ASSEMBLY INSTRUCTIONS

RCA WV-98C (K)

SENIOR VOLTOHMYST® KIT

RADIO CORPORATION of AMERICA

ELECTRONIC COMPONENTS AND DEVICES

DISTRIBUTOR PRODUCTS HARRISON, N. J.

Tools Recommended for Use in Assembling the WV-98C(K)

Screwdriver

Neutralizing tool (insulated screwdriver)

Long-nosed pliers

Diagonal cutting pliers

Slip-joint pliers

25 to 50 watt soldering iron or gun

½" open-end wrench

Abbreviations and Symbols

C = Capacitor

K = Multiple of 1000

Meg = Multiple of 1,000,000

μfd = Microfarad

$\mu\mu$fd = Micro-microfarad

R = Resistor

S = Switch

T = Transformer

V = Volt

W = Watt

Ω = Ohms (Greek letter Omega)

Resistor Color Code

STANDARD RESISTOR COLOR CODE

K = X 1000 OR 3 ZEROS
MEG. = X 1,000,000 OR 6 ZEROS

EXAMPLE: RED-VIOLET-YELLOW-SILVER = 270,000 OHMS ±10%, WHICH IS USUALLY WRITTEN 270K ±10%.

COLOR	FIGURE	MULTIPLIER	TOLERANCE
BLACK	0	NONE	
BROWN	1	0	
RED	2	00	
ORANGE	3	000	
YELLOW	4	0,000	
GREEN	5	00,000	
BLUE	6	000,000	
VIOLET	7	0,000,000	
GRAY	8	00,000,000	
WHITE	9	000,000,000	
GOLD		0.1	±5%
SILVER		0.01	±10%
NO COLOR			±20%

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ASSEMBLY INSTRUCTIONS

RCA WV-98C(K) Senior VoltOhmyst

Introductory Instructions

The RCA WV-98C(K) Senior VoltOhmyst has been especially designed to provide a quality test instrument in easy-to-assemble kit form. A special laminated circuit board is used in this kit, providing a neat and trouble-free assembly.

Each sub-assembly of the kit instructions is a separate section, with the instructions, illustrations, and parts list complete within each section. Wherever necessary, a fold-out page is provided for the illustrations, so that both the instructions and illustrations are available to you at a glance. No cross-referencing to other sections or illustrations is required. The sections are lettered, and each individual operation is numbered, e.g. Section A, step 1, 2, 3, etc. Each step is checked upon completion, thereby reducing the possibility of missing parts or unsoldered connections.

The most important requirement necessary to build good electronic kits is the ability to solder properly. If you have limited experience in soldering electronic components, read the section below entitled "Soldering".

Finally, read the entire sentence or paragraph of each step before you proceed with the actual construction. Follow the step-by-step procedure exactly as written. Position each part and lead according to the description and illustrations. Solder carefully. Above all, take your time. The few extra minutes the construction will take may save you many hours of checking to find a mistake.

For information regarding the operation, circuit description, and maintenance (including the schematic diagram) of the instrument, refer to the WV-98C Instruction Manual supplied with the kit.

NOTE: If any difficulties are experienced in the assembly of this kit, consult the RCA Distributor from whom it was purchased. If service is necessary, he will give you the name of the nearest RCA Test Equipment Service Depot.

Soldering

A good many of the troubles experienced by kit builders are due to improper soldering. Soldering a part in the circuit does more than hold the part in place; the solder forms the electrical connection. Unless the solder joint is made properly, the instrument may be inoperative or have erratic operation.

Preparation of the Soldering Iron or Gun

If you have a new soldering iron, or one that has not been used for some time, it should be cleaned and "tinned" before it is used. To tin the iron, file the tip (keeping the original shape of the tip) so that the copper is exposed. Then heat the iron and apply rosin-core solder until the tip is coated with solder. Remove the excess solder with a clean cloth or soft wire brush of the type used for cleaning suede shoes.

NOTE: Some new irons are pre-tinned. These irons have a tip with a bright silver colored coating. Never file this coating off the tip. Simply clean when hot, using soft wire brush.

How to Solder

If you follow the steps outlined below, you should have no trouble in soldering properly.

1. Make good mechanical connections; wrap the wire ½ turn around the terminal, and crimp tight with pliers.
2. First place the soldering iron against the joint to be soldered. Then place the solder against both the joint and the soldering iron, and allow the solder to flow into the joint. Let the solder cool and solidify.
3. A good joint is bright and smooth, while a poor solder joint is lumpy and grainy. If there is any doubt about the connection, re-heat the joint.
4. Reasonable care should be used in handling the soldering iron. Do not allow it to touch nearby components or melt the insulation on other wires. Take time to solder properly and carefully. A little extra time spent in this operation may save you many hours of trouble-shooting.
5. Only the rosin-core solder of the type supplied with the kit should be used. If acid-core solder or paste flux is used in the construction of this kit, all warranties are void, and the instrument will not be serviced by RCA.

Tinning

When stranded wire is used, as with the ground test lead, the ends of the wires should be "tinned". Tinning consists of stripping some of the insulation from the end of the wire to be soldered, twisting the strands tightly together and applying a small amount of solder to the tip of the wire. This prevents the strands from parting, thereby providing a better mechanical connection.

SECTION A

Laminated Circuit Board

ILLUSTRATIONS

Figure 1.

PARTS LIST

Each Section of the WV-98C (K) Assembly Instructions has its own Parts List, indicating only the parts required for that particular sub-assembly (except where noted). Accordingly, the parts listed below are used in assembling the laminated circuit board.

Symbol	Description *Identifying Markings Indicated by Quotation Marks*	Quantity
C-1	Capacitor, ceramic flat, .05 μfd, 600V. ".05"	1
C-2	Capacitor, ceramic disc, .02 μfd, 450V. ".02"	1
C-3	Capacitor, ceramic tubular, 24 mmf, "red, yel, blk, grn"	1
C-4	Capacitor, ceramic flat, .1 μfd, 600V. ".1"	1
C-5, C-7	Capacitor, ceramic disc, .01 μfd, 450V. ".01"	2
C-6	Capacitor, ceramic disc, .005 fd, 450V. ".005"	1
C-8	Capacitor, electrolytic, 10 μfd, 200V. "10 μfd 200WVDC"	1
R-1	Resistor, 150K, ½ watt, 1%, "150K, 1%"	1
R-2	Resistor, 324K, ½ watt, 1%, "324KΩ, ½ W, 1%"	1
R-3	Resistor, 900K, 2 watt, 1%, "900KΩ, 1%, 2 W"	1
R-4	Resistor, 9.75 ohms, 1 watt, 1%, "9.75"	1
R-5	Resistor, 100 ohms, ½ watt, 1%, "100 1%"	1
R-6	Resistor, 1K, ½ watt, 1%, "1KΩ, 1%"	1
R-7	Resistor, 10K, ½ watt, 1%, "10KΩ, 1%"	1
R-8	Resistor, 2.12 Meg, ½ watt, 1%, "2.12M, 1%"	1
R-9	Resistor, 8.49 Meg, ½ watt, 1%, "8.49M, 1%"	1
R-10	Resistor, 91 Meg, ½ watt, 20%, "wht, brn, blue"	1
R-11	Resistor, 16 Meg, ½ watt, 5%, "16MΩ, 5%"	1
R-12	Resistor, 7 Meg, 1 watt, 1%, "7MΩ, 1W, 1%"	1
R-19, R-20 R-21, R-33	Potentiometer, 4-section	1
R-23, R-24	Resistor, 10K, ½ watt, 5%, "brn, blk, org, gold"	2
R-25	Resistor, 3.3 Meg, ½ watt, 10%, "org, org, grn, silv"	1
R-26	Resistor, 6.8 Meg, ½ watt, 10%, "blue, gray, grn, silv"	1
R-27, R-28	Resistor, 330Ω, ½ watt, 5%, "org, org, brn, gold"	2
R-30	Resistor, 27K, ½ watt, 10%, "red, viol, org, silv"	1
R-31	Resistor, 1 Meg, ½ watt, 10%, "brn, blk, grn, silv"	1
R-32	Resistor, 47K, ½ watt, 5%, "yel, viol, org, gold"	1
R-34	Resistor, 180K, ½ watt, 10%, "brn, gray, yel, silv"	1
R35	Potentiometer, 10K	1
R39	Resistor, 1K, ½ watt, 10%, "brn, blk, red, silver"	1
SR-1	Rectifier, Selenium, 30 ma, 130V.	1
Miscellaneous		
	Laminated Circuit Board "904046-2"	1
	Rosin Core Solder, 60/40	10 feet
	(This quantity of solder is sufficient for complete assembly of the kit.)	
	Socket, 7-pin, molded-type	1
	Socket, 9-pin, molded-type	1

STEPS 1 THROUGH 38.

Check ☑ each step as it is completed. "(S)" means solder any and all connections on the designated lug, terminal, or component.

1. ☐ Place the laminated circuit board in the position shown in Figure 1, with copper foil side down.

NOTE: In the following steps, care should be taken to prevent damage to the components. The enameled resistors in particular must not be chipped, scratched, or burned with the soldering iron.

2. ☑ Select the 7-pin tube socket. Insert the pins of this socket into the 7-hole pattern on the laminated board, marked "6AL5". Press the socket down until the pins are firmly in place. Turn the board over and solder each of the 7 pins to the copper foil. The solder should flow out and cover the pin and the circular sections of copper foil around each pin.

3. ☑ Select the 9-pin tube socket. Insert this socket into the 9-hole pattern on the board, marked "12AU7A". As in step 2, solder each of the pins to the copper foil.

4. ☑ Select resistor R-5. (100Ω) Scrape off any excess sealant paint that might be on the leads of the resistor. Bend the leads of the resistor to fit the holes marked "R-5" on the laminated board. Insert the leads into the holes, and push through until the resistor is flush with the board. To hold resistor in place, bend leads slightly on copper foil side of board. (S) Clip off the excess leads just above the solder globule. Use this method for mounting the other resistors on the laminated board, unless special instructions are given.

5. ☑ Mount resistor R-6 (1K). (S)

6. ☑ Mount resistor R-7 (10K). (S)

7. ☑ Mount resistor R-4 (9.75Ω). (S)

8. ☑ Mount resistor R-8 (2.12 Meg). (S)

9. ☑ Mount resistor R-12 (7 Meg). (S)

10. ☑ Mount resistor R-27 (330Ω). (S)

11. ☑ Mount resistor R-23 (10K). (S)

12. ☑ Mount resistor R-25 (3.3 Meg). (S)

13. ☑ Mount resistor R-26 (6.8 Meg). (S)

14. ☑ Mount resistor R-28 (330Ω). (S)

15. ☑ Mount resistor R-24 (10K). (S)

16. ☑ Mount resistor R-30 (27K). (S)

17. ☑ Mount resistor R-9 (8.49 Meg). (S)

18. ☑ Mount resistor R-31 (1 Meg). (S)

19. ☑ Mount resistor R-1 (150K). (S)

20. ☑ Mount resistor R-39 (1K). (S)

21. ☑ Mount resistor R-11 (16 Meg). (S)

22. ☑ Mount resistor R-2 (324K). (S)

23. ☑ Mount resistor R-3 (900K). (S)

24. ☑ Mount resistor R-34 (180K). (S)

25. ☑ Mount resistor R-32 (47K). (S)

26. ☑ Mount resistor R-10 (91 Meg). (S)

27. ☑ Select C-5, a .01 μfd ceramic disc capacitor. Insert the leads of C-5 into the holes on board marked "C-5". This type of capacitor is mounted perpendicular to the board, as shown in Figure 1. (S)

28. ☑ As above, mount capacitor C-6 (.005 μfd). (S)

29. ☑ Mount capacitor C-7 (.01 μfd). (S)

30. ☐ Mount capacitor C-2 (.02 μfd). (S)

31. ☑ Select C-4, the .1 μfd rectangular-shaped ceramic capacitor. Insert the leads of C-4 into the holes marked "C-4" on the laminated board. (S) Clip off excess leads.

32. ☑ Select C-1, the .05 μfd rectangular-shaped capacitor. Insert the leads of C-1 into the holes marked "C-1" on the laminated board. (S) Clip off excess leads.

33. ☑ Select C-8, a 10 μfd electrolytic tubular capacitor. Insert the pins of C-8 into the holes marked "C-8" on the laminated board. Be sure that the pin marked "+" on the capacitor is inserted in the hole marked "+" on the board. (S)

34. ☑ Select C-3, a 24 μμf ceramic tubular capacitor. Insert the leads of C-3 into the holes on the laminated board marked "C-3". (S) Clip off excess leads.

35. ☑ Select CR-1, the selenium rectifier. Insert the lugs of CR-1 into the holes provided on the laminated board. Be sure the pin marked "+" is inserted in the "+" hole of the laminated board. (S)

36. ☑ Select R-35, the 10K potentiometer. Insert the three lugs of R-35 into the holes on the board marked "R-35". Bend the lugs against the foil side of the board. Solder the two lugs that pass thru the foil circuit.

37. ☑ Select the four-section potentiometer, R-19, R-21, R-20, R-33. Insert the twelve pins of the potentiometer into the 12-hole pattern on the laminated board, with the body of the potentiometer in the position shown in Figure 1. The four blue adjustment controls must extend through the four holes in the board marked, "AC Z", "DC–", "AC", and "DC+". Press the potentiometer firmly against the board until the pins protrude approximately 1/16 inch beyond the copper foil. Bend the tips of the pins against the foil to hold the potentiometer in place. Solder each of the twelve pins to the copper foil. Be sure that a good solder connection is made at each pin, and that the solder does not flow beyond the foil section and contact an adjacent solder joint or copper strip.

38. ☑ Inspect work. All components mounted thus far to the laminated board should be soldered. Be sure that no solder joints are shorted against each other, or against adjacent strips of copper foil.

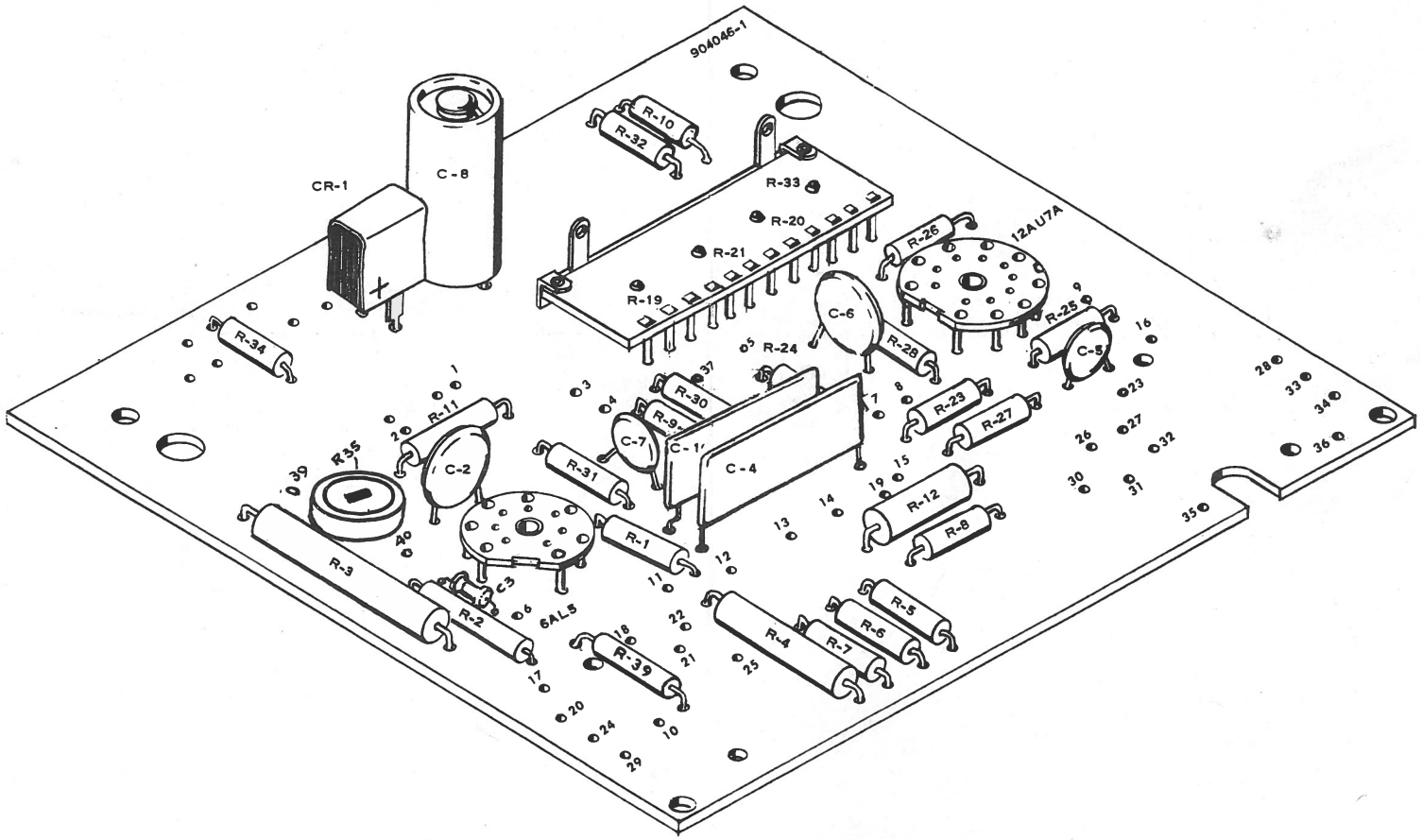

904046-1
CR-1
C-8
R-10
R-32
R-33
R-20
R-21
R-19
R-25
12AU7A
R-34
C-6
R-28
R-24
R-30
R-9
C-7
C-1
C-4
R-23
R-27
C-5
R-11
C-2
R-31
R-12
R-8
R35
R-3
R-1
C3
6AL5
R-2
R-39
R-4
R-7
R-6
R-5

FIGURE 1

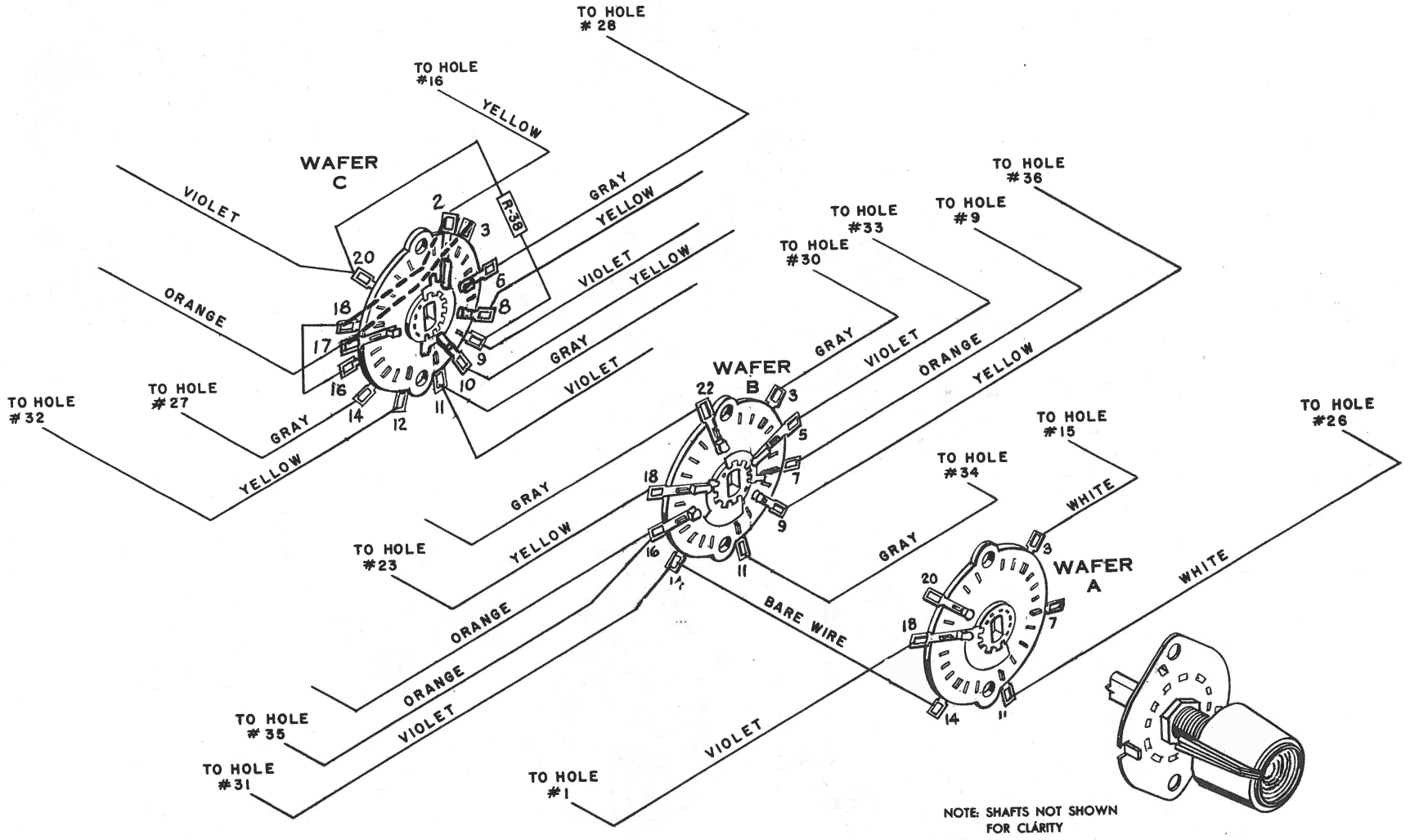


FIGURE 2
Assembly of Function Switch, S-1

SECTION B

Assembly of Function Switch, S-1

ILLUSTRATIONS

Figures 2, 3, 4.

PARTS LIST

Symbol	Description	Quantity
S-1	Function Switch, 5 position	1
R-38	Resistor, 2400Ω, 5%, ½W (red, yel, red, gold)	1
	Knob, blue, with pointer	1
	#4 Hex Nut, small pattern	2
	#4 Split-Type Lockwasher	2
	#4 Flat Washer	2
	Hookup Wire, #22	
	White (heavy insulation)	2½ ft.
	Orange	4 ft.
	Gray	5 ft.
	Violet	5½ ft.
	Yellow	5½ ft.

STEPS 1 THROUGH 33.

Check ☑ each step as it is completed.

1. ☐ Cut the following lengths of insulated hookup wire:

White: 4" ☐ 4½" ☐

Gray: 1¾" ☐ 1¾" ☐ 2½" ☐ 3½" ☐
4½" ☐ 6" ☐

Orange: 2½" ☐ 3" ☐ 6" ☐ 6" ☐

Violet: 2¾" ☐ 3¾" ☐ 6" ☐ 6" ☐
9" ☐ 9" ☐

Yellow: 1¾" ☐ 1¾" ☐ 2¾" ☐ 2½" ☐
2½" ☐ 2¾" ☐ 6" ☐ 7" ☐

Strip off ¼ inch of insulation from each of the above cut wires.

2. ☐ Select S-1, the 3-wafer Function Switch. Temporarily place one of the blue pointer knobs on the shaft of S-1, making sure that the flat side of the switch shaft coincides with the flat side of the knob shaftway.

3. ☐ Rotate the knob to the full counterclockwise position (of five positions). Examine Figure 3 and position S-1 in the same manner, using the knob pointer as a guide. From the component side of the laminated board, insert the two threaded studs of S-1 through the holes provided in the board. Fasten the switch to the board using a #4 flat washer, a #4 split-type lockwasher, and a #4 hex nut on each stud. (There are two types of #4 nuts provided with this kit; use the smaller type on the switch studs.) Tighten securely.

CAUTION: In the following steps, be careful not to exert excessive pressure against the switch. At this stage of construction, the switch is supported only by the laminated board.

4. ☑ Examine Figure 2, the switch wafers and lugs can be identified easily by referring to this illustration.

NOTE: In making connections to the switch solder lugs, crimp the end of the wire or lead as shown in Figure 4.

5. ☐ Connect one end of a 2¾-inch yellow wire to wafer C, lug #2. Do not solder. Remove an extra ¾ inch of insulation from the other end of the wire, so that ¾ inches of bare wire is exposed. Position the wire behind wafer C. Pass the end of the wire through lug #18, then connect it to lug #16 of wafer C. Solder both lug #16 and lug #18.

6. ☑ Connect a 2¾-inch yellow wire from lug #3 to lug #17 of wafer C, positioning the wire behind the switch wafer. Solder lug #3 only.

7. ☑ Insert one end of a 1¾-inch yellow wire in hole #16 on the laminated board. Push the wire conductor through the hole until the insulation touches the board. Turn the board over and bend the wire slightly to hold it in place. Solder the wire to the copper foil and clip off any excess wire just above the solder globule. Follow this procedure in installing all wires to the laminated board.

8. ☑ Connect the other end of the yellow wire from hole #16 to wafer C, lug #2. (S)

9. ☐ Connect a 1¾-inch gray wire from hole #28 to wafer C, lug #6. (S)

10. ☑ Connect a 6-inch yellow wire to wafer C, lug #8. (S)

11. ☑ Cut each lead of R-38, 2400Ω, to a length of 1 inch. Position R-38 behind wafer C, and connect it between lug #9 and lug #20 of wafer C. Do not solder. Be sure that the resistor is positioned away from the switch so that it doesn't interfere with the switching action.

12. ☑ Connect one end of a 6-inch violet wire to wafer C, lug #9. (S)
13. ☑ Connect one end of a 7-inch yellow wire to wafer C, lug #10. (S)
14. ☑ Connect one end of a 6-inch gray wire to wafer C, lug #11. Do not solder.
15. ☑ Connect one end of a 9-inch violet wire to wafer C, lug #11. (S)
16. ☑ Connect a 1¾-inch yellow wire from hole #32 to wafer C, lug #12. (S)
17. ☑ Connect a 1¾-inch gray wire from hole #27 to wafer C, lug #14. (S)
18. ☑ Connect one end of a 6-inch length of orange wire to wafer C, lug #17. (S)
19. ☑ Connect one end of a 9-inch violet wire to wafer C, lug #20. (S)
20. ☑ Insert a 3½-inch gray wire in hole #30. (S) Pass this wire underneath wafer C, and connect it to wafer B, lug #3. (S)
21. ☑ Connect a 2¼-inch violet wire from hole #33 to wafer B, lug #5. (S)
22. ☑ Connect a 3-inch orange wire from hole #9 to wafer B, lug #7. (S)
23. ☑ Connect a 2½-inch yellow wire from hole #36 to wafer B, lug #9. (S)
24. ☑ Connect a 2½-inch gray wire from hole #34 to wafer B, lug #11. (S)
25. ☑ Insert one end of a 3¼-inch violet wire in hole #31. (S) Remove an extra 1 inch of insulation from the other end so that 1¼ inches of bare wire is exposed. Pass the end of the wire through lug #14 of wafer B, and connect it to lug #14 of wafer A. Solder both lug #14 of wafer B and lug #14 of wafer A.
26. ☑ Connect a 2½-inch orange wire from hole #35 to wafer B, lug #16. Do not solder.
27. ☑ Connect one end of a 6-inch orange wire to wafer B, lug #16. (S)
28. ☑ Connect a 2½-inch yellow wire from hole #23 to wafer B, lug #18. Do not solder.
29. ☑ Connect one end of a 4½-inch gray wire to wafer B, lug #22. (S)
30. ☑ Connect a 4½-inch white wire from hole #15 to wafer A, lug #3. (S)
31. ☑ Connect a 4-inch white wire from hole #26 to wafer A, lug #11. (S)
32. ☑ Connect a 6-inch violet wire from hole #1 to wafer A, lug #18. (S)
33. ☐ Inspect work. Check switch wiring by referring to Figure 2. All lugs should be used except wafer A, lugs #7 and #20. All connections to S-1 should be soldered except the yellow wire connected to wafer B, lug #18.

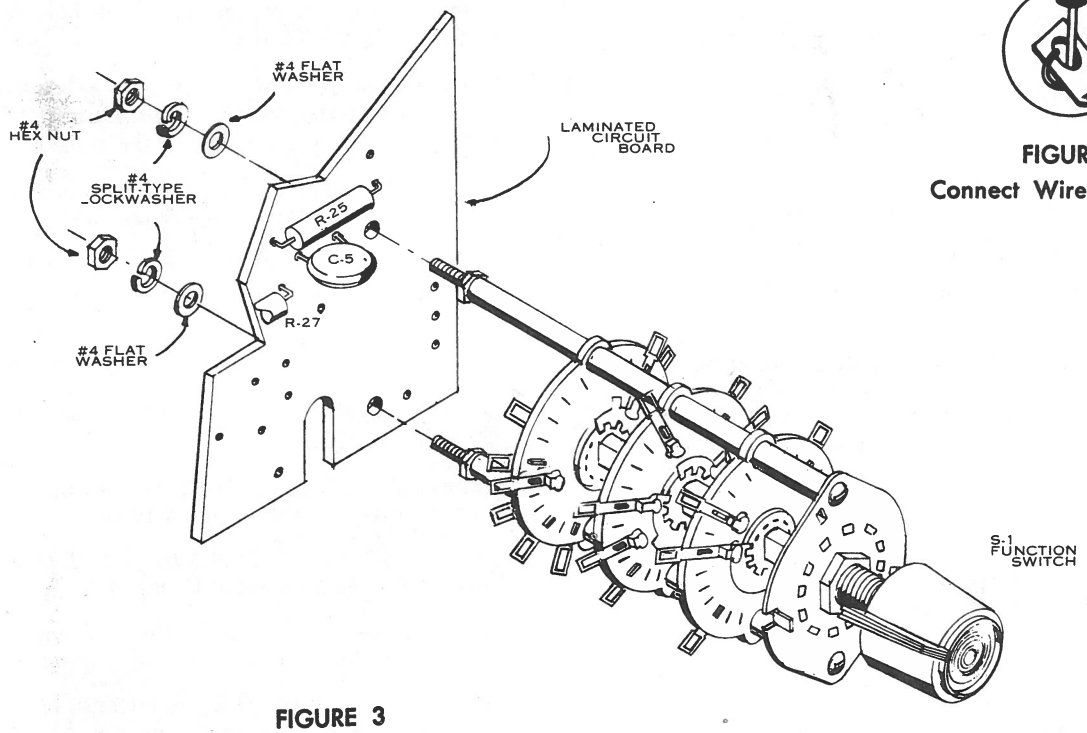


FIGURE 3

FIGURE 4
Connect Wires as Shown

SECTION C

Assembly of Range Switch, S-2

ILLUSTRATIONS

Figures 5, 6, and 7.

PARTS LIST

Symbol	Description *Identifying Markings Indicated by Quotation Marks*	Quantity
C-9	Capacitor, 56 $\mu\mu$f, 550V., "grn, grn, blu, blk, blk"	1
R-13	Resistor, 2 Meg, ¼ Watt, 1%, "2MΩ, 1%"	1
R-14	Resistor, 700K, ¼ Watt, 1%, "700KΩ, 1%"	1
R-15	Resistor, 200K, ¼ Watt, 1%, "200KΩ, 1%"	1
R-16	Resistor, 70K, ¼ Watt, 1%, "70KΩ, 1%"	1
R-17	Resistor, 20K, ¼ Watt, 1%, "20KΩ, 1%"	1
R-29	Resistor, 15K, ¼ Watt, 5%, "brn, grn, org, gold"	1
R-36	Resistor, 8.2K, ¼ Watt, 5%, "gray, red, red, gold"	1
R-37	Resistor, 1.6K, ¼ Watt, 5%, "brn, blu, red, gold"	1
S-2	Range Switch, 8 position	1
	Knob, blue, with pointer	1
	#4 Hex Nut, small pattern	2
	#4 Flat Washer	2
	#4 Split-Type Lockwasher	2
	Black Insulating Sleeving	1 ft.

Note: The quantity of black sleeving is sufficient for complete assembly of the kit.

STEPS 1 THROUGH 50.

Check ☑ each step as it is completed.

1. ☐ Cut the following lengths of insulated hookup wire:

White: 3" ☐ 3¼" ☐ 3¾" ☐

Gray: 1¾" ☐ 2" ☐ 2¾" ☐ 3½" ☐ 5" ☐ 6" ☐

Orange: 1¼" ☐ 1¾" ☐ 1¾" ☐ 2½" ☐ 3" ☐ 4" ☐ 4" ☐

Violet: 1¾" ☐ 2¾" ☐ 3" ☐ 3" ☐ 4" ☐

Yellow: 1¼" ☐ 1½" ☐ 2¼" ☐ 2½" ☐ 2¾" ☐ 3" ☐ 4½" ☐ 4½" ☐

Strip ¼ inch of insulation from the ends of these wires.

2. ☐ Temporarily place the blue knob on the shaft of S-2. Rotate the knob to the full counterclockwise position (of eight positions). Examine Figure 5 and position S-2 in the same manner, using the knob pointer as a guide. Insert the two studs of S-2 through the holes provided in the laminated circuit board. Fasten the switch to the board by placing a #4 flat washer, a #4 split-type lockwasher, and a #4 hex nut over each stud of the switch. Tighten securely.

CAUTION: In the following steps, be careful not to exert excessive pressure against the switch. At this point the switch is supported only by laminated board.

3. ☑ Connect a 1¼-inch yellow wire between lugs #1 and #22 of wafer C. Do not solder.
4. ☑ Connect a 3¼-inch white wire from hole #19 on the laminated circuit board to wafer C, lug #1. (S)
5. ☑ Connect a 1¼-inch orange wire from hole #12 to wafer C, lug #3. Do not solder.
6. ☑ Cut one lead of R-13 (2 Meg) to a length of ⅜ inch. Connect this lead to wafer C, lug #3. See Figure 6 for proper position of the resistor. (S)
7. ☑ Connect the other lead of R-13 to wafer C, lug #5, as shown in Figure 6. Do not solder.
8. ☐ Connect a 3-inch yellow wire between lug #5 and lug #17 of wafer C. Do not solder.
9. ☑ Cut one lead of R-14 (700K) to a length of ⅜ inch. Connect this lead to wafer C, lug #5. (S)
10. ☐ Connect the other lead of R-14 to wafer C, lug #7. Do not solder.
11. ☑ Connect a 3-inch violet wire between lugs #7 and #19 of wafer C. Solder lug #19 only.
12. ☑ Cut one lead of R-15 (200K) to a length of ⅜ inch. Connect this lead to wafer C, lug #7. (S)
13. ☑ Pass the other lead of R-15 through lug #9 of wafer C, and connect it to lug #8. Do not solder.
14. ☑ Cut one lead of R-16 (70K) to a length of ⅜ inch. Connect this lead to wafer C, lug #9. (S)

15. ☐ Cut a ½-inch length of black sleeving and slip it over the other lead of R-16. Connect this lead to lug #11 of wafer C. Do not solder.

16. ☐ Connect a 1¼-inch orange wire between wafer C, lug #8, and wafer A, lug #9. (S)

17. ☐ Cut one lead of R-17 (20K) to a length of ⅜ inch. Connect this lead to wafer C, lug #12. Do not solder.

18. ☐ Cut a ⅜-inch length of black sleeving and slip it over the other lead of R-17. Position this lead inside the switch post as shown in Figure 6, then connect it to wafer C, lug #11. (S)

19. ☐ Connect a 2¾-inch yellow wire from wafer C, lug #12, to wafer A, lug #7. Solder wafer C, lug #12 only.

20. ☐ Insert a 6-inch gray wire in hole #4. (S) Pass this wire under wafer C, and connect it to wafer C, lug #13. (S)

21. ☐ Insert a 4½-inch yellow wire in hole #13. (S) Pass this wire underneath wafer C, and connect it to wafer C, lug #15. (S)

22. ☐ Connect a 2-inch gray wire to wafer C, lug #17. Do not solder. Pass this wire between wafer A and wafer B, then connect it to wafer A, lug #11. (S)

23. ☐ Connect a 1¾-inch orange wire from hole #29 to wafer C, lug #17. (S)

24. ☐ Connect a 1¾-inch violet wire from hole #24 to wafer C, lug #18. (S)

25. ☐ Connect a 1¾-inch gray wire from hole #17 to wafer C, lug #21. (S)

26. ☐ Cut each lead of R-37 (1.6K) to a length of 1 inch, then place a ¾-inch length of black sleeving over each lead of the resistor. Position R-37 between wafers A and B as shown in Figure 6, then connect it between lug #5 and lug #18 of wafer B. The resistor should be positioned about halfway between the two switch wafers so that it does not interfere with the switching circuit. Do not solder.

27. ☐ Clip each lead of R-36 (8.2K) to a length of ½ inch. As shown in Figure 6, connect R-36 between lug #1 and lug #6 of wafer B.

28. ☐ Connect a 3½-inch gray wire from hole #40 in the laminated board to wafer B, lug #1. (S)

29. ☐ Identify the yellow wire previously connected to S-1, wafer C, lug #10. Connect this wire to S-2, wafer B, lug #5. (S)

30. ☐ Cut each lead of R-29 (15K) to a length of ½ inch. Connect this resistor between lug #6 and lug #10 of wafer B. Solder lug #10 only.

31. ☐ Connect a 4-inch orange wire from hole #38 to wafer B, lug #6. (S)

32. ☐ Identify the violet wire previously connected to S-1, wafer C, lug #9. Connect this wire to S-2, wafer B, lug #7. (S)

33. ☐ Connect a 5-inch gray wire from hole #37 to wafer B, lug #8. (S)

34. ☐ Connect a 4½-inch length of yellow wire to wafer B, lug #11. (S)

35. ☐ Identify the orange wire previously connected to S-1, wafer C, lug #17. Connect this wire to S-2, wafer B, lug #12. (S)

36. ☐ Identify the violet wire previously connected to S-1, wafer C, lug #11. Connect this wire to S-2, wafer B, lug #18. (S)

37. ☐ Press together the two sections of lug #21 of wafer B. Connect a 4-inch orange wire from hole #39 to lug #21, passing the wire through both sections of the lug. (S)

38. ☐ Cut each lead of C-9 (56 $\mu\mu$f) to a length of ¾ inch. Connect C-9 from lug #1 to lug #2 of wafer A. Do not solder.

39. ☐ Connect a 3-inch orange wire from hole #18 to wafer A, lug #1. (S)

40. ☐ Connect a 3-inch white wire from hole #6 to wafer A, lug #2. (S)

41. ☐ Connect a 2½-inch yellow wire from hole #22 to wafer A, lug #3. (S)

42. ☐ Connect a 1½-inch yellow wire between lug #4 and lug #22 of wafer A. Solder wafer A, lug #22 only.

43. ☐ Connect a 3-inch violet wire from hole #11 to wafer A, lug #4. (S)

44. ☐ Connect a 2¾-inch gray wire from hole #21 to wafer A, lug #5. (S)

45. ☐ Connect a 2¾-inch yellow wire from hole #25 to wafer A, lug #7. (S)

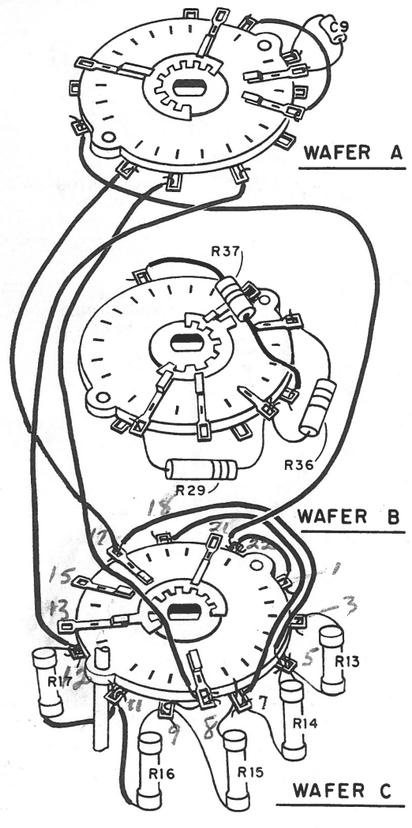
46. ☐ Connect a 2¾-inch violet wire between wafer C, lug #22, and wafer A, lug #12. (S)

47. ☐ Connect a 3¼-inch length of white wire from hole #10 to wafer A, lug #15. (S)

48. ☐ Connect a 2½-inch orange wire from hole #20 to wafer A, lug #20. (S)

49. ☐ Connect a 4-inch violet wire from hole #14 to wafer A, lug #21. (S)

50. ☐ Inspect work. Check switch wiring by referring to Figure 7. All lugs on S-2 should be used and soldered. Dress all wires and resistors so that no leads short against each other, or against the supporting parts of the switch. Be sure that no wires or components interfere with the rotation of the switch shaft.



S-2

FIGURE 6

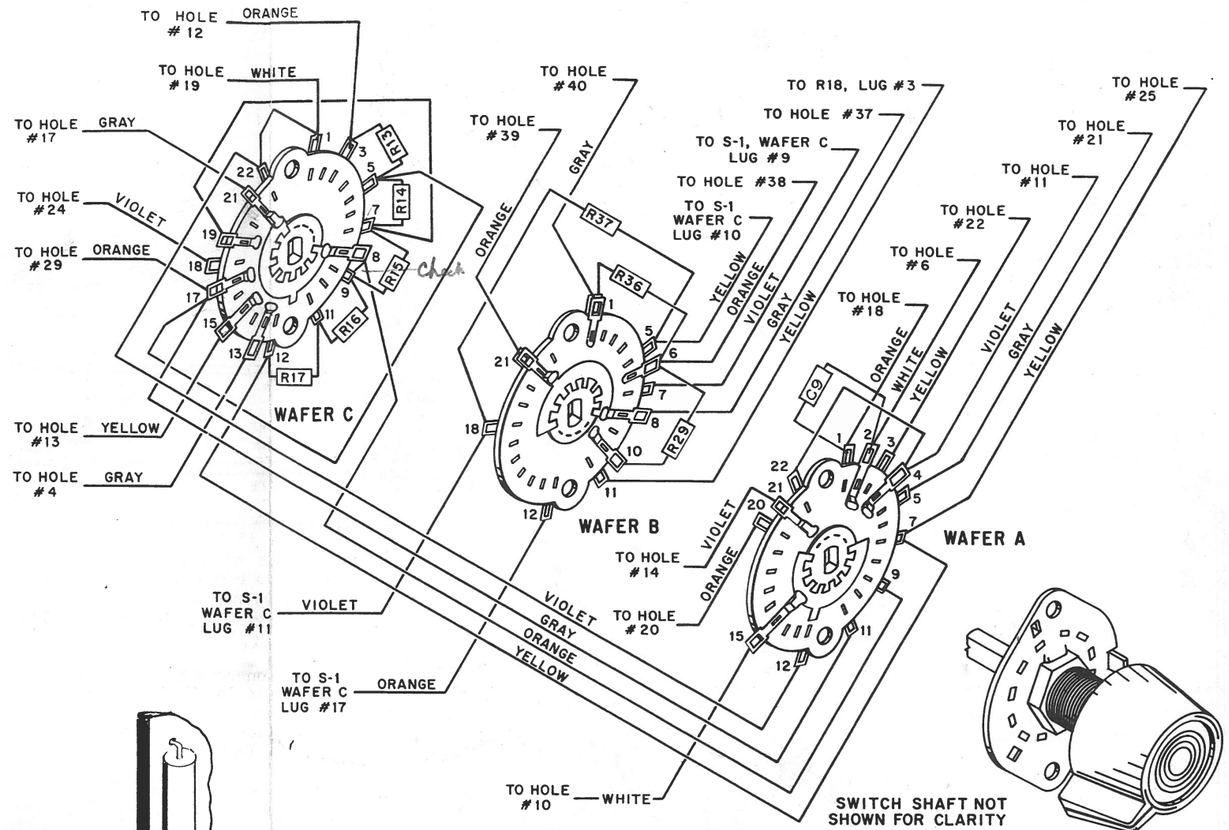


FIGURE 7

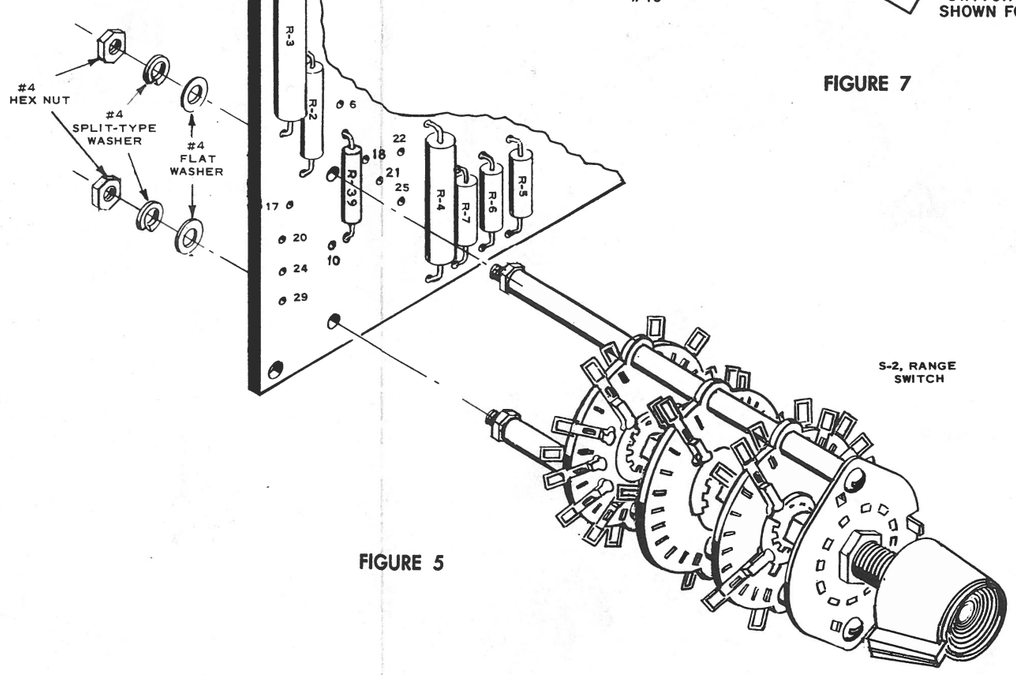


FIGURE 5

R36

SECTION D

Assembly of Lower Support Bracket

ILLUSTRATIONS

Figures 8, 9, and 10.

PARTS LIST

Symbol	Description *Identifying Markings Indicated by Quotation Marks*	Quantity
R-18	Potentiometer, 15K, ¼ watt, 20%, "904049-2"	1
R-22	Potentiometer, 10K, ¼ watt, 20%, "904049-1"	1
	Connector, microphone-type, with hex nut	1
	Lower Support Bracket	1
	Panel, aluminum	1
	Hex Nut, ⅜-inch inside diameter	4
	Washer, fibre, ⅜-inch inside diameter	1
	Washer, fibre, with shoulder, ⅜-inch inside diameter	1
	Lockwasher, ⅜-inch inside diameter, large pattern	1
	Solder Lug, ⅜-inch inside diameter	1
	Alligator Clip	1
	Test Lead, black	4 ft.
	Insulator, black rubber	1

STEPS 1 THROUGH 23.

Check ☑ each step as it is completed.

1. ☑ Select the microphone-type cable connector. Remove the hex nut from the connector. Be sure to use this same nut when mounting the connector in a later step.

2. ☑ Place the "D" shaped fibre shoulder washer over the inner bushing of the connector, with the shoulder facing the small end of the connector as shown in the illustration. Position the connector in the "D" shaped hole in the lower support bracket, with the shoulder of the fibre washer fitting into the hole so that the connector is completely insulated from the bracket. Place the flat fibre washer, the ⅜-inch internal tooth lockwasher, the ⅜-inch solder lug, and the ⅜-inch hex nut on the inner bushing of the connector. Do not tighten at this time.

3. ☑ Cut a 3-inch length of yellow wire. Strip both ends. Connect one end of the wire to the solder lug of the connector. Do not solder.

4. ☑ Strip ½ inch of insulation from one end of the 4-foot length of black test lead. Twist the strands so that they do not separate, then "tin" the exposed wire by applying a small amount of solder. Connect the wire to the solder lug of the connector, wrapping the tinned end around the side of the lug so that a good mechanical connection is formed. Solder the lug, using enough heat so that both the test lead and the yellow wire form a good solder joint on the lug. Pass the other end of the test lead through the small hole in the bracket under the connector, as shown in Figure 10.

5. ☑ Check the connector to be sure that the fibre washers completely insulate the connector from the support bracket. Bend the solder lug so that it is in the position shown in Figure 8, then tighten the nut on the connector.

   IMPORTANT: This nut must be as tight as possible so that the connector does not work loose. It is difficult to tighten this connector after the instrument is fully assembled.

6. ☑ Strip ¼ inch of insulation from the other end of the test lead, then tin the exposed wire.

7. ☑ Place the black rubber insulating boot over the end of the test lead, as shown in Figure 10. Insert the tinned end of the test lead into the shaft of the alligator clip, passing the lead through the small metal loop. Solder as shown in the illustration. Allow to cool, then slip the insulating boot over the clip.

8. ☑ Remove the knobs previously placed on the shafts of S-1 and S-2. Mount the laminated board and switches to the lower support bracket as shown in Figure 9. Be sure the protruding lug on the front section of each switch is inserted in the small hole provided in the bracket. Place a ⅜-inch hex nut over the shaft of each switch. Tighten securely.

9. ☐ Cut a 5½-inch length of white wire. Strip both ends. Insert one end of the wire into the connector from the inside until the center lead passes through the eyelet of the connector, and the insulation of the wire is flush against the eyelet inside the connector. Cut off the center lead of the wire at the point where it emerges through the eyelet. Solder the end of the wire to the eyelet, using only enough solder to fill the eyelet. File the solder joint so that it provides a smooth, flat surface. Scrape off any rosin deposited on the eyelet or insulating disc.

10. ☐ Connect the white wire from the connector to S-1, wafer A, lug #7. (S)

11. ☐ Connect the yellow wire from the connector solder lug to S-1, wafer B, lug #18. (S)

12. ☐ Select R-22, the 10K potentiometer. Insert the shaft of R-22 through the hole in the support bracket to the left of the probe connector, as shown in Figure 9. Place a ⅜-inch hex nut over the shaft of R-22, but do not tighten. To facilitate wiring, temporarily position R-22 with the lugs upward, as shown.

13. ☐ Cut a 4-inch orange wire. Strip both ends of the wire and connect it from hole #7 on the laminated board to R-22, lug #1, as shown in Figure 10. (S)

14. ☐ Cut a 5-inch gray wire. Strip both ends of the wire and connect it from hole #3 to R-22, lug #2. (S)

15. ☐ Cut a 4-inch yellow wire. Strip both ends of the wire and connect it from hole #8 to R-22, lug #3. (S)

16. ☐ Rotate R-22 so that it is in the position shown in Figure 10, with the retaining lug on the front of the potentiometer inserted in the small hole in the bracket. Tighten the nut on the shaft of the potentiometer.

17. ☐ Using the same procedure as with R-22, mount R-18 to the support bracket on the right side of the connector. Place a ⅜-inch hex nut on the shaft of R-18, but do not tighten. Temporarily place the potentiometer in the position shown in Figure 9.

18. ☐ Identify the yellow wire previously connected to S-1, wafer C, lug #8. Connect the free end of this wire to R-18, lug #1. (S)

19. ☐ Identify the yellow wire connected to S-2, wafer B, lug #11. Connect this wire to R-18, lug #2. Do not solder.

20. ☐ Cut a 5-inch length of orange wire. Remove ¼ inch of insulation from one end of the wire. Insert this end in hole #5 on the laminated board. (S) Strip ¾ inch of insulation from the other end of the wire. Insert this end through R-18, lug #3, then connect it to R-18, lug #2. Solder lugs #2 and #3 of R-18.

21. ☐ Position R-18 as shown in Figure 9, with the retaining lug on the front of the potentiometer inserted in the small hole in the bracket. Tighten the hex nut.

22. ☐ Select the etched aluminum front panel. Temporarily place the panel over the four controls on the front of the instrument. The panel should slip easily over the bushings of these controls. If it does not, loosen the hex nuts on the controls, realign the controls slightly as required, then tighten the nuts again. Remove the panel from the instrument, since it will be permanently mounted in a later section.

23. ☐ Inspect work. Dress all leads and connections to R-18, R-22, and the cable connector so that no shorting contact is made with the bracket, or with other components.

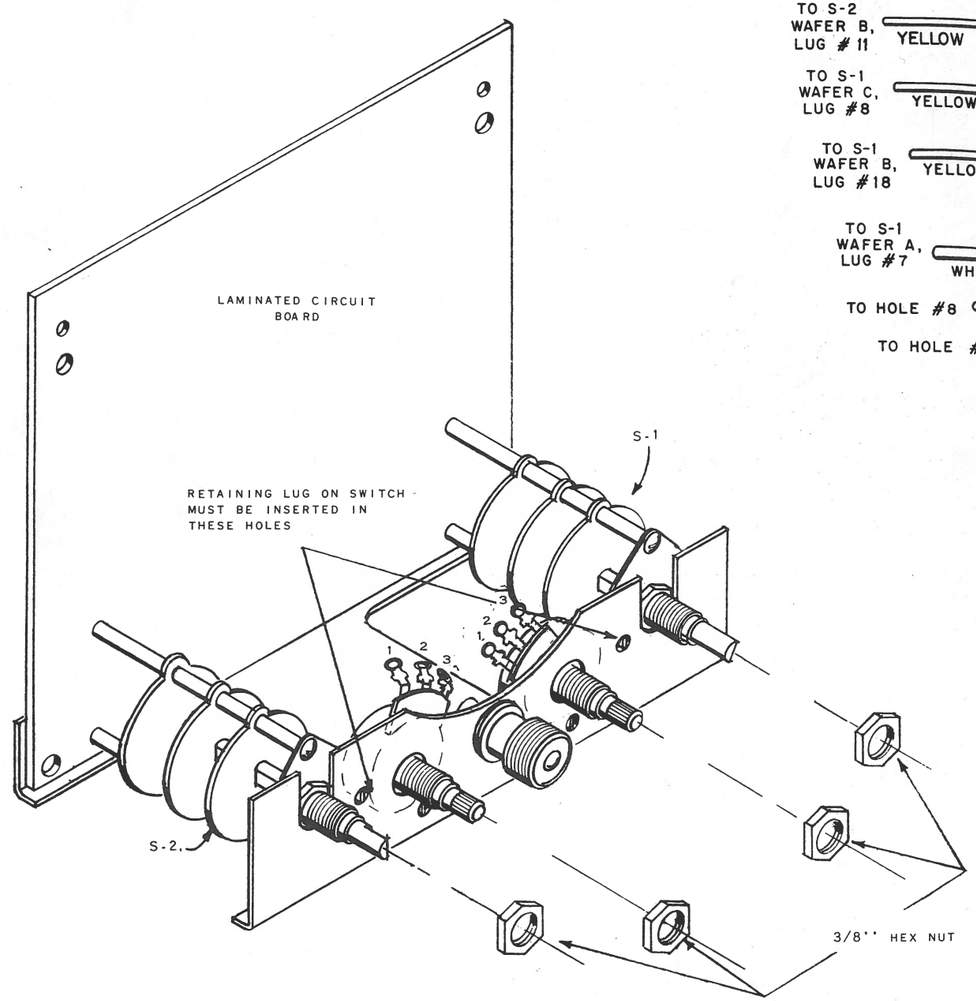


FIGURE 9

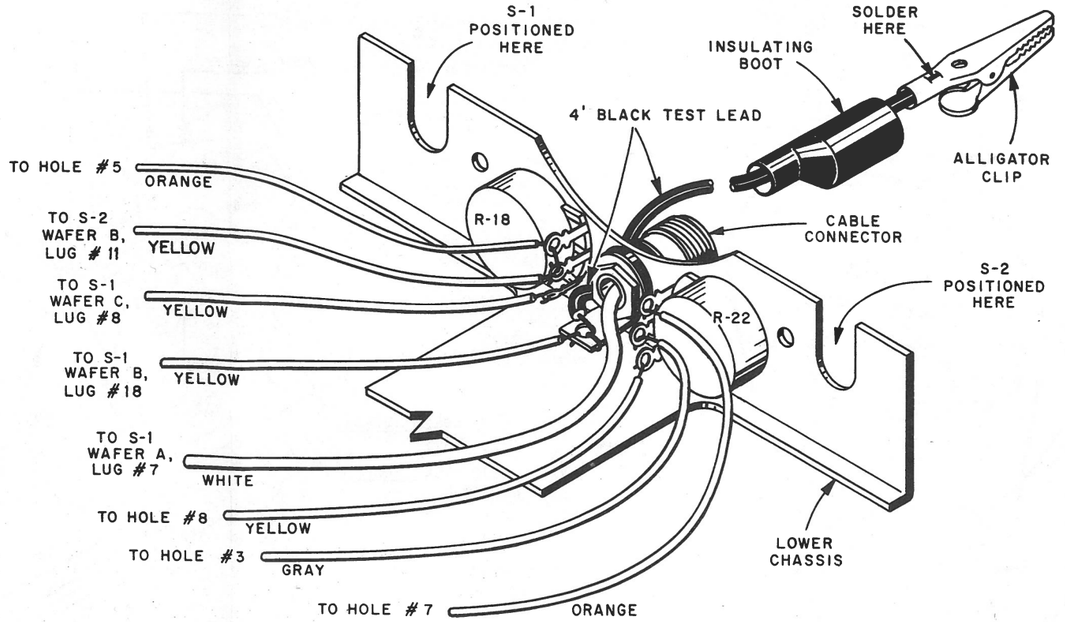


FIGURE 10

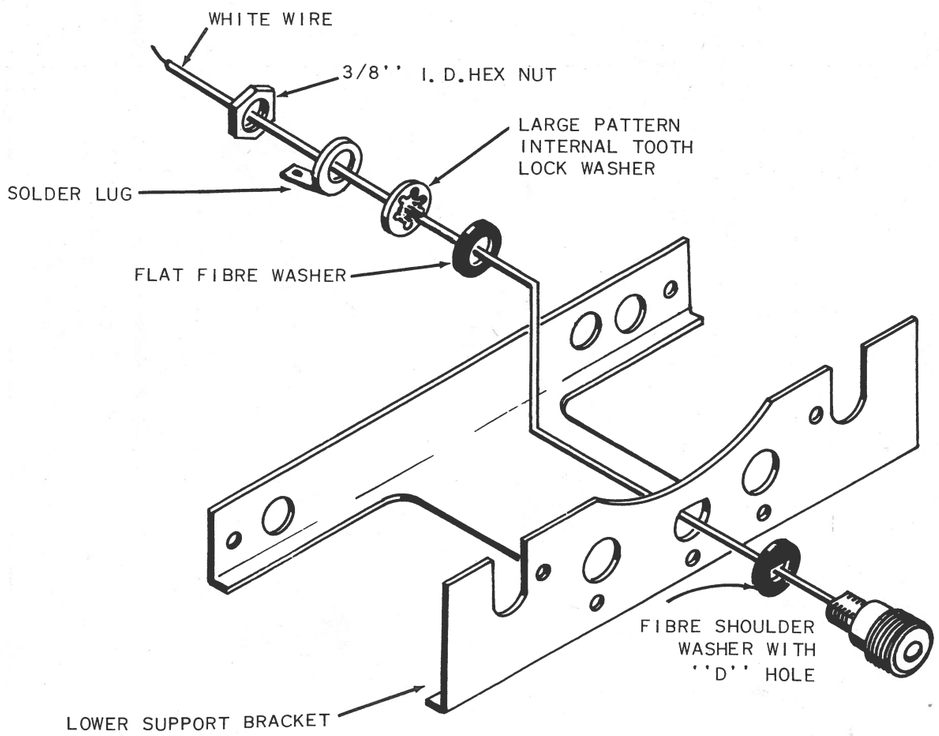


FIGURE 8

SECTION E

Assembly of Upper Chassis Bracket

ILLUSTRATIONS

Figures 11, 12, and 13.

PARTS LIST

Symbol	Description	Quantity
ID-1	Lamp, Neon, 5 inch leads	1
T-1	Transformer, power	1
	Clip, for battery	1
	Upper Support Bracket	1
	#2 Machine Screw, ½-inch long	2
	#4 Machine Screw, ⅜-inch long	3
	#4 Machine Screw, ⅞-inch long	2
	#2 Hex Nut	2
	#4 Hex Nut, large pattern	3
	#4 Hex Nut, small pattern	2
	#2 Lockwasher, internal tooth	2
	#4 Lockwasher, internal tooth	3
	#4 Lockwasher, split type	2
	#4 Flat Washer	1

STEPS 1 THROUGH 16.

Check ☑ each step as it is completed.

1. ☑ Select the upper support bracket. Position the bracket on the laminated board as shown in Figure 12, inserting the two spacers attached to the bracket through the holes provided in the laminated board. From the rear of the board, insert a #4 x ⅜-inch screw in each of the two mounting holes just above the spacers. Fasten with a #4 lockwasher and a #4 nut on each screw.
2. ☑ Examine the rear (copper foil side) of the laminated circuit board. The #4 machine screw just inserted in the upper right corner of the board makes contact with the foil circuit, as shown in Figure 11. Solder the head of this screw to the copper foil.
3. ☑ Identify the 4-section potentiometer (R-19, R-20, R-21, R-33) mounted on the laminated board. As shown in Figure 13, fasten the potentiometer to the upper chassis bracket using two #2 x ½-inch screws, two #2 internal tooth lockwashers, and two #2 hex nuts.
4. ☑ Mount the battery clip on the support bracket with a #4 x ⅜-inch screw, #4 flat washer, #4 lockwasher, and #4 hex nut as shown in Figure 12.
5. ☑ Mount the transformer, T-1, to the bracket. Position T-1 so that the blue, brown, red-green, and red-yellow leads are on the top side. The black and red-black leads will then be underneath the bracket. Fasten with two #4 x ⅞-inch screws, two #4 split-type lockwashers, and two #4 small-pattern hex nuts. Use care so that the screwdriver does not slip and damage the transformer windings.
6. ☑ Insert the blue lead from T-1 in the hole in the laminated board marked "BLU". (S)
7. ☑ Insert the brown lead from T-1 in the hole marked "BRN". (S)
8. ☑ Insert the red-green lead from T-1 in the hole marked "RED-GRN". (S)
9. ☑ Insert the red-yellow lead from T-1 in the hole marked, "RED-YEL". (S)
10. ☑ On the underside of the bracket, insert the red-black lead from T-1 in the hole marked "RED-BLK". (S)
11. ☑ Insert the black lead from T-1 in the hole marked "BLACK". (S)
12. ☑ Select ID-1, the neon pilot lamp. Cut each lead of ID-1 to a length of 3½-inches.
13. ☑ Cut two 3¼-inch lengths of black insulating sleeving. Slip one length of sleeving over each lead of the neon lamp.
14. ☑ Insert one lead of the lamp in one of the pins marked "ID-1" on the laminated board. (S)
15. ☑ Insert the remaining lead in the other pin marked "ID-1". (S)
16. ☑ Inspect work. Make sure that the transformer and the battery clip are fastened as tightly as possible to the support bracket.

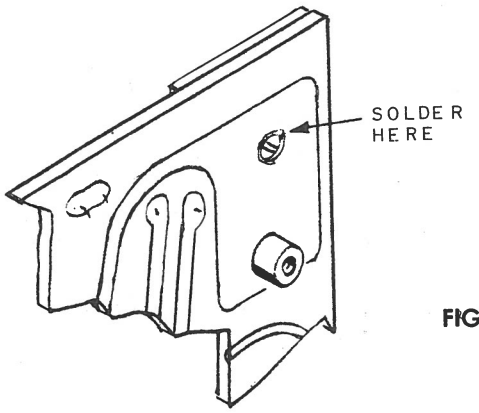


FIGURE 11

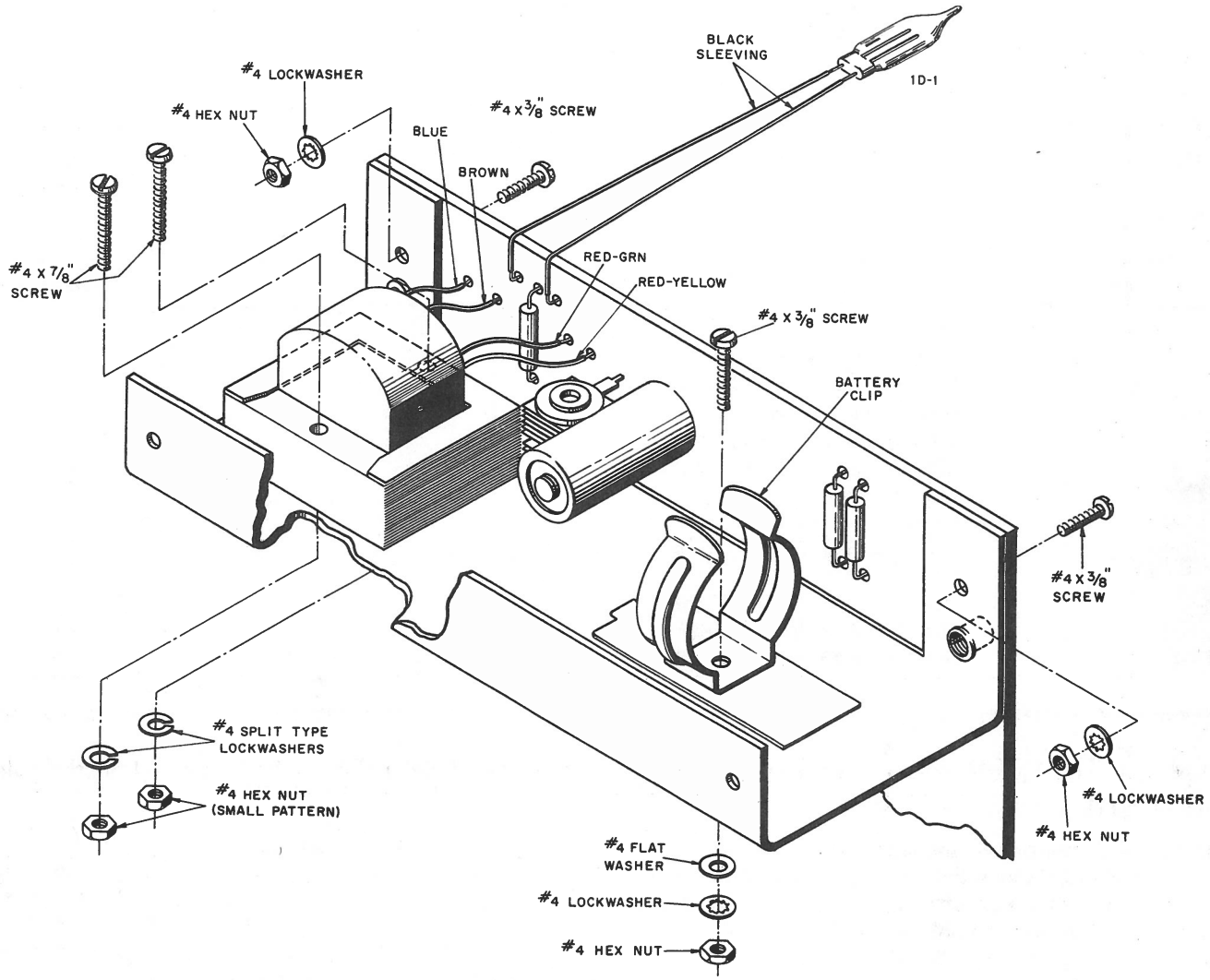


FIGURE 12

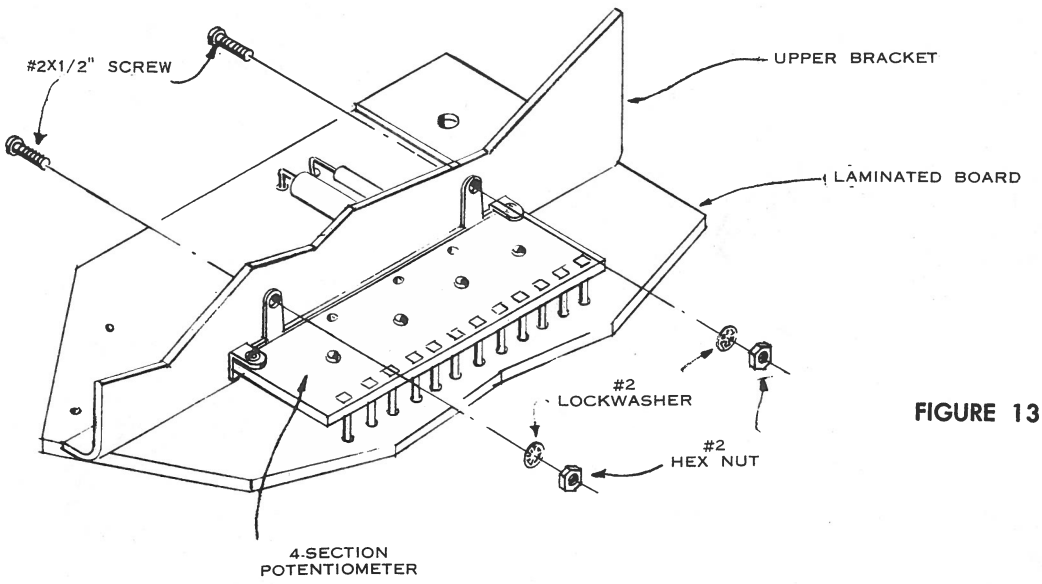


FIGURE 13

SECTION F

Final Wiring

ILLUSTRATIONS

Figures 14, 15, 16, 17, 18, and 19.

PARTS LIST

Symbol	Description	Quantity
M-1	Meter	1
V-1	Electron Tube, RCA 6AL5	1
V-2	Electron Tube, RCA 12AU7A	1
	Case, front section	1
	Clamp, for pilot lamp	1
	Clip, strain relief, 2-piece black plastic	1
	Cord, power	1
	Knob, black rubber	2
	#6 Machine Screw, ¼-inch long	2
	#6 Hex Nut	4
	Hex Nut, ⅜-inch inside diameter	2
	Nut, knurled, ⅜-inch inside diameter	2
	#6 Lockwasher, internal tooth	6
	Washer, flat, ⅜-inch inside diameter	4

STEPS 1 THROUGH 18.

Check ☑ each step as it is completed.

1. ☐ Select the power line cord. Insert the cut end of the cord through the hole in the rear of the lower support bracket and the slot in the laminated circuit board. Pull the end of the cord through the hole approximately 8 inches.
2. ☑ Separate the two insulated leads of the cord to a point 3½-inches from the end. Clip off one lead 2 inches from the end, so that the separated length is 1½-inches. Strip and tin both leads.
3. ☑ Insert the longer lead of the cord in hole #2 on the laminated board. (S)
4. ☐ Connect the other lead to S-1, wafer A, lug #20. (S)
5. ☑ Identify the 2-piece black plastic strain relief clip (see Figure 14). Position the clip on the power cord, about 1 inch from the point where the cord passes through the outside of the lower supporting bracket. The open section of the clip should face downward, as shown. With pliers, press the two sections of the clip together then force the clip in the bracket hole.
6. ☑ Pass the gray wire from S-1, wafer B, lug #22, through the ¼-inch hole by the outer edge of the upper support bracket, near the battery clip. See Figure 15. Pass the orange wire from S-1, wafer B, lug #16 through the other ¼-inch hole on the other side of the battery clip. These wires will be connected later.
7. ☑ Insert V-1 (6AL5) in the 7-pin tube socket on the laminated board. Insert V-2 (12AU7A) in the 9-pin tube socket.
8. ☑ Select the front section of the case. As shown in Figure 16, carefully place the meter in the case. Fasten with a #6 lockwasher and a #6 hex nut over each of the four meter-case studs. Remove the shorting clip from between the two meter studs.
9. ☑ Pass the black test lead through the center hole in the front panel section of the case-front. For final wiring, stand the case-front and meter assembly close to the chassis, in the position shown in Figure 17.
10. ☑ Identify the gray wire previously connected to S-1, wafer C, lug #11. Connect this wire to the solder lug on the "+" terminal of the meter. (S)
11. ☐ Identify the violet wire previously connected to S-1, wafer C, lug #20. Connect this wire to the solder lug on the "—" terminal of the meter. (S)
12. ☐ Carefully place the case-front over the panel controls. Press the case-front flush against the lower chassis, making sure that the threaded bushings of the four panel controls and connector extend through the case holes as far as possible.
13. ☑ Position the aluminum panel over the controls of the instrument, as shown in Figure 19. Be sure that the panel does not contact the connector. Place a ⅜-inch flat washer over each of the four panel control shafts. Place a ⅜-inch hex nut over each of the two switch shafts (S-1 and S-2), and a ⅜-inch knurled nut over each of the two potentiometer shafts (R-18 and R-22). Tighten these nuts, being extremely careful not to scratch the aluminum panel.

14. ☑ Place the copper clamp for the pilot lamp between the upper support bracket and the case-front, as shown in Figure 18. The V-shaped indent in the clamp should face the front of the instrument. Align the hole in the clamp with the holes in the bracket and case-front. Insert a #6 x ¼-inch long screw with a #6 lockwasher in the bracket hole, through the hole in the clamp, and into the corresponding hole in the case-front. Position the clamp over the pilot light window in the meter case, then tighten the screw securely.

15. ☑ Place the neon lamp between the clamp and the pilot window. Make sure that the insulating sleeving on the leads of the pilot lamp prevent them from shorting against each other, or against the support bracket or case-front.

16. ☑ Insert a #6 x ¼-inch long screw, with a #6 lockwasher, through the hole in the other side of the upper support bracket, and into the corresponding hole in the case-front.

17. ☑ Place the blue pointer knobs on the shafts of S-1 and S-2, and the small black rubber knobs on the shafts of R-18 and R-22, the "ZERO" and "OHMS" controls.

18. ☑ The WV-98C(K) is now completely wired, except for installation of the battery, and is ready for calibration. Inspect the instrument thoroughly, checking for loose or unsoldered connections, and for possible shorts between any components, leads, or wires. Check over the entire assembly instructions to be sure that no steps were omitted.

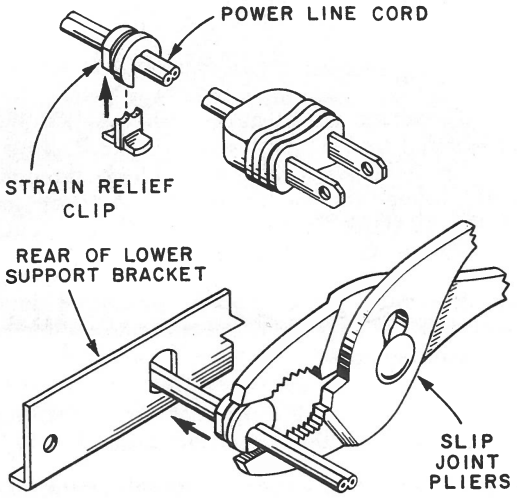


FIGURE 14

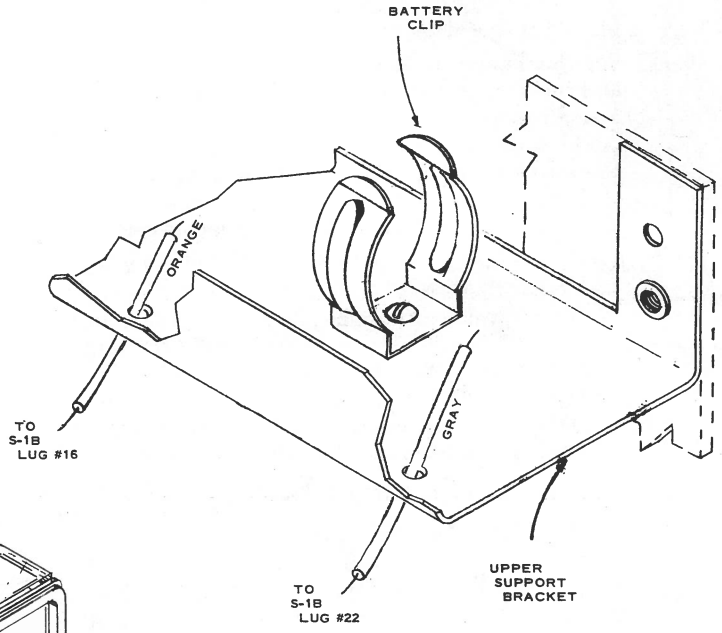
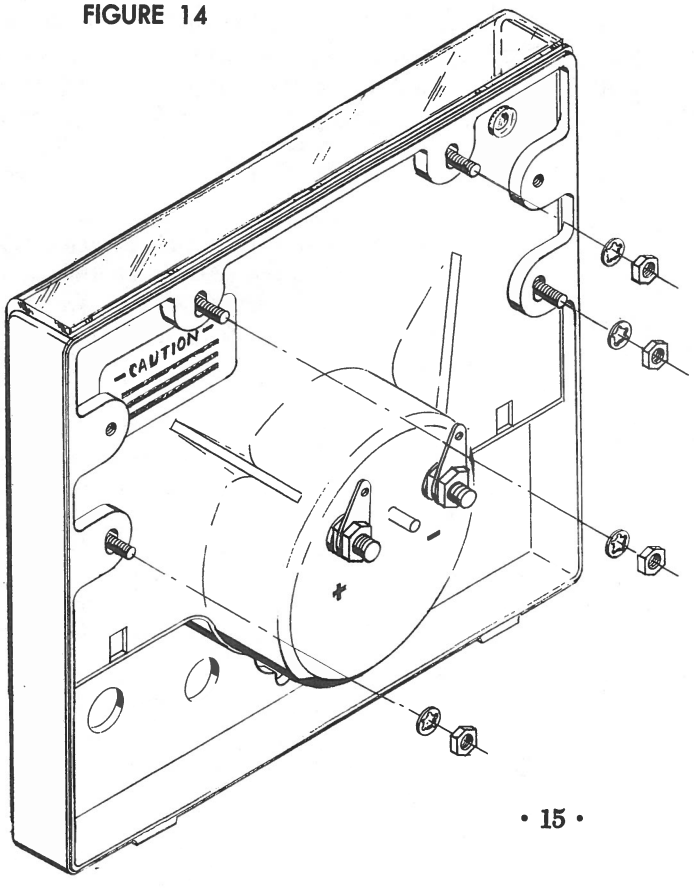


FIGURE 15



NOTE:
FOUR #6 INTERNAL TOOTH LOCKWASHERS, AND FOUR #6 HEX NUTS USED TO FASTEN METER TO CASE-FRONT

FIGURE 16

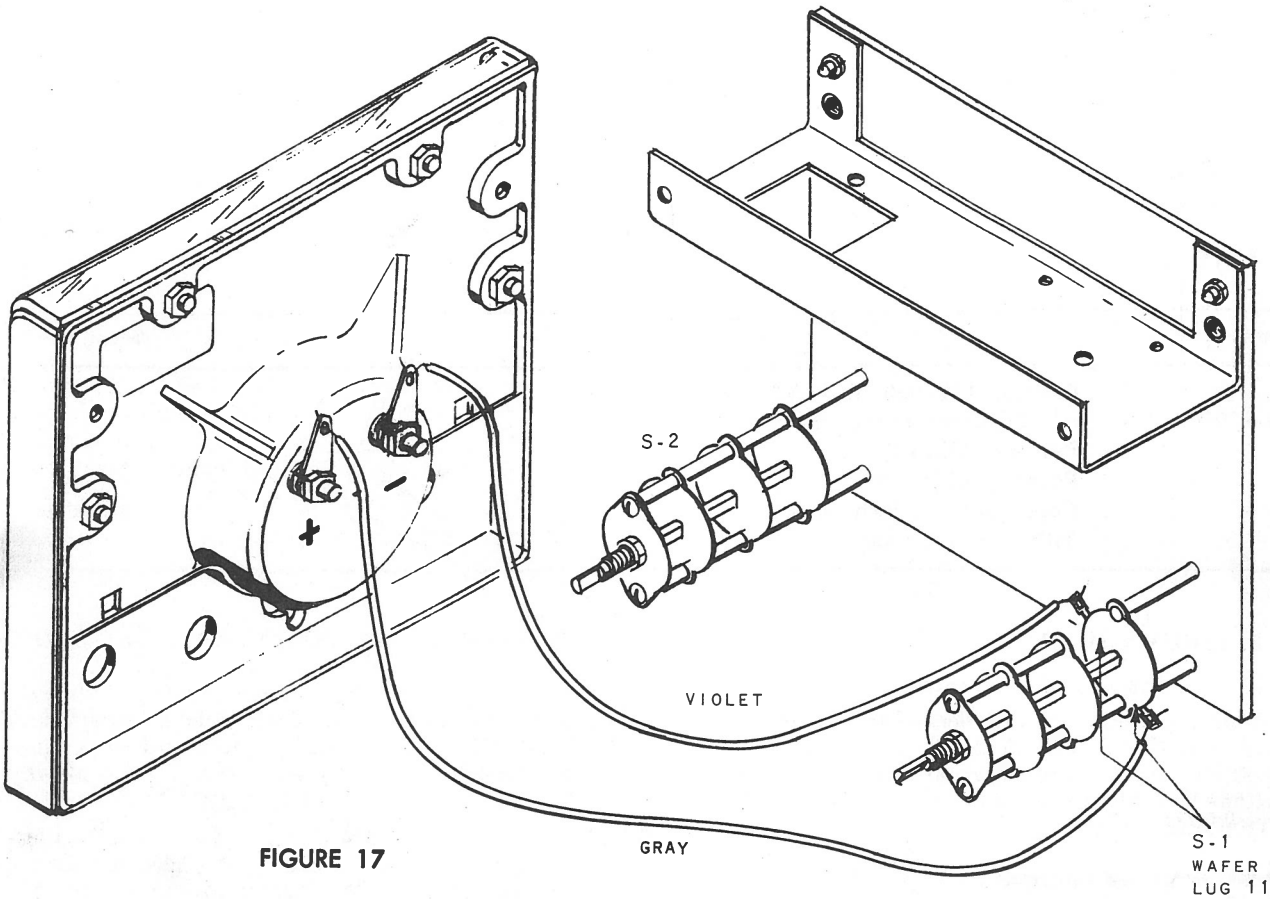


FIGURE 17

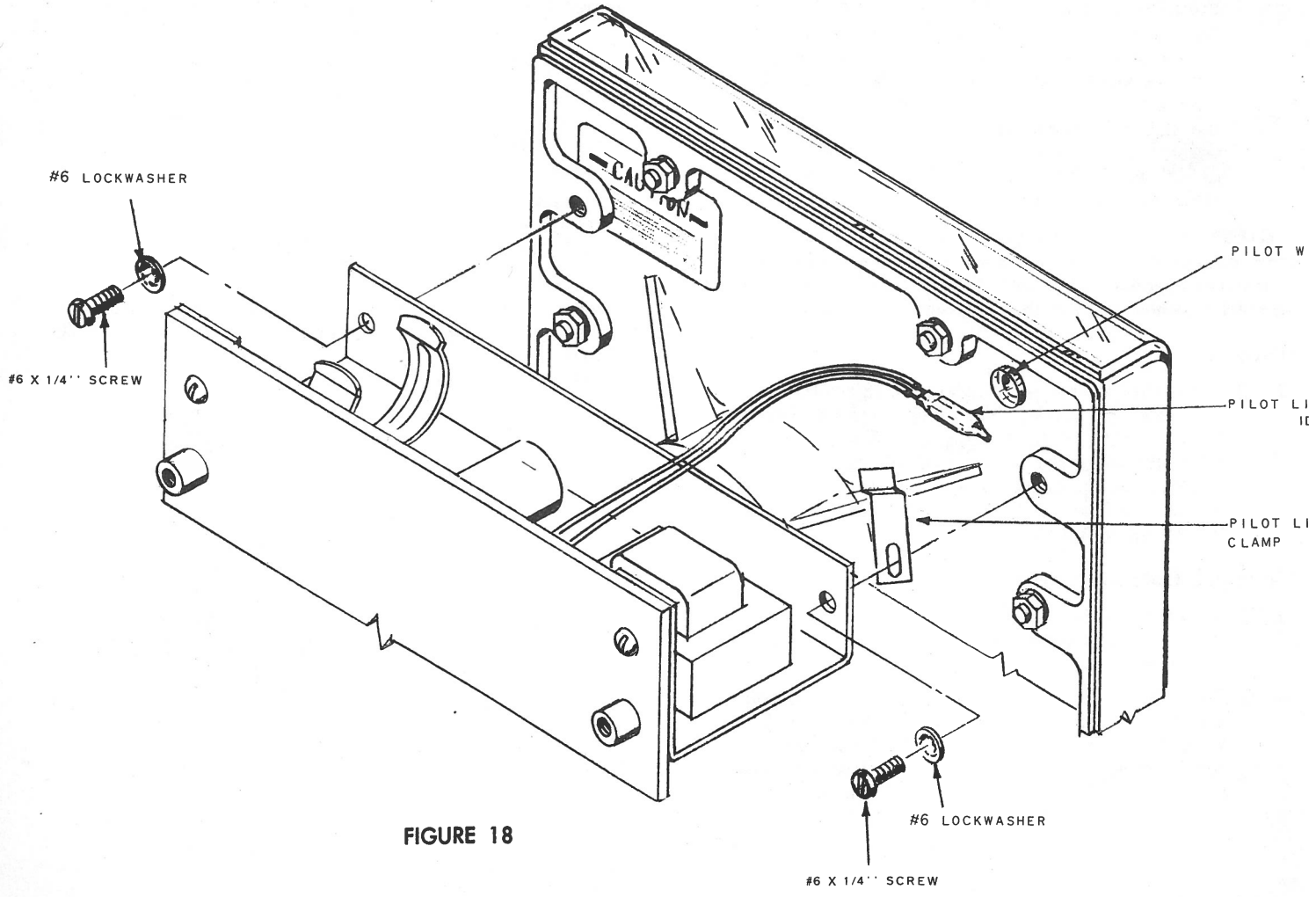


FIGURE 18

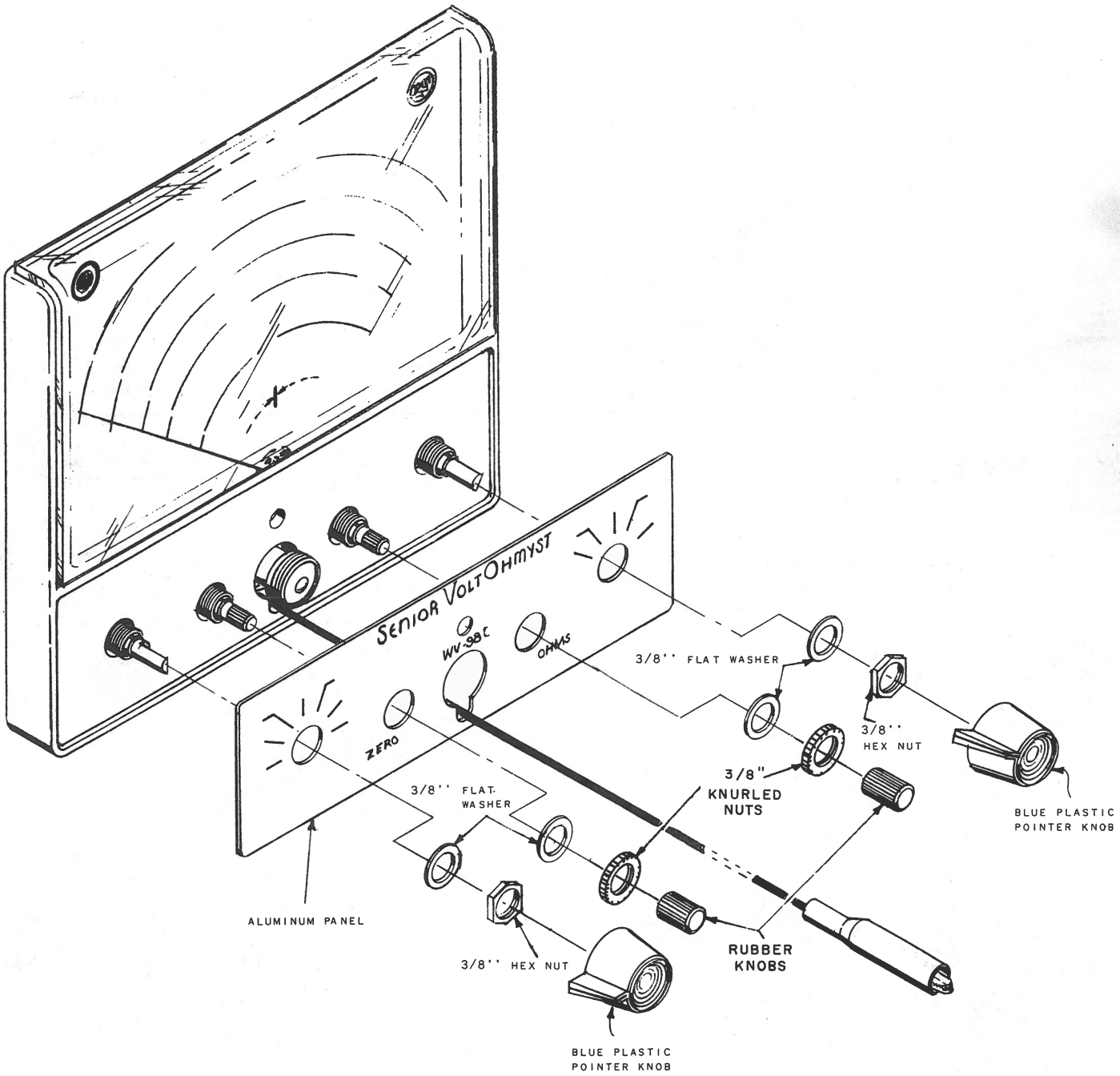

SENIOR VOLTOHMYST
WV-98C
OHMS
ZERO
3/8'' FLAT WASHER
3/8'' HEX NUT
3/8" KNURLED NUTS
BLUE PLASTIC POINTER KNOB
3/8'' FLAT WASHER
ALUMINUM PANEL
3/8'' HEX NUT
RUBBER KNOBS
BLUE PLASTIC POINTER KNOB

FIGURE 19

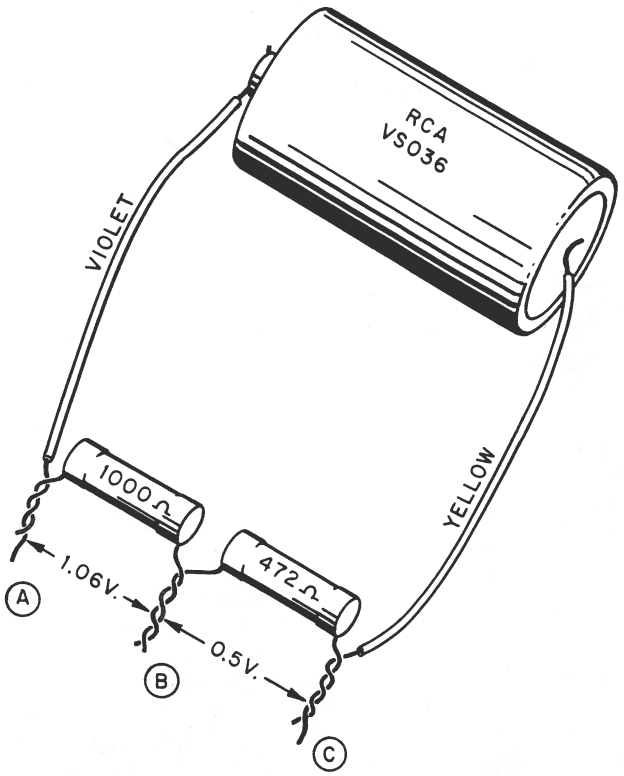


FIGURE 20

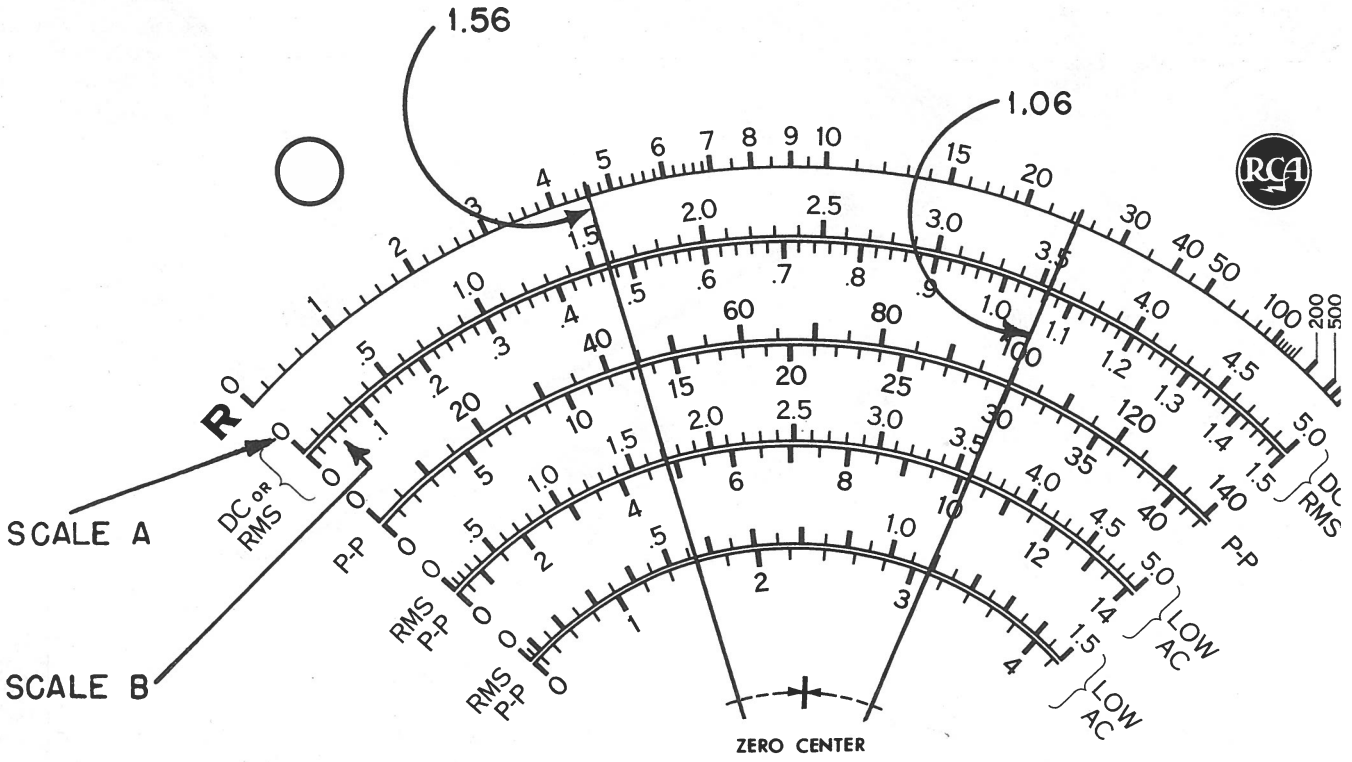


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FIGURE 21

SECTION G

Calibration

ILLUSTRATIONS

Figures 20, 21, 22, and 23.

PARTS LIST

Symbol	Description	Quantity
B-1	Battery, 1½ volt, RCA VS036	1
WG-229D	AC/DC-Ohms Probe and Cable	1
	Resistor, 1K, 1%	1
	Resistor, 472Ω, 1%	1
	Cork Tape, ¾-inch wide	4 inches
	Button, metal snap-in	1

STEPS 1 THROUGH 39.

Check ☑ each step as it is completed.

NOTE: If any difficulties are experienced in this section, and the WV-98C(K) does not perform as indicated by the instructions, remove the power cord from the AC outlet and consult Section H, Troubleshooting.

Mechanical Zero Adjustment

1. ☑ The meter pointer should rest at "O" when the Function Switch is in the "OFF-TRANSIT" position. If it does not, carefully insert the pointed tip of the probe through the small hole in the panel just above the cable-connector. Pierce the clear tape seal over the hole in the meter, and engage the slotted zero-adjustment lever. Move the lever slightly sideways as required to bring the pointer to "O". Insert the small metal snap-in button in the meter adjustment hole.

CAUTION: To avoid electrical shock, in the following steps do not touch any components or wires when the instrument is connected to the AC outlet. Use an insulated screwdriver when making the calibration adjustments.

Warmup

2. ☑ Insert the power-cord plug into a 120 volt, 50 or 60 cycle, AC outlet. Turn the Function Switch to the "+DC VOLTS" position. The tubes and pilot lamp should light immediately. Examine the electrical components for any indication of shorting or overheating. Let the instrument warm up for 30 minutes before calibrating further.

Electrical Balance Check

3. ☑ Attach the W6-229D Probe and Cable to the connector on the front panel. Set the slide switch on the probe to "DC".
4. ☑ Turn the Range Switch to the "1.5 V" position. The Function Switch should still be in the "+DC VOLTS" position. Rotate the "ZERO" adjustment control on the front panel fully clockwise and note the position of the meter pointer. Turn the Function Switch to "−DC VOLTS". Rotate the "ZERO" adjustment control fully counter-clockwise and note the position of the meter pointer. It should be possible to bring the meter pointer beyond the "ZERO-CENTER" meter indication with the Function Switch in one or both of the positions above ("+DC VOLTS" or "−DC VOLTS").
5. ☑ Set the Function Switch on "+DC VOLTS", and the Range Switch to the "1.5V" position. Connect the ground-lead alligator clip to the tip of the probe. Adjust the "ZERO" adjustment control so that the meter pointer rests exactly on "O".

DC Calibration

6. ☑ Cut the following lengths of insulated hookup wire. Yellow: 6" ☐ Violet: 6" ☐ Gray: 6" ☐ Strip ¼-inch of insulation from both ends of these wires.
7. ☐ Tin both the battery cap (positive terminal), and the center area of the bottom (negative terminal) of the RCA VS036 battery.
8. ☐ Solder one end of the 6-inch yellow wire to the bottom of the battery. When soldering to the battery, be sure to apply enough heat with the soldering iron so that the solder forms a good electrical connection.
9. ☑ Solder one end of the 6-inch violet wire to the battery cap. Allow at least 15 minutes for the battery to cool.
10. ☑ Connect the 1K and 472 ohm resistors together as shown in Figure 20. Connect the 1K resistor to the violet wire from the battery cap, and the 472 ohm resistor to the yellow wire from the battery as shown in the illustration. Solder these three connections.
11. ☑ Set the Function Switch to the "+DC VOLTS" position, the Range Switch to the "1.5V" position, and the slide switch on the probe to the "DC" position. Note that there are three connection points on the calibrating circuit, shown in Figure 20. Connect the ground lead to point B, and the probe tip to point A.

12. ☑ Adjust R-19, the "+DC" control on the rear of the laminated board so that the meter pointer indicates 1.06 volts. Read on Scale B as shown in Figure 21.

13. ☑ Reverse the connection to the calibrating circuit, with the ground lead to point A and the probe to point B. Set the Function Switch to the "—DC VOLTS" position.

14. ☑ Adjust R-20, the "—DC" control so that the meter pointer reads 1.06 volts on scale B.

NOTE: Due to the high sensitivity of the .5 DC range, the calibration of this range requires more care than the other ranges. It is important that the instructions be followed exactly.

15. ☑ Connect the ground-lead clip to the probe tip. Set the Function Switch to the "+DC" position, and the Range Switch to "1.5V". If necessary, adjust the ZERO control on the front panel so that the pointer rests exactly on "O".

16. ☐ Set the Range Switch to the ".5V DC" position, and the Function Switch to "—DC VOLTS". Insert a small screwdriver through the hole in the circuit board marked ".5V DC", passing the tip of the screwdriver through the slot in the center section of R-35. Adjust R-35 to bring the meter pointer as far up-scale as possible. Note the meter reading.

17. ☐ Set the Function Switch to the "+DC VOLTS" position. Adjust R-35 to bring the meter pointer as far up-scale as possible, and note the meter reading. If this reading is approximately the same or higher than that obtained in step 16, follow calibration procedure A, given in steps 18 through 21. If the reading in step 16 was higher, follow calibration procedure B, steps 22 through 25.

PROCEDURE A

18. ☐ From a full counterclockwise position (viewed from rear of circuit board), rotate R-35 clockwise to approximately one-quarter of its range. With the ground-lead clip still connected to the probe tip, set the meter pointer to "O", using the ZERO control on the front panel.

19. ☐ Connect the ground-lead clip to point C and the probe to point B of the calibrating circuit. Adjust the .5V DC calibration potentiometer, R-35, so that the meter pointer indicates exactly "5.0" on scale A (full-scale deflection).

20. ☐ Touch the probe tip to the ground-lead clip, then re-adjust the ZERO control to bring the meter pointer to "O" again.

21. ☐ Repeat steps #19 and #20 one or more times as necessary so that the meter pointer ranges exactly from "O" with the probe tip touching the ground-lead clip, to full-scale deflection with the probe connected to point B.

PROCEDURE B

22. ☐ From a full counterclockwise position (viewed from rear of circuit board), rotate R-35 clockwise to approximately one-quarter of its range. Set the Function switch to "—DC VOLTS". With the ground lead clip still connected to the probe tip, set the meter pointer to "O", using the ZERO control on the front panel.

23. ☑ Connect the ground-lead clip to point B and the probe tip to point C of the calibrating circuit. Adjust the .5V DC calibration potentiometer, R-35, so that the meter pointer indicates exactly "5.0" on scale A (full-scale deflection).

24. ☑ Touch the probe tip to the ground-lead clip, then re-adjust the ZERO control to bring the meter pointer to "O" again.

25. ☑ Repeat steps #23 and #24 one or more times as necessary so that the meter pointer ranges exactly from "O" with the probe tip touching the ground-lead clip, to full-scale deflection with the probe connected to point C.

NOTE: Due to the high sensitivity of the .5V DC range, it will usually be necessary to re-adjust the ZERO control slightly when the Range Switch is first set to the ".5V DC" position.

AC Calibration

When AC voltage is measured with the WV-98C(K), it is first rectified by V-1, the 6AL5 twin diode. Thus converted to DC voltage, it is then applied, through the appropriate voltage divider, to the grid of triode section V-2A of the 12AU7A bridge tube. The circuit action is then the same as for DC measurement.

Accordingly, this AC calibration procedure involves applying a +DC voltage from the calibration circuit into the AC measuring circuit, at a point where the AC would ordinarily have been converted to DC. The AC calibration control is then adjusted so that the meter pointer indicates 1.56 volts on the 5 volt DC scale.

This method is more accurate than calibrating against the AC line voltage, which is usually assumed to be 117 volts, but which may vary from 105 volts to 130 volts.

26. ☑ Connect the ground-lead clip to the tip of the probe. Set the Function Switch in the "+DC VOLTS" position and the Range Switch in the "5V" position. If necessary, adjust the ZERO control so that the meter pointer indicates exactly "O".

27. ☑ Set the Function Switch to the "AC" position. Adjust R-23, the "AC Z" control on the rear of the laminated board so that the meter pointer rests on "O".

28. ☑ Remove the power-cord plug from the AC outlet. Solder one end of the 6-inch gray wire to point "D" on the rear of the laminated board, as shown in Figure 22. This is the point where one lead of R-11 is connected to the foil circuit.

29. ☑ Solder the other end of the gray wire to point C on the calibration circuit.

30. ☐ Connect the ground-lead clip to point A. Insert the power-cord plug into the AC outlet. Allow 5 minutes for the instrument to warm up again. Adjust R-21, the "AC" control on the rear of the laminated board so that the meter pointer indicates "1.56" on the 5.0 scale, as shown in Figure 21. All AC ranges are now calibrated.

31. ☐ Remove the ground-lead clip from the calibration circuit. Disconnect the violet wire from the battery cap to prevent the circuit from loading the battery for an extended period. Do not disassemble the calibrating circuit since it will be used again in the Final Calibration procedure.

Final Calibration

32. ☐ Leave the instrument turned "ON" for a period of 36 hours or more to age the tubes, then repeat the calibration procedure, steps #11 through #30.

Ohms Adjustment

33. ☐ Disconnect the two wires from the battery by heating the connections with the soldering iron. It is suggested that the 2-resistor calibration circuit be saved for future use in calibrating the instrument.

34. ☐ Remove the covering from the sticky side of the 4-inch length of cork tape. Wrap the tape around the center of the battery as shown in Figure 23. Place the battery in the clamp on the upper support bracket, in the position indicated on the bracket (battery cap inside).

35. ☐ Identify the orange wire previously connected to S-1, wafer B, lug #16, with the free end passing through the hole in the upper support bracket, near the battery cap. Solder this wire to the battery cap, as shown in Figure 23.

36. ☐ Identify the gray wire previously connected to S-1, wafer B, lug #22, with the free end passing through the hole in the upper support bracket near the bottom of the battery. Solder this wire to the bottom of the battery.

37. ☐ Plug the power-cord plug into the AC outlet. Set the Range Switch to the "R x 1MEG" position, and the Function Switch to the "R OHMS" position. Set the switch on the probe to "AC-OHMS".

38. ☐ Connect the alligator clip on the ground lead to the tip of the probe. Set the "ZERO" control on the front panel so that the meter indicates "0".

39. ☐ Disconnect the ground lead from the probe. Adjust the "OHMS" control on the front panel so that the meter pointer reaches full scale deflection (∞ on the "R" scale).

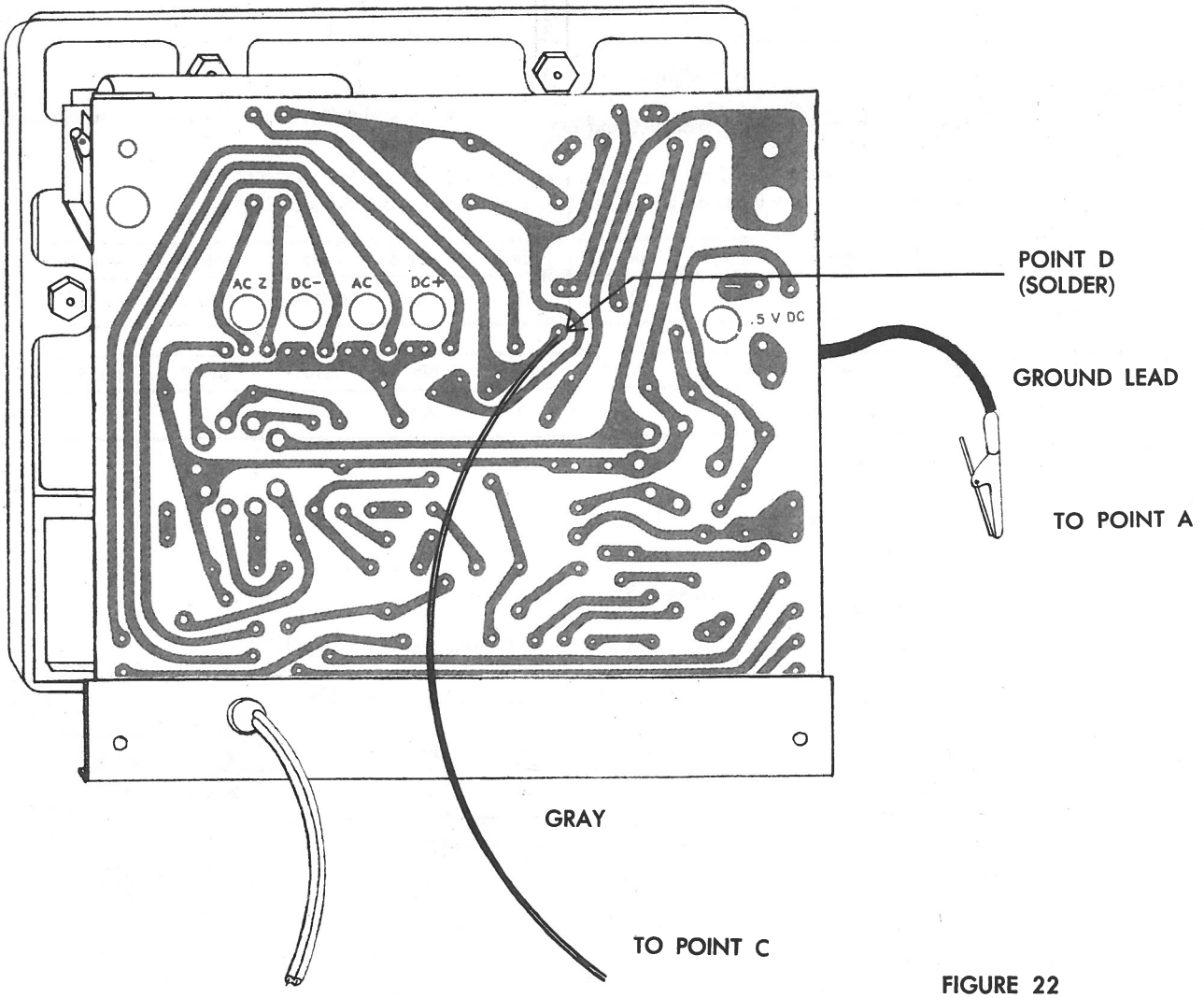

FIGURE 22

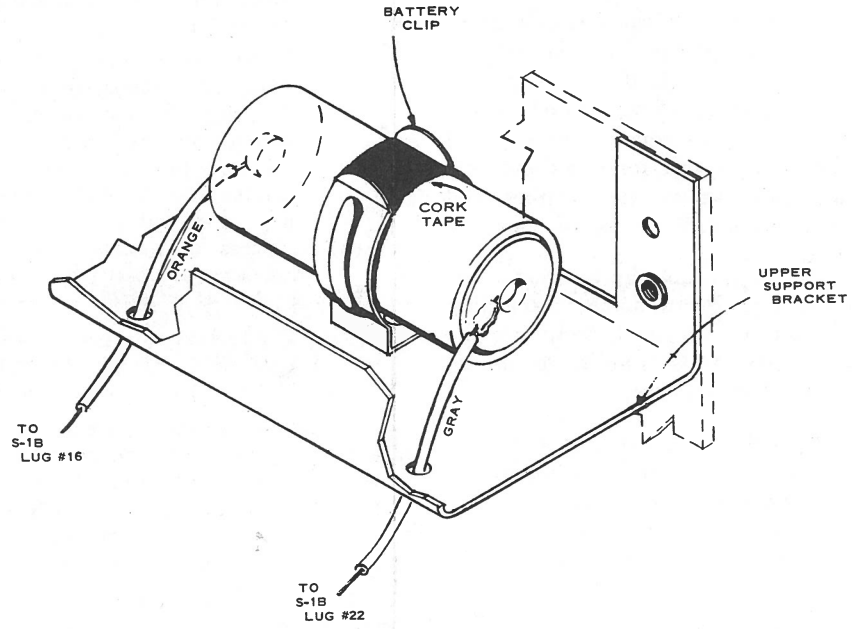
BATTERY CLIP
CORK TAPE
ORANGE
UPPER SUPPORT BRACKET
GRAY
TO S-1B LUG #16
TO S-1B LUG #22

FIGURE 23

SECTION H

Troubleshooting

This section is provided as an aid in "troubleshooting" the WV-98C (K), in the event that the instrument does not operate properly after it has been fully assembled. If the instrument was successfully calibrated in the preceding section, turn directly to Section I, Final Assembly.

ILLUSTRATIONS

Figures 24, 25, and 26.

STEPS 1 THROUGH 6.

Check ☑ each step as it is completed.

Make the following checks in Steps #1 through #4 with the *power off*, and the power-cord plug removed from the AC outlet.

1. ☐ Check the top side of the laminated circuit board to make sure no component is "shorted" to (touching) another component. If any component becomes overheated, trace its associated wiring very carefully. To identify the components mounted on the laminated circuit board, refer to Figure 24. This illustration also shows the copper foil circuitry on the underside of the board.

2. ☐ Inspect the copper-foil side of the laminated circuit board. Look for bits of solder connecting foils that should not be connected. Scrutinize the foil-runners for breaks. Make sure there are no unused or unsoldered connections.

3. ☐ Inspect the front panel wiring. Look for a globule of solder that may have run along a lug to the point where it is making contact with the frame of the switch or potentiometer. Make sure that there are no shorts between adjacent lugs or components.

4. ☐ Remove the tubes from their sockets, if a tube-checker is available, test the tubes. Check the resistance between tube pins and common ground. Compare the resistance readings with those listed in Figure 25. Readings which vary by more than 25% from those shown, may be caused by shorted circuits or defective components.

   NOTE: Tube pin locations may be found by referring to the upper side of the tube sockets. With the space or "missing pin" at the top, start with #1 at the left of the space and number consecutively counterclockwise.

   CAUTION: To avoid electrical shock, in the following steps do not touch any components or wires when the instrument is connected to the AC outlet.

5. ☐ Insert tubes and apply power to the instrument. Wait 20 seconds, then measure the voltages on the pins of tube sockets. Compare the readings with those listed in Figure 26. Be extremely careful—turn power off while connecting and disconnecting the voltmeter. Large deviations from the indicated values of voltages suggest possible sources of difficulty. With the aid of this data and the schematic, a thorough check can be made to find the specific source of trouble.

6. ☐ For further information helpful in troubleshooting, read the sections in the Instruction Manual entitled "Circuit Description" and Maintenance".

If a defective part is located as a result of the troubleshooting procedure, you may have the part replaced by writing to RCA Electronic Instruments, Customer Service, P.O. Box 654, Camden 1, New Jersey. Be sure and describe the part completely, including the stock number, if any. Check Replacement Parts List in Instruction Manual.

If no defective components or wiring errors can be found, and the instrument still fails to function properly after troubleshooting, you may send the instrument to the RCA Test Equipment Repair Depot most convenient to you. The instrument will then be serviced under the terms of the RCA kit warranty. For the name of the nearest RCA Repair Depot, contact your local RCA Test Equipment Distributor, or write to the address given in the preceding paragraph.

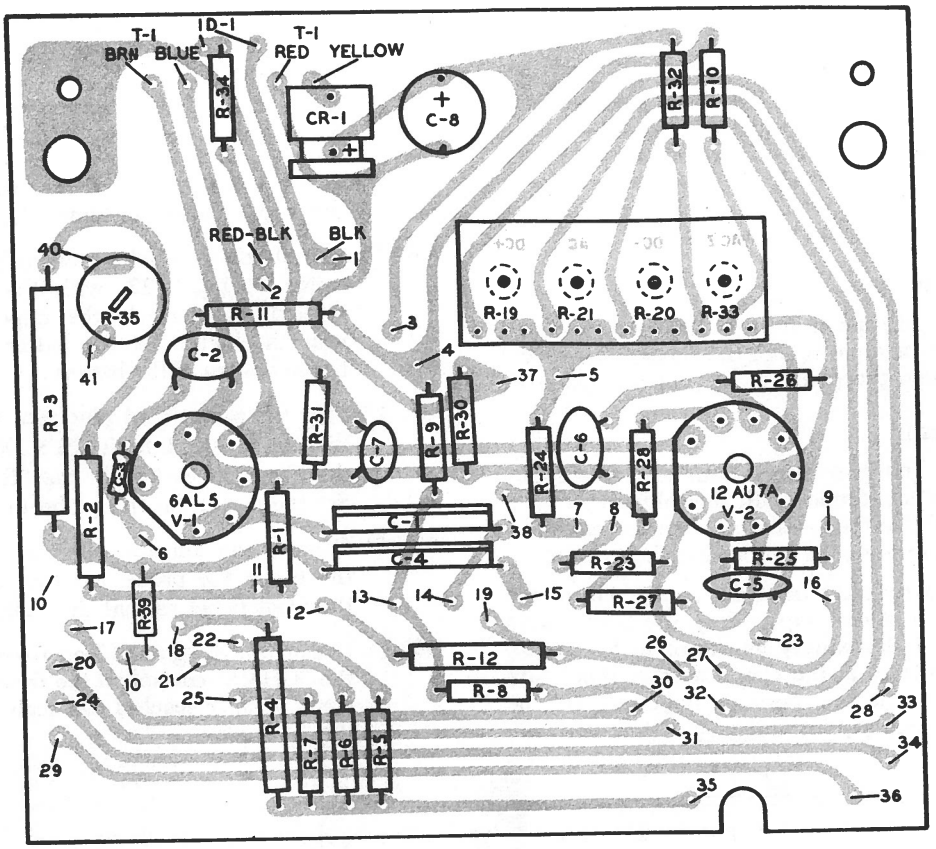

FIGURE 24

Resistance Measurements

Remove power-cord plug from AC outlet.
Remove V-1 and V-2.
Set Range Switch to "1.5V", and Function Switch to "+DC VOLTS".
Measure resistance to common ground (instrument ground-lead clip).

V-1, 6AL5

pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9
∞	∞	0	2.8	0	∞	100 Meg.	None	None

V-2, 12AU7A

pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9
60K	14 Meg.	40K	0	0	60K	7 Meg.	40K	2.8

Notes: ∞ = Infinity
K = 1000 ohms
Meg = 1,000,000 ohms

FIGURE 25

Voltage Measurements

Insert tubes.
Set Range Switch to "1.5V", and Function Switch to "+DC VOLTS".
Insert power cord in AC outlet.
Measure voltage to common ground (instrument ground-lead clip).

V-1, 6AL5

pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9
−.65	−.65	—	—	—	—	−1.5	None	None

V-2, 12AU7A

pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9
70	—	2.7	—	—	70	—	2.7	—

Notes: All voltages DC (—DC where indicated)
— = Do not test

FIGURE 26

SECTION I

Final Assembly

ILLUSTRATIONS

Figures 27 and 28.

PARTS LIST

Symbol	Description	Quantity
	Case	1
	Handle, black leather	1
	Stud, handle mounting	2
	"C"-Washers	2
	Cork Tape, ½-inch by 2¾-inch	2
	Cork Tape, ½-inch by ⅝-inch	2
	#8 Machine Screw, ⅜-inch long	4
	Lockwasher, split-type, ¼-inch inside diameter	2

STEPS 1 THROUGH 7.

Check ☑ each step as it is completed.

1. ☐ Assemble the handle to the case as shown in Figure 27. Insert the studs through the holes on each side of the handle, place a split-type lockwasher on the shaft of each stud, then insert the studs through the holes in the case. Inside the case, snap a "C" washer on the slotted section of each stud, then crimp the washers together slightly to prevent them from coming off.
2. ☐ Separate the two 2¾-inch lengths of cork tape. Remove the covering from the sticky side, and firmly press the tape on the two raised sections of corresponding size on the underside of the case.
3. ☐ Separate the two ⅝-inch lengths of cork tape. Remove the covering from the sticky side, and firmly press the tape on the two raised sections of corresponding size on the underside of the case-front.
4. ☐ Pass the power cord through the large hole in the rear of the case, then carefully slide the instrument into the case.
5. ☐ Insert a #8 by ⅜-inch long machine screw in each of the holes in the rear of the case.
6. ☐ Insert a #8 by ⅜-inch long sheet metal screw in each of the two lower holes on the rear of the case. These screws may be identified by their widely spaced threads.
7. ☐ The WV-98C(K) Senior VoltOhmyst is now completely assembled. For information concerning the operation, applications, circuit description, and maintenance of the instrument, read the Instruction Manual supplied with the kit.

IMPORTANT

Before applying the probe to a "hot" circuit, always make sure that the Function Switch is in one of the "VOLTS" positions. Applying the probe to a hot circuit with Function Switch in the "OHMS" position may result in damage to the precision resistors in the ohms divider network of the instrument.

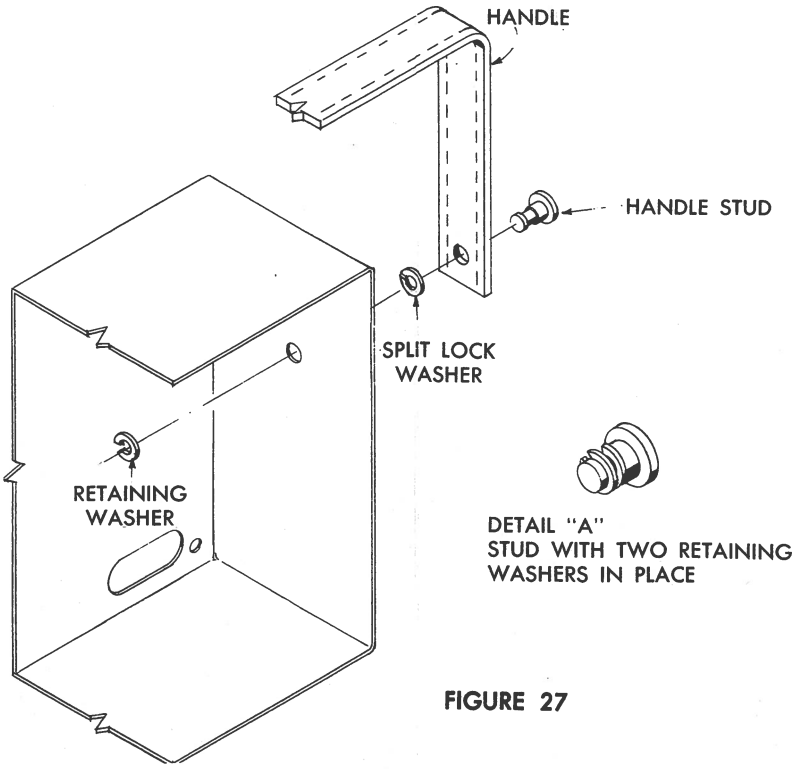

FIGURE 27

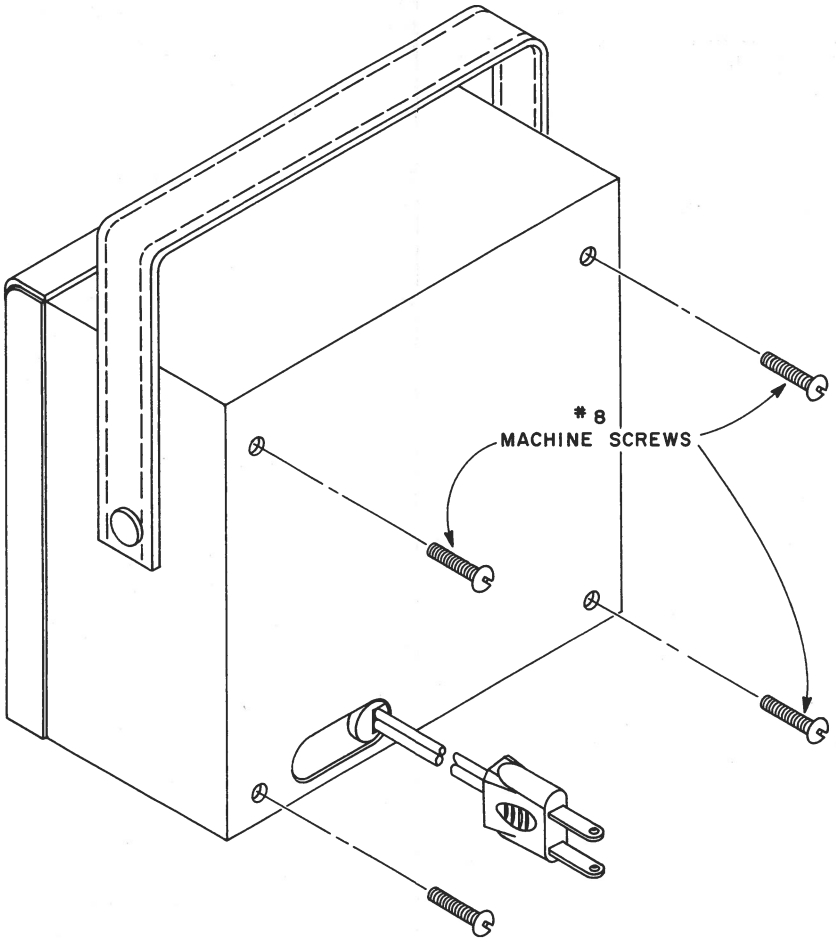

FIGURE 28


RCA