VERTICAL CIRCUIT BOARD

PARTS LIST

Remove the parts from the pack marked #1. Check each part against the following list. The key numbers correspond to the numbers on the Vertical Circuit Board Parts Pictorial (Illustration Booklet, Pages 1 and 2). Any part that is in an individual envelope with the part number on it should be placed back into the envelope after you identify it until it is called for in a step. Do not discard any packing materials until all parts are accounted for.

Some parts are marked with a "171-" or "172-" packaging number. These numbers are used for packaging purposes only and do not appear in the "Manual Parts List."

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

RESISTORS

All resistors are 5% (fourth band gold) unless designated 10% (fourth band silver).

NOTE: The resistors may be packed in more than one envelope (stamped RES). Open all the resistor envelopes in this pack before you check the resistors against the Parts List.

1/2-Watt

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
A1	6-279	3	2.7 Ω (Red-Viol-Gold)	R179, R181, R182
A1	6-100	20	10 Ω (Brn-Blk-Blk)	R124A, R124B, R131A, R131B, R142A, R142B, R145A, R145B, R157A, R157B, R158A, R158B, R159A, R159B, R164A, R164B, R166, R168, R174, R175
A1	6-220	4	22 Ω (Red-Red-Blk)	R147A, R147B, R148A, R148B
A1	6-330	6	33 Ω (Org-Org-Blk)	R1A, R1B, R2A, R2B, ~~R105A, R105B~~ R106A, R106B
A1	6-390	2	39 Ω (Org-Wht-Blk)	R151A, R151B
A1	6-470	2	47 Ω (Yel-Viol-Blk)	R134A, R134B
A1	6-820	2	82 Ω (Gry-Red-Blk)	R144A, R144B
A1	6-101	6	100 Ω (Brn-Blk-Brn)	R161A, R161B, R162A, R162B, R171, R172
A1	6-201	2	200 Ω (Red-Blk-Brn)	R117A, R117B
A1	6-221	8	220 Ω (Red-Red-Brn)	R111A, R111B, R113A, R113B, R114A, R114B, R183, R184
A1	6-271	2	270 Ω (Red-Viol-Brn)	R108A, R108B
A1	6-331	2	330 Ω (Org-Org-Brn)	R116A, R116B
A1	6-391	6	390 Ω (Org-Wht-Brn)	R135A, R135B, R139A, R139B, R153A, R153B
A1	6-471	2	470 Ω (Yel-Viol-Brn)	R136A, R136B
A1	6-511	2	510 Ω (Grn-Brn-Brn)	R115A, R115B
A1	6-751	2	750 Ω (Viol-Grn-Brn)	R163A, R163B

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
Resistors (Contd.)				
A1	6-102	20	1000 Ω (Brn-Blk-Red)	R104A, R104B, R133A, R133B, R141A, R141B, R146A, R146B, R149A, R149B, R156A, R156B, R165, R167, R185, R186, R187, R188, R191, R192
A1	6-122	2	1200 Ω (Brn-Red-Red)	R155A, R155B
A1	6-182	2	1800 Ω (Brn-Gry-Red)	R137A, R137B
A1	6-272	4	2700 Ω (Red-Viol-Red)	R118A, R118B, R122A, R122B
A1	6-332	4	3300 Ω (Org-Org-Red)	R119A, R119B, R121A, R121B
A1	6-912	2	9100 Ω (Wht-Brn-Red)	R103A, R103B
A1	6-103	4	10 kΩ (Brn-Blk-Org)	R109A, R109B, R154A, R154B
A1	6-153	2	15 kΩ (Brn-Grn-Org)	R132A, R132B
A1	6-223	1	22 kΩ (Red-Red-Org)	R169
A1	6-913	2	91 kΩ (Wht-Brn-Org)	R102A, R102B
A1	6-104	2	100 kΩ (Brn-Blk-Yel)	R107A, R017B
A1	6-914	2	910 kΩ (Wht-Brn-Yel)	R101A, R101B
Other Resistors				
A2	6-1801-~~11~~ 12	4	1800 Ω (1.8 k) ~~1/8~~ 1/4-watt, 1% (Brn-Gry-Blk-Brn)	R123A, R123B, R127A, R127B
A2	6-4320-11	4	432 Ω, 1/8-watt, 1% (Yel-Org-Red-Blk)	R125A, R125B, R126A, R126B
A3	1-19-1	1	220 Ω, 1-watt, 10% (Red-Red-Brn)	R173
A4	5-11-2	1	15 kΩ, 2-watt, 10% (Brn-Grn-Org)	R176
A5	3-55-5	2	2000 Ω (2 k), 5-watt	R177, R178
CAPACITORS				
Ceramic				
B1	21-7	2	33 pF	C117A, C117B
B1	21-121	4	56 pF	C112A, C112B, C116A, C116B
B1	21-75	1	100 pF	C121
B1	21-722	2	330 pF	C105A, C105B
B1	21-140	2	.001 μF	C128, C129
B1	21-36	2	.002 μF	C108A, C108B
B1	21-141	1	.0033 μF	C131
B1	21-27	4	.005 μF	C107A, C107B, C135, C136
B1	21-47	3	.01 μF	C109A, C109B, C122
B1	21-31	1	.02 μF	C124
B1	21-199	2	.1 μF	C114A, C114B
Electrolytic				
B2	25-115	8	10 μF	C111A, C111B, C113A, C113B, C123, C132, C133, C134
B3	25-117	4	100 μF	C118A, C118B, C119A, C119B
B3	25-160	3	250 μF	C125, C126, C127
Trimmer				
B4	31-56	4	1.5 - 20 pF	C101A, C101B, C103A, C103B
B4	31-54	2	4-40 pF	C102A, C102B
B4	31-52	4	8-60 pF	C104A, C104B, C115A, C115B
B5	31-77	2	80-400 pF	C106A, C106B
Other Capacitors				
B6	27-28	2	.1 μF Mylar	C1, C2
DIODES				
C1	56-56	~~20~~ 16	1N4149	~~D101A, D101B, D102A, D102B,~~ D103A, D103B, D104A, D104B, D105A, D105B, D106A, D106B, D108A, D108B, D109A, D109B, D111A, D111B, D112A, D112B
C1	56-67	1	VR10A	D107
C1	56-89	4	GD510	D113, D114, D115, D116

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

TRANSISTORS-INTEGRATED CIRCUITS (IC's)

NOTE: Transistors and integrated circuits are marked for identification in one of the following four ways:

1. Part Number.
2. Type number. (On integrated circuits, this refers only to the numbers and letters listed. Any additional letters or numbers on an IC are not significant.)
3. Part number and type number.
4. Part number with a type number other than the one listed.

D1	417-235	8	2N4121 transistor	Q106A, Q106B, Q107A, Q107B, Q108A, Q108B, Q109A, Q109B
D1	417-237	2	SE6020 transistor	Q113, Q114
D1	417-260	4	2N4258A transistor	Q104A, Q104B, Q105A, Q105B
D1	417-293	4	2N5770 transistor	Q111A, Q111B, Q112A, Q112B
D1	417-801	4	MPSA20 transistor	Q103A, Q103B, Q117, Q118
D2	417-834	2	MPSU10 transistor	Q115, Q116
D3	417-902	4	5566 transistor	Q101A, Q101B, Q102A, Q102B
D4	443-1	1	7400 IC	U101
D4	443-4	1	7472 IC	U102
D1	417-854	4	selected transistor	D101A, D101B D102A, D102B

OTHER CIRCUIT COMPONENTS

E1	10-357	2	100 Ω control	R112A, R112B
E2	10-917	3	200 Ω control	R152A, R152B, R189
E2	10-918	2	500 Ω control	R143A, R143B
E2	10-936	2	1000 Ω (1K) control	R138A, R138B
E3	10-1118	2	1000 Ω (1K) control	R4A, R4B
E4	60-73	2	DP3T 3-position slide switch	SW1A, SW1B
E5	60-624	1	DP4T 4-position slide switch	SW3
E6	63-1316	2	Rotary switch with 5000 Ω (5K) control	SW2A-R3A, SW2B-R3B
E7	475-16	2	Ferrite bead	

HARDWARE

#4 Hardware

F1	250-428	1	4-40 × 1/4" flat head screw
F2	250-52	2	4-40 × 1/4" screw
F3	250-186	4	#4 × 3/8" screw
F4	252-15	3	4-40 nut
F5	254-9	3	#4 lockwasher

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

#6 Hardware

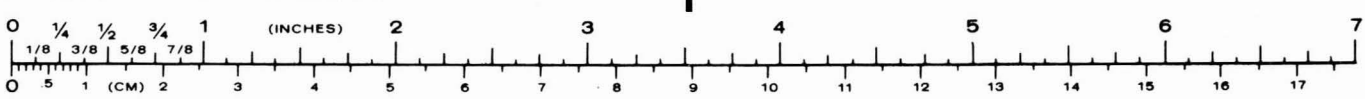
G1	250-1282	3	6-32 × 1/8" black setscrew
G2	250-33	4	6-32 × 1/8" setscrew
G3	250-416	4	6-32 × 1/4" flat head screw
G4	250-56	4	6-32 × 1/4" screw
G5	252-3	4	6-32 nut
G6	254-1	4	#6 lockwasher

Other Hardware

H1	253-50	2	1/4" plastic spacer
H2	252-7	4	3/8-32 nut
H3	255-145	2	3/8" spacer

MISCELLANEOUS

J1	75-769	1	Slide switch cover (1-7/16")	
J2	75-770	1	Slide switch cover (29/32")	
J3	266-1008	1	Slide switch cover (1-3/16")	
	85-2043-1	1	Vertical circuit board	
J4	204-2315	1	Switch bracket	
J5	204-2333	2	Control bracket	
J6	206-1273	1	Circuit board shield	
J7	215-95	2	Heat sink	
	343-15	4'	Shielded cable	
	344-51	3'	Brn wire	
	346-1	8-1/2"	Sleeving	
	347-55	1-1/2'	8-conductor flat cable	
	390-1436	1	Metal front panel	
J8	432-892	2	BNC connector	J1, J2
J9	434-230	4	8-pin IC socket	
J10	434-298	2	14-pin IC socket	
J11	453-66	2	5" extension shaft	
J12	455-44	2	Split plastic bushing	
J13	456-7	2	Shaft coupling	
J14	462-1049	1	Red knob	
J15	462-1050	2	Small black knob	
J16	462-1055	1	Large black knob	
L1	490-5	1	Plastic nut starter	
	134-237	1	Cable with connector	
L2	260-16	2	Alligator clip	
L3	73-34	2	Red alligator clip insulator	
	390-147	1	Danger label	
	390-1255	1	Fuse label	
	390-1483	1	Power consumption label	
	391-34	1	Blue and white label	
	597-260	1	Parts Order Form	
			Solder	
			Assembly Manual (See Page 1 for Part Number)	



STEP-BY-STEP ASSEMBLY

START

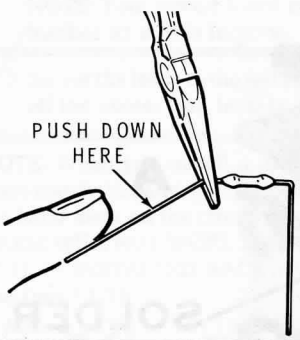
In the following steps, you will be given detailed instructions on how to install and solder the first part on the circuit board. Read and perform each step carefully. Then use the same procedure whenever you install parts on a circuit board.

NOTE: Only a portion of the circuit board is shown in some of the following Pictorials. The small "Identification Drawing" at the top of the page shows the area of the circuit board to be assembled.

( ) Position the circuit board as shown with the printed side (not the foil side) up.

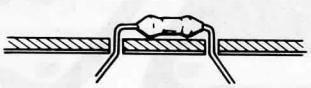
NOTE: When you install a component that has its value printed on it, position the value marking up, so it can be easily read. Diodes should be mounted with their type or part number up, if possible.

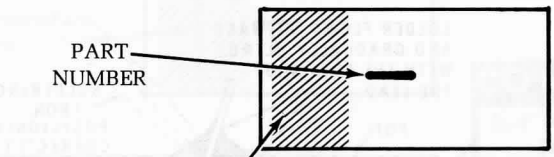
(✓) Hold a 910 kΩ (Wht-Brn-Yel) resistor with long-nose pliers and bend the leads straight down to fit the hole spacing on the circuit board.



( ) R101B: Push the leads through the holes at the indicated location on the circuit board. The end with color bands may be positioned either way.

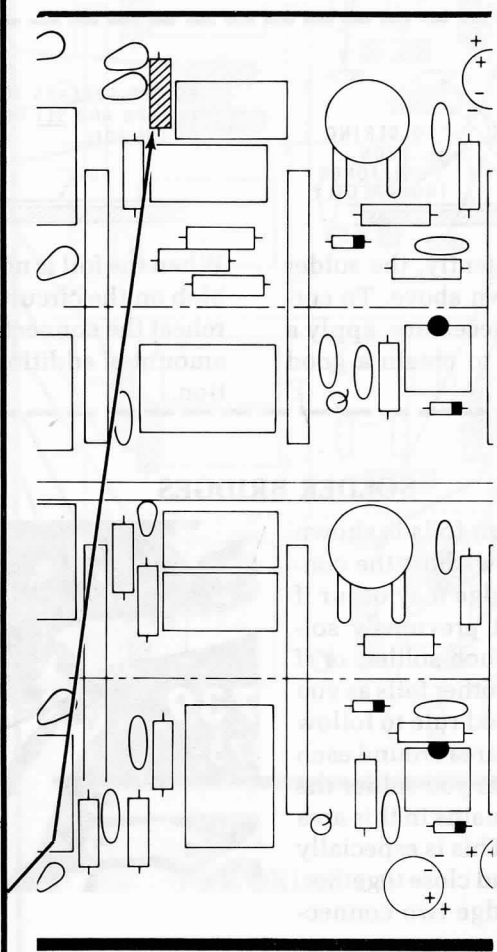
( ) Press the resistor against the circuit board. Then bend the leads outward slightly to hold the resistor in place.





IDENTIFICATION
DRAWING

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

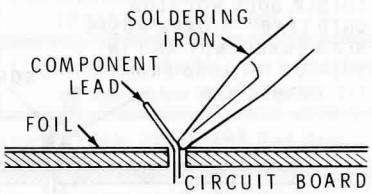


PICTORIAL 1-1

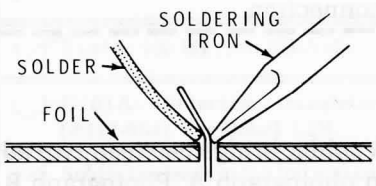
CONTINUE

( ) Turn the circuit board over and solder the resistor leads to the foil as follows:

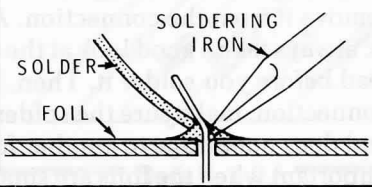
1. Push the soldering iron tip against both the lead and the circuit board foil. Heat **both** for two or three seconds.



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



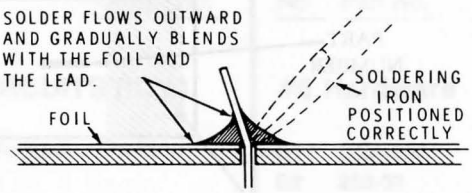
3. As the solder begins to melt, allow it to flow around the connection. Then remove the solder and the iron and let the connection cool.



( ) Cut off the excess lead lengths close to the connection. WARNING: Clip the leads so the ends will not fly toward your eyes.

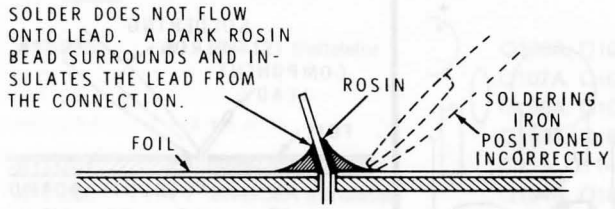
( ) Check each connection. Compare it to the illustrations on Page 12. After you have checked the solder connections, proceed with the assembly on Page 13. Use the same soldering procedure for each connection.

A GOOD SOLDER CONNECTION

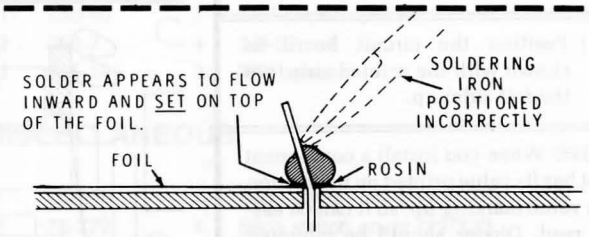


When you heat the lead and the circuit board foil at the same time, the solder will flow evenly onto the lead and the foil. The solder will make a good electrical connection between the lead and the foil.

POOR SOLDER CONNECTIONS



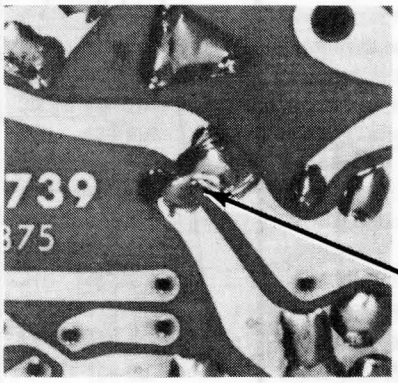
When the lead is not heated sufficiently, the solder will not flow onto the lead as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.



When the foil is not heated sufficiently the solder will blob on the circuit board as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.

SOLDER BRIDGES

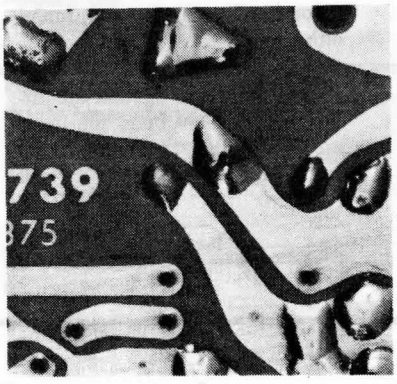
A solder bridge between two adjacent foils is shown in photograph **A**. Photograph **B** shows how the connection should appear. A solder bridge may occur if you accidentally touch an adjacent previously soldered connection, if you use too much solder, or if you "drag" the soldering iron across other foils as you remove it from the connection. A good rule to follow is: always take a good look at the foil area around each lead before you solder it. Then, when you solder the connection, make sure the solder remains in this area and does not bridge to another foil. This is especially important when the foils are small and close together. NOTE: It is alright for solder to bridge two connections on the same foil.



A

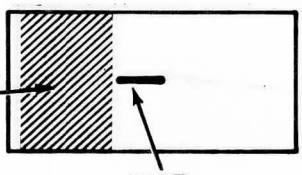
SOLDER BRIDGE

B



Use only enough solder to make a good connection, and lift the soldering iron straight up from the circuit board. If a solder bridge should develop, turn the circuit board foil-side-down and heat the solder between connections. The excess solder will run onto the tip of the soldering iron, and this will remove the solder bridge. NOTE: The foil side of most circuit boards has a coating on it called "solder resist." This is a protective insulation to help prevent solder bridges.

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



IDENTIFICATION DRAWING

START

NOTE: Be sure you installed resistor R101B in Pictorial 1-1 (Page 11).

( ) R102B: 91 kΩ (Wht-Brn-Org).

( ) R105B: 1.5 Ω (Brn-Grn-Gold). NOTE: Your circuit board may be marked **33** at this location.

( ) R103B: 9100 Ω (Wht-Brn-Red).

( ) R104B: 1000 Ω (Brn-Blk-Red).

( ) R101A: 910 kΩ (Wht-Brn-Yel).

( ) R102A: 91 kΩ (Wht-Brn-Org).

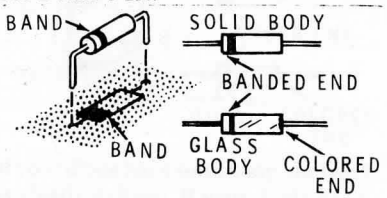
( ) R103A: 9100 Ω (Wht-Brn-Red).

( ) R104A: 1000 Ω (Brn-Blk-Red).

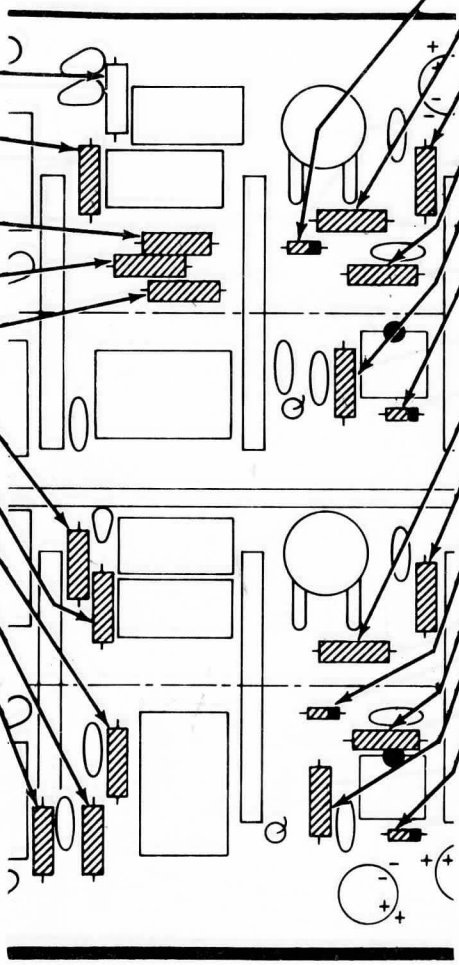
( ) R105A: 1.5 Ω (Brn-Grn-Gold). NOTE: Your circuit board may be marked **33** at this location.

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

NOTE: When you install a diode, always match the band on the diode with the band mark on the circuit board. A DIODE WILL NOT WORK PROPERLY IF IT IS INSTALLED BACKWARDS. See Detail 1-2A.



If your diode has a solid body, the band is clearly defined. If your diode has a glass body, do not mistake the colored end inside the diode for the banded end. Look for a band painted on the outside of the glass.



PICTORIAL 1-2

CONTINUE

( ) D102B: Selected transistor (#417-854). See Detail 1-2B.

( ) R111B: 220 Ω (Red-Red-Brn).

( ) R109B: 10 kΩ (Brn-Blk-Org).

( ) R108B: 270 Ω (Red-Viol-Brn).

( ) R107B: 100 kΩ (Brn-Blk-Yel).

( ) D101B: Selected transistor (#417-854). See Detail 1-2B.

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

( ) R111A: 220 Ω (Red-Red-Brn).

( ) R109A: 10 kΩ (Brn-Blk-Org).

( ) D102A: Selected transistor (#417-854). See Detail 1-2B.

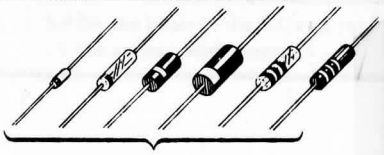
( ) R108A: 270 Ω (Red-Viol-Brn).

( ) R107A: 100 kΩ (Brn-Blk-Yel).

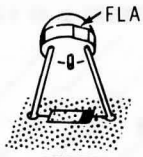
( ) D101A: Selected transistor (#417-854). See Detail 1-2B.

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

IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.

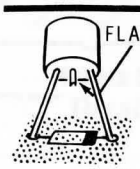


Detail 1-2A



CUT OFF CENTER LEAD AND INSTALL AS SHOWN (FLAT TOWARD YOU)

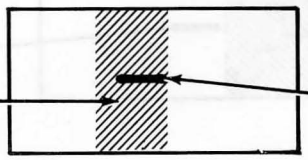
OR



CUT OFF CENTER LEAD AND INSTALL AS SHOWN (FLAT AWAY FROM YOU)

Detail 1-2B

IDENTIFICATION DRAWING



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

IDENTIFIC
DRAWI

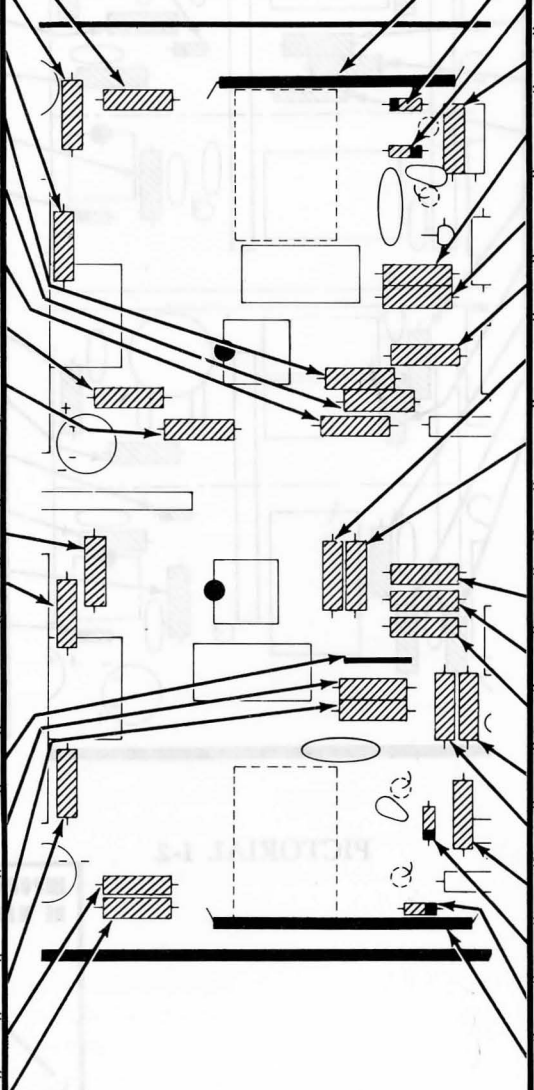
1550

START

- ( ) R113B: 220 Ω (Red-Red-Brn).
- ( ) R117B: 200 Ω (Red-Blk-Brn).
- ( ) R116B: 330 Ω (Org-Org-Brn).
- ( ) R123B: 1800 Ω (1.8 k), 1% (Brn-Gry-Blk-Brn). 1/4 Watt
- ( ) R131B: 10 Ω (Brn-Blk-Blk).
- ( ) R127B: 1800 Ω (1.8 k), 1% (Brn-Gry-Blk-Brn). 1/4 watt
- ( ) R115B: 510 Ω (Grn-Brn-Brn).
- ( ) R114B: 220 Ω (Red-Red-Brn).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) R117A: 200 Ω (Red-Blk-Brn).
- ( ) R116A: 330 Ω (Org-Org-Brn).

NOTE: When a bare wire is called for in a step, remove all the insulation from the specified length of brown wire.

- ( ) 1" bare wire.
- ( ) R125A: 432 Ω, 1% (Yel-Org-Red-Blk).
- ( ) R126A: 432 Ω, 1% (Yel-Org-Red-Blk).
- ( ) R115A: 510 Ω (Grn-Brn-Brn).
- ( ) R114A: 220 Ω (Red-Red-Brn).
- ( ) R113A: 220 Ω (Red-Red-Brn).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

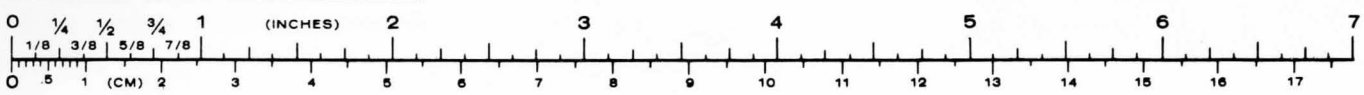


PICTORIAL 1-3

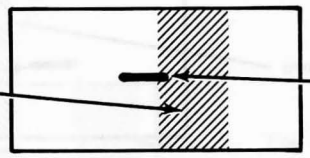
CONTINUE

NOTE: When a wire is called for in a step, cut the brown wire to the specified length. Then remove 1/4" of insulation from each end.

- ( ) 2-1/4" Brn wire.
- ( ) D104B: 1N4149 diode (#56-56).
- ( ) D103B: 1N4149 diode (#56-56).
- ( ) R118B: 2700 Ω (Red-Viol-Red).
- ( ) R126B: 432 Ω, 1% (Yel-Org-Red-Blk).
- ( ) R125B: 432 Ω, 1% (Yel-Org-Red-Blk).
- ( ) R124B: 10 Ω (Brn-Blk-Blk).
- ( ) R127A: 1800 Ω (1.8 k), 1% (Brn-Gry-Blk-Brn). 1/4 watt
- ( ) R123A: 1800 Ω (1.8 k), 1% (Brn-Gry-Blk-Brn). 1/4 watt
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) R134A: 47 Ω (Yel-Viol-Blk).
- ( ) R131A: 10 Ω (Brn-Blk-Blk).
- ( ) R124A: 10 Ω (Brn-Blk-Blk).
- ( ) R132A: 15 kΩ (Brn-Grn-Org).
- ( ) R122A: 2700 Ω (Red-Viol-Red).
- ( ) R136A: 470 Ω (Yel-Viol-Brn).
- ( ) D104A: 1N4149 diode (#56-56).
- ( ) D103A: 1N4149 diode (#56-56).
- ( ) 2-3/8" Brn wire.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.



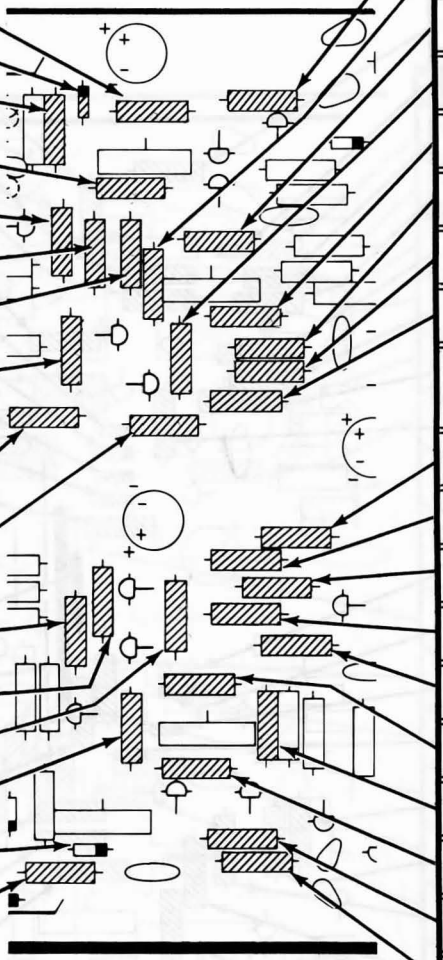
IDENTIFICATION DRAWING



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

START

- ( ) R149B: 1000 Ω (Brn-Blk-Red).
- ( ) D105B: 1N4149 diode (#56-56).
- ( ) R136B: 470 Ω (Yel-Viol-Brn).
- ( ) R137B: 1800 Ω (Brn-Gry-Red).
- ( ) R122B: 2700 Ω (Red-Viol-Red).
- ( ) R132B: 15 kΩ (Brn-Grn-Org).
- ( ) R145B: 10 Ω (Brn-Blk-Blk).
- ( ) R139B: 390 Ω (Org-Wht-Brn).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) R134B: 47 Ω (Yel-Viol-Blk).
- ( ) R135B: 390 Ω (Org-Wht-Brn).
- ( ) R139A: 390 Ω (Org-Wht-Brn).
- ( ) R135A: 390 Ω (Org-Wht-Brn).
- ( ) R156A: 1000 Ω (Brn-Blk-Red).
- ( ) R137A: 1800 Ω (Brn-Gry-Red).
- ( ) D105A: 1N4149 diode (#56-56).
- ( ) R118A: 2700 Ω (Red-Viol-Red).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.



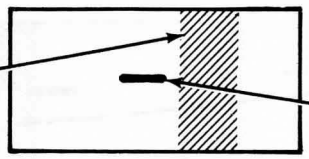
CONTINUE

- ( ) R155B: 1200 Ω (Brn-Red-Red).
- ( ) R144B: 82 Ω (Gry-Red-Blk).
- ( ) R142B: 10 Ω (Brn-Blk-Blk).
- ( ) R156B: 1000 Ω (Brn-Blk-Red).
- ( ) R141B: 1000 Ω (Brn-Blk-Red).
- ( ) R158B: 10 Ω (Brn-Blk-Blk).
- ( ) R157B: 10 Ω (Brn-Blk-Blk).
- ( ) R133B: 1000 Ω (Brn-Blk-Red).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) R159A: 10 Ω (Brn-Blk-Blk).
- ( ) R133A: 1000 Ω (Brn-Blk-Red).
- ( ) R157A: 10 Ω (Brn-Blk-Blk).
- ( ) R141A: 1000 Ω (Brn-Blk-Red).
- ( ) R158A: 10 Ω (Brn-Blk-Blk).
- ( ) R144A: 82 Ω (Gry-Red-Blk).
- ( ) R142A: 10 Ω (Brn-Blk-Blk).
- ( ) R154A: 10 Ω (Brn-Blk-Blk).
- ( ) R148A: 22 Ω (Red-Red-Blk).
- ( ) R147A: 22 Ω (Red-Red-Blk).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

1750

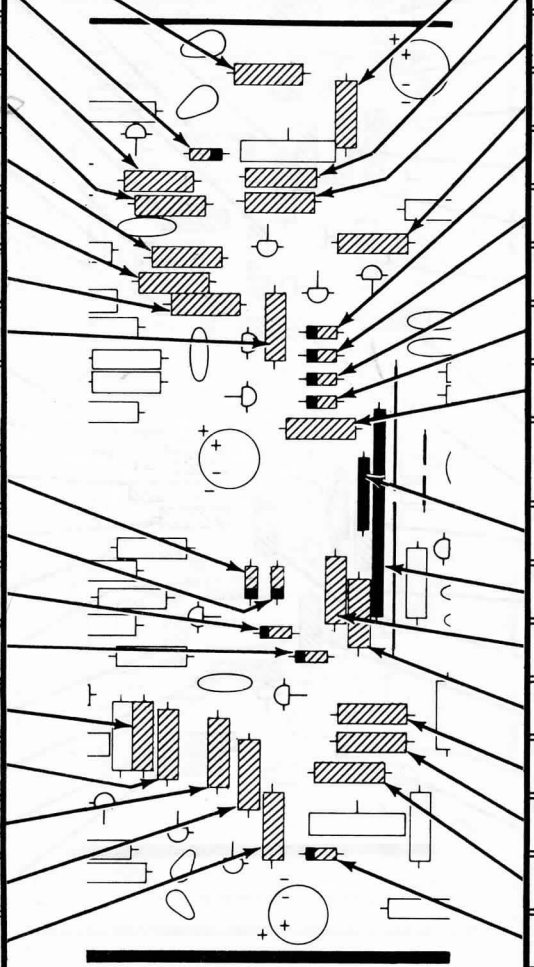
PICTORIAL 1-4

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



START

- ( ) R164B: 10 Ω (Brn-Blk-Blk).
- ( ) D106B: 1N4149 diode (#56-56).
- ( ) R146B: 1000 Ω (Brn-Blk-Red).
- ( ) R148B: 22 Ω (Red-Red-Blk).
- ( ) R147B: 22 Ω (Red-Red-Blk).
- ( ) R151B: 39 Ω (Org-Wht-Blk).
- ( ) R162B: 100 Ω (Brn-Blk-Brn).
- ( ) R161B: 100 Ω (Brn-Blk-Brn).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) D109A: 1N4149 diode (#56-56).
- ( ) D111A: 1N4149 diode (#56-56).
- ( ) D108A: 1N4149 diode (#56-56).
- ( ) D112A: 1N4149 diode (#56-56).
- ( ) R146A: 1000 Ω (Brn-Blk-Red).
- ( ) R149A: 1000 Ω (Brn-Blk-Red).
- ( ) R155A: 1200 Ω (Brn-Red-Red).
- ( ) R151A: 39 Ω (Org-Wht-Blk).
- ( ) R154A: 10 kΩ (Brn-Blk-Org).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

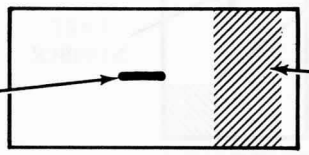


CONTINUE

- ( ) R163: 750 Ω (Viol-Grn-Brn).
- ( ) R153B: 390 Ω (Org-Wht-Brn).
- ( ) R154B: 10 kΩ (Brn-Blk-Org).
- ( ) R187: 1000 Ω (Brn-Blk-Red).
- ( ) D111B: 1N4149 diode (#56-56).
- ( ) D112B: 1N4149 diode (#56-56).
- ( ) D109B: 1N4149 diode (#56-56).
- ( ) D108B: 1N4149 diode (#56-56).
- ( ) R159B: 10 Ω (Brn-Blk-Blk).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) 1″ Brn wire.
- ( ) 2″ Brn wire.
- ( ) R165: 1000 Ω (Brn-Blk-Red).
- ( ) R167: 1000 Ω (Brn-Blk-Red).
- ( ) R162A: 100 Ω (Brn-Blk-Brn).
- ( ) R161A: 100 Ω (Brn-Blk-Brn).
- ( ) R153A: 390 Ω (Org-Wht-Brn).
- ( ) D106A: 1N4149 diode (#56-56).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 1-5

IDENTIFICATION DRAWING

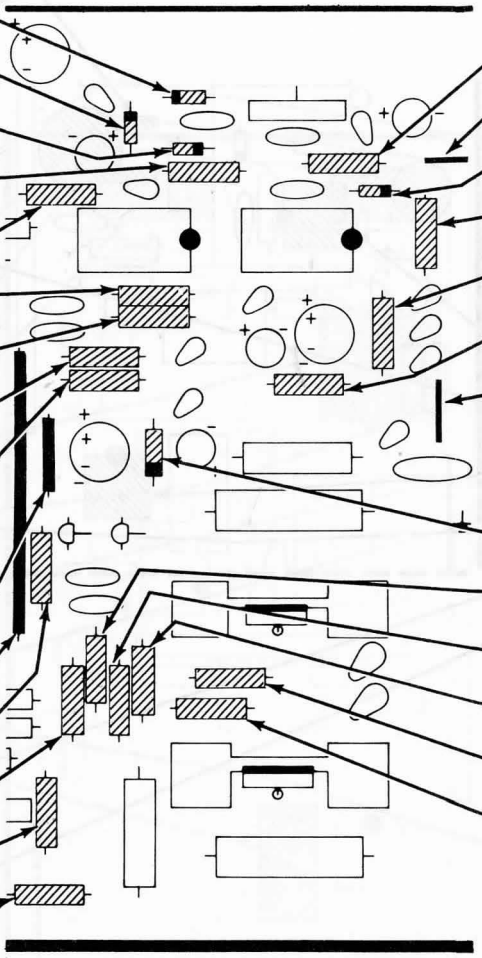


PART NUMBER

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

START

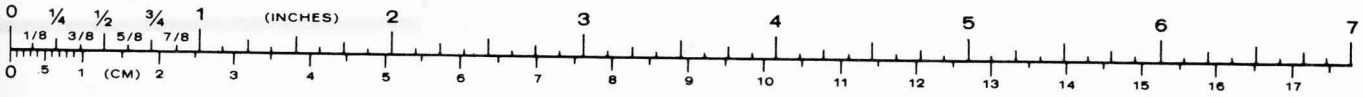
- ( ) D116: GD510 diode (#56-89).
- ( ) D114: GD510 diode (#56-89).
- ( ) D113: GD510 diode (#56-89).
- ( ) R192: 1000 Ω (Brn-Blk-Red).
- ( ) R186: 1000 Ω (Brn-Blk-Red).
- ( ) R188: 1000 Ω (Brn-Blk-Red).
- ( ) R185: 1000 Ω (Brn-Blk-Red).
- ( ) R184: 220 Ω (Red-Red-Brn).
- ( ) R183: 220 Ω (Red-Red-Brn).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) 1" Brn wire.
- ( ) 2-3/8" Brn wire.
- ( ) R166: 10 Ω (Brn-Blk-Blk).
- ( ) R171: 100 Ω (Brn-Blk-Brn).
- ( ) R163: 750 Ω (Viol-Grn-Brn).
- ( ) R164A: 10 Ω (Brn-Blk-Blk).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.



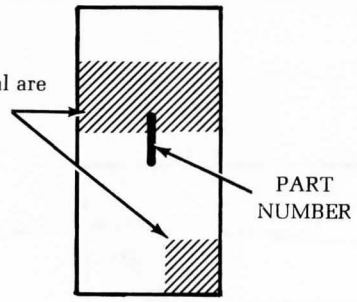
CONTINUE

- ( ) R191: 1000 Ω (Brn-Blk-Red).
- ( ) 1" bare wire.
- ( ) D115: GD510 diode (#56-89).
- ( ) R181: 2.7 Ω (Red-Viol-Gold).
- ( ) R182: 2.7 Ω (Red-Viol-Gold).
- ( ) R179: 2.7 Ω (Red-Viol-Gold).
- ( ) 1" bare wire.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) D107: VR10A diode (#56-67).
- ( ) R169: 22 kΩ (Red-Red-Org).
- ( ) R172: 100 Ω (Brn-Blk-Brn).
- ( ) R168: 10 Ω (Brn-Blk-Blk).
- ( ) R174: 10 Ω (Brn-Blk-Blk).
- ( ) R175: 10 Ω (Brn-Blk-Blk).
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 1-6



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

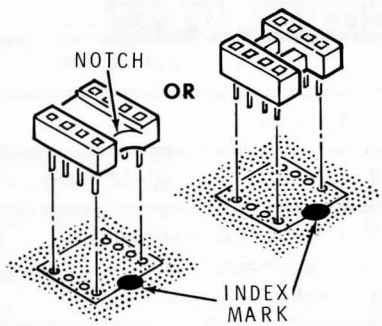


IDENTIFICATION DRAWING

START

( ) Reposition the circuit board as shown. Solder the pins to the foil as you install each part.

NOTE: When you install an IC socket, insert the pins into the circuit board holes. The index mark on the circuit board must still be visible after the socket is installed.



( ) 8-pin IC socket at Q101A.

( ) 8-pin IC socket at Q101B.

( ) 8-pin IC socket at Q102A.

( ) 8-pin IC socket at Q102B.

( ) 14-pin IC socket at U102.

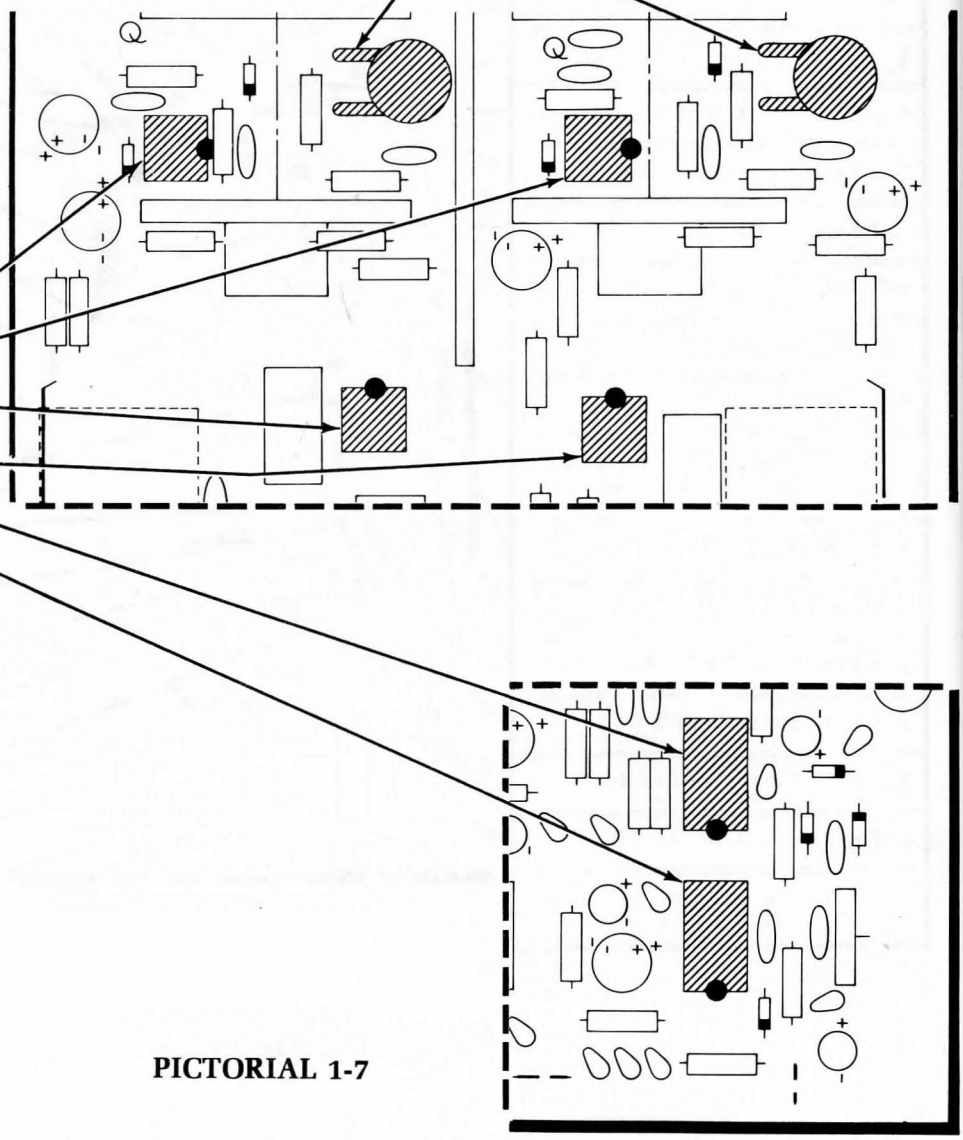
( ) 14-pin IC socket at U101.

CONTINUE

NOTE: When you install a control, insert the pins into the circuit board holes and solder them to the foil.

( ) R112A: 100 Ω control (#10-357).

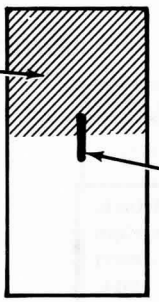
( ) R112B: 100 Ω control (#10-357).



PICTORIAL 1-7

2120

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

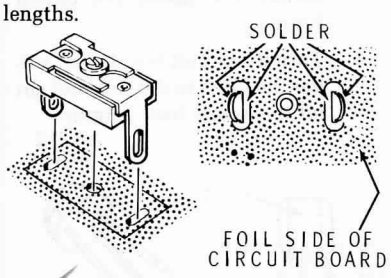


IDENTIFICATION DRAWING

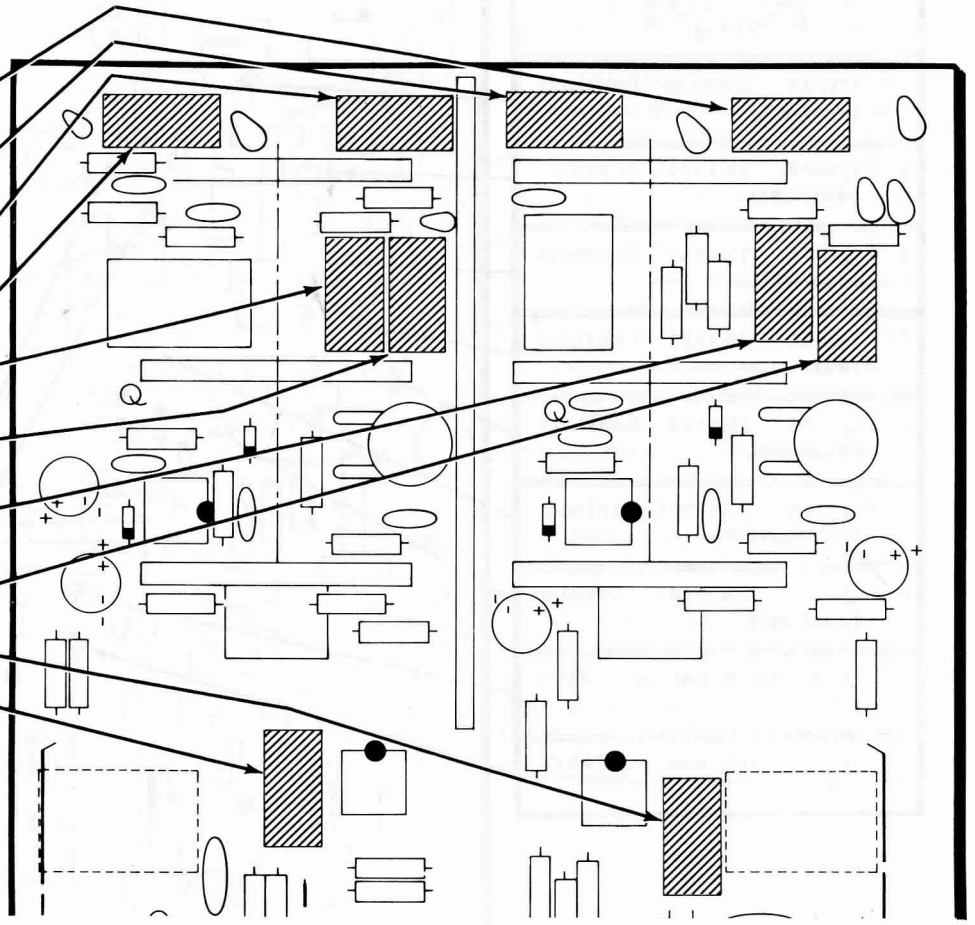
PART NUMBER

START

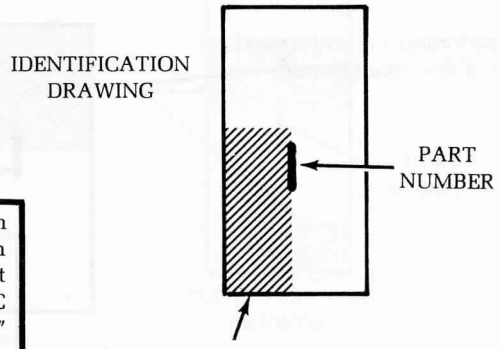
NOTE: When you install a trimmer capacitor, insert its end leaves into the circuit board slots. Solder both sides of the end leaves to the foil as you install each trimmer. All the leaves must be soldered. Then cut off the excess leaf lengths.



- ( ) C102B: 4-40 pF trimmer (#31-54).
- ( ) C101B: 1.5-20 pF trimmer (#31-56).
- ( ) C102A: 4-40 pF trimmer (#31-54).
- ( ) C101A: 1.5-20 pF trimmer (#31-56).
- ( ) C104A: 8-60 pF trimmer (#31-52).
- ( ) C103A: 1.5-20 pF trimmer (#31-56).
- ( ) C104B: 8-60 pF trimmer (#31-52).
- ( ) C103B: 1.5-20 pF trimmer (#31-56).
- ( ) C115A: 8-60 pF trimmer (#31-52).
- ( ) C115B: 8-60 pF trimmer (#31-52).



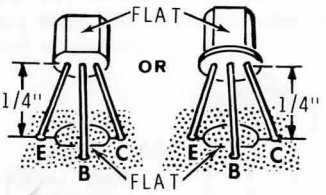
PICTORIAL 1-8



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

START

NOTE: When you install a transistor in each of the following nine steps, align its flat with the flat on the board. Insert the leads into their correct E, B, and C holes. Position the transistor 1/4" above the board. Then solder the leads to the foil and cut off the excess lead lengths.



( ) Q103A: MPSA20 transistor (#417-801).

( ) Q107A: 2N4121 transistor (#417-235).

( ) Q106A: 2N4121 transistor (#417-235).

( ) Q109A: 2N4121 transistor (#417-235).

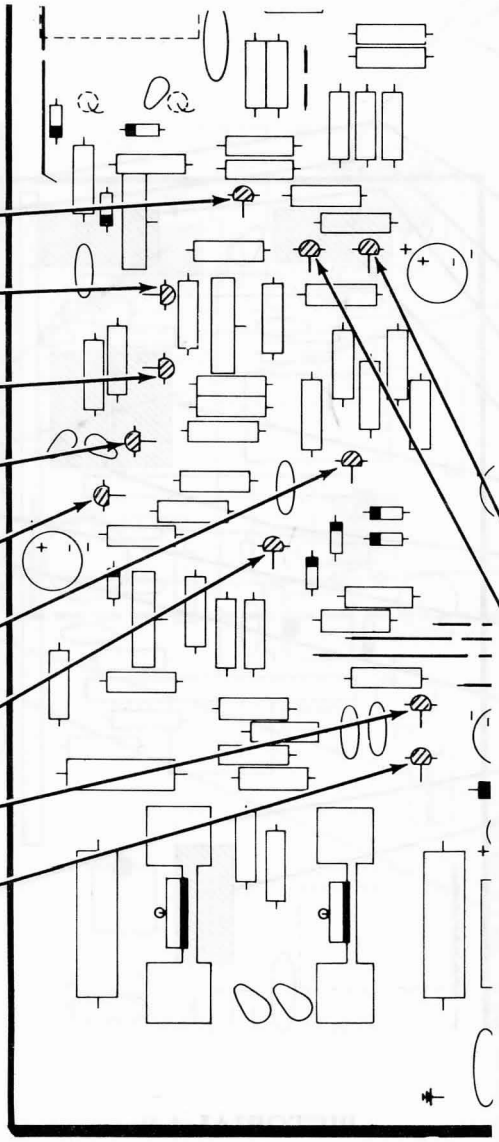
( ) Q108A: 2N4121 transistor (#417-235).

( ) Q111A: 2N5770 transistor (#417-293).

( ) Q112A: 2N5770 transistor (#417-293).

( ) Q113: SE6020 transistor (#417-237).

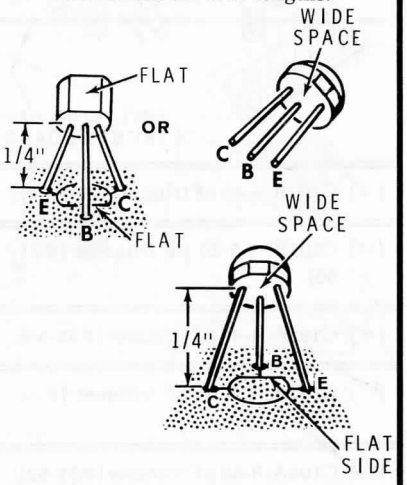
( ) Q114: SE6020 transistor (#417-237).



CONTINUE

NOTE: In the following four steps, install each of the transistors as follows:

1. Refer to the illustration example below and identify the E, B, and C leads of the transistor.
2. Insert the transistor leads into the corresponding E, B, and C holes in the circuit board.
3. Position the transistor approximately 1/4" above the circuit board.
4. Turn the circuit board over, solder the leads to the foil, and cut off the excess lead lengths.

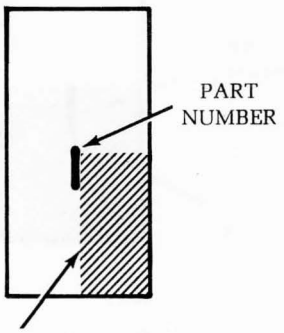


( ) Q104A: 2N4248 transistor (#417-260).

( ) Q105A: 2N4248 transistor (#417-260).

PICTORIAL 1-9

IDENTIFICATION DRAWING

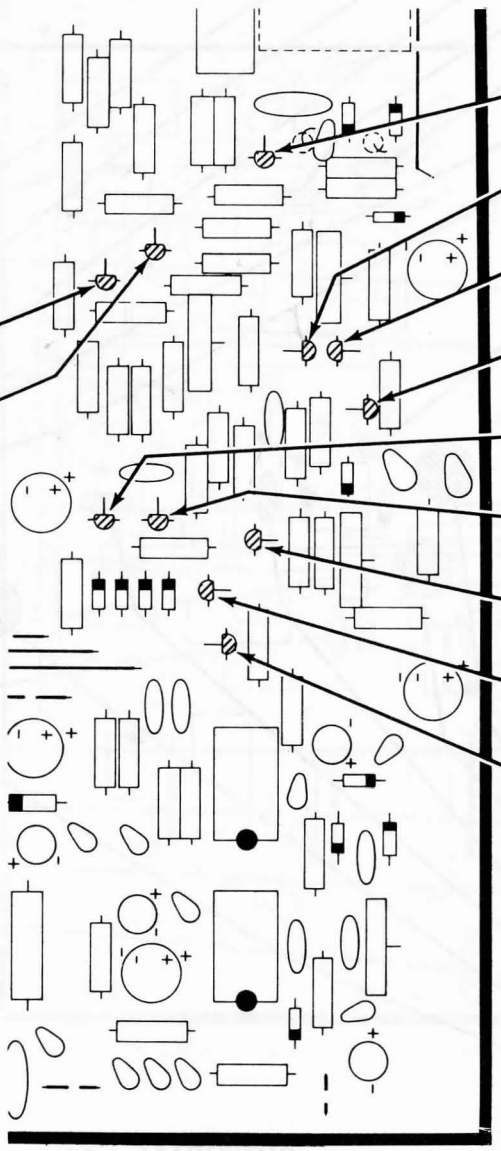


The steps performed in this Pictorial are in this area of the circuit board.

START

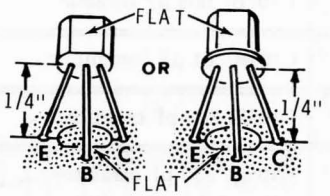
( ) Q104B: 2N4258 transistor (#417-260).

( ) Q105B: 2N4258 transistor (#417-260).



CONTINUE

NOTE: When you install a transistor in each of the following nine steps, align its flat with the flat on the board. Insert the leads into their correct E, B, and C holes. Position the transistor 1/4" above the board. Then solder the leads to the foil and cut off the excess lead lengths.



( ) Q103B: MPSA20 transistor (#417-801).

( ) Q106B: 2N4121 transistor (#417-235).

( ) Q107B: 2N4121 transistor (#417-235).

( ) Q109B: 2N4121 transistor (#417-235).

( ) Q111B: 2N5770 transistor (#417-293).

( ) Q112B: 2N5770 transistor (#417-293).

( ) Q108B: 2N4121 transistor (#417-235).

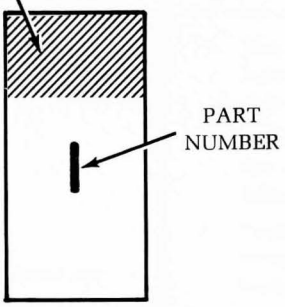
( ) Q117: MPSA20 transistor (#417-801).

( ) Q118: MPSA20 transistor (#417-801).

(0010)

PICTORIAL 1-10

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



IDENTIFICATION
DRAWING

START

( ) C107B: .005 μF ceramic.

( ) C109B: .01 μF ceramic.

( ) C105B: 330 pF ceramic.

( ) C105A: 330 pF ceramic.

( ) C107A: .005 μF ceramic.

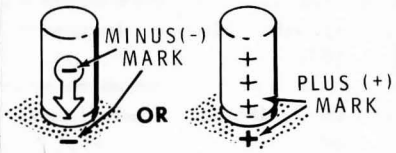
( ) C108B: .002 μF ceramic.

( ) C112B: 56 pF ceramic.

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

( ) C108A: .002 μF ceramic.

NOTE: When you install electrolytic capacitors, always match the positive (+) mark on the capacitor with the positive (+) mark on the circuit board OR match the minus (−) mark on the capacitor with the minus (−) mark on the capacitor with the minus (−) mark on the circuit board.



( ) C113A: 10 μF electrolytic.

( ) C111A: 10 μF electrolytic.

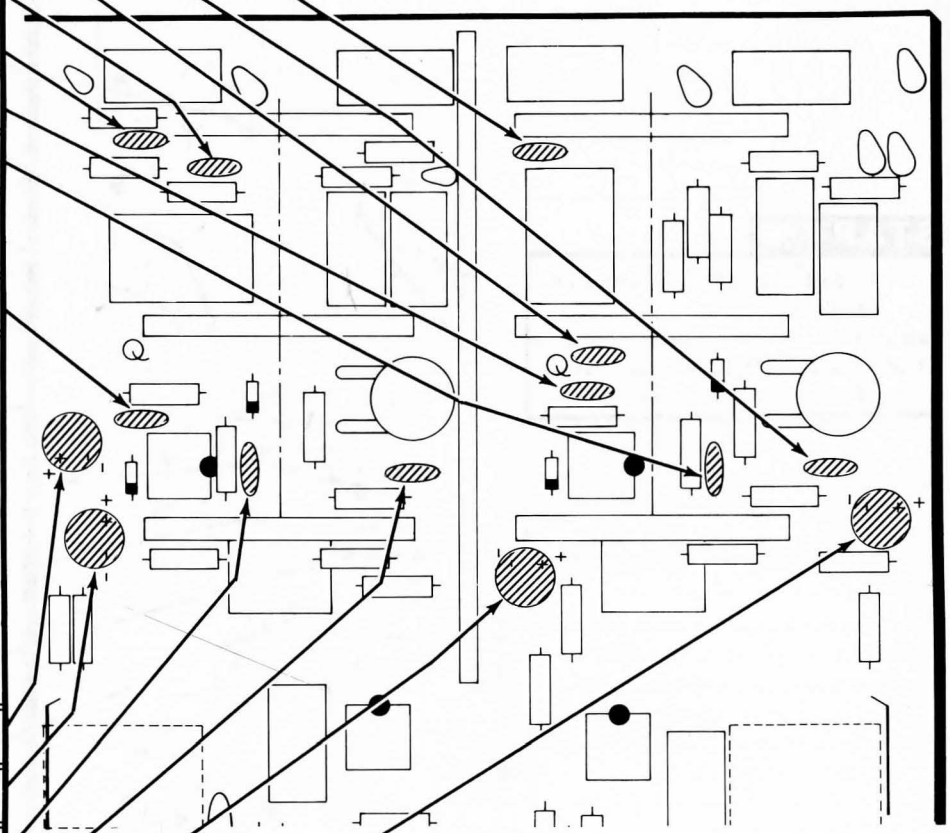
( ) C112A: 56 pF ceramic.

( ) C109A: .01 μF ceramic.

( ) C111B: 10 μF electrolytic.

( ) C113B: 10 μF electrolytic.

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



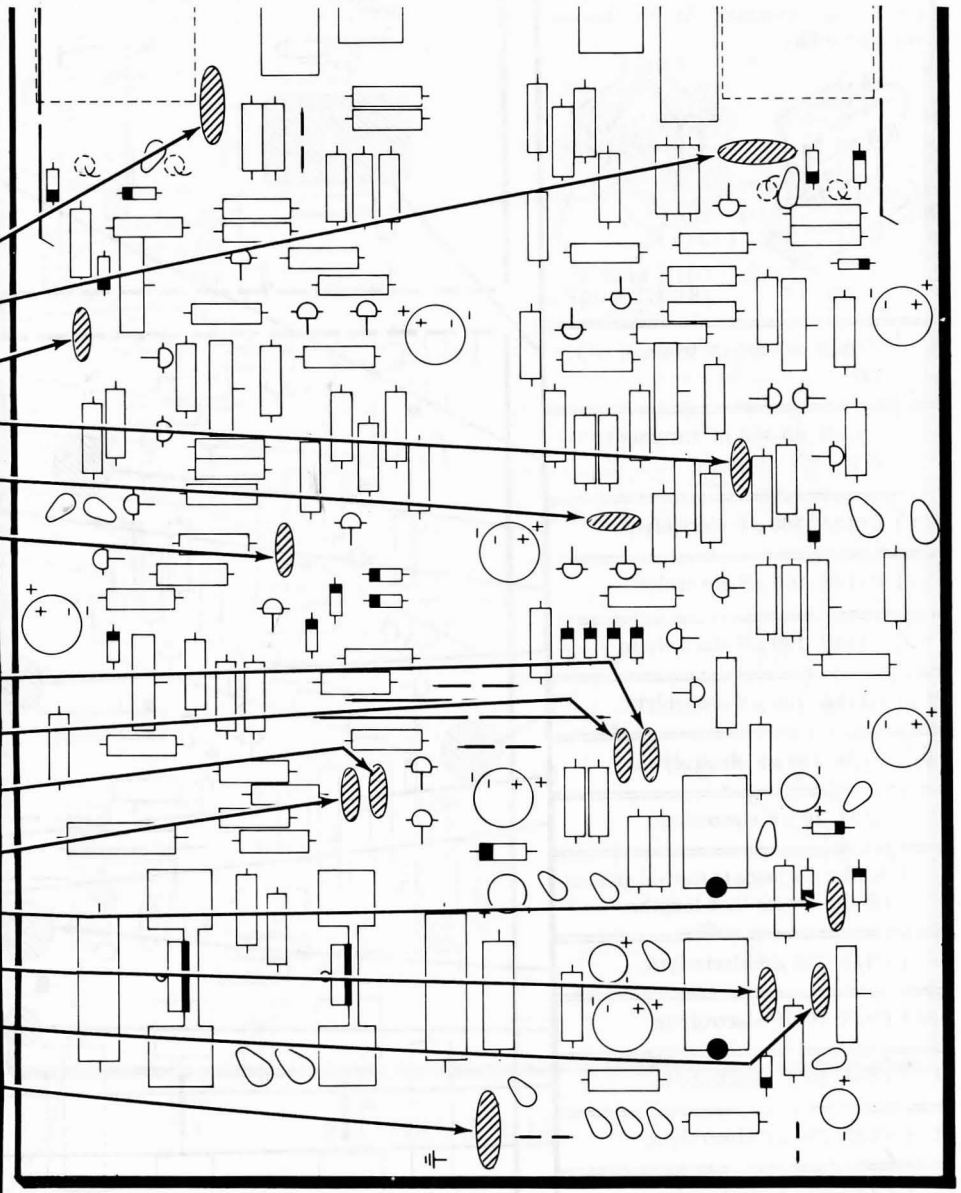
PICTORIAL 1-11

IDENTIFICATION DRAWING

START

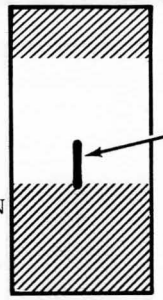
- ( ) C114A: .1 μF ceramic.
- ( ) C114B: .1 μF ceramic.
- ( ) C116A: 56 pF ceramic.
- ( ) C116B: 56 pF ceramic.
- ( ) C117B: 33 pF ceramic.
- ( ) C117A: 33 pF ceramic.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.
- ( ) C128: .001 μF ceramic.
- ( ) C129: .001 μF ceramic.
- ( ) C121: 100 pF ceramic.
- ( ) C122: .01 μF ceramic.
- ( ) C131: .0033 μF ceramic.
- ( ) C135: .005 μF ceramic.
- ( ) C136: .005 μF ceramic.
- ( ) C124: .02 μF ceramic.
- ( ) Solder the leads to the foil and cut off the excess lead lengths.

(2430)



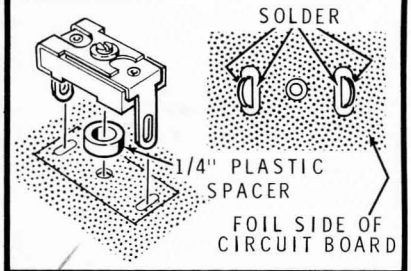
PICTORIAL 1-12

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



START

NOTE: When you install a trimmer capacitor, place a 1/4" plastic spacer over the screw and insert its end leaves into the circuit board slots. Solder both sides of the end leaves to the foil as you install each trimmer. All the leaves must be soldered.



( ) C106A: 80-400 pF trimmer (#31-77).

( ) C106B: 80-400 pF trimmer (#31-77).

( ) C118A: 100 μF electrolytic.

( ) C119B: 100 μF electrolytic.

( ) C118B: 100 μF electrolytic.

( ) C119A: 100 μF electrolytic.

( ) C126: 250 μF electrolytic.

( ) C133: 10 μF electrolytic.

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

( ) C125: 250 μF electrolytic.

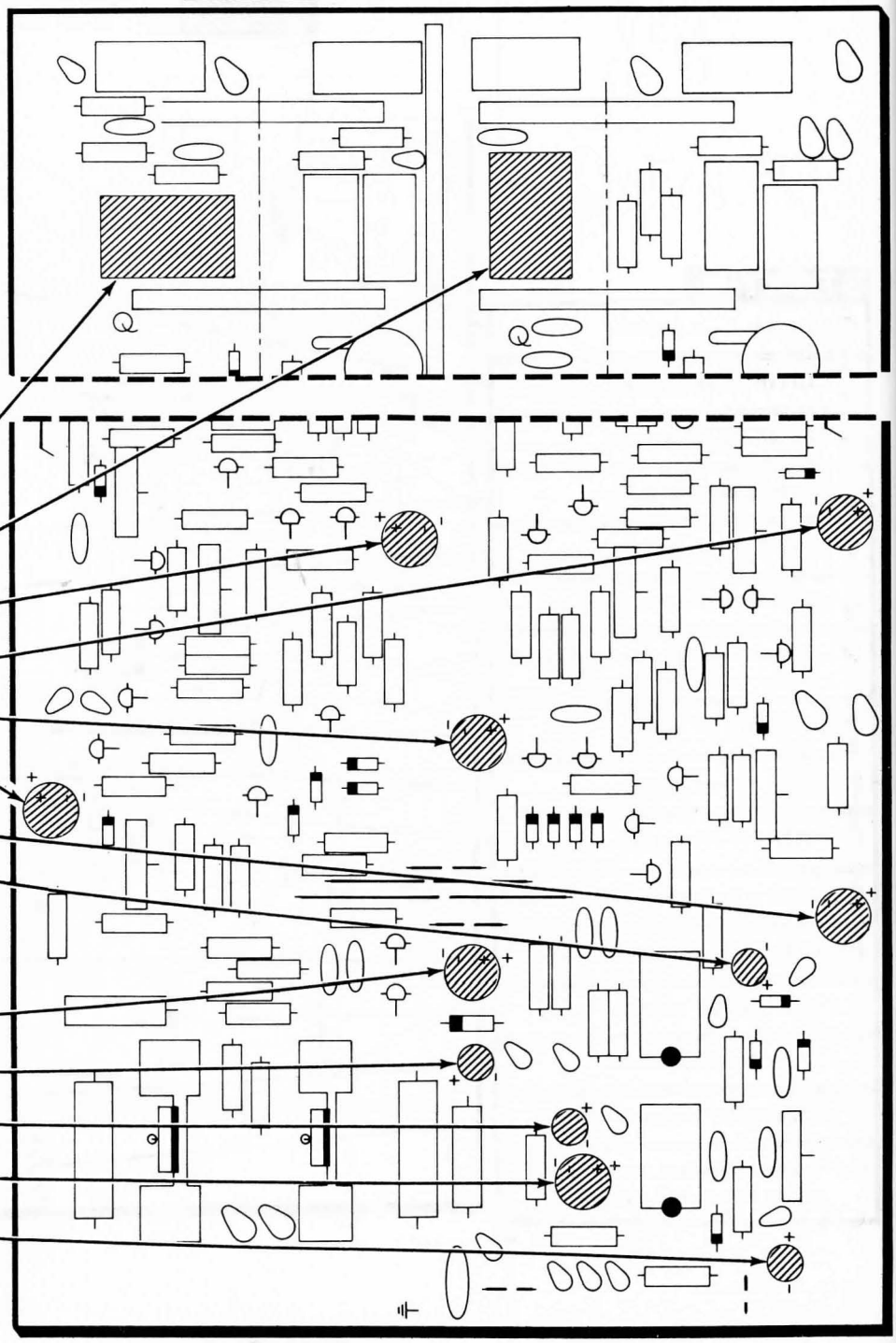
( ) C123: 10 μF electrolytic.

( ) C134: 10 μF electrolytic.

( ) C127: 250 μF electrolytic.

( ) C132: 10 μF electrolytic.

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

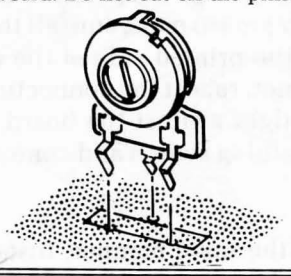


PICTORIAL 1-13

START

NOTE: Solder the leads or pins to the foil and cut off the excess lengths of each part as you install it.

When you install a control, be sure it is tight against and perpendicular to the circuit board. Do not cut off the pins.



( ) R138A: 1000 Ω (1 k) control (#10-936).

( ) R138B: 1000 Ω (1 k) control (#10-936).

( ) R143A: 500 Ω control (#10-918).

( ) R143B: 500 Ω control (#10-918).

( ) R152B: 200 Ω control (#10-917).

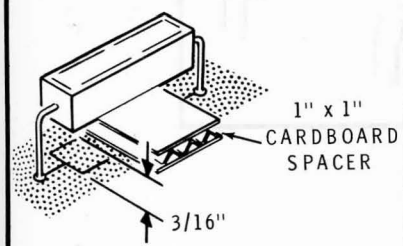
( ) R189: 200 Ω control (#10-917).

( ) R152A: 200 Ω control (#10-917).

( ) R176: 15 kΩ, 2-watt (Brn-Grn-Org).

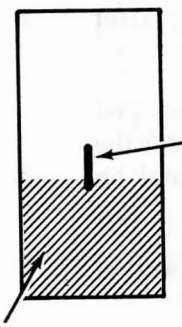
( ) R173: 220 Ω, 1-watt (Red-Red-Brn).

NOTE: When you are instructed to mount a resistor 3/16" above the circuit board as shown, use a 1" × 1" piece of 3/16" cardboard (from shipping carton) for a spacer. After the leads are soldered, remove the cardboard spacer.

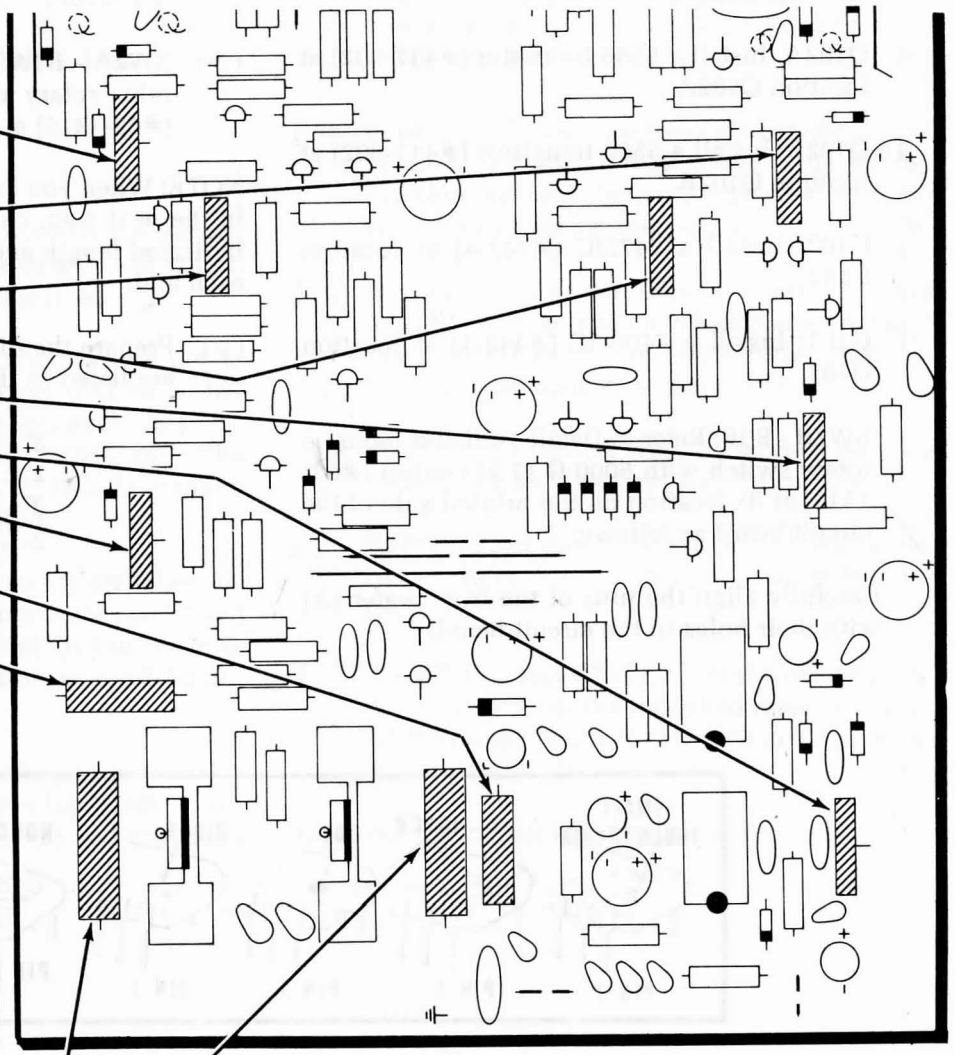


( ) R178: 2000 Ω, 5-watt (3/16" above board).

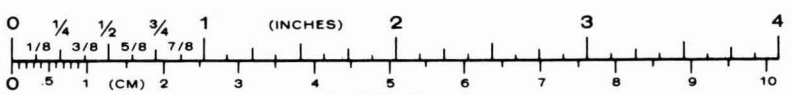
( ) R177: 2000 Ω, 5-watt (3/16" above board).



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



PICTORIAL 1-14



Refer to Pictorial 1-15 (Illustration Booklet, Page 3) for the following steps.

NOTE: When you install a transistor or integrated circuit (IC) in the following steps, be sure to match the pin 1 end of the transistor or IC to the index mark on the circuit board. See Detail 1-15A.

( ) Q101A: Install a 5566 transistor (#417-902) at location Q101A.

( ) Q101B: Install a 5566 transistor (#417-902) at location Q101B.

( ) Q102A: Install a 5566 transistor (#417-902) at location Q102A.

( ) Q102B: Install a 5566 transistor (#417-902) at location Q102B.

( ) U102: Install a 7472IC (#443-4) at location U102.

( ) U101: Install a 7400 IC (#443-1) at location U101.

( ) SW2B - R3B: Refer to Detail 1-15B and mount a rotary switch with 5000 Ω (5 k) control (#63-1316) at its location on the printed side of the circuit board as follows:

1. Carefully align the pins of the front wafer (A) with their holes in the circuit board.

2. Fit the pins of each switch wafer, one wafer at a time, into their board holes until all the switch and control pins are in place. Then push the switch down tight against the circuit board.

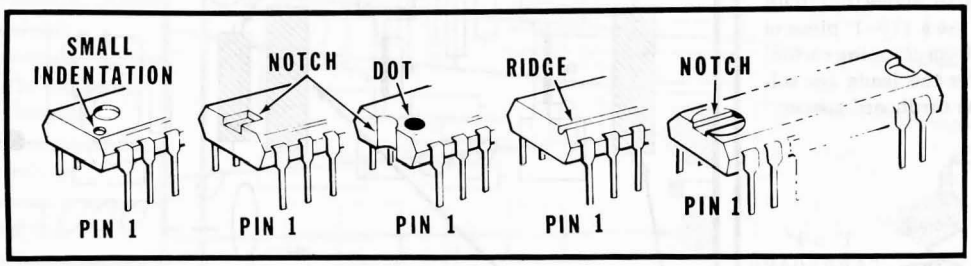
3. Carefully turn the circuit board over and solder **only** the end pins of each wafer to the foil. Inspect these switch pins to make sure all the pins are tight against the printed side of the circuit board. If they are not, reheat the connection and push the switch tight against the board. Then solder all the remaining switch and control pins to the foil.

( ) SW2A - R3A: In the same manner, install the other rotary switch with 5000 Ω (5 k) control (#63-1316) at its location on the circuit board.

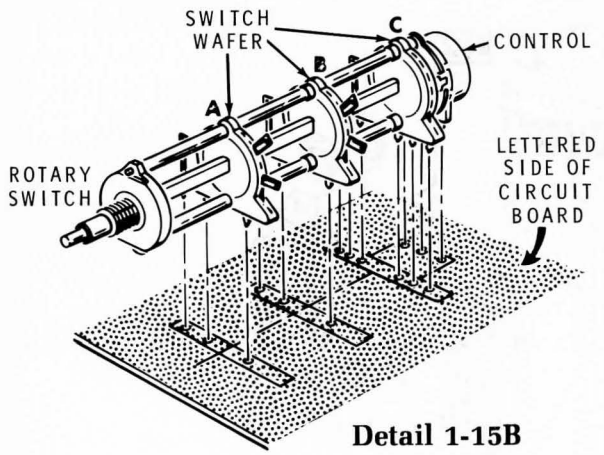
NOTE: When you are instructed to prepare wires, as in the next step, cut the specified color wire to the indicated length and remove 1/4" of insulation from each end.

( ) Prepare the following brown wires. The wires are listed in the order they will be used.

3"
2"
3"
2-1/4"



Detail 1-15A



Detail 1-15B

NOTES:

1. When you connect a wire to the circuit board, always cut off the excess lead length after the connection is soldered.

2. in the following steps, (NS) means not to solder because other wires will be added later. "S-" with a number, such as (S-3), means to solder the connection. The number following the "S" tells how many wires are at the connection.

3. When you wire to the rotary switches, be sure **no** wires or components are positioned directly above the screws in the trimmer capacitors, as these trimmers must be adjusted later.

( ) Connect a 3" Brn wire from circuit board hole A (S-1) to switch SW2A wafer A lug 9 (NS). Position the wire between the shaft and indicated spacer on the switch.

( ) Connect a 2" Brn wire from circuit board hole A2 (S-1) to switch SW2A wafer A lug 8 (S-1).

( ) Place a 1/2" length of sleeving on each lead of a 33 Ω, 1/2-watt (Org-Org-Blk) 5% resistor.

( ) R2A: Connect this resistor to switch SW2A between wafer A lug 9 (NS) and wafer B lug 8 (S-1).

( ) R106A: Connect a 33 Ω, 1/2-watt (Org-Org-Blk) 5% resistor from the indicated resistor outline in the circuit board (S-1) to switch SW2A wafer B lug 9 (S-1).

( ) Connect a 3" Brn wire from circuit board hole CC (S-1) to switch SW2B wafer A lug 9 (NS). Position the wire between the shaft and the indicated spacer on the switch.

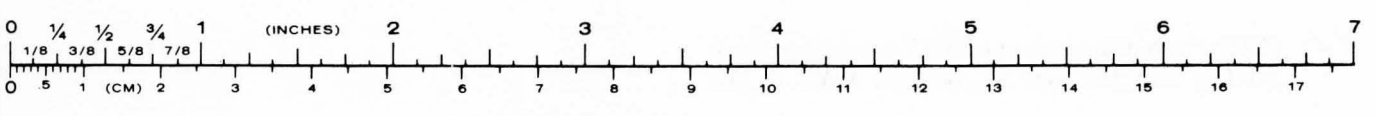
( ) Connect a 2-1/4" Brn wire from circuit board hole B2 (S-1) to switch SW2B wafer A lug 8 (S-1). Position the wire between the shaft and the indicated spacer on the switch.

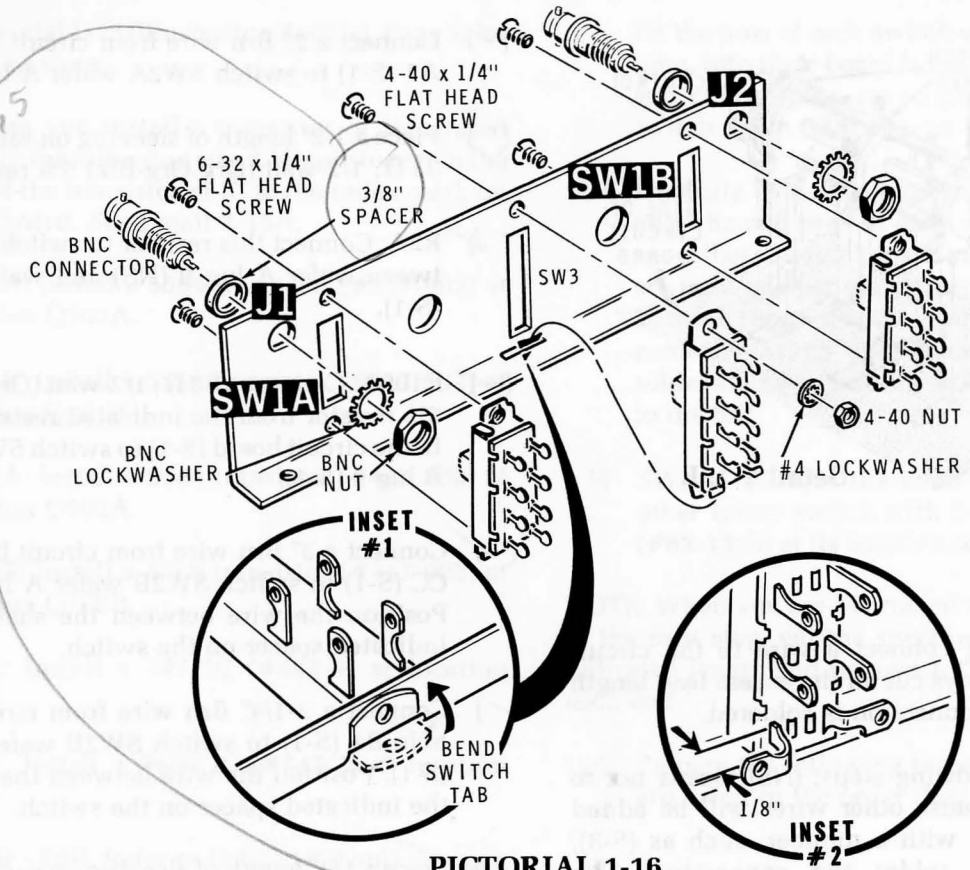
( ) Place a 1/2" length of sleeving on each lead of a 33 Ω, 1/2-watt (Org-Org-Blk) 5% resistor.

( ) R2B: Connect this resistor to switch SW2B between wafer A lug 9 (S-2) and wafer B lug 8 (S-1).

( ) R106B: Connect a 33 Ω, 1/2-watt (Org-Org-Blk) 5% resistor from the indicated resistor outline on the circuit board (S-1) to switch SW2B wafer B lug 9 (S-1).

( ) Set the circuit board aside temporarily.





PICTORIAL 1-16

Refer to Pictorial 1-16 for the following steps.

( ) Locate the switch bracket and position it as shown.

( ) SW1A: Install a DP3T 3-position slide switch at location SW1A in the switch bracket. Use 6-32 × 1/4" **flat head** screws. The switch can be installed either way.

( ) SW1B: In the same manner, install a DP3T 3-position slide switch at location SW1B in the switch bracket.

NOTE: The term "hardware" in the following steps refers to the screws, nuts, and lockwashers you will use to mount parts. The phrase "Use 4-40 × 1/4" hardware," for example, means to use a 4-40 × 1/4" screw, one or more #4 lockwashers and a 4-40 nut. Refer to the Detail called out in the step for the correct number of lockwashers to use and the correct way to install the hardware. Use the plastic nut starter furnished with the kit to pick up #4 and #6 nuts and start them on screws.

( ) SW3: Push either tab of a DP4T 4-position slide switch into the slot at location SW3 in the switch bracket. Secure the other tab of the switch with 4-40 × 1/4" flat head hardware. Now bend the switch tab, that is in the slot, flat against the bend in the switch bracket. See inset drawing #1 on Pictorial 1-16.

( ) J1: Install a BNC connector at location J1 in the switch bracket. Use the lockwasher and nut furnished with the connector and a 3/8" spacer.

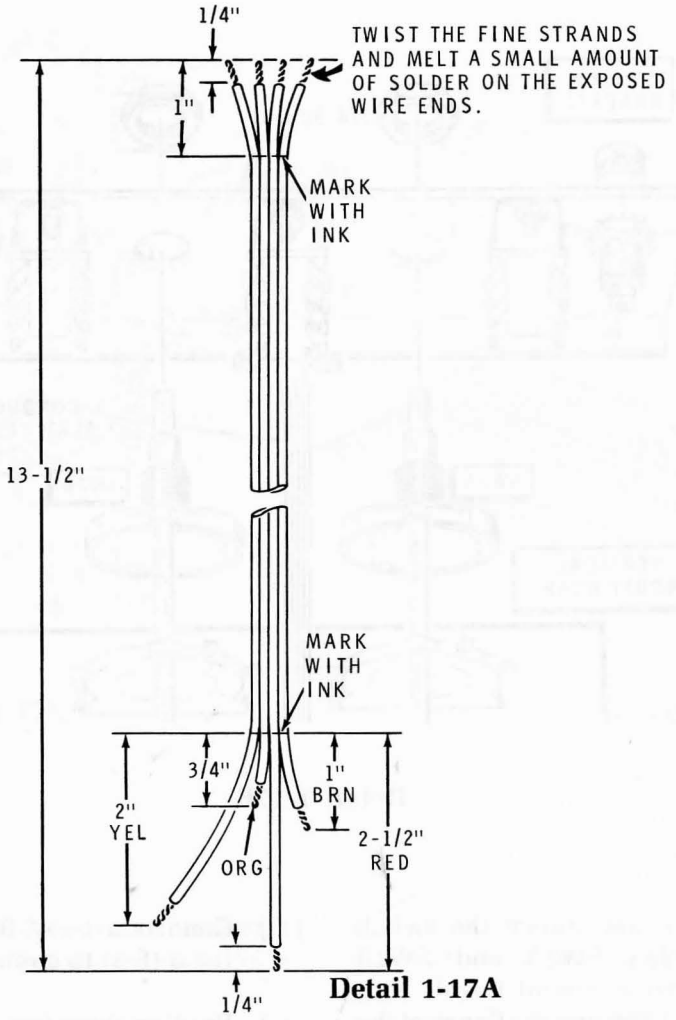
( ) J2: In the same manner, install a BNC connector at location J2 in the switch bracket.

( ) Refer to inset drawing #2 on Pictorial 1-16 and bend the indicated lugs on switch SW3 as shown.

Refer to Pictorial 1-17 (Illustration Booklet, Page 4) for the following steps.

( ) Prepare two 2" brown wires.

( ) Remove an extra 1/2" (total 3/4") of insulation from one end of both 2" brown wires.



Detail 1-17A

Connect these two wires to switch SW3 as follows:

( ) Pass the longer bared end of one 2" Brn wire through lug 9 (NS) to lug 4 (S-1). Connect the other end of this wire to lug 6 (S-1).

( ) Pass the longer bared end of the other 2" Brn wire through lug 8 (NS) to lug 7 (S-1). Connect the other end of this wire to lug 5 (S-1).

( ) Locate the 8-conductor flat cable. Separate this cable for its full length between the Yel and Grn conductors. Discard the 4-conductor section consisting of the Grn, Blu, Viol, and Gry conductors, as it will not be used.

( ) Refer to Detail 1-17A and prepare the ends of the 13-1/2" length of 4-conductor flat cable.

NOTE: Where a wire passes through a connection and goes to another point, it will count as two wires in the solder instructions (S-2), one entering and one leaving the connection. Be sure, when you solder these connections, to apply enough heat to solder these "through wires."

Connect the end of this 4-conductor flat cable, that has its ends even, to switch SW3 as follows:

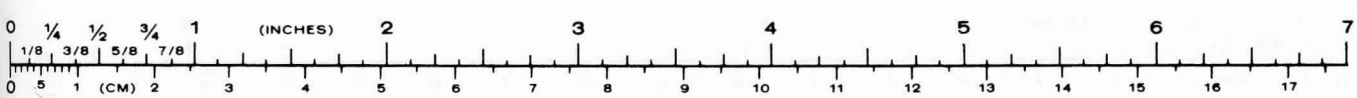
( ) Yel to lug 10 (S-1).

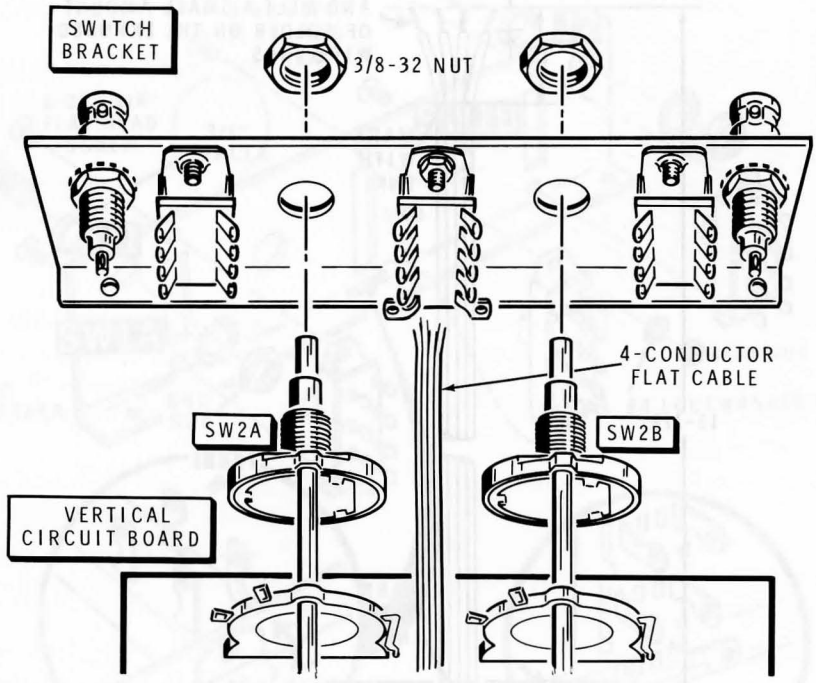
( ) Org to lug 9 (S-3).

( ) Red to lug 8 (S-3).

( ) Brn to lug 3 (S-1).

The free end of this cable will be connected later.





Detail 1-17B

( ) Refer to Detail 1-17B and mount the switch bracket onto switches SW2A and SW2B (mounted on the vertical circuit board) with 3/8-32 nuts. Be sure to position the flange of the switch bracket as shown and the 4-conductor cable above the board.

Connect the free end of the 4-conductor flat cable to the circuit board as follows:

( ) Org to hole T (S-1).

( ) Brn to hole P (S-1).

( ) Yel to hole S (S-1).

( ) Red to hole X (S-1).

( ) Prepare two 1-3/4" brown wires.

( ) Connect a 1-3/4" Brn wire from switch SW1A lug 7 (S-1) to circuit board hole B (S-1).

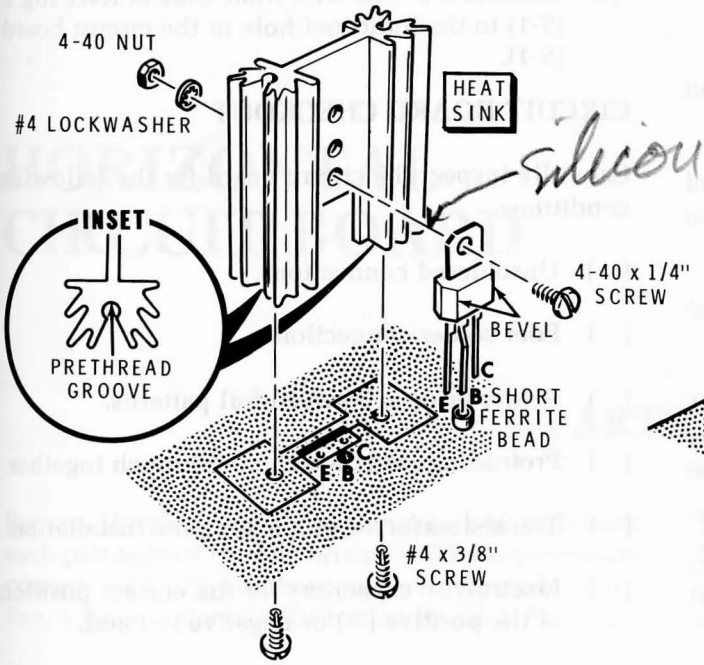
( ) Connect a 1-3/4" Brn wire from switch SW1B lug 3 (S-1) to circuit board hole BB (S-1).

( ) Position these two wires down against the circuit board.

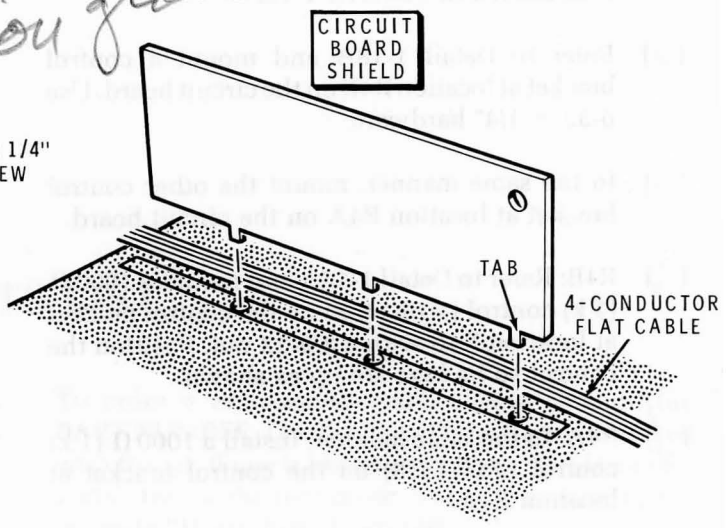
( ) Place a 3/8" length of sleeving on each lead of two 33 Ω, 1/2-watt (Org-Org-Blk) 5% resistors.

( ) R1A: Connect one lead of one of these resistors to switch SW1A through lug 3 (S-2) to lug 6 (S-1). Connect the other lead to switch SW2A lug 9 (S-3). Position the resistor as shown.

( ) R1B: Connect one lead of the other 33 Ω resistor to switch SW1B through lug 7 (S-2) to lug 2 (S-1). Connect the other lead to hole AA in the circuit board (S-1). Position the resistor as shown.



Detail 1-17C



Detail 1-17D

NOTE: Be sure to position the capacitors, installed in the next two steps, **exactly** as they are shown in Pictorial 1-17.

( ) C1: Connect one lead of .1 μF Mylar capacitor through connector J1 (S-2) to switch SW1A through lug 1 (S-2) to lug 5 (S-1). Connect the other lead to switch SW1A lug 4 (S-1). Disregard the band on the capacitor.

( ) C2: Connect one lead of a .1 μF Mylar capacitor through connector J2 (S-2) to switch SW1B through lug 5 (S-2) to lug 1 (S-1). Connect the other lead to switch SW1B lug 8 (S-1). Disregard the band on the capacitor.

( ) Refer to Detail 1-17C and prethread the two grooves in the bottom of both heat sinks. Use a #4 ×3/8" screw.

( ) Refer to Detail 1-17C and install an MPSU10 transistor (#417-834) on a heat sink with 4-40 × 1/4" hardware. Be sure the beveled edges of the transistor are positioned as shown.

( ) In the same manner, install another MPSU10 transistor (#417-834) on a heat sink.

( ) Q115: Place a short ferrite bead on the center lead of one of these transistors. Insert the E, B, and C leads of the transistor into their corresponding E, B, and C holes in the circuit board at location Q115. Secure the heat sink to the circuit board with two #4 × 3/8" screws. Then solder the transistor leads to the foil and cut off the excess lead lengths.

( ) Q116: In the same manner, install the other transistor and short ferrite bead at location Q116 on the circuit board.

( ) Refer to Detail 1-17D and insert the tabs on the circuit board shield into their circuit board holes and push the shield down tight against the printed side of the circuit board. Be sure the flat 4-conductor cable is positioned as shown. Then turn the circuit board over and solder the shield tabs to the foil.

Refer to Pictorial 1-18 (Illustration Booklet, Page 5) for the following steps.

( ) Turn the circuit board foil side up and position it as shown in Pictorial 1-18.

( ) Refer to Detail 1-18A and mount a control bracket at location R4B on the circuit board. Use 6-32 × 1/4" hardware.

( ) In the same manner, mount the other control bracket at location R4A on the circuit board.

( ) R4B: Refer to Detail 1-18A and mount a 1000 Ω (1 k) control (#10-1118) on the control bracket at location R4B with a 3/8-32 nut. Position the control so its lugs are up as shown.

( ) R4A: In the same manner, install a 1000 Ω (1 k) control (#10-1118) on the control bracket at location R4A.

NOTE: When you wire these two controls in the following steps, do not allow any of the resistor leads to touch the metal case of the controls.

( ) R12B: Connect a 3300 Ω, 1/2-watt (Org-Org-Red) 5% resistor from control R4B lug 1 (S-1) to the indicated hole in the circuit board (S-1).

( ) R119B: Connect a 3300 Ω, 1/2-watt (Org-Org-Red) 5% resistor from control R4B lug 3 (S-1) to the indicated hole in the circuit board (S-1).

( ) R121A: Connect a 3300 Ω, 1/2-watt (Org-Org-Red) 5% resistor from control R4A lug 1 (S-1) to the indicated hole in the circuit board (S-1).

( ) R119A: Connect a 3300 Ω, 1/2-watt (Org-Org-Red) 5% resistor from control R4A lug 3 (S-1) to the indicated hole in the circuit board (S-1).

( ) Prepare two 2" brown wires.

NOTE: When you connect a wire to the foil side of a circuit board, keep the insulation on the wire 1/8" above the foil to be sure you get a good solder connection to the wire and circuit board foil.

( ) Connect a 2" Brn wire from control R4B lug 2 (S-1) to the indicated hole in the circuit board (S-1).

( ) Connect a 2" Brn wire from control R4A lug 2 (S-1) to the indicated hole in the circuit board (S-1).

CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following conditions.

( ) Unsoldered connections.

( ) Poor solder connections.

( ) Solder bridges between foil patterns.

( ) Protruding leads which could touch together.

( ) Transistors for the proper type and installation.

( ) Electrolytic capacitors for the correct position of the positive (+) or negative (−) end.

( ) Diodes for the proper type and the correct position of the banded end.

( ) IC's for the proper type and installation.

There are a number of unused holes in the circuit board that will be used later. Set the circuit board aside temporarily.

Save the remaining parts for use later.

The following parts should be left over at this time. Save them for use later.

3	6-32 × 1/8" black setscrews
4	6-32 × 1/8" setscrews
3	Slide switch covers
1	Metal front panel
2	5" extension shafts
2	Split plastic bushings
2	Shaft couplings
1	Red knob
2	Small black knobs
1	Large black knob
1	Sleeving
1	Shielded cable
1	Label
1	Cable assembly with connector
2	Alligator clips
2	Alligator clip insulators