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T. O. 31R2-4-18-16

HANDBOOK
PREVENTIVE MAINTENANCE
INSTRUCTIONS

HAMMARLUND RADIO RECEIVER

MODELS SP-600-JX-17 AND SP-600-JX-21

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Revised 27 January 1961

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INTRODUCTION

1. PURPOSE

This handbook establishes standardized work methods and simplified step-by-step job instructions for the preventive maintenance of this equipment. The individual job instructions, in the form of "Routines," are presented simply and logically to permit their ready use by maintenance personnel. Adequate performance standards are included.

2. SCOPE

These job instructions are applicable to and will be used by all activities maintaining the equipment.

3. SPECIAL INSTRUCTIONS

This handbook will be used as a portion of the standardized communications electronics maintenance inspection system. Personnel using this handbook shall notify supervisory personnel immediately if satisfactory performance cannot be obtained.

SCHEDULE FOR ACCOMPLISHMENT OF ROUTINES

(Intervals are in days, for example "30" means "every thirty days.")

Routine Number	CONTINUOUS OPERATION				TACTICAL OPERATION				STANDBY OPERATION			
	Temperate	Arctic	Tropic	Desert	Temperate	Arctic	Tropic	Desert	Temperate	Arctic	Tropic	Desert
1. 1(6)					Deleted							
1. 2(6)	7	7	5	5	7	7	5	5	30	30	15	10
1. 3(2)					Deleted							
1. 4(3)					Deleted							
1. 5(6)	7	7	5	5	7	7	5	5	30	30	15	10
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2. 5(5)	*	*	*	*	*	*	*	*	*	*	*	*
3. 1(1)	30	30	30	30	30	30	30	30	60	60	30	30

* Accomplishment to be directed by maintenance supervisor.

PERFORMANCE TEST - RADIO RECEIVERS
SP-600-JX-21 AND SP-600-JX-17

Routine 1.1(6), original pages 1 thru 10, deleted

PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND
SP-600-JX-17, POWER SUPPLY

1. GENERAL INFORMATION

- a. The purpose of this routine is to determine if the power supply of Radio Receiver SP-600-JX-21 or Radio Receiver SP-600-JX-17 is operating properly.
- b. The approximate time required to do this routine is 1-1/2 man-hours.
- c. Report all indications that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED

- a. Multimeter AN/PSM-6

3. MATERIAL REQUIRED

- a. Screwdriver
- b. Resistor, 600-ohm, 2-watt, non-inductive

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the BFO, IFO, DIODE OUTPUT and AVC leads from their respective terminals.
- (4) Disconnect the antenna cable from the antenna input connector.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Set the radio receiver on its side. Remove the seven machine screws holding the bottom plate to the radio receiver and remove the plate.
- (8) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (9) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (10) Set the FUNCTION switch on Multimeter AN/PSM-6 to the DCV-20K Ω /V position.
- (11) Set the RANGE switch on Multimeter AN/PSM-6 to the Ω x 10000/500 position.
- (12) Insert the red test lead into the red jack of the multimeter and the black test lead into the black jack of the multimeter.
- (13) Slip a red alligator clip over the red test prod point and a black alligator clip over the black test prod point.
- (14) Connect the black test lead to the receiver chassis and the red test lead to the junction of L-51, L-52, and C-161B (figure 1-3).

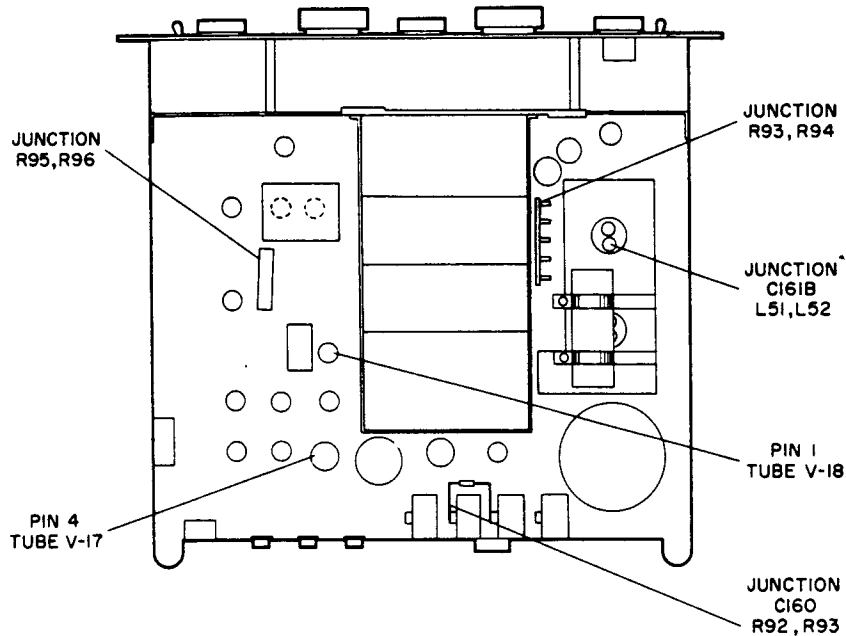


Figure 1-3. Radio Receivers SP-600-JX-21 and SP-600-JX-17, Bottom View

b. Measure the output voltages of the radio receiver power supply as follows:

- (1) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 10. The indication on the multimeter should be between 270 and 290 volts.

WARNING

When the RF GAIN control is not in the OFF position, dangerous voltages are present in the unit under test. In succeeding steps of this routine, observe all safety precautions when this control is not set to OFF.

- (2) Rotate the RF GAIN control counterclockwise to 0. The indication on the multimeter should be between 295 and 315 volts.
- (3) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (4) Set the RANGE switch on the multimeter to the $\Omega \times 1000/250$ position.
- (5) Remove the red test lead from the junction of L-51, L-52, and C-161B and connect it to pin 4 of tube V-17 (figure 1-3).
- (6) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 10. The indication on the multimeter should be between 220 and 235 volts.
- (7) Set the RANGE switch on the multimeter to the $\Omega \times 10000/500$ position.
- (8) Rotate the RF GAIN control on the radio receiver counterclockwise to 0. The indication on the multimeter should be between 255 and 275 volts.
- (9) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (10) Set the RANGE switch on the multimeter to the $\Omega \times 1000/250$ position.

- (11) Remove the red test lead from pin 4 of tube V-17 and connect it to pin 1 of tube V-18 (figure 1-3).
- (12) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 0. The indication on the multimeter should be between 145 and 155 volts.
- (13) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (14) Remove the red test lead from pin 1 of tube V-18 and connect it to the radio receiver chassis (ground). Remove the black test lead from the radio receiver chassis (ground) and connect it to the junction of C-160, R-92, and R-93 (figure 1-3).
- (15) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 0. The indication on the multimeter should be between 50 and 53 volts.
- (16) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (17) Set the RANGE switch on the multimeter to the $\Omega \times 100/50$ position.
- (18) Remove the black test lead from the junction of C-160, R-92, and R-93 and connect it to the junction of R-95 and R-96 (figure 1-3).
- (19) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 0. The indication on the multimeter should be between 9.5 and 10.5 volts.
- (20) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (21) Set the RANGE switch on the multimeter to the $\Omega \times 1/25$ position.
- (22) Remove the black test lead from the junction of R-95 and R-96 and connect it to the junction of R-93 and R-94 (figure 1-3).
- (23) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 10. Set the AVC-MAN switch on the radio receiver to the MAN position. The indication on the multimeter should be between 0.95 and 1.0 volt.
- (24) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.

c. Concluding Procedure

- (1) Remove the multimeter test leads from the radio receiver.
- (2) Remove the 600-ohm, 2-watt resistor from the radio receiver AUDIO OUTPUT terminals.
- (3) Disconnect the power line plug of the radio receiver from the power source.
- (4) Replace the bottom plate on the radio receiver and tighten the seven machine screws.
- (5) Replace the top cover of the radio receiver and tighten the four thumb screws.
- (6) Place the radio receiver in the relay rack and tighten the eight holding screws.
- (7) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (8) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND
SP-600-JX-17, SENSITIVITY

Routine 1.3(2), original pages 15 thru 20, deleted

PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND
SP-600-JX-17, SELECTIVITY

Routine 1.4(3), original pages 21 thru 26, deleted

**PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
INTERMEDIATE-FREQUENCY REJECTION RATIO****1. GENERAL INFORMATION**

- a. The purpose of this routine is to check the rejection ratio of the intermediate-frequency stages of Radio Receiver SP-600-JX-21 or SP-600-JX-17.
- b. The approximate time required to do this routine is 2 man-hours.
- c. Report all indications that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED

- a. Signal Generator AN/URM-25
- b. Electronic Multimeter TS-505()/U

3. MATERIAL REQUIRED

- a. Screwdriver
- b. Soldering iron
- c. Resistor, 600-ohm, 2-watt, non-inductive
- d. Resistors, 121-ohm, 1/2-watt, non-inductive, two
- e. Black test lead
- f. Two alligator clips
- g. Connector plug PL-259
- h. Connector plug UG-102/U
- i. One 30-inch length of RG-22/U cable
- j. One 30-inch length of RG-59/U cable
- k. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:
 - (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.
 - (2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.
 - (3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hold with the conductors.
 - (4) Assemble the front shell to the back shell so that both solder holes are in line.
 - (5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.
 - (6) Screw the coupling ring to the back shell.
 - (7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

1. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly to the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, DIODE OUTPUT, and AVC connections from their respective terminals.
- (5) Remove the eight screws holding the receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Insert the power line plug of the Electronic Multimeter TS-505()/U into the 115-volt, 60-cycle power source.
- (10) Connect the black test lead to the COMMON binding post on the multimeter.
- (11) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected across the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (12) Connect an alligator clip to the a-c probe of the multimeter and clip the probe to the other side of the 600-ohm resistor.
- (13) Set the RANGE switch on the multimeter to the 4V/R x 10 position.
- (14) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.
- (15) Set up Signal Generator AN/URM-25() to deliver an unmodulated 0.6-mega-cycle r-f signal. Set up Signal Generator AN/URM-25 as follows:

- (a) Insert the female plug of the power line into the socket located on the lower left corner of the signal generator front panel.
 - (b) Insert the male plug of the power line into a 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL and the % MODULATION control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH to the Band D position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 0.6 megacycle is obtained on the frequency and vernier dials.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch to the ON position and allow 15 minutes for the signal generator to warm up.
- (16) Connect the antenna test cable to the antenna input connector of the receiver.
- (17) Connect the antenna test cable to the signal generator as follows:
- (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (18) Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the MAN position.
- (19) Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the MAN position.
- b. Check the 455-kilocycle i-f rejection ratio as follows:
- (1) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 0.

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (2) Set the MOD-CW switch on the radio receiver to the MOD position.
 - (3) If this check is being performed on Radio Receiver SP-600-JX-17 set the BFO-AVC switch to the INT BFO - FAST position.
 - (4) Rotate the MICROVOLTS control on the signal generator fully clockwise.
 - (5) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL until an indication of 100 is obtained on the signal generator output meter.
 - (6) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position and adjust the signal generator MICROVOLTS control until an indication of 20 is obtained on the upper scale of the signal generator output meter.
 - (7) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and the METER READS switch on the signal generator to the % MOD position.
 - (8) Adjust the % MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
 - (9) Set the METER READS switch on the signal generator to the RF position and rotate the radio receiver RF GAIN control fully clockwise.
 - (10) Set the BAND CHANGE switch on the radio receiver until the indication 0.54 - 1.35 appears in the MEGACYCLES window.
 - (11) Adjust the radio receiver TUNING control until an indication of 0.6 megacycle is obtained on the main tuning and vernier dials.
 - (12) Set the RANGE SWITCH on the multimeter to the 4V/R x 10 position and adjust the AUDIO GAIN control on the radio receiver until an indication of 2.45 volts is obtained on the multimeter.
 - (13) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
 - (14) Rotate the signal generator tuning dial until an indication of 0.455 megacycle is obtained on the frequency and index scales.
 - (15) Set the MULTIPLIER switch on the signal generator to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
 - (16) Adjust the MICROVOLTS control until an indication of 66.7 is obtained on the upper scale of the signal generator output meter. The indication on the multimeter should be between 2.3 and 2.6 volts.
- c. Check the 3955-kilocycle intermediate-frequency rejection ratio as follows:
- (1) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
 - (2) Set the signal generator FREQUENCY BAND SWITCH to the Band F position.
 - (3) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (4) Rotate the signal generator tuning dial until an indication of 7.6 megacycles is obtained on the frequency and index scales.
 - (5) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
 - (6) Adjust the MICROVOLTS control on the signal generator until an indication of 20 is obtained on the upper scale of the signal generator output meter.

- (7) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (8) Rotate the BAND CHANGE switch on the radio receiver until the indication 7.4 - 14.8 appears in the MEGACYCLES window.
- (9) Adjust the radio receiver TUNING control until an indication of 7.6 megacycles is obtained on the main tuning and vernier dials.
- (10) Adjust the AUDIO GAIN control on the radio receiver until an indication of 2.45 volts is obtained on the multimeter.
- (11) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (12) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (13) Rotate the signal generator tuning dial until an indication of 3.9 megacycles is obtained on the frequency and vernier scales.
- (14) Set the MULTIPLIER switch on the signal generator to the 1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (15) Adjust the MICROVOLTS control on the signal generator until an indication of 40 is obtained on the upper scale of the signal generator output meter.
- (16) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and observe the multimeter. The indication on the multimeter should be between 2.3 and 2.6 volts.

d. Concluding Procedure

- (1) Rotate the RF GAIN control on the radio receiver fully counterclockwise to the OFF position.
- (2) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (3) Disconnect the power line plug of the signal generator from the power source.
- (4) Disconnect the multimeter test leads from the radio receiver and the power line plug of the multimeter from the power source.
- (5) Disconnect the power line plug of the radio receiver from the power source.
- (6) Remove the 600-ohm, 2-watt resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (7) Replace the top cover on the radio receiver and tighten the four thumb screws.
- (8) Replace the radio receiver in the relay rack and tighten the eight holding screws to secure the radio receiver.
- (9) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (10) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND
SP-600-JX-17, IMAGE REJECTION RATIO

1. GENERAL INFORMATION

- a. The purpose of this routine is to check the image rejection of Radio Receiver SP-600-JX-21 or SP-600-JX-17.
- b. The approximate time required for this routine is 2 man-hours.
- c. Report all indications that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED

- a. Signal Generator AN/URM-25
- b. Electronic Multimeter TS-505()/U

3. MATERIAL REQUIRED

- a. Screwdriver
- b. Soldering iron
- c. Resistor, 600-ohm, 2-watt, non-inductive
- d. Resistor, 121-ohm, 1/2-watt, non-inductive, two
- e. Black test lead
- f. Two alligator clips
- g. Connector plug PL-259
- h. Connector plug UG-102/U
- i. One 30-inch length of RG-22/U cable
- j. One 30-inch length of RG-59/U cable
- k. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:
 - (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.
 - (2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.
 - (3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.
 - (4) Assemble the front shell to the back shell so that both solder holes are in line.
 - (5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.
 - (6) Screw the coupling ring to the back shell.
 - (7) Strip 5/8 inch of insulation from the center conductors on the other end of cable.
 - (8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

1. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:
 - (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
 - (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
 - (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly on the cable.
 - (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
 - (5) Screw the coupling ring to the plug subassembly.
 - (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
 - (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, DIODE OUTPUT and AVC connections from their respective terminals.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Insert the power line plug of Electronic Multimeter TS-505()/U into a 115-volt, 60-cycle power source.
- (10) Connect the black test lead to the COMMON binding post on the multimeter.
- (11) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected across the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (12) Connect an alligator clip to the a-c probe of the multimeter and clip the probe to the other side of the 600-ohm resistor.
- (13) Set the RANGE switch on the multimeter to the 4V/R x 10 position.
- (14) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the meter to warm up.
- (15) Set up Signal Generator AN/URM-25() to deliver an unmodulated 2.26-mega-cycle r-f signal. Set up Signal Generator AN/URM-25 as follows:
 - (a) Insert the female plug of the power line into the socket on the lower left

corner of the signal generator front panel.

- (b) Insert the male plug of the power line into the 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL and the % MODULATION control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 2.26 megacycles is obtained on the frequency and index scales.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch to the ON position and allow 15 minutes for the signal generator to warm up.
- (16) Connect the antenna test cable to the antenna input connector of the receiver.
- (17) Connect the antenna test cable to the signal generator as follows:
- (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (18) Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the AVC position.
- (19) Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the MAN position.
- b. Check the radio receiver image rejection ratios as follows:
- (1) Rotate the RF GAIN control on the radio receiver fully clockwise.

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (2) Set the MOD-CW switch on the radio receiver to the MOD position.
- (3) If this check is being performed on radio receiver SP-600-JX-17, set the BFO-AVC switch to the INT-BFO - FAST position.
- (4) Rotate the signal generator MICROVOLTS control fully clockwise.
- (5) Set the MULTIPLIER switch on the signal generator to the 1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (6) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position and adjust the signal generator MICROVOLTS control until an indication of 33.4 is obtained on the upper scale of the signal generator output meter.
- (7) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and the METER READS switch on the signal generator to the % MOD position.
- (8) Adjust the % MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
- (9) Set the METER READS switch on the signal generator to the RF position.
- (10) Rotate the BAND CHANGE switch on the signal generator until the indication 1.35 - 3.45 appears in the MEGACYCLES window.
- (11) Rotate the radio receiver TUNING control until an indication of 1.35 megacycles is obtained on the main tuning and vernier dials multimeter. The indication on the multimeter should be between 2.3 and 2.6 volts.
- (12) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (13) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (14) Rotate the signal generator tuning dial until an indication of 4.31 megacycles is obtained on the frequency and index scales.
- (15) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (16) Adjust the MICROVOLTS control on the signal generator until an indication of 20 is obtained on the upper scale of the signal generator output meter.
- (17) Rotate the radio receiver TUNING control until an indication of 3.4 megacycles is obtained on the main tuning and vernier dials.
- (18) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position. The indication on the multimeter should be between 2.3 and 2.6 volts.
- (19) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (20) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (21) Set the FREQUENCY BAND SWITCH on the signal generator to the Band G position.
- (22) Rotate the signal generator tuning dial until an indication of 8.31 megacycles is obtained on the frequency and index scales.
- (23) Set the MULTIPLIER switch on the signal generator signal to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (24) Adjust the MICROVOLTS control on the signal generator output meter until an

indication of 50 is obtained on the upper scale of the signal generator output meter.

- (25) Rotate the BAND CHANGE switch on the radio receiver until the indication 7.4 - 14.8 appears in the MEGACYCLES window.
- (26) Rotate the radio receiver TUNING control until an indication of 7.4 megacycles is obtained on the main tuning and vernier dials.
- (27) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position. The indication on the multimeter should be between 2.3 and 2.6 volts.
- (28) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (29) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (30) Set the FREQUENCY BAND SWITCH on the signal generator to the Band H position.
- (31) Set the CARRIER RANGE switch on the signal generator to the H position.
- (32) Rotate the signal generator tuning dial until an indication of 22.41 megacycles is obtained on the frequency and index scales.
- (33) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (34) Adjust the MICROVOLTS control on the signal generator until an indication of 67 is obtained on the upper scale of the signal generator output meter.
- (35) Rotate the radio receiver TUNING control until an indication of 14.5 megacycles is obtained on the main tuning and vernier dials.
- (36) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position. The indication on the multimeter should be between 2.3 and 2.6 volts.
- (37) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (38) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (39) Rotate the signal generator tuning dial until an indication of 37.41 megacycles is obtained on the frequency and index scales.
- (40) Set the MULTIPLIER switch on the signal generator to the 1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (41) Adjust the MICROVOLTS control on the signal generator until an indication of 40 is obtained on the upper scale of the signal generator output meter.
- (42) Rotate the BAND CHANGE switch on the radio receiver until the indication 14.8 - 29.7 appears in the MEGACYCLES window.
- (43) Rotate the radio receiver TUNING control until an indication of 29.5 megacycles is obtained on the main tuning and vernier dials.
- (44) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position. The indication on the multimeter should be between 2.3 and 2.6 volts.
- (45) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.

c. Concluding Procedure

- (1) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect

the antenna test cable from the radio receiver equipment.

- (2) Disconnect the power line plug of the signal generator from the power source.
- (3) Disconnect the multimeter test leads from the radio receiver and the power line plug of the multimeter from the power source.
- (4) Disconnect the power line plug of the radio receiver from the power source.
- (5) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (6) Replace the top cover on the radio receiver and tighten the four thumb screws.
- (7) Replace the radio receiver in the relay rack and tighten the eight holding screws to secure the radio receiver.
- (8) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (9) Insert the power line plug of the radio receiver into a 115-volt, 60-cycle power source.

**PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
SENSITIVITY, AUDIO POWER, AND INTERMEDIATE-FREQUENCY OUTPUT****1. GENERAL INFORMATION**

- a. The purpose of this routine is to check the sensitivity, audio power, and intermediate-frequency voltage output of Radio Receiver SP-600-JX-21 or SP-600-JX-17.
- b. The approximate time required to do this routine is 1-1/2 man-hours.
- c. Report all indications that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED

- a. Signal Generator AN/URM-25
- b. Electronic Multimeter TS-505()/U

3. MATERIAL REQUIRED

- a. Screwdriver
- b. Soldering iron
- c. Resistor 600-ohm, 2-watt, non-inductive
- d. Resistors, 121-ohm, 1/2-watt, non-inductive, two
- e. Resistor, 68-ohm, 1/2-watt, non-inductive
- f. Black test lead
- g. Two alligator clips
- h. Two connector plugs PL-259
- i. Connector plug UG-102/U
- j. One 30-inch length of RG-22/U cable
- k. Two 30-inch lengths of RG-59/U cable
- l. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:
 - (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.
 - (2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.
 - (3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder holes with the conductors.
 - (4) Assemble the front shell to the back shell so that both solder holes are in line.
 - (5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.
 - (6) Screw the coupling ring to the back shell.
 - (7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

m. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly to the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor and the braid.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

n. Cathode follower cable for Radio Receiver SP-600-JX-21 or SP-600-JX-17 fabricated as follows:

- (1) Repeat step m. (1) through (6).
- (2) Solder the 68-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, DIODE OUTPUT and AVC connections from their respective terminals.
- (5) Deleted
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Insert the power line plug of Electronic Multimeter TS-505()/U into a 115-volt, 60-cycle power source.
- (10) Connect the black test lead to the COMMON binding post on the multimeter.
- (11) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected across the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (12) Connect an alligator clip to the a-c probe of the multimeter and clip the probe to the other side of the 600-ohm resistor.

- (13) Set the RANGE switch on the multimeter to the 40V/R x 10K position.
- (14) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.
- (15) Set up Signal Generator AN/URM-25() to deliver an unmodulated 2-megacycle r-f signal. Set up Signal Generator AN/URM-25 as follows:
 - (a) Insert the female plug of the power line into the socket on the lower left corner of the signal generator front panel.
 - (b) Insert the male plug of the power line into the 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL and the % MODULATION control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 2 megacycles is obtained on the frequency and index scales.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch to the ON position and allow 15 minutes for the signal generator to warm up.
- (16) Connect the antenna test cable to the antenna input connector of the radio receiver.
- (17) Connect the antenna test cable to the signal generator as follows:
 - (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (18) Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:
 - (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the AVC position.
- (19) Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:
 - (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the AVC position.

b. Check the sensitivity of the radio receiver as follows:

- (1) Rotate the RF GAIN control on the radio receiver clockwise from the OFF position to 0.

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (2) Set the MOD-CW switch on the radio receiver to the MOD position.
- (3) If this check is being performed on Radio Receiver SP-600-JX-17 set the BFO-AVC switch to the INT BFO-FAST position.
- (4) Rotate the MICROVOLTS control on the signal generator fully clockwise.
- (5) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL until an indication of 100 is obtained on the signal generator output meter.
- (6) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position and adjust the MICROVOLTS control on the signal generator until an indication of 30 is obtained on the upper scale of the signal generator output meter.
- (7) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (8) Set the METER READS switch on the signal generator to the % MOD position and adjust the % MODULATION control until an indication of 30 is obtained on the lower scale of the signal generator output meter.
- (9) Set the METER READS switch on the signal generator to the RF position.
- (10) Rotate the RF GAIN control on the radio receiver fully clockwise.
- (11) Rotate the radio receiver TUNING control until an indication of 2 megacycles is obtained on the main tuning and vernier dials.
- (12) Set the RANGE switch on the multimeter to the 4V/R x 10 position and adjust the AUDIO GAIN control on the radio receiver until an indication of 2.45 volts is obtained on the multimeter.
- (13) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (14) Set the RANGE switch on the multimeter to the 2V/R x 1 position and adjust the AUDIO GAIN control on the radio receiver until an indication of 0.6 volt is obtained on the multimeter.
- (15) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and adjust the MICROVOLTS control on the signal generator until an indication of 1.9 volts is obtained on the multimeter. Observe the signal generator output meter. The indication on the upper scale should be 20 or less.
- (16) Set the RANGE switch on the multimeter to the 4V/R x 10 position and adjust the AUDIO GAIN control on the radio receiver until an indication of 2.45 volts is obtained on the multimeter.

c. Check the audio power output of the radio receiver as follows:

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (1) If this check is being performed on Radio Receiver SP-600-JX-17 set the BFO-AVC

switch to the INT BFO - FAST position.

- (2) Rotate the signal generator MICROVOLTS control fully clockwise.
 - (3) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
 - (4) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTALS position and adjust the signal generator MICROVOLTS control until an indication of 30 is obtained on the upper scale of the signal generator output meter.
 - (5) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and the METER READS switch on the signal generator to the % MOD position.
 - (6) Adjust the % MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
 - (7) Set the METER READS switch on the signal generator to the RF position.
 - (8) Rotate the BAND CHANGE switch on the radio receiver until the indication 1.35-3.45 appears in the MEGACYCLES window.
 - (9) Rotate the radio receiver TUNING control until an indication of 2.0 megacycles is obtained on the main tuning and vernier dials.
 - (10) Rotate the AUDIO GAIN control on the radio receiver fully clockwise. The indication on the multimeter should be between 33 and 36 volts.
 - (11) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- d. Check the intermediate-frequency output voltage of the radio receiver as follows:
- (1) Connect the cathode follower cable to the I-F OUTPUT connector located on the rear of the radio receiver chassis.
 - (2) Disconnect the test lead and a-c probe from the 600-ohm resistor.
 - (3) Clip the black test lead to the braid of the cathode follower cable and the a-c probe to the other side of the 68-ohm resistor.
 - (4) Set the multimeter RANGE switch to the 2V/R x 1 position.
 - (5) Rotate the RF GAIN control on the radio receiver fully clockwise. The indication on the multimeter should exceed 0.2 volt.
 - (6) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- e. Concluding Procedure
- (1) Set the signal generator POWER ON-OFF switch to the OFF position.
 - (2) Disconnect the antenna test cable from the radio receiver.
 - (3) Disconnect the power line plug of the signal generator from the power source.
 - (4) Disconnect the multimeter test leads from the cathode follower cable.
 - (5) Disconnect the multimeter power line cord plug from the 115-volt, 60-cycle power source.
 - (6) Disconnect the cathode follower from the I-F OUTPUT connector.
 - (7) Disconnect the power line plug of the radio receiver from the power source.

- (8) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Replace the top cover of the radio receiver and tighten the four thumb screws.
- (10) Replace the radio receiver in the rack and tighten the eight holding screws to secure the radio receiver.
- (11) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (12) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
HETERODYNE INTERFERENCE CHECK

1. GENERAL INFORMATION

a. The purpose of this routine is to check the heterodyne interference of Radio Receiver SP-600-JX-21 or SP-600-JX-17.

b. The approximate time required to do this routine is 1 man-hour.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED

a. Signal Generator AN/URM-25

3. MATERIAL REQUIRED

a. Screwdriver

b. Soldering iron

c. Resistor, 600-ohm, 2-watt, non-inductive

d. Resistors, 121-ohm, 1/2-watt, non-inductive, two

e. Headset HS-33

f. Connector plug PL-259

g. Connector plug UG-102/U

h. One 30-inch length of RG-22/U cable

i. One 30-inch length of RG-59/U cable

j. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:

(1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.

(2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.

(3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.

(4) Assemble the front shell to the back shell so that both solder holes are in line.

(5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.

(6) Screw the coupling ring to the back shell.

(7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

k. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling on the cable. Screw the plug subassembly to the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the BFO, IFO, RF, GND, DIODE OUTPUT, and AVC connections from their respective terminals.
- (4) Disconnect the antenna cable from the antenna input connector.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the radio receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into a 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Set up Signal Generator AN/URM-25() to deliver an unmodulated 2-megacycle r-f signal. Set up Signal Generator AN/URM-25 as follows:
 - (a) Insert the female plug of the power line into the socket on the lower left corner of the signal generator front panel.
 - (b) Insert the male plug of the power line into a 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL on the signal generator and the % MODULATION control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator dial until an indication of 2 megacycles is obtained on the frequency and index scales.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.

- (h) Set the METER READS switch on the signal generator to the RF position.
- (i) Set the POWER ON-OFF switch on the signal generator to the ON position and allow 15 minutes for the signal generator to warm up.
- (9) Connect the antenna test cable to the antenna input connector of the receiver.
- (10) Connect the antenna test cable to the signal generator as follows:
 - (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (11) Set up Radio Receiver SP-600-JX-21 for the reception of a continuous-wave signal as follows:
 - (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the MAN position.
- (12) Set up Radio Receiver SP-600-JX-17 for the reception of a continuous-wave signal as follows:
 - (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the MAN position.
- b. Check the heterodyne interference of the radio receiver as follows:
 - (1) Set the BEAT OSC control on the radio receiver to the 0 position, and plug Headset HS-33 into the PHONES jack.
 - (2) Rotate the RF GAIN control on the radio receiver fully clockwise.

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (3) Set the MOD-CW switch on the radio receiver to the CW position.
- (4) If this check is being performed on Radio Receiver SP-600-JX-17 set the BFO-AVC switch to the INT BFO - FAST position.
- (5) Rotate the signal generator MICROVOLTS control fully clockwise.
- (6) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (7) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position and adjust the signal generator MICROVOLTS control until an indication of 20 is obtained on the upper scale of the signal generator output meter.
- (8) Rotate the BAND CHANGE switch on the radio receiver until the indication 1. 35-

3.45 appears in the MEGACYCLES window.

- (9) Rotate the radio receiver TUNING control until an indication of 2 megacycles is obtained on the main tuning and vernier disk.
- (10) Rotate the BEAT OSC control on the radio receiver to the 1.0 KC MINUS position and check that a tone can be heard in the headset. Rotate the BEAT OSC control to the 1.0 KC PLUS position and check that a tone can be heard in the headset.
- (11) Set the AVC-MAN switch on the radio receiver to the AVC position and the SELECTIVITY switch on the radio receiver to the 1.3 XTAL position.
- (12) Vary the signal generator tuning dial within 1.3 kilocycles above the 2-megacycle position until a distorted tone is heard in the headset. Check that the XTAL PHASING control on the radio receiver can eliminate the distortion in the tone heard in the headset.
- (13) Vary the signal generator tuning dial within 1.3 kilocycles below the 2-megacycle position until a distorted tone is heard in the headset. Check that the XTAL PHASING control on the radio receiver can eliminate the distortion in the tone heard in the headset.

c. Concluding Procedure

- (1) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (2) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (3) Disconnect the power line plug of the signal generator from the power source.
- (4) Disconnect the power line plug of the radio receiver from the power source.
- (5) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (6) Replace the top cover of the radio receiver and tighten the four thumb screws.
- (7) Replace the radio receiver in the rack and tighten the eight holding screws to secure the radio receiver.
- (8) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (9) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

PERFORMANCE TEST - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
AUTOMATIC VOLUME CONTROL ACTION

1. GENERAL INFORMATION

- a. The purpose of this routine is to check the action of the automatic volume control circuit of Radio Receiver SP-600-JX-21 or SP-600-JX-17.
- b. The approximate time required to do this routine is 1 man-hour.
- c. Report all indications that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED

- a. Signal Generator AN/URM-25
- b. Electronic Multimeter TS-505()/U

3. MATERIALS REQUIRED

- a. Screwdriver
- b. Soldering iron
- c. Resistor, 600-ohm, 2-watt, non-inductive
- d. Resistors, 121-ohm, 1/2-watt, non-inductive, two
- e. Black test lead
- f. Two alligator clips
- g. Connector plug PL-259
- h. Connector plug UG-102/U
- i. One 30-inch length of RG-22/U cable
- j. One 30-inch length of RG-59/U cable
- k. Headset HS-33
- l. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:
 - (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.
 - (2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.
 - (3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.
 - (4) Assemble the front shell to the back shell so that both solder holes are in line.
 - (5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.
 - (6) Screw the coupling ring to the back shell.
 - (7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

m. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly on the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the BFO, IFO, DIODE OUTPUT and AVC connections from their respective terminals.
- (4) Disconnect the antenna cable from the antenna input connector.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into a 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Insert the power line plug of Electronic Multimeter TS-505()/U into a 115-volt, 60-cycle power source.
- (10) Connect the black test lead to the COMMON binding post on the multimeter.
- (11) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected across the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (12) Connect an alligator clip to the a-c probe of the multimeter and clip the probe to the other side of the 600-ohm resistor.
- (13) Set the RANGE switch on the multimeter to the 4V/R x 10 position.
- (14) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.

- (15) Set up Signal Generator AN/URM-25() to deliver an unmodulated 2-megacycle r-f signal. Set up Signal Generator AN/URM-25 as follows:
- (a) Insert the female plug of the power line into the socket on the lower left corner of the radio receiver front panel.
 - (b) Insert the male plug of the power line into a 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL on the signal generator and the % MODULATION control on the signal generator counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 2 megacycles is obtained on the frequency and index scales.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch to the ON position and allow 15 minutes for the signal generator to warm up.
- (16) Connect the antenna test cable to the antenna input connector of the receiver.
- (17) Connect the antenna test cable to the signal generator as follows:
- (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (18) Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the AVC position.
- (19) Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HPO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the AVC position.
- b. Check the operation of the radio receiver automatic volume control circuit as follows:
- (1) Rotate the RF GAIN control on the radio receiver fully clockwise.

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (2) Rotate the AUDIO GAIN control on the radio receiver fully counterclockwise.
- (3) Set the MOD-CW switch on the radio receiver to the MOD position.
- (4) If this check is being performed on Radio Receiver SP-600-JX-17 set the BFO-AVC switch to the INT BFO - FAST position.
- (5) Rotate the signal generator MICROVOLTS control fully clockwise.
- (6) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (7) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position and adjust the signal generator MICROVOLTS control until an indication of 20 is obtained on the upper scale of the signal generator output meter.
- (8) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and the METER READS switch on the signal generator to the % MOD position.
- (9) Adjust the % MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
- (10) Set the METER READS switch on the signal generator to the RF position.
- (11) Rotate the BAND CHANGE switch on the radio receiver until the indication 1.35-3.45 appears in the MEGACYCLES window.
- (12) Rotate the radio receiver TUNING control until an indication of 2 megacycles is obtained on the main tuning and vernier dials.
- (13) Adjust the AUDIO GAIN control on the radio receiver until an indication of 2.54 volts is obtained on the multimeter.
- (14) Rotate the signal generator MICROVOLTS control clockwise. The indication on the multimeter should be between 2.5 and 3.8 volts. Rotate the MICROVOLTS control fully counterclockwise.
- (15) Set the MULTIPLIER switch to the 1 position and repeat step (14).
- (16) Set the MULTIPLIER switch to the 10 position and repeat step (14).
- (17) Set the MULTIPLIER switch to the 100 position and repeat step (14).
- (18) Set the MULTIPLIER switch to the 1000 position and repeat step (14).

c. Concluding Procedure

- (1) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (2) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (3) Disconnect the power line plug of the signal generator from the power source.
- (4) Disconnect the multimeter test leads from the radio receiver and disconnect the multimeter power line plug from the power source.
- (5) Disconnect the power line plug of the radio receiver from the power source.
- (6) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (7) Replace the top cover of the radio receiver and tighten the four thumb screws.

- (8) Replace the radio receiver in the rack and tighten the eight holding screws to secure the radio receiver.
- (9) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (10) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

SERVICING - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
OPERATING INSTRUCTIONS

1. GENERAL INFORMATION

a. The purpose of this routine is to outline procedures for placing Radio Receiver SP-600-JX-21 or SP-600-JX-17 in the desired mode of operation.

b. The approximate time required to do this routine is 20 minutes.

2. TEST EQUIPMENT REQUIRED

a. None

3. MATERIALS REQUIRED

a. Headset HS-33

4. PROCEDURE

a. Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:

- (1) Set the SEND-REC switch to the REC position.
- (2) Set the FREQ CONTROL switch to the VFO position.
- (3) Set the LIMITER-OFF switch to the OFF position.
- (4) Set the AVC-MAN switch to the AVC position.
- (5) Set the XTAL PHASING control to the position indicated by the diamond between settings 4 and 6.

b. Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:

- (1) Set the SEND-REC switch to the REC position.
- (2) Set the IFO switch to the INT position.
- (3) Set the HFO switch to the VAR position.
- (4) Set the LIMITER-OFF switch to the OFF position.
- (5) Set the AVC-MAN switch to the AVC position.
- (6) Set the XTAL PHASING control to the position indicated by the diamond between settings 4 and 6.

c. Operate the radio receiver for reception of modulated, continuous-wave signals, either phone, signal-tone, or telegraph as follows:

- (1) Plug Headset HS-33 into the PHONES jack.
- (2) Rotate the RF GAIN control fully clockwise. Observe that the main tuning and vernier dials are illuminated by the panel lamps. Allow 15 minutes for the radio receiver to reach operating temperature.
- (3) Unclamp the TUNING LOCK by turning it counterclockwise.
- (4) Set the MOD-CW switch to the MOD position.

- (5) If Radio Receiver SP-600-JX-17 is being operated, set the BFO-AVC switch to the INT BFO - FAST position.
 - (6) Rotate the AUDIO GAIN control until a tone is heard in the headset.
 - (7) Rotate the BAND CHANGE switch until the desired frequency range is observed through the MEGACYCLES window.
 - (8) Rotate the TUNING control until the desired frequency is obtained on the main tuning and vernier dials.
- d. Operate the radio receiver for reception of modulated, continuous-wave (variable-frequency) signals as follows:
- (1) Repeat steps a. and c. for Radio Receiver SP-600-JX-21.
 - (2) Repeat steps b. and c. for Radio Receiver SP-600-JX-17.
 - (3) Rotate the TUNING control until the desired frequency is obtained on the dials. A maximum indication should be obtained on the radio receiver output meter.
 - (4) Readjust the AUDIO GAIN control until a satisfactory audio level is obtained in the headset.
- e. Operate the radio receiver for reception of modulated continuous-wave (crystal-controlled) signals as follows:
- (1) Repeat steps a. and c. for Radio Receiver SP-600-JX-21.
 - (2) Repeat steps b. and c. for Radio Receiver SP-600-JX-17.
 - (3) Set the XTAL switch to the desired crystal position.
 - (4) Rotate the HFO-FREQ control until a maximum indication is obtained on the radio receiver output meter.
 - (5) Rotate the TUNING control until a maximum indication is obtained on the radio receiver output meter.
 - (6) Readjust the AUDIO GAIN control until a satisfactory audio level is obtained in the headset.
- f. Operate the radio receiver for reception of continuous-wave signals as follows:
- (1) For Radio Receiver SP-600-JX-21 repeat steps a. and c. with the exception of c. (4). The MOD-CW switch is to be set in the CW position.
 - (a) Rotate the BEAT OSC control to the 0 position.
 - (2) For Radio Receiver SP-600-JX-17 repeat steps b. and c. with the exception of c. (4). The MOD-CW switch is to be set in the CW position.
 - (a) Rotate the BEAT OSC control to the 0 position.
- g. Operate the radio receiver for reception of continuous-wave (variable-frequency) signals as follows:
- (1) For Radio Receiver SP-600-JX-21 repeat steps a. and c. with the exception of c.(4). The MOD-CW switch is to be set in the CW position.
 - (2) For Radio Receiver SP-600-JX-17 repeat steps b. and c. with the exception of c.(4). The MOD-CW switch is to be set in the CW position.
 - (3) Rotate the TUNING control until a maximum indication is obtained on the radio receiver output meter or a condition of zero beat is heard in the headset.

- (4) Rotate the BEAT OSC control to approximately the 1.0 position on the dial, this control should be set in the position that will provide the clearest reception.
- (5) Readjust the RF GAIN control and AUDIO GAIN control until a satisfactory audio level is obtained in the headset.

h. Operate the radio receiver for reception of continuous-wave (crystal-controlled) signals as follows:

- (1) For Radio Receiver SP-600-JX-21 repeat steps a. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (2) For Radio Receiver SP-600-JX-17 repeat steps b. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (3) Set the XTAL switch to the desired crystal position.
- (4) Rotate the HFO-FREQ control until a maximum indication is obtained on the radio receiver output meter.
- (5) Rotate the TUNING control until a maximum indication is obtained on the radio receiver output meter.
- (6) Rotate the BEAT OSC control to approximately the 1.0 position on the dial. This control should be set in the position that will provide the clearest reception.
- (7) Readjust the RF GAIN control and AUDIO GAIN control until a satisfactory audio level is obtained in the headset.

i. Operate the radio receiver for reception of frequency-shift (teletype) signals as follows:

- (1) For Radio Receiver SP-600-JX-21 repeat steps a. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (2) For Radio Receiver SP-600-JX-17 repeat steps b. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (3) Set the BEAT OSC control to the 0 position.

j. Operate the radio receiver for reception of frequency-shift (variable-frequency) signals as follows:

- (1) For Radio Receiver SP-600-JX-21 repeat steps a. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (2) For Radio Receiver SP-600-JX-17 repeat steps a. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (3) Rotate the TUNING control until a tone output is obtained in the headset and a maximum indication is obtained on the radio receiver output meter.
- (4) Rotate the BEAT OSC control until at approximately the ± 2.5 position on the dial a two-tone signal output is obtained from the headset.

k. Operate the radio receiver for reception of frequency-shift (crystal-controlled) signals as follows:

- (1) For Radio Receiver SP-600-JX-21 repeat steps a. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (2) For Radio Receiver SP-600-JX-17 repeat steps b. and c. with the exception of c(4). The MOD-CW switch is to be set in the CW position.
- (3) Set the XTAL switch to the desired crystal position.
- (4) Rotate the HFO-FREQ control until a maximum indication is obtained on the radio receiver output meter.

- (5) Rotate the TUNING control until a maximum indication is obtained on the radio receiver output meter.
- (6) Rotate the BEAT OSC control until at approximately the ± 2.5 position on the dial a two-tone signal output is obtained from the headset.
- (7) Readjust the RF GAIN control and AUDIO GAIN control until a satisfactory audio level is obtained.

l. Operate the radio receiver for reception of suppressed carrier phone, telegraph, and teletype signals as follows:

- (1) Repeat steps a. and c. for Radio Receiver SP-600-JX-21.
- (2) Repeat steps b. and c. for Radio Receiver SP-600-JX-17.
- (3) Set the SELECTIVITY switch to the desired position determined by the mode of operation of the radio receiver.

m. Operate the radio receiver for reception of suppressed carrier (variable-frequency) signals as follows:

- (1) Repeat steps a. and c. for Radio Receiver SP-600-JX-21.
- (2) Repeat steps b. and c. for Radio Receiver SO-600-JX-17.
- (3) Rotate the TUNING control on the radio receiver until a maximum indication is obtained on the output meter.
- (4) Set the SELECTIVITY switch to the desired position determined by the mode of operation of the radio receiver.
- (5) Adjust the AUDIO GAIN control until a satisfactory audio level is obtained in the headset.

n. Rotate the RF GAIN control counterclockwise to the OFF position.

SERVICING - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17, ALIGNMENT

1. GENERAL INFORMATION

a. The purpose of this routine is to align the intermediate-frequency and radio-frequency sections of Radio Receiver SP-600-JX-21 or SP-600-JX-17.

b. The approximate time required to do this routine is 8 man-hours.

2. TEST EQUIPMENT REQUIRED

a. Signal Generator AN/URM-25

b. Electronic Multimeter TS-505 ()/U

3. MATERIAL REQUIRED

a. Screwdriver

b. Soldering iron

c. Resistor, 600-ohm, 2-watt, non-inductive

d. Resistors, 121-ohm, 1/2-watt, non-inductive, two

e. Black test lead

f. Two alligator clips

g. Connector plug PL-259

h. Connector plug UG-102/U

i. One 30-inch length of RG-22/U cable

j. One 30-inch length of RG-59/U cable

k. Test adapter, 7-pin-tube-socket

l. Alignment tool, insulated

m. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.
- (3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.
- (4) Assemble the front shell to the back shell so that both solder holes are in line.
- (5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.
- (6) Screw the coupling ring to the back shell.
- (7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

n. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly on the cable,
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, DIODE OUTPUT, and AVC connections from their respective terminals.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (8) Remove the shield from tube V-5 (figure 2-1) and remove the tube.
- (9) Plug tube V-5 into the tube socket test adapter and plug the adapter into the tube socket on the radio receiver.
- (10) Insert the power line plug of the radio receiver into a 115-volt, 60-cycle power source.
- (11) Insert the power line plug of Electronic Multimeter TS-505()/A into a 115-volt, 60-cycle power source.
- (12) Connect the black test lead to the COMMON binding post of the multimeter.
- (13) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (14) Connect an alligator clip to the a-c probe of the multimeter and clip the probe to the other side of the 600-ohm resistor.
- (15) Set the RANGE switch on the multimeter to the 40V/R x 10K position.

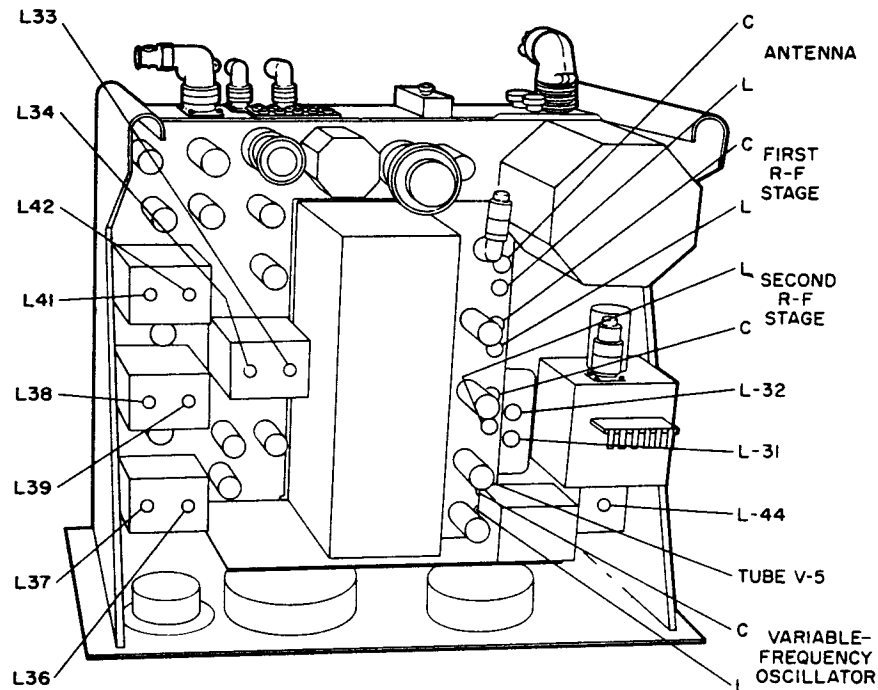


Figure 2-1. Radio Receiver SP-600-JX-17, Top View

- (16) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.
- (17) Set up Signal Generator AN/URM-25() to deliver an unmodulated 0.455-megacycle r-f signal to pin 7 of tube V5 on the radio receiver. Set up Signal Generator AN/URM-25 as follows:
- (a) Insert the female plug of the power line into the socket on the lower left corner of the signal generator front panel.
 - (b) Insert the male plug of the power line into a 115-volt, 60-cycle power source.
 - (c) Connect one end of the cable, W-105, to the signal generator X MULT RF OUTPUT jack and the other end of the cable to the test lead, CX-1363/U.
 - (d) Connect the black test lead of CX-1363/U to the radio receiver chassis (ground) and the red test lead of CX-1363/U to pin 7 of tube V-5.
 - (e) Rotate the CARRIER CONTROL and the % MODULATION control on the signal generator fully counterclockwise.
 - (f) Set the FREQUENCY BAND SWITCH on the signal generator to the Band D position.
 - (g) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (h) Rotate the signal generator tuning dial until an indication of 0.455 megacycle is obtained on the frequency and index scales.
 - (i) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (j) Set the METER READS switch on the signal generator to the RF position.
 - (k) Set the POWER ON-OFF switch on the signal generator to the ON position and allow 15 minutes for the signal generator to warm up.
- b. Align the i-f stages of the radio receiver as follows:
- (1) Set the SEND-REC switch on the radio receiver to the REC position.

- (2) Set the MOD-CW switch on the radio receiver to the MOD position.
- (3) Set the AVC-MAN switch on the radio receiver to the MAN position.
- (4) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position.
- (5) Set the LIMITER-OFF switch on the radio receiver to the OFF position.
- (6) Set the XTAL PHASING control on the radio receiver to the position indicated by the diamond between the settings 4 and 6.
- (7) Rotate the BAND CHANGE switch on the radio receiver until the indication 1. 35-3. 45 appears in the MEGACYCLES window.
- (8) Rotate the radio receiver TUNING control until an indication of 2. 5 megacycles is obtained on the main tuning and vernier dials.
- (9) Rotate the AUDIO GAIN control on the radio receiver fully clockwise.
- (10) Rotate the RF GAIN control on the radio receiver fully clockwise.

NOTE

In each of the following steps where alignment adjustments are to be made, the indicator on the multimeter should first be set to the midpoint of the scale. This is done by rotating the RF GAIN control. This procedure will assure accurate adjustments.

- (11) Set the MULTIPLIER switch on the signal generator to the 10 position and rotate the MICROVOLTS control on the signal generator fully clockwise.
- (12) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (13) Adjust the MICROVOLTS control on the signal generator until an indication of 20 volts is obtained on the multimeter.
- (14) Set the METER READS switch on the signal generator to the % MOD position and the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (15) Adjust the % MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
- (16) Set the METER READS switch on the signal generator to the RF position.
- (17) Adjust, in turn, coils L-42, L-41, L-39, L-38, L-36, and L-32 (figure 2-1) until a maximum indication is obtained on the multimeter.
- (18) Set the SELECTIVITY switch on the radio receiver to the . 2 XTAL position and adjust the signal generator tuning dial until a maximum indication is obtained on the multimeter.
- (19) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position and repeat step b(17).
- (20) Set the SELECTIVITY switch on the radio receiver to the 1. 3 XTAL position and adjust coil L-37 (figure 2-1) until a maximum indication is obtained on the multimeter.
- (21) Set the MOD-CW switch on the radio receiver to the CW position.
- (22) If Radio Receiver SP-600-JX-17 is being aligned, set the BFO-AVC switch to the INT BFO - FAST position.

- (23) Set the BEAT OSC control on the radio receiver to 0 and the MOD SELECTOR switch on the radio receiver to the OFF position.
 - (24) Allow 15 minutes for the receiver to warm up then adjust coil L-44 (figure 2-1) until an indication of zero volts is obtained on the multimeter.
 - (25) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
 - (26) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position and rotate the signal generator tuning dial until an indication of 3.955 megacycles is obtained on the frequency and index scales.
 - (27) Set the MOD-CW switch on the radio receiver to the MOD position and the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position.
 - (28) Rotate the BAND CHANGE switch on the radio receiver until the indication 7.4-14.8 appears in the MEGACYCLES window.
 - (29) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
 - (30) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and adjust the MICROVOLTS control on the signal generator until an indication of 20 volts is obtained on the multimeter.
 - (31) Adjust, in turn, coils L-31, L-33, and L-34 (figure 2-1) until a maximum indication is obtained on the multimeter.
 - (32) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
 - (33) Set the MOD SELECTOR switch on the signal generator to the OFF position and rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
 - (34) Remove the signal generator test leads from the radio receiver.
 - (35) Connect the antenna test cable to the radio receiver antenna input connector.
 - (36) Connect the antenna test cable to the signal generator as follows:
 - (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- c. Align the r-f stages of the radio receiver as follows:
- (1) Set the FREQUENCY BAND SWITCH on the signal generator to the Band D position.
 - (2) Rotate the signal generator tuning dial until an indication of 0.56 megacycle is obtained on the frequency and index scales.
 - (3) Adjust the CARRIER CONTROL until an indication of 100 is obtained on the signal generator output meter.
 - (4) Rotate the RF GAIN control on the radio receiver fully clockwise.
 - (5) Rotate the BAND CHANGE switch until the indication .54-1.35 appears in the MEGACYCLES window.
 - (6) Rotate the radio receiver TUNING control until an indication of 0.56 megacycle is obtained on the main tuning and vernier dials.
 - (7) Set the AVC-MAN switch on the radio receiver to the AVC position and the FREQ CONTROL on the radio receiver to the VFP position.

- (8) If Radio Receiver SP-600-JX-17 is being aligned, set the HFO switch to the VAR position.
- (9) Adjust the MICROVOLTS control on the signal generator until an indication of 20 volts is obtained on the multimeter.
- (10) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (11) Set the METER READS switch on the signal generator to the $\%$ MOD position and adjust the $\%$ MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
- (12) Set the METER READS switch to the RF position.
- (13) Remove the metal buttons that cover L and C of the four r-f tuner subassemblies on the radio receiver.
- (14) Refer to figure 2-1 for Radio Receiver SP-600-JX-17, or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L and second r-f stage L until a maximum indication is obtained on the multimeter.

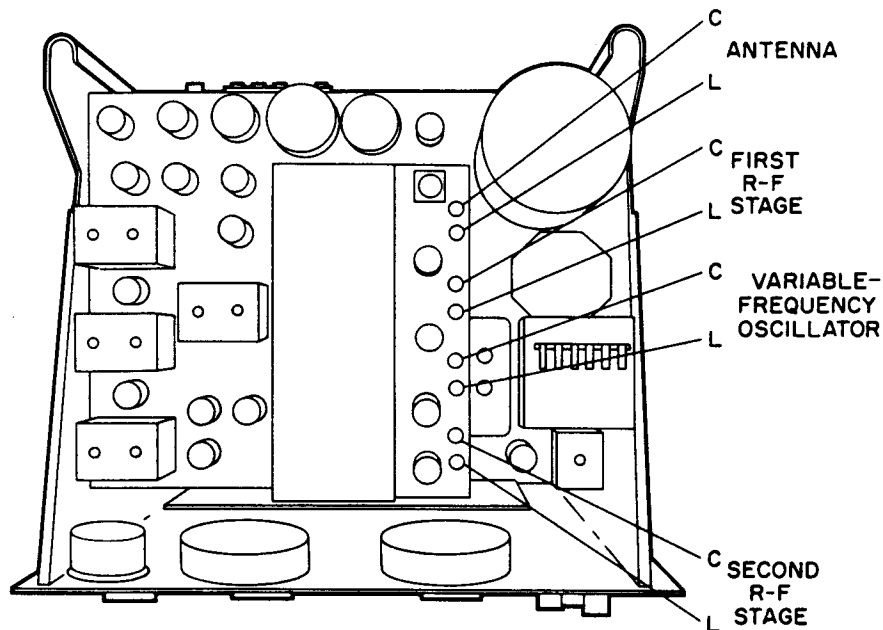


Figure 2-2. Radio Receiver SP-600-JX-21, Top View of R-F Section

- (15) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (16) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (17) Set the FREQUENCY BAND SWITCH on the signal generator to the Band E position.
- (18) Rotate the signal generator tuning dial until an indication of 1.3 megacycles is obtained on the frequency and index scales.
- (19) Rotate the radio receiver TUNING control until an indication of 1.3 megacycles is obtained on the main tuning and vernier dials.
- (20) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.

- (21) Adjust the MICROVOLTS control on the signal generator until an indication of 20 volts is obtained on the multimeter.
- (22) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (23) Refer to figure 2-1 for Radio Receiver SP-600-JX-17, or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (24) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (25) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (26) Repeat step c. (1) through (25) with exception of (7), (8) and (13).
- (27) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (28) Adjust the MICROVOLTS control on the signal generator until an indication of 30 is obtained on the upper scale of the signal generator output meter.
- (29) Set the AVC-MAN switch on the radio receiver to the MAN position and adjust the RF GAIN control on the radio receiver until an indication of 20 volts is obtained on the multimeter.
- (30) Repeat step c. (1) through (25) with exception of (7), (8) and (13).
- (31) Rotate the signal generator tuning dial until an indication of 1.4 megacycles is obtained on the frequency and vernier scales.
- (32) Set the MULTIPLIER switch on the signal generator to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (33) Rotate the BAND CHANGE switch on the radio receiver until the indication 1.35-3.45 appears in the MEGACYCLES window.
- (34) Rotate the radio receiver TUNING control until an indication of 1.4 megacycles is obtained on the main tuning and vernier dials.
- (35) Set the AVC-MAN switch on the radio receiver to the AVC position and rotate the RF GAIN control on the radio receiver fully clockwise.
- (36) Adjust the MICROVOLTS control on the signal generator until an indication of 20 volts is obtained on the multimeter.
- (37) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (38) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (39) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (40) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (41) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position.
- (42) Rotate the signal generator tuning dial until an indication of 3.4 megacycles is obtained on the frequency and index scales.

- (43) Rotate the radio receiver TUNING control until an indication of 3.4 megacycles is obtained on the main tuning and vernier dials.
- (44) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (45) Adjust the MICROVOLTS control on the signal generator until an indication of 20 volts is obtained on the multimeter.
- (46) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (47) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (48) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (49) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (50) Repeat step c. (31) through (49).
- (51) Repeat step c. (27) through (29).
- (52) Repeat step c. (31) through (49).
- (53) Rotate the signal generator tuning dial until an indication of 3.75 megacycles is obtained on the frequency and index scales.
- (54) Set the MULTIPLIER switch on the signal generator to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (55) Rotate the BAND CHANGE switch on the radio receiver until the indication 3.45-7.4 appears in the MEGACYCLES window.
- (56) Rotate the receiver TUNING control until the main tuning and vernier dials indicate 3.75 megacycles.
- (57) Repeat step c. (35) through (37).
- (58) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (59) Repeat step c. (39) and (40).
- (60) Rotate the signal generator tuning dial until an indication of 7.15 megacycles is obtained on the frequency and index scales.
- (61) Rotate the radio receiver TUNING control until an indication of 7.15 megacycles is obtained on the main tuning and vernier dials.
- (62) Repeat step c. (44) through (46).
- (63) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (64) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (65) Set the MOD SELECTOR switch on the signal generator to the OFF position.

- (66) Repeat step c. (53) through (65).
- (67) Repeat step c. (27) through (29).
- (68) Repeat step c. (53) through (65).
- (69) Rotate the signal generator tuning dial until an indication of 7.5 megacycles is obtained on the frequency and index scales.
- (70) Set the MULTIPLIER switch on the signal generator to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (71) Rotate the BAND CHANGE switch on the radio receiver until the indication 7.4-14.8 appears in the MEGACYCLES window.
- (72) Rotate the radio receiver TUNING control until an indication of 7.5 megacycles is obtained on the main tuning and vernier dials.
- (73) Repeat step c. (35) through (37).
- (74) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (75) Repeat step c. (39) and (40).
- (76) Set the FREQUENCY BAND SWITCH on the signal generator to the Band G position.
- (77) Rotate the signal generator tuning dial until an indication of 14.5 megacycles is obtained on the frequency and index scales.
- (78) Rotate the radio receiver TUNING control until an indication of 14.5 megacycles is obtained on the main tuning and vernier dials.
- (79) Repeat step c. (44) through (46).
- (80) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (81) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (82) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (83) Repeat step c. (69) through (82).
- (84) Repeat step c. (27) through (29).
- (85) Repeat step c. (69) through (82).
- (86) Rotate the signal generator tuning dial until an indication of 15.0 megacycles is obtained on the frequency and index scales.
- (87) Set the MULTIPLIER switch on the signal generator to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (88) Rotate the BAND CHANGE switch on the radio receiver until the indication 14.8-29.7 appears in the MEGACYCLES window.
- (89) Rotate the radio receiver TUNING control until an indication of 15.0 megacycles is obtained on the main tuning and vernier dials.

- (90) Repeat step c. (35) through (37).
- (91) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (92) Repeat step c. (39) and (40).
- (93) Set the FREQUENCY BAND SWITCH on the signal generator to the Band H position and the CARRIER RANGE switch on the signal generator to the H position.
- (94) Rotate the signal generator tuning dial until an indication of 29.0 megacycles is obtained on the frequency and index scales.
- (95) Rotate the radio receiver TUNING control until an indication of 29.0 megacycles is obtained on the main tuning and vernier dials.
- (96) Repeat step c. (44) through (46).
- (97) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (98) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (99) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (100) Repeat step c. (86) through (99).
- (101) Repeat step c. (27) through (29).
- (102) Repeat step c. (86) through (99).
- (103) Rotate the signal generator tuning dial until an indication of 30.0 megacycles is obtained on the frequency and index scales.
- (104) Set the MULTIPLIER switch on the signal generator to the 10 position and adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (105) Rotate the BAND CHANGE switch on the radio receiver until the indication 29.7-54.0 appears in the MEGACYCLES window.
- (106) Rotate the radio receiver TUNING control until an indication of 30.0 megacycles is obtained on the main tuning and vernier dials.
- (107) Repeat step c. (35) through (37).
- (108) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (109) Repeat step c. (39) and (40).
- (110) Rotate the signal generator tuning dial until an indication of 26.0 megacycles is obtained on the frequency and index scales.
- (111) Rotate the radio receiver TUNING control until an indication of 52.0 megacycles is obtained on the main tuning and vernier dials.
- (112) Repeat step c. (44) through (46).

- (113) Refer to figure 2-1 for Radio Receiver SP-600-JX-17 or figure 2-2 for Radio Receiver SP-600-JX-21. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (114) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (115) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (116) Repeat step c. (103) through (115).
- (117) Repeat step c. (27) through (29).
- (118) Repeat step c. (103) through (115).
- (119) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.

d. Concluding Procedure

- (1) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (2) Disconnect the power line plug of the signal generator from the power source.
- (3) Disconnect the multimeter test leads from the radio receiver and disconnect the power line plug from the power source.
- (4) Disconnect the power line plug of the receiver from the power source.
- (5) Replace all the metal buttons removed from the r-f section of the radio receiver.
- (6) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (7) Remove the tube socket test adapter and replace tube V-5 in the socket.
- (8) Replace the shield on tube V-5.
- (9) Replace the top cover on the radio receiver and tighten the four thumb screws.
- (10) Replace the radio receiver in the relay rack and tighten the eight holding screws to secure the radio receiver.
- (11) Connect all the cables and wires to the respective terminals on the rear of the radio receiver.
- (12) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

**SERVICING - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
VARIABLE-FREQUENCY HETERODYNE OSCILLATOR ALIGNMENT****1. GENERAL INFORMATION**

a. The purpose of this routine is to align the variable-frequency oscillator stage of Radio Receiver SP-600-JX-21 or SP-600-JX-17.

b. The approximate time required to do this routine is 2-1/2 man-hours.

2. TEST EQUIPMENT REQUIRED

a. Signal Generator AN/URM-25

b. Electronic Multimeter TS-505()/U

3. MATERIAL REQUIRED

a. Screwdriver

b. Soldering iron

c. Resistor, 600-ohm, 2-watt, non-inductive

d. Resistors, 121-ohm, 1/2-watt, non-inductive, two

e. Black test lead

f. Two alligator clips

g. Connector plug PL-259

h. Connector plug UG-102/U

i. One 30-inch length of RG-22/U cable

j. One 30-inch length of RG-59/U cable

k. Alignment tool, insulated

l. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:

(1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.

(2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.

(3) Disassemble the connector plug, UG-102/U and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.

(4) Assemble the front shell to the back shell so that both solder holes are in line.

(5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.

(6) Screw the coupling ring on the back shell.

(7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

m. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly to the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, RF, GND, DIODE OUTPUT, and AVC connections from their respective terminals.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (9) Insert the power line plug of Electronic Multimeter TS-505()/U into a 115-volt, 60-cycle power source.
- (10) Connect the black test lead to the COMMON binding post on the multimeter.
- (11) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (12) Connect an alligator clip to the a-c probe of the multimeter and clip the probe to the other side of the 600-ohm resistor.
- (13) Set the RANGE switch on the multimeter to the 4V/R x 10 position.
- (14) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.
- (15) Set up Signal Generator AN/URM-25() to deliver an unmodulated 0.56-megacycle r-f signal. Set up Signal Generator AN/URM-25 as follows:
 - (a) Insert the female plug of the power line into the socket located in the lower left corner of the signal generator front panel.

- (b) Insert the male plug of the power line into a 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL, the % MODULATION control, and the MICRO-VOLTS control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band D position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 0.56 megacycle is obtained on the frequency and index scales.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch on the signal generator to the ON position and allow 15 minutes for the signal generator to warm up.
- (16) Connect the antenna test cable to the antenna input connector of the radio receiver.
- (17) Connect the antenna test cable to the signal generator as follows:
- (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (18) Set up Radio Receiver SP-600-JX-21 for reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the MAN position.
- (19) Set up Radio Receiver SP-600-JX-17 for reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the MAN position.
- b. Align the variable-frequency heterodyne oscillator as follows:
- (1) Rotate the RF GAIN control on the radio receiver fully clockwise.
 - (2) Set the MOD-CW switch on the radio receiver to the MOD position.
 - (3) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position.
 - (4) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL until an indication of 100 is obtained on the output meter of the signal generator.
 - (5) Adjust the MICROVOLTS control on the signal generator until an indication of 30 is obtained on the upper scale of the signal generator output meter.

- (6) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (7) Set the METER READS switch on the signal generator to the % MOD position and adjust the % MODULATION control until an indication of 30 is obtained on the lower scale of the signal generator output meter.
- (8) Set the METER READS switch on the signal generator to the RF position.
- (9) Rotate the BAND CHANGE switch on the radio receiver until the indication 0.54-1.35 appears in the MEGACYCLES window.
- (10) Rotate the radio receiver TUNING control until an indication of 0.56 megacycle is obtained on the main tuning and vernier dials.
- (11) Adjust the AUDIO GAIN control on the radio receiver until an indication of 2.45 volts is obtained on the multimeter.
- (12) Refer to figure 2-3 for radio receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Remove the metal cap and adjust variable-frequency oscillator L until a maximum indication is obtained on the multimeter.

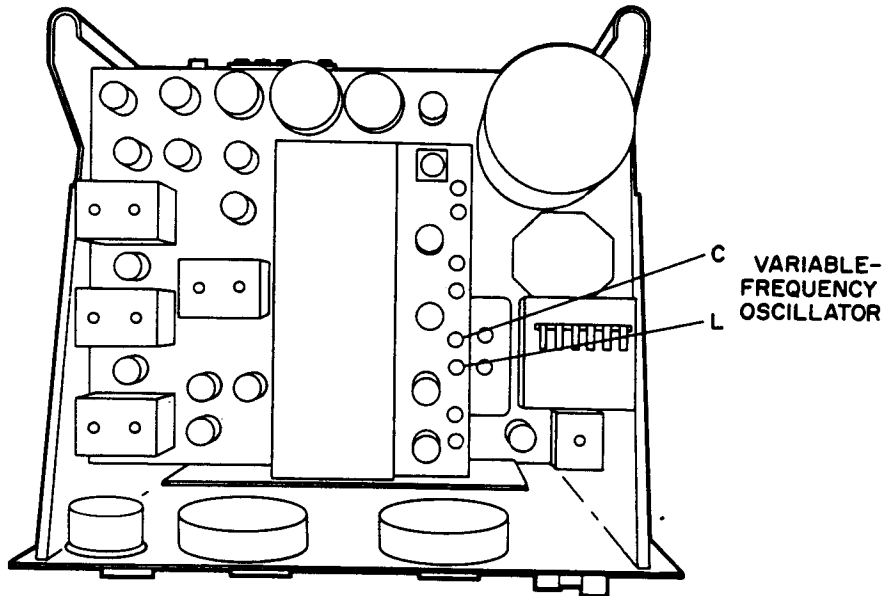


Figure 2-3. Radio Receiver SP-600-JX-21, Top View of R-F Section

- (13) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (14) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (15) Set the FREQUENCY BAND SWITCH on the signal generator to the Band E position and rotate the signal generator tuning dial until an indication of 1.3 megacycles is obtained on the frequency and index scales.
- (16) Rotate the radio receiver TUNING control until an indication of 1.3 megacycles is obtained on the main tuning and vernier dials.
- (17) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (18) Adjust the MICROVOLTS control on the signal generator until an indication of 30 is obtained on the upper scale of the signal generator output meter.

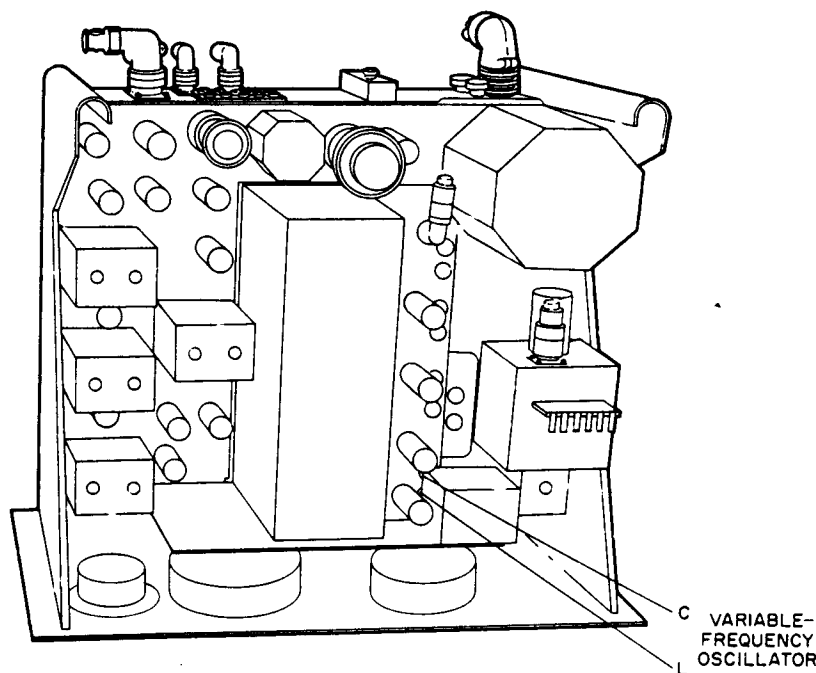


Figure 2-4. Radio Receiver SP-600-JX-17, Top View

- (19) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (20) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Remove the metal cap and adjust variable-frequency oscillator C until a maximum indication is obtained on the multimeter.
- (21) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (22) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (23) Repeat step b. (4) through (6) and (8) through (22).
- (24) Rotate the signal generator tuning dial until an indication of 1.4 megacycles is obtained on the frequency and index scales.
- (25) Rotate the BAND CHANGE switch on the radio receiver until the band indication 1.35-3.45 appears in the MEGACYCLES window.
- (26) Rotate the radio receiver TUNING control until an indication of 1.4 megacycles is obtained on the main tuning and vernier dials.
- (27) Repeat step b. (17) through (19).
- (28) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator L until a maximum indication is obtained on the multimeter.
- (29) Repeat step b. (13) and (14).
- (30) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position and rotate the signal generator tuning dial until an indication of 3.4 megacycles is obtained on the frequency and index scales.
- (31) Rotate the radio receiver TUNING control until an indication of 3.4 megacycles is obtained on the main tuning and vernier dials.

- (32) Repeat step b. (17) through (19).
- (33) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator C until a maximum indication is obtained on the multimeter.
- (34) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (35) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (36) Repeat step b. (24) through (35).
- (37) Rotate the signal generator tuning dial until an indication of 3.75 megacycles is obtained on the frequency and index scales.
- (38) Rotate the BAND CHANGE switch on the radio receiver until the indication 3.45-7.4 appears in the MEGACYCLES window.
- (39) Rotate the radio receiver TUNING control until an indication of 3.75 is obtained on the main tuning and vernier dials.
- (40) Repeat step b. (17) through (19).
- (41) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator L until a maximum indication is obtained on the multimeter.
- (42) Repeat step b. (13) and (14).
- (43) Rotate the signal generator tuning dial until an indication of 7.15 megacycles is obtained on the frequency and index scales.
- (44) Rotate the radio receiver TUNING control until an indication of 7.15 megacycles is obtained on the main tuning and vernier dials.
- (45) Repeat step b. (17) through (19).
- (46) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator C until a maximum indication is obtained on the multimeter.
- (47) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (48) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (49) Repeat step b. (37) through (48).
- (50) Rotate the signal generator tuning dial until an indication of 7.5 megacycles is obtained on the frequency and index scales.
- (51) Rotate the BAND CHANGE switch on the radio receiver until the indication 7.4-14.8 appears in the MEGACYCLES window.
- (52) Rotate the radio receiver TUNING control until an indication of 7.5 megacycles is obtained on the main tuning and vernier dials.
- (53) Repeat step b. (17) through (19).
- (54) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator L until a maximum indication is obtained on the multimeter.
- (55) Repeat step b. (13) and (14).

- (56) Set the FREQUENCY BAND SWITCH on the signal generator to the Band G position and rotate the signal generator tuning dial until an indication of 14.5 megacycles is obtained on the frequency and index scales.
- (57) Rotate the radio receiver TUNING control until an indication of 14.5 megacycles is obtained on the main tuning and vernier dials.
- (58) Repeat step b. (17) through (19).
- (59) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator C until a maximum indication is obtained on the multimeter.
- (60) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (61) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (62) Repeat step b. (50) through (61).
- (63) Rotate the signal generator tuning dial until an indication of 15.0 megacycles is obtained on the frequency and index scales.
- (64) Rotate the BAND CHANGE switch on the radio receiver until the indication 14.8-29.7 appears in the MEGACYCLES window.
- (65) Rotate the radio receiver TUNING control until an indication of 15.0 megacycles is obtained on the main tuning and vernier dials.
- (66) Repeat step b. (17) through (19).
- (67) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator L until a maximum indication is obtained on the multimeter.
- (68) Repeat step b. (13) and (14).
- (69) Set the FREQUENCY BAND SWITCH on the signal generator to the Band H position and also set CARRIER RANGE switch to the H position.
- (70) Rotate the signal generator tuning dial until an indication of 29.0 megacycles is obtained on the frequency and index scales.
- (71) Rotate the radio receiver TUNING control until an indication of 29.0 megacycles is obtained on the main tuning and vernier dials.
- (72) Repeat step b. (17) through (19).
- (73) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator C until a maximum indication is obtained on the multimeter.
- (74) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (75) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (76) Repeat step b. (63) through (75).
- (77) Rotate the signal generator tuning dial until an indication of 30.0 megacycles is obtained on the frequency and index scales.
- (78) Rotate the BAND CHANGE switch on the radio receiver until the indication 29.7-54.0 appears in the MEGACYCLES window.
- (79) Rotate the radio receiver TUNING control until an indication of 30.0 megacycles is obtained on the main tuning and vernier dials.

- (80) Repeat step b. (17) through (19).
- (81) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator L until a maximum indication is obtained on the multimeter.
- (82) Repeat step b. (13) and (14).
- (83) Rotate the signal generator tuning dial until an indication of 26.0 megacycles is obtained on the frequency and index scales.
- (84) Rotate the radio receiver TUNING control until an indication of 52.0 megacycles is obtained on the main tuning and vernier dials.
- (85) Repeat step b. (17) through (19).
- (86) Refer to figure 2-3 for Radio Receiver SP-600-JX-21 or figure 2-4 for Radio Receiver SP-600-JX-17. Adjust variable-frequency oscillator C until a maximum indication is obtained on the multimeter.
- (87) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise and the MICROVOLTS control on the signal generator fully clockwise.
- (88) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (89) Repeat step b. (77) through (88) .
- (90) Rotate the RG GAIN control on the radio receiver counterclockwise to the OFF position.

c. Concluding Procedure

- (1) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (2) Disconnect the power line plug of the signal generator from the power source.
- (3) Disconnect the multimeter test leads from the radio receiver and the multimeter power line plug from the power source.
- (4) Disconnect the power line plug of the radio receiver from the power source.
- (5) Replace all the metal buttons removed from the radio receiver.
- (6) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (7) Replace the top cover of the radio receiver and tighten the four thumb screws.
- (8) Replace the radio receiver in the rack and tighten the eight holding screws to secure the receiver.
- (9) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (10) Insert the power line plug of the radio receiver into a 115-volt, 60-cycle power source.

SERVICING - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
RADIO-FREQUENCY TUNER ALIGNMENT

1. GENERAL INFORMATION

a. The purpose of this routine is to align the radio-frequency tuner assembly of Radio Receiver SP-600-JX-21 or SP-600-JX-17.

b. The approximate time required to do this routine is 2-1/2 man-hours.

c. The intermediate-frequency stages of the radio receiver must be aligned before the following routine is performed.

2. TEST EQUIPMENT REQUIRED

a. Signal Generator AN/URM-25

b. Electronic Multimeter TS-505()/U

3. MATERIAL REQUIRED

a. Screwdriver

b. Soldering iron

c. Resistor, 600-ohm, 2-watt, non-inductive

d. Resistors, 121-ohm, 1/2-watt, non-inductive, two

e. Black test lead

f. Two alligator clips

g. Connector plug PL-259

h. Connector plug UG-102/U

i. One 30-inch length of RG-22/U cable

j. One 30-inch length of RG-59/U cable

k. Alignment tool, insulated

l. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:

(1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.

(2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.

(3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.

(4) Assemble the front shell to the back shell so that both solder holes are in line.

(5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.

(6) Screw the coupling ring to the back shell.

(7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.

(8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

m. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly on the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, DIODE OUTPUT and AVC leads from their respective terminals.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals and connect a jumper between the JUMPER terminals.
- (9) Insert the power line plug of Electronic Multimeter TS-505()/U into a 115-volt, 60-cycle power source.
- (10) Connect the black test lead to the COMMON binding post on the multimeter.
- (11) Connect an alligator clip to the other end of the test lead and clip the lead to one side of the 600-ohm resistor connected between the AUDIO OUTPUT terminals.
- (12) Connect an alligator clip to the a-c probe and clip the probe to the other side of the 600-ohm resistor.
- (13) Set the RANGE switch on the multimeter to the 4V/R x 10 position.
- (14) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.
- (15) Set up signal generator AN/URM-25() to deliver an unmodulated 0.56-megacycle r-f signal. Set up signal generator AN/URM-25 as follows:

- (a) Insert the female plug of the power line in the socket located in the lower left corner of the signal generator front panel.
 - (b) Insert the male plug of the power line into a 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL and the % MODULATION control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band D position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 0.56 megacycle is obtained on the frequency and index scales.
 - (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch to the ON position and allow 15 minutes for the signal generator to warm up.
- (16) Connect the antenna test cable to the antenna input connector of the radio receiver.
- (17) Connect the antenna test cable to the signal generator as follows:
- (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (18) Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the AVC position.
- (19) Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the AVC position.
- b. Align the r-f tuner of the radio receiver as follows:
- (1) Rotate the RF GAIN control on the radio receiver fully clockwise.

WARNING

Dangerous voltages are present in the unit under test. Observe all safety precautions.

- (2) Set the MOD-CW switch on the radio receiver to the MOD position.

- (3) Set the **SELECTIVITY** switch on the radio receiver to the **3 NON-XTAL** position.
- (4) Set the **MULTIPLIER** switch on the signal generator to the **.1** position and adjust the **CARRIER CONTROL** until an indication of **100** is obtained on the signal generator output meter.
- (5) Adjust the **MICROVOLTS** control on the signal generator until an indication of **30** is obtained on the upper scale of the signal generator output meter.
- (6) Set the **MOD SELECTOR** switch on the signal generator to the **400 cycle** position.
- (7) Set the **METER READS** switch on the signal generator to the **% MOD** position and adjust the **% MODULATION** control until an indication of **30** is obtained on the lower scale of the signal generator output meter.
- (8) Set the **METER READS** switch on the signal generator to the **RF** position.
- (9) Rotate the **BAND CHANGE** switch on the radio receiver until the indication **0.54-1.35** appears in the **MEGACYCLES** window.
- (10) Rotate the radio receiver **TUNING** control until an indication of **0.56** megacycle is obtained on the main tuning and vernier dials.
- (11) Adjust the **AUDIO GAIN** control on the radio receiver until an indication of **2.45** volts is obtained on the multimeter.
- (12) Refer to figure 2-5 for Radio Receiver **SP-600-JX-21** or figure 2-6 for Radio Receiver **SP-600-JX-17**. Remove the metal caps and adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.

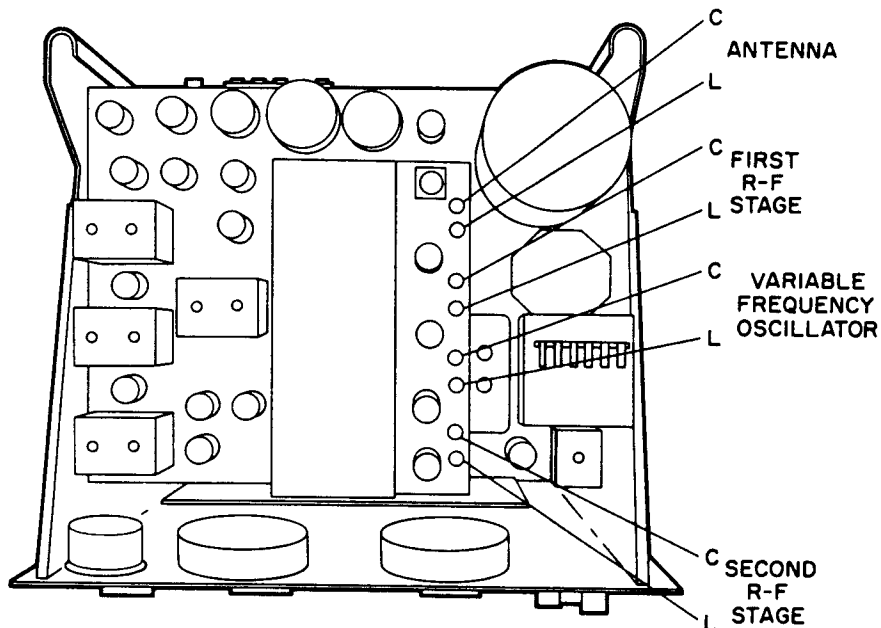


Figure 2-5. Radio Receiver SP-600-JX-21, Top View of R-F Section

- (13) Rotate the **CARRIER CONTROL** on the signal generator fully counterclockwise.
- (14) Set the **MOD SELECTOR** switch on the signal generator to the **OFF** position.
- (15) Set the **FREQUENCY BAND SWITCH** on the signal generator to the **Band E** position and rotate the signal generator tuning dial until an indication of **1.3** megacycles is obtained on the frequency and index scales.
- (16) Rotate the radio receiver **TUNING** control until an indication of **1.3** megacycles

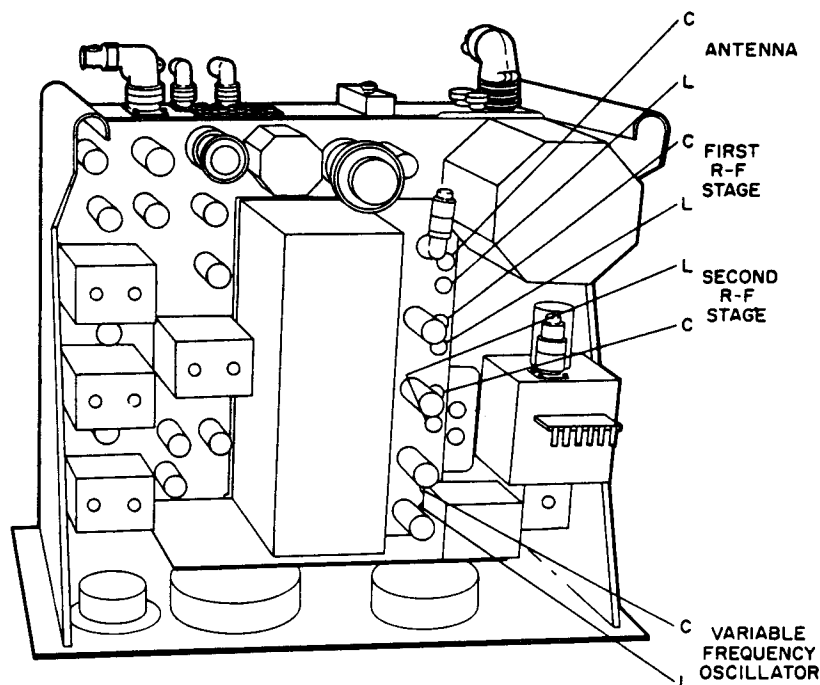


Figure 2-6. Radio Receiver SP-600-JX-17, Top View

is obtained on the main tuning and vernier dials.

- (17) Adjust the CARRIER CONTROL on the signal generator until an indication of 100 is obtained on the signal generator output meter.
- (18) Adjust the MICROVOLTS control on the signal generator until an indication of 30 is obtained on the upper scale of the signal generator output meter.
- (19) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position.
- (20) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (21) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise.
- (22) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (23) Repeat step b. (4) through (6) and (8) through (22).
- (24) Rotate the signal generator tuning dial until an indication of 1.4 megacycles is obtained on the frequency and index scales.
- (25) Rotate the BAND CHANGE switch on the radio receiver until the indication 1.35-3.45 appears in the MEGACYCLES window.
- (26) Rotate the radio receiver TUNING control until an indication of 1.4 megacycles is obtained on the main tuning and vernier dials.
- (27) Repeat step b. (17) through (19).
- (28) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.

- (29) Repeat step b. (13) and (14).
- (30) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position and rotate the signal generator tuning dial until an indication of 3.4 megacycles is obtained on the frequency and index scales.
- (31) Rotate the radio receiver TUNING control until an indication of 3.4 megacycles is obtained on the main tuning and vernier dials.
- (32) Repeat step b. (17) through (19).
- (33) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (34) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise.
- (35) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (36) Repeat step b. (24) through (35).
- (37) Rotate the signal generator tuning dial until an indication of 3.75 megacycles is obtained on the frequency and index scales.
- (38) Rotate the BAND CHANGE switch on the radio receiver until the indication 3.45-7.4 appears in the MEGACYCLES window.
- (39) Rotate the radio receiver TUNING control until an indication of 3.75 megacycles is obtained on the main tuning and vernier dials.
- (40) Repeat step b. (17) through (19).
- (41) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (42) Repeat step b. (13) and (14).
- (43) Rotate the signal generator tuning dial until an indication of 7.15 megacycles is obtained on the frequency and index scales.
- (44) Rotate the radio receiver TUNING control until an indication of 7.15 megacycles is obtained on the main tuning and vernier dials.
- (45) Repeat step b. (17) through (19).
- (46) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (47) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise.
- (48) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (49) Repeat step b. (37) through (48).
- (50) Rotate the signal generator tuning dial until an indication of 7.5 megacycles is obtained on the frequency and index scales.
- (51) Rotate the BAND CHANGE switch on the radio receiver until the indication 7.4-14.8 appears in the MEGACYCLES window.
- (52) Rotate the radio receiver TUNING control until an indication of 7.5 megacycles

is obtained on the main tuning and vernier dials.

- (53) Repeat step b. (17) through (19).
- (54) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (55) Repeat step b. (13) and (14).
- (56) Set the FREQUENCY BAND SWITCH on the signal generator to the Band G position and rotate the signal generator tuning dial until an indication of 14.5 megacycles is obtained on the frequency and index scales.
- (57) Rotate the radio receiver TUNING control until an indication of 14.5 megacycles on the main tuning and vernier dials.
- (58) Repeat step b. (17) through (19).
- (59) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (60) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise.
- (61) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (62) Repeat step b. (50) through (61).
- (63) Rotate the signal generator tuning dial until an indication of 15 megacycles is obtained on the frequency and index scales.
- (64) Rotate the BAND CHANGE switch on the radio receiver until the indication 14.8-29.7 appears in the MEGACYCLES window.
- (65) Rotate the radio receiver TUNING control until an indication of 15.0 megacycles is obtained on the main tuning and vernier dials.
- (66) Repeat step b. (17) through (19).
- (67) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (68) Repeat step b. (13) and (14).
- (69) Set the FREQUENCY BAND SWITCH on the signal generator to the Band H position and the CARRIER RANGE switch on the signal generator to the H position.
- (70) Rotate the signal generator tuning dial until an indication of 29.0 megacycles is obtained on the frequency and index scales.
- (71) Rotate the radio receiver TUNING control until an indication of 29.0 megacycles is obtained on the main tuning and vernier dials.
- (72) Repeat step b. (17) through (19).
- (73) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (74) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise.

- (75) Set the MOD SELECTION switch on the signal generator to the OFF position.
- (76) Repeat step b. (63) through (75).
- (77) Rotate the signal generator tuning dial until an indication of 30.0 megacycles is obtained on the frequency and index scales.
- (78) Rotate the BAND CHANGE switch on the radio receiver until the indication 29.7-54.0 appears in the MEGACYCLES window.
- (79) Rotate the radio receiver TUNING control until an indication of 30.0 megacycles is obtained on the main tuning and vernier dials.
- (80) Repeat step b. (17) through (19).
- (81) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator L, antenna L, first r-f stage L, and second r-f stage L until a maximum indication is obtained on the multimeter.
- (82) Repeat step b. (13) and (14).
- (83) Rotate the signal generator tuning dial until an indication of 26.0 megacycles is obtained on the frequency and index scales.
- (84) Rotate the radio receiver TUNING control until an indication of 52.0 megacycles is obtained on the main tuning and vernier dials.
- (85) Repeat step b. (17) through (19).
- (86) Refer to figure 2-5 for Radio Receiver SP-600-JX-21 or figure 2-6 for Radio Receiver SP-600-JX-17. Adjust, in turn, variable-frequency oscillator C, antenna C, first r-f stage C, and second r-f stage C until a maximum indication is obtained on the multimeter.
- (87) Rotate the CARRIER CONTROL on the signal generator fully counterclockwise.
- (88) Set the MOD SELECTOR switch on the signal generator to the OFF position.
- (89) Repeat step b. (77) through (88).
- (90) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.

c. Concluding Procedure

- (1) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (2) Disconnect the power line plug of the signal generator from the power source.
- (3) Disconnect the multimeter test leads from the radio receiver and the power line plug of the multimeter from the power source.
- (4) Disconnect the power line plug of the radio receiver from the power source.
- (5) Replace the metal buttons removed in step b. (12).
- (6) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals of the radio receiver.
- (7) Replace the top cover of the radio receiver and tighten the four thumb screws.
- (8) Replace the radio receiver in the relay rack and tighten the eight holding screws to secure the radio receiver.

- (9) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (10) Insert the power line plug of the radio receiver into the 115-volt 60-cycle power source.

SERVICING - RADIO RECEIVERS SP-600-JX-21 AND SP-600-JX-17,
TUNING METER ADJUSTMENT

1. GENERAL INFORMATION

a. The purpose of this routine is to adjust the tuning meter of Radio Receiver SP-600-JX-21 or SP-600-JX-17.

b. The approximate time required to do this routine is 1-1/2 man-hours.

2. TEST EQUIPMENT REQUIRED

a. Signal Generator AN/URM-25

b. Electronic Multimeter TS-505()/U

3. MATERIAL REQUIRED

a. Screwdriver

b. Soldering iron

c. Resistor, 600-ohm, 2-watt, non-inductive

d. Resistors, 121-ohm, 1/2-watt, non-inductive, two

e. Black test lead

f. Two alligator clips

g. Connector plug PL-259

h. Connector plug UG-102/U

i. One 30-inch length of RG-22/U cable

j. One 30-inch length of RG-59/U cable

k. Headset HS-33

l. Antenna test cable for Radio Receiver SP-600-JX-21 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-22/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from both conductors and tin the exposed conductors and braid.
- (3) Disassemble the connector plug, UG-102/U, and slide the coupling ring on the cable. Screw the back shell to the cable, aligning the solder hole with the conductors.
- (4) Assemble the front shell to the back shell so that both solder holes are in line.
- (5) Solder the braid to the shells through the solder holes and solder the conductors to the contacts.
- (6) Screw the coupling ring to the back shell.
- (7) Strip 5/8 inch of insulation from the center conductors on the other end of the cable.
- (8) Solder a 121-ohm, 1/2-watt resistor between the two conductors.

m. Antenna test cable for Radio Receiver SP-600-JX-17 fabricated as follows:

- (1) Remove 1-1/8 inches of outer insulation from both ends of the RG-59/U cable and cut the braid back 3/4 inch.
- (2) Strip 5/8 inch of insulation from the center conductor and tin the exposed conductor and braid.
- (3) Disassemble the connector plug, PL-259, and slide the coupling ring on the cable. Screw the plug subassembly to the cable.
- (4) Solder the braid to the assembly through the solder hole and solder the center conductor to the contact.
- (5) Screw the coupling ring to the plug subassembly.
- (6) Unravel the exposed braid at the other end of the cable and twist it to form a lead. Strip 5/8 inch of insulation from the center conductor.
- (7) Solder a 121-ohm, 1/2-watt resistor between the center conductor and the braid.

4. PROCEDURE

a. Preliminary Procedure

- (1) Disconnect the power line plug of the radio receiver from the power source.
- (2) Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
- (3) Disconnect the antenna cable from the antenna input connector.
- (4) Disconnect the BFO, IFO, GND, DIODE OUTPUT, and AVC leads from their respective terminals.
- (5) Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
- (6) Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
- (7) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.
- (8) Connect the 600-ohm, 2-watt resistor between the AUDIO OUTPUT terminals and connect a jumper between the JUMPER terminals on the radio receiver.
- (9) Set up Signal Generator AN/URM-25() to deliver an unmodulated 2-megacycle r-f signal. Set up Signal Generator AN/URM-25 as follows:
 - (a) Insert the female plug of the power line into the socket located in the lower left corner of the signal generator front panel.
 - (b) Insert the male plug of the power line into the 115-volt, 60-cycle power source.
 - (c) Rotate the CARRIER CONTROL and the % MODULATION control on the signal generator fully counterclockwise.
 - (d) Set the FREQUENCY BAND SWITCH on the signal generator to the Band F position.
 - (e) Set the CARRIER RANGE switch on the signal generator to the DEFG position.
 - (f) Rotate the signal generator tuning dial until an indication of 2 megacycles is obtained on the frequency and index scales.

- (g) Set the MOD SELECTOR switch on the signal generator to the OFF position.
 - (h) Set the METER READS switch on the signal generator to the RF position.
 - (i) Set the POWER ON-OFF switch on the signal generator to the ON position and allow 15 minutes for the signal generator to warm up.
- (10) Connect the antenna test cable to the antenna input connector of the radio receiver.
- (11) Connect the antenna test cable to the signal generator as follows:
- (a) Connect one end of the 121-ohm resistor to the center contact of the signal generator X·MULT RF OUTPUT jack.
 - (b) Connect the other end of the 121-ohm resistor to ground terminal G.
- (12) Set up Radio Receiver SP-600-JX-21 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the FREQ CONTROL switch to the VFO position.
 - (c) Set the LIMITER-OFF switch to the OFF position.
 - (d) Set the AVC-MAN switch to the AVC position.
- (13) Set up Radio Receiver SP-600-JX-17 for the reception of an amplitude-modulated signal as follows:
- (a) Set the SEND-REC switch to the REC position.
 - (b) Set the IFO switch to the INT position.
 - (c) Set the HFO switch to the VAR position.
 - (d) Set the LIMITER-OFF switch to the OFF position.
 - (e) Set the AVC-MAN switch to the AVC position.
- b.** Adjust the METER ADJ RF control on the radio receiver as follows:
- (1) Rotate the RF GAIN control on the radio receiver fully clockwise.
 - (2) Set the MOD-CW switch on the radio receiver to the MOD position.
 - (3) If the adjustment is being performed on Radio Receiver SP-600-JX-17 set the BFO-AVC switch to the INT BFO- FAST position.
 - (4) Set the METER switch on the radio receiver to the RF position.
 - (5) Rotate the MICROVOLTS control on the signal generator fully clockwise.
 - (6) Set the MULTIPLIER switch on the signal generator to the .1 position and adjust the CARRIER CONTROL until an indication of 100 is obtained on the signal generator output meter.
 - (7) Set the SELECTIVITY switch on the radio receiver to the 3 NON-XTAL position.
 - (8) Set the MOD SELECTOR switch on the signal generator to the 400 cycle position and the METER READS switch to the % MOD position.
 - (9) Adjust the % MODULATION control on the signal generator until an indication of 30 is obtained on the lower scale of the signal generator output meter.
 - (10) Set the METER READS switch on the signal generator to the RF position.

- (11) Rotate the BAND CHANGE switch on the radio receiver until the indication 1. 35-3. 45 appears in the MEGACYCLES window.
- (12) Rotate the radio receiver TUNING control until an indication of 2 megacycles is obtained on the main tuning and vernier dials on the front panel.
- (13) Adjust the signal generator tuning dial until a maximum indication is obtained on the radio receiver tuning meter.
- (14) Adjust the METER ADJ RF control in the radio receiver until an indication of 20 db is obtained on the radio receiver tuning meter.
- (15) Rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.
- (16) Insert the power line plug of Electronic Multimeter TS-505()/U into the 115-volt, 60-cycle power source.
- (17) Connect the black test lead to the COMMON binding post of the multimeter.
- (18) Connect an alligator clip to the other end of the black test lead and clip the lead to one side of the 600-ohm resistor connected between the AUDIO OUTPUT terminals on the rear of the radio receiver.
- (19) Connect an alligator clip to the a-c probe and clip the probe to the other side of the 600-ohm resistor.
- (20) Set the RANGE switch on the multimeter to the 2V/R x 1 position.
- (21) Set the FUNCTION switch on the multimeter to the A. C. position and allow 3 minutes for the multimeter to warm up.
- (22) Rotate the AUDIO GAIN control on the radio receiver fully counterclockwise to the 10 position.
- (23) Rotate the RF GAIN control on the radio receiver fully clockwise to the 10 position.
- (24) Hold the METER switch in the AF position. Adjust the AUDIO GAIN control until an indication of 1. 9 volts is obtained on the multimeter. Adjust the METER ADJ AF control on the radio receiver until an indication of 0 db is obtained on the radio receiver tuning meter.
- (25) Release the METER switch and rotate the RF GAIN control on the radio receiver counterclockwise to the OFF position.

c. Concluding Procedure

- (1) Set the signal generator POWER ON-OFF switch to the OFF position and disconnect the antenna test cable from the radio receiver.
- (2) Disconnect the power line plug of the signal generator from the power source.
- (3) Disconnect the electronic multimeter test leads from the radio receiver and the power line plug of the multimeter from the power source.
- (4) Disconnect the power line plug of the receiver from the power source.
- (5) Remove the 600-ohm resistor from the AUDIO OUTPUT terminals on the radio receiver.
- (6) Replace the top cover of the radio receiver and tighten the four thumb screws.
- (7) Replace the radio receiver in the relay rack and tighten the eight holding screws to secure the radio receiver.

- (8) Connect all the cables and wires to their respective terminals on the rear of the radio receiver.
- (9) Insert the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

CLEANING AND INSPECTION - RADIO RECEIVERS SP-600-JX-21
AND SP-600-JX-17, 750-HOUR INSPECTION

1. GENERAL INFORMATION
 - a. The purpose of this routine is to clean and inspect the chassis and component parts of Radio Receiver SP-600-JX-21 or SP-600-JX-17.
 - b. The approximate time required to do this routine is 1 man-hour.
 - c. Report all defective items to the maintenance supervisor.
2. TEST EQUIPMENT REQUIRED
 - a. None
3. MATERIAL REQUIRED
 - a. Screwdriver
 - b. Clean, lint-free cloths
 - c. Brush, dry, 1 inch wide
 - d. No. 0000 sandpaper
 - e. Solvent, cleaning, trichlorethylene, MIL-T-7003
 - f. Vacuum cleaner
4. PROCEDURE
 - a. Rotate the RF GAIN control on the radio receiver to the OFF position.
 - b. Disconnect the power line plug of the radio receiver from the power source.
 - c. Disconnect the antenna cable from the antenna input connector.
 - d. Disconnect the loudspeaker from the AUDIO OUTPUT terminals.
 - e. Disconnect the BFO, IFO, RF, GND, DIODE OUTPUT and AVC connections from their terminals.
 - f. Remove the eight screws holding the radio receiver in the relay rack and remove the receiver from the rack.
 - g. Loosen the four thumb screws holding the top cover to the radio receiver and remove the cover.
 - h. Set the radio receiver on its side and remove the seven machine screws holding the bottom plate to the radio receiver. Remove the bottom plate.
 - i. Clean and inspect the radio receiver as follows:
 - (1) Clean the windows with lint-free cloths.
 - (2) Brush the dust from all front panel controls.
 - (3) Use a vacuum cleaner or dust brush to remove dust and dirt from the chassis.
 - (4) Moisten a lint-free cloth with solvent and wipe the radio receiver free of dirt and grease.

- (5) Remove all traces of rust and corrosion on metal parts with No. 0000 sandpaper.
 - (6) Inspect the tube and crystal sockets and pins for loose contacts, dirt, and corrosion.
 - (7) Inspect the tubes for loose envelopes and proper seating in sockets.
 - (8) Inspect all fixed capacitors for leakage, bulging, and discoloration.
 - (9) Inspect all variable capacitors for bent or damaged plates, tightness of mounting, dirt, and moisture.
 - (10) Inspect all resistors, bushings, and insulators for cracks, chipping, blistering, discoloration, and dirt or moisture.
 - (11) Inspect the terminals of wire-wound resistors and fixed capacitors for loose connections and loose or broken lugs.
 - (12) Inspect the switches, transformers, chokes, potentiometers, and terminal boards for tightness of mountings.
 - (13) Inspect the BAND CHANGE control for bent or broken "V" contacts.
 - (14) Inspect the terminal boards for loose terminals, cracks and breaks.
 - (15) Inspect the power transformer and the audio output transformer for loose mounting and overheating.
- j. Replace the bottom plate on the radio receiver and tighten the seven machine screws.
 - k. Replace the top cover on the radio receiver and tighten the four thumb screws.
 - l. Replace the radio receiver in the relay rack and tighten the eight holding screws to secure the radio receiver.
 - m. Connect all cables and wires to their respective terminals on the rear of the radio receiver.
 - n. Connect the power line plug of the radio receiver into the 115-volt, 60-cycle power source.

Original Routines 3.1(1) and 3.2(1)
deleted

Original Routine 3.3(1) changed to
Routine 3.1(1)