

Heathkit® Manual

for the

CROSSFIRE
Model HD-3006

595-3232

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

Copyright © 1984
Heath Company
All Rights Reserved
Printed in the United States of America

TABLE OF CONTENTS

Introduction	2	Specifications	26
Assembly Notes	3	Circuit Description	26
Parts List	7	Semiconductor Identification Charts	27
Step-By-Step Assembly	9	Circuit Board X-Ray View	28
Initial Tests	21	Schematic Diagram (Illustration Booklet, Page 4)	
Calibration	22	Warranty	inside front cover
Operation	23	Customer Service	inside rear cover
In Case Of Difficulty	24		
Troubleshooting Chart	25		

INTRODUCTION

The Heathkit Model HD-3006 Crossfire is a visual tuning indicator for radioteletype (RTTY) communication. There are sixteen LED's that make up the tuning display. The eight vertical LED's are for the mark signal and the eight horizontal LED's are for the space signal. When tuning in a signal, you tune for a maximum number of vertical and horizontal LED's.

The HD-3006 Crossfire has a wide input voltage range and is compatible with almost any interface / terminal unit that has oscilloscope outputs for tuning. The Crossfire is a versatile tuning indicator that eliminates the need for an oscilloscope for this type of communication.

PARTS LIST

Unpack the kit and check each part against the following list. The key numbers correspond to the numbers on the "Parts Pictorial" (Illustration Booklet, Page 1). Return any part that is packed in an individual envelope, with the part number on it, back to the envelope after you identify it until that part is called for in a step. Do not discard any packing material until after you locate all of the parts.

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

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

ELECTRONIC COMPONENTS

NOTE: The following resistors are rated at 1/4-watt and have a tolerance of 5%.

A1	6-222-12	2	2200 Ω (red-red-red) resistor	R1, R6
A1	6-184-12	2	180 k Ω (brn-gry-yel) resistor	R2, R5
A2	10-946	2	500 k Ω control	R3, R4
A3	21-140	2	.001 μ F (1000 pF) ceramic capacitor	C1, C2
A4	25-837	2	1.5 μ F tantalum capacitor	C4, C5
A5	25-891	1	470 μ F electrolytic capacitor	C3
A6	56-56	2	1N4149 diode	D21, D22
A6	57-65	4	1N4002 diode	D1, D2, D3, D4
A7	61-48	1	Rocker switch	SW1
A8	150-94	1	Power cube	
A9	412-634	16	LED (light-emitting diode)	D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20

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

Electronic Components (Cont'd.)

NOTES:

- Integrated circuits (ICs) may be marked for identification in any of the following four ways:
 - Part number.
 - Type number. (This refers only to the numbers and letters shown in **bold** print in the Parts List. Disregard any other numbers and letters on the IC.)
 - Part number and type number.
 - Part number with a type number other than the one listed.
- Some ICs are packed in conductive foam. Do not remove these ICs from the foam until a step directs you to install them.

A10	442-54	1	UA7805 IC	U1
A11	442-718	2	LM3915 IC	U2, U3

HARDWARE

B1	250-1307	4	#6 \times 1/4" sheet metal screw
B2	250-1325	4	6-32 \times 1/4" screw
B3	252-3	7	6-32 nut
B4	254-1	8	#6 lockwasher
B5	255-49	4	Round spacer

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

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

CONNECTORS — SOCKETS

C1	432-72	2	Male terminal pin
C2	432-73	2	Female terminal pin
C3	432-196	1	2-pin plug shell
C4	432-907	1	2-pin socket shell
C5	434-42	2	Phono socket
C6	434-310	2	18-pin IC socket
C7	438-4	2	Phono plug

MISCELLANEOUS

	85-2955-1	1	Circuit board
E1	90-1325-1	1	Top cover
E2	90-1326-1	1	Chassis
E3	261-29	4	Foot
	344-52	24"	Red wire
	344-55	18"	Green wire
E4	490-5	1	Nut starter
		1	Package of solder

PRINTED MATERIAL

D1	390-2638	1	Front panel label*
D2		1	Blue and white label*
	597-260	1	Parts Order Form*
		1	Assembly Manual (See Page 1 for the part number.)

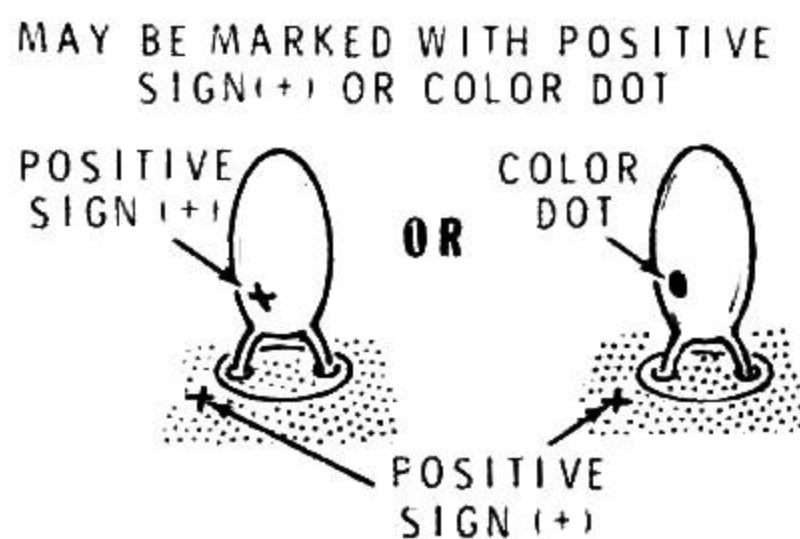
*These items may be packed inside the Manual.



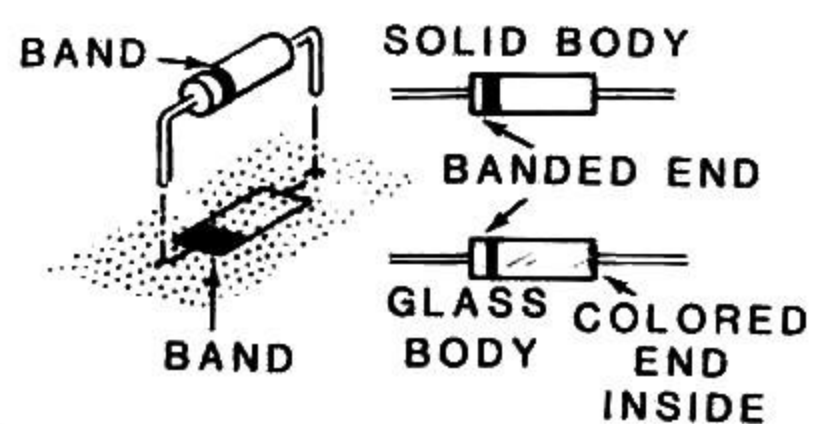
Section 1

Start at the top of Section 1 and install the following resistors. The sequence of the steps matches the locations of the components on the circuit board.
NOTE: Make sure you installed resistor R6 in an earlier step.

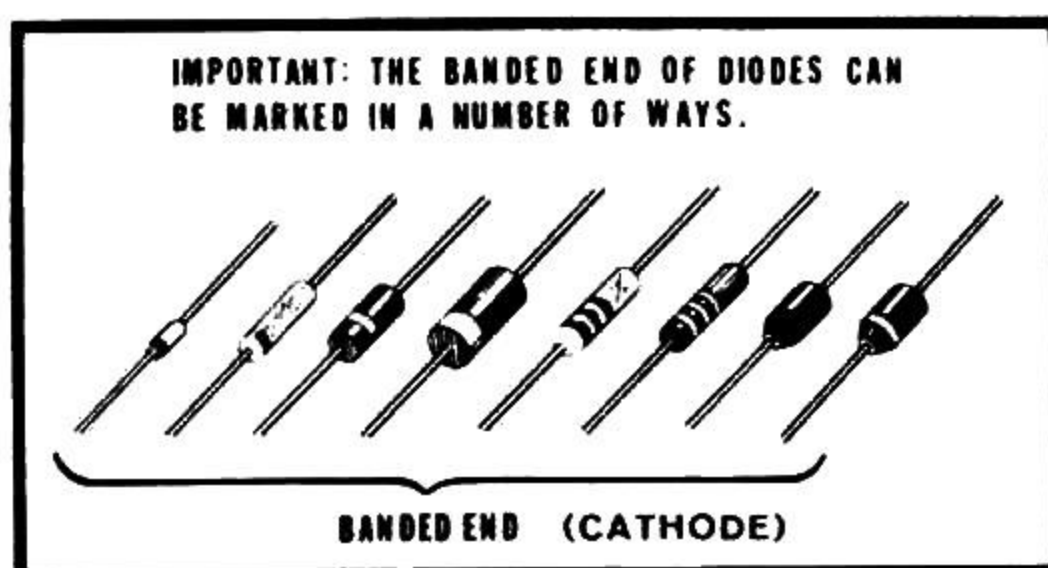
- () R5: 180 k Ω (brn-gry-yel).
- () C5: 1.5 μ F tantalum. Make sure you position the marked end as shown.



NOTE: In some of the following steps, you will install diodes. Whenever you install a diode, always match the banded end of the diode with the band mark on the circuit board. A diode will not work properly if it is installed backwards.



CAUTION: ALWAYS POSITION THE BANDED END OF A DIODE AS SHOWN ON THE CIRCUIT BOARD.



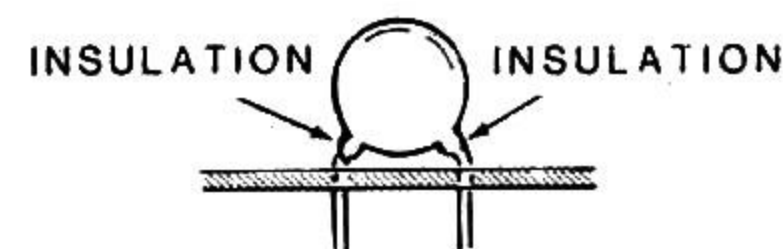
- () D2: 1N4002 diode (#57-65).
- () D4: 1N4002 diode (#57-65).
- () D3: 1N4002 diode (#57-65).
- () Solder the leads to the foil and cut off the excess lead lengths.

Section 2

Install components in Section 2 of the circuit board as follows:

- () D22: 1N4149 diode (#56-56).

NOTE: When you install ceramic capacitors, do not push the insulated portion of the leads into the circuit board holes. This could make it difficult to solder the leads to the foil.



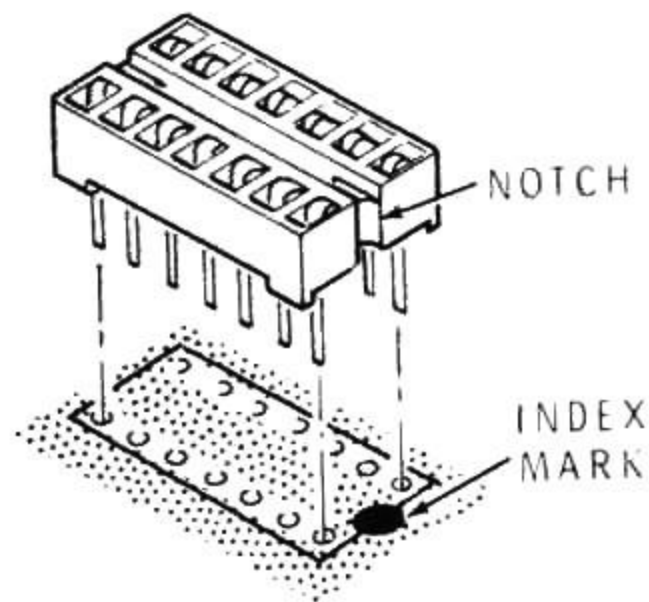
- () C2: .001 μ F (1000 pF) ceramic.
- () C1: .001 μ F (1000 pF) ceramic.
- () D1: 1N4002 diode (#57-65).
- () R1: 2200 Ω (red-red-red).
- () D21: 1N4149 diode (#56-56).
- () R2: 180 k Ω (brn-gry-yel).
- () C4: 1.5 μ F tantalum. Be sure to match the marked end with the positive (+) mark on the board.
- () Solder the leads to the foil and cut off the excess lead lengths.

Heathkit®

Refer to Pictorial 1-2 (Illustration Booklet, Page 2) for the following steps.

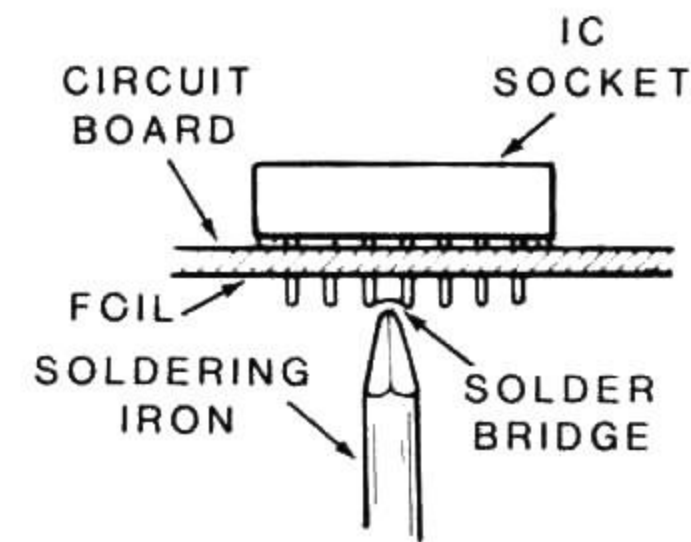
NOTES:

1. In the following steps, you will install IC sockets. To install an IC socket, make sure the pins are straight. Then start the pins into the circuit board holes. The index mark on the circuit board must still be visible after you install the socket. Solder the pins to the foil as you install each socket.



2. It is very easy to form a solder bridge between foils when you install an IC socket. After you install each socket, carefully inspect the foil for solder bridges and remove any that you find as described in the next column. If you suspect that you have a solder bridge, but are not positive, you can check your foil pattern against the one shown on Page 28.

To remove a solder bridge, hold the circuit board component-side-up as shown and hold your soldering iron tip between the two points that are bridged. The solder will flow down the soldering iron tip.



Install the IC sockets on the circuit board as follows:

- () Two IC sockets at U2 and U3.

Use the procedure shown in Detail 1-2A when you are directed to install the ICs.

() U3, U2: LM3915 (#442-718).

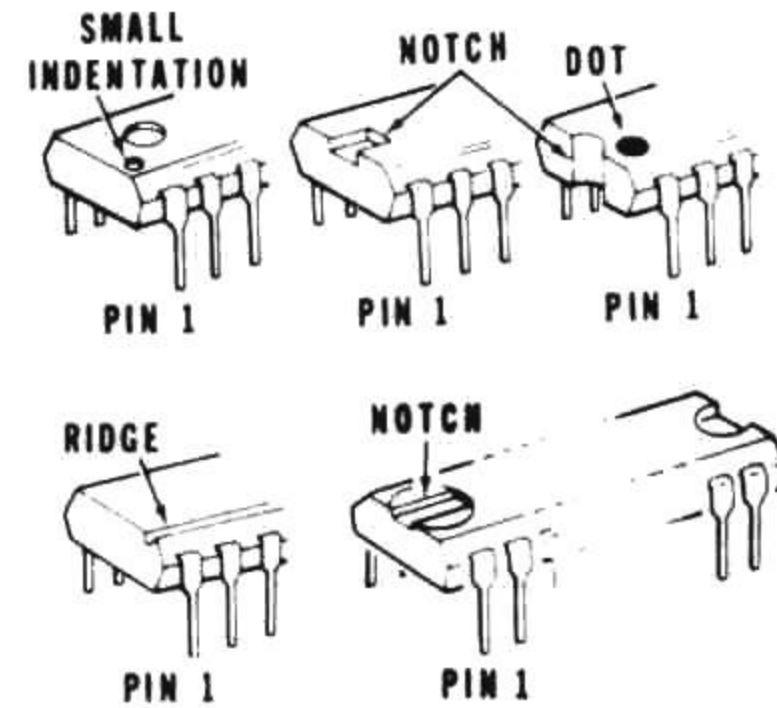
The pins on the IC's may be bent out at an angle, so they do not line up with the holes in the IC socket. DO NOT try to install an IC without first bending the pins as described below. To do so may damage the IC pins or the socket, causing intermittent contact.



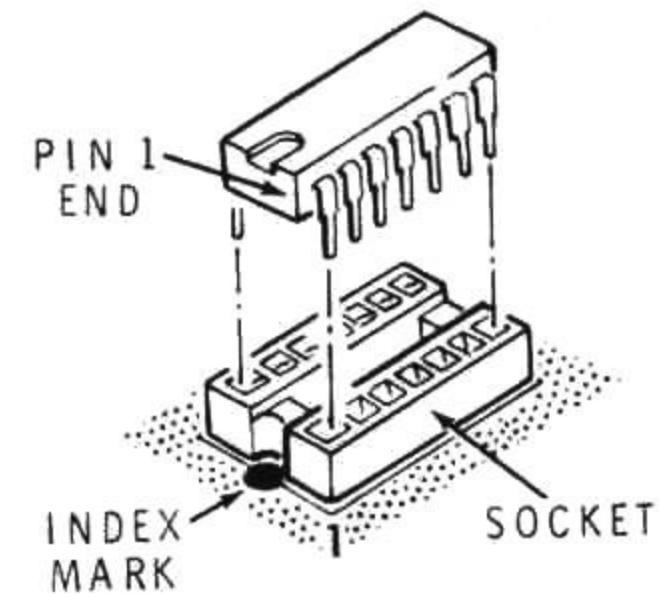
Before you install an IC, lay it down on its side as shown below and very carefully roll it toward the pins to bend the lower pins into line. Then turn the IC over and bend the pins on the other side in the same manner.



Compare the IC to the drawing shown below. Then determine which end of the IC is the pin 1 end.



Position the pin 1 end of the IC over the index mark on the circuit board. Then start the IC pins into the socket. Make sure that all of the pins are started into the socket. Then push the IC firmly into the socket. NOTE: An IC pin can become bent under the IC and it will appear as though it is correctly installed in the socket.



Detail 1-2A

Heathkit®

- () Place the chassis as shown in Pictorial 1-4 (Page 16) and slide four round spacers over the threaded studs. Then return to this page and complete the steps.

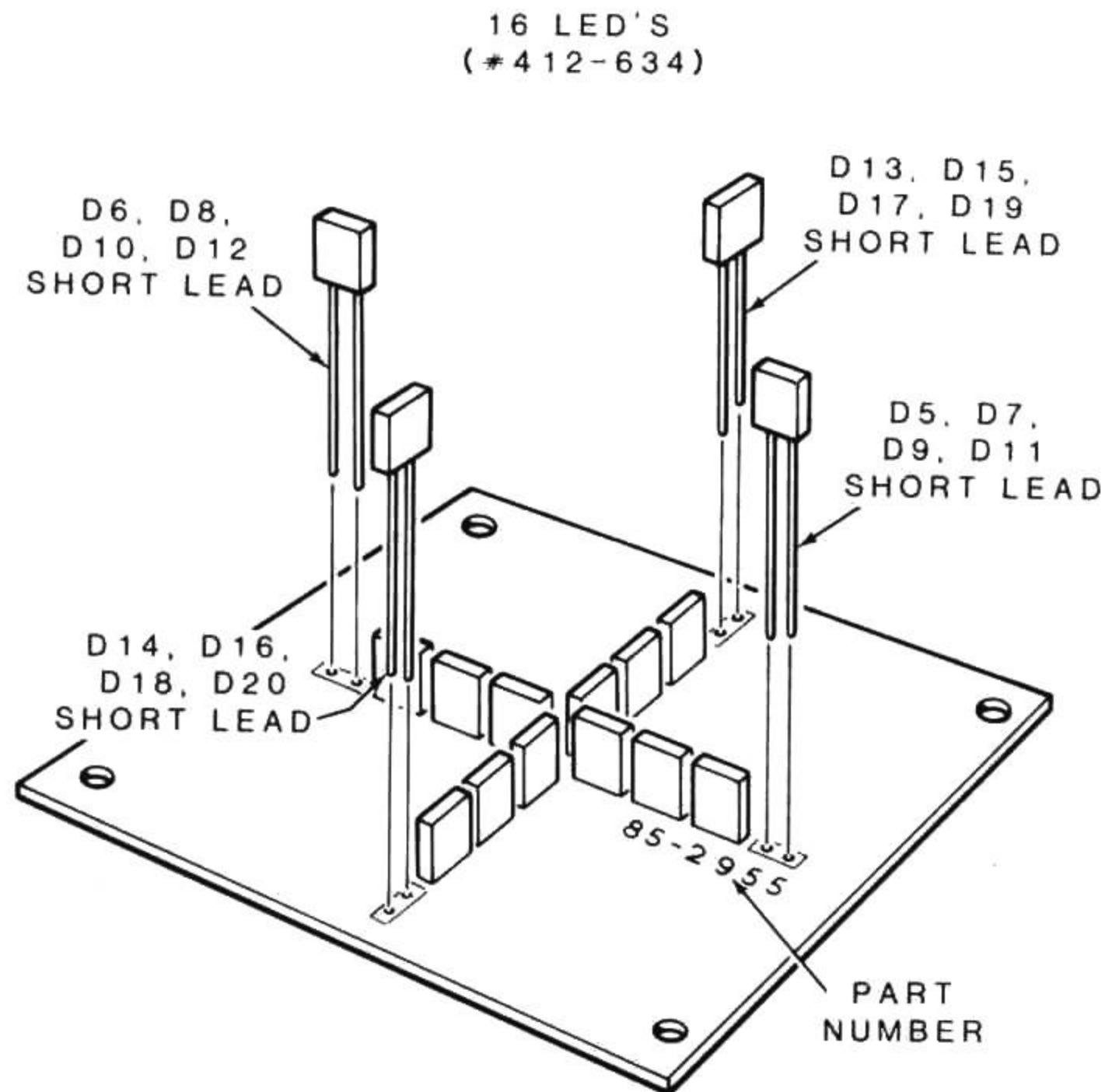
Refer to Pictorial 1-3 for the following steps.

- () Turn the circuit board over so the foil side is up and position it so the part number 85-2955 is readable as shown.

NOTE: Before you install the following LED's, make sure the leads are straight.

Insert the LEDs (#412-634) into the circuit board holes at the following locations. When you install the LED's, make sure the shorter lead is positioned as called out in the Pictorial. **DO NOT SOLDER ANY OF THE LEADS TO THE FOIL UNTIL YOU ARE INSTRUCTED TO.**

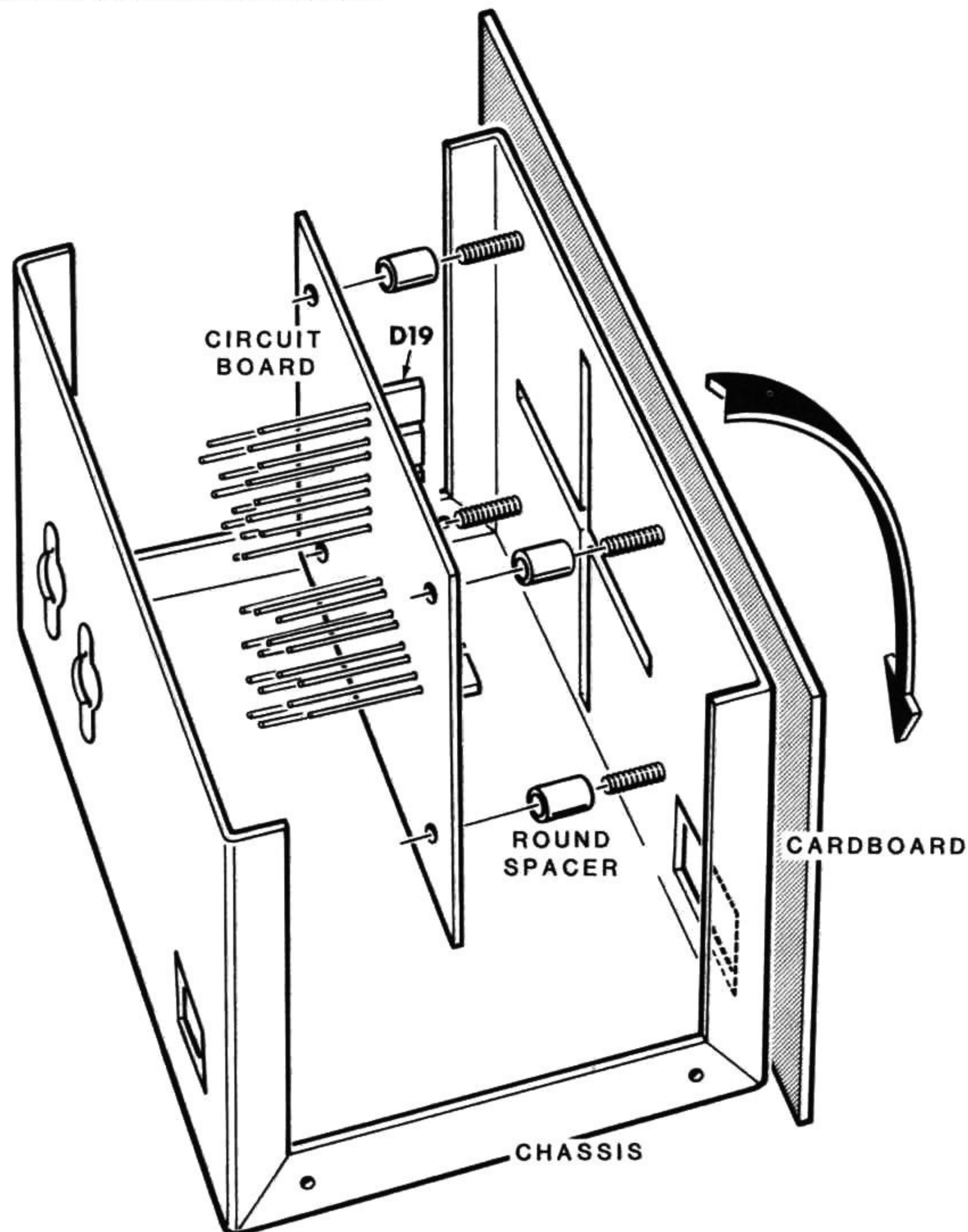
- () D5, D7, D9, and D11.
 () D6, D8, D10, and D12.
 () D13, D15, D17, and D19.
 () D14, D16, D18, and D20.



PICTORIAL 1-3

Refer to Pictorial 1-4 for the following steps.

- () Now position the circuit board in a vertical position so the component side is toward you and LED D19 is toward the top. Then place the board only part way onto the threaded studs.
- () Place a piece of cardboard against the front of the chassis and hold it tightly in place as you turn the chassis over onto its front.
- () Move each LED around by its leads until they are all seated into the chassis slots. Make sure the circuit board is against the spacers.
- () Solder only one lead of each LED to the foil.
- () Now remove the circuit board from the chassis. Also remove the spacers and set the chassis aside. Make sure all of the LEDs are straight across and spaced equally between each other. Then solder the other leads to the foil and cut off the excess lead lengths. NOTE: Leave the longer of the two leads slightly longer than the other lead when you cut them off. This will easily identify the anode lead and aide you in troubleshooting your unit later if it should become necessary.



PICTORIAL 1-4

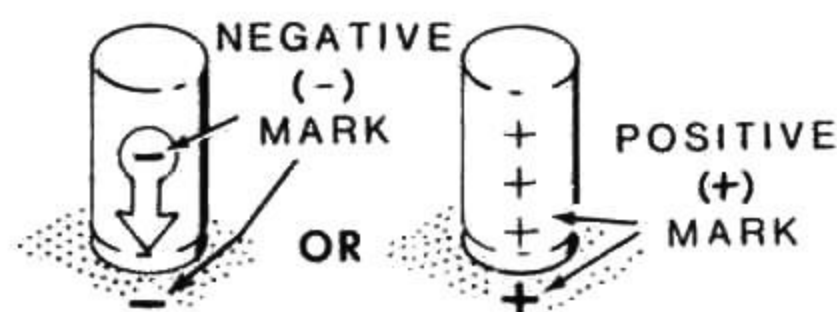
Heathkit®

Refer to Pictorial 1-5 (Illustration Booklet, Page 2) for the following steps.

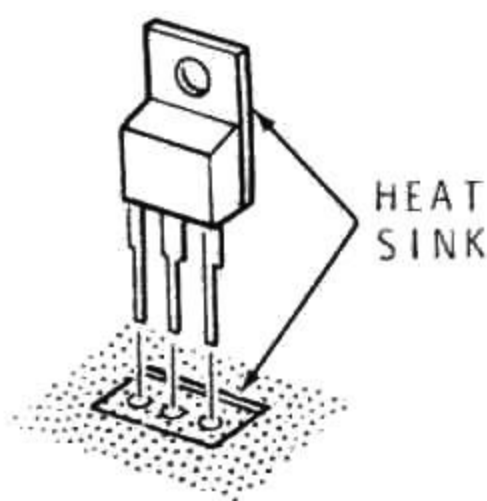
- () Position the circuit board with the component side up as shown.

Install the remaining components on the circuit board as follows:

NOTE: Before you install the following electrolytic capacitor, look at it and identify the leads. One lead will have a positive (+) mark or a negative (-) mark near it. Be sure to install the positive lead in the positive-marked hole, or the negative lead in the negative-marked hole.



- () C3: 470 μ F electrolytic. Solder the leads to the foil and cut off the excess lead lengths.
- () U1: UA7805 IC (#442-54). Match the heat sink of the IC with the double outline on the board and insert the leads. Position the IC $\frac{1}{4}$ " above the board, solder the leads to the foil, and cut off the excess lead lengths.



- () R4, R3: 500 k Ω control (#10-946). Insert the control lugs and solder them to the foil.



Refer to Pictorial 1-6 (Illustration Booklet, Page 2) for the following steps.

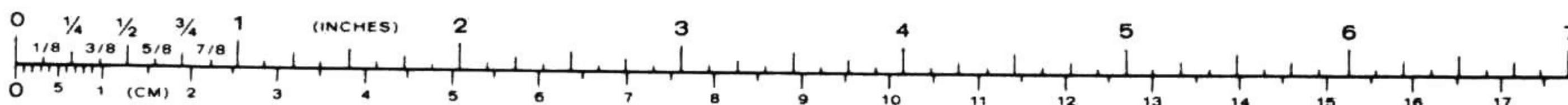
NOTE: When you prepare the following wires, cut them to the lengths specified, and remove $\frac{1}{4}$ " of insulation from the ends.

- () Prepare the following wires:

Two 3 $\frac{3}{4}$ " red
 One 7" red
 One 9 $\frac{1}{2}$ " red
 Two 6 $\frac{1}{2}$ " green

Connect and solder one end of these wires to the circuit board as follows. Cut off the excess lead lengths from the foil side. The other end of the wires will be connected later.

- () 3 $\frac{3}{4}$ " red to hole C.
 () 3 $\frac{3}{4}$ " red to hole D.
 () 7" red to hole E.
 () 9 $\frac{1}{2}$ " red to hole F.
 () 6 $\frac{1}{2}$ " green to hole A.
 () 6 $\frac{1}{2}$ " green to hole B.



CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following most-commonly-made errors.

- () Unsoldered connections.
- () Poor solder connections.
- () Solder bridges between foil patterns.
- () Protruding leads which could touch together or touch the chassis when the circuit board is installed later.

Refer to the Pictorials where the parts were installed as you make the following visual checks:

- () Diodes for the proper type and position of the banded end.
- () Tantalum capacitors for the correct position of the marked lead.
- () ICs for the proper installation.
- () LEDs for the proper installation.
- () Electrolytic capacitor for the correct position of the positive (+) or negative (-) marked lead.

Set the circuit board aside temporarily until it is called for in a step.

CHASSIS ASSEMBLY

Refer to Pictorial 1-7 for the following steps.

- () Position the chassis as shown.
- () Carefully peel the backing from the front panel label and install the label on front of the chassis. Make sure it is lined up properly with the openings in the chassis.

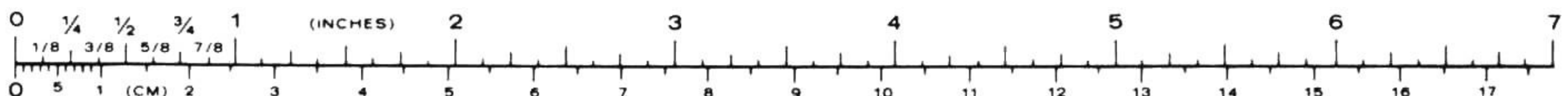
- () Peel the backing from the four feet and install them on the bottom of the chassis about $\frac{1}{4}$ " in from each corner.
- () Peel the backing from the blue and white label. Install the label on the bottom of the chassis as shown in the Pictorial. Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.
- () SW1: Position the rocker switch as shown and install it at SW1. Push the switch into the opening until it snaps into place.
- () S1: Position the 2-pin socket shell so the beveled side is as shown. Then bend both tabs back and insert the shell into the opening at S1.

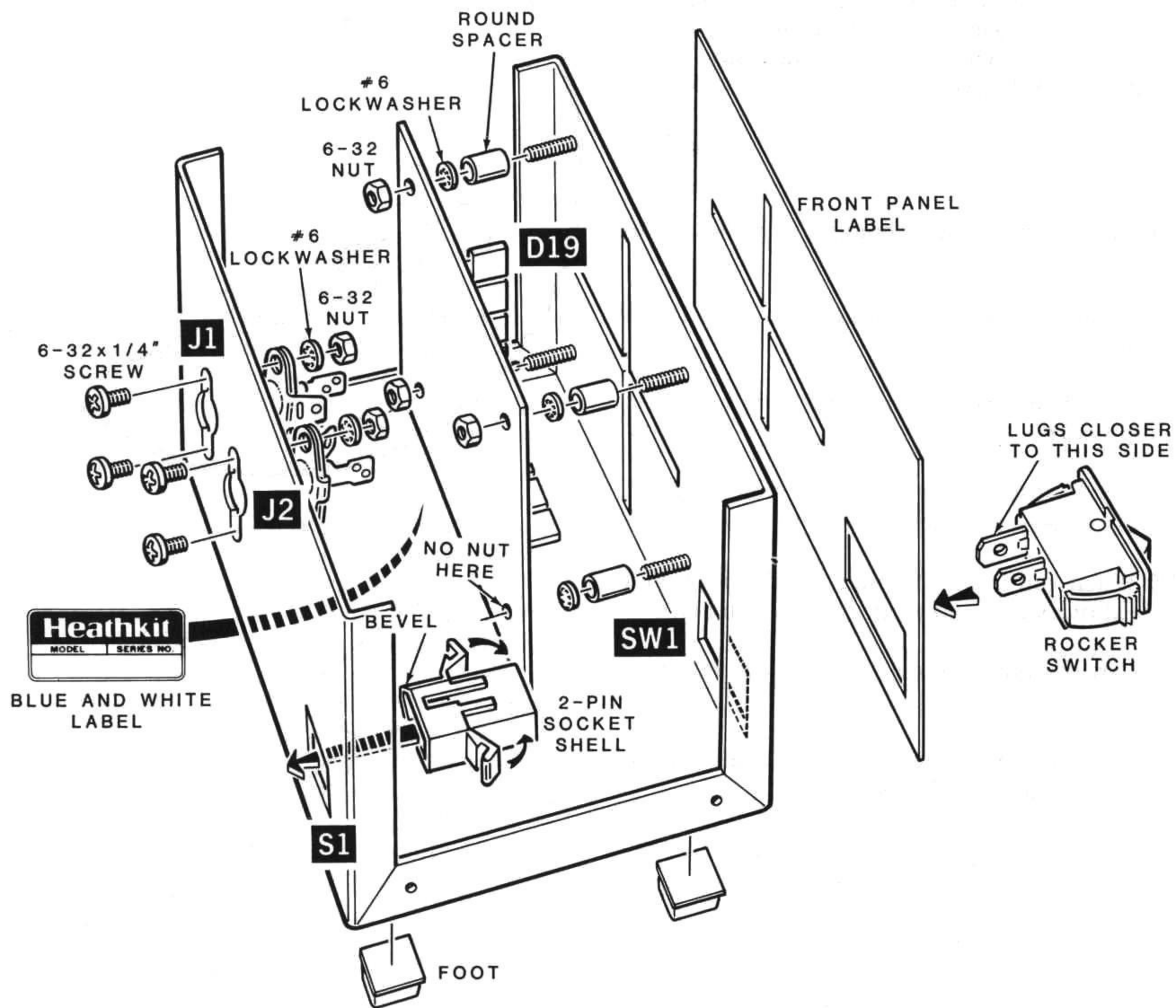
NOTE: Use the plastic nut starter to hold and start 6-32 nuts on screws.

- () Cut 1" off the narrow end of the nut starter so it can be used easier in the following steps.

NOTE: If there is any paint on the inside of the chassis at locations J1 and J2, be sure to scrape it off before you install the phono sockets in the following steps.

- () J1: Position a phono socket as shown and install it at J1. Use two 6-32 \times $\frac{1}{4}$ " screws, #6 lockwashers, and 6-32 nuts.
- () J2: Position the other phono socket as shown and install it in the same manner at J2.
- () Place the four round spacers and four #6 lockwashers on the threaded studs. Inspect the LED's on the foil side of the circuit board to make sure they are still lined up properly. Then position the board so that LED D19 is as shown and install the board on the spacers with three 6-32 nuts. NOTE: No nut will be used on the indicated stud.





PICTORIAL 1-7

Refer to Pictorial 1-8 (Illustration Booklet, Page 3) for the following steps.

Connect the wires coming from the circuit board to the chassis in the following steps. Solder the wires as you connect them.

- () Route the red wires coming from holes C and D down between the two controls. Then route the four red wires along the right side of the circuit board as you view it from the back.
- () Connect the red wire coming from hole C to lug 1 of SW1.
- () Connect the red wire coming from hole D to lug 2 of SW1.
- () Connect the red wire coming from hole E to lug 1 of J2.
- () Connect the red wire coming from hole F to lug 1 of J1.
- () Refer to inset #1 and install a male terminal pin on the end of each green wire.

NOTE: When you insert the pins into the plug shell in the next two steps, make sure they lock in place.

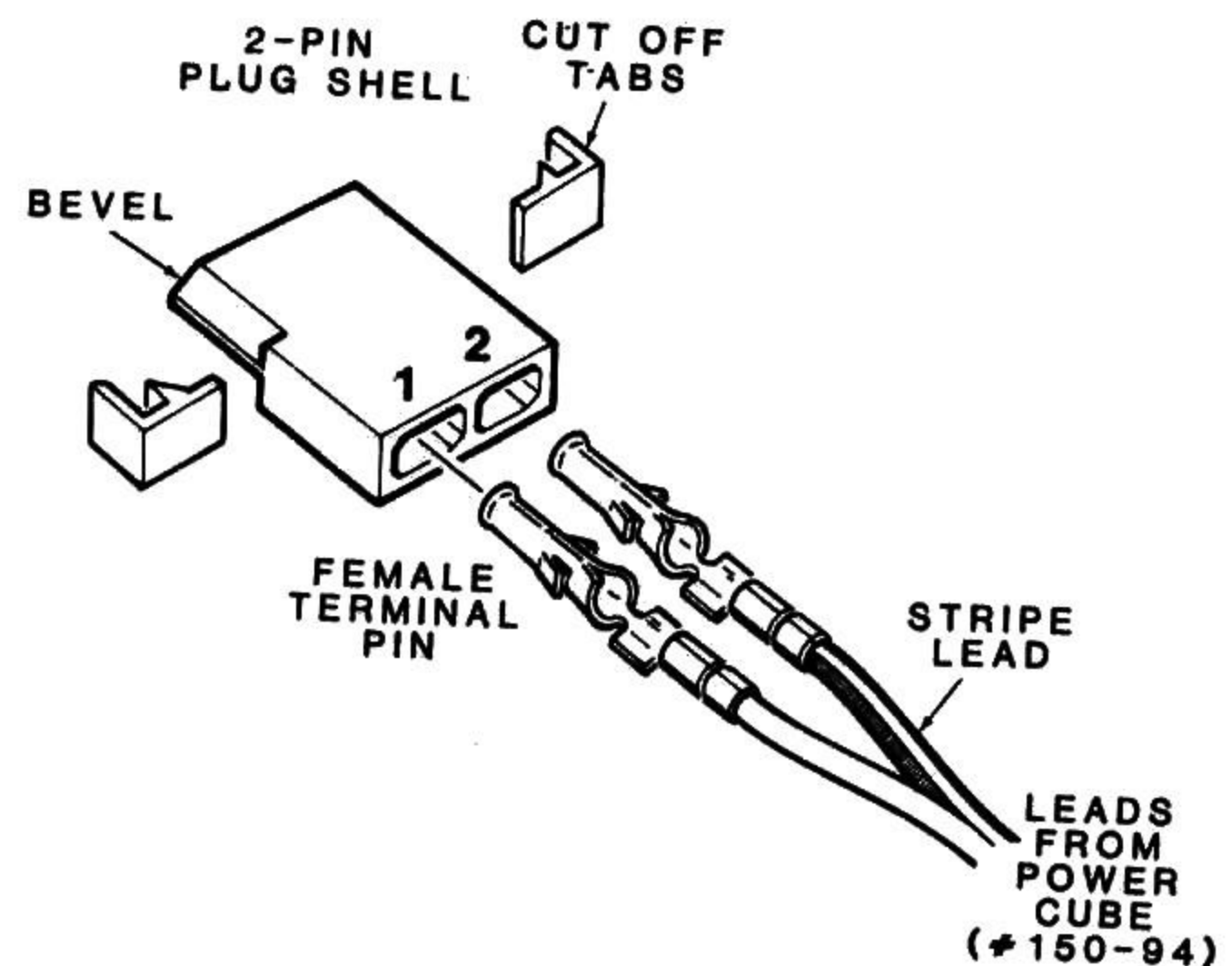
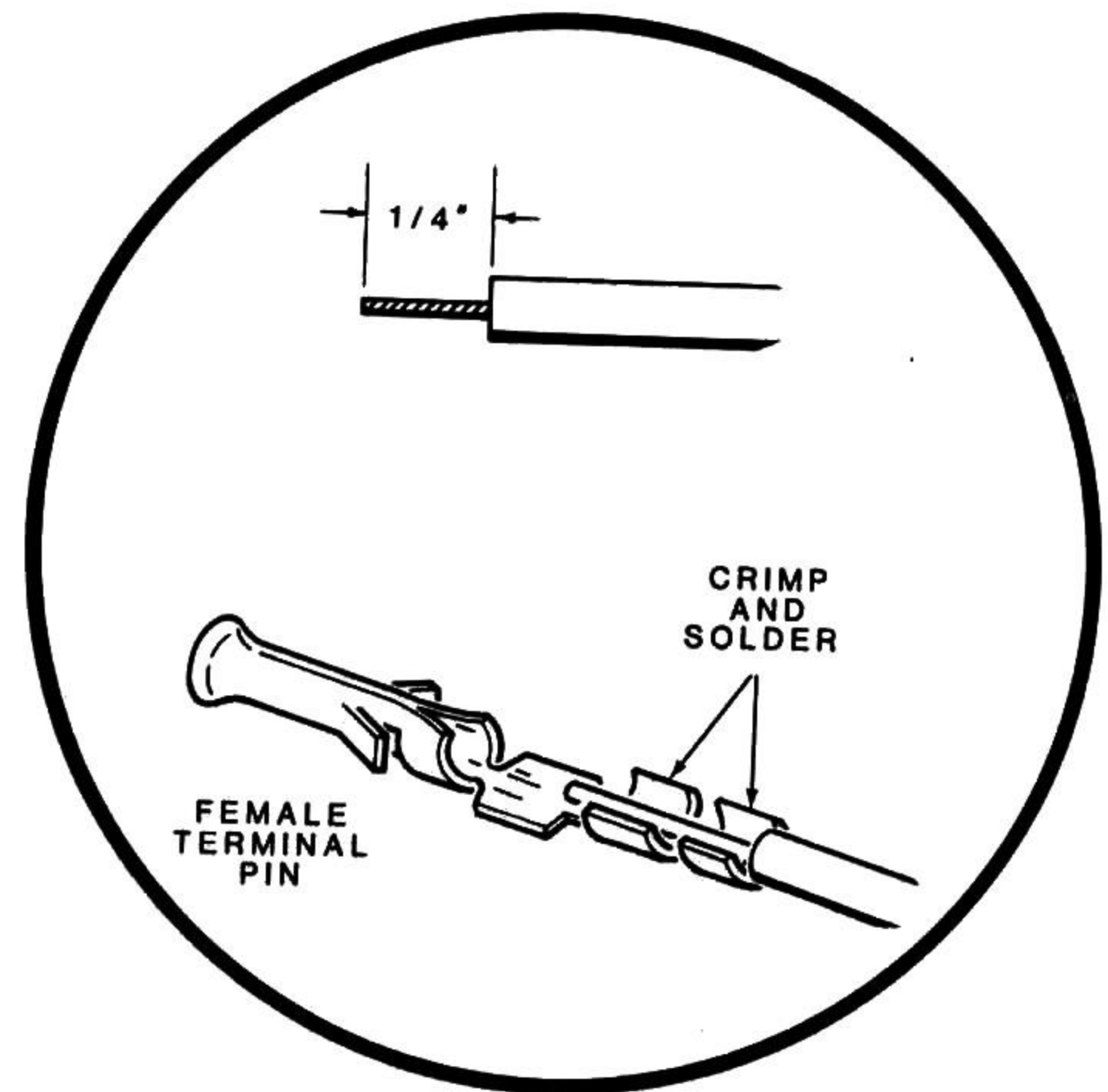
- () Insert the pin on the green wire coming from hole B in hole 1 of S1.
- () Insert the pin on the green wire coming from hole A in hole 2 of S1.
- () Route all of the wires against the chassis as shown.

Refer to Pictorial 1-9 for the following steps.

In the following steps, you will install female terminal pins and a 2-pin plug shell on the ends of the power cube leads.

- () Prepare the ends of both leads and install the female terminal pins as shown.
- () Cut off both tabs from the 2-pin plug shell.
- () Position the shell with the bevel as shown and insert the lead with the stripe in hole 2. Insert the plain lead in hole 1.

This completes the assembly, except the top cover, which you will install later. Check the inside of the chassis for any bits of solder or cut leads. Then proceed to the "Initial Tests".



PICTORIAL 1-9

INITIAL TESTS

If a volt-ohmmeter is available, perform the following tests. If a meter is not available, proceed to the "Calibration."

Refer to Pictorial 2-1 (Illustration Booklet, Page 3) for the following steps.

If you do not get the proper reading in a step, reverse the meter leads and take another reading. If you still do not get the proper results, refer to the "In Case Of Difficulty" section of the Manual and the Schematic Diagram. Also, review the Circuit Description.

NOTE: Do not plug in the power cube at this time.

- () Place the OFF-ON switch (SW1) to ON.
- () Set your ohmmeter to the $R \times 100$ range.
- () Connect one of the ohmmeter leads to chassis ground.
- () Take a reading from either lug of switch SW1 to ground. The reading should be greater than 1000Ω .
- () Set your ohmmeter to the $R \times 1000$ range.

- () Take a reading from the indicated common foil of the 16 LEDs to ground. The reading should be greater than 2500Ω .
- () Take a reading from pin 1 and pin 2 of socket S1 to ground. Each reading should be greater than $20 \text{ k}\Omega$.
- () Plug the power cube into an AC outlet. Then insert the plug into socket S1 on the chassis.
- () Set your volt-ohmmeter to DC volts and to the 15-volt range.
- () Connect the common lead of the meter to chassis ground.
- () Take a reading at either lug of switch SW1. The reading should be $13.4 \text{ volts} \pm 10\%$.
- () Take a reading at the indicated common foil of the 16 LEDs. The reading should be $5.0 \text{ volts} \pm 10\%$.
- () Disconnect the meter leads.

This completes the Initial Tests; proceed to "Calibration."

CALIBRATION

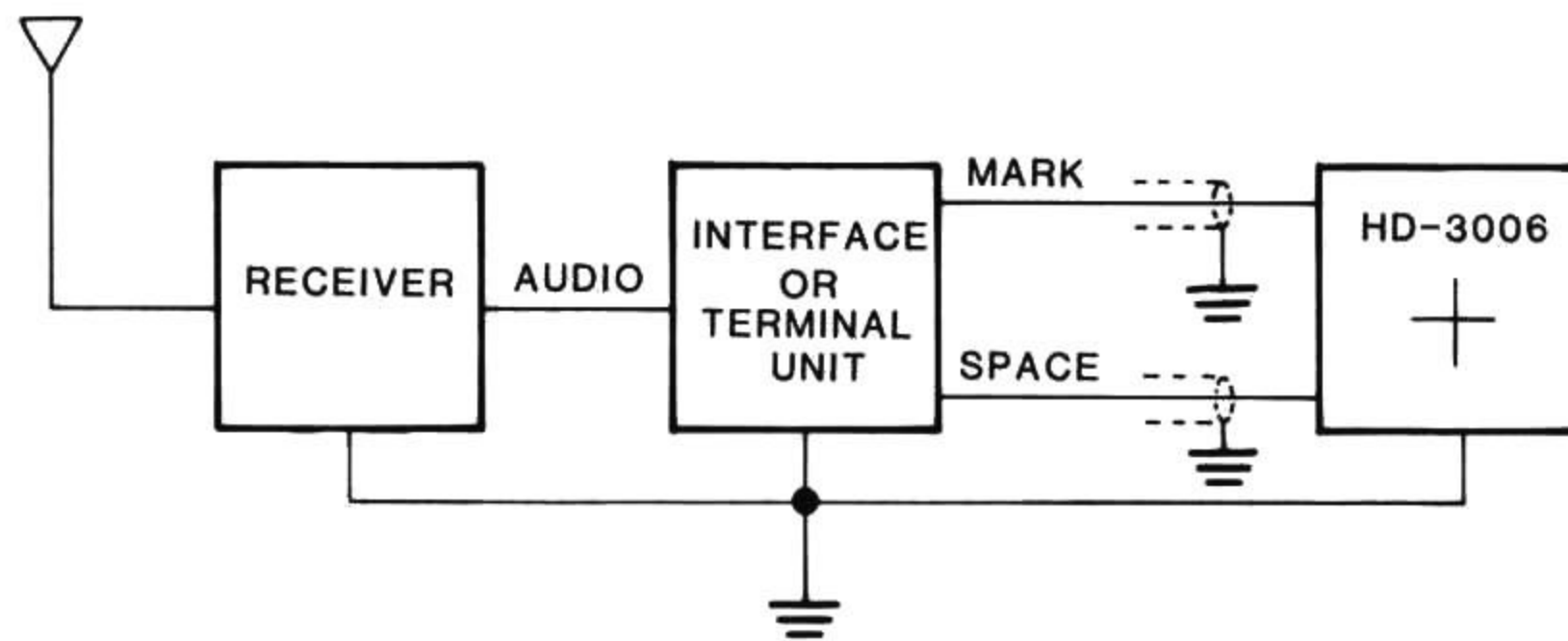


FIGURE 1

NOTE: You will need two shielded cables to connect your HD-3006 to your interface/terminal unit. Two phono plugs are supplied that you will install on one end of these cables. The other end of these cables are connected to your interface/terminal unit with the correct style of connector.

() Install the phono plugs on one end of the cables as shown below.

() Figure 1 shows a typical hookup between the HD-3006 Crossfire, a terminal unit, and a receiver. Connect these units together as shown.

Refer to Pictorial 2-1 (Illustration Booklet, Page 3) for the locations of the controls, LEDs, and switch in the following steps.

() Make sure the power cube is plugged into an AC outlet and into socket S1 of the Crossfire.

() Turn the ON-OFF switch (SW1) ON.

() Tune your receiver to an RTTY signal.

() Adjust the AF gain on your receiver for normal operating level.

() Tune your receiver off station so that all you hear is background noise. NOTE: If you can not obtain the following results, disregard steps 1 and 2 and perform Steps 3, 4, and 5 instead.

1. () Adjust control R3 to the point before LED D5 just starts to light.

2. () Adjust control R4 to the point before LED D13 just starts to light.

3. () Tune your receiver to a strong RTTY signal.

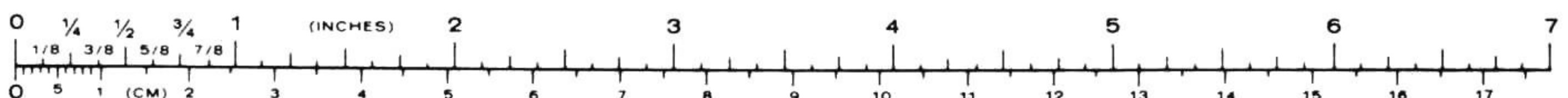
3/8" 7/8" 7/8" 3/8"

INSERT THE INNER LEAD THROUGH THE PLUG AND WRAP THE SHIELD LEAD AROUND THE PLUG.

APPLY HEAT TO THE TIP OF THE PIN ONLY LONG ENOUGH FOR THE SOLDER TO BE DRAWN UP INTO THE PIN BY CAPILLARY ACTION.

SOLDER THE SHIELD LEAD ONTO THE PLUG.

CUT OFF THE EXCESS WIRE FROM THE TIP OF THE PIN.



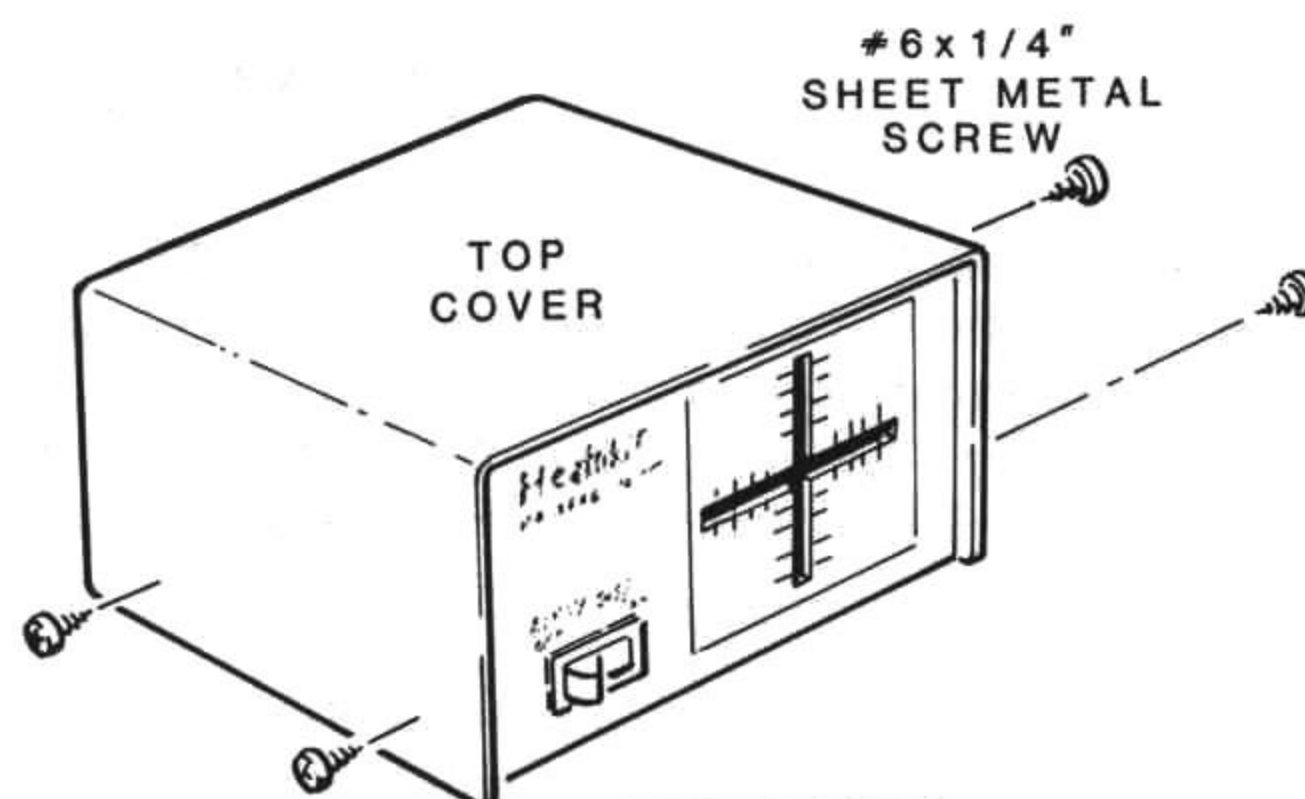
Heathkit®

4. () Adjust control R3 to the point where LED's D11 and D12 just light.
5. () Adjust control R4 to the point where LED's D19 and D20 just light.

This completes the Calibration.

Refer to Pictorial 3-1 and install the top cover on the chassis with four #6 × ¼" sheet metal screws.

This completes the assembly, proceed to the "Operation."



PICTORIAL 3-1

OPERATION

The following information describes the function of your HD-3006 Crossfire.

RTTY DISPLAY – The vertical LEDs are for the mark channel and the horizontal LEDs are for the space channel. When you tune your receiver, try for the maximum number of "lit" mark and space LEDs on the display. Normally, there will be more mark LEDs indicating than space LEDs. This is due to shifting of the mark-to-space condition; the space signal being in the "on" state for a shorter period of time than the mark signal. With exceptionally strong signals, the mark and space indications may be equal.

The mark and space LED's will light in the following manner: Starting from the center, the mark LED's will light alternately until the last one on each end is reached, and then these will come on simultaneously. The space LED's will operate in the same manner.

Depending on the setting of the receiver sensitivity control, there may be random flashing of some LEDs during a no-signal condition. This is due to the receiver noise and limiter action in the interface or terminal unit.

Assuming that the sensitivity is adjusted to the same level for each channel and the receiver is tuned correctly, some of the space LEDs may indicate when only a mark signal is present. This is due to the coupling between the filters in the interface or terminal unit.

OFF-ON Switch – Turns the unit On or Off.

8-16V AC/DC 150 mA Power Socket – The power cube or any power source that is capable of these requirements may be plugged into this socket. If you use a DC power supply, the polarity does not matter.

SPACE Socket – The space cable from the interface or terminal unit plugs into this socket.

MARK Socket – The mark cable from the interface or terminal unit plugs into this socket.

IN CASE OF DIFFICULTY

This part of the Manual will help you locate and correct any difficulty that might occur in your Cross-fire. This information is divided into two sections. The first section, "General," contains suggestions for reviewing your kit to locate possible causes of incorrect performance.

The second section is a "Troubleshooting Chart." This chart calls out specific problems that may occur and lists one or more conditions or components that could cause each difficulty.

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

GENERAL

1. Recheck the wiring. Trace each lead in colored pencil on the Pictorial as you check it. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something you consistently overlook.
2. Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.
3. About 90% of the kits that are returned for repair do not function properly due to poor connections and soldering. Therefore, you can often eliminate many troubles by reheating all connections to make sure they are soldered properly, as described in the soldering instructions in this Manual.
4. Check each circuit board foil to be sure there are no solder bridges between adjacent connections. Remove any solder bridges by holding a clean soldering iron tip between the two points that are bridged until the excess solder flows **down** onto the tip of the soldering iron.
5. Check integrated circuits for proper positioning and for good contact at each pin connection.
6. Check capacitor values carefully. Be sure the proper part is wired into the circuit at each capacitor location. For example, it would be easy to mistake a .001 μF capacitor for 100 pF capacitor. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
7. Check each resistor value carefully. It would be easy, for example, to install a 2200 Ω (red-red-red) resistor where a 220 Ω (red-red-brown) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging indicates that it is faulty and should be replaced.
8. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
9. Check all component leads connected to the circuit board. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts, such as the chassis.
10. If you still cannot locate the trouble and a voltmeter is available, check the voltage readings against those shown on the Schematic Diagram. A review of the "Circuit Description" may also help you locate the trouble.

NOTE: To remove faulty multi-lead components from a circuit board, clip all the leads, and then unsolder and remove them one at a time.

NOTE: Refer to the "Circuit Board X-Ray View" on Page 28 of this Manual for the physical location of parts.

Troubleshooting Chart

This Troubleshooting Chart lists specific problems that could occur and some possible causes. The numbers for the components are the same numbers used in the Schematic Diagram and Circuit Description. A Circuit Board X-ray View is provided on Page

28 to help you locate any circuit board component. If a component is indicated (such as U1 for example), check that part and any other components associated directly with it to see if they are installed correctly.

PROBLEM	POSSIBLE CAUSE
No 13.4 volt supply.	<ol style="list-style-type: none"> 1. Diodes D1-D4. 2. Capacitor C3. 3. Switch SW1. 4. ICs U2,U3. 5. Power cube.
No 5-volts, but 13.4 volts is present.	<ol style="list-style-type: none"> 1. IC U1.
Have supply voltage, but not all LEDs light.	<ol style="list-style-type: none"> 1. LED installed incorrectly. 2. Diodes D21, D22. 3. IC's U2, U3. 4. Controls R3, R4 misadjusted. 5. Signal not strong enough.

SPECIFICATIONS

Display	Two 8-LED bars. Each bar requires approximately 14 dB no-signal-to-signal voltage ratio (5:1) for full use of the bar.
Input Level	
Threshold	AC, 0.3 volts RMS. DC, 0.5 volts.
Maximum	AC, 15 volts RMS. DC, 15 volts.
Power Supply	8-16 volts AC/DC power cube at 150 mA typical.
General	
Dimensions	3 ³ / ₁₆ " high × 5" wide × 4" deep (8.1 × 12.7 × 10.0 cm).
Net Weight	2.3 lbs (1.0 kg).

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

CIRCUIT DESCRIPTION

Refer to the Schematic Diagram (Illustration Booklet, Page 4) as you read this description.

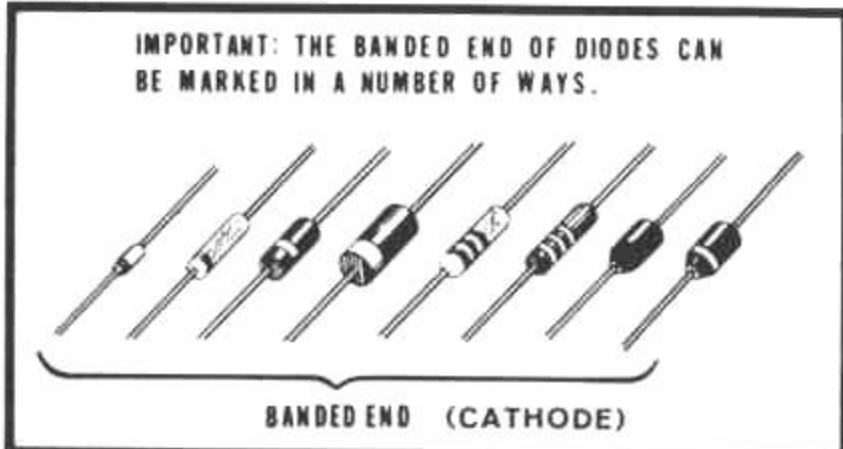
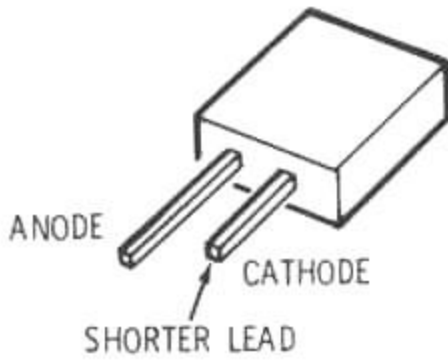
The space and mark signals are routed through sensitivity controls R3 and R4 and diodes D21 and D22 to the input of driver ICs U2 and U3. U2 and U3 are log LED drivers that drive LED's D5 through D20 for mark and space indications. D21 and D22 rectify the AC mark and space signals, while resistors R2 and R5 and capacitors C4 and C5 form filter timing networks. The timing networks reduce the effect of

noise bursts. Once the input level exceeds the threshold set by the sensitivity controls, R3 and R4, ICs U2 and U3 will start turning on LED's D5 through D20. As the input level increases, more LEDs are turned on. Resistors R1 and R6 provide a reference voltage for ICs U2 and U3.

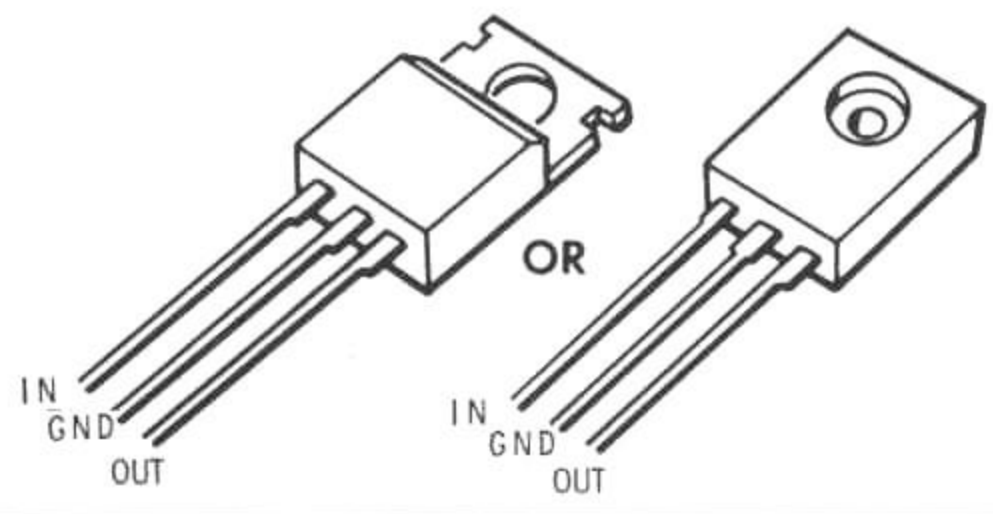
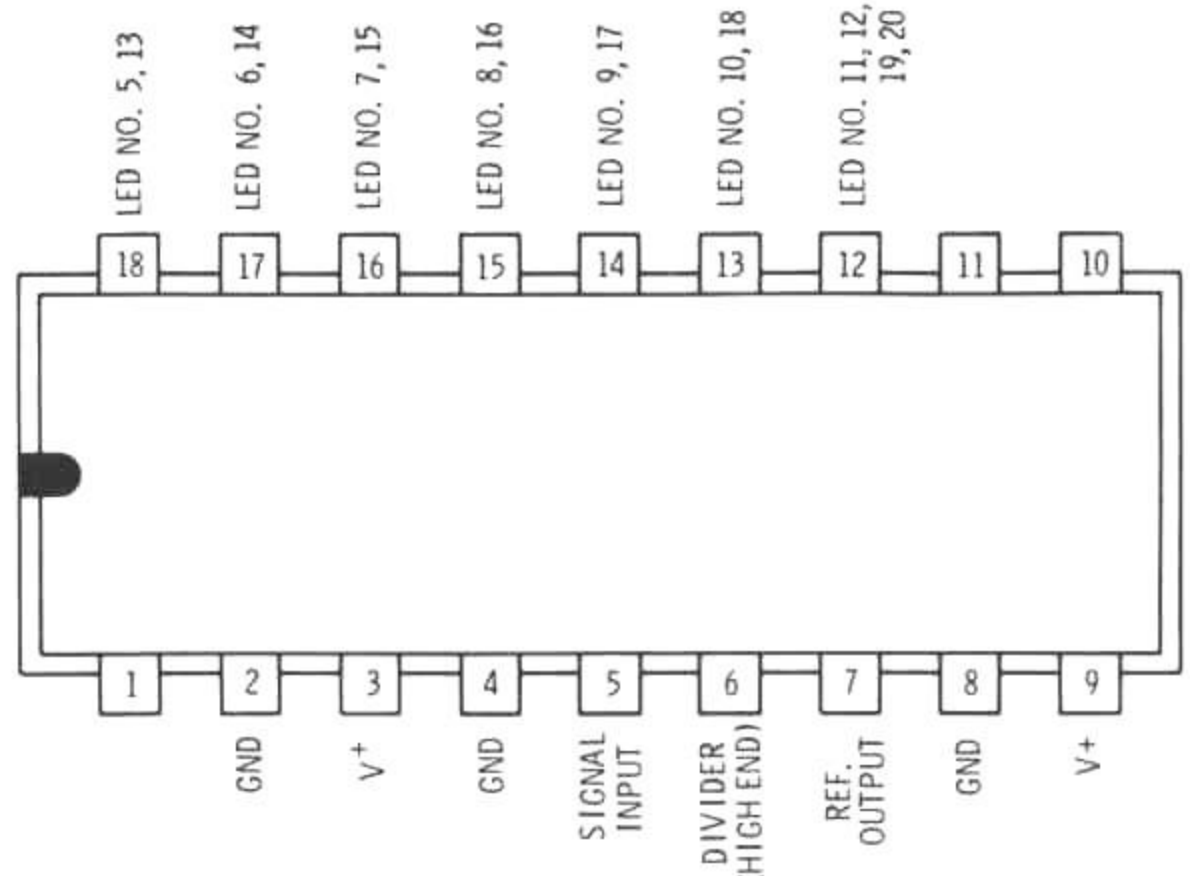
Diodes D1 through D4 and capacitor C3 form a bridge rectifier-filter circuit. Capacitors C1 and C2 are line bypass filters. IC U1 is a 5-volt regulator for LEDs D5 through D20.

SEMICONDUCTOR IDENTIFICATION CHARTS

DIODES

CIRCUIT COMPONENT NUMBER	HEATH PART NUMBER	MAY BE REPLACED WITH	IDENTIFICATION
D21, D22	56-56	1N4149	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="font-size: small; margin: 0;">IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.</p>  <p style="text-align: center; font-size: x-small; margin: 0;">BANDED END (CATHODE)</p> </div>
D1, D2, D3, D4	57-65	1N4002	
D5, D6, D7, D8 D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20	412-634	Light-emitting diode (LED)	

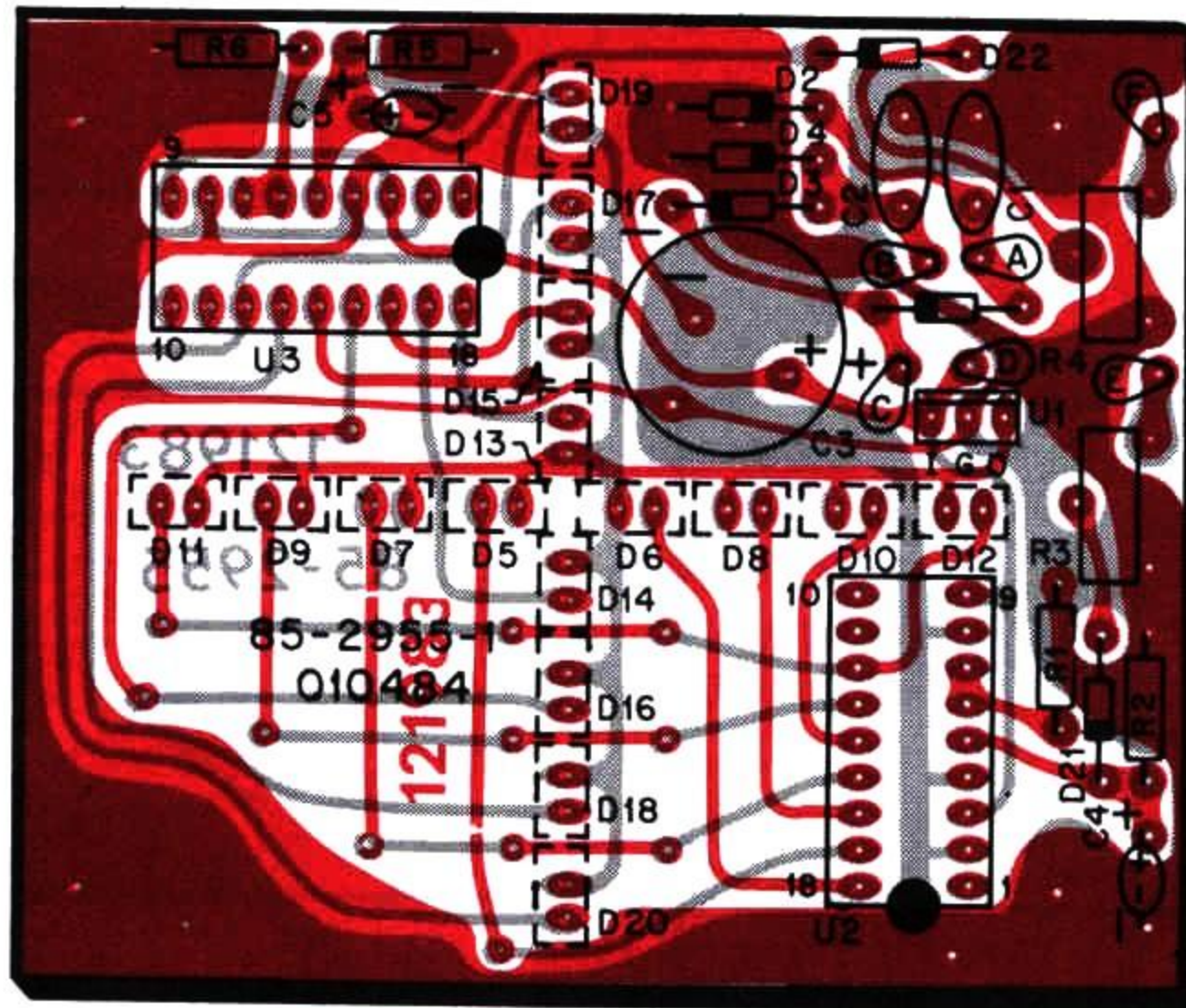
INTEGRATED CIRCUITS

CIRCUIT COMPONENT NUMBER	HEATH PART NUMBER	MAY BE REPLACED WITH	IDENTIFICATION
U1	442-54	UA7805	
U2, U3	442-718	LM3915	

CIRCUIT BOARD X-RAY VIEW

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

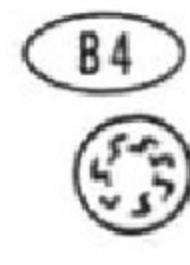
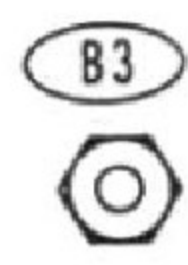
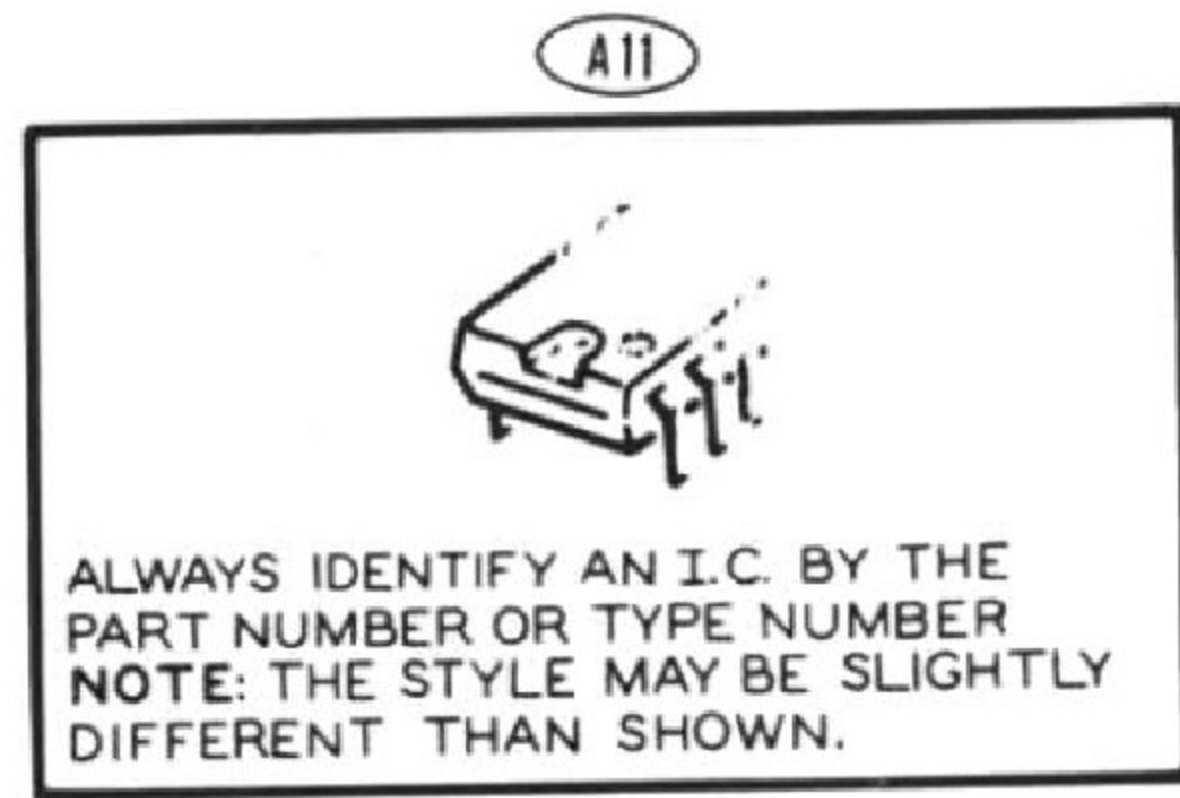
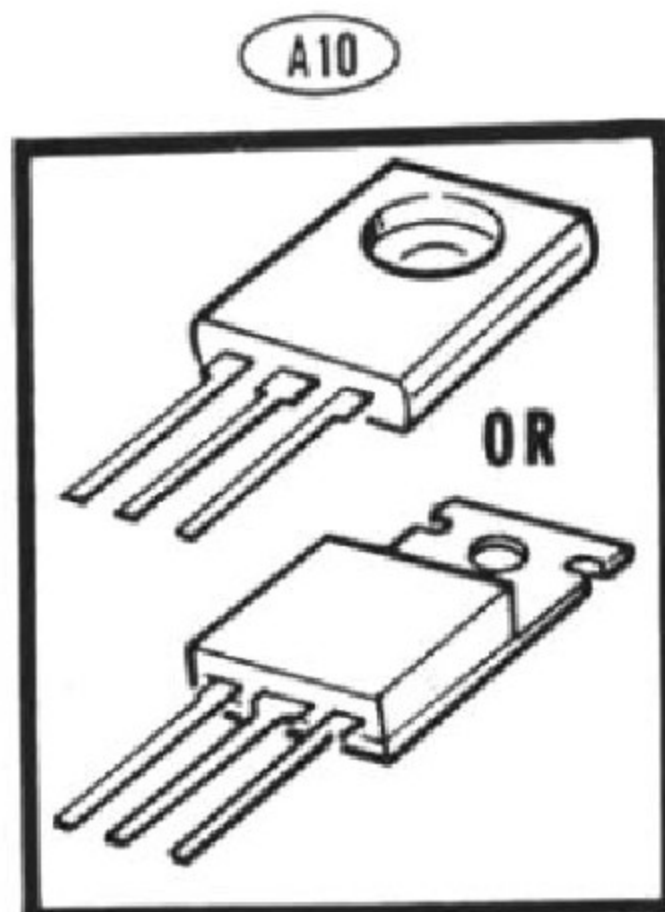
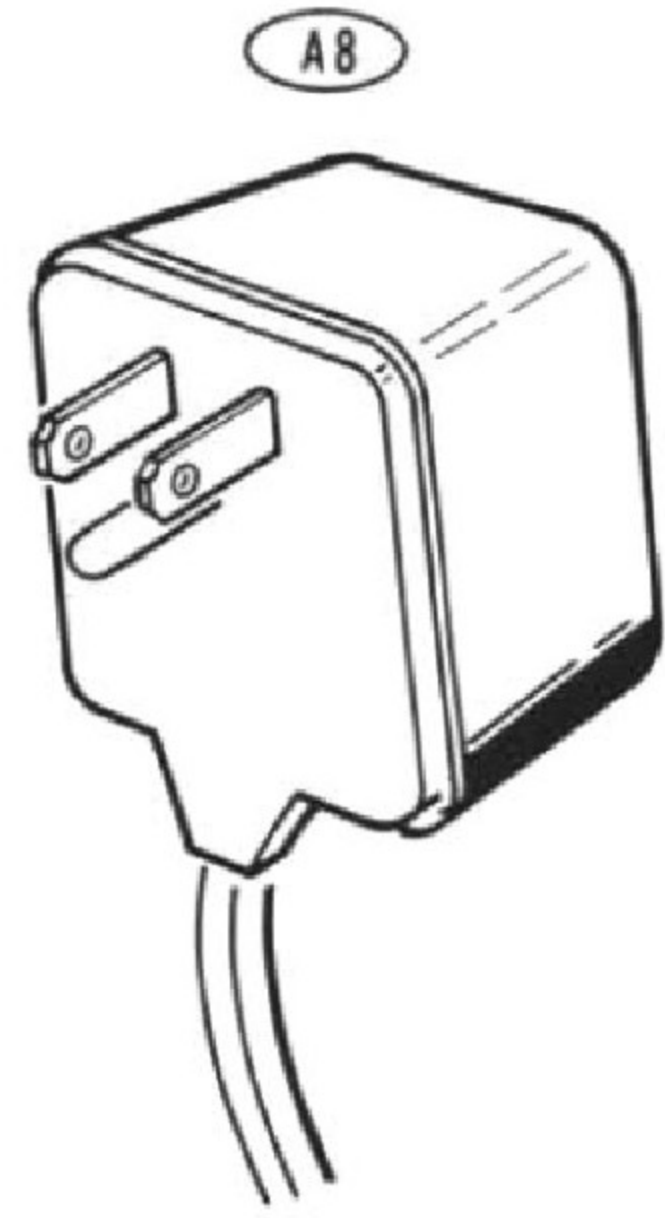
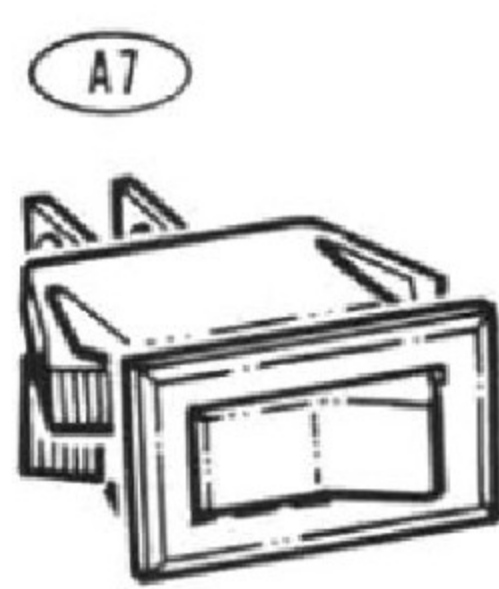
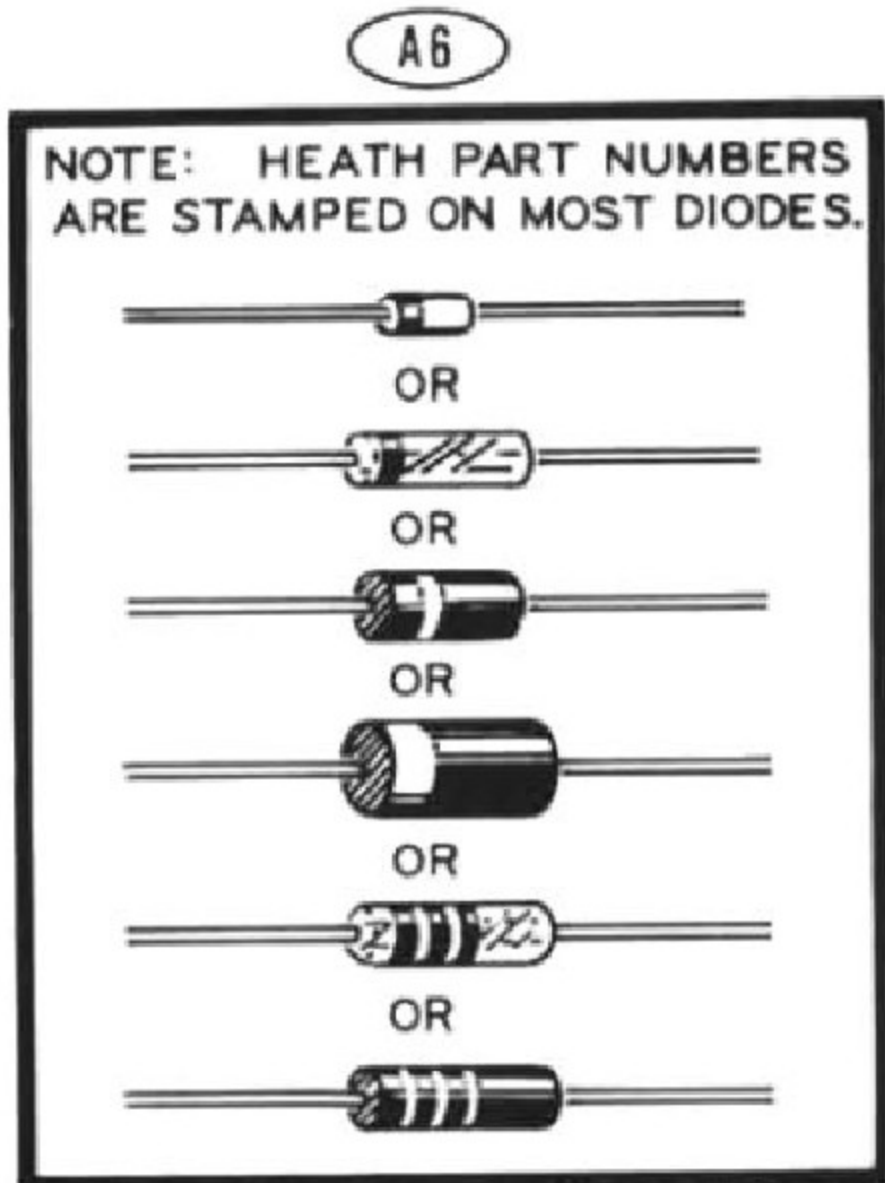
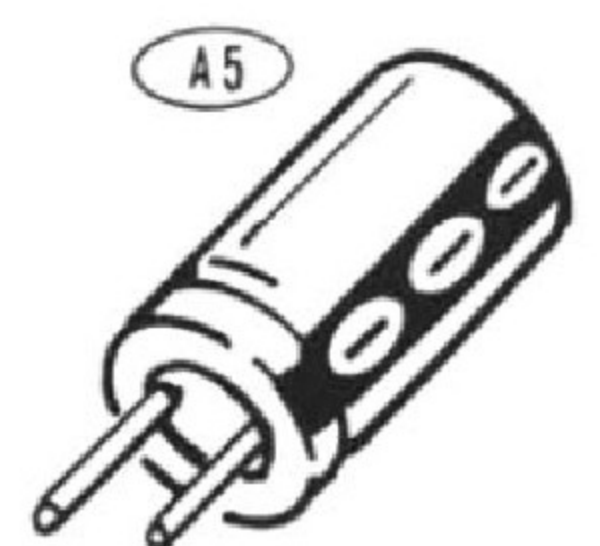
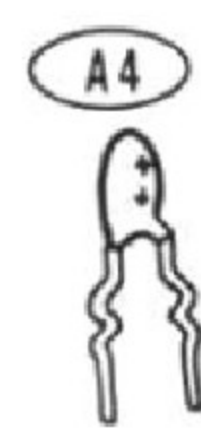
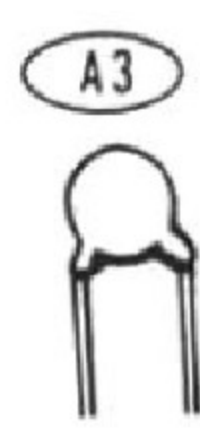
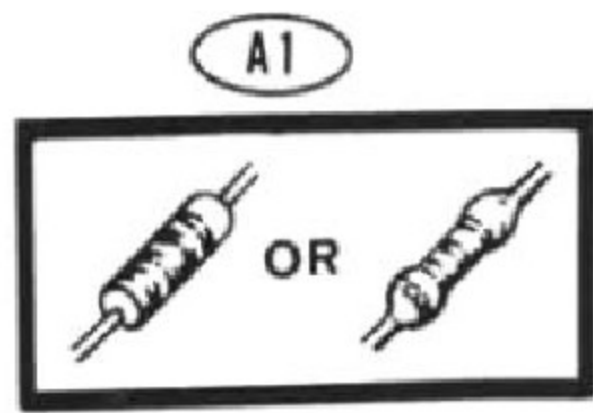
- A. Find the circuit component number (R5, C3, etc.) on the "X-Ray View."
- B. Locate the same number in the "Circuit Component Number" column of the "Parts List" in the front of this Manual.
- C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION which must be supplied when you order a replacement part.



SHOWN FROM COMPONENT SIDE
(The foil on the component side is shown in red)

ILLUSTRATION

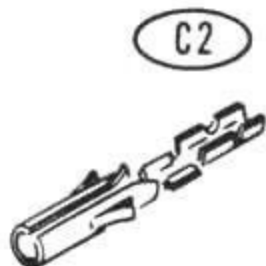
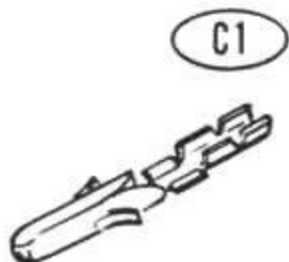
PARTS P



IN BOOKLET

Part of 595-3232

EDITORIAL



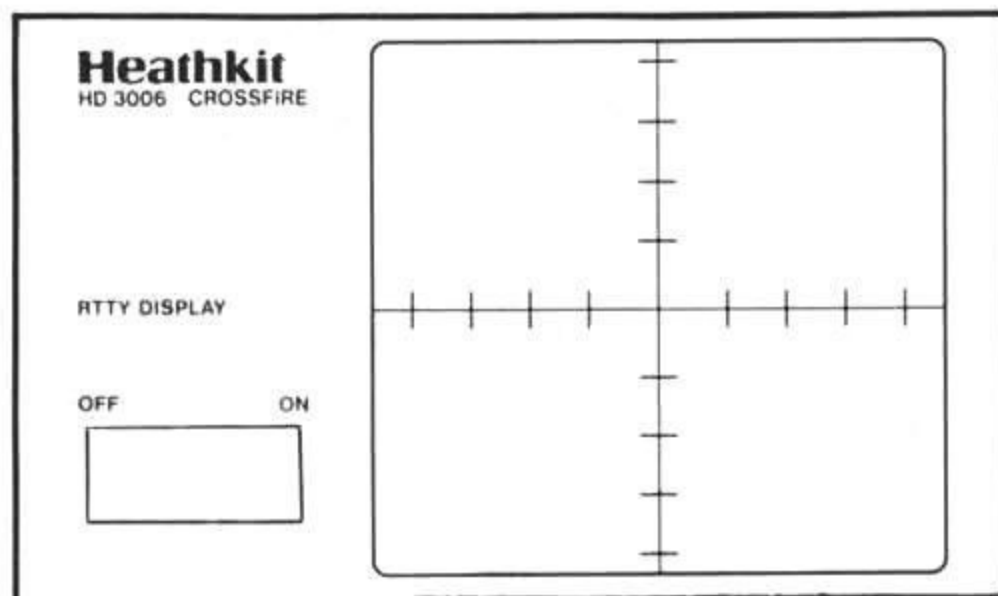
C6



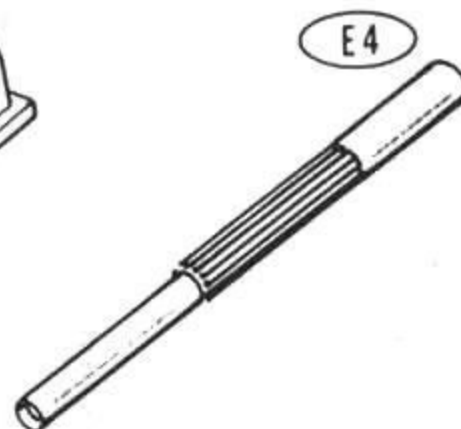
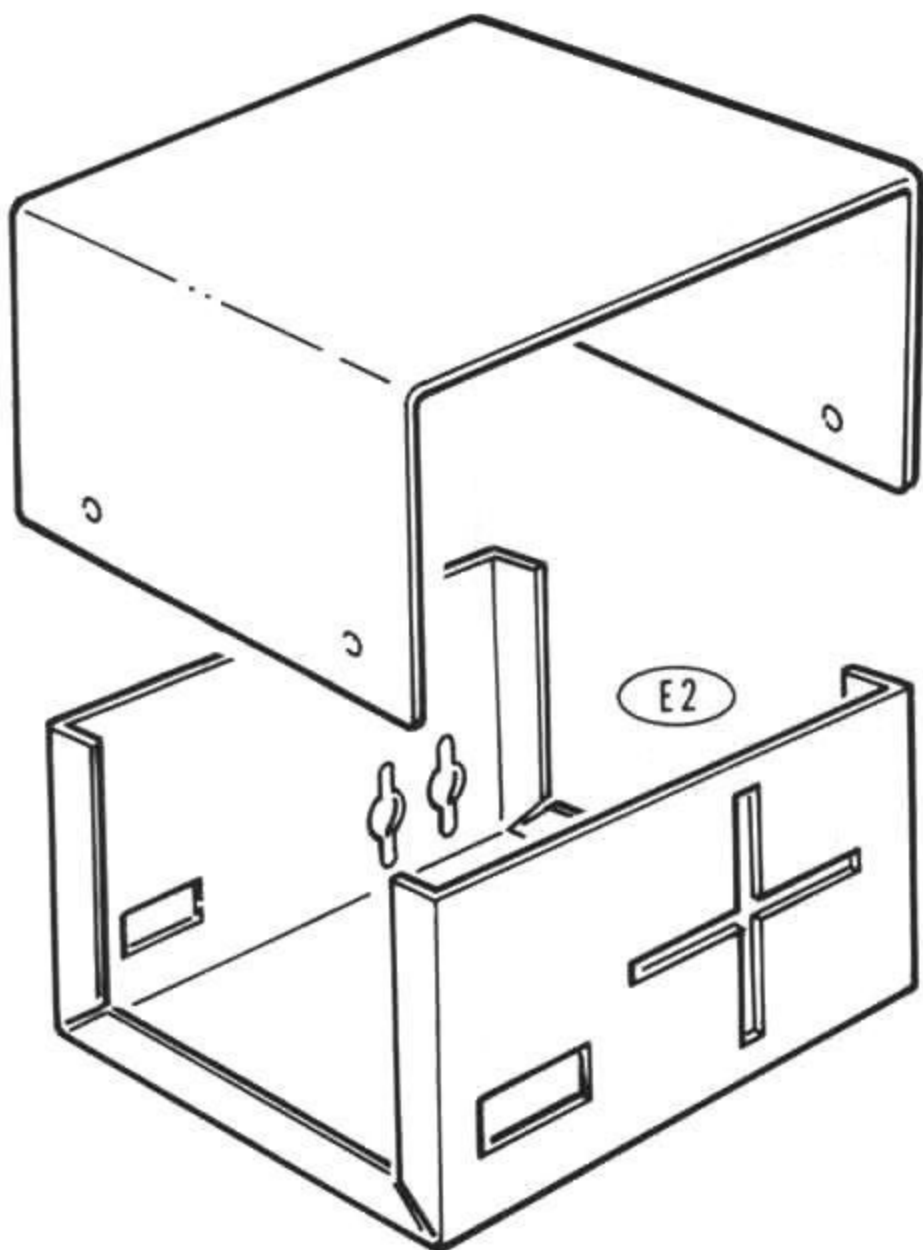
ALWAYS IDENTIFY AN I.C. SOCKET BY COUNTING ITS PINS.
NOTE: THE STYLE MAY BE SLIGHTLY DIFFERENT THAN SHOWN.

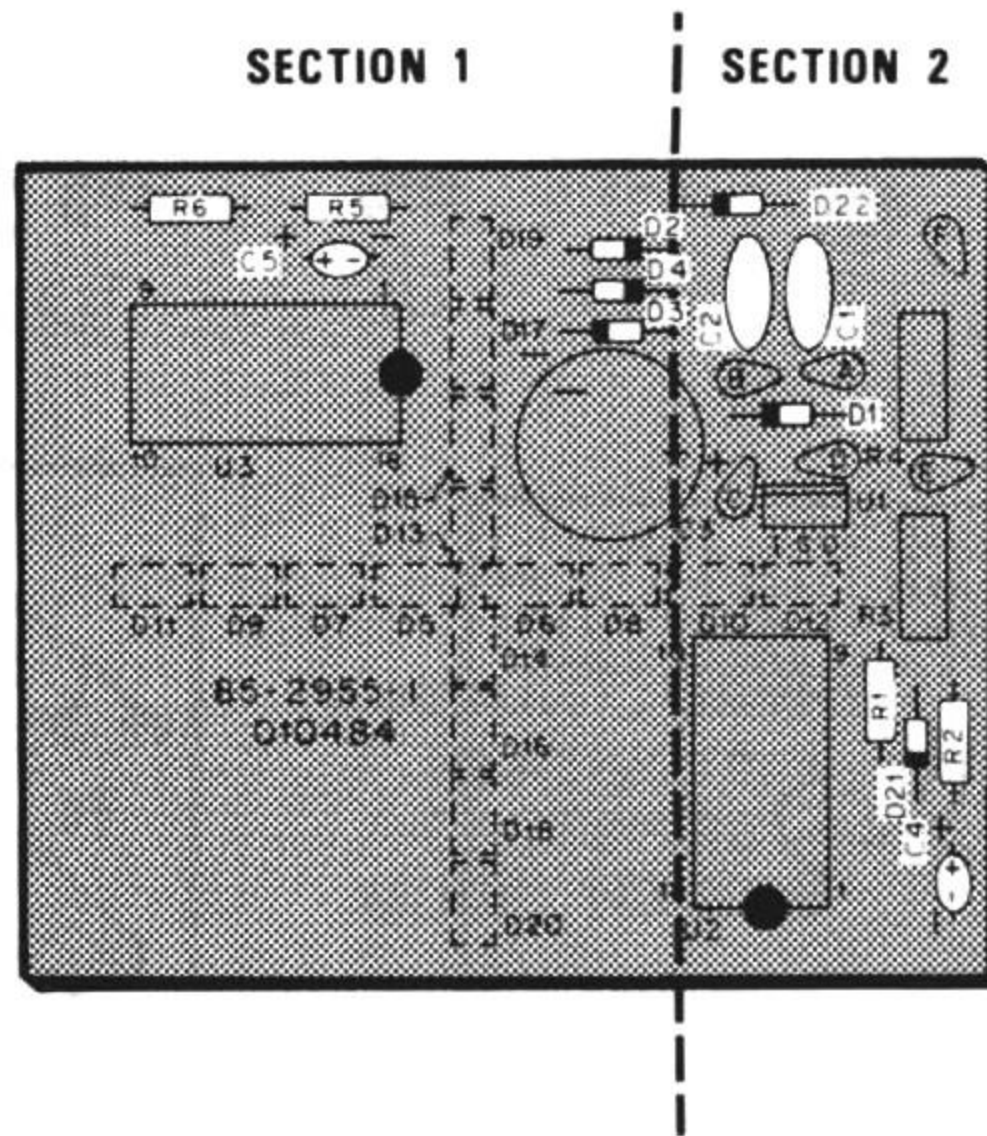


D1

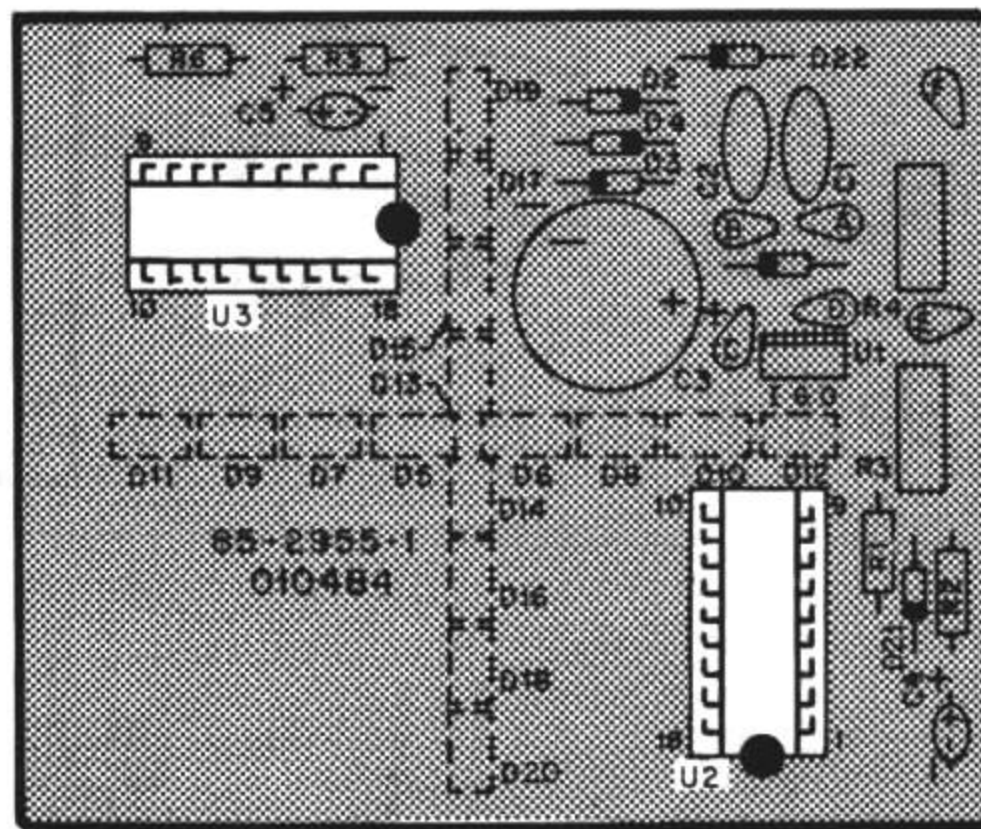


D2

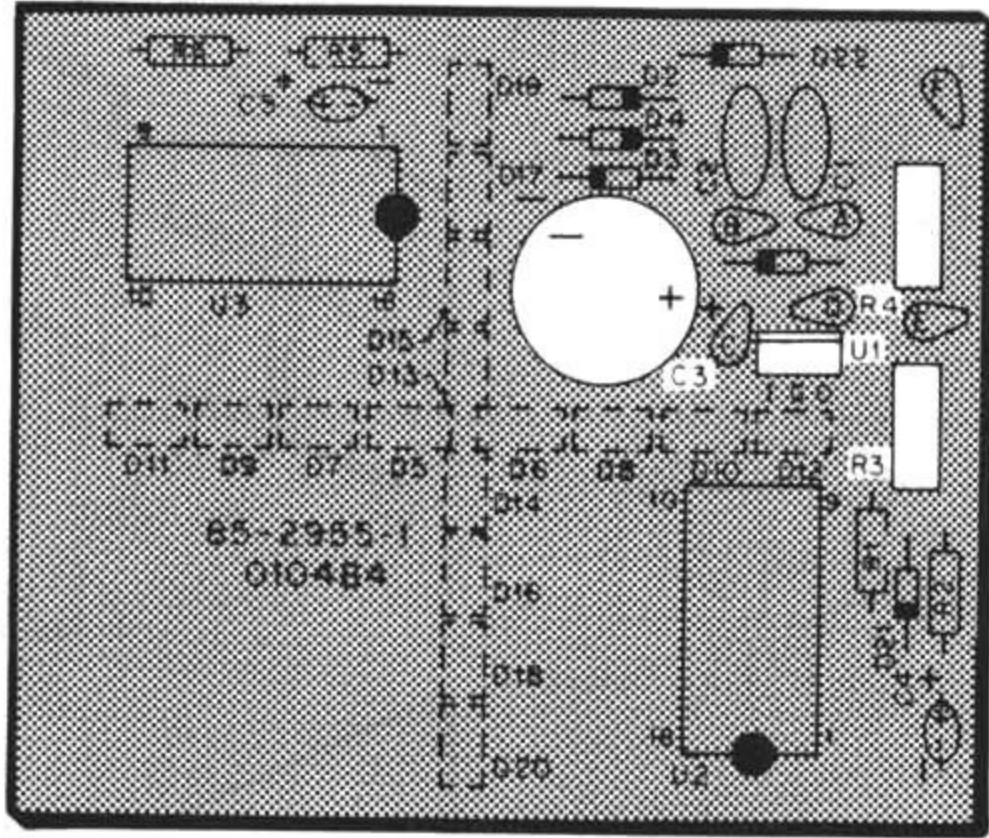




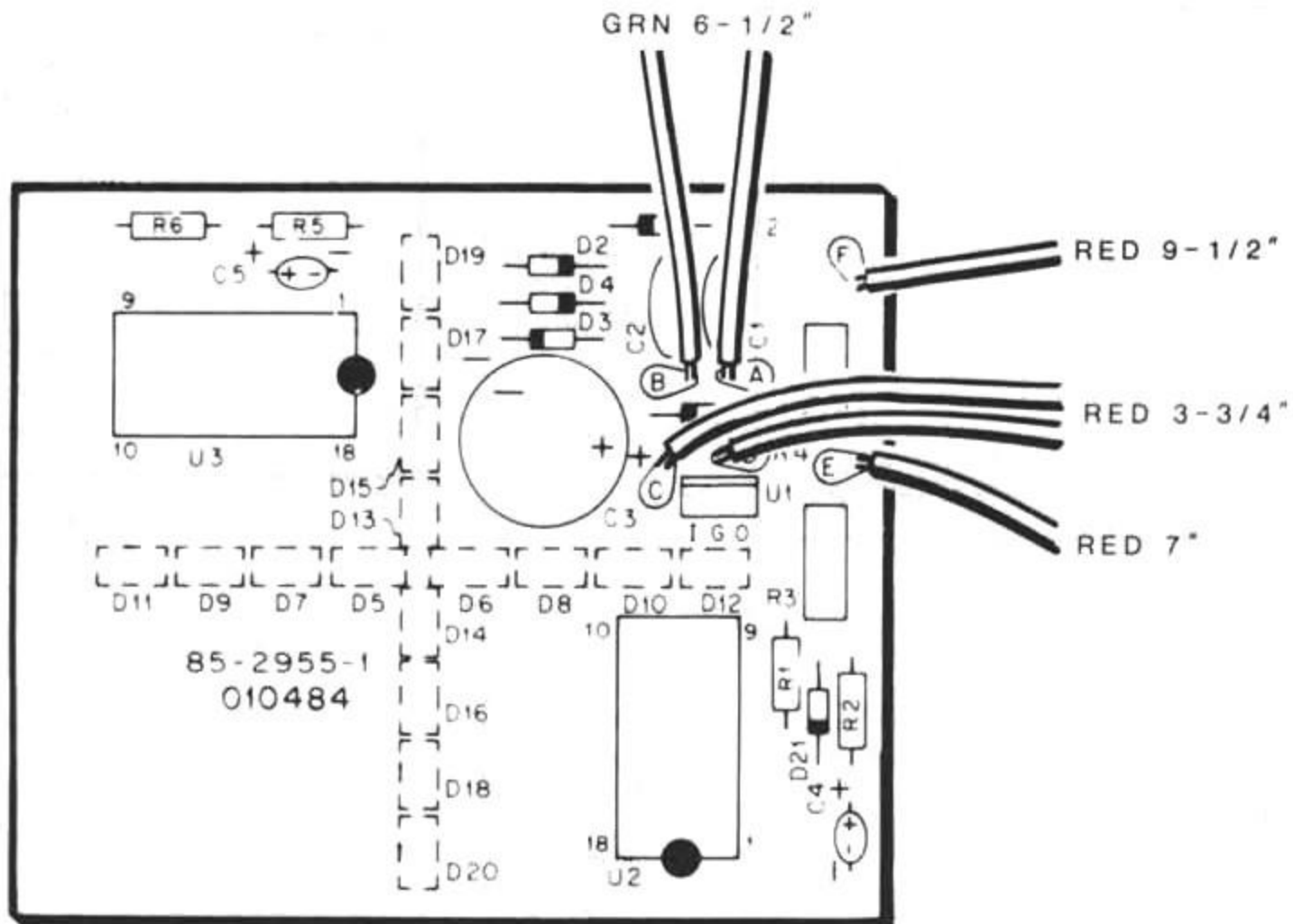
PICTORIAL 1-1



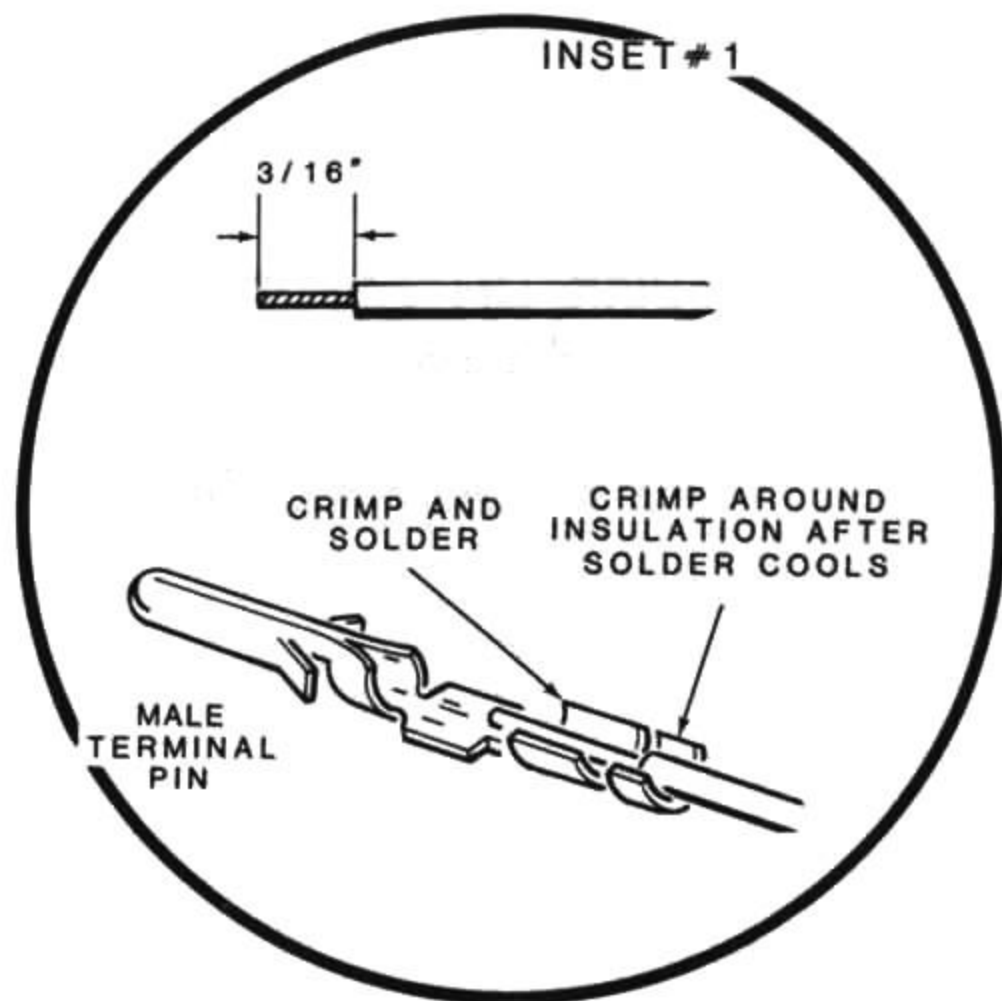
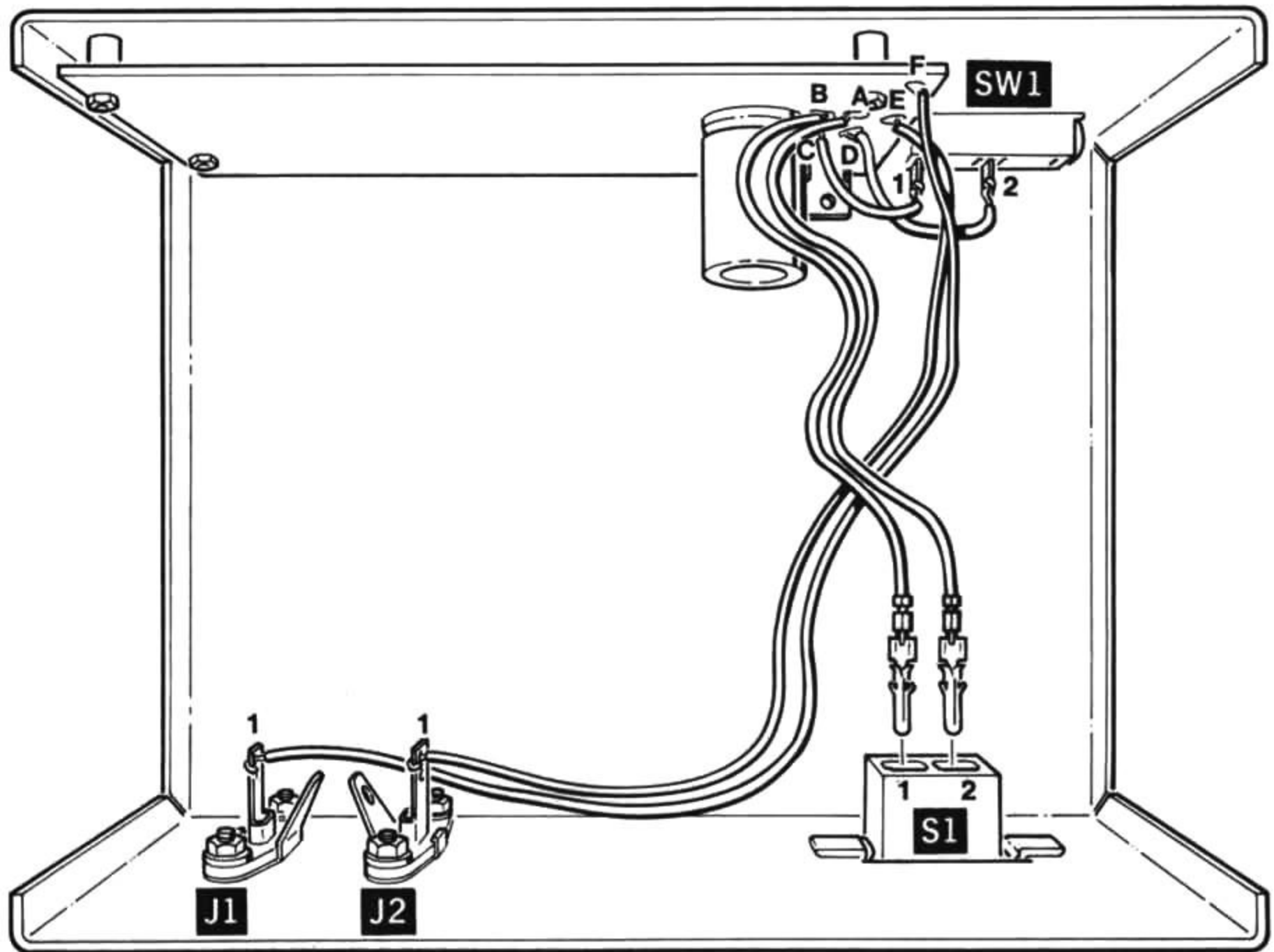
PICTORIAL 1-2



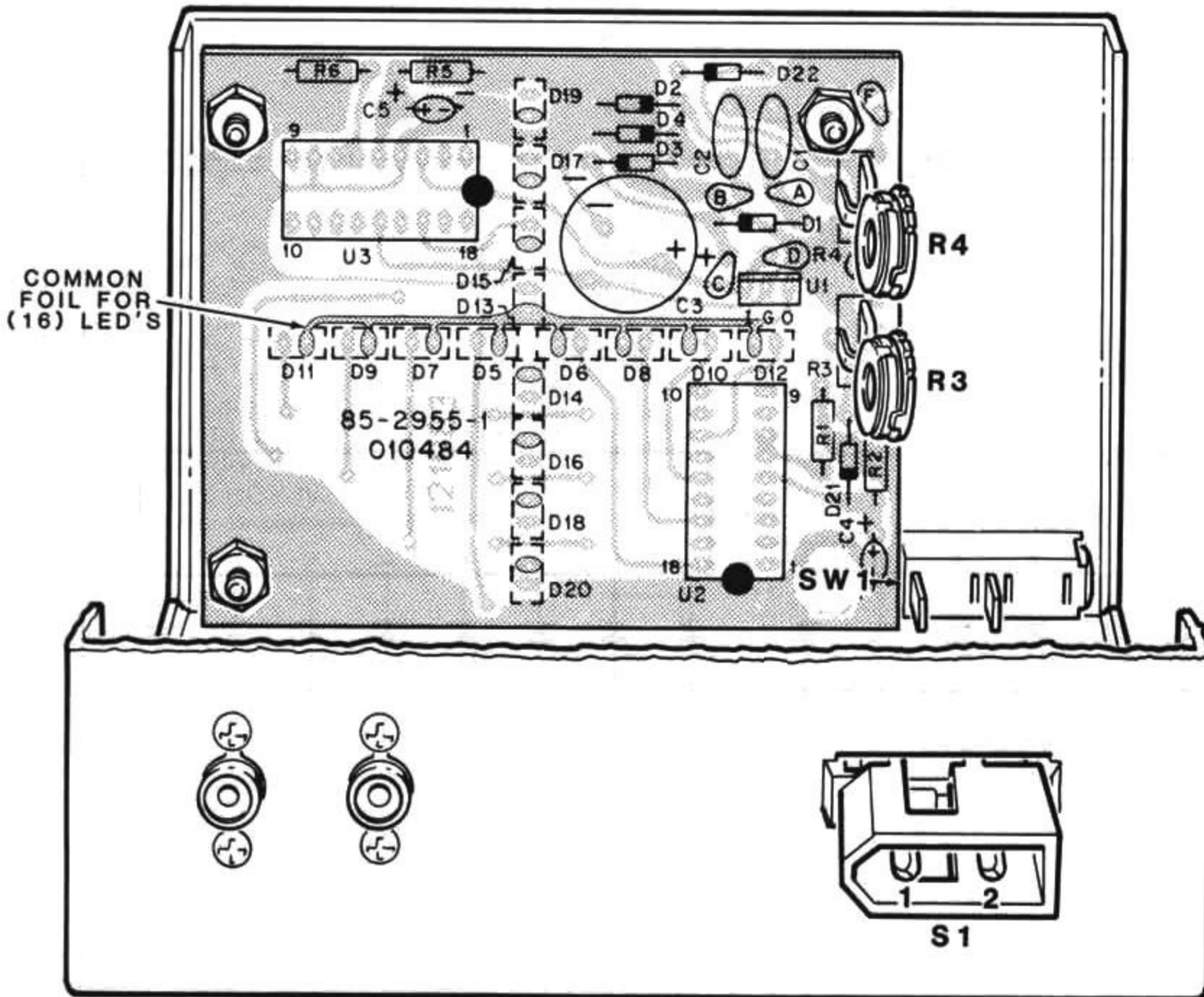
PICTORIAL 1-5



PICTORIAL 1-6



PICTORIAL 1-8







PICTORIAL 2-1

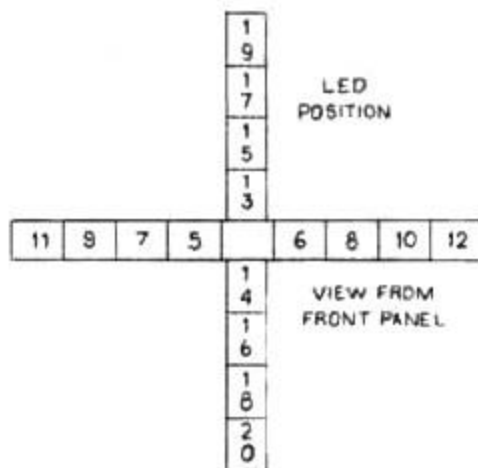
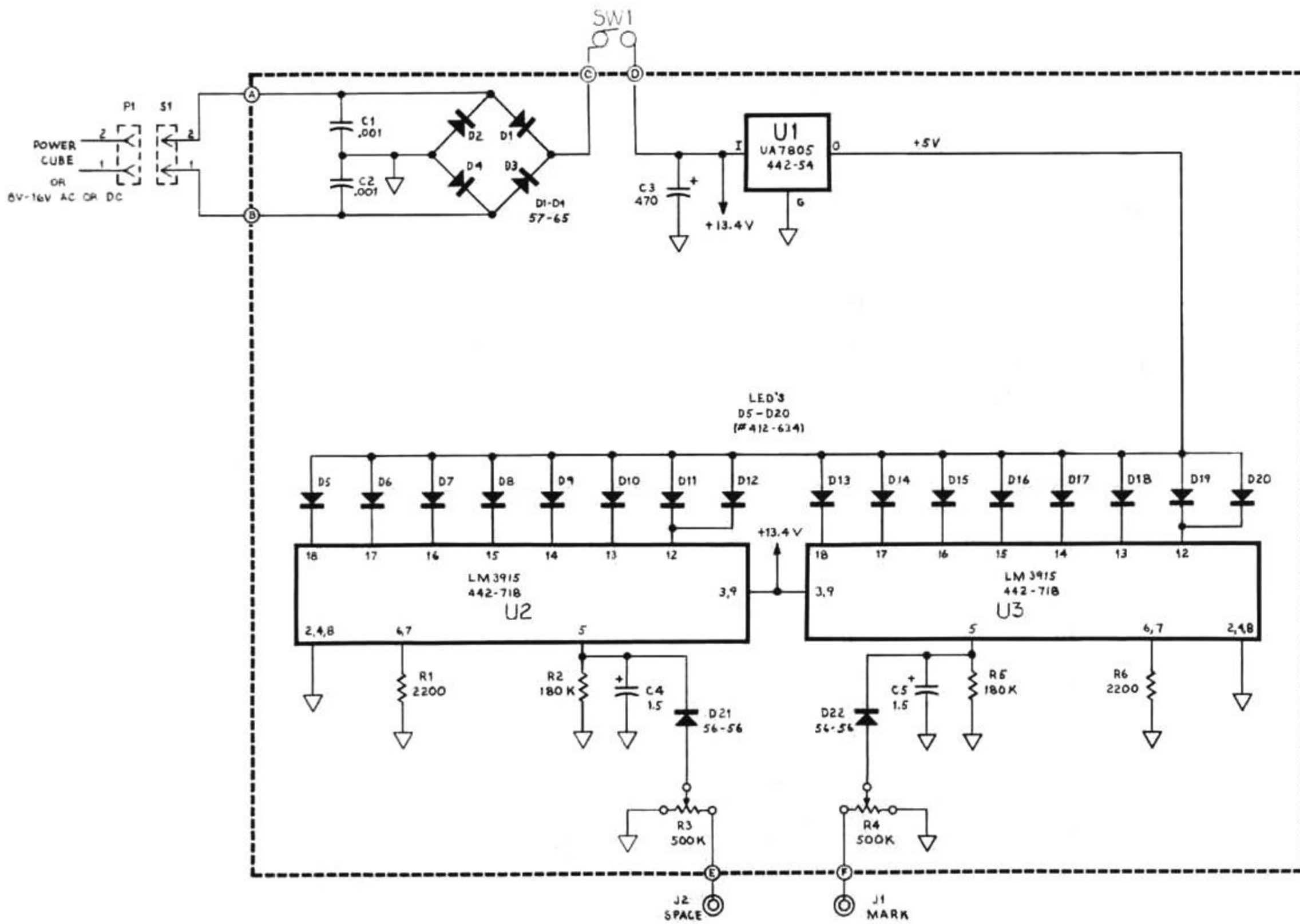
SCHEMATIC OF THE HEATHKIT® CROSSFIRE MODEL HD-3006

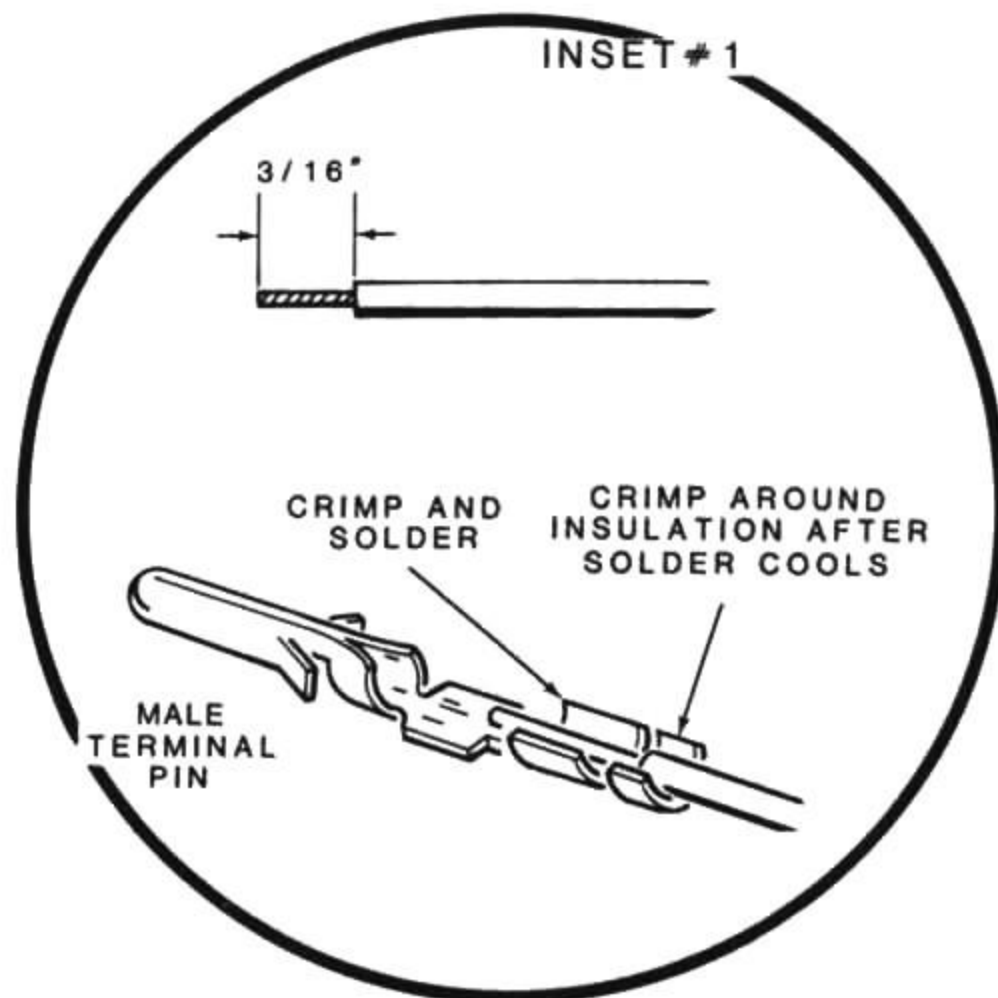
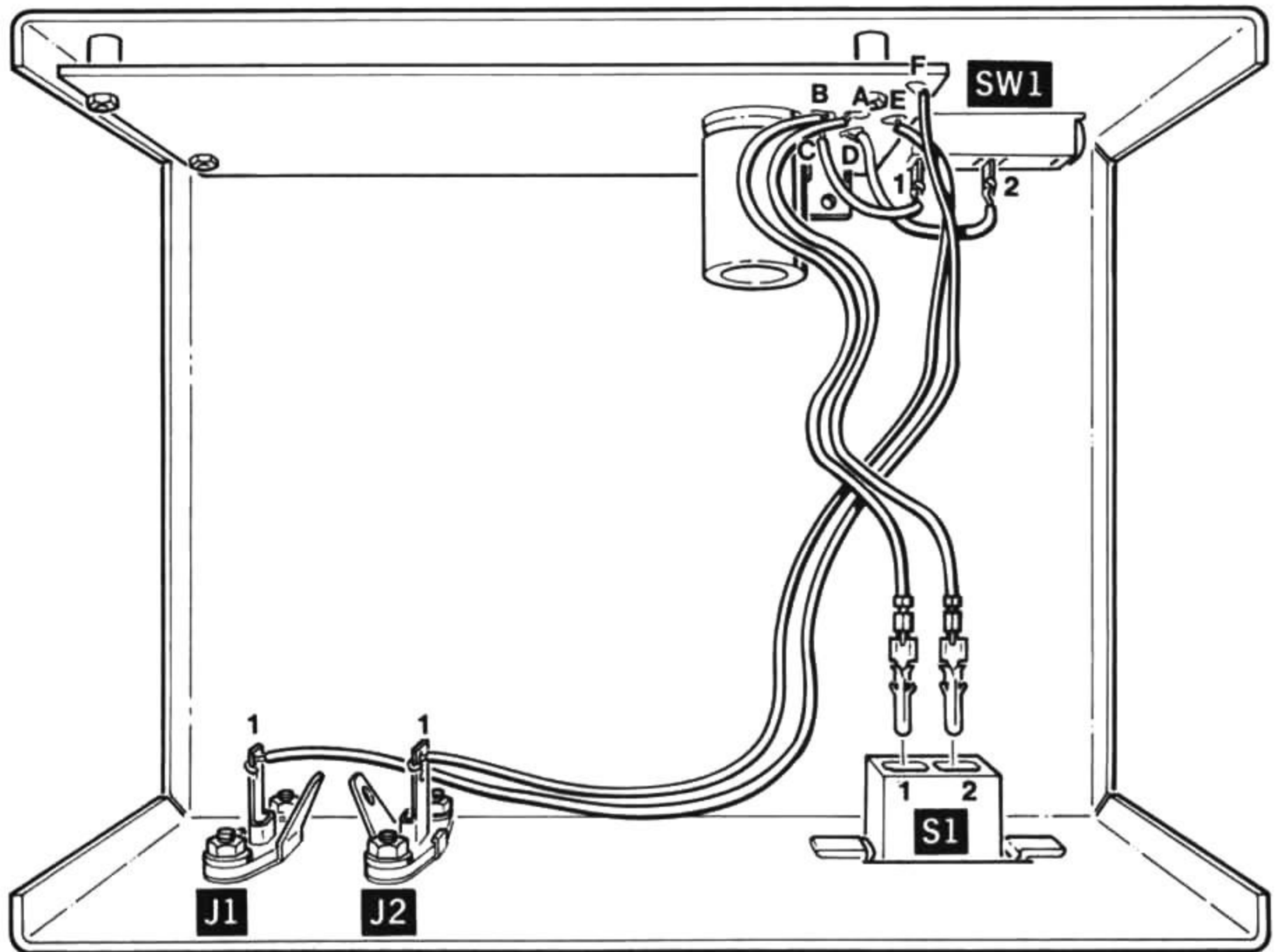
NOTES:

1. ALL RESISTORS ARE IN OHMS (K=1,000).
ALL RESISTORS ARE 1/4-WATT, 5%.
2. ALL CAPACITOR VALUES ARE IN μ F (MICROFARADS).
3. REFER TO THE CIRCUIT BOARD X-RAY VIEW FOR THE
PHYSICAL LOCATION OF PARTS.
4. VOLTAGES TAKEN WITH NO SIGNAL INPUT.

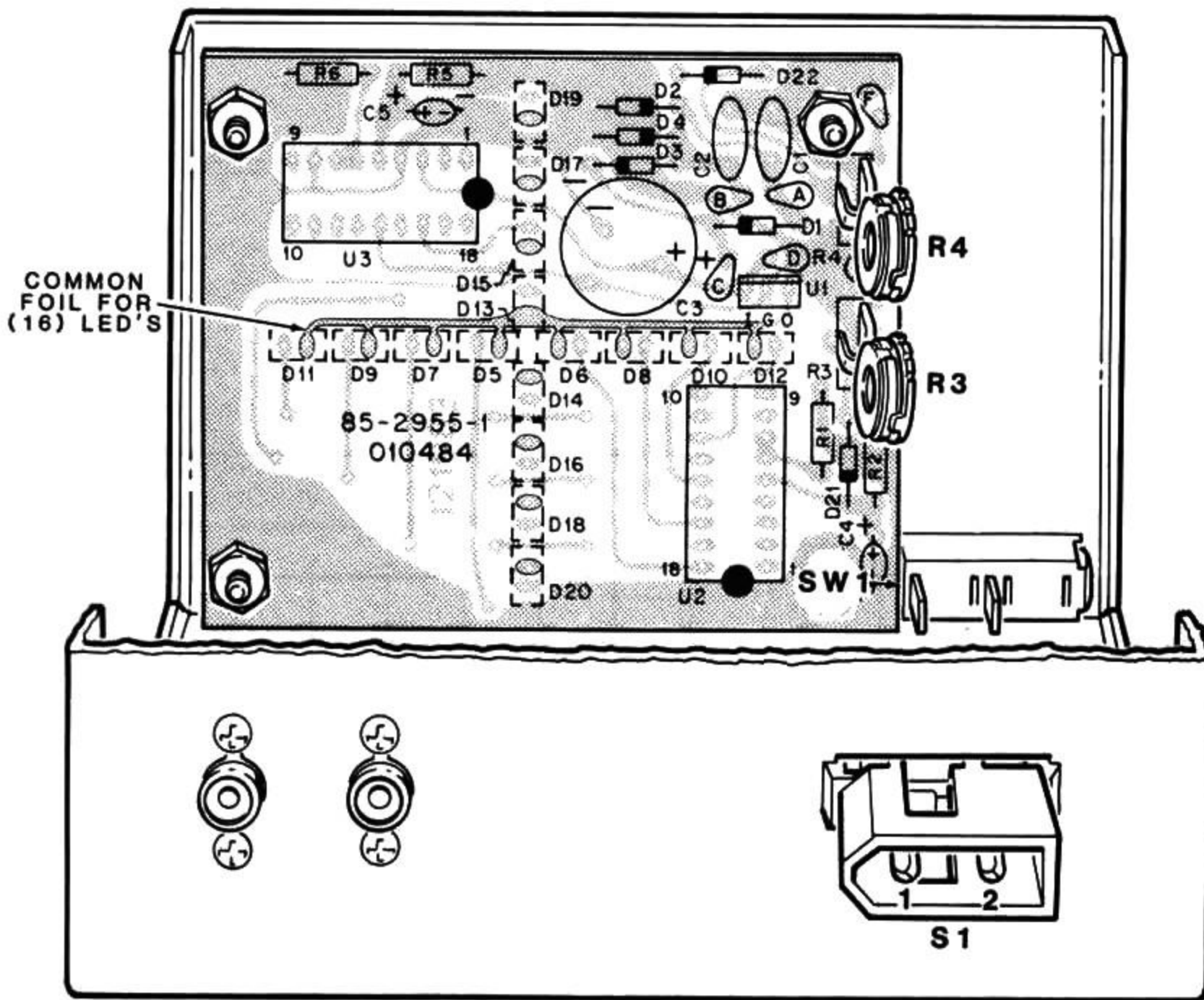
LEGEND:

1.  CIRCUIT BOARD GROUND
2.  MALE CONNECTOR
3.  FEMALE CONNECTOR
4.  CONNECTION
5.  CONNECTION TO CIRCUIT BOARD





PICTORIAL 1-8



PICTORIAL 2-1