

INSTRUCTION MANUAL

VFO MODEL 755

WRL ELECTRONICS
COUNCIL BLUFFS, IOWA

SECTION I
GENERAL DESCRIPTION

1-1. GENERAL

1-2. The WRL VFO Model 755 is made by WRL Electronics, Inc. of Council Bluffs, Iowa. The WRL VFO Model 755 is completely self-contained and is calibrated for all amateur bands 160-10 meters. The VFO has output on the 160 and 40 meter bands. Unusually good stability is obtained by a modification of the basic Clapp circuit and the use of temperature compensated components.

1-3. Automatic operation is possible with an external SPST relay that is energized by the transmitter. (The aforementioned relay is optional equipment and must be purchased separately.)

1-4. DESCRIPTION.

1-5. The Model 755 VFO is completely self-contained in a metal cabinet of distinctive, modern design. Dimensions are 6 5/8 inches high, 7 1/2 inches deep, and 7 inches wide. Weight is approximately 7 pounds. A ventilating grille is provided on the top side of the cabinet to provide the proper amount of heat dissipation. The oscillator stage is separately shielded to provide correct temperatures for optimum stability and performance of this stage. As heat circulation is a critical factor, it is recommended the cabinet be kept in the normal horizontal operating position. Tilting the cabinet in any direction will adversely affect the frequency stability to a considerable extent. This is due to the fact that the special temperature sensitive components are positioned exactly and tilting the cabinet will cause the heat to flow around the compensating components in a manner other than that which will give best stability. Do not place the VFO on a hot receiver or other hot object as this will adversely affect the stability.

1-6. The VFO should be coupled to the transmitter by coaxial cable. RG-59/U, or lower capacity coaxial cable should be used. IT IS IMPORTANT THAT NO MORE THAN 4 FOOT OF CABLE BE USED. More cable than 4 feet will reduce the output to a lower level, probably less than that required to drive the transmitter properly. This is due to the fact that the capacity of the coaxial cable detunes the Buffer output circuit. THE SHORTEST POSSIBLE LENGTH OF CABLE SHOULD BE USED. When inserting the output cable plug into the transmitter crystal socket, make certain the center conductor of the coaxial cable is connected to the grid side of the crystal socket and the shield to the grounded side, or side that is electrically closest to ground.

|(NOTE - Globe King and Globe Scout owners. Grid side of Globe King crystal socket is left hole, viewed from front; grid side of Globe Scout crystal socket is top hole, viewed from front.)

1-7. The unit may be removed from the cabinet for inspection and servicing. To remove the unit from the cabinet, remove the two top panel screws, the four mounting feet and the rear screw on the rear apron. Power requirements are 115 volts, 50/60 cycles single phase alternating current only. Tube complement is shown in Table I.

TABLE I. TUBE COMPLEMENT.

| Quantity | Type | Function |
|----------|------|-------------------|
| 1 | 6AU6 | Oscillator |
| 1 | 6CB6 | Buffer-output |
| 1 | OA2 | Voltage Regulator |

1-8. THEORY OF OPERATION.

1-9. The oscillator stage, utilizing a 6AU6 tube, is basically a series tuned Clapp oscillator but with additional parallel padding. This modification of the Clapp circuit provides much better frequency stability, more constant output and less tube loading. The frequency stability of the oscillator is governed mainly by maintaining a constant temperature in the oscillator compartment and by utilizing temperature compensating condensers at critical points in the circuit. The fundamental oscillator frequency and output is in the 160 and 40 meter bands. Cathode keying of this stage is employed as it is the easiest and most dependable type of keying. A broadband load choke in the output circuit of the oscillator supplies RF drive to the buffer stage through a coupling capacitor.

1-10. The buffer stage employs a type 6CB6 tube operating as a Class "A" RF amplifier. The plate circuit of this stage is bandswitched to broadband RF coils which supply RF output in the 160 and 40 meter bands through an output coupling capacitor. The amount of RF output varies, depending upon the type and length of cable used plus the care exercised in tuning the output coils. (See 5-3).

1-11. The power supply is of the selenium rectifier type and furnished all necessary high voltages without unnecessary heat. The filament power is derived from a transformer. The B supply voltage is held constant by a type OA2 voltage regulator tube plus the fact that the buffer stage operates continuously and the oscillator current drain is very low. As a result the keying characteristics are very clean and overall stability is greatly improved.

SECTION II
OPERATING PROCEDURES

2-1. GENERAL

2-2. The following paragraphs describe the various panel controls of the Model 755 VFO. Output coil peaking and operating procedures are outlined following the description of controls. It is recommended that this section be studied thoroughly before any attempt is made to place the VFO into operation.

2-3. DESCRIPTION OF CONTROLS.

2-4. BANDSWITCH. Permits instant change of operating band through the entire range of amateur bands 160-10 meters. When this switch is in the OFF position AC power is removed from the VFO.

2-5. TUNING. Tunes the VFO to the desired frequency in conjunction with the bandswitch.

2-6. CALIBRATE SWITCH. This switch is placed in the OFF position for normal operation of the VFO. In the ON position the key jack is shorted, allowing the operator to spot the VFO frequency or "zero" a received signal without turning on the transmitter and putting out a signal on the air when changing frequency.

2-7. EXTERNAL CONNECTIONS.

WARNING

Before making any external connections to the VFO, or making any connections between the VFO and transmitter, remove the AC line cord plug (s) from the AC outlet. Also, place the VFO bandswitch in the OFF position and place all transmitter power switches in the OFF position.

2-8. KEY. Located on rear of VFO. For CW operation.

2-9. OUTPUT. Located on rear of VFO. For output cable connection to transmitter.

2-10. POWER CORD. Supplies AC power to VFO.

2-11. PRELIMINARY PROCEDURE.

2-12. The preliminary procedure as outlined must only be followed before the VFO is placed into initial operation. Once the preliminary procedure has been performed it may be dispensed with for normal operation of the VFO.

(a) Upon unpacking the VFO, examine it carefully for any damage suffered in shipment. Should any damage be evident, file claim with the carrier, as outlined on the notice enclosed with the VFO.

(b) Place Bandswitch to OFF position.

(c) Place Calibrate switch to OFF position.

(d) Insert power cord plug into a 115-volt 50/60 cycle alternating current source.

WARNING

Do not insert power cord plug into a DC source outlet. Severe damage to the VFO will result.

- (e) Place Bandswitch to 160/80M position, this supplies AC power to the VFO. Glance through the ventilating grille on the top of VFO and observe the tubes to see if the filaments are lit. (Allow a few moments warm-up period.)
- (f) Rotate the dial pointer to the 3800 KC point on the dial.
- (g) Turn on receiver BFO and tune receiver to 3800 Kc.
- (h) Place Calibrate switch to the ON position.
- (i) Rock the tuning knob of the VFO so the dial pointer swings across the 3800 Kc point on the VFO dial. An audible tone that varies in pitch should be heard from the receiver as the VFO is tuned across the frequency to which the receiver is tuned. ✓
- (j) Place the VFO Bandswitch to the 40/10M position.
- (k) Tune receiver to 7100 Kc. Receiver BFO ON. ✓
- (l) Rock the tuning knob of the VFO so the dial pointer swings across the 7100 Kc point on the dial. An audible tone should be heard from the receiver as in step (i).
- (m) Place the VFO Bandswitch to the 20/15/11M position.
- (n) Leave the receiver tuned to 7100 Kc. Tune the VFO across the 14.2 Mc. point. An audible tone should be heard as in the preceding steps.

2-13. If all checks to this point have been satisfactory, the VFO may now be connected to the transmitter. (See Operating Procedures, 2-14.) For maximum efficiency it is recommended the output coils of the VFO be peaked for maximum output to the transmitter stage being driven. Peaking of these coils must be done while the VFO and transmitter are in operation. This is covered in the alignment procedure (see 5-3) and should be followed closely for optimum efficiency and operation of the VFO.

2-14. OPERATING PROCEDURE.

2-15. Once the preliminary operating procedure has been completed, normal operation of the VFO may proceed as follows:

- (a) Insert the small single plug of the VFO output cable into the Output jack on the rear of the VFO.
- (b) Insert the two-prong plug of the VFO output cable into the transmitter crystal socket. Make certain the center conductor of the VFO output cable connects to the grid side of the transmitter crystal socket.

* (NOTE - Globe King and Globe Scout owners. Grid side of Globe King crystal socket is left hole, viewed from front; grid side of Globe Scout crystal socket is top hole, viewed from front.)

2-16. CW OPERATION.

2-17. After the VFO has been properly connected to the transmitter CW operation may begin as follows:

- (a) Insert key plug into Key jack of VFO.
- (b) Place Calibrate switch to OFF position.
- (c) Place VFO Bandswitch to desired operating band.
- (d) Tune VFO to desired frequency.
- (e) Turn transmitter on and tune up the same as if a crystal were being used.
- (f) Place key into operation.

2-18. PHONE OPERATION.

2-19. After the VFO has been properly connected to the transmitter phone operation may begin as follows:

- (a) Place Calibrate switch to ON position.
- (b) Place VFO Bandswitch to desired operating band.
- (c) Tune VFO to desired frequency.
- (d) Turn transmitter on.
- (e) Speak into microphone for normal phone operation. At end of transmission turn transmitter off and place VFO Calibrate switch in OFF position.

2-20. AUTOMATIC PHONE OPERATION.

2-21. A more convenient (automatic) method of phone operation may be enjoyed by the use of an SPST-Normally Open, 115 VAC relay connected to the VFO and transmitter as follows:

- (a) Connect the relay 115 VAC leads to the "115 VAC" or "Antenna Relay" strip on the transmitter.
- (b) Connect the contacts of the relay to a phone plug.
- (c) Insert the aforementioned plug in the KEY jack on the rear of the VFO.
- (d) Place VFO Calibrate switch to OFF position.
- (e) Now when the transmitter is turned on, the 115 VAC present at the "115 VAC" or "Antenna Relay" strip will energize the relay which in turn will key the VFO so that it will drive the transmitter. The Calibrate switch is placed in the ON position only when spotting a particular frequency or for "zeroing" in on another signal (transmitter off.)

2-22. IMPROPER OPERATION.

2-23. Should the VFO fail to operate when first turned on, make the

following checks:

- (a) Remove VFO from cabinet and check the 1 amp. fuse.
- (b) Check tubes for an open filament.
- (c) Failure to operate or improper operation may be the result of low voltages. The proper voltages at various points are indicated on the schematic diagram. Should the voltages be more than 10% lower than indicated, a faulty component is the probable source of trouble. Low line voltage will also cause sub-normal voltage readings.

2-24. Should a rough note develop after the VFO has been in operation for some time a bad 6AU6 tube is indicated. Replace.

2-25. Low output may be the result of a bad or weak 6CB6 tube, or improperly peaked output coils. (See 5-3). Replace tube or re-peak output coils, whichever is necessary.

SECTION III

PARTS MOUNTING PROCEDURE

3-1. General:

3-2. Following is the parts mounting procedure for kit assembly. It is recommended the procedure be followed as outlined for ease and proper assembly. Prior to assembly the large folded sheet included with the manual should be laid out in a convenient manner for ready identification of the various parts and mounting holes. Check off each step as completed.

1. Install a 1/2" rubber grommet in hole GR2 on top of chassis. (This hole is hidden by transformer T1 in the illustrations. Location is in the right rear corner of the chassis top.)
2. Install a 3/8" rubber grommet in hole GR1 on rear apron of chassis.
3. Mount a 7-pin mica filled socket in hole S01, positioning as shown in Figures 3 or 4. Use two 4-40x3/8" screws and two 4-40x3/16" hex nuts. Add a #4 grounding lug GL1 to the front screw as indicated in Figure 4. Socket should be inserted into hole from bottom of chassis.
4. Mount a 7-pin mica filled socket in hole S02, position as shown in Figure 4. Use 4-40x3/8" screws and 4-40x3/16" hex nuts.
5. Mount a 7-pin mica filled socket in hole S03, adding a #4 grounding lug GL2, positioning the socket and lug as shown in Figure 4. Use 4-40x3/8" screws and 4-40x3/16" hex nuts.
6. Mount key jack in hole K1 from inside the chassis. Install the smooth washer followed by the nut on the outside of the chassis. Position as shown in Figure 4 and tighten securely.
7. Mount the output jack in hole J1, Position as shown in Figure 4 and secure with 6-32x5/16" screws and 6-32x1/4" nuts.
8. Mount selenium rectifiers SR-1 and SR-2 as follows: Slip the 6-32x1/2" screw through the hole nearest GR-2 from top of chassis. Mount SR-2 (minus side to chassis) on this screw. Mount SR-1 (it's minus side to the plus side of SR-2) on this screw also. (NOTE: Bend over, or break off the positioning tabs on the rectifiers to allow them to come together snugly) Position as shown in Figure 4 and secure with a 6-32x1/4" hex nut and lock washer.
9. Insert all the leads of transformer T-1 through grommet GR-2. Route the two black leads through the slot on the transformer core so that all leads come out the same side. Position as shown in Figure 2. Secure the left side (top front view) to the chassis with a 6-32x5/16" screw, #6 lock washer and a 6-32x1/4" hex nut. Tighten with fingers only.

10. Insert a 6-32 X 5/16" screw into the remaining mounting hole of T1. On the underside of this screw add the two lug tie strip TS-1. Position as shown in Fig. 4. Add a #6X1/4" hex nut then tighten both nuts securely.
11. Mount trimmer condenser C6 (MAC-15) through the top of the chassis, position as shown in Fig. 2 and secure underneath chassis with a 3/8" mounting nut.
12. Mount the five tie strip TS-2, position as shown in Fig. 4. Secure 6-32X5/16" screws, 6-32X1/4" hex nuts and lockwashers.
13. Mount trimmer condenser C3 (MAC-10) through the top of the chassis. Position as shown in Fig. 2. Secure underneath chassis with 3/8" mounting nut.
14. Mount the small U shaped bracket for capacitor C-4. Insert a 6-32X 5/16" screw through the short side of the bracket from inside the U, through the chassis. Add a #6 lockwasher and a 6-32X1/4" hex nut from the top side of the chassis. Position the bracket as per Fig. 3 and tighten securely. Mount C4 (9 mmfd) trimmer condenser on this bracket. Position as per Fig. 4 and secure with 3/8" mounting nut. See Fig. 6 for mounting details.
15. Mount the fuse retainer FS1 on underside of chassis, Fig. 4. Secure with 6-32X 5/16" screw and 6-32X1/4" hex nut.
16. Install the 3/4" bakelite insulated I1 onto the mounting screw of TS2 which is nearest to S02. Do not tighten excessively as the threads on I1 may strip.
17. Install a #6 solder lug GL3 on I1 with a 6-32X5/16" screw. Position as shown in Fig. 4.
18. Install the electrolytic capacitor mounting plate on the chassis with two each 6-32x5/16" screws, #6 lockwashers and 6-32x1/4" hex nuts. Insert the capacitor lugs into the mounting plate slots and give each lug a 1/8 turn twist with a pair of pliers.
19. Mount the 160M oscillator coil L3 (Orange Dot) through the top of the chassis. Position lugs as shown in Fig. 2. Secure from underneath with 3/8" mounting nut.
20. Mount the 40M oscillator coil L4 (Yellow Dot) through the top of the chassis. Position lugs as shown in Fig. 2. Secure from underneath with 3/8" mounting nut.
21. Mount the front mounting bracket of condenser C1 on the chassis. Secure with 6-32x5/16" screws, 6-32x1/4" hex nuts and lockwashers. (See Fig. 7 for mounting details). On the underside of one of these screws add a #6 solder lug GL5. Position as shown in Fig. 3. Do not tighten nuts yet.
22. Mount bandswitch SW-1 as shown in Figures 3 and 4. Position terminals as shown in Fig. 3. Secure w/ 7/16" mounting nut and lockwasher.
23. Install the panel bearing assembly (VFO tuning shaft) as shown in Figures 2 and 3. Do not tighten nut yet.

24. Install mounting bracket on rear of condenser C1. The bracket mounts on rear of ceramic frame. See Fig. 7 for details. Use a 3/8" hex nut to secure.
25. Solder a 2" piece of #20 bus-bar wire to lug 3 of C1 as it is inaccessible after the condenser is mounted to the chassis. See Fig. 7 for details.
26. Insert the shaft of C1 into the large hole of its front mounting bracket (this bracket was mounted in an earlier step). Position C1 as shown in Fig. 2 and secure to front bracket with 6-32x5/16" screws.
27. Secure the rear bracket of C1 to the chassis with a 6-32x5/16" screw. A #6 solder lug GL4 mounts on this screw on the top side of chassis. (See Fig. 2). Secure with a 6-32x1/4" nut and lockwasher.
28. Tighten all C1 bracket nuts and screws.
29. Engage the large drive wheel and the drive pulley by inserting the edge of the large wheel into the edge of the split drive pulley. Insert it approximately 1/16" into the small pulley by moving the short drive shaft in its hole.
30. Mount the 4" drive wheel on the shaft of C1, hub side away from C1.
31. Mount the 7/8" drive pulley on the tuning shaft with hub side towards you, Fig. 1.
32. Slide both wheels as close to the chassis as the nut on the tuning shaft will allow. Tighten the 4 set screws.
33. Mount the 160M output coil L1 (Brown Dot) from underneath in the 3/16" hole. Position lugs as shown in Fig. 3. Secure with 5/16" nut on top side of chassis.
34. Mount the 40M output coil L2 (Red Dot) from underneath in the 1/4" hole next to L1. Position lugs as shown in Fig. 3. Secure on top side of chassis with a 3/8" nut. Attach a #6 nut to the core adjusting screw.
35. Mount the slide switch SW-2 on the rear side of the panel with the two lugs nearest to the ON position. Use 4-40x3/8" screws and 4-40x3/16" hex nuts.
36. Attach the panel to the chassis as follows: Insert the two 6-32x7/8" screws into the two small panel holes from the front side of the panel. Place two #10 washers over each of the screws from the rear side of the panel, then add the 3/8" brass spacers. Insert the two screws into the two small holes on the front of the chassis. Add a #6 lock washers and a 6-32x1/4" hex nut to each screw from the inside of the chassis. Tighten snugly only.
37. Mount the knobs on the bandswitch and VFO tuning shafts. Set the bandswitch to the OFF position, then align the white indicator line on the knob skirt with the OFF line on the panel. Tighten the set screw. As the tuning knob rotates 360 degrees it may be installed with the indicator line in any position.
- 3-3. The mounting of parts has now been completed. Advance to the Wiring Procedure 4-1.

SECTION IV
WIRING PROCEDURE

4-1. GENERAL.

4-2. Wiring of the VFO is critical. Leads should be routed, and resistors and condensers positioned as specified in the wiring procedure. While this is not difficult, great care should be taken to follow the instructions carefully, so as to obtain best results. In the wiring procedure (S) means solder; (NS) mean do not solder. Check off each step as completed.

1. Select the two black leads of T1. Trim one lead to length and connect to lug 2 of TS1. (NS) Figure 4.
2. Trim the other black lead of T1 to length and connect to lug 2 of FS1. (S). Figure 4.
3. Trim one green lead of T1 to length and connect to lug 4 of TS2. (NS). Figure 3.
4. Trim remaining green lead of T1 to length and connect to the left mounting lug (nearest lug #1) of TS2. (S).
5. Trim one red lead of T1 to length and connect to lug 1 of C16-17. (NS). Figure 4.
6. Trim other red lead of T1 to length and connect lug 1 (plus terminal) of SR1. (S). Figure 4.
7. Connect a 5" length of black hook-up wire from lug 1 of FS1 (S) to lug 5, front wafer (nearest front edge of chassis) of SW1. (S). Figures 3 and 4. Route this lead along the left edge of the chassis.
8. Connect a 9-1/2" length of green hook-up wire from lug 1 of TS1 (NS) to lug 6, front wafer, of SW1. (S). Figures 3 and 4. Route this lead along the left edge of the chassis (viewing from rear upside down).
9. Connect lug 2 of SR1 (S) to lug 1 of SR2 (S) with a short length of #20 bus-bar wire. Fig. 4.
10. Thread a 2-1/2" length of #20 bus-bar wire through lug 2 of SR2, through the center mounting hole of TS1, to a grounding twist lug of C16-17. (S at SR-2 and C16-17). Fig. 4.
11. Connect a .005 mfd. disc condenser (C-11) from lug 1 (S) to lug 3 on K1. (NS).
12. Connect a 2-3/4" length of blue hook-up wire from lug 3 of K1 (NS) to lug 3 of TS-2, (NS). Figures 3 and 4.

13. Connect a 2-1/2" length of green hook-up wire from pin 4 of S01 (NS) to lug 4 of TS2. (S). Fig. 3.
14. Connect a 3" length of green hook-up wire from pin 4 of S01 (S) to pin 3 of S03. (S). Fig. 4.
15. Connect a 2" length of red hook-up wire from lug 2 of C-16-17 (NS) to lug 5 of TS2. (NS). Fig. 4.
16. Thread a 2" length of #20 bus-bar through pin 2 of S02, through GL2, through pin 7 of S03, through the center shield of S03, then through pin 4 of S03. Fig. 4. (S at all but center post and GL2).
17. Connect a 2-1/4" length of red hook-up wire from pin 5 of S02 (NS) to pin 6 of S01. (NS). Fig. 4.
18. Connect a 4" length of red hook-up wire from lug 2 of C16-17 (NS) to pin 6 of S03. (NS). Fig. 4.
19. Connect a 4-1/2" length of blue hook-up wire from pin 5 of S03 (NS) to lug 1, front wafer, of SW1. (S). Fig. 3. Route this lead between L1 and L2 and keep clear of chassis by 1/4".
20. Connect a 2-3/4" length of red hook-up wire from pin 6 of S03 (NS) to the lug of L2 which is nearest to the chassis. (NS). Fig. 3.
21. Connect a short length of #20 bus-bar wire from the bottom lug of coil L1 to the bottom lug of coil L2. These are the lugs nearest to the chassis. (S at L2 only). Fig. 3.
22. Connect a 15,000 ohm 1/2 watt resistor R4 (Brown-Green-Orange) from lug 1 to lug 2 of L1. (S at bottom lug of L-1 only).
23. Connect a 2-1/4" length of blue hook-up wire from the remaining lug of L1 (S) to lug 2, front wafer, of SW1 (S). Fig. 3.
24. Connect a 3" length of blue hook-up wire from the remaining lug of L2 (S) to lugs 3 and 4, front wafer, of SW1. (S). Fig. 3.
25. Thread a 2" length of #20 bus-bar wire through GL1 (NS), through pin 3 of S01, (S), through the center shield post of S01 (S), then through pin 2 of S01. (S). Figure 4.
26. Connect the lead, which has been soldered to the rotorlug of C1 to GL4. (S). Fig. 2.
27. Connect a 2" length of blue hook-up wire from the lug of L3 which is nearest the chassis (S), to lug 2, rear wafer, of SW1. (S). Route this lead through the 1/2" hole between coils L3 and L4, keep wire clear of hole edge. Figures 2 and 3.
28. Connect a 3-1/2" length of yellow hook-up wire from the lug of L4, which is nearest to the chassis (S), to lugs 3 and 4, rear wafer of SW1. (S) Figures 2 and 3.

29. Connect a 2" length of #20 bus-bar wire from the remaining lug of L3 (NS) to lug 1 of C1. (S). This lead must be clear of the condenser frame by 1/4". Fig. 2.
30. Connect a 1-1/4" length of #20 bus-bar wire from the remaining lug of L4 (NS) to lug 2 of C1. (S) This lead must also be clear by 1/4". Fig. 2.
31. Connect a length of #20 bus-bar wire from the stator lug 1 of C3 (S) to the top lug of L4. (NS). Fig. 2.
32. Connect a length of #20 bus-bar wire from the stator lug 1 of C6 (NS) to the top lug of coil L3. (S). Fig. 2.
33. Connect a length of #20 bus-bar wire from the stator lug 1 of C4 (S) to lug 6, rear wafer, of SW1. (S). Figures 3 and 4.
34. Connect a 4" length of green hook-up wire from the top lug of L4 (NS), route through the 1/2" hole in the chassis and connect to lug 5, rear wafer, of SW1. (S). Figures 2 and 3.
35. Connect a 3-1/2" length of #20 bus-bar wire from lug 1 of TS2 (NS) to lug 1, rear wafer, of SW1. (S). Keep this lead clear of all surrounding objects by at least 1/4". Fig. 3.
36. Connect a 500 mmf silver mica condenser with red body (C8) from pin 7 of S01 (NS) to the grounding hole of TS2 nearest to I1. (S). Position this condenser to lay on edge between S01 and I1. Fig. 4.
37. Connect the other 500 mmf silver mica condenser with red body (C7) from pin 7 of S01 (NS) to lug 1 of TS2. (NS). Position this condenser to lay on edge between S01 and TS2. Fig. 4.
38. Connect the 100,000 ohm 1/2 watt resistor (R1, Brown-Black-Yellow) from pin 1 of S01 (NS) to GL1. (NS). Fig. 4.
39. Connect the 56 ohm 1/2 watt resistor (R2, Green-Blue-Black) from pin 1 of S01 (S) to lug 2 of TS2. (NS). Figures 3 and 4.
40. Connect the 4700 ohm, 1 watt resistor (R6, Yellow-Violet-Red) from pin 5 S02 (S) to lug 5 of TS2. (NS). Figures 3 and 4.
41. Connect the 220 ohm 1 watt resistor (R5, Red-Red-Brown) from lug 1 to lug 2 of C16-17. (S-both connections). Figure 4.
42. Select a 22,000 ohm 1/2 watt resistor (R3 Red-Red-Orange) and a 18 mmf tubular type condenser C20 (Black-Brown-Gray). Parallel C20 across R3. Wrap condenser leads around resistor leads close to resistor body, cut off excess condenser leads and solder each end. Connect one resistor lead to pin 1 of S03 (NS) and the other resistor lead to GL2 (NS). Fig. 4.

43. Connect a .005 mfd disc condenser (C12) from pin 6 of S01 (S) to GL1.(NS)
44. Connect a .005 mfd disc condenser (C14) from pin 6 of S03 (S) to GL2. (S). Fig. 4.
45. Select a 120 ohm 1/2 watt resistor (R7, Brown-Red-Brown) and a .005 mfd disc condenser (C18). Parallel C18 across R7. Wrap condenser leads around resistor leads close to resistor body, cut off excess condenser leads and solder each end. Connect one resistor lead to pin 2 of S03 (S) and the other resistor lead to center post of S03.(S). Fig. 4.
46. Connect the larger RF choke (RFC1, 750 uh) from pin 7 of S01 (S) to lug 3 of TS2. (S). Figures 3 and 4.
47. Connect the smaller RF choke (RFC-2, 50 uh) from pin 5 of S01 (NS) to lug 5 of TS2. (S). Figures 3 and 4.
48. Connect an 82 mmfd condenser (C10,Black-Grey-Red-Black) from lug 1 to lug 2 of TS2. (S-at lug 2 only). Fig. 3.
49. Connect the 130 mmf condenser (C9, Black-Brown-Orange-Brown) from lug 1 of TS2 (S) to GL1. (S). Position this condenser so it clears the 3-1/2" lead to SW1. Fig. 3.
50. Connect an 82 mmf condenser (C13,Black-Grey-Red-Black) from pin 5 of S01 (S) to pin 1 of S03. (S). Fig. 3.
51. Connect the 100 mmf condenser (C15,Black-Brown-Black-Brown) from pin 5 of S03 (S) to GL3 which is mounted on I1. (NS). Fig. 3.
52. Connect a 2" length of #20 bus-bar wire from GL3 (S) to the longest lug of J1. (S). Fig. 4.
53. Select condensers C2 (39 mmf zero temperature) and C23 (15 mmf, negative temperature). Hold these condensers side by side then twist the leads of C23 around the leads of C2. Solder the two connections and trim away any excess leads of C23. Connect one lead of C2 to lug 2 of trimmer C3. (S). Connect the other lead of C2 to top lug of L4. (S). Position these two condensers vertically between C3 and socket SO-1 and exactly 3/8" up from the chassis top.
54. Connect the 18 mmf condenser (C5, Black-Brown-Grey-Black) from lug 1 to lug 2 of trimmer C6. (S-at lug 1 only). Fig. 2.
55. Connect the 120 mmf condenser (C19,Orange-Brown-Red-Brown-Brown) from lug 2 of C6 to the top lug of L3. (S-both connections). Position this condenser vertically between C6 and L3 and exactly 1/2" off the chassis. Fig. 2.
56. Connect a 2" length of #20 bus-bar wire from right lug of SW2 (S) to GL5. (S). Fig. 3. (SW2 not shown in this illustration as it is on panel. This figure gives location of GL5).

57. Connect a 14" length of black hook-up wire from left lug of SW2 (S), route along right edge of chassis to lug 3 of K1. (S). Fig. 4.
 58. Trim the leads of dual condenser C21, 22 (.008 mf) to 1/2" length. Insert the center condenser lead into the mounting hole of tie strip TS1. (S). Insert the other two condenser leads into holes #1 and #2 of TS1. (NS).
 59. Slip the tinned ends of the AC power cord through hole GR1, tie a knot in the cord 4" back from the tinned ends. Connect the tinned ends to lugs 1 and 2 of TS1. (S). Fig. 4.
 60. Insert the 1 amp. fuse into the clips of FS1. Figure 4.
 61. Set trimmer condenser C3 to approximately 1/4 mesh.
 62. Set trimmer condenser C6 to approximately 3/4 mesh.
 63. Set trimmer condenser C4 to approximately 1/2 mesh.
 64. Set tuning condenser C1 to full mesh (large section).
 65. Center the tuning condenser shaft in the dial face hole by loosening the two panel mounting screw and shifting the panel until the shaft is exactly centered in the hole. This step is very important for proper dial scale calibration.
 66. Attach dial pointer and set to 3.5 Mc mark on dial face (Plates of condenser C1 must be in full mesh with pointer at 3.5 Mc setting).
 67. Rotate tuning knob so dial pointer travels over entire scale. Observe to see that dial pointer does not bind or rub on dial face.
 68. Snap the plastic cover on to the dial face. Make certain the thicker portion of the cover is towards bottom of the panel.
 69. Install the tubes in their respective sockets as indicated on the top side of chassis.
 70. Install the oscillator stage shield. Secure with the four #2 self-tapping screws.
 71. Attach the four rubber mounting feet to the bottom of the cabinet using four #6x3/8" self-tapping screws to secure.
- 4-3. Wiring and parts mounting are now complete. You may now go on to the alignment procedure.

SECTION V

ALIGNMENT PROCEDURE

5-1. GENERAL.

5-2. Successful and satisfactory use of the VFO may be realized only if the dial calibration is correct and maximum output is obtained. Therefore, you are urged to follow the alignment procedure meticulously. Do not proceed from step to step until you are certain each step has been performed properly and satisfactorily. Failure on your part to do a good job of alignment will result in generally unsatisfactory operation. Keep in mind the fact that you have spent money for a quality kit, however, the final outcome of kit assembly and operation rests with you. Do a good job and you will have a piece of equipment you will take pride in. Alignment procedure is as follows:

1. Place Calibrate switch in OFF position.
2. Place Bandswitch in 160/80M position.
3. Allow 5 minute warm-up. The VFO may be aligned in or out of the cabinet and as there is only a 350 cycle difference in frequency when out of the cabinet it is optional which way alignment is completed.
4. Tune the receiver (with 100 Kc crystal calibrator) to 1.8 Mc.
5. Tune the VFO to 1.8 Mc. Place CALIBRATE switch in ON position and adjust the slug in coil L3(screw approx. 3/4" out of coil)for zero beat with the calibrator.
6. Tune the VFO and receiver to 2 Mc.
7. Adjust trimmer condenser C6 for zero beat with the receiver.
8. Repeat steps 5, 6, and 7 as many times as necessary until the 1.8 Mc and 2 Mc points on the VFO dial correspond with these same points on the receiver dial.
9. Place the VFO Bandswitch to the 40/10M position.
10. Tune the receiver and VFO to 7 Mc.
11. Adjust the slug in coil L4 (screw approx. 7/8" out of coil) for zero beat with the receiver and calibrator.
12. Tune the receiver and VFO to 7.4 Mc.
13. Adjust trimmer C3 for zero beat with the receiver and calibrator.
14. Repeat steps 10, 11, 12, and 13 as many times as necessary to make the 7 and 7.4 Mc points on the VFO dial correspond to these same points on the receiver dial.

15. Place the VFO bandswitch to the 20/15/11M position.

16. Tune the receiver to 7 Mc and the VFO to 14 Mc.

17. Adjust trimmer C4 for zero beat with the receiver and calibrator.

5-3. This completes the oscillator alignment. Output coils L1 (160M) and L2 (40M) should be adjusted for maximum output after being connected to the stage to be driven. Coil L1 should be peaked to approximately 3.8 Mc and coil L2 should be peaked at 21.225 Mc, with output cable connected to operating transmitter. When adjusting VFO output coils, observe transmitter oscillator plate current for greatest amount of dip when tuned to resonance. Now with transmitter properly tuned, and in operation with the VFO, coils L1 or L2 may be peaked for maximum output while observing Final Grid meter of transmitter for maximum current.

5-4. Install the VFO in the cabinet then secure the panel and the chassis rear apron to the cabinet using three #6x1/4" self-tapping screws.

SECTION VI

PARTS LIST

| QUAN. | DESCRIPTION | CIRCUIT DESIGNATION | WRL PART NO. |
|-------|---|------------------------|-----------------|
| 1 | Capacitor, Variable-Dual | C1 | 1105-007A |
| 1 | Capacitor, Zero Temperature 39 mmf | C2 | 1101-026 |
| 1 | Capacitor, Variable, 1.8-8.7 mmfd | C3 | 1105-010 |
| 1 | Capacitor, Variable, 1.8-8.7 mmfd | C4 | 1105-010 |
| 1 | Capacitor, Zero Temperature, 18 mmfd | C5 | 1101-017 |
| 1 | Capacitor, Variable, 2.3-14.2 mmfd | C6 | 1105-008 |
| 1 | Capacitor, Silver Mica, 500 mmfd | C7 | 1102-007 |
| 1 | Capacitor, Silver Mica, 500 mmfd | C8 | 1102-007 |
| 1 | Capacitor, Zero Temperature, 130 mmfd | C9 | 1101-013 |
| 1 | Capacitor, Zero Temperature, 82 mmfd | C10 | 1101-012 |
| 1 | Capacitor, Ceramic, .005 mfd-600 V. | C11 | 1101-003 |
| 1 | Capacitor, Ceramic, .005 mfd-600 V. | C12 | 1101-003 |
| 1 | Capacitor, Zero Temperature, 82 mmfd | C13 | 1101-012 |
| 1 | Capacitor, Ceramic, .005 mfd-600 V. | C14 | 1101-003 |
| 1 | Capacitor, Zero Temperature, 100 mmfd | C15 | 1101-014 |
| 1 | Capacitor, Electrolytic, 30-30/250V.(W/plate) | C16-17 | 1106-010 |
| 1 | Capacitor, Ceramic, .005 mfd-600 V. | C18 | 1101-003 |
| 1 | Capacitor, Negative Temperature, 120 mmfd | C19 | 1101-016 |
| 1 | Capacitor, Zero Temperature, 18 mmfd | C20 | 1101-017 |
| 1 | Capacitor, Dual .0008 mf AC line bypass | C21-22 | 1104-002 |
| 1 | Capacitor, Negative Temperature 15 mmf | C23 | 1101-025 |
| 1 | Fuse Retainer | F31 | 1500-001 |
| 1 | Socket, Output | J1 | 2000-002 |
| 1 | Jack, Key | K1 | 2004-001 |
| 1 | Coil, 160 M. Output Brown with 5/16" nut | L1 | 1400-021A |
| 1 | Coil, 40 M. Output Red with 3/8" nut | L2 | 1400-024 |
| 1 | Coil, 160 M. Osc. Orange with 3/8" nut | L3 | 1400-025 |
| 1 | Coil, 40 M. Osc. Yellow with 3/8" nut | L4 | 1400-026 |
| 1 | Resistor, Composition, 100K-1/2 Watt | R1 | 1000-009 |
| 1 | Resistor, Composition, 56 ohms - 1/2 watt | R2 | 1000-010 |
| 1 | Resistor, 22K-1/2 Watt | R3 | 1000-008 |
| 1 | Resistor, Composition, 15K-1/2 Watt | R4 | 1000-013 |
| 1 | Resistor, Composition, 220 ohms 1 watt | R5 | 1001-004 |
| 1 | Resistor, Composition, 4700 ohms - 1 watt | R6 | 1001-005 |
| 1 | Resistor, Composition, 120 ohms 1/2 watt | R7 | 1000-003 |
| 1 | Choke, R.F., 750 uh | RFC1 | 1301-006 |
| 1 | Choke, R.F., 50 uh | RFC2 | 1301-005 |
| 1 | Rectifier, Selenium, 65 ma. | SR1 | 3700-001 |
| 1 | Rectifier, Selenium, 65 ma. | SR2 | 3700-001 |
| 1 | Bandswitch, 2-section | SW1 | 2100-006C |
| 1 | Switch, slide, SPST | SW2 | 2102-001 |
| 1 | Transformer, Power | T1 | 1200-003 |

| QUAN. | DESCRIPTION | WRL PART NO. |
|-------|---------------------------------------|--------------|
| 1 | Bracket, Capacitor Mounting, C1 Front | 1901-008 |
| 1 | Bracket, Capacitor Mounting, C1 Rear | 1901-007 |
| 1 | Bracket, Capacitor Mounting, C4 | 1901-009 |
| 1 | Bearing, Panel | 3300-019 |
| 1 | Cabinet | 1700-006 |
| 1 | Chassis, Punched | 1900-006 |
| 1 | Cord, AC, and Plug | 2700-042 |
| 1 | VFO Dial Cover | 3300-005A |
| 4 | Feet, Rubber Mounting | 3300-010 |
| 1 | Fuse, Type 3AG, 1 amp | 1500-003 |
| 1 | Grommet, 3/8" | 3200-001 |
| 1 | Grommet, 1/2" | 3200-002 |
| 1 | Insulator, 3/4" tapped 6-32 | 2201-003 |
| 2 | Knobs | 2600-009 |
| 2 | Lugs, Solder, #4 hole | 2006-005 |
| 3 | Lugs, Solder, #6 hole | 2006-004 |
| 2 | Nuts, 3/8" | 2901-006 |
| 8 | Nuts, Hex, 4-40x3/16" | 2901-001 |
| 18 | Nuts, Hex, 6-32x1/4" | 2901-003 |
| 1 | Panel, with dial attached | 1700-006 |
| 2 | Pillars, Brass, 3/8" | 3300-027 |
| 1 | Shaft, 1-1/2" | 2300-024 |
| 1 | Pointer, dial | 2300-007 |
| 1 | Pulley, Drive, 7/8" | 2300-011 |
| 1 | 2 Prong Plastic Plug | 2001-007 |
| 1 | Phono Tip Plug | 2001-003 |
| 8 | Screws, Machine, 4-40x3/8" B.H. | 2900-001 |
| 18 | Screws, Machine, 6-32x5/16" B.H. | 2900-004 |
| 1 | Screw, Machine, 6-32x1-1/2" B.H. | 2900-014 |
| 4 | Screws, Self-tapping, No. 6x1/4" | 2900-017 |
| 4 | Screws, Self-tapping, No. 6x3/8" | 2900-013 |
| 4 | Screws, Self-tapping, No. 2x5/16" | 2900-012 |
| 2 | Screws, Machine, 6-32x 7/8" | 2900-006 |
| 1 | Shield, Oscillator | 1902-011 |
| 3 | Sockets, 7 pin mica filled | 1600-012 |
| 1 | Tie Strip, 5 lug | 2002-004 |
| 1 | Tie Strip, 2 lug | 2002-002 |
| 1 | Washer, lock, 3/8" | 3101-005 |
| 13 | Washer, lock, #6 hole, internal teeth | 3101-002 |
| 4 | Washers, Flat, #10 | |
| 1 | Wheel, Drive, 4" diameter | 3300-004 |
| 1 | Cable, Output RG59U | 2701-001 |
| 1 | Tube, OA2 | |
| 1 | Tube, 6AU6 | |
| 1 | Tube, 6CB6 | |

| WIRE | | |
|--------|----------------------------|--------------|
| LENGTH | DESCRIPTION | WRL PART NO. |
| 13" | Wire, Hook-up, Red, #20 | 2700-014 |
| 21" | Wire, Hook-up, Black, #20 | 2700-015 |
| 20" | Wire, hook-up, Green, #20 | 2700-011 |
| 16" | Wire, hook-up, Blue, #20 | 2700-013 |
| 4" | Wire, hook-up, Yellow, #20 | 2700-032 |
| 28" | Wire, Bus Bar | 2700-005 |

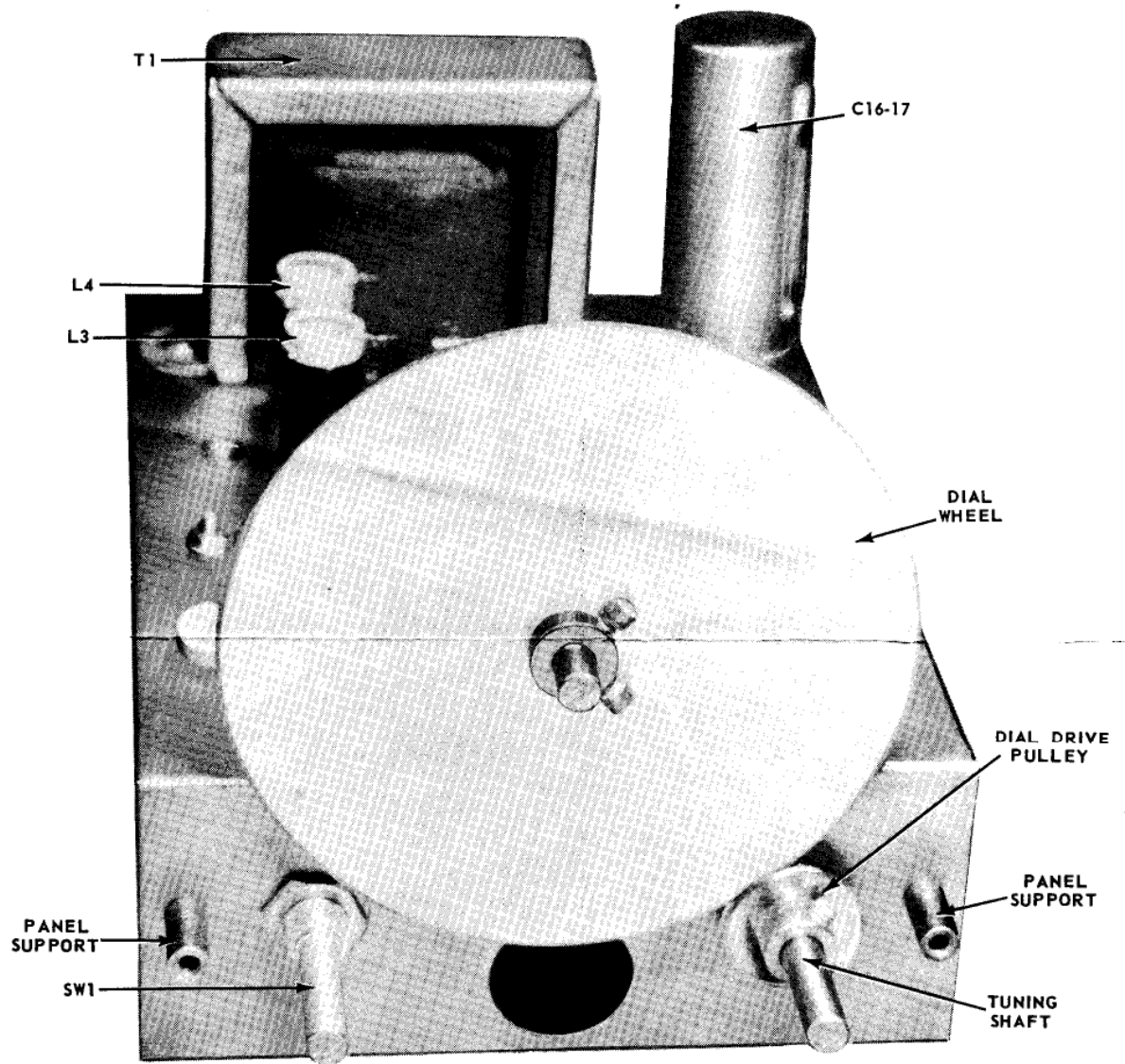


Figure 1. Front View With Cabinet And Oscillator Stage Shield Removed

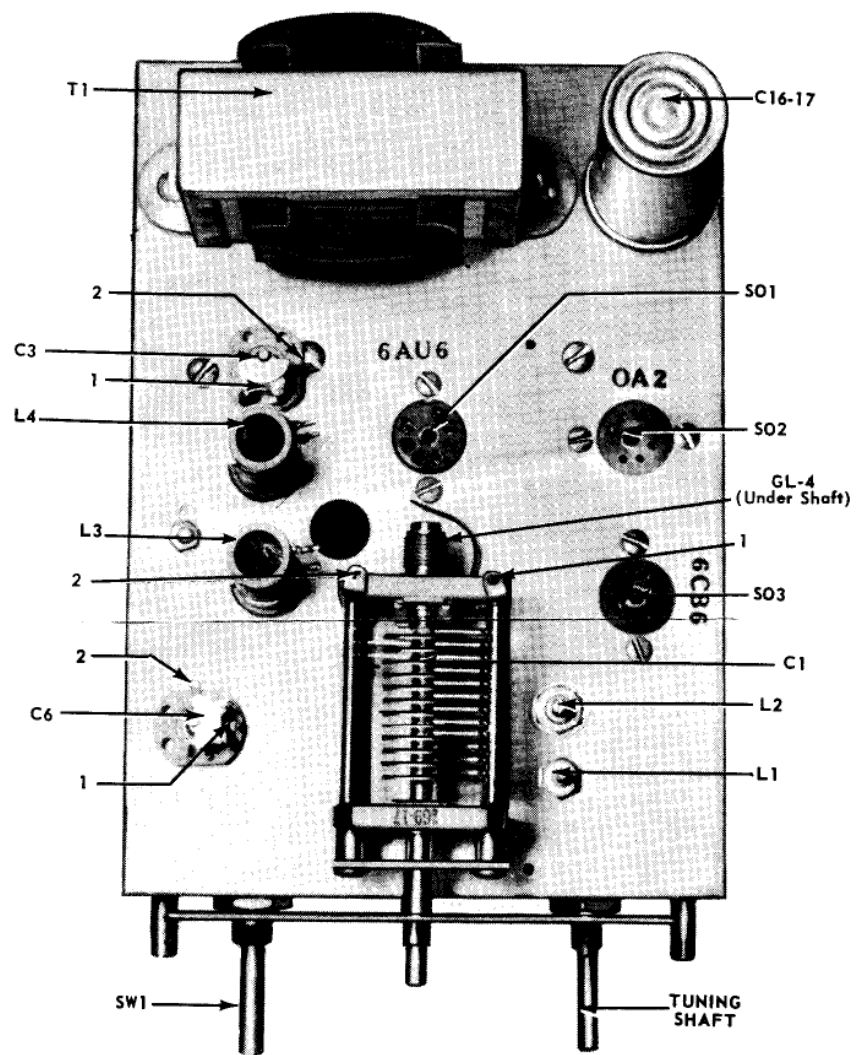


Figure 2. Top View.

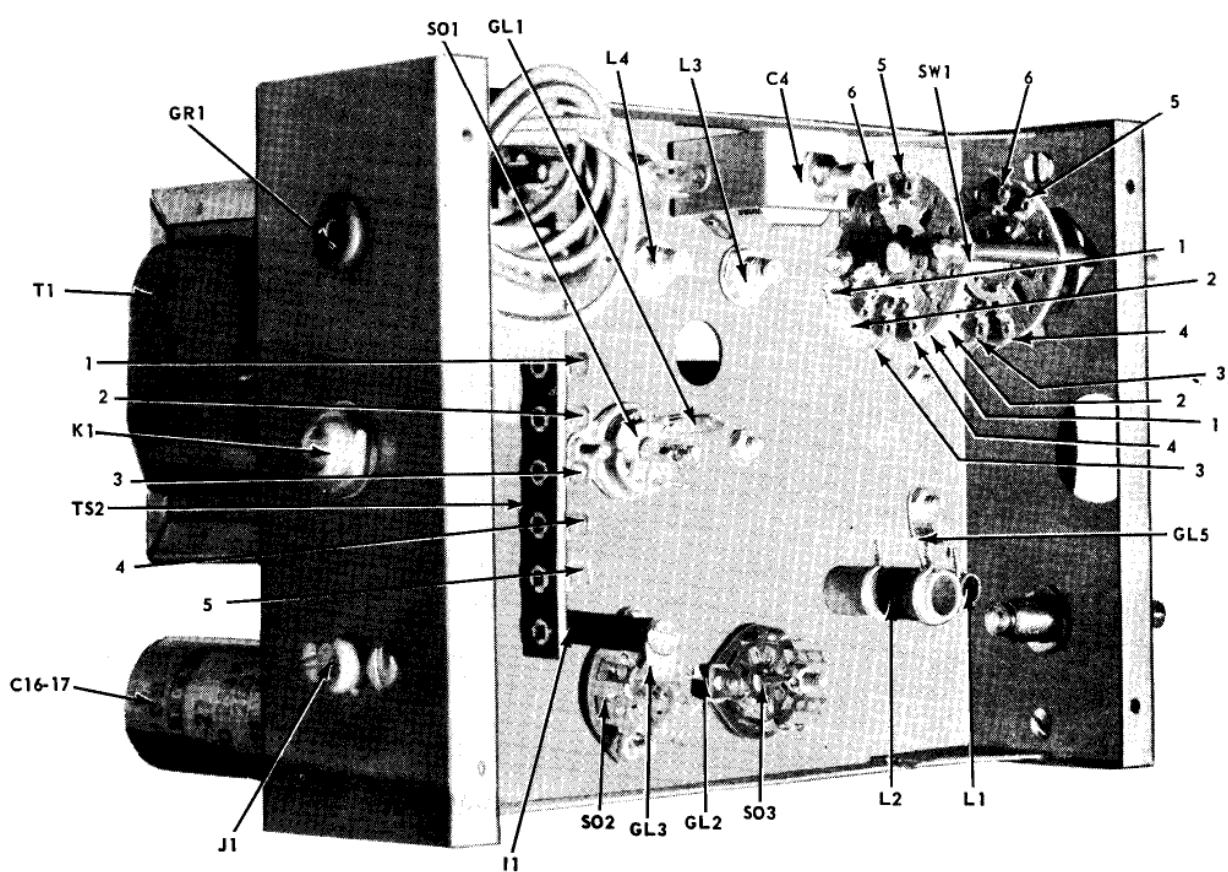


Figure 3. Under Chassis View.

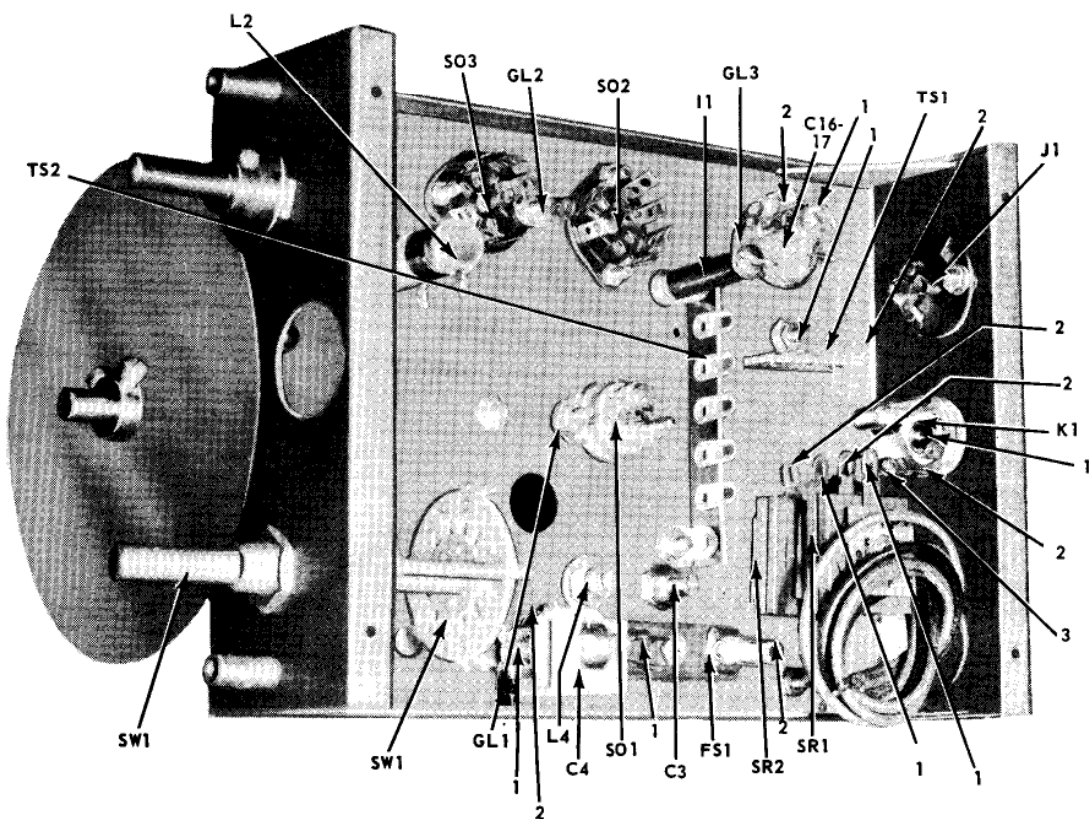


Figure 4. Under Chassis View.



Figure 5. Schematic Drawing of WRL VFO Mode

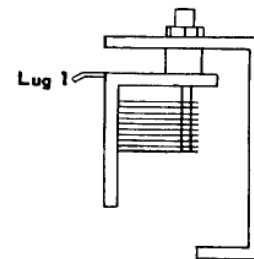
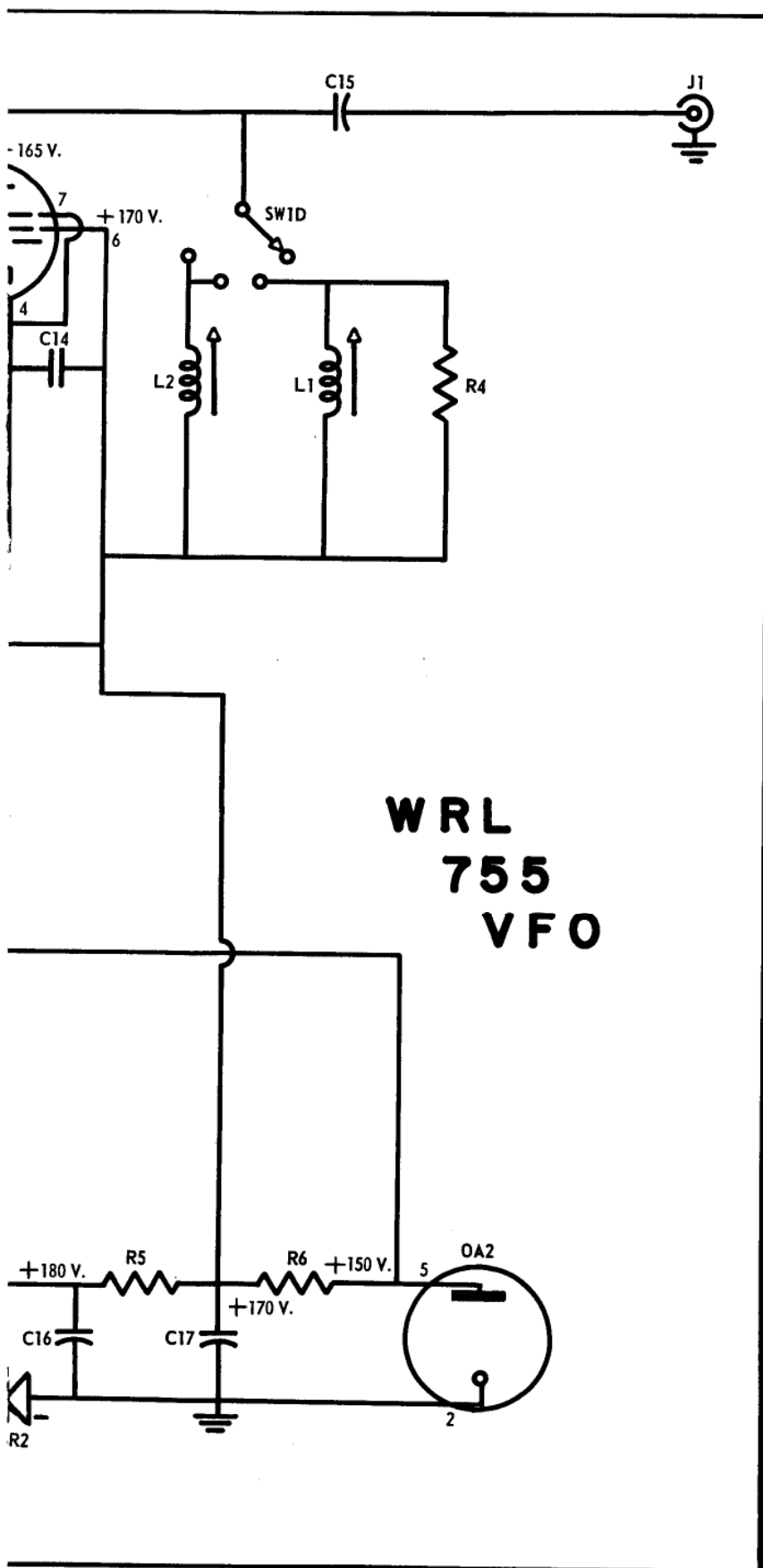


Figure 6. Mounting Details for Condenser C4.

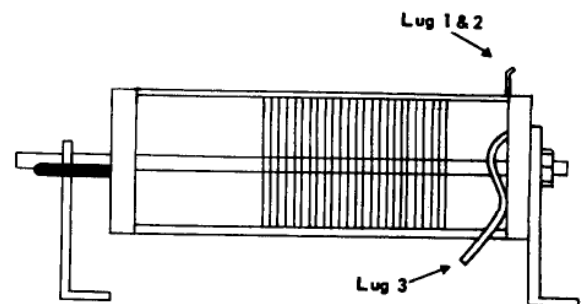


Figure 7. Mounting Details for Condenser C1.