INSTRUCTION MANUAL

for the

WRL

"Globe King"

TRANSMITTER MODEL 500B

Manufactured by WRL ELECTRONICS, INC.
Council Bluffs, Iowa
For

WORLD RADIO LABORATORIES, INC.

TABLE OF CONTENTS

SPECIFICATIONS

FINAL POWER INPUT: 540 watts CW, and Phone. 540 watts SSB Peak Envelope Power(with external SSB exciter).

OUTPUT: Coaxial into 52-600 ohm antenna.

BAND COVERAGE:

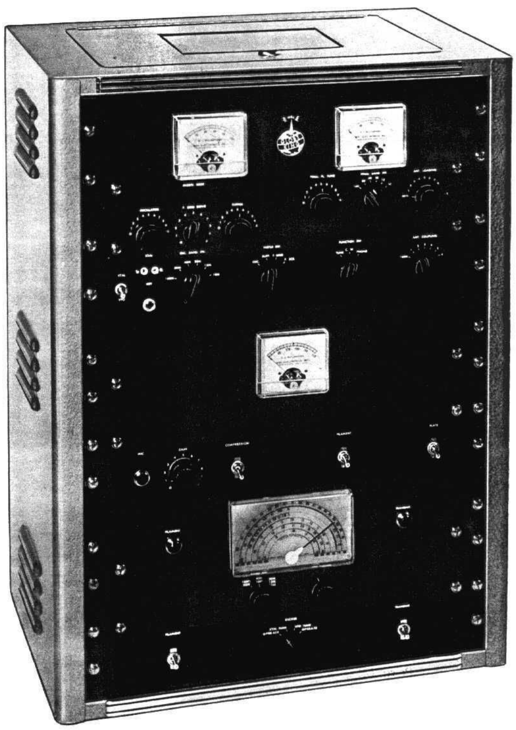
160 meters	1750-3000 Kc.
80 meters	3200-4800 Kc.
40 meters	6600-9000 Kc.
20 meters	13-19 Mc.
15 meters	13-24 Mc.
10 meters	16-31 Mc.

POWER REQUIREMENTS: 115 VAC. 50/60 cycles 1300 watts phone, 820 watts CW.

FREQUENCY CONTROL: Xtal or VFO.

DIMENSIONS: 31 inches high, 15 inches deep, 22 inches wide.

SHIPPING WEIGHT: 270 pounds.



SECTION I

GENERAL DESCRIPTION

1-1. GENERAL.

1-2. The WRL Globe King Transmitter Model 500B is made by WRL Electronics, Inc. of Council Bluffs, Iowa. This transmitter is rated at 540 watts DC plate input power to the R.F. Power Amplifier, either Radio Telegraphy (CW), Radio Telephony (AM) operation, or 540 watts P-E-P Single sideband operation (with external SSB Exciter that will deliver 10 to 15 watts power at the final grid).

1-3. DESCRIPTION.

1-4. The Model 500B transmitter is completely self-contained in a metal relay rack cabinet. Dimensions are 31 inches high, 15 inches deep and 22 inches wide. Weight is approximately 250 pounds. Ventilating louvres are provided in the cabinet to assure adequate ventilation and heat dissipation. Complete TVI precautions have been taken. The R.F. section of the transmitter is completely shielded, meter leads have been by-passed and all AC leads have been by-passed.

1-5. The components of the transmitter are so arranged that semi-unit construction is employed and are broken down into three units as follows:

a. Exciter, Buffer and Power Amplifier.
b. Modulator with integral Power Supply.
c. Main Power Supply with built-in VFO.

Each unit may be removed from the cabinet independently for inspection and servicing. Power requirements are 115 volts, 50/60 cycles single phase alternating current. Tube complement is shown in Table 1. The rear and top doors of the cabinet may be opened for additional ventilation in very hot climates. This will not affect TVI or BCI, as the R.F. section is individually shielded.

TABLE 1. TUBE COMPLEMENT.

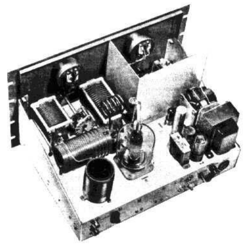
Quan.	Type	Function
1	4-250/AX6156	RF Power Amplifier
1	6146	Buffer Doubler
1	6AG7	Crystal Oscillator VFO Doubler
1	6X5	Bias Rectifier
1	5Y3GT	P.A. Screen Rectifier
1	12AU7	Keyer Tube
1	6SJ7	Microphone Amplifier
1	6C5	Speech Amplifier
1	6AL5	Compression Rectifier
1	6L6G	Modulator Driver
2	811A	Modulators
1	5Y3GT	Modulator Low Voltage Rectifier
2	816	Modulator High Voltage Rectifiers
2	866A	P.A. High Voltage Rectifiers
1	5U4G	Exciter Low Voltage Rectifier
1	6AU6	VFO
1	OA2	VFO Voltage Regulator
1	6CB6	VFO Buffer

1-6. THEORY OF OPERATION.

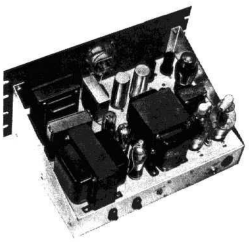
1-7. A 6AG7 tube is employed in a regenerative crystal oscillator circuit. The oscillator has a substantial output and works very well as a doubler or tripler with a minimum of crystal current; this allows the use of 160-80 and 40 meter crystals to cover all amateur bands up to 10 meters. The crystal stage is keyed in its grid circuit as a blocking bias is applied at this point. This bias voltage is timed with the VFO bias in such a manner that the VFO comes on first and goes off last with respect to the crystal stage, thus the term timed sequence keying. A 12AU7 is used as the keyer or bias control tube for the VFO. A switch on the panel selects crystal or VFO operation, and with this switch in the correct position either VFO or crystal operation may be used.

1-8. A type 6146 tube functions as a buffer or doubler stage. This stage is capacity coupled to the oscillator. A combination of fixed and excitation bias is applied to the buffer stage; this allows class "C" operation and also assures complete cut-off of buffer plate current in the event of excitation failure. R.F. drive to the power amplifier is controlled by a potentiometer in the buffer screen grid circuit. Bandswitching of the entire exciter section is simplified by a ganged switch. DC voltages are kept off the coil (L3) and the bandswitch by shunt feeding of the plate of the buffer stage. A SSB RF signal may be inserted by means of a link in the plate coil (L3). SSB operation requires the removal of low B plus voltages from the exciter section. A switch located on the rear of the RF section is provided for this purpose.

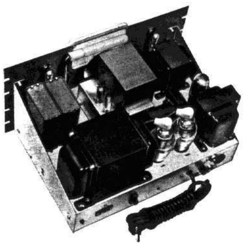
1-9. The power amplifier employs a type 4-250A tube which operates as a straight through class "C" AM, or class "B" SSB amplifier. Fixed and excitation bias are used in the power amplifier stage. Class of operation is determined by the switch, on the rear of the RF chassis, which selects the proper fixed bias voltage. The plate circuit is tuned by a pi-network and an additional "L" section is used on 160 meters. The pi-network will match resistive loads of 50-600 ohms except on 160 meters; where an external matching device, in conjunction with the "L" coil, will match antennas below 300 ohms. When properly tuned, harmonic output of the power amplifier is reduced considerably. The plate of the power amplifier is high level modulated directly while the screen grid is self-modulated by means of a high inductance choke in series with the screen lead. The power amplifier is unique in that the screen grid voltage is self regulating. A rise of



R.F.Section



Speech Amplifier And Modulator



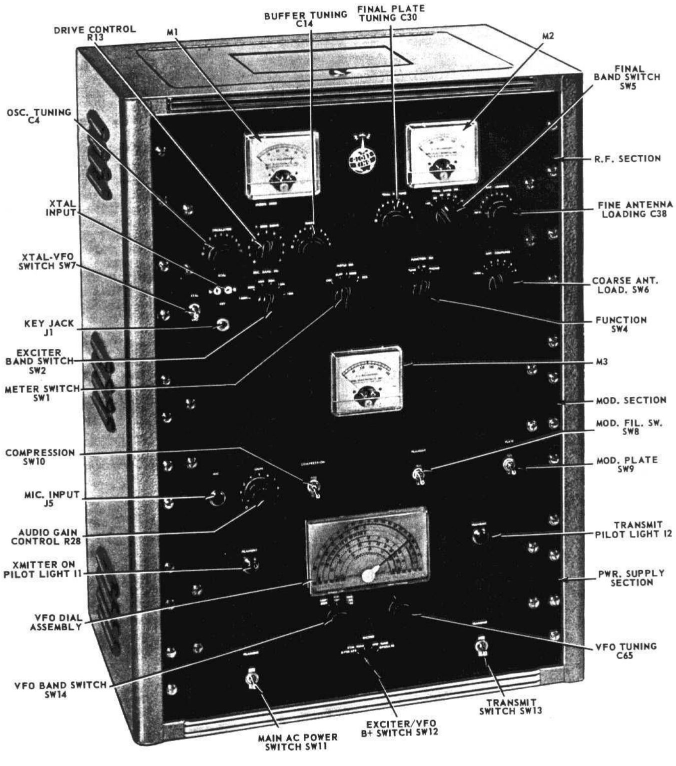
Dual Power Supply Section And VFO

screen grid current automatically reduces voltage and vice-versa. By this means the screen grid power rating is not exceeded, giving excellent tube protection, and tube life is extended. A 5Y3GT tube is employed as low voltage rectifier for the power amplifier screen grid supply. A 6X5GT tube, operating as a half-wave rectifier, supplies all bias voltages to the power amplifier, buffer and keyer stages.

1-10. The microphone amplifier tube consists of a 6SJ7 tube which is capacity coupled to the following speech amplifier stage. One 6C5 tube is utilized as a speech amplifier, capacity coupled into a 6L6G driver stage. "Couplates" are used for coupling the aforementioned audio stages. They have a restricted audio range and allow full use of usable audio power, also, they discriminate against power wasting high and low audio frequencies. The 6L6G driver stage is transformer coupled to the modulator stage. All speech and driver stages are thoroughly decoupled, and all DC voltages applied to them are thoroughly filtered. Two 811A tubes, with zero bias, operate as push-pull, Class B modulators. Modulator plate current is indicated at all times, by a meter in the plate circuit. High voltage for the modulator is supplied by a pair of 816 rectifier tubes in a full wave rectification circuit. A 5Y3GT tube, in a full wave rectification circuit, supplies plate voltage for the speech and driver stages.

1-11. The speech compression circuit uses a 6AL5 rectifier operating in the following manner: A portion of the audio voltage developed in the plate circuit of the 6L6G driver stage is fed back through a voltage divider and decoupling network to the 6AL5 rectifier connected as a voltage doubler. The rectified audio from the 6AL5 is applied as a variable bias voltage to the suppressor grid of the 6SJ7 microphone amplifier. A maximum of 7DB compression is available with this circuit in operation. Due to this feature 100% modulation cannot be exceeded on voice peaks to cause excessive sideband splatter.

1-12. The high voltage supply for the R.F uses two 866A tubes in a full wave rectification circuit. The filter section utilizes choke input. The R.F. driver power supply uses a 5U4G rectifier tube in a full wave rectification circuit, with single section choke input filter. Reduced screen voltage on the final amplifier tube is obtained by placing the function switch in tune position. This will prevent the final amplifier tube from drawing excessive plate current during tune-up and testing. A terminal strip on the rear of the main power supply chassis provides 115 VAC when the TRANSMIT switch is in ON position. This is to operate external relays used to silence the receiver, etc. The AC input circuit is fused with a 20 amp. fuse to protect the equipment in the event of component failure.



Front View of Globe King 500B

SECTION II

OPERATING PROCEDURES

2-1. GENERAL.

2-2. The following paragraphs describe the various panel controls of the Globe King Transmitter, Model 500B. Tune-up 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 transmitter in operation.

2-3. DESCRIPTION OF CONTROLS.

2-4. OSC. TUNING. Tunes oscillator plate circuit to fundamental, second or third harmonic of crystal, or VFO frequency.

2-5. EXCITER BAND SWITCH. Selects proper amount of inductance in both oscillator and buffer plate circuits.

2-6. BUFFER TUNING. Tunes buffer plate circuit to oscillator frequency, or selected harmonic.

2-7. METER SWITCH. Places meter M1 into any one of the following four circuits. OSC. PLATE, BUFF. PLATE, FINAL GRID or FINAL SCREEN.

2-8. FUNCTION SWITCH. Serves three purposes. Inserts high resistance in power amplifier screen grid circuit for tune-up, shorts modulation choke for CW operation, inserts modulation choke into power amplifier screen grid circuit for AM operation.

2-9. DRIVE CONTROL. Controls Screen voltage of buffer stage, thereby controlling power amplifier grid current and RF drive.

2-10. ANT. COUPLING. Inserts added inductance or capacity into the output circuit for proper antenna match.

2-11. FINAL PLATE TUNING. Tunes plate circuit of power amplifier stage to resonance. Must be retuned after any adjustment of either ANT. LOAD control or ANT. COUPLING control.

2-12. FINAL BAND SWITCH. Inserts proper amount of inductance into the Pi network to resonate on selected band.

2-13. ANTENNA LOAD. Varies amount of loading by matching power amplifier plate circuit to antenna circuit. Always start with this control in the "MIN" position. This corresponds to maximum capacity of condenser, and at this setting will match lowest impedance.

2-14. SSB-AM SWITCH. Changes class of operation of the power amplifier tube from class "C" to class "B". Also removes all low B plus voltages from oscillator and buffer stages for SSB operation of the power amplifier.

2-15. AUDIO GAIN. Controls level of modulation in AM operation.

2-16. FILAMENT SWITCH. (Modulator section panel). Applies AC power to the modulator section.

2-17. PLATE SWITCH. (Modulator section panel). Actuates two relays. One applies AC to the modulator plate transformers, the other removes a short circuit from across the secondary of the modulation transformer (shorted for CW operation).

2-18. FILAMENT SWITCH. (Power supply panel). Applies AC power to the entire transmitter.

2-19. EXCITER SWITCH. Applies AC power to low B plus plate transformer for the exciter section, and to the VFO switching relay.

2-20. TRANSMIT SWITCH. Applies AC power to plate transformer for high B plus voltage for the power amplifier tube. Also applies AC voltage to the exciter plate transformer. Push-to-talk switch on the microphone stand will also energize the complete transmitter by relay control.

2-21. XTAL-VFO SWITCH. In VFO position shorts osc. cathode choke RFC1, also connects VFO to input of crystal stage.

2-22. KEYING ADJ. Regulates amount of bias applied to keyer tube and may be adjusted for best keying characteristics.

2-23. COMPRESSION. Switches speech compression circuit in or out as desired.

2-24. VFO BAND SWITCH. Selects proper band of operation for VFO with the transmitter. Must be set to same band of operation as the EXCITER BAND SWITCH and FINAL BAND SWITCH.

2-25. VFO TUNING. Tunes the VFO to the desired frequency of operation.

2-26. EXTERNAL CONNECTIONS.

WARNING

Before making any external connections to the transmitter, remove the AC line cord plug from the AC outlet. Also place all power switches in the OFF, or down position and ground cabinet.

2-27. PATCH IN. This jack is wired to the top of the audio GAIN control so that an external audio signal, such as from a phone patch, may be fed into the speech stages independently of the microphone.

2-28. KEY JACK. Closed circuit type wired in the grid circuit of the keyer stage for sequential keying.

2-29. CRYSTAL SOCKET. Insertion of proper 160-80-40 meter crystal, allows operation on all amateur bands, 160 meters through 10 meters.

2-30. SSB SOCKET. Input socket for use of external SSB exciter. SSB exciter must deliver SSB signal of 10-15 Watts. Located on rear apron of RF section chassis.

2-31. MICROPHONE CONNECTOR. Located on the front panel of the modulator section. Audio input is between pin 1 and ground. Push-to-talk connections are from pin 2, through push-to-talk switch and to ground.

2-32. KEYING JACK. Located on front panel of R.F. section.

2-33. RECEIVER DISABLING TERMINAL. Located on rear of power supply chassis. Provides 110 VAC to operate relay when transmit switch or push-to-talk is in ON position.

2-34. ANTENNA CONNECTORS. Located on rear of R.F. section. Two coax connectors marked ANT. and RECEIVER.

2-35. OPERATING HINTS.

2-36. Proper tune-up is necessary for optimum performance of the Globe King 500B transmitter. Attempted operation of the transmitter without proper tune-up may result in damage.

TABLE II. CRYSTAL CHART

Band	Crystal
160 meters	1800-2000 Kc.
80-75 meters	3500-4000 Kc.
40 meters	7000-7300 Kc.
20 meters	7000-7175 Kc.
15 meters	7000-7150 Kc.
11 meters	6740-6807 Kc.
10 meters	7000-7425 Kc.

WARNING

Operation of this equipment involves the use of high voltages which are dangerous to life. Observe all safety precautions! Do not attempt to make adjustments inside the equipment, or change tubes with any power on. Disconnect the main power line before touching any high voltage components.

Dial settings in Table III are typical for frequencies and resistive loads indicated. A deviation of more than 10% from these readings indicates a reactive load presented to the transmitter, causing improper tuning. When the loading control is advanced from the minimum position to obtain loading, the final plate tuning control should NOT have to be returned more than a degree or two from it's original setting of resonance. If when advancing the loading control clock-wise. the plate tuning control has to be returned excessively to obtain resonance again, this indicates excessive reactance is present. This should be corrected immediately, as operating under these conditions will cause R.F. heating of the Pi network coils, resulting in damage to them, as well as the band-switch. Overloading of the transmitter is evidenced by the operator being unable to obtain a low enough plate current reading at resonance, even with the loading control at minimum, or by DECREASE OF FINAL PLATE CURRENT AS LOADING CONTROL IS INCREASED (clock-wise rotation of load control). The above condition of overloading with the load control at minimum usually indicates that a very low impedance is being presented to the Pi network, below 50 ohms, and an impedance step-up device, such as an antenna tuner, balun coils, etc., should be used to increase the feed point impedance to a point within the range of the Pi network. An antenna that would normally be assumed to have an impedance of around 70 ohms may also have a reactive component that is quite large, giving a total complex (reactive and resistive) load far higher or lower than would be usual. The use of a matching device, such as an antenna tuner, is not normally necessary, except when using a very low impedance beam, or very high impedance long wire, or similar antenna. For easiest loading we recommend the following type an-

TABLE III. TYPICAL DIAL SETTINGS FOR RESISTIVE LOADS

FREQ. KC	OSC. DIAL	BUFF. DIAL	FINAL PLATE DIAL	ANT. COUPLING SWITCH		ANT. LOADING DIAL	
				52 OHM	300 OHM	52 OHM	300 OHM
1975	6	6	4½	*	160 M.	*	5
3925	6	2	3	4	2	7½	4½
7125	7 8	3 2.5	2	3	1	5	5
14,250	7	6½	3	1 2	1	2 3	4½
21,365	1	1½	2	1	1	4½	5½
28,500	7	1½	2	1	1	5½	6

* Indicates that a match to a resistive 52 ohm load requires an external matching circuit.

tennas: 1/2 wave dipole, center fed; 300 ohm folded dipole; beam type antenna, or similar types that will present a load of 50-300 ohms, with small reactance, AT THE TRANSMITTER.

When overloading is evidenced (too low an impedance), place ANT. COUPLING control in position 6 and ANT. LOADING control in minimum position. Retune the final plate control for resonance (minimum current). If clockwise rotation of ANT. LOAD control now increases plate current reading, satisfactory loading can be obtained in most all instances. If, when in position 6 on ANT. COUPLING, maximum clockwise rotation of the ANT. LOAD control will not allow full power input (approx. 330 Ma.), place ANT. COUPLING in position 5 and repeat the above sequence, or position 4, 3, 2, or 1, as necessary until proper load is obtained. This does not apply to 160 meters, where the ANT. COUPLING should be in the 160 M. position only.

2-37. TUNE-UP PROCEDURE-CRYSTAL OPERATION.

a. Place all power and control switches in the OFF position. Place exciter switch to XTAL OPERATE.
b. Insert AC line cord plug into a 115 volt, 60 cycle, single phase current source.
c. Connect antenna feed line to coax connector marked ANT. (rear of R.F. chassis).
d. Select the proper crystal for the frequency from the crystal chart, TABLE II. Insert into crystal socket. Place XTAL-VFO switch in XTAL position.
e. Place filament switch (Power Supply panel) in the ON position, and allow three minutes warm-up time.
f. Set Exciter and Final bandswitches to the desired band.
g. Place FUNCTION switch to the TUNE position.
h. Set ANT. COUPLING switch to position indicated in TABLE III for band in use and load expected. Set ANT. LOAD control to minimum (counter-clockwise).
i. Rotate drive control to minimum position (counter-clockwise).
j. Place SSB-AM switch in AM position. (On rear of R.F. chassis).
k. Place meter switch in OSC. PLATE position.
l. Place EXCITER switch to XTAL TUNE position and adjust OSC. TUNING control for minimum current indication of the meter. Note the tuning chart for approximate dial reading for band in operation.

m. Place meter switch to BUFF. PLATE position.
n. Advance DRIVE CONTROL clockwise slowly. When a meter reading of 25 MA. is obtained tune BUFFER plate control for minimum current reading. (Check TABLE III for typical dial readings, as a wrong harmonic can be tuned in some instances).
o. Place meter switch to F. GRID position and note the amount of grid current. A reading of approximately 15 Ma. should be obtained. If not, adjust the DRIVE CONTROL until a reading of 15 Ma. is obtained.
p. Place EXCITER SWITCH in XTAL OPERATE position and TRANSMIT SWITCH to ON position. Carefully adjust FINAL PLATE TUNING for minimum final plate current. This indicates resonance in the final plate circuit, dial setting of FINAL PLATE TUNING control should correspond closely with the setting on Chart III.
q. Advance the ANTENNA LOAD control slowly clock-wise, final plate current should increase. When plate current has increased to 200 Ma, re-tune the FINAL PLATE TUNING control for minimum plate current again. Repeat the procedure of advancing ANTENNA LOAD control and re-tuning FINAL PLATE TUNING control to resonance until the minimum plate current dip is 190 Ma.
r. Place FUNCTION switch to the CW position, this should cause an increase in final plate current up to approximately 300 Ma. Retune BUFFER TUNING for maximum grid current then re-adjust the DRIVE CONTROL so that 15 Ma. of grid current is indicated again. When the full voltage is applied to the final stage, normal loading will decrease grid current 10 to 20% so readjusting of the BUFFER TUNING and DRIVE CONTROL is necessary.
s. Repeat the loading procedure by advancing ANTENNA LOAD control and re-tuning the FINAL PLATE TUNING control, until the minimum plate current dip of 330 Ma. is obtained. This is full load for the final stage and it should not be exceeded or a reduction in power output will result. Do not exceed 15 Ma. grid current or shortened tube life will result. The ANTENNA LOAD control may be advanced until sufficient final loading is obtained. Should the dial indications differ greatly from the typical table readings, a defective antenna or a high SWR is indicated and should be corrected.
t. Recheck all meter readings for safety sake. The Screen Grid current of the power amplifier has the widest allowable tolerance as it's value depends on the plate current. A reading of 25-50 Ma. is reasonable. Also if the final is loaded below 500 Watts on CW, the screen grid current will be considerably higher.

2-38. TUNE-UP PROCEDURE-VFO OPERATION.

2-39. Tune-up procedure for VFO operation varies somewhat from crystal operation tune-up. Proper procedure is as follows:

a. Place all power and control switches in the OFF position. Place the POWER SUPPLY EXCITER switch to VFO OPERATE.

b. Insert AC line cord plug into a 110-115 volt, 60 cycle, single phase current source.

c. Connect antenna feed line to coax connector marked ANT. (rear of R.F. Chassis).

d. Set the VFO BANDSWITCH and VFO TUNING control to the desired band and frequency of operation.

e. Place filament switch (Power Supply panel in the ON position and allow three minutes warm-up time.

f. Set EXCITER and FINAL bandswitches to the desired band, and remove the crystal.

g. Place FUNCTION switch to the TUNE position. Place Xtal/VFO SW to VFO position.

h. Set ANT. COUPLING switch to position indicated in TABLE III for band in use and load expected. Set ANT. LOAD control to minimum (counter-clockwise).

i. Rotate DRIVE CONTROL to minimum position (counter-clockwise).

j. Place SSB-AM switch in AM position. (On rear of R.F. Chassis).

k. Place meter switch in OSC. PLATE position.

l. Place the EXCITER switch to VFO TUNE position and adjust OSC. TUNING control for minimum oscillator plate current reading. Note tuning chart for approximate dial reading for band of operation.

m. Place meter switch to BUFF. PLATE position.

n. Advance DRIVE CONTROL clockwise slowly. When a meter reading of 25 Ma. is obtained tune BUFFER plate control for minimum current reading. (Check TABLE III for typical dial readings, as a wrong harmonic can be tuned in some instances).

o. Place meter switch to F. GRID position and note the amount of grid current. A reading of approximately 15 Ma. should be obtained. If not, adjust the DRIVE CONTROL until a reading of 15 Ma. is obtained.

p. Place the EXCITER switch in VFO OPERATE position and TRANSMIT switch to ON position. Carefully adjust FINAL PLATE TUNING for minimum final plate current. This indicates resonance in the final plate circuit dial setting of FINAL PLATE TUNING control and should correspond closely with the settings indicated in Chart III.

q. Advance ANTENNA LOAD control slowly clockwise, final plate current should increase. When plate current has increased to 200 Ma., re-tune FINAL PLATE TUNING control for minimum plate current again. Repeat the procedure of advancing ANTENNA LOAD control and re-tuning FINAL PLATE TUNING control to resonance until the minimum plate current dip is 190 Ma.

r. Place FUNCTION switch to CW position, this should cause final plate current to rise to approximately 300. Ma. Re-tune BUFFER TUNING for maximum grid current, then re-adjust DRIVE CONTROL to indicate 15 Ma. grid current. When the full voltage is applied to the final stage, normal loading will decrease the grid current 10 to 20% therefore re-adjustment of the BUFFER TUNING and DRIVE CONTROL is necessary,

s. Repeat the loading procedure by advancing ANTENNA LOAD control and re-tuning the FINAL PLATE TUNING control, until the minimum plate current dip of 330 Ma. is obtained. This is full load for the final stage and it should not be exceeded or a reduction in power output will result. Do not exceed 15 Ma. grid current or shortened tube life will result. The ANTENNA LOAD control may be advanced until sufficient final loading is obtained. Should the dial indications differ greatly from the typical table readings, a defective antenna or a high SWR is indicated and should be corrected.

2-40. KEYER CONTROL ADJUSTMENT.

2-41. The keying system employed in the Globe King, Model 500B, is fundamentally grid block keying, however, several refinements have been incorporated into the basic circuits. The keyer stage utilizes a 12AU7 tube connected as a cathode follower in series with the bias voltage and provides a predetermined time lag in the application of bias voltage. The 6AG7 crystal stage is biased directly from the bias line through a suitable decoupling network. The 6AU6 VFO stage is biased through the keyer tube. The circuit constants in the keyer stage are such that key closure turns the VFO on first. Opening the key turns the crystal stage off first. Inasmuch as the VFO goes on first and off last, it eliminates the possibility of any keying chirp generated in the VFO stage to be transmitted on the air.

The keying circuit need be adjusted for the desired keying characteristics only when the transmitter is placed into initial operation. The key adjust control determines the desired keying characteristics. With the key adjust control in the extreme counter-clockwise position, softest keying is obtained. With the control in the extreme clockwise position sharper keying with a very slight click is obtained. Optimum operation, with the most pleasant keying is at the point where the VFO is just cut-off. For break-in operation on one's own frequency, it is necessary the VFO be completely cut off to eliminate interference with the received signal. Proper adjustment is as follows:

a. Rotate keyer control potentiometer shaft to extreme counter-clockwise position.

b. Complete the tune-up procedure (on the 40 meter band) as outlined in paragraph 2-38, steps a. through s. inclusive.
c. Place TRANSMIT switch to the OFF position.
d. Insert key plug into the KEY jack.
e. Place EXCITER switch to VFO TUNE position.
f. Close key contacts.
g. Tune in your signal on a nearby receiver.
h. Open the key contacts and advance receiver gain control so the VFO signal may be heard.
i. Rotate the KEY ADJUST potentiometer very slowly in a clockwise direction until the VFO signal is just cut-off. Then rotate the control an additional 1/8 turn in a clockwise direction to assure complete VFO cut-off.

2-42. The tune-up procedure and keyer control adjustment is now completed. The transmitter may now be placed in CW operation by plugging in a key, in AM phone operation by procedure as described in SECTION III, or SSB operation by referring to SECTION IV.

CAUTION

DO NOT operate Telegraphy (CW) with plate switch of the modulator in ON position, or FUNCTION switch in phone position. Modulator plate switch should be OFF, and the FUNCTION switch should be in the CW position.

2-43. VFO ALIGNMENT.

2-44. In the event it should be necessary, for any reason, to re-align the VFO; the following procedure should be followed to assure correct alignment.

2-45. PRELIMINARY.

a. Disconnect all cables from the rear apron of the power supply section and remove this section of the transmitter from the cabinet.
b. Place all power and control switches in the OFF position.
c. Insert the AC line cord plug into a 110-115 volt, 60 cycle, single phase current source.
d. Place the power supply section EXCITER switch to the VFO OPERATE position.
e. Place the power supply FILAMENT switch to the ON position and allow a ten minute warm up period.

f. Elevate the power supply section chassis to provide convenient access to the VFO slugs and trimmers located on the bottom side of the chassis. It is very important that the power supply section and the VFO remain in their normal operating position or else the compensating capacitors will not function properly and calibration may be off as much as 5 to 10 KC.

2-46. See Figure 1 for identification and location of the alignment slugs and trimmers.

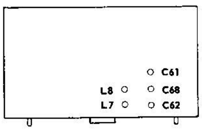


FIG. 1. BOTTOM VIEW OF POWER SUPPLY SECTION

2-47. ALIGNMENT PROCEDURE.

a. Place the EXCITER switch to the VFO TUNE position.
b. Place the VFO BAND SW. to the 160/80 M. position.
c. Tune your receiver (using a 100 KC crystal calibrator) to 1800 KC.
d. Tune the VFO dial to 1800 KC.
e. Adjust the slug in coil L8 for zero beat with the receiver.
f. Tune the VFO and receiver to 2.0 Mc.
g. Adjust trimmer condenser C68 for zero beat with the receiver.
h. Repeat steps c, d, e, f and g as many times as necessary until the 1800 KC and 2.0 Mc points on the VFO dial correspond with these same points on the receiver.
i. Place the VFO BAND SW. to the 40/10 M. position.
j. Tune the VFO and the receiver to 7.0 Mc.
k. Adjust the slug in coil L7 for zero beat with the receiver.
l. Tune the VFO and receiver to 7.4 Mc.
m. Adjust trimmer condenser C62 for zero beat with the receiver.

n. Repeat steps j, k, l and m as many times as necessary to make the VFO track with the receiver.
o. Place the VFO BAND SW. to the 20/15/11 M. position.
p. Tune the receiver to 7.1 Mc and the VFO to 14.2 Mc.
q. Adjust trimmer condenser C61 for zero beat with the receiver.

2-48. The VFO alignment is now completed. The VFO output coils should now be peaked for maximum drive to the crystal stage of the transmitter. Proceed as follows:

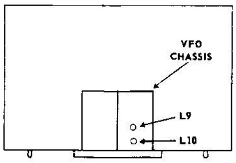


FIG. 2. TOP VIEW OF POWER SUPPLY SECTION

a. Place all switches on the power supply section to the OFF position.
b. Place the power supply section as close as possible to the RF section of the transmitter.
c. Insert the VFO output cable into power supply and RF section sockets labeled VFO. They are located on the rear apron of each of the two chassis.
d. Insert the 6-prong power plug from the power supply section into the socket on the RF section labeled POWER.
e. Place the power supply section FILAMENT switch to the ON position.
f. Place the EXCITER switch to the VFO TUNE position.
g. Place the VFO BAND SW. and the RF section EXC. BAND SW. to the 80 M position.
h. Adjust the slug of coil L10 (Refer to Fig. 2 for location) for maximum drive to the oscillator stage of the transmitter as determined by the maximum amount of oscillator plate current dip.
i. Place the VFO BAND SW. and the RF section EXC. BAND SW. to the 40M position.
j. Adjust the slug of coil L9 (Refer to Fig. 2 for location) for maximum drive to the oscillator stage as in step h.

2-49. VFO alignment and peaking is now completed and the transmitter may be reassembled for normal operation.

SECTION III

RADIO TELEPHONY OPERATION

3-1. RADIO TELEPHONY (AM) OPERATION.

3-2. After the transmitter has been properly tuned for CW operation it may be placed in AM operation, as follows:

a. Place TRANSMIT switch in OFF position.
b. Place FILAMENT switch in ON position. (Modulator panel). Allow a three minute warm-up for the tubes in the modulator section.
c. Connect microphone to microphone jack on the modulator panel. (Use only high impedance crystal or dynamic microphone).
d. Place MOD. PLATE switch in the ON position.
e. Set FUNCTION switch to PHONE position.
f. Place TRANSMIT switch in ON position, or actuate push-to-talk switch on microphone, if used.
g. Speak into the microphone in a normal tone of voice, while advancing the audio GAIN control until modulator plate current increases from it's static reading of about 60 Ma. up to 200 Ma. on PEAKS (the average reading will be lower). This will give full modulation of the carrier. An external device may be used to determine the exact point of 100% modulation, if desired.
h. When speech compression is desired, place the COMPRESSION switch to the ON position.
i. Talk into the microphone in a normal steady tone and advance the audio GAIN control until the modulation meter indicates 180 Ma. on peaks. The audio GAIN control should now be at approximately 7½ and modulation will hold to approximately 95% with either a whisper or a shout into the microphone. Sideband splatter will also be greatly reduced.

CAUTION

DO NOT modulate the transmitter unless the final amplifier is fully loaded and the FUNCTION switch is in the PHONE position. DO NOT attempt to change bands while any voltages are on, other than filaments. Always place TRANSMIT switch in the OFF position, or release the push-to-talk switch first. Failure to heed this warning will most likely result in damage to the equipment.

SECTION IV

SINGLE SIDE BAND OPERATION

4-1. SINGLE SIDE BAND OPERATION (SSB).

4-2. After the transmitter has been tuned properly for CW operation, it may be placed in SSB operation, as follows:

a. Place the TRANSMIT switch, modulator PLATE and FILAMENT switches in OFF position.
b. Place SSB-AM switch in SSB position.
c. Connect SSB signal source to the SSB-VFO connection on the rear of the R.F. section. The SSB driver unit must deliver 10-15 watts power AT THE FINAL GRID.
d. Place the FUNCTION switch in CW position.
e. Place the TRANSMIT switch in the ON position.
f. Feed a steady tone into the audio input of the SSB exciter, in the range of 1,000 to 1,500 cycles. An audio signal generator is excellent for this purpose. Should no generator be available, the operator may whistle into the microphone, holding the tone as steady as possible. Final amplifier grid current should NOT exceed 5 Ma. (A grid current of about 1 Ma. on peaks is excellent).
g. The final plate current swing for full input should not exceed 260 Ma. PEAK. The resting current will be approximately 90 Ma. In SSB operation, the power amplifier grid and plate current swings are entirely controlled by the amount of excitation from the SSB exciter. Heat dissipation at the resting current of 80-100 Ma. on the final plate will be evidenced by a slight color on the plate of the tube, however, this will disappear under modulation.
h. Settings of the tuning controls will hold over a slight frequency shift. For large frequency excursions, the transmitter should be returned as described in Section II.

4-3. The best way to tune any SSB amplifier for maximum efficiency is to use a R.F. current indicating device in the antenna system, along with a scope to monitor linearity. Using the two tone test, adjust drive to the final for about 1 Ma. Load the final for maximum R.F. output, as indicated by the R.F. indicator so long as the waveshape stays linear.

SECTION V

EMERGENCY SHUT-OFF

5-1. EMERGENCY SHUT-OFF.

5-2. For emergency shut-off, place filament switch (Power Supply panel) in OFF position. This action removes all voltages.

5-3. TYPICAL INSTRUMENT READINGS-PHONE & CW. 20 METER BAND.

OSC. PLATE 15 MA.	BUFFER PLATE 30 Ma.	P.A. GRID 15 Ma.	P.A. SCREEN 40 Ma.	P.A. PLATE 330 Ma.
SSB operation		Peak 3-5 Ma.	0-30 Ma. PEAK	90-260 Peak Ma.

5-4. PRECAUTIONS TO BE OBSERVED

5-5. All meter readings should be noted occasionally. Should the readings deviate considerably (20% P.A. SCREEN, 10% others) from that listed in the typical readings, operation should be suspended until the cause is determined. Failure to do this may result in damage to the equipment, or in any event cause a poor signal to be transmitted.

SECTION VI
MALFUNCTIONS AND PROBABLE CAUSE

SYMPTOM	PROBABLE CAUSE
1. Main fuse blows when filament switch turned on.	1-1. Shorted capacitor C55 or C56. 1-2. Internally shorting tube or tubes.
2. Main fuse blows when high B+ turned on.	2-1. Shielding on M2 or M3 shorting to ground at meter connections. 2-2. Internally shorting tubes. 2-3. Insulators ST-1, ST-2, ST-3 or ST-4 punctured and shorting. 2-4. Shorted capacitors C27, C60 or C53.
3. Buzzing relay or relays.	3-1. AC line voltage too low or too high. 3-2. Filings between armature and core of noisy relay.
4. No modulation.	4-1. Open coil on RLY 4. 4-2. Bad speech or modulator tubes.
5. Rough VFO note.	5-1. Weak 6AU6 tube. 5-2. Gassy 6CB6 tube.
6. Final screen current excessive or insufficient.	6-1. Weak 4-250A tube. 6-2. Improper antenna loading. 6-3. Insufficient grid drive to final.
7. Exciter B+ goes on when filament switch turned on.	7-1. Shorted capacitor, C55 or C56.
8. Excessive final plate current swing when modulating.	8-1. Excessive antenna reactance causing poor loading. 8-2. Capacity of the house wiring being exceeded. 8-3. Function Switch on CW instead of Phone, position.
9. Push-to-talk provision inoperative.	9-1. RLY3 requires adjustment or replacement. 9-2. Shorted capacitor C40. 9-3. Defective rectifier SR1.
10. Inoperative VFO.	10-1. Defective rectifier SR2 or SR3. 10-2. Defective 6AU6 or 6CB6 tube.

SECTION VII
ANTENNA CONSIDERATIONS

7-1. ANTENNA CONSIDERATIONS.

7-2. The GLOBE KING 500B uses a PI-NET final tank circuit which has the capability of matching a considerable range of non-reactive load impedances. As the reactive component increases in the antenna and feed line, the range of match possible is reduced, as the PI-NET has to compensate with an opposite reactive component, thereby reducing it's capability to match higher impedances. In some cases where the reactive load may be large enough, as compared to the resistive load, the matching range may be reduced to as little as 50-100 ohms. It is to the operators advantage to correctly measure the impedance at the transmitter end of the feed line and to correct a large reactance at the antenna, rather than trying to tune it out with the PI-NET. Many low power transmitters have a greater capability to tune out reactance from an antenna system than is possible with the 500B. This is due to the fact that components in the average low power transmitter can have a high capacity etc., and still have only a very low power rating. These same components will stand a very high power loss without failure in most cases. In a 500 watt transmitter these components are impractical as they become too large physically, so the compromise consists of not being able to handle as large a reactive load. The capability of handling a LARGE RESISTIVE LOAD is however still present in the 500B transmitter.

7-3. The WINDOM antenna, when properly constructed, will most likely come closest to giving a reasonable impedance to match on all bands, without using an antenna tuner. There are numerous antenna configurations that will give excellent all band results, however, in nearly all cases the impedance presented to the transmitter on one or more bands will not be within the capabilities of the PI-NET, and an antenna tuner will be required. The simple DIPOLE, or FOLDED DIPOLE will most likely be easiest to match. While the free space impedance of the dipole, at the center, is usually considered to be about 70 ohms, in practice it is usually 50-60 ohms. This is due to the fact that the impedance is lowered considerably by it's being nearer to ground. If the antenna is 1/2 wave or more above the ground, a 72 ohm line will most likely give the better match. If nearer a 1/4 wave, or less, a 50 ohm line is usually best. Using a folded dipole made of 300 ohm ribbon will give a center impedance of around 270 ohms, therefore making an acceptable match to 300 ohm feedline. A height of 1/2 wave, or more, is still very desirable.

7-4. One of the most commonly encountered troubles is a feedline that acts as a transformer. Such a feedline may present a complex load to the transmitter very different from the impedance at the feed point of the antenna. As an example; using a 52 ohm feedline having an SWR of only 1.5:1, due to mismatch at the antenna, the impedance at the transmitter end of the feedline may be anywhere from approximately 32 to 77 ohms resistive and 21 ohms reactive. At an SWR of only 3:1 the resistance may vary from 17 to 156 ohms and the reactance to 70 ohms. The transmitter may normally have the capability of matching this resistive range, but due to compensation for such a large reactance, the transmitter may no longer be able to match the resistive load. A resistive antenna having an impedance the same as the characteristic impedance of the feedline should give no difficulty, as the line is flat, and changing the length of the feedline will not change the feed point impedance. Where the antenna does not have an impedance the same as the feedline, or where the antenna is reactive (off resonance) the feedline should preferably be cut to exact EVEN multiples of ½ wave, taking into account velocity factor of the type feedline used. In such case the impedance at the end of the feed line will be the same as to the antenna feed point. A feed line cut to 1/8 or 1/4 wave can present a very complex impedance at the end of the feed line. Such a feed line, while measuring a relatively low SWR, may be virtually impossible to load in many cases.

7-5. On most all bands, the GLOBE KING 500B can match in excess of 50-600 ohms where little reactance is present. On 160 meters the minimum impedance that may be matched is 300 ohms. On this band a 300 ohm folded dipole is good, or a 1/2 wave antenna fed off center with a single wire, against ground. In the case of the latter arrangement, a very good ground is necessary. The exact feed point can be determined experimentally with a point about 1/3 in from either end being acceptable. The 400 ohm point, if it can be determined, would be most satisfactory.

7-6. Beams usually have a very low impedance, often as low as 15 ohms for a close spaced 3 element array. By using a folded dipole driven element, "T" match or other means to increase the feed point impedance, the feed point impedance is increased to a high enough value to use common type feed lines. Even so, it takes a very little reactance to present a complex impedance below 50 ohms, and out of range for the PI-NET to match. In any type antenna it is best to try and make the impedance presented to the antenna about 70 ohms where a bit more reactance can be tuned out and still maintain a match.

7-7. The most reliable way to adjust any antenna is by the use of a good SWR bridge. Most bridges cover the range of 52-72 ohms. The bridge should be excited by a low power signal on the operating frequency (power to be determined by the manufacturers specifications on the particular instrument), and the antenna adjusted for the lowest possible SWR, (1:1 not usually obtainable). A SWR of 1.5:1 is good. If the bridge used is for coax, a balancing device should be used (or the readings most likely will be in error) when measuring a balanced type antenna feedline. The antenna section of A.R.R.L. Handbook gives many suggestions for antennas, or similar publications can be refered to.

7-8. Keep in mind the fact that many antenna diagrams refer only to free space, or theoretical dimensions and impedances which will seldom hold true in practical application. Also an antenna which may be a certain impedance at one location may be considerably different at another location, even when the same height above ground, and this can be due to no more than different soil conductivity. Therefore, specified dimensions may have to be corrected for each particular loaction and the only sure way that an antenna impedance can be determined is to measure it, properly.

7-9. FORMULA. (ALL ANSWERS IN FT.)

1 wavelength in free space $= \dfrac{300}{f\ mc.}$

1/2 wave dipole (end supported) $= \dfrac{468}{f\ mc.}$

1/2 wave folded dipole (end supported) $= \dfrac{462}{f\ mc.}$

SECTION VIII

GENERAL INFORMATION CONCERNING WARRANTY, SERVICE, REPLACEMENTS, ETC.

8-1. GENERAL.

8-2. The following paragraphs give complete information concerning Warranty, Service, Replacement of faulty components, etc. Should it be necessary to write to World Radio Laboratories concerning any of these items the procedure outlined should be followed to assure you of complete satisfaction.

8-3. WARRANTY.

8-4. All parts in this unit (except tubes and meters) are guaranteed against defects in workmanship or materials ONE FULL YEAR from date of purchase. Standard 90 day warranty on tubes and meters (see paragraph 8-9 concerning replacement of defective parts). This warranty is not transferable and applies only to the original purchaser.

8-5. SERVICE.

8-6. In the event this unit does not operate properly, please write us giving full details. Include the model, serial number and date of purchase. We may be able to determine the nature of the trouble from the details you give us in your letter.

8-7. This unit may be returned for service or inspection at any time within the one year warranty period for a special service charge of $5.00. Transportation charges should be prepaid by you. Parts within the warranty will be replaced without charge, however, a charge will be made for any component damaged due to abuse. After the one year warranty period service charges, plus the cost of parts, are based on the length of time required to repair the unit. Should this unit be modified in any manner other than any modifications set forth in this manual please write us for an estimate of charges for any repairs before you ship the transmitter to us. There is a minimum charge of $10.00 for service of modified units. Any modifications other than set forth in this manual will depreciate the trade-in value of your transmitter.

8-8. Units in which acid core solder or solder paste or flux have been used are not eligible for repair or service and shall be returned unrepaired or unserviced, at your expense immediately.

8-9. REPLACEMENTS.

8-10. Replacement of defective parts will be made only when the defective part is postpaid to WRL after prior permission has been obtained from World Radio Laboratories. When writing concerning a faulty component please supply the following information.

(a) Identify the part by symbol number, description and WRL part number as found in Section IX, PARTS LIST.

(b) Give the transmitter model and serial number.

(c) Give date of purchase.

(d) Advise the nature of the defect or reason for requesting replacement.

8-11. We will promptly supply any necessary replacement. Do not return any defective components unless we specifically request you to do so. Do not attempt to repair a defective component as this will void the guarantee. Tubes to be returned should be packed very carefully to avoid damage as broken tubes are not eligible for replacement. Insure your shipment. Any parts damaged or broken through carelessness on the part of the owner will not be replaced free of charge. We do not authorize the purchase, from any other source, of any replacement for any faulty component that may be found in this unit. Under no circumstances will we re-imburse the purchaser of this unit for any such purchase. Any replacement should be obtained from World Radio Laboratories as outlined in paragraphs 8-10 and 8-11.

8-12. SHIPPING INSTRUCTIONS.

8-13. Should it be necessary to return the transmitter to us for service or inspection please use the original carton and packing; they have been designed to assure safe arrival. Attach a tag to the unit itself giving your name and address. If the original carton is not available consult your local Express Agent for proper packaging. He will be glad to assist you. Return shipment to you will be made via express collect.

8-14. POLICY.

8-15. All prices are subject to change without notice. World Radio Laboratories, Inc. and WRL Electronics, Inc. reserve the right to make circuit or component changes or incorporate new features at any time without incurring any obligation to owners of instruments previously sold.

SECTION IX

PARTS LIST (R.F. SECTION)

Quan.	Description	Circuit Designation	WRL Part No.
1	Capacitor, ceramic, 120 mmf 600 volt	C1	1101-002
1	Capacitor, ceramic, 25 mmf 600 volt	C2	1101-001
1	Capacitor, disc .005 mf 600 volt	C3	1101-003
1	Capacitor, variable 75 mmf.	C4	1105-002
1	Capacitor, disc .005 mf 600 volt	C5	1101-003
1	Capacitor, disc 500 mmf. 600 volt	C6	1101-005
1	Capacitor, disc 500 mmf 600 volt	C7	1101-005
1	Capacitor, ceramic, 25 mmf 600 volt	C8	1101-001
1	Capacitor, disc .005 mf 600 volt	C9	1101-003
1	Capacitor, disc. .005 mf 600 volt	C10	1101-003
1	Capacitor, disc .005 mf 600 volt	C11	1101-003
1	Capacitor, disc 500 mmf 600 volt	C12	1101-005
1	Capacitor, disc .005 mf 600 volt	C13	1101-003
1	Capacitor, variable, 140 mmf	C14	1105-001
1	Capacitor, ceramic, .0 .001 mf 1500 V.	C15	1101-011
1	Capacitor, electrolytic, 12 mf 250 volt	C16	1106-009
1	Capacitor, electrolytic, 12 mf 250 volt	C17	1106-009
1	Capacitor, ceramic, 70 mmf 1000 volt	C18	1101-018
1	Capacitor, disc .005 mf 600 volt	C19	1101-003
1	Capacitor, disc .005 mf 600 volt	C20	1101-003
1	Capacitor, disc .005 mf 600 volt	C21	1101-003
1	Capacitor, disc .002 mf 600 volt	C22	1101-009
1	Capacitor, disc 500 mmf 600 volt	C23	1101-005
1	Capacitor, disc 500 mmf 600 volt	C24	1101-005
1	Capacitor, electrolytic 10 mf 500 volt	C25	1106-002
1	Capacitor, electrolytic 10 mf 500 volt	C26	1106-002
1	Capacitor, ceramic, 500 mmf 10K volt	C27	1101-010
1	Capacitor, bypass 500 mmf 20K volt	C28	1107-002
1	Capacitor, variable, 250 mmf	C30	1105-003
1	Dual 800 mmf 1600 volt ceramic disc	C31, C32	1104-002
1	Capacitor mica .001 mf 2500 volt W.	C33	1102-006
1	Capacitor, mica 500 mmf 2500 volt W.	C34	1102-005
1	Capacitor, mica 400 mmf 2500 volt W.	C35	1102-008
1	Capacitor, mica 20 mmf 2500 volt W.	C36	1102-004
1	Capacitor, mica 100 mmf 2500 volt W.	C37	1102-003
1	Capacitor, 350 variable	C38	1105-004
1	Choke, filter, Screen B+	CH1	1300-011
1	Choke, screen modulation	CH2	1300-002
1	Fuse, 3 amp, 3AG	FS1	1500-002
1	Jack, key	J1	2004-001
1	Jack, SSB Input	J2	2000-002
1	Connector, antenna coax	J3	2000-004
1	Connector, antenna coax	J4	2000-004
1	Coil, Osc. Plate	L1	1400-007A
1	Coil, Osc. Plate	L2	1400-006
1	Coil, Buffer Plate	L3	1400-004
1	Coil, SSB Input link	L4	1400-005
1	Coil, 10M Final Plate	L5A	1400-029
1	Coil, Final Plate 20-40M	L5B	1400-001
1	Coil, Final Plate 80-160M	L5C	1400-009
1	Coil, Matching 160M	L5	1400-010
1	Meter, 3" shielded 0-100 MA	M1	2500-006
1	Meter, 3" shielded 0-400 MA	M2	2500-008
1	Parasitic Suppressor Buffer Plate	PS1	1301-009
1	Choke, 2.4 MH, 50 MA	RFC1	1301-001
1	Choke, 2.5 MH, 200 MA	RFC2	1301-002
1	Choke, 2.5 MH, 200 MA	RFC3	1301-003
1	Choke, 1 MH, 600 MA	RFC4	1301-004
1	Choke, 2.5 MH, 200 MA	RFC5	1301-002
1	Choke, RF, Meter	RFC6	1301-008
1	Choke, RF, Meter	RFC7	1301-008
1	Choke, RF, Meter	RFC8	1301-008
1	Choke, RF, Meter	RFC9	1301-008
1	Choke, 2.5 MH, 200 MA	RFC10	1301-003
1	Relay, Screen B+	RLY-1	3500-002

SECTION IX

PARTS LIST (RF SECTION)

Quan.	Description	Circuit Designation	WRL Part No.
1	Relay, Antenna Changeover	RLY-2	3500-001
1	Resistor, 47K-½ Watt	R1	1000-002
1	Resistor, 1 meg. ½ Watt	R2	1000-023
1	Resistor, 47K-1 Watt	R3	1001-009
1	Resistor, 22K-1 Watt	R4	1001-010
1	Resistor, 120 ohm ½ Watt	R5	1000-003
1	Resistor, 22K-½ Watt	R6	1000-008
1	Resistor, 6000 ohm 10 W.	R7	1003-010
1	Resistor, 1 meg, ½ Watt	R8	1000-023
1	Potentiometer, 500 K	R9	2300-001
1	Resistor, 47 K, ½ Watt	R10	1000-002
1	Resistor, 2500 ohm 10 W.	R11	1003-005
1	Resistor, 1000 ohm 10 W.	R12	1003-004
1	Control, 25K Wire Wound	R13	2300-003
1	Resistor, 3000 ohm 10 W.	R14	1003-003
1	Resistor, 22 ohm 1 Watt	R15	1001-001
1	Resistor, 2500 ohm 10 W.	R16	1003-005
1	Resistor, 560 ohm 1 W	R17	1001-002
1	Resistor, 5000 ohm 10 W.	R18	1003-002
1	Resistor, 22 ohm 1 Watt	R19	1001-001
1	Resistor, 22 ohm 2 Watt	R20	1002-001
1	Resistor, 56 ohm 1 Watt	R21	1001-003
1	Resistor, 22 ohm 1 Watt	R22	1001-001
1	Resistor, 20 K ohm, 20 Watt	R23	1004-001
1	Resistor, 50 K ohm, 10 Watt	R24	1003-009

Quan.	Description	Circuit Designation	WRL Part No.
1	Resistor, 68 K ohm, 2 Watt	R42	1002-006
1	Resistor, 47 K, ½ Watt	R43	1000-002
1	Safety Terminal, RF B+	ST1	2200-002
1	Socket, RF Power Input	S01	1600-003
1	Socket, VFO Input	S02	2001-011
1	Switch, Exciter Metering	SW1	2100-005
1	Switch, Exciter band-change	SW2	2100-002
1	Switch, Bias	SW3	2101-001
1	Switch, Function	SW4	2100-004
1	Switch, Final Band-change	SW5	2100-001A
1	Switch, Antenna Load-ing	SW6	2100-001A
1	Switch, Xtal/VFO	SW7	2101-001
1	Transformer, Final Filament	T1	1202-001
1	Transformer, Screen and Bias Power	T2	1200-001

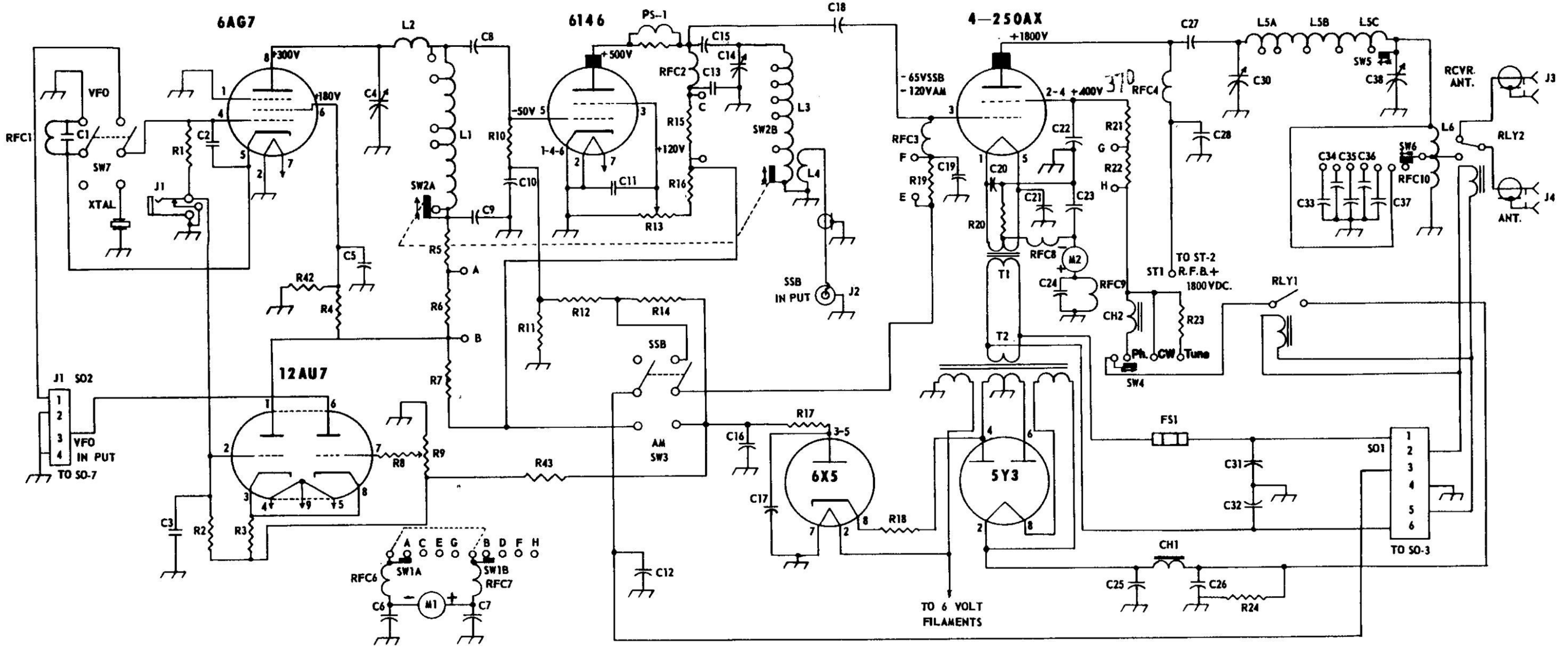
Quan.	Description	Circuit Designa- tion	WRL Part No.
1	Capacitor, electroly- tic, 25 mf, 25 volt	C39	1106-003
1	Capacitor, electroly- tic, 50 mf, 25 volt	C40	1106-005
1	Capacitor, electroly- tic, 8 mf, 450 volt	C41	1106-004
1	Capacitor, Tubular, .1 mf, 200 volt	C42	1100-001
1	Capacitor, ceramic, disc, .005 mf, 600 volt	C43	1101-003
1	Capacitor, electroly- tic, 25 mf, 25 volt	C44	1106-003
1	Capacitor, electroly- tic, 8 mf, 450 volt	C45	1106-004
1	Capacitor, electroly- tic, 8 mf, 450 volt	C46	1106-004
1	Capacitor, tubular, .02 mf, 200 volt	C48	1100-002
1	Capacitor, electroly- tic, 8 mf, 450 volt	C49	1106-004
1	Capacitor, electroly- tic, 25 mf, 25 volt	C50	1106-003
1	Capacitor, electroly- tic, 8 mf, 450 volt	C51	1106-004
1	Capacitor, ceramic, disc, 500 mmf, 600 volt	C52	1101-005
1	Capacitor, oil, 6 mf, 1000 volt	C53	1103-004
1	Capacitor, ceramic, disc, .01, 1000 volt	C54	1101-024
1	Choke, filter, 7H, 200 Ma.	CH3	1300-008
1	Choke, filter, 7H, 350 Ma.	CH4	1300-010
1	Jack, Microphone input	J5	2000-001
1	Jack, phone patch input	J6	200R-002
1	Meter, 3" sq., 0-300 Ma	M3	2500-007
1	Couplet, Triode	PC81	1109-001
1	Couplet, Triode	PC91	1109-002
1	Relay, push-to-talk control	RLY3	3500-006
1	Relay, modulator out- put shorting relay	RLY4	3500-005
1	Relay, modulator plate ccontrol	RLY5	3500-003
1	Resistor, 47 K ohm, ½ Watt	R25	1000-002
1	Resistor, 2.2 megohm, ½ Watt	R26	1000-005
1	Resistor, 2200 ohm, ½W.	R27	1000-006
1	Potentiometer, 500 K ohm	R28	2300-001
1	Resistor, 560 K ohm, ½W.	R29	1000-022
1	Resistor, 1500 ohm, ½W.	R30	1000-007

Quan.	Description	Circuit Designa- tion	WRL Part No.
1	Resistor, 22 K ohm ½ Watt	R31	1000-008
1	Resistor, 1 meg ohm, ½ Watt	R32	1000-023
1	Resistor, 390 K ohm, ½ Watt	R33	1000-015
1	Resistor, 220 K ohm, ½ Watt	R34	1000-019
1	Resistor, 22 K ohm, ½ Watt	R35	1000-008
1	Resistor, 50 K ohm, 20 Watt	R36	1004-002
1	Resistor, 390 ohm, 2 Watt	R37	1002-005
1	Resistor, 22 K ohm, 2 Watt	R38	1002-003
1	Resistor, 47 K ohm, ½ Watt	R39	1000-002
1	Resistor, 100K ohm, ½ Watt	R40	1000-004
1	Resistor, 50 K ohm, 50 Watt	R41	1006-002
1	Resistor, 47 K ohm, ½ Watt	R44	1000-002
1	Terminal, Safety, Modulator B+	ST2	2200-002
1	Safety Terminal, Modulator B+	ST3	2200-002
1	Rectifier, Push-to- talk	SR1	3700-003
1	Socket, Modulator power input	S03	1600-007
1	Socket, Push-to-talk connecting	S04	2000-003
1	Switch, Modulator fila- ment	SW8	2101-003
1	Switch, Modulator plate control	SW9	2101-003
1	Switch, Compressor On/ Off	SW10	2101-001
1	Transformer, Audio driver	T3	1203-006
1	Transformer, Modulation	T4	1203-004
1	Transformer, Speech filament	T5	1202-010
1	Transformer, Modula- tor filament	T6	1202-007
1	Transformer, Low B+ rectifier	T7	1202-009
1	Transformer, High B+ rectifier	T8	1202-002
1	Transformer, Dual High and Low B+ plate	T9	1201-004

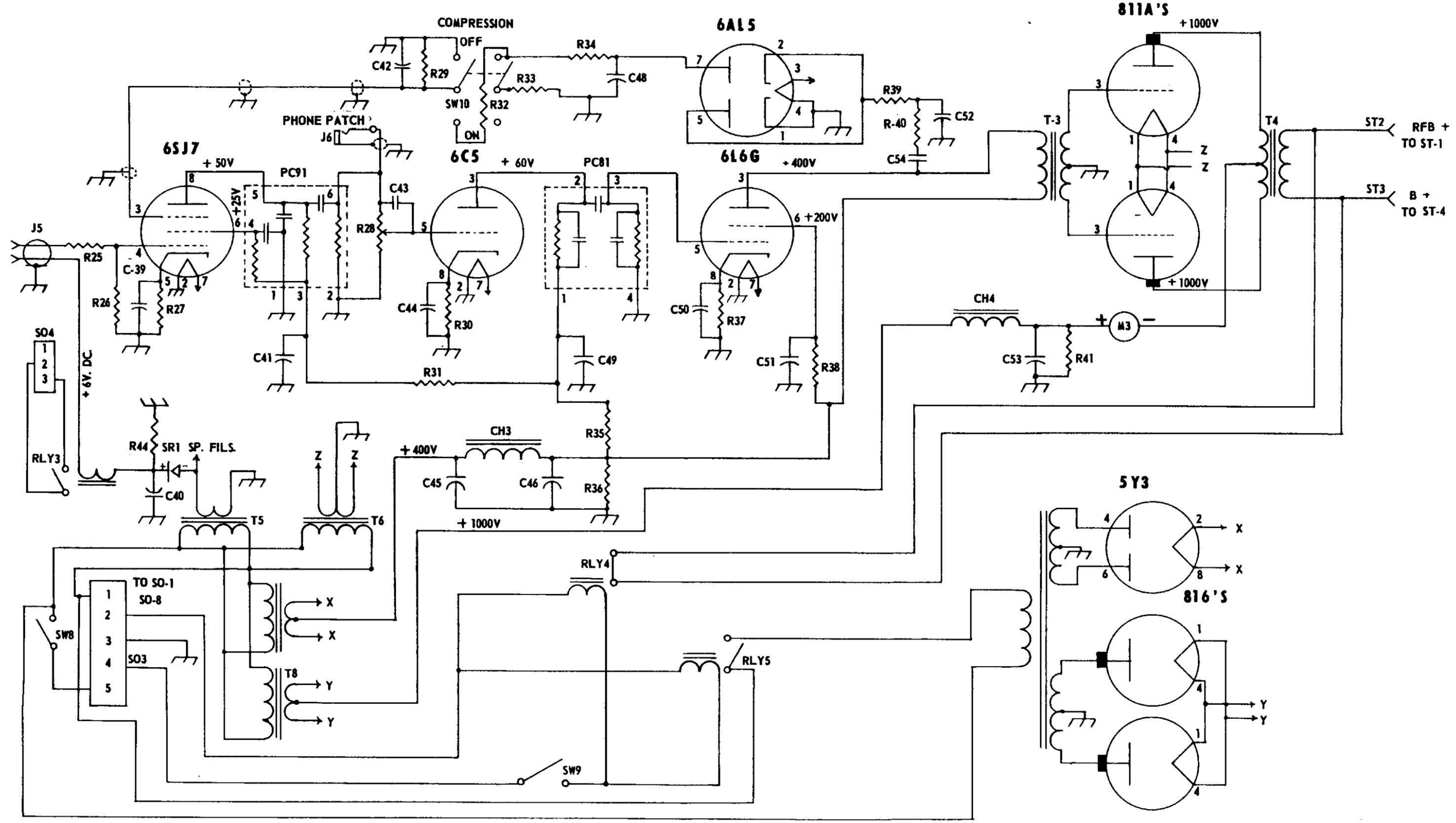
PARTS LIST (POWER SUPPLY SECTION)

Quan.	Description	Circuit Designation	WRL Part No.
1	Capacitor, AC line filter	C55	1104-001
1	Capacitor, AC line filter	C56	1104-001
1	Capacitor, electrolytic 30 mf, 250 volt	C57	1106-010
1	Capacitor, electrolytic, 30 mf, 250 volt	C58	1106-010
1	Capacitor, electrolytic, 12 mf, 700 volt	C59	1106-007
1	Capacitor, oil filled, 4 mf, 300 volt	C60	1103-003
1	Capacitor, variable trimmer, 9 mmf	C61	1105-010
1	Capacitor, variable trimmer, 9 mmf	C62	1105-010
1	Capacitor, zero temperature, 18 mmf	C63	1101-017
1	Capacitor, N150 Compensating, 39 mmf	C64	1101-006
1	Capacitor, Dual VFO tuning	C65	1105-007
1	Capacitor, zero temperature, 18 mmf	C66	1101-017
1	Capacitor, N150 Compensating, 120 mmf	C67	1101-016
1	Capacitor, variable trimmer, 15 mmf	C68	1105-008
1	Capacitor, zero temperature, 130 mmf	C69	1101-013
1	Capacitor, zero temperature, 82 mmf	C70	1101-012
1	Capacitor, silver mica, 500 mmf, 500 volt	C71	1102-007
1	Capacitor, silver mica, 500 mmf, 500 volt	C72	1102-007
1	Capacitor, ceramic disc .005 mf, 600 volt	C73	1101-003
1	Capacitor, zero temperature, 82 mmf	C74	1101-012
1	Capacitor, zero temperature, 18 mmf	C75	1101-017
1	Capacitor, ceramic disc .005 mf, 600 volt	C76	1101-003
1	Capacitor, ceramic disc .005 mf, 600 volt	C77	1101-003
1	Capacitor, zero temperature, 100 mmf	C78	1101-014
1	Choke, B+ filter, 7H, 200 Ma	CH5	1300-008
1	Choke, B+ filter, 15H, 50 Ma	CH6	1300-001
1	Choke, B+ filter, 7H, 350 Ma	CH7	1300-010
1	Fuse, AC line, 20A	FS2	1500-005
1	Lamp, Indicator	I1	3800-003

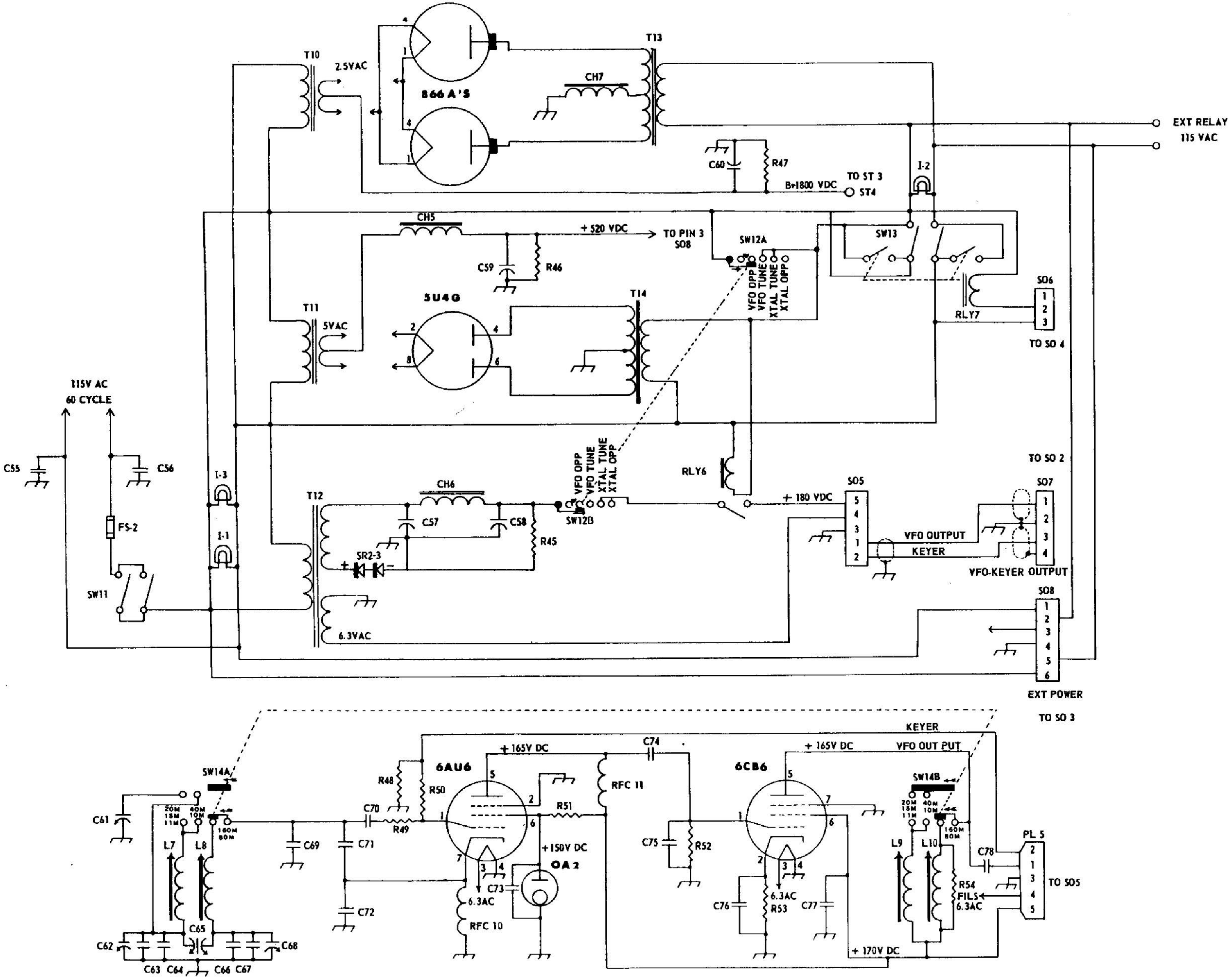
Quan.	Designation	Circuit Designation	WRL Part No.
1	Lamp, Indicator	I2	3800-003
1	Lamp, VFO Indicator	I3	3800-001
1	Coil, VFO Grid, 40M	L7	1400-026
1	Coil, VFO Grid, 160M	L8	1400-025
1	Coil, VFO Output, 40M	L9	1400-024
1	Coil, VFO Output, 160M	L10	1400-021A
1	Socket, VFO output	PL5	1600-007
1	Relay, VFO B+	RLY6	3500-007
1	Relay, B+ plate control	RLY7	3500-004
1	Resistor, 100 K ohm ½ Watt	R45	1000-009
1	Resistor, 50 K ohm, 20 Watt	R46	1004-002
1	Resistor, 75 K ohm, 100 Watt	R47	1008-001
1	Resistor, 22 K ohm, ½ Watt	R48	1000-008
1	Resistor, 56 ohm, ½ Watt	R49	1000-010
1	Resistor, 100 K ohm, ½ Watt	R50	1000-009
1	Resistor, 3300 ohm, 1 Watt	R51	1001-011
1	Resistor, 22 K ohm, ½ Watt	R52	1000-008
1	Resistor, 120 ohm, ½ Watt	R53	1000-003
1	Resistor, 15 K ohm, ½ Watt	R54	1000-013
1	Rectifier, VFO B+	SR2	3700-001
1	Rectifier, VFO B+	SR3	3700-001
1	Terminal, B+ safety	ST4	2200-002
1	Socket, VFO power input	SO5	1600-007
1	Socket, Push-to-talk control	SO6	2000-003
1	Socket, VFO output	SO7	2000-006
1	Socket, AC power output	SO8	1600-003
1	Switch, Main AC power	SW11	2101-003
1	Switch, Exciter power	SW12	2100-005
1	Switch, Transmit	SW13	2101-003
1	Switch, VFO band	SW14	2100-006C
1	Transformer, filament 866A	T10	1202-006
1	Transformer, filament 5U4G	T11	1202-009
1	Transformer, VFO power	T12	1200-003
1	Transformer, High B+ plate	T13	1201-006A
1	Transformer, Low B+ plate	T14	1201-002



WRL 500B RF SECTION



WRL 500B MODULATOR



WRL 500B POWER SUPPLY AND VFO