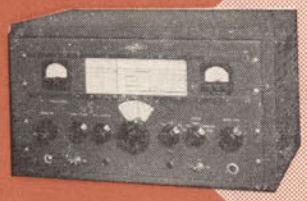
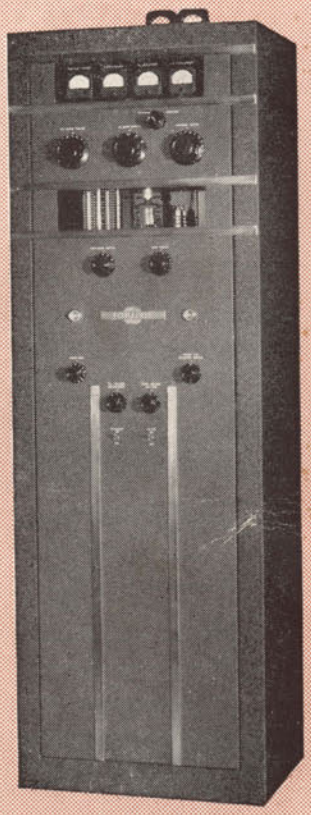
COLLINS EQUIPMENT OF HIGHER QUALITY FOR DISCRIMINATING AMATEURS

The 75A Double Conversion Amateur Band Receiver.

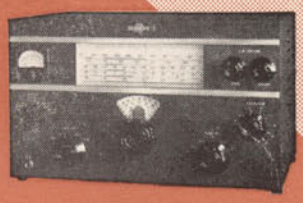


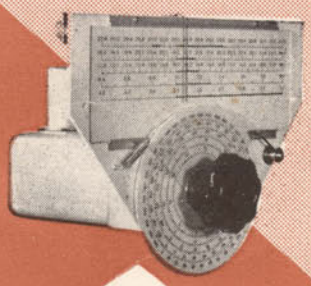
The 32V 150 Watt Bandswitching Transmitter. Permeability Tuned Oscillator Control.

The 30K 500 Watt Bandswitching Transmitter



The 310A Exciter Unit (for the 30K). Single Dial Tuning. Permeability Tuned Oscillator Control. Bandswitching.





The 70E-8 Permeability Tuned Oscillator. 1600-2000 kc.

REGISTRATION CARD

Gentlemen: Date_____

I have purchased the following unit of Collins Amateur Radio Equipment:

Model No._____

Date Purchased_____ Serial No._____

Purchased From:

Dealer's Name:_____

Dealer's Address:_____

I am familiar with the Collins Guarantee of Amateur equipment as printed in the instruction book and request that you register ownership of the above described equipment in my name.

Owner's Name_____ Call_____

Address _____

Please send data on the following equipment:_____

BE SURE TO FILL IN THIS CARD COMPLETELY. THANK YOU.

INSTRUCTION BOOK

for

310B-1/3 AMATEUR EXCITER

Manufactured By

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

310B1- Ser 208

520 9345 00

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

SECTION 1

GENERAL DESCRIPTION

1.1. GENERAL.

1.1.1. This instruction book has been written to assist in the installation, adjustment, operation and maintenance of the Collins Model 310B-1 and 310B-3 Exciter Units.

1.1.2. The Model 310B-1 Exciter is a versatile bandswitching exciter rated at 15 watts output on all amateur bands under 32 mc and can be used as a complete low power cw transmitter with the addition of suitable antenna tuning apparatus. The Model 310B-3 is identical to the 310B-1 in all respects except that a built in antenna tuner has been added making it possible to load the exciter with almost any type of antenna. Provision is made in the 310B-1 for adding an antenna tuner at a later date, if such is desired.

The Model 310B has ample output to drive the new pentode type tubes to a kilowatt input. The units employ the Collins 70E-8 permeability tuned oscillator which has a linear tuning range of 1600 kc to 2000 kc. Its overall accuracy and stability is extremely good. Sixteen turns of the vernier dial are required to cover the tuning range.

1.1.3. The tube line-up is composed of a 6SJ7 variable frequency oscillator, three 6AG7 frequency multipliers and a 2E26 power amplifier. In addition a 6H6, a 5Z4 and a 5R4GY are used as rectifiers to furnish bias, low and high voltage power. The low voltage to the oscillator tube is regulated by a VR105 and a VR150. A type 6SL7GT is used as a sidetone oscillator to furnish an audio tone for monitoring the keying.

The 310B has separate multiplier and amplifier tuning controls, a POWER ON-OFF switch, an EMISSION switch with MO OFF, MO TEST, STAND BY, and SEND positions, a buffer BAND SWITCH, a METER switch for reading PLATE and GRID currents in the 2E26 stage, CW sidetone pitch and volume controls and a keying wave-form selector.

1.2. REFERENCE DATA.

1.2.1. EQUIPMENT SUPPLIED.

310B-1	310B-3
310B-1 Complete with tubes	310B-3 Complete with tubes
Set of PA Coils (4) *	Set of PA Coils (4) *
Instruction Book	Set of Antenna Coils (2)
	Instruction Book

1.2.2. FREQUENCY RANGE. - All amateur bands between 3.5 and 32 mc.

1.2.3. FREQUENCY CONTROL. - Variable frequency oscillator with a type 70E-8 PTO.

* 80M, 40M, 20M, 15-11-10M.

1.2.4. TYPE OF EMISSION. - cw only.

1.2.5. NOMINAL CARRIER OUTPUT. - 15 watts on all bands.

1.2.6. POWER REQUIRED. - NORMAL OPERATING POWER. - 160 watts at 115 v, 50/60 cps.

STAND-BY POWER. - 100 watts.

1.2.7. OUTPUT IMPEDANCE. - 310B-1 = 73 ohms nominal.

SECTION 2

INSTALLATION

2.1. PRELIMINARY.

2.1.1. UNPACKING. - Once the 310B has been unpacked, search the packing material for small packages, check the tuning and control knobs for proper operation, and check the condition and placement of the tubes. If a claim for transportation damages is to be made, the original packing material must be preserved and the transportation company called immediately.

2.2. INSTALLATION PROCEDURE.

2.2.1. MOUNTING POSITION. - The 310B Exciter Unit should be placed in a position convenient to the operator to take full advantage of the variable frequency features of the equipment. For this reason, the output has been terminated in a low impedance circuit suitable for feeding a low impedance coaxial or twin line. Lines of 52 to 75 ohms are recommended. This line should terminate in soldering lugs at the exciter end.

The 310B-3 Unit, which has an antenna tuner included, can be connected to almost any type of transmission line or antenna at the Antenna Terminals or can be used as an exciter by choice.

2.2.2. CONNECTIONS.

(a) POWER. - The 310B is equipped with a power cord having a standard convenience outlet type plug. The power requirements are 160 watts at 115 volts 50/60 cps. Do not use power lines of other voltages or frequencies.

(b) OUTPUT.

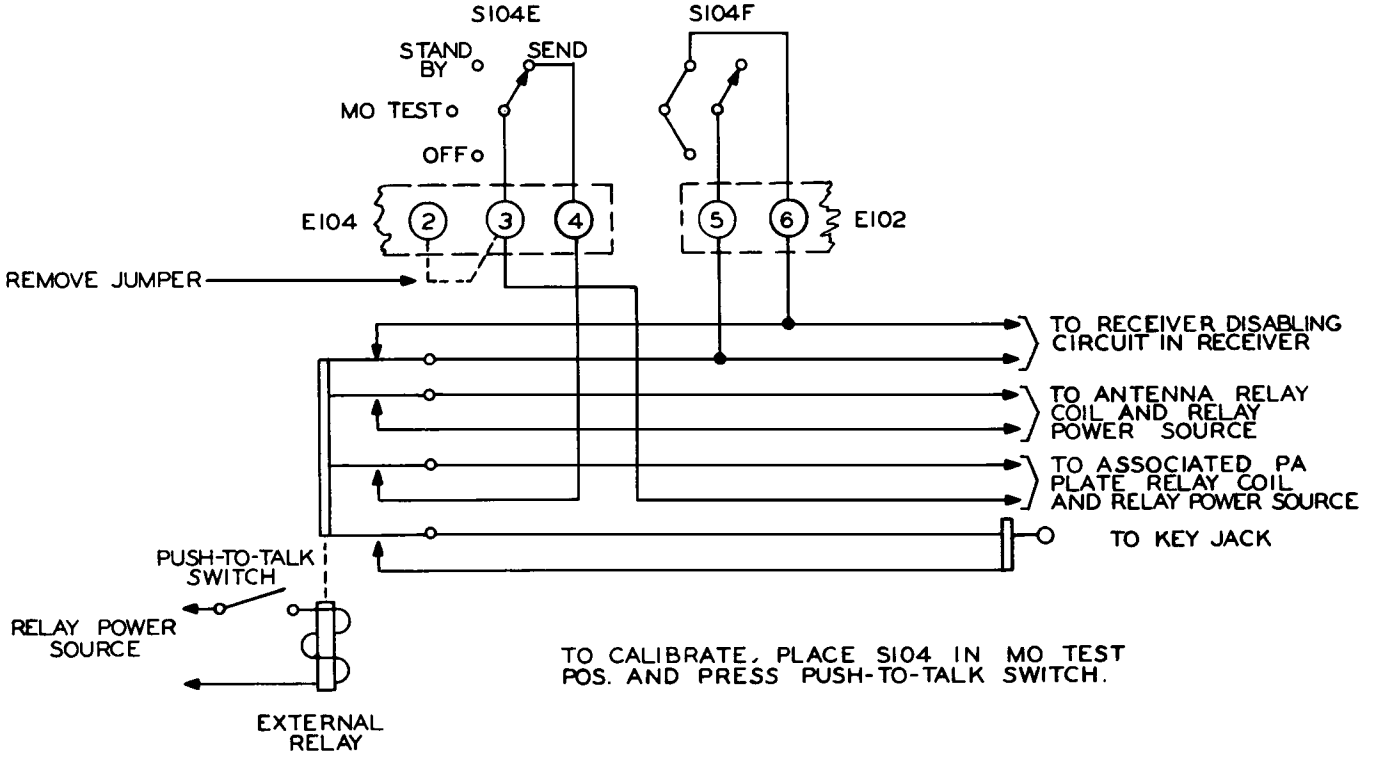
(1) 310B-1. - 52 to 75 ohm impedance coaxial or twin line preferred. Connect to terminals 10 and 11 on E101 at the rear of the unit. If pi network output is desired, remove the jumper between 12 and 13 on E101, connect a 400 mmf variable capacitor from 12 to 13 (rotor on 13). Connect antenna to 12, ground to 13. When using pi network to feed coaxial transmission lines, connect inner conductor to 12, outer conductor to 13. Start with the 400 mmf capacitor set at maximum capacity. Decrease capacity to increase antenna loading.

(2) 310B-3. - Same as for 310B-1 when the antenna tuner is not used. In this case, remove the antenna coil. When used with the built-in antenna network, remove the jumper from terminals number 12 and 13 on E101. The antenna should be connected to terminals 1 and 2 on J201 (push posts next to the antenna coil). See paragraph 3.1.4. and figure 3-2 for antenna tuner operation.

(c) SIDETONE. - The cw sidetone is terminated at terminals #7 and 8 on E102 at the rear of the unit. Speakers with impedance ratings of 500 to 1000 ohms or headphones with impedance ratings of 500 ohms or higher will be suitable for sidetone reproduction.

(d) RECEIVER MUTING. - Terminals 8 and 9 on E102 are provided for use with a Collins 75A receiver to provide cw break-in operation. This connection furnishes 15 volts of positive voltage which cuts the receiver audio off when the key is pressed. Terminal #9 should be connected to terminal B on the receiver while terminal #8 should be connected to G.

(e) 115 v ac EXTERNAL RELAY. - An external 115 v ac relay can be operated by connecting its coil to terminals #1 and 4 on E104. This relay will operate when the 310B EMISSION switch is in the SEND position. Such a relay could be used for applying plate power to a power amplifier stage or for antenna changeover.



2-1 Connections for Push-to-talk Operation

(f) EXTERNAL RELAY. - A d-c or other external relay can be connected to operate when the EMISSION control is in the SEND position. If this feature is used, remove the jumper from terminals 2 and 3 on E104 and connect the relay coil in series with the proper power source and with terminals number 3 and 4.

(g) KEY. - The telegraph key is connected by means of an ordinary single circuit phone plug. The key jack is located at the rear of the unit.

(h) PUSH-TO-TALK. - Push-to-talk operation can be had by connecting an external push-to-talk switch in series with the coil of an external relay which is equipped with several sets of contacts, one of which shorts the telegraph key, one which turns on the plate power of the associated power amplifier and modulator, one which disables the associated receiver and one which operates the antenna changeover relay. See figure 2-1. In this type of operation, the EMISSION switch would be left in the SEND position except when calibrating.

(i) RECEIVER DISABLING. - The receiver disabling circuit can be connected to terminals 5 and 6. This connection goes to section S104F of the EMISSION switch. The connection is closed circuit for all positions of the EMISSION switch except the SEND position.

SECTION 3

ADJUSTMENT AND OPERATION

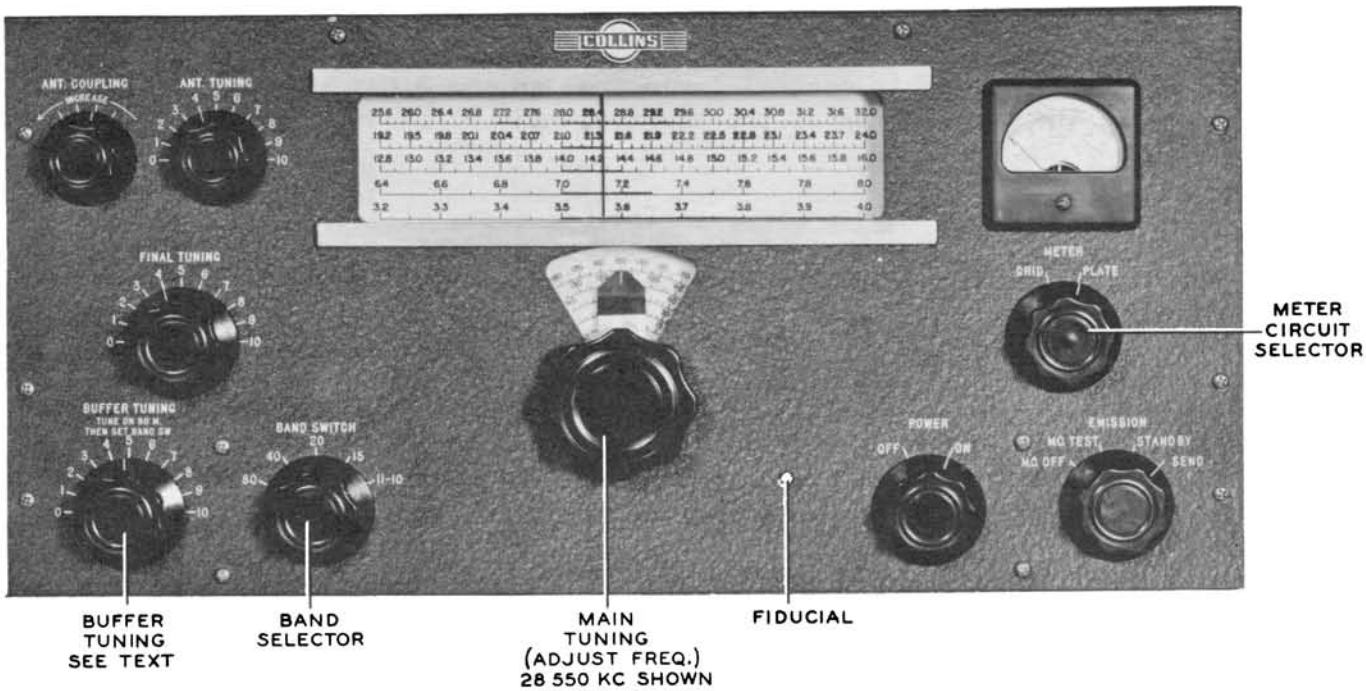
3.1. ADJUSTMENTS.

3.1.1. FUNCTION OF CONTROLS.

(a) MAIN TUNING DIAL. - The main tuning dial consists of a slide rule dial which roughly indicates the frequency and a vernier dial which is calibrated directly in kilocycles. A separate scale is used for each band except the 10 and 11 meter bands which have a scale common to both. The dial is read by combining the vernier reading with the slide rule reading. A study of figure 3-1 and a few practice set-ups will enable the operator to set the exciter on any pre-determined frequency.

(b) BAND SWITCH. - This control selects the proper multiplier circuits for operation on the various amateur bands. The power amplifier coils are plug-in type.

(c) BUFFER TUNING. - The buffer (multiplier) stages are gang tuned by this control. This control should be tuned first for maximum PA grid current in the 80 meter position of the BAND SWITCH. This is important, otherwise the buffer might possibly be tuned to an undesired harmonic.



(310B-3 Front View Shown)

(d) FINAL TUNING. - This control tunes the final amplifier plate circuit. Tune for minimum plate current.

(e) EMISSION. - This is the exciter function switch. In the MO OFF position, plate and screen voltage is removed from the final amplifier and MO tubes. In the MO TEST position, the key circuit is completed (providing key is depressed or key plug is removed from key jack) and plate voltage is applied to the MO. In the STAND-BY position, plate voltage is applied to the MO but the key circuit is again broken. In the SEND position, plate and screen voltage is applied to the MO and PA stages and the key circuit is again closed. The receiver disabling section of the function switch makes contact for all positions except the SEND position. The external relay section of the function switch is open on all positions except the SEND position.

(f) METER. - The METER control selects the power amplifier grid or the power amplifier plate circuits for metering. Use the 0-10 scale for grid current and the 0-100 scale for plate current readings.

(g) POWER. - The power switch disconnects both sides of the power line in the OFF position.

(h) FIDUCIAL. - This control, a small screw visable through a hole to the right of the MAIN TUNING knob is used to set the vernier dial indicator to exact frequency.

(i) SIDETONE PITCH. - This control is located on the 310B chassis and is adjusted through the top opening of the cabinet. Adjust sidetone pitch to individual taste.

(j) SIDETONE VOLUME. - This control is located along side of the Sidetone Pitch Control. It controls the volume of the sidetone output and is most useful where additional audio amplifiers are used on the sidetone output.

(k) KEYING WAVE-FORM SEL. - *

3.1.2. PRINCIPLE OF OPERATION. - The 310B exciter unit operates in a very straightforward manner. The only precaution to be observed is that of first tuning the BUFFER stages with the BAND SWITCH in the 80M position regardless of upon which band operations is desired. If this is not done, the buffer may be erroniously tuned to some undesired harmonic. Small changes in frequency can be safely negotiated without switching to the 80 meter position if due care is taken.

3.1.3. TUNING ADJUSTMENTS. - Place the EMISSION control in the MO TEST position and turn the POWER switch ON. Allow the equipment one minute in which to warm up.

(a) Plug in the correct PA coil for the band upon which operation is desired.

(b) Place the METER switch in the GRID position.

(c) Turn the MAIN TUNING control to the chosen frequency.

(d) Place the BAND switch in the 80M position.

(e) Press the key and tune the BUFFER TUNING control for maximum grid current

(f) Place the BAND switch in the position corresponding to the band upon which operation is desired. Normal grid current should be indicated.

(g) Readjust the buffer tuning control slightly for maximum grid current, if necessary.

(h) Place the METER switch in the PLATE position.

(i) Place the EMISSION switch in the SEND position and with the key down, tune the FINAL TUNING for minimum plate current dip.

3.1.4. ANTENNA TUNING 310B-3. The antenna tuner in the 310B-3 unit is a very flexible unit which will tune and load into most types of antenna or trans is-sion line. This unit adds two controls on the front panel, one for ANTENNA COUPLING and one for ANTENNA TUNING. Two plug-in type antenna coils are necessary for complete coverage of the range of the exciter. The antenna coil is coupled to the plate coil by extending a few turns of the plate coil into the center of the antenna coil. Series or parallel tuning is accomplished with one split stator tuning condenser by means of a small jumper which, when open, places the tuning condenser in series and when closed, places the tuning condenser in parallel.

* A toggle switch located at the rear of the chassis is used to select "soft" or "sharp" keying.

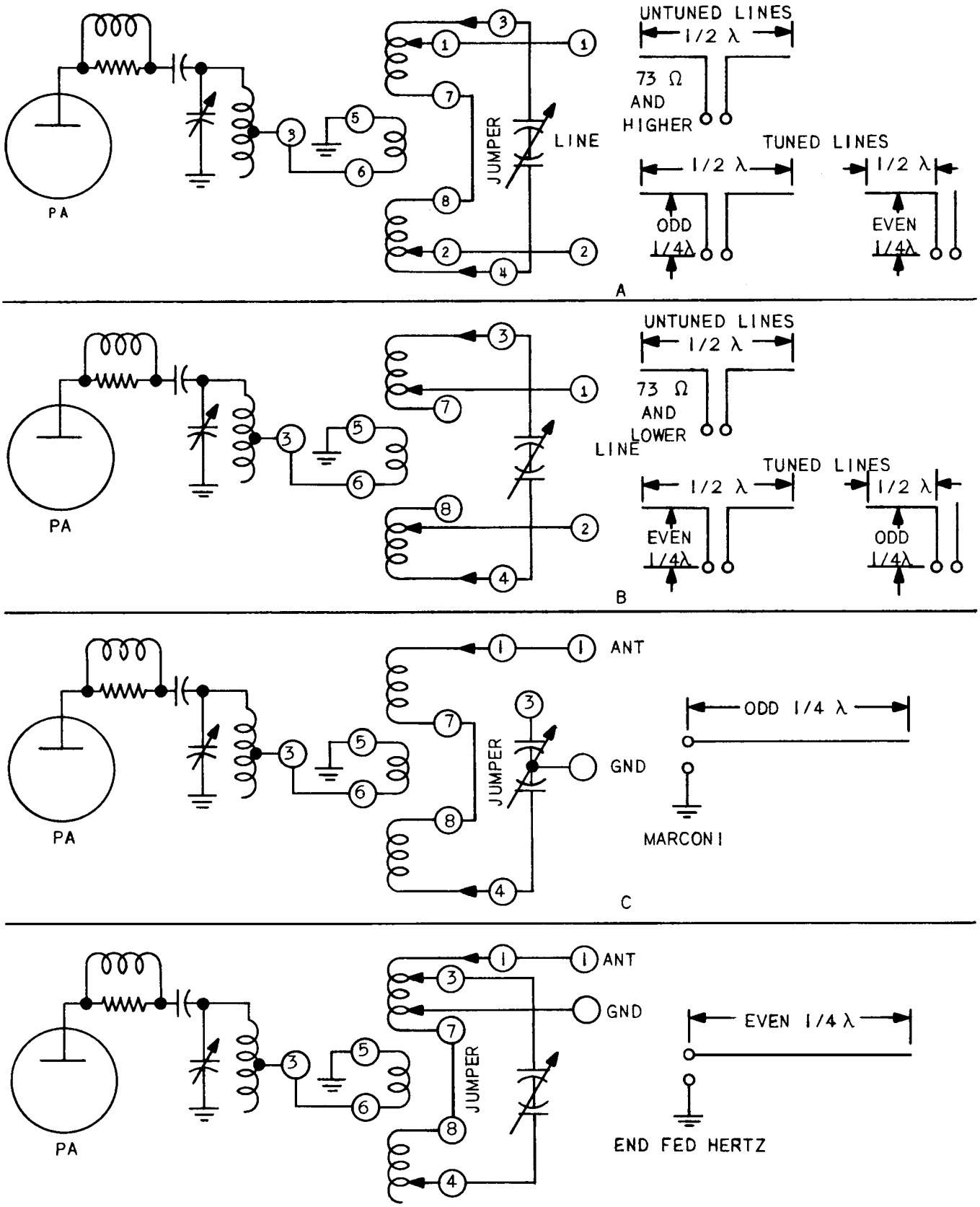


Figure 3-2 Typical Antenna Tuner Circuits

The point of antenna attachment can be changed by two coil tapping wheels as can the points of condenser attachment.

Best results with the following methods of tuning is usually obtained with the ANT. COUPLING control set for heavy loading and the feed lines adjusted for approximately proper loading.

(a) UNTUNED HIGH IMPEDANCE TRANSMISSION LINE. - If the line has a characteristic impedance of 73 ohms or more, parallel tuning of the antenna coils L201A and L201B should be employed. For parallel tuning, the jumper bar seen above the antenna coils should be closed. The transmission line taps should be set on the same turns as the capacitor taps to start with, then varied towards the center of the coils until proper loading is obtained. The transmission line taps are those at the bottom of the coils while the antenna tuning capacitor taps are those nearer the top. In this type of operation, low values of capacitance and high values of inductance for the operating frequency generally are best. See illustration A, figure 3-2.

(b) UNTUNED LOW IMPEDANCE TRANSMISSION LINES. - Transmission lines having a characteristic impedance of less than 50 ohms require series tuning of the antenna coils. This is done by opening the jumper bar above the coils and moving the transmission line tap arms to the inside coil turns. The capacitor taps should be set at the outside turns and varied towards the inside turns until proper loading is obtained. Higher values of tuning capacity usually work out best in this type of operation. See illustration B, figure 3-2.

(c) VOLTAGE FED TUNED LINES. - Transmission lines which have a high voltage point at the transmitter should be connected and tuned identically with instructions given in (a) above. It is recommended that tuned lines be cut to multiples of a quarter wave in length.

(d) CURRENT FED TUNED LINES. - Transmission lines having high current at the transmitter end should be connected and tuned identically with instructions given in (b) above. These lines should also be cut to exact multiples of a quarter wave in length.

(e) QUARTER WAVE MARCONI. - Series tuning is indicated for quarter wave Marconi antennas. In this type of operation, the antenna tuning circuit should be connected so that the two sections of the antenna coil and one half of the antenna tuning capacitor are in series. To do this, connect the ground lead to the rotor of the antenna tuning capacitor (terminal 14 on E101), connect the antenna to terminal number 1 on one end of the antenna coil, connect one stator (terminal number 4) of the tuning capacitor to the other end of the antenna coil and disconnect the other stator (terminal number 3) completely. (Place a piece of insulation material between the tap rotor and the coil turns.)

(f) END FED HALF WAVE. - This tuner can be used to tune this type of antenna also. Parallel tuning should be employed for this type operation. The antenna should be connected to one end (terminal number 1) of the antenna coil, a ground

connection should be made to the inside turn of one of the antenna coils (terminal number 7) and the jumper bar on top of the coils should be closed. The tuning capacitors taps should be equally spaced from each end of the antenna coils for proper tuning at the operating frequency. See illustration D, figure 3-2.

3.1.5. CALIBRATION. - To set the dial calibration, proceed as follows:

(a) Turn the exciter ON.

(b) Tune a communications receiver to WWV at 15 mc. The BFO in the receiver should be off.

(c) Rotate the BAND SWITCH to 80M.

(d) Rotate the tuning dial to 15 mc.

(e) Rotate the EMISSION switch to MO TEST and press the telegraph key.

(f) Continue rotating the TUNING dial about 15 mc until zero beat is obtained with WWV.

(g) Turn the FIDUCIAL screw until the vernier dial line indicates 15 mc.

(h) The dial can be calibrated on 4.0 mc in like manner by referring to the following table.

WWV Frequency	Dial Setting (kc)	Oscillator Frequency	Oscillator Harmonic
10 mc	4,000	2,000	5th
15 mc	15,000	1,875	8th

3.2. OPERATION. - Once the 310B has been tuned, it will be found that operation of the unit is exceedingly simple. Ordinarily the EMISSION selector switch will remain in the STAND-BY position during receiving. If it is desired to check the frequency or move the frequency of the 310B to another place in the band, place the EMISSION switch in the MO TEST position and press the telegraph key. A calibration signal can now be heard in the receiver which will aid in setting the frequency to a clear spot in the band. If, on the 80M band, too much feed thru from the MO is experienced during reception, the EMISSION switch should be turned to the MO OFF position instead of STAND-BY.

Remember to adjust the BUFFER TUNING control with the BAND SWITCH in the 80M position in every instance. Tune for maximum grid current (not to exceed 3.5 ma - detune BUFFER TUNING if necessary).

TYPICAL METER READINGS

310B-1	3.5 mc	7.0 mc	14 mc	21 mc	28 mc
GRID	3	3	3	3	3
PLATE	70	70	70	70	70

SECTION 4

MAINTENANCE

4.1. OSCILLATOR ALIGNMENT. - Should trouble develop in the high frequency master oscillator, the unit should be returned to the factory for servicing. However, the unit can be serviced and realigned by persons understanding such techniques providing accurate test equipment is at hand. A crystal controlled frequency standard with outputs at 1700 and 2000 kc with an accuracy of better than .015 percent must be used for setting the band edges.

4.1.1. PROCEDURE.

(a) Apply power to the exciter unit and warm up the oscillator for approximately 30 minutes.

(b) Couple a receiver to the output of the oscillator.

(c) Set the vernier index to exact center of the dial window.

(d) Tune receiver to output of 1700 kc frequency standard.

(e) Rotate MO to vicinity of 3400 kc on the exciter dial and zero beat with the signal from the standard. Write dial reading down for use as a reference.

(f) Rotate the MO dial toward 4 mc exactly 12 turns.

(g) Tune the receiver to the 2000 kc output of the standard.

(h) The MO should zero beat with the 2000 kc output of the standard at exactly 12 turns of the MO dial.

(i) If such is the case but the dial reading is incorrect, loosen the set screw in the oscillator coupler and turn the dial to the correct reading (4000 kc) after which, tighten the set screws again. If the MO does not zero beat with the standard at 4 mc, proceed as follows:

(j) Read the kc difference (the difference of where the signal appeared from where it should have appeared after 12 turns) and multiply it by 5, add this figure to the actual beat note dial setting if the beat note was less than 12 turns or subtract it if the beat note occurred at more than 12 turns. Now set the dial to this new frequency, remove the trimmer plug from the top of the oscillator, and turn the adjustment until zero beat is again reached.

It will be found that the high and low ends are very nearly 12 turns apart. Repeat the above procedure until such is the case; remember that a new reference point will occur at the low end of the dial each time.

Examples of above operations:

#1

Beat note at low end of dial	= 3402 kc
Reading at which beat note should appear after 12 turns of dial	= 4002 kc
Actual dial reading	= 4003 kc
Difference frequency (4003 - 4002)	= 1 kc
Multiplied by 5	= 5 kc
Subtracted from 4003 (since beat note occurred at more than 12 turns)	= 3998 kc

After setting dial to 3998 kc and zero beating the MO to the standard with the trimmer adjustment, the low end beat note should appear at 3398 kc.

#2

Beat note on low end of dial	= 3498 kc
Reading at which dial should appear after 12 turns	= 3998 kc
Actual dial reading	= 3996 kc
Difference frequency (3998 - 3996)	= 2 kc
Multiplied by 5	= 10 kc
Added to 3996 (since beat note occurred at less than 12 turns of the dial)	= 4006 kc

After setting the dial at 4006 and zero beating the MO to the standard with the trimmer adjustment, the low end beat note should appear at 3406 kc.

(k) After the oscillator has been adjusted to cover the range 3400 to 4000 kc in exactly 12 turns, the coupler set screws can be loosened and the dial set on frequency.

NOTE

The above method of adjustment is that which is used at the factory. This is a short cut method and proves very reliable. Actually, the object is to get the 1700 kc and the 2000 kc outputs of the oscillator exactly 12

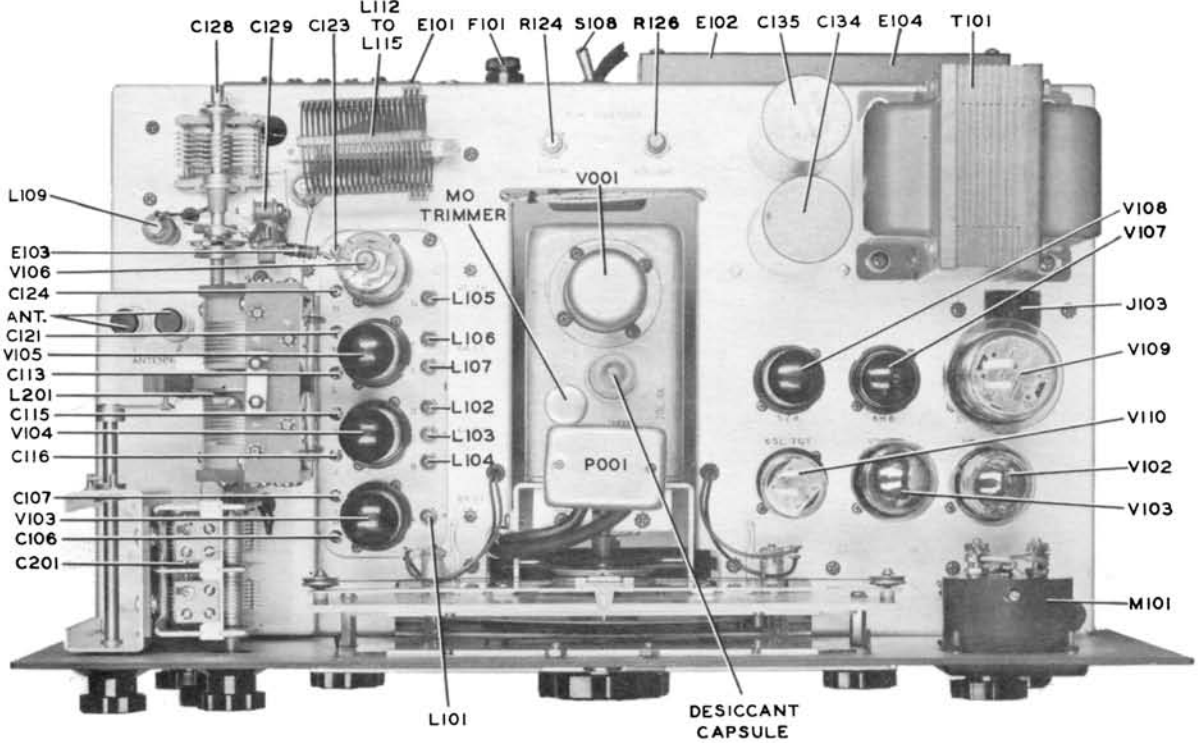


FIGURE 4-1 310B-3 TOP VIEW

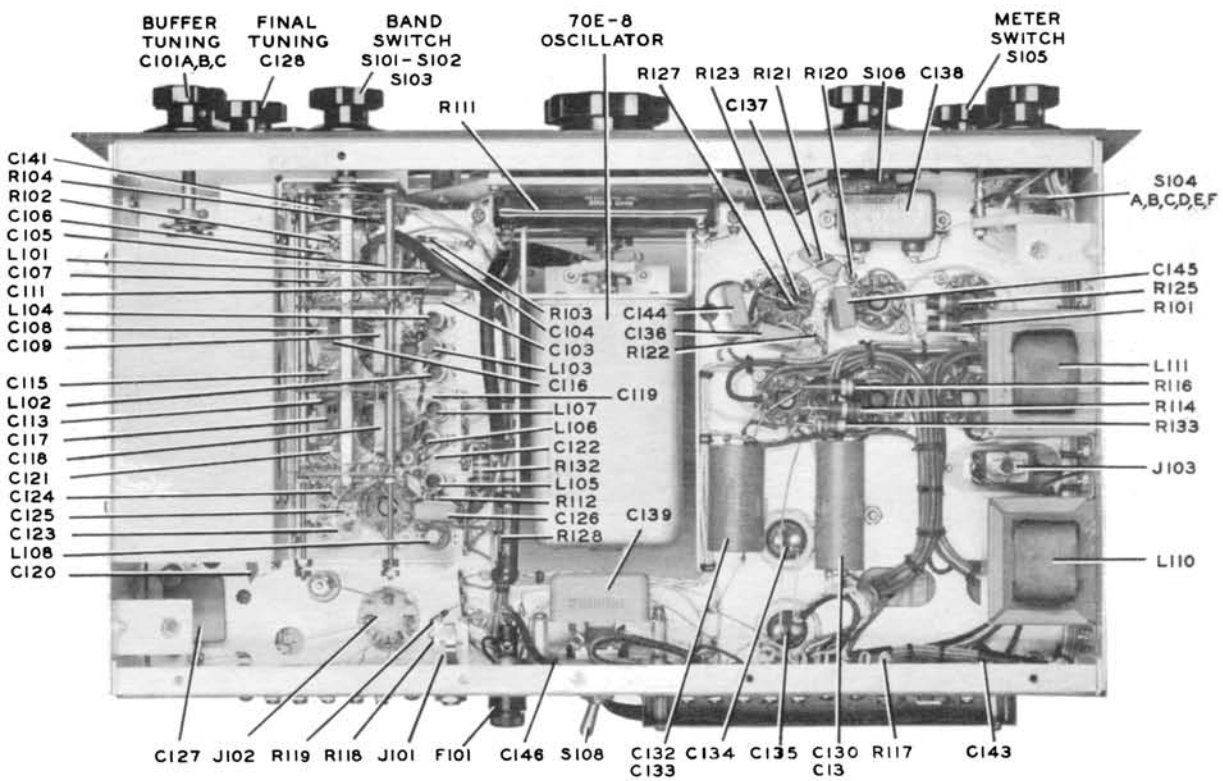


FIGURE 4-2 310B-3 BOTTOM VIEW

turns apart and it can be attained by using the slower method of moving the trimmer capacitor in one direction or the other and checking the results until the desired answer is obtained. Be sure and replace the trimmer cover plug after alignment.

4.2. MULTIPLIER ALIGNMENT. - The multiplier stages can be realigned with the use of a screwdriver if the amount of misalignment is small. If service work has been done on the equipment and it is suspected that the misalignment is great, an absorption type frequency meter covering the range 3.2 to 32 mc should be at hand.

4.2.1. ALIGNMENT DATA.

(a) The following table lists the output frequency in MC of each stage on both ends of each band, and the trimmer to be adjusted for alignment.

Band	Osc. 6SJ7	1st Mult. 6AG7	Adj.	2nd Mult. 6AG7	Adj.	3rd Mult. 6AG7	Adj.	PA 2E26
80	1.6	3.2	A	--	--	--	--	3.2
"	2.0	4.0	H	--	--	--	--	4.0
40	1.6	3.2	-	6.4	B	--	--	6.4
"	2.0	4.0	I	8.0	J	--	--	8.0
20	1.6	3.2	-	6.4	--	12.8	E	12.8
"	2.0	4.0	-	8.0	--	16.0	N	16.0
15	1.6	3.2	-	9.6	C	19.2	F	19.2
"	2.0	4.0	-	12.0	K	24.0	O	24.0
11 and 10	1.6	3.2	-	12.8	D	25.6	G	25.6
"	2.0	4.0	-	16.0	L	32.0	M	32.0

(b) Location of trimmers. - Looking at the unit from the front, the capacity trimmers are located under the row of rubber grommets on the left side of the sub chassis. These trimmers are to be adjusted with a screwdriver thru the grommets. These trimmers are located in the following order reading from front to rear: C106 (H), C107 (I), C116 (J), C115 (K), C113 (L), C121 (M), C124 (N) and C123 (O). The inductance trimmers are on the right side of the sub chassis, located in the following order, front to rear: L101 (A), L104 (B), L103 (C), L102 (D), L107 (E), L106 (F), L105 (G).

4.2.2. EQUIPMENT SET UP.

(a) Power switch on.

(b) Control switch on MO TEST.

(c) Meter switch on GRID.

4.2.3. ALIGNMENT PROCEDURE.

(a) Inductance trimmer adjustments.

(1) Turn tuning dial to 3.2 mc.

(2) Turn Buffer tuning control to 0.

(3) Turn band sw to 80 and adjust A for max reading on grid meter.

(4) Turn band sw to 40 and adjust B to max on meter.

(5) Turn band sw to 20 and adjust E to max on meter. Check with wave meter at 12.8 mc.

(6) Turn band sw to 15 and adjust C. Check frequency at 9.6 on L103 and adjust F and check frequency at 19.2 mc on L106.

(7) Turn band sw to 10, adjust D and check frequency at 12.8 mc on L102, adjust G and check frequency at 25.6 mc on L105.

(b) Capacity trimmer adjustments.

(1) Turn tuning dial to 4.0 mc.

(2) Turn buffer tuning control to 10.

(3) Turn band sw to 80 and adjust H for max on grid meter.

(4) Turn band sw to 40 and adjust I and J for max on meter.

(5) Turn band sw to 20, adjust N and check frequency at 16.0 mc on L107.

(6) Turn band sw to 15 meters, adjust K and check frequency at 12.0 mc on L103, adjust O and check frequency at 24.0 mc on L106.

(7) Turn band sw to 10, adjust L and check frequency at 16.0 mc on L102, adjust M and check frequency at 32 mc on L105.

(8) Repeat steps (a) and (b) until buffer tuning control tracks on both ends of each band.

CAUTION

With this control properly tracked it is normally possible to tune the buffer tuning control to the wrong oscillator harmonic when operating on the 40-20-15 and 10 meter bands.

(c) In normal operation, therefore, to assure that the multiplier stages are tuned to the proper harmonic of the MO the following tuning procedure should be followed:

(1) Set main tuning dial at desired frequency.

(2) Set buffer band switch at 80.

(3) Adjust buffer tuning for maximum grid current.

(4) Set buffer band switch at desired band.

(5) Normal grid current should be indicated. A slight readjustment of the buffer tuning control may be required to obtain maximum grid current.

4.3. LUBRICATION. - The following parts should be lubricated annually or whenever the need arises. Brush a thin film of MOBILE PD 535A (Socony Vacuum Oil Co.) on the points of mechanical contact. Don't over-lubricate.

(a) Panel Bushings.

(1) Buffer tuning.

(2) PA Plate tuning

(b) Dial.

(1) Bearing on main tuning shaft.

(c) Antenna Coupler.

(1) Two bearings on antenna coupling control shaft.

4.4. OSCILLATOR TUBE REMOVAL. - Replacing an oscillator tube requires the breaking of the seal around the shield and it will then become necessary to reseal the shield. If it becomes necessary to replace an oscillator tube, use a glyptal cement or a generous portion of Duco cement to reseal the shield.

4.5. DESICCANT CAPSULE. - A silica-gel tube is mounted on the top of the oscillator shield. The silica-gel absorbs moisture from within the oscillator and aids in retaining the oscillator calibration. Moisture causes the color of the silica-gel to change from blue to pink. The silica-gel tube is screwed into a hole in the shield. The plastic tube should be replaced by a new tube of silica-gel when all of the material within the tube has changed from blue to pink. New tubes of silica-gel may be ordered from the Collins Radio Company.

NOTE

The seal around the oscillator tube shield and the silica-gel tube is more easily broken if the parts are warm. This can be done safely with a light bulb or infra-red lamp placed close to the oscillator.

310B1/3 EXCITER

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
70E-8A	OSCILLATOR: This unit has been dehydrated and hermetically sealed, and should be returned to Collins Radio Company, if servicing is required.		
C101	C101A, B, C	CAPACITOR: 3 sect; 6-35 mmf per sect	922 0026 00
C101A	V101 plate tuning	CAPACITOR: Sect of C101	
C101B	V104 plate tuning	CAPACITOR: Sect of C101	
C101C	V105 plate tuning	CAPACITOR: Sect of C101	
C102	Osc. B+ filter	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C103	V101 plate by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C104	V101 screen by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C105	V101 cathode by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C106	L101 trimmer	CAPACITOR: 2.5-6 mmf, 1500 TV ac peak	917 1017 00
C107	L101 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C108	V104 grid coupling	CAPACITOR: 10 mmf ±20%; 500 WV	935 0071 00
C109	V104 cathode by-pass	CAPACITOR: 10,000 mmf ±20%; 350 WV	913 0106 00
C110	B+ by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C111	V104 screen by-pass	CAPACITOR: 2,200 mmf ±20%, 500 WV	935 4068 00
C112	V104 plate circuit by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C113	L102 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C114	V101 grid loading	CAPACITOR: 10 mmf ± 20%, 500 WV	935 0071 00
C115	403 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C116	L104 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C117	V105 grid coupling	CAPACITOR: 47 mmf ±20%, 500 WV	935 0093 00
C118	V105 cathode by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C119	V105 screen by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C120	B+ by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C121	L105 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C122	V105 plate circuit by-pass	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C123	L106 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C124	L107 trimmer	CAPACITOR: 5-20 mmf, 1500 TV ac peak	917 1018 00
C125	V106 grid coupling	CAPACITOR: 100 mmf ±10%, 500 TV	916 4003 00
C126	V106 screen by-pass	CAPACITOR: 10,000 mmf ±10%, 300 WV	935 2117 00
C127	V106 plate by-pass	CAPACITOR: 2200 mmf ±20%, 1200 WV	936 0272 00
C128	PA plate tuning	CAPACITOR: 7-100 mmf, 14 plates	922 0025 00
C129	V106 plate blocking	CAPACITOR: 1000 mmf ±20%, 2500 WV	936 0250 00
C130 and C131	Bias supply filter	CAPACITOR: dual, 20-20 mf -10+100%, 150 WV	183 1066 00
C132 and C133	Low voltage filter	CAPACITOR: dual, 10-10 mf -10+50%, 450 WV	183 1085 00
C134	High voltage filter	CAPACITOR: 4 mf +40-15%, 600 WV	961 3005 00
C135	High voltage filter	CAPACITOR: 4 mf +40-15%, 600 WV	961 3005 00
C136	Sidetone feedback	CAPACITOR: 10,000 mmf ±10%, 300 WV	935 2117 00
C137	Sidetone feedback	CAPACITOR: 10,000 mmf ±10%, 300 WV	935 2117 00
C138	Sidetone plate de-coupling	CAPACITOR: 0.5 mf +40-15%, 400 WV	961 4077 00
C139	Sidetone output coupling	CAPACITOR: 0.5 mf +40-15%, 400 WV	961 4077 00
C140	V101 grid coupling	CAPACITOR: 100 mmf ±10%, 500 WV	916 4003 00
C141	V101 grid decoupling	CAPACITOR: 0.1 mf ±10%, 400 WV	931 3020 00
C142	V106 grid coupling	CAPACITOR: 100 mmf ±10%, 500 WV	916 4003 00
C143	AC line by-pass	CAPACITOR: .02 mf ±20%, 600 WV	931 7640 00
C144	Sidetone by-pass	CAPACITOR: 10,000 mmf ±10%, 300 WV	935 2117 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C145	Sidetone pitch control by-pass	CAPACITOR: 10,000 mmf ±10%, 300 WV	935 2117 00
C146	Wave shaping	CAPACITOR: .1 mf ±10%, 400 WV	931 3020 00
E101	Rear terminal strip	CONNECTOR: 5 screw term on bakelite strip	367 1800 00
E102	Rear terminal strip	CONNECTOR: 5 screw term on bakelite strip	367 1800 00
E103	V106 plate	SUPPRESSOR: 2 turns #20 wire on 47 ohm 1 w resistor	503 4254 001
E104	Rear terminal strip	CONNECTOR: 4 screw term on bakelite strip	367 1700 00
		KNOB: black phenolic (2 used on 310B-3 only)	281 0004 00
		KNOB: black phenolic	281 0018 00
		KNOB: black phenolic, skirt w/indicator mark (qty six used)	281 0007 00
F101	Line fuse	FUSE: cartridge, 2 amp, 250 v	264 4070 00
I101, I102	Dial light Dial light	LAMP: Pilot light bulb, 6.3 v, .15 amp, min bayonet base	262 3240 00
J101	Key jack	JACK: Phone, midget, 2 circ	360 1090 00
J102	PA plate coil socket	SOCKET: Coil std 5 pin	220 1530 00
J103		CONNECTOR: 2 cond convenience outlet	368 4500 00
L101	V101 plate	COIL: 60T #32 wire, powdered iron core	503 4217 002
L102	V104 plate	COIL: 14T #22 wire, powdered iron core	503 4214 002
L103	V104 plate	COIL: 19T #26 wire, powdered iron core	503 4215 002
L104	V104 plate	COIL: 30T #26 wire, powdered iron core	503 4216 002
L105	V105 plate	COIL: 7T #20 wire, powdered iron core	503 4212 002
L106	V105 plate	COIL: 9T #20 wire, powdered iron core	503 4213 002
L107	V105 plate	COIL: 14T #22 wire, powdered iron core	503 4214 002
L108	V106 grid choke	COIL: RF choke, 2.5 mh ±10%, .125 amp	240 5300 00
L109	V106 plate choke	COIL: RF choke, 2.5 mh ±10%, .125 amp	240 5300 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
L110	HV filter	REACTOR: filter, 12 hy, .080 amp	668 0004 00
L111	LV filter	REACTOR: filter, 12 hy, .080 amp	668 0004 00
*L112	V106 plate	COIL: 80 meter, plug-in	503 5858 001
*L113	V106 plate	COIL: 40 meter, plug-in	503 5857 001
*L114	V106 plate	COIL: 20 meter, plug-in	503 5856 001
*L115	V106 plate	COIL: 10 meter, plug-in	503 5855 001
L116	Osc. plate r-f choke	COIL: RF choke, 2.5 mh ±20%, 0.125 amp	240 2100 00
M101	Grid plate	METER: 0-5 ma DC, 2% accuracy scale 0-10, 0-100 ma DC	458 0155 00
P101	A-C connector cord	PLUG & CORD ASSEM: AC, std 2 prong plug	426 1003 00
P102	Door interlock plug	PLUG: two prong, male	368 0028 00
R101	Voltage regulator dropping	RESISTOR: 1500 ohm ±10%, 2 w	745 5093 00
R102	V101 grid	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R103	V101 cathode	RESISTOR: 1500 ohm ±10%, 1/2 w	745 1093 00
R104	V101 screen	RESISTOR: 22,000 ohm ±10%, 1/2 w	745 1142 00
R105	V104 grid	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R106	V104 cathode	RESISTOR: 1500 ohm ±10%, 1/2 w	745 1093 00
R107	V104 screen	RESISTOR: 68,000 ohm ±10%, 1/2 w	745 1163 00
R108	V105 grid	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R109	V105 cathode	RESISTOR: 330 ohm ±10%, 1/2 w	745 1065 00
R110	V105 screen	RESISTOR: 22,000 ohm ±10%, 1/2 w	745 1142 00
R111	HV supply bleeder	RESISTOR: 50,000 ohm ±10%, 50 w size	710 4504 20
R112	V106 screen suppressor	RESISTOR: 47 ohm ±10%, 1/2 w	745 1030 00
R113	Meter multiplier	RESISTOR: 1.2 ohm ±5%, 1/2 w	707 0053 00

* Use plug-in coil of appropriate frequency.

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
R114	Bias supply filter	RESISTOR: 2200 ohm ±10%, 2 w	745 5100 00
R115	Meter multiplier	RESISTOR: 25 ohm ±5%, 1/2 w	701 0001 00
R116	LV supply bleeder	RESISTOR: 100,000 ohm ±10%, 2 w	745 5170 00
R117	Bias supply bleeder	RESISTOR: 4700 ohm ±10%, 1 w	745 3114 00
R118	Keying circuit	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R119	Keying circuit	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R120	Sidetone decoupling	RESISTOR: 10,000 ohm ±10%, 1/2 w	745 1128 00
R121	V110 plate	RESISTOR: 47,000 ohm ±10%, 1/2 w	745 1156 00
R122	V110 plate	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R123	V110 grid	RESISTOR: 4700 ohm ±10%, 1/2 w	745 1114 00
R124	Sidetone pitch control	RESISTOR: 0.25 megohm ±20%, 1/2 w	376 3776 00
R125	Voltage regulator dropping	RESISTOR: 1500 ohm ±10%, 2 w	745 5093 00
R126	Sidetone volume control	RESISTOR: 25,000 ohm ±20%	377 0007 00
R127	V110 grid	RESISTOR: 10,000 ohm ±10%, 1/2 w	745 1128 00
R128	V106 screen	RESISTOR: 10,000 ohm ±10%, 10 w size	710 1104 20
R129	L104 load	RESISTOR: 27,000 ohm ±10%, 1 w	745 3146 00
R130	L107 load	RESISTOR: 27,000 ohm ±10%, 1 w	745 3146 00
R131	L106 load	RESISTOR: 82,000 ohm ±10%, 1 w	745 3167 00
R132	V106 screen bleeder	RESISTOR: 68,000 ohm ±10%, 2 w	745 5163 00
R133	Power amplifier grid	RESISTOR: 4700 ohm ±10%, 1 w	745 3114 00
S101 and S102 and S103	Band (V101 plate) Band (V104 plate) Band (V105 plate)	SWITCH: Rotary, 3 sect, 4 pole, 5 pos, shorting	259 0211 00
S104	Emission switch	SWITCH: Rotary, 4 pos, 7 pole, 2 sect	259 0227 00
S105	Meter selector	SWITCH: Rotary, 2 pos, 2 circ, non-shorting	259 0238 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
S106	Power	SWITCH: Rotary, DPDT, 3 amp at 250 v, 6 amp at 125 v	260 0563 00
S107	Interlock	SWITCH: Snap, SPNO, 10 amp at 115 v, 5 amp at 230 v AC	260 0708 00
S108	Wave shaping capacitor selecting	SWITCH: Toggle, SPST, lug type term	260 0529 00
T101	Power	TRANSFORMER: Power, 60 cps, pri: 115 v sec #1: 1360 v, .06 amp, CT, sec #2: 600 v, .06 amp/CT/150 v, .007 amp, sec #2: 5 v, 3 amp, sec #4: 5 v, 3 amp, sec #3: 6.3 v, 4 amp/CT	662 0038 00
V101	1st buffer multiplier	TUBE: type 6AG7, video power amplifier pentode	255 0039 00
V102	Voltage regulator	TUBE: type VR150, voltage regulator	257 0001 00
V103	Voltage regulator	TUBE: type VR105, voltage regulator	257 0002 00
V104	2nd buffer multiplier	TUBE: type 6AG7, video power amplifier pentode	255 0039 00
V105	3rd buffer multiplier	TUBE: type 6AG7, video power amplifier pentode	255 0039 00
V106	Power amplifier	TUBE: type 2E26, VHF beam power amplifier	256 0084 00
V107	Bias rectifier	TUBE: type 6H6, twin diode	255 0117 00
V108	LV rectifier	TUBE: type 5Z4, full-wave high-vacuum rectifier	255 0084 00
V109	HV rectifier	TUBE: type 5R4GY, full-wave high-vacuum rectifier	257 0020 00
V110	Sidetone oscillator	TUBE: type 6SL7GT, twin-triode amplifier	255 0040 00
XF101	Holder for F101	HOLDER: fuse, extractor post	265 1002 00
XI101, XI102	Sockets for I101, I102	MTG BRKT: Pilot light socket, min bayonet	262 1210 00
XV101	Socket for V101	SOCKET: Tube, std octal	220 1005 00
XV102, XV103	Sockets for V102, V103	SOCKET: Tube, std octal	220 1851 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
XV104, XV105, XV106	Sockets for V104, V105, V106	SOCKET: Tube, std octal	220 1005 00
XV107, XV108, XV109, XV110	Sockets for V107, V108, V109, V110	SOCKET: Tube, std octal	220 1851 00

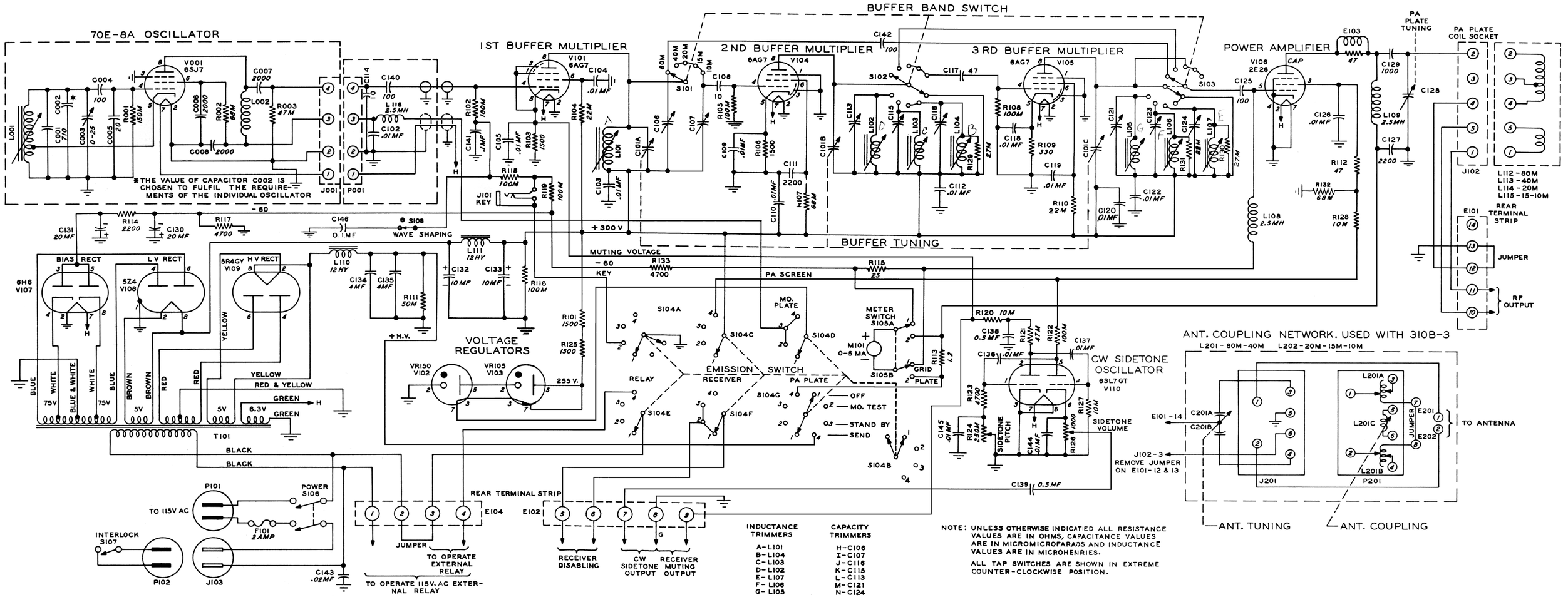


Figure 4-3 310B-1, 3 Schematic Diagram