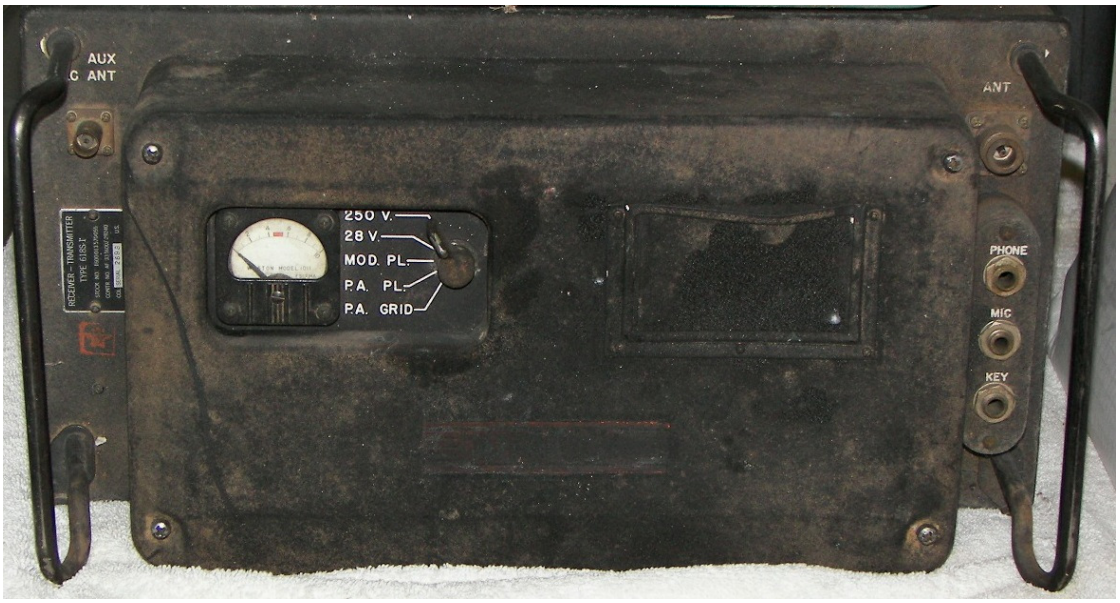
T.O. 12R2-4-6-2

COLLINS
618S-1
618S-1A
HF TRANCEIVER

AM / CW, 2 TO 25MHz, 4 Bands, 144 Channels



Also in this document:
Hookup and Channel Selection Notes
ARC-38 PTO Schematic for Continuous Coverage
BASIC Programs for Frequency and Crystal Calculations

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Part 3 of 3

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The maintenance kit includes a set of ten test crystals, three tube adapters, a gauge block, a dial gauge, an alignment tool, and a test kit case. If both the 478H-1 and its maintenance kit are available, the alignment procedures will be simplified greatly.

6-51. EXTENSION CABLES. The 618S-1 or 618S-1A subassemblies may be inspected and tested with power applied while removed from the main chassis with the use of extension cables. These cables are illustrated in figures 2-5 through 2-9 and may be fabricated from bulk supplies. Refer to paragraph 2-9 and table IX.

6-52. GAUGE BLOCK AND DIAL GAUGE. For alignment of the tuner subassembly, it is necessary to have a gauge block made of nonmagnetic metal, exactly 1.375 inches wide, thin enough to slide between the coil shields of the tuner subassembly, and long enough to be placed under the tuning rack. Also, it is necessary to have a dial gauge. The dial gauge must be capable of measuring from 0 to 0.798 inch, and should be mounted on a clamp bracket for securing to the rear plate of the tuner subassembly. The placement and use of the gauge block and dial gauge will be described in paragraphs 6-66 and 6-67.

6-53. ALIGNMENT OF R-F CRYSTAL OSCILLATOR SUBASSEMBLY.

6-54. Alignment of the r-f crystal oscillator subassembly consists of Autopositioner mechanical adjustments and switch alignment. All electrical alignment procedures are performed at the factory and further adjustment in the field is not recommended. Before performing the mechanical alignment procedures outlined in paragraphs 6-55 through 6-57, the r-f crystal oscillator subassembly should be removed from the main chassis. Refer to paragraph 5-30 for the removal and replacement procedure.

6-55. AUTOPOSITIONER RELAY ADJUSTMENT. Steps a through f describe the adjustment procedures for the Autopositioner relays of the r-f crystal oscillator subassembly. These procedures also may be used for adjustment of the bandchange autopositioner relay, K101. Steps a through f describe the adjustment method which should be employed with the autopositioner relay still installed. Paragraph 6-56, steps a through h, describe the adjustment method which should be used when replacing an autopositioner relay.

a. Loosen relay mounting screws.

b. With the pawl engaged in one of the notches of the stop wheel, hold the pawl fully seated in the notch.

c. Rotate the relay clockwise about the mounting screws so that the frame and armature contact the pawl projection to eliminate all lost motion in the relay.

d. Tighten relay mounting screws in this position.

e. Depress the relay armature, and check to see that the pawl lifts clear of the notch to allow free rotation of the stop wheel. Pawl should clear the stop-wheel teeth by about 1/64 of an inch. More than 1/32 of an inch clearance indicates excessive relay travel with a corresponding loss of power. Relay travel can be adjusted, if necessary, by loosening the two screws near the hinge and sliding the hinge plate up or down slightly as required.

f. The contacts on the relay should be adjusted to maintain contact when the pawl is resting on top of a stop-wheel tooth between positions with the relay de-energized. This is to insure that the motor will continue to drive until the pawl engages the proper notch, which opens the contacts by at least 0.025 inch. Contacts can be adjusted, if necessary, by bending the stationary contact arm.

6-56. AUTOPOSITIONER RELAY REPLACEMENT AND ADJUSTMENT. Steps a through h describe the adjustment procedures for the autopositioner relays of the r-f crystal oscillator subassembly, and also may be used for the bandchange autopositioner relay, K101. These adjustment methods should be used when it is necessary to replace and adjust an autopositioner relay. The steps of paragraph 6-55 describe the adjustment method to be used with the autopositioner still installed.

a. Seat the pawl in a notch of the stop wheel. Turn the gear train by hand, and allow the pawl to seat fully.

b. Place the relay so that the pawl finger comes between the relay spring and frame at about the middle of the spring.

c. Line up the mounting hole farthest from the pawl, and start the mounting screw without applying any pull to the relay spring. That is, let the relay turn clockwise slightly.

d. Turn the relay counterclockwise about this screw. This will let the pawl finger slide between the spring and relay arm. Start the second screw.

e. Hold the pawl firmly seated in the stop-wheel notch, and hold the relay frame against the pawl finger. Tighten mounting screws. See that the pawl is firmly seated and the relay armature and arm have no appreciable free play. Reposition, if necessary, to meet these conditions.

f. Depress the relay armature, and turn the relay manually to check the clearance between the pawl tip and the stop wheel. This should be 1/64 inch or less. If adjustment is required, loosen the two screws near the hinge point and slide the hinge plate up or down as required. Adjustment may be aided by placing a 0.020-inch feeler gauge between the armature and coil core. Be careful that the frame arm does not rub on the side of the frame and that the spring does not shift closer to the contacts when tightening the screws.

g. Check the operation of the relay contacts. With power off, depress the armature of the relay and turn the gearing to let the pawl tip rest on the stop wheel between notches. In this position, the relay contacts should be closed, and the armature and arm should have a small amount of free play to permit full contact pressure at the contact points.

h. If necessary, bend the stationary contacts in or out. Failure to make contact in this position may allow the autopositioner to set up on the wrong position, with the seeking switch circuit open, but with the pawl between notches. Excessive free play of the armature in this position indicates insufficient contact opening in the de-energized position.

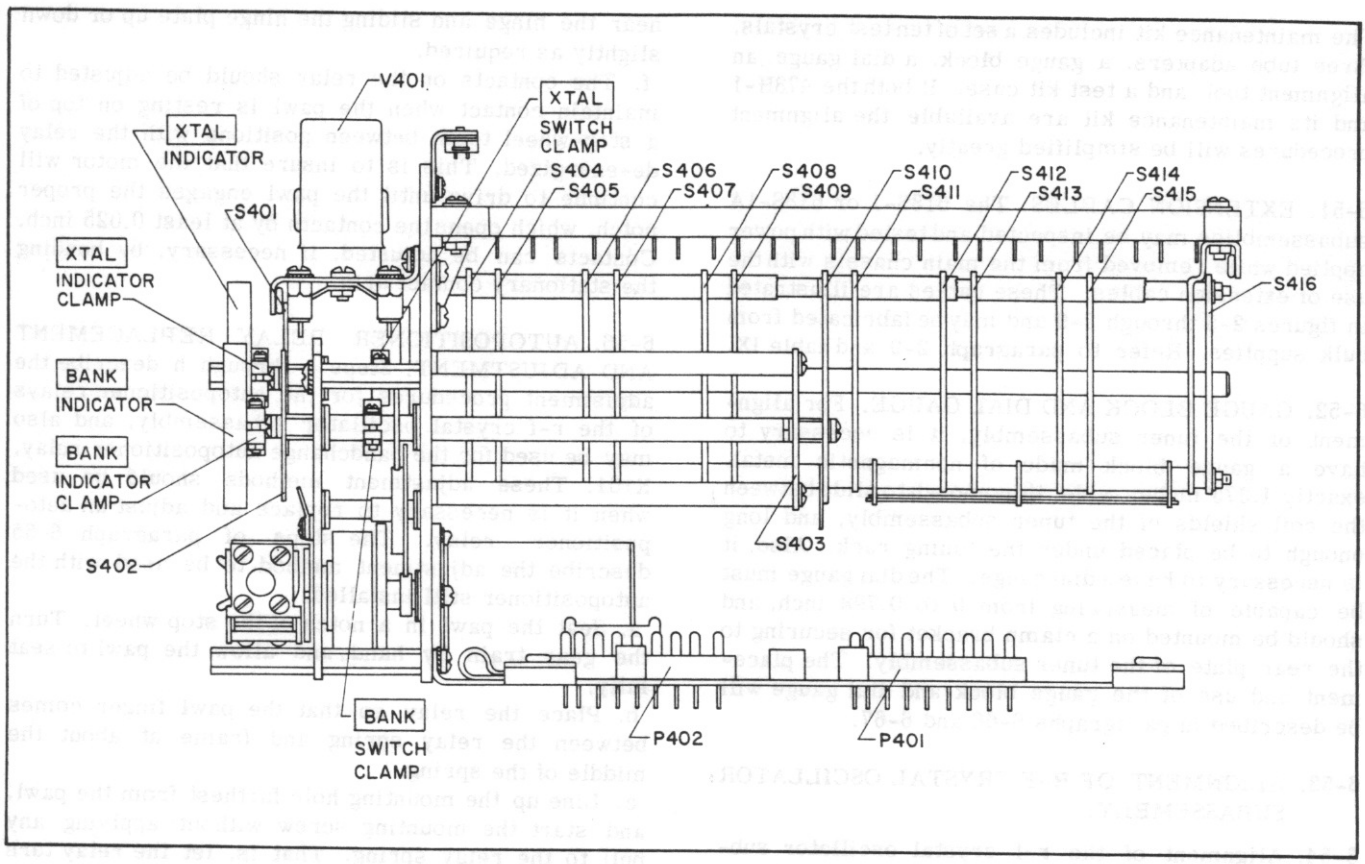


Figure 6-2. R-F Crystal Oscillator Subassembly, Right Side View, Switch Alignment Points

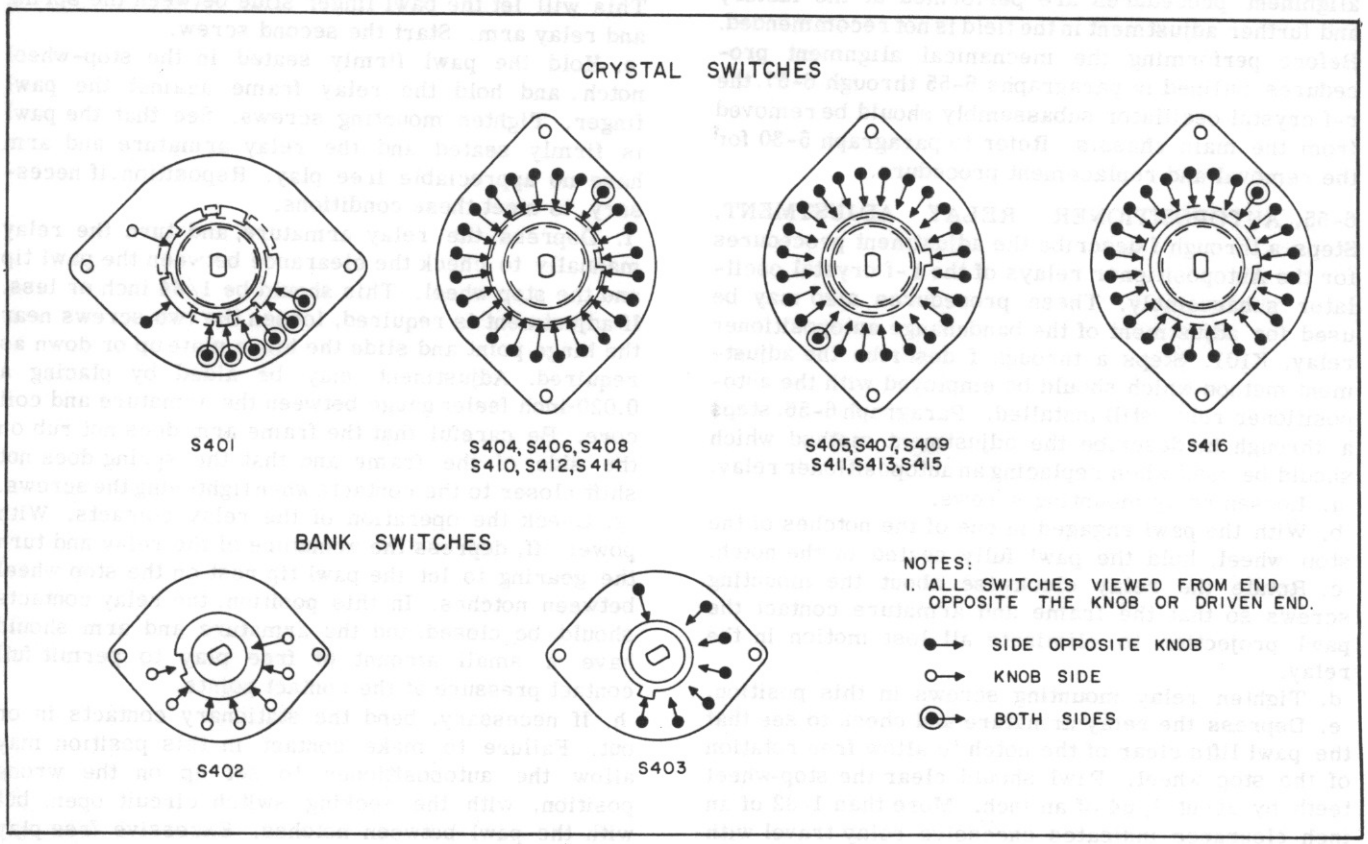


Figure 6-3. R-F Crystal Oscillator Subassembly, Correct Switch Alignment

6-57. SWITCH ALIGNMENT. If the trouble isolation procedures in sections V or VI indicate the r-f crystal oscillator switches are out of alignment, the applicable steps of this paragraph should be performed. When performing the switch alignment procedures, no electrical connections are necessary as all the procedures are mechanical. Before removing the r-f crystal oscillator subassembly from the test bench setup (figure 3-1), operate the channel selectors to the A1 position and observe the BANK and XTAL indicators. The BANK indicator should read A and the crystal indicator should read 1. If not, either the BANK or XTAL indicators or the associated switches are misaligned. After the A1 position has been selected, remove the r-f crystal oscillator subassembly from the main chassis and proceed with steps a through c. Refer to paragraph 5-30 for the removal and replacement procedure. When performing the following procedural steps, refer to figures 6-2 and 6-3 for parts location and switch alignment.

a. Remove the front cover from the r-f crystal oscillator subassembly. The front cover is secured by four Phillips-head screws.

b. Remove the crystal cover and rear cover from the r-f crystal oscillator subassembly. The rear cover is secured by nine Phillips-head screws; two at the front (upper right and left), two at the rear (above the BAND ASSIGNMENT SWITCH cover), and five at the bottom (three on the side of the plugs and two on the side opposite the plugs). The crystal cover is secured by one Dzus fastener, and is hinged to the rear cover.

c. Observe the switch positions and compare with figure 6-3. If either of the switch sections is misaligned, proceed to the applicable steps. Proceed to steps d through f if the switch section consisting of S402 and S403 is misaligned. Proceed to steps j through l if the switch section consisting of S401 and S404 through S416 is misaligned.

d. Loosen the BANK switch clamp with a No. 8 Bristo wrench.

e. Rotate the BANK indicator manually until the positions of switches S402 and S403 correspond with figure 6-3.

f. Tighten the BANK indicator clamp. The BANK indicator should now read A (observed from the top), and switches S402 and S403 should be in correct alignment. If the BANK indicator reads some letter other than A, and switches S402 and S403 are known to be in correct alignment, proceed to steps g through i. Otherwise, proceed to step p.

g. Loosen the BANK indicator clamp with a No. 8 Bristo wrench.

h. Rotate the BANK indicator for a reading of A on the top of the r-f crystal oscillator subassembly.

i. Tighten the BANK indicator clamp. Both the bank switches and the BANK indicator should now be correctly aligned. Proceed to step p.

j. Loosen the XTAL switch clamp with a No. 8 Bristo wrench.

k. Rotate the XTAL indicator manually until the positions of switches S401 and S404 through S416 correspond with figure 6-3.

l. Tighten the XTAL indicator clamp. The XTAL indicator should now read 1 (observed from the top), and switches S401 and S404 through S416 should be in correct alignment. If the XTAL indicator reads some number other than 1, and switches S401 and S404 through S416 are known to be in correct alignment, proceed to steps m through o. Otherwise, proceed to step p.

m. Loosen the XTAL indicator clamp with a No. 8 Bristo wrench.

n. Rotate the XTAL indicator for a reading of 1 on the top of the r-f crystal oscillator subassembly.

o. Tighten the XTAL indicator clamp. Both the crystal switches and the XTAL indicator now should be correctly aligned. Proceed to the following step.

p. Replace the rear cover, crystal cover, and front cover, and replace the r-f crystal oscillator subassembly in the main chassis. Refer to steps a and b of this paragraph and to paragraph 5-30.

6-58. ALIGNMENT OF 250 KC OSCILLATOR AND BFO SUBASSEMBLY.

6-59. Paragraphs 6-60 and 6-61 describe the adjustment procedures for the 250 kc oscillator and bfo subassembly. If desired, the 250 kc oscillator and bfo subassembly may be removed from the main chassis before aligning. In this case, the proper extension cable, illustrated in figure 2-6, must be used to provide connection between the main chassis and the

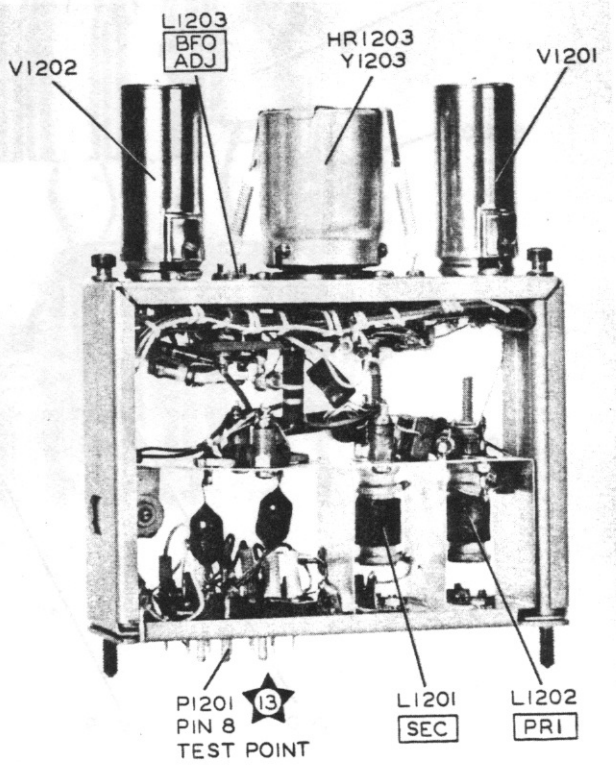


Figure 6-4. 250 Kc Oscillator and BFO Subassembly, Right Side View, Alignment Points

250 kc oscillator and bfo subassembly. Reference is made to paragraph 5-30 for the removal and replacement procedure. Before proceeding with the alignment procedure, connect the 618S-1 or 618S-1A system in a test bench setup similar to that illustrated in figure 3-1. All test points are identified on the main schematic diagram, figure 7-19, and on the bottom view of the 618S-1 or 618S-1A main chassis, figure 6-23. All alignment points are identified in figure 6-4.

6-60. 250 KC OSCILLATOR ADJUSTMENT. Perform the following operations:

a. Operate the OFF PHONE CW switch to the PHONE position, and allow at least ten minutes for warmup.

b. Connect VTVM TS-375/U between terminal 8 of J313 (test point 13) and ground. Adjust to the 3-volt a-c scale.

c. Operate the telegraph key or microphone push-to-talk button.

d. Adjust L1201 and L1202 for maximum indication on the TS-375/U. Inductors L1201 and L1202 are both adjustable from the bottom of the 250 kc oscillator and bfo subassembly. If the subassembly is being adjusted while installed in the main 618S-1 or 618S-1A chassis, inductors L1201 and L1202 are obtainable through two holes (silk screened SEC for L1201 and PRI for L1202).

e. Repeat the adjustment described in step d until no further peaking is obtainable.

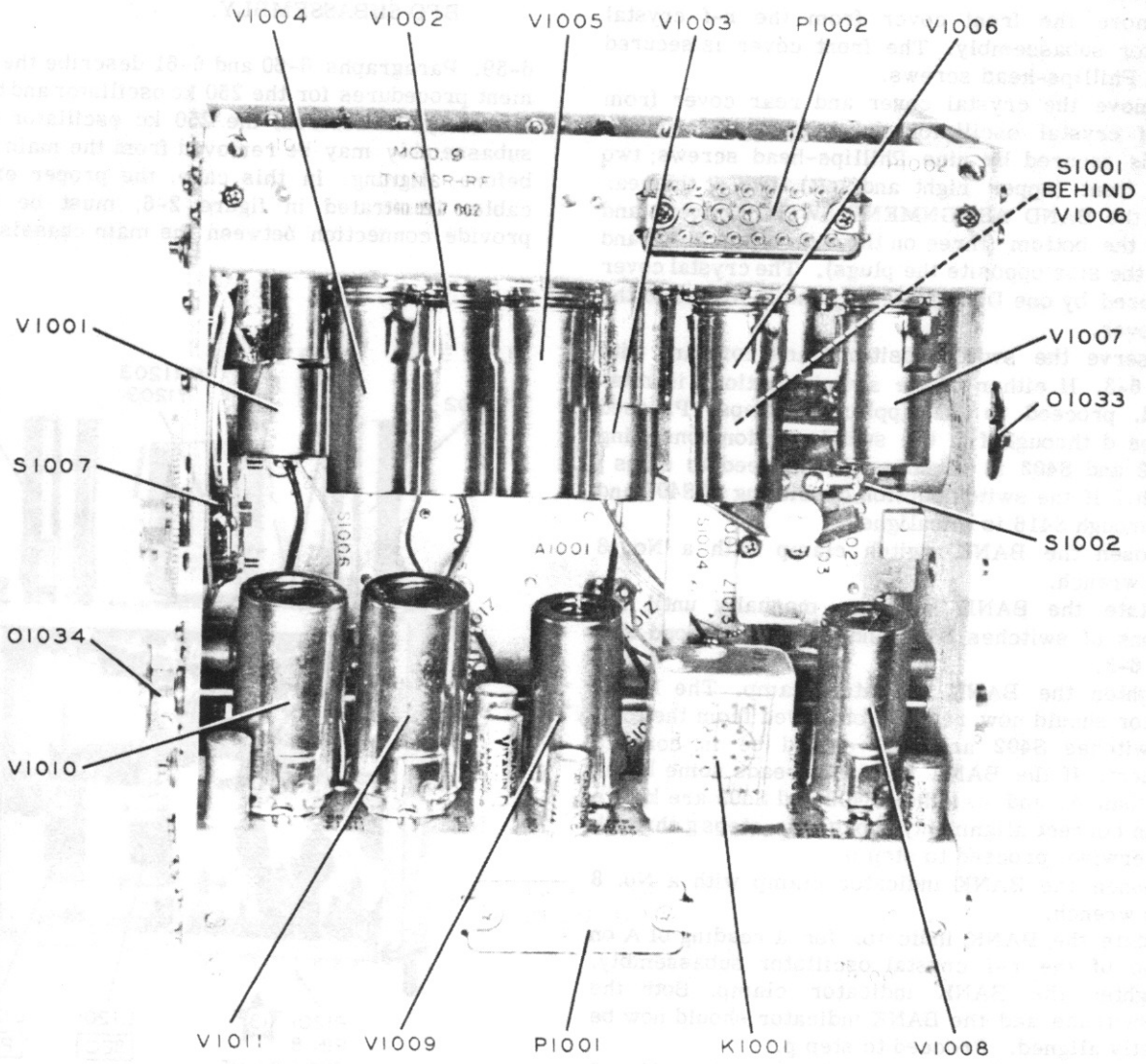


Figure 6-5. Tuner Subassembly, Bottom View, Switch and Tube Location

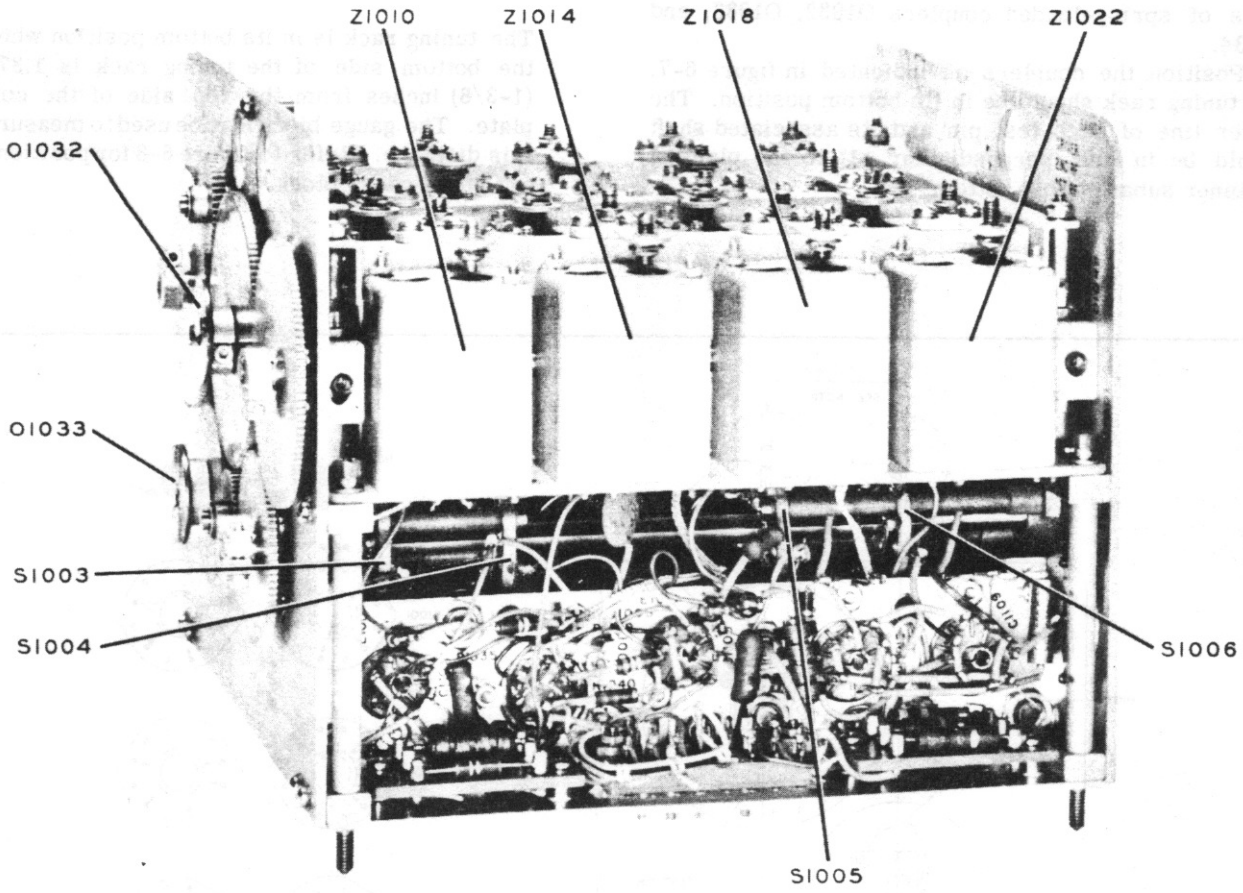


Figure 6-6. Tuner Subassembly, Right Side View, Switch and Coupler Location

f. Observe the tuner subassembly. If stamped MOD 8 or later, the secondary (L1201) should be detuned for a reading of 1.75 volts a-c on VTVM TS-375/U.

6-61. BFO ADJUSTMENT. Perform the following operations:

a. Operate the OFF PHONE CW switch to the PHONE position. Allow at least ten minutes for warmup. After warmup, operate the OFF PHONE CW switch to the CW position.

b. Connect Signal Generator AN/URM-25 to J109 (test point 3). Adjust to approximately 100 microvolts, unmodulated.

c. Connect a headset to terminal b of J2601 (test point 8).

d. Select a channel and tune the AN/URM-25 to the same frequency with Frequency Meter AN/USM-26.

e. Operate the BFO control throughout its range and determine the center position. Leave the BFO control in this position.

f. Adjust L1203 for zero beat. Inductor L1203 is adjustable from the top of the 250 kc oscillator and bfo subassembly. The adjustment is silk screened BFO ADJ.

6-62. ALIGNMENT OF TUNER SUBASSEMBLY.

6-63. Paragraphs 6-64 through 6-73 describe the adjustment procedures for the tuner subassembly. The tuner subassembly should be removed during the mechanical alignment procedures and installed in the main chassis during the electrical alignment procedures. Reference is made to paragraphs 5-31 and 5-32 for the removal and replacement procedures. During electrical alignment, the 618S-1 or 618S-1A should be connected to a test bench setup similar to figure 3-1. All test points are identified on the main schematic diagram, figure 7-19, and on the bottom view of the 618S-1 or 618S-1A main chassis, figure 6-23. All electrical and mechanical alignment points are identified in figures 6-5 through 6-8 and figure 6-10.

6-64. COUPLER AND SWITCH ADJUSTMENTS, 618S-1. Refer to figures 6-5 through 6-9. Perform the following operations:

a. Place the 618S-1 or 618S-1A in the A1 position and remove from the main chassis. Refer to paragraphs 5-31 and 5-32.

b. Insert a 0.125/0.130-inch diameter test pin in the forks of spring-loaded couplers O1032, O1033, and O1034.

c. Position the couplers as indicated in figure 6-7. The tuning rack should be in its bottom position. The center line of each test pin and its associated shaft should be in line, perpendicular ±1° to the plane of the tuner subassembly bottom.

NOTE

The tuning rack is in its bottom position when the bottom side of the tuning rack is 1.375 (1-3/8) inches from the top side of the coil plate. The gauge block may be used to measure this distance. Refer to figure 6-8 for positioning of the gauge block.

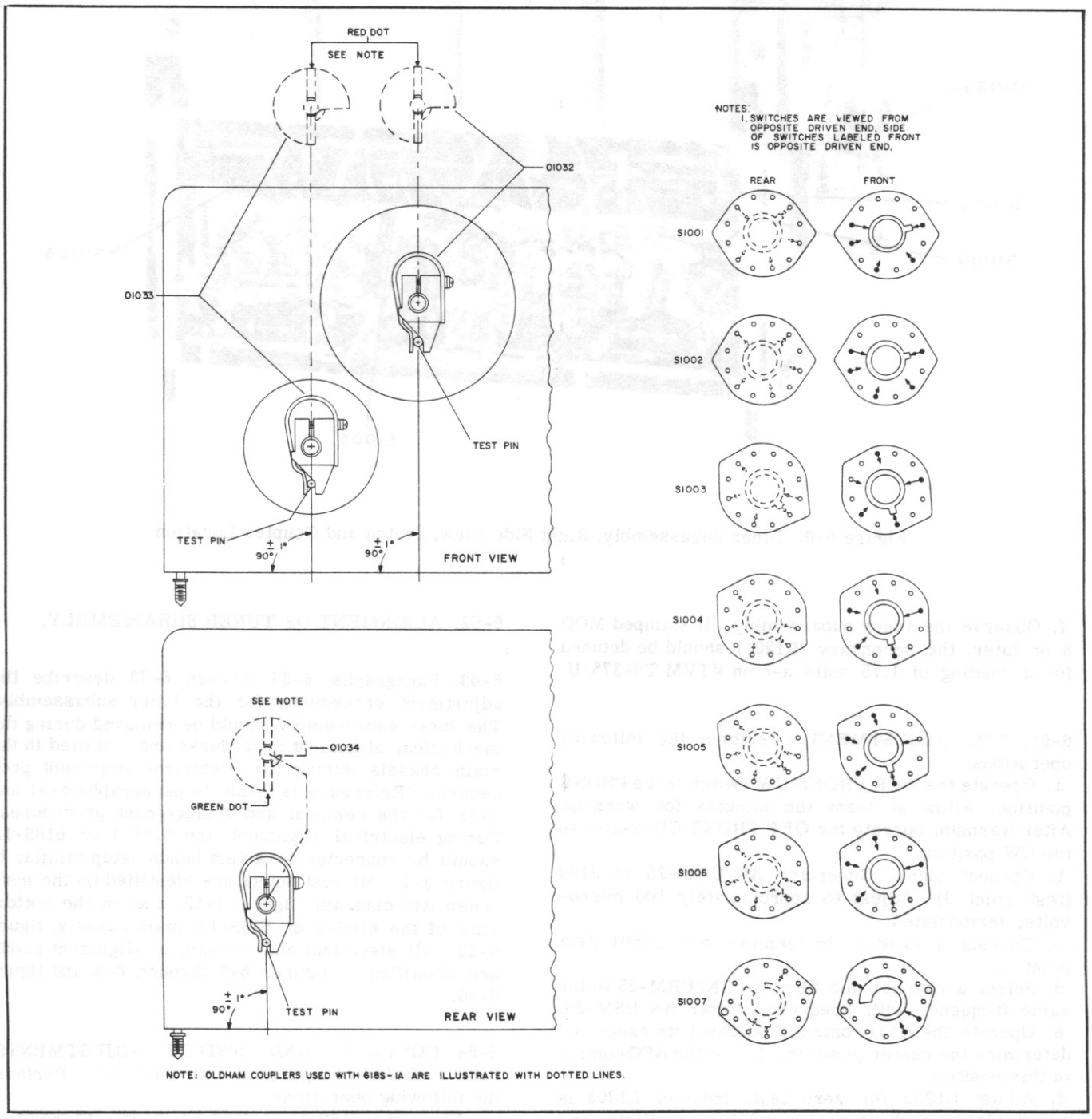


Figure 6-7. Tuner Subassembly, Switch and Coupler Alignment

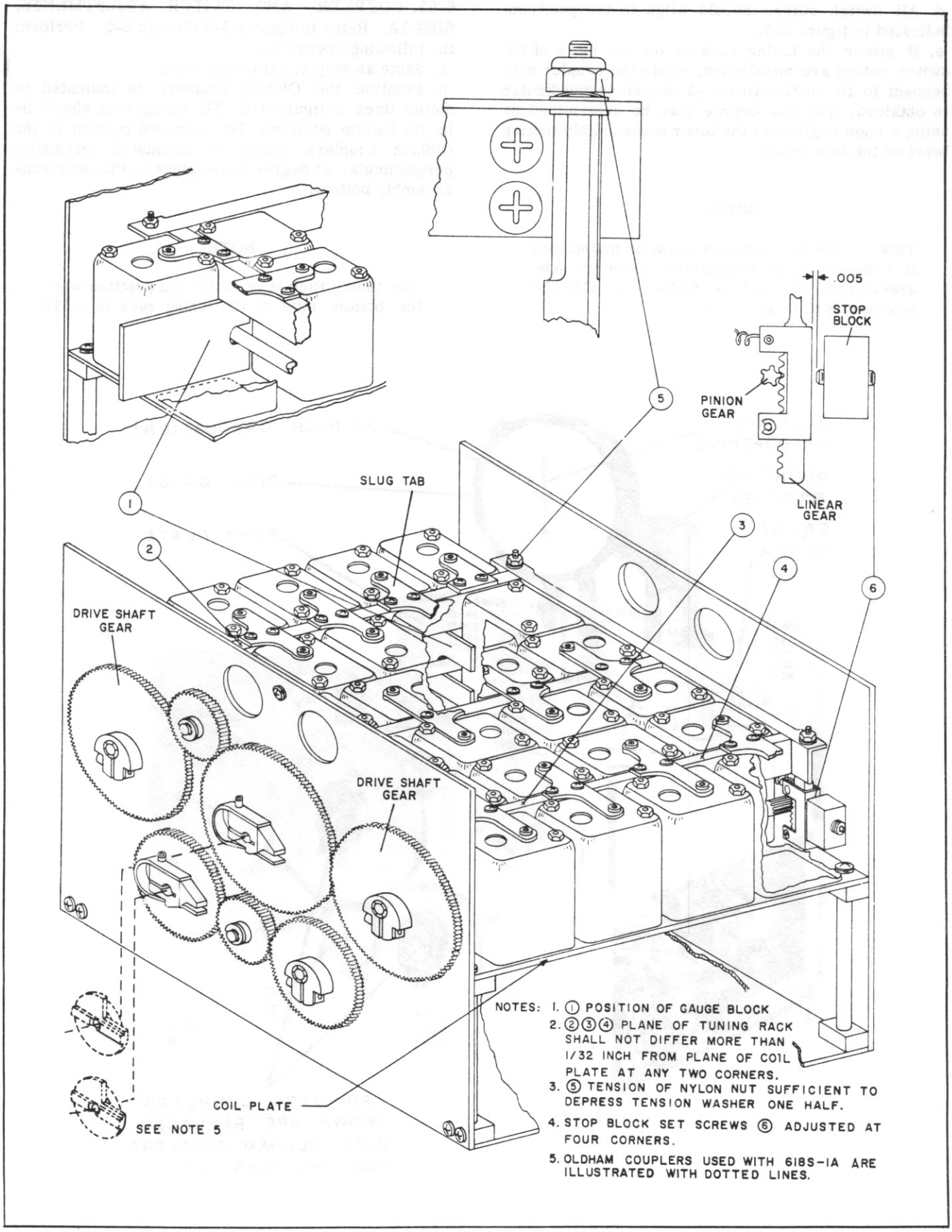


Figure 6-8. Tuner Subassembly, Mechanical Alignment Points

d. All switch rotors should align in the positions indicated in figure 6-7.

e. If either the tuning rack or one or more of the switch rotors are misaligned, rotate the coupler with respect to its shaft until the ±1 degree perpendicular is obtained. The one degree may be determined by using a right angle with the tuner subassembly resting level on the test bench.

NOTE

This ±1 degree tolerance must be maintained if complete interchangeability between subassemblies of various 618S-1 or 618S-1A systems is to be achieved.

6-65. COUPLER AND SWITCH ADJUSTMENTS, 618S-1A. Refer to figures 6-5 through 6-9. Perform the following operations:

a. Same step a, paragraph 6-64.

b. Position the Oldham couplers as indicated in dotted lines in figure 6-4. The tuning rack should be in its bottom position. The extruded portion of the Oldham couplers should be orientated vertically, perpendicular ±1 degree to the plane of the tuner subassembly bottom.

NOTE

The tuning rack is in its bottom position when the bottom side of the tuning rack is 1.375

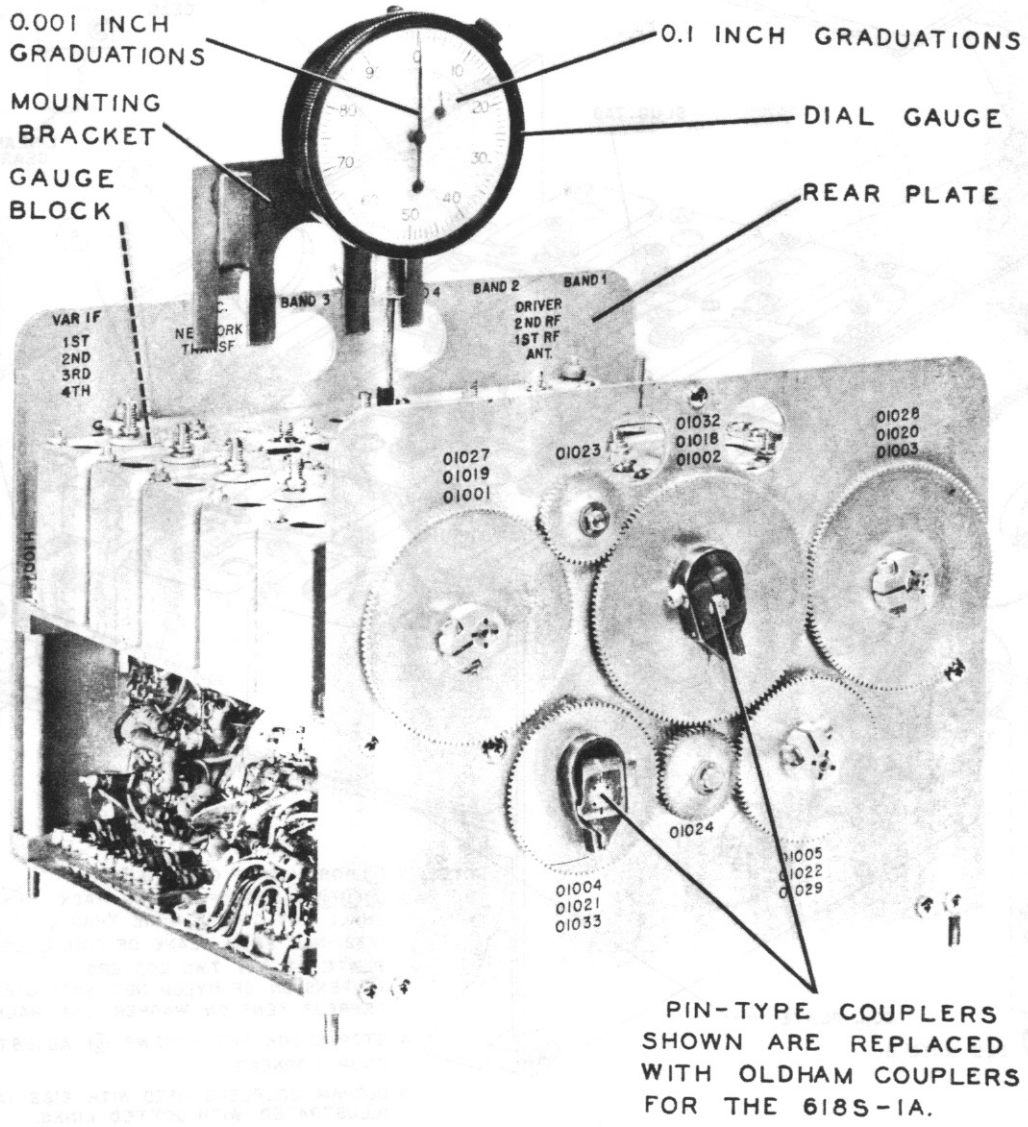


Figure 6-9. Tuner Subassembly, Dial Gauge in Place

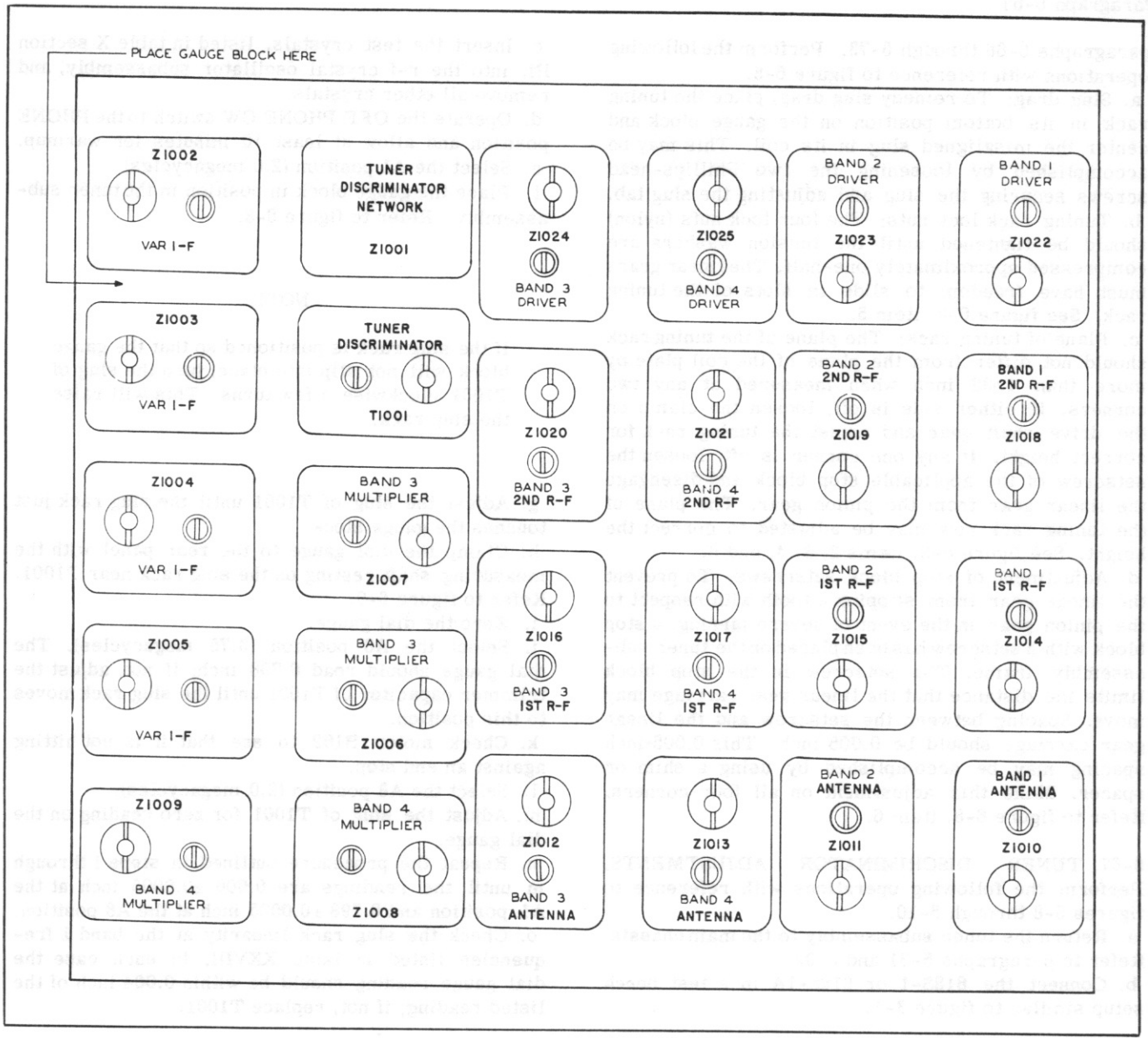


Figure 6-10. Tuner Subassembly, Electrical Alignment Points

(1-3/8) inches from the top side of the coil plate. The gauge block may be used to measure this distance. Refer to figure 6-8 for positioning of the gauge block.

NOTE

This ±1 degree tolerance must be maintained if complete interchangeability between subassemblies of various 618S-1 or 618S-1A systems is to be achieved.

c. All switch rotors should align in the positions indicated in figure 6-7.

d. If either the tuning rack or one or more of the switch rotors are misaligned, rotate the coupler with respect to its shaft until the ±1 degree perpendicular is obtained. The one degree may be determined by using a right angle with the tuner subassembly resting level on the test bench.

6-66. TUNING RACK ADJUSTMENTS. Certain mechanical adjustments are necessary in addition to the coupler and switch alignment procedures described in paragraphs 6-64 and 6-65. These adjustments are very important and should be completed before advancing to the electrical alignment procedures,

paragraphs 6-68 through 6-73. Perform the following operations with reference to figure 6-8.

a. Slug drag: To remedy slug drag, place the tuning rack in its bottom position on the gauge block and center the misaligned slug in its coil. This may be accomplished by loosening the two Phillips-head screws securing the slug and adjusting the slug tab.

b. Tuning rack lock nuts: The four lock nuts (nylon) should be tightened until the tension washers are compressed approximately one-half. The linear gears must have freedom to slide in slots of the tuning rack. See figure 6-8, item 5.

c. Plane of tuning rack: The plane of the tuning rack should not differ from the plane of the coil plate by more than 1/32 inch when measured at any two corners. If either side is off, loosen the clamp on the drive shaft gear and adjust the tuning rack for correct height. If any one corner is off, loosen the setscrew of the applicable stop block and disengage the linear gear from the pinion gear. The plane of the tuning rack now may be adjusted to correct the height. See figure 6-8, items 2, 3, 4, and 6.

d. Adjustment of stop block setscrews: To prevent the linear gear from slipping a tooth with respect to the pinion gear in the event of severe jarring, a stop block with a setscrew has been placed on the tuner subassembly frame. The setscrew in the stop block limits the distance that the linear gear carriage may move. Spacing between the setscrew and the linear gear carriage should be 0.005 inch. This 0.005-inch spacing may be accomplished by using a shim or spacer. Make this adjustment on all four corners. Refer to figure 6-8, item 6.

6-67. TUNER DISCRIMINATOR ADJUSTMENTS. Perform the following operations with reference to figures 6-8 through 6-10.

a. Return the tuner subassembly to the main chassis. Refer to paragraphs 5-31 and 5-32.

b. Connect the 618S-1 or 618S-1A in a test bench setup similar to figure 3-1.

c. Insert the test crystals, listed in table X section III, into the r-f crystal oscillator subassembly, and remove all other crystals.

d. Operate the OFF PHONE CW switch to the PHONE position and allow at least 10 minutes for warmup.

e. Select the A1 position (2.0 megacycles).

f. Place the gauge block in position in the tuner subassembly. Refer to figure 6-8.

NOTE

If the slug rack is positioned so that the gauge block will not slip into place, turn the slug of T1001 clockwise a few turns. This will raise the slug rack.

g. Adjust the slug of T1001 until the slug rack just touches the gauge block.

h. Clamp the dial gauge to the rear panel with the measuring shaft resting on the slug rack near T1001. Refer to figure 6-9.

i. Zero the dial gauge.

j. Select the A8 position (3.75 megacycles). The dial gauge should read 0.798 inch; if not, adjust the trimmer capacitor of T1001 until the slug rack moves to this position.

k. Check motor B102 to see that it is not hitting against an end stop.

l. Select the A8 position (2.0 megacycles).

m. Adjust the slug of T1001 for zero reading on the dial gauge.

n. Repeat the procedure outlined in steps i through m until the readings are 0.000 ±0.0005 inch at the A1 position and 0.798 ±0.0005 inch at the A8 position.

o. Check the slug rack linearity at the band 1 frequencies listed in table XXVIII. In each case the dial gauge reading should be within 0.004 inch of the listed reading; if not, replace T1001.

TABLE XXVIII. TUNER SUBASSEMBLY, SLUG RACK LINEARITY MEASUREMENTS

CHANNEL SELECTOR POSITIONS	OPERATING FREQUENCY (MEGACYCLES)	DIAL GAUGE READING (INCH)
A1	2.00	0.000
A2	2.25	0.114
A3	2.50	0.228
A4	2.75	0.342
A5	3.00	0.456
A6	3.25	0.570
A7	3.50	0.684
A8	3.75	0.798

6-68. VARIABLE I-F ADJUSTMENTS. After completion of the mechanical adjustments on the tuner subassembly, paragraphs 6-64 through 6-67, the variable i-f tuned circuits should be adjusted. The tuner subassembly should be returned to the main chassis, and the 618S-1 or 618S-1A should be connected in the test bench setup. The test crystals, table X section III, should be inserted in the crystal sockets for the following adjustments. Refer to figure 6-10 for alignment point location.

a. Before applying primary power, remove tube V1003 and place a 7-pin tube socket adapter in the socket. Refer to figure 6-5.

b. Replace V1003 and apply primary power.

c. Connect VTVM TS-375/U between pin 1 of V1003 (test point 14) and ground. Adjust to the 3-volt a-c scale.

d. Operate the OFF PHONE CW switch to the PHONE position and allow at least ten minutes for warmup.

e. Operate the channel selectors to the A1 position (2.0 megacycles).

f. Operate the OFF PHONE CW switch to the CW position and depress the telegraph key or microphone push-to-talk button.

g. Adjust the slugs of Z1002, Z1003, Z1004, and Z1005 for maximum indication on the TS-375/U.

h. Operate the channel selectors to the A8 position (3.75 megacycles).

i. Adjust the trimmer capacitors of Z1002, Z1003, Z1004, and Z1005 for maximum indication on the TS-375/U.

j. Repeat steps e through i until no further peaking is attainable. After completion, the TS-375/U should indicate at least 1-volt a-c.

NOTE

The agc voltage applied to the variable i-f stage (V1002) should hold the voltage at pin 1 of V1003 at a reasonable level throughout the preceding steps.

6-69. BAND 3 MULTIPLIER ADJUSTMENTS. Maintain the equipment setup established in the preceding paragraph throughout the following steps:

a. Connect VTVM TS-375/U to pin 7 of second transmitter mixer V1003. Select the 3-volt a-c range.

b. Select the channel corresponding to 7.25-megacycle operation (band 3, position M1).

c. Depress the telegraph key or microphone push-to-talk button.

d. Adjust the slugs of the Z1007 and Z1006 for maximum reading on the TS-375/U. Refer to figure 6-10.

e. Select the channel corresponding to 14.25-megacycle operation (band 3, position M8).

f. Adjust the capacitors of both band 3 multipliers (Z1007 and Z1006) for maximum reading on the TS-375/U.

g. Repeat steps c through f until no further peaking is attainable. Meter readings should be not less than 2.5 volts a-c.

6-70. BAND 4 MULTIPLIER ADJUSTMENTS. Maintain the equipment setup of paragraph 6-69 throughout the following steps:

a. Select the channel corresponding to 14.25 megacycles (band 4, position U1).

b. Depress the telegraph key or microphone push-to-talk button.

c. Adjust the slugs of the two-band 4-multiplier coils (Z1009 and Z1008) for maximum indication on the TS-375/U.

d. Select the channel corresponding to 25.0-megacycle operation (band 4, position U9).

e. Adjust the capacitors of the band 4 multipliers (Z1009 and Z1008) for maximum indication on the TS-375/U.

f. Repeat steps a through d until no further peaking is achievable. The meter readings should be at least 1 volt a-c.

NOTE

The slug-adjusting screws should be approximately centered in the slug-holding nuts for the multiplier stages to be tuned to the correct harmonic. If possible, use an accurately calibrated wavemeter to check the tuning.

6-71. R-F AND DRIVER ADJUSTMENTS. Maintain the 618S-1 or 618S-1A equipment in the test bench setup throughout the following procedures. The 614C-2 sensitivity and threshold controls should be at the maximum clockwise positions. Perform the following operations:

a. Operate the OFF PHONE CW switch to the PHONE position and allow at least 10 minutes for warmup.

b. Connect VTVM TS-375/U between J1001 (test point 12) and ground. Adjust to the 120-volt a-c range.

c. Operate the channel selectors to the A1 position (2.0 megacycles).

d. Depress the telegraph key or microphone push-to-talk button and lock in position.

e. Adjust the slugs of Z1014, Z1018, and Z1022 for maximum indication on the TS-375/U.

f. Operate the channel selectors to the A8 position (3.75 megacycles).

g. Perform steps e, f, and g with the exception that the trimmer capacitors should be adjusted instead of the inductors. The trimmer capacitors are adjustable through holes in the top of the indicated tuned circuits.

h. Repeat step c and steps e through g until no further peaking is attainable. The TS-375/U should read at least 85 volts a-c after completion of step j.

i. Repeat the adjustments outlined in step c and steps e through h for the frequencies listed in table XXIX. In each case, adjust the inductor or trimmer capacitor of the listed tuned circuit. Upon completion, VTVM TS-375/U should indicate at least 85 volts a-c throughout all of the 618S-1 or 618S-1A channels. Check several channels on each band.

TABLE XXIX. R-F AND DRIVER ADJUSTMENTS, BANDS 2, 3, AND 4

BAND	CHANNEL SELECTOR POSITION	OPERATING FREQUENCY (MC)	TUNED CIRCUIT	TYPE OF ADJUSTMENT
2	G1	3.75	Z1015, Z1019, Z1023	Inductor
	G8	7.25	Z1015, Z1019, Z1023	Trimmer Capacitor
3	M1	7.25	Z1016, Z1020, Z1024	Inductor
	M8	14.25	Z1016, Z1020, Z1024	Trimmer Capacitor
4	U1	14.25	Z1017, Z1021, Z1025	Inductor
	U9	25.00	Z1017, Z1021, Z1025	Trimmer Capacitor

6-72. ANTENNA ADJUSTMENTS. Maintain the 618S-1 or 618S-1A in the test bench setup throughout the succeeding steps. The 614C-2 sensitivity and threshold controls should be set to the maximum clockwise positions. Perform the following operations:

a. Operate the OFF PHONE CW switch to the PHONE position and allow at least 10 minutes for warmup.

b. Connect VTVM TS-375/U between terminal 5 of J310 (test point 7) and ground.

c. Terminate J101 (test point 4) in 300 ohms. Output Meter TS-585B/U may be used if operated to the 300-ohm, 500-milliwatt position.

d. Connect Signal Generator AN/URM-25 to J109 (test point 3).

e. Select the channel corresponding to 2.0-megacycle operation (position A1).

f. Adjust the frequency of the AN/URM-25 to 2.0 megacycles, and set the output level to approximately 3000 microvolts. Use Frequency Meter AN/USM-26 to set the AN/URM-25 frequency.

g. Adjust the band 1 antenna coil slug for maximum avc voltage. Refer to figure 6-10, Z1010.

h. Select the channel corresponding to 3.75-megacycle operation (position A8), and change the AN/URM-25 frequency to 3.75 mc. Maintain the AN/URM-25 output level to approximately 3000 microvolts.

i. Adjust the band 1 antenna trimmer capacitor for maximum avc voltage. Refer to figure 6-10, Z1010.

j. Repeat the procedures outlined in steps a through i for the low and high end points of bands 2, 3, and 4, using 25.0 mc as the high end point on band 4. Table XXIX lists the proper positions and frequencies. Refer to figure 6-10, Z1011, Z1012, and Z1013.

6-73. AGC ADJUSTMENTS. Maintain the 618S-1 or 618S-1A in the test bench setup and adjust the 614C-2 sensitivity and threshold controls to maximum. Perform the following operations:

a. Operate the OFF PHONE CW switch to the PHONE position and allow at least ten minutes for warmup.

b. Depress the telegraph key or microphone push-to-talk button.

c. Connect VTVM TS-375/U between terminal 6 of J308 (test point 16) and ground. If desired, the TS-375/U may be connected across resistor R1006. Adjust the TS-375/U to the negative 12-volt range.

d. Procure values of R1006 as stated in the Illustrated Parts Breakdown, T.O. 12R2-4-6-4. The values listed are as follows: 4.7K, 5.6K, 7.8K, 8.2K, 10K, 12K, and 15K.

e. Select correct value of R1006 by replacement which will give the voltage readings listed in table XXX.

TABLE XXX. SELECTION OF R1006

CHANNEL SELECTOR POSITION	OPERATING FREQUENCY (MC)	VOLTAGE READING
A1	2.00	-4 to -8
A2	2.25	-4 to -8
A3	2.50	-3 to -7
A8	3.75	-1 to -3

6-74. POWER AMPLIFIER SUBASSEMBLY.

6-75. Paragraphs 6-76 through 6-78 describe the procedures for alignment of the power amplifier subassembly. During the mechanical alignment procedures, the power amplifier subassembly should be removed from the main chassis. Refer to paragraphs 5-33 and 5-34 for the removal and replacement procedures. During the electrical alignment procecures, paragraph 6-78, the power amplifier subassembly should be installed in the main chassis, and the 618S-1 or 618S-1A should be connected in a test bench setup similar to figure 3-1. Further electrical adjustments than those detailed in paragraph 6-78 are not recommended by field maintenance personnel. All electrical and mechanical alignment points are identified in figures 6-11 through 6-13. All test points are identified in figure 3-1 and figures 6-21 through 6-23.

6-76. SWITCH ALIGNMENT AND ADJUSTMENTS. Before performing the procedures outlined in steps a through d, the power amplifier subassembly should be removed from the main chassis. Perform the following operations with reference to figures 6-11 through 6-13:

a. The contact pressure on S1504 should be 80-120 grams. Adjust the setscrews on both switch arms for this pressure, using a gram gauge or similar instrument for measurement. The long switch arm of S1504 should clear the cam gear by 1/64 inch when this switch is in the closed position.

b. Synchronize S1503 and S1504, as shown in figure 6-13, so that S1504 is open when S1503 is in the band 1 position and closed in band positions 2, 3, and 4. It may be necessary to loosen the setscrew in gear O1513. Refer to figures 6-11 and 6-13 for location of this gear.

NOTE

It may be necessary to move capacitor C1523 in order to place a Bristo wrench in the setscrews. This can be accomplished by removing the screws, nuts, and spacers used to mount C1523, and the screw and nut holding the ground lead of C1523 in place. Capacitor C1523 then can be pushed aside during alignment.

c. Set S1503 in the band 4 position. Refer to figure 6-12. Position coupler O1521 and switches S1501, S1502, S1503, and S1506 as indicated in figure 6-12. To accomplish this, it may be necessary to loosen

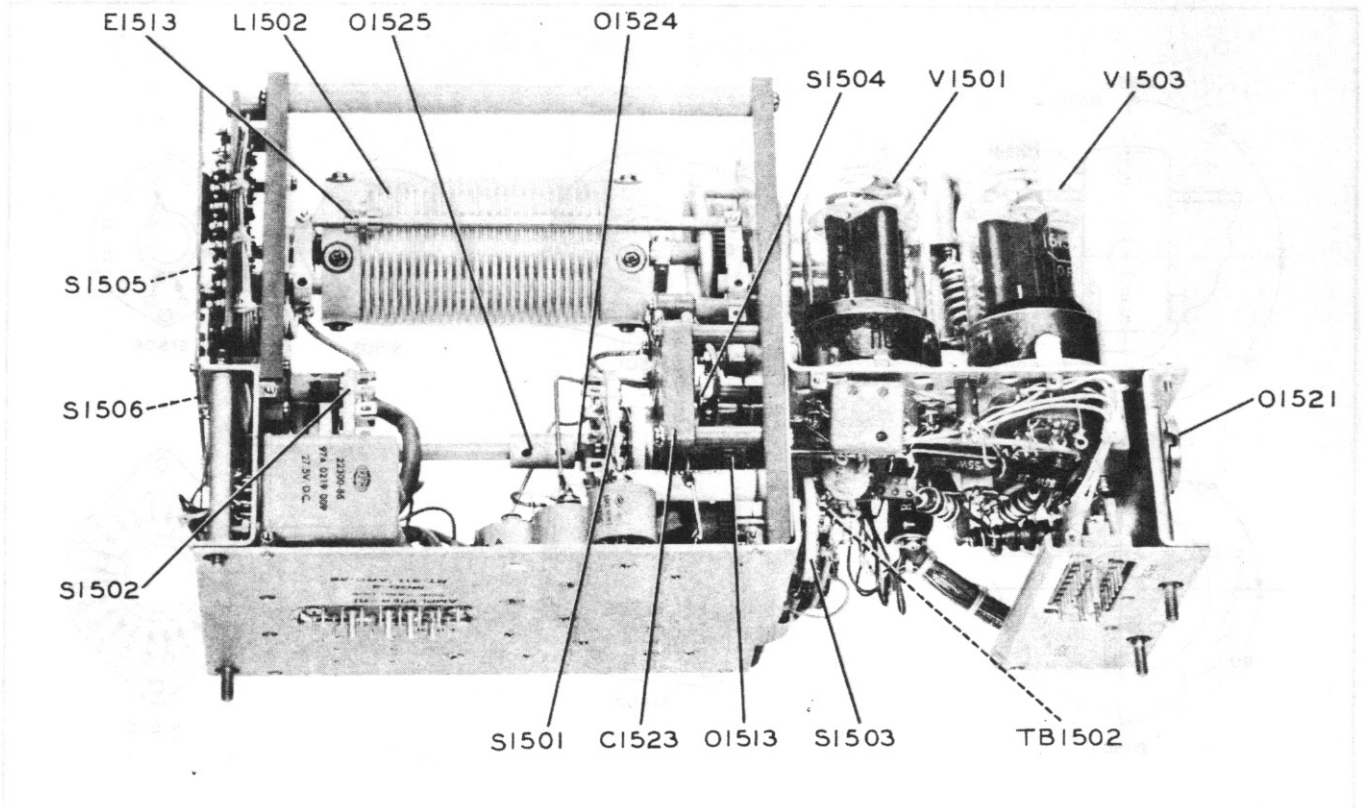


Figure 6-11. Power Amplifier Subassembly, Left Oblique View, Mechanical Alignment Points

setscrews in the clamp of coupler O1521 and rotate the switch shaft manually. Switch S1505 will be aligned according to the following paragraph.

d. Tighten all setscrews permanently after completing steps b and c.

6-77. ROLLER COIL ADJUSTMENTS. Steps a through c describe the mechanical adjustments necessary for synchronization of main tuning inductor L1502. Before performing the procedures outlined in steps a through c, the power amplifier subassembly should be removed from the main chassis. Perform the following operations with reference to figure 6-11.

a. The contact pressure on the front and back slip rings of L1502 should be 80-120 grams. Adjust the setscrews of each contact for this pressure, using a gram gauge or similar instrument for measurement. The pressure, at the point of contact between the roller inductor (L1502) and the roller wheel (E1513), should be 12-14 oz. Adjust for this pressure with the roller wheel at each end of L1502.

b. Rotate inductor L1502 until switch S1505 is in the position shown in figure 6-12.

c. Roller E1513 should make contact with L1502 approximately one turn from the end of L1502 (end toward S1505). Moving the roller along the shaft, adjust the position of roller E1513 by applying pressure to the roller shaft in a direction away from L1502.

6-78. PA DISCRIMINATOR ADJUSTMENTS. In the following steps, the power amplifier subassembly should be replaced in the main chassis, and the 618S-1 or 618S-1A should be connected in a test bench setup. Refer to paragraphs 5-33 and 5-34 for the replacement procedures and to figure 3-1 for a typical test bench setup. Perform the following operations:

a. Operate the OFF PHONE CW switch to the PHONE position and allow at least 10 minutes for warmup.

b. Depress the telegraph key or microphone push-to-talk button.

c. Remove the PA chopper (G601 of the pa servo amplifier subassembly).

d. Observe the front panel meter with the meter selector switch in the P.A. PL. position.

e. Rotate the roller inductor (L1502) with an insulated material, and observe if the meter indication can be reduced.

CAUTION

An insulated material must be used to rotate L1502. Do not use a material which will draw r-f or short out L1502.

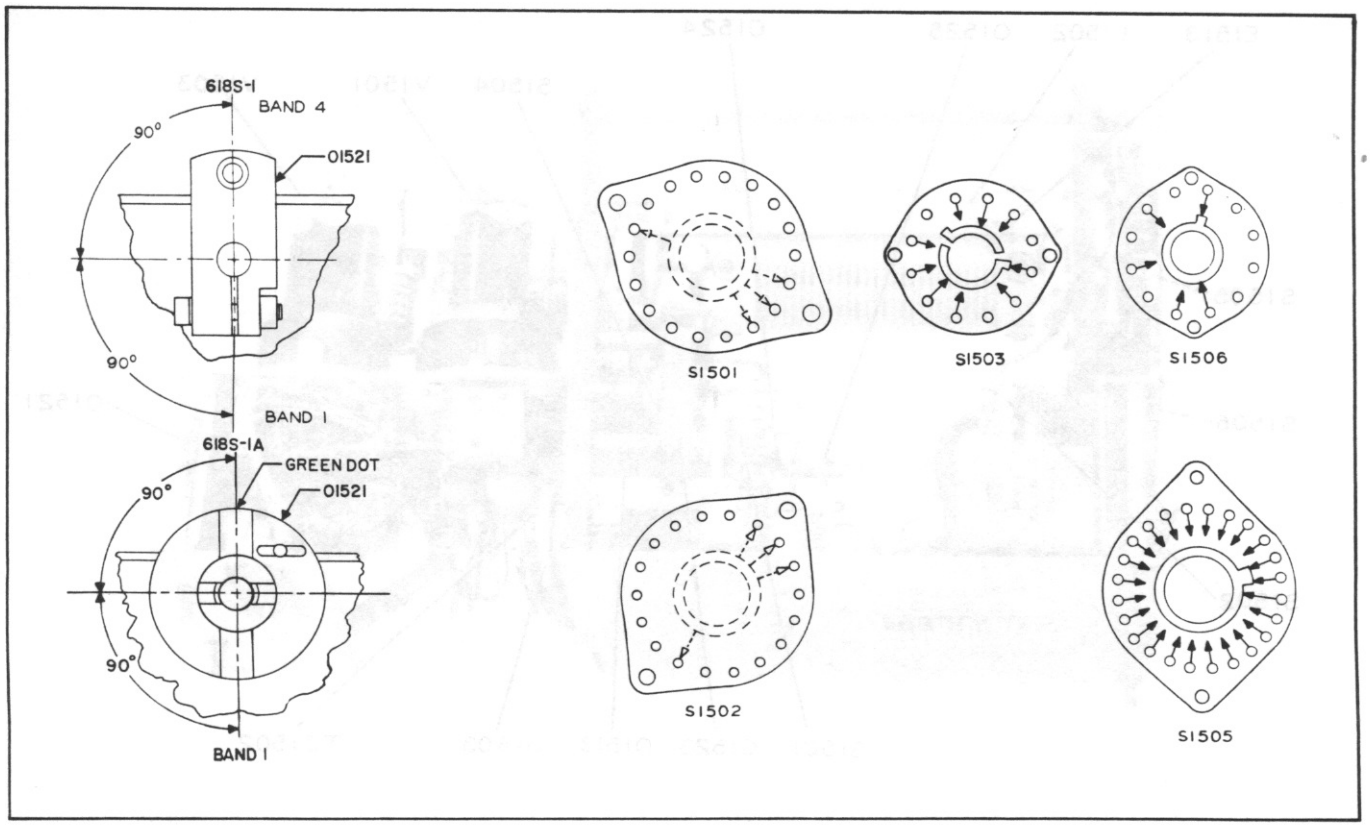


Figure 6-12. Power Amplifier Subassembly, Switch and Coupler Alignment

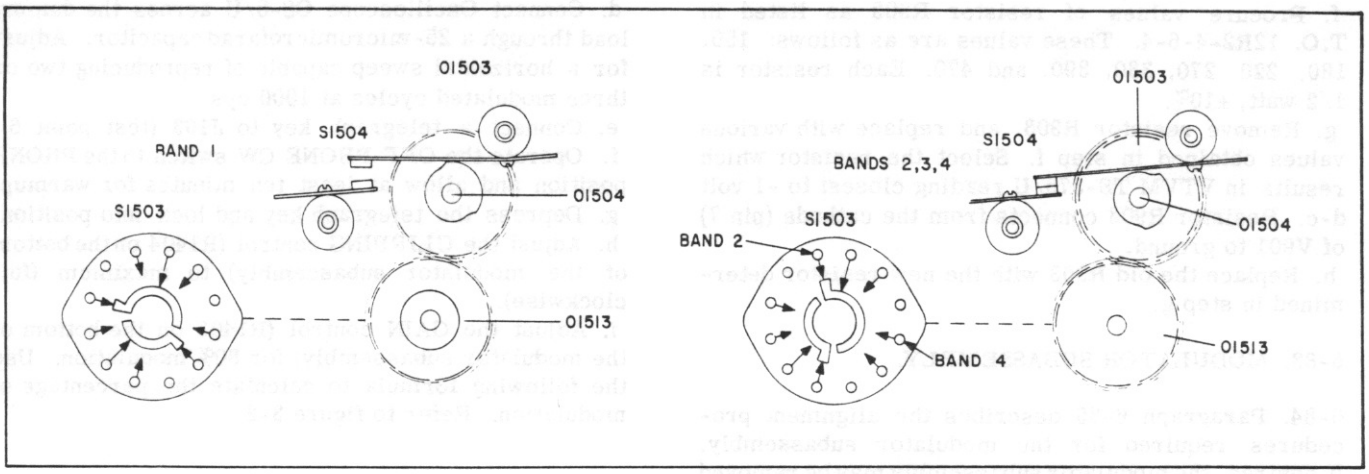


Figure 6-13. Power Amplifier Subassembly, Alignment of Switch S1504

f. If the current can be reduced by more than 1/5 scale division in step e, resistor R1524 should be replaced.

g. Procure values of R1524 as listed in the Illustrated Parts Breakdown, T.O. 12R2-4-6-4. These values are as follows: 1200, 1500, 1800, 2200, 2700, 3300, 3900, 5600, and 8200 ohms. Each resistor is 1/2 watt, ±10%.

h. Remove resistor R1524 from terminal board TB1502, and replace with various values obtained in step g. Select a value which gives a scale reduction of less than 1/5 division on the front panel meter when L1502 is rotated throughout its range.

i. Replace the old R1524 with the new resistor determined in step h.

6-79. I-F AMPLIFIER SUBASSEMBLY.

6-80. Paragraphs 6-81 and 6-82 describe the procedures for alignment of the i-f amplifier subassembly. All test points are indicated in figure 3-1, figures 6-21 through 6-23, and the main schematic diagram, figure 7-19. All alignment points are identified on figure 6-22.

6-81. TUNED CIRCUIT ADJUSTMENTS. Throughout the alignment procedures, steps a through h of this paragraph, the 618S-1 or 618S-1A should be connected to a test bench setup similar to figure 3-1. Perform the following operations:

a. Remove the second receiver mixer tube, V1006, from the tube socket, and insert a 7-pin tube socket adapter. Refer to figure 6-5 for the location of V1006.

b. Insert V1006 into the tube socket adapter, and connect Signal Generator AN/URM-25 from pin 1 (test point 17) to ground. Adjust the AN/URM-25 to 500 microvolts, modulated 30% at 1000 cps, and set the r-f frequency to 250 kilocycles with Frequency Meter AN/USM-26.

c. Connect VTVM TS-375/U between terminal 5 of J310 (test point 7) and ground. Adjust to the negative 12-volt scale.

d. Connect Output Meter TS-585B/U to the PHONE jack (test point 4). Adjust the TS-585B/U to the 500-milliwatt range with an internal impedance of 300 ohms. If desired, Headset H-4/AR or H-1/AR may be connected to either the PHONE jack or terminal b of P2601 for aural monitoring. However, to afford proper loading, the TS-585B/U and the H-4/AR or H-1/AR should not be used simultaneously.

e. Operate the OFF PHONE CW switch to the PHONE position, and allow at least ten minutes for warmup.

f. Adjust the slug of Z901 for maximum indication on VTVM TS-375/U. Tuned circuit Z901 is located on the forward left corner of the i-f amplifier subassembly.

g. Reduce the output level of the AN/URM-25 to 200 microvolts, but maintain the 1000-cps, 30%-modulation.

h. Adjust the slug of Z902 for maximum indication on Output Meter TS-585B/U. Tuned circuit Z902 is located next to Z901.

6-82. I-F GAIN ADJUSTMENTS. Maintain the 618S-1 or 618S-1A in the test bench setup, and leave all test equipment connected, as described in the preceding paragraph. Steps a through h of this paragraph will be performed more easily with the i-f amplifier subassembly removed from the main chassis and connected with the proper extension cable (figure 2-5). Perform the following operations:

a. With Signal Generator AN/URM-25 still connected to pin 1 (test point 17) of V1006, adjust the r-f level to 200 microvolts unmodulated. Reset the AN/URM-25 frequency to 250 kilocycles with Frequency Meter AN/USM-26.

b. Operate the 614C-2 sensitivity and threshold controls to the maximum clockwise positions.

c. With VTVM TS-375/U still connected to terminal 5 of J310 (test point 7), adjust to the negative 3-volt range.

d. Operate the OFF PHONE CW switch to the PHONE position, and allow at least 10 minutes for warmup.

e. Observe the indication on VTVM TS-375/U. The reading should be approximately -1 volt d-c.

f. Procure values of resistor R903 as listed in T.O. 12R2-4-6-4. These values are as follows: 150, 180, 220, 270, 330, 390, and 470. Each resistor is 1/2 watt, ±10%.

g. Remove resistor R903, and replace with various values obtained in step f. Select the resistor which results in VTVM TS-375/U reading closest to -1 volt d-c. Resistor R903 connects from the cathode (pin 7) of V901 to ground.

h. Replace the old R903 with the new resistor determined in step g.

6-83. MODULATOR SUBASSEMBLY.

6-84. Paragraph 6-85 describes the alignment procedures required for the modulator subassembly. If desired, the modulator subassembly may be removed from the main chassis during the alignment procedures. Reference is made to paragraph 2-9 and figure 2-6 for the necessary cable fabrication data. The removal and replacement procedures are covered in paragraph 5-30. All test points are indicated in figure 3-1, figure 6-21, and figure 7-19, and all alignment points are indicated in figure 6-23.

6-85. GAIN AND CLIPPING ADJUSTMENTS. Connect the 618S-1 or 618S-1A in a test bench setup similar to figure 3-1, and perform the following operations:

a. Connect the dummy microphone (figure 2-1) to J102 (test point 5).

b. Connect VTVM TS-375/U and Audio Oscillator TS-382A/U to the dummy microphone as illustrated in figure 2-1. Adjust the TS-375/U to the 1.2-volt a-c range and the TS-382A/U for an output of 0.25 volt a-c at 1000 cps.

c. Connect the dummy load between E102 or J110 and ground (test point 1).

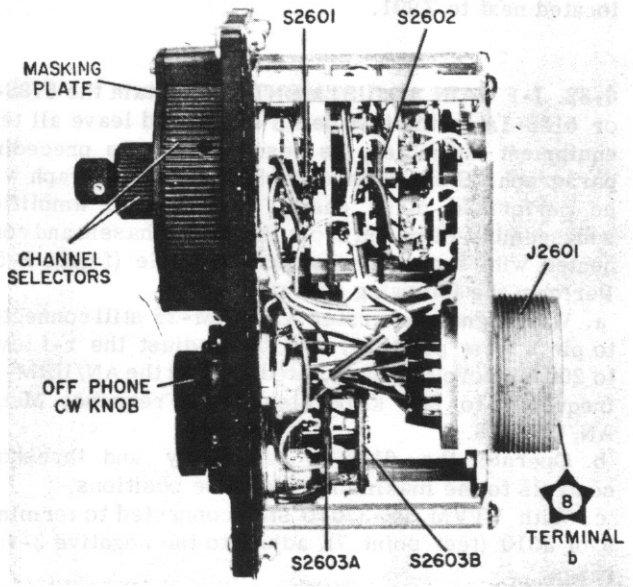


Figure 6-14. Radio Set Control 614C-2, Bottom View, Cover Removed

d. Connect Oscilloscope OS-8/U across the dummy load through a 25-micromicrofarad capacitor. Adjust for a horizontal sweep capable of reproducing two or three modulated cycles at 1000 cps.

e. Connect a telegraph key to J103 (test point 6).

f. Operate the OFF PHONE CW switch to the PHONE position and allow at least ten minutes for warmup.

g. Depress the telegraph key and lock into position.

h. Adjust the CLIPPING control (R1404 on the bottom of the modulator subassembly) to maximum (full clockwise).

i. Adjust the GAIN control (R1403 on the bottom of the modulator subassembly) for 80% modulation. Use the following formula to calculate the percentage of modulation. Refer to figure 3-2.

$$\% \text{ Modulation} = \frac{\text{Maximum - Minimum}}{\text{Maximum + Minimum}} \times 100$$

j. Adjust the CLIPPING control for threshold at the 80% modulation point.

6-86. RADIO SET CONTROL 614C-2.

6-87. Paragraph 6-88 describes the mechanical alignment procedures required for Radio Set Control. All necessary electrical adjustments are covered in paragraph 6-96. All alignment points are indicated in figure 6-14, and all switch positions are illustrated in figure 6-15.

6-88. SWITCH ALIGNMENT. Steps a through l describe the procedures necessary for alignment of the channel selector switches (S2601 and S2602) and the OFF PHONE CW switches (S2603A and S2603B). Perform the following operations:

a. Operate the OFF PHONE CW switch to the OFF position and the channel selectors to the A1 position.

b. Turn the two Dzus fasteners at the rear of the 614C-2, and remove the cover.

c. View switches S2601, S2602, S2603A, and S2603B from the front and compare with figure 6-15. The positions should correspond; if not, proceed to the applicable steps. Switches S2603A and S2603B are adjusted in steps d through f, and switches S2601 and S2602 are adjusted in steps g through j.

d. Loosen the two setscrews of the OFF PHONE CW switch knob and remove knob.

e. Rotate the shaft of S2603A and S2603B until the positions correspond with figure 6-15. An alternate method is to replace the knob in a different position from which removed, and rotate to the OFF position. By trial and error, the alternate method may be employed until the switch positions correspond to the knob in the OFF position.

f. Replace the OFF PHONE CW switch knob and rotate to the OFF position. Proceed to step k.

g. Remove four Phillips-head screws securing the masking plate and remove the masking plate.

h. Loosen the setscrews securing the selector knobs and remove the selector knobs.

i. Rotate the shaft of S2601 and S2602 until the positions correspond with figure 6-15.

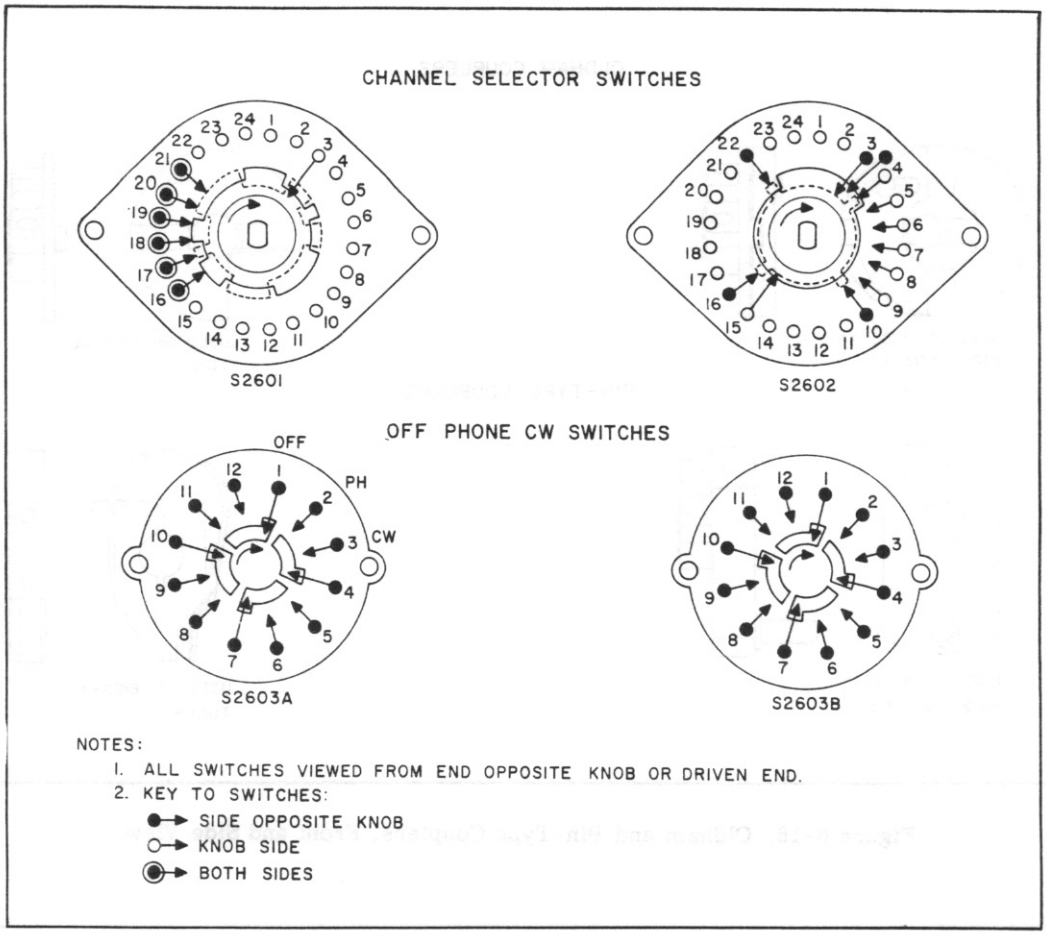


Figure 6-15. Radio Set Control 614C-2, Correct Switch Alignment

j. Replace the channel selector knobs and the masking plate. Make sure the channel selector knobs are in positions A and 1 when replaced. Proceed to step k.

k. Replace the cover and secure with the two Dzus fasteners.

l. After completion of the switch synchronization procedures, the 614C-2 should be tested. Perform the frequency selection tests outlined in paragraph 3-11.

6-89. CONVERSION OF 618S-1 TO 618S-1A.

6-90. Conversion of Radio Set 618S-1 to Radio Set 618S-1A consists of removing the pin-type couplers from the tuner and power amplifier subassemblies and the bandchange autopositioner and servomotor B102 units, and replacing with Oldham couplers. The Oldham couplers employed differ from regular Oldham couplers in that the center guide (or slider) is held captive to one of the couplers by a pin. This pin, and a notch in the mating coupler, serve to assure non-ambiguity of coupler engagement. Figure 6-16 illustrates both the pin-type and Oldham couplers and the mating coupler of each. Reference is made to paragraph 1-23 and table III for a brief description of the affected units and subassemblies and the new MOD numbers. Paragraphs 6-91 through 6-95 describe the method of conversion, as well as the interchangeability and part requirements involved.

6-91. INTERCHANGEABILITY. The four units which are affected, the tuner subassembly, the power amplifier subassembly, the bandchange autopositioner unit, and servomotor B102 unit, cannot be replaced directly. However, with the proper parts (table XXXI) and a hack saw, grinder, or file, conversion can be accomplished without too much difficulty.

6-92. CONVERSION PROCESSES.

6-93. SHAFT LENGTH REDUCTIONS. The simplest method of shaft conversion is to reduce the shaft lengths. Using new shafts would require disassembly, whereas shafts may be shortened without removing them from the subassemblies or units. No changes are required on the tuner subassembly shafts. The pin-type couplers still may be used after the shaft reductions. Modify the power amplifier subassembly, bandchange autopositioner unit, and servomotor B102 unit shafts as follows:

a. Reduce the shaft of servomotor B102 unit by cutting off 3/32 inch.

b. Reduce the shaft of the bandchange autopositioner unit by cutting off 5/64 inch.

c. Reduce the shaft of the power amplifier subassembly by cutting off 1/8 inch.

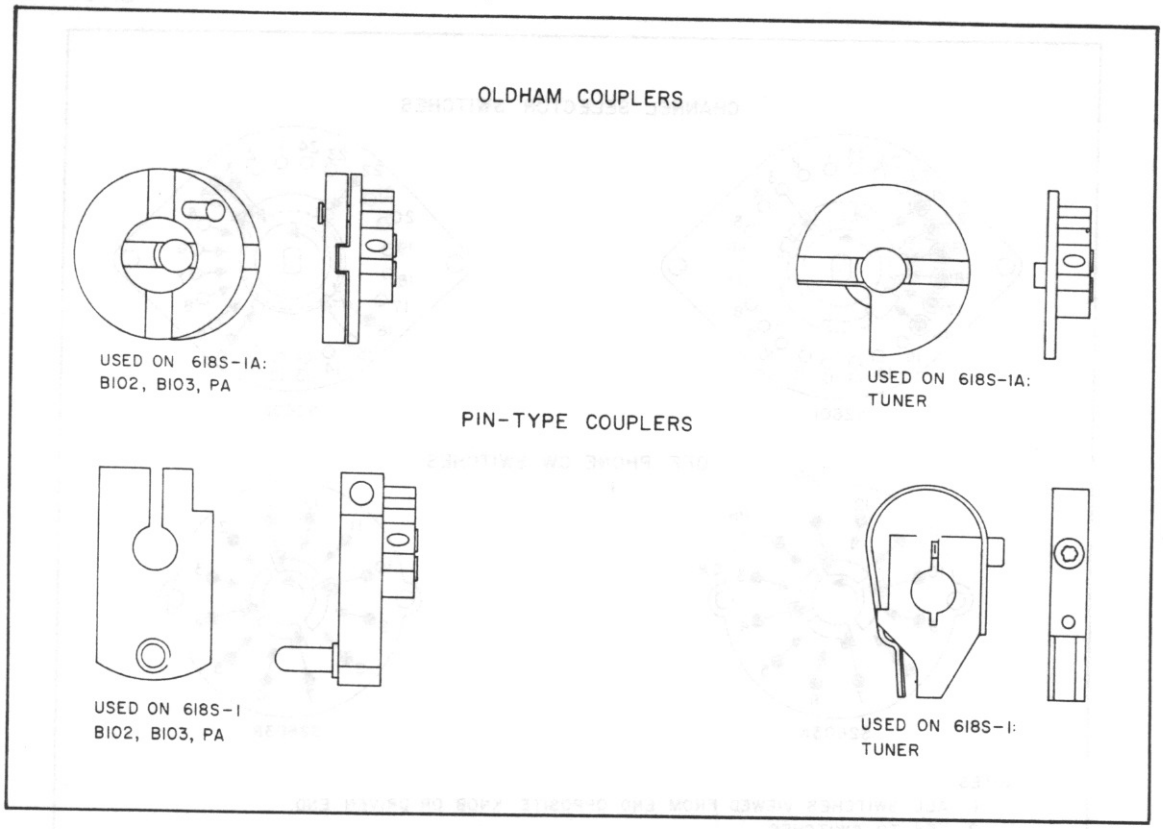


Figure 6-16. Oldham and Pin-Type Couplers, Front and Side Views

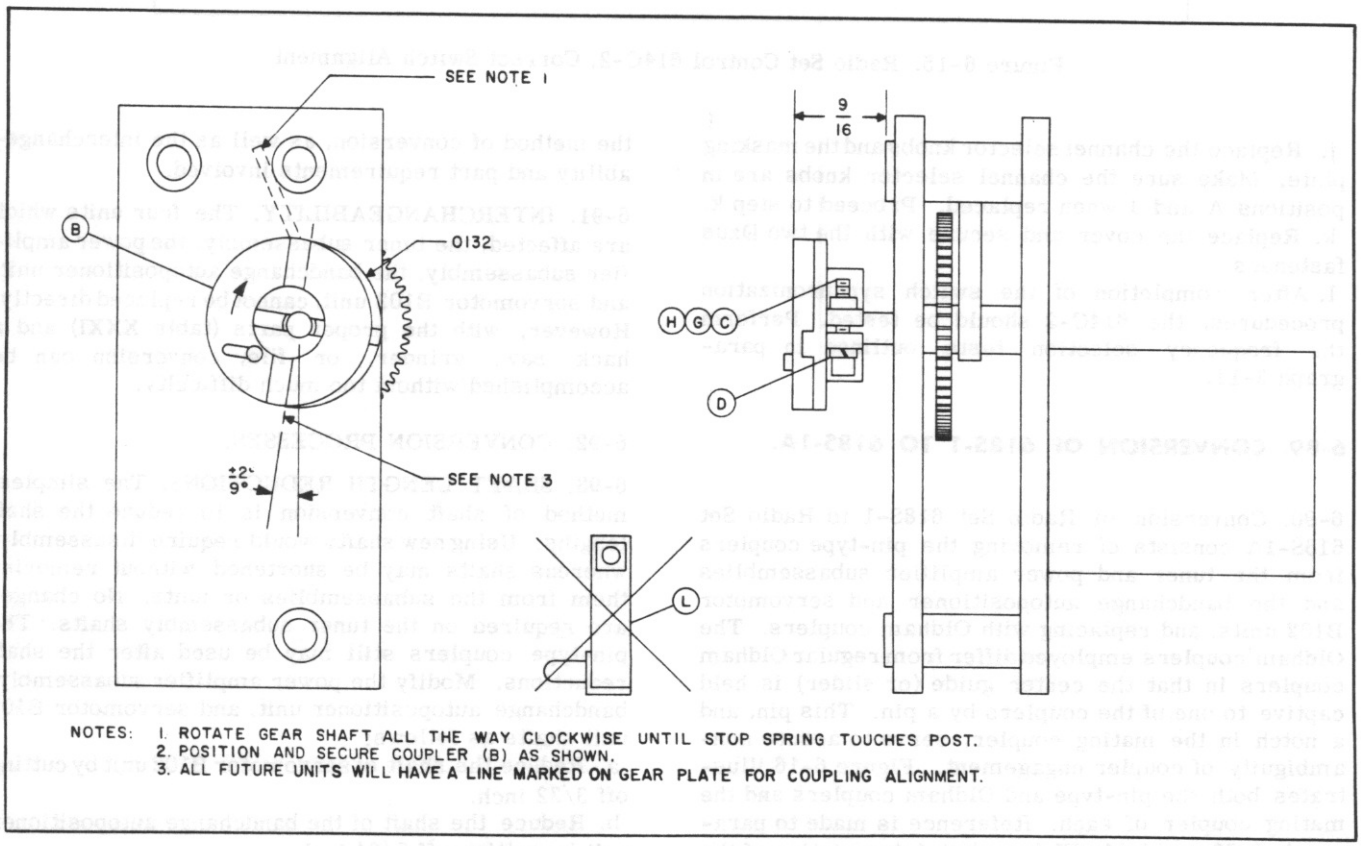


Figure 6-17. Installation of Oldham Couplers on Servomotor B102 Unit

TABLE XXXI. PARTS REQUIRED FOR CONVERSION OF 618S-1 TO 618S-1A

ITEM	QUANTITY REQUIRED	COLLINS PART NUMBER	DESCRIPTION
PARTS REQUIRED FOR CONVERSION			
A	3	540 7421 003	Coupler - Split Hub, 1 Dial, Notched
B	3	540 7420 003	Coupler - Split Hub, Riveted
C	5	504 7537 002	Clamp - Gear, 0.312 Diameter
D	6	310 3340 00	Washer - Spring Lock No. 4
E	2	310 0148 00	Washer - Tension
F	3	310 0059 00	Washer - Flat No. 10
G	6	324 0300 00	Screw - Cap, 4-40 x 1/2
H	6	334 0485 00	Nut - 3/16 Square, 4-40
J	1	540 9956 002	Clamp - Graduated
PARTS TO BE REMOVED			
K	3	506 6928 002	Coupler - Spring Loaded
L	3	506 6618 002	Clamp - Special
M	1	506 7416 002	Post - Spacing, 0.3125 x 0.200
N	2	506 5908 003	Washer - 0.0156 Thick x 0.255 Inside Diameter
USE OF THE FOLLOWING PARTS IS OPTIONAL			
P	1	540 7426 002	Gear - Switch, 64
R	1	506 6607 002	Gear - Shaft, 136
S	1	506 7389 002	Shaft - Switch, Cam

6-94. INSTALLATION OF OLDHAM COUPLERS. Remove old parts and install new parts as directed in the following steps. Refer to table XXXI and figures 6-17 through 6-20.

a. Servomotor B102 unit: Remove clamp (L) and install coupler (B) on shaft using clamp (C), washer (D), screw (G), and nut (H). Position coupler as shown in figure 6-17.

b. Bandchange autopositioner unit: Follow the same procedure as described in step a. Position coupler as shown in figure 6-18.

c. Tuner subassembly: Remove three couplers (K) and two of the three washers (N) on the rear of the tuner subassembly. Install three couplers (A) using clamps (C), washers (D), screws (G), and nuts (H). Position couplers as shown in figure 6-19. Reference is made to figure 6-7 for band 1 switch positions.

d. Power amplifier subassembly: Remove clamp (L), post (M), and gear clamp. Install three washers (F), two washers (E), and coupler (B), on shaft using clamp (J), washer (D), screw (G), and nut (H). Position coupler as shown in figure 6-20. Reference is made to figure 6-12 for band 4 switch positions.

6-95. REINSTALLATION PROCEDURES. The subassembly reinstallation procedures are covered in paragraph 5-27 and subsequent paragraphs of this handbook. However, certain precautions should be observed after completion of the conversion processes. These precautions are covered in steps a through e of this paragraph.

a. Tighten all screws (G) to 10-12 inch-pound.

b. The 90 ±1-1/2 degree angular setting of the couplers indicated in figures 6-17 through 6-20 may be obtained with sufficient accuracy by using any reasonably square object, or by eye if sufficient care is taken and if initial switch positioning is good. The 9 ±2 degree setting on servomotor B102 unit, figure 6-17, requires a simple tool or protractor.

c. The tuning rack on the tuner subassembly should be in the bottom position (refer to paragraphs 6-66 and 6-67). The coupler of servomotor B102 unit should be turned to the extreme clockwise position (when viewed from the shaft end) then rotated counter-clockwise 9 degrees when being installed in the 618S-1 or 618S-1A main component.

d. The couplers on the units should be color coded (refer to notes on figures 6-17 through 6-20) to indicate proper angular positions when inserting or removing the units. When the red dots of the front tuner subassembly couplers (O1033 and O1034) are up, the tuner subassembly may be inserted or removed with all other units in place (band 1 switch position and tuning rack in bottom position). When the green dot on the rear tuner subassembly coupler (O1034) is up, the power amplifier subassembly may be inserted or removed with all other units in place (band 4 position).

CAUTION

Failure to have couplers properly positioned (pin engaged in notch) will prevent equipment from operating properly and may damage tubes. The couplers may be damaged also, when inserting or removing units.

e. Locating dimensions shown in figures 6-17 through 6-20 are approximate and couplers should be adjusted axially for proper engagement (approximately 0.010 inch running clearance) after units are installed. Care should be taken to avoid rotating the couplers out of position.

6-96. FINAL ADJUSTMENTS.

6-97. The adjustment procedures described in paragraphs 6-98 through 6-101 should be performed following completion of the alignment and testing procedures outlined in this section. The final adjustments consist of setting the AUDIO, PHONE SIDETONE, and CW SIDETONE controls of Radio Receiver-Transmitter 618S-1 or 618S-1A and setting the threshold control of Radio Set Control 614C-2.

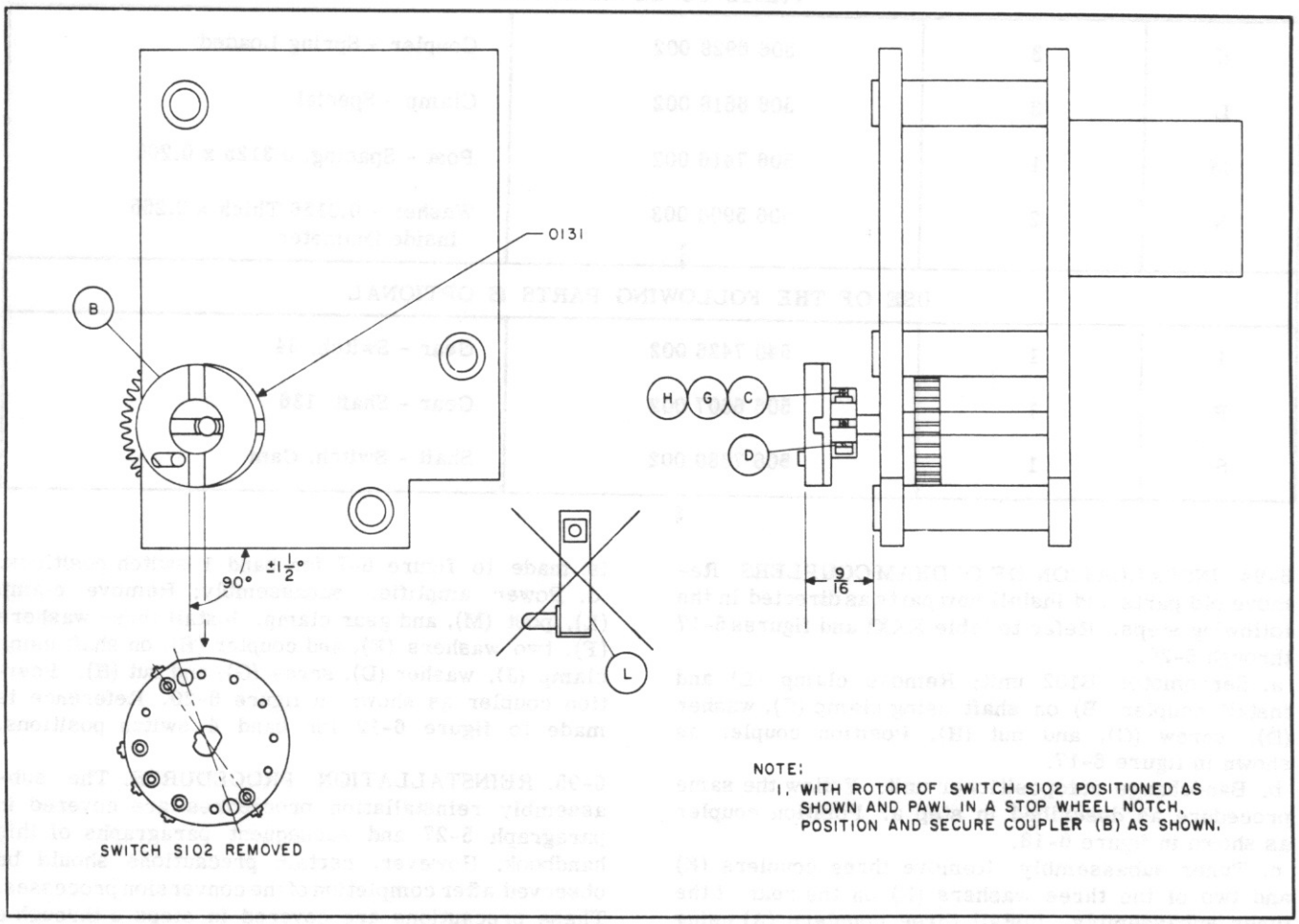


Figure 6-18. Installation of Oldham Couplers on Bandchange Autopositioner Unit

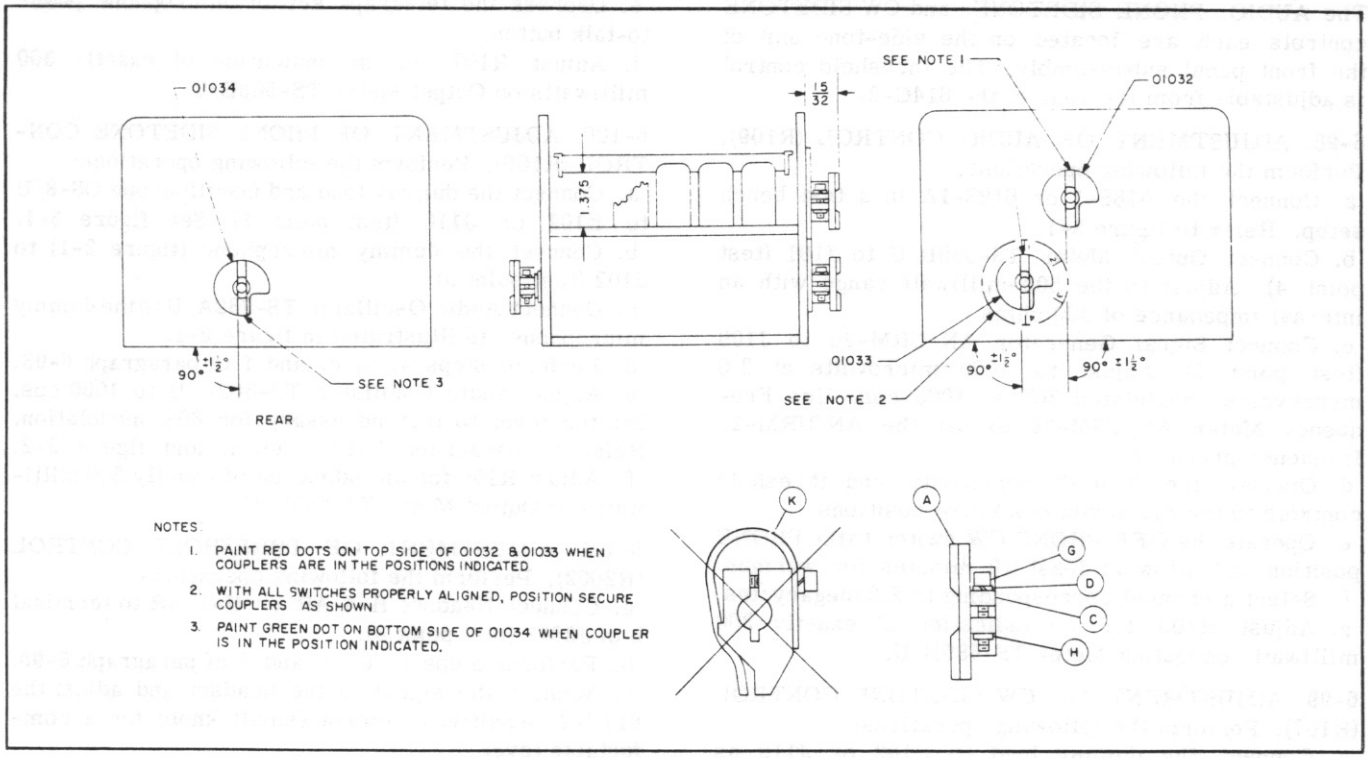


Figure 6-19. Installation of Oldham Couplers on Tuner Subassembly

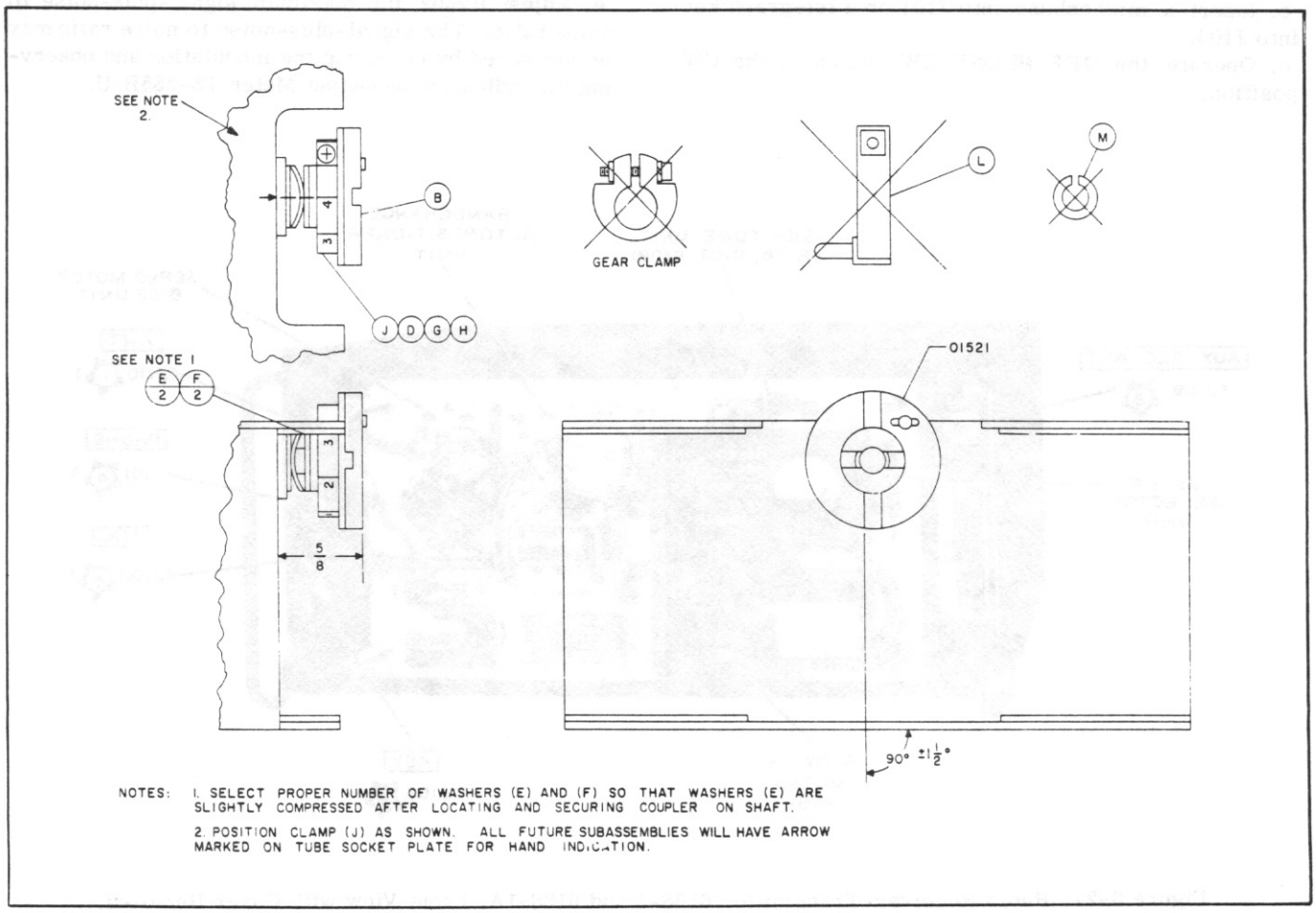


Figure 6-20. Installation of Oldham Couplers on Power Amplifier Subassembly

The AUDIO, PHONE SIDETONE, and CW SIDETONE controls each are located on the side-tone unit of the front panel subassembly. The threshold control is adjustable from the rear of the 614C-2.

6-98. ADJUSTMENT OF AUDIO CONTROL (R109). Perform the following operations:

a. Connect the 618S-1 or 618S-1A in a test bench setup. Refer to figure 3-1.

b. Connect Output Meter TS-585B/U to J101 (test point 4). Adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Connect Signal Generator AN/URM-25 to J109 (test point 3). Adjust to 1000 microvolts at 2.0 megacycles, modulated 30% at 1000 cps. Use Frequency Meter AN/USM-26 to set the AN/URM-25 frequency properly.

d. Operate the 614C-2 sensitivity and threshold controls to the maximum clockwise positions.

e. Operate the OFF PHONE CW switch to the PHONE position and allow at least 10 minutes for warmup.

f. Select a channel corresponding to 2.0 megacycles.

g. Adjust R109 for an indication of exactly 300 milliwatts on Output Meter TS-585B/U.

6-99. ADJUSTMENT OF CW SIDETONE CONTROL (R107). Perform the following operations:

a. Connect the dummy load to E102 or J110 as illustrated in figure 3-1.

b. Perform steps a, b, e, and f of paragraph 6-98.

c. Insert a microphone into J101 or a telegraph key into J103.

d. Operate the OFF PHONE CW switch to the CW position.

e. Depress the telegraph key or microphone push-to-talk button.

f. Adjust R107 for an indication of exactly 300 milliwatts on Output Meter TS-585B/U.

6-100. ADJUSTMENT OF PHONE SIDETONE CONTROL (R106). Perform the following operations:

a. Connect the dummy load and Oscilloscope OS-8/U to E102 or J110 (test point 1). See figure 3-1.

b. Connect the dummy microphone (figure 2-1) to J102 (test point 5).

c. Connect Audio Oscillator TS-382A/U to the dummy microphone, as illustrated in figure 2-1.

d. Perform steps a, b, e, and f of paragraph 6-98.

e. Adjust Audio Oscillator TS-382A/U to 1000 cps. Set the level to that necessary for 80% modulation. Refer to paragraph 3-14, step i, and figure 3-2.

f. Adjust R106 for an indication of exactly 300 milliwatts on Output Meter TS-585B/U.

6-101. ADJUSTMENT OF THRESHOLD CONTROL (R2602). Perform the following operations:

a. Connect Headset H-4/AR or H-1/AR to terminal b of J2601 (test point 8).

b. Perform steps a, c, e, and f of paragraph 6-98.

c. Monitor the signal in the headset and adjust the 614C-2 sensitivity control (small knob) for a comfortable level.

d. Disconnect the headset and connect Output Meter TS-585B/U to J101 (test point 4).

e. Adjust R2602 for maximum signal-plus-noise to noise ratio. The signal-plus-noise to noise ratio may be measured by removing the modulation and observing the indication on Output Meter TS-585B/U.

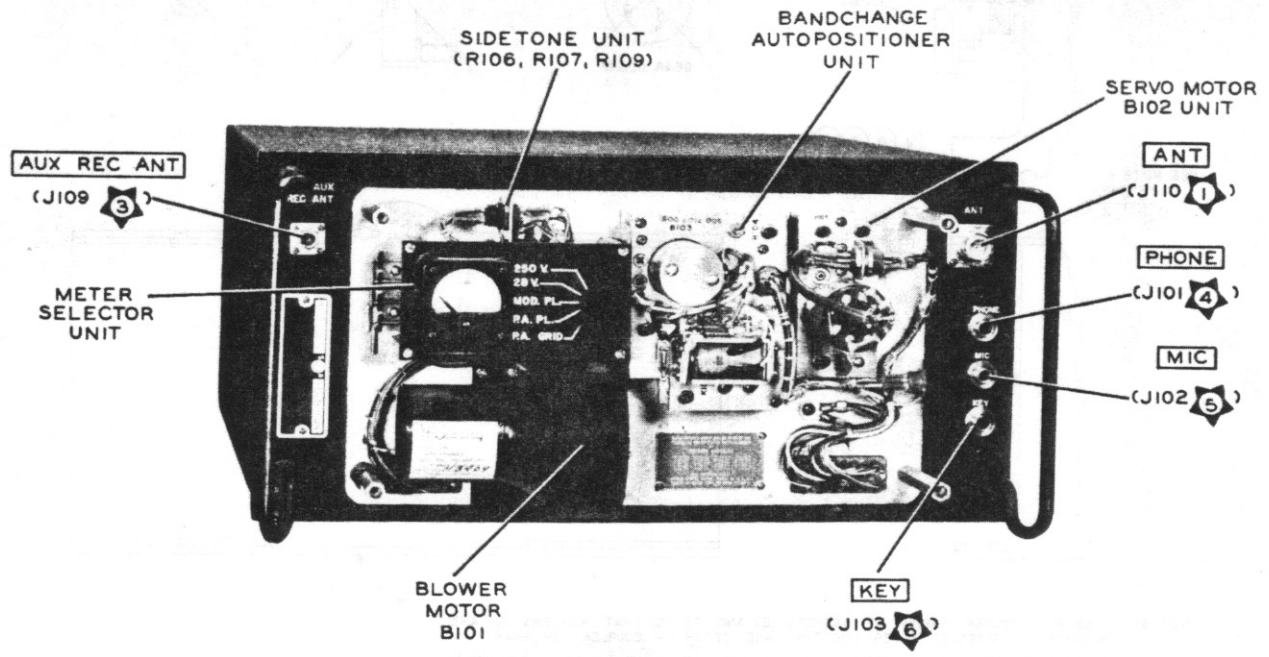


Figure 6-21. Radio Receiver-Transmitter 618S-1 and 618S-1A, Front View with Cover Removed, Test and Alignment Point Location

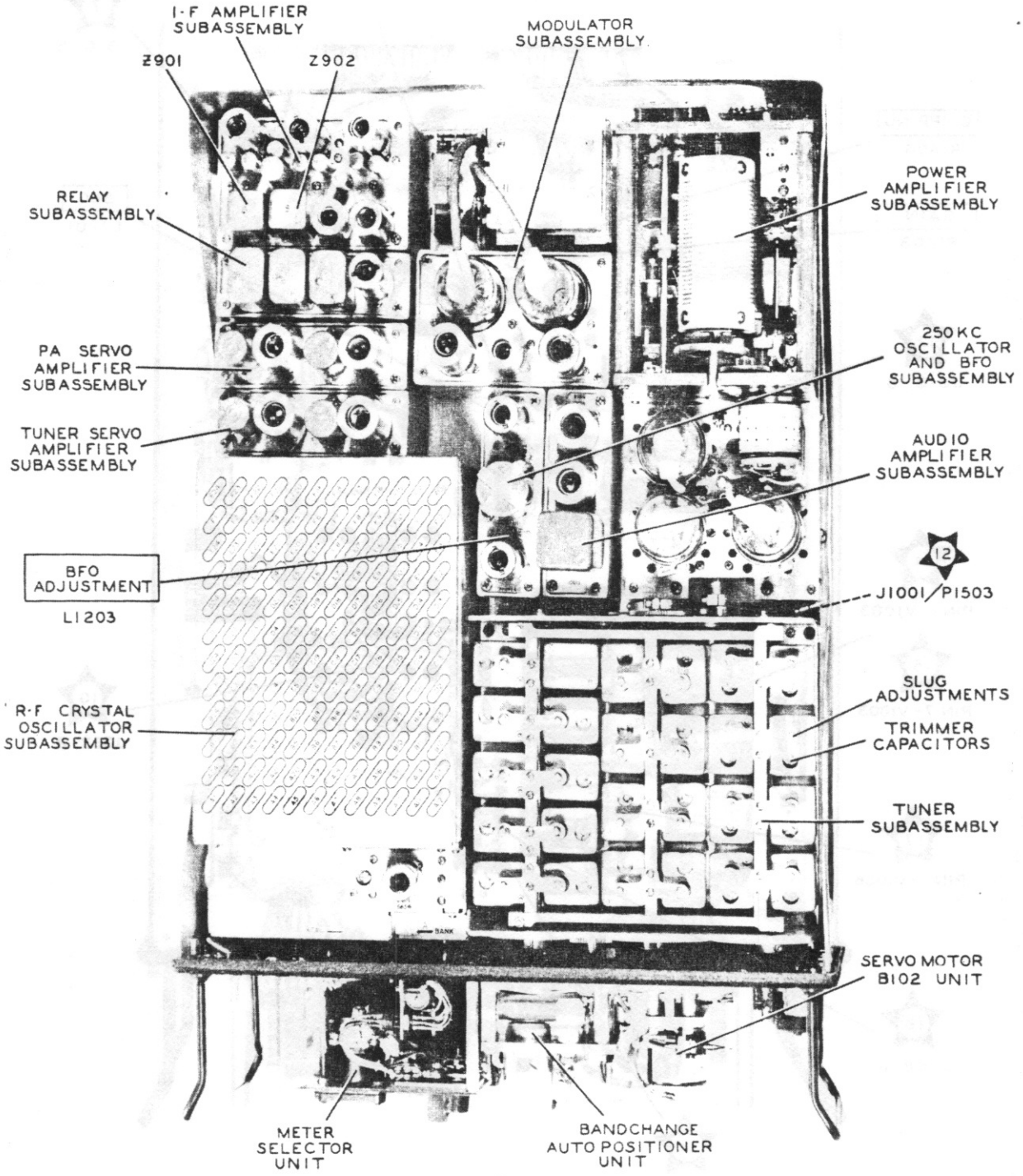


Figure 6-22. Radio Receiver-Transmitter 618S-1 and 618S-1A, Top View with Cover Removed, Test and Alignment Point Location

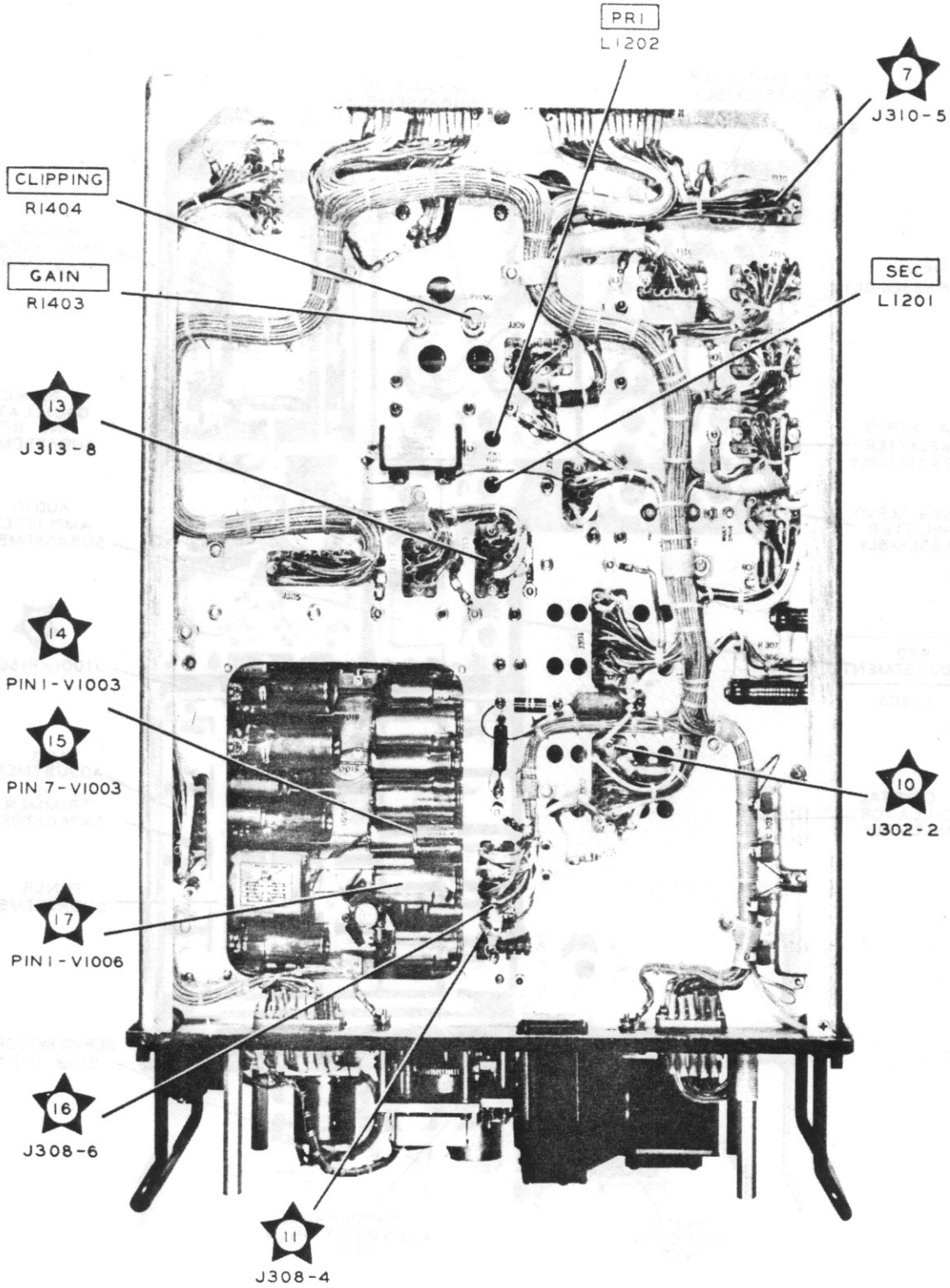
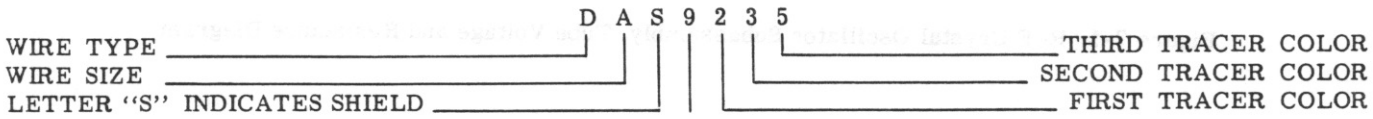


Figure 6-23. Radio Receiver-Transmitter 618S-1 and 618S-1A, Bottom View with Cover Removed, Test and Alignment Point Location

SECTION VII
DIAGRAMS

7-1 WIRE CODE LEGEND.

7-2. The characteristics of the hookup wire, used in this equipment, are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used, the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S," used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used, it indicates the wire size only. The first numeral indicates the color of the wire body and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard RTMA and JAN-C-76 color code. The symbols are assigned according to the following chart.



FIRST LETTER	TYPE OF WIRE
A	AN-J-C-48
B	Busbar round tinned copper
C	JAN type WL (600 volts)
D	Miniature JAN wire (Prodelin)
F	Extra flexible varnished cambric
G	General Electric Deltabeston
H	KEL-F (Monochloro-trifluoroethylene)
K	Neon sign cable (15,000 volts)
L	Silicone
N	Single conductor stranded (not rubber)
P	Single conductor stranded (rubber covered)
R	JAN type SRIR (1000 volts)
T	Teflon (Polytetra-fluoroethylene)
V	JAN type SRHV (2500 volts)

SECOND LETTER	AWG # WIRE SIZE
A	22
B	20
C	18
D	16
E	14
F	12
G	10
H	8
J	6
K	4
L	2
M	1
N	0
P	00
Q	000
R	0000
T	28
V	26

THIRD LETTER	
S	Shielded
None	Unshielded

BODY OR TRACER COLOR	NUMERAL
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light green
f	Light blue

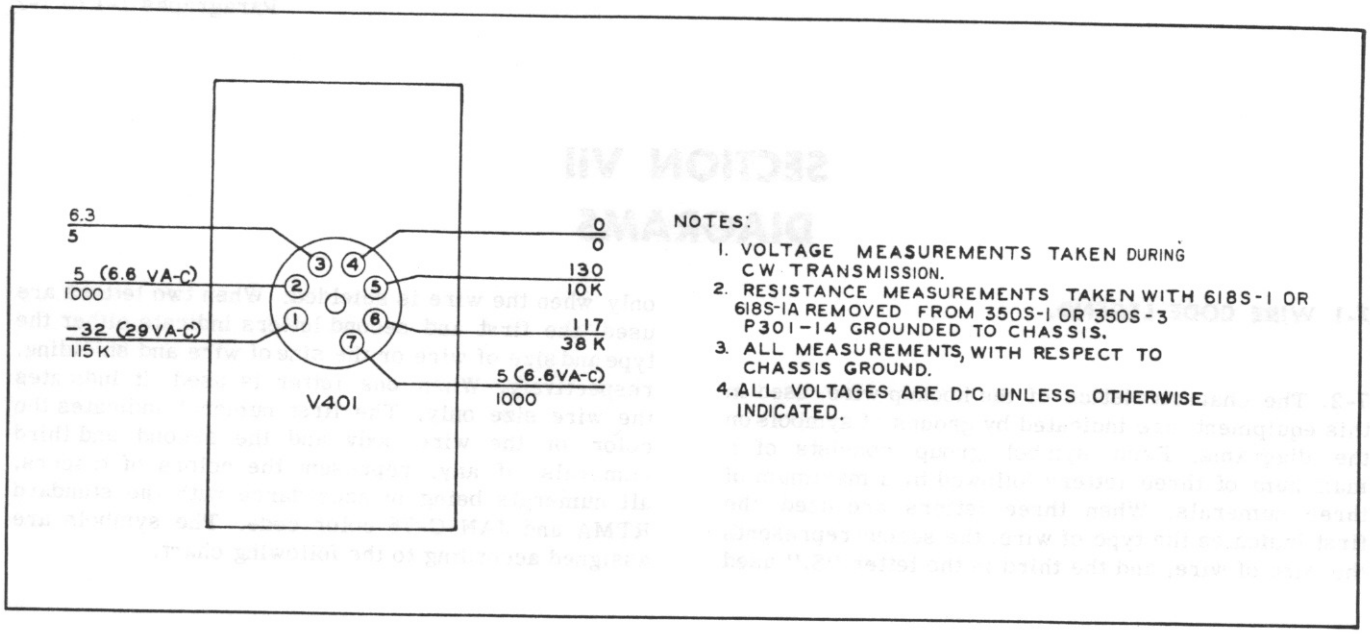


Figure 7-1. R-F Crystal Oscillator Subassembly, Tube Voltage and Resistance Diagram

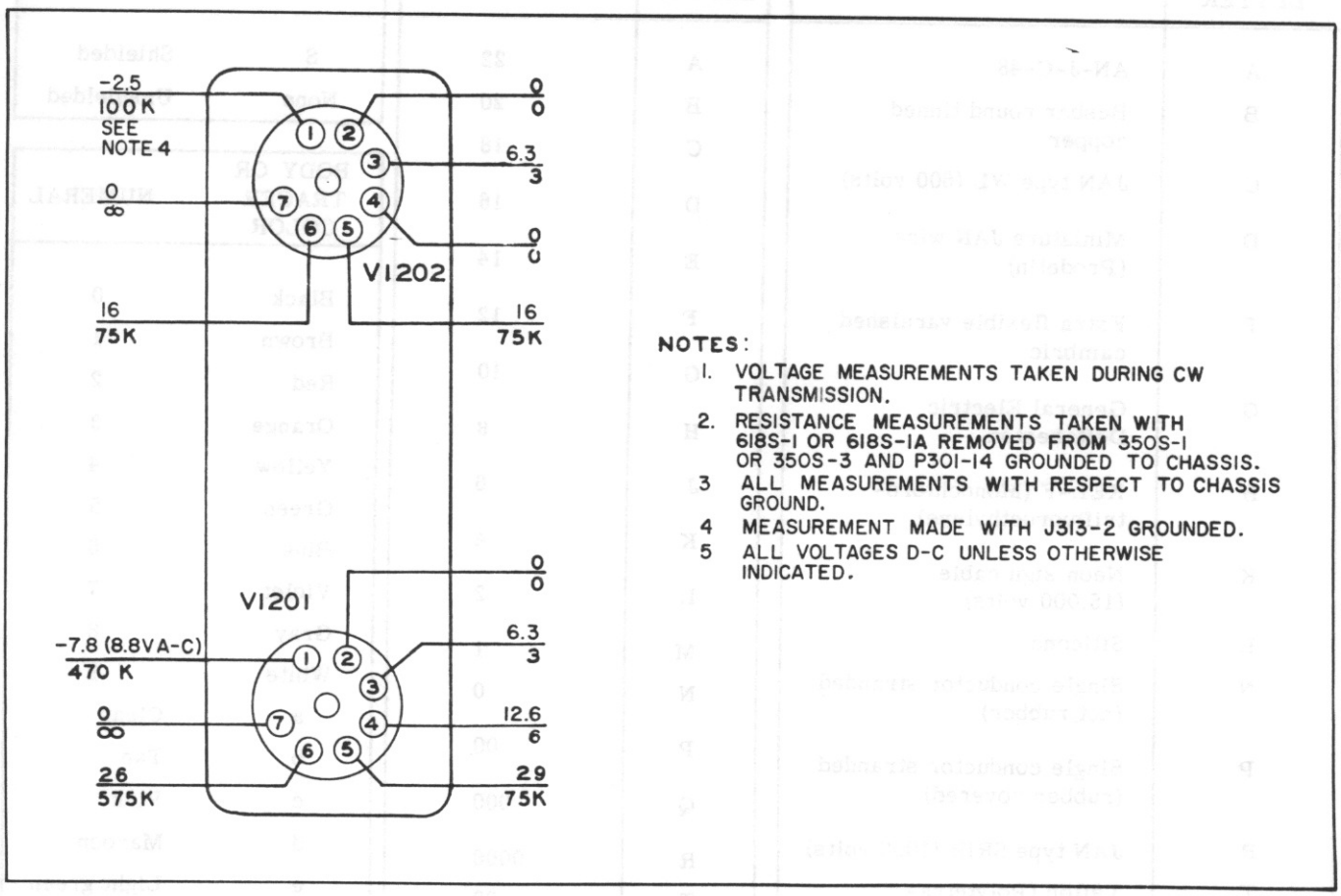
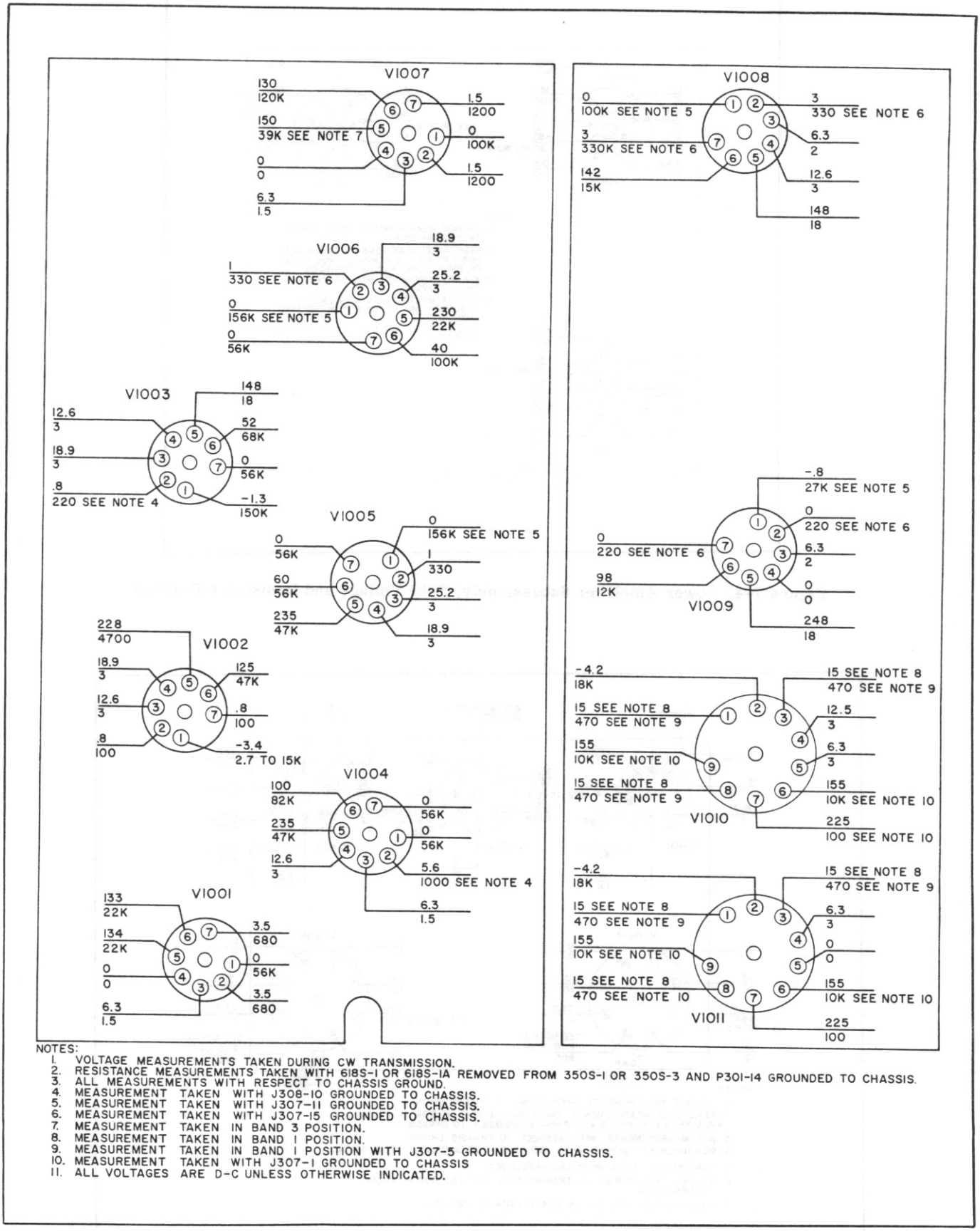


Figure 7-2. 250 Kc Oscillator and BFO Subassembly, Tube Voltage and Resistance Diagram



NOTES:
1. VOLTAGE MEASUREMENTS TAKEN DURING CW TRANSMISSION.
2. RESISTANCE MEASUREMENTS TAKEN WITH 618S-1 OR 618S-1A REMOVED FROM 350S-1 OR 350S-3 AND P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. MEASUREMENT TAKEN WITH J308-10 GROUNDED TO CHASSIS.
5. MEASUREMENT TAKEN WITH J307-11 GROUNDED TO CHASSIS.
6. MEASUREMENT TAKEN WITH J307-15 GROUNDED TO CHASSIS.
7. MEASUREMENT TAKEN IN BAND 3 POSITION.
8. MEASUREMENT TAKEN IN BAND 1 POSITION.
9. MEASUREMENT TAKEN IN BAND 1 POSITION WITH J307-5 GROUNDED TO CHASSIS.
10. MEASUREMENT TAKEN WITH J307-1 GROUNDED TO CHASSIS
11. ALL VOLTAGES ARE D-C UNLESS OTHERWISE INDICATED.

Figure 7-3. Tuner Subassembly, Tube Voltage and Resistance Diagram

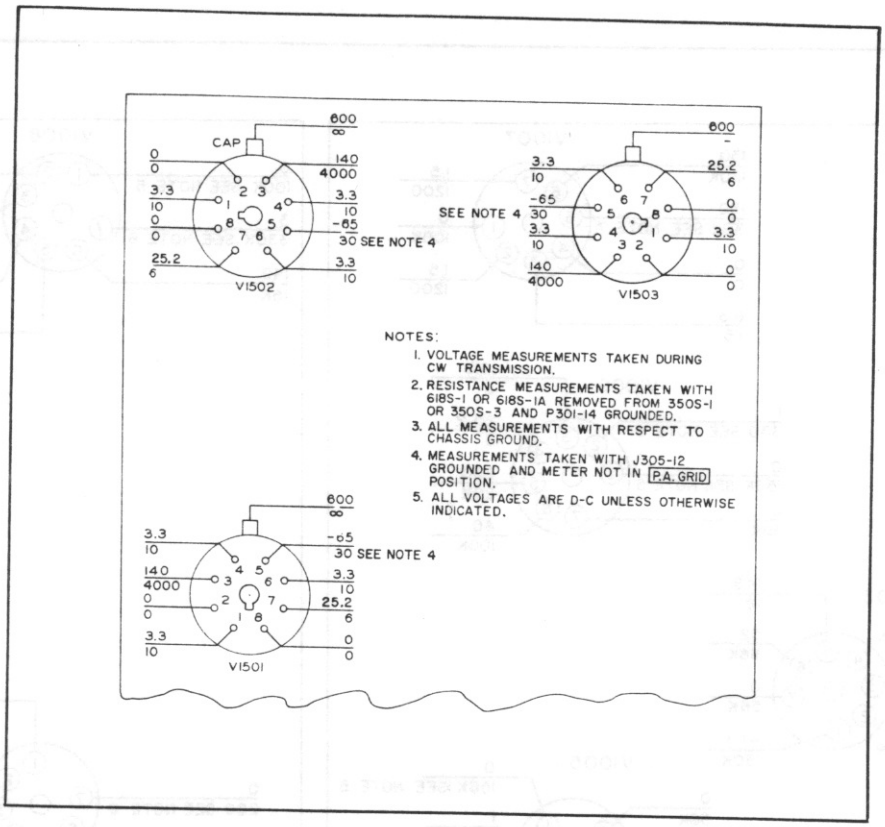


Figure 7-4. Power Amplifier Subassembly, Tube Voltage and Resistance Diagram

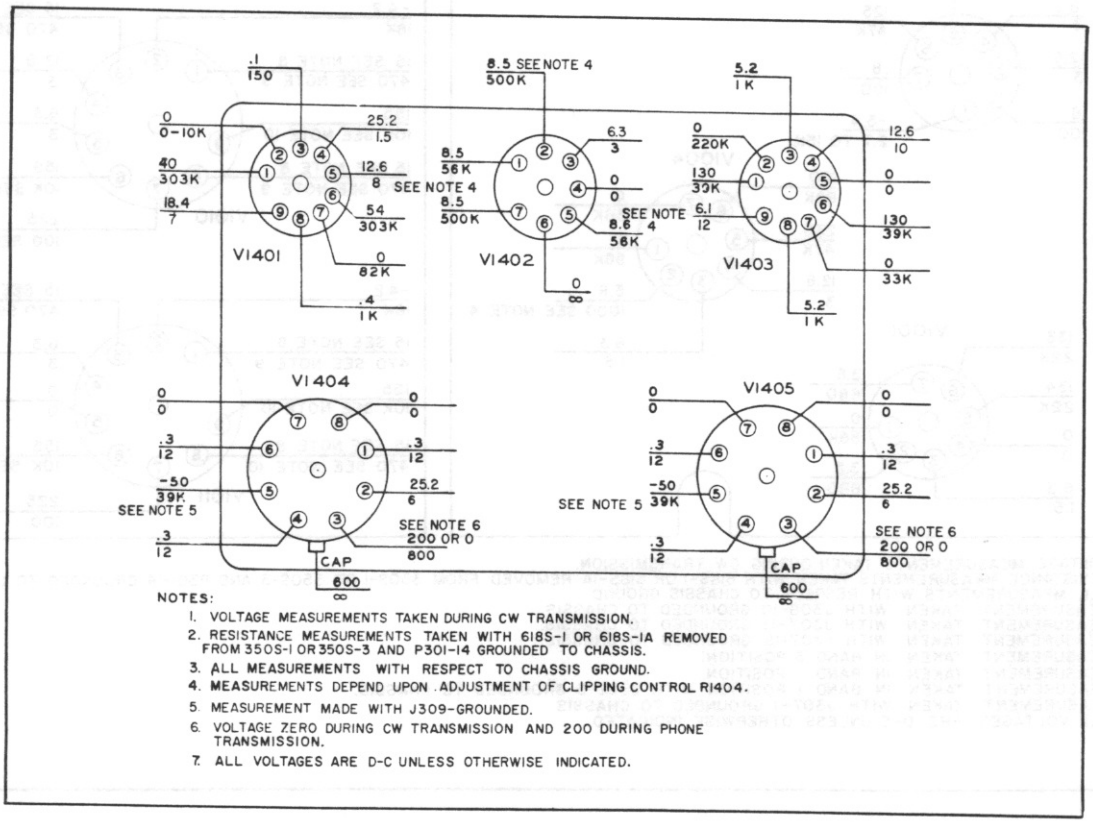


Figure 7-5. Modulator Subassembly, Tube Voltage and Resistance Diagram

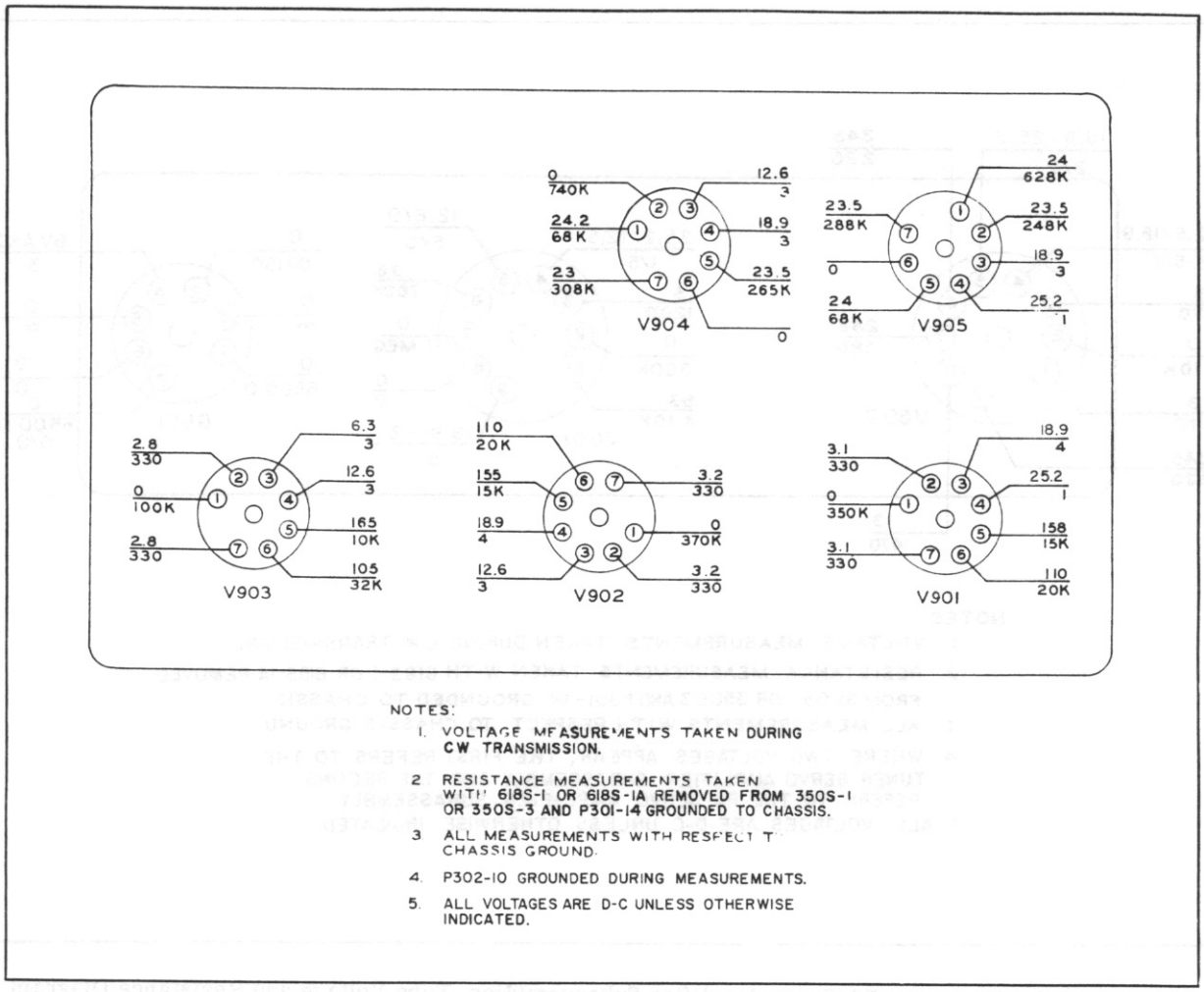


Figure 7-6. I-F Amplifier Subassembly, Tube Voltage and Resistance Diagram

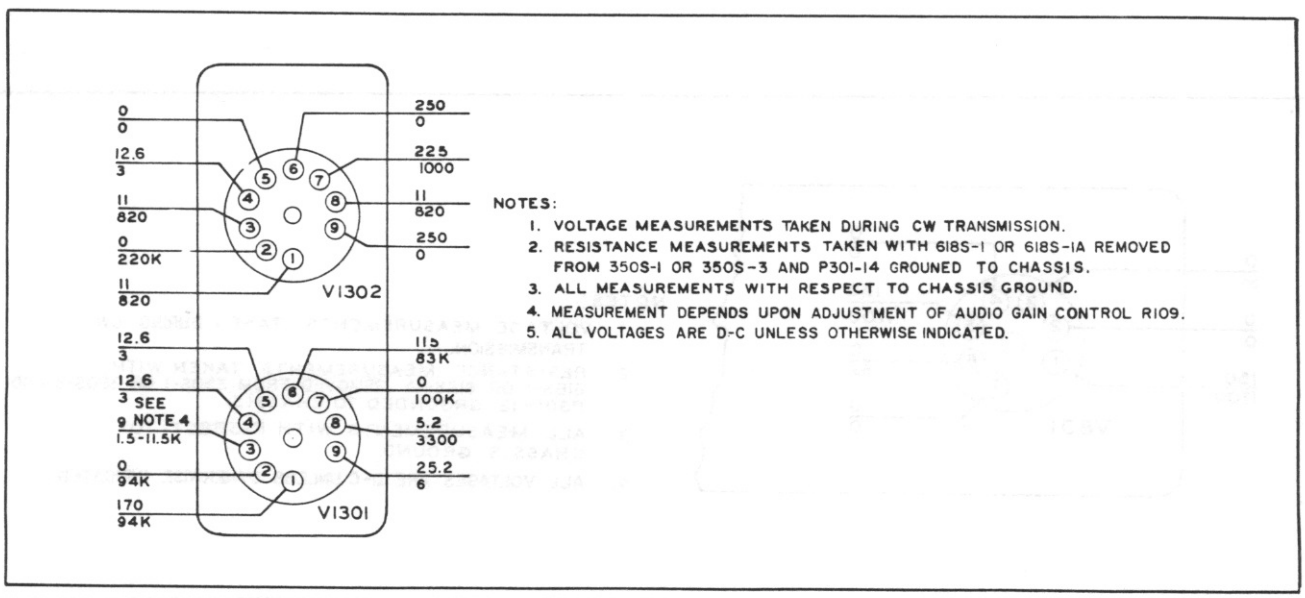


Figure 7-7. Audio Amplifier Subassembly, Tube Voltage and Resistance Diagram

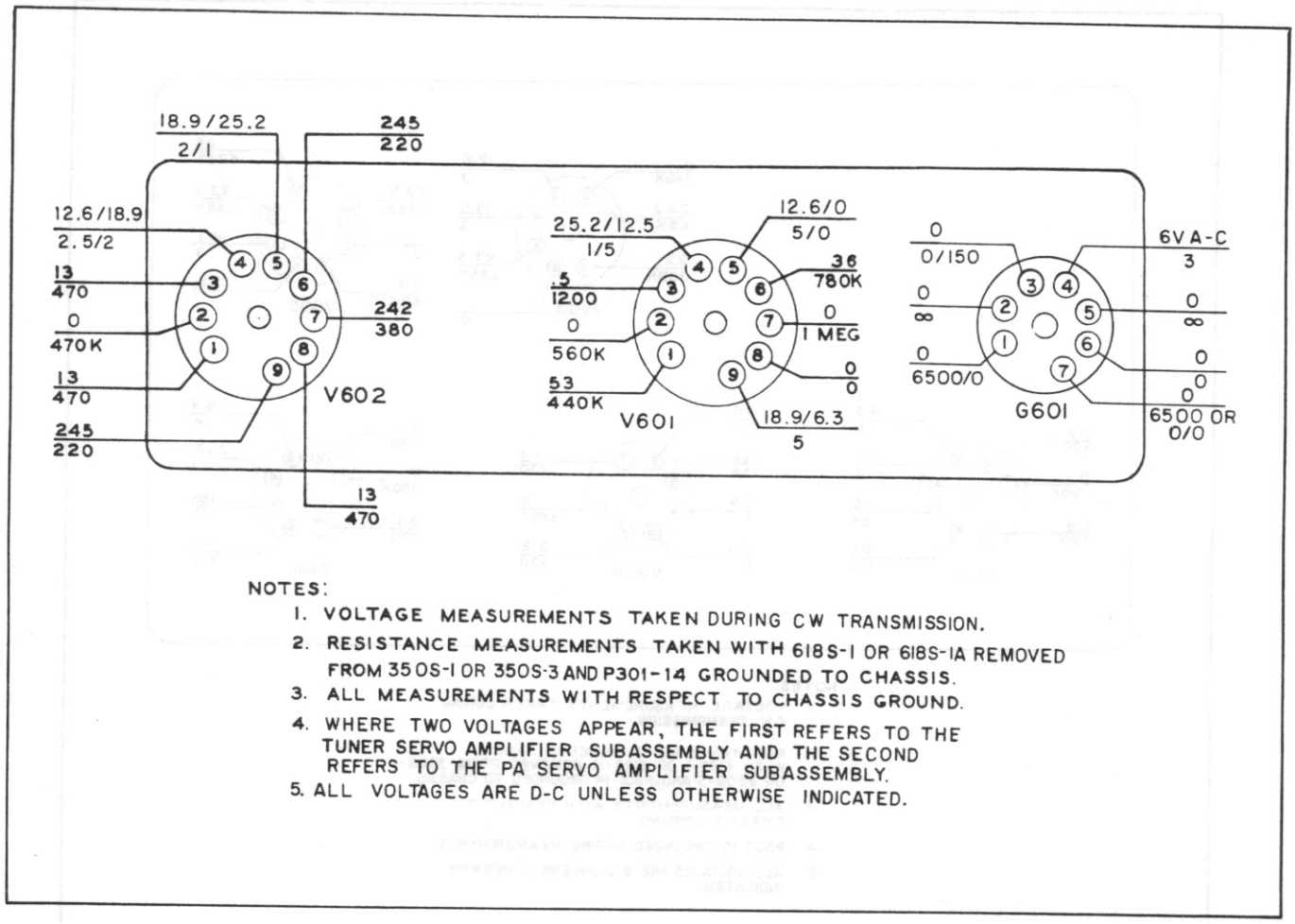


Figure 7-8. Tuner and PA Servo Amplifier Subassemblies, Tube Voltage and Resistance Diagram

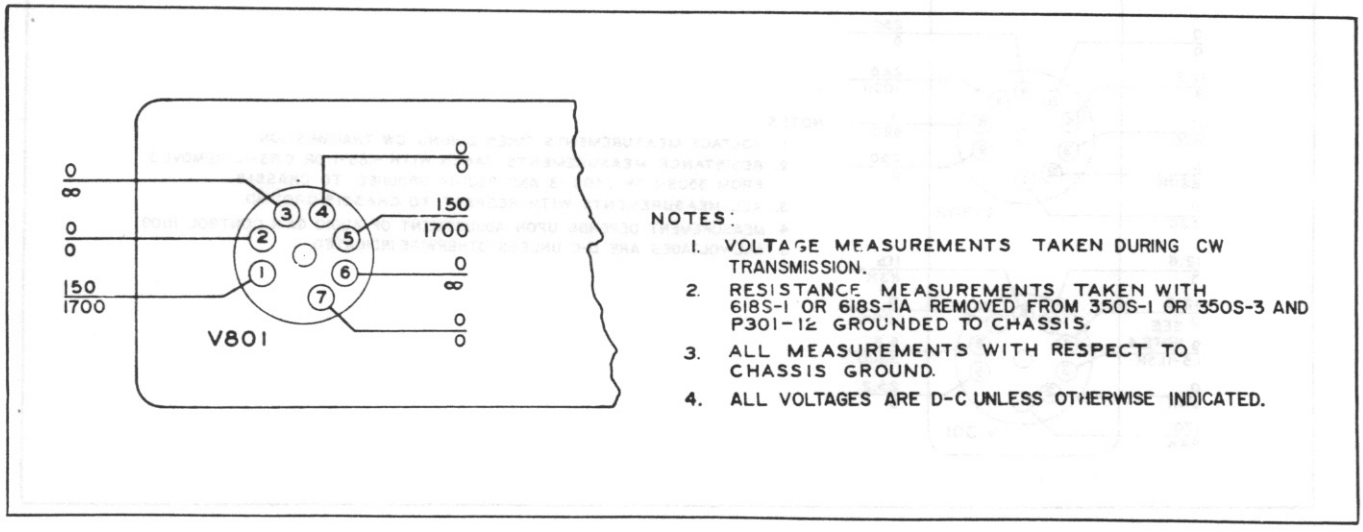
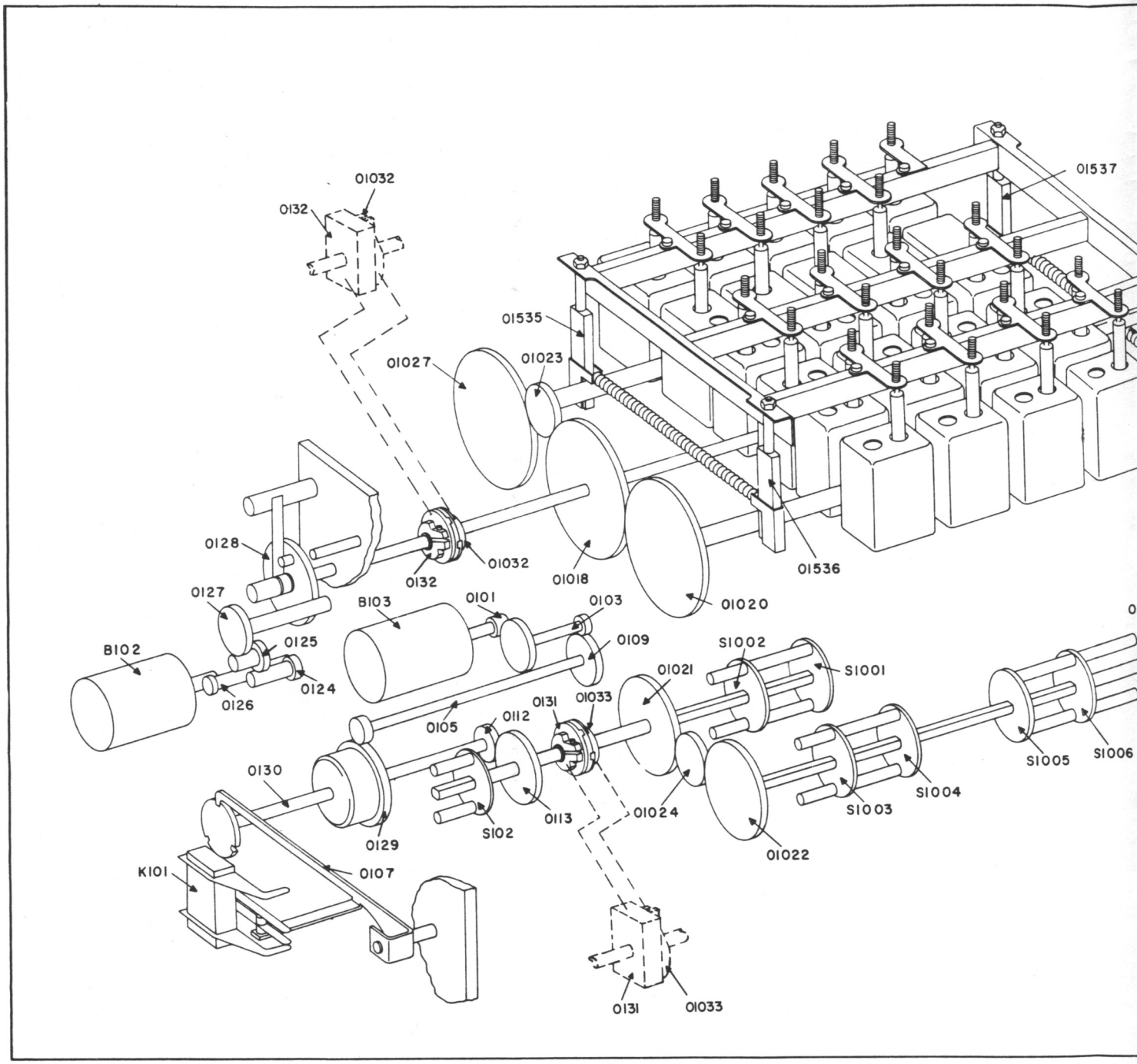


Figure 7-9. Relay Subassembly, Tube Voltage and Resistance Diagram


01032
0132
01537
01535
01027
01023
0128
01032
0132
01018
01536
01020
0127
B103
0101
0103
B102
0125
0109
S1002
S1001
01021
0126
0124
0105
0112
0131
01033
0130
S1005
S1006
S1004
S1003
0113
01024
S102
0129
01022
K101
0107
0131
01033

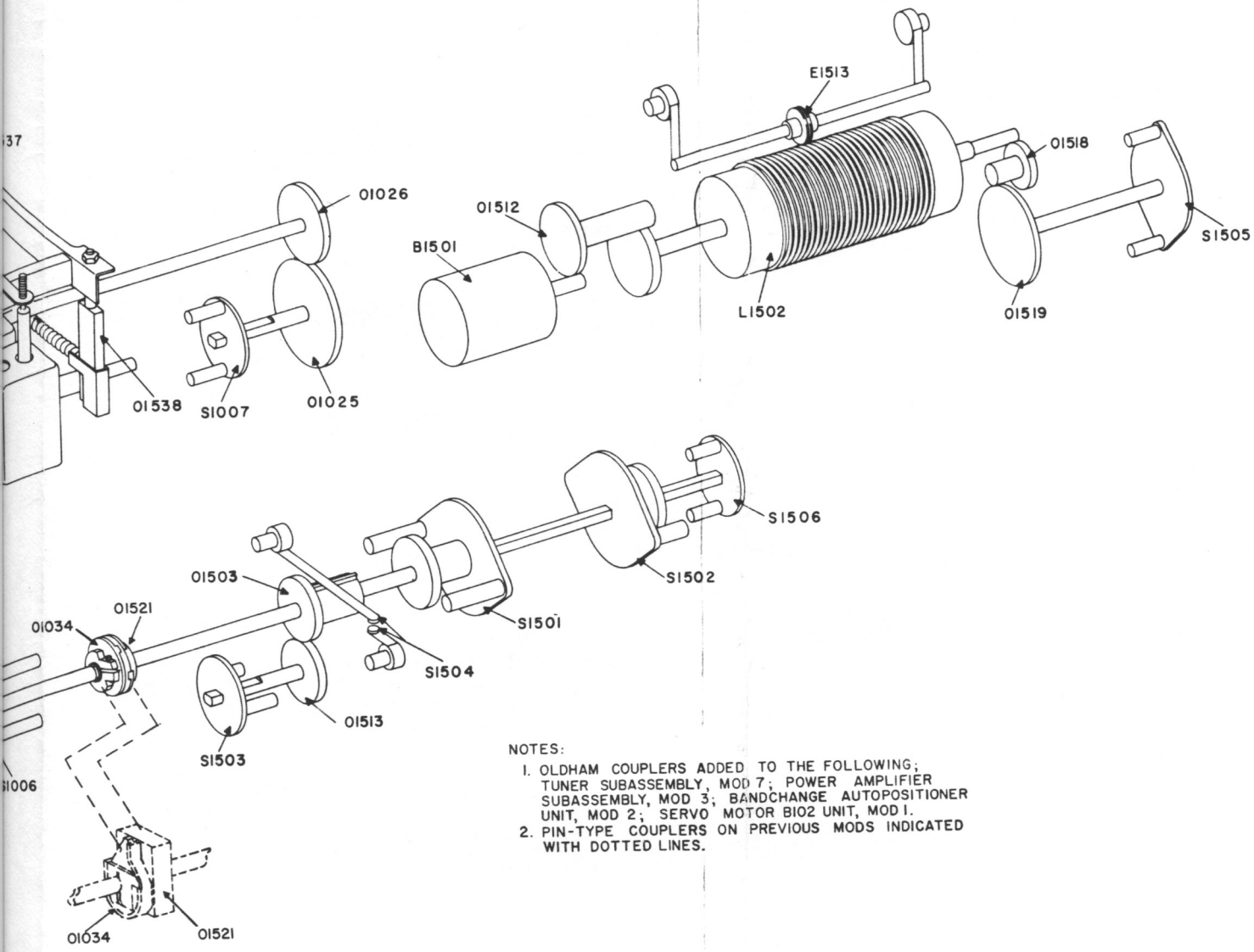


Figure 7-14. Tuner and Power Amplifier Subassemblies, Mechanical Functional Diagram

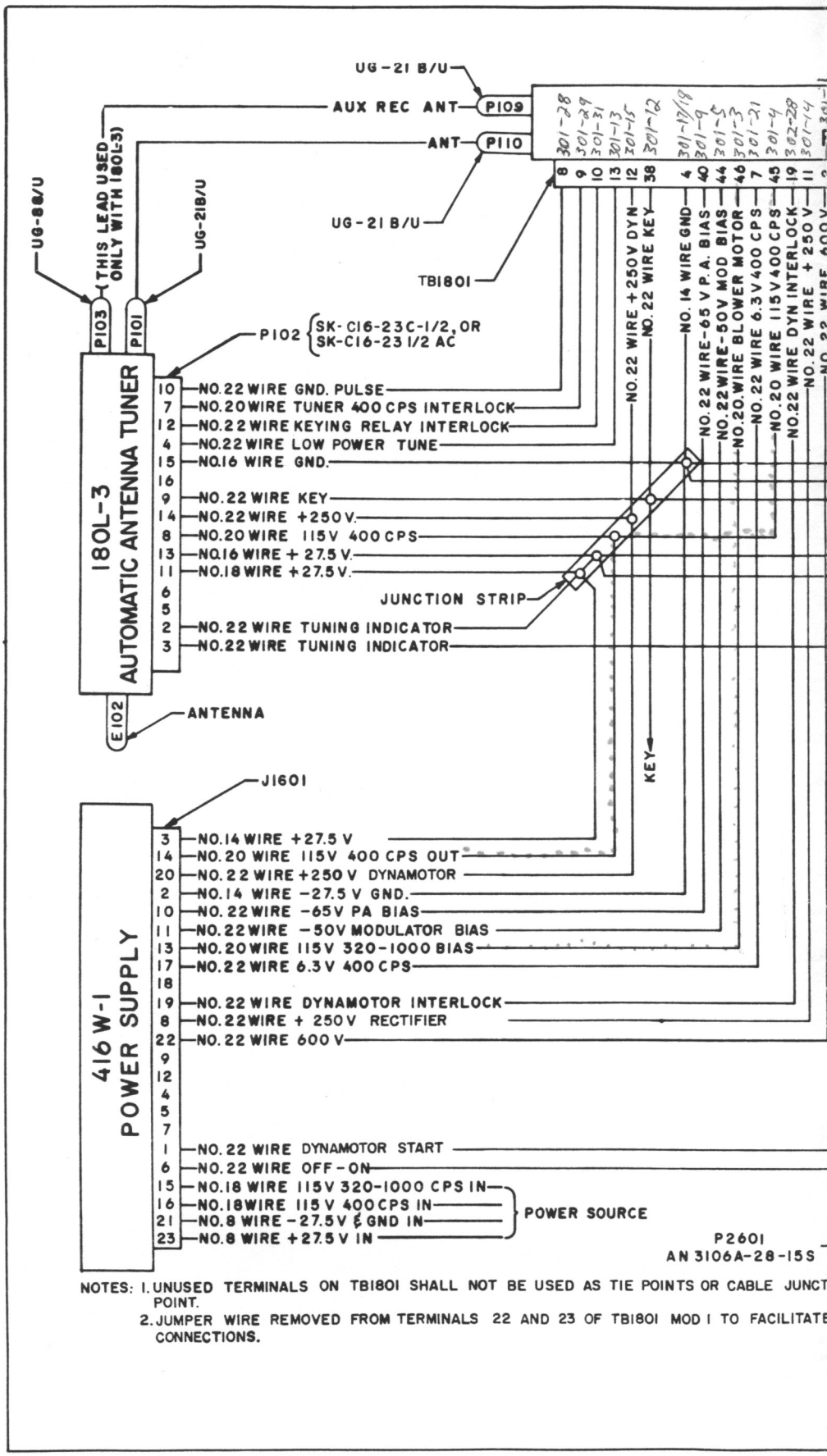
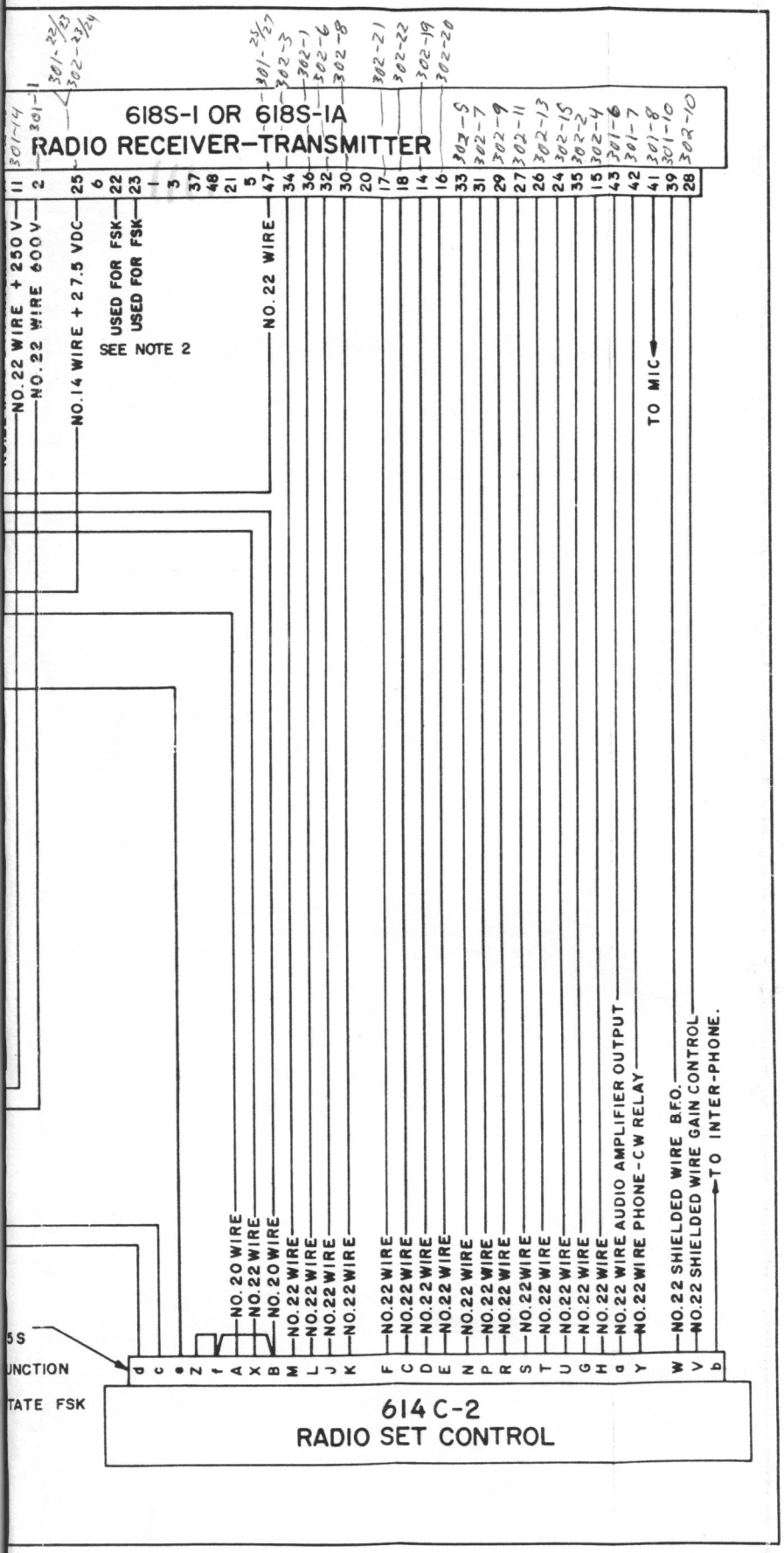
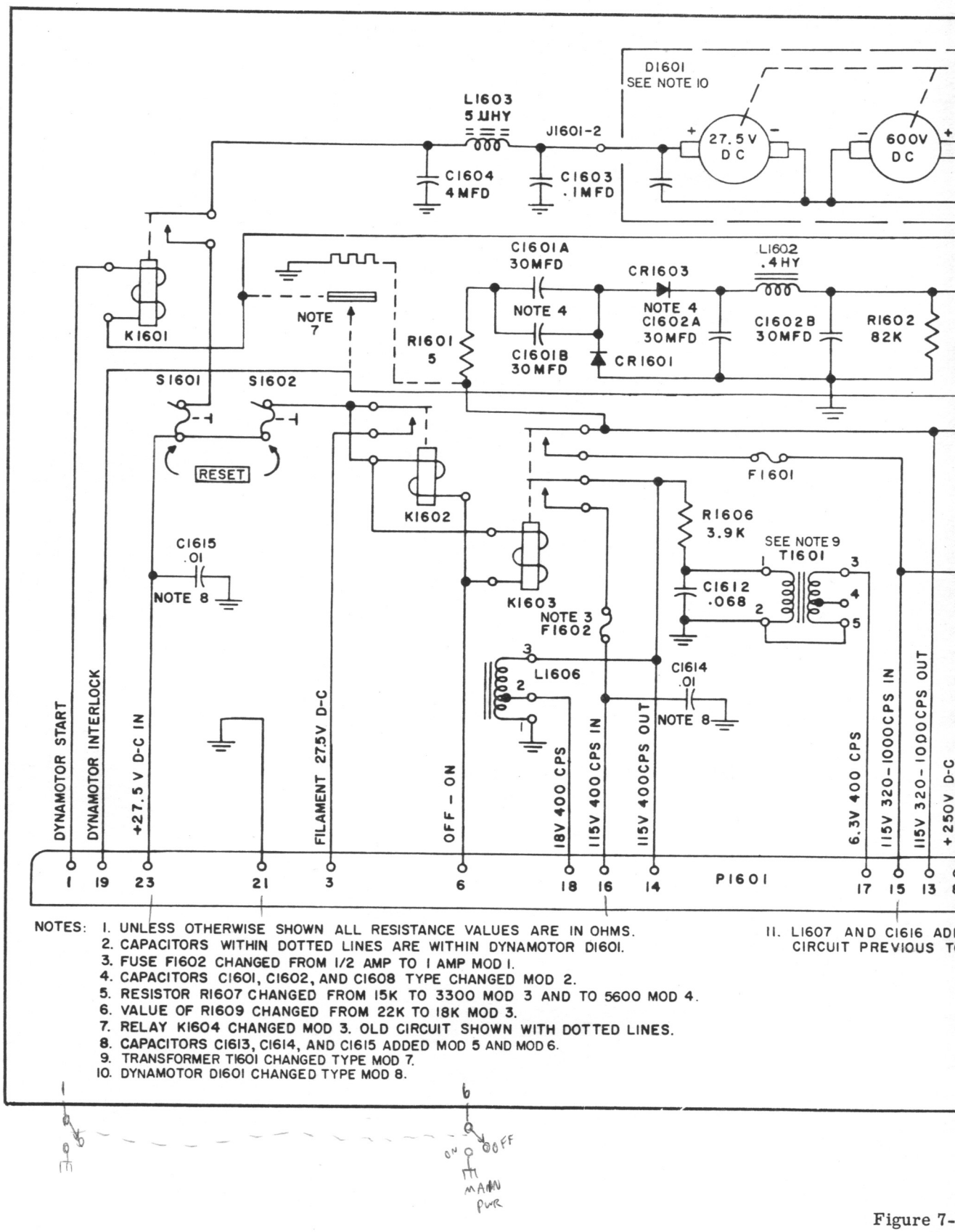


Figure 7-15. Radio Se



BAND SW.
1 2 3 4
1, 3, 37, 48
NOT USED.

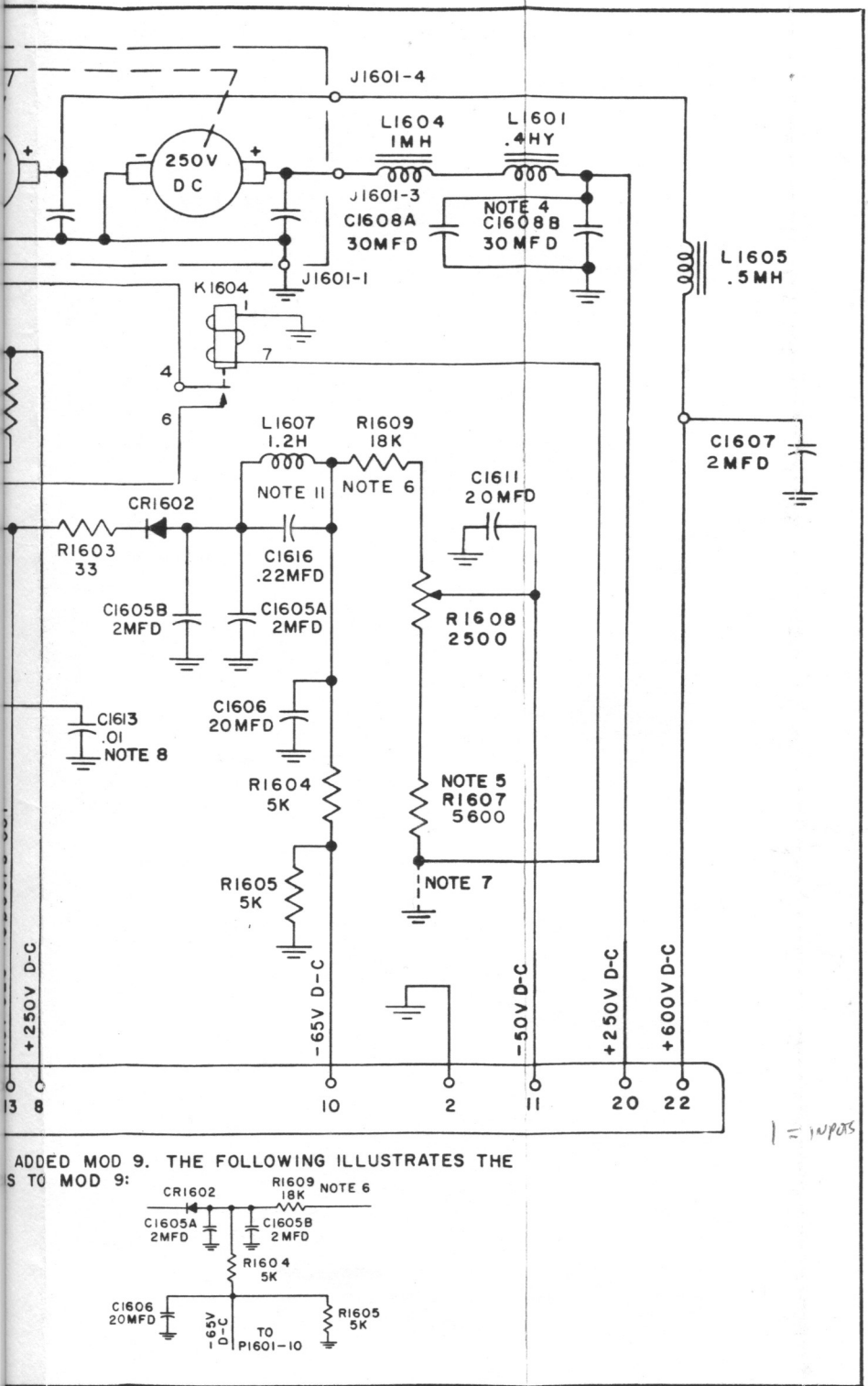
Set 618S-1 and 618S-1A, External Wiring Diagram



NOTES:
1. UNLESS OTHERWISE SHOWN ALL RESISTANCE VALUES ARE IN OHMS.
2. CAPACITORS WITHIN DOTTED LINES ARE WITHIN DYNAMOTOR D1601.
3. FUSE F1602 CHANGED FROM 1/2 AMP TO 1 AMP MOD 1.
4. CAPACITORS C1601, C1602, AND C1608 TYPE CHANGED MOD 2.
5. RESISTOR R1607 CHANGED FROM 15K TO 3300 MOD 3 AND TO 5600 MOD 4.
6. VALUE OF R1609 CHANGED FROM 22K TO 18K MOD 3.
7. RELAY K1604 CHANGED MOD 3. OLD CIRCUIT SHOWN WITH DOTTED LINES.
8. CAPACITORS C1613, C1614, AND C1615 ADDED MOD 5 AND MOD 6.
9. TRANSFORMER T1601 CHANGED TYPE MOD 7.
10. DYNAMOTOR D1601 CHANGED TYPE MOD 8.

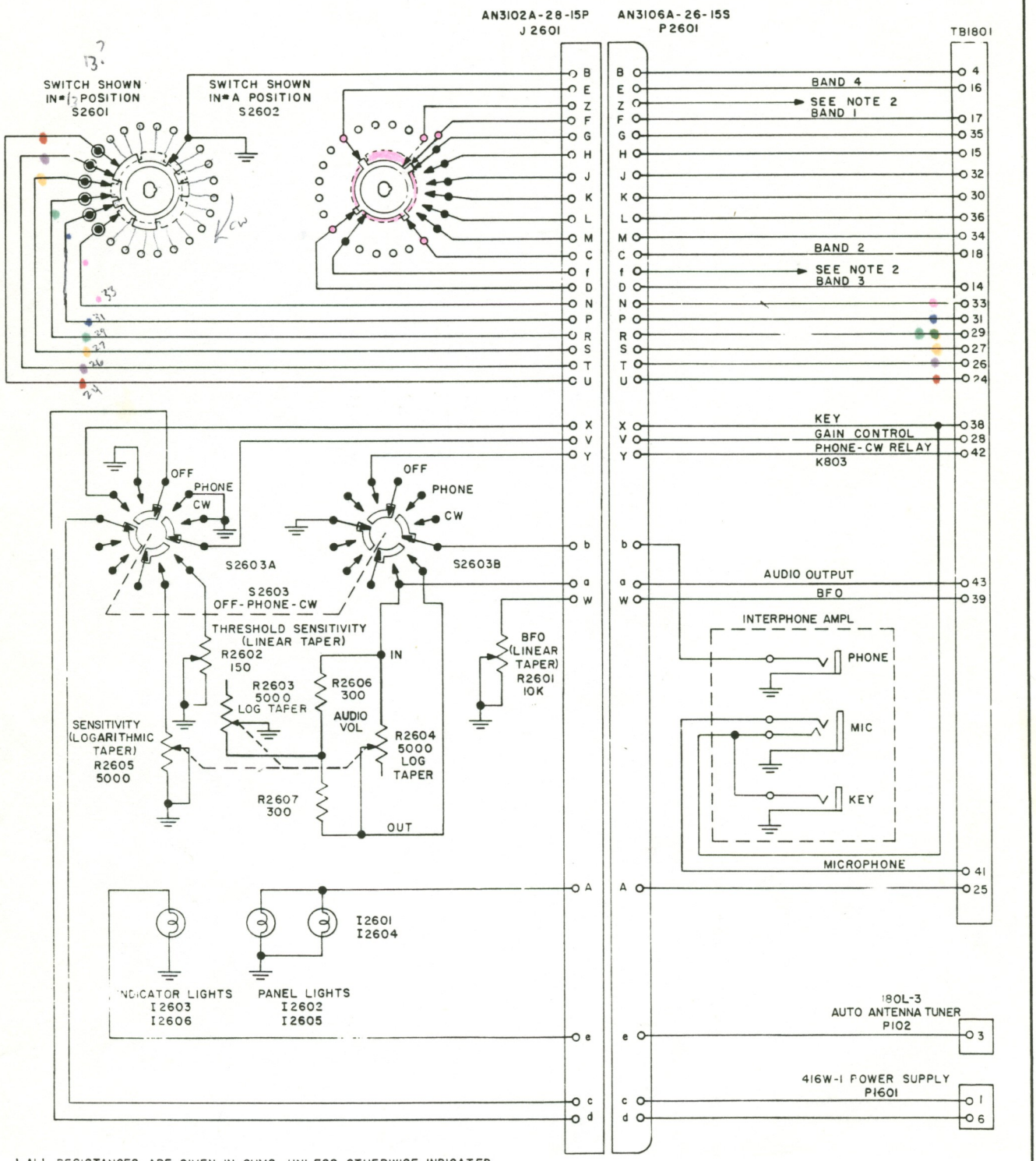
11. L1607 AND C1616 AD
CIRCUIT PREVIOUS T

Figure 7-



ADDED MOD 9. THE FOLLOWING ILLUSTRATES THE
S TO MOD 9:

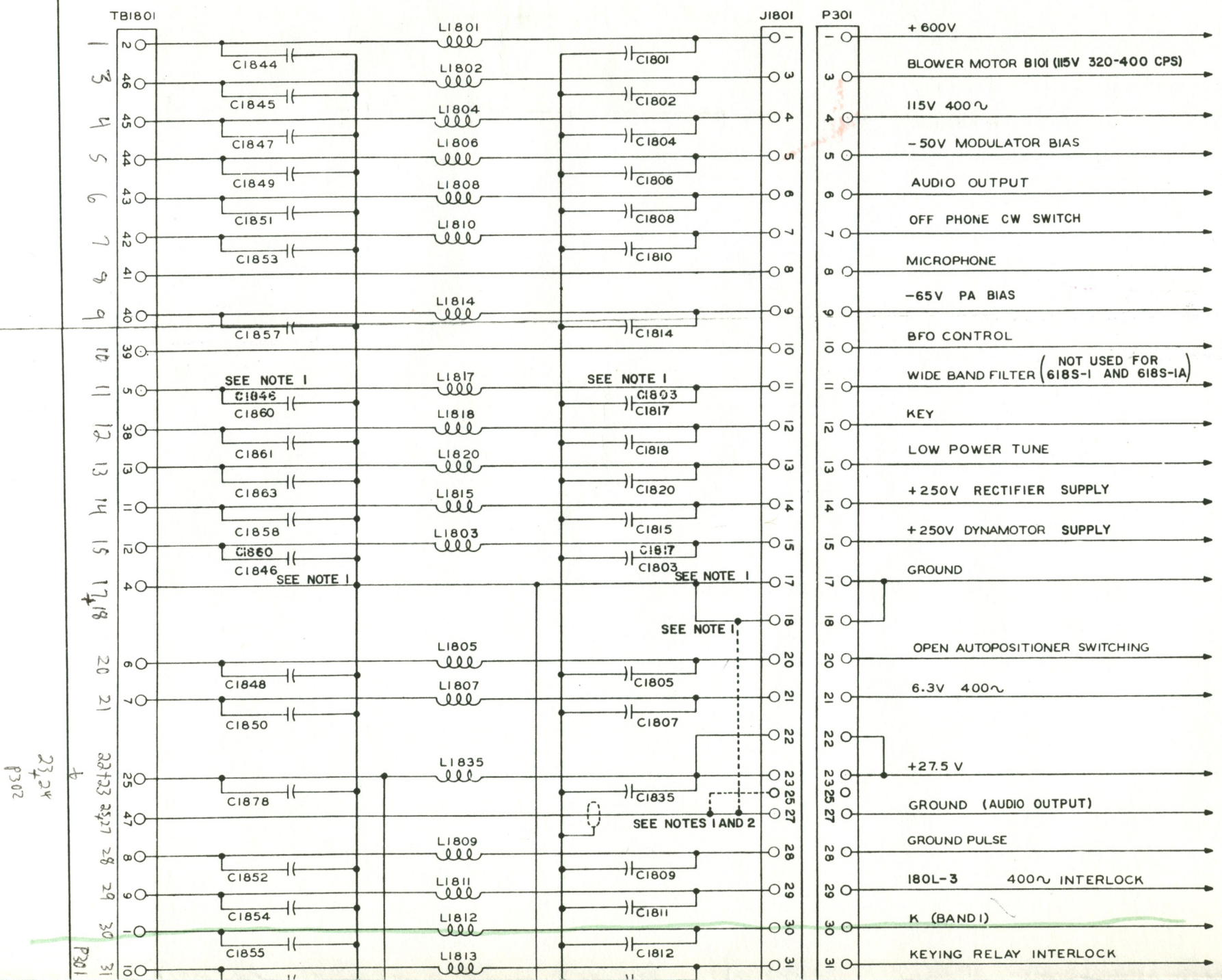
e 7-16. Power Supply 416W-1, Schematic Diagram

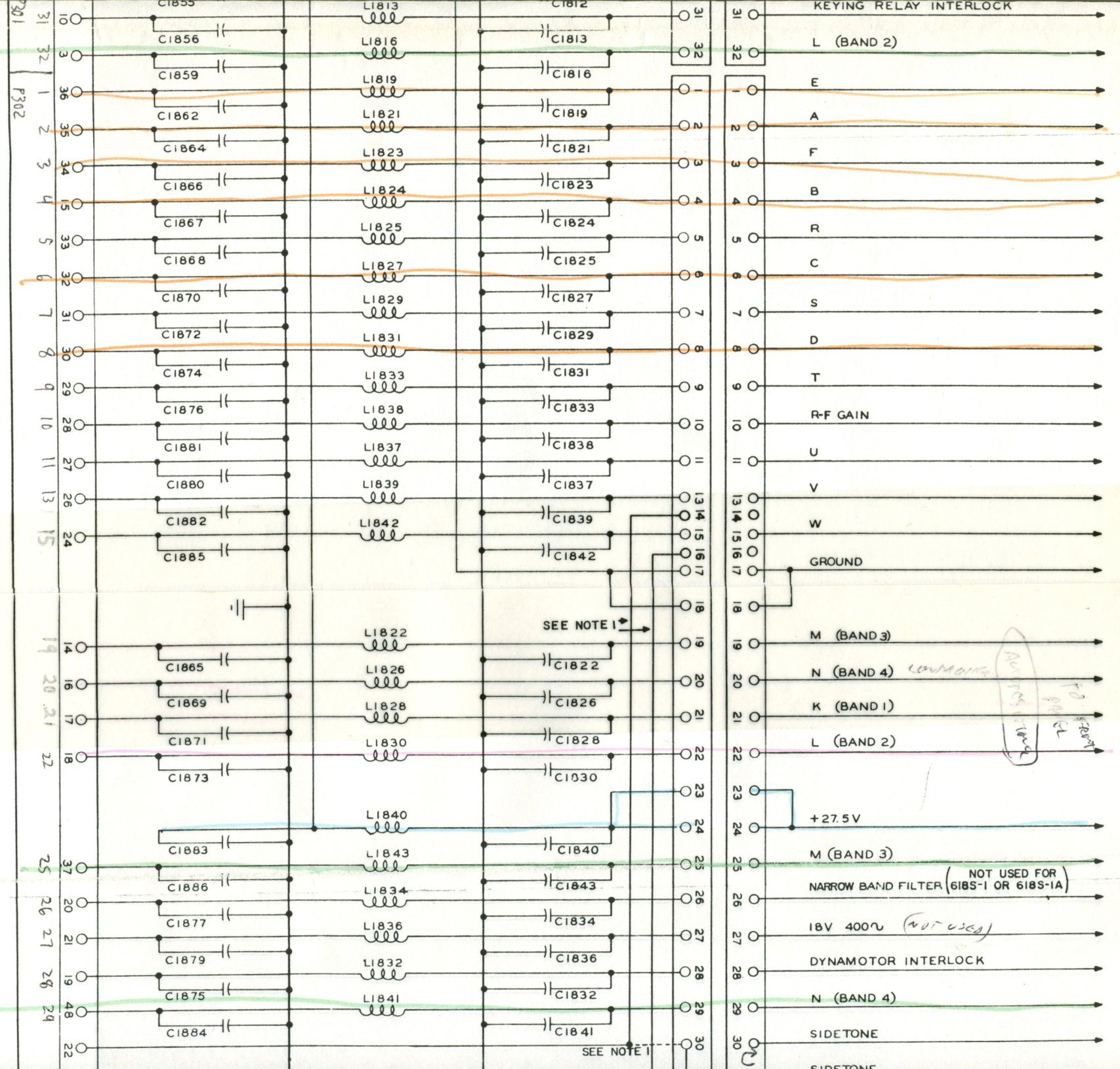


1 ALL RESISTANCES ARE GIVEN IN OHMS, UNLESS OTHERWISE INDICATED.
2 TERMINALS Z AND f SHOULD BE GROUNDED FOR NORMAL 614C-2 OPERATION. THESE TERMINALS TO BE OPENED WHEN DISTRESS CALL SWITCHING IS OPERATED.
3 KEY TO SWITCHES
- REAR CONTACT
- FRONT CONTACT
- FRONT AND REAR CONTACTS ELECTRICALLY CONNECTED

4 ALL SWITCHES VIEWED FRONT OR SIDE

Figure 7-17. Radio Set Control 614C-2, Schematic Diagram


TB1801
J1801
P301
L1801
L1802
L1804
L1806
L1808
L1810
L1814
L1817
L1818
L1820
L1815
L1803
L1805
L1807
L1835
L1809
L1811
L1812
L1813
C1844
C1845
C1847
C1849
C1851
C1853
C1857
C1846
C1848
C1850
C1878
C1852
C1854
C1855
C1801
C1802
C1804
C1806
C1808
C1810
C1814
C1803
C1817
C1818
C1820
C1815
C1805
C1807
C1835
C1809
C1811
C1812
SEE NOTE 1
SEE NOTES 1 AND 2
+600V
BLOWER MOTOR B101 (115V 320-400 CPS)
115V 400∿
-50V MODULATOR BIAS
AUDIO OUTPUT
OFF PHONE CW SWITCH
MICROPHONE
-65V PA BIAS
BFO CONTROL
WIDE BAND FILTER (NOT USED FOR 618S-1 AND 618S-1A)
KEY
LOW POWER TUNE
+250V RECTIFIER SUPPLY
+250V DYNAMOTOR SUPPLY
GROUND
OPEN AUTOPOSITIONER SWITCHING
6.3V 400∿
+27.5 V
GROUND (AUDIO OUTPUT)
GROUND PULSE
180L-3 400∿ INTERLOCK
K (BAND I)
KEYING RELAY INTERLOCK


P301
P302
C1855
C1856
C1859
C1862
C1864
C1866
C1867
C1868
C1870
C1872
C1874
C1876
C1881
C1880
C1882
C1885
C1865
C1869
C1871
C1873
C1883
C1886
C1877
C1879
C1875
C1884
L1813
L1816
L1819
L1821
L1823
L1824
L1825
L1827
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L1831
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L1838
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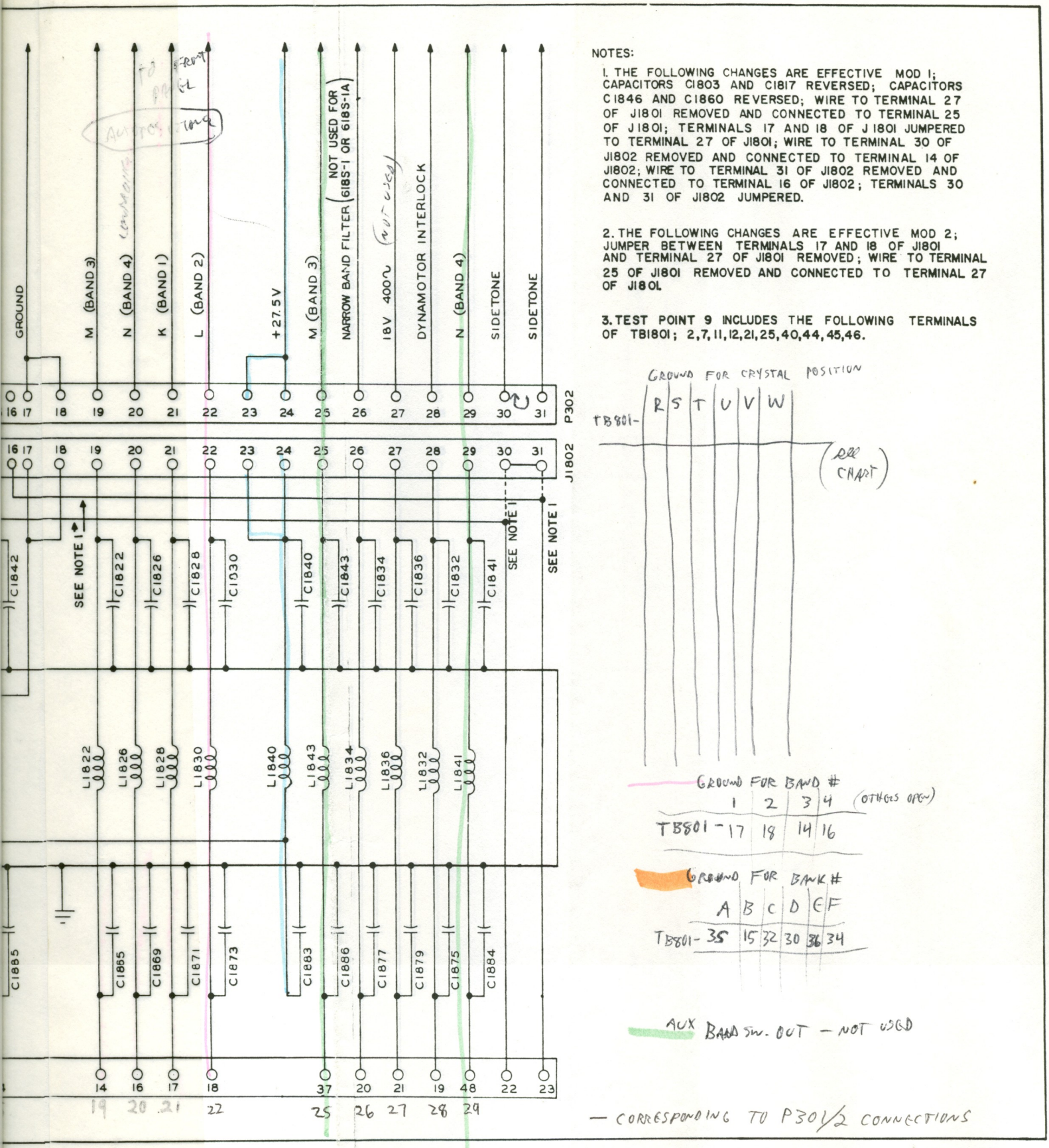
L1839
L1842
L1822
L1826
L1828
L1830
L1840
L1843
L1834
L1836
L1832
L1841
C1812
C1813
C1816
C1819
C1821
C1823
C1824
C1825
C1827
C1829
C1831
C1833
C1838
C1837
C1839
C1842
SEE NOTE 1
C1822
C1826
C1828
C1030
C1840
C1843
C1834
C1836
C1832
C1841
SEE NOTE 1
KEYING RELAY INTERLOCK
L (BAND 2)
E
A
F
B
R
C
S
D
T
R-F GAIN
U
V
W
GROUND
M (BAND 3)
N (BAND 4)
K (BAND 1)
L (BAND 2)
+27.5V
M (BAND 3)
NARROW BAND FILTER (NOT USED FOR 618S-1 OR 618S-1A)
18V 400~ (NOT USED)
DYNAMOTOR INTERLOCK
N (BAND 4)
SIDETONE
SIDETONE

Figure 7-1



NOTES:

1. THE FOLLOWING CHANGES ARE EFFECTIVE MOD 1; CAPACITORS C1803 AND C1817 REVERSED; CAPACITORS C1846 AND C1860 REVERSED; WIRE TO TERMINAL 27 OF J1801 REMOVED AND CONNECTED TO TERMINAL 25 OF J1801; TERMINALS 17 AND 18 OF J1801 JUMPERED TO TERMINAL 27 OF J1801; WIRE TO TERMINAL 30 OF J1802 REMOVED AND CONNECTED TO TERMINAL 14 OF J1802; WIRE TO TERMINAL 31 OF J1802 REMOVED AND CONNECTED TO TERMINAL 16 OF J1802; TERMINALS 30 AND 31 OF J1802 JUMPERED.

2. THE FOLLOWING CHANGES ARE EFFECTIVE MOD 2; JUMPER BETWEEN TERMINALS 17 AND 18 OF J1801 AND TERMINAL 27 OF J1801 REMOVED; WIRE TO TERMINAL 25 OF J1801 REMOVED AND CONNECTED TO TERMINAL 27 OF J1801.

3. TEST POINT 9 INCLUDES THE FOLLOWING TERMINALS OF TB1801; 2,7,11,12,21,25,40,44,45,46.

GROUND FOR CRYSTAL POSITION

TB801-	R	S	T	U	V	W

(SEE CHART)

GROUND FOR BAND #

	1	2	3	4
TB801-	17	18	14	16

(OTHERS OPEN)

GROUND FOR BANK #

	A	B	C	D	E	F
TB801-	35	15	32	30	36	34

AUX BAND SW. OUT — NOT USED

— CORRESPONDING TO P301/2 CONNECTIONS

Figure 7-18. Filter Unit, Schematic Diagram

NOTES

1. Unless otherwise indicated, all resistance values are in ohms, all capacitance values are in micromicrofarads, and all inductance values are in microhenries.

2. All switches viewed from rear (opposite knob or driven end). Front contacts and rings of switches are shown in broken lines.

3. Key to switches:

●—► Rear Contact

○···► Front Contact

◉—► Front and rear contacts electrically connected.

4. All switches are shown in the A1 position.

5. Selected resistors; refer to T.O. 12R2-4-6-4 for values.

6. Value of R405 changed from 100 to 120; MOD 2 of r-f crystal oscillator subassembly.

7. Value of R401 changed from 1 MEG to 100K and value of R402 changed from 56K to 15K; MOD 3 of r-f crystal oscillator subassembly.

8. Detail parts R408, C418, and R409 added; MOD 3 of r-f crystal oscillator subassembly.

9. Value of C409 changed from 1 uf to 8 uf and resistor R407 added; MOD 4 of r-f crystal oscillator subassembly.

10. Value of C917 changed from 10 to 15 and back to 10; MOD 1 and MOD 3, respectively, of i-f amplifier subassembly.

11. Value of R912 changed from 22K to 27K, value of R913 changed from 10K to 6.8K, and value of R922 and R923 changed from 15K to 8.2K; MOD 2 of i-f amplifier subassembly.

12. Value of R915 changed from 68K to 82K and tolerance of R914 changed from ±10% to ±5%; MOD 4 of i-f amplifier subassembly.

13. Detail parts C306, C307, C305, C304, L301, L302, R308, and R309 and wiring added to facilitate interchangeability of r-f crystal oscillator subassembly and stabilized master oscillator assembly; MOD 1 of main chassis.

14. Wiring added to facilitate fsk adaption; MOD 1 of main chassis.

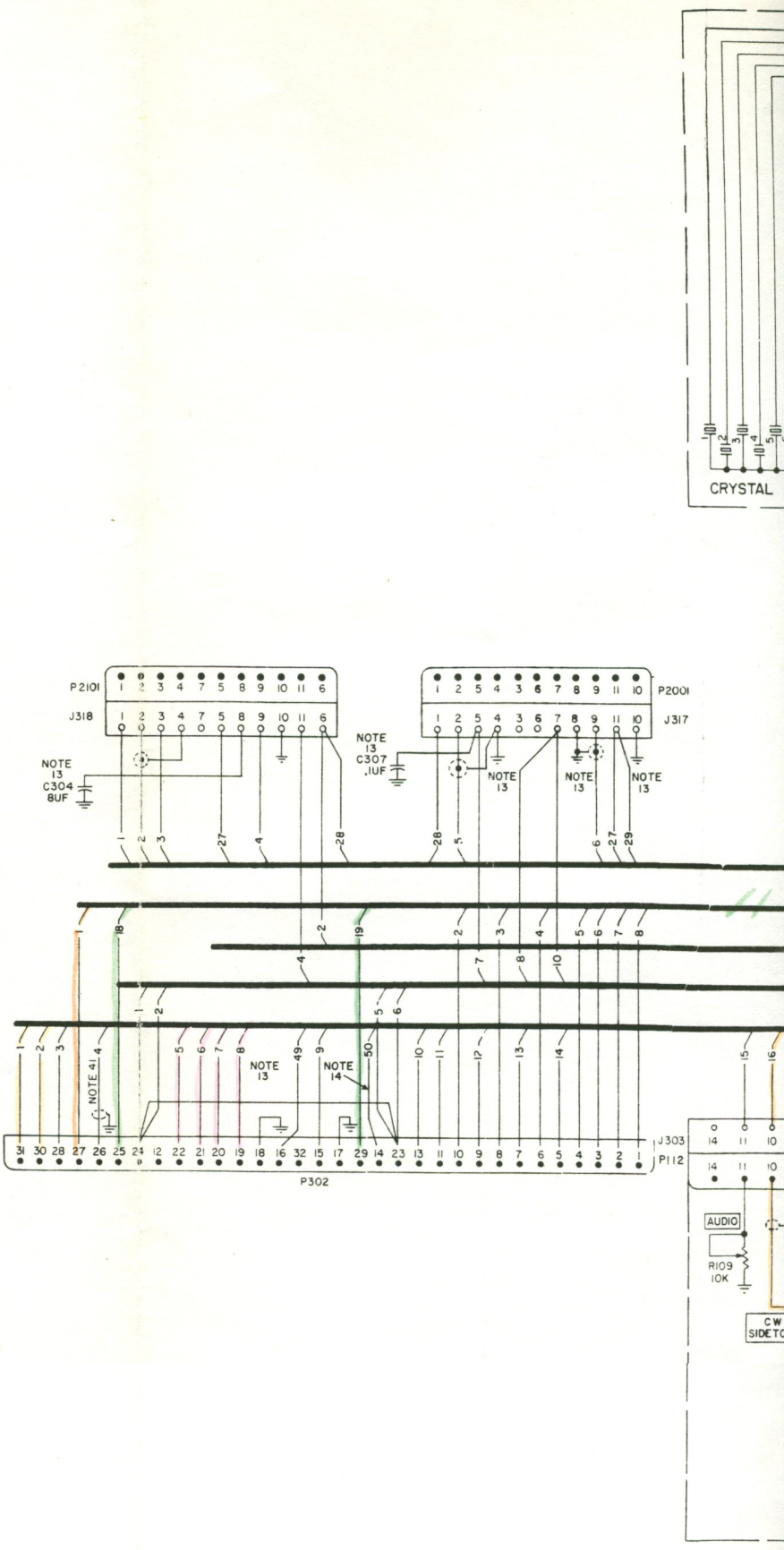
15. Capacitor C1124 added; MOD 3 of tuner subassembly.

16. The capacitors listed in the following table are changed in value and/or tolerance; MOD 3 of tuner subassembly. Capacitors indicated with asterisk (*) are changed in temperature compensation and/or fungi-resistant qualities only.

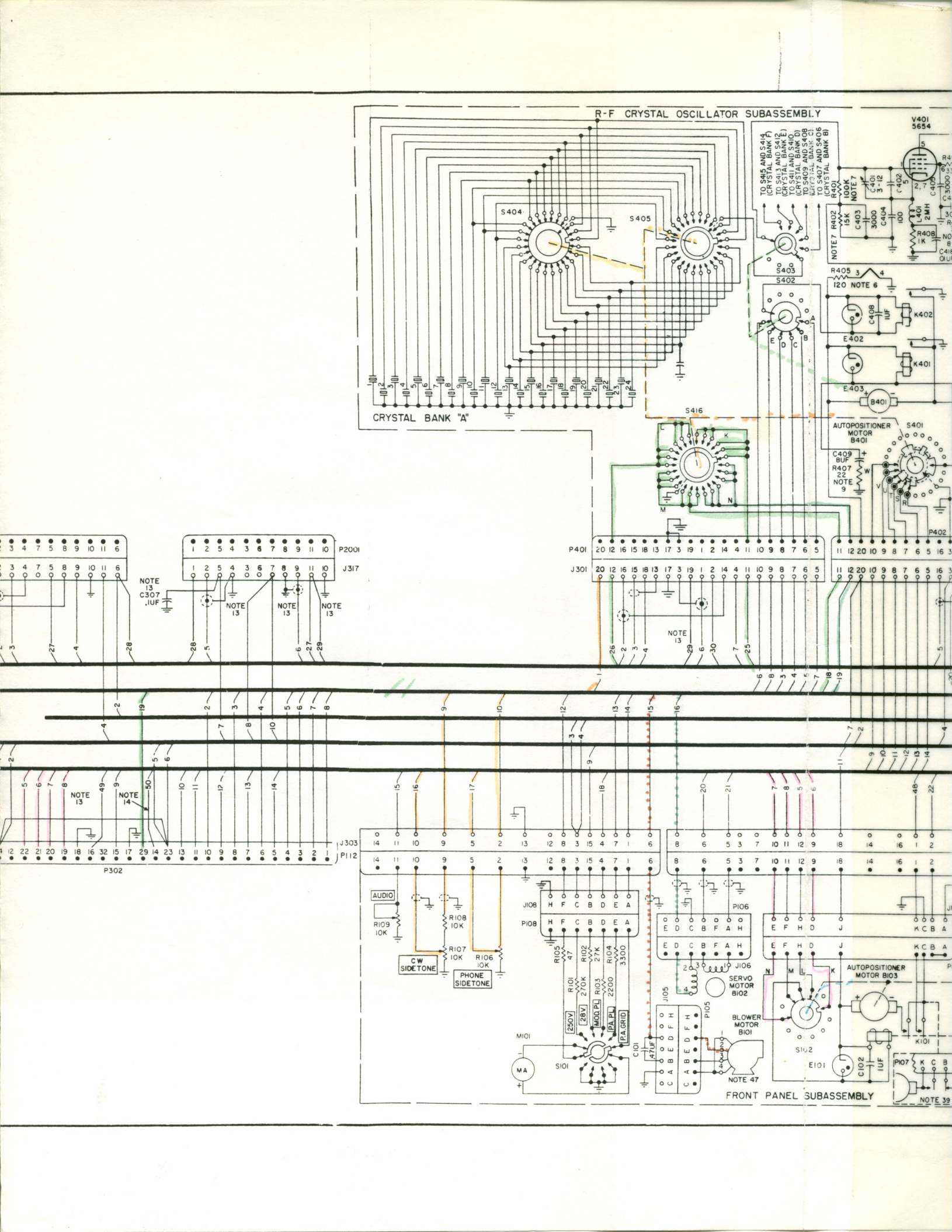
CAPACITOR	PREVIOUS VALUE AND TOLERANCE	MOD 3 VALUE AND TOLERANCE
C1012	7 ±1/2 uuf	4 ±1/2 uuf
C1015	7 ±1/2 uuf	4 ±1/2 uuf
C1018	62 ±2%	75 ±5%
C1019	5-25	5-30
C1022	5-25	5-30
C1023	100 ±20%	120 ±2%
C1025*	10 ±5%	10 ±5%
C1032	82 ±2%	100 ±5%
C1033	8-50	5-30
C1036	5-25	5-30
C1039	5-25	5-30
C1040	2000 ±20%	510 ±5%
C1041	220 ±2%	180 ±5%
C1044	100 ±2%	100 ±5%
C1045	8-50	5-30
C1047*	10 ±5%	10 ±5%
C1048	5-25	5-30
C1050	5-25	5-30
C1051	470 ±2%	800 ±2%
C1055	470 ±2%	10 ±5%
C1056	8-50	5-30
C1060	24 ±2%	30 ±5%
C1063	5-25	5-30
C1067	47 ±2%	56 ±5%
C1067	8-50	5-30
C1068	2000 ±2%	27 ±5%
C1069	5-25	5-30
C1070	5-25	5-30
C1116*	5 ±5%	5 ±1/2 uuf
C1121*	10 ±5%	10 ±5%

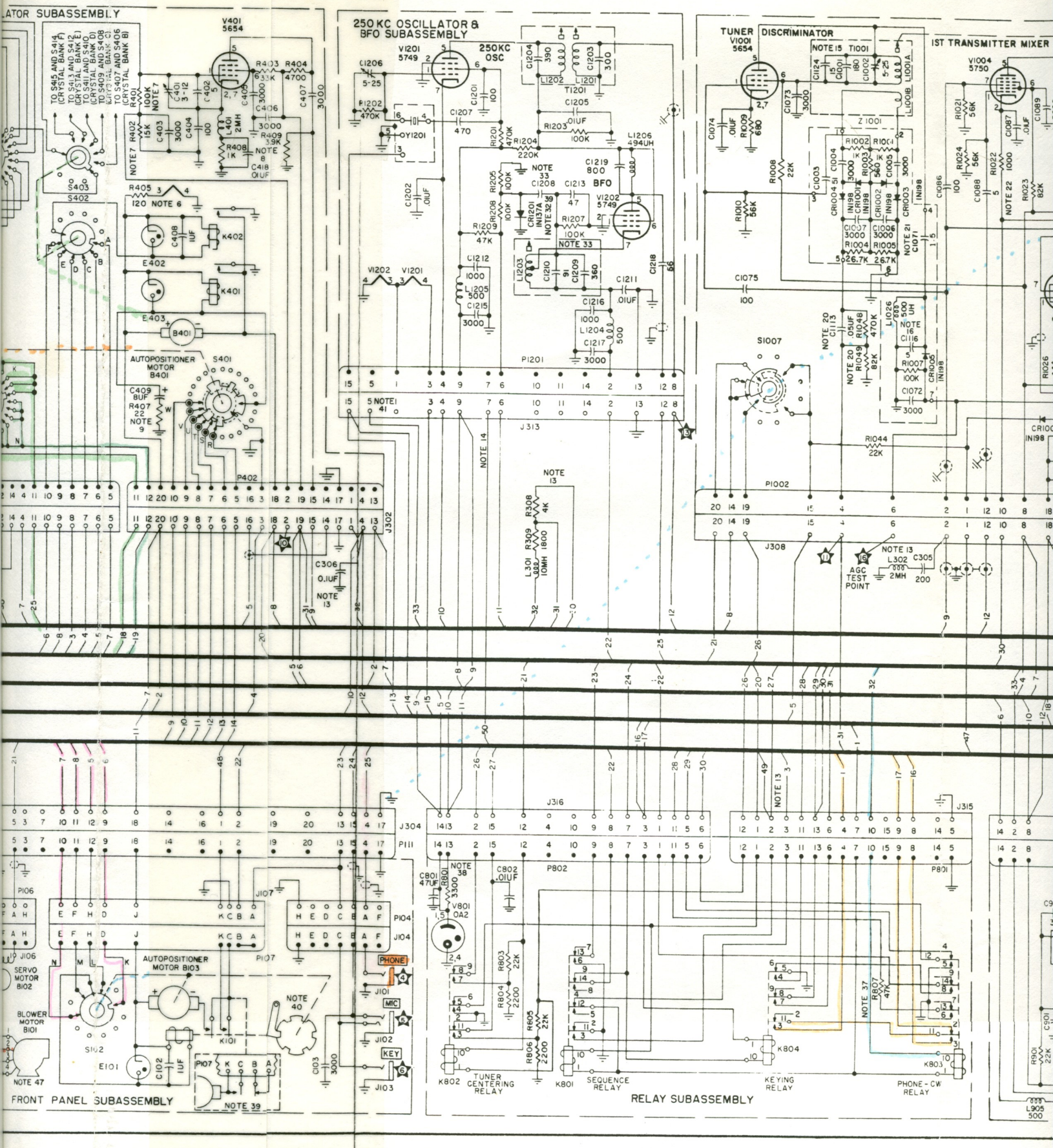
Figure 7-19. Radio Receiver-Transmitter 618S-1 and 618S-1A, Schematic Diagram (Sheet 1 of 2 sheets)

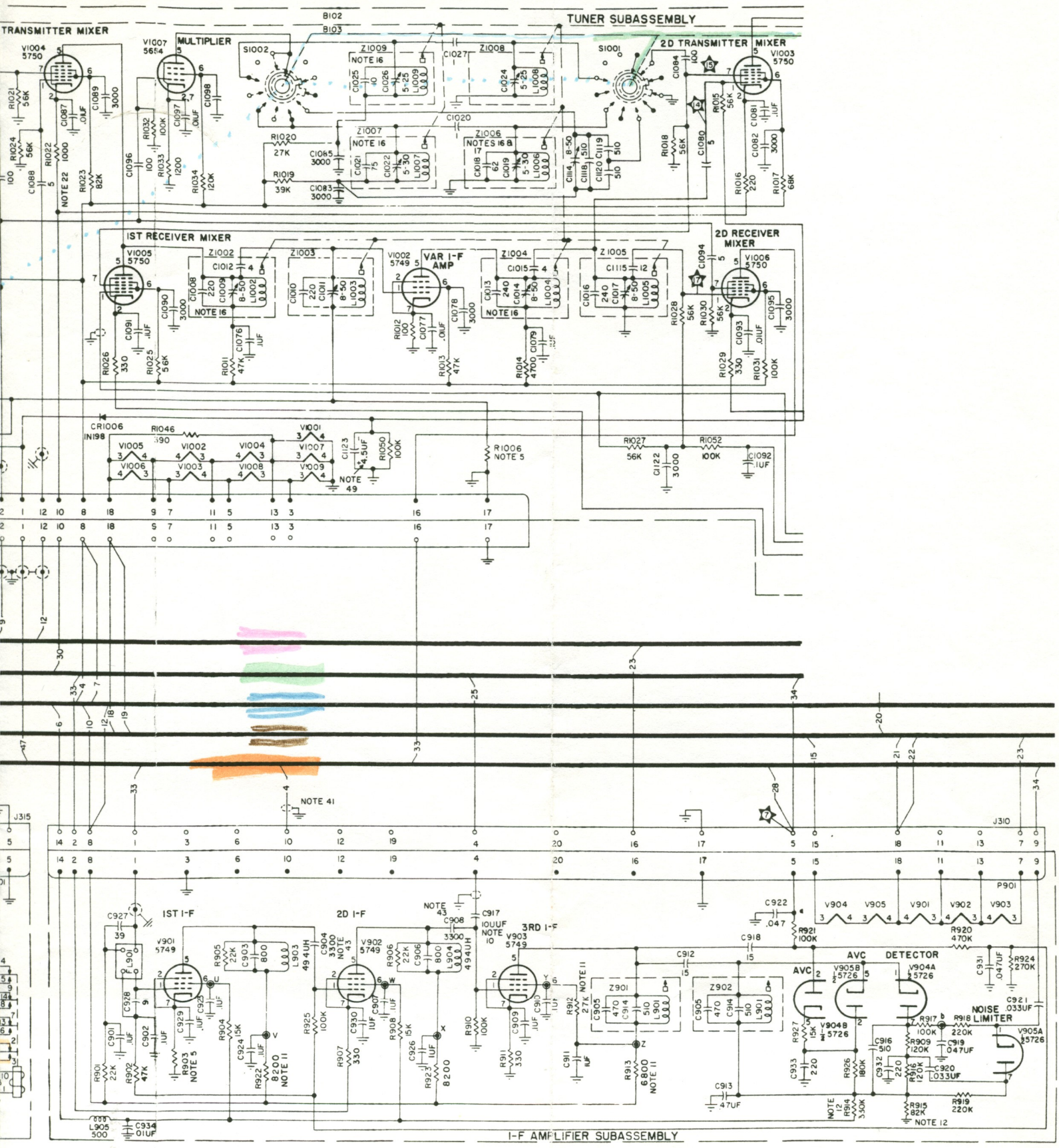
CAPACITOR	PREVIOUS VALUE AND TOLERANCE	MOD 3 VALUE AND TOLERANCE
C1012	7 ±1/2 uuf	4 ±1/2 uuf
C1015	7 ±1/2 uuf	4 ±1/2 uuf
C1018	62 ±2%	75 ±5%
C1019	5-25	5-30
C1022	5-25	5-30
C1023	100 ±20%	120 ±2%
C1025*	10 ±5%	10 ±5%
C1032	82 ±2%	100 ±5%
C1033	8-50	5-30
C1036	5-25	5-30
C1039	5-25	5-30
C1040	2000 ±20%	510 ±5%
C1041	220 ±2%	180 ±5%
C1044	100 ±2%	100 ±5%
C1045	8-50	5-30
C1047*	10 ±5%	10 ±5%
C1048	5-25	5-30
C1050	5-25	5-30
C1051	470 ±2%	800 ±2%
C1055	470 ±2%	10 ±5%
C1056	8-50	5-30
C1060	24 ±2%	30 ±5%
C1063	5-25	5-30
C1067	47 ±2%	56 ±5%
C1067	8-50	5-30
C1068	2000 ±2%	27 ±5%
C1069	5-25	5-30
C1070	5-25	5-30
C1116*	5 ±5%	5 ±1/2 uuf
C1121*	10 ±5%	10 ±5%



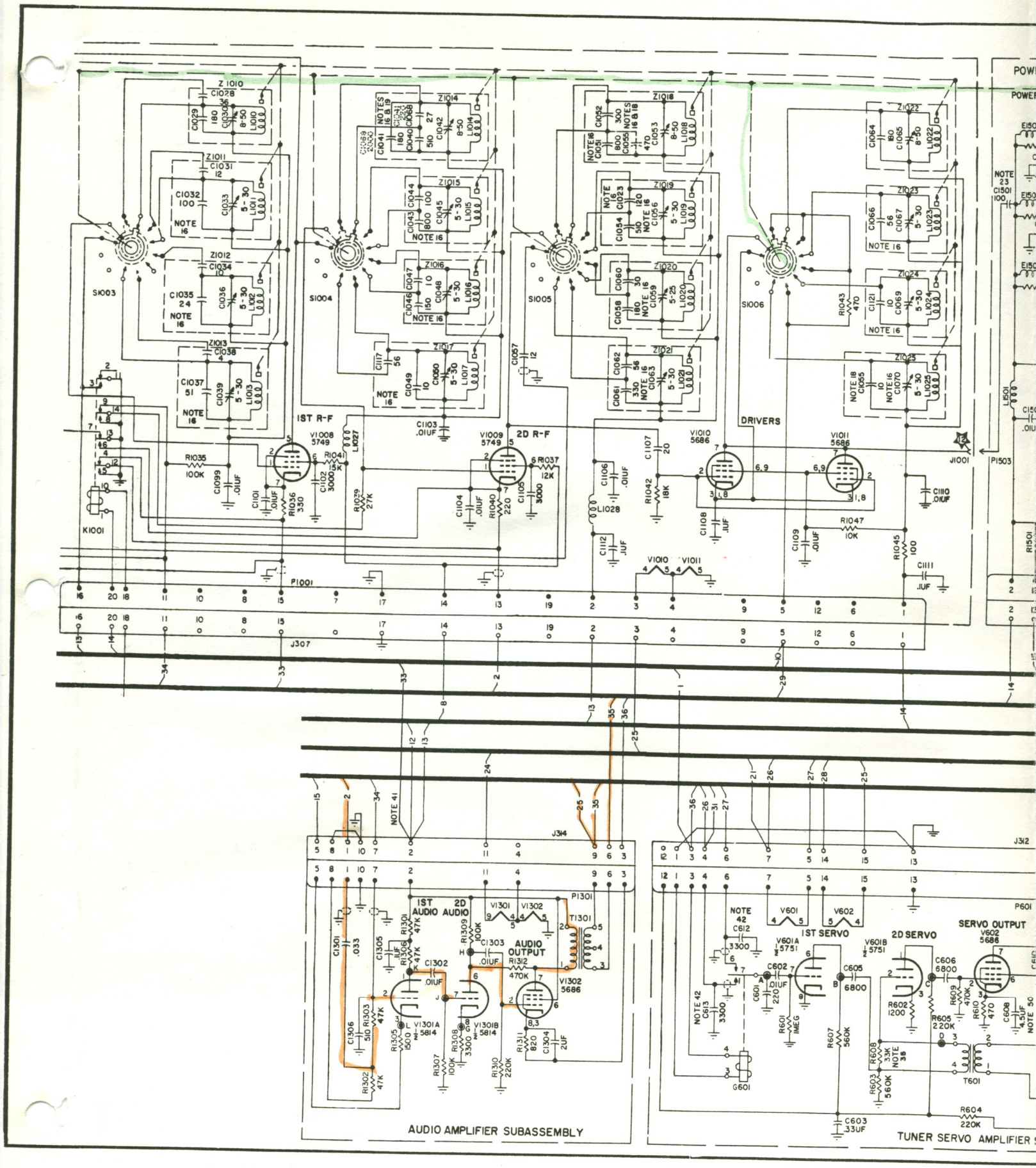
itter 618S-1 and 618S-1A,
1 of 2 sheets)


R-F CRYSTAL OSCILLATOR SUBASSEMBLY
CRYSTAL BANK "A"
S404
S405
S403
S402
S416
S401
V401
5654
K402
K401
E402
E403
B401
AUTOPOSITIONER MOTOR B401
P2001
J317
P401
J301
P402
P302
J303
P112
NOTE 13
NOTE 14
C307 .1UF
C409 8UF
R407 22 NOTE 9
R405 120 NOTE 6
R401 100K NOTE 7
R402 15K
R408 1K
L401 2MH
AUDIO
R109 10K
R108 10K
R107 10K
R106 10K
CW SIDETONE
PHONE SIDETONE
J108
P108
P106
J106
SERVO MOTOR B102
J105
P105
BLOWER MOTOR B101
AUTOPOSITIONER MOTOR B103
M101
MA
S101
S102
E101
C101 .47UF
C102 1UF
K101
P107
NOTE 47
NOTE 39
FRONT PANEL SUBASSEMBLY

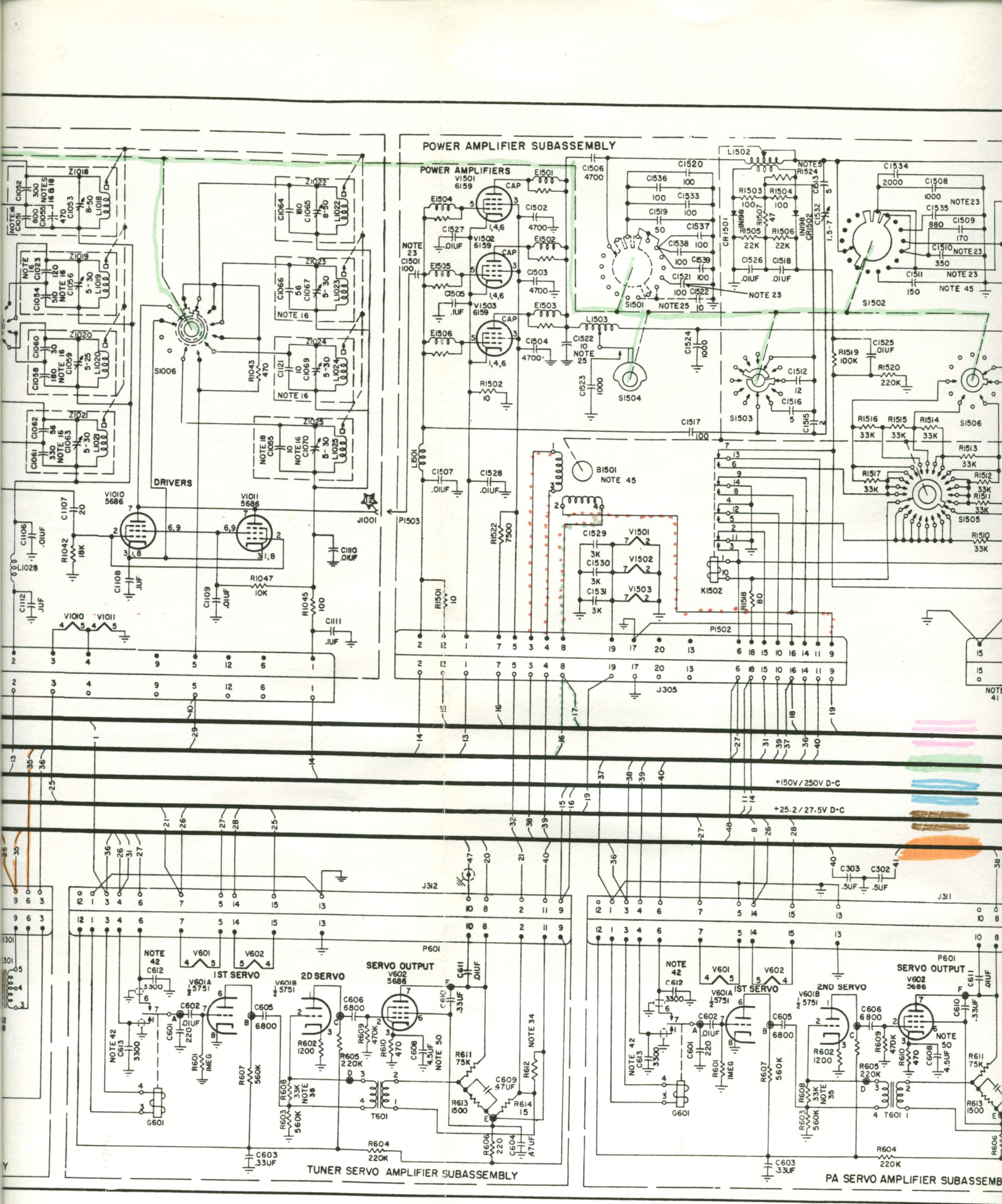

250 KC OSCILLATOR & BFO SUBASSEMBLY
TUNER DISCRIMINATOR
1ST TRANSMITTER MIXER
FRONT PANEL SUBASSEMBLY
RELAY SUBASSEMBLY
AUTOPOSITIONER MOTOR B401
AUTOPOSITIONER MOTOR B103
SERVO MOTOR B102
BLOWER MOTOR B101
250KC OSC
BFO
PHONE
MIC
KEY
AGC TEST POINT
TUNER CENTERING RELAY
SEQUENCE RELAY
KEYING RELAY
PHONE-CW RELAY

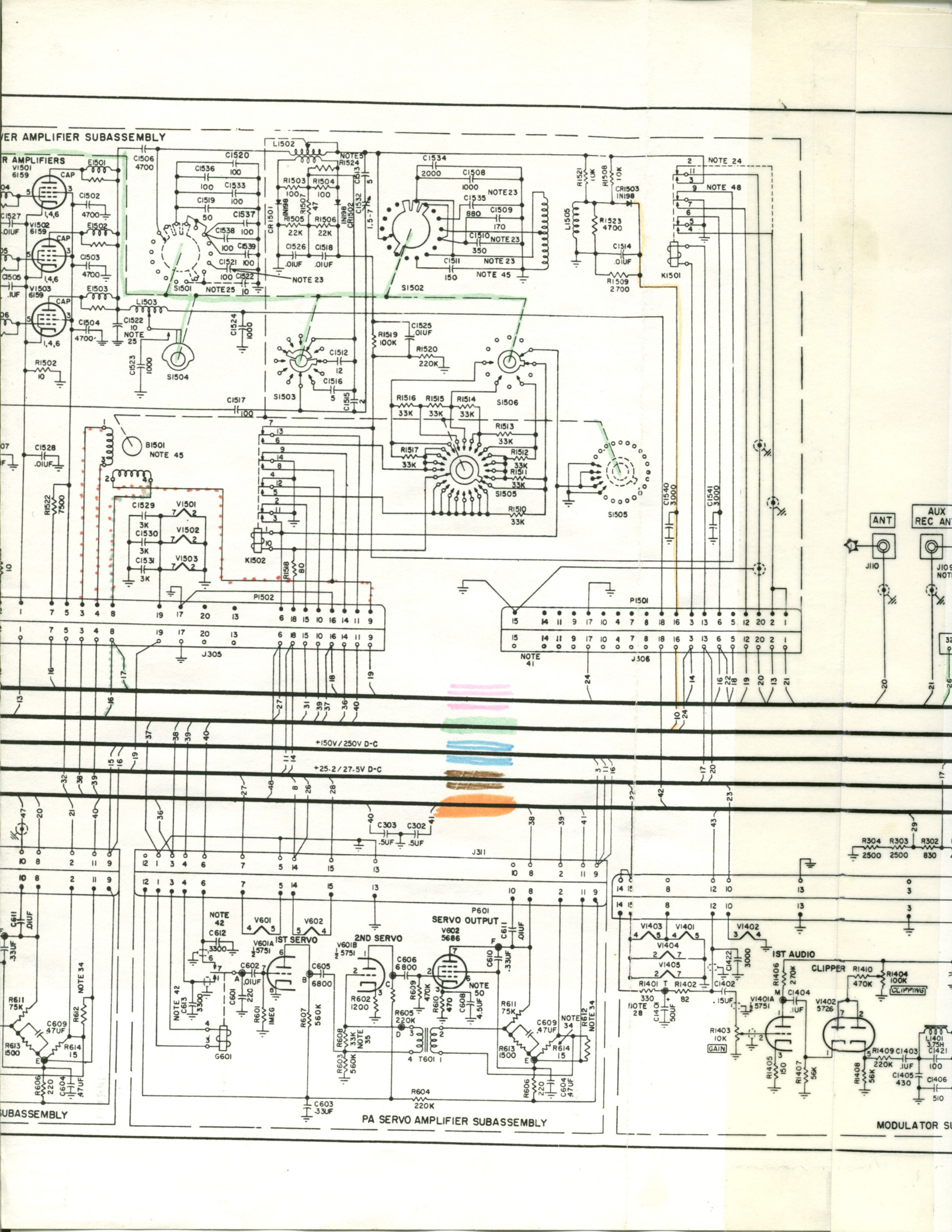


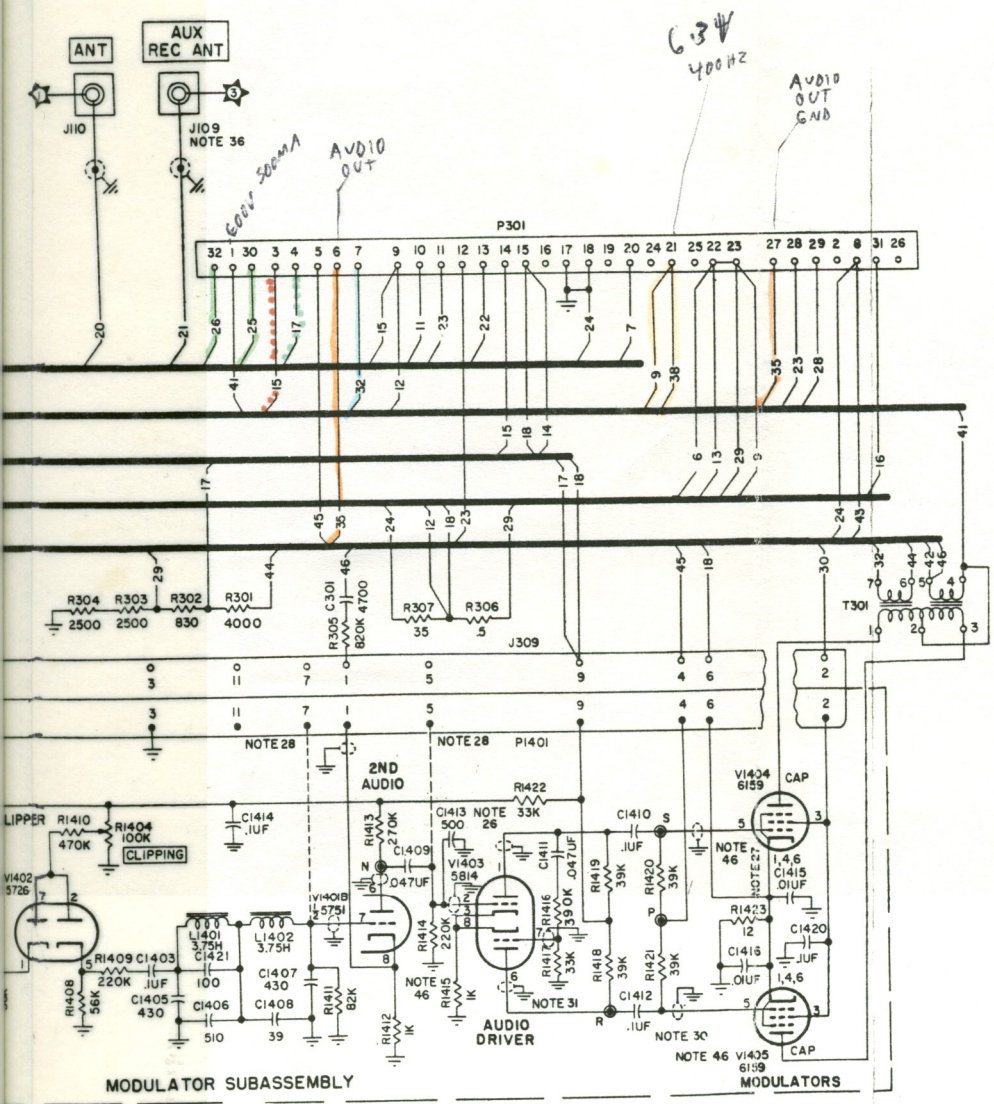
250 KHz I.F. /6185-1



Revised 1 August 1960


POWER AMPLIFIER SUBASSEMBLY
POWER AMPLIFIERS
DRIVERS
TUNER SERVO AMPLIFIER SUBASSEMBLY
PA SERVO AMPLIFIER SUBASSEMB
1ST SERVO
2D SERVO
2ND SERVO
SERVO OUTPUT
+150V/250V D-C
+25.2/27.5V D-C
P1502
P1503
P601
J1001
J305
J312
J311
S1501
S1502
S1503
S1504
S1505
S1506
K1502
T601
G601


VER AMPLIFIER SUBASSEMBLY
R AMPLIFIERS
V1501 6159
V1502 6159
V1503 6159
P1501
P1502
J305
J306
J311
J110
ANT
AUX REC ANT
S1501
S1502
S1503
S1504
S1505
S1506
K1501
K1502
B1501
NOTE 45
+150V/250V D-C
+25.2/27.5V D-C
V601 5751
V602 5686
IST SERVO
2ND SERVO
SERVO OUTPUT
P601
G601
T601
V1401 5751
V1402 5726
IST AUDIO
CLIPPER
GAIN
PA SERVO AMPLIFIER SUBASSEMBLY
MODULATOR SU



17. Value of C1018 changed from 62 to 75 a 62; MOD 3 and MOD 5 respectively, of assembly.

18. Capacitor C1055 deleted from Z1018 an Z1025; MOD 3 of tuner subassembly.

19. Capacitor C1041 and C1068 reversed; tuner subassembly.

20. Value of R1049 changed from 120K to 1 82K; MOD 4 and MOD 9 respectively, of assembly. Value of C1113 changed from 0.05 uf; MOD 9 of tuner subassembly.

21. Value of C1071 changed from 1 to 1.5; tuner subassembly.

22. Value of R1022 changed from 2200 to 10 of tuner subassembly.

23. The following capacitors changed in tem compensation capabilities and/or value and ance: C1501, 100 ±2%, changed to 100 ±5 1100 ±2%, changed to 170±2%; C1510, 400±2 to 350 ±2%; C1511, 170 ±2%, changed t C1521, 63±5%, changed to 100±5%; and C153 changed to 880 ±2%; MOD 1 of power subassembly.

24. Coax running from pin 2 of P1501 changed from terminal 2 to terminal 4 MOD 2 of power amplifier subassembly. paragraph 3-4.

25. Capacitor C1522 moved from S1501 power amplifier subassembly modification with 618S-1A serial number 4696.

26. Capacitor C1413 added; MOD 2 of subassembly.

27. Type of C1417 changed and value changed from 1000 to 470; MOD 2 and modulator subassembly.

28. Test point wiring to P1401 deleted; modulator subassembly.

29. Power rating of R1401 changed from 1 watt; MOD 4 of modulator subassembly.

30. Type of C1418 changed and value changed from 1000 to 470; MOD 2 and modulator subassembly.

31. Shielded wires added between plates of control grids of V1404 and V1405; MOD 5 subassembly.

32. Crystal rectifier CR1201 changed from 1N37A; MOD 2 of 250 kc oscillator subassembly.

33. Value of the following capacitors changed: C1208, 36, changed to 39; C1209, 430, changed to 360; and C1210, 20, changed to 91; MOD 3 of 250 kc oscillator and bfo subassembly.

34. Value of R614 changed from 10 to 15 and R612 added; MOD 1 of tuner and pa servo amplifier subassemblies. Value of R612 is selected value; refer to T.O. 12R2-4-6-4 for values.

35. Value of R608 changed from 68K to 33K; MOD 2 of tuner and pa servo amplifier subassemblies.

36. Connector J109 changed to facilitate interconnection of the 618S-1 or 618S-1A with the 180L-3 without the necessity of using an external adapters on J109; MOD 1 of front panel subassembly.

37. Resistor R807 added; MOD 2 of relay subassembly.

38. Power rating of R801 changed from 5 watts to 8 watts; MOD 3 of relay subassembly.

39. Relay K101 type changed; MOD 1 of bandchange autopositioner unit. Old circuit indicated with dotted lines in figure 7-19.

40. Pawl of bandchange autopositioner unit type changed; MOD 3 of bandchange autopositioner unit.

41. The following wiring changes are made terminal 19 of J306 removed; shielded wire added between terminal 10 of J310 and terminal 26 of P302; wire added between terminal 5 of J313 and terminal 2 of J314; MOD 4 of main chassis.

42. Value of C612 and C613 changed from 3000 to 3300; MOD 3 of tuner and pa servo amplifier subassemblies.

43. Value of C904 and C908 changed from 3000 to 3300; MOD 5 of i-f amplifier subassembly.

44. Pin-type couplers deleted and Oldham couplers added to the following units: bandchange autopositioner unit, MOD 2; servomotor B102 unit, MOD 1; tuner subassembly, MOD 7; power amplifier subassembly, MOD 3. Refer to paragraph 1-23.

45. Motor B1501 changed type (refer to Illustrated Parts Breakdown, T.O. 12R2-4-6-4), wire removed from P1501-5 to K1501-7, wire removed from K1501-9 and connected to K1501-7, and shield braid on the three wires of B1501 grounded to P1502-17. The wire connected to B1501-2 removed and connected to K1502-8, wire removed from K1502-7 to P1502-9, wire to P1502-16 removed and connected to P1502-9, a jumper wire connected between P1502-16 and P1502-17, and capacitor C1511 changed type; MOD 5 of power amplifier subassembly and MOD 6 of main chassis.

46. Formerly unshielded wires from V1401B-6 t junction of R1413 and C1409, from V1401B-7 to junctio of L1402 and C1407, from V1403-2 to C1409, and fro V1403-7 to R1416 replaced with shielded wires originally shielded number 22-AWG copper wire fro P1401-1 to V1401B-8, from P1401-12 to junction o R1402 and C1402, from V1403-1 to junction of C141 and C1410, from V1403-6 to junction of R1418 an C1412, from R1403 (side opposite ground) to C1402 from R1403 (center arm) to V1401A-2, from V1405- to junction of C1412 and R1421, and from V1404-5 t junction of C1410 and R1420 replaced with shielde number 26-AWG copperweld wire; and capacitor C1417 and C1418 deleted; MOD 6 of modulato subassembly.

47. Blower motor B101 changed type; MOD 2 of fron panel subassembly.

48. K1502-7 connected to K1501-9; MOD 6 of powe amplifier subassembly.

49. Value of C1123 changed from 4 uf to 4.5 uf MOD 10 of r-f tuner subassembly.

50. Value of C608 changed from 8 uf to 4.5 uf MOD 4 of tuner and pa servo amplifier subassemblies

51. For mechanical modifications, refer to Illustrated Parts Breakdown, T.O. 12R2-4-6-4.

Figure 7-19. Radio Receiver-Transmitter 618S-1 and 618S-1A, Schematic Diagram (Sheet 2 of 2 sheets)

acitors changed: C1208, 30, changed to 360; and OD 3 of 250 kc oscillator

rom 10 to 15 and R612 pa servo amplifier sub- selected value; refer to

rom 68K to 33K; MOD 2 plifier subassemblies.

to facilitate intercon- 1A with the 180L-3 with- ternal adapters on J109; nbly.

) 2 of relay subassembly.

hanged from 5 watts to sembly.

; MOD 1 of bandchange uit indicated with dotted

topositioner unit type nge autopositioner unit.

ges are made terminal ed wire added between minal 26 of P302; wire J313 and terminal 2 of

changed from 3000 to nd pa servo amplifier

changed from 3000 to subassembly.

d and Oldham couplers nits: bandchange auto- omotor B102 unit, MOD 7; power amplifier sub- aragraph 1-23.

pe (refer to Illustrated -4-6-4), wire removed e removed from K1501-9 and shield braid on the ded to P1502-17. The removed and connected om K1502-7 to P1502-9, d connected to P1502-9, between P1502-16 and 11 changed type; MOD 5 bly and MOD 6 of main

46. Formerly unshielded wires from V1401B-6 to junction of R1413 and C1409, from V1401B-7 to junction of L1402 and C1407, from V1403-2 to C1409, and from V1403-7 to R1416 replaced with shielded wires; originally shielded number 22-AWG copper wire from P1401-1 to V1401B-8, from P1401-12 to junction of R1402 and C1402, from V1403-1 to junction of C1411 and C1410, from V1403-6 to junction of R1418 and C1412, from R1403 (side opposite ground) to C1402, from R1403 (center arm) to V1401A-2, from V1405-5 to junction of C1412 and R1421, and from V1404-5 to junction of C1410 and R1420 replaced with shielded number 26-AWG copperweld wire; and capacitors C1417 and C1418 deleted; MOD 6 of modulator subassembly.

47. Blower motor B101 changed type; MOD 2 of front panel subassembly.

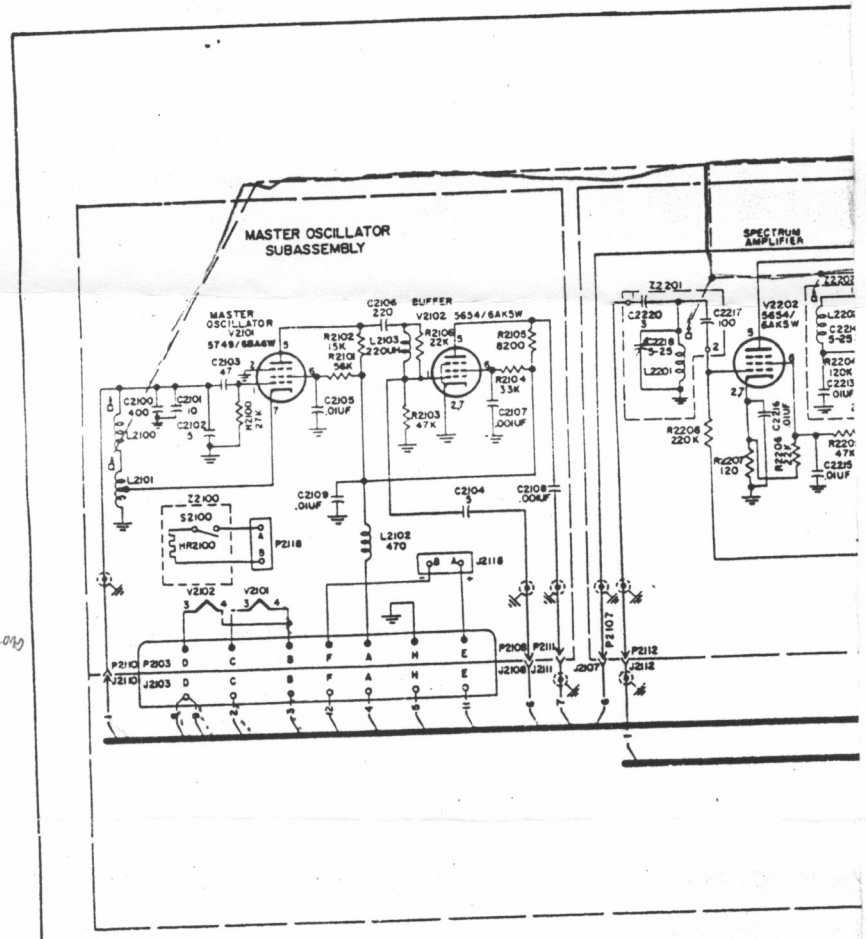
48. K1502-7 connected to K1501-9; MOD 6 of power amplifier subassembly.

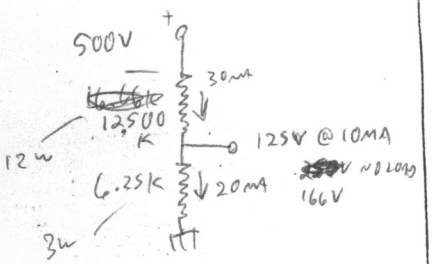
49. Value of C1123 changed from 4 uf to 4.5 uf; MOD 10 of r-f tuner subassembly.

50. Value of C608 changed from 8 uf to 4.5 uf; MOD 4 of tuner and pa servo amplifier subassemblies.

51. For mechanical modifications, refer to Illustrated Parts Breakdown, T.O. 12R2-4-6-4.

Figure 7-19. Radio Receiver-Transmitter 618S-1 and 618S-1A, Schematic Diagram (Sheet 2 of 2 sheets)





S.M.O.

RED — 6.3V COMMON
V10+PMK — 6.3V SUPPLY
BLU — 100VDC IN
BLK — GND
RD/WT COAX — BUFFER OUT

10 TURNS → 1.75 TO 3.5 MHZ

8.5MA 100V 24V
10MA 125V 31V
13.3MA 150V 38V OUT

~~P2102~~ ~~+15~~ ~~S.M.O. OUT~~ ~~BT 150V?~~

HEATER = GRN/BK WIRES
GN - + 12VDC
BK - (COM)

Figure 7-26. Radio Receiver-Transmitter RT-311/ARC-38.

COOPER INDUSTRIES **BELDEN**

~~1) 350-4221 - STEREO.~~

~~2) 394-1509 - BRIAN DEWHURST JVC.~~

I

AMPHENOL CONNECTOR

COLLINS CONNECTOR

PIN#	FUNCT.	
1	600VB+	301-1
3	GND	301-17
6	GND	301-18
7	BLOWER 115V 400HZ	301-3
8	115V 400HZ PWR.	301-4
9	6.3V 400HZ	301-21
10	AUDIO GND.	301-27
11	+250V DYNAMOTOR	301-15
12	+250V RECTIFIER	301-14
13	27.5V	301-22
14	-50V MOD BIAS	301-5
15	27.5V	301-23

2,4,5 - UNUSED - see PIN (1)

FEMALE PLASTIC

MALE PINS

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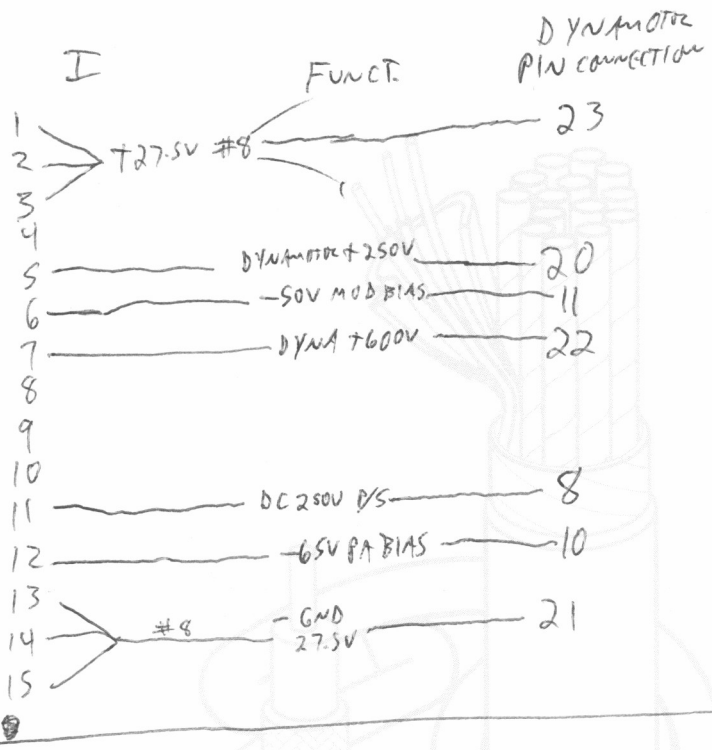
COOPER INDUSTRIES **BELDEN**

DYNAMOTOR



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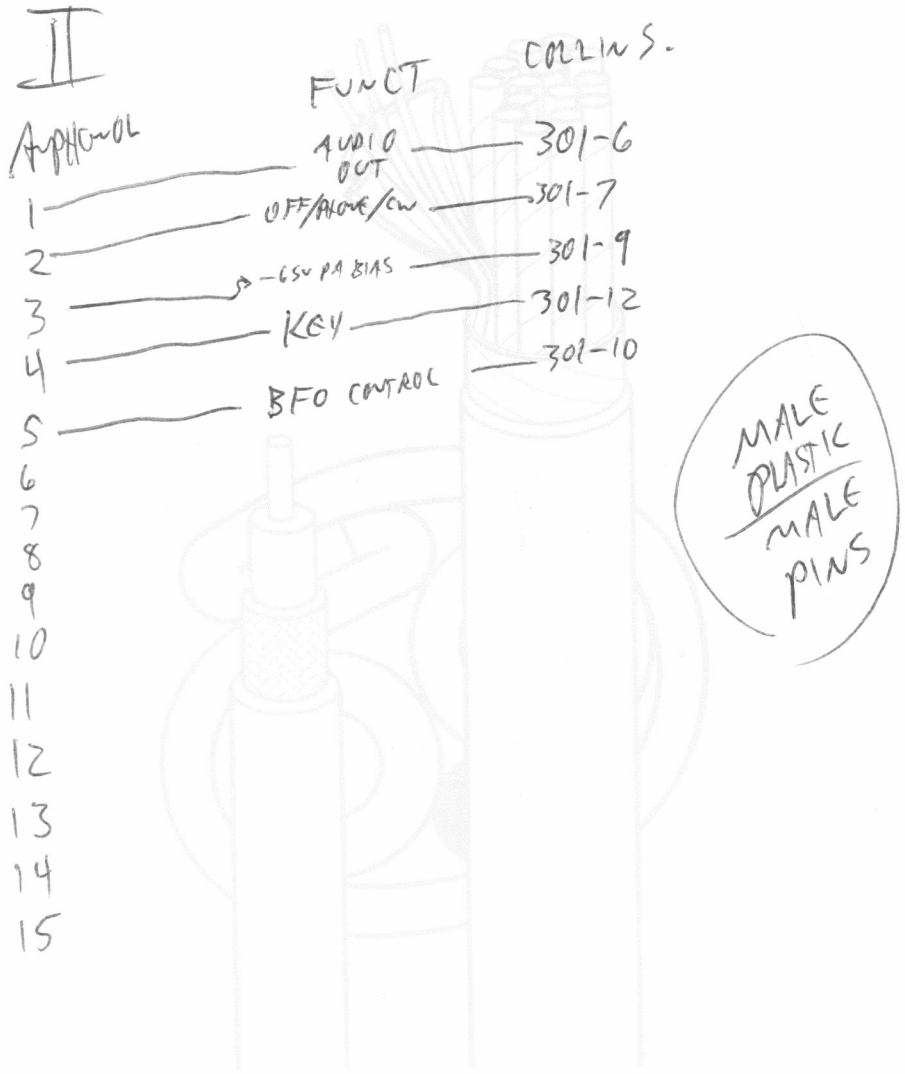

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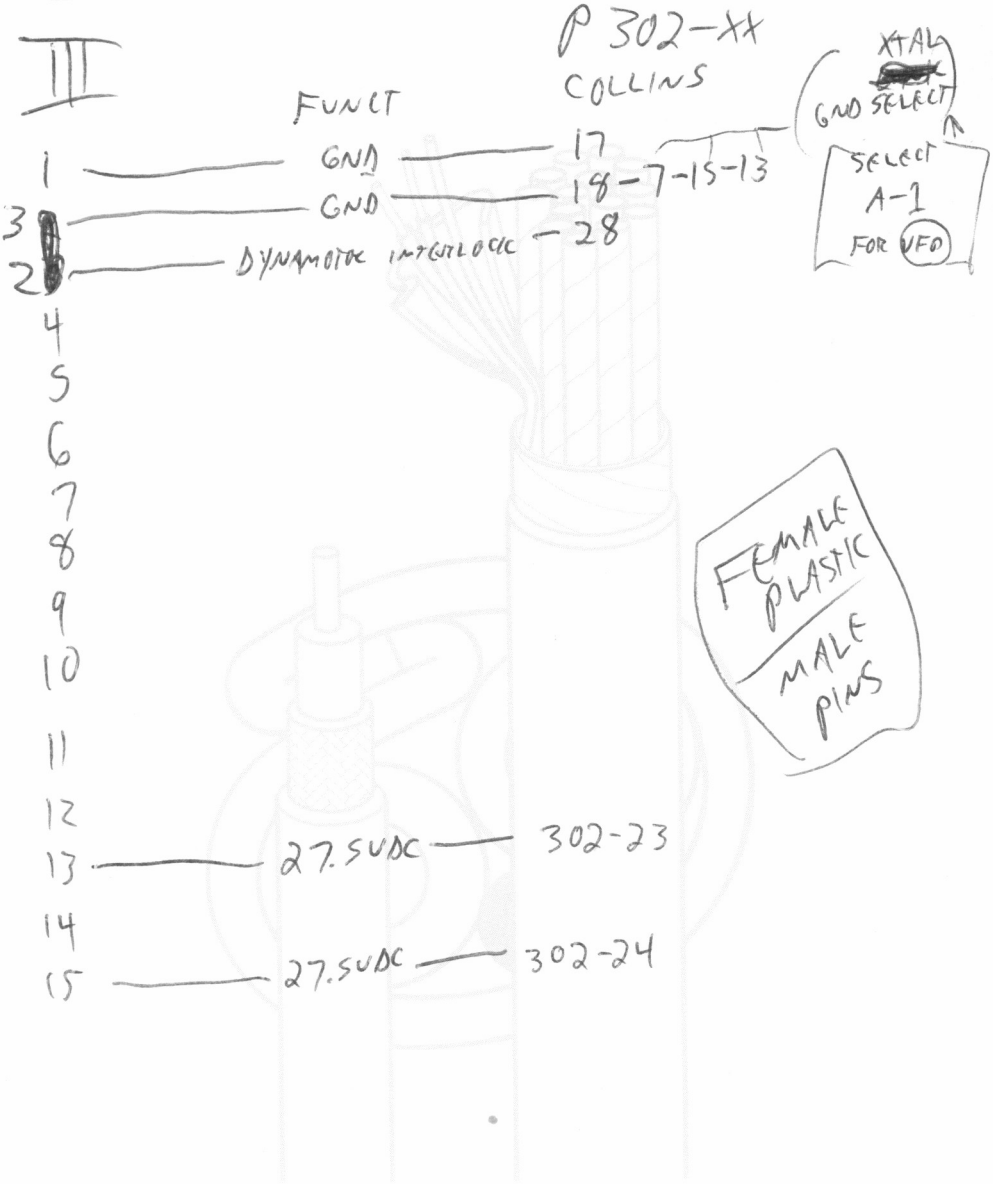

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COOPER INDUSTRIES **BELDEN**

P302-XX

IV

PIN	FUNCT	302-XX COLLINS	
1	RF GAIN	302-10	
2			
3			
4			
5			
6	BAND 2	302-22	
7			
8			
9	BAND 1	302-21	
10			
11			
12	BAND 4	302-20	
13	BANK "A"	302-2	GROUND - NORMAL
14	BANK "B"	302-3	OPEN - NORMAL
15	BAND 3	302-19	

FEMALE PLASTIC
MALE PINS

SELECT A-1 CRYSTAL POSITION - VFO

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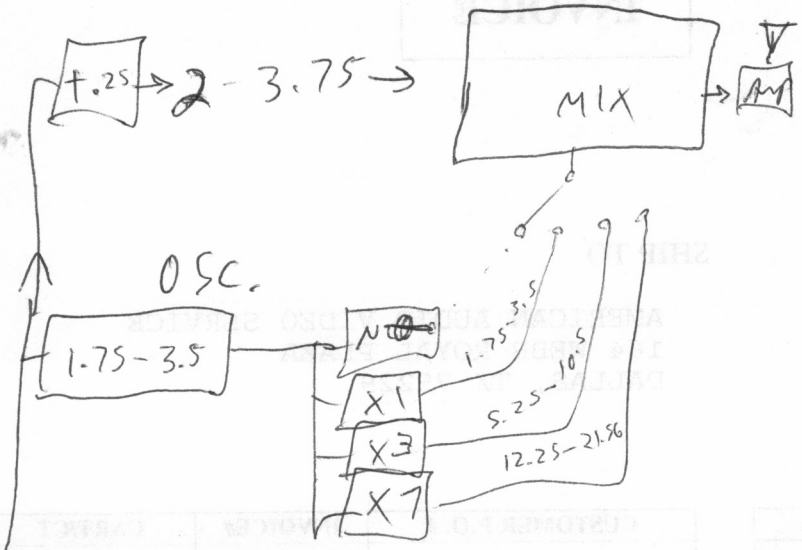
21.56
3.75
25.31

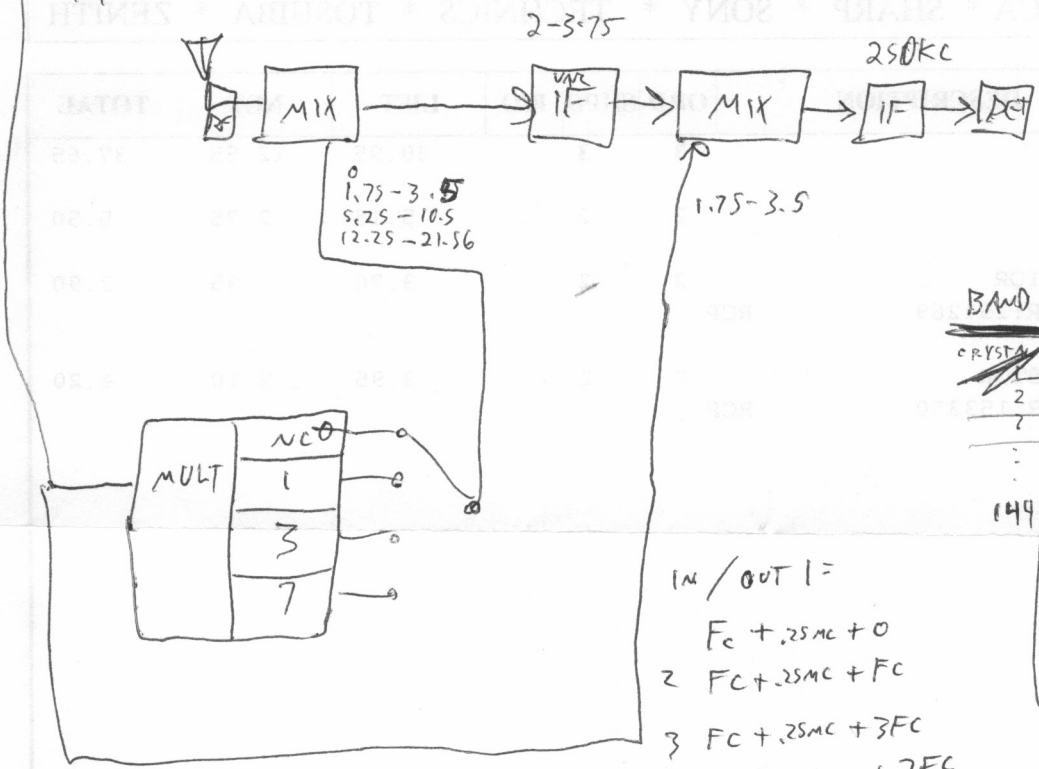
OUT @ TOP OF BAND

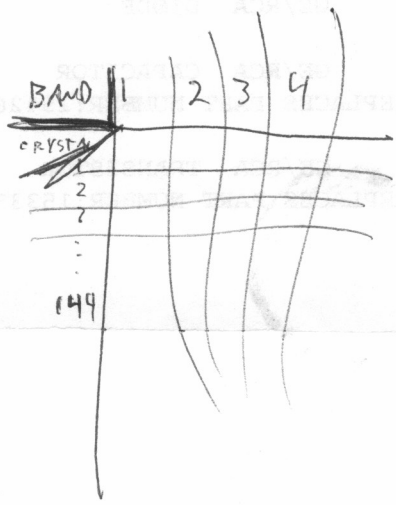
1 3.75 + 0 = 3.75
2 3.75 + 3.50 = 7.25
3 3.75 + 10.5 = 14.25
? 3.75 + 21.56 = 25.31
4 3.34 + 21.56 = 25.0



IN @ TOP OF BAND

2 - 3.75
3.75 - 7.25
7.25 - 14.25
14.25 - 25.00





IN / OUT I =

1 Fc + .25MC + 0
2 Fc + .25MC + Fc
3 Fc + .25MC + 3Fc
4 Fc + .25MC + 7Fc

F_c = XTAL FREQ.

CRYSTAL SELECTION - TB801 CONNECTIONS - GROUND TO SELECT

GND = ■

■ = CONNECTED TOGETHER, NOT GROUNDED

CRYSTAL POSITION	R 33	S 31	T 29	U 27	V 26	W 24
1		■				■
2			■			■
3	■			■		
4	■	■			■	
5	■	■	■			■
6		■	■	■		
7			■	■	■	
8				■	■	■
9					■	■
10	■					■
11	■	■				
12		■	■			
13	■		■	■		
14	■	■		■	■	
15		■	■		■	■
16			■	■		■
17				■	■	
18	■				■	■
19	■	■				■
20	■	■	■			
21	■	■	■	■		
22		■	■	■	■	
23			■	■	■	■
24	■			■	■	■

~~HOLDO~~

~~HOLDO~~

32 16 8 4 2 1

BAND SELECT

TB801 - GND			
17	18	14	16
1	2	3	4
BAND			

BANK SELECT

TB801 - GND					
35	15	32	30	36	34
A	B	C	D	E	F
BANK					

INSTALLED CRYSTALS

(1) 3

	2-3.75	3.75-7.25	7.25-14.25	14.25-25.0
OPERATING FREQUENCIES FOR COLLINS 618S-1 FOR CRYSTALS LISTED BELOW				
XTAL FREQ.	BAND 1	BAND 2	BAND 3	BAND 4
A1 2.4375	2.6875	5.125	10	19.75
1.8355	2.0855	3.921	7.592	14.934
3.1835	3.4335	6.617	12.984	25.718
3.187	3.437	6.624	12.998	25.746
3.1905	3.4405	6.631	13.012	25.774
3.208	3.458	6.666	13.082	25.914
3.2535	3.5035	6.757	13.264	26.278
3.215	3.465	6.68	13.11	25.97
2.7045	2.9545	5.659	11.068	21.886
2.758	3.008	5.766	11.282	22.314
3.2635	3.5135	6.777	13.304	26.358
2.76525	3.01525	5.7805	11.311	22.372
2.17725	2.42725	4.6045	8.958999	17.668
2.165	2.415	4.58	8.91	17.57
2.16325	2.41325	4.5765	8.903	17.556
2.709375	2.959375	5.66875	11.0875	21.925
~~1.358~~	~~1.508~~	~~2.766~~	~~5.282~~	~~10.314~~ MISTAKE
2.158	2.408	4.566	8.882	17.514
1.84375	2.09375	3.9375	7.625	15
3.27612	3.52612	6.80224	13.35448	26.45896
3.2735	3.5235	6.797	13.344	26.438
2.18675	2.43675	4.6235	8.997	17.744
2.708	2.958	5.666	11.082	21.914
2.824	3.074	5.898	11.546	22.842
A24 2.375	2.625	5	9.75	19.25
B1 2.617	2.867	5.484	10.718	21.186
2.1755	2.4255	4.601	8.951999	17.654
2.6275	2.8775	5.505	10.76	21.27
2.62825	2.87825	5.5065	10.763	21.276
2.6345	2.8845	5.519	10.788	21.326
3.2765	3.5265	6.803	13.356	26.462
2.6415	2.8915	5.533	10.816	21.382
2.64325	2.89325	5.5365	10.823	21.396
~~0~~	~~.25~~	~~.25~~	~~.25~~	~~.25~~ EMPTY SOCKETS
~~0~~	~~.25~~	~~.25~~	~~.25~~	~~.25~~
B12 2.652	2.902	5.554	10.858	21.466
B24 2.68086	2.93086	5.61172	10.97344	21.69688
2.68	2.93	5.61	10.97	21.69
2.223	2.473	4.696	9.142	18.034
2.6765	2.9265	5.603	10.956	21.662
2.6695	2.9195	5.589	10.928	21.606
2.666	2.916	5.582	10.914	21.578
2.6625	2.9125	5.575	10.9	21.55
2.66215	2.91215	5.5743	10.8986	21.5472
2.659	2.909	5.568	10.886	21.522
2.65825	2.90825	5.5665	10.883	21.516
2.6555	2.9055	5.561	10.872	21.494
2.6545	2.9045	5.559	10.868	21.486
C1 2.751	3.001	5.752	11.254	22.258
2.7735	3.0235	5.797	11.344	22.438
2.765	3.015	5.78	11.31	22.37
3.154	3.404	6.558	12.866	25.482
3.161	3.411	6.572	12.894	25.538
3.182	3.432	6.614	12.978	25.706
2.15312	2.40312	4.55624	8.86248	17.47496
3.2695	3.5195	6.789	13.328	26.406
3.217	3.467	6.684	13.118	25.986
3.231	3.481	6.712	13.174	26.098
3.239	3.489	6.725	13.202	25.154

B13 - B23 SKIPPED BY MISTAKE

~~2.212375 2.462375 4.67475 9.0995 17.949~~ MISTAKE

cont'd

OPERATING FREQUENCIES FOR COLLINS 618S-1 FOR CRYSTALS LISTED BELOW

XTAL FREQ.	BAND 1	BAND 2	BAND 3	BAND 4
2.212375	2.462375	4.67475	9.0995	17.949
2.211375	2.461375	4.67275	9.0955	17.941
2.70812	2.95812	5.66624	11.08248	21.91496
2.2195	2.4695	4.689	9.128	18.006
2.209375	2.459375	4.66875	9.087499	17.925
2.2125	2.4625	4.675	9.100001	17.95
2.208375	2.458375	4.66675	9.0835	17.917
2.207375	2.457375	4.66475	9.0795	17.909
3.2755	3.5255	6.801	13.352	26.454
3.2715	3.5215	6.793	13.336	26.422
3.245	3.495	6.74	13.23	26.21
D1-2.694	2.944	5.638	11.026	21.802
2.687	2.937	5.624	10.998	21.746
2.6975	2.9475	5.645	11.04	21.83
2.69575	2.94575	5.6415	11.033	21.816
2.701	2.951	5.652	11.054	21.858
3.166	3.416	6.582	12.914	25.578
2.7115	2.9615	5.673	11.096	21.942
2.715	2.965	5.68	11.11	21.97
2.73	2.98	5.71	11.17	22.09
2.646	2.896	5.542	10.834	21.418
2.702	2.952	5.654	11.058	21.866
3.13975	3.38975	6.5295	12.809	25.368
3.20735	3.45735	6.6647	13.0794	25.9088
3.19225	3.44225	6.6345	13.019	25.788
3.1885	3.4385	6.627	13.004	25.758
3.18	3.43	6.61	12.97	25.69
3.181	3.431	6.612	12.974	25.698
3.173	3.423	6.596	12.942	25.634
3.695	3.945	7.64	15.03	29.81
3.1625	3.4125	6.575	12.9	25.55
3.159	3.409	6.568	12.886	25.522
3.1555	3.4055	6.561	12.872	25.494
3.145	3.395	6.54	12.83	25.41
3.1435	3.3935	6.537	12.824	25.398
E1-2.0285	2.2785	4.307	8.364001	16.478
2.14225	2.39225	4.5345	8.819	17.388
2.14462	2.39462	4.53924	8.82848	17.40696
2.14575	2.39575	4.5415	8.833	17.416
2.14675	2.39675	4.5435	8.837	17.424
2.14887	2.39887	4.54774	8.84548	17.44096
2.151	2.401	4.552	8.854	17.458
3.2675	3.5175	6.785	13.32	26.39
2.15525	2.40525	4.5605	8.871	17.492
2.15737	2.40737	4.56474	8.879481	17.50896
2.15975	2.40975	4.5695	8.889	17.528
2.16162	2.41162	4.57324	8.896479	17.54296
2.15625	2.40625	4.5625	8.875	17.5
2.1545	2.4045	4.559	8.868	17.486
2.14925	2.39925	4.5485	8.847	17.444
2.1475	2.3975	4.545	8.84	17.43
2.144	2.394	4.538	8.826	17.402
2.17375	2.42375	4.5975	8.945	17.64
2.1765	2.4265	4.603	8.956001	17.662
2.17437	2.42437	4.59874	8.94748	17.64496
2.172	2.422	4.594	8.938	17.626
2.17025	2.42025	4.5905	8.931	17.612
2.165875	2.415875	4.58175	8.9135	17.577
2.16375	2.41375	4.5775	8.905	17.56
F1-1.932	2.182	4.114	7.978	15.706
2.43975	2.68975	5.1295	10.009	19.768
2.618	2.868	5.486	10.722	21.194

(2)/3

2.639	2.889	5.528	10.806	21.362
2.44175	2.69175	5.1335	10.017	19.784
2.66	2.91	5.57	10.89	21.53
2.44375	2.69375	5.1375	10.025	19.8
2.44575	2.69575	5.1415	10.033	19.816
2.75725	3.00725	5.7645	11.279	22.308
2.76325	3.01325	5.7765	11.303	22.356
2.695	2.945	5.64	11.03	21.81
3.2655	3.5155	6.781	13.312	26.374
3.2615	3.5115	6.773	13.296	26.342
3.2595	3.5095	6.769	13.288	26.326
3.2575	3.5075	6.765	13.28	26.31
3.2555	3.5055	6.761	13.272	26.294
2.78525	3.03525	5.8205	11.391	22.532
2.77925	3.02925	5.8085	11.367	22.484
2.737	2.987	5.724	11.198	22.146
2.77325	3.02325	5.7965	11.343	22.436
2.716	2.966	5.682	11.114	21.978
2.76925	3.01925	5.7885	11.327	22.404
2.76725	3.01725	5.7845	11.319	22.388
3.579545	3.829545	7.40909	14.56818	28.88636

618S-1 Crystal and Frequency Calculators

Today, a spreadsheet would be used to do this. These were created back in ancient times when spradsheet software (and most computers) cost so much no one could afford them. They are in the BASIC programming language which is easy to understand.

This program lets you put in a crystal frequency and then tells you what frequency the 618S-1 will be on.

```
10 CLS

20 SCREEN 1

30 PRINT"another fine program by Patrick Jankowiak KD5OEI"

40 PRINT"www.bunkerofdoom.com"

50 PRINT"free to public domain - calculator for 618S-1"

55 PRINT""

60 PRINT"OPERATING FREQUENCIES FOR SELECTED CRYSTAL
FREQUENCIES FOR THE 618S-1"

70 PRINT"ENTER CRYSTAL FREQUENCIES FROM 1.75 TO 3.5 IN
MEGAHERTZ"

80 LPRINT"OPERATING FREQUENCIES FOR SELECTED CRYSTALS FOR
THE 618S-1"

90 PRINT"enter 0 to quit"

100 LPRINT"                    by Patrick Jankowiak"

110 PRINT"CRYSTAL","BAND 1","BAND 2","BAND 3","BAND 4"

120 LPRINT"CRYSTAL","BAND 1","BAND 2","BAND 3","BAND 4"

130 INPUT FC

140 IF FC = 0 THEN GOTO 270

150 IF FC < 1.75 THEN GOSUB 240

160 IF FC > 3.5 THEN GOSUB 240
```

```
170 F1 = FC + .25

180 F2 = FC + .25 + FC

190 F3 = FC + .25 + (3 * FC)

200 F4 = FC + .25 + (7 * FC)

210 PRINT FC, F1, F2, F3, F4

220 LPRINT FC, F1, F2, F3, F4

230 GOTO 130

240 PRINT"SPECIFIED OSCILLATOR RANGE IS 1.75 TO 3.5 MHz"

250 LPRINT"specified range is 1.75 to 3.5 MHz"

260 RETURN

270 END
```

This program lets you put in a frequency and tells you what crystal to use.

```
10 CLS

20 SCREEN 2

30 PRINT"another fine program by Patrick Jankowiak KD5OEI"

40 PRINT"www.bunkerofdoom.com"

50 PRINT"free to public domain - calculator for 618S-1"

55 PRINT""

60 PRINT"CRYSTAL FREQUENCIES NEEDED FOR SPECIFIC 618S-1
OPERATING FREQUENCIES"

70 PRINT"ENTER OPERATING FREQUENCIES IN MEGAHERTZ"

80 PRINT"ENTER 0 TO QUIT"

90 LPRINT"CRYSTAL FREQUENCIES NEEDED FOR 618S-1 OPERATING
FREQUENCIES"

100 LPRINT"                by Patrick Jankowiak"

110 PRINT"OPERATING FREQUENCY","CRYSTAL FREQUENCY"

120 LPRINT"OPERATING FREQUENCY","CRYSTAL FREQUENCY"

130 INPUT FO

140 IF FO = 0 THEN GOTO 300

150 IF FO<2 THEN GOSUB 240

160 IF FO>25 THEN GOSUB 270

170 IF FO<3.75 THEN FX=(FO-.25)

180 IF FO>3.74999999# THEN FX=(FO-.25)/2

190 IF FO>7.25 THEN FX=(FO-.25)/4

200 IF FO>14.25 THEN FX=(FO-.25)/8
```

```
210 PRINT FO,,FX:LPRINT FO,,FX

220 FO=0

230 GOTO 130

240 IF FO<2 THEN PRINT"the 618S1 Minimum frequency is 2 mhz.

250 IF FO<2 THEN LPRINT FO" MHz is below designed range of 618S1 by
"(100-(100/(2/FO)))" %.

260 RETURN

270 IF FO>25 THEN PRINT"The 618S1 maximum frequency is 25 MHz."

280 IF FO>25 THEN LPRINT FO " MHz is above designed range of 618S1 by
"(((FO/25)*100)-100)" %.

290 RETURN

300 END
```