MODEL 666 VFO
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SPECIFICATIONS

Band Coverage: 50 to 54 MC (8330 to 9000 KC Fundamental Frequencies)

OUTPUT: Coaxial Cable

Power Requirements: 115 Volts, 50/60 cycle, single phase alternating current only.

WRL ELECTRONICS, INC.

Council Bluffs, Iowa

NOTICE

This VFO has been peaked at the factory for maximum output on 51 mc. If it is to be operated on the high end of the band, it may be necessary to repeak the output (see instruction manual.)

When using this VFO with a WRL Globe Scout model 680 or 680A, the VFO-XTAL switch on the transmitter should be in the XTAL position.

Be sure grounded side of the VFO output is connected to grounded side of VFO input on the transmitter.

Section I

General Description

1-1. GENERAL.

1-2. The VFO, Model 666, is made by WRL Electronics, Inc. of Council Bluffs, Iowa. The VFO, model 666, is completely self-contained, including power supply and is calibrated for the six meter amateur band. RF output from the VFO is on the fundamental frequencies between 8330 and 9000 KC requiring suitable multiplier stages in the transmitter to obtain six meter output. Full 170° bandspread of the tuning dial is incorporated for operating convenience.

1-3. DESCRIPTION.

1-4. The VFO, model 666, is housed in a distinctive cabinet of modern design. Dimensions are 6-5/8" high, 7½" long and 7" wide. Weight is approximately 7 pounds. Among the various features is the CALIBRATE switch on the front panel of the VFO. The switch allows the operator to energize the VFO independently of the transmitter in order to "zero-beat" a received signal. A new exclusive feature called VFO BANDSPREAD permits very precise tuning of the VFO and eliminates "overshoot" when "zero-beating" a specific signal. RF output is obtained through a cable connected to the rear chassis connector labeled OUTPUT. Length of this cable should not exceed four feet. The VFO may be removed from the cabinet for service and inspection by removing the two top panel screws and the two rear chassis screws. Power requirements are 115V AC, 50/60 cycles, 10 watts.

TABLE 1. TUBE COMPLEMENT

Quan.	Type	Function
1	6AU6	Oscillator
1	6CB6	Buffer/Output
1	0A2	Voltage Regulator

1-5. THEORY OF OPERATION.

1-6. The oscillator stage utilizes a 6AU6 tube in a modified series-tuned Clapp oscillator. Exceptional frequency stability with more constant output are the result of this modified circuitry. The fundamental oscillator frequency is in the 8.3 to 9.0 MC range so that multiplication of six times provides output in the six meter band. Cathode keying of the oscillator is employed for CW operation. The oscillator plate circuit is series fed through a broadband R. F. choke and capacity coupled to the buffer grid circuit.

1-7. The 6CB6 buffer stage operates as a Class A, broadly tuned, R. F. amplifier with a certain amount of plate current flowing at all times. The constant current drain of this stage stabilizes the B-plus voltage to such an extent that keying characteristics and overall stability is greatly improved.

1-8. The power supply is a half-wave selenium type with condenser input and choke filtering. Regulation of the B supply voltage from no load to full load is better than 5%. The oscillator screen voltage is held to a constant value by a type 0A2 voltage regulator tube.

Section II

OPERATING PROCEDURE

2-1. GENERAL.

2-2. The following paragraphs describe the various operating controls and external connections of the VFO, model 666. The operating procedure is outlined following the description of controls. It is recommended that this section be studied thoroughly before any attempt is made to place the VFO in operation.

2-3. DESCRIPTION OF CONTROLS AND EXTERNAL CONNECTIONS.

2-4. VFO TUNING. Tunes the VFO to the desired frequency of operation.
2-5. VFO BANDSPREAD. Allows precise zero-beat.
2-6. CALIBRATE. A slide switch. Completes the cathode circuit of the oscillator tube in the ON position; this allows the operator to spot the VFO frequency or zero-beat a received signal at a low output level.

2-7. POWER. Slide switch on rear apron of chassis. Applies 115V AC to the power transformer when in the ON position.

2-8. KEY. Open circuit jack on rear apron of chassis. Connected in series with the oscillator cathode circuit allowing the operator to key the VFO for CW operation.

2-9. OUTPUT. Receptacle on rear apron. For output cable connection between VFO and transmitter crystal socket.

2-10. POWER CORD AND PLUG. Connect only to 115V AC source.

2-11. PRELIMINARY PROCEDURE. The preliminary procedure as outlined must be followed only before the VFO is placed into initial operation with the transmitter.

(1). Upon unpacking the VFO, carefully examine it for any damage suffered in shipment. Should any damage be evident, file claim for concealed damage with the CARRIER IMMEDIATELY.

(2). Place the CALIBRATE switch to the OFF position.

(3). Place the POWER switch to the OFF position.

(4). Insert the line cord plug into a 115 volt AC source receptacle.

WARNING

Do not insert the line cord plug into a DC source receptacle. Severe damage to the VFO components will result.

(5). Place the white indicator line of the VFO BANDSPREAD knob to the vertical reference line on the panel.

(6). Tune a 6 meter receiver (BFO on) to 52MC.

(7). Place the VFO POWER switch to the ON position.

(8). Allow a few minutes for tube warm-up, then place CALIBRATE switch to the ON position, rock the VFO TUNING control across the 52 MC point on the dial. A signal will be heard in the receiver if the VFO is working properly.

(9). If all checks to this point have been satisfactory, place the CALIBRATE switch to the OFF position and connect the VFO to the transmitter as outlined in paragraph 2-12.

2-12. PROPER CONNECTION TO TRANSMITTER.

(1). Insert the small single prong plug of the VFO output cable into the VFO OUTPUT receptacle.

(2). Insert the two-prong plug of the VFO output cable into the transmitter crystal socket. Make certain the center conductor of the coaxial cable connects to the grid side of the crystal socket.
NOTE: On the WRL Electronics Globe Scout and VHF-62, the grid side is the upper hole of the crystal socket. (When using the WRL Globe Scout, leave VFO-XTAL switch in crystal).

2-13. OPERATING PROCEDURE.

2-14. After the VFO has been properly connected to the transmitter, operation is as follows:

(1). Place the VFO CALIBRATE switch to the ON position.

(2). Tune the VFO to the desired operating frequency.

(3). Turn on and tune up the transmitter the same as if a crystal was in use.

(4). For CW operation, insert the key plug into the VFO KEY jack and operate key. NOTE: For transmitters without cut-off bias, such as the WRL Globe Scout, key the transmitter rather than the VFO. Transmitters with cut-off bias may be keyed through the VFO.

(5). For phone operation, we recommend that a relay be employed to automatically turn on the VFO with the transmitter. See paragraph 2-15.

2-15. AUTOMATIC PHONE OPERATION.

2-16. A convenient (automatic) method of phone operation may be enjoyed by the use of a SPST-normally open, 115V AC relay connected to the VFO and transmitter as follows:

(1). Connect the relay coil lugs to the "115V AC" or the "ANTENNA RELAY" strip of the transmitter with four or five feet of two conductor cable. NOTE: On WRL Electronics Globe Scout and VHF-62, antenna relay connectors are pins 4 and 5 of auxiliary socket.

(2). Connect a six inch length of two conductor cable to a phone plug. Connect the other ends of this cable to the normally open contact lugs of the relay.

(3). Insert the phone plug into the VFO KEY jack.

(4). Place the VFO CALIBRATE switch to the OFF position.

(5). Now, when the transmitter is turned on, the relay will be energized which in turn will key the VFO so that it will drive the transmitter. The CALIBRATE switch must be left in the OFF position for this type of operation or the VFO signal will be heard in the receiver constantly.

Section III

TROUBLE SHOOTING AND ALIGNMENT PROCEDURE

3-1. GENERAL.

3-2. This section deals with alignment procedure and various malfunctions the operator may encounter. The most likely causes for each type of malfunction are given. The operator should be able to ascertain the nature of the malfunction from this chart and thus easily repair the equipment. A voltage chart is also given as an aid to determining the nature of various malfunctions.

WARNING

Observe all safety precautions when making any tests or adjustments with the power on.

TABLE II. MALFUNCTIONS AND PROBABLE CAUSE

SYMPTOM	PROBABLE CAUSE
1. VFO fails to operate when power switch turned on.	1-1. Check 1-amp fuse. 1-2. Check tube filaments for continuity.
2. Low grid drive to transmitter.	2-1. Check 6CB6 tube. 2-2. Re-peak 6CB6 output coil (L-2). 2-3. Check transmitter crystal stage tube.
3. Rough VFO signal.	3-1 Check 6CB6 and 6AU6 tubes. 3-2. Check tube socket contacts. 3-3. Check filter capacitors C17-C18.
4. VFO calibration off.	4-1. Bandspread condenser improperly set. Align with panel marking. 4-2. Check alignment procedure.

3-3. TYPICAL VOLTAGE READINGS.

3-4. The voltage readings given are typical for the conditions as set forth. Some allowance must be given if the meter used is not a 20,000/ohm-per-volt meter, or if line voltage is higher or lower than prescribed conditions.

WARNING

Observe all safety precautions when taking voltage readings.

3-5. CONDITIONS: AC line voltage-115 volts; Test meter 20,000/ohms-per-volt DC, 5000/ohms-per-volt AC; calibrate switch in ON position. Voltage readings taken from specified tube pin to ground unless otherwise noted. Allowance for any variations must be taken into account should any of the stated conditions vary to any extent.

TABLE III. TYPICAL VOLTAGE READINGS.

Tube	Tube Pin Number						
Type	1	2	3	4	5	6	7
6AU6	0	0	0	6.3 V.A.C.	+167V	+150V	0
6CB6	0	+2V.	6.3 V.A.C.	0	+165V	+170V	0
0A2	0	0	0	0	+150V	0	0

3-6. ALIGNMENT PROCEDURE

3-7. Following is the proper procedure for alignment and output coil peaking:

(1). Disconnect the VFO from the transmitter.
(2). Place the CALIBRATE switch to the OFF position.
(3). Place the VFO POWER switch to the ON position.
(4). Tune the receiver (BFO on) to 50MC.
(5). Place the white indicator line of the VFO Bandspread knob to the vertical reference line on the panel.
(6). Set the VFO Tuning knob so that the dial pointer is at 50MC, tuning condenser plates must be fully meshed.
(7). Place the CALIBRATE switch to the ON position.
(8). Adjust the slug in coil L-1 (See Figure 1) for zero-beat with the receiver.
(9). Tune the VFO and receiver to 54MC.
(10). Adjust trimmer condenser C-5 for zero-beat with the receiver.
(11). Repeat steps 8, 9 and 10 as many times as necessary until the 50 and 54MC points on the VFO dial correspond to these same points on the receiver dial.
(12). Output coil L-2 (See Figure 2) should be adjusted for maximum output and grid drive after being connected to the stage to be driven. The alignment procedure is now completed.

Section IV

PARTS LIST

Qty	Description	Circuit Designation	WRL Part Number
1	Capacitor, Trimmer, 10mmfd	C-1	1105-010
1	Capacitor, Ceramic, TCN 15, 5%	C-2	1101-025
1	Capacitor, Ceramic, TCZ 25, 5%	C-3	1101-031
1	Capacitor, Variable	C-4	1105-018
1	Capacitor, Trimmer, 10 mmfd	C-5	1105-010
1	Capacitor, Silver mica, 500 mmfd	C-6	1102-007
1	Capacitor, Ceramic, TCZ 82	C-7	1101-012
1	Capacitor, Silver mica, 500 mmfd	C-8	1102-007
1	Capacitor, Disc ceramic, .005 mfd	C-9	1101-003
1	Capacitor, Disc ceramic, 2 x 800 mmfd	C-10	1104-002
1	Capacitor, Disc ceramic, .005 mfd	C-11	1101-003
1	Capacitor, Ceramic, TCZ 18	C-12	1101-017
1	Capacitor, Ceramic, TCZ 82	C-13	1101-012
1	Capacitor, Disc ceramic, .005 mfd	C-14	1101-003
1	Capacitor, Disc ceramic, .005 mfd	C-15	1101-003
1	Capacitor, Mica, 200 mmfd	C-16	1102-001
1	Capacitor, 30-30/250V Electrolytic	C-17,C-18	1106-010
1	Choke, Filter, 7 Hy-50 MA.	CH-1	1300-012
1	Fuse, 1 amp.-3AG	FS-1	1500-003
1	Receptacle, Output	J-1	2000-002
1	Jack, Key	K-1	2004-002
1	Coil, Oscillator grid	L-1	1400-050
1	Coil, Output	L-2	1400-051
1	Resistor, 56 ohm-$\frac{1}{2}$ watt	R-1	1000-010
1	Resistor, 100K ohm-$\frac{1}{2}$ watt	R-2	1000-009
1	Resistor, 22K ohm-$\frac{1}{2}$ watt	R-3	1000-008
1	Resistor, 120 ohm-$\frac{1}{2}$ watt	R-4	1000-003
1	Resistor, 4700 ohm-1 watt	R-5	1001-005
1	Choke, R. F. 750 uh-50 MA	RFC-1	1301-006
1	Choke, R.F. 50 uh-50 MA	RFC-2	1301-005
1	Rectifier, Selenium, 65 MA	SR-1	3700-001
1	Rectifier, Selenium, 65 MA	SR-2	3700-001
1	Switch, Slide, SPST	SW-1	2102-001
1	Switch, Slide, SPST	SW-2	2102-001
1	Transformer, Power	T-1	1200-003
1	Tube, 6AU6		
1	Tube, 6CB6		
1	Tube, 0A2		

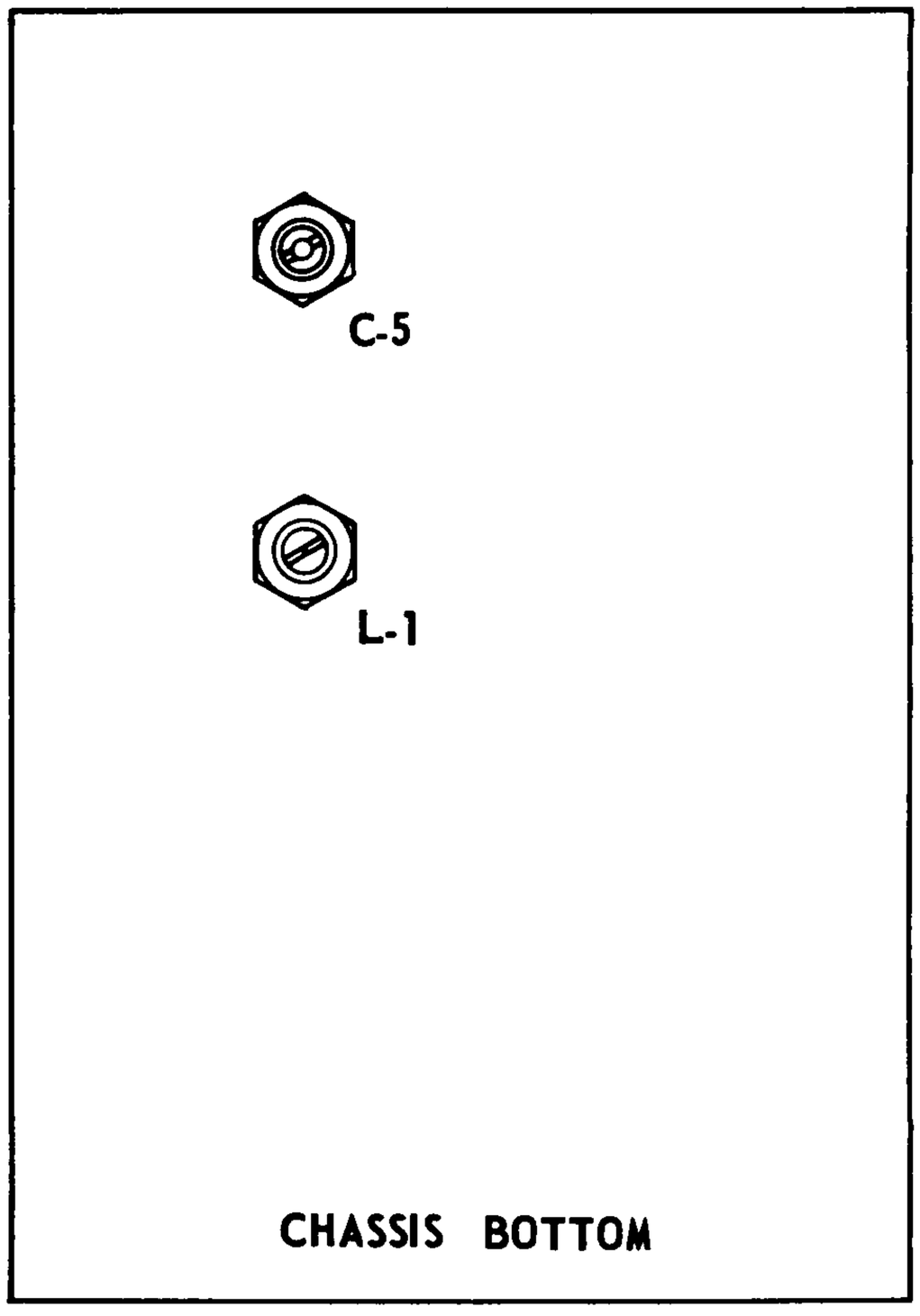


Figure 1.

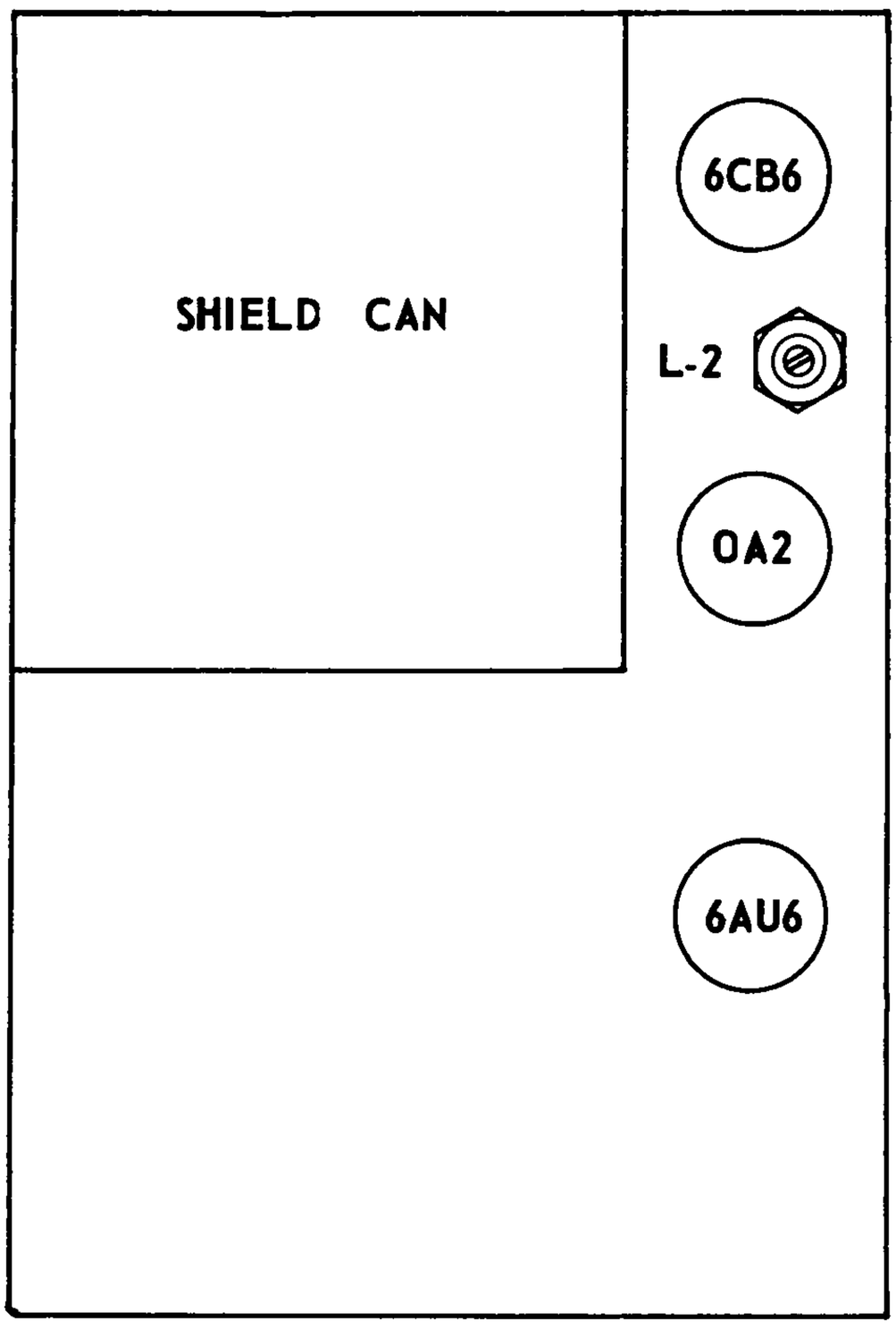
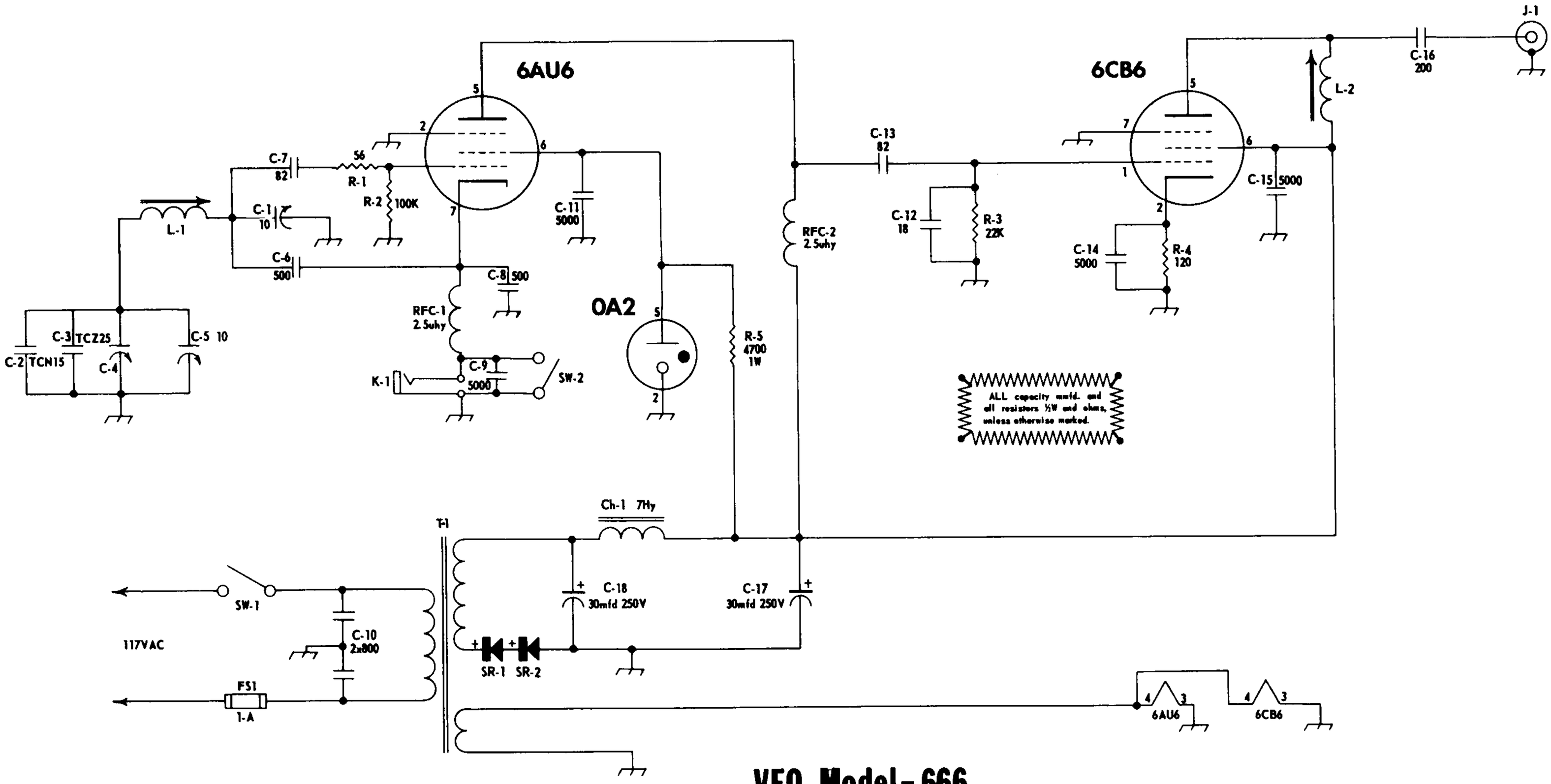


Figure 2.



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