HEATHKITS for 1963

STEREO HI-FI COMPONENTS • AMATEUR RADIO GEAR • TEST & LAB EQUIPMENT
MARINE EQUIPMENT • SCIENCE KITS • EDUCATIONAL KITS • WIRED EQUIPMENT

HEATHKIT®
a subsidiary of Daystrom

HEATH COMPANY
International Division
BENTON HARBOR, MICHIGAN, U.S.A.

HEATHKIT®

an earned and valued reputation

The Heath Company pioneered the concept of electronic kits and continues to lead the industry today. This world-wide leadership is the result of pace-setting standards for every Heathkit, satisfaction for every Heathkit customer, and complete devotion of our efforts to kits . . . kits are our business, not a sideline. The quality and value in each Heathkit is achieved by the following means, dedicated to serving you:

ADVANCED ENGINEERING

Heath engineers and technicians are specialists in the Heath-pioneered idea of transferring sophisticated electronic designs into do-it-yourself kits so economical that everyone recognizes their value, and so easy to build that anyone can assemble them and achieve factory-built performance. Over 300 years of accumulated experience, backed by the military and industrial research facilities of Daystrom, Inc., is brought to bear upon the kit design problems of audio, communications, instruments, marine electronics, science and education.

Ideas become electronic kits through the skill of Heathkit engineers and technicians, a skill in evidence in Heath's advanced engineering.

Engineers and technicians test every component specified for Heathkit designs to guard the quality you've come to expect from Heath.

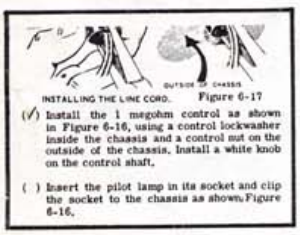
Heath can guarantee kit specifications, regardless of the builder's experience, for each new design is "proof-built" by non-technical people.

WORLD'S EASIEST KITS TO BUILD

The world-famous Heathkit instruction manuals which accompany every Heathkit are the distillation of years of pioneering and searching for the one best way to enable you to build any kit regardless of your experience or skills.

ERSIN MULTI-CORE SOLDER INCLUDED IN EACH KIT

A new addition to the famous Heathkit extra-value technique is this famous brand Ersin Multicore Solder. Each kit contains sufficient solder for you to complete the kit at no extra cost!



INSTALLING THE LINE CORD. Figure 6-17

(√) Install the 1 megohm control as shown in Figure 6-16, using a control lockwasher inside the chassis and a control nut on the outside of the chassis. Install a white knob on the control shaft.

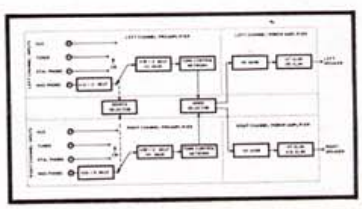
( ) Insert the pilot lamp in its socket and clip the socket to the chassis as shown Figure 6-16.

DOUBLE-CHECK INSTRUCTIONS

Heath Check-by-Step instructions have a double checking system . . . each step is checked off as it is performed . . . and each point that needs soldering has a number to denote the leads to be soldered.

CONVENIENT, ECONOMICAL PACKAGING

The Heathkit packaging technique not only assures you of safe delivery of your kit, but also groups each type of parts into convenient packages in a simple manner that is effective and money-saving, thus permitting us to pass this extra economy to you in the form of better kits.

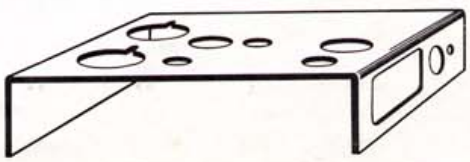


ASSEMBLY TIPS

The famous Heathkit instructions show and tell you how to start . . . proper methods . . . and how to quickly identify parts.

OPERATION TIPS

Heathkit instructions include tips on how to adjust your set for optimum performance . . . how to operate it properly . . . and how to service it should it become necessary.



CIRCUIT DESCRIPTION

Simplified block diagrams accompany descriptions to thoroughly explain the operation of your Heathkit without complicated technical language.

PRE-PUNCHED CHASSIS

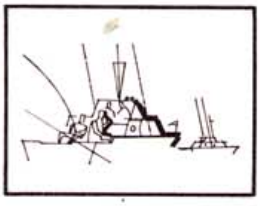
All the hard work is done for you in Heathkits . . . chassis are punched, drilled and labeled to make your kit building easy, the results professional.

HEATHKIT® by Daystrom

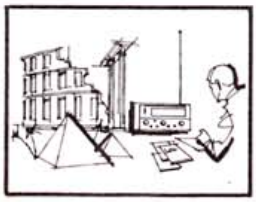
world leader in electronic kits

A KIT FOR EVERY INTEREST
...the World's Largest Selection, over 250 in all!

MUSIC LOVERS choose Heathkit Stereo/Hi-Fi . . . the world's largest selection of fine components from source to sound each with guaranteed performance specifications!



MARINERS choose Heathkit Marine Electronics kits for greater safety and more fun . . . performance you can depend on, savings you can count on.



RADIO AMATEURS choose Heathkit for money-saving, record-breaking performance and value. Known the world over for quality.

HOBBYISTS, Citizen's Band enthusiasts choose Heathkit . . . the biggest CB line in the business! See these and other home and hobby items.

ENGINEERS choose Heathkit test equipment for dependability with economy. Now with new professional styling, a greater value than ever.

EDUCATORS AND PARENTS choose Heathkit educational kits to foster greater interest in science, make learning more fun, more interesting.

COMPLETE SATISFACTION

QUALITY KITS
Quality you can see, quality you can compare . . . by weight, by appearance, by performance . . . by any standard. Quality designed into each unit, assured by rigid control during manufacture, use of only premium-quality components . . . quality you can rely upon to offer you the finest service for years to come . . . quality that is world-famous . . . ask a Heathkit owner and be convinced you get only the finest with Heathkit. We invite comparison of specifications of units costing up to twice as much.

FUN TO BUILD AND USE
Here's interesting work-with-your-hands type of fun. Exciting fun while you build an intricate piece of electronics . . . pleasurable times as you enjoy the famous Heathkit performance.

SATISFYING HOBBY
A life-time hobby that pays off! Building the electronic items you need can be one of life's most rewarding experiences. There is nothing quite so satisfying as seeing a Heathkit assembled with your own hands perform like an expensive, professionally-built model. Educational, too, for all ages 8 to 80!

BIG SAVINGS
Heathkit buying power combined with "do-it-yourself" bring you unbelievable values . . . you save up to 50%.

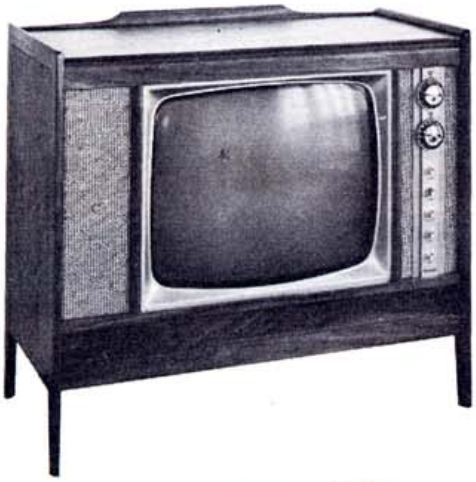
Electronic Transistor Organ

- **America's lowest cost, quality built, two keyboard organ**
- **Easy-to-build, tone generators mount on circuit boards for speed and accuracy**
- **Five year warranty on the transistorized tone generator boards**

Real Organ Features

(1) **Ten True Organ Voices** Faithful tones! Upper Manual: Trombone, Reed, Flute, Oboe, Cornet, Violin, Lower Manual: Saxophone, Horn, Viola, Diapason. All on professional "rocker" tabs. (2) **Variable Bass Pedal Volume Control** Allows you to regulate the 16′ pedal bass voice to the mood of the music. (3) **Manual Balance Control** Makes it easy to adjust the relative volume of the two keyboards to accentuate either in any degree you desire for solo work. (4) **Variable Vibrato** Adds warmth and beauty. First tab turns vibrato on and off. Second tab offers option of heavy or light vibrato to suit the music. (5) **Standard Expression Pedal** You adjust volume from the softest whisper to full majesty. (6) **13-Note Heel & Toe Bass Pedals** Ease and flexibility of playing usually found only on organs costing hundreds of dollars more. (7) **Overhanging Keyboards** Correctly positioned for easy bridging; arranged to standard organ specifications. Each with 37 notes, range C through C. (8) **Beautiful Walnut Cabinet** Deluxe contemporary styling, hand-crafted, hand rubbed. Complete. Matching bench optional. (9) **20 Watt Peak-Power Amplifier & Speaker** Full frequency sound system built right in! **Compact Size** 34½″ high, 39¾″ wide, 21½″ deep. Fits most anywhere! **Transistorized** For better tone, longer life, easier assembly, Uses less power. Virtually trouble free!

Kit GD-232 Organ with Cabinet; **GDA-232-1** Matching Bench **GDA-232-3** Organ Demonstration Record; **GDA-232-2** Self-teacher Recorded Lessons



New 23″ Custom TV Set

- **Advance-Engineered 17 tube, 5 diode circuit with UHF gives 30-tube performance**
- **23″ picture tube with anti-glare bonded safety glass—most expensive type for smallest spot size and best definition**
- **Tubes alone list for over $135**
- **Has finest set of parts ever designed into any TV set**
- **20,000 volt picture power for brighter, sharper pictures**
- **Deluxe turret-type Standard-Kollsman Nuvistor Tuner**
- **All critical circuits are factory-built, aligned and tested**
- **Fully warranteed, picture tube & parts**

SPECIFICATIONS—Picture size: 23″ over-all diagonal, approximately 282 sq. in. **Deflection:** Magnetic, 90°. FOCUS; Electrostatic. **Antenna input impedance:** 300 ohm balanced. **Tuning range:** VHF TV Channels 2-13, (optional UHF Channels 14-82). **Picture IF carrier frequency:** 45.75 mc. **Sound IF carrier frequency:** 41.25 mc. **Sound IF:** 4.5 mc. **Video response:** to 3.5 mc. **Tube complement:** 6DS4 RF Amp: 6CG8A Osc. & converter: 6AJ4A (optional) UHF osc.: 6BZ6 1st IF: 6GM6 2nd IF: 6EW6 3rd IF: 6HF8 Video amp & sound IF: 6GX6 Sound detector & 1st audio: 6GW8 sound output & cathode follower: 6HS8 sync & AGC: 6EW7 vertical osc. & output: 6FQ7 horizontal osc: 6GW8 horizontal output: 6CQ4 damper: 1B3/1G3 high volt. rect.: 5U4GB low volt. rect.: 23AFP4 picture tube. **Diodes:** (2) IN295 video detector & DC restorer: Dual selenium—horizontal AFC: IN82A—UHF Mixer. **Sound cathode follower:** Output impedance 1.5K. Output Voltage—2V. **Audio output:** Output impedance—8 ohms. Output Power—2 Watts hi-fi. **Power requirements:** 105 V to 125 V, 60 cycles AC, 210 watts.

Kit GR-22 Receiver only; **Kit GR-52** TV Receiver & Cabinet; **GR-62** TV Receiver & Wall Mount; Optional UHF Tuner **GRA-22-3; GRA-22-1** Deluxe TV Cabinet; **GRA-22-2** TV Wall Mount

Hi-Fi FM Monophonic Table Radio

- **Engineered for FM Stereo**
- **88 to 108 mc FM coverage**
- **7 tubes function like 11**
- **6″ x 9″ dual-cone speaker**
- **Matches GRA-21-1 Stereo Converter perfectly**
- **Quality preassembled walnut cabinet**
- **Automatic Frequency Control**
- **Tuning eye, slide rule dial**
- **Inputs for crystal phono or AM tuner**

Kit GR-21

Matching Multiplex FM Stereo Converter

- **Completely self-powered, self-contained**
- **Matches the GR-21 receiver perfectly**
- **Quality components assure long, faithful service**
- **Simple controls adjust stereo effect**
- **Can be operated 15′ away from radio**

Kit GRA-21-1

AM and FM Radios

FM Portable Radio

- **10 transistors, 2 diodes**
- **Vernier tuning for easy station selection**
- **Three IF limiters** • **Volume and tone control**
- **AFC and "defeat" switch**
- **Telescoping antenna plus terminals for outside antenna**
- **Headphone jack**
- **Self-contained battery power supply**

SPECIFICATIONS—Tuning range: 88 MC to 108 MC. **IF frequency:** 10.7 MC. **Audio output:** 250 milliwatts. **Loudspeaker:** 4" x 6" permanent magnet. **Battery:** 9 volt, Long-life, leakproof, Neda #1612, Eveready #2356. **Battery life:** 300 to 500 hours. **Dimensions:** 7¼" H x 10" L x 4" D. (overall)

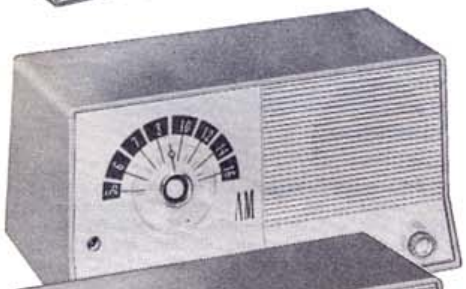
Kit GR-61; Battery **GRA-131-1**

AM Portable Radio

- **Six-transistor, two-diode circuit**
- **Big-set tonal quality with 4" x 6" speaker**
- **Built-in rod antenna**
- **Vernier action tuning**

SPECIFICATIONS—Tuning range: 540-1620 kc. **Sensitivity:** 350 uv/m for 15 db signal-to-noise ratio at 50 mw output. **Transistors:** 6; 2N1108, 2N1110, 2N1111, R251, 2-R-250. **Diodes:** 2. **Loudspeaker:** 4" x 6" permanent magnet. **Battery life:** 500-1000 hours average use.

Kit XR-2P (Plastic); **Kit XR-2L** (Sim. Leather).

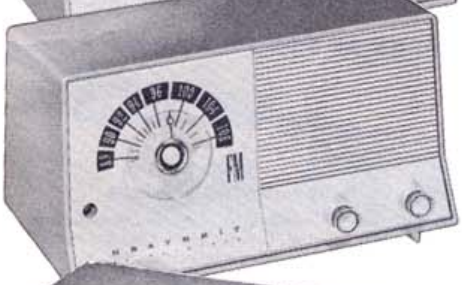


AM Table Radio

- **Transformer operated power supply**
- **Superheterodyne design with AVC**
- **Vernier tuning for easy station selection**

SPECIFICATIONS—Frequency coverage: 550 kc to 1650 kc. **Control functions:** Volume, On-Off, Tuning. **Intermediate frequency (IF):** 455 kc. **Power supply:** Transformer-operated, half-wave rectifier. **Tubes:** (1) 12BE6 Pentagrid converter, (1) 12BA6 IF amplifier (1) 12AV6 Detector, first audio amplifier, (1) 50C5 Audio power amplifier (1) 35W4 Rectifier. **Speaker:** 3½" permanent magnet, 4 ohms. **Power requirements:** 105 to 125 volts AC, 50/60 cps. **Dimensions:** 5" H x 10" W x 5" D.

Kit GR-10

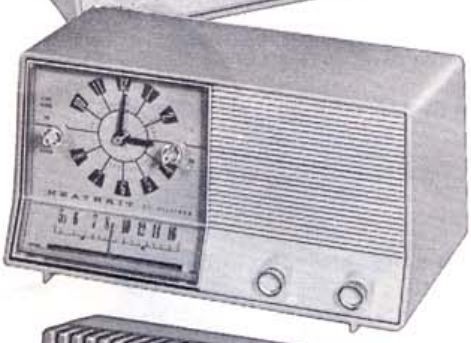


FM Table Radio

- **Transformer operated power supply**
- **Vernier tuning for easy station selection**
- **Preassembled, prealigned FM tuning unit for ease of assembly**

SPECIFICATIONS—Tuning range: 88 to 108 megacycles. **Intermediate frequency:** (IF): 10.7 megacycles. **Demodulation stage:** Ratio detector. **Speaker:** 3½" diameter, 4 ohms. **Tubes:** (1) 17C9 dual tetrode, (2) 12BA6 pentode, (1) 35HB8 triode-pentode, (1) 35W4 diode. **Power requirements:** 105-125 volts, AC 50/60 cps. **Dimensions:** 5" H x 10" W x 5" D.

Kit GR-11



Clock Table Radio

- **Transformer operated power supply**
- **Timer operated outlet for household appliances**
- **Sleep switch—radio alarm—output jack for pillow speaker**

SPECIFICATIONS—Tuning range: 535 kc to 1620 kc. **Intermediate frequency (IF):** 455 kc. **Controls:** Clock, Sleep timer, up to 60 minutes, Selector, Auto Radio, On, Off, Radio Alarm, Time Set and Alarm Set; Radio, Tuning, and Volume control with on-off switch. **Tube complement:** 18FX6 Oscillator-mixer; 18FW6 IF amplifier; 18FY6 Detector-1st audio amplifier; 34GD5 Audio Output; 36AM3 Rectifier. **Power supply:** Transformer-operated half-wave rectifier. **AC outlet:** Switched, 1200 watts maximum, located on rear. **Speaker jack:** For pillow or extension speaker, located on rear. **Dimensions:** 10" W x 5" H x 5" D.

Kit GR-121

Transistor Portable Radio

- **Six-transistor, two-diode circuit**
- **Battery powered for portability**
- **Big set tone from 4" x 6" speaker**

SPECIFICATIONS—Tuning range: 540 to 1620 kc. **Loudspeaker:** 4" x 6" oval, permanent magnet type. **Battery:** 9-volt, Eveready #2356 (NEDA type 1612). **Battery life:** 500 to 1000 hours. **Transistors:** (1) T-6026 RF converter, (2) T-6025 IF amplifiers, (1) T-1577 Driver, (2) T-2286 Audio Output. **Sensitivity:** 200 uv/meter for 20 db signal-to-noise ratio at 50 milliwatts output. **Size:** 8" W x 6¼" H x 3" D.

Kit GR-131; GRA-131-1 Battery for GR-131

Short Wave Listener's Radio

- **Covers 140 kc to 18 mc in four bands**
- **Sensitive regenerative circuit**
- **Transformer isolated circuit**

SPECIFICATIONS—Frequency coverage: 140 kc to 18 mc on four bands. **Tube complement:** 12AT7 Detector/1st Audio 50C5 Audio Output, 35W4 Rectifier. **Power requirements:** 105-125 V 50/60 cycle AC only, 30 watts. Fused. **Controls:** Main tuning (calibrated), Bandspread, Bandswitch, Regeneration, on/off volume, phone jack. **Dimensions:** 10" W x 7" H x 7" D.

Kit GR-81

General Coverage Short Wave Listener's Radio

- **Covers 550 KC to 30 MC in four bands**
- **Seven inch illuminated slide-rule dial**
- **Illuminated relative signal strength meter**

SPECIFICATIONS—Frequency: 550 kc to 30 mc in four bands. Short wave, broadcast bands clearly marked on dial. **Controls:** General coverage tuning. Bandspread tuning, Antenna trimmer, Bandswitch, Noise Limiter—ON/OFF, phone-Standby-CW switch, BFO control, Audio Gain, AC-ON/OFF, Headphone jack, Q-multiplier input jack. **Power requirements:** 105-125 V 50/60 cycles AC, 30 watts. **Dimensions:** 12¼" W x 5½" H x 8¼" D.

Kit GR-91

Shortwave Portable Radio Receiver

- **Ten transistor, six diode circuit**
- **Flashlight battery power supply**
- **Fixed, aligned ceramic IF "Transfilters"**
- **Covers 550 kc to 32 mc in five bands**

SPECIFICATIONS—IF Frequency: 455 kc. **Frequency coverage:** 550 kc to 32 mc in 5 bands with calibrated bandspread scales (oscillator tuning) for 80, 40, 20, 15 and 10 meter amateur bands and 11 meter citizens band. **Selectivity:** 3 kc wide at 6 db down. **Sensitivity:** 10 uv broadcast band, 2 uv short wave bands for 10 db signal-to-noise ratio. **Output:** 400 milliwatts max. **Battery life:** up to 400 hours normal intermittent service using 8 standard size "C" cells. **Dimensions:** 6⅞" H x 12" W x 10" D.

Kit GC-1A; Assembled GCW-1A; Kit XP-2 Plug-in AC Power Supply

Telephone Amplifier

- **Ideal for office work, conference calls or busy housewives**

SPECIFICATIONS—Available power output: 150 milliwatts at 10% maximum distortion, from 300 cps to 3,000 cps. **Controls and switch:** Gain control, On-off switch actuated by telephone handset. **Circuit:** Transistorized; low-current, class B audio amplifier. **Input:** Inductive pickup coil. **Power supply:** 9-volt battery, type NEDA 1602. Provides up to 100 hours of operating time. **Current drain:** 10 to 30 ma, depending upon volume level. **Speaker:** 3" permanent magnet, 3.2 ohm voice coil. **Transistors:** (1) 2N1274 Driver, (2) 2N1274 Output (matched). **Cabinet:** Molded ivory plastic, 9½" L x 6" W x 5" H.

Kit GD-71; GWA-30 Battery Set (two, one for operation, one spare).

Wireless Intercom

- **No connecting wires between units—just plug into nearest AC outlet—impossible to miss a call**

SPECIFICATIONS—Power requirements: 105-125 V 50/60 cycle AC or DC. **Standby power:** 2.5 watts. **Transmit frequency:** 220 kc & 180 kc (switch selected). **Size:** 6¼" H x 8" W x 7½" D.

Kit GD-51 (one station); **Kit GD-51-2** (pair)

High Performance Intercom System

- **Master provides for up to 5 remote stations**
- **Weatherproofed outdoor remote station**

SPECIFICATIONS—Power requirements: 117 v ac 50/60 cycles 2.5 watts (idling), 3.5 watts (full output). **Transistors:** four 2N1274. **Dimensions:** 6¼" H x 8" W x 7½" D (master), 5" H x 8" W x 6" D (indoor remote), 5¾" x 4½" panel size (outdoor remote).

Kit GD-121 Master Station; **Kit GD-131** Indoor Remote; **Kit GD-141** Outdoor Remote.

New Transistor Ignition System

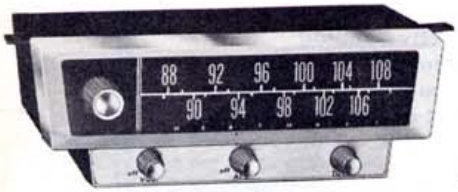
- **Voltage protected transistors**
- **Adjustable for optimum current**
- **Designed for 12 volt negative-ground ignition systems**
- **Easy-to-build kit contains all necessary parts, simple to to install and adjust**

SPECIFICATIONS: Two 2N1546 transistors; two 56v., 1w. Zener diodes: adjustable 1 ohm, 100 watt ballast resistor; Mallory F-12T coil; current meter. **Power requirements:** 12 volt negative ground system only. **Finish:** bright zinc. **Dimensions:** chassis 1¾" H x 3¾" W x 5-13/16" L.

Kit GD-212

FM Auto Radio

- **10 transistor circuit**
- **Preassembled, prealigned FM tuning unit**
- **Automatic frequency control stops drift**
- **Separate tuner and power amplifier for installation ease**
- **Easy circuit board assembly**
- **Beautifully styled**

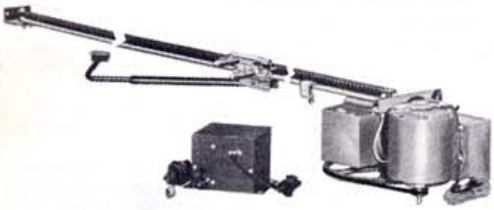


SPECIFICATIONS—Tuning range: 88 to 108 mc. **Quieting sensitivity:** 1.25 uv for 20 db signal to noise quieting. **IF frequency:** 10.7 mc. **IF rejection:** 70 db. **Image rejection:** 30 db. **Total bandwidth:** 340 kc (6 db down). **Audio power response:** ±1 db (60-12,000 cps). **Harmonic distortion:** Less than 1% @ 1 kc; Less than 3% 60—12 kc. **Power output:** 10 watts RMS, 20 watts peak. **Circuit:** 10 transistors. RF amplifier, oscillator, mixer 3 IF stages, 2 audio driver stages, push-pull output. **Controls:** Tuning; on/off, Volume; AFC defeat; Tone control. **Dimensions:** (RF unit) 2⅜" H x 7⅞" W x 4⅜" D, (power amplifier) 2¼" H x 6¾" W x 4⅛" D. **Power requirements:** 2 amperes @ 12 v. DC at full power output.

Kit GR-41

GRA-41-1 Antenna Accessory (not illus.): Solid stainless steel whip, cut for 88-108 mc FM band complete with swivel mount, 15' coax cable, and connector for rear auto mount.
GRA-41-2 Speaker & Grille Accessory (not illus.): 6 x 9 high fidelity speaker with grille for easy rear deck mounting.

Garage Door Operator



- **Opens and closes garage doors automatically**
- **Operates overhead track, and most jamb, or pivot type doors up to 8' high**
- **Fool-proof safety device disengages door upon meeting any obstruction**
- **Easy to install—complete instructions furnished**
- **Transmitter, receiver, and mechanism available separately or as a combination**

TRANSMITTER SPECIFICATIONS—6 or 12 volt operation. 5 watts max. (FCC requirements) to final. 3 modulation frequencies approx. 2KC, 2.9KC & 3.7KC. Fused. 4⅛" wide x 6" long x 4" high. 6AU8 & 12BH7. 27.255MC crystal controlled.

RECEIVER SPECIFICATIONS—117 V.A.C. 4⅛" wide x 6" long x 4" high. 6BH6 & 6CB6. 10 W idle, 12 W with signal. 27.255 MC. 3 audio filter frequencies approx. 2KC, 2.9KC & 3.7KC adjustable to match Xmitter. Fused.

MECHANISM SPECIFICATIONS—126" length x 8⅝" high x 13" wide. 100# max. operating force. Operate doors up to 8' high. 117 V.A.C. ¼ H.P. motor. Fused.

Kit GD-20 Mechanism, transmitter & receiver; **Kit GDA-20-1** Transmitter only; **Kit GDA-20-2** Receiver only; **Kit GDA-20-3** Mechanism only

Ignition Analyzer

- **Shows trouble spots and results of corrective action taken**
- **Switch-selection of 4 different patterns without lead switching**
- **New improved trigger circuit for steady, locked-in patterns**
- **Vertical and horizontal "expand" for magnified views**
- **Easy to use, with complete instructions provided**

SPECIFICATIONS—RPM range: 400-5000 rpm. **Displays:** Secondary, Primary, Parade, Super-imposed. **Screen size:** 4¾" diameter. **Dwell measurement:** 4, 6 & 8 cylinder calibration on face plate. **Pattern height:** Secondary circuit, approx. 1"; Primary circuit, 6 volt system ¾", 12 volt system 1". **Vertical expand ratio:** 2 to 1. **Horizontal expand ratio:** 10 to 1. **Cable length:** 12' pickup clamp, 2' ground, primary and secondary clips. **Front panel controls:** Vertical position, right edge, left edge. **Front panel switches:** Parade-Superimposed, 6-position rotary; Off, secondary expand, secondary normal, primary normal, primary expand and accessory. **Internal controls:** Focus, astigmatism, trigger adjust. **Trigger method:** Current transformer clamp in rugged plastic housing. **Tube complement:** 5UP1, 1V2, 6EA8, 12AU7(2), 12AX7(2). **Rectifiers:** (3) silicon. **Power requirements:** 105-125 V, 50/60 cycles AC, 30 watts.

Kit IO-20; Assembled **IOW-20**
Timing Light Accessory: **Kit ID-11;** Assembled **IDW-11**

CB Transceivers

Citizen's Band Transceiver

- **Sensitive superheterodyne receiver**
- **Crystal controlled or variable receiver tuning**
- **3 crystal-controlled transmitting channels**
- **Push-to-talk microphone—tuning meter**

GENERAL DESCRIPTION—Receiver section: 4-tube superheterodyne circuit with built-in squelch and noise limiter function. **Sensitivity:** 1 uv signal at antenna input produces 10 db signal to noise ratio. **Selectivity:** 7.5 kc at points 6 db down from peak response. **Transmitter section:** power input to final RF amplifier does not exceed 5 watts. **Frequency control:** 3rd overtone quartz crystal. **Frequency control effectiveness:** within .005% of nominal crystal frequency over an ambient temperature range of —20 degrees F to + 130 degrees F. **Modulation:** AM plate and screen modulation automatically limited to less than 100%. **Output impedance:** 50-70 ohms. **Tube complement:** (1) 6U8 Triode receiver crystal oscillator, pentode mixer. (1) 6C4 Receiver variable oscillator. (1) 6BJ6 IF amplifier. (1) 6BJ7 Detector diode, Squelch diode, Noise limiter diode. (1) 6AN8 Pentode first audio amplifier, triode microphone preamplifier. (1) 6AQ5 Combination audio output-modulator. (1) 6AU8 Triode transmitter oscillator, pentode driver. (1) 5763 RF final amplifier. **Power requirements:** 117V AC version, 45 watts; 6V DC version, 7.5 amps; 12V DC version, 4.5 amps. **Dimensions:** 4½" H x 15" W x 5¾" D.

Kit GW-11A (AC only); **Assembled GWW-11A** (AC only); **Kit GW-11D** (6 or 12 v. DC); **Assembled GWW-11D** (6 or 12 v. DC)

Exclusive New 4-Position Selective-Call Unit

- **Eliminates hearing unwanted conversations on crowded CB channels**
- **Equips your station for selective calling**
- **Switch selection of four different tone signals**
- **All-tone monitor position—built-in power supply**
- **Defeat switch allows normal operation at any time**

SPECIFICATIONS—Power requirements: AC version: 15 watts. DC version; 6 V—2 amps; 12 V—1.25 amps. **Controls:** Input and output level controls permit use with a wide variety of transceiver designs. A "Reset Time" control permits variations in "Speaker on" time after a tone is received. **Dimensions:** 6¼" W x 4¼" H x 6¾" D.

Kit GD-162A (AC only); **Kit GD-162D** (6 or 12 v. DC)

Special Deluxe CB Transceiver

- **5 crystal-controlled transmit & receive channels**
- **Superheterodyne receiver with RF stage**
- **Built-in squelch and automatic noise limiter functions**
- **Convenient push-to-talk microphone—no relay**

SPECIFICATIONS—RECEIVER SECTION: General description: 5-tube superheterodyne circuit with built-in squelch, noise limiter, RF amp., and switched 4-tone tone squelch functions. **Crystal controlled receiver tuning range:** Up to five of the 23 citizen's band channels as determined by the particular crystals installed in the unit. **Intermediate frequency:** 455 kilocycles. **Sensitivity:** ½ microvolt for a 10 db signal-to-noise ratio. **Selectivity:** 7.5 kc at points 6 db down from peak response.

TRANSMITTER SECTION: Nominal power input to final RF amplifier: 5 watts. **Frequency control:** 3rd overtone quartz crystal as selected by the 5-position channel Selector Switch. **Frequency control effectiveness:** Operating frequency will be within .005% of nominal crystal frequency over an ambient temperature range of —20 to +130 degrees F. **Modulation:** AM plate modulation automatically limited to less than 100%. **Output impedance:** 50-70 ohms. **GENERAL: Tube complement:** 6CB6 receiver RF amplifier; 6U8 triode receiver crystal oscillator, pentode mixer; 6BJ6 IF amplifier; 6BJ7 detector diode, squelch diode, noise limiter diode; 6AN8 Pentode first audio amplifier, triode microphone preamplifer; 6AQ5 combination audio output modulator; 6AU8 triode transmitter oscillator, pentode driver; 5763 RF final amplifier; 6AN8 voltage amp cathode follower (tone section); 6C4 relay control tube (tone section). **Power requirements:** GW-32A—117 volts, 50/60 cps AC, 50 watts; GW-32D—6 volts DC, 8.0 amperes, 12 volts DC, 4.5 amperes. **Dimensions:** 9¼" D x 6¼" H x 9½" W.

LESS SELECTIVE-CALL FUNCTION

Kit GW-22A (AC only); Assembled **GWW-22A** (AC only); **Kit GW-22D** (6 or 12 v. DC); Assembled **GWW-22D** (6 or 12 v. DC)

WITH BUILT-IN SELECTIVE-CALL

Kit GW-32A (AC only); Assembled **GWW-32A** (AC only); Kit **GW-32D** (6 or 12 v. DC); Assembled **GWW-32D** (6 or 12 v. DC)

Low-cost Citizen's Band Transceiver

- **Single channel, crystal-controlled accuracy—no tuning necessary**
- **Sensitive superheterodyne receiver—always on frequency**

GENERAL DESCRIPTION—Receiver section: 4-tube superheterodyne circuit with built-in squelch and noise limiter function. **Sensitivity:** 1 uv signal at antenna input produces 10 db signal to noise ratio. **Selectivity:** 7.5 kc at points at 6 db down from peak response. **Transmitter section:** power input to final RF amplifier; does not exceed 5 watts. **Frequency control effectiveness:** within .005% of nominal crystal frequency over an ambient temperature range of —20 degrees F to +130 degrees F. **Power requirements:** 117 v. AC operation, 50 watts; 6 v. DC, 8 amps;12 v. DC, 4 amps. **Dimensions:** 5⅜" H x 8⅜" W x 8" D. 9" D with GWA-12-1 power supply.

Kit GW-12A (AC only); Assembled **GWW-12A** (AC only); **Kit GD-12D** (AC & DC); Assembled **GWW-12D** (AC & DC); Accessory DC power supply for AC models only—**GWA-12-1**

"Walkie-Talkie" Transceivers

Low-cost 4-Transistor "Walkie-Talkie" Transceiver

- **No license, forms, tests or age limit requirements**
- **Operates up to 1 mile between units**
- **Crystal-controlled transmitter—superregenerative receiver**
- **Simple circuit board construction**
- **Operates from a single 9-volt battery for up to 75 hours use**

SPECIFICATIONS—Receiver: Superregenerative detector. **Sensitivity:** Usable with signals as low as 4 uv at antenna terminals. **Tuning range:** Fixed (by internal adjustment) to any channel, 1 through 23. **Audio power output:** 30 milliwatts. **Speaker:** 3.2 ohm, round. **Controls:** on/off volume, push-to-talk switch. **Transmitter RF input power:** approx. 90 milliwatts. **Transmitter frequency:** Crystal controlled unlicensed channels 2 through 23 (channel 1 through 23 for licensed operation). **Crystal:** Subminiature, plug-in type, .005% tolerance. **Microphone:** 3.2 ohm speaker. **Modulation:** high level AM limited to less than 100%. **Antenna:** 40" whip type, collapsible to 7½". **Battery:** 9 V. **Battery life:** Approx. 75 hours (normal intermittent use). **Transistors:** 2N1108, R424, (2) 2N185. **Dimensions:** 6½" H x 3¾" W x 2⅜" D.

Note: Fully certified for unlicensed communications with similar transceivers operating in 26.97 to 27.27 mc band, under part 15 of FCC regulations. Since GW-31 is designed to comply with the requirements of part 19 of FCC regulations, it can also be used and licensed for communications with Class D Citizen's Band stations.

Kit GW-31; Assembled **GWW-31;** Kit (pair) **GW-31-2;** Assembled (pair) **GWW-31-2**

GWA-30 Battery Set (Use with GW-21 or GW-31) Set of two, one for operation, one spare.

Deluxe 9-Transistor "Walkie-Talkie" Transceiver

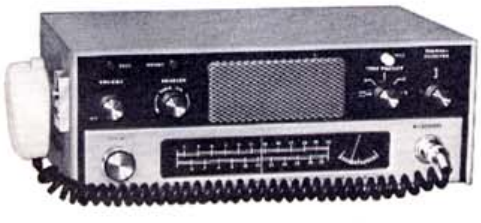
- **Crystal-controlled superheterodyne receiver with RF stage**
- **Built-in squelch & noise limiter circuit**
- **Crystal-controlled transmitter • Easy circuit board assembly**
- **9-transistor circuit • 1 to 3 mile operating range**
- **Economical battery power supply**
- **No license, forms, tests or age limit requirements**

SPECIFICATIONS—Receiver section: *Receiver Type—Crystal controlled, superheterodyne; Sensitivity—1 uv for 10 db SN; Selectivity—7.5 KC @ 6 db; Audio Power Output—150 mw; Speaker-Mike—2½" round PM; Controls—OFF-ON Volume and Squelch. **Transmitter section:** RF Input Power—100 mw; *Frequency Unlicensed—Crystal controlled 26.975 to 27.255 mc (any channel, 2 through 23, in the 11-meter band); *Frequency Licensed—Crystal controlled 26.965 mc to 27.255 mc (any channel, 1 through 23 in the 11-meter citizen's band); Crystal—Subminiature, plug-in type, tolerance .005%; Modulation—High level AM limited to less than 100%; Control—Single push-to-talk switch on side of cabinet. **Power supply:** **Battery—9 V type Neda #1602, Eveready #246, Burgess #2N6, Mallory #M1602, Ray-O-Vac #1602, RCA #VS305: Battery Life—Approximately 75 hours (normal intermittent use); Total Receiver Current Drain Standby—Approximately 12 ma; Total transmitter Current Drain—Approximately 30 ma. **General:** **Antenna—35" whip type, collapsible completely into cabinet; Transistors and Diodes—1-2N1726 RF amp, 1-2N1727 converter, 2-2N1108 IF amp, 3-2N185 audio, 1-R425 trans. osc., 1-R424 RF amp, 1-Germanium Diode-detector, 1-Silicon Diode—squelch & noise limiter. **Cabinet dimensions:** 7⅞" H x 3⅝" W x 1⅜" D.

*Specify desired channel when ordering crystals. See crystal list.

**The antenna supplied and the specified battery must be used to insure compliance with FCC Rules & Regulations, Part 15.

Kit GW-21; Assembled **GWW-21;** Kit (pair) **GW-21-2;** Assembled (pair) **GWW-21-2**



Deluxe "Master Station" CB Transceiver

- **3 circuit boards for easy assembly**
- **3-way power supply for 117V AC, 6 or 12V DC—switch selected**
- **5 crystal-controlled transmit & receive channels**
- **Built-in 4-tone selective call circuitry**
- **Signal strength meter and automatic noise limiter**

GENERAL DESCRIPTION—Receiver section: 6 tube superheterodyne circuit with RF amplifier, squelch noise limiter, variable or crystal receiver tuning, tuning meter and built-in tone squelch with four front panel selected tones. **Tuning range:** (Crystal) Up to 5 switch-selected channels; (Variable) Tunes all 23 channels. **Intermediate frequency:** 455 kilocycles. **Sensitivity:** ½ microvolt or less for a 10 db signal to noise ratio. **Selectivity:** Interference from an adjacent channel (10 kc away) is reduced at least 40 db. **TRANSMITTER SECTION: Nominal power input to final RF amplifier:** 5 watts. **Frequency control:** 3rd overtone quartz crystal as selected by the 5 position channel selector switch. **Frequency control effectiveness:** Operating frequency will be within .005% of nominal crystal frequency over an ambient temperature range of −20 to +130 degrees F. **Modulation:** AM plate modulation, automatically limited to less than 100%. **Output impedance:** 50-70 ohm. **TONE SQUELCH SECTION: Frequency control:** Resonant reed relay; with reeds used for generation of calling tone and frequency selection during monitoring. **Controls:** Tone Selector; Monitor All, A, B, C, & D; Call Switch: Call and Receive; Squelch Switch: Tone Squelch off & on, Reset Time Control. **Tube complement:** 6CB6, Receiver RF amplifier; 6U8, Triode receiver crystal oscillator, pentode mixer; 6C4, Variable oscillator; 6BJ6, 1st IF amplifier; 6BJ6, 2nd IF amplifier; 6BJ7, Detector diode, squelch diode, noise limiter diode; 6AN8, Pentode first audio amplifier, triode microphone preamplifier; 6AQ5, Combination audio output modulator; 6AU8, Triode transmitter oscillator, pentode driver; 6AQ5, RF final amplifier; 6AN8, Voltage amplifier, cathode follower (tone squelch section); 6C4, Relay control tube (tone squelch section). **Power requirements:** AC operation, 6VD6 operation, 12V DC operation. **Dimensions:** 5⅜" H x 17½" W x 10½" D.

Kit GW-42

Marine Equipment

Depth Sounder

- **Shows depth to at least 200 feet on hard bottom**
- **Five-transistor circuit with tuned amplifiers**
- **Circuit board construction—easy to build**
- **May be powered by internal or external batteries**
- **New compact cabinet in Heathkit advanced styling**

SPECIFICATIONS—Dial: 0-200 feet in one foot divisions. **Range:** 0-200 feet on hard bottoms, 0-100 feet on soft bottoms. **Frequency:** 200 kc. **Sounding rate:** 1440 soundings per minute, or 24 per second. **Accuracy:** Within 5% of actual depth. **Depth indication:** Neon lamp flashing at 0 feet and again at indicated depth. **Transducer:** Barium titanate ceramic element encased in a waterproof housing with solid brass fittings; attached 15 foot length of 2 conductor shielded cable. May be mounted permanently to the hull or temporarily with a transom mount. **Controls:** Combined ON/OFF-Sensitivity. **Power supply:** 13.5 volts from nine self-contained size C flashlight cells, or external 12 volt battery. Flashlight cells are contained in three leakproof plastic housings. **Battery drain:** 50 milliamperes. **Average battery life:** 50 hours intermittent operation, 25 hours continuous operation. **Dimensions:** 7¼" W x 5¼" H x 7½" D.

Kit MI-11, MIA-11 Accessory Transducer Mount

3-Band Direction Finder

- **Covers beacon/consolan, broadcast and marine telephone bands**
- **10-transistor, 1-diode circuit**
- **Built-in BFO for receiving Consolan or CW signals**
- **Easy access to battery power supply**
- **Easy to build with prewired component package and pre-assembled tuner**
- **New styling, new colors**
- **Batteries last 500-1000 hours**

SPECIFICATIONS—Beacon band: 188 to 410 kc. **Broadcast band:** 535 to 1620 kc. **Marine band:** 1650 to 3450 kc. **Sensitivity for 6 db signal-to-noise ratio:** BC band, 40 uv/meter; Beacon band, 120 uv/meter; Marine band, 25 uv/meter. **Normal bearing accuracy:** ±3°. **BFO:** 455 kc, switch-selected. **Speaker:** 4" x 6" weather proofed. **Power requirements:** 9 volts from 6 standard size "D" flashlight batteries. **Battery drain:** 35 ma @ 50 mw output level. **Battery life:** 500-1000 hours. **Dial light:** Spring-return switch operated. **Null and tuning indicator:** 0-1 ma meter. **Transistors:** (1) T1363, (2) 2N1108, (1) 2N1109, (1) 2N1110, (1) 2N1111, (1) R251, (2) R250, (1) 2N238, (1) diode. **Dimensions:** 9" x 9¾" x 6⅝".

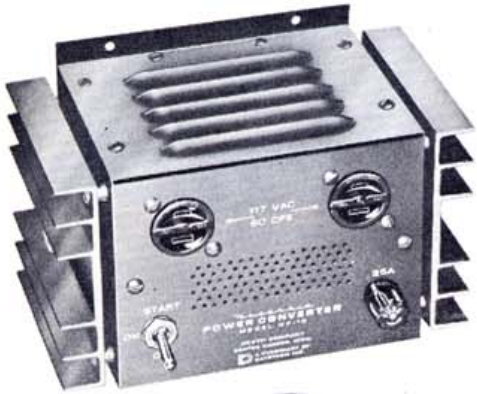
Kit MR-21

50-Watt Marine Radiotelephone

- **Covers standard broadcast and 2-3 MC marine bands**
- **5 crystal-controlled transmit & receive channels**
- **Dependable 8-transistor receiver**
- **Powerful 50 watt long-range transmitter**
- **Doubles as 8-watt deck-hailer or PA amplifier**
- **Built-in heavy-duty vibrator power supply**
- **F.C.C. type accepted**

SPECIFICATIONS—Frequency range: 2-3 mc. **Broadcast:** 550-1600 kc. **Receiver sensitivity:** (providing 10 DB S/N ratio or better). Marine channels; 2 microvolts. Broadcast; 20 microvolts. **Audio output:** 3 watts to internal speaker, 8 watts to PA "deckcall". **Transistor complement:** (1) T1363 Mixer; (1) T1364 Oscillator; (2) T11364 I.F.'s (2) 2N1274 1st Audio and Squelch; (1) 2N301 Driver; (2) 2N1147 Audio Output and Modulator; (3) diodes, noise limiter and squelch. **Transmitter RF input:** 50 watts. **RF output:** 25 W. min. **Transmitter tube complement:** (1) 6BA8 Oscillator and Buffer; (1) 12DQ6A Final Amplifier. **Power requirements:** 12 volts DC. Receiver only; 0.9 amp; Standby; 2.1 amp; Transmit; 13 amps. **Dimensions:** 7" H x 10" W x 13" D.

Assembled MWW-11A



Marine Power Converter

- **Converts 6 or 12v. battery power to 117 v. AC**
- **Uses transistors for dependability and efficiency**
- **Two AC receptacles provided**
- **Ideal for lights and small appliances**
- **Compares with units costing several times more**

SPECIFICATIONS—Power source: 6 or 12 volt storage battery. **Power output:** nominal 117 volt, 60 cycle AC; 12 volt operation, 175 watts continuous, 240 watts max.; 6 volt operation, 120 watts continuous and max. **Input Current for Continuous Ratings:** 6 volt operation, 25 amperes; 12 volt operation, 16.5 amperes.

Kit MP-10

Transistorized Tachometer

- **Use with boat or car . . . works with all outboard and inboard marine engines and automobiles except diesels**
- **Two linear ranges . . . 0-4,000 and 0-8,000 rpm**
- **Unaffected by voltage or temperature variations**
- **Handsome brushed, anodized, die-cast aluminum case**
- **Lighted dial**
- **Simple installation and connections**

Kit MI-31

70-Watt Transistor Stereo Amp/Preamp Comb.

- **Startling realism—superb dynamic range**
- **13 to 25,000 cps ±1 db at 35 watts per channel**
- **Smooth, full power delivery—fast, effortless transient response**
- **28 transistor, 10 diode circuit**
- **Complete freedom from microphonics**
- **Encapsulated, epoxy covered circuit modules for easy assembly**
- **Professional, modern styling—cool operation**

SPECIFICATIONS—Power output per channel: (Heath rating), 35 watts/8 ohm load—26 watts/16 ohm load—18 watts/4 ohm load; (IHFM music power output); 50 watts/8 ohm load—34 watts/16 ohm load—25 watts/4 ohm load (@ 0.7% THD, 1 KC). **Power response:** ±1 db from 13 cps to 25 kc @ rated output: ±3 db from 8 cps to 40 kc @ rated output. **Harmonic distortion (at rated output):** Less than 1% @ 20 cps, 0.5% @ 1 kc, 2.0% @ 20 kc. **Intermodulation distortion (at rated output):** Less than 1%, 60 & 6,000 cps signal mixed 4:1. **Hum and noise:** Tapehead, 40 db below rated output: Mag phono, 45 db below rated output: Aux. inputs, 60 db below rated output: Tape monitor, 70 db below rated output. **Channel separation:** 40 db min. @ 20 kc, 55 db min. @ 1 kc, 50 db min. @ 20 cps. **Input sensitivity:** (For 35 watts output per channel, 8-ohm load) Tapehead, 2 mv: Mag. phono, 3 mv: Tuner, .25 v: FM Stereo. .25 v: Aux., .25 v; Tape Monitor, .90v. **Input impedance:** Tapehead 60 K ohm: Mag. phono, 30 K ohm: Tuner, 100 K ohm: FM Stereo, 100 K ohm; Aux., 100 K ohm; Tape Monitor, 47 K ohm. **Outputs:** 4, 8, & 16 ohms and low impedance tape recorder outputs. **Controls:** 5-pos. Selector (dual-concentric). 5-pos. Mode switch, dual-concentric Volume, Bass & Treble controls, Tape monitor sw., Loudness sw., Phase sw., Input level controls (all inputs except Tape Head & Tape Monitor inputs), Push-Push on/off switch. **Semiconductor complement:** 28 Transistors, 10 diodes. **Power requirements:** 105-125 volts, 50-60 cycles AC, 35 watts idling, no signal: 200 watts, full power out, @ 120 volts with no load on AC receptacles. **Power outlets:** 2 AC receptacles, 1 switched, 1 unswitched. **Dimensions:** 15¼" W x 5" H x 14" D.

Kit AA-21; Assembled AAW-21

50-Watt Stereo Combination Amplifier/Preamp

- **50 hi-fi rated watts (25 watts per channel)**
- **5 stereo inputs** • **Versatile controls** • **Circuit board assembly**
- **Mixed-channel speaker output**
- **Separate monophonic phono input**

SPECIFICATIONS—Channels: 2. **Power output:** 50 watts (25 w. per channel) Heath Hi-Fi Rating: 60 watts (30 w. per channel) IHFM Music Power Output (0.7% THD, 1 kc). **Power response:** ± 1 db from 30 cps to 15 kc at 25 watts output per channel. **Harmonic distortion:** Less than 0.5% at 25 watts, 1 kc. Less than 2% at 25 watts, 30-15,000 cps (each channel). **Intermodulation distortion:** Less than 1% at 25 watts, 60 and 6,000 cps signals mixed 4:1 (each channel). **Hum and noise:** Mag phono, 5 db below 25 watts output at 6 mv sensitivity. Tape head, 35 db below 25 watts output. Tuner and aux. inputs 70 db below 25 watts output. **Channel separation:** 42 db min. at 1 kc. **Input sensitivity:** For 25 watts output per channel: mono mag. phono, 1.5 mv: stereo mag. phono, 1.5 mv: tape head, 1 mv; tuner, 0.2v.; aux. 1 & 2, 0.2 v. **Input impedance:** Mag phono, 47 K ohms (may be changed); tape head. 470 K ohms; tuner & aux., 250 K ohms each. **Outputs:** 4, 8 and 16 ohms: cathode follower tape recorder outputs. **Damping factor:** 15. **Controls:** Function switch (4-position): selector switch (6-position); balance control (total range, 16 db): separation control; ganged level controls; dual-concentric bass & treble controls; phase and power switch. **Tube complement:** 2-EF86, 4-12AX7, 2-7199, 4-7591, 1-GZ34, 1-selenium bias rectifier. **Power requirements:** 117 volts, 50-60 cycles, 150 watts. **Power outlets:** 2 AC receptacles, 1 switched, 1 unswitched. **Dimensions:** 5½" H x 15¾" W x 13½" D. (allow 1" for cables at rear).

Kit AA-100; Assembled AAW-100

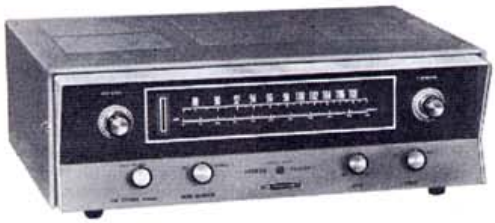
Stereo Preamplifier

- **Separate basic and secondary controls**
- **Push button selected inputs—greatly simplified operation**
- **Self-powered—DC filaments—silicon diode rectifiers**
- **Switch-selected loudness or volume control**
- **Cathode follower outputs for stereo tape recording**
- **Controlled "Derived" center-channel monophonic output**
- **Rumble and scratch filters for optimum record reproduction**
- **Channel and phase reversal switches for convenience**
- **Low distortion triode stage circuit design**
- **More stages for more output, lower noise figures**
- **For use with any stereo or mono power amplifier**

SPECIFICATIONS—Channels: Two. **Inputs:** 5 stereo each channel and 3 monophonic. **Input impedance:** Tape head, 220 k ohms; Phono, 47 k ohms for magnetic, 75 k ohms when used with ceramic: Microphone, 500 k ohms; Multiplex, 600 k ohms and Aux. 600 k ohms. All monophonic inputs 600 k ohms input impedance. **Outputs:** One low impedance to power amplifier and one low impedance to tape recorder in each channel plus a "derived center channel" monophonic output at 1800 ohms impedance. **Frequency response:** ±0.5 db, 20 to 20,000 cps, ±2 db, 10 to 30,000 cps. **Harmonic distortion:** Max. .05% @ 2.5 volts output. **Intermodulation distortion:** Max. .09% @ 2.5 volts output. **Hum and noise:** All values relative to 2.5 V rms output: 2.5 mv input at Tape Head input, 50 db or better; 6 mv input at Mag. phono input, 60 db or better: 2.5 mv at Microphone input, 55 db or better: .1 v at High Level input 65 db or better. **Channel separation:** 1 kc, 36 db or better. **Rumble filter:** 3 db down at 42 cycles, 12 db attenuation per octave. **Scratch filter:** 3 db down at 6 kc, 20 db attenuation per octive. **Baxandall tone controls:** 12 db boost, 16 db cut at 20 cps; 12 db boost, 20 db cut at 20,000 cps. **Controls:** Separate Bass & Treble, each channel; Volume-Loudness, Blend, Balance, Rumble Filter, Scratch Filter, Volume-Loudness switch, Stereo Mono switch, 9 push-button Source Selector switch, Phase Reversal switch, and Channel Reversal switch. **Tube complement:** (8) 12AX7, (2) 12AT7. **Power requirements:** 117 V AC, 50-60 cycles. **Dimensions:** 5½" H x 11½" D x 15⅜" W.

Kit AA-11

FM/FM Stereo Tuner



- **Built-in FM Multiplex Converter**
- **FM Stereo Indicator light shows when stereo is being broadcast**
- **Adjustable AFC control for drift-free reception**

SPECIFICATIONS—FM SECTION: Tuning range: 88 mc—108 mc. **Intermediate frequency:** 10.7 mc. **Antenna:** Balanced input for external 300 ohm antenna. Internal line antenna. **Output voltage (30 microvolts—30% Mod.):** 1 volt. **Image ratio (30 microvolts —30% Mod. —98 mc):** —45 db. **Harmonic distortion (25 microvolts —100% Mod. —98 mc)** Less than 1%. **IF rejection (98 mc):** —65 db. **FM audio response) 20-20,000 cps):** ±1 db. **AFC correction factor (Full AFC):** 100 kc per volt. **AM suppression:** —27 db. **Hum and noise (25 microvolts, 30% Mod.):** —48 db. **Quieting sensitivity:** 20 db—2½ microvolts: 30 db—3½ microvolts: 48 db—30 microvolts (max. quieting). **FM STEREO CONVERTER SECTION: Audio frequency response:** ±2 db from 50 to 15,000 cps. **Subcarrier bandpass:** ±3 db from 23,000 to 53,000 cps. **Channel separation:** 30 db or more at 1 kc; 25 db or more at 10 kc. **Hum and noise:** —55 db relative to 1 volt rms output. **Output impedance (Cathode Follower):** Variable to 4000 ohms, each channel. **Outputs:** Left Channel—Right Channel.

Kit AJ-12; Assembled AJW-12

AM, FM and FM Stereo Tuner

- **Built-in FM Multiplex Converter to Receive FM Stereo**
- **FM Stereo Indicator Light shows when received station is broadcasting in stereo**
- **Continuously variable AFC control for drift-free FM reception**
- **AM, FM, and Multiplex sections are mounted on circuit boards for unit stability and easy assembly.**

SPECIFICATIONS—AM SECTION: Tuning range: 550 kc—1600 kc. **Intermediate frequency:** 455 kc. **Usable sensitivity (normal position):** 1400 kc—10 microvolts (20 db of quieting); 1000 kc—15 microvolts (20 db of quieting); 600 kc—40 microvolts (20 db of quieting). **IF bandwidth:** Normal—6 db—7 kc; Maximum—6 db—12 kc. **AM antenna:** Built-in rod antenna with provisions for external antenna and ground. **Output voltage (750 microvolts—30% Mod.):** 1 volt. **Image rejection:** 1400 kc—40 db; 1000 kc—50 db; 600 kc—60 db. **Harmonic distortion: (750 microvolts —95% Mod.):** Less than 1%. **Hum and noise: (5000 microvolts, 30% Mod.):** 30 db. **IF rejection:** 1400 kc—30 db; 600 kc—50 db. **FM SECTION: Tuning range:** 88 mc—108 mc. **Intermediate frequency:** 10.7 mc. **Antenna:** Balanced input for external 300 ohm antenna. Internal line antenna. **Output voltage (30 microvolts—30% Mod.):** 1 volt. **Image ratio (30 microvolts—30% Mod. —98 mc):** —45 db. **Harmonic distortion (25 microvolts—100% Mod. —98 mc):** Less than 1%. **IF rejection (98 mc):** —65 db. **FM audio response (20-20,000 cps):** ±1 db. **AFC correction factor (Full AFC):** 100 kc per volt. **AM suppression:** —27 db. **Hum and noise (25 microvolts, 30% Mod.):** —48 db. **Quieting sensitivity:** 20 db—2½ microvolts: 30 db—3½ microvolts; 48 db—30 microvolts (max. quieting). **FM STEREO CONVERTER SECTION: Audio frequency response:** ±2 db from 50 to 15,000 cps. **Subcarrier bandpass:** ±3 db from 23,000 to 53,000 cps. **Channel separation:** 30 db or more at 1 kc; 25 db or more at 10 kc. **Hum and noise:** —55 db relative to 1 volt rms output. **Output impedance (Cathode Follower):** Variable to 4000 ohm, each channel. **Outputs:** Left Channel—Right Channel.

Kit AJ-32; Assembled AJW-32

AM, FM and Stereo FM Multiplex Tuner

- **Built-in FM multiplex adapter**
- **Filters for stereo tape recording**
- **Broad-band circuitry for full fidelity**
- **Automatic FM stereo indicator light—adjustable AFC for drift-free reception**
- **Adjustable FM squelch circuit for low noise between stations**
- **Stereo phase control for maximum separation & lowest distortion**
- **Preassembled tuning unit, prealigned coils**

SPECIFICATIONS—Tuning range: 88 mc to 108 mc. **IF frequency:** 10.7 mc. **Frequency response:** ±2 db, 20 to 20,000 cps. **Antenna:** 300 ohm balanced (or internal for local reception). **Output voltage:** Nominal .5 volts (with 3 uv 30% modulation in). **Quieting sensitivity:** 2 uv for 20 db of quieting; 20 uv for full quieting (40 db). **Maximum deviation sensitivity:** 5 uv; (400 cycle 100% modulation). **Deviation sensitivity:** 20 KC (1100 uv in). **Harmonic distortion:** Less than 1% (1100 uv 400 cycle 100% modulation). **Image ratio:** 40 db. **AFC correction factor:** 12 db. **Amplitude modulation suppression:** 25 db. **Hum and noise:** 40 db below 30% modulation (20 uv in).

SPECIFICATIONS MULTIPLEX—Audio frequency response: ±2 db, 50 to 15,000 cps. **Subcarrier bandpass:** ±3 db 23,000 to 53,000 cps. **Channel separation:** 30 db. **Hum and noise:** —55 db (relative to 1 volt rms output). **Output impedance:** Cathode follower, variable to 4,000 ohms (each channel).

SPECIFICATIONS AM—Sensitivity—narrow bandwidth position: 1400 kc, 5 uv: 1000 kc, 6 uv; 600 kc, 10 uv. (standard IRE dummy antenna, .1 volt RMS reference output). **Sensitivity change, narrow to broad position:** —5 db. **IF bandwidth, narrow:** 14 kc, 6 db down; **Broad:** 20 kc, 6 db down. **Image ratio:** 1400 kc 50 db; 600 kc 75 db. **Harmonic distortion:** Less than 1%. **Hum and noise:** 35 db below 30% modulation (1000 kc unmodulated with 100 uv in). **IF rejection ratio:** 1400 kc 42 db; 600 kc 38 db. **Power supply:** Transformer operated 50-60 cycle, 100 watts. **Dimensions:** 5⅜" H x 15⅝" W x 14" D.

Kit AJ-41; Assembled AJW-41

AM/FM Tuner

- **Output for FM multiplex converter**
- **Superbly designed 16-tube circuit**
- **Soft, glare-free illuminated tuning dial**

Kit AJ-30; Assembled AJW-30

HEATHKIT® by Daystrom

High Fidelity Tuners

AM/FM Monophonic Tuner

- **Works with Multiplex Converter for stereo FM**
- **Two eye-tubing tuning indicators**
- **Adjustable AFC on FM**
- **Fidelity switch for AM**
- **Built-in FM antenna**

SPECIFICATIONS (FM)—Tuning range: 88-108 mc. **Quieting sensitivity:** 2.5 uv for 20 db quieting; 3.5 uv for 30 db; 25 uv for max. quieting (43 db). **Image ratio:** —45 db, 25 uv, 30% mod. 98 mc. **IF frequency:** 10.7 mc. **IF rejection:** (98 mc)—63 db. **Output:** Cathode follower type, variable to 800 ohms; level; 0.45 v, 25 uv, 30% mod. **Frequency response:** ±2 db, 20-20,000 cps. **Harmonic distortion:** Less than 1%, 25 uv, 100% mod., 98 mc. **Hum and noise:** —43 db, 25 uv. 30% mod. **RF stage:** 1 tuned RF amplifier. **AFC:** Switched, 3-positions, off-half-full. **Multiplex output:** Output supplied for external multiplex adapter.

SPECIFICATIONS (AM)—Tuning range: 550-1600 kc. **Sensitivity:** Narrow position: 1400 kc, 10 uv; 1,000 kc, 15 uv; 600 kc, 40 uv. **Frequency response:** ±2.5 db, 20-9,000 cps (40 db down at 10 kc). **Image rejection:** 1400 kc, 46 db; 1,000 kc, 45 db; 600 kc, 60 db. **IF frequency:** 455 kc. **IF rejection:** 1400 kc, 40 db; 600 kc, 33 db. **Output:** Cathode follower type, variable to 800 ohms; level, 1 v, 750 uv, 30% mod. **Harmonic distortion:** less than 1%, 750 uv, 95% mod. **Hum and noise:** 30 db down (5,000 uv, 30% mod). **RF stage:** 1 tuned RF amplifier. **AVC:** Derived from voltage doubler detector.

SPECIFICATIONS (general)—Tuning indicators: 2 magic eye tubes, one AM, one FM. **Controls:** AM bandwidth, broad/narrow; function selector, AM/Stereo/FM: FM AFC, full/half/off; AC power on-off; AM tuning; FM tuning; AM level; FM level. **Tube complement:** (AM) 2-6BA6, 1-6BE6, 1-6BN8, 1-6ME5. (FM) 1-6CY5, 1-6EZ8, 3-6AU6, 1-6BN8, 1-6ME5. Transformer operated, full wave voltage doubler with 2 silicon rectifiers. **Power requirements:** 117 v, 50-60 cycles, 40 watts. **Dimensions:** 15¾" W x 5¼" H x 11" D.

Kit AJ-11; Assembled AJW-11

High Fidelity FM Tuner

- **Engineered for FM Stereo with the AC-11 Multiplex Converter**
- **Automatic Frequency Control (AFC)**
- **5 tube circuit (9 tube functions)**
- **Preassembled, prealigned tuning unit**

SPECIFICATIONS—Tuning range: 88 to 108 mc. **Quieting sensitivity:** 2.5 uv for 20 db of quieting; 3.5 uv for 30 db of quieting; 25 uv for maximum quieting (45 db). **IF frequency:** 10.7 mc. **Image ratio:** 45 db. **AFC correction factor:** 75 kc per volt. **AM suppression:** 25 db. **Frequency response:** ±2 db 20-20,000 cps. **Harmonic distortion:** less than 1.5%, 1100 uv, 400 cycles 100% modulation. **Intermodulation distortion:** less than 1%, 60 cycles and 6 kc: mixed 4:1 1100 uv, 30% modulation. **Antenna:** 300 ohms unbalanced. **Output impedance:** 600 ohms (cathode follower). **Output voltage:** nominal .5 volt (with 30% modulation, 20 uv signal). **Power requirements:** 105-125 volts 50/60 cycle AC at 25 watts. **Overall dimensions:** 4-15/16" H x 13½" W x 6" D.

Kit AJ-31; Assembled AJW-31

High Fidelity AM Tuner

- **Superhet circuit with tuned RF stage**
- **Fidelity switch for normal or maximum IF bandwidth**
- **Transformer operated silicon rectifier power supply**
- **10 kc whistle filter**
- **Voltage doubler detector circuit for low distortion**

SPECIFICATIONS—Tuning range: 550 kc to 1600 kc. **Intermediate frequency:** 455 kc. **Sensitivity (for 20 db quieting IHFM standards):** 1000 kc—8 uv. **IF bandwidth (6 db down):** NORMAL—7 kc.; MAXIMUM—18 kc. **Output impedance (cathode follower):** 5000 ohms. **Input signal for 1 volt output:** 2.5 uv—30% mod. 1000 kc. **Image ratio:** 1000 kc—50 db. **Harmonic distortion (750 uv 95% mod.):** Less than 1%. **Hum and noise (500 uv—30% mod.):** 40 db. **IF rejection:** 1000 kc—35 db. **Tube complement:** 2—6BA6, RF amplifier—IF amplifier. 1—6BE6, Oscillator-Mixer. 1—12AU7, AF Amplifier-Cathode follower. 2—Crystal Diodes, Audio Detector. 1—Silicon Diode, Rectifier (Power Supply). 1—No. 47 Pilot Lamp (Dial Illumination). **Power supply:** Transformer operated (fused). **Power requirements:** 117 V AC, 50/60 cycles at 19 watts. **Dimensions:** Overall—including cabinet and feet, 4-15/16" high x 13½" wide x 6" deep.

Kit AJ-21

FM Stereo Converter

- **Use with any FM tuner having multiplex output**
- **Measures only 3⅜" H x 3½" W x 10⅝" D overall**
- **Color styled to match Heathkit tuners**
- **Built-in power supply**
- **Easy to build**

SPECIFICATIONS—Audio frequency response: ±2 db 50 to 15,000 cps. **Subcarrier bandpass:** ±4 db 23,000 to 53,000 cps. **Channel separation:** 30 db. **Hum and noise:** —55 db (relative to 1 volt rms output). **Input impedance:** 470 K ohms. **Output impedance:** 3000 ohms each channel (cathode follower output). **Input:** MULTIPLEX (from tuner). **Input signal voltage:** .4 volt minimum (from multiplex output of FM tuner). **Outputs:** LEFT CHANNEL: RIGHT CHANNEL. **Switch and controls:** OFF-ON switch: CHANNEL SEPARATION control: LEFT CHANNEL LEVEL control: RIGHT CHANNEL LEVEL control. **Tube-diode complement:** 1—12AU7 Amplifier—Cathode Follower: 1—12AU7 Amplifier—Oscillator: 1—12AU7 Cathode Follower Output: 2—Silicon Diode Rectifiers: 2—Crystal Diode Detectors. **Power requirements:** 117 volts AC, 50/60 cps, 12 watts.

Kit AC-11A (black case); **Assembled ACW-11A; Kit AC-11B** (luggage tan case); **Assembled ACW-11B**

Low-cost Stereo Preamplifier

- **New extra stage for better specifications**
- **4 inputs in each channel, 8 in all!**
- **Cathode-follower outputs for low line loss and distortion**
- **Built-in power supply—use with any basic stereo amplifier**
- **Baxandall-type tone controls for better control at highs and lows**

SPECIFICATIONS—Channels: 2. **Inputs (each channel):** Mag Phono, Xtal Phono, Aux 1, Aux 2. **Input sensitivity:** (For 2.5 volts rms output at 1000 cps with the BASS and TREBLE controls set to the middle of their range): **Mag phono:** .006 volt. **Xtal phono:** .2 volt. AUX 1 and 2; .2 volt. **Input impedance:** Mag, Phono 47 k ohm: xtal phono, 1 megohm; aux 1 and 2, 1 megohm: aux 1 and 2, 1 megohm; equalization RIAA for MAG PHONO; outputs (each channel) power amplifier, tape recorder. **Output impedance:** Power Amplifier, 1500 ohms; Tape Recorder, 1500 ohms. **Frequency response:** (with the Volume control at maximum and the Bass and Treble controls set approximately to the mid position): ± 1 db from 20 to 20,000 cps. **Harmonic distortion:** (at 2.5 volts rms output, using AUX 1 or 2 input): .1% or less. **Intermodulation distortion:** (at 2.5 volts equivalent rms output using AUX 1 or 2 inputs): .1% or less. **Channel separation:** 45 db or better 20 to 20,000 cps. **Hum and noise (below 2.5 volts rms):** Mag Phono, 55 db (or better); Xtal Phono, 65 db (or better); Aux 1 and 2, 65 db or better. **Tube complement:** 6—6EU7 tubes. **Controls and switches:** Source Selector Switch, Bass controls, Treble controls, Volume controls, Mode Selector switch (left amp, right amp, mono left source, mono right source, stereo norm, stereo rev). Power (off-on), Filament balance (left channel and right channel). **AC receptacles:** 1—switched, 117 V AC, 375 watts maximum. 1—unswitched, 117 V AC, 375 watts maximum. **Power supply:** Transformer-operated, using two selenium rectifiers in a voltage-doubler arrangement. **Power requirements:** 117 volts, 50-60cps AC, 19.7 watts. **Dimensions:** 15¾" W x 5¼" H x 7-13/16" D. (overall).

Kit AA-141A

28-Watt Stereo Amplifier

- **Two hi-fi-rated 14-watt channels**
- **Stereo or mono operation**
- **4 Stereo inputs • Versatile controls**

SPECIFICATIONS—Channels: 2. **Power output:** 28 watts (14 w. per channel) Heath Hi-Fi Rating: 32 watts (16 w. per channel) IHFM Music Power Output (0.7% THD, 1 kc). **Power response:** ±1 db from 20 cps to 20 kc at 14 watts output per channel. **Harmonic distortion:** Less than 2%, 30 cps to 15 kc at 14 watts output per channel. **Intermodulation distortion:** Less than 2% at 14 watts output per channel using 60 cps and 6 kc signal mixed 4:1. **Hum and noise:** Mag. phono input, 55 db below 14 watts; Tuner and crystal phono 65 db below 14 watts. **Channel separation:** Better than 45 db. **Input sensitivity:** For 14 watt output each channel (tone controls in "Flat" position); mag. phono, 0.004 volts at 1 kc; crystal phono, 0.2 volts; tuner and aux., 0.2 volts. **Outputs:** 4, 8 and 16 ohms. **Damping factor:** 10;1. **Controls:** Dual clutched volume, ganged bass; ganged treble; 4-position source selector; 6-position mode selector; speaker phasing switch. **Tube complement:** 2-6EU7, 2-6AU6, 2-6AN8, 4-EL84/6BQ5, 1-GZ34/5AR4. **Power requirements:** 117 volts, 50-60 cycles, 130 watts. **Power outlets:** 2 AC receptacles, 1 switched, 1 unswitched. **Dimensions:** 15¾" W x 5¼" H x 11" D.

Kit AA-151; Assembled AAW-151

80-Watt Stereo Power Amplifier

- **Full high fidelity power rating • Fixed bias output stage**
- **Mixed-channel center speaker output**

SPECIFICATIONS—Channels: 2. **Power output:** 80 watts (40 w. per channel) Heath Hi-Fi Rating: 98 watts (49 w. per channel) IHFM Music Power Output (0.7% THD, 1 kc). **Power response:** ±0.5 db, 20-20,000 cps, at 40 watts output per channel. **Harmonic distortion:** 1.5% or less, 20-20,000 cps, at 40 watts output per channel. **Intermodulation distortion:** 0.5% or less at 40 watts output per channel, 60 and 6,000 cps mixed 4:1. **Hum and noise:** 85 db below 40 watts output. **Channel separation:** 70 db or better at 1 kc. **Input sensitivity:** 0.95 volts rms for 40 watts output per channel. **Outputs:** 4, 8, 16, and 32 ohms per channel; center speaker terminals can be used with 4, 8 or 16 ohm speakers. **Damping factor:** 16:1, 8 and 16 ohm taps; 12.5:1, 4 ohm tap. **Controls:** A Channel; bias balance, bias voltage, level. B Channel; bias balance, bias voltage, level. Function selector; phase and power switches. **Tube complement:** 2-6AN8: 4-EL34, 4 silicon diode rectifiers, 1 selenium bias rectifier. **Power requirements:** 117 v, 50-60 cycles, 180-320 watts. **Power outlets:** 2 AC outlets; 1 switched, 1 unswitched. **Color and finish:** metallic bronze, expanded metal dust cover: black chassis with ivory lower front panel. **Dimensions:** 7¼" H x 15" W x 11" D.

Kit AA-121

28-Watt Stereo Power Amplifier

- **Conservatively rated at 14 watts per channel**
- **Circuit boards for easy assembly**
- **Individual amplifier gain controls**
- **Phase reversal switch**
- **Supplies preamp power when needed**

SPECIFICATIONS—Channels: 2. **Power output:** 28 watts (14 w. per channel) Heath Hi-Fi Rating: 32 watts (16 w. per channel, IHFM Music Power Output (0.7% THD, 1 kc). **Power response:** ±1 db from 30 cps to 15 kc at 14 watts output per channel. **Harmonic distortion:** 2% or less at 14 watts, 30 cps to 15 kc. **Intermodulation distortion:** 2% or less 60 and 6,000 cps signals mixed 4:1 at 14 watts output per channel. **Hum and noise:** 76 db below 14 watts output. **Channel separation:** 65 db. **Input sensitivity:** 0.74 v for 14 watts output per channel. **Input impedance:** 500 K ohm pot. **Outputs:** 4, 8 and 16 ohm. **Damping factor:** 5.25:1, 4 ohm tap; 10.2:1, 8 ohm tap; 11.5:1, 16 ohm tap. **Controls:** Left and right channel gain; AC switch; phase switch. **Tube complement:** 2-7199; 4-EL84/6BQ5; 1-GZ34/5AR4. **Power requirements:** 117 v, 50-60 cycles, 115 watts. **Power outlets:** 2 octal sockets for pre-amp power supply; 300 v at 10 ma, 6.3 volts at 1.1 amps at each socket.

Kit AA-111

Combination Amplifiers

Stereo Combination Preamp-Amplifier

- **Smart new styling design**
- **Separate bass and treble tone controls**
- **Clutched volume controls**
- **2 high level inputs**

SPECIFICATIONS—Channels: 2. **Power output:** 6 watts (3 w. per channel) Heath Utility Rating. **Power response:** ± 1 db, 50-20,000 cps at 3 watts output per channel. **Harmonic distortion:** Less than 3%, 60-20,000 cps at 3 watts output per channel. **Intermodulation distortion:** Less than 3% at 3 watts output, 60 and 6,000 cps signals, 4:1. **Hum and noise:** 65 db below 3 watts output. **Input sensitivity:** 150 mv for 3 watts output each channel, crystal phono and tuner. **Outputs:** 4, 8 and 16 ohms. **Controls:** Dual clutched volume, ganged treble, ganged bass, 7-position selector switch, speaker phasing switch, on-off switch. **Tube complement:** 2-EL84; 2-7199; 1-EZ81. **Power requirements:** 117 v, 50-60 cycle, 75 watts. **Color and finish:** Black enamel with ivory front panel. **Dimensions:** 12½" W x 3¼" H x 6¾" D.

Kit AA-201

14-Watt Monophonic Combination Amplifier

- **Hi-Fi-Rated at 14 watts**
- **Three inputs for any program source**
- **Complete controls on the front panel**
- **Separate bass and treble controls**
- **Smart charcoal and ivory styling with red accents**

SPECIFICATIONS—Power output: 14 watts Heath Hi-Fi Rating; 16 watts IHFM Music Power Output (2% THD, 1 kc). **Power response:** ± 1 db 30-15,000 cps, 14 watts output. **Harmonic distortion:** Less than 2%, 30 cps to 15 kc, at 14 watts output. **Intermodulation distortion:** 2% or less at 14 watts output using 60 and 6,000 cps signals, 4:1. **Hum and noise:** mag. phono input, 55 db below 14 watts; tuner and crystal phono, 65 db below 14 watts. **Input sensitivity:** For 14 watts output; mag. phono, 0.004 v at 1 kc: crystal phono, 0.2 v; tuner 0.25 v, with tone controls flat. **Outputs:** 4, 8 and 16 ohms. **Damping factor:** 10:1. **Controls:** 3-position function selector switch, bass and treble tone controls, volume control. **Tube complement:** 6EU7, 1-6AU6, 1-6AN8, 2-EL84/6BQ5, 1-EZ81/6CA4. **Power requirements:** 117 v, 50-60 cycles, 55 watts. **Color and finish:** Charcoal grey steel cabinet and upper front panel with ivory colored bezel and lower front panel. **Dimensions:** 5" H x 13¾"W x 10¼" D.

Kit AA-161; Assembled AAW-161

25-Watt Monophonic Combination Amplifier

- **Full 25 watt output—hi-fi rated**
- **Separate bass and treble tone controls**
- **Four switched inputs**
- **Modern styling—matches AJ-21 and AJ-31 tuners**

SPECIFICATIONS—Power output: 25 watts Heath hi-fi rating; 30 watts IHFM music power rating (0.7% THD @ 1 KC). **Power response:** ± 1 db, 30 cps to 15 kc, at 25 watts output. **Harmonic distortion:** Less than 2% at 30 cps—15 KC and less than 0.7% at 1 KC at 25 watts output. **Intermodulation distortion:** Less than 2% at 25 watts using 60 cps and 6000 cps signals 4;1. **Hum and noise:** Microphone —60 db or better; Mag. Phono —55 db or better; Xtal Phono —60 db or better; Auxiliary —60 db or better. **Input sensitivity:** For 25 watts output with tone controls flat—Microphone —9 mv; Mag phono —5 mv (at 1 KC); Xtal Phono —120 mv; Auxiliary —200 mv. **Outputs:** 4, 8 and 16 ohms. **Damping factor:** 9. **Controls:** 4-position selector switch, volume control, bass control and treble control with on/off switch. **Tube complement:** 2—6EU7; 1—12AU7; 2—7591; 1—5AR4; 1—Selenium bias rectifier. **Power requirements:** 117 volts 50-60 cps, 120-135 watts. **Power outlets:** 1 AC receptacle, unswitched. **Indicator:** Neon pilot light. **Color & finish:** Charcoal grey with ivory bezel and lower front panel. **Dimensions:** 13½"W x 4-15/16" H x 9½" D.

Kit AA-181

Monophonic Combination Preamp-Amplifier

- **Three controls—bass, treble, volume**
- **Two separate inputs**
- **3-watt power output**
- **New styling features**
- **Perfect for "starter" systems**

SPECIFICATIONS—Power output: 3 watts, Heath Utility Rated. **Power response:** ± 1 db 60 cps to 15,000 cps at 3 watts output. **Harmonic distortion:** Less than 3% 60-15,000 cps at 3 watts output. **Intermodulation distortion:** Less than 3% at 3 watts output, 60 and 6,000 cps signal mixed 4;1. **Hum and noise:** 70 db below 3 watts. **Input sensitivity:** 0.15 v for 3 watts output, crystal phono and tuner. **Outputs:** 4, 8 and 16 ohms. **Controls:** bass, treble, volume, input selector switch, on-off switch. **Tube complement:** 1-EF86, 1-EL84/6BQ5, 1-6X4. **Power requirements:** 117 v, 60 cycles, 49 watts. **Color and finish:** Satin black, ivory face panel. **Dimensions:** 9½" W x 3¾" H x 6" D.

Kit AA-191

Crystal Microphone

Features frequency response of 30 to 10,000 cps. Includes mike stand adapter, lavalier neckband and desk stand holder, plus 8' cable and phone plug. Two required for stereo recording.

Model AK-1

HEATHKIT® by Daystrom

Speaker Systems

Legato Compact Speaker System

- **Speakers by Altec Lansing cover 30—22,000 cps**
- **Preassembled cabinet in walnut finish, ready for speaker installation**
- **Modern styling matches AE-20 center cabinets**
- **800 cps crossover network—completely assembled**
- **Can be driven by as little as 3 watts**

SPECIFICATIONS—Frequency response: 30-22,000 cps. **Power rating:** 30 watts program material. **Nominal impedance:** 16 ohms. **Cabinet type:** Modified infinite baffle. **Dimensions:** 32" L x 19" D x 32⅜" H. **Magnet wts.:** Low-frequency drivers; 1½ lbs. each. High-frequency driver; .53 lbs. **Crossover network:** 800 cps constant K high frequency shelving type. **Driving power:** as low as 3 watts.

Kit AS-21W (walnut); **Kit AS-31** (all components of AS-21 except cabinet for custom installations)

12" Dual Cone Speaker

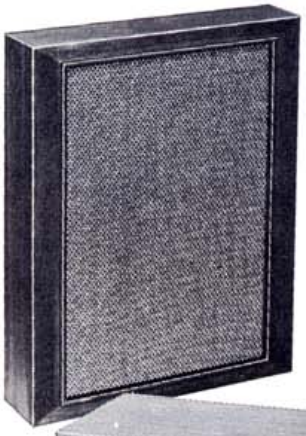
Impedance: 8 ohms. **Power Rating:** 14 watts. **Frequency Response:** 50-12000 cps. **Magnet Weight:** 6.8 oz.

Model US-2

12" Co-axial Speaker

Impedance: 16 ohms. **Power Rating:** 15 watts. **Frequency Response:** 50-15000 cps. **Magnet Weight:** 6.8 & 1.47 oz.

Model US-3



3-Way High Fidelity Speaker System

- **Three speakers—10", 6" & 3½"—special designs**
- **Tube-tuned bass reflex cabinet**
- **Installs anywhere—floor, shelf, or wall**

SPECIFICATIONS—Frequency response: ± 5 db, 55 to 12,500 cps. **Crossover frequency** 2250 cps. **Recommended amplifier power:** 10 to 25 watts. **Nominal impedance:** 8 ohms. **Woofer:** 10" special inverted design, 1.1 lb. Alnico V magnet. **Mid-range:** 6" closed back, 2.16 oz. Alnico V magnet. **Tweeter:** 3½" closed back, 2.15 oz. Alnico V magnet. **Cabinet:** bass reflex, tube-tuned, factory assembled of ¾" furniture grade plywood. **Dimensions:** 19½" W x 25" H x 5" D.

Kit AS 22-U (unfinished); **Kit AS-22W** (walnut)

Acoustic Suspension Speaker System

- **10" acoustic suspension woofer**
- **Two 3½" cone-type tweeters**
- **Preassembled cabinets in three finishes**
- **Takes only 10 watts to drive, yet handles up to 40 watts**
- **Covers 30—15,000 cps**

SPECIFICATIONS—Frequency response: ± 5 db 30 to 15,000 cps: **Crossover frequency:** 2250 cps: **Recommended amplifier power:** 10 to 40 watts rms: **Nominal impedance:** 16 ohms: **Tweeter:** two 3½" cone units, in dispersed array. 1.47 oz. Alnico 5 mag.: **Woofer:** 10" Acoustic Suspension. 1 lb. Alnico 5 mag. Resonant frequency (mounted) 58 cps.; **Crossover** L-C network: **Horizontal dispersion:** 90 degrees.

Kit AS-10U (unfinished); **Kit AS-10W** (walnut); **Kit AS-10** (mahogany)

Heathkit Version AR-2 Acoustic Suspension Speaker System

- **10" acoustic suspension woofer**
- **Two 5" cross-fired cone-type tweeters**
- **Preassembled, unfinished cabinet**
- **Exclusive with Heathkit**

SPECIFICATIONS—Frequency response: ± 5 db, 40 to 15,000 cps. **Crossover frequency:** 2,000 cps. **Recommended amplifier power:** 20 to 40 watts RMS. **Nominal impedance:** 8 8 ohms. **Tweeter:** two 5" cone units, specially treated and equalized, in dispersed array. 2.15 oz. Alnico 5 Magnet: **Woofer:** 10" Acoustic suspension, 1.1 lb. Alnico 5 Magnet. Resonant frequency (mounted) 58 cps; **Crossover:** L-C network; **Horizontal dispersion:** 90°. **Size:** 24" W x 13½" H x 11⅜" D.

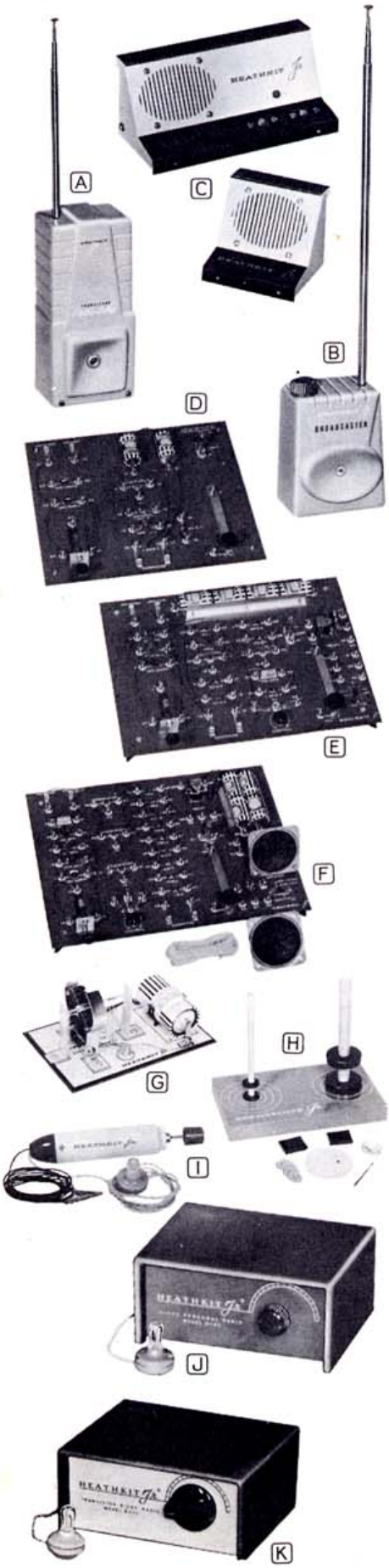
Kit AS-2U (unfinished)

"Starter" High Fidelity Speaker System

- **6" x 9" extended range dual-cone speaker**
- **Walnut or unfinished cabinets**
- **60-16,000 cps response**

SPECIFICATIONS—Frequency response: 60 to 16,000 cps: **Speaker:** 6" x 9" oval extended range dual cone; **Magnet:** 6.8 oz. Alnico 5; **Power handling capacity:** 12 watts peak; **Impedance:** 8 ohms. **Resonant frequency:** 85 cps. **Leads:** 15' 2-conductor, rubber-covered.

Kit AS-41U (unfinished); **Kit AS-41W** (walnut)



A 2-WAY "WALKIE-TALKIE" (Model R-220)

A "walkie-talkie" that operates on the same principles as those used by the men in our armed forces. Completely portable and battery powered—no wires needed, no beams of light necessary—this set communicates with similar units up to a quarter-mile away. Simple to use, you just pull up the telescoping antenna, turn the unit on, and push the button to talk, release to listen—the crystal microphone doubles as an earphone.

B TRANSISTOR RADIO BROADCASTER (Model R-240)

This hand-held, completely portable "Radio Broadcaster" transmits signals to any nearby AM radio receiver—without wires. Simple to use, just pull up the telescoping antenna, turn it on, and speak into the crystal microphone. All parts and complete instructions are included to make assembly simple, with no soldering necessary. Battery powered, this "Broadcaster" is entirely safe and economical to use.

C TRANSISTOR INTERCOM SYSTEM KIT (Model R-150A)

A big thrill is in store for the kids as they talk from room to room, house to house, etc., with this 2-way intercom system! System consists of a "master" unit and a "slave-remote" station. Genuine speakers are used in both units. Powered by flashlight batteries for perfect safety. All-transistor circuit.

D ELECTRONIC EXPERIMENTERS LAB NO. 1 (Model R-120)

Seven different and exciting electronic experiments! Circuits can be assembled . . . taken apart . . . used over and over again. Set includes all parts to build code flasher, crystal radio, 3 transistor radios, wireless voice and code transmitters. Complete with screwdriver, crystal headphone, all parts, and illustrated check-by-step instruction manual.

E ELECTRONIC EXPERIMENTERS LAB NO. 2 (Model R-140)

Consists of 12 fascinating experiments that entertain while they teach. Youngsters can build a code practice flasher, 4 different transistor radios, wireless code and voice transmitters, electronic timer, burglar alarm, electronic flasher, audio signal injector, and an intercom system. Kit includes: circuit workboard, 2 transistors, 2 crystal earphones, relay, slug-tuned coil, capacitors, resistors, controls, hardware, and check-by-step instructions.

F ELECTRONIC EXPERIMENTERS LAB NO. 3 (Model R-160A)

Largest of experimenters kits! Builds 21 different electronic sets: code flasher, 5 different transistor radios, public address system, wireless code and voice transmitters, electronic timer, burglar alarm, electronic flasher, signal injector, intercom, electric eye, television silencer, rain alarm, metronome, voice and capacity operated relays. Kit includes: circuit work board, 3 transistors, crystal earphone, two 3″ cone-type speakers, photo cell, relay, slug-tuned coil, potentiometer, resistors, capacitors, hardware, spring-type solderless connectors, screwdriver and illustrated instruction manual.

G ELECTRICITY KIT (Model R-210)

A "junior-sized" introduction into the fascinating world of electricity for youngsters! Jam-packed with interesting and worthwhile experiments in magnetism and electricity . . . all leading to the wiring and assembly of a genuine electric motor that really works. Comes complete with magnet and magnet wire, compass, motor brackets, mounting base, static electricity materials, and illustrated check-by-step instructions.

H "MAGNETS IN ACTION" (Model R-200)

An exciting series of experiments designed to show youngsters what magnets are, how they behave, and why! With the magnets, iron filings and real compass supplied with the kit, they will perform fascinating experiments.

I DIODE "MICRO" RADIO KIT (Model R-180)

The entire circuit of this tiny receiver fits into a colorful, rocket-shaped plastic case, hardly bigger than a child's hand. Manual teaches radio principles during construction. No soldering or batteries needed.

J DIODE PERSONAL RADIO KIT (Model R-190)

Now the kids can have their own PRIVATE "do-it-yourself" radio receiver. Two-tone plastic and metal case. No soldering . . . no batteries required. Receiver circuit consists of genuine fixed diode detector and permeability slug-tuned coil. Earphone, 50′ of antenna wire, instructions and radio principles included.

K TRANSISTOR DIODE RADIO KIT (Model R-110)

Young "do-it-yourselfers" will listen to "local" and "long-distance" radio stations after assembling this genuine transistor-diode radio of their very own.

HEATHKIT® by Daystrom

Analog Computer

Modular Analog Computer

- **Solves physicial and mathematical problems electronically**
- **Applicable to many design fields**
- **Saves time and money in research**
- **Individual components available for specific needs**

GROUP C

Model ES-401
Voltage Regulator
Transformer

Model ES-2
Amplifier Power Supply

Model ES-201
DC Operational
Amplifier

Model ES-600
Function Generator

The Heathkit Modular Analog Computer Kit (ES Series) provides an advanced "slide-rule" which permits engineering and research personnel to simulate equations or physical problems electronically, thus saving many hours of costly calculation and experimentation. It offers many advantages over other commercial computers since it is available in a wide choice of component groups. It is perfect for design work and adaptable to specific problems which utilize only a portion of the items in the complete computer group.

Because it comes in kit form, and the individual components are available separately depending on your personal requirements, the cost is phenomenally low considering its many uses and applications in today's educational, scientific, and industrial worlds. And another asset obtained by building this computer yourself is the intimate knowledge you receive about the inner workings of these instruments. Construction is aided by Heath's famous "check-by-step" instructions and large pictorial reference diagrams and illustrations.

The ES-400 Computer cabinet houses the power supplies, DC amplifiers and computing components. It includes an accurate dividing network which introduces voltages to a null meter with an accuracy of 1/10 of 1%. By means of a switch, a potentiometer may be connected to the meter, and its value checked. This eliminates inaccuracy due to potentiometer non-linearity, or loading. The dividing network and meter may also be used to set up the initial conditions, to set diode bias, and to read any voltage which appears at the amplifier. The meter may be switched to any of the fifteen amplifiers so they will be set to give full scale deflection of ±2, 20 and 100 volts. The board also has the plus and minus 100 volt standard available, which is used in the dividing network. The built-in meter serves as the readout indicator or an external DC oscilloscope, pen recorder, etc., may be employed using the output terminals provided.

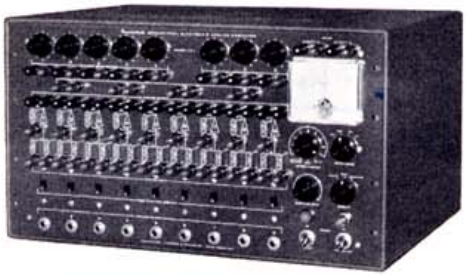
Some of the typical problems solved by the computer relate to mechanical vibration and oscillation, dynamic heat transfer, automotive control systems, transients and electrical circuits, automobile suspension systems, aircraft and missile stability and control, fluid flow, simulation of nuclear reactors, rigid body dynamics, and many more complex mathematical problems.

Analyze your present computer requirements now and order the component groups you need. A free folder is available explaining the various computer groups and the function of each element in the group. Just write to us in regard to any particular question you may have as to how this Heathkit modular analog computer can help you.

Full Component Group C . . . (Consists of 1-ES-2, 1-ES 50, 3-ES 100, 1-ES 151, 15-ES 201, 1-ES 400, 1-ES 401, 3-ES 405, 2-ES 447, 1-ES 450, and 1-ES 505) . . .

INDIVIDUAL COMPONENTS AVAILABLE:

ES 2 Amplifier power supply kit, **ES 50** Reference power supply kit, **ES 100** Initial condition power supply kit, **ES 151** Relay power supply kit, **ES 201** Operational amplifier kit, **ES 400** Cabinet kit, **ES 401** Voltage regulator transformer kit, **ES 405** Patch cord kit (contains 12 patch cords), **ES 447** Cofficient potentiometer kit, **ES 450** Auxiliary coefficient potentiometer kit, **ES 505** Repetitive oscillator kit, **ES 600** Function generator.



Educational Analog Computer

- **Used widely in industry and educational institutions**
- **Ideal for teaching engineering, physics and mathematics**
- **All markings and symbols are standard computer type**
- **Measures only 19¾" W x 11½" H x 15" D**

SPECIFICATIONS—Amplifiers: Open loop gain approximately 1000. Output −60 +60 volts at .7 ma. **Power supplies:** ±300 volts at 25 ma electronically regulated; variable from +250 to +350 by control with meter reference for setting +300 volts. Negative 150 volts at 40 ma regulated by VR tube. **Repetitive operation:** Multivibrator cycles a relay at adjustable rates (.1 to 15 cps), to repeat the solution any number of times; permits observation of effect on solution of changing parameters. **Meter:** 50-0-50 ua movement. **Power requirements:** 105-125 volts, 50/60 cycles, 100 watts.

Kit EC-1

Basic Electricity Course

- **Teaches basic electricity theory in everyday language**
- **Designed by science educators**
- **Results in handy DC meter of many uses**

Kit EK-1

Two-Part Basic Course

- **Simplified basic theory**
- **Two-part textbook and kit project**
- **You construct a receiver as you learn**
- **Easy-to-understand, clearly illustrated**

Kit EK-2A—Basic Radio Part I; Kit EK-2B—Basic Radio Part II; Accessory Cabinet AK-8

Basic Transistors Course

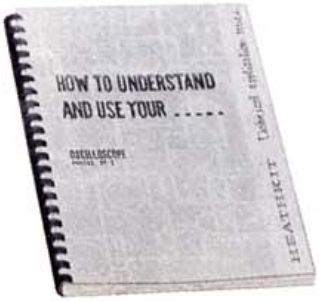
- **Learn Transistor concepts and applications**
- **Easy to understand text**
- **Perform experiments as you learn**
- **All parts furnished with kit**
- **Results in a handy two-station intercom**
- **Textbook is a valuable reference source**

Kit EK-3

VTVM Technical Applications Course

- **Designed for anyone who wants to learn more about test equipment**
- **Combination Kit/Textbook Project**
- **Simplified basic theory written in everyday language**
- **Interesting experiments performed as you learn**
- **Information applies to all VTVM's**
- **No previous electronic experience required**

Kit EF-1



Oscilloscope Technical Applications Course

- **A combination experimental chassis & textbook project**
- **Simplified basic theory written in everyday language**
- **Interesting experiments performed as you learn**
- **Solderless spring-clip connectors permit fast, simple circuit changes in experiments**
- **Big, 100 page textbook remains a valuable reference source**
- **Ideal for beginners, schools and universities**
- **Buy with your favorite Heathkit 'scope**

Kit EF-2

Heathkit EU-Series, A New Concept in Electronics Education

New "solderless" electronic construction kits for experimenting . . . for laboratory circuit development . . . for teaching basic electronics . . . plus wired instruments units and test equipment for teaching scientific instrumentation . . . for research . . . for engineering development and control . . . especially engineered by Heathkit.

Universal Experimental Parts

Consists of four specially designed experimental chassis plus an assortment of components to construct hundreds of circuits. All components are equipped with specially solderless spring-clip connectors and binding posts to simplify wiring. Ideal for class experiments in schools and for circuit development in research and development labs, Over 450 parts in all.

Kit EU-13 Universal Experimental Parts; **Kit EU-14** (additional chassis and parts for conducting further experimetns with EU-13)

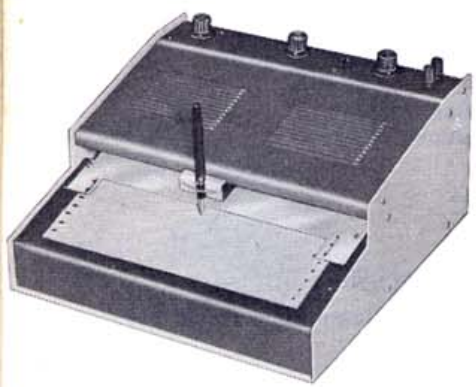
UNIVERSAL POWER SUPPLY

Ideal as a well-regulated power supply for general laboratory use, and as an experimental supply which can provide many different types of power supply circuits. An excellent unit for use in teaching the fundamentals of power supply design.

The following specifications are for the EUW-15 Power Supply when it is wired for voltage-doubler operation.

SPECIFICATIONS: B+ voltage output: 200 to 350 volts DC regulated, at 0 to 100 milliamperes continuous. **Filament voltage output:** 6.3 volts AC at 3 amperes. **B+ regulation:** Output variation less than 1% from no load to full load at 300 volts. Output variation less than ± 1 volt for a ± 10 volt variation in the AC line input. **B+ ripple:** Less than 10 millivolts rms ripple. jitter, and noise. **B+ output impedance:** Less than 10 ohm from 5-100,000 cps. **Divider voltages (unregulated):** Approximately 500 v, 400 v, 300 v, 200 v, 100 v. **Voltage divider:** Internal, using five 1500 ohm 10 watt resistors . . . also can be used as a variable internal load. **Tube complement:** 1-6L6GC, series regulator; 1-6BH6, control amplifier; 1-OB2, voltage regulator. **Controls and switches:** Divider Voltage (or variable load switch); Divider—Regulator switch; Regulator Voltage (min.—max.) control; Power (on-off) switch; High Voltage (on-off) switch. **Output terminals:** DC+ and DC—. Filament (6.3 V.A.C.), Meter, Chassis ground. **Power requirements:** 105-125 volts AC, 50/60 cps, 00 watts. **Dimensions:** 8¼" W x 6½" H x 12½" D.

Assembled EUW-15

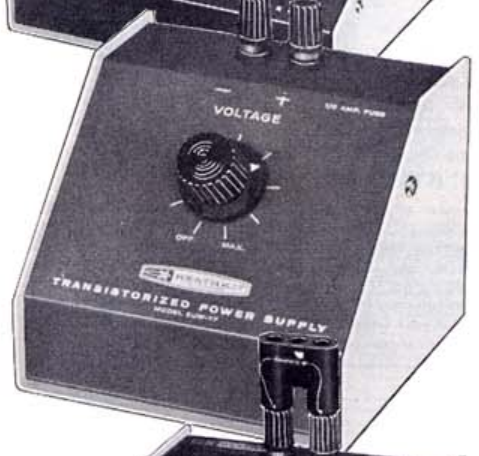


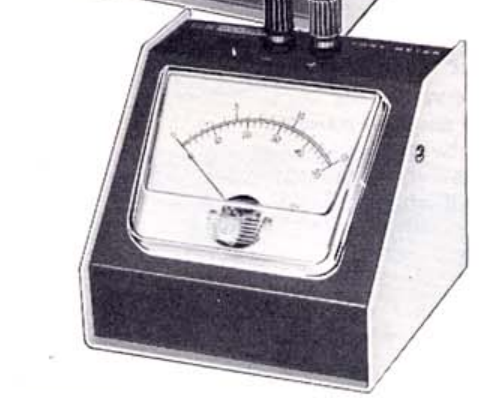
Servo-Recorder

Laboratory-type self-balancing potentiometer chart recorder. Extremely useful in continuously recording DC signals encountered in computer work and in research and development laboratories.

SPECIFICATIONS—Chart grid width: 10". **Chart speed:** 2"/minute. **Chart length:** 120 ft. roll. **Full scale balancing time:** 1 sec. **Chart span:** 100 mv. nominal, adjustable from 100 to 200 mv; 10 mv nominal, adjustable from 10 to 20 mv. **Error:** Less than 1% of full scale for 100 mv; less than 2% of full scale for 10 mv. **Max. source resistance:** 50K ohm. **Power requirements:** 105-125 V AC. 60 cycle, 50 watts. **Fuse:** 1 ampere slow-blow. **Dimensions:** 13¾" W x 7½" H x 13⅜" D.

Assembled EUW-20





Operational Amplifier System

Can be used as a constant current source, a controlled potential source, a linear sweep generator, and used for addition, subtraction, integration, differentiation, and many other applications in measurement, computation and control work.

SPECIFICATIONS—OPERATIONAL AMPLIFIERS: DC gain, open loop: 8600 (79 ±1 db). **Frequency response:** 3 db down at 45 cps, 6 db down at 100 cps. **Voltage range:** −50 V DC to +50 V DC at input and output with a 50 K ohm load. **Output current:** −1 ma to +1 ma with 50 K ohm load. **Output impedance:** 6700 ohms. **Phase shift:** Less than 1 degree at 25 kc. **Rise time:** 15 microseconds. **Drift:** Less than +8 mv/day under normal conditions after 48 hours, or more, aging period. **Amplifier 1 only:** May be switched for Follower or Inverter operation, also to provide + or − inputs. **BOOSTER AMPLIFIER: Maximum output:** ±20 ma at ±50 V DC. **Gain:** Approx. .8. **Output impedance:** 1400 ohms. **Power requirements: AC input:** 105-125 volts, 50/60 cps. **Filament power only:** 44 watts. **Total power required:** 94 watts at quiescent operating conditions. **Fuses:** Two ¾ ampere slow-blow fuses; one for the filament circuits, and one for the DC+ and DC− supplies. **AUXILIARY POWER CONNECTOR: Location:** Octal socket on rear of unit. **Power available:** +300 volts at 20 ma and −300 volts at 20 ma with unit in operation. +300 volts at 60 ma and −300 volts at 60 ma when all amplifier tubes are removed. **Balance resistors:** Available at auxiliary connector to balance power supplies and adjust output voltages. **GENERAL: Dimensions:** 11¼" W x 6⅜" H x 12⅜" D.

Assembled EUW-19

Voltage Reference Source

Produces accurate voltages (±1% or 0.1 mv, whichever is larger) from 0.1 mv to 100 volts.

SPECIFICATIONS—Output voltage: 0-100 volts DC. **Resolution:** .1 mv on X1 range, 1 mv on X10 range, 10 mv on X100 range, 100 mv on X1000 range. **Accuracy:** ±1% or 0.1 mv, whichever is larger. **Readout:** Directly on three dials; Coarse Voltage, Fine Voltage, Range. **Controls:** Coarse Voltage; 0-100 mv, in 10 mv steps. Fine Voltage; 0-10 mv, continuous. Range; X1, X10, X100, X1000. Output Selector; Four positions; AC Off, Signal, STD Voltages, Sum-Difference. Polarity Switch; NORMAL (SUM) position, or REVERSE (DIFFerence) position. Push-button Zero; Shorts OUTPUT terminals together, Mercury reference cell and holder supplied for calibration. **Power required:** 25 watts, 117 V AC, 50/60 cps. **Fuse:** ½ ampere slow-blow. **Dimensions:** 5¾" H x 8¼" W x 8" D.

Assembled EUW-16

TRANSISTORIZED POWER SUPPLY

Designed to furnish operating voltages and currents for experimental transistor and other low voltage circuits. Ideal for laboratory or classroom use.

Assembled EUW-17

LAB METER WITH SHUNTS

Versatile current meter for laboratory experiments.

Assembled EUW-18

"ELECTRONICS FOR SCIENTISTS"

This 450 page book is written expressly for chemists, physicists, engineers, and students and research workers who have little or no background in electronics, but who need to gain a working knowledge of electronic devices and circuits.

EUP-11, Book, "Electronics for Scientists"

WORKBENCH

Can be used for Malmstadt-Enke instrumentation laboratory or for home workshop.

EUP-21

MALMSTADT-ENKE INSTRUMENTATION LABORATORY

A complete, integrated system for teaching scientists and students.
More information on request.

EU-100

Includes **EUP-11** Book "Electronics For Scientists", **EUW-12** Wired Heathkit Test Equipment, **EU-13** Universal Experimental Chassis & Parts, **EU-14** Special Experimental Chassis & Parts, **EUW-15** Wired Universal Power Supply, **EUW-16** Wired Voltage Reference Source, **EUW-17** Wired Transistorized Power Supply, **EUW-18** Wired Lab. Meter with Shunts, **EUW-19** Wired Operational Amplifier System, **EUW-20** Wired Servo Recorder.

EU-200

Includes **EUP-11** Electronics Book "Electronics For Scientists", **EU-13** Universal Experimental Chassis And Parts, **EUW-15** Wired Universal Power Supply.

SSB Mobile Transmitter

- **Hermetically sealed crystal bandpass filter**
- **Crystal controlled dual conversion heterodyne circuitry**
- **Automatic level control for maximum talk power, low distortion**
- **Complete bandswitching of 80 through 10 meter bands**
- **All crystals furnished—ideal for mobile or fixed operation**

SPECIFICATIONS—Types of emission: SSB (Upper or lower) and CW. **Power input:** 90 watts PEP, SSB and CW. **Output impedance:** 50 to 75 ohms with not more than approx. 2:1 SWR. **Frequency range:** (MC): 3.5 to 4; 7.0 to 7.5; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 29.5. **Frequency stability:** Overall frequency within 100 CPS after warmup. **Carrier suppression:** 50 DB below peak output. **Unwanted sideband suppression:** 55 DB below peak output. **Keying characteristics:** Grid block keying throughout. **Audio input:** High impedance microphone. **Power requirements:** 6.3 or 12.6 volts 4 amps.; —125 volts 20 milliamps; 300 volts 100 milliamps; 600 volts 130 milliamps (uses Heath HP-20 or HP-10 power supplies). **Cabinet size:** 12¼" W x 6¼" H x 9¾" D.

Kit HX-20; Push-to-talk microphone **GH-12**

"Marauder" Single Sideband Transmitter

- **Unmatched in features and performance at less than twice the price**
- **First complete filter-type SSB transmitter in kit form**
- **Operates SSB (upper or lower sideband), CW, AM, & FSK**
- **180 watts PEP on SSB & CW . . . 80 through 10 meters**
- **Multi-section, hermetically sealed crystal band-pass filter**
- **Dual conversion, crystal controlled heterodyne oscillator**
- **Preheated, temperature compensated VFO**
- **Automatic level control for higher talk power**
- **Air-cooled, shielded final amplifier**
- **VOX controlled break-in CW operation**
- **165 to 1 gear drive tuning assembly**
- **Beautiful exterior styling—chrome-plated knobs**
- **Perfect driver for "Warrior" KW Linear**

SPECIFICATIONS—Emission: SSB (upper or lower sideband), CW, AM and FSK. **Power input:** 180 watts PEP—SSB and CW, 75 watts AM. **Output impedance:** 50 to 75 ohms with not more than approximately 2:1 SWR. **Frequency range (MC):** 3.5 to 4.1; 6.9 to 7.5; 13.9 to 14.5; 20.9 to 21.5; 27.9 to 28.5; 28.5 to 29.1; 29.1 to 29.7. **Frequency stability:** within 100 cps, after warmup. **Carrier suppression:** 50 db below peak output. **Unwanted sideband suppression:** 55 db below peak output. **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone using grid-block keying. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 400 to 3000 cps at ± 3 db. **Power requirements:** OFF—4 watts; STANDBY—200 watts; KEY DOWN—400 watts at 117 volts, 50/60 cycles AC. **Cabinet size:** 19" W x 11⅞" H x 16" D.

Kit HX-10

"Apache" Transmitter

- **150 watts phone, 180 watts CW & SSB**
- **Covers 80 through 10 meter amateur bands**
- **Provision for SSB adapter built-in**
- **Rotating slide rule dial with vernier tuning**
- **Adjustable low-level speech clipping**
- **Time sequence keying—"spotting" push button**

SPECIFICATIONS—Power input: 150 w PHONE, 180 w CW & SSB. **Output impedance:** 50-72Ω (non-reactive). **Output coupling:** Pi Network (coaxial). **Operation:** Crystal-VFO, CW-SSB-PHONE (time sequence keying, SSB requires external adapter). **Band coverage:** 80, 40, 20, 15, 10. **Audio output:** 100 watts at 300-3000 cycle (Adjustable low-level speech clipping; 500Ω output available). **Tube complement—power section:** 2 selenium rectifiers, 5V4 low voltage rectifier, 2-5R4GY HV rectifier, OA2 voltage regulator, 2-OB2 voltage regulators. **Audio section:** 12AX7 speech amplifier, 12AU7 clipper amplifier, 6AL5 clipper, 12BY7 audio driver, 2-6CA7/EL34 modulator. **RF section:** 6AU6, VFO, 6CL6 crystal oscillator-buffer, 5763 driver, 2-6146 parallel power amplifier, 6AQ5 clamp. **Power requirements:** 115 V AC, 50-60 cycles. **Standby (AM, CW):** 150 watts. **Standby (SSB):** 230 watts. **CW:** 420 watts (intermittent). **Phone:** 500 watts (peak). **SSB:** 500 watts (peak). **Cabinet size:** 19½" W x 11⅞" H x 16" D.

Kit TX-1

Phone & CW Transmitter

- **90 watts phone or CW—80 through 10 meters**
- **Neutralized 6146 final amplifier**
- **Built-in low pass filter**
- **Grid block keying—easy access to crystal sockets**
- **Beautifully designed throughout—easy to assemble**

SPECIFICATIONS—Power input: 90 watts peak, carrier controlled phone or CW. **Output impedance:** 50-72 ohm (coaxial). **Output coupling:** Pi network. **Operation:** CW or AM phone—crystal or VFO control. **Band coverage:** 80 through 10 meters. **Power requirements:** 105-125V, 50-60 cps, 225 watts. **Dimensions:** 13¾" W x 11½" D x 6½" H.

Kit DX-60

CW Transmitter

- **Single-knob bandswitching**
- **Built-in low pass filter**
- **Built-in power supply**
- **50-watt plate power input**

SPECIFICATIONS—RF power input: 50 watts CW. **Output impedance:** 50-600 ohm (non-reactive). **Output coupling:** Pi network. **Operation:** Crystal—external VFO. **Low pass filter cutoff frequency:** 34 MC. **Band coverage:** 80, 40, 20, 15, 10 meters. **Tube complement:** 5U4GB rectifier, 6CL6 oscillator, 6DQ6A final amplifier. **Power requirements:** 117 volts AC, 60 cycles, 150 watts. **Dimensions:** 13" W x 8½" H x 7" D.

Kit HX-11

"Cheyenne" Phone & CW Mobile Transmitter

- **90 watt input on phone or CW**
- **6146 final amplifier—pi network output**
- **Special design push-to-talk microphone**
- **Spotting switch for off-the-air tuning**
- **Rugged shock-proof construction—easy to build**

SPECIFICATIONS—Power input: 90 watt peak carrier controlled phone. **Output impedance:** 50-72 ohms. **Output coupling:** Pi network (coaxial). **Band coverage:** 80, 40, 20, 15, 10 meters. **Panel controls:** Meter switch, spotting switch, final tuning, drive adjust, bandswitch, VFO tuning, audio (gain), loading, function switch. **Tube complement:** 12AX7, 6DE7, 6AU6, 6CL6, 5763, OA2. **Power requirements:** 500-600 V DC @ 150 ma: 300 V DC @ 100 ma: 6.3 V @ 4.7 amps or 12.6 V @ 2.35 amps AC/DC. **Dimensions:** 6½" H x 12¼" W x 9 15/16" D.

Kit MT-1

VHF 6 & 2 Meter Transmitter

- **Produces USB, LSB or DSB signals**
- **Built-in VOX with anti-trip circuit**
- **Sealed audio phase shift network**

SPECIFICATIONS—Power output: 10 watts P.E.P. (peak envelope power). **Power input:** Less than 3 watts of RF at the fundamental operating frequency required. **Carrier suppression:** 40 DB. **Sideband suppression:** 30 DB. **Output:** Pi network, low impedance, coaxial. **Input:** Low impedance, coaxial. **Band coverage:** 80, 40, 20, 15, 10 meters. **Circuitry:** Phasing method of SSB signal generation with voice control and anti-trip action. **Power requirements:** 350 VDC at 85 ma and 6.3 VAC at 3.5 a. **Meter:** 2½" 200 ua movement, indicates carrier null and relative power output. **Dimensions:** 10" H x 6¼" W x 13" D

Kit VHF-1

6-Meter SSB Transmitter

- **Operates SSB upper/lower sideband, AM & CW**
- **Employs heterodyne system to output frequency**
- **10 watts P.E.P. • 50-54 mc in four 1 mc segments**
- **Built-in VFO or crystal control, VOX and anti-trip circuitry**
- **Specially designed for fast, easy assembly**

SPECIFICATIONS—Frequency coverage: 50 to 54 mc in four 1 mc segments. (heterodyne crystal for 50 to 51 mc supplied) (coverage can be extended to 49 8 mc by changing second heterodyne crystal). **Emission:** SSB upper/lower, AM & CW. **DC Power input:** 20 watts peak. **RF Power output:** 10 watts P.E.P. SSB, 10 watts, CW, 2.5 watts AM. **Carrier suppression:** 50 db or better. **Sideband suppression (unwanted):** 40 db or more. **Circuitry:** Phasing method used to generate SSB signal, heterodyned to desired output frequency. **Output impedance:** 50 to 75 ohm, unbalanced. **Audio frequency response:** 300-3,000 cps. **Keying:** Grid block keying with key click filter. **Tuning knob ratio:** Approx. 45 kc per turn. **Power requirements:** 117 volts AC, 50/60 cps, 77 watts standby, 95 watts SSB & CW, 90 watts AM. **Dimensions:** 16⅜" W x 10¼" H x 10" D.

Kit HX-30

Communications Microphone

- **Specially modified for SSB communications**
- **Frequency response—300 to 3,000 cps**
- **Grip-to-talk switch with lock position**
- **Complete with wiring diagrams for any rig**

HDP-21

Specially-designed SSB Microphone

- **Ceramic element with shaped response for SSB**
- **Push-to-talk button and coiled cord**

GH-12

"Mohawk" Amateur Receiver

- **Amateur band coverage only for maximum stability and accuracy**
- **1 uv input for 10 db signal to noise ratio, all bands**
- **Factory assembled and aligned coil/bandswitch assembly**
- **Rotating slide rule dial with vernier action tuning**
- **Built-in 100 kc crystal calibrator**
- **Rich, professional styling—chrome-plated knobs**

SPECIFICATIONS—Fifteen tube double conversion superheterodyne receiver with selectable sideband. First IF frequency: 1682 KC. **Second IF frequency:** 50 KC. **Band coverage:** 160-10 meters. **Selectivity range:** 5 kc, 3 kc, 2 kc, 1 kc, .5 kc. **Bridged T notch filter:** 50 db rejection notch. **Panel controls:** RF Gain, Tuning, IF Gain, Antenna Trimmer, AF Gain w/on-off switch, Calibrate Set, T-Notch Tuning, Calibrate On, T-Notch Depth, CW-SSB-AM, ANL, Receiver-Standby, AVC, Upper-Lower Sideband, BFO, Selectivity, Band, Phones. **Tube complement:** 6BZ6 RF Amplifier, 6CS6 First Mixer, 12AT7 Oscillator-Cathode Follower, 6BA6 1682 kc IF amplifier, 6CS6 Second Mixer, 12AT7 1632-1732 kc crystal Oscillator, 6BA6 50 kc IF amplifier, 6BJ7 DET-AVC8AN:, 6CS6 Product Detector, 12AT7 First Audio S Meter Amp., 6AQ5 Audio Output, 6BA6 100 kc Oscillator, OA2 Voltage Regulator, 5V4 Rectifier. **Signal to noise ratio:** 10 db at less than 1 microvolt input. Converter IF 22 to 26 mc. **Power required:** 117 VAC, 50/60 cycle, 75 watts. **Cabinet size:** 19½" W x 11¾" H x 16" D.

Kit RX-1

SSB Mobile Receiver

- **Tunes SSB, AM & CW signals—80 through 10 meters**
- **Better than 1uv sensitivity on all bands**
- **Crystal bandpass filter for sharp selectivity**
- **Crystal controlled BFO for selectable sideband reception**
- **Built-in calibrated "S" meter—30-1 gear drive tuning**
- **Regulated local oscillator filament voltage**

SPECIFICATIONS—Frequency range: 80 thru 10 meters in 5 bands, 3.5 to 4.0: 7.0 to 7.3: 14.0 to 14.35: 21.0 to 21.5: 28.0 to 29.7 MC. **Intermediate frequency filter:** Center frequency, 3.0 MC: Bandwidth at −6 db, 3.0 KC; Bandwidth at −60 db, 10.0 KC Max.: Hermetically sealed. **Panel controls:** Sideband Select: R.F. gain: A.F. gain—Off-On; Noise Limiter: AVC select: main tuning: band switch: antenna trimmer: SSB, CW-AM switch. **Signal-to-noise ratio:** 10 db at 1 microvolt or less. **Tube complement:** 6BZ6—R.F. amp.: 6EA8—Mixer Oscillator: 6BZ6—1st I.F. amp: 6EA8—2nd I.F. amp (½): 6EA8—S meter amp (½): 6BE6—Product detector—BFO: 6BJ7 AM detector-noise limiter—AVC: 6BE8—1st Audio-Audio Output: 6A2—Voltage Regulator. **Output impedance:** 500 ohms and 8 ohms. **Power requirements:** 6.3 or 12.6 volts 4 amps AC or DC, 300 volts DC at 120MA. **Cabinet size:** 6¼" H x 12¼" W x 9¾" D.

Kit HR-20

Amateur Receiver

- **Amateur band coverage only for high stability and accuracy**
- **Tunes SSB, AM & CW signals on 80 through 10 meters**
- **Large, slide-rule dial—approximately 6" of band spread**
- **RF stage for excellent sensitivity**
- **Prebuilt, aligned coil/bandswitch assembly**
- **Lattice-type crystal filter for high selectivity**

SPECIFICATIONS—Frequency coverage: 80 through 10 meters. **IF frequency:** 1681 kc. **Sensitivity:** 1 uv for 10 db signal-to-noise ratio. **Image rejection:** 40 db or better. **Selectivity:** 3 kc at 6 db, 9 kc at 40 db. **Input impedance:** 50 to 75 ohm, coaxial. **Audio output impedance:** 8 or 500 ohm. **Tube complement:** 6BZ6, (2) 6EA8, 6BA6, 6BJ7, 6EB8, 6X4. **Power requirements:** 117 volts AC, 50/60 cycles, 50 watts. **Dimensions:** 13¾" W x 11½" D x 6½" H.

Kit HR-10; Kit HRA-10-1 Plug-in 100 kc Crystal Calibrator

ACCESSORY SPEAKER

Heavy-duty 8" PM speaker. 8 ohms impedance, 4.7 oz. magnet.

Kit AK-5

MOBILE BASE MOUNT

Holds both transmitter & receiver conveniently at driver's side. Fits most automobiles.

Kit AK-6

MOBILE SPEAKER

Matching companion for HR-20 receiver. Rugged steel case, 5" PM speaker, 8 ohm impedance.

Kit AK-7

6-Meter Linear Amplifier

- **125 watts P.E.P. input SSB, 75 watts DC input AM**
- **Forced-air cooling of final amplifiers**
- **Completely shielded RF circuitry**
- **Metered grid current, plate current, plate voltage, relative power**

SPECIFICATIONS: Driving power required: 2.5 to 10 watts P.E.P. **Power input:** 125 watts P.E.P. SSB, 75 watts D.C. AM. **Power output:** 70 watts P.E.P. SSB. **Output impedance:** 50 to 75 ohm (unbalanced). **Output coupling:** Link. **Input impedance:** Approx. 50 ohm. **Input coupling:** Link (tuned grid). **Panel metering:** Grid current plate current, plate voltage & relative power output. **Frequency coverage:** 49.8 to 54 mc. **Tube complement:** (2) 6146, (1) OA2. **Cooling:** Forced-air (self-contained fan). **Power requirements:** 90 watts standby, 200 watts max. @ 117 volts AC 50/60 cycles. **Dimensions:** 10⅞" H x 16⅝" W x 10" D.

Kit HA-20

"Warrior" Kilowatt Linear Amplifier

- **Operates SSB, AM & CW on 80 through 10 meters**
- **Exclusive internal RF shielding for maximum TVI suppression**
- **Interlocked switching of HV for maximum circuit protection**
- **Low cost, high quality, 811A and 866A tubes**
- **Fan forced-air cooling—clean, functional styling**
- **Perfect KW Linear amplifier for "Marauder"**

SPECIFICATIONS—Maximum power input: SSB-1000 watts P.E.P., CW-1000 watts, AM-400 watts (500 watts using controlled carrier modulation), RTTY-650 watts. **Output circuit:** Variable pi network (50 to 75 ohms). **Driving power required:** 50 to 75 watts—depending on frequency. **Input circuit:** Broad banded—requires no tuning. **Input impedance:** approx. 70 ohms; provides effective match for exciters having 50 ohm output impedance. **Band coverage:** 80, 40, 20, 15, 10 meters. **Panel metering:** Switch-selected, grid current, plate current, high voltage and relative power output for ease of loading. **Tube complement:** 4-811A, 2-866A. **Size:** 19½" W x 11⅞" H x 16" D.

Kit HA-10

SSB Adapter

- **Produces USB, LSB or DSB signals**
- **Built-in VOX with anti-trip circuit**
- **Sealed audio phase shift network**

SPECIFICATIONS—Power output: 10 watts P.E.P. (peak envelope power). **Power input:** Less than 3 watts of RF at the fundamental operating frequency required. **Carrier suppression:** 40 DB. **Sideband suppression:** 30 DB. **Output:** Pi network, low impedance, coaxial. **Input:** Low impedance, coaxial. **Band coverage:** 80, 40, 20, 15, 10 meters. **Circuitry:** Phasing method of SSB signal generation with voice control and anti-trip action. **Power requirements:** 350 VDC at 85 ma and 6.3 VAC at 3.5 a. **Meter:** 2½" 200 ua movement, indicates carrier null and relative power output. **Dimensions:** 10" H x 6¾" W x 13" D.

Kit SB-10

Variable Frequency Oscillator

- **Provides complete amateur coverage at far below the cost of crystals**
- **Covers 80 through 2 meter amateur bands**
- **Each band separately calibrated on rotating drum-type slide-rule dial**
- **Designed for & styled to match Heathkit DX-60 Transmitter**

SPECIFICATIONS—Band coverage: 80, 40, 20, 15, 10, 6, and 2 meters. **VFO output frequencies:** 80, 3.5 to 4 mc; 40, 7 to 7.3 mc; 20, 7 to 7.15 mc; 10, 7 to 7.425 mc; 6, 8.333 to 9 mc; 2, 8 to 8.222 mc. **Load impedance:** 50 K ohms or more. **Output voltage:** 5 volts R.M.S. or more, with no load. **Output connections:** phono plug. **Front panel controls:** Function Switch (Stby/Opr/Spot), VFO tuning & Band selector. **Tube complement:** 6CH8-oscillator-cathode follower; OB2-Voltage regulator. **Power requirements:** 1. From Accessory socket of DX-60, using cable furnished, 2. From Accessory socket of DX-40, with simple changes, 3. From other sources; 140 volts min. @ 25 ma; 6.3 volts ac or dc at 0.75 amp. **Cabinet size:** 9⅜" wide, 9" deep, 6½" high.

Kit HG-10

Monitor Scope

- **Specially designed for amateur radio use**
- **Displays envelope, AF and RF trapezoid patterns**
- **Automatic switching between received and transmitted envelope patterns**
- **Built-in two-tone test oscillator**
- **3" cathode ray tube—small, compact size**
- **Easy to install in antenna system feed line**

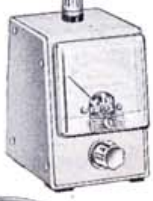
SPECIFICATIONS—Vertical channel (amplified): 500 mv/inch ± 3 db, 10 cps to 500 kc, input impedance 50 K ohms. **Horizontal channel:** 800 mv/inch ± 3 db, 3 cps to 30 kc input impedance 1 megohm. **Tone output:** 15 mv @ approximately 1 kc and 1700 cps (switchable: OFF-1 KC-Two-Tone). **Sweep frequency range:** 15 to 200 cps. **Transmitter power output limits:** 5 watts to 1 kilowatt. **Tube complement:** 3RP1, 1V2, 12AU7, 6BN8, 6C10, 6J11. **Rectifiers:** Silicon diodes for low level-B+. **Power requirements:** 105-125 volts 50/60 cycle AC, 35 watts.

Kit HO-10

Reflected Power Meter

- **Indicates forward or reflected power and SWR**
- **Band coverage is 160 through 6 meters**
- **Handles peak power of well over 1 kilowatt**
- **Matches 50 or 75 ohm lines**
- **New styling matches other Heathkit equipment**

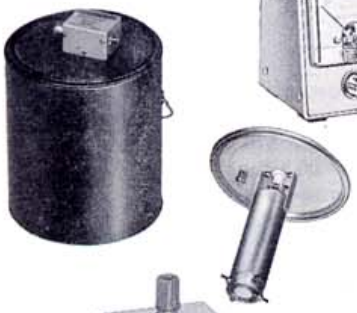
Kit HM-11



RF Power Meter

- **Operates with any transmitter**
- **Requires no external power source**
- **Sensitive 200 ua meter movement**
- **Small, compact size**

Kit PM-2



"Cantenna" Transmitter Dummy Load

- **Ideal for servicing and testing amateur gear**
- **50 ohms impedance**
- **Wide frequency—ideal for testing all types of transmitters**
- **Special oil-cooled temperature-stable resistive element**

Kit HN-31

100 KC Crystal Calibrator

- **Provides output at 100 kc intervals to over 54 megacycles**
- **Transistorized and battery powered for complete portability**
- **Small, compact size—measures only 2½" W x 4½" H x 2⅝" D**

Kit HD-20

"Tunnel Dipper"

- **Tunnel diode oscillator—no tubes**
- **Covers frequency range of 3 to 260 mc**
- **Vernier gear drive tuning**
- **Enclosed drum-type dial with every scale nearly 7" long**
- **6-color-matched coils and dial scales**
- **Sensitive 3-transistor meter amplifier**
- **Durable epoxy-coated plug-in coils**
- **Snap-on cover with built-in storage for coils**
- **Battery powered for complete portability**
- **Printed circuit for easy assembly**
- **Compact, measures only 5¾" L x 4¼" H x 2¾" W**

SPECIFICATIONS—Size: 5¾" L x 4¼" H x 2¾" W. **Controls:** Switch—Off, Diode (wavemeter), OSC. **Frequency tuning:** Meter: 0-1 mc D'Arsonval; Transistors: 2N185(3); Tunnel Diode: STD633. **Frequency:** 3-260 mc. **Bands:** 6. **Temperature caution:** Will not operate at freezing temperatures.

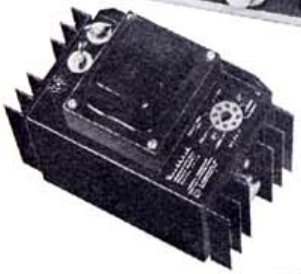
Kit HM-10A

"Q" Multiplier

- **Use with AC-DC or transformer operated receivers**
- **Built-in power supply—power light indicator**
- **Two peak I.F. positions (sharp or broad) plus rejection notch (null)**

SPECIFICATIONS—Operating frequency: 450-460 kc. **Operation:** Off-Sharp Peak—Null—Broad Peak. **Tube complement:** 12AX7. **Power requirements:** 105-125 volts AC, 50-60 cycles, 4 watts. **Dimensions:** 7⅜" W x 4 11/16" H x 4⅛" D.

Kit HD-11



Transistor Mobile Power Supply

- **Powers both transmitter and receiver**
- **Instant starting—high efficiency**
- **Remote relay control of primary power**

SPECIFICATIONS—Input voltage: 11 to 15 V DC (12.6 nominal). **Input current:** 2 to 13 amps (as a function of output load). **Total power output:** 120 watts continuous, 150 watts normal intermittent operation. **Power available:** 600 VDC @ 200 ma or 600 VDC @ 150 ma & 300 VDC @ 100 ma, and bias of —125 VDC @ 30 ma. **Efficiency:** Approximately 75%. **Maximum ambient operating temperature:** 120 degrees F. at 120 watt continuous, 150 degrees F. at 120 watt intermittent operation (50% duty cycle). **Dimensions:** 8" W x 7½" H x 6⅛" D.

Kit HP-10

Hybrid Phone Patch

- **Convenient one-switch operation**
- **Allows VOX or manual operation**

Kit HD-19

6 or 2-Meter Transceivers

- **Everything you need . . . transmitter, receiver, power supply . . . all in one compact unit**
- **3-way power supply operates on 117 V AC, 6 or 12 V DC**
- **10-watt RF output to antenna—6360 final amplifier**
- **Tracked VFO and exciter stages for single knob tuning**
- **Built-in low pass filter—push-to-talk microphone**

SPECIFICATIONS—RECEIVER SECTION—Frequency coverage: HW-20: 143.8 to 148.2 mc, HW-10: 49.8 to 54.0 mc. **IF frequencies:** Double conversion—First IF, 22 to 26 mc (tunable); Second IF, 2 mc. **Noise figure:** HW-20: 8.5 db or less, HW-10: 6 db or less. **Sensitivity:** .5 microvolts of input signal will provide an output signal better than 10 db over the noise level. **Squelch sensitivity:** Less than 1 microvolt. **Selectivity:** 15 kc at 6 db down. **Image rejection:** Better than 70 db. **IF rejection:** 50 db. **Input impedance:** 50 to 72 ohm, unbalanced. **Audio power output:** 3 watts (receiver operation); 15 watts (public address operation). **Headphone jack:** Low impedance, accepts PL-55 type plug (standard 2-conductor ¼" sleeve). **External speaker socket:** 8 ohm impedance, accepts RCA type phono plug.

TRANSMITTER SECTION—Frequency coverage: HW-20: 143.8 to 148.2 mc (crystal or VFO control). HW-10: 49.8 to 54.0 mc (crystal or VFO control). **Modulation:** .01 volts minimum at 1000 cps = 100%. **RF power output:** 8 watts nominal AM, 10 watts nominal CW, 50 ohm non-reactive load. **Distortion:** 10% or less, with 100% modulation at 1000 cps. **Output impedance:** 50 to 72 ohm, unbalanced. **Low pass filter:** HW-20: 152 mc cutoff frequency. HW-10: 54 mc cutoff frequency. **Key jack:** Accepts PL-55 type plug (standard 2-conductor ¼" sleeve). **Crystal sockets:** Accepts FT-243 type holders, pin diameter .093", pin spacing .466". **Microphone:** High impedance ceramic element push-to-talk type with coil cord. **Crystals:** (Not furnished) HW-20: 8 mc fundamental range (8.000 to 8.222 mc for 2 meter band). HW-10: 8 mc fundamental range (8.333 to 9.000 mc for 6 meter band).

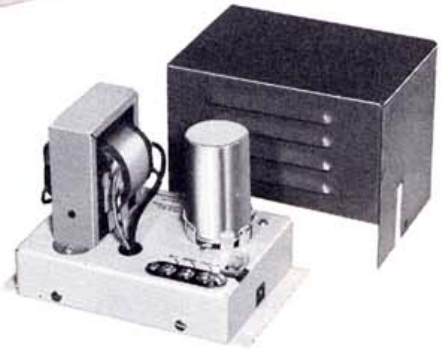
GENERAL—Power requirements: Input voltage: 6.3V DC, 12.6V DC, 117V AC. Transmit—14.5 amps, 7.5 amps, 120 watts. Receive—8.5 amps, 4.5 amps, 60 watts. **Cabinet dimensions:** 6" H x 10" D x 12" W.

Kit HW-10 (6 meter transceiver); Kit HW-20 (2 meter transceiver)

"Low-Cost" 6 or 2-Meter Transceivers

- **Crystal-controlled transmitters—5-watt input**
- **Tunable superregenerative receivers with RF stage**
- **Ideal for emergency communications, fixed or mobile**

Kit HW-29A (6 meter transceiver); Kit HW-30 (2 meter transceiver)



Mobile Vibrator Power Supply

- **Operates from 6 or 12 volt source**
- **Silicon diode rectifiers**
- **Small, compact—easy to install**

SPECIFICATIONS—Power requirements: 6 volt version 6.3 VDC @ 6.5 amperes; 12 volt version, 12.6 VDC @ 3 amperes for rated output. **Power output:** 250 VDC @ 100 ma, ICAS. **Power rectifier:** Two silicon diodes in voltage doubler circuit. **Vibrator:** Mallory type 1610 or equivalent. **Vibrator frequency:** Approximately 115 cps. **Overall dimensions:** 4⅜" H x 6⅛" W x 4¼" D.

Kit GP-11

Balun Coil Set

- **Matches unbalanced coaxial lines**
- **Frequency range 80 through 10 meters**
- **Power inputs up to 200 watts**
- **Bifilar wound coils**
- **Protective cover allows installation wherever convenient**

Kit B-1

Code Practice Oscillator

- **Complete with authentic telegraph key**
- **Switch selection of tone signal or blinker light**
- **Completely transistorized and battery powered**

Kit CO-1

Utility AC Power Supply

- **Powers mobile gear on standard household current**
- **Furnishes filament, B+ and bias voltages**
- **Extensive line filtering—dynamic regulation**

SPECIFICATIONS—Power requirements: 117 volts AC, 50/60 cycles, 200 watts. **Total DC continuous power output:** 120 watts (600 volts @ 200 ma or 600 volts @ 150 ma & 300 volts @ 100 ma; bias of −130 volts @ 30 ma also provided). **Filament power:** 6.3 volts @ 11 amperes or 12.6 volts @ 5.5 amperes. **Regulation:** Approximately 10% (50% load to 100% load, from high voltage tap). **Overall dimensions:** 9" L x 4¾" W x 6" H.

Kit HP-20

World's Largest Selling VTVM

- **Single AC/Ohms/DC probe with switch**
- **7 AC, 7 DC & 7 Ohms ranges**
- **Easy to read 4½" 200 ua meter**
- **1% precision resistors for high accuracy**

SPECIFICATIONS—Meter scales: DC & AC (RMS): 0-1.5, 5, 15, 50, 150, 500, 1500 volts full scale. **AC peak-to-peak:** 0-4, 14, 40, 140, 400, 1400, 4000. **Resistance:** 10 ohm center scale x1, x10, x100, x1000, x10K, x100K, x1 meg. Measures .1 ohm to 1000 megohms with internal battery. **Meter:** 4½" 200 ua movement. **Multipliers:** 1% precision type. **Input resistance DC:** 11 megohms (1 megohm in probe) on all ranges. **Circuit:** Balanced bridge (push-pull) using twin triode. **Accuracy:** DC ± 3%, AC ± 5% of full scale. **Frequency response:** ±1 db, 25 cps to 1 mc (600 ohm source). **Tubes:** 12AU7, 6AL5. **Battery:** 1.5 volt, size "C" flashlight cell. **Power requirements:** 105-125 volt 50/60 cycle AC 10 watts. **Dimensions:** 7⅞" H x 4 11/16" W x 4⅛" D.

Kit IM-11; Assembled IMW-11

Service Bench VTVM

- **Oversize 6" 200 ua meter**
- **Expanded multi-colored meter scales**
- **11 megohm DC input for high accuracy**
- **Separate low voltage AC scales**
- **Recessed zero and ohms adjust controls**

SPECIFICATIONS—Meter scales DC & AC (RMS): 0-1.5, 5, 15, 50, 150, 500, 1500 volts full scale (1.5 and 5 volt AC ranges read on separate scales). **Ohmmeter:** Scale with 10 ohm center x1, x10, x100, x1000, x10K, x100K, x1 meg. Measures 1 ohm to 1000 megohms with internal battery. **Multipliers:** 1% precision type. **Meter:** 6" 200 ua movement. **DC input resistance:** 11 megohms (1 megohm in probe) on all ranges. **AC input impedance:** 1 megohm shunted by 30 uuf (measured at input terminals). **Circuit:** Balanced bridge (push-pull) using twin triode. **Accuracy:** DC ± 3%, AC ± 5% of full scale. **Frequency response:** ± 1 db 25 cps to 1 mc (600 ohm source). **Tubes:** 12AU7, 6AL5. **Battery:** 1.5 volt size "C" flashlight cell. **Power requirements:** 105-125 volts 50/60 cycle AC, 10 watts. **Dimensions:** 9½" H x 6½" W x 5" D.

Kit IM-32

AC VTVM

- **10 voltage ranges—0.01 to 300 volts rms full scale**
- **10 megohm input impedance for high accuracy**
- **Calibrated db scale—measures −52 to + 52 db**

SPECIFICATIONS—Frequency response: ±1 db 10 cps to 500 kc, ±2 db 10 cps to 1 mc, all ranges. **Ranges:** VOLTS—Ten ranges from 0.01 to 300 volts RMS full scale. **Decibles:** Total range −52 to +52 db, meter scale −12 to +2 db (0 db = 1 mw in 600 ohms), ten switch selected ranges from −40 to +50 db in 10 db steps. **Input impedance:** 10 megohms shunted by 12 uuf on ranges 10 to 300 volts, 10 megohms shunted by 22 uuf on ranges .01 to 3 volts. **Tube complement:** (1) 6AW8, (1) 6EJ7/EF-184. **Accuracy:** Within 5% of full scale. **Power requirements:** 105-125 volts AC, 50-60 cycles, 10 watts. **Dimensions:** 7⅞" H x 4 11/16" W x 4⅛" D.

Kit IM-21; Assembled IMW-21

20,000 Ohms/Volt VOM

- **Sensitive 50 microampere 4½" meter**
- **1% precision resistors for high accuracy**
- **Total of 35 meter ranges on 2-color scale**
- **Battery powered for complete portability**

SPECIFICATIONS—Sensitivity: 20,000 ohms/volt DC, 5,000 ohms/volt AC. **Range AC & DC volts:** Full scale, 1.5, 5, 50, 150, 500, 1500, 5000. **Direct current:** 150 microamperes, 15, 150, 500 milliamperes, 15 amperes. **Ohmmeter:** 0.2 ohms to 20 megohms in three ranges. **Decibels:** −10 to +65 db. **Resistors:** 1% precision type. **Controls:** Range switch, Output −AC-DC Reverse DC switch, Ohms adjust control. **Batteries:** 1 type "C" cell, 4 penlight cells. **Dimensions:** 7½" H x 5½" W x 4" D.

Kit MM-1

Low Capacity Probe

- **An essential scope accessory for high frequency work**
- **Variable capacitor permits adjustment to match scope input**

Kit PK-1

Etched Circuit RF Probe

- **Use with any 11 megohm VTVM for RF measurements up to 250 megacycles**
- **Printed circuit for high stability and ease of assembly**

Kit 309-C; Assembled 309W-C

30,000 Volt DC High Voltage Probe

- **Invaluable for TV service**
- **Provides a multiplication factor of 100 on the DC ranges of any 11 megohm VTVM**

Kit 336; Assembled 336W

Transistor Tester

- **Complete DC analysis of all PNP, NPN transistors up to 15 amps**
- **DC gain (beta, alpha) read directly on calibrated scales**
- **15 ua basic range for leakage (Icbo, Iceo) tests**
- **Four lever switches provide rapid test selection**
- **Built-in battery supply—provision for using external supply**
- **Ideal for servicing, design work, incoming inspection, production testing, etc.**

SPECIFICATIONS—Checks: Transistors up to 15 amps and diodes up to 1.5 amps. **Tests:** Shorts, DC Gain (Beta 0-300) (Alpha 0-.9967), Leakage (Icbo, Iceo), Diode Forward and Reverse Current. **Meter:** Current Ranges: 15 ua, 150 ua, 1.5 ma, 15 ma, 150 ma, 1.5 A, 15 A; Voltage Ranges: 1.5 V, 5 V, 15 V, 50 V, 150 V (100 K ohm/volt). **Power supply:** Internal, seven 1.5 volt size D batteries provide 1.5, 3, 4.5, 6, 7.5, 9 volts collector supply for gain or leakage and 1.5 volts for bias; External, 0-50 volts for gain, 0-150 volts for leakage and 1.5 volts for bias. **Bias control:** Permits any collector current from 10 ua to 15 amps for gain tests. **Gain control:** 3% wire-wound potentiometer has calibrated scales to give DC Beta and DC Alpha directly when meter is at null. **Lever switch:** Four spring return levers will individually select the following tests: Base Current, Gain, Collector Voltage, Collector Current, Leak Voltage, Short Test, Icbo and Iceo or diode currents. **Two voltage selector switches:** Gain and Leak Test Voltages can be individually preset at different voltage levels. **Two current range switches:** Collector and Leak currents can be individually preset on different ranges. **Transistor and diode connections:** Universal transistor socket and binding posts. **External power supply connections:** Binding Posts for Gain, Leak and Bias supplies.

Kit IM-30

Transistor/Diode Checker

- **Tests low and high power transistors**
- **Tests forward and reverse current of diodes**

SPECIFICATIONS—Transistor test: leakage, short, open and current gain. **Diode test:** forward and reverse current. Also serves as a continuity checker. **Switches:** Forward-Reverse/PNP-NPN, Diode/HI-LO, Leakage-Gain. **Power supply:** self-contained, two 1.5 volt size "C" flashlight cells. **Dimensions:** 3⅛" H x 3⅜" W x 3¾" D.

Kit IT-10

Capacitor Checker

- **NEW! . . . low bridge voltage for safe tests of miniature electrolytics**
- **NEW! . . . 16 switch-selected leakage testing voltages**
- **NEW! . . . comparator circuit—measure "L", "C", or "R" with external standard**
- **Measures capacity or resistance directly with internal standards**
- **Direct reading scales—no involved calculations**
- **Calibrated power factor control—"eye" tube indicator**
- **Easy to build and operate with complete instructions supplied**

SPECIFICATIONS—Test circuit: AC bridge, powered through special bridge transformer by an internal 60 cycle supply or by an external audio generator with 10 volts output. Upper frequency limit: 10 kc. **Capacitance, 4 ranges:** 10 uuf to .005 ufd; .001 ufd to .5 ufd; .1 ufd to 50 ufd; 20 ufd to 1000 ufd. **Capacitor leakage:** DC test voltages from 3 to 600 volts in 16 steps. **Resistance, 3 ranges:** 5 ohms to 5000 ohms; 500 ohms to 500 K ohms; 50 K ohms to 50 megohms. **Comparator circuit:** External standard R, L or C: Max. Ratio 25-1. **Power supply:** Transformer-operated, half-wave rectifier. **Power requirements:** 105-125 volts AC, 50/60 cycles, 30 watts. **Dimensions:** 9½" high x 6½" wide x 5" deep.

Kit IT-11

"In-Circuit" Capaci-Tester

- **Detects opens, shorts and intermittents**
- **"Eye" tube indicator**

Kit IT-22

Visual-Aural Signal Tracer

- **Traces RF, IF and audio signals**
- **Locates noisy and intermittent components**
- **Convenient RF-audio probe with switch**
- **Doubles as utility amplifier, test speaker**
- **Ideal for testing radios, tuners, amplifiers**
- **Ideal for transistor radio trouble-shooting**

SPECIFICATIONS—Power supply: Transformer operated. **Power requirements:** 117 volts 50/60 cycles AC, 25 watts. **Tube complement:** 12AX7, 12CA5, 1629. **Speaker:** 3½" PM. **Probe and test leads:** 4' input lead for RF and audio with switch on probe body, 2-3' panel test leads with alligator clips. **Dimensions:** 4½" W x 7½" H x 4" D.

Kit IT-12

TV Alignment Generator

- **Complete FM and TV coverage—3.6 to 220 mc**
- **Built-in crystal and variable marker oscillators**
- **Excellent linearity for accurate waveform presentations**

SPECIFICATIONS—Output impedance: 50 ohms terminated at both ends of cable. **Sweep deviation:** Continuously variable from 0-4 mc lowest max. deviation to 0-42 mc highest max. deviation (depending on base frequency). **Marker crystal:** 4.5 mc and multiples thereof. **Variable:** 19 mc to 60 mc on fundamentals, 57 mc to 180 mc on harmonics. **External marker terminals:** Provided on panel. **Attenuators:** Step-switch controls sweep and marker oscillators together, plus variable controls for each output. **Blanking:** Effective blanking eliminates return trace; phasing control also provided. **Cables:** 3 supplied, output, scope horizontal, scope vertical. **Power requirements:** 105-125 VAC, 60 cycles, 50 watts. **Dimensions:** 13" W x 8½" H x 7" D.

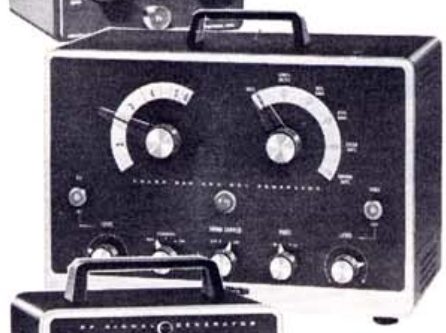
Kit IG-52

FM Alignment Generator

- **Variable 10.7 mc sweep, 200 kc to over 1 mc**
- **Switch selection of 90, 100, & 107 mc signals**
- **100 kc bandwidth markers for checking bandpass**

SPECIFICATIONS—Output frequencies—for RF alignment: 90, 100 and 107 mc, switch-selected. **Modulation:** 400 cycle incidental FM. **For IF and detector alignment:** 10.7 mc sweep. **Sweep width:** 200 kc to over 1 mc. **Markers:** 10.7 mc (crystal); 100 kc sub-markers. **Modulation:** 400 cycle AM. **For other applications:** 10.0 mc (crystal) and harmonics; 100 kc and 400 cycle audio. **Tube complement:** (2) 6U8. **Power supply:** Transformer, selenium rectifier. **Power requirements:** 105-125 V, 50/60 cycle, 12 watts. **Cabinet size:** 7⅜" H x 4¾" W x 4⅜" D.

FMO-1

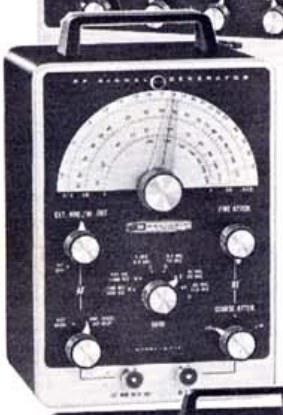


Color Bar & Dot Generator

- **Choice of six different patterns for color or B & W picture adjustment**
- **10 vertical color bars—new shading bar pattern**
- **All frequencies crystal controlled for accuracy and stability**

SPECIFICATIONS—RF output frequency range: TV channels 2 through 6. **Output voltage:** Variable from 100 to 100,000 microvolts. **Sound carrier:** Crystal controlled, unmodulated, 4.5 mc away from picture carrier; off-on switch provided. **Video output:** Positive or negative output variable from 0-10 volts peak-to-peak open circuit. **Modulation:** White dot pattern, cross hatch pattern, horizontal bars, vertical bars, 10 vertical color bars, shading bar pattern. **Tube complement:** 6-12AT7, 4-12AU7, 1-6BQ7, 1-6CS6, 1-OB2. **Power requirements:** 117 VAC, 50/60 cycles, 70 watts. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IG-62



RF Signal Generator

- **Wide frequency range—100 kc to 220 mc in six bands**
- **Large, easy-to-read frequency scales—2% accuracy**
- **Prewired/prealigned/coil/bandswitch assembly**

SPECIFICATIONS—Frequency range: Band A, 100 kc to 320 kc; Band B, 310 kc to 1.1 mc; Band C, 1 mc to 3.2 mc; Band D, 3.1 mc to 11 mc; Band E, 10 mc to 32 mc; Band F, 32 mc to 110 mc. **Calibrated harmonics:** 110 mc to 220 mc. **Accuracy:** 2%. **Output:** Impedance, 50 ohms: Voltage, 100,000 uv. **Modulation:** Internal, 400 cps. 30% depth; External, approx. 3 V across 50 k ohms for 30%. **Audio output:** Approx. 10 V open circuit. **Tube complement:** (1) 12AT7, (1) 6AN8. **Power requirements:** 105-125 V 50/60 cycles AC, 15 watts. **Dimensions:** 6½" W x 9½" H x 5" D.

Kit IG-102

Laboratory RF Generator

- **Metered output voltage and % modulation**
- **Double shielding of all oscillator circuits**
- **Operates on fundamentals—100 kc to 30 mc in five bands**

SPECIFICATIONS—IG-42 frequency ranges: Band A, 100 to 290 kc; Band B, 280 to 1000 kc; Band C, 0.95 to 3.1 mc; Band D, 2.9 to 9.5 mc; Band E, 9 to 31 mc. **RF output:** Impedance, 50 ohms—voltage, 100,000 microvolts max. **Attenuator:** 10:1 per step, 5 steps—Fine, 10:1 continuous, indicated on meter. **Amplitude modulation:** CW, internal 400 cycles or external audio frequencies. **Modulation depth:** 0 to 50% variable, indicated on meter. **Tube complement:** 6AF4, 6AV5, 12AU7, OB2. **Power requirements:** 105-125 V, 50/60 cycles. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IG-42

Audio Generator

- **Switch-selected output frequencies, 10 cps to 100 kc**
- **Less than .1 of 1% distortion between 20 and 20,000 cps**
- **Output and frequency accurate to within ±5%**
- **Neat, compact styling—easy to use—excellent resetability**

SPECIFICATIONS—Frequency: 10 cps to 100 kc, switch selected, 2 significant figures and multiplier. **Output:** 6 ranges 0 to .003, .01, .03, .1, .3, 1 volts RMS into external 600 ohm load or with internal load into Hi-Z, 2 ranges 0 to 3, 10 volts RMS into a minimum of 10,000 ohms, −60 db to ± 22 db in 8 steps −60 dbm to ± 2 dbm (0 dbm = 1 mw in 600 ohms). **Distortion:** less than .1%, 20 to 20,000 cps. **Tubes:** (1) 6AU6, (1) 6CL6, (1) 6X4. **Power:** 105-125 volts AC, 50/60 cycles, 40 watts. **Dimensions:** 9½" W x 6½" H x 5" D.

Kit IG-72

Sine-Square Wave Generator

- **Covers 20 cps to 1 mc in 5 bands**
- **Less than .25% sine wave distortion**
- **Less than .15 microsecond square wave rise time**
- **Sine and square wave output available simultaneously**

SPECIFICATIONS—Sine wave: Frequency range: 20 cycles to 1 mc. **Output volts (RMS):** 0 to 10 volts, 0 to 1 volt, 0 to .1 volt, or 0 to .01 volt when working into a high impedance load. **Source impedance:** (±10%): 10 volt range, 0 to 3.5 k ohm; 1V, .1V, and .01V range, 600 ohm. **Distortion:** Less than .25%, 20 to 20,000 cycles. **Frequency response:** ± 1.5 db 20 cycles to 1 megacycle. **Square wave: Frequency range:** 20 cycles to 1 mc. **Output volts:** (P. to P.) ±5%; 0 to 10 volt, 0 to 1 volt, 0 to .1 volt, into a high impedance load. **Source impedance:** (± 10%); 10 volt range, 0 to 220 ohm; 1V and .1V ranges, 52 ohm. **Rise time:** less than .15 microsecond. **General:** Frequency accuracy; ±5%. **Power requirements:** 105-125V AC, 50/60 cycles, 55 watts. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IG-82

Variable-Voltage Regulated Power Supply

- **Furnishes B+, bias and filament voltages**
- **DC output variable from 0 to 400 volts**
- **Separate panel meters monitor output voltage and current**

SPECIFICATIONS—Output: 0-400 volts regulated DC at 0-100 ma, cont., 125 ma intermittent 0 to −100 volts DC at 1 ma variable bias voltage, 6.3 volts AC at 4 amps, filament voltage. **Regulation:** Output variation less than 1% from no load to full load; Output variation less than ±0.5 volt for a ±10 v. change at 117 v. AC input. **Ripple:** less than 10 millivolts RMS, ripple, jitter and noise. **Output impedance:** less than 10 ohms, DC to 1 mc. **Meters:** Voltmeter 0-400 V or 0-150 V.; Milliammeter 0-150 ma. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IP-32

Low Ripple Battery Eliminator

- **A handy source of 6 & 12 volt DC power**
- **Less than .3% AC ripple for smooth DC output**

SPECIFICATIONS—Continuously variable output: 6 volt range: unfiltered, 10 amp continuous, 15 amp maximum, filtered, 5 amp continuous, less than .3% ripple. 12 volt range: unfiltered, 5 amp continuous, 7.5 amp maximum; filtered, 5 amp continuous, less than .3% ripple. **Power requirements:** 105-125 volts 50/60 cycles AC at 200 watts. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IP-12

Solid-State Regulated Power Supply

- **Voltage regulated, transistorized circuitry**
- **Variable, 0 to 50 volt output at up to 1.5 amperes**
- **Four current ranges, 50 MA, 150 MA, 500 MA & 1.5 A**
- **Adjustable current limiter, 30 to 110% on each current range**
- **Relay protected against heavy overload & short circuit**

SPECIFICATIONS—Input: 105-125 volts 60 cps; 125 watts at full load (50V, 1.5A). **Output:** 0.5-50 volts DC; 1.5 amps max DC. **Load regulation:** ±15 millivolts, can be adjusted for no change. **Line regulation:** (105 to 125 VAC); Less than .005% change. **Ripple & noise:** Less than 150 microvolts. **Transient response:** Less than 25 microseconds. **Output impedance:** Less than .01 ohm DC to 10 kc; Less than .5 ohms 10 kc & up. **Overload protection:** current limiter & relay. **Meter:** 3½", 1 ma, 50 ohm. **Current ranges:** 50 ma, 150 ma, 500 ma, 1.5 amp. **Voltage ranges:** 5V, 15V, 50V. **Front panel controls:** On/Off, coarse voltage switch, Fine voltage adjust, Current range switch, Current limit adjust, Meter slide switch, DC regulation, Reset Standby toggle switch. **Output terminals:** (3), plus (+ 1), minus (−1), chassis ground. **Dimensions:** 9⅛" H x 6½" W x 11" D.

Kit IP-20

Isolation Transformer

- **Controls AC line voltage to meet test requirements**
- **Power rated for color TV work—linear, expanded meter scale**

SPECIFICATIONS—Input: 105-125 volts 50/60 cycles. **Output:** Variable from 90-130 volts in steps of approximately .75 volt by means of transformer secondary tap switching. **Meter:** 90-140 volt scale, ± 1 volt accuracy. Switch selection of input or output voltage indication. **Power rating:** 300 watts continuous, 500 watts intermittent. **Fuse:** 8 ampere. **Dimensions:** 6½" W x 9½" H x 5" D.

Kit IP-22

Electronic Switch

- **Oscilloscope accessory**
- **Permits simultaneous observation of two separate signals**
- **Two traces may be separated or superimposed on each other**

Kit ID-22

Harmonic Distortion Meter

- **Meter scales calibrated in volts rms, % distortion & db**
- **Measures distortion from 20 to 20,000 cps**
- **Measures noise levels down to −60 dbm**
- **Precision components for high accuracy**

SPECIFICATIONS—Frequency: 20 cps to 20,000 cps in three ranges. **Distortion:** 1, 3, 10, 30, 100% full scale. **Voltmeter:** 1, 3, 10, 30 volts full scale. **Input resistance:** 300 k ohm. **Minimum input voltage for distortion measurements:** 0.3 volts. **Output voltage for monitoring:** 2.5 volts at full scale meter reading. **Accuracy:** Voltmeter, ± 5%: Distortion ± 5% of full scale, ± 0.1%. **Tube complement:** OA2, 6X4, 5879, 12AT7, 12AX7, 12BY7. **Power requirements:** 105-125 V, 50/60 cycles AC, 30 watts. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IM-12

Audio Analyzer

- **Combines function of AC, VTVM, Wattmeter and IM Analyzer**
- **High and low frequency source for IM tests built-in**
- **Built-in load resistors for 4, 8, 16 and 600 ohms**
- **Large easy-to-read meter—simplified switching system**

SPECIFICATIONS—Frequency response—AC VTVM: 10 cycles to 100 kc ± 1 db. **Wattmeter:** 10 cycles to 50 kc ± 1 db. **I.M. Analyzer high pass filter:** 2000 cps to 12,000 cps. **I.M. Analyzer low pass filter:** 10 cps to 600 cps. **Range AC VTVM:** .01, .03, .1, .3, 1, 3, 10, 30, 100, 300 volts RMS full scale. **DBM:** −40, −30, −20, −10, 0, +10, +20, +30, +40, +50. Reads from −65 to +52 dbm. **Wattmeter:** 0.15 mw, 1.5 mw, 15 mw, 150 mw, 1.5 w, 15 w, 150 w, full scale. Maximum continuous power 25 watts, intermittent power to 50 watts. **I.M. Analyzer:** 1%, 3%, 10%, 30%, 100% full scale. **Input impedance—AC VTVM:** 1 megohm or 4, 8, 16 or 600 ohm switch selected. **I.M. Analyzer:** 1 megohm or 4, 8, 16 or 600 ohm switch selected. **Wattmeter:** 4, 8, 16 or 600 ohm internal load, 10,000 ohm across external load. **Output impedance—low and high frequency output:** 3000 ohm (600 ohm when shunted with 750 ohm resistor). **Internal generator frequencies—low frequency:** 60 cycles. **High frequency:** Approximately 6 kc. **Accuracy—AC VTVM and wattmeter:** Within 5% of full scale. **I.M. Analyzer:** Within 10% of full scale. **Power requirements:** 105-125 volts 50/60 cycles 20 watts. **Dimensions:** 13" W x 8½" H x 7" D.

Kit IM-22

Handy Lab

- **Five functions in one instrument**
- **Simple one switch operation**
- **Battery operated for portability**
- **Easy to assemble—low in cost**

SPECIFICATIONS—DC voltmeter: Four ranges, 0-15, 50, 150, 500 volts full scale. **Meter:** 0 to 1 milliampere. **Accuracy:** ±10% of full scale. **Input resistance:** 1000 ohms-per-volt. **Resistance substitution:** 100, 1000, 10k, 100k, and 1 megohm, 1 watt 5% tolerance. **Condenser substitution:** .001, .005, .02, .1, and 8 ufd (electrolytic) at 400 volts. **AC indicator:** NE-51 neon lamp. **Continuity indicator:** #49 lamp. **Signal generator:** RF SECTION, preset adjustment from 450 kc to 700 kc, approximately 2 millivolts output. AUDIO SECTION, Approx. 1000 cps, 50 millivolts output. **Output impedance:** 220 ohm. **Transistors:** Two 2N1274. **Batteries:** Two 1.5 volt penlight cells. **Case:** Molded plastic. **Dimensions:** 6" H x 3½" W x 2½" D.

Kit IM-20

3-Decade Condenser

Precision accuracy in this laboratory-type capacitance decade provides switch selection of capacitor values from 100 mmfd to 0.111 mfd in 100 mfd steps at 1% accuracy. Uses precision 1% silver mica capacitors.

Kit IN-21

6-Decade Resistance

Provides any resistance value from 1 ohm to 999,999 ohms. Add or subtract as little as 1 ohm in critical ciruits with ½ of 1% accuracy. Range switches have make-before-break action for smooth switching without opening or shorting the circuit.

Kit IN-11

Resistance Substitution Box

Convenient switch-selection of any one of 36 E.I.A. standard 10% 1-watt resistors, ranging in value from 15 ohms to 10 megohms. Slide switch selects high or low resistance ranges.

Kit IN-12

Condenser Substitution Box

Provides individual selection of any one of 18 popular E.I.A. standard condenser values ranging from 0.0001 mfd to 0.22 mfd. All capacitors rated at 600 volts except the three smallest (500 volts) and the two largest (400 volts). Includes 18" test leads with alligator clips.

Kit IN-22

Impedance Bridge

- **Four popular bridges in one convenient instrument**
- **Battery type tubes—no warmup required**
- **Built-in phase shift generator and detector amplifier**
- **½ % precision resistors and silver mica condensers**
- **Slanted control panel for easy reading of all measurements**

SPECIFICATIONS—Circuit: 4-arm impedance bridge. **DC Measurements:** Built-in power supply. Binding posts provided for external supply. **Meter:** 100-0-100 microampere meter. **AC Measurements:** Built-in 1000 cycle generator. Terminals on panel for external generator at other frequencies. **Detector:** Vacuum tube detector and amplifier, using built-in meter. Terminals provided for external detector. **Resistance:** 0.1 ohm to 10 megohm. **Capacitance:** 100 mmf to 100 mfd. **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. **Tube complement:** (2) 1U4, (2) 1L4. **Power supply:** Transformer and selenium rectifier. **Power requirements:** 105-125 V. 50/60 cycles AC, 10 watts. **Dimensions:** 8" H x 17" W x 6" D.

Kit IB-2A

"Q" Meter

- **Tests components at operating frequency—150 kc to 18 mc**
- **Large 4½" 50 ua meter—easy to read dial scales**
- **Measures Q, L, and distributed capacity of coils**
- **No special alignment equipment required—test coil furnished**
- **Metered oscillator output for constant injection**

SPECIFICATIONS—Frequency: 150 kc to 18 mc in four bands. **Inductance:** 1 microhenry to 10 millihenrys. "Q"; 250 full scale x1 or x2. **Capacitance:** Actual, 40 mmf to 450 mmf; Effective, 40 mmf to 400 mmf; Vernier ± 3 mmf. **Tubes:** (1) 12AT7, (1) 6AL5, (1) 12AU7, (1) 6X5, (1) OD3/VR150. **Power requirements:** 105-125 volts, 50/60 cycles AC, 30 watts. **Dimensions:** 8" H x 17" W x 6" D.

Kit QM-1

Tube Checker

- **Latest design features and professional styling**
- **Tests all tube types including new Compactron, Nuvistor, Novar and 10-pin miniatures**
- **Multi-colored "bad-?-good" meter scale**
- **Constant tension, free-rolling roll chart mechanism**
- **Color-coded wiring harness for easy assembly**

SPECIFICATIONS—Tests: Emission, short, leakage, open element, filament continuity. **Sockets:** 4-pin, 5-pin, 6-pin, 7-pin large and pilot light, 7-pin miniature, octal, loctal, 10-pin miniature, 9-pin novar, 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, thumb-wheel operation, illuminated. **Filament voltage:** .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 V AC. **Element test voltages:** 30, 100, 250 V AC. **Power requirements:** 105-125 V AC, 50/60 cycles. **Dimensions:** 5¼" x 8½" x 13".

Kit IT-21

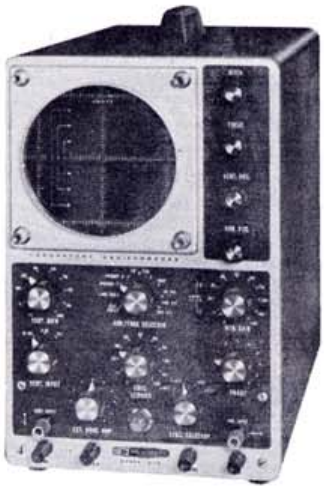
Mutual Conductance Tube Tester

- **Built-in adapter for testing new Compactron, Nuvistor, Novar and 10-pin miniature tube types**
- **Indicates Gm to 24,000 micromhos**
- **Ultra, sensitive grid current test**
- **Direct reading ohmmeter leakage test**
- **Built-in switch operated calibration circuit**
- **Constant current heater supplies**

SPECIFICATIONS—Power requirements—Voltage: 105-125, 60 cycle AC. **Watts:** 10-60 (dependent upon tube under test). **Plate supply:** (SILICON RECTIFIERS). **DC volts:** 26, 90, 135, 225 + variable 80 to 200 (Separate DC supply for space charge grids). **AC volts:** 20, 45, 177. **Bias supply:** (SILICON RECTIFIER). **Low range:** 0 to negative 5 volts DC. **High range:** 0 to negative 20 volts DC. **Signal voltages:** 2, 1, .5, .25 volts AC 5000 cycles. **Filament supply voltage:** .65, 1.1, 1.5, 2, 2.5, 3.3, 5, 6.3, 7.5, 10, 13, 20, 27.5, 35, 47, 70 and 115. Currents: 300, 450, 600 ma. (Note: Filament voltage is reduced 10% during life test). **Testing circuits GM:** (Mutual conductance-amplifiers) 0-24,000 micro-mhos. **Emission:** Rectifiers and diodes. **Leakage:** Direct reading ohmmeter. **Grid current:** ¼ microampere sensitivity. **Voltage regulators:** Firing voltage and regulation tolerance. **Low power thyratrons:** Grid characteristics, conduction capabilities. **Eye tubes:** Control grid characteristics. **Meter AC:** 1000 ohms/volt (1 volt full scale). **DC:** 89 ma full scale. **Scales:** GM; 0-3000 micromhos. VR test volts; 0-200 volts. Leakage: 0-10 megohms. Diodes O.K. Rectifiers O.K. Line check arrow at midscale. **Tube complement:** (1) 3A4 oscillator, (1) 12AV6 meter control. **Calibration circuit:** Built-in switch operated. **Socket accommodations:** 4-pin, 5-pin, 6-pin, 7-pin combination and pilot light, 5 & 7-pin nuvistor, 7-pin miniature, 7-pin sub-miniature, 8-pin sub-miniature, octal, loctal, 9-pin miniature, 9-pin, Novar, ten-pin miniature, 12-pin Compactron. **Line voltage adjustment:** Continuously variable. **Roll chart mechanism:** Constant tension, free rolling, thumbwheel operated, illuminated. **Dimensions:** Cabinet (outside): 17¾" W x 13½" H x 7½" D. **Panel and chassis:** 17" W x 12¾" H x 5½" D.

Kit TT-1A

445-1 Roll Chart for TC-2 Tube Checker; 445-5 Roll Chart for TC-3 Tube Checker



"Extra-Duty" Wide Band 5" Oscilloscope

- **Full 5 mc bandwidth for color TV servicing**
- **Push, pull horizontal and vertical amplifiers**
- **Heath patented sweep circuit—10 cps to 500 kc**
- **Switch-selection of 2 "preset" sweep frequencies**
- **2 circuit boards and wiring harness for easy assembly**

SPECIFICATIONS—(Vertical channel) sensitivity: 0.025 volt RMS per inch at 1 kc. **Frequency response (referred to 1 kc level):** ±1 db 8 cps to 2.5 mc; +1.5 to −5 db, 3 cps to 5 mc; response at 3.58 mc, −2.2 db. **Rise time:** 0.08 microseconds or less. **Input impedance:** (AT 1 KC) 2.7 megohms at X1;3.3 megohms at X10 and X100. **(Horizontal channel) sensitivity:** 0.3 volts RMS per inch at 1 kc. **Frequency response:** ±1 db 1 cps to 200 kc; ±3 db 1 cps to 400 kc. **Input impedance:** 4.9 megohms at 1 kc. **Sweep generator:** Range 10 cps to 500 kc in five steps, variable, plus any 2 switch-selected preset sweep frequencies in this range. **Synchronizing:** automatic lock-in circuit using self-limiting synchronizing cathode follower. **Power requirements:** 105-125 volts 50/60 cycles AC at 80 watts; fused. **Dimensions:** 14⅛" H x 8⅝" W x 16" D.

Kit IO-12

General Purpose 3" Oscilloscope

- **Push-pull vertical and horizontal amplifiers**
- **Wide-range sweep generator—20 to 100,000 cps**
- **Automatic sync—retrace blanking**
- **Clean, open circuit layout for easy, trouble-free assembly**
- **Compact design—light weight and portable for service work**
- **Access to vertical deflection plates—ideal for transmitter modulation monitoring**

SPECIFICATIONS—(Vertical and horizontal amplifiers identical): Frequency response: ±2 db, 2 cps to 200 kc. **Sensitivity:** .25 volts RMS/inch P-P deflection at 1 kc. **Input impedance:** 10 megohms shunted by 20 uuf. (Direct connection to vertical CRT plates on rear panel). **Sweep generator:** Range, 20-100,000 cps. Automatic sync, retrace blanking. **Tube complement:** (1) 3RP1 CR tube, (4) 12AU7 (deflection amplifiers), (1) 12AX7 (sweep generator), 6X4 (LV rectifier) (1) 1V2 (HV rectifier). **Controls:** Gain controls, Horizontal & Vertical; Centering controls, Horizontal & Vertical; Frequency Vernier: Horizontal Input, Sweep Range switch. (Focus and Astigmatism controls mounted on chassis). **Power requirements:** 105-125 volts AC, 50-60 cycle, 40 watts. **Dimensions:** 9½" H x 6½" W x 10" D.

Kit IO-21

"Space-Saver" 3" DC Oscilloscope

- **Identical vertical and horizontal DC or AC coupled amplifiers**
- **DC to 200 kc bandwidth—less than 5° phase shift**
- **Recurrent sweep generator, 5 cps to 50 kc in four ranges**
- **External capacitor binding posts for slower sweep rates**
- **Measures only 7⅝" H x 4⅝" W x 11" D.**

SPECIFICATIONS—(Vertical and horizontal channels identical): Bandwidth; DC to 200 kc (2 db point). **Sensitivity:** 0.1 V (peak-to-peak) per ¼" (uncalibrated). **Attenuator:** 3-position, compensated type. **Gain control:** Continuously variable. **Input impedance:** 3.6 megohms shunted by 35 mmf. **Coupling:** Either AC or DC, switch-selected. **Relative phase shift between channels:** Less than 5°. **Sweep generator (recurrent type):** Linear saw-toothed produced by multivibrator type generator covering 5 cps to 50 kc in four overlapping ranges. "External capacity" binding post for lower sweep rates. **Sync provision:** Either internal or external, switch-selected. **Power requirements:** 105-125 V 50-60 cycle AC at 100 watts max. **Dimensions:** 7⅜" H x 4⅝" W x 11" D.

Kit IO-10

Scope Demodulator Probe

- **Extends oscilloscope use**
- **Useful in all types of radio and TV work**

Kit 337-C

O-12E

Wide Band "Extra Duty" 5″ Oscilloscope

SPECIFICATIONS—VERTICAL CHANNEL—Sensitivity: 0.025 volts (RMS) per inch at 1 kc. **Frequency response referred to 1 kc level:** ±1 db 8 cps to 2.5 mc; +1.5 to — 5 db, 3 cps to 5 mc; response at 3.58 mc, —2.2 db. **Rise time:** 0.08 microseconds or less. **Input impedance at 1 kc:** 2.7 megohms at X1; 3.3 megohms at X10 and X100. **HORIZONTAL CHANNEL—Senstitivity:** 0.3 volts (RMS) per inch at 1 kc. **Frequency response:** ± 1 db 1 CPS to 200 kc; ± 3 db 1 CPS to 400 kc. **Input impedance:** 4.9 megohms at 1 kc. **Sweep generator—Range:** 10 CPS to 500 kc in five steps. **Synchronizing:** automatic lock-in circuit using self-limiting synchronizing cathode follower. **Power requirements:** 105-125 volts 50/60 cycles AC at 80 watts: fused. **Dimensions:** 14⅛" H. x 8¾" W. x 16" D.

Kit Model O-12E

V-7AE

V-7A, World's Largest Selling VTVM

- **Easy-to-read 4½" 200 ua meter**
- **7 ac, 7 dc & 7 ohms ranges**
- **1% precision resistors**

SPECIFICATIONS—Meter scales: DC & AC (RMS): 0-1.5, 5, 15, 50, 150, 500, 1500 volts full scale. **AC peak-to-peak:** 0.4, 14, 40, 140, 400, 1400, 4000. **Resistance:** 10 ohm center scale x1, x10, x100, x1000, x10K, x100K, x1 meg. Measures .1 ohm to 1000 megohms with internal battery. **Meter:** 4½" 200 ua movement. **Multipliers:** 1% precision type. **Input resistance DC:** 11 megohms (1 megohm in probe) on all ranges. **Circuit:** Balanced bridge (push-pull) using twin triode. **Accuracy:** DC ± 3%, AC ± 5% of full scale. **Frequency response:** ±1 db 42 cps to 7.2 mc (600 ohm source). **Tubes:** 12AU7, 6AL5. **Battery:** 1.5 volt, size "C" flashlight cell. **Power requirements:** 105-125 volt 50/60 cycle AC 10 watts. **Dimensions:** 7⅜"H x 4-11/16"W x 4⅛"D.

Kit V-7AE

TO-1E

Test Oscillator

- **5 fixed-tuned frequencies, switch selected**
- **Prewired/prealigned coil/bandswitch assembly**
- **Compact, yet easy to build**

SPECIFICATIONS—Fixed tuned frequencies: 262 kc, 455 kc, 465 kc, 600 kc, 1400 kc. **Accuracy:** ±0.5% or 2 kc. **Crystal provisions:** 2-front panel sockets, switch-selected. **Audio frequency:** 400 cycle, sine wave. **Modulation:** 400 cycle internal, approx. 30%. **Outputs available:** AF, modulated RF or RF only, switch-selected. **Output control:** AF, 10 volts RMS max. RF (mod. or unmod.) 0.1 volt RMS max. **Tube complement:** (1) 12AU7. **Power requirements:** 105-125 volts, 50/60 cycles AC, 10 watts. **Dimensions:** 4¾" W x 7⅜" H x 4¾" D.

Kit TO-1E

C-3E

Condenser Checker

- **Direct reading scales—no involved calculations**
- **Checks paper, molded, mica, ceramic and electrolytic condensers**
- **Automatic-discharge leakage test switch—power factor control**

SPECIFICATIONS—Capacity: 4 ranges: .00001 mfd—.005 mfd, .001 mfd—.5 mfd, .1 mfd—50 mfd, 20 mfd—1000 mfd. **DC Leakage Test. Polarizing Voltages: 5 ranges:** 25 volts DC, 150 volts DC, 250 volts DC, 350 volts DC, 450 volts DC. **Resistance Ranges: 2 ranges:** 100 ohms to 50,000 ohms, 10,000 ohms to 5 megohms. **Circuit:** AC powered bridge for both capacitive and resistive measurements. Maximum opening of electron beam indicator denotes bridge balance. **Cabinet Size:** 9½ wide x 6½" high x 5" deep. **Power Supply:** Transformer operated—half wave rectifier. **Power Requirements:** 110-125 volts, 50-60 cycles AC.

Kit C-3E

SG-8E

SG-8 Signal Generator

- **Separate oscillator sub-chassis for high efficiency and stability**
- **Wide frequency range 160 kc to 220 mc**
- **3 outputs: RF, modulated RF and 400 cps audio**

SPECIFICATIONS—Frequency range: BAND (A) 160 kc to 500 kc; (B) 500 kc to 1650 kc; (C) 1.65 mc to 6.5 mc; (D) 6.5 mc to 25 mc; (E) 25 mc to 110 mc. **Calibrated harmonics:** 110 mc to 220 mc. **RF output:** 100,000 uv. **Modulation frequency:** 400 cps. **Audio output:** 2 to 3 volts. **Tube complement:** (1) 12AU7, (1) 6C4. **Power requirements:** 105-125 volts, 50/60 cycles AC. **Dimensions:** 9½" wide x 6½" high x 5" deep.

Kit SG-8E

HEATHKIT® by Daystrom

With Power Transformers For Use On 115/230 Volts, 50/60 Cycle Power Supply

Heath Export Models Type "E" For 115/230 Volt, 50/60 Cycle Operation

Test

C-3E ..... Condenser Checker
EF-1E ..... VTVM Applications
FMO-1E ..... FM Test Oscillator
IB-2AE ..... Impedance Bridge
ID-22E ..... Electronic Switch
IG-42E ..... Laboratory Generator
IG-52E ..... TV Alignment Generator
IG-62E ..... Color Dot Generator
IG-72E ..... Audio Generator
IG-82E ..... Sine-Square Generator
IG-102E ..... RF Signal Generator
IM-11E ..... VTVM
IM-12E ..... Harmonic Distortion Meter
IM-21E ..... AC VTVM
IM-22E ..... Audio Analyzer
IM-32E ..... Service Bench VTVM
IO-10E ..... 3" DC Oscilloscope
IO-12E ..... 5" Laboratory Oscilloscope
IO-21E ..... 3" Utility Oscilloscope
IP-12E ..... Battery Eliminator
IP-20E ..... Power Supply
IP-32E ..... Power Supply
IT-11E ..... Condenser Checker
IT-12E ..... Signal Tracer
IT-22E ..... Capaci-Tester
OP-1E ..... 5" Projectment Oscilloscope
O-12E ..... 5" General Purpose Oscilloscope
QM-1E ..... Q-Meter
RF-1E ..... RF Signal Generator
SG-8E ..... Signal Generator
TO-1E ..... Test Oscillator
V-7AE ..... VTVM

Ham and Communications

DX-60E ..... Ham Transmitter
GR-91E ..... SWL Receiver
GW-11AE ..... CB Transceiver
GW-12AE ..... CB Transceiver
GW-22AE ..... CB Transceiver
GW-32AE ..... CB Transceiver
HD-11E ..... Q-Multiplier
HO-10E ..... Monitor Scope
HP-20E ..... AC Power Supply
HR-10E ..... Ham Receiver
HX-10E ..... SSB Transmitter
RX-1E ..... Ham Receiver
TX-1E ..... Ham Transmitter

High Fidelity

AA-11E ..... Stereo Preamplifier
AA-21E ..... Transistor Stereo Amplifier
AA-81E ..... 35 Watt Amplifier
AA-100E ..... Stereo Amplifier
AA-111E ..... Stereo Amplifier
AA-121E ..... Stereo Amplifier
AA-141AE ..... Stereo Preamplifier
AA-151E ..... Stereo Amplifier
AA-161E ..... 15-Watt Amplifier
AA-181E ..... Amplifier
AA-191E ..... Economy Amplifier
AA-201E ..... Stereo Amplifier
AJ-11E ..... AM/FM Tuner
AJ-21E ..... AM Tuner
AJ-30E ..... AM/FM Tuner
AJ-31E ..... FM Tuner

Educational/General

EC-1E ..... Analog Computer
EK-2AE ..... Basic Radio
ET-1E ..... Enlarger Timer
GD-121E ..... Intercom Master Station
GD-232E ..... Electronic Organ
IO-20E ..... Ignition Analyzer
ES ..... Professional Analog Computer

. . . and more to come

INT-163—40M

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