

**TL MICROWAVE RADIO
ORDER WIRE AND ALARM
LEVEL AND FREQUENCY ADJUSTMENTS**

The tests and adjustments listed in this section cover the order wire and alarm circuits at TL radio stations as well as at the order-wire and alarm control station. All tests and adjustments in this section can be performed without disrupting message transmission although the order wire circuit is disabled during some of the tests. The tests should be made when no alarm conditions exist on the system. No telephone headsets at any station should be plugged in during these tests unless specified.

APPARATUS:

- J99262AA Portable TL Test Set
- KS-14510, List 1 Volt-ohm-milliammeter
- 262B Terminating Plug

STEP	PROCEDURE
CONTROL PANEL FILAMENT VOLTAGE ADJUSTMENT	
	<i>Note:</i> Steps 1 through 5 need be performed only on initial installation or at such time as adjustment is needed.
1	Set the KS-14510, List 1 volt-ohm-milliammeter to the 60-volt dc scale.
2	Connect the positive voltmeter lead to pin 9 on the V1 tube socket and the negative lead to pin 1 on the V1 tube socket.
3	Adjust the V1 FIL ADJ potentiometer until the meter indicates 40 volts.
4	With the KS-14510, List 1 volt-ohm-milliammeter still on the 60-volt dc scale, connect the positive lead from the meter to pin 4 on the V2 tube socket and the negative lead to pin 3 on the V2 tube socket.
5	Adjust the V2 FIL ADJ potentiometer until the meter indicates 20 volts.
OSCILLATOR LEVEL ADJUSTMENT	
6	Set the input selector of the TL test set for a 600-ohm terminating measurement.
7	Connect the TL test set voltmeter to the EQUIP OUT jack on the control panel.
8	Adjust the OSC OUT potentiometer on the control panel fully clockwise.
9	Adjust the OSC LEVEL potentiometer until the voltmeter indicates 0 dbm.
10	Turn the OSC OUT potentiometer counterclockwise until the voltmeter indicates -7 dbm.

STEP	PROCEDURE
2600-CPS PILOT FREQUENCY ADJUSTMENT	
11	Set the KS-14510, List 1 volt-ohm-milliammeter to the 12-ma scale and connect the meter to the RC jack on the control panel.
12	Adjust the 2600-cps trimming capacitor C20 until maximum current is indicated on the meter.
13	Disconnect the voltmeter from the circuit.
INTERROGATION FREQUENCY ADJUSTMENT	
14	Set the input selector of the TL test set for a 600-ohm terminating measurement, and connect the TL test set voltmeter to the REC AMPL OUT jack on the control panel.
15	Depress the first station key and, while this key is depressed, adjust the 700-cps trimming capacitor C9 for a maximum meter indication. <i>Note:</i> This is a measurement of the level of the interrogation tone after it has been transmitted through the interrogation loop. By adjusting the frequency of the tone for a maximum meter indication, the frequency of the tone is matched to the minimum loss point of the interrogation bandpass filter at the first station.
16	Release the first station key and depress the second key. While this key is depressed, adjust the 850-cps trimming capacitor C10 for a maximum meter indication.
17	Follow the procedure of Steps 15 and 16 for each station tone used on the system.
DETECTOR SENSITIVITY ADJUSTMENT	
18	Set the input selector of the TL test set for a 600-ohm terminating measurement and connect the test set voltmeter to the EQUIP OUT jack on the control panel. Adjust the OSC OUT potentiometer until the voltmeter indicates -9 dbm.
19	Remove the voltmeter and connect between the EQUIP OUT jack and the MON DET IN jack on the control panel.
20	Insert a 262B 600-ohm terminating plug in the REC AMPL OUT jack.
21	Turn the DET SENS potentiometer fully clockwise.
22	Slowly turn the DET SENS potentiometer counterclockwise until the PILOT lamp is extinguished. Repeat the procedure of lighting and extinguishing the PILOT lamp until the DET SENS potentiometer is at a point where the pilot lamp just goes out. <i>Note:</i> If the DET SENS potentiometer does not have enough range to perform Steps 20 and 21, check the adjustment of relay K5 per Section 040-267-701.
23	Remove the cord between the EQUIP OUT jack and the MON DET IN jack and remove the terminating plug from the REC AMPL OUT jack.
24	Repeat Steps 6, 7, and 10.
TRANSMITTING AMPLIFIER GAIN ADJUSTMENT	
25	Set the oscillator on the TL test set for a 0-dbm 2.6-kc output in accordance with Section 104-440-300.
26	Connect between the TRANS AMPL IN jack on the control panel and the OSC OUT jack on the test set.

STEP	PROCEDURE																												
27	Connect between the EQUIP OUT jack on the control panel and the VM IN jack on the test set arranged for a 600-ohm terminating measurement.																												
28	<p>With the OSC CHK key depressed, adjust the gain of the TRANS AMPL per Table A until the voltmeter indicates +6.5 dbm.</p> <table border="1" data-bbox="636 466 1302 877"> <thead> <tr> <th colspan="4" data-bbox="636 466 1302 531">TABLE A</th> </tr> <tr> <th colspan="4" data-bbox="636 531 1302 617">Screw Adjustments for Various Manual Gain Adjustment Ranges on the 227B Amplifier</th> </tr> <tr> <th data-bbox="636 617 854 667">RANGE</th> <th colspan="3" data-bbox="854 617 1302 667">NETWORK SCREW POSITIONS</th> </tr> <tr> <th data-bbox="636 667 854 718">db</th> <th data-bbox="854 667 1024 718">S1</th> <th data-bbox="1024 667 1166 718">S2</th> <th data-bbox="1166 667 1302 718">S3</th> </tr> </thead> <tbody> <tr> <td data-bbox="636 718 854 768">21 to 35</td> <td data-bbox="854 718 1024 768">Closed</td> <td data-bbox="1024 718 1166 768">Open</td> <td data-bbox="1166 718 1302 768">Closed</td> </tr> <tr> <td data-bbox="636 768 854 819">10 to 24</td> <td data-bbox="854 768 1024 819">Open</td> <td data-bbox="1024 768 1166 819">Open</td> <td data-bbox="1166 768 1302 819">Closed</td> </tr> <tr> <td data-bbox="636 819 854 877">-1 to 13</td> <td data-bbox="854 819 1024 877">Open</td> <td data-bbox="1024 819 1166 877">Closed</td> <td data-bbox="1166 819 1302 877">Open</td> </tr> </tbody> </table>	TABLE A				Screw Adjustments for Various Manual Gain Adjustment Ranges on the 227B Amplifier				RANGE	NETWORK SCREW POSITIONS			db	S1	S2	S3	21 to 35	Closed	Open	Closed	10 to 24	Open	Open	Closed	-1 to 13	Open	Closed	Open
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29	<p>Release the OSC CHK key and remove the TL test set from the circuit.</p> <p style="text-align: center;">ALARM INDICATING CIRCUIT CHECK</p>																												
30	<p>Insert a 262B terminating plug in the REC AMPL OUT jack on the control panel. Observe the following:</p> <ul style="list-style-type: none"> (a) PILOT lamp is extinguished. (b) After approximately 35 seconds, the ALM lamp is lighted and the office alarm is sounded. <p><i>Note:</i> If the above observations cannot be made, check the adjustment of relay K5 in accordance with Section 040-267-701. If this relay meets its requirements and the observations cannot be made, replace thermal relay K3.</p>																												
31	<p>Depress and hold down the ACO key, remove the terminating plug, and observe that the PILOT lamp is lighted and the ALM lamp is extinguished.</p> <p style="text-align: center;">CHECK OF ORDER-WIRE LEVELS AT THE NEAR-TERMINAL RADIO STATION</p>																												
32	<p>On initial installation, choose the A pad at the near-terminal radio station in accordance with Note 105 on SD-97041-01, D1.</p> <p><i>Note:</i> The A pad is used to compensate for the length of the connecting facility between the order-wire and alarm control panel and the near-terminal radio station. The level of the 2600-cps tone at the output of the control panel is -7 dbm, and this tone must be at a level of -22 dbm at the output of the A pad.</p>																												
33	Set the input selector on the TL test set for a 600-ohm bridging measurement.																												
34	Connect between the OW OUT jack on the order-wire panel at the near-terminal transmitter-receiver bay to the VM IN jack on the TL test set.																												

STEP	PROCEDURE
35	<p>Contact the attendant at the control station via the order wire circuit and have him adjust the OSC OUT potentiometer until the voltmeter indicates -33.5 dbm.</p> <p><i>Note:</i> Be sure that voice on the order wire circuit does not interfere with the meter indication.</p>
36	<p>The attendant at the control station should now repeat Steps 6 and 7. The level at the EQUIP OUT jack should be measured and recorded for future reference.</p>
	<p style="text-align: center;">ALIGNMENT OF THE RETURN VOICE-FREQUENCY (VF) TRANSMISSION PATH</p> <p><i>Note 1:</i> Before proceeding with the rest of the steps in this section, the requirements stated in Section 409-303-501 concerning system alignment must be met.</p> <p><i>Note 2:</i> In Steps 40 and 45, it is assumed that the level at the OW IN jack is -22 dbm on the rear end terminal. The level at the REC AMPL OUT jack on the control panel must reflect any deviation from the -22 dbm level at the OW IN jack on the near-terminal order-wire and alarm panel. When setting the gain of the amplifiers in the VF line from the near terminal to the control panel, remember that if the level at the OW IN jack is 1-db low, the level at the REC AMPL OUT jack must be 1 db below the normal level.</p>
37	<p>Set the input selector on the TL test set for a 600-ohm bridging measurement, and connect from the OW IN jack on the near-terminal order-wire panel to the VM IN jack on the TL test set.</p> <p><i>Note 1:</i> The nominal level of 2600-cps tone at the OW IN jack is -22 dbm, but this level may vary in accordance with the variations of net loss of the radio system as stated in Section 409-303-501.</p> <p><i>Note 2:</i> Steps 38 and 41 are to be performed on systems which do not employ a receiving amplifier at the order-wire and alarm control station.</p>
38	<p>Set the input selector on the TL test set for a 600-ohm bridging measurement, and connect between the MON DET IN jack on the control panel and the VM IN jack on the TL test set.</p>
39	<p>A craftsman at the near-terminal radio station must contact the attendant at the control station via the order wire circuit.</p>
40	<p>The gain of the A amplifier at the near-terminal radio station must be adjusted in accordance with Table A until the voltmeter at the control station reads 0 dbm.</p>
41	<p>Disconnect the TL test set from the circuit.</p> <p><i>Note:</i> Steps 42 through 46 are to be performed at stations employing a receiving amplifier at the control station.</p>
42	<p>Set the input selector on the TL test set for a 600-ohm bridging measurement and connect the P2DG cord to the voltmeter jack on the test set. Remove the leads from terminals 18 and 19 of TSA (TSA is located on the bay framework to the left of the radio equipment). Holding the pins of the P2DG cord against the screws of terminals 18 and 19 of TSA, adjust the A AMPL on the order-wire panel until the voltmeter indicates -4 dbm.</p>
43	<p>Reconnect the leads to terminals 18 and 19 of TSA which were disconnected in Step 42.</p>

STEP	PROCEDURE
44	At the order-wire and alarm control station, set the input selector of the TL test set for a 600-ohm terminating measurement and connect from the VM IN jack on the test set to the REC AMPL OUT jack on the control panel.
45	Adjust the gain of the REC AMPL until the voltmeter indicates 0 dbm.
46	Remove the TL test set from the circuit. <i>Note:</i> On initial installation the calibration procedure associated with trouble location by net loss measurement of interrogation tones as stated in Section 409-303-501 should be made at this time.