

# HEATHKIT<sup>®</sup> MANUAL

*for the*

**AM PORTABLE RADIO**

**Model GR-1008**

595-1494-05



HEATH COMPANY • BENTON HARBOR, MICHIGAN



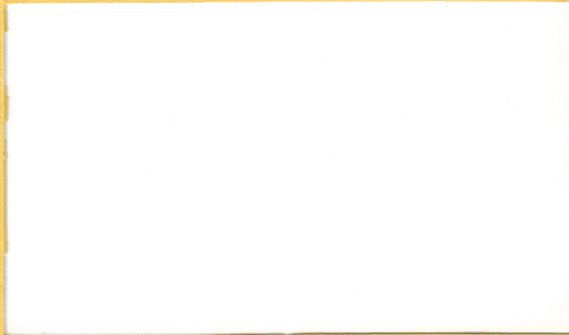
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The following telephone numbers are direct lines to the departments listed:

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

### Technical Assistance Phone Numbers

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Amateur Radio ..... (616) 982-3296  
Test Equipment, Weather Instruments and  
Home Clocks ..... (616) 982-3315  
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Our warranty does not cover and we are not responsible for damage caused by: incorrect assembly, the use of corrosive solder, defective tools, misuse, or fire; or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for inconvenience, loss of use, customer assembly or set-up time.

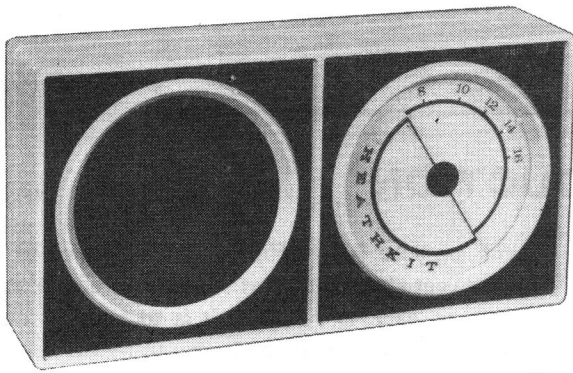
This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for accidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so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

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

HEATH COMPANY  
BENTON HARBOR, MI. 49022

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.





# Heathkit® Manual

for the

## AM PORTABLE RADIO

Model GR-1008

595-1494-05

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**HEATH COMPANY**  
**BENTON HARBOR, MICHIGAN 49022**

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## INTRODUCTION

Your Heathkit Model GR-1008 Portable Radio is handy and compact for your listening pleasure. News, weather, sports, and the "now sounds" of AM are yours at the touch of a dial. . .at home or on the go.

Eight transistors and four diodes are included in the dependable solid-state circuits to show what performance is all about — the kind of quality performance you expect from a Heathkit product. Power is supplied by an inexpensive and easy-to-get 9-volt battery.

The built-in ferrite rod antenna pulls in those fringe area stations. . .and the big 3-1/2" round speaker sounds clear and natural at all volume levels. The trim, high-impact cabinet not only has a pleasing appearance, but is also easy to take care of.

Don't overlook the "repairability" of this Portable Radio. Most other small radios are tossed aside when they go on the

blink because it is difficult and expensive to repair their hard-to-get-at circuits. Not so, for this one. You'll find this Radio as easy to repair as it is to build — thanks to the roomy circuit design and easy-to-follow troubleshooting instructions in the Manual.

All in all, indoors or out, your new Heathkit AM Portable Radio is sure to give you many years of listening enjoyment.

The famous Heathkit assembly procedures and methods used with the larger Heathkit products are used with this AM Portable Radio. This means every effort was made to make the assembly of this kit easy and enjoyable.

*Refer to the "Kit Builders Guide" for information on tools, wiring, soldering, resistors, and capacitors.*

## PARTS LIST

Check each part against the following list. This will show you what the parts look like.

| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

### RESISTORS, 1/2-Watt

NOTE: The following resistors have a fourth band of silver unless described otherwise.

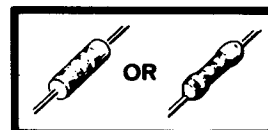
|       |   |  |
|-------|---|--|
| 6-399 | 1 | 3.9 $\Omega$ . 5% (orange-white-gold-gold) |
| 6-470 | 1 | 47 $\Omega$ (yellow-violet-black)          |
| 6-101 | 1 | 100 $\Omega$ (brown-black-brown)           |
| 6-331 | 3 | 330 $\Omega$ (orange-orange-brown)         |
| 6-471 | 1 | 470 $\Omega$ (yellow-violet-brown)         |
| 6-821 | 1 | 820 $\Omega$ (gray-red-brown)              |
| 6-122 | 1 | 1200 $\Omega$ (brown-red-red)              |
| 6-272 | 2 | 2700 $\Omega$ (red-violet-red)             |
| 6-472 | 2 | 4700 $\Omega$ (yellow-violet-red)          |

Any part that is in an individual envelope with a part number on it should be placed back in its envelope after it is identified until it is called for in a step.

| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

### Resistors (cont'd.)

|       |   |                                       |
|-------|---|---------------------------------------|
| 6-103 | 2 | 10 k $\Omega$ (brown-black-orange)    |
| 6-153 | 2 | 15 k $\Omega$ (brown-green-orange)    |
| 6-333 | 1 | 33 k $\Omega$ (orange-orange-orange)  |
| 6-473 | 2 | 47 k $\Omega$ (yellow-violet-orange)  |
| 6-154 | 1 | 150 k $\Omega$ (brown-green-yellow)   |
| 6-394 | 1 | 390 k $\Omega$ (orange-white-yellow)  |
| 6-474 | 1 | 470 k $\Omega$ (yellow-violet-yellow) |





| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

### CAPACITORS

#### Mylar\*

|       |   |              |
|-------|---|--------------|
| 27-63 | 1 | .022 $\mu$ F |
| 27-73 | 2 | .047 $\mu$ F |
| 27-47 | 2 | .1 $\mu$ F   |

#### Disc

|       |   |                  |
|-------|---|------------------|
| 21-3  | 1 | 10 pF            |
| 21-17 | 2 | 270 pF           |
| 21-27 | 3 | .005 $\mu$ F (k) |

#### Electrolytic

|        |   |                   |
|--------|---|-------------------|
| 25-123 | 1 | 2 $\mu$ F         |
| 25-54  | 2 | 10 $\mu$ F (MFD)  |
| 25-96  | 2 | 25 $\mu$ F        |
| 25-56  | 1 | 100 $\mu$ F (MFD) |

### CONTROLS

|        |   |                              |
|--------|---|------------------------------|
| 19-728 | 1 | 20 k $\Omega$ control        |
| 26-158 | 1 | 140-82 pF variable capacitor |

### TRANSFORMERS-COIL-FILTER

|         |   |                               |
|---------|---|-------------------------------|
| 52-161  | 1 | Transformer with yellow screw |
| 40-1603 | 1 | Transformer with red screw    |
| 40-1647 | 1 | Antenna coil                  |
| 404-399 | 2 | Ceramic filter                |

### DIODES

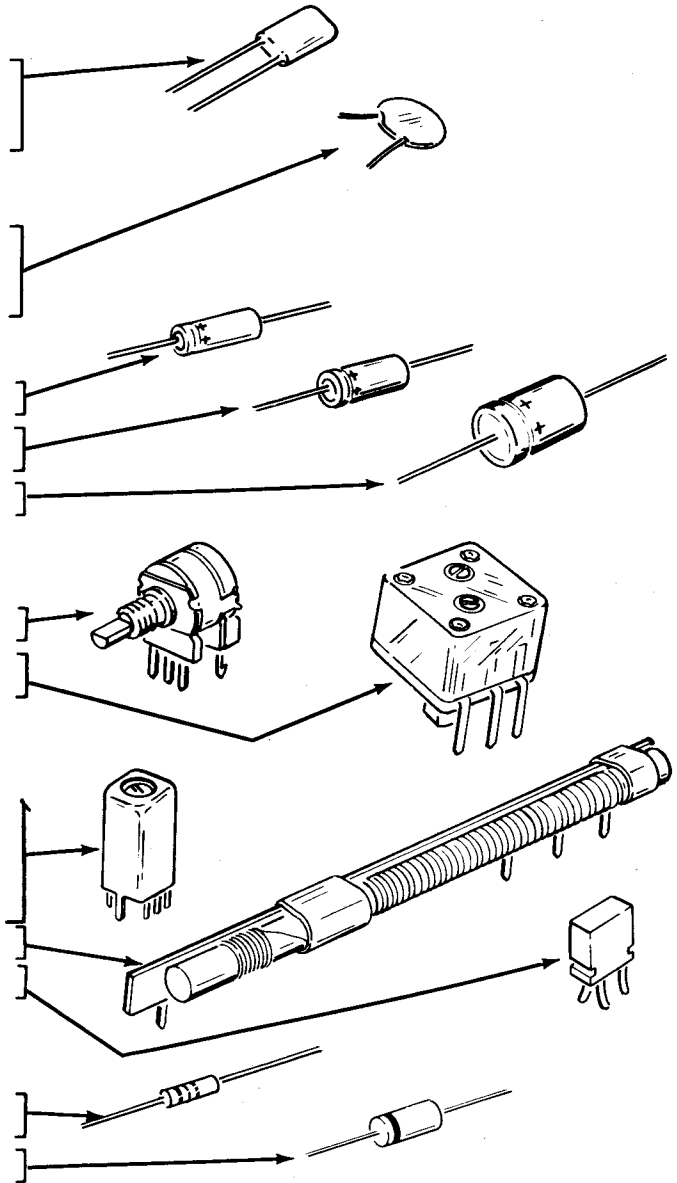
|       |   |                                 |
|-------|---|---------------------------------|
| 56-26 | 2 | 1N191 diode (brown-white-brown) |
| 57-65 | 2 | 1N4002 diode                    |

### TRANSISTORS

**NOTE:** Transistors are marked for identification in one of the following four ways:

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

\*DuPont Registered Trademark



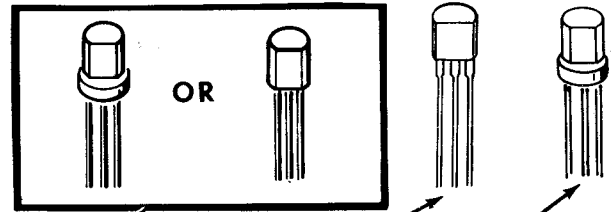


| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

**Transistors (cont'd.)**

NOTE: Keep the following transistors in their separate envelopes until they are called for later.

|         |   |                    |
|---------|---|--------------------|
| 417-201 | 3 | X29A829 transistor |
| 417-801 | 4 | MPS-A20 transistor |
| 417-94  | 1 | 2N3416 transistor  |



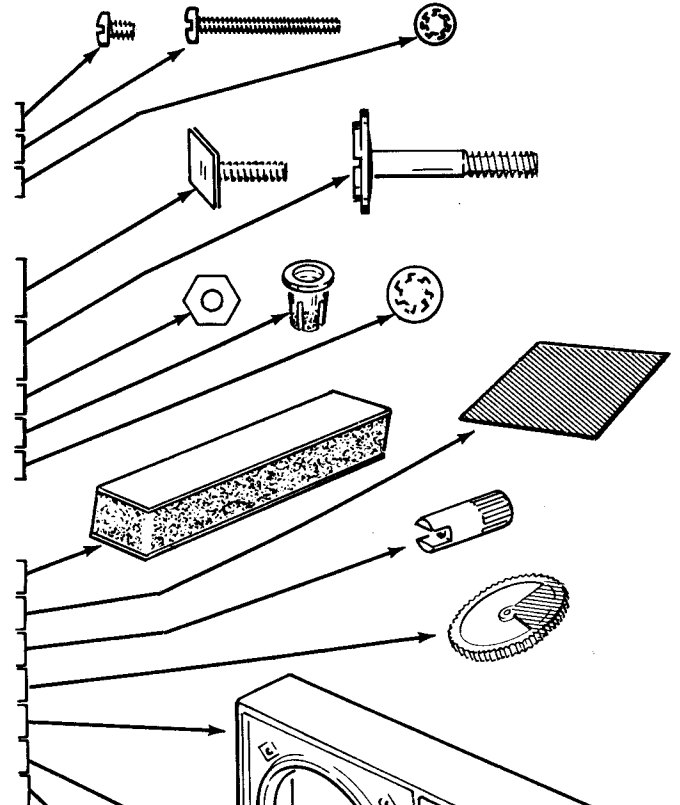
**HARDWARE**

**#3 Hardware**

|          |   |                   |
|----------|---|-------------------|
| 250-256  | 2 | 3-48 x 1/8" screw |
| 250-1238 | 1 | 3-56 x 3/4" screw |
| 254-7    | 1 | #3 lockwasher     |

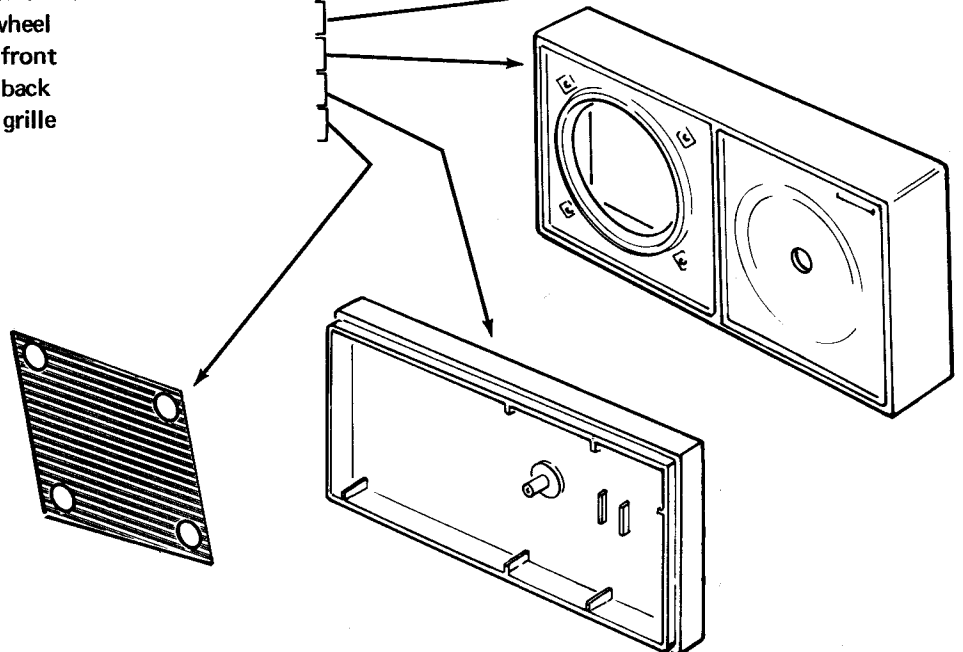
**#6 Hardware**

|          |   |                               |
|----------|---|-------------------------------|
| 250-1101 | 4 | 6-32 x 3/8" square head screw |
| 250-1163 | 1 | 6-32 x 15/16" coin slot screw |
| 252-3    | 4 | 6-32 nut                      |
| 252-170  | 1 | 6-32 brass insert nut         |
| 254-1    | 4 | #6 lockwasher                 |



**MISCELLANEOUS**

|         |   |                 |
|---------|---|-----------------|
| 73-64   | 2 | Battery cushion |
| 75-108  | 1 | Battery support |
| 456-30  | 1 | Extension shaft |
| 462-395 | 1 | Thumbwheel      |
| 92-75   | 1 | Cabinet front   |
| 92-76   | 1 | Cabinet back    |
| 209-71  | 1 | Speaker grille  |

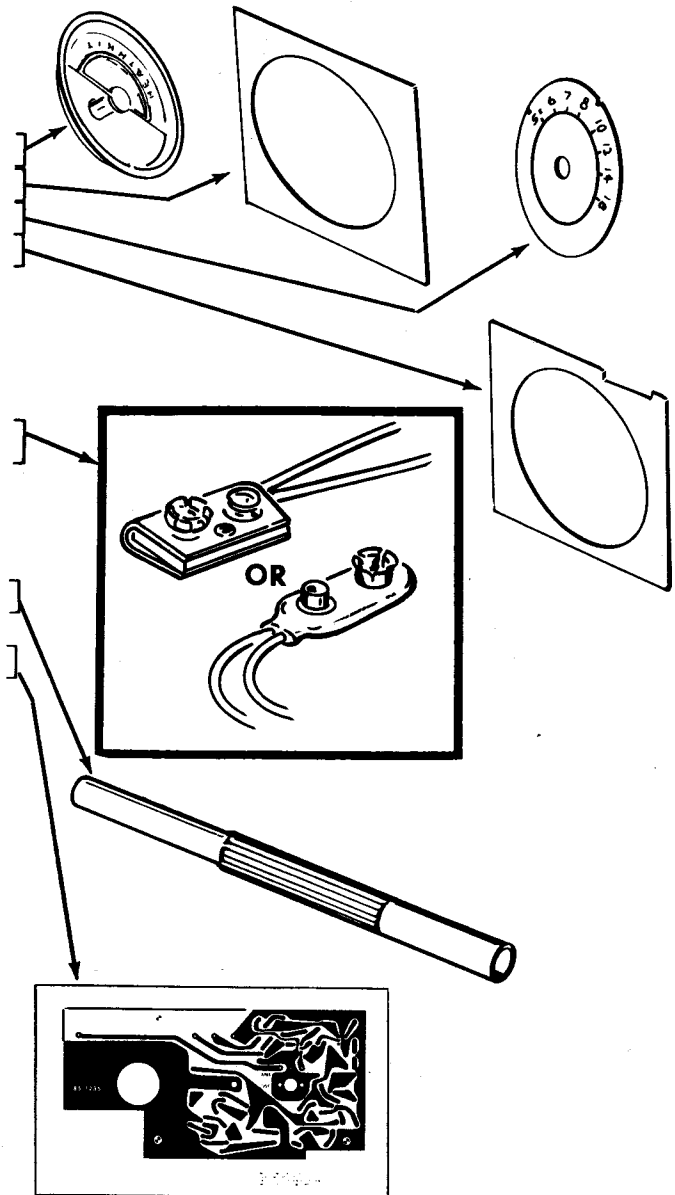




| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

**Miscellaneous (cont'd.)**

|           |   |  |
|-----------|---|--|
| 464-66    | 1 | Dial   |
| 390-985   | 1 | Speaker trim label                                 |
| 390-986   | 1 | Dial label   |
| 390-987   | 1 | Dial trim label                                    |
| 85-2085-1 | 1 | Circuit board                                      |
|           |   |  |
| 401-165   | 1 | Speaker  |
| 432-798   | 1 | Battery connector assembly                         |
|           |   |  |
| 490-5     | 1 | Nut starter  |
| 344-58    | 1 | Gray wire  |
| 490-190   | 1 | Shadow mask  |
| 597-308   | 1 | Kit Builders Guide                                 |
| 597-260   | 1 | Parts Order Form                                   |
|           | 1 | Blue and white label                               |
|           | 1 | Assembly Manual (See front cover for part number.) |
|           |   | Solder   |



To order a replacement part, 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 the Manual. For pricing information, refer to the separate "Heath Parts Price List."



## BATTERY

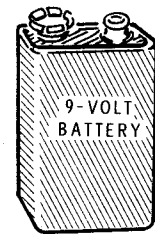
The following battery should be purchased at this time for use in your kit:

One 9-volt transistor battery, NEDA #1604.

Representative manufacturers and their type numbers are:

Eveready #216

Mallory #TR-146X (long life)



## ASSEMBLY NOTES

Before starting to assemble this kit, be sure you have read the wiring and soldering information in the "Kit Builders Guide."

Position all parts as shown in the Pictorials. Follow the instructions carefully, and read the entire step before you perform the operation.

**NOTE:** Your circuit board has a lettered side and a foil side. You will install parts on the lettered side (side having the outline of the parts) and solder the leads to the foil side.

Resistors will be called out by their resistance value (in  $\Omega$  or  $k\Omega$ ) and color code.

Capacitors will be called out by their capacitance value (in pF or  $\mu F$ ) and type (Mylar, disc, or electrolytic).

Due to the small foil area around some of the circuit board holes, you will have to use the utmost care to prevent solder bridges between adjacent foil areas. (See Page 11 of your Kit Builders Guide.) Use only a minimum amount of solder and a 25-watt to 35-watt soldering iron with a small tip. (See Figure 1.) Allow the soldering iron to reach operating temperature, and then apply it long enough for the solder to flow freely and make a good connection.

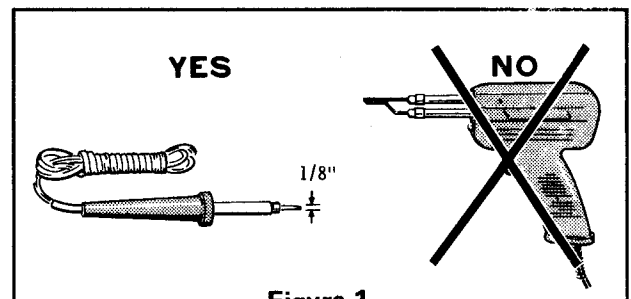


Figure 1

# STEP-BY-STEP ASSEMBLY

## CIRCUIT BOARD PARTS MOUNTING

**START**



**NOTE:** Be sure you have checked the parts in the "Parts List" and have read the "Assembly Notes" (on the preceding page) before performing the following steps.


Position the circuit board as shown in the identification drawing. Then complete each step on the Pictorial.

**NOTE:** Most of the following resistors have a silver fourth band. This fourth band will not be called out unless it is other than silver.

- ( ) 1200  $\Omega$  (brown-red-red).
- ( ) 47 k $\Omega$  (yellow-violet-orange).
- ( ) 330  $\Omega$  (orange-orange-brown).
- ( ) 470  $\Omega$  (yellow-violet-brown).

**SAFETY WARNING:** Avoid eye injury when you clip off excess wire ends in the following steps. We suggest that you wear glasses, or at least clip the leads so the ends will not fly toward your eyes.

**FOR GOOD SOLDER CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN. WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.**



- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) 15 k $\Omega$  (brown-green-orange).
- ( ) 47 k $\Omega$  (yellow-violet-orange).
- ( ) 10 k $\Omega$  (brown-black-orange).
- ( ) 2700  $\Omega$  (red-violet-red).

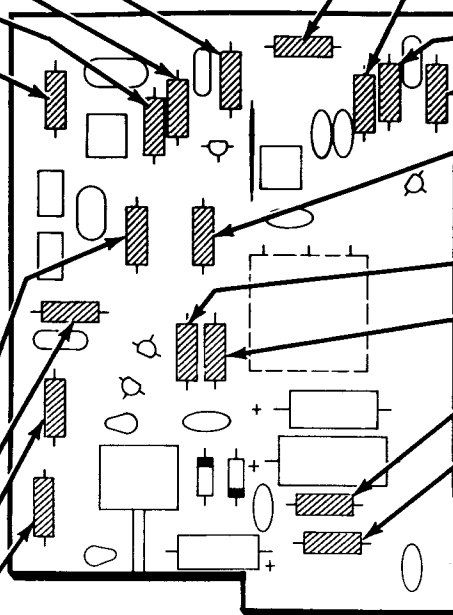
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING

**CONTINUE**

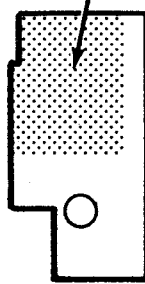


- ( ) 330  $\Omega$  (orange-orange-brown).
- ( ) 2700  $\Omega$  (red-violet-red).
- ( ) 100  $\Omega$  (brown-black-brown).
- ( ) 150 k $\Omega$  (brown-green-yellow).
- ( ) 15 k $\Omega$  (brown-green-orange).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) 4700  $\Omega$  (yellow-violet-red).
- ( ) 330  $\Omega$  (orange-orange-brown).
- ( ) 33 k $\Omega$  (orange-orange-orange).
- ( ) 10 k $\Omega$  (brown-black-orange).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

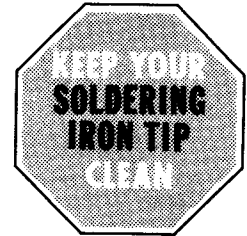
PICTORIAL 1



The steps performed in this Pictorial are in this area of the circuit board.



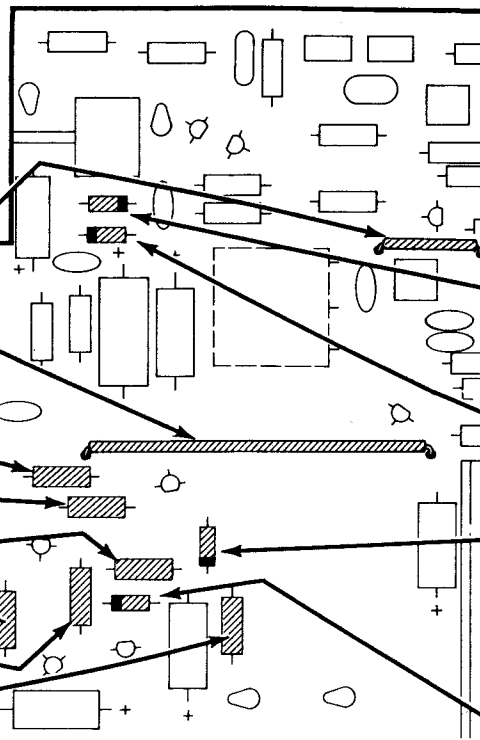
IDENTIFICATION DRAWING



CONTINUE

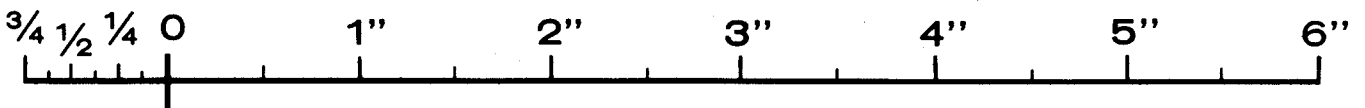
START

- ( ) Reposition the circuit board as shown in the identification drawing.
- NOTE: When you are instructed to install a wire, remove 1/4" of insulation from both ends of the specified length of gray wire.
- ( ) 1-1/4" wire.
- ( ) 2-3/4" wire.
- ( ) Solder the wire ends to the foil and cut off any excess wire lengths.
- ( ) 470 kΩ (yellow-violet-yellow).
- ( ) 4700 Ω (yellow-violet-red).
- ( ) 3.9 Ω, 5% (orange-white-gold-gold).
- ( ) 390 kΩ (orange-white-yellow).
- ( ) 47 Ω (yellow-violet-black).
- ( ) 820 Ω (gray-red-brown).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 2

- NOTE: In the following steps you will install diodes. Always position the banded end of each diode as shown on the circuit board. Be careful when you bend the leads; the next two diodes are fragile. Do not solder the diodes until instructed to do so.
- ( ) 1N191 diode, (#56-26, brown-white-brown) at D2.
  - ( ) 1N191 diode, (#56-26, brown-white-brown) at D1.
  - ( ) 1N4002 diode (#57-65) at D3.
  - ( ) 1N4002 diode (#57-65) at D4.
  - ( ) Check the diodes, in the previous four steps, to be sure the banded ends are positioned as shown on the circuit board. Then solder the leads to the foil and cut off the excess lead lengths.

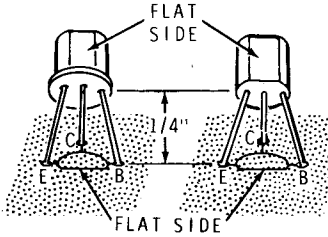


**START**



**IMPORTANT:** Install transistors in the manner shown. First line up the flat of the transistor with the outline of the flat on the circuit board. Then insert the transistor leads into their correct holes, indicated by E, C, and B. Push the transistor down to 1/4" above the circuit board. Solder the leads to the foil and cut off the excess lead lengths.

**NOTE:** Each of the following three transistors will be one of the two types shown below. Determine which type you received and insert the transistor leads into the corresponding E, C, and B holes in the circuit board as shown.

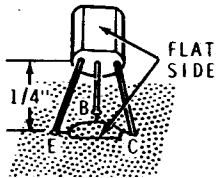


( ) X29A829 transistor (#417-201) at Q4.

( ) X29A829 transistor (#417-201) at Q5.

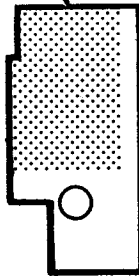
( ) X29A829 transistor (#417-201) at Q8.

**NOTE:** The following four transistors are of the type shown below. Insert the transistor leads into the corresponding E, B, and C holes in the circuit board as shown.

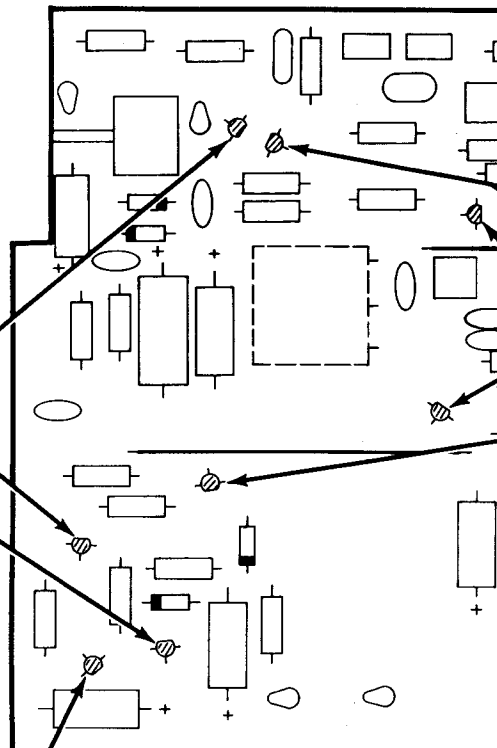


( ) MPS-A20 transistor (#417-801) at Q6.

The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING



**CONTINUE**

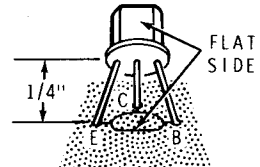


( ) MPS-A20 transistor (#417-801) at Q3.

( ) MPS-A20 transistor (#417-801) at Q2.

( ) MPS-A20 transistor (#417-801) at Q1.

( ) 2N3416 transistor (#417-94) at Q7.



( ) Check to be sure that all transistor leads have been soldered to the foil and the excess lead lengths cut off.

PICTORIAL 3



# START

( ) Reposition the circuit board as shown in the identification drawing.

**NOTE:** In the next four steps, carefully solder each part to the foil. The foil areas are close together. Do not allow solder to "bridge" from one foil to another.

( ) Transformer with yellow screw (#52-161) at T1. **YELLOW SCREW**

( ) Transformer with red screw (#40-1603) at L2.

( ) Ceramic filter (#404-399) at FL1.

( ) Ceramic filter (#404-399) at FL2.

( ) Compare the foil areas soldered in the previous four steps with the foil view in Detail 4A to be sure there are no solder bridges. (To clear a solder bridge, melt the excess solder and then quickly wipe it away with a soft cloth.)

( ) .047  $\mu\text{F}$  Mylar.

( ) .1  $\mu\text{F}$  Mylar.

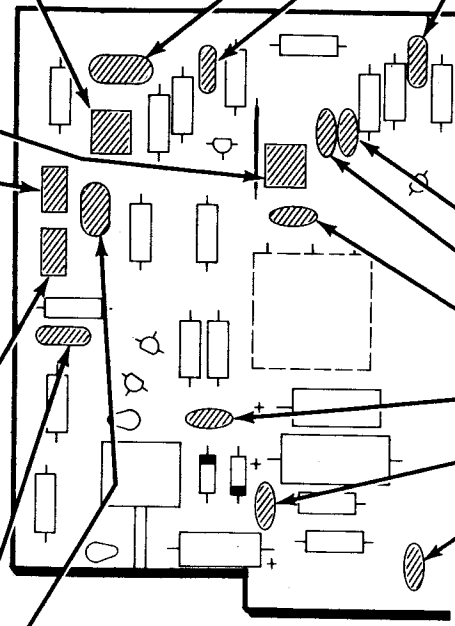
**FOR GOOD SOLDER CONNECTIONS. YOU MUST KEEP THE SOLDERING IRON TIP CLEAN. WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.**

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

The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING



# CONTINUE

( ) .1  $\mu\text{F}$  Mylar.

( ) .022  $\mu\text{F}$  Mylar.

( ) .047  $\mu\text{F}$  Mylar.

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

**NOTE:** When you install disc capacitors, remove any excess coating from the leads. Use long-nose pliers to remove this coating.

REMOVE COATING ON LEADS

( ) 270 pF disc.

( ) 270 pF disc.

( ) 10 pF disc.

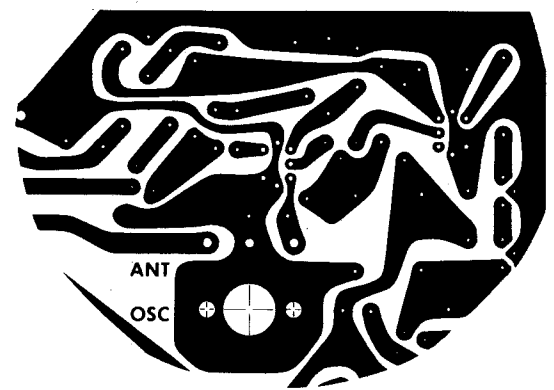
( ) .005  $\mu\text{F}$  (k) disc.

( ) .005  $\mu\text{F}$  (k) disc.

( ) .005  $\mu\text{F}$  (k) disc.

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

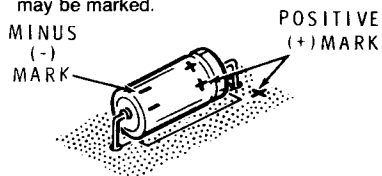
PICTORIAL 4



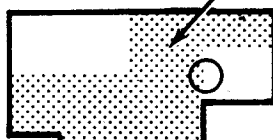
Detail 4A

**START** ↓

NOTE: Before you install an electrolytic capacitor, look at it and identify the leads. One lead will have a plus (+) mark or a minus (-) mark near it. **Be sure** to install the positive lead in the positive-marked hole. Be careful; only the negative lead may be marked.



The steps performed in this Pictorial are in this area of the circuit board.



IDENTIFICATION DRAWING



( ) 10  $\mu$ F (MFD) electrolytic.

( ) 25  $\mu$ F electrolytic.

( ) 25  $\mu$ F electrolytic.

( ) 2  $\mu$ F electrolytic.

( ) 100  $\mu$ F (MFD) electrolytic.

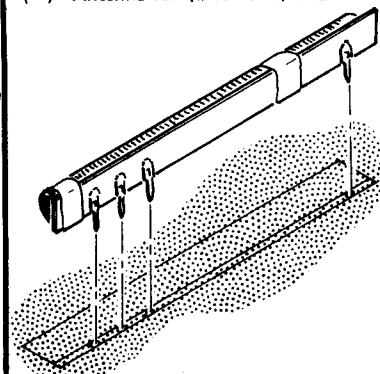
( ) 10  $\mu$ F (MFD) electrolytic.

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

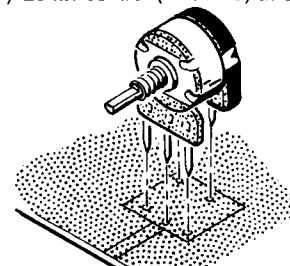
**CONTINUE** ↓

NOTE: In the following steps, solder all connections to the foil as you install each part.

( ) Antenna coil (#40-1647) at L1.



( ) 20 k $\Omega$  control (#19-728) at SW1.

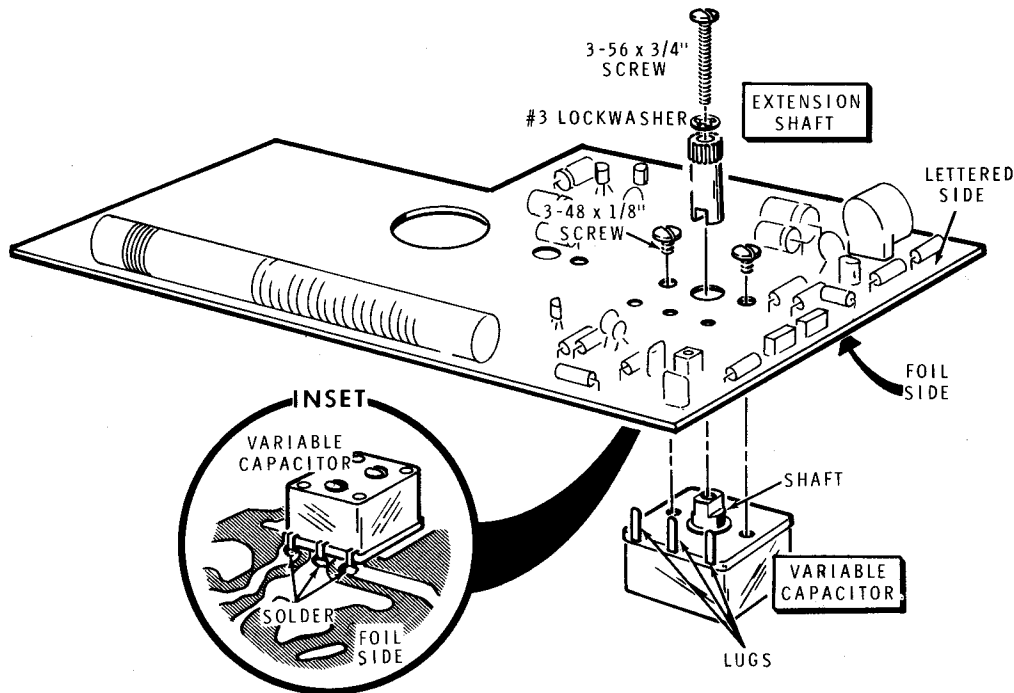


NOTE: The shadow mask (#490-190) is a piece of clear flexible plastic that shows the foil pattern of the circuit board.

( ) Turn the circuit board over and position the shadow mask over the foil. The foil pattern of the mask should cover up the foil on the board. Any solder bridges between foils can now easily be seen. If there is a solder bridge, remove it by holding the soldering iron tip on it. Then allow the excess solder to flow onto the soldering iron tip.

PICTORIAL 5





PICTORIAL 6

Refer to Pictorial 6 for the following steps.

- ( ) Check to be sure that the three lugs on the variable capacitor are positioned as shown in the Pictorial. If necessary, bend or straighten these lugs to their correct positions.
- ( ) Mount the variable capacitor to the foil side of the circuit board. Be sure that all three lugs and the shaft extend through the circuit board to the lettered side. Then install two 3-48 x 1/8" screws as shown.
- ( ) Mount the extension shaft to the variable capacitor shaft with a 3-56 x 3/4" screw and a #3 lockwasher.
- ( ) Position the circuit board foil-side-up.
- ( ) Refer to the inset drawing and solder each of the three variable capacitor lugs to the foil at the points where they go through the circuit board.
- ( ) Set the completed circuit board aside until it is called for.

## CABINET PARTS MOUNTING

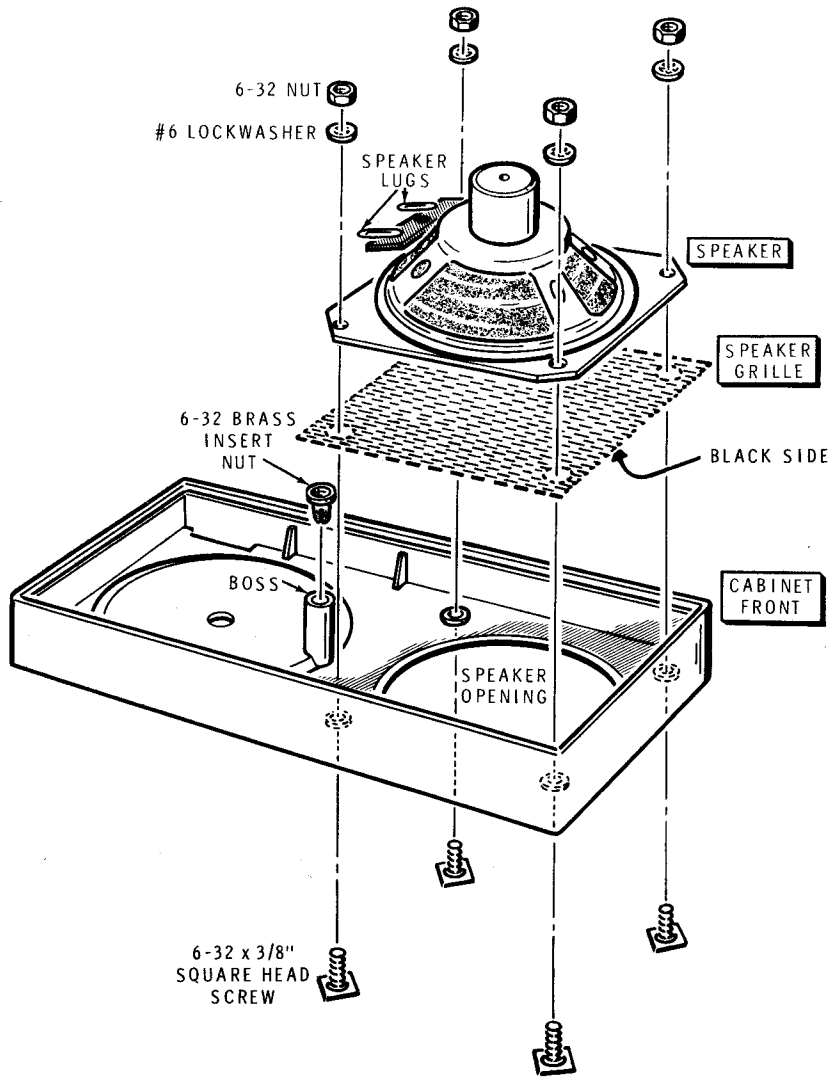
Refer to Pictorial 7 for the following steps.

**NOTE:** Spread a soft cloth or some other protective material on top of your work surface to prevent marring the cabinet as you perform the following steps.

- ( ) Position the cabinet front with its face down on your work surface as shown in the Pictorial.
- ( ) Press the 6-32 brass insert nut into the hole at the top of the boss. Force the brass insert nut down as far as it will go and until it is evenly seated within the boss.
- ( ) Position the speaker grille, black side down, over the speaker opening so its design pattern is lengthwise with the cabinet front.

**NOTE:** Handle the speaker with care to avoid damaging its diaphragm.

- ( ) Position the speaker over the speaker grille so its two lugs are toward the boss containing the 6-32 brass insert nut.



PICTORIAL 7

NOTE: Use the plastic nut starter supplied with this kit to hold and start 6-32 nuts on screws. The method for using this nut starter is shown in Figure 2.

- ( ) Mount the speaker grille (black side down) and the speaker to the cabinet front with four 6-32 x 3/8" square head screws, four #6 lockwashers, and four 6-32 nuts. Be sure the square heads of all four screws are seated within the square indentions on the face of the cabinet front; then tighten the four 6-32 nuts onto the four screws.

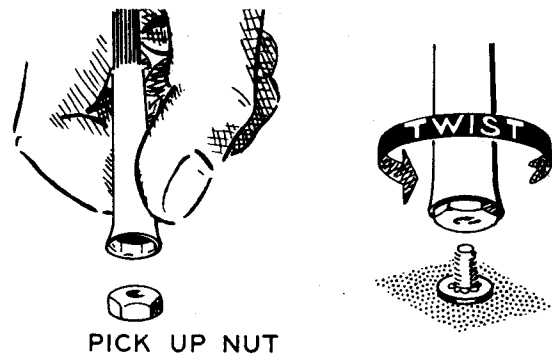
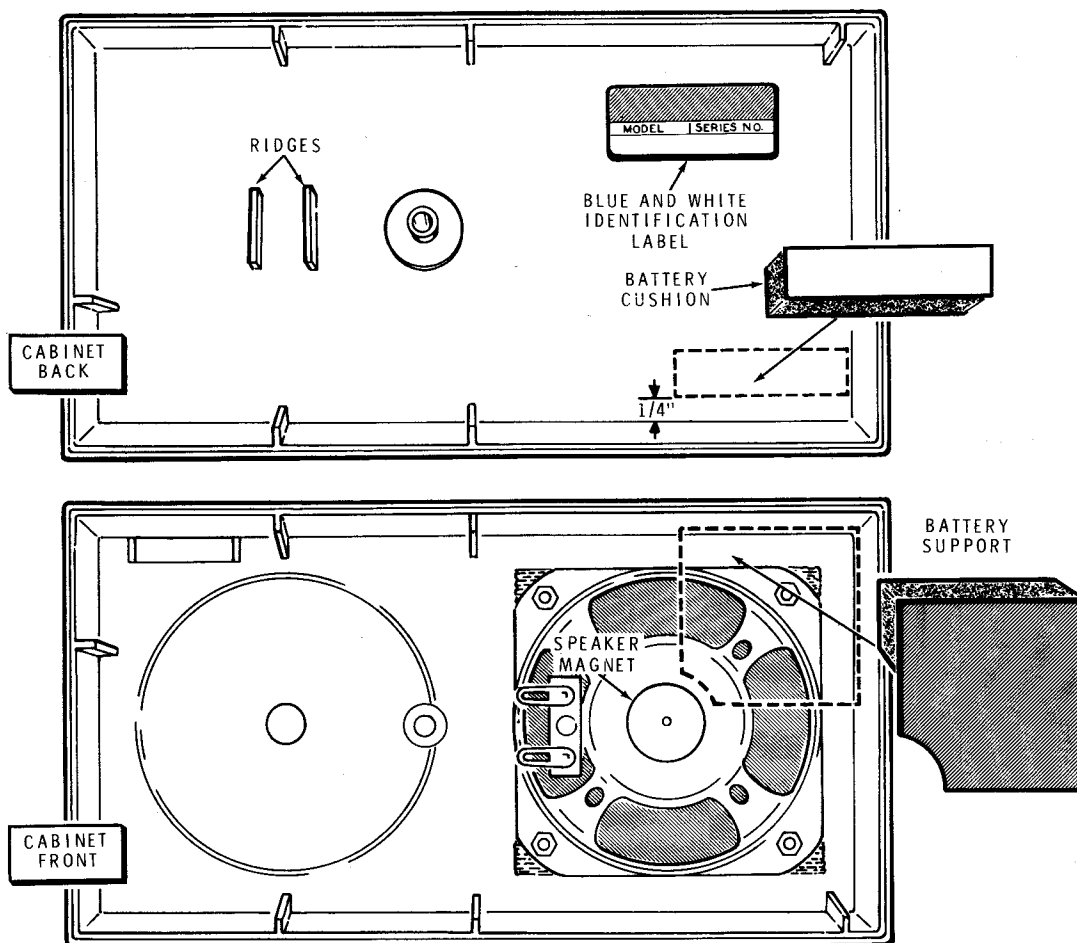


Figure 2



### PICTORIAL 8

Refer to Pictorial 8 for the following steps.

- ( ) Position the cabinet front and the cabinet back together on your work surface with their open side up. Be sure the two ridges inside the cabinet back are positioned to the left side as shown in the Pictorial.
- ( ) Carefully peel away the backing paper from the blue and white identification label and press the label onto the inside surface of the cabinet back. Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.

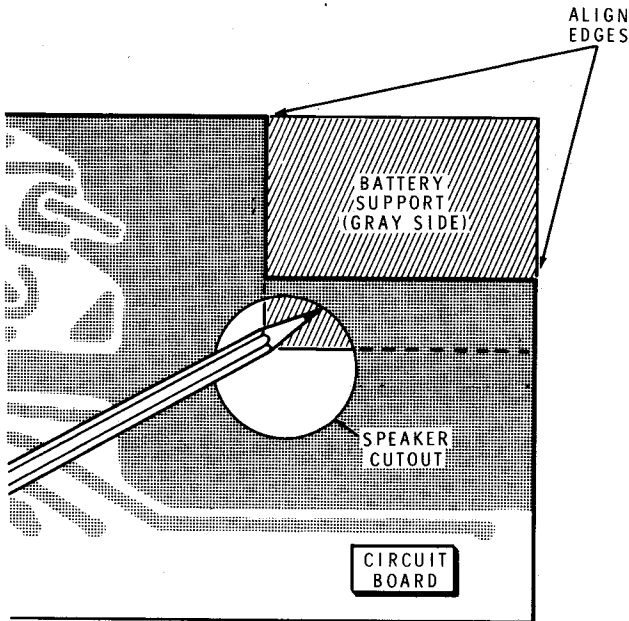
**NOTE:** Be sure the cabinet front and cabinet back are positioned exactly as shown in the Pictorial while you perform the following steps.

- ( ) Mount one battery cushion into the lower right-hand corner of the cabinet back. To do this, first peel away the protective paper from one side of the cushion only. Then press the cushion, sticky side down, into position. Leave approximately 1/4" of space between the cushion and the long side of the cabinet back as shown in the Pictorial. **DO NOT REMOVE THE PROTECTIVE PAPER FROM THE EXPOSED SIDE OF THIS CUSHION.**

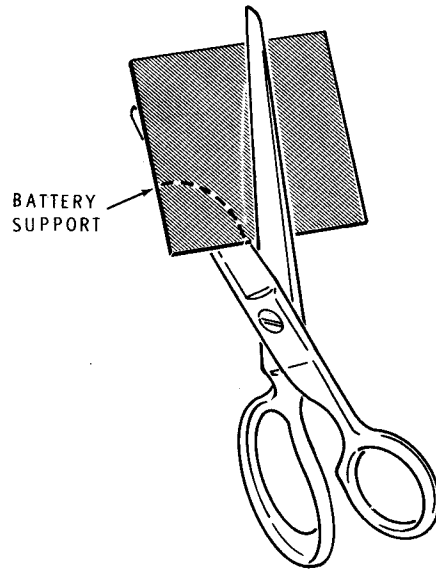


NOTE: You will use part of the circuit board as a pattern to mark the battery support in the following step.

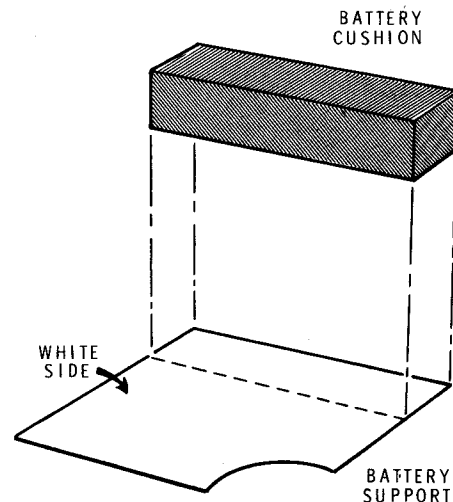
- ( ) Refer to Detail 8A and position the battery support with its gray side against the lettered side of the circuit board as shown. Be sure the two outside edges of the battery support are aligned with the edges of the circuit board. Then, while you hold the battery support in position, use a pencil to mark the area of the battery support that shows through the speaker cutout hole.



Detail 8A



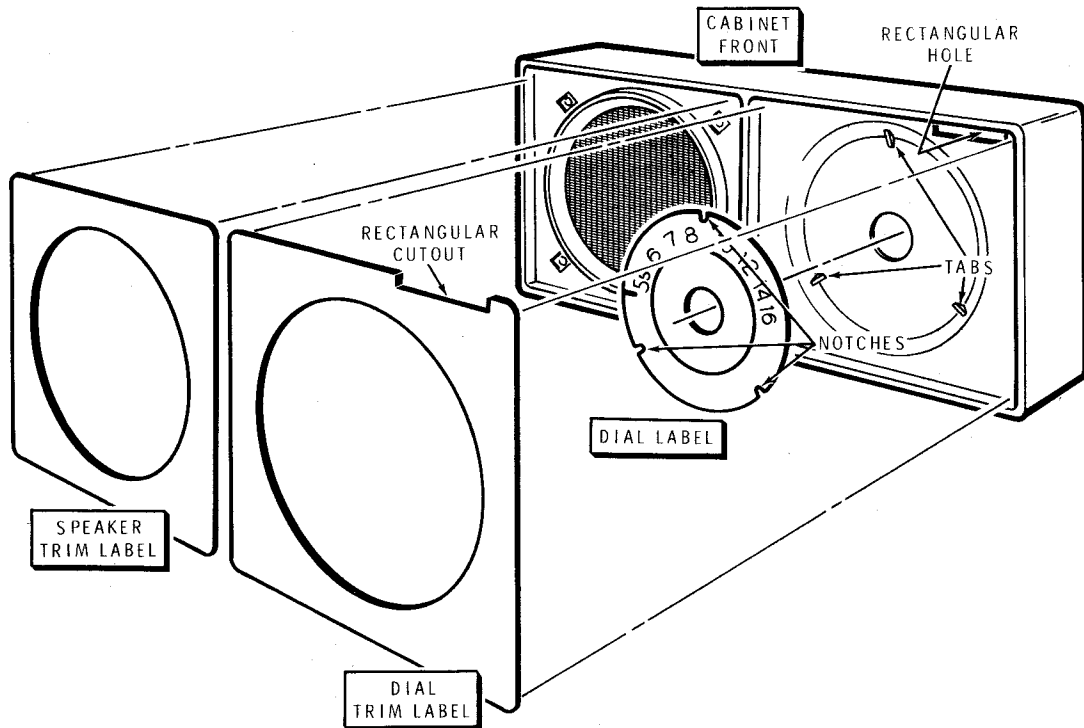
Detail 8B



Detail 8C

- ( ) Refer to Detail 8B and use a pair of scissors to cut away the small area marked in the previous step.
- ( ) Refer to Detail 8C and mount the remaining battery cushion to the white side of the battery support. To do this, first peel away the protective paper from one side of the cushion only. Then press the cushion, sticky side down, into position.

- ( ) Refer to Pictorial 8 and position the battery support with its gray side up and its cut away corner toward the speaker magnet. Peel away the protective paper from the exposed side of the attached battery cushion. Then firmly press the battery support with its attached battery cushion into the top right-hand corner of the cabinet front as shown. When pressed into position, the sticky side of the battery cushion will attach itself to the cabinet front and/or the rim of the speaker.



PICTORIAL 9

Refer to Pictorial 9 for the following steps.

**NOTE:** In the following steps you will install three labels on the face of the cabinet front. In each case, peel away the protective paper from the back of the label and firmly press the label into the position called for.

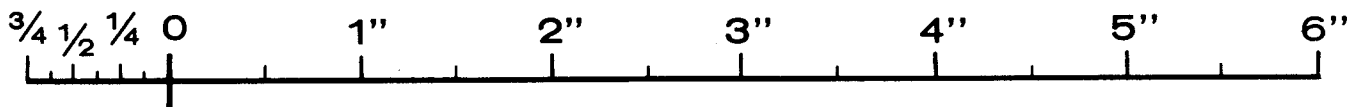
- ( ) Install the dial label with the numbers up as shown in the Pictorial. Align the three label notches with the three tabs as shown.
- ( ) Install the dial trim label. Be sure to position the rectangular cutout in the label over the rectangular hole in the cabinet.
- ( ) Install the speaker trim label. This label is symmetrical and may be installed in any direction around the speaker grille.

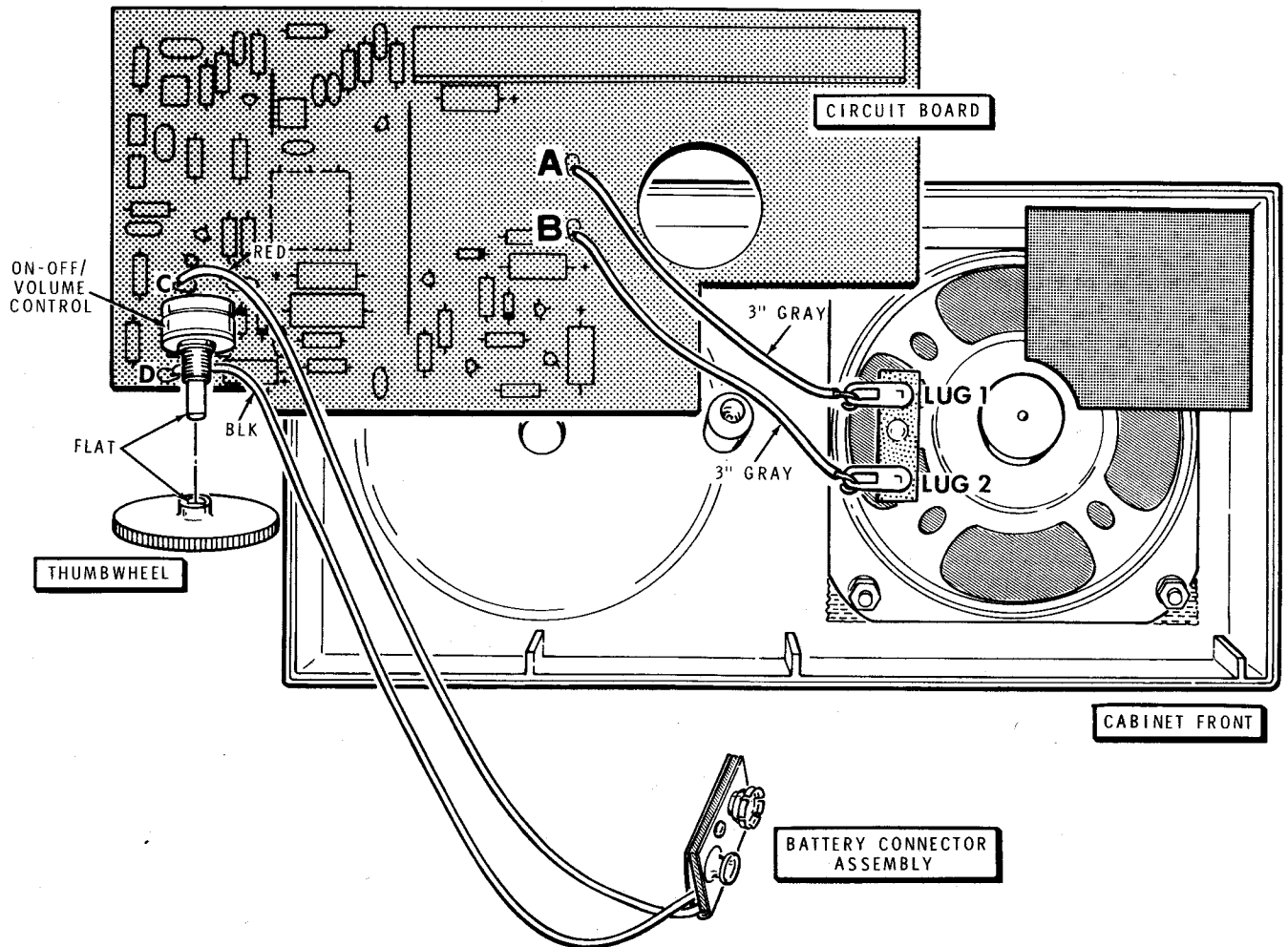
## BATTERY CONNECTOR AND SPEAKER WIRING

Refer to Pictorial 10 for the following steps.

**NOTE:** You will connect four wires to the circuit board in the following steps. In each case, insert the wire end through the circuit board at the lettered hole called for in the step. Then solder the wire end to the foil side of the circuit board and cut off any excess wire length.

- ( ) Solder the red wire from the battery connector assembly to circuit board hole C.
- ( ) Solder the black wire from the battery connector assembly to circuit board hole D.
- ( ) Cut two 3" lengths of gray wire. Then remove 1/4" of insulation from both ends off these two wires.





PICTORIAL 10

- ( ) Solder one end of either 3" gray wire to circuit board hole A. The other end of this wire will be connected later.
- ( ) Solder one end of the remaining 3" gray wire to circuit board hole B. The other end of this wire will be connected later.
- ( ) Position the circuit board on top of the cabinet front as shown in the Pictorial.
- ( ) Solder the free end of the gray wire coming from circuit board hole A to lug 1 of the speaker.
- ( ) Solder the free end of the gray wire coming from circuit board hole B to lug 2 of the speaker.

**NOTE:** In the following step you will install the thumbwheel onto the shaft of the On-Off/Volume control. Use one of your fingers to support the back of this control as you perform the step.

**NOTE:** You will connect the free ends of the two gray wires coming from the circuit board to the two speaker lugs in the following steps. In each case, solder the wire end to the speaker lug and cut off any excess wire length.

- ( ) Install the thumbwheel onto the shaft of the On-Off/Volume control. Align the flat inside the thumbwheel with the flat on the control shaft. Then while supporting the back of the control, push the thumbwheel onto the shaft as far as it will go.



## VISUAL CHECKOUT

Perform the following steps to make sure your Radio will not be damaged as the result of a wiring error or the incorrect installation of parts. One or more transistors, for example, could be damaged by a solder bridge or by the incorrect installation of a part.

( ) Examine all of the mounted parts on the circuit board to be sure they are properly mounted and connected. Be sure the transistors and diodes are in their proper locations and the banded ends of the diodes are positioned properly.

( ) Examine the circuit board foil for improperly soldered connections or connections that you may have missed and not soldered. Also check for solder bridged across two or more circuit board foils, which would cause a short circuit. Pay special attention to the foil areas around the IF transformer (T1) and the oscillator coil (L2).

( ) Check for bits of solder, wire ends, or other foreign matter which may be lodged between the mounted parts or foils.

( ) Be sure that the correct color wire is properly soldered to the point called for in the steps.

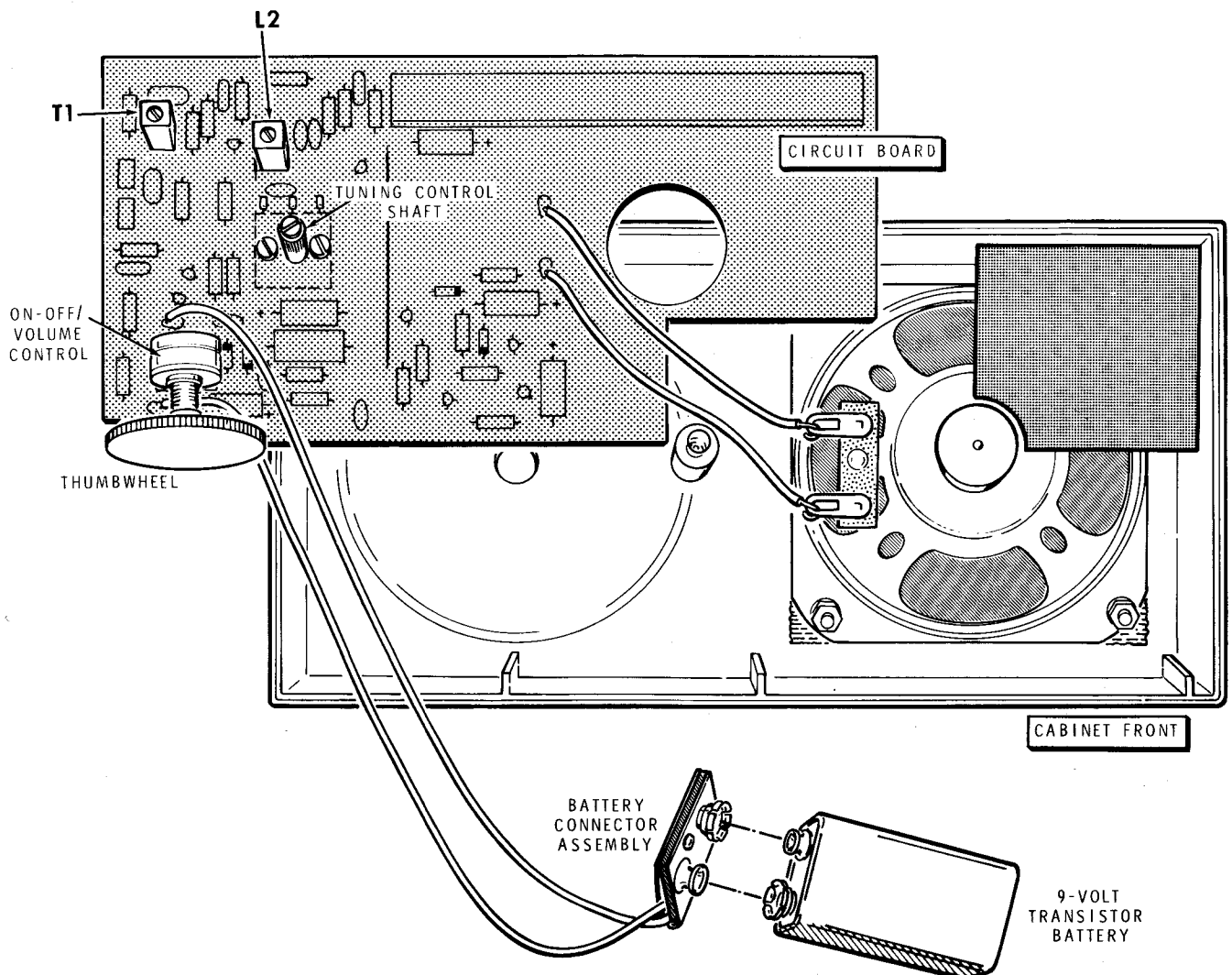


Figure 3

## INITIAL ADJUSTMENTS

The Radio performance depends greatly on how carefully and accurately you perform the following steps. These steps are designed to require only a minimum of equipment to adjust your Radio to obtain the best possible reception.

If at any time you do not obtain the results called for in a step, refer to the "In Case of Difficulty" section on Page 23 for the information on how to correct the problem.

Refer to Figure 3 for the following steps.

- ( ) Position the circuit board and cabinet front together as shown.
- ( ) Turn the thumbwheel of the ON-OFF/VOLUME control fully counterclockwise until you hear it "click" to the off position.
- ( ) Turn the shaft of the TUNING control fully counterclockwise.

**IMPORTANT:** Information on the type of battery to be used with this Radio is located on Page 6 of this Manual.

- ( ) Connect a 9-volt transistor battery (not supplied with your kit) to the battery connector assembly.
- ( ) Turn on a source of electrical noise such as a fluorescent lamp or an electric shaver.
- ( ) Place the circuit board and cabinet front close to the electrical noise source.
- ( ) Turn the thumbwheel of the ON-OFF/VOLUME control clockwise to turn the Radio on. Then continue to turn the thumbwheel clockwise until you hear static at a comfortable listening level.

- ( ) Turn the shaft of the TUNING control slightly clockwise (no more than 1/8 turn) to a point where you do not hear a station.

NOTE: If a radio station is heard while you perform the following step, slowly turn the shaft of the TUNING control in either direction until the station is no longer heard.

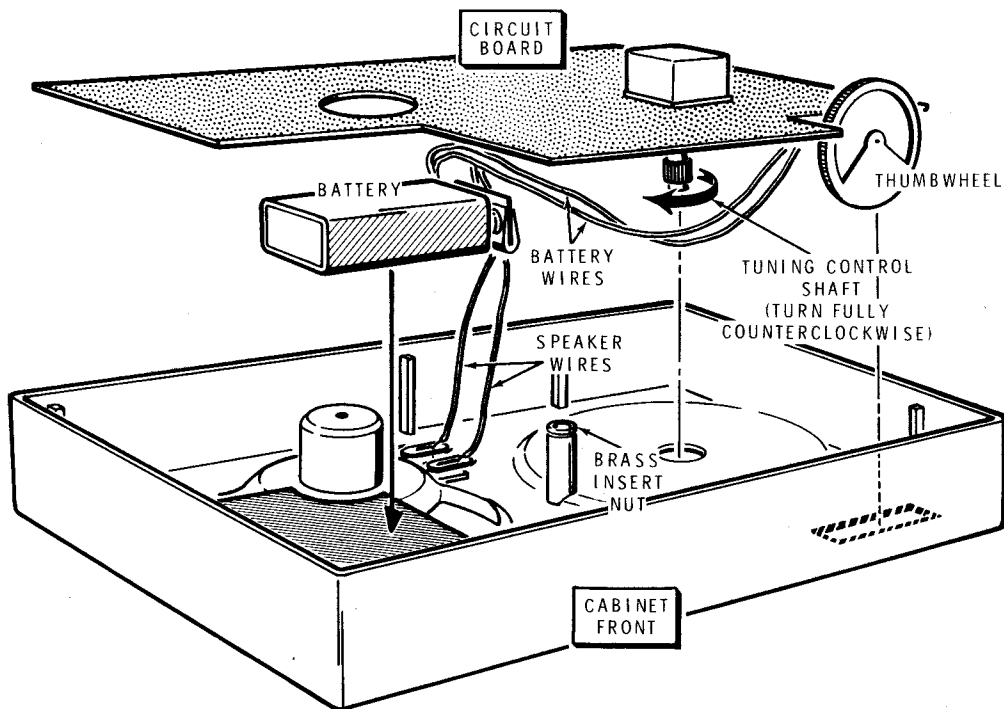
- ( ) Use a small screwdriver to adjust the red colored screw in the top of transformer L2. Turn the screw very slowly, and not more than one turn in either direction, until you hear the loudest static.
- ( ) Turn off the electrical noise source.
- ( ) Turn the shaft of the TUNING control fully counterclockwise.

NOTE: Transformer T1 has been preset at the factory and should require very little, if any, further adjustment. However, to insure that your Radio has the best possible reception of weak stations, perform the following steps.

- ( ) Slowly turn the shaft of the TUNING control clockwise, but not more than 1/4 turn, until you hear a weak station. If several stations are heard while performing this step, set the TUNING control to the station that produces the lowest volume.
- ( ) Use a small screwdriver to adjust the yellow colored screw in the top of transformer T1. Turn the screw very slowly, and not more than 1/4 turn in either direction, until you hear the highest volume.
- ( ) Turn the shaft of the TUNING control fully counterclockwise.
- ( ) Turn the thumbwheel of the ON-OFF/VOLUME control fully counterclockwise until you hear it "click" to the OFF position.

This completes the "Initial Adjustments." Proceed to the "Circuit Board and Dial Indicator Installation" section.

## CIRCUIT BOARD AND DIAL INDICATOR INSTALLATION



PICTORIAL 11

Refer to Pictorial 11 for the following steps.

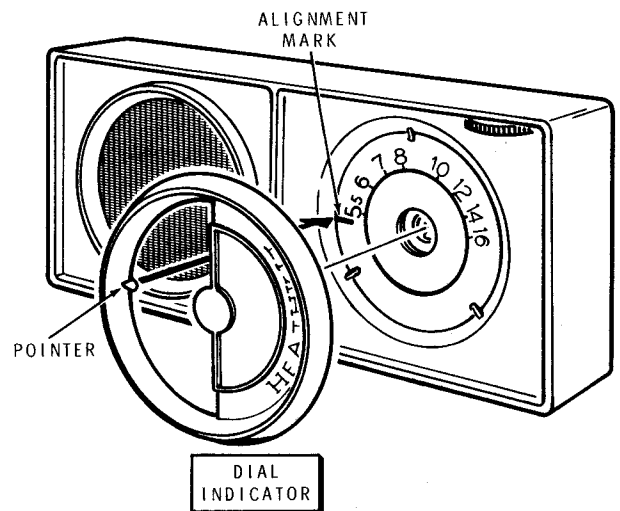
- ( ) Again, check to be sure that the tuning control shaft is turned fully counterclockwise as viewed from the end of the shaft.

**NOTE:** Be very careful not to pinch the two battery wires or the two speaker wires as you perform the following step. The exact position of these wires is not critical as long as they do not interfere with the operation of the thumbwheel or cross over the brass insert nut.

- ( ) Install the circuit board with its attached battery into the cabinet front as shown. Position the battery into the cut-out area of the circuit board so it will rest against the battery support when the circuit board is in place. Be sure that both the tuning control shaft and the thumbwheel clear through their respective openings.

Refer to Pictorial 12 for the following steps.

**NOTE:** Hold the circuit board and the cabinet front together as you install the dial indicator in the following step. Once installed, the dial indicator will hold the circuit board in place while you complete the adjustments.



PICTORIAL 12

- ( ) Position the dial indicator so that its pointer is directly over the dial alignment mark on the cabinet. Then, while supporting the back of the circuit board with one hand, press the dial indicator as far as possible onto the tuning control shaft.



- ( ) Turn the dial indicator to be sure its pointer indicates all the numbered positions on the dial from 5.5 to 16.

This completes the "Circuit Board and Dial Indicator Installation." Proceed to "Final Adjustments."

## FINAL ADJUSTMENTS

**NOTE:** Do not touch any of the foils on the exposed side of the circuit board as you perform the following steps. Although not dangerous, contact with your body may cause distortion or a temporary loss of sound.

- ( ) Turn your Radio on and tune in a station at the high frequency end of the dial (near 14). Adjust the volume to a comfortable listening level.

the DIAL INDICATOR so that it points just above the 14 on the dial.

- ( ) Set the DIAL INDICATOR so that it points to the correct frequency on the dial for the station you are tuned to. The station may temporarily fade out as you perform this step.

**NOTE:** Be very careful not to move the DIAL INDICATOR as you perform the following step.

### NOTES:

1. You will need to know the exact frequency of the station that you are tuned to in order to complete the following adjustment. If you do not know the exact frequency, refer to your local newspaper. Newspapers often list both the call letters and frequencies of stations within their area, with the frequencies given in kilohertz (kHz). At this time, however, the station you are tuned to may not appear at the correct place on your dial. For example, a radio station that is operating on 1400 kHz may not appear at the 14 on your dial as it should, but instead may appear anywhere between the 12 and the 16. In the following steps, you will adjust your Radio so the station will appear at the correct place on the dial.
2. If the correct frequency of the station you are tuned to is between the numbers printed on the dial, it will be necessary to estimate the setting of the dial indicator in the following step. For example, if the frequency of the station is 1420 kHz, you should set

- ( ) Refer to Figure 4 and use a small screwdriver to adjust the oscillator trimmer capacitor, C7, until you hear the same station you previously tuned to, as clearly as possible and at maximum volume.

- ( ) Reset the DIAL INDICATOR to tune in a weak station between 1000 and 1200 kHz (10 and 12) or, if there is no weak station between these frequencies, a weak station as close to 1000 kHz (10) as possible.

**NOTE:** Be very careful not to move the DIAL INDICATOR as you perform the following step.

- ( ) Refer to Figure 4 and use a small screwdriver to adjust the antenna trimmer capacitor, C1, until you hear the station as clearly as possible and at maximum volume.

- ( ) Turn the Radio off.

This completes the "Final Adjustments." Proceed to the "Final Assembly" section.

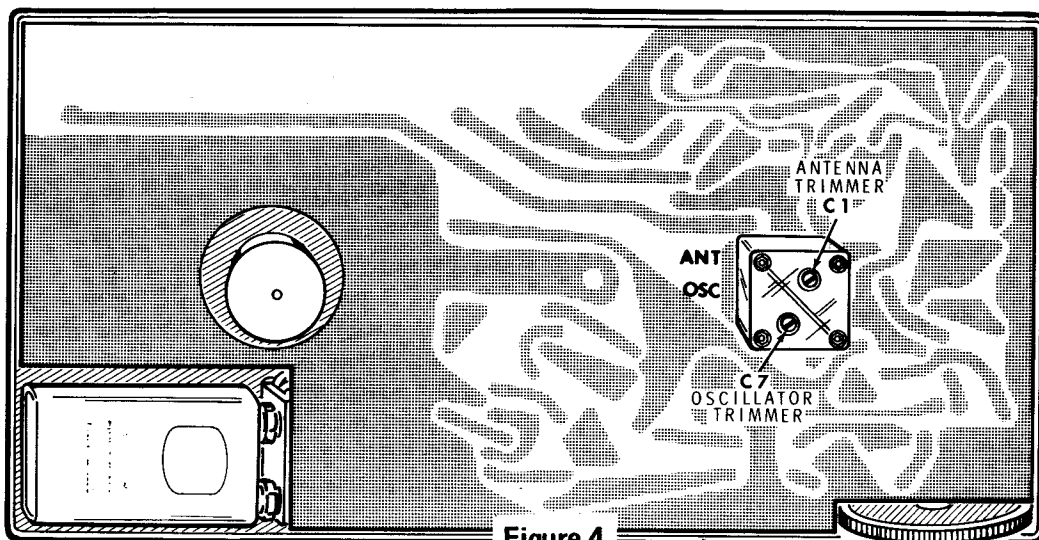
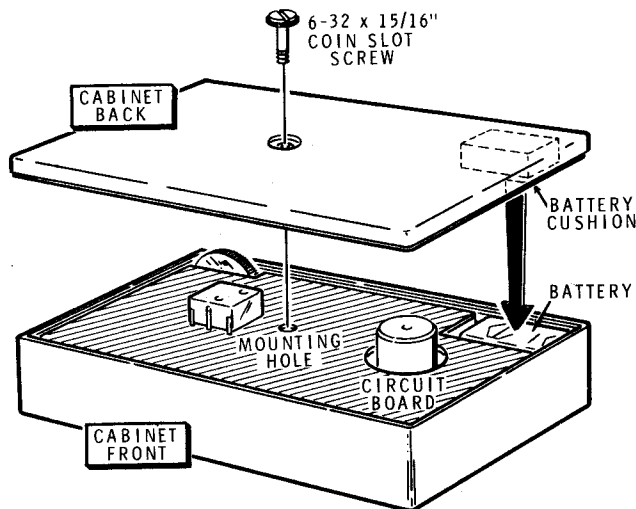


Figure 4

## FINAL ASSEMBLY



PICTORIAL 13

Refer to PICTORIAL 13 for the following steps.

- ( ) Check to be sure that the circuit board and the battery are correctly positioned and that no wires are located directly under the mounting hole in the circuit board.

NOTE: Most small coins, such as a dime, penny, or quarter, can be used to install or remove the 6-32 x 15/16" screw used in the following step.

- ( ) Position the cabinet back so its battery cushion is located over the battery in the circuit board cutout. Then mount the cabinet back with the 6-32 x 15/16" coin-slot screw. Press the back into position with your fingers as you tighten the screw.

## OPERATION

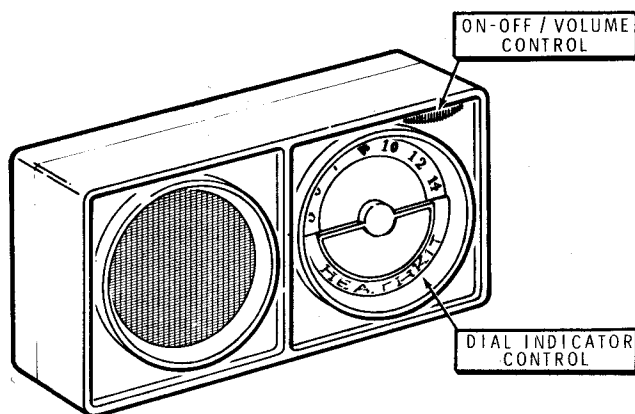


Figure 5

Refer to Figure 5 for the location of the controls.

### HOW TO OPERATE YOUR RADIO

1. Turn the ON-OFF/VOLUME control on and adjust the volume to the desired level.
2. Turn the DIAL INDICATOR control to select the desired AM station; then readjust the volume as necessary.

Your Radio has a ferrite rod antenna that has a directional receiving pattern. Therefore, the reception of a weak or distant station may be improved by rotating the Radio to a slightly different position. Figure 6 (fold-out from Page 23) shows the relative position of the Radio and its antenna to the station transmitter for the best reception of a weak or distant station.

Reception in automobiles and trains is possible in most locations. However, it may be necessary to place the Radio near the window because the metal body of the vehicle will tend to shield out all but the strongest radio signals.

### HOW TO CARE FOR YOUR RADIO CABINET

The cabinet of your Radio can be cleaned with a damp cloth and mild detergent when necessary. DO NOT use solvents, cleaning fluids, or abrasive compounds to clean the cabinet.

### BATTERY CARE

Be sure to turn your Radio off whenever it is not being used, in order to prolong the life of the battery. In addition, a weak or exhausted battery should be replaced immediately. A weak battery will not only cause the Radio to have a "tinny" sound and low volume, but may leak chemical compounds that cause corrosion. DO NOT STORE THE RADIO FOR EXTENDED PERIODS OF TIME WITHOUT REMOVING THE BATTERY.

## IN CASE OF DIFFICULTY

If your kit does not work correctly, the following information will help you locate the problem yourself. And if you find that you cannot locate the difficulty, the Customer Service organization at Heath Company is always ready to assist you. See the inside rear cover of the Manual for details on how to get this assistance.

This section of your Manual is divided into several parts. One part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Radio is assembled.

Another part, titled "Point-To-Point Test," will help you service your Radio if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Radio has been in use for some time. The "Point-To-Point Test" section contains a chart to help isolate an area of difficulty, along with several possible solutions to remedy the difficulty.

Before you start any troubleshooting procedure, try to narrow the problem down to a specific area by trying the various controls of your Radio.

**NOTE:** Refer to the "Circuit Board X-Ray View" on Page 28 for the physical location of parts mounted on the circuit board.

### GENERAL TROUBLESHOOTING INFORMATION

1. Repeat the steps under "Visual Checkout" on Page 18. (These steps are very important.) In addition, you might mark each part in color pencil on the Pictorial as it is checked. Someone who is not familiar with the Radio is more likely to notice something that you, as the builder, consistently overlook.
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 often eliminate a difficulty by simply reheating all the connections to make sure they are well soldered. If you have any doubts of what constitutes a "good" solder connection, read the "Soldering" section of your "Kit Builders Guide."
3. Check the battery. It is often possible for even a "new" battery to have deteriorated or become defective. If possible, check the battery in another radio or device that you know is in operating condition.

4. Check the values of the parts. Be sure in each step that the proper part has been mounted into the circuit as shown in the Pictorial diagrams. It would be easy, for example, to install a 4700  $\Omega$  (yellow-violet-red) resistor where a 470  $\Omega$  (yellow-violet-brown) resistor should have been installed.
5. Pay particular attention to the transistors and diodes. Be sure that the correct type of transistor is mounted at each location and that the emitter (E), base (B), and collector (C) leads are positioned as called for in the step. Be sure each diode is mounted with its banded end as shown in the Pictorial diagram.
6. A review of the "Circuit Description" on Page 27 may also help you determine where the trouble is located.

If you are unable to locate the trouble by following the above checks, and a voltmeter is available, check your Radio's voltages against the voltages shown on the "Schematic" (fold-out from Page 29) and the "Voltage Chart" on (fold-out from Page 26). Be sure to read the "Test Equipment Notes" in this section before you make any measurements with a voltmeter.

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

### TEST EQUIPMENT NOTES

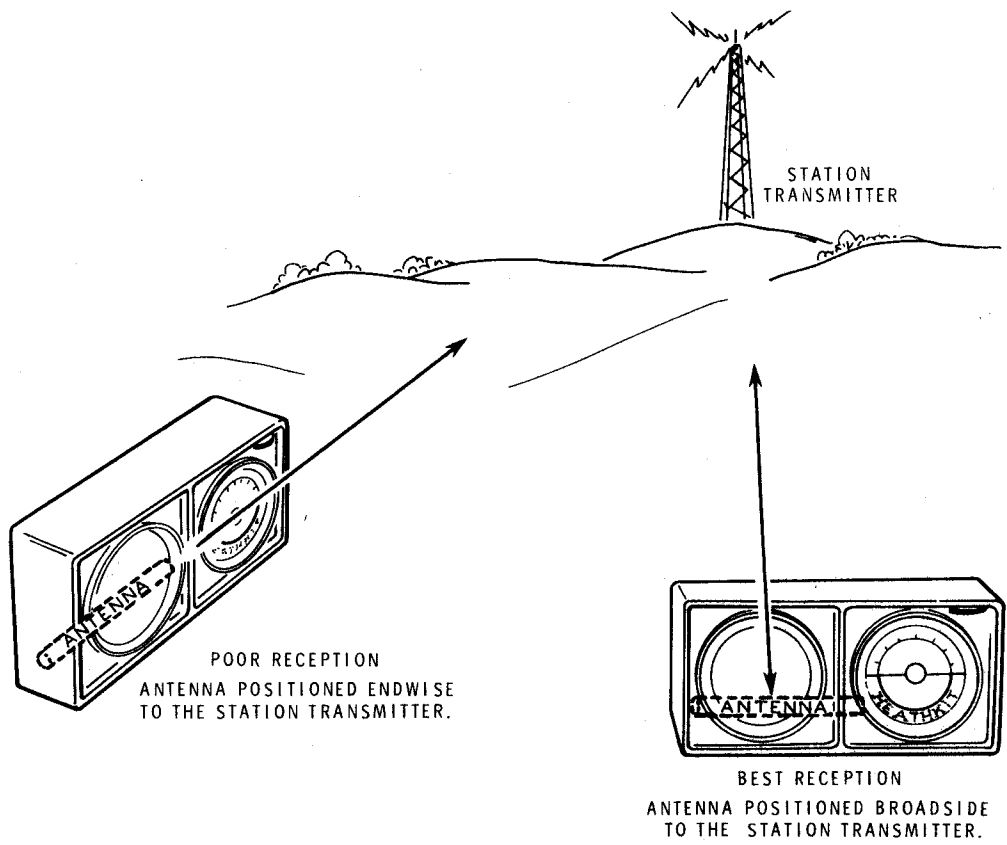
**NOTE:** If you do not have test equipment, proceed to "Point-to-Point Test."

#### Voltmeter

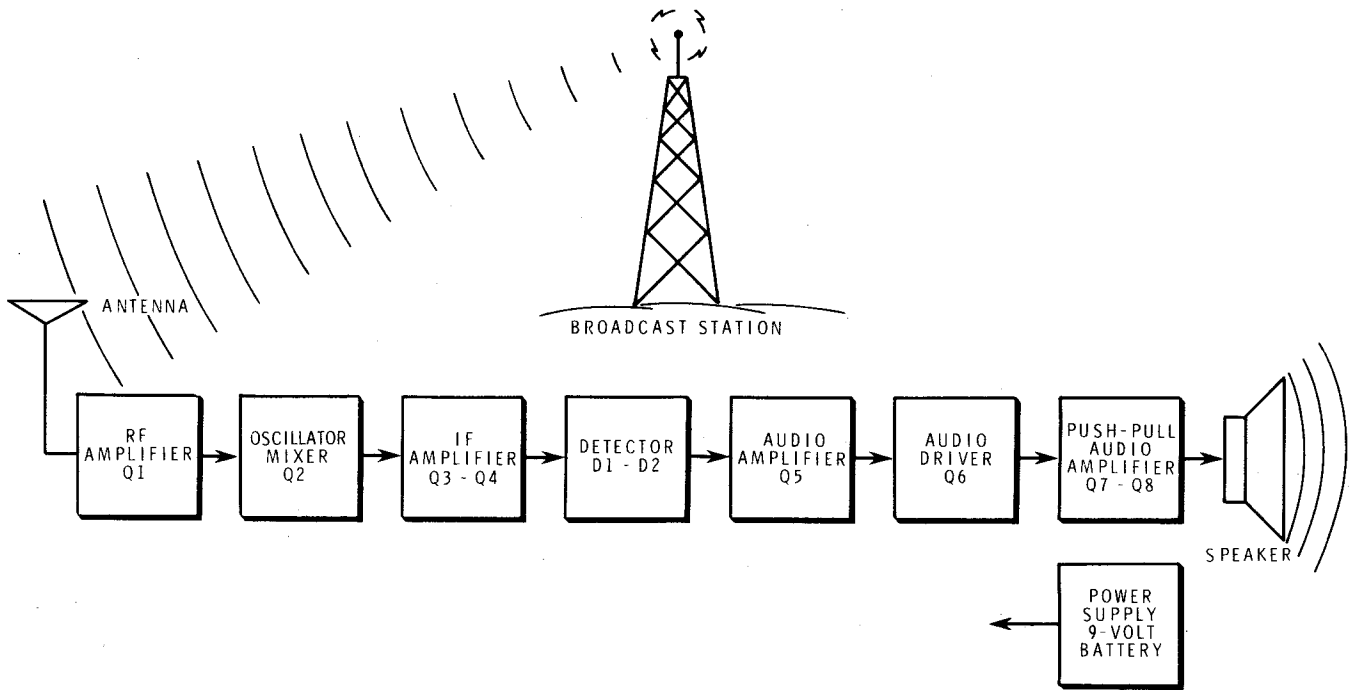
You may want to use a voltmeter to check the voltages in your Radio against the voltages shown on the "Schematic" (fold-out from Page 29). If so, be sure to observe the following precautions.

1. Be cautious when you test the transistor circuits. Although transistors have almost unlimited life when used properly, they are much more vulnerable to damage from excessive voltage or current than are many other devices.





**Figure 6**



**BLOCK DIAGRAM**

2. Be sure you do not short any foils to ground when making voltage measurements. If the probe should slip, for example, and short out a bias supply point, it can damage one or more of the transistors or diodes.

### Ohmmeter

Although a transistor checker provides a more accurate check of transistors, you can use an ohmmeter to determine the general condition of any transistor in this kit. The ohmmeter you use must have at least 1 volt DC at its probes in order to exceed the threshold of the diode junctions inside the transistors. Most vacuum tube voltmeters meet this requirement. To check a transistor with an ohmmeter, proceed as follows:

1. Remove the transistor from the circuit.
2. Set your ohmmeter on the RX1000 range.

**NOTE:** If you have any doubt about which lead is the emitter (E), base (B), or collector (C), refer to the "Transistor-Diode Identification Chart" on the fold-out from Page 29 before continuing with the next two steps.

3. Connect one of the ohmmeter test leads to the base (B) of the transistor. Touch the other ohmmeter lead to the emitter (E) and then to the collector (C). Both readings should be the same, but may be either high or low. If one reading is high and the other low, replace the transistor with a new one of the same type.
4. Repeat step 3 with the ohmmeter test leads reversed.

**NOTE:** In the unusual case when the readings are all low, or all high, no matter which ohmmeter lead is connected to the base, replace the transistor.

5. Connect one of the ohmmeter test leads to the emitter (E) of the transistor. Touch the other ohmmeter lead to the collector (C). The reading should be high. If it is not, replace the transistor.
6. Repeat step 5 with the meter leads reversed. The reading should be high again. If it is not, replace the transistor.

### POINT-TO-POINT TEST

The "Point-To-Point Test" is easily made without the use of instruments, and will help to locate the problem area. Use this test when you get no sound or when there is noise but no station is heard.

Refer to Figure 7 for the following:

Touch the indicated test points with the blade of a screwdriver. Hold the screwdriver so that your finger touches the blade. **TOUCH ONLY THE POINTS INDICATED.** Do not touch any other part of the Radio, or any other object, with your other hand while you perform these checks.

As each Test Point (TP) is touched, a certain sound will be heard in a properly operating circuit. If you do not hear the proper sound, the trouble probably lies between the test point you are touching, and the one you last touched which gave the proper sound. Refer to the following "Point-To-Point Test Chart" and to Figure 7 for making the tests.

### Point-To-Point Test Chart

**NOTE:** The following tests should be made with the Radio turned on, the volume turned as high as possible, and the pointer on the dial indicator at 6.

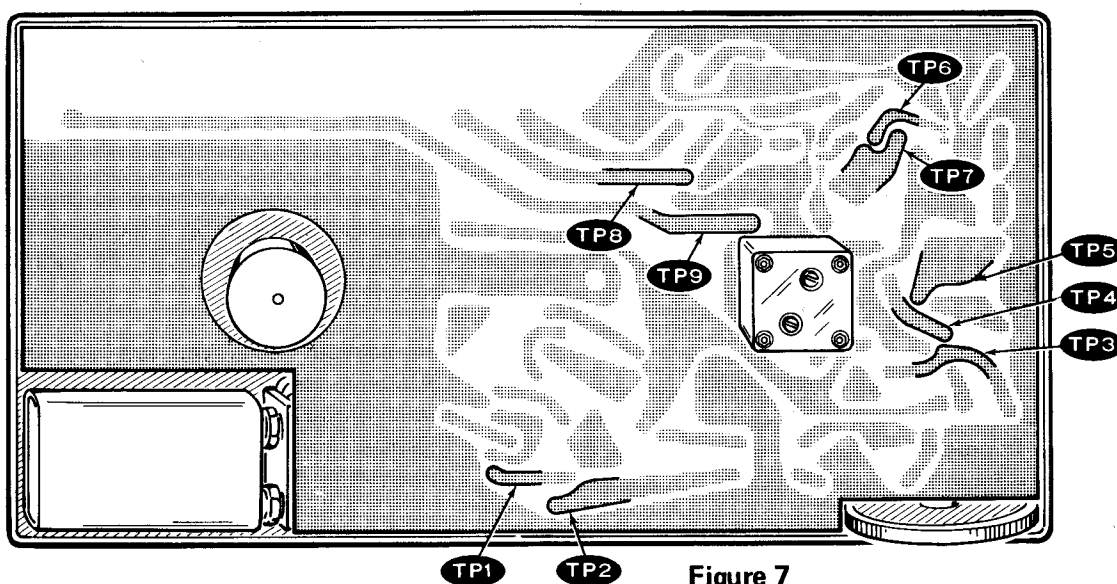
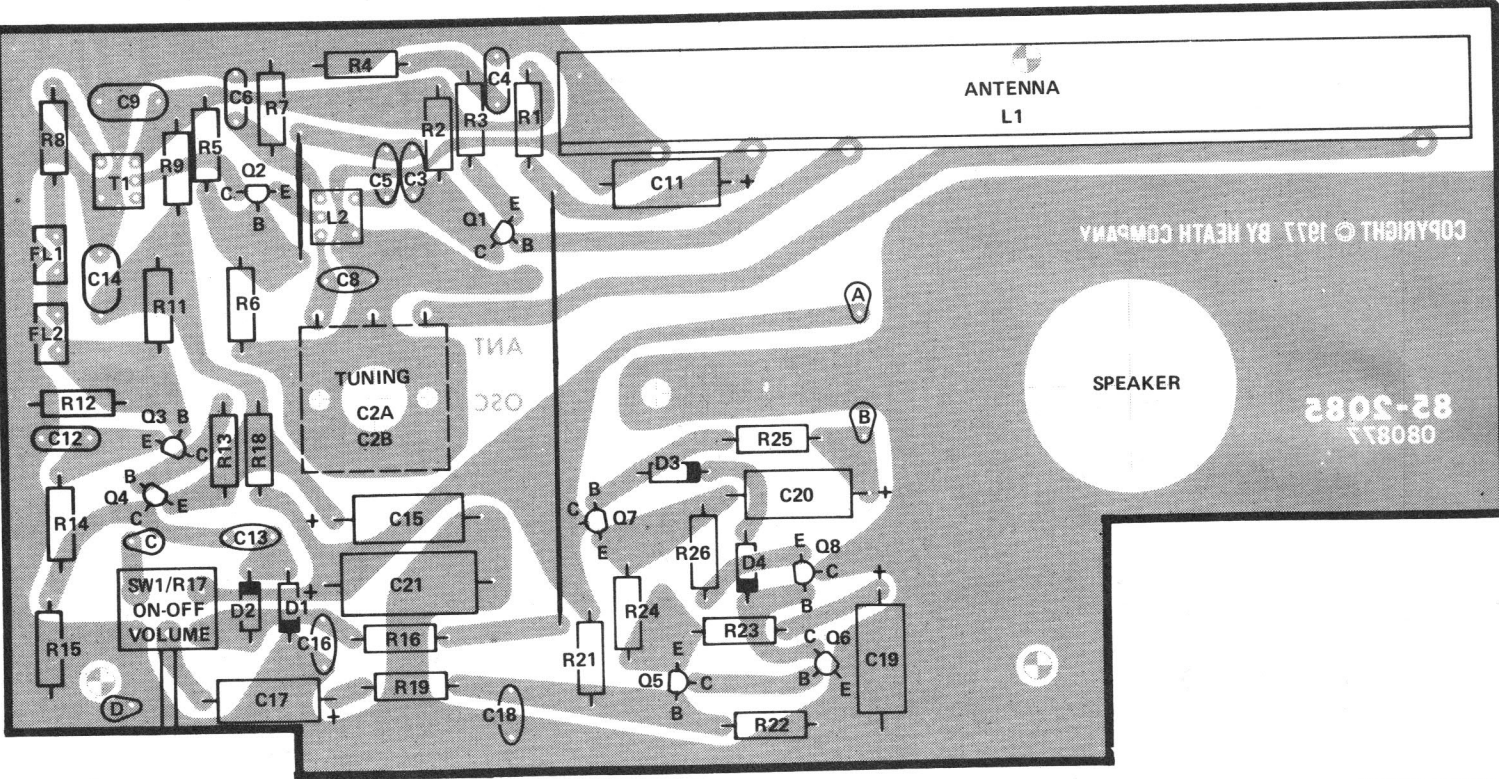


Figure 7

| TOUCH TEST POINT | PROPER SOUND   | POSSIBLE CAUSE OF TROUBLE (If proper sound is not heard)   |
|------------------|--|--|
| TP1              | Faint static.  | <ol style="list-style-type: none"> <li>1. Transistors Q7 and Q8 interchanged or improperly installed.</li> <li>2. Transistors Q5 and Q6 interchanged or improperly installed.</li> <li>3. Resistors R25 and R26, or capacitor C20 interchanged with other parts.</li> <li>4. Diodes D3 or D4 incorrectly installed.</li> </ol> |
| TP2              | Moderate static.   | <ol style="list-style-type: none"> <li>1. Transistor Q5 incorrectly installed.</li> <li>2. Resistors R19, R21, R22, R23, or capacitors C17 or C19 interchanged with other parts.</li> </ol>  |
| TP3              | Moderate click when touched.                             | <ol style="list-style-type: none"> <li>1. Diodes D1 or D2 incorrectly installed.</li> <li>2. Capacitors C13 or C16 interchanged with other parts.</li> </ol>   |
| TP4              | Moderate click when touched followed by moderate static. | <ol style="list-style-type: none"> <li>1. Transistor Q4 incorrectly installed.</li> <li>2. Resistors R13, R14, or R15 interchanged with other parts.</li> </ol>  |
| TP5              | Loud static or buzz.                                     | <ol style="list-style-type: none"> <li>1. Transistor Q3 incorrectly installed.</li> <li>2. Resistors R11, R12, R13, R14 or capacitors C12, C14, or C15 interchanged with other parts.</li> </ol>   |
| TP6              | Moderate click when touched followed by faint static.    | <ol style="list-style-type: none"> <li>1. Transformer T1, resistor R8, or filters FL1 or FL2 incorrectly installed.</li> </ol>   |
| TP7              | Loud static or buzz.                                     | <ol style="list-style-type: none"> <li>1. Transistor Q2, resistor R7, R9, or capacitors C5, C6, or C9 incorrectly installed or interchanged with other parts.</li> </ol>   |
| TP8              | Loud static or buzz.                                     | <ol style="list-style-type: none"> <li>1. Transistor Q1, resistors R2, R3, R4, R5, R6, or capacitors C2A and C2B, C3, or C11 incorrectly installed or interchanged with other parts.</li> </ol>  |
| TP9              | Loud static or buzz.                                     | <ol style="list-style-type: none"> <li>1. L1 (antenna) either open or shorted.</li> <li>2. Capacitors C1 or C2A shorted.</li> </ol>  |



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CIRCUIT BOARD X-RAY VIEW  
(Viewed from lettered side)

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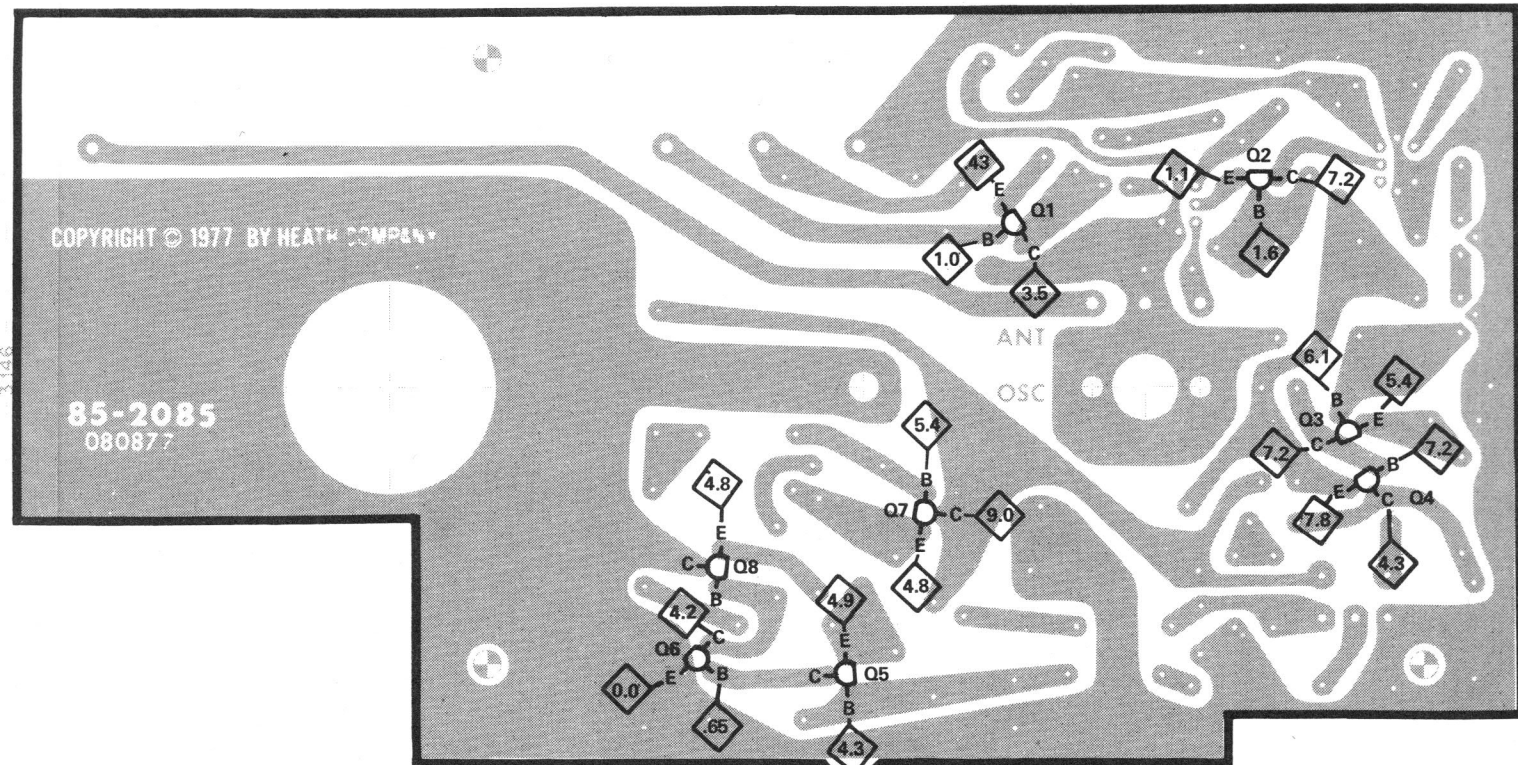
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## CIRCUIT BOARD VOLTAGE CHART



NOTE:  INDICATES A POSITIVE DC VOLTAGE MEASUREMENT TAKEN UNDER A NO SIGNAL CONDITION (NO BROADCAST STATION BEING RECEIVED). ALL MEASUREMENTS TAKEN WITH AN 11 MEGOHM INPUT VOLTMETER FROM THE POINT INDICATED TO CIRCUIT BOARD GROUND. VOLTAGES MAY VARY AS MUCH AS  $\pm 20\%$ .

## SPECIFICATIONS

|  |  |
|--|--|
| Tuning Range . . . . .                 | 535 – 1605 kHz.  |
| Intermediate Frequency (IF) . . . . .  | 455 kHz.   |
| Sensitivity . . . . .                  | 350 microvolts per meter for 20 dB signal-to-noise ratio or<br>150 microvolts per meter for 10 dB signal-to-noise ratio.   |
| Audio Output Power . . . . .           | 0.2 watt (200 milliwatts).   |
| Speaker . . . . .                      | 3-1/2" round, .5 oz. permanent magnet, 16 $\Omega$ voice coil.   |
| Power Requirements . . . . .           | 9-volt transistor battery, NEDA type 1604.   |
| Current Drain . . . . .                | Approximately 9.0 milliamperes with Radio turned on and<br>volume set to minimum level.<br><br>Approximately 15.0 milliamperes with Radio turned on<br>and volume set to normal level. |
| Dimensions . . . . .                   | Overall, 4" high x 8" wide x 2" deep.  |
| Net Weight (without battery) . . . . . | 1 lb.  |

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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

**NOTE:** The average kit builder may not understand the following information. It is intended for persons with an electronics background.

Refer to the Block Diagram (fold-out from Page 24) and the Schematic (fold-out from Page 29) while you read this "Circuit Description."

Your AM Portable Radio is an 8-transistor superheterodyne receiver which tunes to standard AM (amplitude modulated) broadcast stations from 535 kHz to 1605 kHz. The Radio consists of RF amplifier Q1, oscillator-mixer Q2, IF amplifiers Q3 and Q4, detector D1 and D2, audio amplifier Q5, audio driver Q6, and push-pull audio output amplifier Q7 and Q8.

### Tuner-RF Amplifier

The radio frequency (RF) signals transmitted by broadcast stations are picked up by antenna L1. The desired signal is selected by a tuned circuit consisting of the primary winding of the antenna and capacitors C1 and C2A. This selected signal is coupled through the secondary winding of L1 to the base of RF amplifier transistor Q1. Bias voltage is supplied to transistor Q1 through resistor R1 and the AGC (Automatic Gain Control) circuit. Transistor Q1 amplifies the selected RF signal before it is coupled through capacitor C3 to the base of oscillator-mixer transistor Q2.

### Oscillator-Mixer

The selected RF signal is applied to oscillator-mixer transistor Q2 where it is mixed with the oscillator signal. Coil L2 and capacitors C2B, C7, and C8 determine the frequency of the oscillator signal. Transistor Q2, because of the mixing of the two signals, produces several different frequencies at its collector output. Among these several different frequencies is an IF (Intermediate Frequency) of 455 kHz. Transformer T1 contains a tuned circuit that passes only this IF frequency on to filters FL1 and FL2.

### IF Amplifiers

Filters FL1 and FL2 serve to get rid of any frequencies other than the IF. Therefore, only a pure IF of 455 kHz is applied to the base of IF amplifier transistor Q3. Bias voltage for transistor Q3 is developed across the voltage divider network of resistors R11 and R12. Transistor Q3 amplifies the IF signal. From transistor Q3 the IF signal is applied to the base of transistor Q4 where it is once again amplified before being coupled through capacitor C13 to the detector circuit of D1 and D2.

### Detector

Detector diode D2 converts the IF signal into a DC voltage that varies in amplitude at an audio frequency rate. During this conversion, D1 gets rid of the unwanted portion of the IF signal. Capacitor C16 filters any remaining unwanted signals from the audio line. Resistor R16 and capacitor C11 filter out the audio and leave a DC voltage that is proportional to the strength of the original RF signal voltage picked up by the antenna. This DC voltage potential is used for AGC as explained in the following paragraph.

### AGC (Automatic Gain Control)

The AGC voltage is applied through resistor R16 and the secondary of antenna L1 to the base of transistor Q1. Here, the AGC voltage helps control the bias of Q1. The overall effect of the AGC system is to control the gain of Q1 to prevent excessively large signals picked up by the antenna from being amplified to the point of distortion.

### Volume Control-Audio Amplifier-Audio Driver

The audio signal from detector diode D2 is applied to one end of volume control resistor R17. Here, some portion of the audio signal (as determined by the setting of the Volume control) is picked from R17 by the variable contact of the control. This audio signal is then coupled through capacitor C17 and applied through resistor R19 to the base of audio amplifier transistor Q5. The audio signal is amplified by transistor Q5 and then applied directly to the base of audio driver transistor Q6. Transistor Q6 again amplifies the audio signal before it is coupled directly to the base of transistor Q8 and through diodes D4 and D3 to the base of transistor Q7.

### Push-Pull Amplifier

Transistors Q7 and Q8 make up a push-pull amplifier that provides the audio signal with the necessary current amplification to drive the speaker. A negative-going audio signal applied to the base of transistor Q8 causes the transistor to conduct, charging capacitor C20 through the speaker voice coil. When the audio signal goes positive, Q8 is cut off and Q7 conducts. The conduction of transistor Q7 causes capacitor C20 to discharge back through the speaker coil. This charging and discharging of capacitor C20 through the speaker voice coil produces the sound from the speaker.

## CIRCUIT BOARD X-RAY VIEW

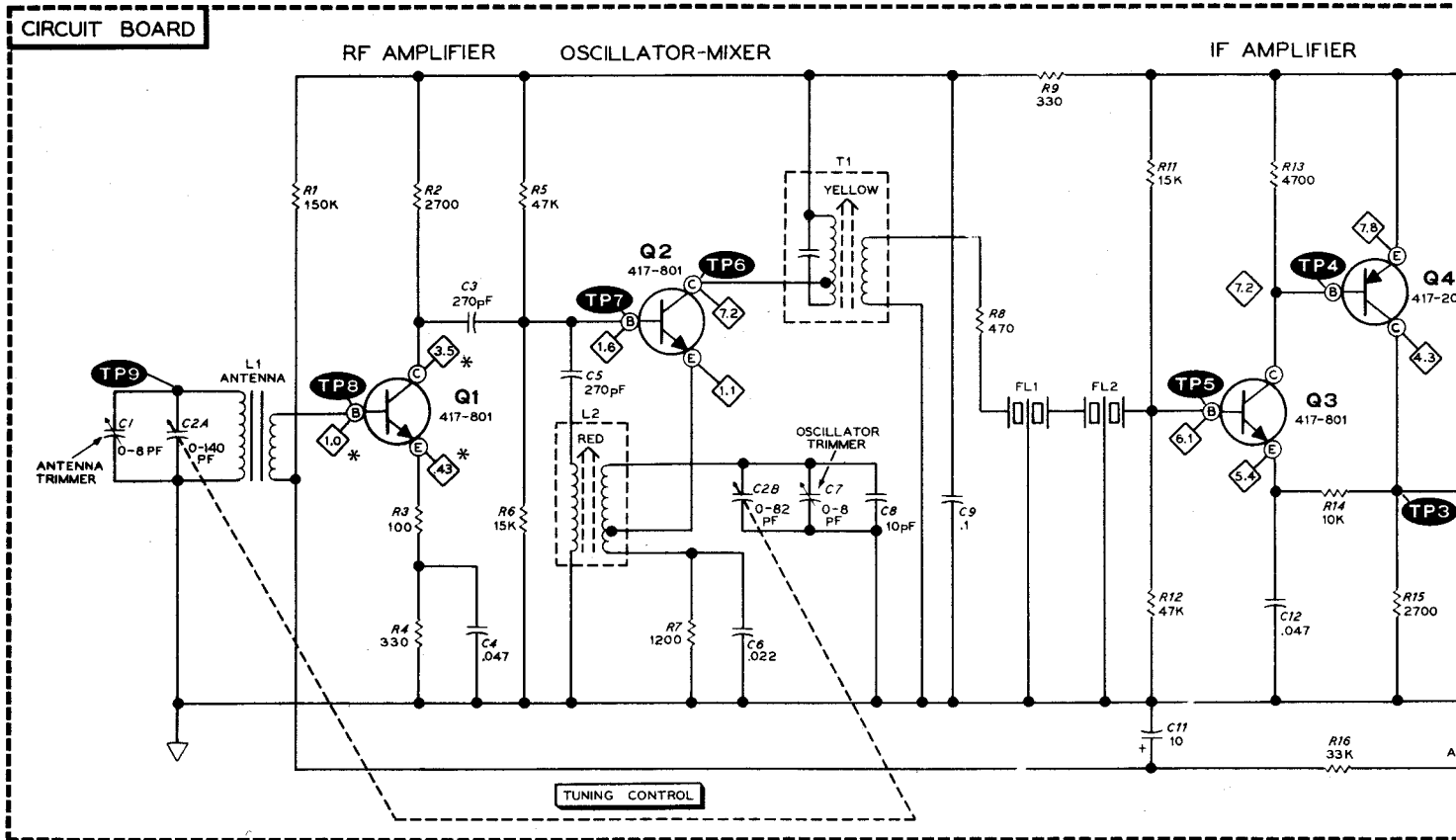
(fold-out from Page 26)

NOTE: To identify a part shown in this View, so you can order a replacement, proceed in either of the following ways:

1. A. Refer to the place where the part is installed in the Step-by-Step instructions and note the "Description" of the part (for example: 2700  $\Omega$ , .005  $\mu$ F, or 2N3416).
  - B. Look up this Description in the "Parts List."
2. A. Note the identification number of the part (R-number, C-number, etc.).
  - B. Locate the same identification number (next to the part) on the Schematic. The "Description" of the part will also appear near the part.
  - C. Look up this Description in the "Parts List."







**SCHEMATIC OF THE  
HEATHKIT®  
AM PORTABLE RADIO  
MODEL GR-1008**

**NOTES:**

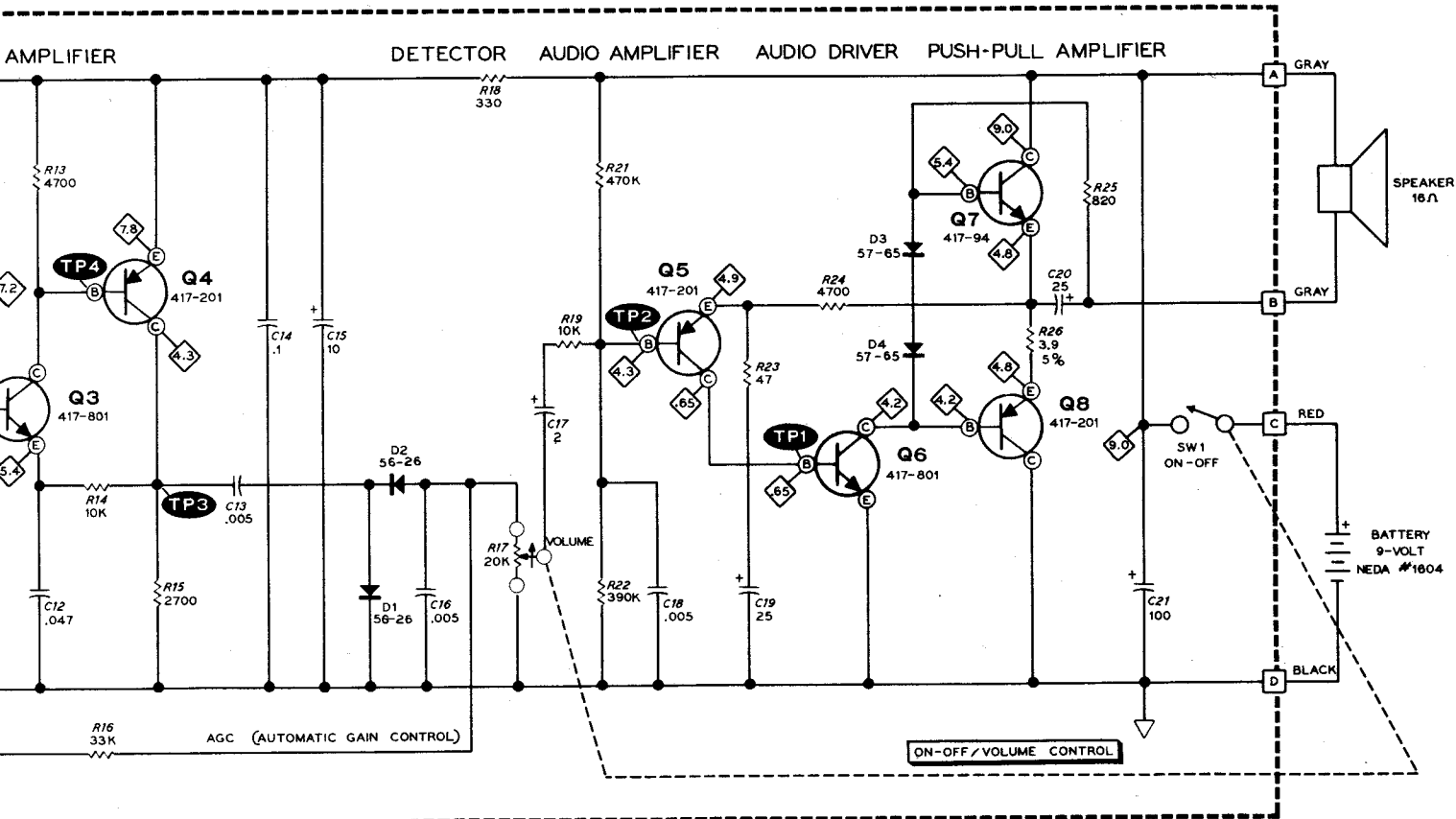
1. ALL RESISTORS ARE 1/2 WATT UNLESS MARKED OTHERWISE. RESISTOR VALUES ARE IN OHMS OR K OHMS (K = 1000).
2. ALL RESISTORS ARE 10% UNLESS MARKED OTHERWISE.
3. ALL CAPACITOR VALUES ARE IN  $\mu\text{F}$  UNLESS MARKED OTHERWISE.
4. REFER TO THE "CIRCUIT BOARD X-RAY VIEW" FOR THE PHYSICAL LOCATION OF PARTS.

5. THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND.
6. THIS SYMBOL INDICATES A TEST POINT. SEE THE POINT-TO-POINT TEST CHART FOR THE FOIL LOCATION OF THESE TEST POINTS.
7. THIS SYMBOL INDICATES A POSITIVE DC VOLTAGE MEASUREMENT TAKEN UNDER A NO SIGNAL CONDITION (NO BROADCAST STATION BEING RECEIVED). ALL MEASUREMENTS TAKEN WITH AN 11 MEGOHM INPUT VOLTMETER FROM THE POINT INDICATED TO CIRCUIT BOARD GROUND VOLTAGES MAY VARY AS MUCH AS  $\pm 20\%$ .
8. THIS SYMBOL INDICATES CLOCKWISE ROTATION CONTROL WHEN VIEWED FROM THE KNOB END.
9. THIS LINE REPRESENTS A MECHANICAL CONNECT BETWEEN THE POINTS INDICATED.
10. THIS SYMBOL INDICATES A LETTERED CIRCUIT BOARD CONNECTION POINT.

\* VOLTAGES MAY CHANGE UNDER A SIGNAL CONDITION

**DIODES**

| COMPONENT NO. | HEATH PART NO. | TYPE NO. | IDENTIFICATION |
|---------------|----------------|----------|----------------|
| D1, D2        | 56-26          | 1N191    |                |
| D3, D4        | 57-65          | 1N4002   |                |



A CIRCUIT BOARD GROUND.  
 A TEST POINT. SEE THE  
 PART FOR THE FOIL LOCATIONS

A POSITIVE DC VOLTAGE  
 UNDER A NO SIGNAL CONDITION \*  
 BEING RECEIVED). ALL  
 11 MEGOHM INPUT VOLTMETER  
 CIRCUIT BOARD GROUND.  
 ±20%.

CLOCKWISE ROTATION OF A  
 FROM THE KNOB END.

MECHANICAL CONNECTION  
 CATED.

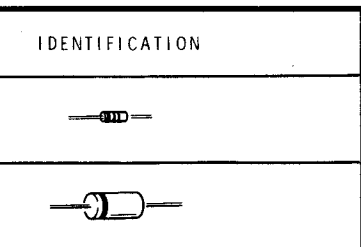
A LETTERED CIRCUIT BOARD

A SIGNAL CONDITION.

### TRANSISTOR-DIODE IDENTIFICATION CHART

#### TRANSISTORS

| COMPONENT NO.<br>(Q NO.) | HEATH<br>PART NUMBER | TYPE<br>NO. | BASE DIAGRAM |
|--------------------------|----------------------|-------------|--------------|
| Q4, Q5, Q8               | 417-201              | X29A829     |              |
| Q1, Q2, Q3, Q6           | 417-801              | MPS-A20     |              |
| Q7                       | 417-94               | 2N3416      |              |



**FOR PARTS REQUESTS ONLY**

- Be sure to follow instructions carefully.
- Use a separate letter for all correspondence.
- Please allow 10 - 14 days for mail delivery time.

**DO NOT WRITE IN THIS SPACE**

**INSTRUCTIONS**

- Please print all information requested.
- Be sure you list the correct **HEATH** part number exactly as it appears in the parts list.
- If you wish to prepay your order, mail this card and your payment in an envelope. Be sure to include 10% (25¢ minimum, \$3.50 maximum) for insurance, shipping and handling. Michigan residents add 4% tax. Total enclosed \$\_\_\_\_\_
- If you prefer COD shipment, check the COD box and mail this form. COD

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE \_\_\_\_\_ ZIP \_\_\_\_\_

The information requested in the next two lines is not required when purchasing nonwarranty replacement parts, but it can help us provide you with better products in the future.

Model # \_\_\_\_\_ Invoice # \_\_\_\_\_  
 Date Purchased \_\_\_\_\_ Location Purchased \_\_\_\_\_

| LIST HEATH PART NUMBER | QTY. | PRICE EACH | TOTAL PRICE |
|------------------------|------|------------|-------------|
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|-------------------------------|--|
| TOTAL FOR PARTS               |  |
| HANDLING AND SHIPPING         |  |
| MICHIGAN RESIDENTS ADD 4% TAX |  |
| <b>TOTAL AMOUNT OF ORDER</b>  |  |

SEND TO: **HEATH COMPANY**  
 BENTON HARBOR  
 MICHIGAN 49022  
**ATTN: PARTS REPLACEMENT**

Phone (Replacement parts only): 616 982-3571

**FOR PARTS REQUESTS ONLY**

- Be sure to follow instructions carefully.
- Use a separate letter for all correspondence.
- Please allow 10 - 14 days for mail delivery time.

**DO NOT WRITE IN THIS SPACE**

**INSTRUCTIONS**

- Please print all information requested.
- Be sure you list the correct **HEATH** part number exactly as it appears in the parts list.
- If you wish to prepay your order, mail this card and your payment in an envelope. Be sure to include 10% (25¢ minimum, \$3.50 maximum) for insurance, shipping and handling. Michigan residents add 4% tax. Total enclosed \$\_\_\_\_\_
- If you prefer COD shipment, check the COD box and mail this form. COD

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE \_\_\_\_\_ ZIP \_\_\_\_\_

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Model # \_\_\_\_\_ Invoice # \_\_\_\_\_  
 Date Purchased \_\_\_\_\_ Location Purchased \_\_\_\_\_

| LIST HEATH PART NUMBER | QTY. | PRICE EACH | TOTAL PRICE |
|------------------------|------|------------|-------------|
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|                               |  |
|-------------------------------|--|
| TOTAL FOR PARTS               |  |
| HANDLING AND SHIPPING         |  |
| MICHIGAN RESIDENTS ADD 4% TAX |  |
| <b>TOTAL AMOUNT OF ORDER</b>  |  |

SEND TO: **HEATH COMPANY**  
 BENTON HARBOR  
 MICHIGAN 49022  
**ATTN: PARTS REPLACEMENT**

Phone (Replacement parts only): 616 982-3571

CUT ALONG DOTTED LINE



# 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.