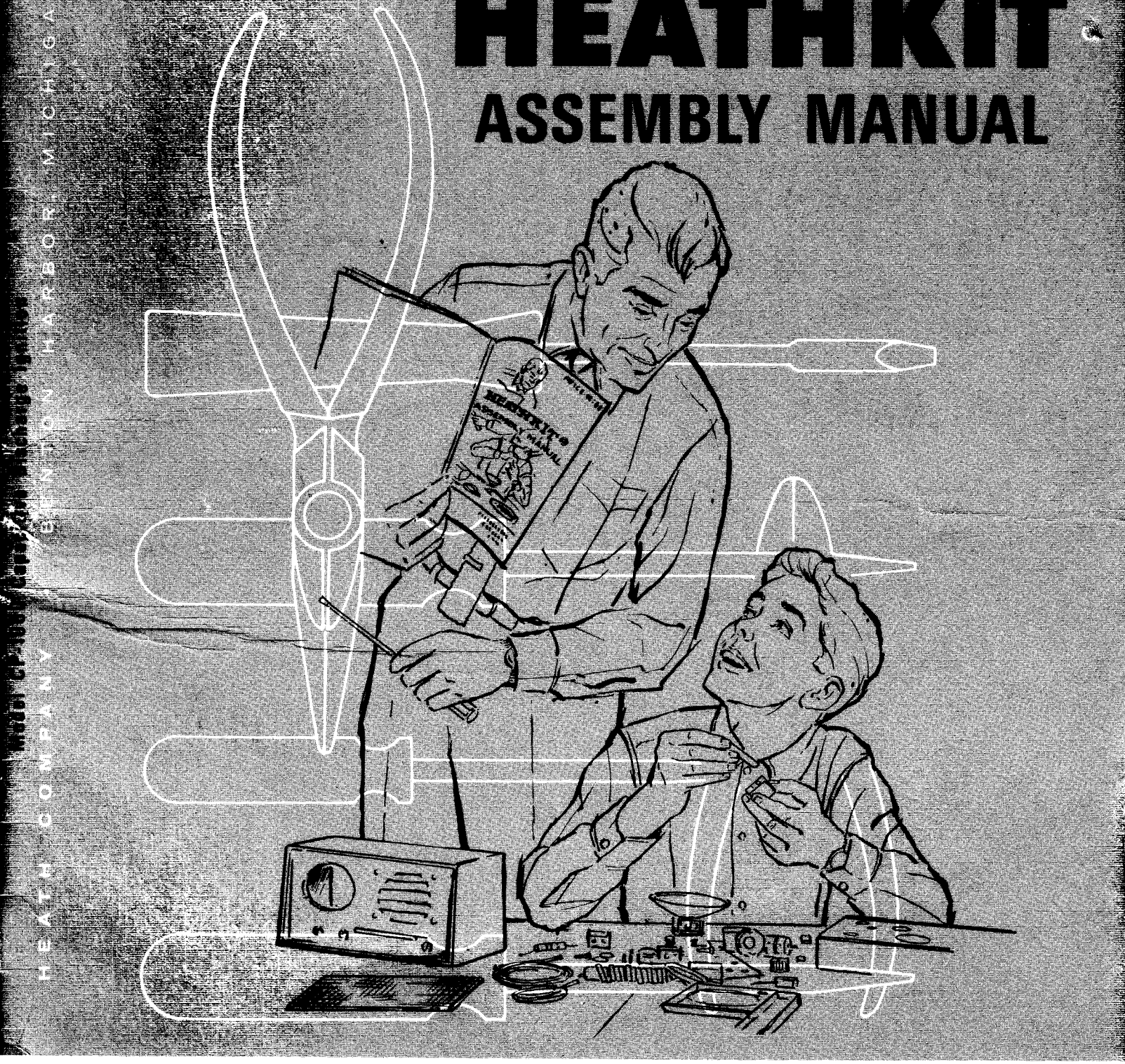
MODEL CP-1060 Capacitive Discharge Ignition

HEATHKIT®

ASSEMBLY MANUAL



HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATHKIT

PRICE $2.00

KL7HAC

CHARLEY

07510

595-1509-05

KL7HAC

Dear Customer:

The Heathkit electronic product you have purchased is one of the best performing electronic products in the world.

Here's how we aim to keep it that way:

Your Heathkit Warranty

During your first 90 days of ownership, any parts which we find are defective, either in materials or workmanship, will be replaced or repaired free of charge. And we'll pay shipping charges to get those parts to you — anywhere in the world.

If we determine a defective part has caused your Heathkit electronic product to need other repair, through no fault of yours, we will service it free — at the factory, at any retail Heathkit Electronic Center, or through any of our authorized overseas distributors.

This protection is exclusively yours as the original purchaser. Naturally, it doesn't cover damage by use of acid-core solder, incorrect assembly, misuse, fire, flood or acts of God. But, it does insure the performance of your Heathkit electronic product anywhere in the world — for most any other reason.

After-Warranty Service

What happens after warranty? We won't let you down. If your Heathkit electronic product needs repairs or you need a part, just write or call the factory, your nearest retail Heathkit Electronic Center, or any Heath authorized overseas distributor. We maintain an inventory of replacement parts for each Heathkit model at most locations — even for many models that no longer appear in our current product line-up. Repair service and technical consultation are available through all locations.

We hope you'll never need our repair or replacement services, but it's nice to know you're protected anyway — and that cheerful help is nearby.

Sincerely,

HEATH COMPANY
Benton Harbor, Michigan 49022

Prices and specifications subject to change without notice.

Assembly and Operation of the HEATHKIT CAPACITIVE DISCHARGE IGNITION

MODEL CP-1060

FOR USE WITH 12-VOLT NEGATIVE GROUND SYSTEM ONLY

TABLE OF CONTENTS

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

INTRODUCTION

Your Heathkit Model CP-1060 Capacitive Discharge Ignition is a reliable ignition system that outperforms conventional systems. It supplies more energy to the spark plugs and greatly reduces the problems and wear associated with the ignition points. The carefully engineered circuits are backed up with high-quality components to provide many years of high performance and trouble-free operation.

The solid-state circuits are designed to deliver increased energy (higher voltage) through the coil to the spark plugs. The increased energy more completely burns the fuel-air mixture. This results in increased engine performance. In addition, there is an increase in the firing duration of each spark plug when it is needed – during starts, low temperatures, and when the battery voltage is low. This firing duration decreases as the engine reaches a higher rpm and is not needed; yet the increased energy continues to the plugs.

Ignition points tend to bounce at high rpm's and can sometimes cause false triggering of an ignition system. However, the circuitry of the Heathkit Capacitive Discharge Ignition does not respond to these false trigger pulses. Also, in conventional systems heavy currents flow through the points and causes them to pit and wear out. The Heathkit Ignition system, however, produces a remarkably long point life as it allows only small currents to flow through the points so that nearly all the wear is associated with the rubbing block as it rides the cam.

These many features, when added together in one easy-to-build unit, are sure to provide the performance and reliability that is so essential for the ignition of fuel in today's modern engines.

Refer to the "Kit Builders Guide" for complete information on tools, wiring, soldering, and step-by-step assembly procedures.

UNPACKING INSTRUCTIONS

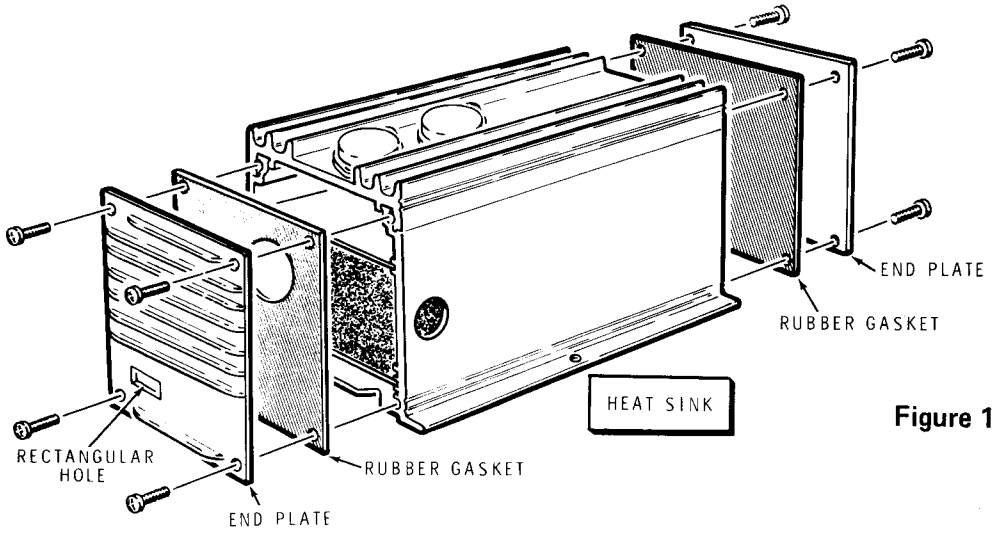


Figure 1

The main shipping carton contains your Assembly Manual, Kit Builders Guide, Parts Order Form, solder, three labels, and a sealed box.

The sealed box contains the heat sink (metal case) of your Heathkit Capacitive Discharge Ignition, a 4-wire cable assembly, and a plastic bag containing some loose parts. ALL OTHER PARTS AND SOME ADDITIONAL SOLDER ARE PACKED INSIDE THE HEAT SINK. Open this heat sink as directed in the following steps. Be sure to save all the parts.

Refer to Figure 1 for the following steps.

( ) Use a phillips screwdriver to remove the four screws that hold the end plate (with the rectangular hole) to the heat sink. Remove this end plate and its rubber gasket.

( ) In the same manner, remove the four screws, end plate, and rubber gasket from the opposite end of the heat sink.

Refer to Figure 2 for the following steps.

( ) Position the heat sink as shown in Figure 2 and observe the seam that separates its top and case sections.

CAUTION: Be careful not to cut your fingers on the sharp metal edges of the heat sink while performing the following step.

( ) Slide the heat sink top off from either end of the heat sink case to separate the two sections.

( ) Remove all of the parts packed inside the heat sink case. Remove the two circuit boards by sliding them in their grooves toward either end of the case.

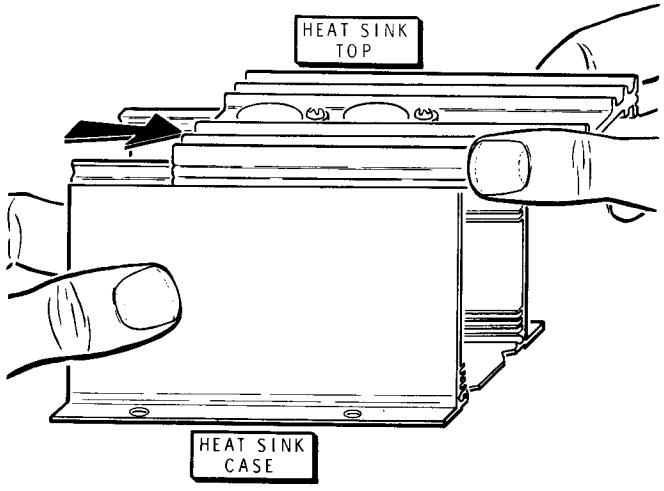


Figure 2

PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers in the Parts Pictorial (fold-out from Page 5).

To order replacement parts, refer to the Price Each column and use the Parts Order Form furnished with this kit. If one is not available, refer to "Replacement Parts" inside the rear cover of the Manual.

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
RESISTORS				
1/2-Watt				
NOTE: The last (4th) band on all color coded resistors may be either gold or silver.				
A1	1-41	1	10 Ω (brown-black-black)	.15
A1	230-628	1	120 Ω (brown-red-brown)	.15
A1	1-42	1	270 Ω (red-violet-brown)	.15
A1	1-9	1	1000 Ω (brown-black-red)	.15
A1	1-11	3	1500 Ω (brown-green-red)	.15
A1	1-40	1	10 MΩ (brown-black-blue)	.15
1-Watt				
A2	1-12-1	2	15 Ω (brown-green-black)	.15
A2	1-1-1	1	470 Ω (yellow-violet-brown)	.15
10-Watt				
A3	230-629	1	40 Ω (no color code)	.45
CAPACITORS				
B1	230-624	5	.01 MFD (.01 K 250)	.75
B2	230-622	2	.47 MFD (.47 K 250)	1.15
B3	230-623	3	.1 MFD (.1 K 250)	.75
B4	230-611	1	1.5 MFD (1.5 K 250)	3.75
B5	230-621	1	400 MFD or 470 MFD electrolytic	2.25
TRANSISTORS-DIODES				
NOTE: Two power transistors (#230-616) and the heat sink top (#230-613) are shipped as an assembly, however, the transistors and/or heat sink top must be ordered separately for replacement purposes.				
Transistors-Diodes (cont'd.)				
C1	230-616	2	Power transistor (factory mounted on heat sink top)	4.50
C2	230-620	1	SCR (factory mounted on foil side of circuit board #C-1007)	5.00
NOTE: The following transistor may be marked with a different transistor type (Description) number than the one listed.				
C3	230-627	1	2N3414 transistor	.90
C4	230-625	5	Diode	1.95
WIRE-CABLE				
		1	Long white wire	.05/ft
		1	Long black wire	.05/ft
		1	Long orange wire	.05/ft
		1	Long red wire	.05/ft
		1	Long gray wire	.05/ft
		2	Short black wire	.05/ft
		4	Short white wire	.05/ft
		1	Bare wire	.05/ft
D1	230-602	1	4-wire cable assembly consisting of:	5.00
		1	*4-wire cable with attached green and red terminal strips.*	
	250-126	*2*	*10-32 x 1/2" screw*	.05
	252-2	*2*	*10-32 nut*	.05
MISCELLANEOUS				
E1	230-630	1	SCR clip	.30
E2	230-626	1	RF choke	1.50
E3	230-609	1	Switch	4.50
E4	230-632	1	Switch button	.60
E5	230-633	1	Switch spacer	.15
E6	230-631	1	Strain relief	.20
E7	230-607	2	Rubber gasket	.30

KEY No.	PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
Miscellaneous (cont'd.)				
E8	230-606	1	End plate with rectangular hole	2.10
E9	230-605	1	End plate	2.10
			Mounting hardware bag consisting of:	
E10	*230-603*	4	*Insulated knurled nut*	.25
E11	*250-140*	3	*#8 x 3/8" sheet metal screw*	*.05*
E12	*254-2*	3	*#8 lockwasher*	*.05*
	230-634	1	*Grounding wire with attached lugs*	.45
E13	230-608	12	#6 x 1/2" self-tapping screw (Eight of these screws were removed from the end plates of the heat sink; the other four are factory installed on the heat sink top.)	.15
E14	230-617	1	Circuit board #C1007 (with factory-mounted transformer and SCR).	20.25
E15	230-613	1	Heat sink top (with factory mounted transistor sockets, and solder lugs)	9.00
E16	230-604	1	Heat sink case	6.00
	230-612	1	Top circuit board (#C-1008)	4.50
	391-34	1	Blue and white label	
	230-610	1	Switch operation label	.20
	390-993	1	Nameplate label	.35
	390-994	1	Heathkit automotive label	.30
	597-308	1	Kit Builders Guide	
	597-260	1	Parts Order Form	
		1	Solder (Additional 6' rolls of solder, #331-13, can be ordered for 25 cents each.)	
			Manual (See front cover for part number.)	2.00

The above prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage, and handling. Outside the U.S.A. parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties, and rates of exchange.

ASSEMBLY NOTES

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

You will install components on the circuit boards in the following pictorials. Follow the instructions carefully, read the entire step before performing the operation and position all parts as shown.

Resistors will be called out by their resistance value in Ω or MΩ, and by their color code if one is used.

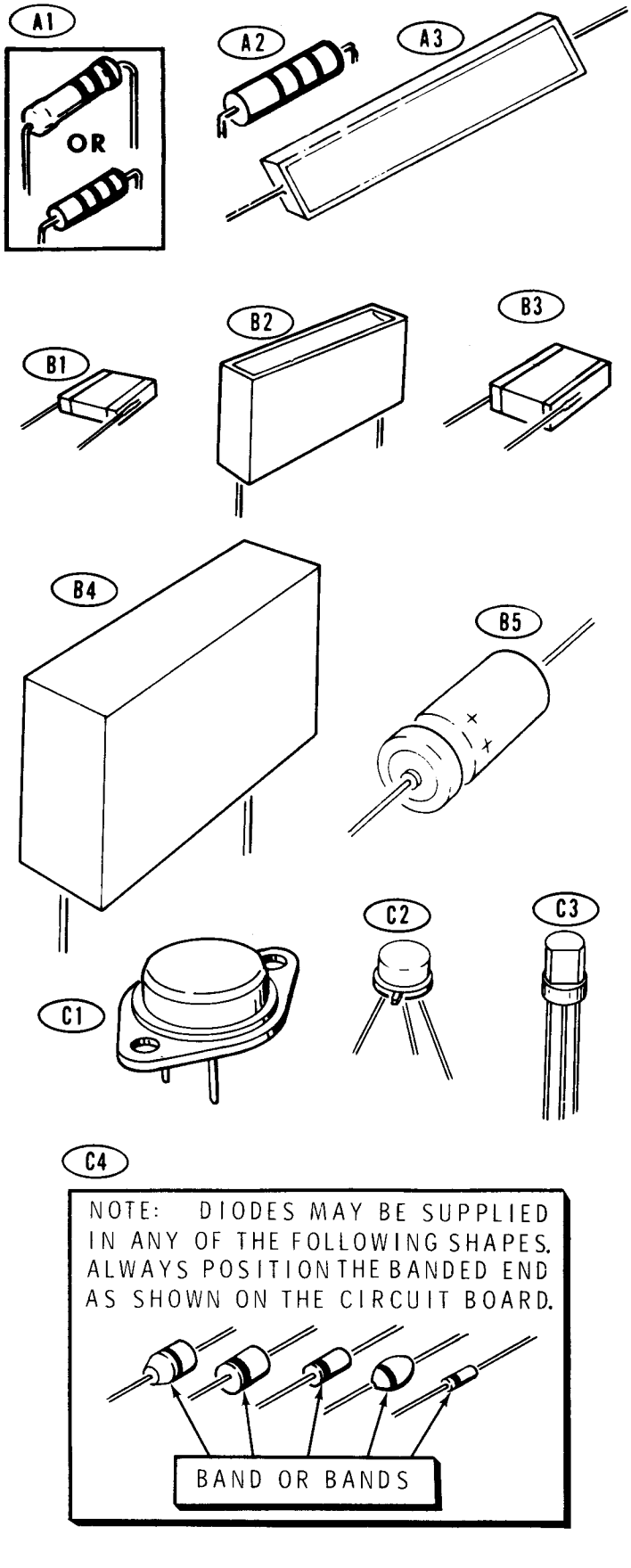
Capacitors will be called out by their capacitance value (in MFD).

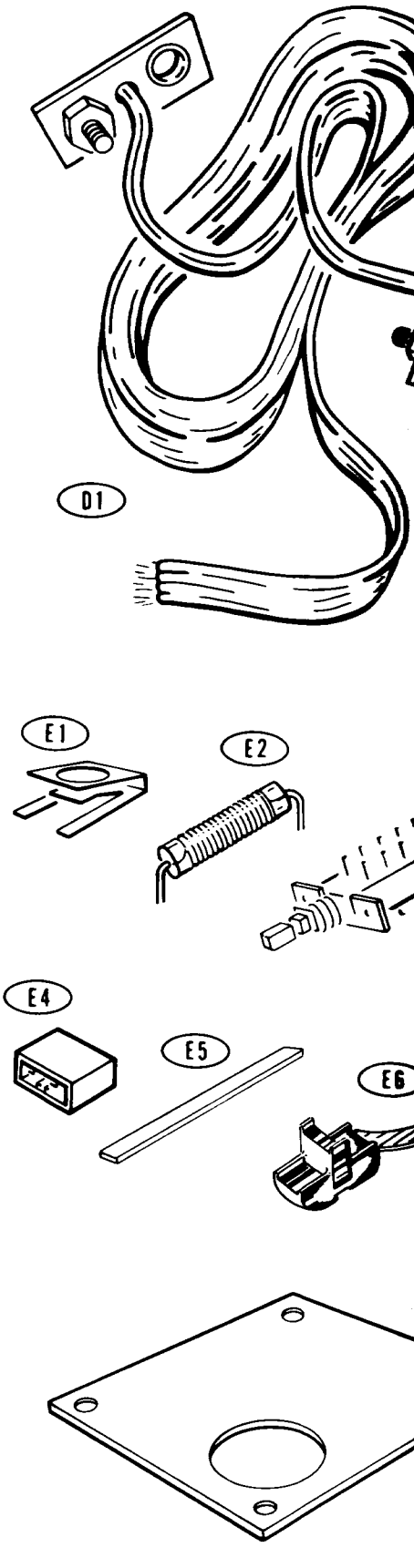
Due to the small areas around the circuit board holes and the small areas between many of the foils, use the utmost care to prevent solder bridges between adjacent foils. Use only a minimum amount of solder and do not heat the foils or components excessively with the soldering iron. Use no larger than a 30-watt soldering iron with a small tip. Allow it to reach operating temperature and then apply it on '' long enough to make a good solder connection.

After completing each circuit board, check to make sure that all connections are properly soldered and that there are no solder bridges between adjacent foils. If you find a solder bridge, refer to the "Kit Builders Guide" for information on correcting it.

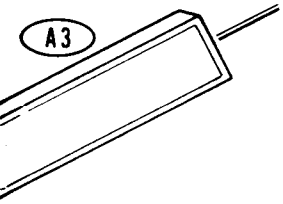
Most of the wires in this kit are precut to their required length. Straighten the individual strands of wire and twist them together so that the connections can be made more easily. Do not shorten any wire unless instructed to do so in the steps.

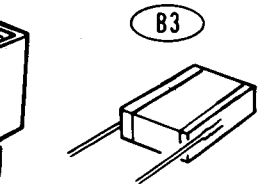
PARTS PICTOR

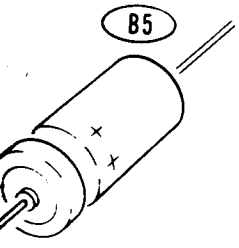


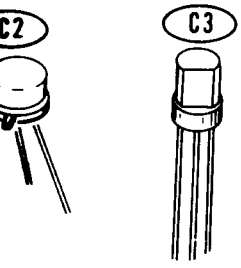


PARTS PICTORIAL









E SUPPLIED
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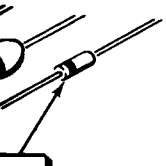
BANDED END
CUIT BOARD.



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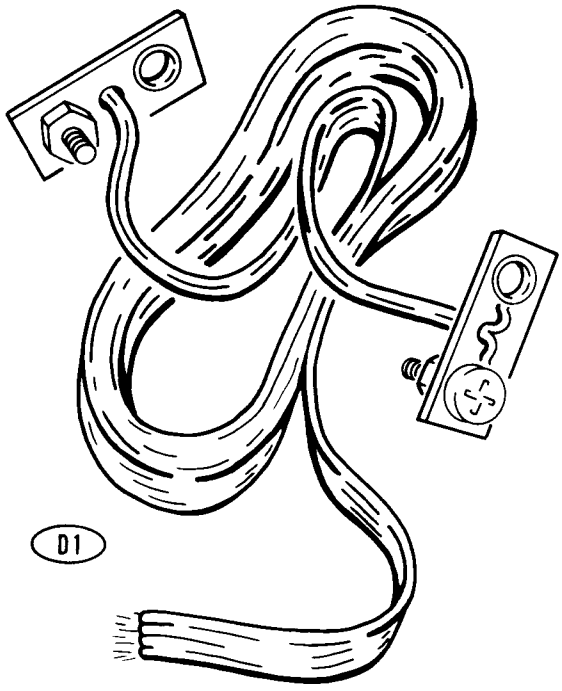
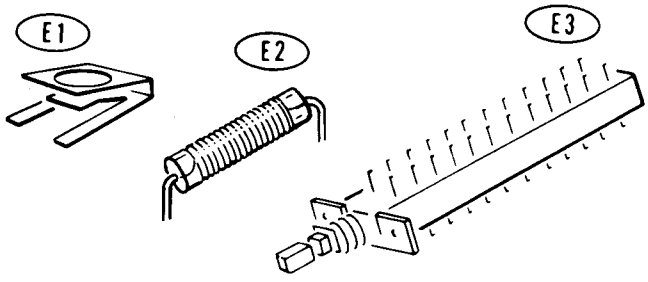
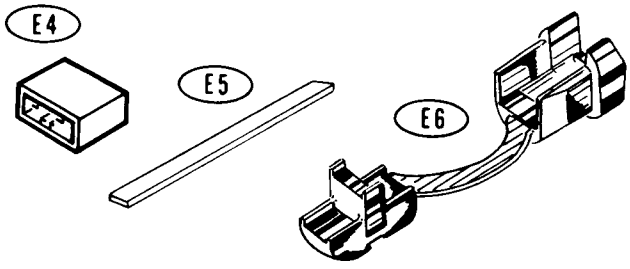
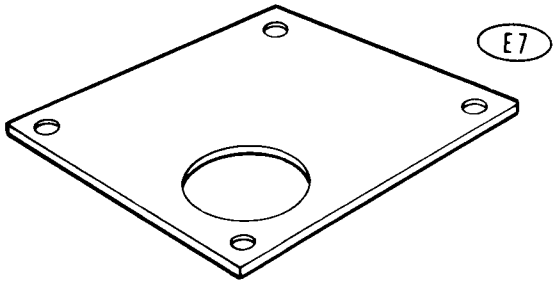
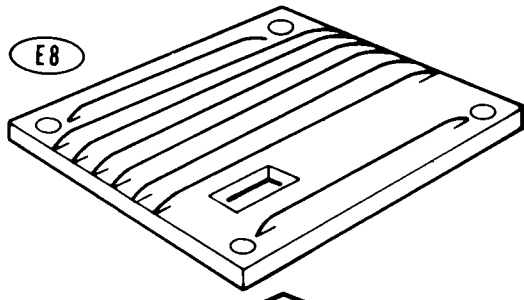
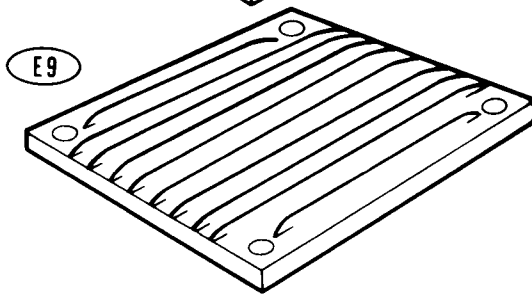


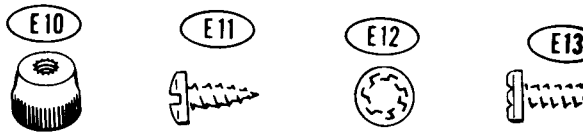


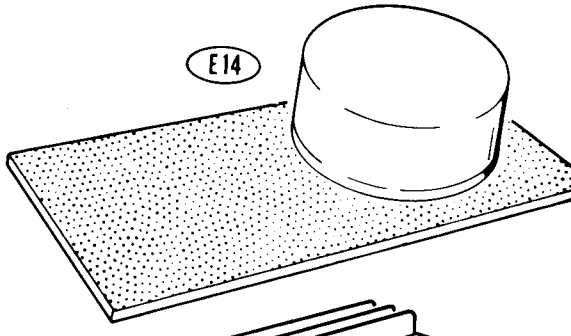


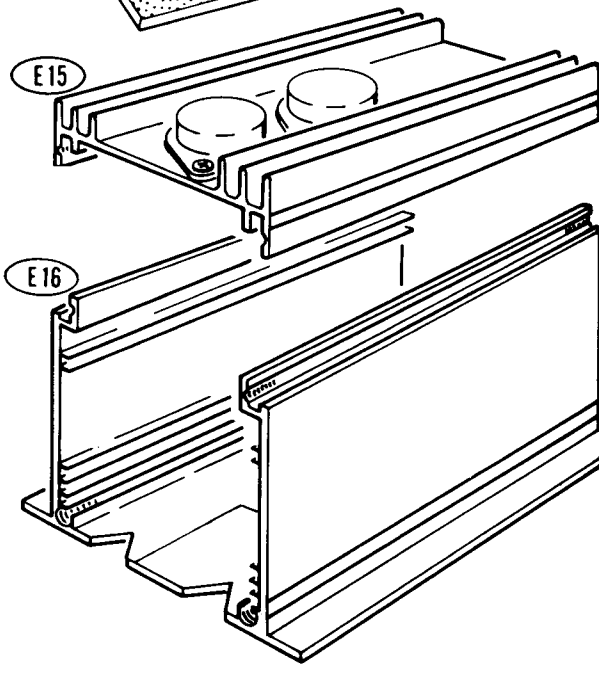




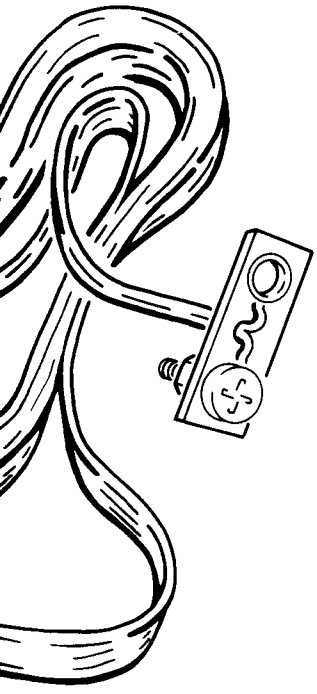


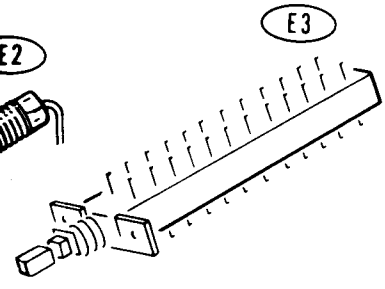


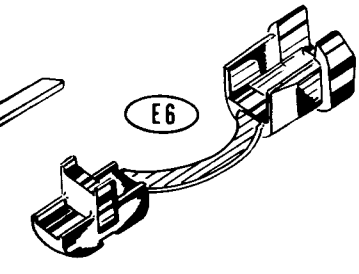


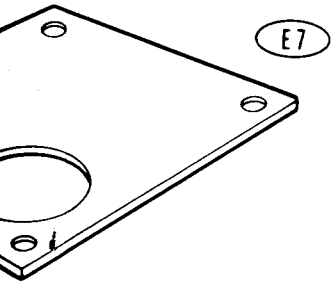


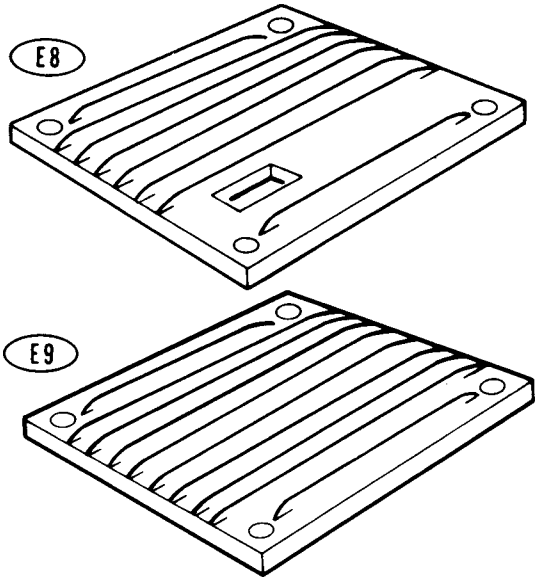
PICTORIAL

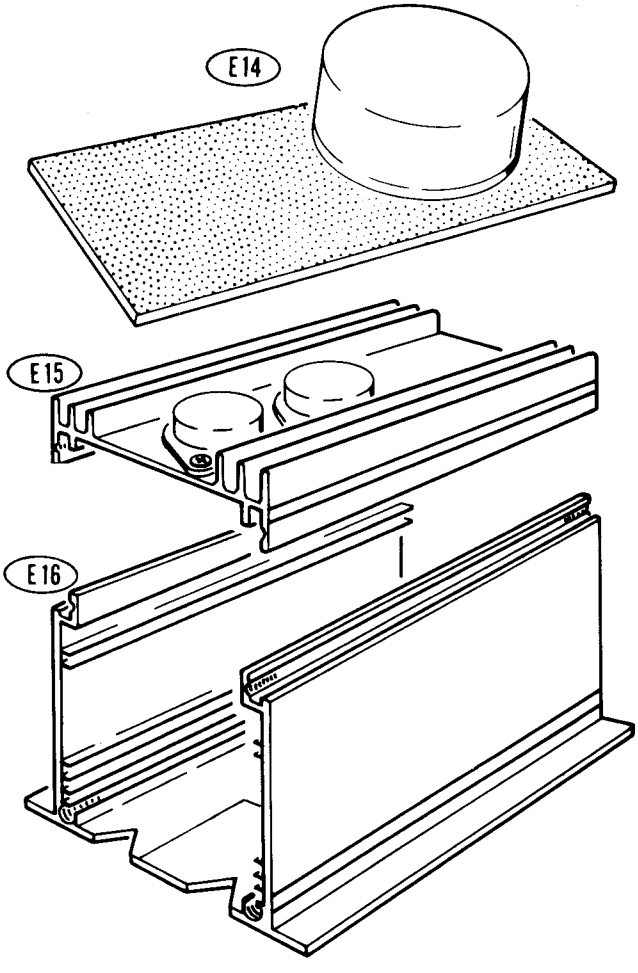












STEP-BY-STEP ASSEMBLY

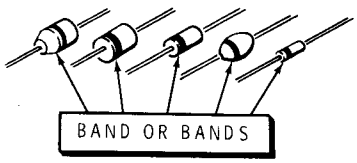
BOTTOM CIRCUIT BOARD

START

NOTE: Be sure you have read the "Assembly Notes" (on the preceding page) before performing the following steps.

Position the bottom circuit board #C-1007 (with premounted transformer) foil side down as shown in Pictorial 1. Then complete each step on the Pictorial.

NOTE: DIODES MAY BE SUPPLIED IN ANY OF THE FOLLOWING SHAPES. ALWAYS POSITION THE BANDED END AS SHOWN ON THE CIRCUIT BOARD.



( ) Diode at D5.

( ) Diode at D3.

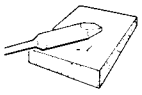
( ) Diode at D1.

( ) Diode at D4.

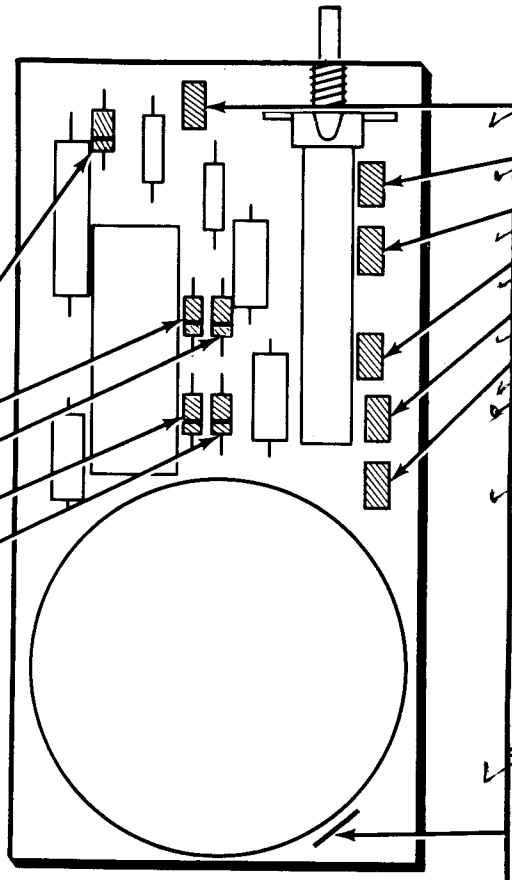
( ) Diode at D2.

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

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



( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (10 places).



CONTINUE

( ) .1 MFD capacitor.

( ) .01 MFD capacitor.

( ) .01 MFD capacitor.

( ) .01 MFD capacitor.

( ) .01 MFD capacitor.

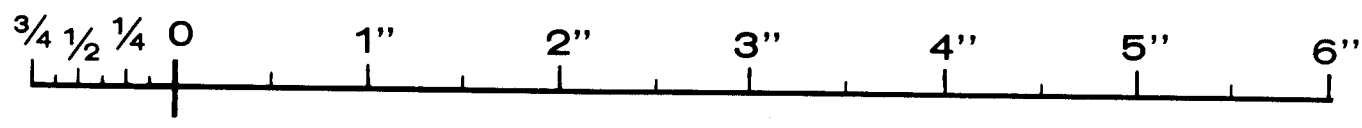
( ) .01 MFD capacitor.

( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (12 places).

( ) Prepare a fuse wire as follows: Remove 1" of insulation from one end of a short black wire (supplied with your kit). Cut off the 1" bared end. Then select any one of the 19 individual 1" strands of wire for use in the following step. Save several of these strands for use as replacement fuses; then discard the remaining strands.

( ) Fuse wire. Install the single strand of wire as shown in the Pictorial. Then turn the circuit board over and solder the wire ends to the foil. Cut off any excess wire lengths.

PICTORIAL 1



START

( ) 10 MΩ, 1/2-watt, resistor (brown-black-blue).

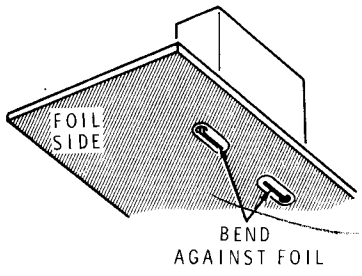
( ) 1000 Ω, 1/2-watt, resistor (brown-black-red).

( ) RF choke.

( ) 15 Ω, 1-watt, resistor (brown-green-black).

( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (8 places).

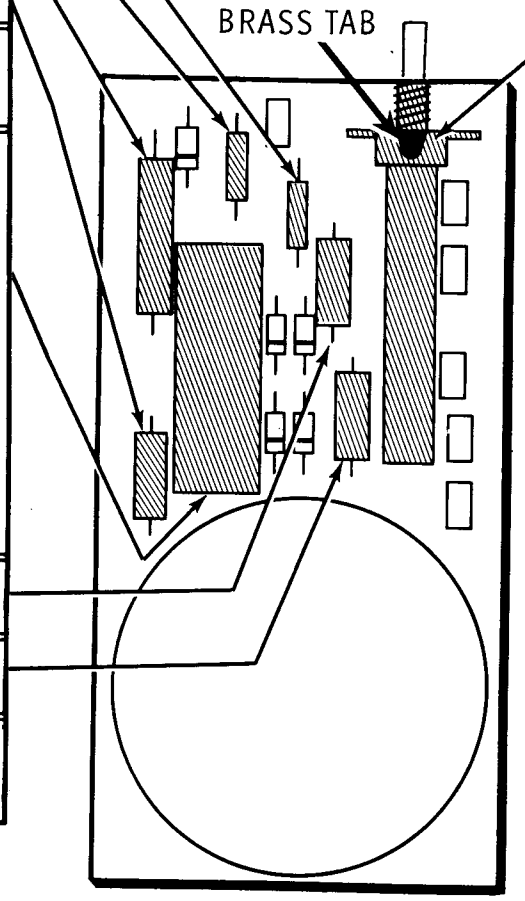
( ) 1.5 MFD capacitor. Mount this capacitor tight against the circuit board. Hold the capacitor in position and bend the two leads against the foil as shown below.



( ) 470 Ω, 1-watt, resistor (yellow-violet-brown).

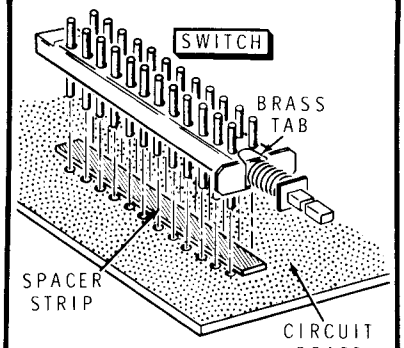
( ) 15 Ω, 1-watt, resistor (brown-green-black).

( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (6 places).



CONTINUE

( ) Position the switch with its brass tab up as shown in the Pictorial. Start the double row of switch terminals into their circuit board holes. Then insert the spacer strip between the switch and circuit board as shown below.



( ) Turn the circuit board over and solder any one of the 24 switch terminals to the foil.

( ) Closely inspect the switch to be sure it is well seated, with all 24 switch terminals extending through the circuit board to the foil side.

( ) Solder the remaining 23 switch terminals to the foil.

NOTE: If the spacer strip falls out after the switch leads have been soldered to the foil, it may be left out and discarded.

( ) Closely inspect the circuit board for solder bridges and poor solder connections as explained in the "Assembly Notes" on Page 5. Then set the circuit board aside until it is called for later.

PICTORIAL 2

FINISH

TOP CIRCUIT BOARD

START

Position the top circuit board #C-1008 foil side down as shown in Pictorial 3. Then complete each step on the Pictorial.

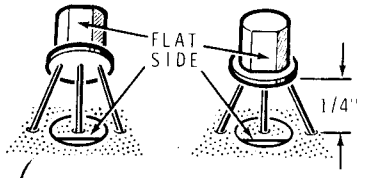
( ) .1 MFD capacitor.

( ) 10 Ω, 1/2-watt, resistor (brown-black-black).

( ) 120 Ω, 1/2-watt, resistor (brown-red-brown).

( ) .1 MFD capacitor.

( ) Transistor 2N3414 (may be marked otherwise) at Q3. Line up the flat side of the transistor with the outline of the flat on the circuit board. Then insert the transistor leads into the three holes as shown below. Leave approximately 1/4" between the transistor and the circuit board.



( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (11 places).

SOLDERING IRON TIP

CONTINUE

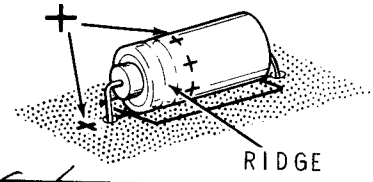
( ) 270 Ω, 1/2-watt, resistor (red-violet-brown).

( ) 1500 Ω, 1/2-watt, resistor (brown-green-red).

NOTE: When you install the following 40 Ω, 10-watt resistor, be sure to position the resistor a full 1/8" from the edge of the circuit board as shown in the Pictorial.

( ) 40 Ω, 10-watt, resistor.

NOTE: When you install the following electrolytic capacitor, match the positive (+) mark on the capacitor (or the ridged end) with the positive (+) mark on the circuit board.



( ) 400 MFD or 470 MFD electrolytic capacitor.

( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (8 places).

( ) 1500 Ω, 1/2-watt, resistor (brown-green-red).

( ) 1500 Ω, 1/2-watt, resistor (brown-green-red).

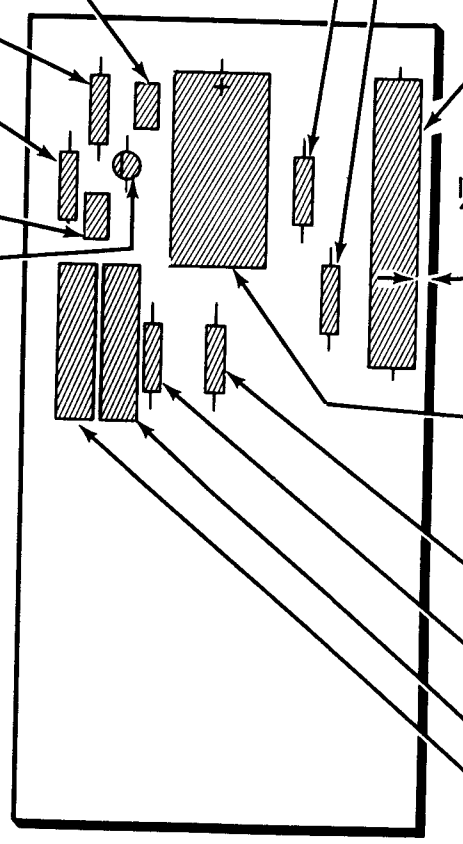
( ) .47 MFD capacitor.

( ) .47 MFD capacitor.

( ) Turn the circuit board over and solder the leads to the foil. Cut off the excess lead lengths (8 places).

( ) Closely inspect the circuit board for solder bridges and poor solder connections as explained in the "Assembly Notes" on Page 5. Then set the circuit board aside until it is called for later.

FINISH



PICTORIAL 3

HEAT SINK AND CIRCUIT BOARD WIRING

Refer to Pictorial 4 for the following steps.

( ) Position the heat sink top with its finned side down as shown in the Pictorial.

NOTES:

1. After you solder each of the following connections, cut off any excess wire lengths that may exist. Then examine each connection to be sure that there are no individual wire strands that could make contact with an adjacent lug.

2. Refer to the "Soldering" section of the "Kit Builders Guide" for an explanation of the soldering abbreviations (S-1, S-2, etc.) used in this Manual.

( ) Cut a 1" length from the bare wire supplied with your kit.

( ) Position the 1" bare wire so that its ends will lay flat on top of the two collector strips as shown in the Pictorial. Then connect this 1" bare wire between the collector strip at B (S-1) and the collector strip at C (S-1).

( ) Connect one end of the long white wire to lug 1 of socket Q2 (S-1). The other end of this wire will be connected later.

( ) Connect one end of a short black wire to lug 2 of socket Q2 (S-1). Connect the other end of this wire to solder lug A (NS).

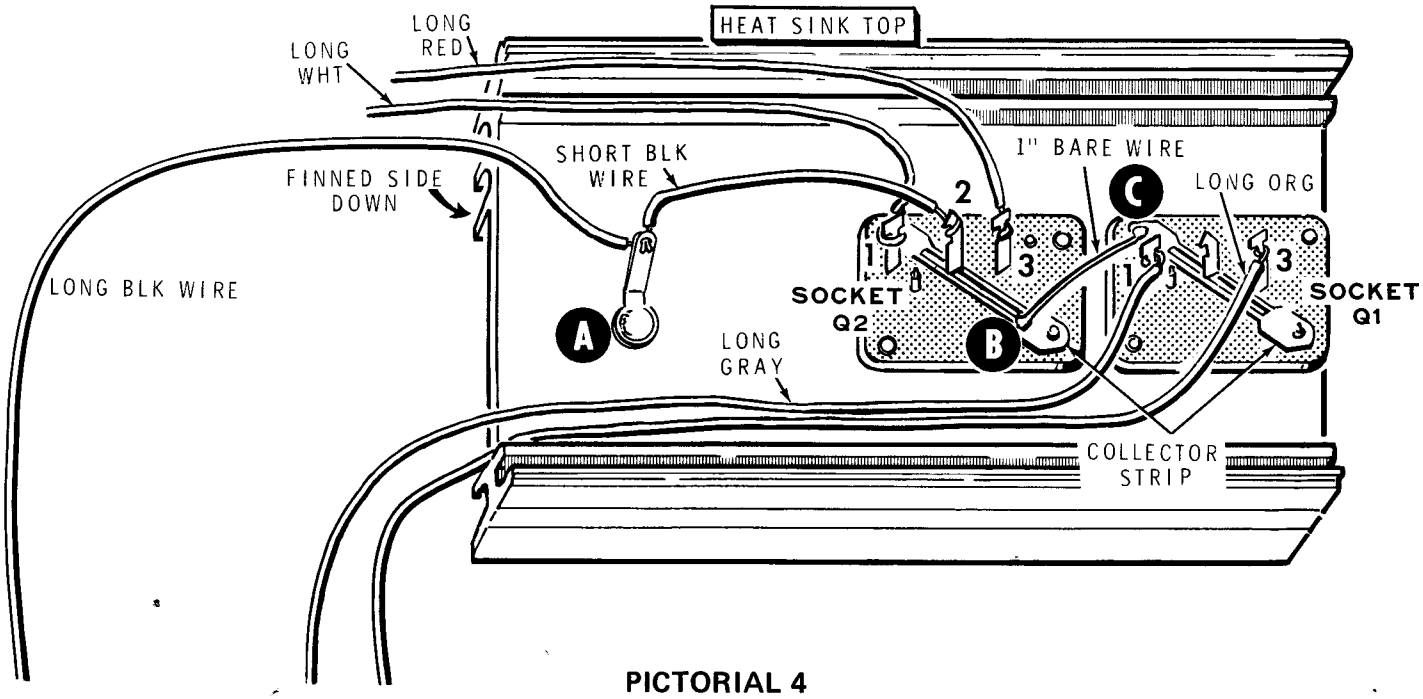
( ) Connect one end of the long black wire to solder lug A (S-2). The other end of this wire will be connected later.

( ) Connect one end of the long red wire to lug 3 of socket Q2 (S-1). The other end of this wire will be connected later.

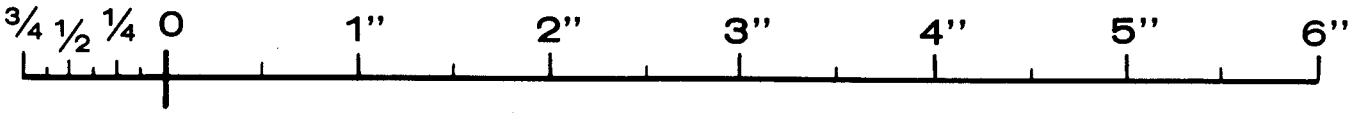
( ) Connect one end of the long gray wire to lug 1 of socket Q1 (S-1). The other end of this wire will be connected later.

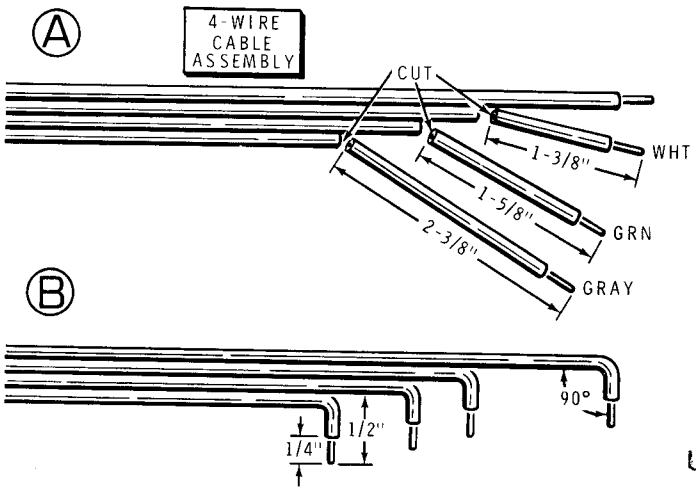
( ) Connect one end of the long orange wire to lug 3 of socket Q1 (S-1). The other end of this wire will be connected later.

( ) Set the heat sink top aside until it is called for later.



PICTORIAL 4





Detail 5-1

Refer to Pictorial 5 for the following steps.

( ) Position the bottom circuit board (#C-1007) and the heat sink case as shown in the Pictorial.

( ) Pass the free end of the 4-wire cable assembly through the 1/2" hole in the side of the heat sink case.

( ) Refer to Part A of Detail 5-1 and cut the indicated lengths from the ends of the gray, green, and white cable wires. Be careful not to cut through the insulation of any adjacent wire. Discard the cutoff wire ends.

( ) Refer to Part B of Detail 5-1 and separate the insulation for 1/2" from each of the three cut ends. Bend the separated ends 90 degrees as shown. Then remove 1/4" of insulation from the ends of each cut wire and twist together the individual strands of wire of the four wire ends.

NOTE: In the following four steps you will connect the 4-wire cable to the circuit board. Position the cable on top of the circuit board as shown in the Pictorial. Then insert each wire through its circuit board hole and solder it to the foil. After soldering, cut off any excess wire lengths.

( ) Gray cable wire to hole 5 (S-1).

( ) Green cable wire to hole 6 (S-1).

( ) White cable wire to hole 7 (S-1).

( ) Red cable wire to hole 8 (S-1).

( ) Closely examine the previous four connections to be sure there are no wire strands that can make contact with any adjacent foil or component.

NOTE: In the following four steps you will connect four short white wires to the circuit board. First, twist together the strands of wire at each wire end so they will fit into the circuit board holes. Then, insert each wire through its circuit board hole and solder it to the foil. After soldering, cut off any excess wire lengths. The other ends of these wires will be connected later.

( ) One end of a short white wire to hole 1 (S-1).

( ) One end of a short white wire to hole 2 (S-1).

( ) One end of a short white wire to hole 3 (S-1).

( ) One end of a short white wire to hole 4 (S-1).

( ) Closely examine the previous four connections to be sure there are no wire strands that can make contact with any adjacent foil or component.

( ) Again, refer to the Pictorial and position the heat sink top with its finned side down near the bottom circuit board.

NOTE: In the following five steps you will connect the free ends of the five wires coming from the heat sink top to the circuit board. Twist together the strands of wire at each wire end so they will fit into the circuit board holes. Insert each wire through its circuit board hole and solder it to the foil. After soldering, cut off any excess wire lengths.

( ) Long black wire to hole 9 (S-1).

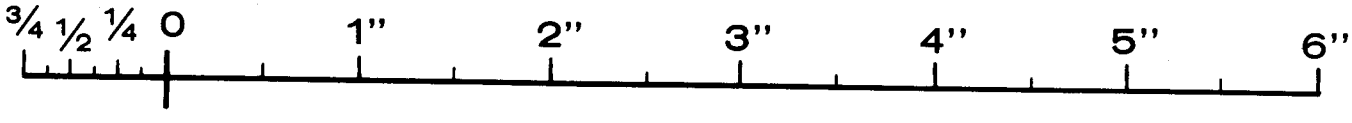
( ) Long red wire to hole 10 (S-1).

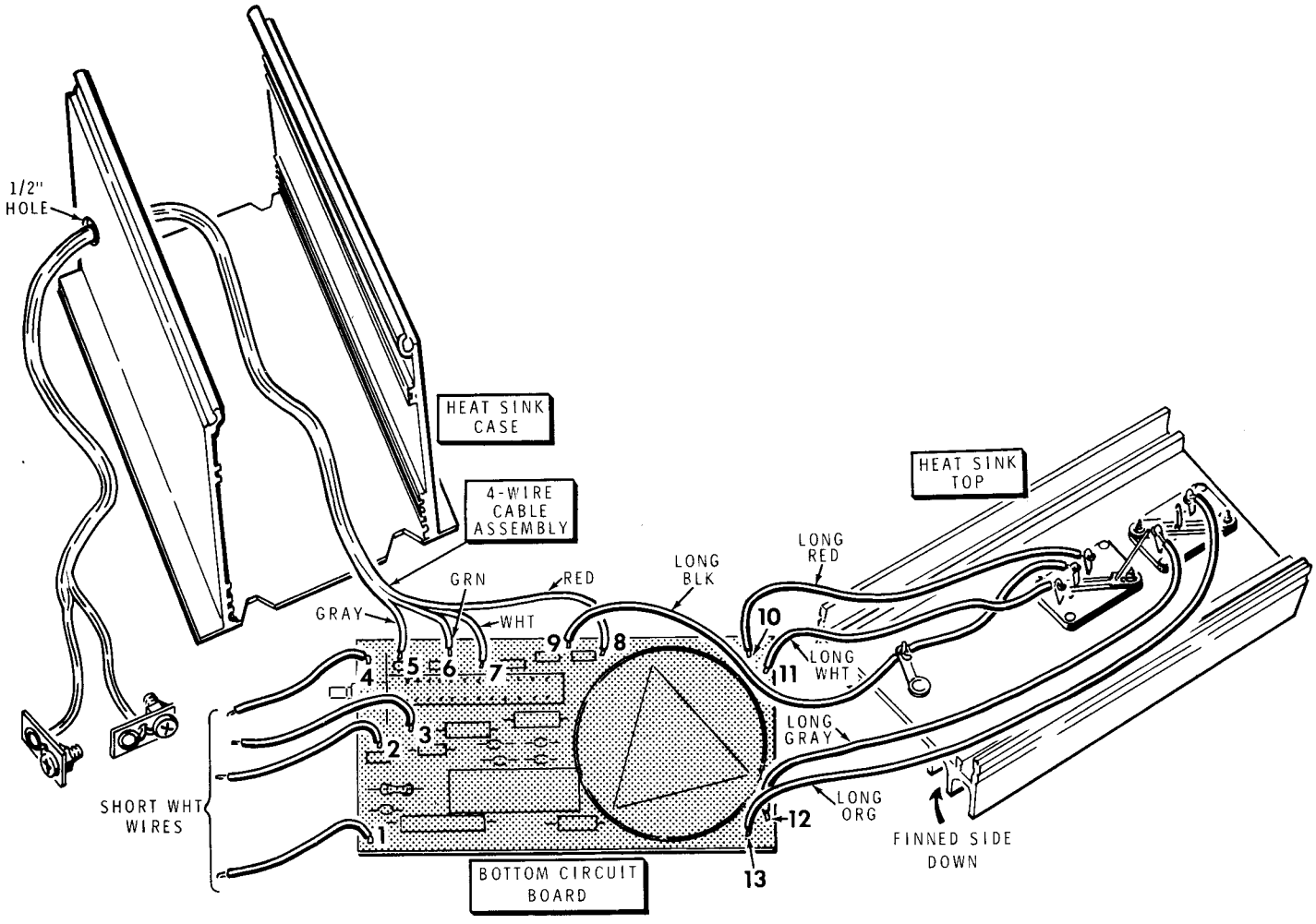
( ) Long white wire to hole 11 (S-1).

( ) Long gray wire to hole 12 (S-1).

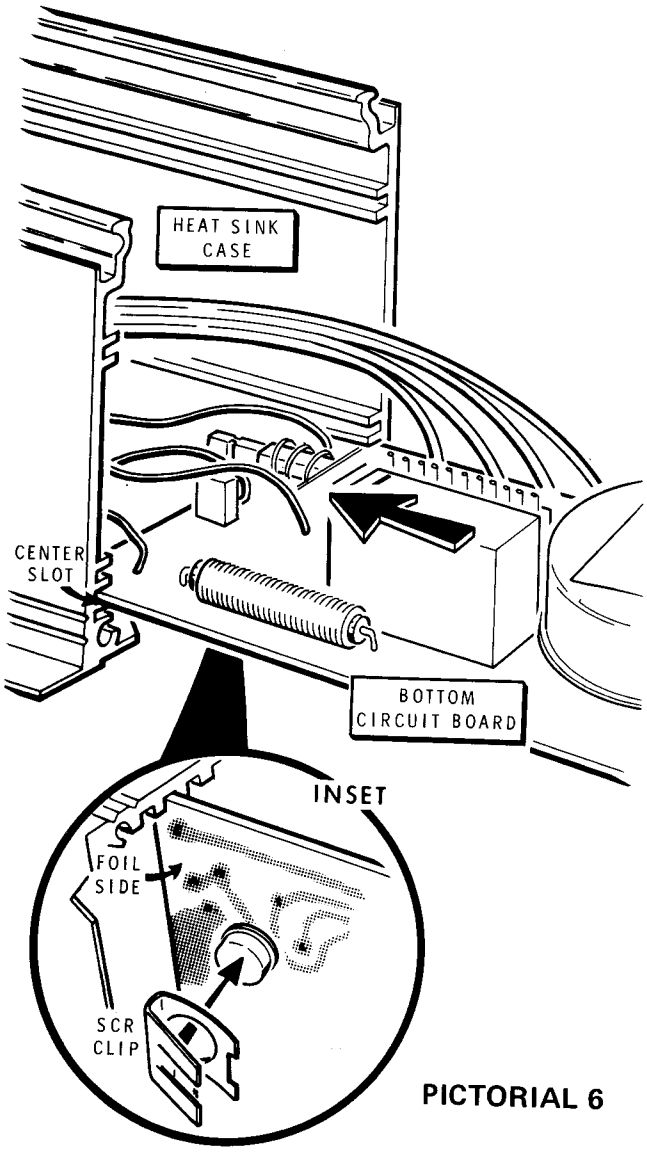
( ) Long orange wire to hole 13 (S-1).

( ) Closely examine the previous five connections to be sure there are no wire strands that can make contact with any adjacent foil or component.




1/2" HOLE
HEAT SINK CASE
4-WIRE CABLE ASSEMBLY
HEAT SINK TOP
LONG RED
LONG BLK
GRN
RED
GRAY
WHT
10
9
8
4
5
6
7
11
LONG WHT
LONG GRAY
3
2
SHORT WHT WIRES
1
12
LONG ORG
FINNED SIDE DOWN
BOTTOM CIRCUIT BOARD
13

PICTORIAL 5



PICTORIAL 6

Refer to Pictorial 6 for the following steps.

(14) Start the switch end of the bottom circuit board into the center slots at the bottom of the heat sink case. Insert the circuit board only about 1/4" into the case at this time.

(15) Refer to the inset drawing and install the SCR clip over the SCR mounted on the foil side of the circuit board. Be sure the rounded side of the clip is positioned toward the heat sink case.

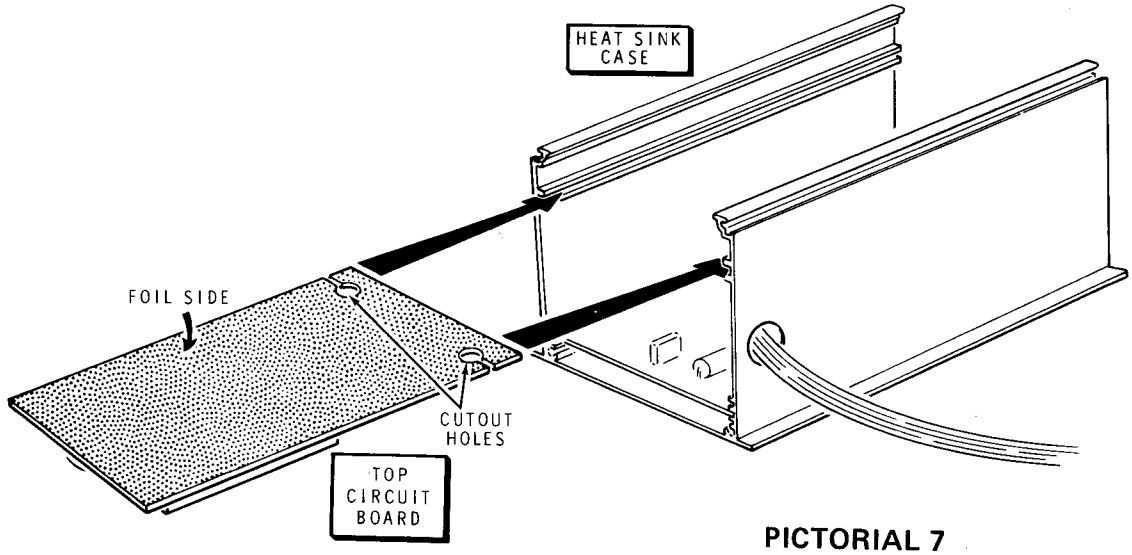
(16) Hold the SCR clip in position and slide the circuit board all the way into the heat sink case. The clip will slightly compress and slide along the inside bottom of the case.

Refer to Pictorial 7 for the following steps.

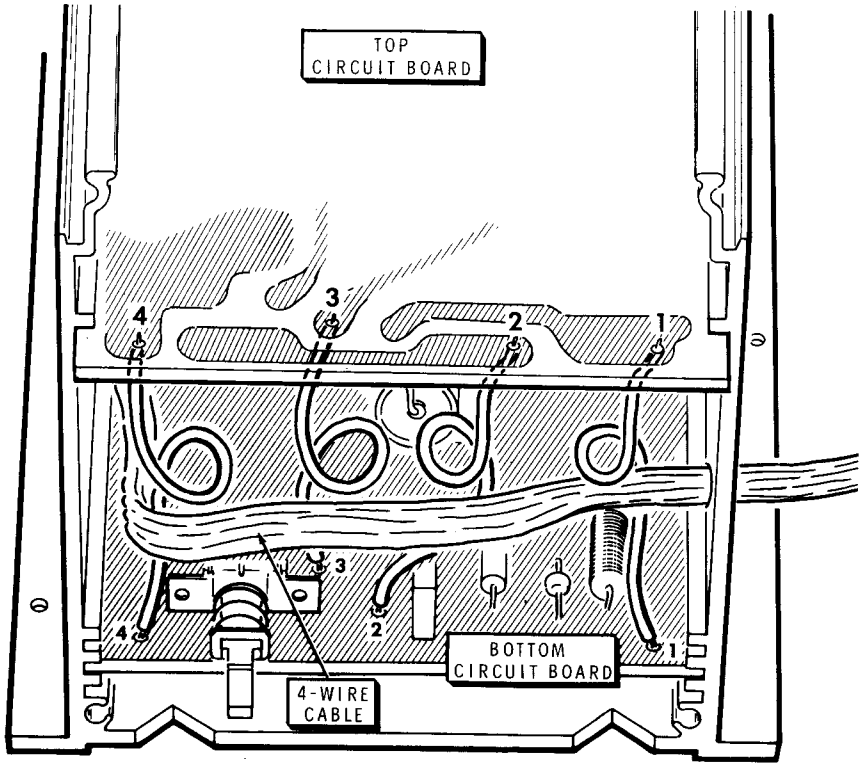
(17) Position the top circuit board (#C-1008) with its foil side up and cutout holes toward the heat sink case as shown.

NOTE: In the following step, it may be necessary to slightly reposition one or more of the components mounted on the top circuit board to avoid their hitting components mounted on the bottom circuit board.

(18) Slide the top circuit board into the slots of the heat sink case. NOTE: If there are three slots at this location, be sure to use the center slot. Leave about 1/2" of the board extending outside the switch end of the case.



PICTORIAL 7



PICTORIAL 8

Refer to Pictorial 8 for the following steps.

(V) Position the 4-wire cable assembly on the outside of the four white wires attached to the bottom circuit board.

NOTE: In the following four steps you will connect the free ends of the four white wires coming from the bottom circuit board to the top circuit board. First, twist together the individual strands of wire at the ends of these wires so they will fit into the circuit board holes. Then insert each wire through its circuit board hole and solder it to the foil. After soldering, cut off any excess wire lengths.

(V) White wire from hole 1 on the bottom circuit board to hole 1 on the top circuit board (S-1).

(V) White wire from hole 2 on the bottom circuit board to hole 2 (S-1) on the top circuit board.

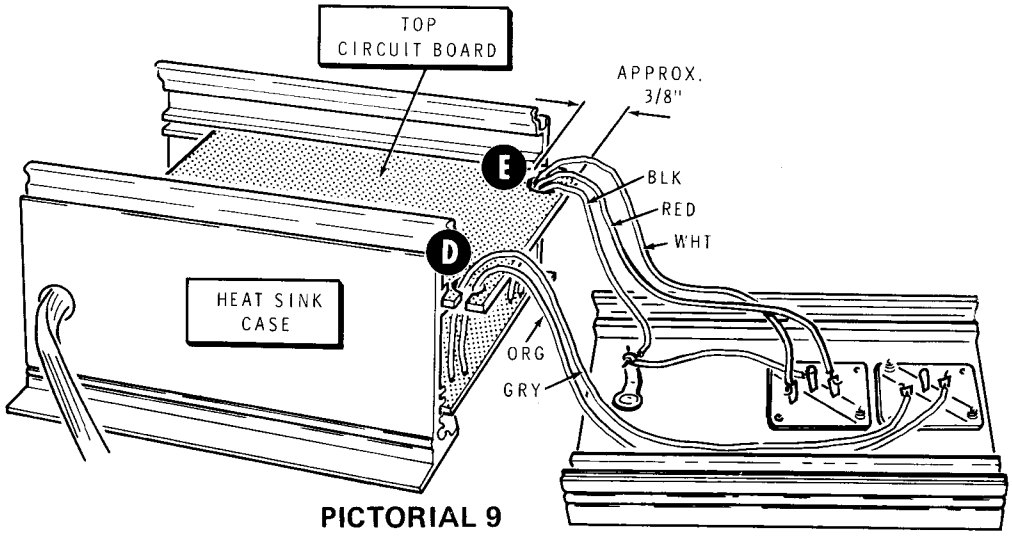
(V) White wire from hole 3 on the bottom circuit board to hole 3 (S-1) on the top circuit board.

(V) White wire from hole 4 on the bottom circuit board to hole 4 (S-1) on the top circuit board.

(V) Closely examine the previous four connections to be sure there are no wire strands that can make contact with any adjacent foil or component.

(V) Slide the top circuit board all the way into the heat sink case.

(V) Refer to the Pictorial and twist a loop in each of the four white wires to take up the excess wire length.



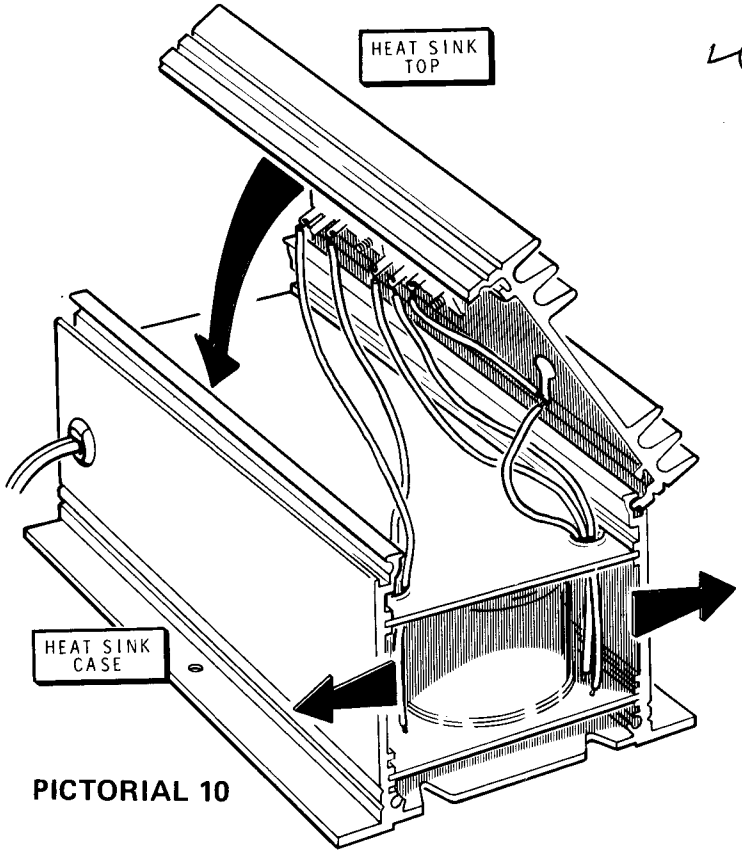
PICTORIAL 9

Refer to Pictorial 9 for the following steps.

(U) Slide the top circuit board until its two holes at D and E extend beyond the end of the heat sink case. You may have to move the bottom circuit board slightly to accommodate this position.

(V) Route the gray wire and the orange wire coming from the bottom circuit board through hole D as shown.

(V) Route the black wire, red wire, and white wire coming from the bottom circuit board through hole E as shown.



PICTORIAL 10

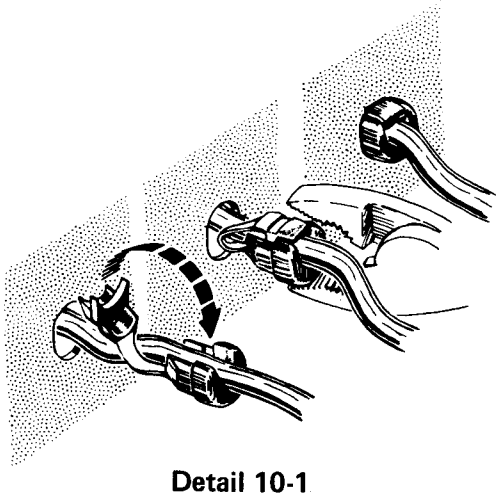
Refer to Pictorial 10 for the following steps.

NOTE: Be very careful not to pinch or scrape any insulation from the wires as you perform the following steps.

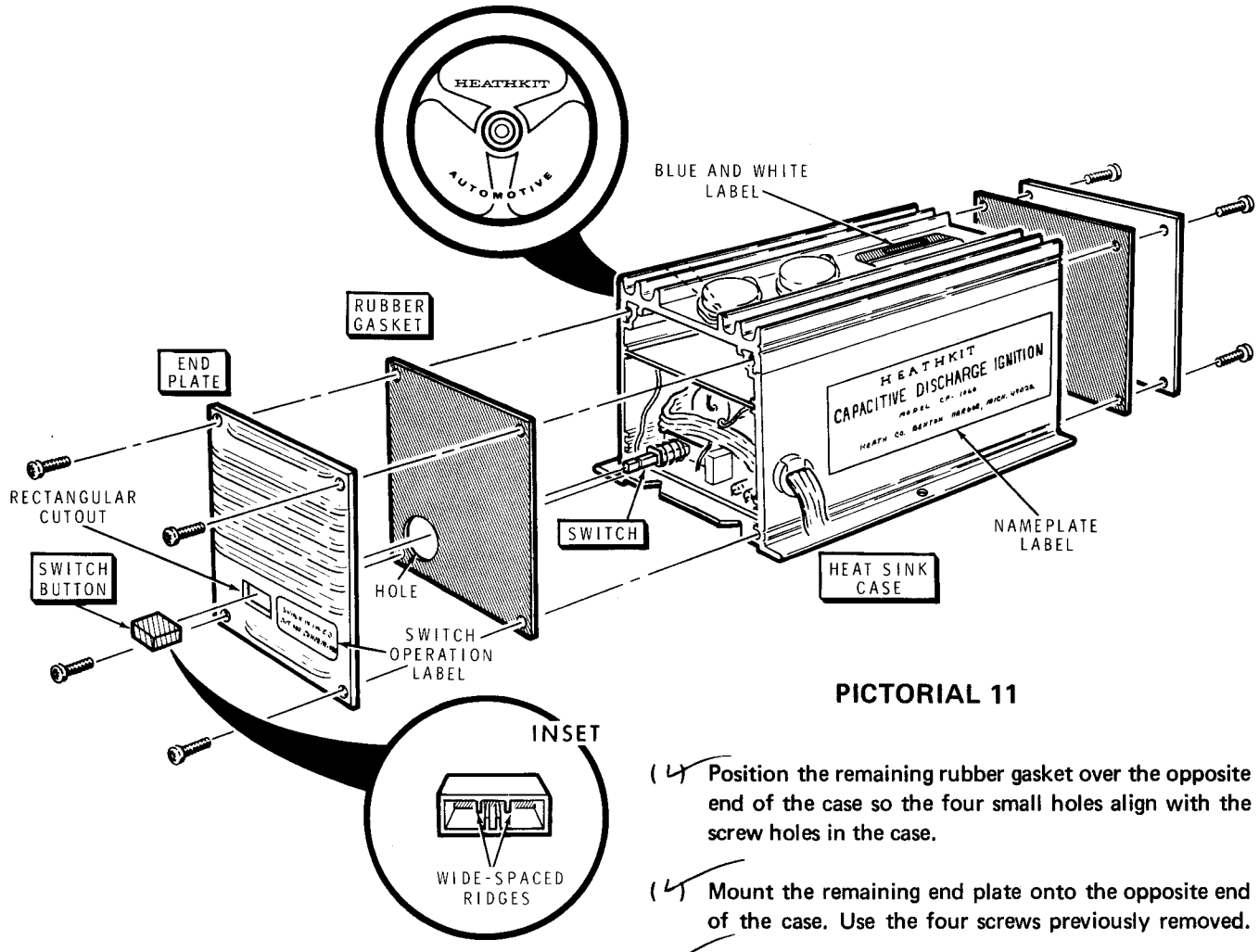
(V) Slide the top circuit board back into position within the heat sink case.

(V) Position one side of the heat sink top into its groove on the top edge of the heat sink case. Then, while you exert a slight outward pressure on the sides of the heat sink case, snap the other side of the heat sink top into position.

(V) Be sure that the 4-wire cable assembly is properly positioned with no excess slack inside the heat sink case. Then refer to Detail 10-1 and install the strain relief on the 4-wire cable assembly and into the 1/2" hole.



Detail 10-1



PICTORIAL 11

Refer to Pictorial 11 for the following steps.

( ) Check to be sure the ends of the heat sink top are even with the ends of the heat sink case.

( ) Position one of the rubber gaskets over the switch end of the heat sink case so the large hole in the gasket fits over the switch and the four small holes align with the screw holes in the case.

( ) Mount the end plate with the rectangular cutout onto the switch end of the case. Use the four screws previously removed.

( ) Carefully peel away the backing paper from the switch operation label. Then press the label onto the flat surface of the end plate as shown.

( ) Refer to the inset drawing and observe the inside of the red plastic switch button. Position this button with its two wide spaced ridges toward the top of the case. Then firmly press the button onto the switch shaft.

( ) Position the remaining rubber gasket over the opposite end of the case so the four small holes align with the screw holes in the case.

( ) Mount the remaining end plate onto the opposite end of the case. Use the four screws previously removed.

( ) Carefully peel away the backing paper from the blue and white identification label. Then press the label on either the case top as shown, or if you prefer, on the outside case bottom. Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.

NOTE: In the following steps you will install the nameplate label on one side of the case, and the Heathkit automotive label on the other side of the case. Therefore, determine where the case will be installed so you can place these labels as you want them viewed. (See the "Installation" information on Page 16 if necessary.)

( ) Carefully peel away the backing paper from the name plate label. Then press the label on the selected side of the case.

( ) Carefully peel away the backing paper from the Heathkit automotive label. Then press the label on the selected side of the case.

This completes the assembly of your Capacitive Discharge Ignition.

PREINSTALLATION CHECK

Your Heathkit Capacitive Discharge Ignition is designed to provide optimum performance with standard (original equipment) coils. The use of special coils, such as transistor or high ratio types, is not desirable and will substantially detract from the performance of the system.

Because of the high output energy of your Heathkit Capacitive Discharge Ignition, it is very important that the high-tension system of your engine be in good condition. Defective or cracked distributor caps or rotors, which may cause an occasional misfire on a conventional ignition system, will usually cause extreme engine roughness when your Heathkit Capacitive Discharge Ignition is placed in the CD (capacitive discharge) mode. High-resistance-type spark plug wires, in particular, must be in good condition* to prevent hard starting and poor performance. If there is any question as to the condition of your high-tension leads, we suggest that you replace the high-tension leads, including the lead between the coil and distributor. New leads are available at most stores that carry automotive supplies.

If you find it necessary to reduce radio noise, an inductive high-tension wire may be used. This type wire is available from Triple-A Specialty Company, 5730 West 51st Street, Chicago, Illinois, 60638.

SPARK PLUGS: To insure optimum performance, use standard heat-range plugs that have been gapped at .040. Surface gap plugs are not recommended. Cold range plugs should be used for racing or extremely high-speed operation. If you install your Heathkit Capacitive Discharge Ignition during the winter months in extremely cold climates, we recommend that you gap the spark plugs to .045.

BALLAST RESISTOR: The ballast resistor or resistance wire is a part in the electrical system of most automobiles, and is normally mounted on the firewall. This resistor (or resistance wire) should be retained if the automobile is to be used for normal street and highway speeds. However, if the automobile is to be used for racing or operation over 5000 rpm, the ballast resistor (or resistance wire) should be bypassed for optimum performance. If you elect to bypass the ballast resistor (or resistance wire), do not operate your Heathkit Capacitive Discharge Ignition in the "switch out" (conventional) mode for prolonged periods of time. To do so may cause burning of the points.

DISTRIBUTOR POINT CONDENSER: This condenser should be retained in your system.

RADIO NOISE SUPPRESSION CAPACITORS: These capacitors may be used with your Heathkit Ignition system but they must not be connected to the coil terminals. One of these capacitors may, however, be connected to the connector on the red terminal strip where the lead from the ignition switch connects. (See Figure 3.)

DEFECTIVE COIL: If your ignition coil has shorted turns or primary-to-secondary shorts, it will cause a rapid failure of the SCR (see the Schematic). If you have any doubt as to the condition of your engine coil, check it with a good coil tester or replace it.

*The resistance of these wires must be 30 kΩ or less (as checked with an ohmmeter) to be considered in good condition.

INSTALLATION

To install your Heathkit Capacitive Discharge Ignition in a typical vehicle, perform the following steps. To install your Ignition system for marine or special engine use, first read "Marine or Special Engine Applications" on Page 18. Then perform the steps under "Typical Vehicle Installation" and modify the steps as necessary to fit your application.

Typical Vehicle Installation

Refer to Figure 3 (fold-out from Page 17) as you perform the following steps.

1. ( ) Check to be sure that the vehicle ignition switch is turned off.

2. ( ) Select a mounting location for your unit. Be sure to consider the length of the 4-wire cable that must extend from the unit to the ignition coil. Also, the 4-wire cable may require support at one or more points along its route, and must be kept away from all high-tension leads and the exhaust manifolds. Be sure that the metal case of the unit is well grounded to the frame of the vehicle. Usually a location on the fire wall or a fender well provides a satisfactory mounting location. However, if you have any doubt as to the unit being well grounded, connect the ground wire provided with your kit by following the instructions on the ground wire wrapper.

3. ( ) Remove the template section from this Manual (located on the fold-in from Page 33). Use the template to mark the location for drilling the three mounting holes.

4. ( ) Drill a 1/8" pilot hole at each of the three marked locations.

5. ( ) Mount the unit with three #8 x 3/8" sheet metal screws and three #8 lockwashers (supplied).

6. ( ) Route the 4-wire cable assembly, supporting it where necessary, from the unit to the ignition coil.

7. ( ) Disconnect and remove all the leads from the positive (+) coil stud where your ignition switch lead is connected. Remove any clips, stampings, or washers that may be on this stud.

NOTE: Four insulated knurled nuts are supplied with your kit. Use two of these knurled nuts to connect the leads coming from the distributor and ignition switch. Use the two remaining knurled nuts or the nuts removed from your coil to connect the terminal boards to the ignition coil studs.

8. ( ) Install the red terminal board with its white wire side attached to the positive (+) coil stud. Then replace only the hardware previously removed from this stud or use an insulated knurled nut. Tighten this connection.

NOTE: If your ignition coil has push-on type connectors (such as those used on Ford products), be careful not to bend the metal contact strips that are located inside the insulation as you connect the leads to the terminal boards.

9. ( ) Connect the leads that you removed from the positive (+) coil stud in step 7 to the red wire (outside) terminal on the red terminal board. Tighten this connection.

10. ( ) Disconnect and remove all the leads from the negative (–) coil stud where your distributor lead is connected. Remove any clips, stampings, or washers that may be on this stud.

11. ( ) Install the green terminal board with its gray wire side attached to the negative (–) coil stud. Then replace only the hardware previously removed from this stud or use an insulated knurled nut. Tighten this connection.

12. ( ) Connect the leads that you removed from the negative (–) coil stud in step 10 to the green wire (outside) terminal on the green terminal board. Tighten this connection.

13. ( ) Push the button switch on your unit to the IN position for capacitive discharge operation.

14. ( ) Check all the wiring and connections made during the above steps. Be sure that each connection was made to the proper point, that each connection is tight, and that all wires are routed away from the manifold and supported as necessary. If the 4-wire cable assembly is too long to be easily accommodated, the excess length may be folded together and secured with tape.

CAUTION: Never short circuit the connections on the red or green terminal board to each other or to ground (any metal part of the vehicle) when the ignition switch is turned on. To do so may cause permanent damage to the unit.

15. ( ) Turn the ignition switch on, but do not start the engine. Then listen for a high-pitched whine coming from the unit. (This sound indicates that the converter is operating.) If no sound can be heard, check again to be sure that the button switch on the unit is in the IN position. If still no sound can be heard, refer to the "In Case of Difficulty" section on Page 27.

16. ( ) Start your engine and check the unit for proper operation. If the engine fails to start within a reasonable time or runs rough, refer to the "In Case of Difficulty" section on Page 27.

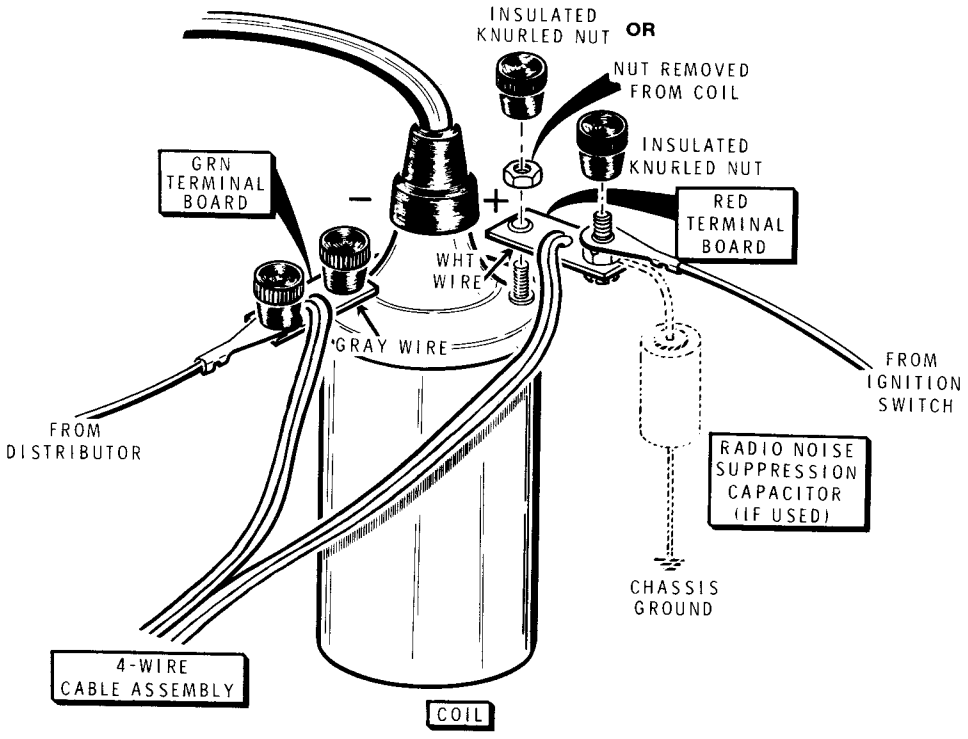

INSULATED
KNURLED NUT
OR
NUT REMOVED
FROM COIL
INSULATED
KNURLED NUT
GRN
TERMINAL
BOARD
RED
TERMINAL
BOARD
WHT
WIRE
GRAY WIRE
FROM
IGNITION
SWITCH
FROM
DISTRIBUTOR
RADIO NOISE
SUPPRESSION
CAPACITOR
(IF USED)
CHASSIS
GROUND
4-WIRE
CABLE ASSEMBLY
COIL

Figure 3

NOTES:

1. Some vehicles that have a generator or alternator warning light may exhibit a tendency to continue running with the ignition turned off. If this problem occurs, it may be solved in either of the following ways:

   a. Change the generator or alternator warning light bulb to one that requires less power for operation, such as a type 1892 or type 53. (These type bulbs are available at most radio supply houses).

   b. Install a 100-volt, 1-ampere diode in series with the generator or alternator warning light wiring. If this method is used, the diode must be installed in the right direction. Temporarily install the diode in one direction; then check to see if the warning light will turn on. If the warning light does not turn on, remove the diode and install it in the opposite direction.

2. Proper analysis of this system requires the use of a laboratory oscilloscope. Major tune-ups should be performed with the button switch on the unit in the OUT position for conventional operation. This enables the use of standard automotive instruments to perform the tune-up, and, with the exception of plug gaps as noted earlier, the use of the manufacturer's tune-up procedures and specifications.

This completes the "Installation" of your unit.

MARINE OR SPECIAL ENGINE APPLICATIONS

Your Heathkit Capacitive Discharge Ignition is ideal for use on a marine engine and does not require any modifications to the system. *However, the engine must have a standard: automotive type battery - distributor - coil ignition system. It cannot be used with magnetos.* In addition, engines having a dual ignition (two or more coils) must use a Heathkit Capacitive Discharge Ignition unit for each coil used in the system.

When you install this unit on a marine system, locate the unit in as dry a location as possible. Also, mount the unit on a metal sheet, such as a .040 aluminum sheet that is about one foot square, to help dissipate the heat generated within the unit when running at high speed. If your unit is to be installed inside an engine compartment, mount this metal sheet vertically with 1/4" to 1/2" standoffs to insure adequate air circulation.

Remember that the unit must have a good ground connection to operate properly. You can provide this ground by attaching an 18 gauge or larger grounding wire between the metal case of the unit and the ground terminal of the battery. The use of a standard coil is required in all applications. Standard plugs should be gapped at .040 for optimum performance.

The Heathkit Ignition system can also be used on propane, butane, and natural gas fueled engines without modification. For these type engines, be sure to follow the manufacturer's specifications for tune-up procedures in all regards - including standard spark plug gapping. If, however, the engine is a conversion (gasoline to butane, etc.), the plugs should be re-gapped to .040 for optimum performance.

TACHOMETER INSTALLATION

This section of the Manual is provided as a guide to help you connect a tachometer when using your new Heathkit Capacitive Discharge Ignition system on your engine.

There are a number of different tachometer types, and each requires different connections. Before you make any connection, refer to the Tachometer Chart and find the Type number of your tachometer. The Type number corresponds to the following paragraphs. If your tachometer is not listed, read paragraph VII to properly identify its type. Some manufacturers make tachometers of more than one type. Read both paragraphs before making any connections.

TACHOMETER CHART

MANUFACTURER	TYPE	MANUFACTURER	TYPE
American Motors	I	Mazda	VI
Arrow	II	Merc Cruiser	II
Austin Healy	I	OMC	II, III
Bendix	I	Ongara	III
BMW	III	Opal	III
Capri	IA	Porsche	III
Chrysler Products	III	RAC	II
Citroen	II	Saab	III
Datsun	IB	Smith/Jaeger	I
Dixco	II	Sprite	I
English Ford	I	Stewart Warner	III, IV
Faria	I	Studebaker	III
Fiat	III	Sun Electric	II, IV
Ford Products	I	Teleflex	II, IV
General Motors	VA	Toyota Celica	II
Heathkit	III	VDO Instruments	III
Knight	VB	Veglia	III
Maserati	III	Volvo	I
		Warner	III

NOTES:

1. Most tachometers are extremely sensitive to dwell settings. Therefore, if your tachometer appears erratic or unstable, check the engine dwell to make sure it is properly set.

2. The use of dual points allow only marginal tachometer operation, and in no way improves the operation of your Heathkit Ignition system. Therefore, we recommend that you remove the normal "make" set of contact points when you install a tachometer. (The normal "make" set are those that close first with normal engine rotation.)

3. Do not disconnect or bypass the ballast resistor or resistance wire (lead from terminal block to coil). To do so, will cause rapid deterioration of points when the CD System is switched to standard ignition.

4. The resistors, diodes, and capacitors are available from electronic parts stores. Ballast resistors are available from automotive parts stores.

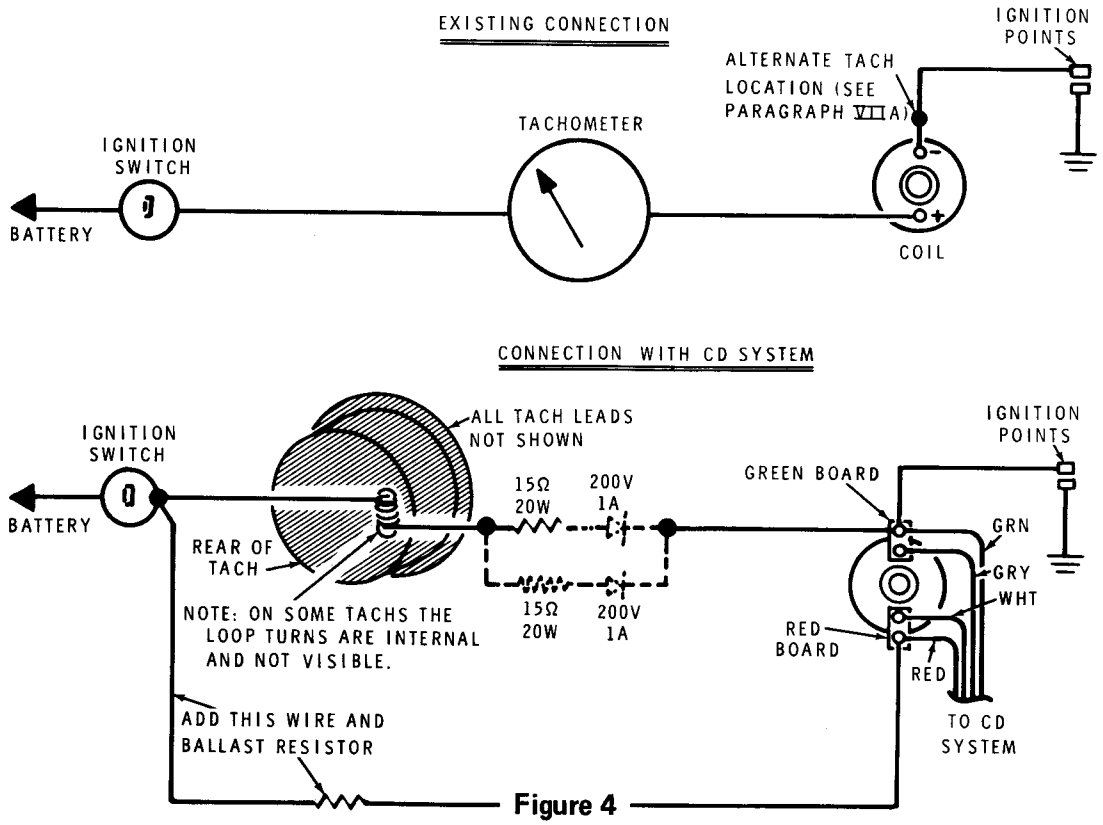


Figure 4

I. PASSIVE SERIES AND SOME ACTIVE SERIES CONNECTED TACHOMETERS

Refer to Figure 4 and connect the tachometer as shown. It is necessary to connect a resistor (15 ohm, 20 watt) and a diode (1 ampere, 200 volt or higher) between the tachometer and the green terminal board (green wire connecting point) on the negative (–) terminal of the ignition coil.

Some tachometers have lower sensitivity than others. These require two resistor and diode sets connected in parallel with each other. See the dotted resistor and diode in Figure 4. This is to correct low readings at higher RPM.

If the engine fails to start with the tachometer connected as explained above, it is necessary to install a standard auto ballast resistor between the ignition switch and the red terminal board (red wire connecting point) on the positive (+) terminal of the ignition coil. See Figure 4.

IA. Capri V6

Models previous to 1973 require a 5 ohm, 50 watt resistor and a 3 ampere, 200 volt diode in series with the tachometer rather than those shown in Figure 4.

Capri 1973 models have a VDO Instrument transistor triggered tachometer, which is covered in paragraph III.

IB. Datsun

In addition to the changes outlined in paragraph I, the Datsun tachometers also require a change to their pickup loop. The single turn loop on the rear of the tachometer must be changed to a six turn loop. To change this loop, cut the existing wires near the loop. Loosen the clamp and discard the single loop. Using 22 gauge insulated wire, form six loops and place them in the clamp assembly. If there is not enough space, leave out the nylon spacer. Splice and tape the new loop ends to the initially cut tachometer wire. This wire is white on most Datsun tachometers.

If the tachometer operates erratically, interchange the loop end connections.

The Datsun 240Z tachometer is removable from under the dashboard by removing the two large wing nuts.

A complete modification kit (Model P/N A-1144) for the Datsun tachometer can be ordered from Delta Products.*

*Delta Products, Inc.
Post Office, Box 1147
Grand Junction, Colorado 81501

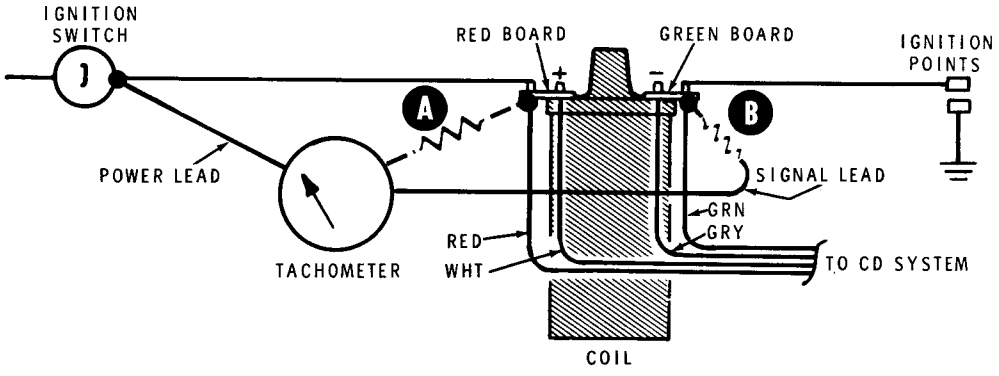


Figure 5

II. TRANSISTORIZED SWITCHING AND PASSIVE SHUNT TACHOMETERS (Operating Up to 5000 RPM)

These tachometers should be connected in accordance with the manufacturer's instructions except the signal lead should be connected to the green terminal board (green wire connecting point) on the negative (-) terminal of the ignition coil. See Figure 5.

Some passive shunt tachometers operate best if the indicated (dotted) wire is removed from ground and connected instead to the ignition switch. See Figure 6.

In case of absent or erratic readings with transistorized tachometers:

IIA. Connect the tachometer power lead through resistor A (3 to 5 ohm, 1/2 watt) to the red terminal (red wire connecting point) on the positive (+) terminal of the ignition coil instead of the ignition switch. See the dotted line in Figure 5. NOTE: This resistor is not always necessary.

1. If the tachometer uses a separate lead for its internal lamp, use a 180 ohm, 1/2 watt for resistor A.

2. Dixco units without a separate lead for the internal lamp require a 22 ohm, 1/2 watt resistor for resistor A.

3. Toyota Celica tachometers require a 470 ohm, 1/2 watt resistor for resistor A.

IIB. In rare cases, it may be necessary to add a resistor at B in series with the signal lead for proper readings. This should be a 1000 ohms to 22k ohms, 1/2 watt resistor (try 1000, 3300, 6800, 10k, and 22k to obtain proper results).

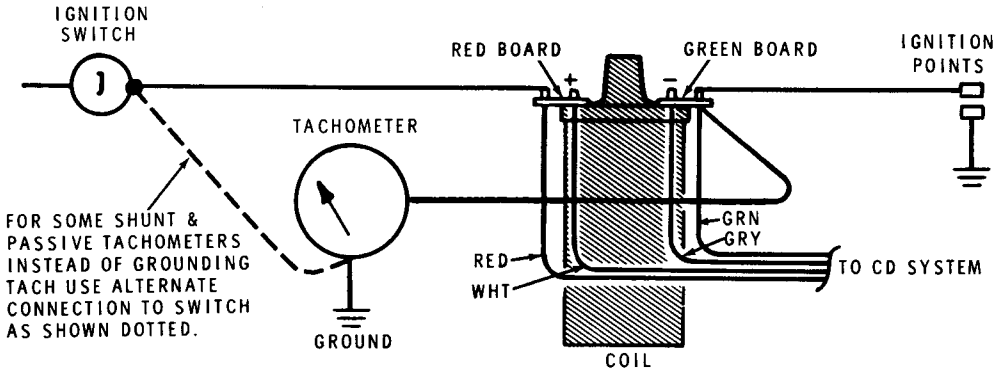


Figure 6

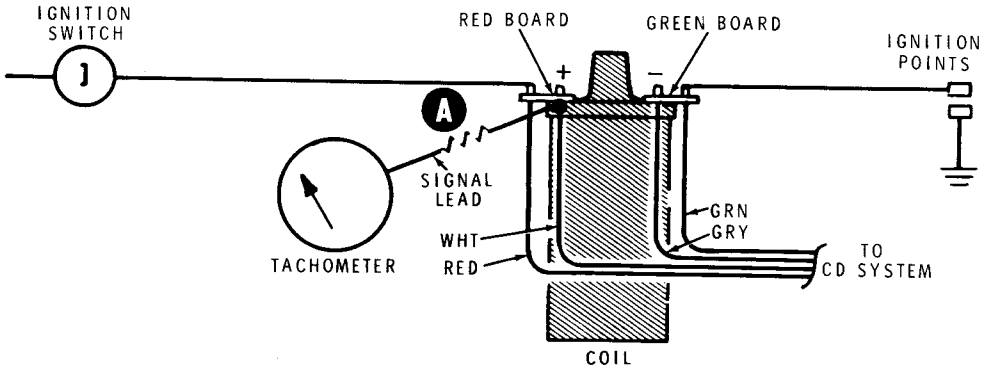


Figure 7

III. TRANSISTORIZED TRIGGERED TACHOMETERS

Connect these tachometers according to the manufacturer's instructions except the signal lead should be connected to the red terminal board (white wire connecting point) on the positive (+) terminal of the ignition coil. See Figure 7.

If the tachometer reading is high or erratic, add a resistor at A (dotted line in Figure 7) in series with the signal lead. Start with a 47k ohm, 1/2 watt resistor and work down to a 10k ohm, 1/2 watt resistor. Use the value resistor that gives proper operation.

IV. RELAY AND SWITCHING TACHOMETERS (Operating Over 5000 RPM)

Reliable operation of these tachometers can only be insured if the adapter circuit shown in Figure 8 is used. An assembled adapter (Model TA-200) can be ordered from Delta Products*.

The ignition point lead and the tachometer signal lead must be securely connected to the white wire of the adapter. Use a bolt and then tape the connection.

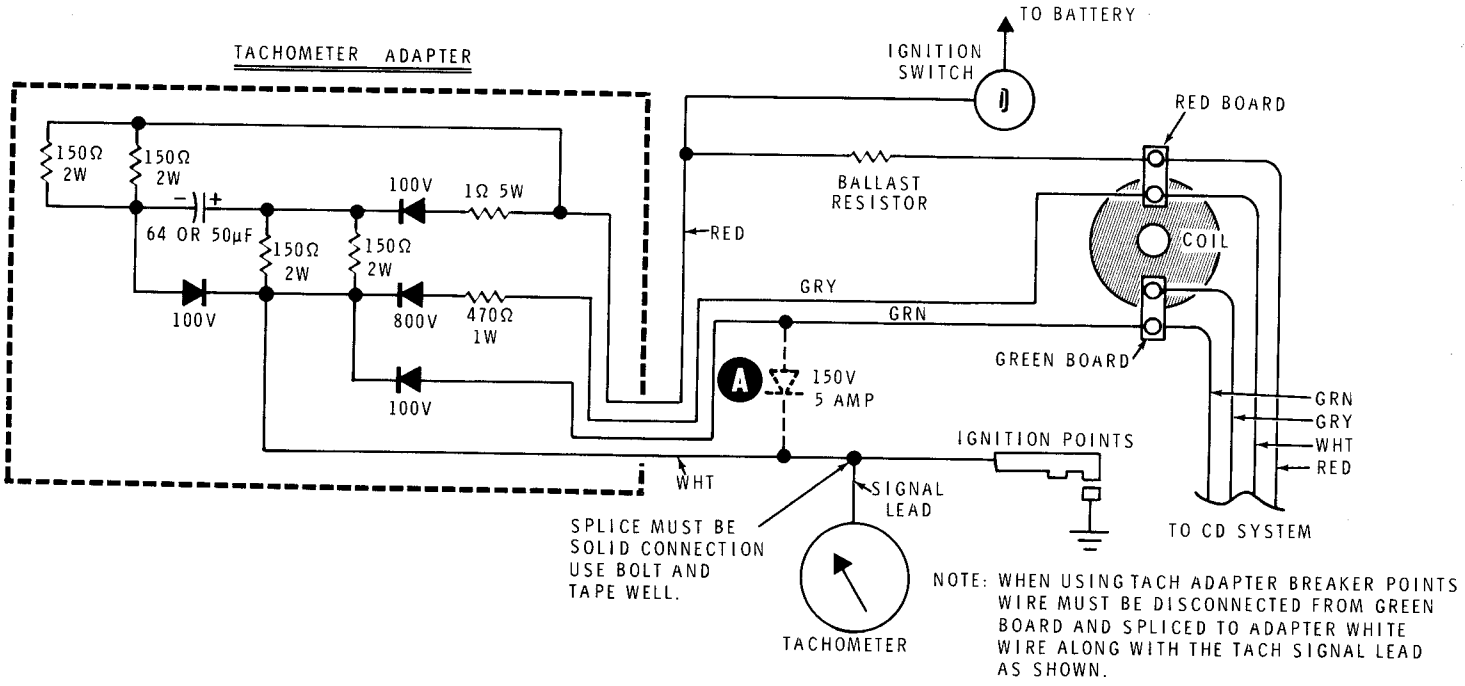


Figure 8

It may be necessary to readjust the relay spring on Relay tachometers. Make this adjustment as follows:

1. Remove the screw from the sending unit.
2. Insert a small screwdriver in the hole of the sending unit and turn the adjustment very slightly until the tachometer reading is steady over the entire RPM range.
3. Replace the screw removed from the sending unit.

For reliable operation when switching to standard ignition you must:

1. Install a diode (5 ampere, 150 V or higher) at A. See the dotted line in Figure 8.
2. Or, place a jumper wire in place of the diode at A in Figure 8.

* Delta Products, Inc.
Post Office, Box 1147
Grand Junction, Colorado 81501

V. PASSIVE TACHOMETERS

VA. General Motors

Connect these tachometers according to the manufacturer's instructions except, connect the tachometer signal lead to the green terminal board (green wire connecting point) on the negative (–) terminal of the ignition coil. See Figure 9.

On older units, it may be necessary to adjust the control (located inside case) to correct the low reading (new units read properly).

VB. Knight-kit 340

Connect these units in accordance with the manufacturer's instructions except:

1. Connect the red tachometer lead to the green terminal board (green wire connecting point) on the negative (–) terminal of the ignition coil. See Figure 10.
2. And connect the tachometer white lead to ground. See Figure 10.

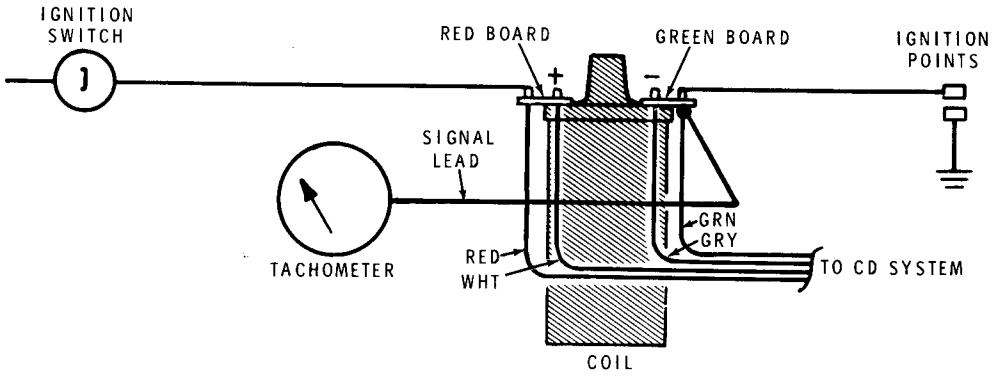


Figure 9

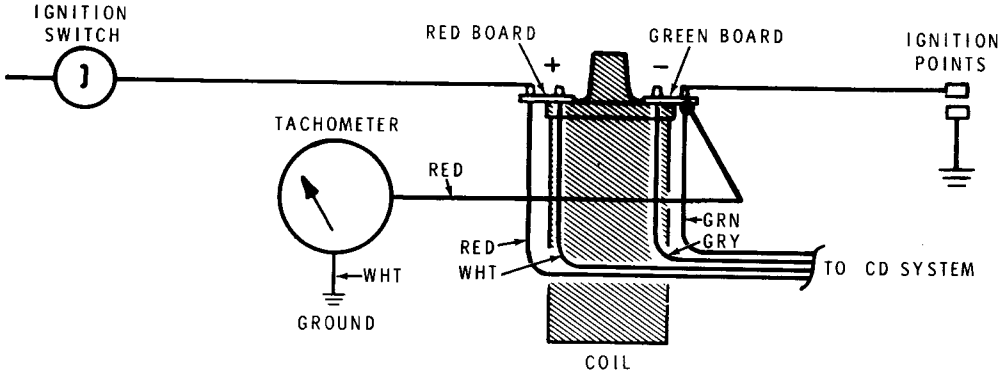


Figure 10

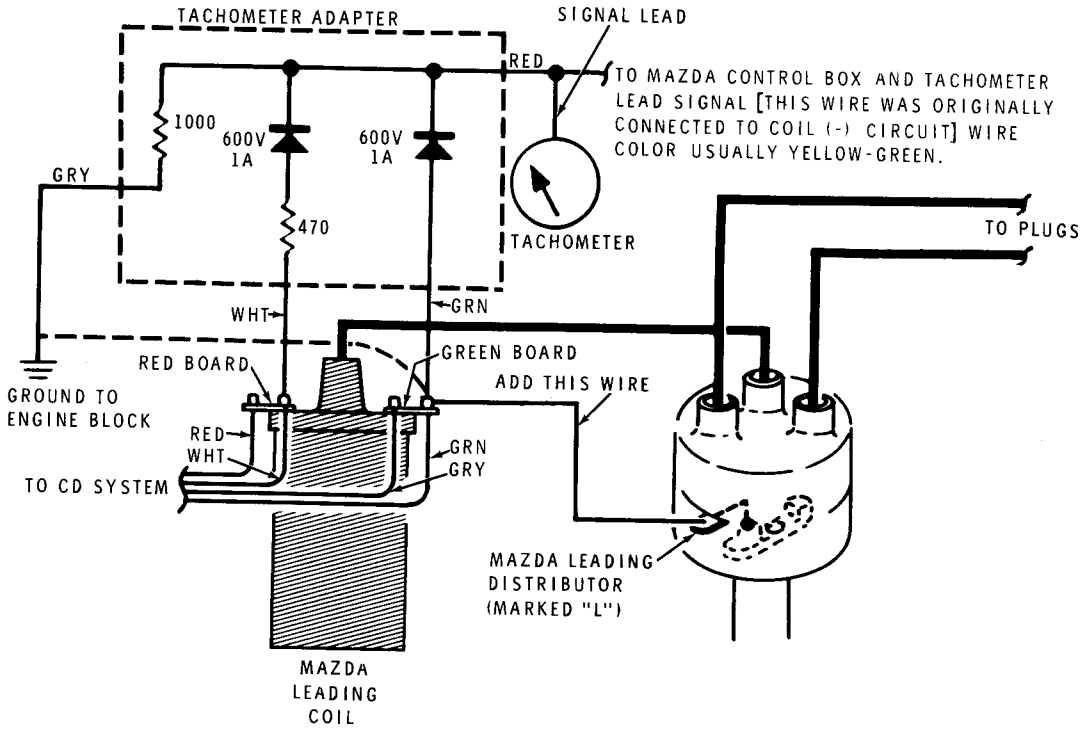


Figure 11

VI. MAZDA TACHOMETER

The tachometer adapter circuit shown in Figure 11 is required for operation of the Mazda Tachometer with the Heathkit CD System. This adapter (Model TA-610) is available from Delta Products*.

* Delta Products, Inc.
Post Office, Box 1147
Grand Junction, Colorado 81501

Refer to Figure 11 and make the wire changes and connections as follows:

1. Disconnect the lead (usually yellow-green) from the negative (–) terminal of the leading ignition coil.
2. Disconnect the lead (usually yellow-green) from the leading distributor (marked "L").
3. Connect either of these leads (yellow-green) to the red lead of the adapter circuit.
4. Tape the other lead (yellow-green) to prevent a short circuit.
5. Add a new lead from the leading distributor (marked "L") to the green terminal board (green wire connecting point) on the negative (–) terminal of the leading ignition coil.
6. Connect the remaining gray, green, and white leads of the adapter circuit as shown in Figure 11.

NOTE: If the tachometer reading is erratic, remove the gray wire of the adapter circuit from ground and connect it to the green terminal board (green wire connecting point) on the negative (–) terminal of the leading ignition coil. See the dotted line in Figure 11.

VII. UNLISTED TACHOMETERS

There are a number of tachometers that are not listed in the Tachometer Chart. Before these tachometers are connected, they must be identified by type.

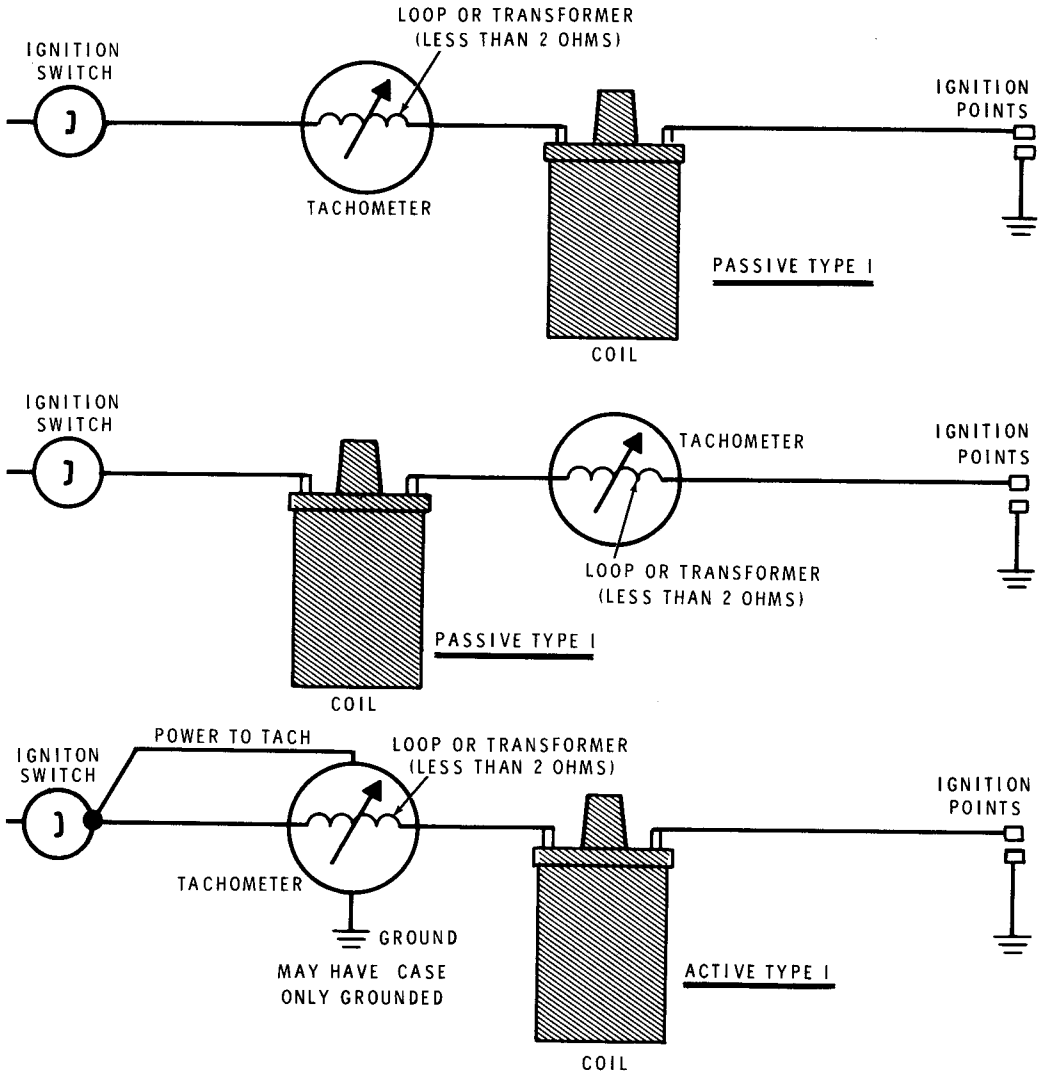


Figure 12

To establish the type, match your original standard tachometer connections to one of the following typical connection figures. Each figure indicates the tachometers type. These type numbers correspond to the paragraph numbers. Use the information following that paragraph to connect your tachometer.

The lamp leads are separate on many tachometers and are not shown. Ballast resistors have also been omitted from the figures.

VIIIA. Series Connected Installed with Standard Ignition (See Figure 12)

Series connected tachometers when installed according to the manufacturer's instructions may exhibit high erratic, or zero readings. They may also register as soon as the ignition is turned on without the engine running. These tachometers should be installed according to the Type I instructions.

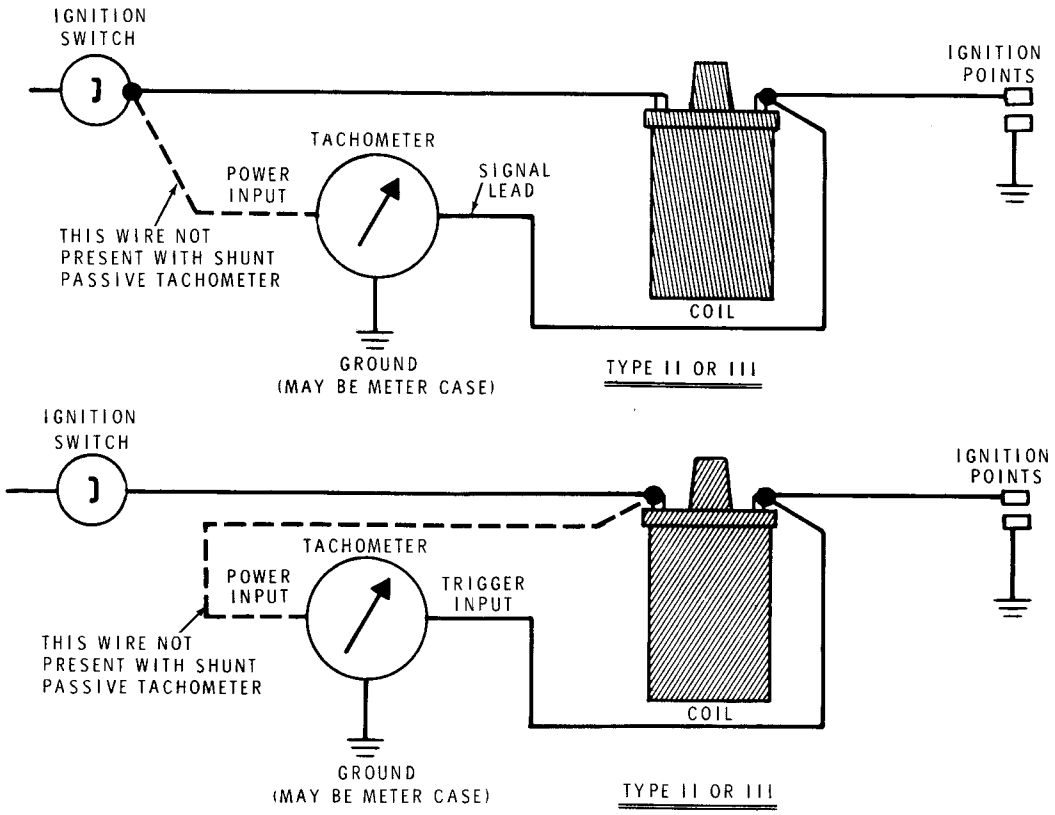


Figure 13

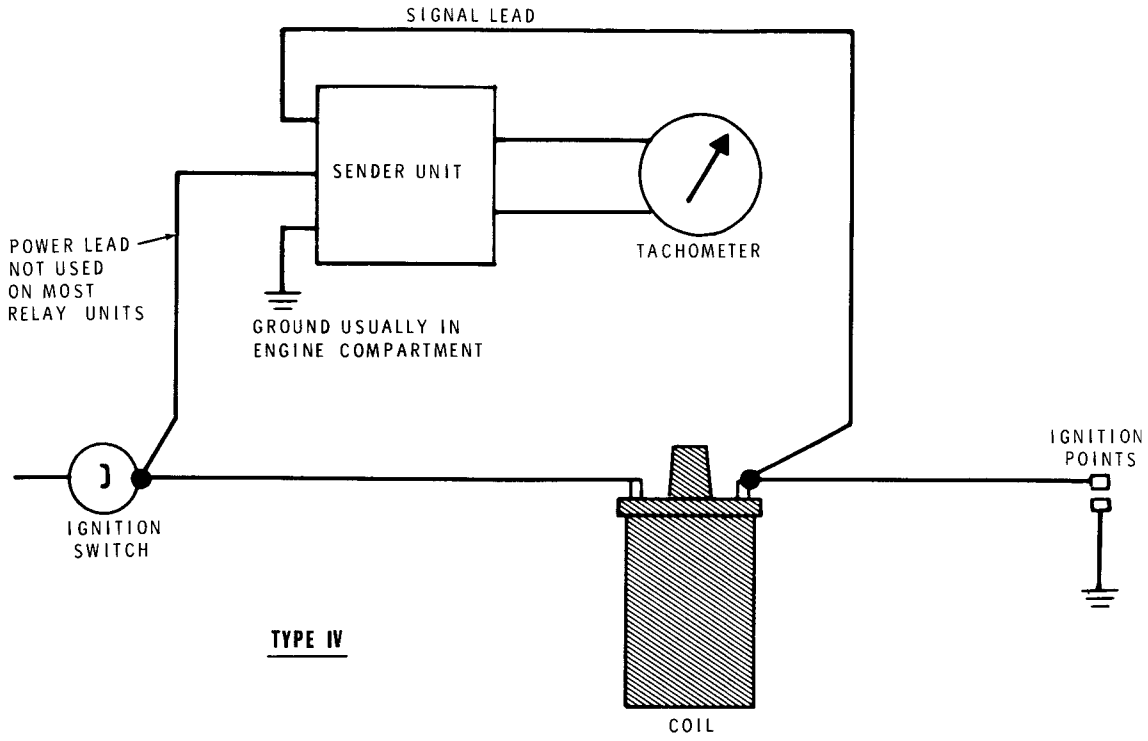


Figure 14

VIIB. Transistor Switching, Transistor Triggered, and Shunt Passive Installed with Standard Ignition (See Figure 13)

Switching, triggered, or shunt passive tachometers when installed according to the manufacturer's instructions can show normal, erratic, or no readings. See the Type II instructions. NOTE: If you are in doubt as to whether your tachometer is a switching or triggered type, try the Type IIA or IIB remedies first to prevent possible damage to the tachometer.

Triggered tachometers will have a zero reading. In this case see the Type III instructions.

VIIC. Relay Tachometer Installed with Standard Ignition (See Figure 14)

Relay tachometers when installed according to the manufacturers instructions usually exhibit erratic or zero readings. Install these tachometers according to the Type IV instructions.

IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your unit is assembled and installed.

The second part, titled "Troubleshooting Guide," will help you service your unit if the "General Troubleshooting Information" fails to clear up the problems, or if difficulties occur after your unit has been in use for some time. The "Troubleshooting Guide" lists a number of possible difficulties that could arise, along with several possible solutions to those difficulties.

NOTE: Refer to the "Circuit Board X-Ray View" on Page 33 for the physical location of parts on the circuit boards.

GENERAL TROUBLESHOOTING INFORMATION

1. Recheck the installation wiring of your unit to the engine. Be sure that each wire or cable is connected to the correct point and that the connection is tight. Remember that the metal case of the unit must have a good ground connection to the frame of the vehicle (or the ground side of the battery) to operate properly.

2. Recheck the internal wiring in the unit. Trace each lead in colored pencil on the Pictorial as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistantly overlooked by the Kit Builder.

3. 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, many troubles can be eliminated by reheating all connections to make sure that they are soldered as described in the "Soldering" section of the "Kit Builders Guide."

4. Check to be sure that each transistor and diode is correctly connected in the circuit. These components will not function if their leads are connected to the wrong points.

5. Check the value of the parts. Be sure in each step that the proper part has been wired into the circuit, as shown in the Pictorial diagrams. It would be easy, for example, to install a 1000 Ω (brown-black-red) resistor where a 1 MΩ (brown-black-blue) resistor should have been installed.

6. Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring or between parts on the circuit boards.

7. A review of the "Circuit Description" may also help you determine where the trouble is located.

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 inside the front cover.

TROUBLESHOOTING GUIDE

If the engine runs rough when the button switch is placed in the IN position for capacitive discharge operation, proceed to Part IV of this guide.

If the engine runs rough only at high engine rpm when the button switch is placed in the IN position for capacitive discharge operation, proceed to Part V of this guide.

If the engine will not start, proceed with the following steps.

( ) Place the button switch on the unit to the IN position for capacitive discharge operation.

( ) Turn the ignition on, but do not start the engine.

( ) Listen for a high-pitched whine coming from the unit. If you hear this sound, proceed to Part II of this guide. If you do not hear this sound, continue with the following steps.

( ) Turn the ignition off.

( ) Connect the points lead (green wire of the 4-wire cable) to a good vehicle ground point such as the frame or the grounded side of the battery.

( ) Turn the ignition on, but do not start the engine.

( ) Again, listen for an audible whine coming from the unit. If you hear this sound, proceed to Part III of this guide. If you do not hear this sound, continue with the following step.

( ) Check for one or more of the difficulties listed in Part I below.

Part I (Unit will not whine)

1. Metal case of the unit is not well grounded to the frame of the vehicle.

2. The red wire of the 4-wire cable is not connected to the circuit board.

3. The fuse wire was not installed on the circuit board or has blown (opened due to excessive current). If the fuse is blown, check for the following:

   A. Capacitor C1 installed backward.

   B. Solder bridges on circuit board foils.

   C. Solder bridges or short circuits across leads or associated wiring of transistors Q1 and Q2.

4. One or more transistor leads not properly connected to the circuit board.

5. Transformer T1 secondary shorted to its primary. Check for solder bridges or wiring errors on the C-1007 circuit board.

6. Resistors R1, R2, R3, or R4 not of correct value. Check the color codes against the step-by-step instructions to be sure that one or more of these resistors is not of the wrong value.

7. Diodes D1, D2, D3, or D4 either shorted or not positioned on the circuit board as called for in the step-by-step instructions.

8. Solder bridge(s) across the SCR leads or on its associated foil(s).

9. Capacitor C2 shorted.

Part II (Unit whines, but will not operate)

1. SCR is not properly connected. Check the connection of each lead for poor solder connections and/or solder bridges.

2. Resistors R10, R11, or R12 not of the correct value. Check the color codes against the step-by-step instructions to be sure that one or more of these resistors is not of wrong value.

3. Resistor R5 poorly connected to the circuit board.

4. Shorted circuit board foils in the vicinity of R11, C6, or C7.

5. Resistor R6 not of the correct value. Check the color code against the step-by-step instructions.

6. Choke L1 and/or capacitor C2 improperly connected to the circuit board.

7. Green, white, and/or gray wires of the 4-wire cable connected to the wrong point or not making a good connection.

Part III (Unit whines with green wire grounded)

1. Transistor Q3 improperly installed.

2. Resistors R7, R8, or R9 not of the correct value. Check the color codes against the step-by-step instructions to be sure that one or more of these resistors is not of the wrong value.

3. Solder bridge across either the leads or foils of R9, C3, C4, C5, or Q3.

Part IV (Rough engine with capacitive discharge operation)

1. High-tension wires in poor condition. Old or defective high-tension wiring may operate perfectly with a conventional ignition system. However, these same wires often prove inadequate for handling the much higher voltages that are present with capacitive discharge operation. Therefore, you should check this wiring very carefully and replace it if there is any doubt as to its condition.

2. Spark plug(s) are incorrectly gapped.

3. Engine dwell and/or timing is incorrectly set.

PART V (Rough engine at high engine rpm)

1. Points floating and/or timing is incorrectly set.

2. Resistors R7, R8, R9, R10, R11, or R12 not of the correct value. Check the color codes against the step-by-step instructions to be sure that one or more of these resistors is not of the wrong value.

3. Capacitor C3 and/or C4 poorly connected to the circuit board.

4. Diodes D1, D2, D3, or D4 not positioned correctly on the circuit board as called for in the step-by-step instructions.

5. Transistors Q1 and/or Q2 improperly wired.

6. Resistor R1, R2, R3, and/or R4 not of the correct value.

SPECIFICATIONS

Nominal Input	12-14-volt battery with generator or alternator system.
Maximum Input	18 volts DC.
Triggering Source	Ignition points or generator capable of switching 40 ohm load to ground within 1 volt.
Output Pulse Duration	0.6 milliseconds at low battery voltage and low rpm. Typical: 8.5 volts at 500 rpm with ballast resistor in system. 0.4 milliseconds at normal battery voltage and normal rpm. Typical: 12-14 volts at 500-4000 rpm. 0.2 milliseconds at high battery voltage and high rpm. Typical: 14.5 volts at 6,000 rpm.
Maximum Allowable Ignition Point Contact Resistance	7 ohms.
Minimum Allowable Ignition Point Shunting Resistance	100 ohms.
Typical Open Circuit Voltage with Standard Coil	Cranking, 8-volt input; greater than 26 KV. 500 rpm, 12-volt input; greater than 38 KV. 6,000 rpm, 14-volt input; greater than 40 KV.
Dimensions	3-3/4" wide x 3-1/8" high x 6" deep.
Weight	1-3/4 lbs.

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 (fold-out from Page 33) while you read this "Circuit Description."

When the ignition switch is turned on and the points are closed, the nominal 12 volts DC supplied from the vehicle battery is applied to the converter circuit. This circuit consists of the primary winding of transformer T1 and transistors Q1 and Q2. The battery voltage causes a current flow through two paths of resistance. One path consists of resistors R1 and R2, and the other path consists of resistors R3 and R4. Because the combined resistance of R3 and R4 is less than the combined resistance of R1 and R2, a slightly larger current flows in the lower half of the primary winding of T1 than in its upper half.

Since the lower half of the primary winding carries a slightly higher current than does its upper half, voltages are developed that tend to increase the conduction of transistor Q2, while at the same time decrease the conduction of transistor Q1. This action tends to reinforce the original current unbalance, and results in voltages that further drive Q2 into conduction and Q1 into cutoff.

Transistor Q2 remains in conduction, with transistor Q1 cut off, until current through the lower half of the primary winding can no longer increase. This reduces the voltage supplied to transistor Q2 and causes it to reduce conduction.

At the same time, the collapsing magnetic field of the transformer develops voltages that are of opposite polarity to the original voltages. These opposite polarity voltages bring transistor Q1 into conduction and, at the same time, drive transistor Q2 into cut off. Capacitor C1 is used to filter out noise transients before they reach the converter circuit.

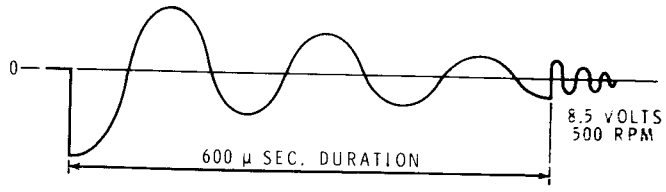
The alternate conduction of transistors Q1 and Q2 convert the 12 volts DC to an alternating signal of approximately 400 volts at the secondary of transformer T1. The diode bridge (diodes D1 through D4) changes the alternating signal to a DC potential of about 400 volts, which causes capacitor C2 to charge through the engine's ignition coil. During this same time, battery voltage is applied through resistor R5 to the points. Capacitors C6 and C7, along with resistor R12, serve as a filter to prevent false triggering of the SCR by any random voltage variations.

As the first cylinder comes up on compression and reaches the position where its spark plug should fire, the points open. At this time, the voltage through R10 and R12 turns the SCR on and short circuits the power supply. The effect of this short circuit is reflected to the primary of T1, where it removes the drive from transistors Q1 and Q2 and stops the converter operation. The SCR also connects the positive side of capacitor C2 to the negative (−) ignition coil connection and thus forms a closed circuit consisting of C2, the SCR, and the primary winding of th ignition coil. This connection allows capacitor C2 to deliver its stored charge to the ignition coil and causes the voltage in its primary winding to rise from zero to some 400 volts in approximately two microseconds.

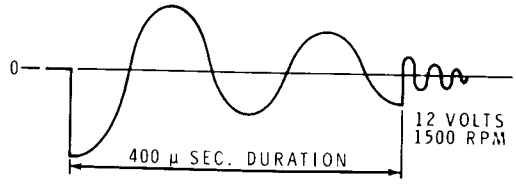
In the closed circuit made up of capacitor C2, the SCR, and the primary winding of the ignition coil, a resonant tank circuit is formed between the primary winding and the capacitor. As capacitor C2 delivers its stored charge through the SCR to the primary winding of the ignition coil, it creates a magnetic field within the coil. This field, representing stored energy, collapses when C2 reaches a zero charge, thus maintaining current through the primary winding of the ignition coil in the same direction as before. This current continues to flow in the circuit until C2 is charged in a reverse direction to approximately 300 volts. At this point, the current attempts to reverse and causes the SCR to turn off. The reverse voltage causes the diode bridge to conduct as a short circuit and discharges capacitor C2 back to zero from its reverse charge, and continues charging it to near its original voltage. This transfer of energy between the primary winding of the ignition coil and capacitor C2 continues until transistor Q3 is caused to turn on. Diode D5 and the RF choke are used to control the turn on characteristics of the SCR.

The turn on characteristics of transistor Q3 are determined by capacitors C3 and C4. Resistors R7, R8, and R9 form a voltage divider that allow C3 and C4 to charge to about 6 volts. At low engine rpm, or low battery voltage, these capacitors must charge for a longer period of time before they can reach the voltage necessary to turn on Q3. Under these conditions, Q3 remains cut off to allow capacitor C2 to deliver its full energy to the ignition coil. At high engine rpm, or high battery voltage, these capacitors retain some residual charge that enables them to reach the turn on voltage of Q3 sooner and thus lower the overall amount of energy delivered to the ignition coil. Figure 15 shows a comparison of waveforms at the positive (+) side of the coil for different engine rpm's and battery voltages. Capacitor C5 serves to prevent any erratic triggering of transistor Q3.

LOW ENGINE RPM AT LOW BATTERY VOLTAGE



NORMAL ENGINE RPM AT NORMAL BATTERY VOLTAGE



HIGH ENGINE RPM AT HIGH BATTERY VOLTAGE

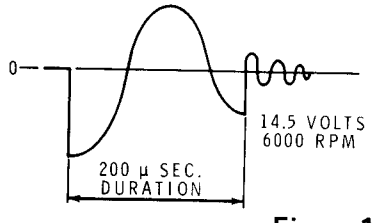
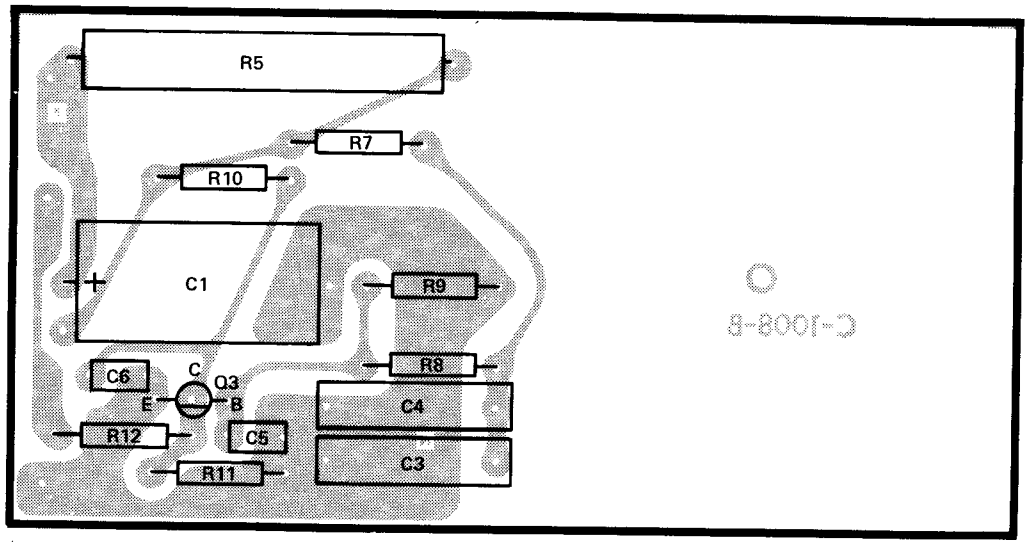


Figure 15

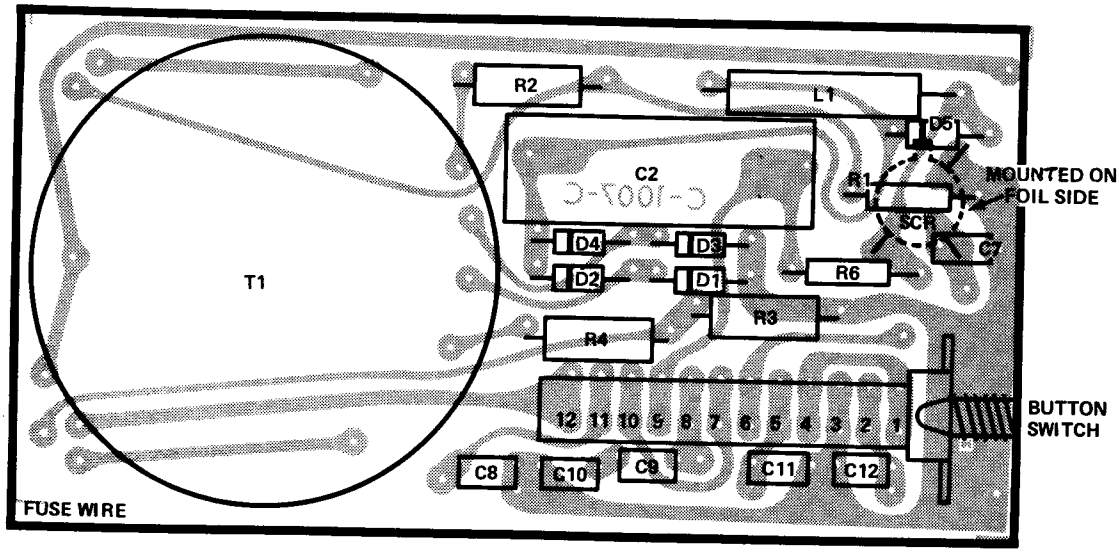
CIRCUIT BOARD X-RAY VIEWS

NOTE: To identify a part shown in one of these Views, so you can order a replacement, proceed as follows:

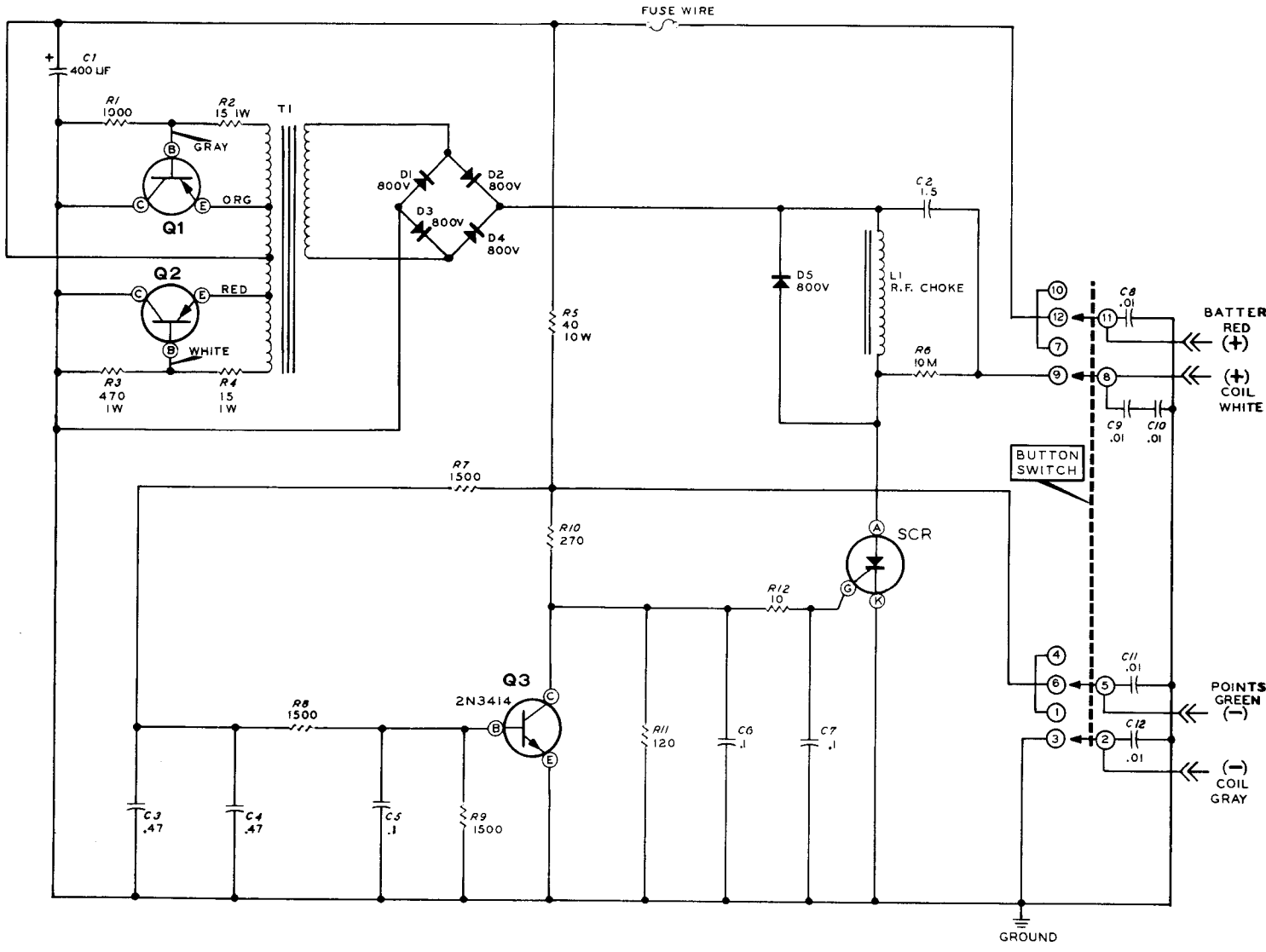
1. Note the identification number of the part (R-number, C-number, etc.).
2. Locate the same identification number (next to the part) on the Schematic. The "Description" of the part (for example: 1500 Ω, .1 MFD., or 2N3414) will also appear near the part.
3. Look up this Description in the Parts List.



TOP CIRCUIT BOARD
(#C-1008)
Viewed from the lettered side of the board

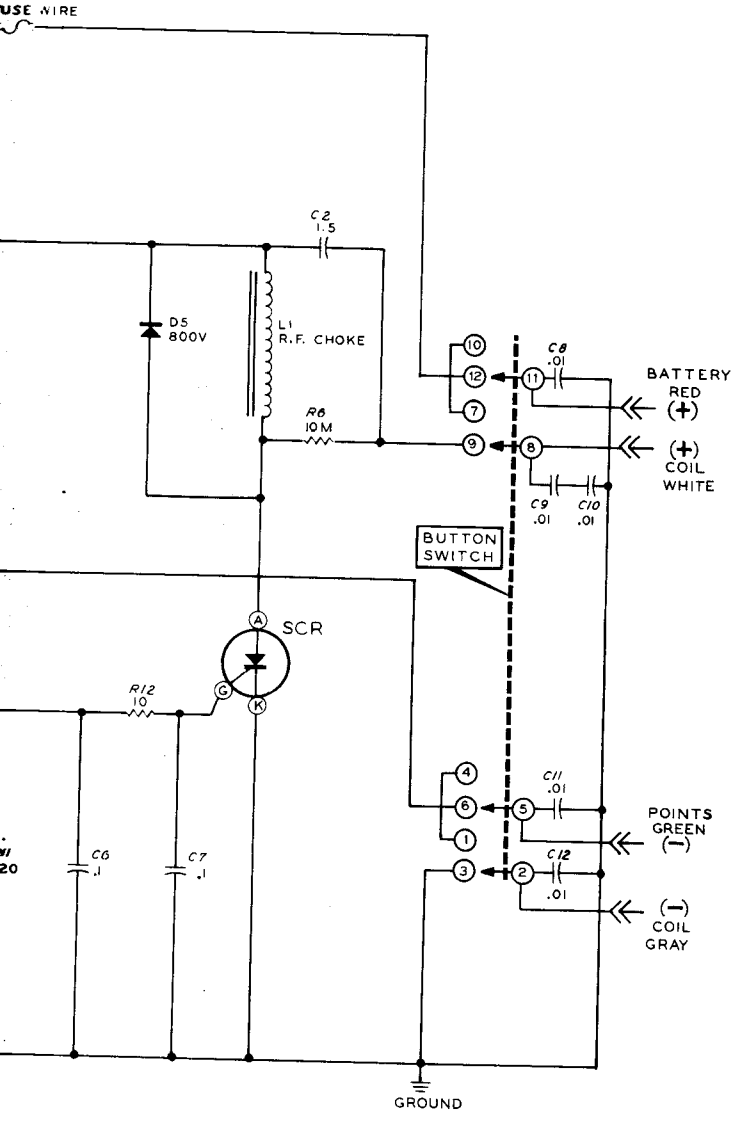


BOTTOM CIRCUIT BOARD
(#C-1007)
Viewed from the lettered side of the board



SCHEMATIC OF THE HEATHKIT® CAPACITIVE DISCHARGE IGNITION MODEL CP-1060

1. ALL RESISTORS ARE 1/2 WATT UNLESS MARKED OTHERWISE.
2. ALL CAPACITOR VALUES ARE IN MF (μF).
3. THE BUTTON SWITCH IS SHOWN IN THE CAPACITIVE DISCHARGE (C.D.) POSITION.
4. EACH OF THE NUMBERED BUTTON SWITCH TERMINALS REPRESENTS A DUAL CONTACT.
5. ---------- THIS SYMBOL INDICATES A MECHANICAL CONNECTION WITHIN THE BUTTON SWITCH.
6. ⏚ THIS SYMBOL INDICATES A VEHICLE OR CHASSIS GROUND CONNECTION.
7. ⋘ THIS SYMBOL INDICATES A CONNECTION TO THE 4-WIRE CABLE.



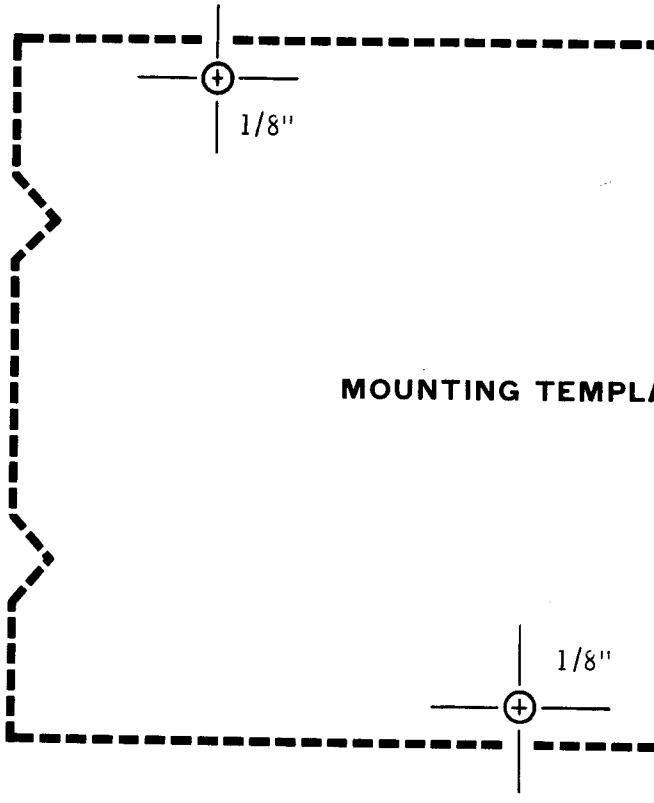
IC OF THE
HKIT®
HARGE IGNITION
CP-1060

5. ------- THIS SYMBOL INDICATES A MECHANICAL CONNECTION WITHIN THE BUTTON SWITCH.

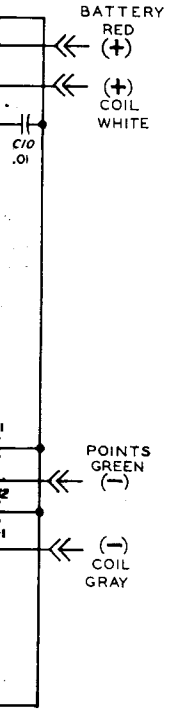
6. ⏚ THIS SYMBOL INDICATES A VEHICLE OR CHASSIS GROUND CONNECTION.

7. ⟵ THIS SYMBOL INDICATES A CONNECTION TO THE 4-WIRE CABLE.

CUT ALONG DOTTED LINE TO REMOVE TEMPLATE



MOUNTING TEMPL

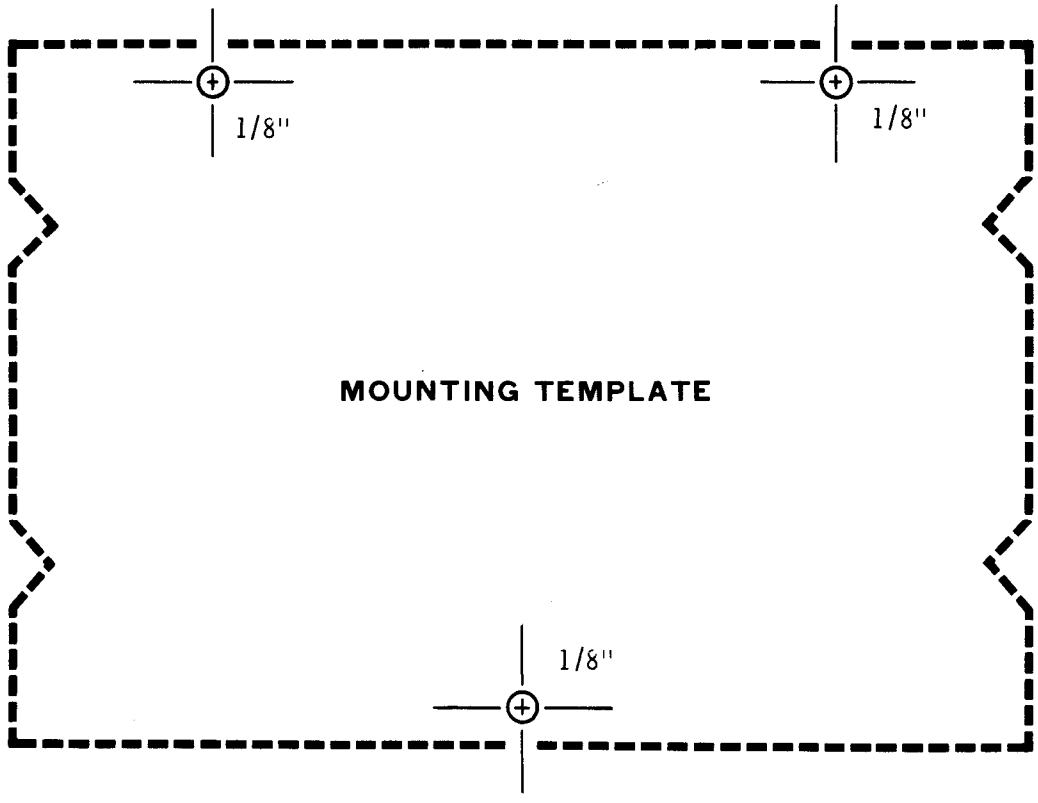


MECHANICAL
TTON SWITCH.

VEHICLE OR
ON.

CONNECTION

CUT ALONG DOTTED LINE TO REMOVE TEMPLATE



EXPEDITED PARTS ORDER FORM
(FOR REPAIR PARTS ONLY)

PLEASE DO NOT WRITE IN THIS SPACE

(1) Give Part Numbers as they are in parts list.

(2) Include remittance or permission for C.O.D. shipment. ☐ CASH ☐ C.O.D.

(3) Use separate sheet of paper for all correspondence.

(4) Prices may change to reflect current manufacturing costs.

(5) Current **HEATH** account number **AA**

KIT MODEL _____

DATE OF PURCHASE _____

SERIES NUMBER _____

QTY.	PART NUMBER	DESCRIPTION	PRICE	TOTAL PRICE	MARK PROPER SPACE FOR WARRANTY PARTS ONLY 3 DAMAGED	2 DEFECTIVE	1 MISSING

HEATH COMPANY
BENTON HARBOR
MICHIGAN 49022
PHONE 616-983-7381

NAME _____
ADDRESS _____
CITY _____
STATE _____

THIS FORM IS FOR U.S. CUSTOMERS ONLY. OVERSEAS CUSTOMERS SEE YOUR DISTRIBUTOR.

CUT ALONG DOTTED LINE

EXPEDITED PARTS ORDER FORM
(FOR REPAIR PARTS ONLY)

PLEASE DO NOT WRITE IN THIS SPACE

(1) Give Part Numbers as they are in parts list.

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HEATH COMPANY
BENTON HARBOR
MICHIGAN 49022
PHONE 616-983-7381

NAME _____
ADDRESS _____
CITY _____
STATE _____

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CUSTOMER SERVICE

REPLACEMENT PARTS

If you need a replacement part, please fill in the Parts Order Form that is furnished and mail it to the Heath Company. Or, if you write a letter, include the:

- **Part number** and **description** as shown in the **Parts List.**
- Model number and Series number from the blue and white label.
- Date of purchase.
- Nature of the defect.

Please do not return parts to the factory unless they are requested. Parts that are damaged through carelessness or misuse by the kit builder will not be replaced without cost, and will not be considered in warranty.

Parts are also available at the Heathkit Electronic Centers listed in your catalog. Be sure to provide the Heath part number. Bring in the original part when you request a warranty replacement from a Heathkit Electronic Center.

NOTE: Replacement parts are maintained specifically to repair Heathkit products. Parts sales for other reasons will be declined.

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.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit C.O.D. 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.) 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