

TD-3 MICROWAVE RADIO
J68386A AND J68386B TRANSMITTER-RECEIVER BAYS
TRANSMITTER TESTS
J86835A TRAVELING WAVE TUBE POWER SUPPLY TESTS
AND TWT AMPLIFIER REPLACEMENT PROCEDURE

This section is reissued to modify procedures for TWT amplifier replacement. This reissue does not affect the Equipment Test List.

The J86835A traveling wave tube power supply consists of two plug-in subassemblies: the J86835B inverter and heater regulator section, and the J86835C rectifiers and helix regulator section, mounted in a steel case.

Caution: During manufacture, the J86835B and J86835C sections are tested as a mated pair, serialized, and shipped together with the intent of being operated as a mated pair. However, it has been determined that the sections may be operated as mismatched pairs provided the requirements of Chart 1 are satisfied.

The J86835D test load is used during tests to simulate the load presented by the traveling wave tube to the power supply. During regular operation, only the J86835B and J86835C sections are mounted in the steel case. The J86835D test load is mounted on the steel case for tests only.

Warning: Voltages inside this power supply are much higher than those usually encountered in telephone power plants. Avoid contact with terminals.

The routine tests are performed at the transmitter site and use only the built-in meters on the rectifiers and helix regulator panel and the test load panel.

CHART	PAGE
1—J86835A Traveling Wave Tube Power Supply Tests	1
2—TWT Amplifier Replacement Procedure	6

CHART 1
J86835A TRAVELING WAVE TUBE POWER SUPPLY TESTS

APPARATUS:

KS-14510, List 1 Volt-Ohm-Milliammeter

CHART 1 (Cont)

STEP	PROCEDURE
	<p>Caution: These are performed on an out-of-service basis. Obtain a release from the designated control office and remove the channel from service as designated by local practice.</p>
1	Operate INPUT circuit breaker CB1 to the OFF position.
2	Remove the inverter and regulator section (left unit) from the power supply steel case.
	<p>Caution: Remove the unit slowly to prevent accidentally dropping it.</p>
3	Disconnect the power connection from the traveling wave tube by loosening the two captive screws and unplugging the connector. Mount the test load on the steel case by means of the mountings provided on top of the steel case, and connect the power connector to the receptacle on the test load.
4	Check that the pointer on relay K1 (in the inverter and regulator section) is set at 180 seconds and that the voltage selector switch (S1) on the test load is in the OFF position.
5	Replace the inverter and heater regulator section in the steel case.
6	Rotate the ANODE VOLTAGE ADJUST and HELIX ADJUST controls to their approximate midrange position.
7	Operate the INPUT circuit breaker to the ON position.
	<p>Requirement: The TWT WARM-UP lamp shall light and the HEATER VOLTAGE meter on the test load shall indicate between 8.8 and 9.6 volts. After 180 ± 25 seconds, the TWT WARM-UP lamp shall be extinguished and the HEATER VOLTAGE meter shall indicate between 7.4 and 7.6 volts.</p>
	<p>If the TWT WARM-UP lamp does not light, check the interlock path in accordance with SD-81660-01 and also check the TWT WARM-UP lamp. If the heater voltage is incorrect, proceed with Step 8. If all requirements are met, proceed to Step 18.</p>
8	Connect the KS-14510 meter to the INPUT VOLTAGE jacks.
	<p>Requirement: Battery power plants with a nominal voltage of 24 volts at the battery: between 21.2 and 25.6 volts. Battery power plants with a nominal voltage of 26 volts at the battery: between 23.3 and 27.7 volts.</p>
9	Disconnect the KS-14510 meter.
10	If the requirement in Step 8 is not met, the trouble is in the battery power plant and/or the distribution system. If the requirement of Step 8 is met, proceed to Step 11 for inverter and heater regulator units that have a HEATER ADJUST control on the front panel, or to Steps 12 through 16 for inverter and heater regulator units that do not have a front panel adjustment.

CHART 1 (Cont)

STEP	PROCEDURE						
11	<p>Adjust the HEATER ADJUST control to obtain, as close as possible, 7.5 volts. If the requirement is met, proceed to Step 18; otherwise, proceed to Step 17.</p> <p>Note: Clockwise rotation raises the heater voltage; counterclockwise rotation lowers the voltage.</p>						
12	Operate the INPUT circuit breaker to the OFF position.						
13	Pull the inverter and heater regulator section out of the enclosure far enough to expose the shaft of R13 (heater voltage adjust potentiometer).						
14	<p>Adjust R13 a small amount to raise or lower the heater voltage, as required.</p> <p>Note: Rotating R13 in the clockwise direction raises the heater voltage, and rotating it in the counterclockwise direction lowers the heater voltage.</p>						
15	Push the inverter and heater regulator section back into the enclosure.						
16	Operate the INPUT circuit breaker to the ON position. The TWT WARM-UP lamp should light; and, after 180 seconds, it should extinguish. The HEATER VOLTAGE meter on the test load should indicate 7.5 ± 0.1 volts. If the HEATER VOLTAGE meter does not indicate 7.5 ± 0.1 volts, repeat Steps 12 through 16 until the proper indication is obtained with the objective of obtaining, as close as possible, 7.5 volts. If the requirement is met, proceed to Step 18; otherwise, proceed with Step 17.						
17	<p>If the requirements of Step 11 or 16 cannot be met after using the adjustment procedure or if the requirements of Steps 18 through 26 cannot be met, replace the J86835B and J86835C plug-in units with a spare pair of matched units and repeat all required steps in this section.</p> <p>Note 1: Perform the following visual check on the spare units before inserting them into the steel case.</p> <p>Check: Locate transformer T5 in the J86835B rectifiers and helix regulator section. The B lead must be connected to the tap in accordance with the following table:</p>						
	<table border="1"> <thead> <tr> <th>NOMINAL VOLTAGE OF BATTERY POWER PLANT</th> <th>CONNECT B LEAD TO</th> </tr> </thead> <tbody> <tr> <td>24V</td> <td>Tap 11 of T5</td> </tr> <tr> <td>26V</td> <td>Tap 10 of T5</td> </tr> </tbody> </table>	NOMINAL VOLTAGE OF BATTERY POWER PLANT	CONNECT B LEAD TO	24V	Tap 11 of T5	26V	Tap 10 of T5
NOMINAL VOLTAGE OF BATTERY POWER PLANT	CONNECT B LEAD TO						
24V	Tap 11 of T5						
26V	Tap 10 of T5						

CHART 1 (Cont)

STEP	PROCEDURE
18	<p>Set the VOLTAGE SELECTOR switch to COLLECTOR.</p> <p>Requirement: Battery power plants having a nominal voltage of 24 volts at the battery: between 134 and 152 volts. Battery power plants having a nominal voltage of 26 volts at the battery: between 136 and 150 volts.</p> <p>Note: When the VOLTAGE SELECTOR switch is in the COLLECTOR position, the actual voltage (collector with respect to cathode) is the VOLTAGE MONITOR indication multiplied by 10.</p>
19	<p>Set the VOLTAGE SELECTOR switch to the HELIX 0.6 MA position and adjust the HELIX ADJUST control until the VOLTAGE MONITOR meter indicates 135 volts.</p> <p>Requirement: The HELIX CURRENT meter on the test load shall indicate between 0.57 and 0.63 mA, and the HELIX CURRENT meter on the rectifiers and helix regulator section shall indicate between 0.3 and 0.9 mA.</p>
20	<p>With the VOLTAGE SELECTOR switch in the HELIX 0.6 MA position, rotate the HELIX ADJUST control through its range.</p> <p>Requirement: The VOLTAGE MONITOR meter shall indicate from 122 volts to 148 volts.</p> <p>Note: When the VOLTAGE SELECTOR switch is in the HELIX 0.6 MA position, the actual voltage (helix with respect to cathode) is the VOLTAGE MONITOR indication multiplied by 20.</p>
21	<p>With the VOLTAGE SELECTOR switch in the HELIX 0.6 MA position, adjust the HELIX ADJUST control for an indication of 135 volts on the VOLTAGE MONITOR meter.</p>
22	<p>Set the VOLTAGE SELECTOR switch to the HELIX 6 MA or HELIX 10 MA position, whichever appears on the VOLTAGE SELECTOR.</p> <p>Note 1: On some of the earlier models of the test load, the position marked HELIX 10 MA indicates that the internal loads of this test load draw approximately 10 mA of helix current. On later models of the test load, the position is marked HELIX 6 MA and indicates that this test load will draw approximately 6 mA of helix current.</p> <p>Requirement: For units marked HELIX 10 MA, the VOLTAGE MONITOR meter shall indicate between 130 and 140 volts. For units marked HELIX 6 MA, the VOLTAGE MONITOR meter shall indicate between 134.5 and 135.5 volts.</p> <p>Note 2: In the HELIX 10 MA or HELIX 6 MA position of the VOLTAGE SELECTOR switch, the actual voltage is the voltage (helix with respect to cathode) indicated by the VOLTAGE MONITOR meter multiplied by 20.</p>

CHART 1 (Cont)	
STEP	PROCEDURE
	<p>Note 3: On units marked HELIX 10 MA, the CATHODE CURRENT meter on the test load and the CATHODE CURRENT meter on the rectifiers and helix regulator section will indicate beyond full scale. No damage will occur when these meters indicate beyond full scale.</p>
23	<p>With the VOLTAGE SELECTOR switch in the HELIX 10 MA or HELIX 6 MA position, rotate the HELIX ADJUST control through its range.</p> <p>Requirement: The VOLTAGE MONITOR meter shall indicate from 122 volts to 148 volts.</p>
24	<p>Set the VOLTAGE SELECTOR switch to the HELIX 0.6 MA position, and adjust the HELIX ADJUST control until the VOLTAGE MONITOR meter indicates 135 volts.</p>
25	<p>Set the VOLTAGE SELECTOR switch to the ANODE position, and adjust the ANODE VOLTAGE ADJUST control for an indication of 150 volts on the VOLTAGE meter.</p> <p>Requirement 1: The ANODE TO CATHODE VOLTAGE meter on the rectifiers and helix regulator section shall indicate between 2.85 and 3.15 kV.</p> <p>Requirement 2: The CATHODE CURRENT meter on the test load shall indicate between 38.2 and 46.4 mA. The CATHODE CURRENT meter on the rectifiers and helix regulator section shall indicate within ± 2 mA of the indication on the test load CATHODE CURRENT meter.</p> <p>Note: When the VOLTAGE SELECTOR switch is in the ANODE position, the actual voltage is the VOLTAGE MONITOR meter indication multiplied by 20.</p>
26	<p>With the VOLTAGE SELECTOR switch in the ANODE position, perform the following.</p> <p>(a) Set the ANODE VOLTAGE ADJUST control to its maximum counterclockwise position.</p> <p>Requirement: The VOLTAGE MONITOR meter shall indicate not less than 136 volts.</p> <p>(b) Set the ANODE VOLTAGE ADJUST control to its maximum clockwise position.</p> <p>Requirement: The VOLTAGE MONITOR meter shall indicate at least 162 volts.</p> <p>(c) Adjust the ANODE VOLTAGE ADJUST control until the VOLTAGE MONITOR meter indicates 150 volts.</p>
27	<p>If the requirements in Steps 18 through 26 cannot be met, see Step 17. Otherwise, proceed to Step 28.</p>
28	<p>Set the VOLTAGE SELECTOR switch on the test load to the OFF position.</p>
29	<p>Set the INPUT circuit breaker on the inverter and heater regulator section to the OFF position.</p>

CHART 1 (Cont)	
STEP	PROCEDURE
30	<p>Remove the inverter and heater regulator section from the steel case.</p> <p>Caution: Remove the unit slowly to prevent accidentally dropping it.</p> <p>Disconnect the power connector and remove the test load. Reconnect the power connector to the traveling wave tube and insert the inverter and heater regulator section into the steel case.</p>
31	<p>The power supply is now ready to furnish power to the TWT. Refer to Section 411-406-501 for the power supply adjustment procedure.</p>
CHART 2	
TWT AMPLIFIER REPLACEMENT PROCEDURE	
STEP	PROCEDURE
1	<p>If the tests of Section 411-406-501 indicate replacement of the TWT amplifier, turn the TWT power supply INPUT circuit breaker to the OFF position.</p>
2	<p>Remove the INVERTER and HEATER REGULATOR UNIT from the power supply. Reach inside the opening, and unscrew and disconnect the plug from the amplifier.</p>
3	<p>Remove the eight screws from each waveguide transformer, MT1 and MT2 (a 32A and 21A transformer, respectively), at the amplifier waveguide ports.</p>
4	<p>Using a 5/8-inch nut driver, supplied as a special tool, remove the two nuts from the front of the amplifier. The amplifier is now mechanically free.</p>
5	<p>Slide the amplifier off the two studs by pulling it toward the front of the bay.</p>
6	<p>Prepare the replacement amplifier by removing the protective covers from the waveguide ports. Liberally coat the two heat sink mating surfaces on the rear of the amplifier with G641 Insulgrease (supplied in accordance with ED-50514, spare parts, special tools, etc).</p>
7	<p>Slide the replacement amplifier onto the two studs and replace the two 5/8-inch nuts. Reconnect the two transformers to the top of the amplifier.</p>
8	<p>Reconnect the plug from the power supply to the amplifier and insert the INVERTER and HEATER REGULATOR unit.</p>
9	<p>Present the ANODE VOLTAGE ADJUST control to a maximum counterclockwise position, and the HELIX ADJUST control to midrange. Turn ON the INPUT circuit breaker on the power supply. Repeat Chart 5 in Section 411-406-501 for the adjustment procedure.</p>