ASSEMBLING AND USING YOUR

Heathkit

SIGNAL GENERATOR

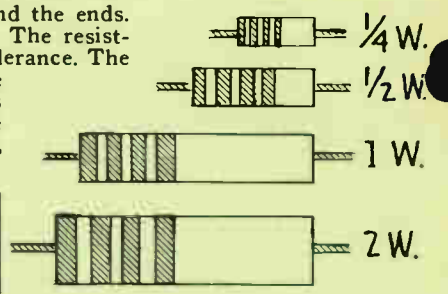
MODEL G-I

THE HEATH COMPANY
BENTON HARBOR, MICH.

PRICE $1.00

USEFUL INFORMATION FOR KIT BUILDERS

Resistors are identified by a color code used in several bands around the resistors. There are two general types of resistors. One, the uninsulated type, has the connecting wires bound around the ends. The other, the insulated type, has the wire connected internally and coming out the ends. The resistance code uses three bands or colors, while a fourth, usually silver or gold, indicates the tolerance. The colors are arranged so that the first two indicate the first two figures of the resistance, while the third indicates the number of digits (zeros or multiplier) which follow the first two figures On uninsulated resistors, the body is the first figure, the end color the second figure, and the dot the number of digits. On insulated resistors, the band nearest the end is the first figure, the next band is the second figure and the third band the number of digits.



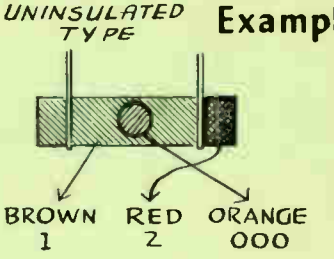
WATTAGE SIZES

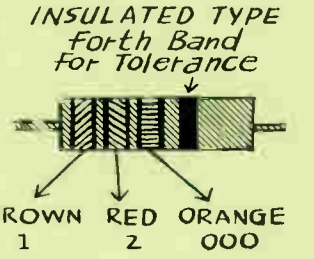
WATTAGE. Resistors are rated as to wattage (power dissipation) according to size. The chart shows approximate sizes which vary with manufacturers. To determine wattage size necessary multiply current through resistor in amperes by voltage drop across resistors in volts. Example — A plate loading resistor for a tube drawing 10 milliamperes (.01 Amperes) has a voltage on one side of 300 volts and on the other side 200 volts, giving a drop of 100 volts. Therefore 100 volts × .01A. = 1 Watt.

A higher wattage resistor can always be substituted for smaller size.

Uninsulated Insulated Color	Body Color First Ring First Figure	End Color Second Ring Second Figure	Dot Color Third Ring Number of Digits
Black	0	0	None
Brown	1	1	0
Red	2	2	00
Orange	3	3	,000
Yellow	4	4	0,000
Green	5	5	00,000
Blue	6	6	000,000
Violet	7	7	0,000,000
Grey	8	8	00,000,000
White	9	9	000,000,000

Examples





Some Popular Sizes of Resistors

RESISTANCE IN OHMS	BODY OR FIRST BAND	END OR SECOND BAND	DOT OR THIRD BAND
50	Green	Black	Black
250	Red	Green	Brown
1500	Brown	Green	Red
30,000	Orange	Black	Orange
220,000	Red	Red	Yellow
1 Megohm	Brown	Black	Green

The fourth ring or other end may be silver (10% tolerance) or gold (5% tolerance) or it may be omitted entirely which indicates 20% tolerance.

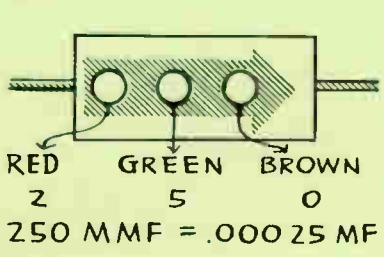
Condenser Code

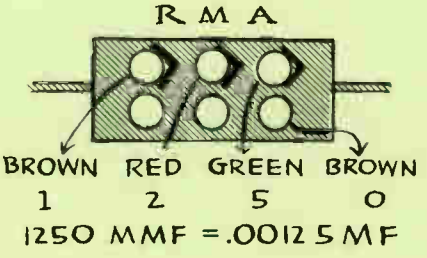
Condensers use the same code as resistors and are read in micromicrofarads.

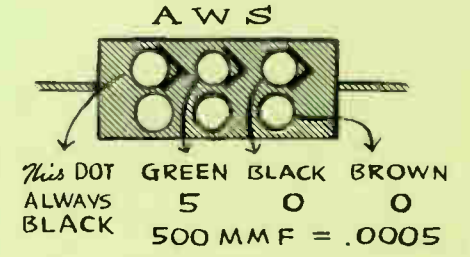
If there is one row of dots, they are read in direction of arrow or if manufacturer's name appears in the same direction as name. If two rows of dots appear, it can either be of two different codes: The RMA or the AWS (American War Standard). In the RMA, the top row of dots are the first three figures (carried to three figures), the bottom row are left to right the voltage rating, tolerance, and decimal multiplier.

In the AWS code, the top row of dots are the first three figures while the bottom row are, left to right, characteristic, tolerance, and decimal multiplier.

Examples







Some Commonly Used Sizes of Condensers

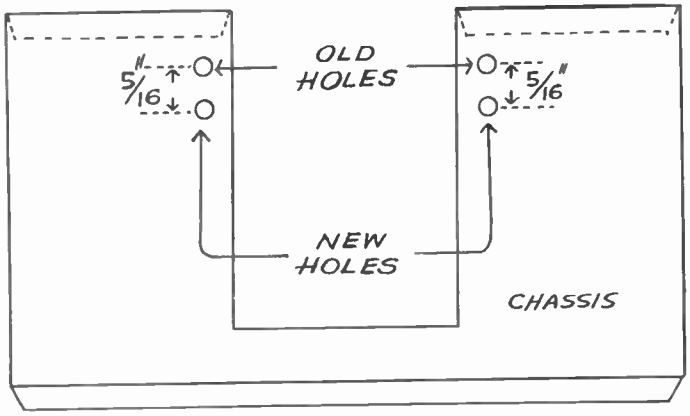
MMF.	MF.	FIRST DOT	SECOND DOT	THIRD DOT
10	.00001	Brown	Black	Black
50	.00005	Green	Black	Black
100	.0001	Brown	Black	Brown
250	.00025	Red	Green	Brown
500	.0005	Green	Black	Brown
1000	.001	Brown	Black	Red
3000	.003	Orange	Black	Red
10,000	.01	Brown	Black	Orange

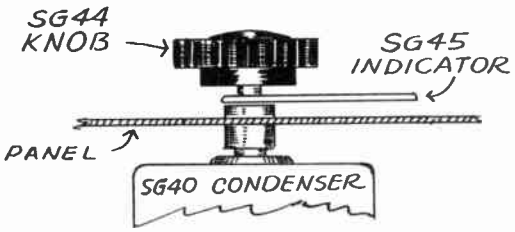
The tolerance rating corresponds to the color code, i.e., red — 2%, green — 5%, etc.

The voltage rating corresponds to the code multiplied by 100. Example: Orange dot — 300 volt rating; Blue — 600 volt rating.

CONVERTING YOUR G-1 SIGNAL GENERATOR

The conversion entails three major parts: The vernier drive condenser, the external modulation control and the higher output coil for band "E". Proceed as follows: Remove panel, modulation control and coil turret assembly. From the coil turret assembly, remove the tuning condenser and old band "E" coil. Carefully cut off $\frac{3}{8}$ of the shaft of the band switch, remove the burrs, and press on shaft extension. Mount new band "E" coil and new tuning condenser. Replace K10 (2700 ohm) resistor with SW12 (1000 ohm) resistor. On the chassis, drill two new holes 5/32" dia. for turret mounting spade bolts 5/16" back from old holes. Mount new control SG42 and wire up as shown in the diagram, replacing condenser T13 (.01 MFD) with T12 (.1 MFD) On 6SN7 socket, replace O12 (100K ohm) resistor with SW13 (22K ohm) resistor from pin #4 to pin #8. On the panel, increase the hole for the tuning condenser shaft from $\frac{3}{8}$" to $\frac{1}{4}$" diameter. Re-assemble coil turret and panel, and install pointer assembly and knobs.





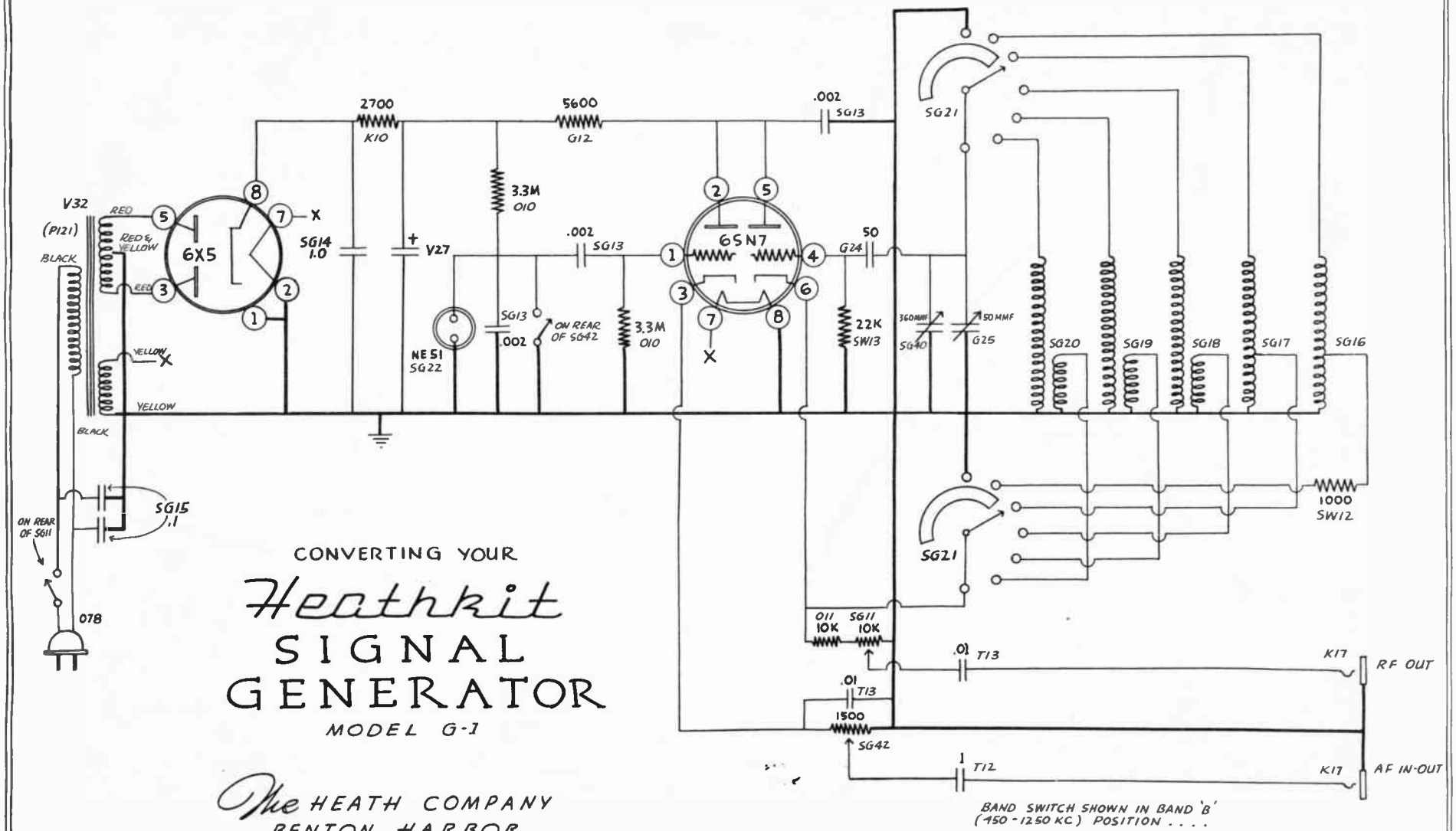
Operation of AF control: For internal modulation, turn control counterclockwise until switch clicks. AF output is controlled by the knob. For external modulation, turn control clockwise until switch clicks. A signal fed into the phone jack will modulate the RF output. The amount of modulation may be controlled by the knob.

#316 SIGNAL GENERATOR CONVERSION KIT PARTS LIST

Part No.	Part Per Kit	Description
Resistors		
SW12	1	1000 Ohm Resistor
SW13	1	22,000 Ohm Resistor
Condensers		
T12	1	.1 MFD Fixed Condenser
SG40	1	360 MMF Tuning Condenser
Control		
SG42	1	1500 Ohm Control with Special Switch

Part No.	Parts Per Kit	Description
Miscellaneous		
SG45	1	Indicator Assembly
SG44	1	Knob (4100A)
SG48	1	Shaft Extension for SG21
SG20	1	Band "E" Coil
SG29	1	Roll Hook-up wire (20')
316	1	Set of Instructions

HEATH COMPANY
Benton Harbor, Michigan



CONVERTING YOUR

Heathkit

SIGNAL GENERATOR

MODEL G-1

The HEATH COMPANY
BENTON HARBOR,
MICHIGAN

BAND SWITCH SHOWN IN BAND 'B'
(450 - 1250 KC) POSITION . . . .

8/18/49 316

ASSEMBLING YOUR HEATHKIT
MODEL G1 R. F. SIGNAL GENERATOR

The Heathkit R. F. Signal Generator uses one of the most modern of R. F. oscillator circuits. The cathode follower output gives an excellent wave form. The precision wound tuning coils are factory adjusted to eliminate problems of calibration. The entire unit is transformer operated allowing it to be used on any type radio without danger. The case has been made compact to allow plenty of room on work benches. This Heathkit will last for years and by assembling it the builder is in good position to make any repairs that may arise--Save your instruction book.

The construction of this instrument is not difficult, but as this is a delicate test instrument which will be useful for many years, it deserves the best of careful workmanship. Poor construction will result in an inaccurate instrument.

Thoroughly familiarize yourself with the layout, schematic and pictorial diagram. Do not rush the construction. Make a good mechanical joint of each connection and then solder it with the best quality of rosin core radio type solder. Hold each joint rigid until cool and then test by attempting to pull the joint loose. Most difficulty in construction results from improper wiring and poor soldered connections.

Begin by checking the parts against the parts list. Identify each part. This will avoid throwing away any small parts in the packing. Use the charts to identify resistors and condensers.

From time to time, small changes in parts will be made by the Heath Company. All parts supplied will work just as well as the part for which it was substituted. 47,000 ohm resistors (which is the new radio manufacturers rating for 50,000 ohms) may be substituted for 50,000 ohms or a one watt resistor may be substituted for $\frac{1}{2}$ watt, etc. All substitutions will be of equal or better quality than the original and will be made in order that a minimum delay will occur in filling your order.

The newer types of insulated resistors have a higher wattage rating. The $\frac{1}{4}$ watt size is now rated at $\frac{1}{2}$ watt and these are used in this kit. Bolts and nuts are counted mechanically, and if a few are missing, secure locally.

Resistors and potentiometers have a tolerance rating of plus or minus 20% unless otherwise stated. Therefore, a one megohm unit may test between 800,000 and 1,200,000 ohms. The Heathkit circuits are designed to accommodate these variations.

The socket connections are numbered on the bottom of the sockets. They are fastened into the chassis with the wavy metal rings which are forced over the bottom of the socket and into the grooves in the socket. The end of the ring can be held in the groove and the rest of the ring forced over and into the groove with a screw driver.

Use extreme care in handling, assembling and soldering the coils and tuning condenser. These parts are very delicate and rough handling will damage and affect the calibration of the instrument.

Start the assembly with the sockets which are mounted with the keyways toward the ends of the chassis. Mount the transformer as shown. Mount the condenser SG15 and SG27 using

solder lugs under the mounting bolts as shown on prints SG36 and SG33. Mount the potentiometers (which have their part number and rating stamped on the rear cover) and the phone jacks, through chassis and panel, using lock washers on the inside and the nickel washers under the nuts. The neon bulb (NE51) is mounted in a rubber grommet which is placed in the hole provided in the chassis. The terminal strip is mounted with a nut and bolt.

Start the wiring with the 6X5 socket. The red leads from the transformer going to contacts 3 and 5 should be twisted to cancel the AC field as should the yellow leads going to 2 and 7. Resistor K10 which is part of the filter system uses contact 4 as a tie or solder point (contact 4 is a blank on the 6X5.)

In wiring SG15 be sure to ground the common lug which may be marked by a red dot or a "C" stamped on the side. The common lug location varies with the make of condenser. One make has it the center connection while another has it on the side. These condenser contacts can be used also to connect the line cord to the transformer and switch connections.

Note that contact 2 of the 6X5 socket grounds to the solder lug. The balance of the wiring of the chassis is shown clearly on sheet SG36. Observe the polarity of V27 electrolytic condenser. The other condensers are paper types and may be connected either way.

The tuning assembly is now wired. Study the diagrams carefully. Use extreme care with the soldering iron, as the very fine wire used in the coils is easily broken or burned. All grounds in this unit are brought to the central solder lug. In soldering to the rotary switch, be certain not to allow the rosin from the solder to flow into the contact, as this will result in erratic operation and may cause the generator to be inoperative on some bands. Be sure that a good mechanical joint is made before solder is applied. In the higher frequencies, poorly soldered joints result in poor operation.

After wiring the tuning unit, install it on the main chassis with the two spade bolts supplied, and connect the switch contacts to the 6SN7, using G24.

The switch SG21 has a pair of shorting or grounding contacts which short out all lower frequency coils on any band. These grounding contacts should both be connected to the central solder lug.

The audio modulation is supplied by the neon bulb which acts as an audio oscillator supplying a saw tooth audio wave. The normal frequency is between 300 and 500 cycles. This frequency may be varied by varying the size of O10 resistor between the bulb and the plate supply voltage. The audio signal is available through the AF jack for amplifier and speaker testing.

CALIBRATION

Assemble indicator knob to tuning condenser shaft so hairline is on the beginning of the scales just below 150 Kc., with the condenser plates fully meshed.

On a receiver, tune in a strong station of known frequency between 1,000 and 1,250 Kc.

Place the test lead from the generator close to the antenna of the receiver and tune the generator to approximately the same frequency, which will result in a whistle in the receiver.

The lowest pitch whistle (zero beat) indicates signal generator and station to be on the same frequency. Now set indicator to read the same frequency as the station and adjust trimmer to give again zero beat. The trimmer should be nearly unmeshed.

The calibration will now hold quite accurately on all bands.

The calibration on the higher frequency bands may be upset by excessively long leads on the tuning assembly and by failure to ground all coils to the common solder lug. Such variations in inductance cannot be compensated for by trimmer adjustment.

If the trimmer is fully unmeshed before zero beat is again obtained, there is an excessive amount of distributed capacity due to wiring in the tuning circuits. Make sure all the "hot" leads (from the top lug on the coils to the switch, and from the switch to the tuning condenser and trimmer) are at least a quarter inch away from the metal chassis and all other wiring.

ACCURACY

Any signal generator is designed as a controllable source of modulated or unmodulated signals, that can readily be identified. No signal generator is designed as a frequency standard. Expensive standard signal generators have fairly accurate (3-20%) attenuators, which control the output voltage, and the calibration accuracy is rarely closer than 1%. The Heathkit generator may be expected to fall within 2-3% of the frequency calibration, which is quite satisfactory for service work and alignment. In receiver alignment, the frequency at which the particular adjustment is made is rarely critical, but the adjustment itself for maximum signal output from the receiver is frequently quite critical.

For calibration of home built receivers or equipment with great accuracy proceed as follows:

Make a rough calibration with the signal generator. Then with a receiver tune in WWV (Bureau of Standards) at 2.5, 5 or 10 Mc. Set the signal generator to a suitable sub harmonic, such as for instance 500 Kc. and adjust for zero beat. Now the harmonics of the signal generator occur very accurately every 500 Kc. and may be used to give accurate calibration points at 500 Kc. intervals, like for instance 2500 Kc.-3000 Kc.-3500 Kc.-4000 Kc. These points can then be used to correct the rough calibration, which is merely used to distinguish between the many harmonics available. For calibration of higher frequency equipment, a choice of a higher sub harmonic will reduce confusion between the multitude of harmonics and insure adequate signal strength.

When checking the calibration accuracy of the Heathkit generator, the most convenient standards of comparison, of sufficient accuracy, are broadcast stations of known frequency. Crystal oscillators of standard frequencies, when zero beat against WWV, are also convenient to use, if available. The use of receiver dial calibrations is frequently not of sufficient accuracy to warrant consideration.

USE OF R. F. SIGNAL GENERATOR

This signal generator is used to align radio receivers. A variable source of radio frequency or modulated radio frequency waves on fundamentals between 150 Kilocycles and 34

Megacycles (Megacycle = 1,000 Kilocycles) with useful calibrated harmonics to over 100 Megacycles.

A source of 400 cycle saw tooth audio waves is also provided which is useful in testing amplifiers and speakers.

Wherever possible, the recommendations of the manufacturer of the radio being aligned should be used. When this is not available, the following procedure can be followed.

Output Indication. With the newer types of receivers, especially those using AVC (automatic volume control), a visual means of indicating resonance is desirable. This may be an output meter (AC voltmeter) or oscilloscope, connected to the speaker voice coil terminals, or output tube plate and ground. Or a DC vacuum tube voltmeter connected across the diode load resistor may be used.

IF Alignment. Connect the signal generator shield to chassis and clip the shielded wire to the signal grid terminal on the converter tube socket. Set the signal generator to the IF frequency required. RMA standard is 455 Kc., but other frequencies like 262 and 175 Kc. are also used. Adjust generator output for minimum readable output indication. Adjust IF transformers starting with the one nearest the second detector and working forward. The adjustment consists generally of two screws, operating trimmer condensers, or iron cores inside the coils. They may be located on top, on the side or on top and bottom of the IF transformer. Turn the adjusting screw for maximum output, reducing the signal generator output if necessary to keep the output indicator from going off scale.

Oscillator Alignment. With the generator connected as above, set dial to highest frequency of receiver dial (1600 or 1720 Kc.) and set receiver dial to the same frequency. Adjust oscillator trimmer to bring in the signal. An additional adjustment is often provided in the form of a padding condenser or an iron core. This is generally adjusted at 600 Kc. and its final adjustment is made later.

RF Alignment. Using a 200 MMF condenser between generator and antenna post, set receiver and generator to 1400 Kc. Adjust antenna (and RF, if used) trimmer (frequently located on the tuning condenser) for maximum output. Set generator to 600 Kc. and "rock" tuning condenser through the signal while adjusting the oscillator padder for maximum output at resonance.

For receivers with a loop antenna, couple the signal through a single turn loop connected to the generator output.

Tuned radio frequency receivers are aligned as shown under RF Alignment.

OUTPUT VOLTAGE

The RF signal strength going into the output control depends upon the strength of oscillation of the 6SN7. In all variable frequency oscillators, the amplitude will vary with the tuning condenser setting. With careful design, the variation may be minimized. In the Heathkit signal generator, the variation is kept down to about two to one on each band, except on band E where the L/C (inductance to capacitance) ratio becomes sufficiently unfavorable, that oscillation may stop with the tuning condenser nearly fully closed. However, sufficient overlap is provided to insure complete frequency coverage. The variation between bands is

such as to provide a greater signal strength at the lower frequencies. This permits a signal to be "forced through" a badly misaligned IF channel. The maximum output on all bands is usually greater than 100,000 microvolts.

IN CASE OF DIFFICULTY

1. Recheck entire wiring. Follow each lead and color it on the schematic with colored pencil. Most cases of difficulty result from wrong or reversed connections. (Often having a friend check the wiring will divulge an error being consistently overlooked.)

2. Be sure that the output is connected to the tip connection of the jack and that the output cable is not shorted inside the PL55 plug.

3. Check the voltages. The table below lists voltages from pins of 6SN7 to chassis. These voltages were measured with an 11 megohm input vacuum tube voltmeter. A normal variation of ± 15% is to be expected.

Pin 1	0	Pin 5	80-100V
Pin 2	80-100V	Pin 6	7 to 8V (Band "A" only)
Pin 3	4 to 5V	Pin 7	5-6V AC
Pin 4	1 to 21V Neg.	Pin 8	0

With regular voltmeters, readings may be very much lower.

4. If you are unable to obtain results, write the Heath Company, giving all possible information, such as voltages obtained, indications if any, and all other helpful information.

5. If desired, your instrument may be returned to the factory. The Heath Company will check and put it into operating condition for a charge of $3.00 plus any parts or alterations required due to damaged or improper construction. Attach a tag giving your name and address and trouble experienced with the instrument. Pack carefully with plenty of padding over face of instrument. Mark "FRAGILE--DELICATE INSTRUMENT" and ship to us prepaid. Instrument will be returned charges collect.

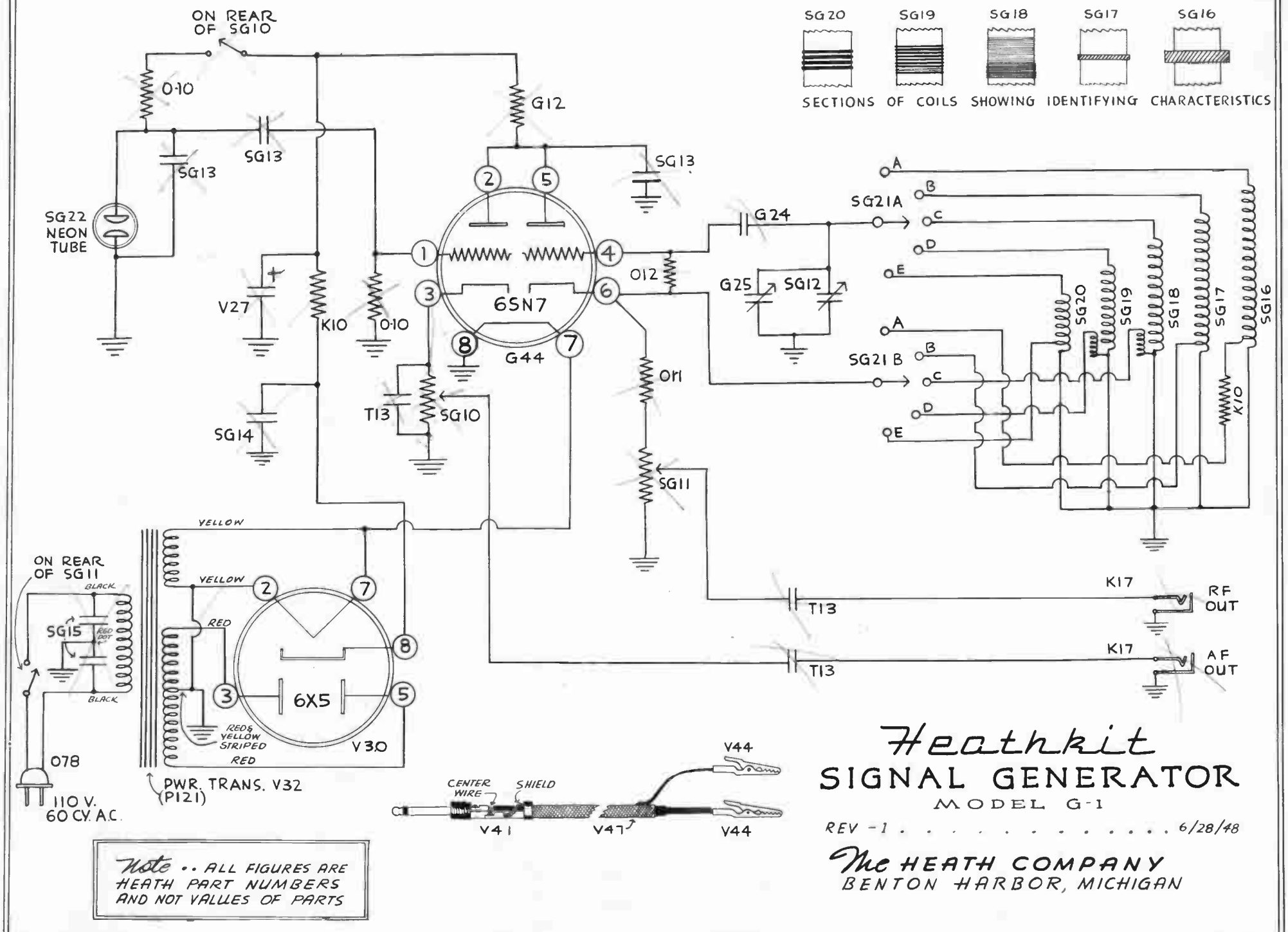
Prices subject to change without notice. The Heath Company reserves the right to change the design of its instruments without incurring liability for equipment previously supplied.

HEATH COMPANY
Benton Harbor, Michigan

SG 1--SIGNAL GENERATOR

STOCK NO.	NO. PCS. PER KIT	DESCRIPTION
K10	2	2700 Ohm ½ Watt Resistor
O10	2	3.3 Megohm ½ Watt Res.
G12	1	5600 Ohm ½ Watt Resistor
O11	1	10,000 Ohm ½ Watt Res.
O12	1	100,000 Ohm ½ Watt Res.
SG10	1	1500 Ohm Control with Switch (34-O11-443)
SG11	1	10,000 Ohm Control with Sw. (34-O11-444)
SG12	1	360 MMF Tuning Condenser
G24	1	50 MMF Mica Condenser
G25	1	50 MMF Air Trimmer Cond.
SG13	3	.002 MFD Fixed Condenser
T13	3	.01 MFD Fixed Condenser
V27	1	12 MFD 150 Volt Condenser
SG14	1	1 MFD 250 Volt Condenser
SG15	1	Dual 0.1 MFD 600 Volt Cond.
V30	1	6X5 Tube
G44	1	6SN7 Tube
V32	1	Power Transformer (P121)
SG16	1	Oscillator Coil 150-450 KC
SG17	1	Oscillator Coil 450-1300 KC
SG18	1	Oscillator Coil 1.3-4.0 MC
SG19	1	Oscillator Coil 4.0-12 MC
SG20	1	Oscillator Coil 12-34 MC
SG21	1	2 Circuit 5 Pos. Band Sw.
K17	2	Phone Jacks
O28	4	3/8" Nickel Washers (#741)
O78	1	Line Cord
SG22	1	Neon Bulb
O34	4	Rubber Feet (#716)
O54	2	Octal Sockets
O43	2	Octal Socket Rings

STOCK NO.	NO. PCS. PER KIT	DESCRIPTION
O51	3	Pointer Knobs (#2300)
SG23	1	Indicator Knob
C25	1	Neon Bulb Socket
G31	2	4-40 x 3/8 Screws
G32	2	Spade Bolts
O31	9	6-32 x 3/8 Screws
O32	22	6-32 Nuts
K16	3	6-32 x 3/16 Screws
O33	5	Potentiometer Nuts (#737)
O33C	3	Lock Washers (#1220)
O33D	8	#6-3/8 Sheet Metal Screws
V41	1	Phone Plug (#PL55)
V44	2	Alligator Clips
V47	1	Pc. Shielded Test Lead Wire
SG25	1	Terminal Strip
O30	2	10-24 x 3/8 Handle Screws
O35	1	3/8" Grommet (#905)
C24	1	7/16" Grommet
O37	5	Soldering Lugs
O79	1	Handle
SG26	1	Panel
SG27	1	Chassis
SG28	1	Sub Chassis
SG29	1	Roll Hookup wire 20'
T32	1	Cabinet
O83	1	Manual Cover
SG30	1	Instruction Sheet
SG31	1	Parts List
SG32	1	Schematic
SG33	1	Chassis Photo Print
SG34	1	Coil Turret Photo Print
SG36	1	Pictorial



Note .. ALL FIGURES ARE HEATH PART NUMBERS AND NOT VALUES OF PARTS

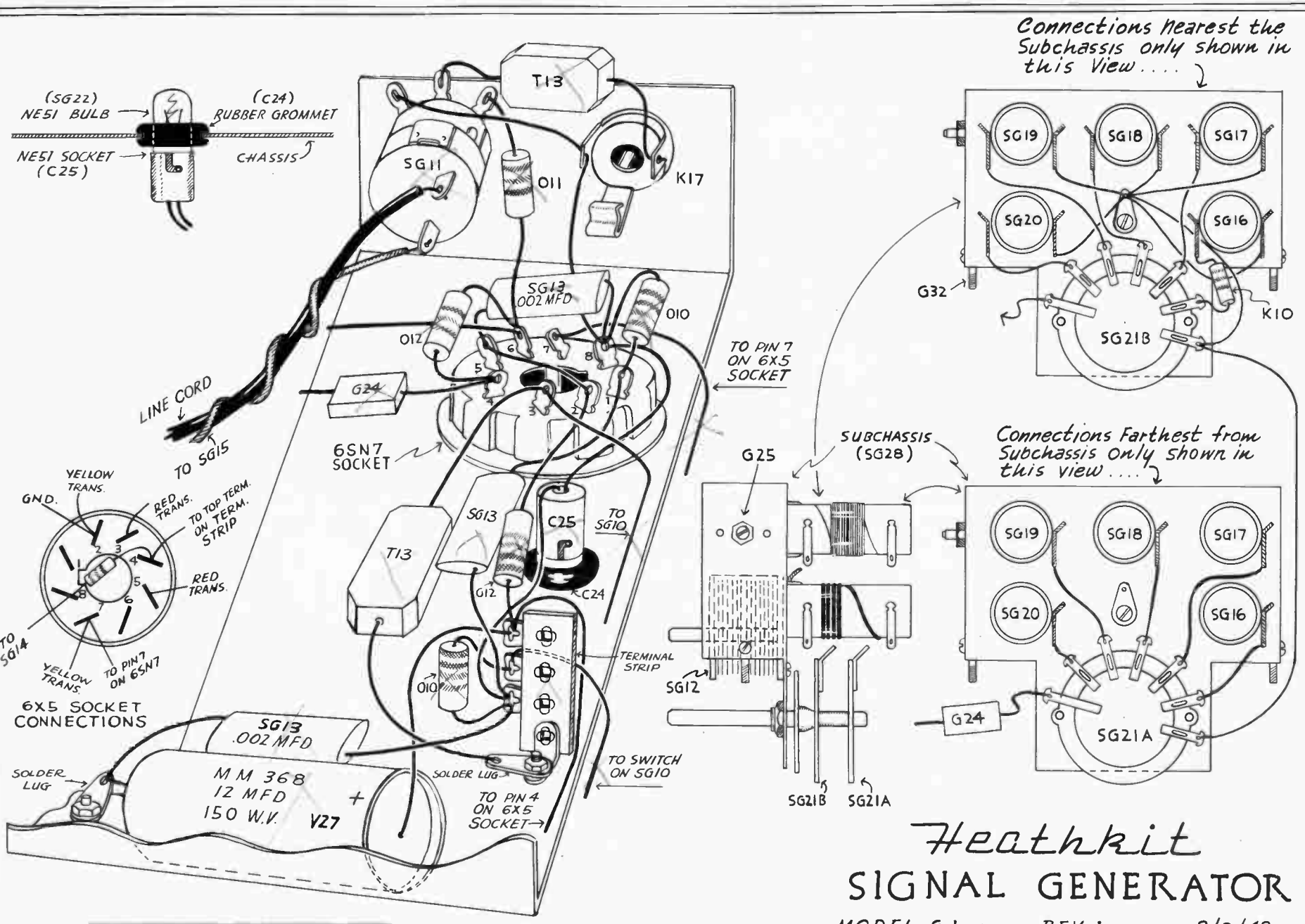
Heathkit

SIGNAL GENERATOR

MODEL G-1

REV -1 . . . . . 6/28/48

The HEATH COMPANY
BENTON HARBOR, MICHIGAN



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Heathkit

SIGNAL GENERATOR

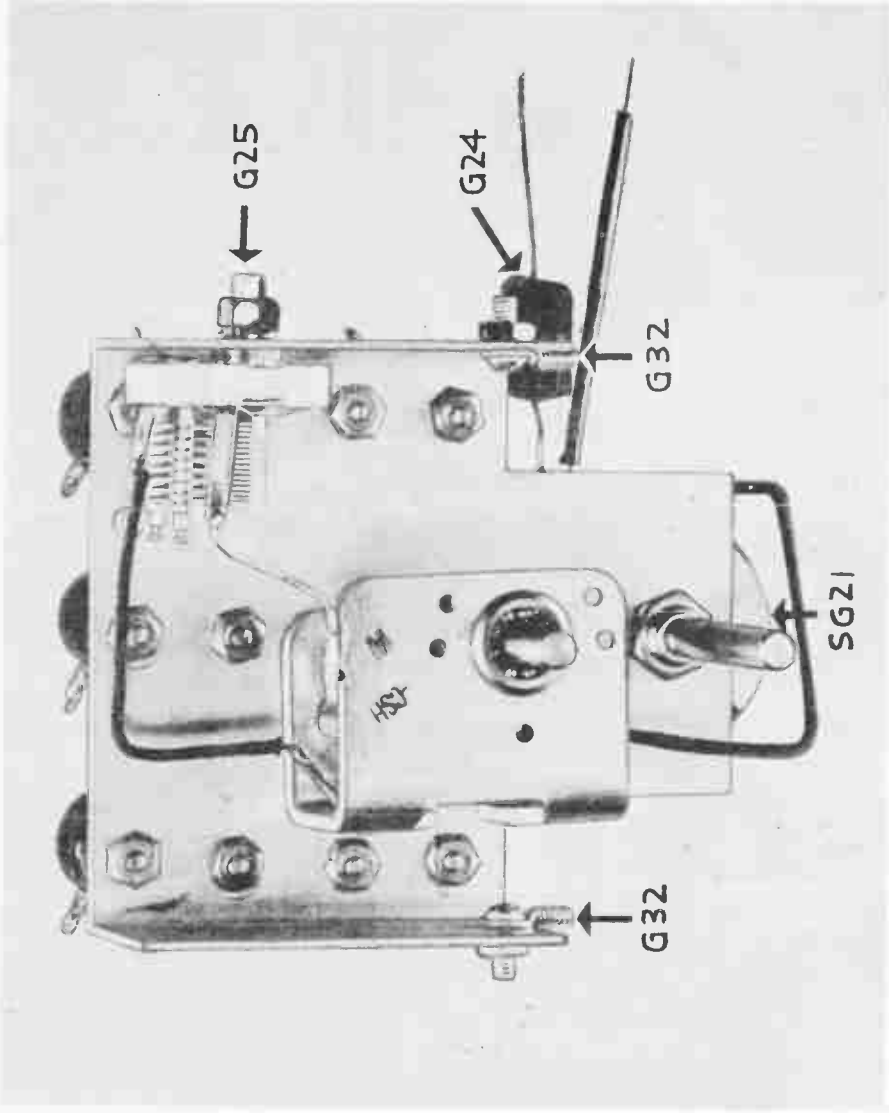
MODEL G-1 · · · REV. 1 · · · 8/2/48

The HEATH COMPANY

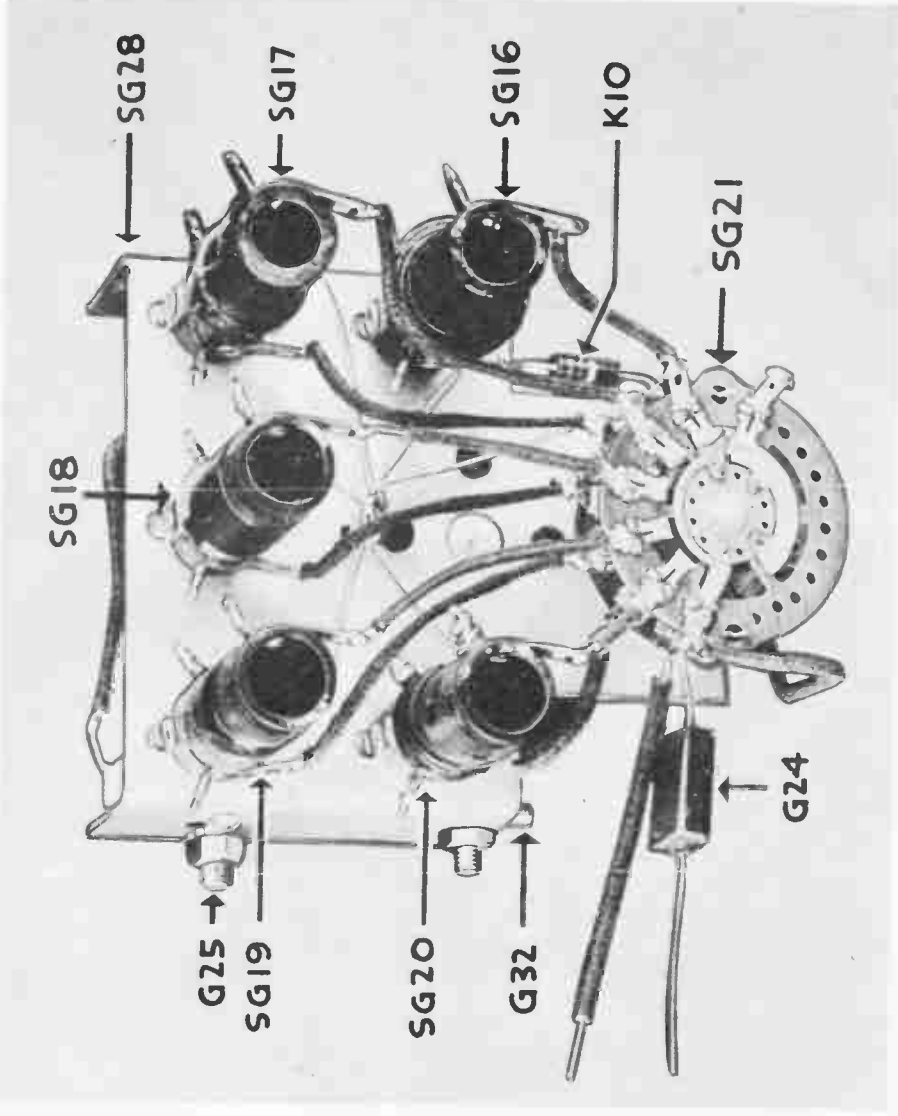
BENTON HARBOR, MICHIGAN

SG36

Heathkit SIGNAL GENERATOR ··· MODEL G-1



COIL TURRET ·· FRONT VIEW

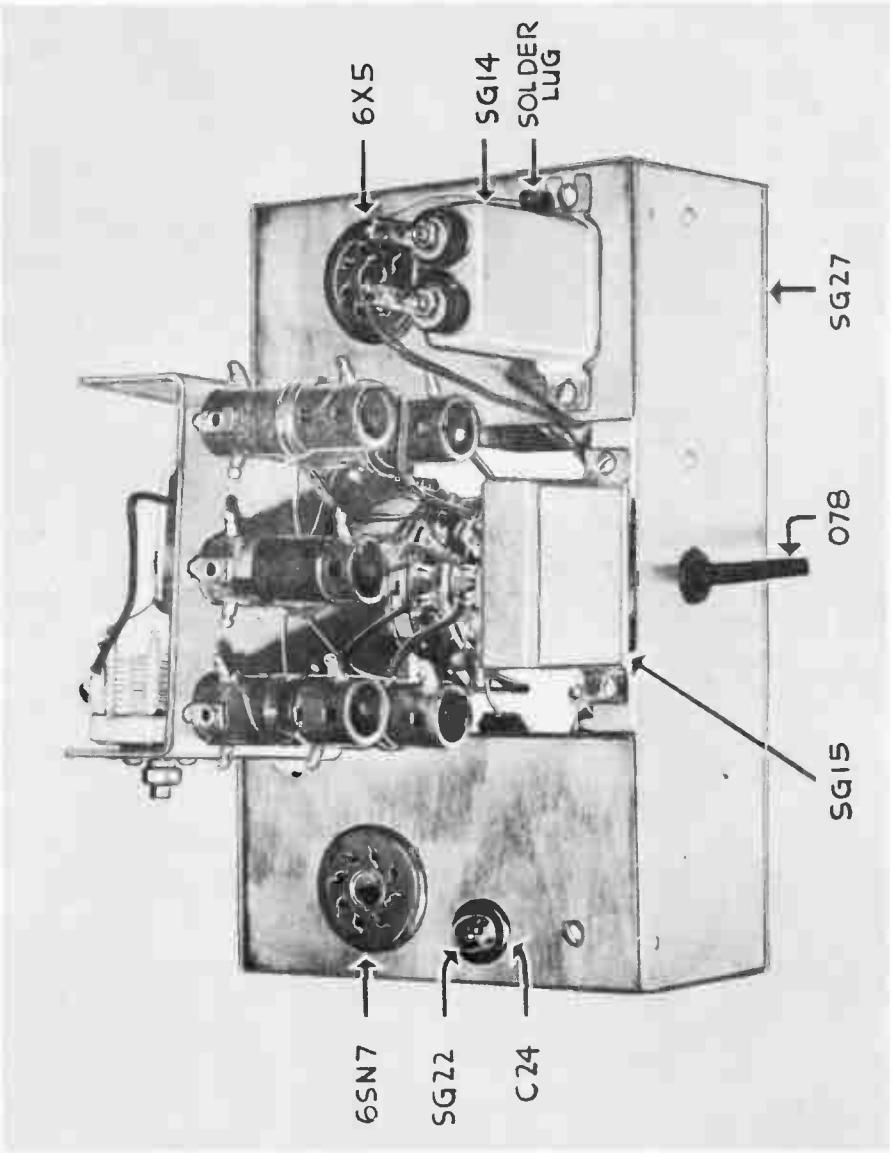


COIL TURRET ·· REAR VIEW

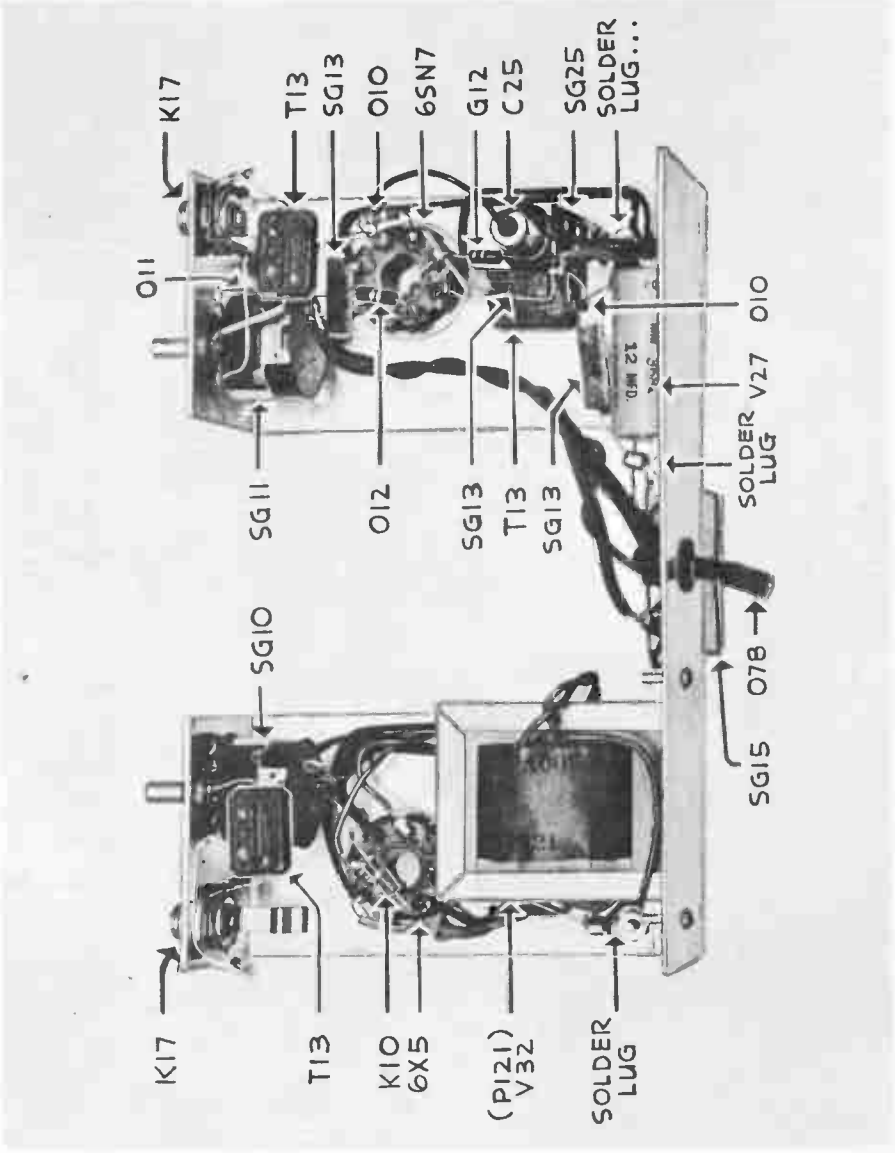
THE HEATH COMPANY
BENTON HARBOR, MICH.

6/28/48
SG-34

Heathkit SIGNAL GENERATOR ··· MODEL G-1



CHASSIS · TOP VIEW

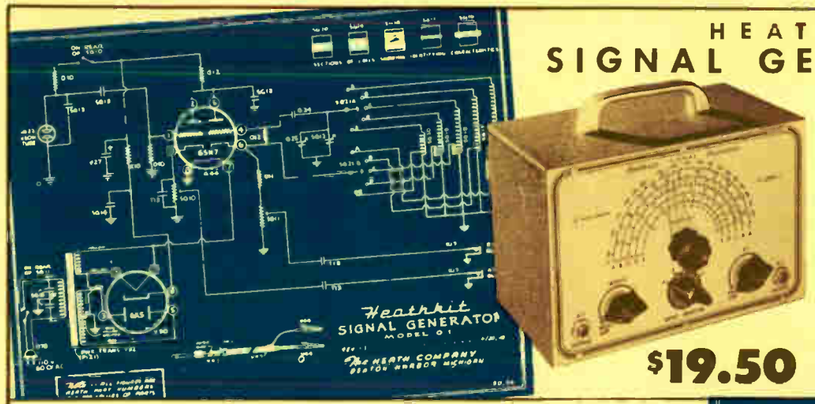


CHASSIS · BOTTOM VIEW

The HEATH COMPANY
BENTON HARBOR, MICH.

6/28/48
SG-33

HEATHKIT RF
SIGNAL GENERATOR KIT



Every shop needs a good signal generator. The Heathkit fulfills every servicing need, fundamentals from 150Kc. to 30 megacycles with strong harmonics over 100 megacycles covering the new television and FM bands. 110V 60 cycle transformer operated power supply.

400 cycle audio available for modulation or audio testing. Uses 6SN7 as RF oscillator and audio amplifier. Complete kit has every part necessary and detailed blueprints and instructions enable the builder to assemble it in a few hours. Large easy to read calibration. Convenient size 9" x 6" x 4¾". Shipping weight 4½ lbs.

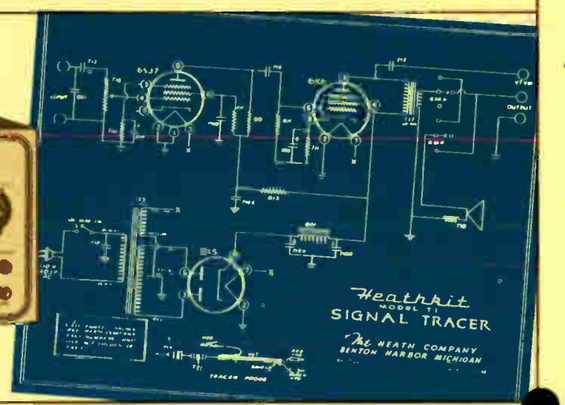
$19.50

Nothing ELSE TO BUY

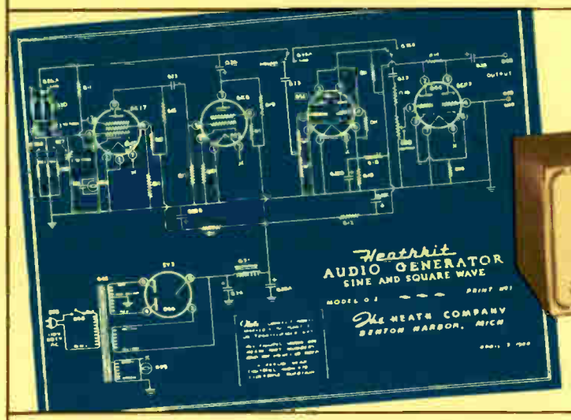
HEATHKIT
SIGNAL TRACER KIT

Let a Heathkit Signal Tracer do the tedious watching of intermittents while you go on to other profitable jobs. Follow the signal from the antenna to the defective part in a matter of soconds. Triples the repairs per man in many shops. A Heathkit Signal Tracer Kit pays for itself in a matter of days of operation. Locates faults immediately. Internal amplifier available for speaker testing and internal speaker available for amplifier testing. Connection for VTVM on panel allows visual tracing and gain measurements. Also tests phonograph pickups, microphones, PA systems, etc. Frequency range to 200 Mc. Complete ready to assemble. 110V 60 cycle transformer operated. Supplied with 3 tubes, diode probe, 2 color panel, all other parts. Easy to assemble, detailed blueprints and instructions. Shipping weight 10 lbs.

$19.50



HEATHKIT SINE AND SQUARE
AUDIO GENERATOR KIT



Experimenters and servicemen working with a square wave for the first time invariably wonder why it was not introduced before. The characteristics of an amplifier can be determined in seconds compared to several hours of tedious plotting using older methods. Stage by stage, amplifier testing is as easy as signal tracing. The low distortion (less than 1%) and linear output (± one db.) make this Heathkit equal or superior to factory built equipment selling for three or four times its price. The circuit is the popular RC tuning circuit using a four gang variable condenser. Three ranges 20-200, 200-2,000, 2,000-20,000 cycles are provided by selector switch. Either sine or square waves instantly available at toggle switch. All components are of highest quality, cased 110V 60 cycle power transformer, Mallory F.P. filter condensers, 5 tubes, calibrated 2 color panel, grey crackle aluminum cabinet. The detailed instructions make assembly an interesting and instructive few hours. Shipping weight 13 lbs.

$34.50

Nothing ELSE TO BUY

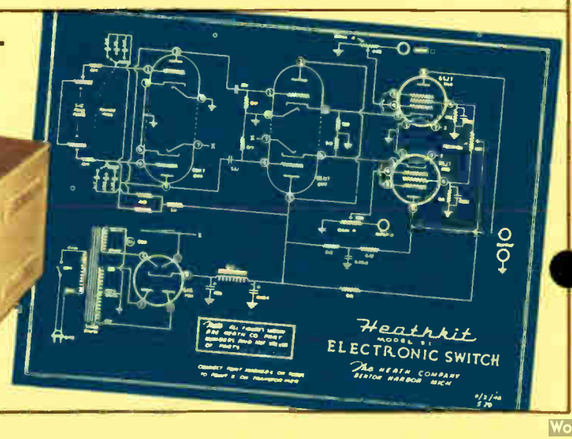
Heathkit ELECTRONIC SWITCH KIT

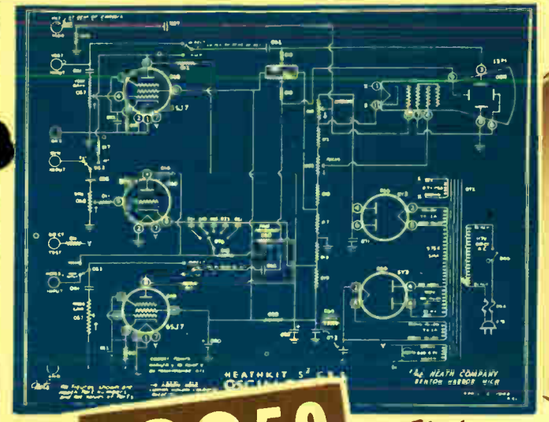
DOUBLES THE UTILITY OF ANY SCOPE

An electronic switch used with any oscilloscope provides two separately controllable traces on the screen. Each trace is controlled independently and the position of the traces may be varied. The input and output traces of an amplifier may be observed one beside the other or one directly over the other illustrating perfectly any change occurring in the amplifier. Distortion—phase shift and other defects show up instantly. 110 Volt 60 cycle transformer operated. Uses 5 tubes (1—6X5, 2—6SN7's, 2—6SJ7's). Has individual gain controls, positioning control, and coarse and fine sweeping rate controls. The cabinet and panel match all other Heathkits. Every part supplied including detailed instructions for assembly and use. Shipping weight 11 lbs.

$34.50

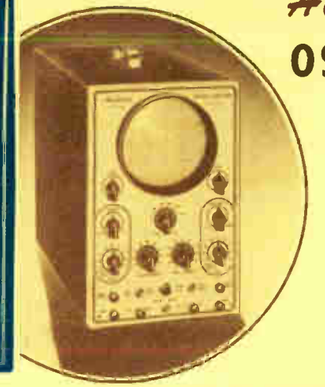
Nothing ELSE TO BUY





$39.50

Nothing
ELSE TO BUY
SHIPPING WT. 24 LBS.
EXPRESS ONLY



Heathkit 5 INCH
OSCILLOSCOPE KIT

Features

- ★ Instant switching to plates or amplifier from front panel.
- ★ Sweep generator supplying variable sweep 15 cycles to 30,000 cycles.
- ★ All controls on front panel.
- ★ Cased electrostaticly shielded 110V 60 cycle power transformer.
- ★ AC test voltage post on front panel.
- ★ External synchronization post on front panel.
- ★ Deflection sensitivity .65V per inch full gain.
- ★ Frequency response ± 20% from 50 cycles to 50 Kc.
- ★ Input impedance 1 Megohm and 50 MMF.

The Heathkit 5" Oscilloscope Kit fulfills every servicing need. The husky cased power transformer supplies 1100 Volts negative and 350 Volts positive. Tubes supplied are two 6SJ7 amplifiers, 884 sweep generator, two 5Y3 rectifiers, and 5BP1 or 5BP4 CR tube. Grey crackle aluminum cabinet and beautiful grey and maroon panel. Chassis especially designed for easy assembly.

An oscilloscope provides almost endless sources of experimentation in radio, electronics, medicine and scientific research.

Detailed instructions make assembly fun and instructive.

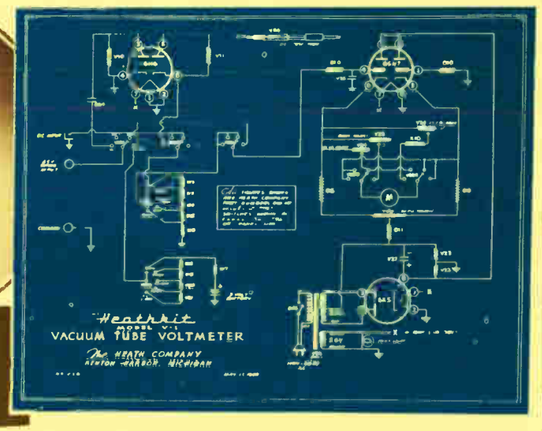
Nothing ELSE TO BUY

Heathkit
VACUUM TUBE
VOLTMETER KIT

Everything you want in a VTVM. Shatterproof solid plastic meter face, automatic meter protection in burn-out proof circuit, push pull electronic voltmeter circuit assuring maximum stability. Linear DC and AC scales. Complete selection of voltage ranges starting with 3 Volts full scale up to 1,000 Volts. Isolated DC test prod for signal tracing and measurements of voltage while instrument is in operation. An ohmmeter section accurately measuring resistance of 1/10 ohm to one billion ohms with internal battery. Extremely high input resistance 11 megohms on all ranges DC and 6.5 megohms on AC. All these features and many more are the reasons hundreds of radio and television schools are using Heathkit VTVM's and recommending them to all students. Like all Heathkits, the VTVM kit is complete, 110V 60 cy power transformer, 500 microamp meter, tubes, grey crackle cabinet, panel, test leads, 1% ceramic precision divider resistors and all other parts. Complete instruction manual. Better start your laboratory now,

$24.50

Shipping weight 8 lbs.



Nothing ELSE TO BUY

ORDER BLANK

HEATH COMPANY
BENTON HARBOR,
MICHIGAN

FROM_____

SHIP VIA K

___Parcel Post ___Freight
___Express ___Best Way

Quan.	DESCRIPTION	Price	Total	Quan.	DESCRIPTION	Price	Total

ENCLOSED FIND ☐ *CHECK . . .* ☐ *MONEY ORDER FOR*_____

*PLEASE SHIP C.O.D. . . . POSTAGE ENCLOSED FOR*_____*POUNDS*

NOTE: 25% DEPOSIT REQUIRED ON ALL ORDERS WEST OF DENVER, COLORADO

HEATHKIT FM AND TELEVISION
SWEEP GENERATOR KIT

Features

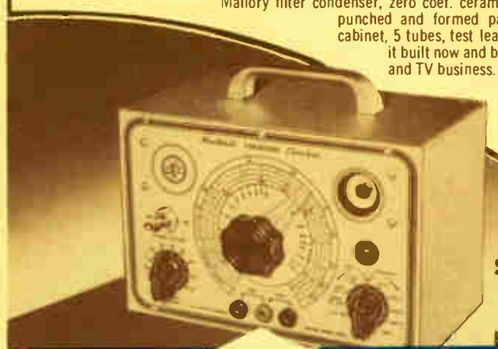
- ★ 5 tube Circuit.
- ★ Covers 2 Mc to 226 Mc.
- ★ 110V 60 cy transformer operated.
- ★ Supplies either RF or FM.
- ★ Variable sweep width 0 to app. 10 Mc.
- ★ Large calibrated dial.
- ★ Variable phasing control.
- ★ Sweep output for scope.
- ★ No band switching necessary.
- ★ Uses new miniature HF tubes.

$24.50 *Nothing* ELSE TO BUY

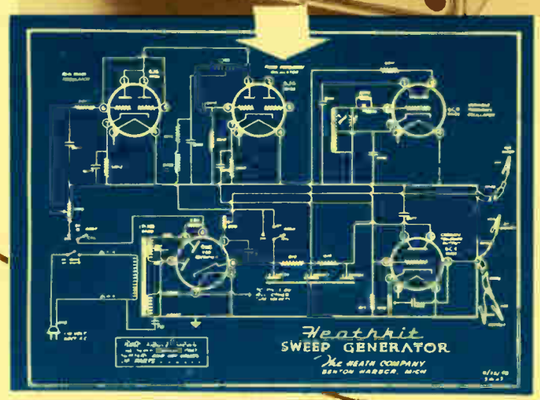
A necessity for television and FM. This Heathkit completely covers the entire FM and TV bands. 2 megacycles to 230 megacycles. The unit is 110V 60 cy power transformer operated. Uses two 6J6 tubes, two 6C4 tubes and a 6X5 rectifier. An electronic sweep circuit is incorporated allowing a range of 0 to 10 Mc. A sawtooth horizontal sweeping voltage and phase control are provided for the oscilloscope.

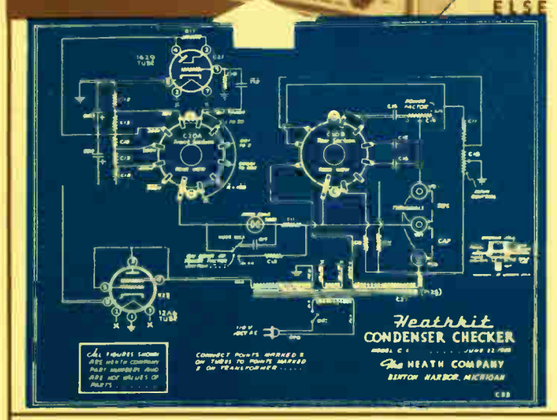
The coils are ready assembled and precision adjusted to exact frequency. As in all Heathkits, the best of parts are supplied, Mallory filter condenser, zero coef. ceramic condensers, all punched and formed parts, grey crackle cabinet, 5 tubes, test leads, etc. Better get it built now and be ready for the FM and TV business. Shipping wt. 6 lbs.

SHIPPING WEIGHT 6 POUNDS



$19.50 *Nothing* ELSE TO BUY





HEATHKIT
CONDENSER CHECKER KIT

Features

- ★ Bridge type circuit.
- ★ Magic eye indicator.
- ★ 110V transformer operated.
- ★ All scales on panel.
- ★ Power factor scale.
- ★ Measures resistance.
- ★ Measures leakage.
- ★ Checks paper-mica-electrolytics.

Checks all types of condensers, paper-mica-electrolytic-ceramic over a range of .00001 MFD to 1000 MFD. All on readable scales that are read direct from the panel. NO CHARTS OR MULTIPLIERS NECESSARY. A condenser checker anyone can read without a college education. A leakage test and polarizing voltage for 20 to 500 volts provided. Measures power factor of electrolytics between 0% and 50%. 110V 60 cycle transformer operated complete with rectifier and magic eye tubes, cabinet, calibrated panel, test leads and all other parts. Clear detailed instructions for assembly and use. Why guess at the quality and capacity of a condenser when you can know for less than a twenty dollar bill. Shipping weight 7 lbs.

The HEATH COMPANY
BENTON HARBOR, MICHIGAN

Why BUILD YOUR OWN TEST EQUIPMENT

1. You save two-thirds in cost. With increasing prices of most everything, labor costs are an important factor. Eliminating assembly labor costs, we can offer the Heathkit Oscilloscope, VTVM and Signal Generator at a total of only $83.50—about the cost of a factory-built VTVM alone.

2. You have all the fun and learn while you save. The thrill of assembling these beautiful instruments makes them seem more your own to be used with justifiable pride. Through knowledge of construction gained in assembly, better use can be made of the instruments and you can keep them in better repair if need arises.

Sec. 562, P. L. & R.
U. S. POSTAGE
1¢ Paid
Benton Harbor, Mich.
Permit No. 273

Features that make Heathkits the best kits....

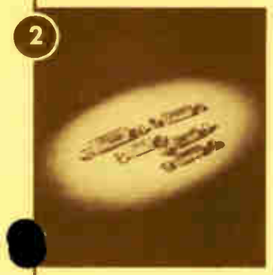
1 KITS THAT FIT

Heathkit chassis are precision punched to fit the quality parts supplied. The grey crackle aluminum cabinet and the two color panels are die punched to assure proper fitting.

Many builders have written marveling at the ease with which assembly can be accomplished.

The chassis are specially engineered for easy assembly and wiring — there are no small tight corners which cannot be reached — the ends of the chassis are left open in order that installation of parts and soldering can be done with both hands.

2



PRECISION PARTS

Wherever required, the finest quality 1% ceramic resistors are supplied. These require no aging and do not shift. No matching of common resistors is required. You find in Heathkit the same quality voltage divider resistors as in the most expensive equipment.

The transformers are designed especially for the Heathkit unit. The scope transformer has two electrostatic shields to prevent interaction of AC fields.

These transformers are built by several of the finest transformer companies in the United States.

3 COMPLETE KITS

When you receive your Heathkit you are assured of every necessary part for the proper operation of the instrument.

Beautiful cabinets, handles, 2 color panels, all tubes, test leads where they are a necessary part of the instrument, quality rubber line cords and plugs, rubber feet for each instrument, all scales and dials ready printed and calibrated. Every Heathkit is 110V 60 cy. power transformer operated by a husky transformer especially designed for the job.

4

COMPLETE INSTRUCTION MANUALS

Everyone is pleased at the thorough instructions covering the assembly of each Heathkit instrument. Every detail of the ossembly is covered, together with sections on the use of the instrument and trouble shooting instructions in case of difficulty. Actual photos of the assembled instrument enable fast and accurate assembly, clear schematics and pictorial diagrams of the confusing parts such as rotary switches enable the wiring to be completed quickly.

5 BEST OF ENGINEERING...

Heathkits are the result of many years experience in the test equipment field. Heathkit oscilloscopes have been under development and test since 1943 and most other instruments now being produced have had over two years of thorough testing.

As proof of their design, Heathkits have been adopted by many of the largest Universities and laboratories in the United States. Thousands of engineering students are receiving their training using Heathkits.

6 BEST OF PARTS

You will find many famous names on the parts in your Heathkit. Mallory switches and filter condensers, Chicago Transformer Corporation and Electrical Assembly Transformers, Centralab Potentiometers, Belden Cable, IRC & Allen Bradley resistors, G.E. tubes, Cinch and Amphenol sockets with silver plated contacts, Defiance variable condensers, Eby binding post and many other quality parts. The finest of parts are used to assure long trouble-free service from Heathkits.

7

MODERN STYLING

Heathkits have brought a new conception of beauty to laboratories and service benches.

Many organizations have standardized on Heathkits to make their shops appear attractive and uniform.

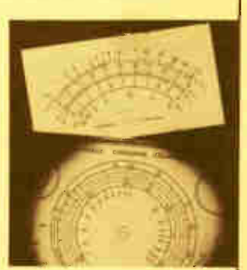
The panels are produced in grey and maroon and the modern streamline aluminum handles give the instruments a pleasant professional appearance.

There is no waste space or false effort to appear large in Heathkits — space on service benches is at a premium and the size of Heathkit instruments is kept as small as is consistent with good engineering design.

8 LARGE EASILY READ CALIBRATIONS

No charts or calculations are necessary to use any Heathkit properly. All scales are simply and plainly marked.

The operator instantly knows the proper use of the instrument and can proceed confidently. No multiplication is required as each scale is calibrated independently of the others.



9

IDEAL FOR SCHOOLS

Heathkits have been adopted as standard equipment of many of the largest universities and colleges. The low cost plus the fact that the students learn by actual assembly make them ideal training mediums. Many high schools and small colleges are finding that they too can have a modern physics and electronics laboratory by using Heathkits.

Some of the largest technical schools recommend Heathkits to their students as the best means of securing the necessary equipment to start their own shops.

10 WHY NOT BUILD YOUR OWN...

The great strides made in electronics during the war have made it hard for everyone to keep abreast of new developments. By actually assembling modern test equipment knowledge is gained in the most practical manner. Further a complete knowledge of the instrument allows greater flexibility of use and many possible uses suggest themselves.

Lastly with the cost of everything shooting upward any means of eliminating costs is welcomed. This reduction is a remarkable saving, as can be seen by comparing Heathkit prices with comparable built up test equipment.

HEATH COMPANY BENTON HARBOR, MICH.