-6201-30	19.95



Effective soldering manual and kit

- Invaluable for Novice Kitbuilders

Heath's EI-3133 Soldering Manual and Kit teaches you the techniques necessary for high reliability soldering in all electronics applications. Whether you're a kit-builder, hobbyist or experimenter, it's the perfect way to learn or brush up on this skill. 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 kitbuilding experience. Requires soldering iron and small hand tools.

Program EI-3133, Shpg. wt. 2 lbs. 9.95

\$9⁹⁵
ONLY



\$84⁹⁵
Kit

Convenient Laboratory Breadboard Experimenter Kit

Makes basic circuit design a breeze. Solderless sockets and a built-in power supply make hook-up and teardown quick and easy. It can even be used to test electronic components.

Kit ET-3300, Shpg. wt. 5 lbs. 84.95

Assembled ETW-3300, Shpg. wt. 6 lbs. 140.00

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.

Microprocessor Self-Instruction Program

Learn Microprocessor Programming
and Application Techniques

This self-instruction program covers microprocessor basics, computer arithmetic, programming, interfacing and much more. It assumes a knowledge of electronics equivalent to Heath's Digital Techniques Program.

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 self-learning program and accompanying computer trainer is the easy, effective way to learn about these powerful devices. The program uses Heath's proven self-instructional techniques including programmed instructions and audio-visual aids to teach computer programming, microprocessor operation, interfacing and related topics.

When you have completed this program, you will be able to:

1. Program a representative microprocessor.
2. Interface a representative microprocessor with the "outside world".

The microprocessor program is organized into 10 learning units as follows:

UNIT 1: NUMBER SYSTEMS AND CODES. Covers decimal, binary, octal, hexadecimal number systems; conversions and binary codes, positional notation.

UNIT 2: MICROCOMPUTER BASICS. Covers terms and conventions, computer words, executing a program, addressing.

UNIT 3: COMPUTER ARITHMETIC: Covers Binary addition, subtraction, multiplication and division; two's complement arithmetic; Boolean operations — AND, OR, Exclusive-OR, INVERT.

UNIT 4: INTRODUCTION TO PROGRAMMING: Covers branching, conditional branching, algorithms, additional instructions.

UNIT 5: THE 6800 MICROPROCESSOR — PART 1. Covers architecture, instruction set and addressing modes.

UNIT 6: THE 6800 MICROPROCESSOR — PART 2. Covers stack operations, subroutines, input-output (I/O) operations and interrupts.

UNIT 7: INTERFACING — PART 1. Covers interfacing fundamentals; interfacing with random access memory (RAM); interfacing with displays.

UNIT 8: INTERFACING — PART 2. Covers interfacing with switches; the Peripheral Interface Adapter (PIA); Using the PIA.

UNIT 9: PROGRAMMING EXPERIMENTS. Covers experiments with binary/decimal, hexadecimal/decimal, and straight line programs; arithmetic and logic instructions, branches, additional instructions, new addressing modes, arithmetic operations, stack operations and subroutines.

UNIT 10: INTERFACING EXPERIMENTS. Provides experiments with memory circuits, clock, address decoding, data output, data input, peripheral interface adapter, audio output, key matrix and parallel-to-serial conversion, digital-to-analog and analog-to-digital conversion.

Each unit is complete with introduction, unit objectives, activity guide, experiment, examination and examination answers.

The EE-3401 is complete with 62 electronic components required to complete the experiments. These components include two 2112 256x4-bit RAM's, 6820 PIA interface chip, 1406 digital to analog converter, 741 and 301 op amps and a variety of other microprocessor-oriented devices. The ET-3400 Computer Trainer, next page, is required for the experiments in the Microprocessor Course.

Upon completion of the program, if you choose to take the optional final exam, a passing grade of 70% or better earns you 8.0 Continuing Education Units and a Certificate of Achievement.

Program EE-3401, Shpg. wt. 10 lbs.	89.95
EE-3401-1 Slides. Optional 35 mm Slides duplicate the audio-visual flip charts in the EE-3401 program. Shpg. wt. 2 lbs.	60.00
EE-3401-2 Filmstrip. Optional 35 mm Filmstrip duplicates the audio-visual flip charts in the EE-3401 Program. 1 lb.	20.00

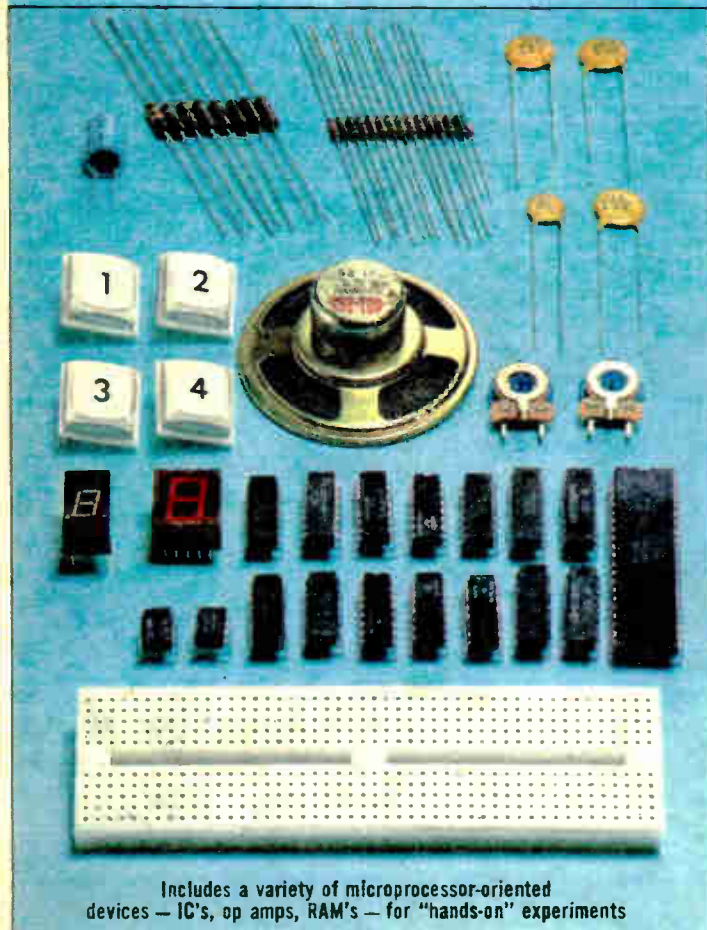
Save \$9⁹⁵

\$269⁹⁵

If purchased
separately, \$279.90

SAVE when you order the Microprocessor Course with the ET-3400 Microprocessor Trainer.

ETS-3400, Course and Trainer
Together, Shpg. wt. 16 lbs. . . . 269.95



Includes a variety of microprocessor-oriented devices — IC's, op amps, RAM's — for "hands-on" experiments

Microprocessor Trainer and BASIC Self-Instruction Program

Microprocessor Trainer for EE-3401 Program lets you get "hands-on" computer experience

\$189⁹⁵

- Use with the EE-3401 program to learn the fundamentals of microprocessors, programming and interfacing
- Uses the popular 6800 microprocessor
- Built-in 1K ROM Monitor Program
- Breadboarding Socket for Prototyping

Functioning as a miniature digital computer, the ET-3400 Microprocessor trainer is essential for the experiments in the EE-3401 self-instruction program. After completing the program, the ET-3400 is ideal for breadboarding, prototyping and system design.

The ET-3400 features a built-in 1K ROM monitor program for controlling unit operation; 6-digit hexadecimal 7-segment LED display for address and data read-out; 17-key hexadecimal keyboard for entering programs and data. Has 256 bytes of random access memory (RAM) built-in, expandable to 512 bytes with the RAM's supplied in the EE-3401 program. Also has 8 buffered binary LED's for display of breadboard logic states, 8 SPST DIP switches for binary input to breadboard circuits, a breadboarding socket for prototyping, interfacing and memory circuits.

All microprocessor address, control and data busses are buffered and terminated on the front panel for ease of connection to prototyped circuits. There's also provision for a 40-pin external connector to extend memory and I/O capacity, Built-in +5, +12 and -12 volt power supplies.

Kit ET-3400, Shpg. wt. 6 lbs. 189.95

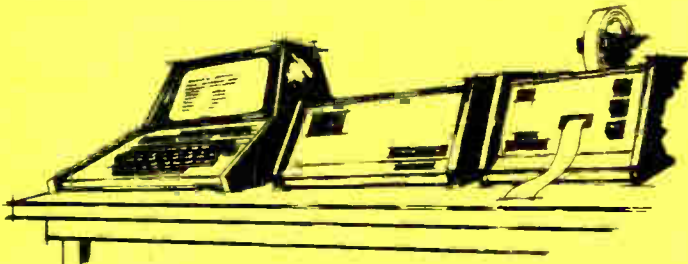
Factory assembled and tested version of above.

ETW-3400, Shpg. wt. 6 lbs. 240.00



HEATHKIT CONTINUING EDUCATION

**BASIC is the
Language to Learn
if you're Into
Computers!**



This BASIC self-instruction program will help you get the most benefit from your H8 or H11 computer system. It's easy and fun to learn, and gives you a thorough background so you can really accomplish creative programming!

Self-Instruction for Programming in BASIC — The Essential Computer Language

This Heathkit self-instructional program is designed to help you get the most from your computer investment, whether you buy your computer hardware from Heath or anyone 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. The EC-1100 uses the PROVEN Heathkit individual learning techniques to give you a thorough understanding of programming, even if you have no prior knowledge or experience. It will show you exactly how to make your personal computer system really personal!

This program 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.

The program is divided into 14 segments, each with its own review test, introduction and objectives. Subjects covered are: BASIC words, decision making, numbers, statements, functions, loops, lists and arrays, strings, programming techniques, programming tools, defining the program, step-by-step plans for writing a program, formatting the program and improving the program.

Three appendices provide descriptions and playing rules for computer blackjack, a rundown of microprocessor number systems and codes, and an explanation of Benton Harbor BASIC and extended Benton Harbor BASIC.

Also included are handy reference cards for Benton Harbor BASIC statements, ASCII number codes, BASIC direct command statements, a reference chart for math and Boolean algebra operations. A workbook provides programming instructions and experiments for use with your computer. While the BASIC program is keyed to Heathkit computers, it is equally applicable to any computer system using BASIC.

An optional final exam (passing grade 70%) brings you a Certificate of Achievement and 3.0 Continuing Education Units.

EC-1100, Shpg. wt. 7 lbs. 39.95



Here's How Heathkit TV Gives you MORE VALUE for your money!

There's Performance — Heathkit TV's are designed to offer the best performance in each price category — they use first class components like rugged fiberglass circuit boards for long life, sockets for IC's and transistors, precision resistors and capacitors, latest design picture tubes. They're engineered for reliability and quality throughout, and since you build them yourself, you have direct control over how well they're put together!

There's Savings — Because you build Heathkit TV yourself, you become familiar with each circuit and each component in the set. And the troubleshooting sections included in each manual are extensive enough to cover virtually every problem that may arise. Our color TV's even have built-in servicing instruments so you can do convergence, alignment, vertical and horizontal centering and make many other adjustments yourself. You can keep your set in peak condition year after year. And because you built it yourself, you can service it yourself. With the high price of repairs, that can be a **really** big savings.

There's Satisfaction — The kind of satisfaction that's built into every Heathkit black-and-white or color TV is a unique feature you simply won't find in an assembled TV. The knowledge that you have built one of the most advanced pieces of electronic equipment available will give you a feeling of pride and accomplishment words can hardly describe.

SPECIAL WARRANTY SERVICE PLAN FOR SOLID-STATE TV MODULES!

If a component proves defective during the 90-day warranty 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.

Simulated TV Picture

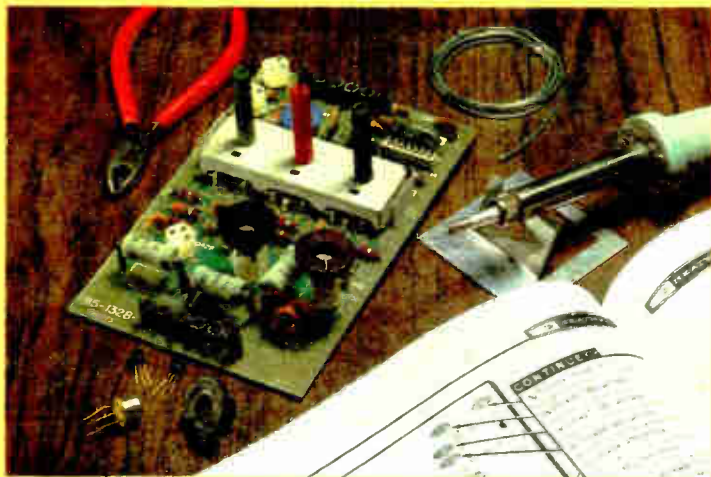
The Heathkit GR-2001-Color TV lets you

The GR-2001 is one of the most sophisticated and versatile color TV's available anywhere, but it's also much more. It's the "heart" of a completely automatic total home viewing system — a fully computerized programmable color TV.

This computer TV system allows you to program your set for an entire evening's viewing, then just sit back and relax. The GD-1185 programmer then automatically changes to the right channel at the right time. You can even program the set to return to manual operation at a preselected time, then resume automatic operation at another time. And programming is easy too — the top bank of 8 keys accesses the memory and turns the on-screen clock display into a readout which lets you "see" your program as you enter it. The selected time appears in the first four digits of the clock display, the channel number in the last two. Simply enter the time at which you want the set to change channels, then enter the channel number you want. You can program up to 32 channel changes within two 12/24 hour periods!

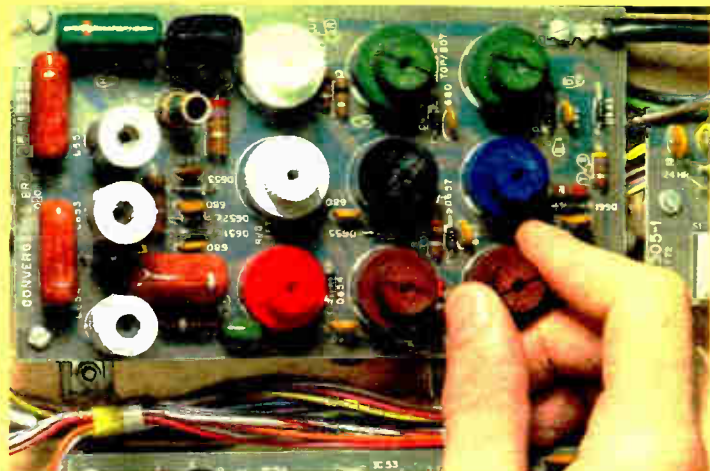
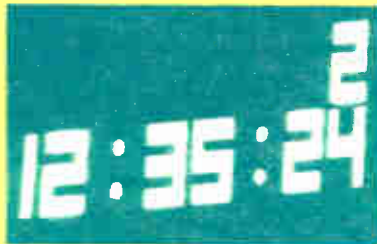
The fully automatic antenna rotor system adds even more automated convenience — you can program the set to turn your antenna to the correct heading each time the GR-2001 changes channels!

To further automate the GR-2001 system, the GD-1184 antenna rotator control lets you rotate your antenna for the best reception on each channel — it's perfect for areas where stations are in widely separate locations. You can select up to 8 separate antenna headings with up to three stations per heading. It's the most convenient antenna-rotor system ever!



Comprehensive, fully illustrated assembly manuals take you step-by-step from unpacking your kit to plug-in. Check-off blanks by each step let you keep your place and follow the instructions for easy, organized kit assembly.

The on-screen digital clock displays the programming sequence in bright, easy-to-see 1" high digits. After programming, it functions as a clock displaying hours, minutes and seconds in 12 or 24-hour format.



Famous Heath built-in self-service features let you keep the GR-2001 in perfect shape for years to come. A dot generator, centering and convergence circuits and a test meter help you really save money on service during the life of the set.

The world's First Fully Computerized program an entire evening's viewing!

With all this programming convenience, you also get a color TV that features our best color picture ever!

While the programmer and antenna-rotor make the GR-2001 system unique, the color TV itself really makes the GR-2001 system worthwhile! The GR-2001 is simply one of the best-performing color TV's you'll find anywhere. Dozens of circuit refinements and improvements combine for a picture that's vivid, accurate, bright and ultra-sharp. The 25" (diagonal) rectangular picture tube uses a black matrix screen for one of the best pictures ever. It's fully shielded to maintain outstanding color purity by eliminating stray magnetic fields. The phase-locked loop horizontal and vertical oscillators provide a picture so rock steady and adjustment-free we've eliminated conventional horizontal and vertical hold controls!

Even the audio circuitry has been improved to provide excellent sound.

The GR-2001 gives you outstanding audio reception to go along with its outstanding picture. The sound signal has its own IF stage to provide a difference you can really hear — through the GR-2001's wide-range speaker or even more dramatically when you use the audio output jack to connect the GR-2001 to your stereo system. It's one of the first sets ever to give you real "hi-fi" sound from a TV! So shop and compare — we think you'll find the GR-2001 color TV one of the finest television values around! Order from next page.

GR-2001 SPECIFICATIONS: Deflection: Magnetic, 90°. Focus: Electrostatic. Convergence: Magnetic. Antenna Input Impedance: VHF: 300Ω balanced or 75Ω unbalanced. UHF: 300Ω balanced. Picture IF Carrier: 45.74 MHz. Sound IF Carrier: 41.25 MHz. Color IF Subcarrier: 42.17 MHz. Sound IF Frequency: 4.5 MHz. Video IF Bandwidth: 4.08 MHz, at 6 dB down. HI-FI Output: Frequency response: ±1 dB, 50 Hz to 15 kHz. Output voltage: Greater than 1.0 V RMS. Audio Output: 4Ω or 8Ω. 2 watts. Power Requirements: 110 to 130 volts AC, 60 Hz, 200 watts. Net weight: 112 lbs.

Eight programming pushbuttons let you sequence the GR-2001 to change channels and rotate your antenna at times you pre-select! Above the pushbuttons, backlit nomenclature shows the current operating mode of the programmer.

Random Access tuning keyboard lets you instantly choose any of up to 16 preselected stations. You can switch from VHF to UHF, up or down, in any sequence and be tuned in instantly, without switching between channels. An optional accessory (GRA-2001-9) lets you add up to 8 additional channels for a total of 24.

The "Instant" on-off switch is defeatable to save energy when the GR-2001 is off for longer periods of time. All primary controls are hidden behind a front panel door for easy access. Most of the control circuitry is located on the slide-out chassis drawer for easy service and adjustment should the need arise.



"The programmer puts you into the real avant garde of TV fanciers. Add this option and you will never again miss a desired program because you forget to turn the channel on in time. The computer memory does all your remembering and automatically chooses the right channel at the right time."

Budget Electronics, Jan. 1978

"The programmable automatic channel selection feature really caught our eye. This one feature sets this set aside from all the others on the market."

Radio Electronics, May 1977

Heathkit GR-2001 25" (diagonal) Color TV Kit

Even if you order it without the options below, it's still one of the finest sets you can buy anywhere! Less cabinet, order your choice of fine-furniture cabinets at right. Includes chassis, picture tube, one speaker.

Kit GR-2001, Shpg. wt. 146 lbs. 699.95

Second Speaker for GR-2001. Fits in space on GR-2001 cabinets where indicated. Includes all cables. GRA-2000-7, Shpg. wt. 2 lbs. 8.95

8-Channel Accessory for your GR-2001

Adds 8 more channels to the GR-2001's random-access tuning system (a total of 24 channels) for even greater versatility. Kit GRA-2001-9, Shpg. wt. 1 lb. 9.95

GD-1185 TV Programmer

Automatically changes channels at any time you select — up to 16 changes in either of two switch-selected 12/24-hour periods. Front-panel keyboard and on-screen readout make it easy to enter any time or channel you want. It's the ultimate in convenience — and a Heathkit exclusive! Requires GRA-601 Clock below for operation. Kit GD-1185, Shpg. wt. 8 lbs. 159.95

Automatic Antenna Rotor Control

Automatically rotates your antenna to preselected directions for the best reception on each channel. Accepts up to 3 channels for each of 8 directions. Operates with or without GD-1185 above. For use only with existing Cornell Dubilier AR-40 rotor system (Heath GDP-1176 or GDP-258) or optional motor below.

Kit GD-1184, Shpg. wt. 6 lbs. 59.95

GDA-1184-1, Rotor Motor. Requires 5-wire cable (not supplied). 11 lbs. 34.95

Easy-to-build On-Screen Digital Clock

Displays the time in hours, minutes and, if desired, seconds in 12/24 hour format below the channel number. Easy-to-read white digits can be adjusted with the channel numbers to remain on the screen for up to 1½ minutes each time the channel is changed, remain on permanently or automatically reappear at approximately 2-minute intervals. Kit GRA-601, Shpg. wt. 1 lb. 29.95



Convenient Hand-held Remote Control for the GR-2001. Lets you adjust volume, turn the set on or off, adjust tint, scan up or down, even turn the optional programmer on or off — all from the comfort of your easy chair. Operates to 20-ft. away from set. Kit GRA-2001-6, Shpg. wt. 4 lbs. 89.95



SAVE \$49.90 on GR-2001 System with Programmer and Clock

Consists of GR-2001 Color TV, GD-1185 Programmer and GRA-601 On-Screen Digital Clock. If purchased separately, \$879.85. Order optional cabinet below. GRS-2001, Shpg. wt. 175 lbs. Motor Freight 829.95

SAVE \$59.85 on GR-2001 with Programmer, Clock, Rotor Control!

Consists of GR-2001 Color TV, GD-1185 Programmer, GRA-601 On-Screen Digital Clock, and GD-1184 Automatic Rotor Control (less motor). If purchased separately, \$939.80. Order optional cabinet below.

GRS-2002, Shpg. wt. 187 lbs. Motor Freight 879.95

Fine-Furniture Cabinets for your GR-2001 or GR-2000 Color TV



1 Contemporary cabinet. Dual speaker capability. Comes completely assembled and finished. Constructed of solids and veneers; oiled walnut finish. 28¾" H x 46¼" W x 20¾" D (23¾" D including cup).

GRA-602-25, Shpg. wt. 66 lbs. Motor Freight 179.95

2 Compact contemporary cabinet. Solidly constructed of wood solids and veneers, beautifully finished in luxurious oiled walnut finish. Comes fully assembled with cut-out for one speaker. Measures 34¾" H x 33¾" W x 20¾" D (24¼" D including cup.) Shpg. wt. 76 lbs.

GRA-608-25, Motor Freight 149.95

3 Mediterranean cabinet with doors. Accepts 2 speakers. Constructed of solids & veneers; simulated wood-grain base & trim. Dark oak finish. Hardware finished in Windsor Antique Gold tone. Fully assembled, finished. 29¾" H x 48¾" W x 23" D. (26¾" D including cup.) Shpg. wt. 108 lbs. Available after Jan. 1, 1979.

GRA-605-25, Motor Freight 269.95

92

4 Early American cabinet. Twin speaker capability. Distressed maple finished wood solids & veneers; simulated wood-grain trim. Hardware has Windsor Antique Gold finish. Fully assembled & finished. 31¾" H x 47¼" W x 20½" D. (23¾" D including cup.) Shpg. wt. 94 lbs.

GRA-603-25, Motor Freight 199.95

5 Mediterranean cabinet. Accepts 2 speakers. Crafted of solids & veneers; simulated wood-grain trim. Dark oak finish. Hardware features Antique Gold finish. Fully assembled and finished. 30¾" H x 49¾" W x 20¾" D. (23¾" D including cup.) Shpg. wt. 82 lbs.

GRA-604-25, Motor Freight 189.95

6 Mediterranean cabinet. For GR-900 Color TV only. Pecan-stained wood solids and veneers, simulated wood-grain base and trim. 30¾" H x 48¾" W x 20¾" D (23½" D. with cup).

Assembled GRA-404-25. 91 lbs. Motor Freight 189.95

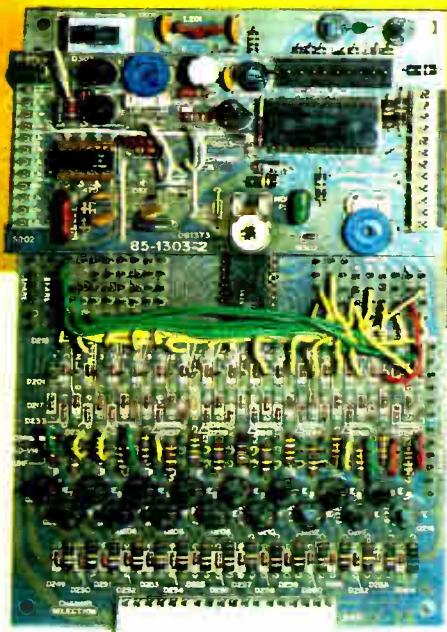
Simulated TV Pictures

"The picture obtained on the GR-2000 can only be described as superb. The Black (Negative) Matrix CRT, the tuner and i-f strip, and the video amplifier provide a picture equal to that of many studio color monitors."

Popular Electronics, April 1974

"Constructing the GR-2000 is made up of simple tasks... anybody who can follow instructions, solder and use wire cutters is capable of building himself a great television set."

Mechanix Illustrated, December 1974



Simulated TV Picture

The "heart" of the GR-2000 is the channel selector circuit board. It provides the direct electronic tuning, the dot generator for color alignment, and controls the numerical channel display.

realistic tints, and an IC automatic gain control for excellent sensitivity, selectivity and noise rejection. You get a consistently excellent picture year after year. And the audio portion of the GR-2000 gives you great sound too, especially if you use the hi-fi output jack to connect it to your stereo system.

Easy and fun to build! 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. There's even a test meter (included) so you can check your progress each step of the way.

Save money on service! 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 peak-performing condition with less expense.

Optional accessories make your set even more enjoyable! The optional Clock Module adds the time to the on-screen channel readout. The time appears in 1" digits beneath the channel and the clock can be set for 4 or 6-digit readout in 12 or 24-hour formats.

The optional remote control provides wireless selection of the channel, volume, tint, color intensity — it even turns the set on and off!

You can custom-mount your GR-2000 in a wall or your own installation, or you can order one of our fine-furniture cabinets from page 92.

And, if you want the incomparable performance of the GR-2000 in a more compact cabinet, look at the GR-2050 on the next page. It uses exactly the same chassis but with a smaller 21" (diagonal) screen.

Kit GR-2000, Motor Freight 599.95

Optional Digital Clock for GR-2000.

Kit GRA-601, Shpg. wt. 1 lb. 29.95

Optional Remote Control for GR-2000.

Kit GRA-2000-6, Shpg. wt. 4 lbs. 89.95

Second Speaker for GR-2000. Fits in space on GR-2000 cabinets (where indicated). Includes all cables. **GRA-2000-7, Shpg. wt. 2 lbs.** 8.95

GR-2000 SPECIFICATIONS: Picture Tube: 25" (diagonal). Viewing Area: 315 sq. in. Deflection: Magnetic, 90 degrees. 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). Hi-Fi Output: Output Impedance: 2000 Ω . Frequency Response: ± 1 dB, 50 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. Mounting Dimensions: 20 $\frac{1}{2}$ " H x 29 $\frac{1}{4}$ " W x 21 $\frac{3}{4}$ " D. Power Requirement: 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

\$599⁹⁵

Total electronic tuning convenience! 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. The large, white digits can be positioned anywhere on the screen. They can be adjusted to remain on the screen for up to 1½ minutes, or permanently if you choose. And you can recall them by changing the channel or by tapping the Volume on the remote control.

A 25" (diagonal) color picture second to none! 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.

Revolutionary electronics! 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,

Small Screen TV's, Video Recorder and Accessories



GR-2050 21" Diagonal 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 **549.95**
GRA-2050-1, Contemporary Cabinet, Shpg. wt. 94 lbs., Motor Freight **134.95**
 Optional Remote Control.
Kit GRA-2000-6, Shpg. wt. 4 lbs. **89.95**
 Optional On-Screen Digital Clock.
Kit GRA-601, Shpg. wt. 1 lb. **29.95**

GR-2050 SPECIFICATIONS: Same as GR-2000 pg. 93, except Picture Tube: 21" diagonal. Dimensions: 19" H x 27½" W x 19" D.



Fully Assembled Sony Betamax® Video Recorder at a special Heath discount price

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! And it works with any color or b&w TV!

Here's the videocassette recorder you've heard so much about. Now you can add a totally new dimension to your television viewing. Record and view any time you like.

Just set the Betamax and your show is recorded (sound and picture) on the special ½" video tape cassette. Play it back with outstanding sound and picture resolution whenever you're ready.

The standard cassette will record up to two hours of programming. The cassette may be erased and used over and over again.

The optional Timer records at a pre-set time so you can capture your favorite programs when you're not at home.

The Betamax gives you complete access to all the shows on TV. The Sony Betamax includes one 60-minute blank cassette so you can start recording right away. Fully assembled. Order Timer and additional videocassettes below.

GD-1230, 52 lbs. Motor Freight **920.00**
GDA-1230-1 Automatic Timer. 5 lbs. **40.00**
GDA-1230-2, 2-Hour Videocassettes. 1 lb. each **16.95**



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, 19" Diagonal Measure, Shpg. wt. 101 lbs., UPS **499.95**

GRA-500-1, walnut veneer table model cabinet (main illustration). 17¼" H x 25½" W x 14" D (17" D including cup), Shpg. wt. 28 lbs., UPS **44.95**

Kit GR-400 (less cabinet), 17" Diagonal Measure, Shpg. wt. 104 lbs., UPS **449.95**

GRA-400-1, walnut-veneer cabinet (16⅞" H x 24⅞" W x 12¾" D), (15¾" D including cup). Shpg. wt. 26 lbs., UPS **39.95**

GRA-403-18, roll-around cart. 22" H x 27" W x 15⅝" D, Shpg. wt. 17 lbs., UPS **21.95**

GRA-601, Digital Clock Accessory, Shpg. wt. 1 lb. **29.95**

GR-500 - 400 SPECIFICATIONS: Antenna input impedance: VHF: 300 Ω balanced or 75 Ω unbalanced. UHF: 300 Ω balanced. Audio frequency response: ±1 dB, 50 Hz to 15 kHz. Harmonic distortion: less than 1% at 1 kHz. Power requirement: 110-130 VAC, 60 Hz, 200 W.



Simulated TV Pictures

Carry Anywhere B&W 12" Diagonal Portable TV

The GR-104C is a really versatile performer. At home, it plugs into a wall outlet. In your car, camper or boat, it works directly from your 12-volt battery system. Outdoors, you can use it anywhere with its optional self-contained battery pack. Any way you use it, you'll get a crisp, clear black-and-white picture of excellent quality. Has a regulated power supply for drift-free operation, all-channel detent tuning, lighted channel indicator, telescoping antenna for VHF and a loop antenna for UHF. The VHF and UHF tuners are factory assembled and aligned. The optional battery pack features an automatic recharging circuit. Rugged high-impact case with carrying handle for easy portability. 11½" H x 15¾" W x 9⅞" D.

Kit GR-104C, Shpg. wt. 35 lbs. **169.95**
Kit GRA-104-3, Optional Battery Pack. Shpg. wt. 10 lbs. **59.95**



Antennas and Accessories for better reception

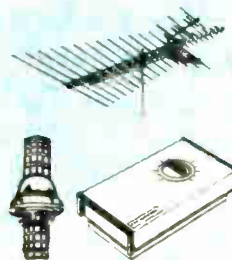
"Super Antenna." 60-element VHF-UHF-FM has 171" boom and 109" turning radius. Includes removable FM blocking elements. Less mast and cable. Motor Freight.

GD-1461, 300 ohms, Shpg. wt. 17 lbs. **79.95**
GDS-1461, 75 ohms, Shpg. wt. 34 lbs. **84.95**

"Deluxe Fringe Antenna." Not shown. Has 131" boom, 80" turning radius. Less mast and cable.

GD-1441, 300 ohms, Shpg. wt. 25 lbs. **39.95**
GDS-1441, 75 ohms, Shpg. wt. 42 lbs. **44.95**

Cornell-Dubilier Antenna-Rotor System. Consists of control box and rugged outdoor rotor. Has heavy-duty 1-rpm rotor with automatic stop and instant reverse; solid-state control box with 360° rotor control. For antennas to 150 lbs. For 120 VAC, 60 Hz. Requires 5-wire cable (not supplied).
GDP-1176, Shpg. wt. 14 lbs. **59.95**



CB Trap Filter. Cuts out CB interference for improved reception. Connects to TV antenna terminals. 300 ohms.
GD-1239, Fully Assembled. 1 lb. **6.95**

75/300 Ohm Transformer/Splitter. With pre-attached leads. **GD-298**, 1 lb. **4.95**

300/75 Ohm Matching Transformer. For use with coax cable.

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

Coax Cable. 100-ft. low-loss RG-59U with antenna boot, connectors.

GD-328, Shpg. wt. 4 lbs. **10.95**

Electronic Home Pinball Machine

From One to Four
Players Can Play

\$599⁹⁵

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

Here it is, the world-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.

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The OC-1401 complies with FAA Advisory Circular No. 60-11 which describes guidelines for using Navigation Computers during airman written tests.

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