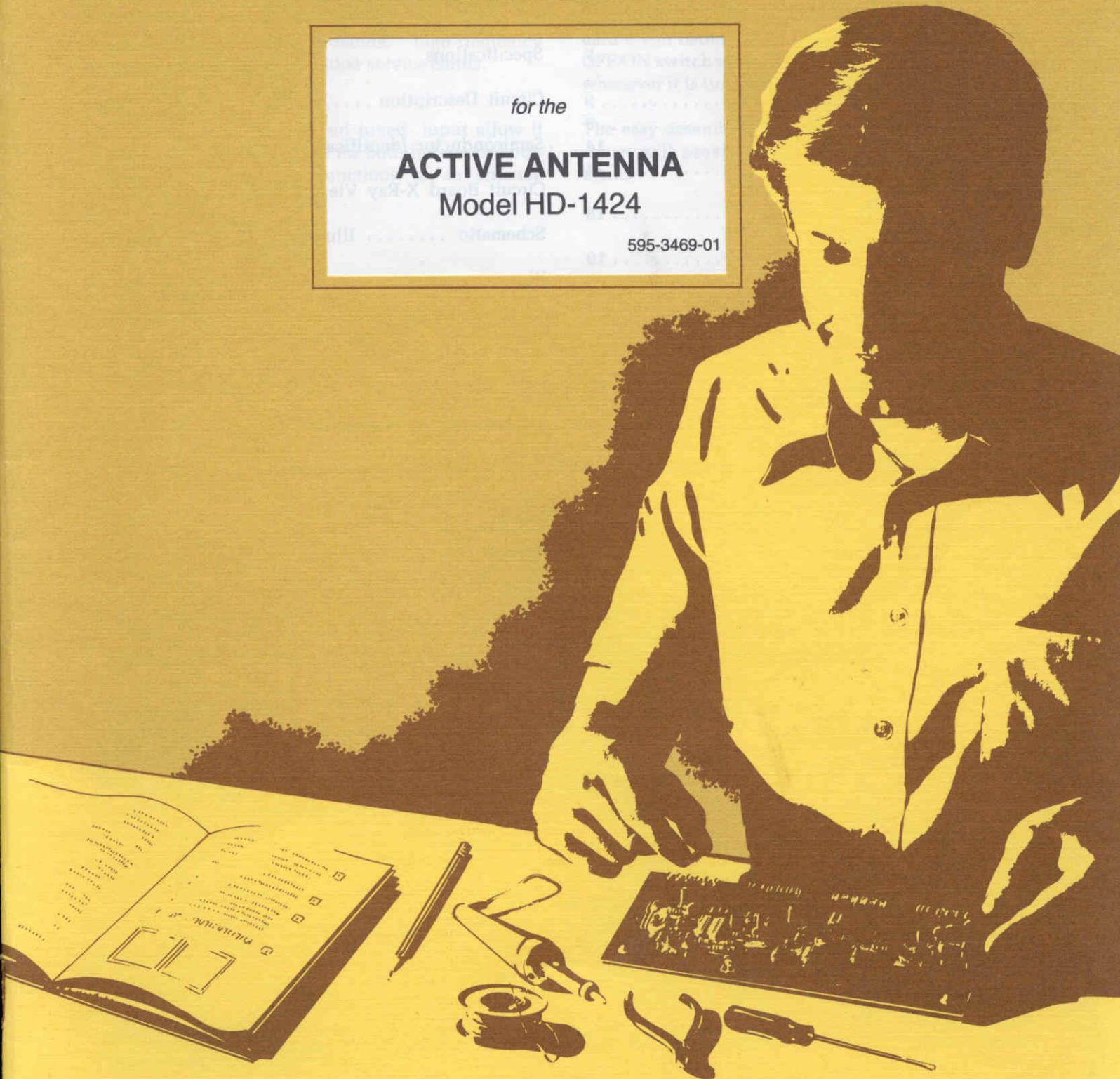


# HEATHKIT<sup>®</sup> MANUAL

*for the*

## **ACTIVE ANTENNA** Model HD-1424

595-3469-01



HEATH COMPANY • BENTON HARBOR, MICHIGAN

# HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information ..... (616) 982-3411  
Credit ..... (616) 982-3561  
Replacement Parts ..... (616) 982-3571

## Technical Assistance Phone Numbers

8:00 A.M. to 12 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays Only  
R/C, Audio, and Electronic Organs ..... (616) 982-3310  
Amateur Radio ..... (616) 982-3296  
Test Equipment, Weather Instruments and  
Home Clocks ..... (616) 982-3315  
Television ..... (616) 982-3307  
Aircraft, Marine, Security, Scanners, Automotive,  
Appliances and General Products ..... (616) 982-3496  
Computers — Hardware ..... (616) 982-3309  
Computers — Software:  
Operating Systems, Languages, Utilities ..... (616) 982-3860  
Application Programs ..... (616) 982-3884  
Heath Craft Wood Works ..... (616) 982-3423



## YOUR HEATHKIT 90-DAY LIMITED WARRANTY

### Consumer Protection Plan for Heathkit Consumer Products

Welcome to the Heath family. We believe you will enjoy assembling your kit and will be pleased with its performance. Please read this Consumer Protection Plan carefully. It is a "LIMITED WARRANTY" as defined in the U.S. Consumer Product Warranty and Federal Trade Commission Improvement Act. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

#### Heath's Responsibility

**PARTS** — Replacements for factory defective parts will be supplied free for 90 days from date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. You can obtain warranty parts direct from Heath Company by writing or telephoning us at (616) 982-3571. And we will pay shipping charges to get those parts to you . . . anywhere in the world.

**SERVICE LABOR** — For a period of 90 days from the date of purchase, any malfunction caused by defective parts or error in design will be corrected at no charge to you. You must deliver the unit at your expense to the Heath factory, any Heathkit Electronic Center (units of Veritechnology Electronics Corporation), or any of our authorized overseas distributors.

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

**NOT COVERED** — The correction of assembly errors, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Use of corrosive solder and/or the unauthorized modification of the product or of any furnished component, will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, customer assembly, set-up time, or unauthorized service.

This warranty covers only Heath products and is not extended to other equipment or components that a customer uses in conjunction with our products.

SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORSEEABLE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

#### Owner's Responsibility

**EFFECTIVE WARRANTY DATE** — Warranty begins on the date of first consumer purchase. You must supply a copy of your proof of purchase when you request warranty service or parts.

**ASSEMBLY** — Before seeking warranty service, you should complete the assembly by carefully following the manual instructions. Heathkit service agencies cannot complete assembly and adjustments that are customer's responsibility.

**ACCESSORY EQUIPMENT** — Performance malfunctions involving other non-Heath accessory equipment, (antennas, audio components, computer peripherals and software, etc.) are not covered by this warranty and are the owner's responsibility.

**SHIPPING UNITS** — Follow the packing instructions published in the assembly manuals. Damage due to inadequate packing cannot be repaired under warranty.

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

# Heathkit® Manual

*for the*

## **ACTIVE ANTENNA**

**Model HD-1424**

595-3469-01

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## INTRODUCTION

The Heathkit Model HD-1424 Active Antenna provides reception of radio signals between 300 kHz and 30 MHz when you cannot put up an outside antenna. The wide frequency range covers all of the international broadcast bands, high-frequency amateur bands, and many other service bands.

In addition, its circuitry and tuned- input allow it to function as a preselector for both indoor and outdoor antennas. It also functions as an antenna

preamplifier when you use it with an external 50-ohm antenna.

The telescoping antenna and provision for a standard 9-volt battery provide complete portability. An OFF/ON switch automatically bypasses the circuitry whenever it is turned off.

The easy assembly and simple connection to a receiver will provide many hours of listening enjoyment.

## ASSEMBLY NOTES

### TOOLS

You will need these tools to assemble your kit.



PLIERS



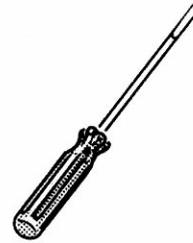
LONG-NOSE  
PLIERS



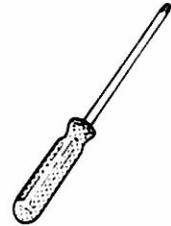
DIAGONAL  
CUTTERS



WIRE  
STRIPPERS



1/8" BLADE  
SCREWDRIVER

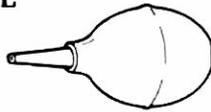


#1 & #2  
PHILLIPS  
SCREWDRIVER

### OTHER HELPFUL TOOLS



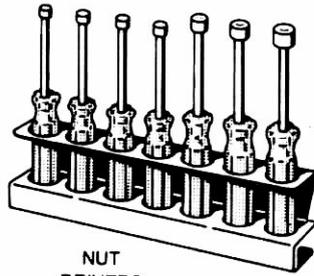
NUT STARTER  
(May Be Supplied  
With Kit)



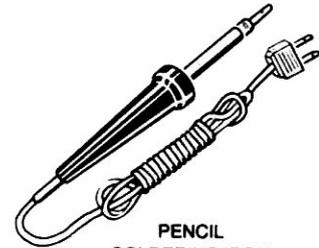
DESOLDERING  
BULB\*



DESOLDERING  
BRAID\*



NUT  
DRIVERS



PENCIL  
SOLDERING IRON  
(22 to 25 WATTS)

\*To Remove Solder From Circuit Connections.

### ASSEMBLY

1. Follow the instructions carefully. Read the entire step before you perform each operation.
2. Refer to the separate "Illustration Booklet" for the Pictorials and Details. Keep the "Illustration Booklet" with the Assembly Manual. The illustrations in it are arranged in the proper sequence, as called for in the steps.
3. Pictorials show the overall operation for a group of assembly steps; Details generally illustrate a single step. When you are directed to refer to a certain Pictorial "for the following steps," continue using that Pictorial until you are referred to another Pictorial for another group of steps.
4. Position all parts as shown in the Pictorials.
5. Solder instructions are generally given only at the end of a series of similar steps. You may solder more often if you desire.

6. Each circuit part in an electronic kit has its own component number (R2, C4, etc.). Use these numbers when you want to identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:
- In the Parts List,
  - At the beginning of each step where a component is installed,
  - In some illustrations,
  - In Troubleshooting Charts,
  - In the Schematic,
  - In the sections at the rear of the Manual.
7. When you are instructed to cut something to a particular length, use the scales (rulers) provided at the bottom of the Manual pages.

**SAFETY WARNING: Avoid eye injury when you cut off excessive lead lengths. Hold the leads so they cannot fly toward your eyes.**

## SOLDERING

Soldering is one of the most important operations you will perform while assembling your kit. A good solder connection will form an electrical connection between two parts, such as a component lead and a circuit board foil. A bad solder connection could prevent an otherwise well-assembled kit from operating properly.

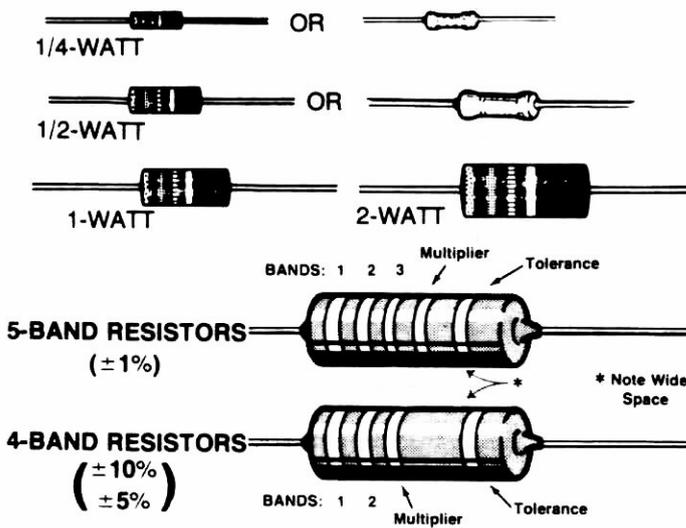
It is easy to make a good solder connection if you follow a few simple rules:

1. Use the right type of soldering iron. A 22 to 25-watt pencil soldering iron with a 1/8" or 3/16" chisel or pyramid tip works best.
2. Keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth; then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good connections. When solder tends to "ball" or does not stick to the tip, the tip needs to be cleaned and retinned.

NOTE: Always use rosin core, radio-type solder (60:40 tin-lead content) for all of the soldering in this kit. This is the type we have supplied with the parts. The Warranty will be void and we will not service any kit in which acid core solder or paste has been used.

**PARTS**

**Resistors** are identified in Parts Lists and steps by their resistance value in  $\Omega$  (ohms),  $k\Omega$  (kilohms), or  $M\Omega$  (megohms). They are usually identified by a color code of four or five color bands, where each color represents a number. These colors (except for the last band, which indicates a resistor's "tolerance") will be given in the steps in their proper order. Therefore, the following color code is given for information only. NOTE: Occasionally, a "precision" or "power" resistor may have the value stamped on it.

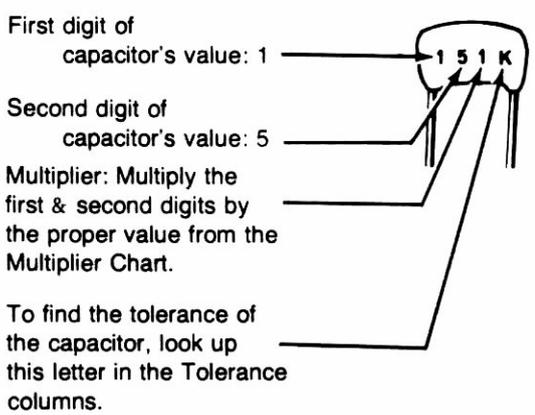


Band 1 1st Digit		Band 2 2nd Digit		Band 3 (if used) 3rd Digit		Multiplier		Resistance Tolerance	
Color	Digit	Color	Digit	Color	Digit	Color	Multiplier	Color	Tolerance
Black	0	Black	0	Black	0	Black	1	Silver	± 10%
Brown	1	Brown	1	Brown	1	Brown	10	Gold	± 5%
Red	2	Red	2	Red	2	Red	100	Red	± 2%
Orange	3	Orange	3	Orange	3	Orange	1,000	Brown	± 1%
Yellow	4	Yellow	4	Yellow	4	Yellow	10,000	Green	± 5%
Green	5	Green	5	Green	5	Green	100,000	Blue	± 25%
Blue	6	Blue	6	Blue	6	Blue	1,000,000	Violet	± .1%
Violet	7	Violet	7	Violet	7	Silver	0.01	Gray	± .05%
Gray	8	Gray	8	Gray	8	Gold	0.1		
White	9	White	9	White	9				

**Capacitors** will be called out by their capacitance value in  $\mu F$  (microfarads) or pF (picofarads) and type: ceramic, Mylar\*, electrolytic, etc. Some capacitors may have their value printed in the following manner:

**EXAMPLES:**  
 151K =  $15 \times 10 = 150 \text{ pF}$   
 759 =  $75 \times 0.1 = 7.5 \text{ pF}$

**NOTE:** The letter "R" may be used at times to signify a decimal point: as in: 2R2 = 2.2 ( $\text{pF}$  or  $\mu F$ ).



MULTIPLIER		TOLERANCE OF CAPACITOR		
FOR THE NUMBER:	MULTIPLY BY:	10 pF OR LESS	LETTER	OVER 10 pF
0	1	± 0.1 pF	B	
1	10	± 0.25 pF	C	
2	100	± 0.5 pF	D	
3	1000	± 1.0 pF	F	± 1%
4	10,000	± 2.0 pF	G	± 2%
5	100,000		H	± 3%
			J	± 5%
8	0.01		K	± 10%
9	0.1		M	± 20%

\*DuPont Registered Trademark.

## PARTS LIST

Unpack the kit and check each part against the following list. The key numbers correspond to the numbers on the "Parts Pictorial." Do not remove components from the tape until you use them in a step. If a part is packed in an individual envelope with the part number on it, identify the part; then return it to the envelope until a step calls for it. Do not throw away any packing material until you account for all of the parts.

To order a replacement part, always include the PART NUMBER. Use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of this Manual. For prices, refer to the separate "Heath Parts Price List."

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

**CAPACITORS**

A1	21-147	2	47 pF (47K) ceramic	C2, C104
A1	21-75	1	100 pF (100K) ceramic	C101
A1	21-176	8	.01 $\mu$ F (.01M) ceramic	C102, C103, C105, C106, C107, C108, C109, C111

**CONTROL—SWITCHES**

B1	10-1054	1	1000 $\Omega$ (1 k) control	R1
B2	60-20	1	Slide switch	SW1A/B/C
B3	63-1398	1	Rotary switch	SW2

**SHEET METAL PARTS**

C1	90-1357-1	1	Cover
C2	200-1506-1	1	Chassis
C3	204-2257	1	Angle bracket
C4	204-2915	1	Capacitor mounting bracket

**HARDWARE**

NOTE: Hardware packets are marked to show the size of the hardware they contain (HDW#4, or HDW #6 & #8, etc.). You may have to open more than one packet to locate all of the hardware of any one size (#6, for example).

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

**HARDWARE (Cont'd.)****#3 Hardware**

D1	250-49	2	3-48 $\times$ 1/4" screw
D2	252-1	2	3-48 nut
D3	254-7	2	#3 lockwasher

**#4 Hardware**

E1	250-1412	8	4-40 = 3/8" screw
E2	252-2	8	4-40 nut
E3	254-9	7	#4 lockwasher
E4	259-9	1	#4 solder lug

**#6 Hardware**

F1	250-1282	1	6-32 $\times$ 1/8" setscrew
F2	250-230	2	6-32 $\times$ 3/16" setscrew
F3	250-1325	2	6-32 $\times$ 1/4" screw
F4	250-1432	4	#6 $\times$ 3/8" sheet metal screw
F5	250-1425	4	6-32 $\times$ 1/2" black screw
F6	250-1430	1	6-32 $\times$ 1/2" stainless steel screw
F7	252-3	13	6-32 nut
F8	253-35	1	#6 fiber flat washer
F9	253-741	1	#6 shoulder washer
F10	254-1	9	#6 lockwasher
F11	259-1	2	#6 solder lug

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

**Other Hardware**

G1	252-4	1	8-32 nut	
G2	252-7	3	Control nut	
G3	253-734	2	Control flat washer	
G4	254-2	1	#8 lockwasher	
G5	254-5	2	Control lockwasher	
G6	259-10	1	Control solder lug	

**TRANSISTORS**

NOTE: Transistors may be marked for identification in any of the following four ways:

1. Part number.
2. Type number
3. Part number and type number.
4. Part number with a type number other than the one listed.

H1	417-290	1	MRF502	Q103
H2	417-931	2	PN4858	Q101, Q102

**SOCKETS—CONNECTORS**

J1	432-798	1	Battery snap connector	
J2	432-866	2	Spring connector	
J3	432-1030	1	2-pin socket shell	
J4	436-5	2	Coaxial jack	J2, J3
J5	436-28	1	Phone jack with hardware	J1

**WIRE—SLEEVING**

343-15	31"	Shielded cable
344-165	15"	Red solid wire
344-172	24"	White solid wire
346-6	1	Sleeving (1-1/4" long)

**MISCELLANEOUS**

K1	26-171	1	10-350 pF variable capacitor	C1
K2	45-74	1	.47 $\mu$ H choke	L101
K3	45-606	1	1 $\mu$ H choke (brn-gold-blk)	L107
K3	45-634	1	82 $\mu$ H choke (gry-red-blk)	L104
K4	75-743	1	Insulator	
	85-3093-1	1	Circuit board	
K5	142-128	1	Collapsible antenna	
K6	208-42	1	Battery clamp	
K7	261-29	4	Foot	

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

**MISCELLANEOUS (Cont'd.)**

K8		1	Blue and white label*	
K9	412-633	1	LED (light-emitting diode)	D1
K10	455-44	1	Snap-in bearing	
K11	462-1152	3	Knob	
K12	490-14	1	Allen wrench	
	597-260	1	Parts Order Form*	
		1	Assembly Manual (See Page 1 for the part number.)	

Solder

\* These items may be packed inside the Manual.

**TAPED COMPONENT CHART**

NOTE: These parts are taped on a strip which was checked before shipment. Since these parts are taped in the order of assembly, it is not necessary to check them against the following list.

**RESISTORS**

NOTE: The following resistors are rated at 1/4-watt and have a tolerance of 5%. A 5% tolerance is indicated by a fourth color band of gold.

6-101-12	3	100 $\Omega$ (brn-blk-brn)	R101, R104, R107
6-221-12	2	220 $\Omega$ (red-red-brn)	R102, R105
6-391-12	1	390 $\Omega$ (org-wht-brn)	R109
6-471-12	1	470 $\Omega$ (yel-viol-brn)	R108
6-104-12	1	100 k $\Omega$ (brn-blk-yel)	R106
6-185-12	1	1.8 M $\Omega$ (brn-gry-grn)	R103

**CHOKES**

45-626	1	3.3 $\mu$ H (org-org-gold)	L102
45-631	1	22 $\mu$ H (red-red-blk)	L103
45-621	1	100 $\mu$ H (brn-blk-brn)	L105
45-635	1	1 mH (brn-blk-red)	L106

## STEP-BY-STEP ASSEMBLY

### CIRCUIT BOARD ASSEMBLY

Refer to Pictorial 1-1 as you read the following notes and steps.

#### NOTES:

1. Many circuit board drawings, such as the one shown in Pictorial 1-1, are divided into two or more sections. These sections show you which area of the circuit board you are working in for a specific series of steps.
2. Cut the "Taped Component Chart" from the last page of the Illustration Booklet. Make sure you read the instructions at the top of the chart before you use it. Note that it is divided into numbered sections which correspond to the numbered sections on the circuit board pictorial. The components are listed in the order of assembly.
3. Each series of steps has you installing parts in a top-to-bottom, left-to-right sequence. Occasionally, you may be directed to install a particular component in an area out of sequence. These components are each identified in the step and on the Pictorial with a special callout.
4. As you perform each step, check it off in the box provided. You may also wish to place a check mark near each component on the Pictorial as you install the part.
5. In general, solder instructions are given only at the end of a series of similar steps; you may solder more often if you wish.

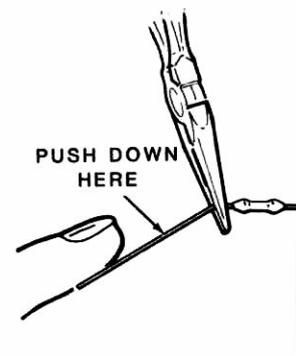
In the following steps, you will be given detailed instructions on how to install and solder the first part on the circuit board. Read and perform each step carefully. Then use the same procedure as you install the remaining parts on the board.

Note that the circuit board has foil patterns on one side and the other side has outlines of the components (parts) shown on it. The side with the component outlines is referred to as the "component side."

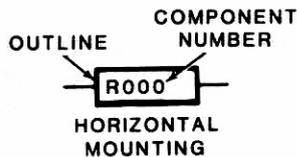
- ( ) Position the circuit board on your work area in front of you with the component side up as shown in the Pictorial. NOTE: Always install parts on the component side of the circuit board and solder the leads or wires to the circuit board foil pads on the other side, unless a step specifically directs you to do otherwise.

#### Section 1

- ( ) Cut the first part, a 390  $\Omega$  (org-wht-brn) resistor from the Taped Component Chart as outlined in the Chart instructions. Bend the resistor leads as shown to fit the hole spacing at R109 on the circuit board.



- ( ) R109: Start the leads into the holes at the resistor's location in Section 1 of the circuit board. The end with the color bands may be positioned either way. NOTE: Resistors are identified on the circuit board by the following outline:

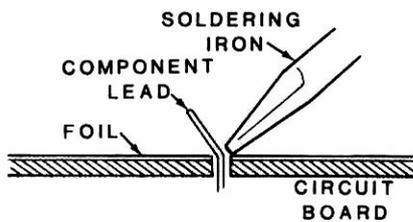


- ( ) Press the resistor against the circuit board. Then bend the leads outward slightly to hold it in place.

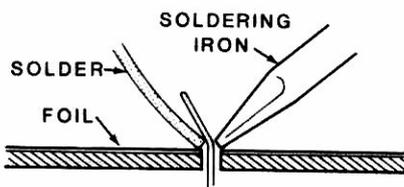


- ( ) Solder the resistor leads to the circuit board as follows:

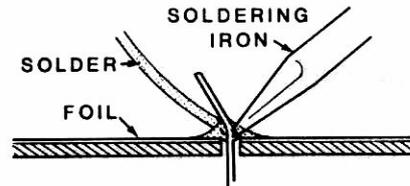
1. Push the soldering iron tip against both the lead and the circuit board foil. Heat **both** for two or three seconds.



2. Apply solder to the other side of the connection. IMPORTANT: Let the heated lead and the circuit board melt the solder.



3. As the solder begins to melt, allow it to flow around the connection. Then remove the solder and the iron and let the connection cool.



- ( ) Cut off the excess lead lengths close to the connection. WARNING: Clip the leads so the ends will not fly toward your eyes.
- ( ) Check the connection. Compare it to the illustrations in Detail 1-1A. After you have checked the solder connections, proceed with the assembly below. Use the same soldering procedure for each connection.

## Section 2

- ( ) R102: 220  $\Omega$  (red-red-brn) resistor.
- ( ) R101: 100  $\Omega$  (brn-blk-brn) resistor.
- ( ) R103: 1.8 M $\Omega$  (brn-gry-grn) resistor.
- ( ) R105: 220  $\Omega$  (red-red-brn) resistor.
- ( ) R104: 100  $\Omega$  (brn-blk-brn) resistor.
- ( ) R106: 100 k $\Omega$  (brn-blk-yel) resistor.
- ( ) R107: 100  $\Omega$  (brn-blk-brn) resistor.
- ( ) R108: 470  $\Omega$  (yel-viol-brn) resistor.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

## Section 3

NOTE: Install the following chokes the same way as you do resistors.

- ( ) L106: 1 mH choke (brn-blk-red, #45-635).
- ( ) L105: 100  $\mu$ H choke (brn-blk-brn, #45-621).

NOTE: Do not install a part at L104 yet.

- ( ) L103: 22  $\mu$ H choke (red-red-blk, #45-631).
- ( ) L102: 3.3  $\mu$ H choke (org-org-gold, #45-636).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

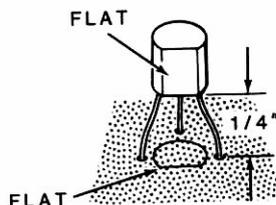
Refer to Pictorial 1-2 for the following steps.

## Section 1

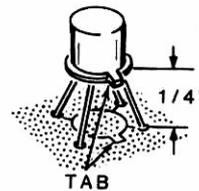
NOTE: The following parts are not taped on strips.

- ( ) L107: 1  $\mu$ H choke (brn-gold-blk, #45-606). Solder the leads to the foil and cut off the excess lead lengths.

NOTE: When you install each of the following two transistors, position it so the flat side is over the outline of the flat on the circuit board. Then start the leads into their corresponding holes in the circuit board. Position the transistor 1/4" above the circuit board. Then solder the leads to the foil and cut off any excess lead lengths.



- ( ) Q101: PN4858 transistor (#417-931).
- ( ) Q102: PN4858 transistor (#417-931).
- ( ) Q103: MRF502 transistor (#417-290). Match the tab on the transistor with the outline of the tab on the circuit board. Then start the leads into their corresponding circuit board holes. Position the transistor 1/4" above the circuit board. Then solder the leads to the foil and cut off any excess lead lengths.



## Section 2

- ( ) L104: 82  $\mu$ H choke (gry-red-blk, #45-634).
- ( ) L101: .47  $\mu$ H choke (#45-74). Bend the leads on this choke toward the slots before you install it in the circuit board.



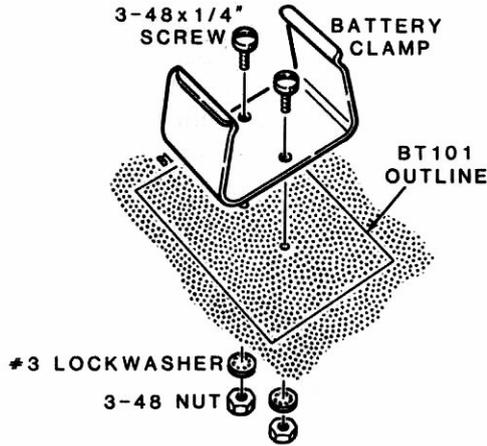
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

Refer to Pictorial 1-3 for the following steps.

## Section 1

NOTE: When a step calls for hardware, only the screw size is given. If a step calls for "3-48  $\times$  1/4" hardware," for example, it means you should use a 3-48  $\times$  1/4" screw, one or more #3 lockwashers, and a 3-48 nut. The Pictorial or Detail drawing referred to in the step shows the proper number of lockwashers and their proper use.

- ( ) Mount the battery clamp to the circuit board within the BT101 outline as shown below. Use 3-48 x 1/4" hardware.

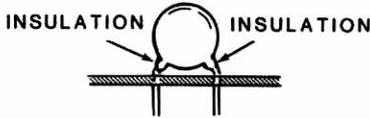


Install .01  $\mu$ F (.01M) ceramic capacitors at the following six locations:

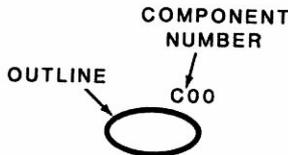
- ( ) C105.
- ( ) C102.
- ( ) C107.
- ( ) C106.
- ( ) C111.
- ( ) C109.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

**Section 2**

NOTE: In the following steps you will install disc-type ceramic capacitors. When you install these capacitors, do not push the insulated portion of the leads into the circuit board holes. This could make it difficult to solder the leads to the foil.



- ( ) C104: 47 pF (47K) ceramic capacitor. NOTE: Ceramic capacitors are identified on the circuit board by the following outline:



**Section 3**

- ( ) C103: .01  $\mu$ F (.01M) ceramic capacitor.
- ( ) C108: .01  $\mu$ F (.01M) ceramic capacitor.
- ( ) C101: 100 pF (100K) ceramic capacitor.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

Refer to Pictorial 1-4 for the following steps.

NOTE: When a step directs you to prepare a solid wire, first cut the wire to the length indicated in the step. Then remove 1/4" of insulation from each end.

- ( ) Prepare the following solid wires. They are listed in the order in which you will use them.

- one 3-1/2" red
- one 3-1/2" white
- four 1-1/2" white
- one 2" white
- one 1-3/4" white

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Connect one end of the prepared wires to the circuit board as follows. Solder the end of each wire to the foil as you connect it and cut off any excess wire end. NOTE: The other ends of these wires will be connected later.

- ( ) 3-1/2" red to hole 9V.
- ( ) 3-1/2" white to hole D.
- ( ) 1-1/2" white to hole J.
- ( ) 1-1/2" white to hole I.
- ( ) 1-1/2" white to hole H.
- ( ) 1-1/2" white to hole F.
- ( ) 2" white to hole E.
- ( ) 1-3/4" white to hole C.
- ( ) Prepare a 5" white and a 5" red solid wire. Then loosely twist together (approximately 1 turn-per-inch) the two wires to form a twisted pair.
- ( ) Refer to Detail 1-4A Part A and install a spring connector on each wire at one end of the twisted pair.
- ( ) Refer to Detail 1-4A Part B and push the spring connectors into the 2-pin socket shell as follows. NOTE: Be sure to position the spring connectors and the socket shell as shown.

White wire into hole 1.  
Red wire into hole 2.

- ( ) Connect and solder the free end of the twisted pair to the circuit board holes as follows and cut off any excess wire ends. NOTE: The socket on the other end of this twisted pair will be connected later.

Red wire to hole P.  
White wire to nearby hole GND.

- ( ) Cut the following lengths of shielded cable. Then refer to Detail 1-4B and prepare the ends of each cable as shown.

one 4"  
two 3"

- ( ) Connect and solder one end of the 4" shielded cable to the circuit board as follows. NOTE: The other end of the cable will be connected later.

Inner wire to hole M.

Shield wire to nearby hole GND (be sure to use the hole that is closest to capacitor C105).

- ( ) Connect and solder one end of a 3" shielded cable to the circuit board as follows. NOTE: The other end of the cable will be connected later.

Inner wire to hole Q.

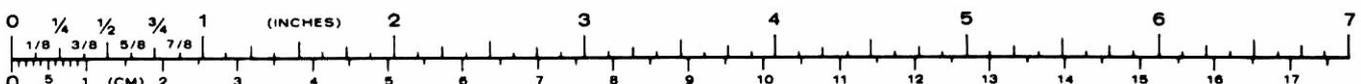
Shield wire to nearby hole GND.

- ( ) Connect and solder one end of the remaining 3" shielded cable to the circuit board as follows. NOTE: The other end of the cable will be connected later.

Inner wire to hole N.

Shield wire to nearby hole GND.

- ( ) Locate the battery snap connector. Then connect and solder the free end of the black wire to circuit board hole GND (that is between holes M and 9V). The red wire coming from the battery snap connector will be connected later.



**CIRCUIT BOARD CHECKOUT**

Carefully inspect the foil side of the circuit board for the following most-commonly-made errors:

- ( ) Unsoldered connections.
- ( ) Poor solder connections.
- ( ) Solder bridges between foil patterns.
- ( ) Protruding leads which could touch together or touch the chassis when the circuit board is installed later.
- ( ) Refer to the illustrations where you installed the transistors and make sure you installed them properly.

Set the circuit board aside temporarily.

**CHASSIS ASSEMBLY**

Refer to Pictorial 2-1 for the following steps.

- ( ) Refer to Detail 2-1A and scrape or sand the excess paint away from the indicated holes on the inside of the chassis. It is important that the parts that will be mounted at these locations make good electrical contact with the chassis.
- ( ) Position the chassis bottom-side-up as shown in Detail 2-1B. Then carefully peel the backing paper from the four feet and press them onto the bottom of the chassis in the indicated areas.
- ( ) Carefully peel away the backing paper from the blue and white label. Then press the label onto the bottom of the chassis in the area shown in Detail 2-1B. Do not cover up any holes in the chassis. NOTE: Be sure to refer to the numbers on this label in any communications you may have with the Heath Company about your kit.
- ( ) Position the chassis as shown in the Pictorial.

- ( ) Install 6-32 × 1/2" black hardware at chassis hole AA. Do not install the second nut yet. Only tighten the hardware finger tight at this time.
- ( ) Similarly, install 6-32 × 1/2" black hardware at chassis holes AB, AC, and AD. Do not install the second nuts yet. Only tighten this hardware finger tight at this time.
- ( ) Temporarily set the circuit board on the screws at AA, AB, AC, and AD. Hold the circuit board in place while you tighten the four screws. Then remove the circuit board and set it aside until it is called for in a step.
- ( ) Turn an additional nut as far as possible onto the screws at AA, AB, AC, and AD. Tighten these nuts securely.
- ( ) SW1: Mount the slide switch to the chassis at SW1 as shown. Use two 6-32 × 1/4" screws. NOTE: Be sure to position the switch so the six closely-spaced lugs are toward the bottom of the chassis.
- ( ) D1: Use the following procedure to mount an LED (light-emitting diode) onto the front of the chassis at D1:
  1. Position the insulator paper as shown in the Pictorial. Note that the hole is closer to one side than it is to the other. Now trim the indicated side of the insulator paper so it is 3/16" away from the hole.
  2. Position the LED as shown. Then shorten the shorter of the two leads to 1/2" and the other lead to 5/8".
  3. Carefully peel the backing paper from the insulator paper. Then position the insulator paper and the LED as shown and push the LED leads all the way into the hole. Be sure to position the long and short leads as shown.
  4. Start the LED into hole D1 in the front of the chassis so the narrow side of the paper (where you trimmed some away) is toward switch SW1 as shown. Then press the insulator paper onto the inside of the chassis.

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- ( ) R1: Use the following procedure to mount the 1000  $\Omega$  control (#10-1054) onto the front of the chassis at R1:
1. Locate the control solder lug. Then flatten the lug and reform it as shown in inset drawing #1.
  2. Use the prepared solder lug, a control flat washer, and a control nut to mount the control onto the chassis. Be sure to position the control and the solder lug as shown in the Pictorial before you tighten the hardware.
- ( ) Turn the shaft of the rotary switch (#63-1398) fully counterclockwise. Then remove the hardware from the bushing of the rotary switch. Now refer to inset drawing #2 and reinstall the detent ring so the tab is in slot #5. Be sure the detent stays in this position and reinstall the lockwasher and nut. NOTE: Do not overtighten the nut.
- ( ) SW2: Mount the rotary switch onto the front of the chassis at SW2 as shown. Use a control lockwasher, a control flat washer, and a control nut. Position the switch so the space between lugs 8 and 9 is up. NOTE: Do not overtighten the nut.
- NOTE: When you install the snap-in bearing in the next step, you may have to cut it a small amount so it will fit into the chassis hole. Cut away only as much of the bearing as necessary so you can push it into the hole. This bearing is quite brittle; therefore, do not use too much pressure when you install it.
- ( ) Refer to inset drawing #3 and install a snap-in bearing into hole AE in the front of the chassis.
- ( ) Scrape or sand the paint from around both holes in the angle bracket only on the side where the screw head and antenna nut will be mounted. As with some of the chassis holes, the hardware that will be mounted in these holes must make good electrical contact.
- ( ) Mount the shorter side of the angle bracket onto the rear of the chassis at AF. Use a 6-32  $\times$  1/2" stainless steel screw, two #6 lockwashers, a #6 shoulder washer, a #6 fiber flat washer, a #6 solder lug, and a 6-32 nut. Be sure the shoulder on the washer is in the hole in the chassis. Also be sure to position the bracket and the solder lug as shown in the Pictorial before you tighten the hardware.
- ( ) J1: Mount the phone jack onto the rear of the chassis at J1 as shown. Use the flat washer and nut supplied with the jack. Be sure to position the jack as shown in the Pictorial before you tighten the hardware.
- ( ) J2: Refer to inset drawing #4 and mount a coaxial jack onto the rear of the chassis at J2 as shown. Use 4-40  $\times$  3/8" hardware. Be sure to position the socket so the open side of the lug is up.
- ( ) J3: Refer again to inset drawing #4 and mount a coaxial jack onto the rear of the chassis at J3. Use 4-40  $\times$  3/8" hardware (use a #4 solder lug at the indicated location instead of a lockwasher). Be sure to position the socket so the open side of the lug is up. Also be sure to position the solder lug as shown before you tighten the hardware.
- ( ) C1: Use the following procedure to mount the circuit board and the tuning capacitor in the chassis:
1. Set the circuit board onto the screws at AA, AB, AC, and AD. Then use a #6 lockwasher and a 6-32 nut to secure the circuit board at AA and AB. Be sure to position the circuit board so the battery clamp is toward coaxial jack J2.
  2. Use a #6 solder lug and a 6-32 nut to secure the circuit board at AC. Be sure to position the solder lug as shown in the Pictorial before you tighten the nut.

3. Secure the capacitor mounting bracket and the circuit board at AD with a #6 lockwasher and a 6-32 nut. Only tighten this nut finger tight at this time.
4. If there is a nut already on the bushing of the 10-350 pF variable capacitor (#26-171), remove it. You will not need it.
5. Slide a control lockwasher onto the shaft of the variable capacitor. Then start the shaft through the capacitor mounting bracket and slide a control nut onto the shaft.
6. Pass the shaft through the bearing at AE in the front of the chassis. Then use the control nut to secure the variable capacitor to the mounting bracket. Be sure to position the variable capacitor as shown in the Pictorial before you tighten the hardware.
7. Make sure the shaft of the variable capacitor is parallel to the edge of the circuit board and turns freely in the bearing. Then tighten the nut at AD.

Refer to Pictorial 2-2 for the following steps.

- ( ) Bend lug 1 of the tuning capacitor as shown so that it cannot touch the cover when it is installed later.

NOTE: In the following steps, (NS) means not to solder the connection because you will add other wires later. "S-" with a number, such as (S-2), means to solder the connection. The number following the "S-" tells you how many wires should be at the connection. This helps you check your work for errors as you go.

- ( ) Connect the free end of the white wire coming from circuit board hole D to tuning capacitor C1 lug 2 (S-1). NOTE: Route this wire down against the circuit board as shown so it cannot interfere with the operation of the tuning capacitor.

Connect some of the white wires coming from the circuit board to rotary switch SW2 as follows:

NOTE: Lug 1 of the switch will not be used.

- ( ) Wire from hole I to lug 2 (S-1).
- ( ) Wire from hole H to lug 3 (S-1).
- ( ) Wire from hole F to lug 4 (S-1).
- ( ) Wire from hole E to lug 5 (S-1).
- ( ) Wire from hole J to lug A (S-1).
- ( ) C2: Cut one lead of a 47 pF (47K) ceramic capacitor to 1/2" and the other lead to 3/4". Then connect the 1/2" lead to control R1 lug 3 (NS). Pass the other lead through control R1 lug 1 (NS) and connect the end of the lead to the control solder lug (S-1).
- ( ) Remove all of the insulation from a 3/4" white solid wire. Then refer to inset drawing #1 and connect the wire between switch SW1 lugs 3 (S-1) and 6 (S-1).
- ( ) Connect the free end of the shielded cable coming from circuit board hole N and GND to control R1 as follows:

Inner wire to lug 2 (S-1).  
Shield wire to lug 1 (NS).

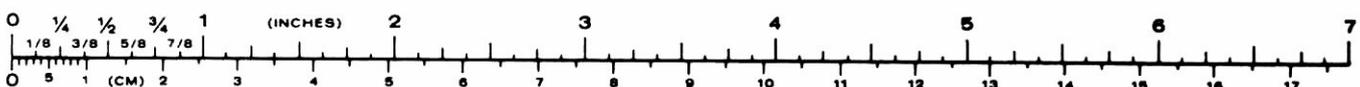
- ( ) Connect the free end of the shielded cable coming from circuit board hole M and GND to control R1 as follows:

Inner wire to lug 3 (S-2).  
Shield wire to lug 1 (S-4). NOTE: The capacitor lead that passes through this lug counts as 2 wires; one entering and one leaving the connection.

- ( ) Connect the free end of the red wire coming from circuit board hole 9V to switch SW1 lug 7 (S-1).

NOTE: Refer to inset drawing #2 when you connect wires to jack J1.

- ( ) Prepare a 6-1/2" red solid wire. Then connect the wire from switch SW1 lug 8 (S-1) to jack J1 lug 1 (S-1). Route this wire down against the chassis as shown.



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( ) Connect the free end of the white wire coming from circuit board hole C to switch SW1 lug 4 (S-1).

( ) Connect the free end of the shielded cable coming from circuit board hole Q and GND as follows:

Inner wire to switch SW1 lug 1 (S-1).  
Shield wire to solder lug AC (NS).

( ) Prepare a 5" white solid wire. Then connect the wire from solder lug AF (S-1) to socket J3 lug 1 (NS). Route this wire along the rear of the chassis as shown.

( ) Prepare a 10" and a 9" length of shielded cable.

( ) Connect one end of the 10" shielded cable as follows:

Inner wire to switch SW1 lug 5 (S-1).  
Shield wire to solder lug AC (NS).

( ) Connect the free end of the 10" shielded cable as follows:

Inner wire to jack J3 lug 1 (S-2).  
Shield wire to solder lug AG (NS).

( ) Connect one end of the 9" shielded cable as follows:

Inner wire to switch SW1 lug 2 (S-1).  
Shield wire to solder lug AC (S-3).

( ) Connect the free end of the 9" shielded cable as follows:

Inner wire to jack J2 lug 1 (S-1).  
Shield wire to solder lug AG (S-2).

( ) Carefully push the 2-pin socket shell on the free end of the twisted pair of wires coming from circuit board holes P and GND onto the leads of LED D1. Be sure the red wire goes to the longer LED lead. Hold the leads with a pair of pliers to prevent them from damage.

( ) Connect the free end of the red battery snap connector wire to jack J1 lug 2 (S-1).

( ) Push the length of sleeving onto the battery snap connector so it completely covers the contacts.

Refer to Pictorial 2-3 for the following steps.

( ) Turn the shafts of control R1 (GAIN) and switch SW2 (BAND) fully counterclockwise, if this has not already been done.

( ) Use the allen wrench to start 6-32 × 3/16" setscrews into two of the knobs.

NOTE: If a knob does not line up properly with the markings on the front of the chassis in one of the next two steps, remove the knob and loosen the control or switch hardware so you can reposition it; then retighten the hardware and reinstall the knob.

( ) Install one of the knobs onto the shaft of control R1. Line up the knob pointer with the dot near the "1" on the front of the chassis. Then tighten the setscrew against the flat on the shaft.

( ) Install a knob onto the shaft of switch SW2. Line up the knob pointer with the dot near the "A" on the front of the chassis. Then tighten the setscrew against the flat on the shaft.

( ) Turn the shaft of tuning capacitor C1 so the capacitor plates are fully meshed (closed).

( ) Start a 6-32 × 1/8" setscrew into the remaining knob. Then install the knob on the shaft of tuning capacitor C1. Line up the knob pointer with the left-most marking on the front of the chassis before you tighten the setscrew.

( ) Refer to Detail 2-3A and mount the collapsible antenna onto the angle bracket on the rear of the chassis as shown. Use a #8 lockwasher and an 8-32 nut.

This completes the assembly of your Active Antenna. Shake out any wire clippings, solder splashes, or other foreign matter which may be lodged in the wiring. Also check each connection to make sure it is properly soldered. Then proceed to "Initial Tests." NOTE: The cover will be installed later.

## INITIAL TESTS

NOTE: You will need a high-impedance input ohmmeter to perform the following tests. If you do not have one, proceed to the "Installation and Operation" section.

Refer to Pictorial 3-1 for the following steps.

If you do not obtain the correct indications in the following steps, check for solder bridges on the circuit board or wiring errors. Be sure you obtain the correct indication in each step before you proceed to the next step.

NOTE: Do not install a battery or connect a power source to the unit until a step directs you to do so.

- ( ) Be sure the OFF/ON switch is OFF and the BAND switch is at D.
- ( ) Connect your negative (or common) ohmmeter lead to the chassis. Leave this lead connected to the chassis until a step directs you to disconnect it.
- ( ) Set the ohmmeter to the R  $\times$  10 range.
- ( ) Touch the positive ohmmeter lead to switch SW1 lug 7. The ohmmeter should indicate between 120 and 180 ohms.
- ( ) Touch the positive ohmmeter lead to switch SW1 lug 8. The ohmmeter should indicate infinity with the OFF/ON switch off and between 120 and 180 ohms with the switch on.
- ( ) Touch the positive ohmmeter lead to tuning capacitor C1 lug 2. The ohmmeter should indicate zero ohms.
- ( ) Set the ohmmeter to the R  $\times$  100 range.
- ( ) Touch the positive ohmmeter lead to control R1 lug 3. The ohmmeter should indicate between 700 and 1200 ohms.
- ( ) Touch the positive ohmmeter lead to control R1 lug 2. The ohmmeter will vary from zero ohms to between 700 and 1200 ohms as you rotate the control.
- ( ) Disconnect the ohmmeter leads from the chassis.

Refer to Pictorial 3-2 for the following steps.

NOTE: You may wish to read the "Installation and Operation" section and determine whether or not you will need to install a battery before you perform the next two steps.

- ( ) Position the battery snap wires out of the way so they will not interfere with the cover when you perform the next step. If you do not wish to install a battery, neatly fold the wires and place the battery snap connector inside the battery clamp.
- ( ) Use four #6  $\times$  3/8" sheet metal screws to mount the cover onto the chassis.

This completes the "Initial Tests." Proceed to "Installation and Operation."

## INSTALLATION AND OPERATION

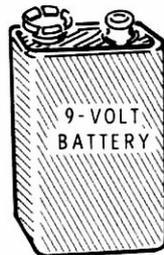
### INSTALLATION

Refer to Pictorial 4-1 as you read the following information.

The Active Antenna may be powered either from an external power source or a battery. We recommend, however, that you use an external power source, one that is capable of supplying 6 to 14-volts DC at 45 milliamperes. (The jack requires a 2.5 millimeter subminiature plug with the tip positive.) The Heathkit Model PS-2350 Power Cube is ideal for this purpose. Connect the power source to jack J1 on the rear of the chassis. NOTE: When you use this jack, it automatically disconnects the internal battery (if one is present).

If you decide to use a battery, use an alkaline 9-volt transistor battery (NEDA #1604). Some representative manufacturers and their type numbers are listed below:

Eveready #522  
Mallory #M1604A  
Duracell #MN1604



To install a battery, remove the sleeving from the battery snap contacts, push the battery snap onto the battery, and then push the battery into the battery clamp to hold it in place. See Detail 4-1A.

Use a suitable length of coaxial cable to connect the Receiver jack on the rear of the chassis to the antenna input of your receiver. CAUTION: If you use your Active Antenna with a transceiver, **do not** transmit while it is connected. To do so will damage the Active Antenna or transceiver.

If you wish to use an external antenna, connect it to the Antenna jack on the rear of the chassis.

### OPERATION

Refer to Pictorial 4-2 for the following steps.

You can leave the Active Antenna connected to your receiver at all times. When the slide switch is in the OFF position, the antenna signal is connected directly to the Receiver jack.

To use your Active Antenna, perform the following steps:

1. Push the OFF/ON switch to ON. The LED will light to indicate that power is being applied to the circuitry.
2. Set the GAIN control to 2.
3. Set the BAND switch to the desired frequency range as follows:
  - A .3— .6 MHz (300—600 kHz)
  - B .7—1.5 MHz (700—1500 kHz)
  - C 1.6—4 MHz
  - D 4—12 MHz
  - E 12.5—30 MHz
4. Set the TUNING dial to the desired frequency. Note that the five scales on the dial match the positions of the BAND switch.
5. Tune your receiver to the desired frequency.
6. Extend the collapsible antenna (if you are not using an external antenna). IMPORTANT: Do not extend the collapsible antenna if you use an external antenna.
7. Adjust the TUNING dial on the Active Antenna for maximum signal strength (as determined by the receiver's meter or your ears).

**NOTES:**

- A. Always preset the Active Antenna TUNING dial to the desired frequency before you adjust it for maximum signal strength. If you do not do this, you could inadvertently tune the Active Antenna to a receiver image or a strong, unrelated signal that is overloading your receiver.
- B. The Active Antenna may pick up noise that is generated by fluorescent lights, electric motors, microwave ovens, television sets, computers, and other electronic devices. You may find it necessary to turn those devices off while you use your Active Antenna.
- 8. Increase the GAIN control to the desired level. You will obtain best results with this control set at some point less than fully clockwise. Too much gain could cause strong signals to overload your receiver.

**NOTE:** Oscillations can occur on some frequencies when you use the Active Antenna with portable receivers and set the GAIN control too high. This is especially a problem with receivers that have plastic cabinets. You can recognize this type of oscillation by one or more of the following symptoms:

- A. Unmodulated carriers as you tune the TUNING control through the frequency range.
- B. Stations appear and disappear as you tune the TUNING control.
- C. You may hear stations other than your desired station.

This completes the "Installation and Operation" of your Active Antenna.

## IN CASE OF DIFFICULTY

Begin your search for any trouble that occurs after assembly by carefully following the steps listed below in the "Visual Checks." After you complete the "Visual Checks," refer to the "Troubleshooting Charts."

NOTE: Refer to the "Circuit Board X-Ray View" (Page 26) for the physical location of parts on the circuit board.

### VISUAL CHECKS

1. Recheck the wiring. Trace each lead with a colored pencil on the Pictorial as you check it. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something that you have consistently overlooked.
2. About 90% of the kits that are returned to the Heath Company for repair do not function properly due to poor connections and soldering. Therefore, you can eliminate many troubles by making sure all connections are soldered as described in Detail 1-1A. Be sure there are no solder "bridges" between circuit board foils.
3. Check to be sure all transistors are in their proper locations. Make sure each lead is connected to the proper point.
4. Check the values of the parts. Be sure in each step that you wired the correct part into the circuit, as shown in the Pictorial. It would be easy, for example, to install a 680  $\Omega$  (blue-gray-brown) resistor where a 68  $\Omega$  (blue-gray-black) resistor should be installed.
5. Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.
6. A review of the "Circuit Description" may also help you determine where the trouble is.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of this Manual. Your Warranty is located inside the front cover.

## Troubleshooting Chart

The following chart lists problems and possible causes of some troubles you might encounter. If a particular part is mentioned (Q3 for example) as a possible cause, check that part and any other components connected to it to see that they are installed

and/or wired correctly. Also check for solder bridges and poor connections in the surrounding area. It is also possible, on rare occasions, for a part to be faulty and require replacement.

CONDITION	POSSIBLE CAUSE
Unit does not function; LED does not light.	<ol style="list-style-type: none"> <li>1. Dead battery.</li> <li>2. Jack J1 or wiring.</li> <li>3. Switch SW1 or wiring.</li> <li>4. Solder bridge on circuit board.</li> </ol>
Unit does not function; LED does light.	<ol style="list-style-type: none"> <li>1. Wiring error.</li> <li>2. Connection to your receiver.</li> </ol>
Unit does not tune on some frequencies.	<ol style="list-style-type: none"> <li>1. Coils L101—L106.</li> <li>2. Capacitor C1 or wiring.</li> <li>3. Switch SW2 wiring.</li> </ol>
Unit does not tune on any frequency.	<ol style="list-style-type: none"> <li>1. Coils L101—L106.</li> <li>2. Capacitor C1 or wiring.</li> <li>3. Wiring error.</li> <li>4. Connection to your receiver.</li> </ol>

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## SPECIFICATIONS

Frequency Range .....	300 kHz to 30 MHz.
Antenna Provision .....	Collapsible (supplied), or external 50 ohm.
Power Requirements .....	9-volt alkaline battery (NEDA #1604) or external 6 to 14-volt DC (45 mA) source. Model PS-2350 power cube recommended.
Dimensions (overall) .....	2-1/4" H × 5-1/8" W × 5" D. (5.7 × 13 × 12.7 cm)
Weight .....	1.4 lb. (0.6 g).

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The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

## CIRCUIT DESCRIPTION

Refer to the Schematic Diagram while you read the following description. The component numbers are arranged in the following groups to help you locate specific parts on the Schematic, circuit board, and chassis:

1—99 Parts mounted on the chassis.

101—199 Parts mounted on the circuit board.

Signals coming from the collapsible antenna or an external antenna via Antenna jack J3 pass through a preselector and a preamplifier (Q101 through Q103) before they are applied to a receiver.

When power is applied to the Active Antenna, signals are applied to a tuned-input filter formed by variable capacitor C1 and coils L101 through L106. Band switch SW2 allows you to select the coil or coils necessary to place the desired frequency within the tuning range of C1.

Transistors Q101 and Q102 each operate in a source-follower configuration to provide amplification for the filtered signal. Transistor Q103 is a high-level amplifier which further amplifies the signal so it can drive the output through Receiver jack J2 into a 50-ohm load at the receiver.

Jack J1 allows you to connect an external power supply, such as the Heathkit Model PS-2350 Power Cube. When you connect a power source to this socket, the internal battery is automatically disconnected from the circuit.

OFF/ON switch SW1 turns the Active Antenna off and on. When this switch is in the Off position, signals coming from the antenna are automatically bypassed around the preselector and preamplifier circuits to Receiver jack J2.

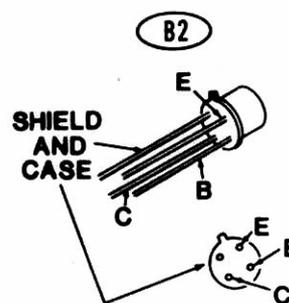
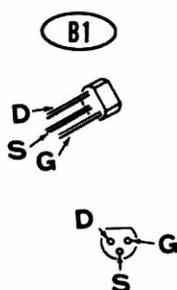
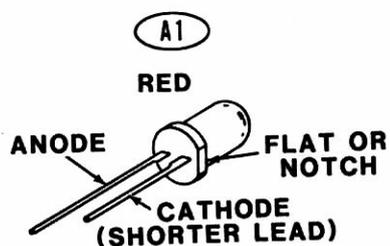
## SEMICONDUCTOR IDENTIFICATION

### DIODE

<u>COMPONENT NUMBER</u>	<u>HEATH PART NUMBER</u>	<u>MAY BE REPLACED WITH</u>	<u>KEY NUMBER</u>
D1	412-633	LED	A1

### TRANSISTORS

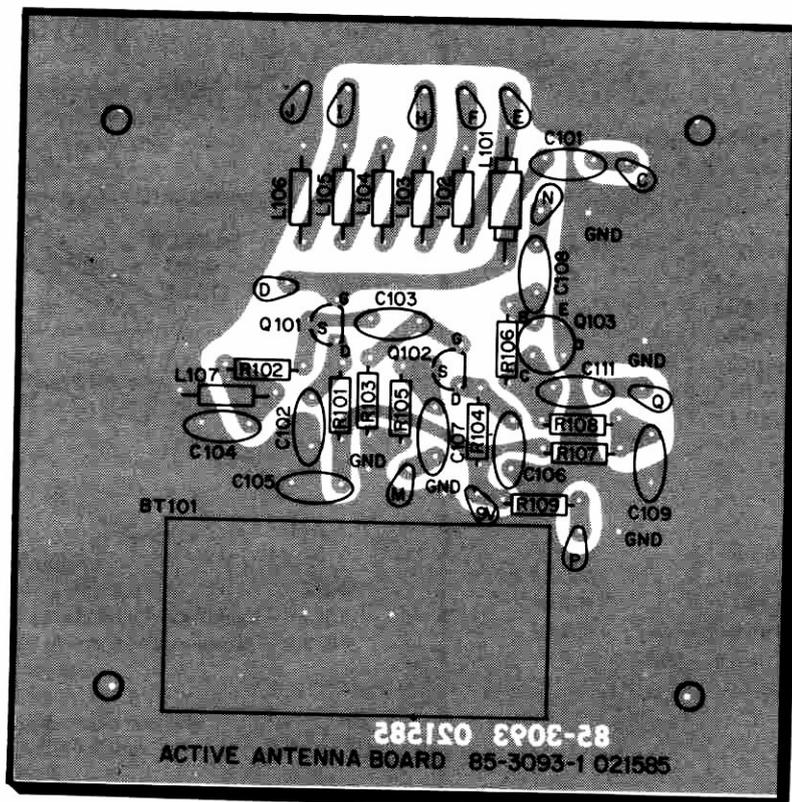
<u>COMPONENT NUMBER</u>	<u>HEATH PART NUMBER</u>	<u>MAY BE REPLACED WITH</u>	<u>KEY NUMBER</u>
Q101	417-931	PN4858	B1
Q102	417-931	PN4858	B1
Q103	417-290	MRF502	B2



## CIRCUIT BOARD X-RAY VIEW

NOTE: To find the PART NUMBER of a component for the purpose of ordering a part:

- A. Find the circuit component number (R105, C103, etc.) on the X-Ray View.
- B. Locate this same number in the "Circuit Component Number" column of the "Parts List."
- C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION which must be supplied when you order a replacement part.



(Shown from the component side.)

# CUSTOMER SERVICE

## REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

## ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company  
Benton Harbor  
MI 49022  
Attn: Parts Replacement

**Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.**

## OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

## TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

**Please do not send parts for testing**, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

## REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

**If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.**

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company  
Service Department  
Benton Harbor, Michigan 49022



HEATH COMPANY • BENTON HARBOR, MICHIGAN  
***THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM***

LITHO IN U.S.A.