
TD-3 MICROWAVE RADIO
J68386G AND J68386H TRANSMITTER-RECEIVER BAYS
TRANSMITTER TESTS
IF RETURN LOSS MEASUREMENTS

This section describes the procedures for measuring the return loss of the various IF units in the transmitter portion of the radio bay.

The preliminary checks in Section 411-502-500 should be completed before performing the tests in this section.

The recommended maintenance interval for these tests is given in the Equipment Test List.

This section is reissued to add a caution to be observed when working on a system equipped with Hot Standby/Space Diversity Switching.

This reissue does not affect the Equipment Test List.

Caution 1: *These tests are performed on an out-of-service basis. Obtain a release from the designated control office and remove the channel from service as directed by local practice.*

Caution 2: *On Hot Standby/Space Diversity equipped bays, consult Section 411-600-500 for forced switching procedures to remove service from the desired transmitter. Exercise extra caution during tests since the receiver in this bay may be carrying service.*

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2—IF Driver Amplifier	5

CHART 1

IF LIMITER-CARRIER RESUPPLY

APPARATUS:

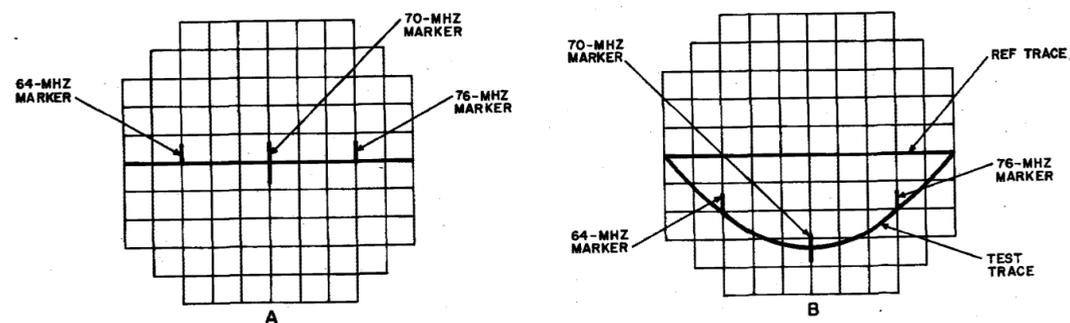
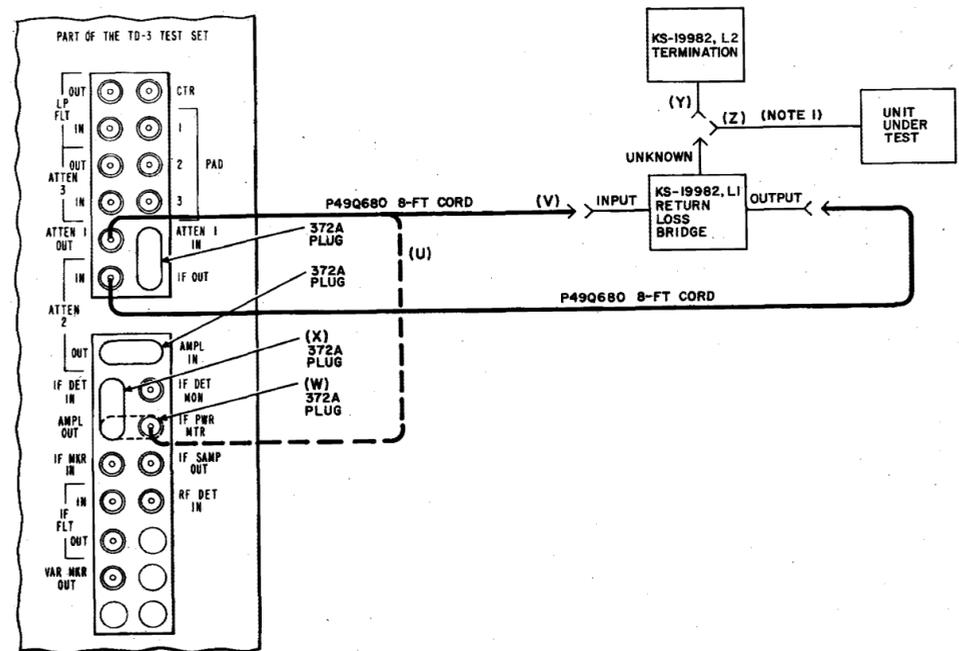
- 1—J68392A Transmitter-Receiver Test Set

- 1—KS-20114, L2 Adjusting Tool

CHART 1 (Cont)

STEP	PROCEDURE
1	<p>When performing the main station transmitter tests, disconnect the cable at the IF IN jack of the IF limiter-carrier resupply and terminate the end of the cable with a 188A adapter and a 20-dB, 19A pad. Also perform this step when testing any transmitter equipped for hot standby operations.</p> <p><i>Note:</i> Terminating the cable is necessary to prevent reflections that might otherwise impair transmission in the signal (service-carrying) path back at the 100A transmitting IF switch bay (frequency diversity systems) or in the service-carrying transmitter (Hot Standby/Space Diversity Systems).</p>
2	Prepare the test set in accordance with Fig. 1.
3	Connect the P-48N309 cable assembly between test points TP1 and TP5 on the IF limiter-carrier resupply. (This disables the carrier resupply.)
4	Remove the normal connection from the IF OUT jack and insert a 442A plug.
5	Measure the return loss at the IF IN jack as directed in the measurement procedure in Fig. 1.
	<p>Requirement: Greater than 30 dB between 60 and 80 MHz.</p>
	<p>If the requirement is not met, adjust the IN RL1 and IN RL2 controls for the best return loss.</p>
	<p>If the requirement still is not met, replace the IF limiter-carrier resupply with a spare unit and repeat Steps 3 through 5.</p>
6	Remove the 442A plug from the IF OUT jack and insert it into the IF IN jack.
7	Measure the return loss at the IF OUT jack.
	<p>Requirement: Greater than 28 dB between 60 and 80 MHz.</p>
	<p>If the requirement is not met, adjust the OUT RL1 and OUT RL2 controls.</p>
	<p>If the requirement still is not met, replace the IF limiter-carrier resupply and repeat Steps 3 through 7.</p>
8	Remove the P-48N309 cable assembly from between TP1 and TP5 and restore normal bay connections.

PREPARATION FOR TEST (FIG. 1)



1. Operate the test set controls to the following positions:

UNIT	CONTROL	POSITION
Control Panel	FUNCTION	IF-IF
	IF MARKER AMPLITUDE	Midrange
	AMPL GAIN	Midrange
Oscilloscope	CTR	MKR FREQ
	INTENSITY	Midrange
	POSITION	Midrange
	MAGNIFIER	X10
	SWEEP TIME	EXT
	VERNIER	Midrange
	SINGLE-NORMAL	NORMAL
	POSITION	Midrange
	BANDWIDTH	4
	AMPLIFIER	DC
Differential amplifier unit	SENSITIVITY	10 MV/CM
	VERNIER	Midrange
	AC-DC-OFF (+INPUT)	DC
	AC-DC-OFF (-INPUT)	OFF
	INPUT CHANNEL	IF (Note 2)
	POWER RANGE DBM	0

2. Set ATTN 1 to 14 dB and ATTN 2 to 50 dB.
 3. Establish test connections using option (U).
 4. Adjust ATTN 1 for a power meter indication of -4.0 ± 0.5 dBm.
 5. Connect options (V) and (W) and set the power meter POWER RANGE DBM switch to -5.
 6. Adjust the AMPL GAIN control on the control panel to obtain -7 dBm.
 7. Change option (W) to option (X).
 8. Adjust the TEST TRACE and REF TRACE controls to center the trace on the oscilloscope.
 9. Adjust the SWEEP TIME-VERNIER and POSITION controls on the oscilloscope time base unit for approximately 10 centimeters horizontal deflection.
 10. Adjust the IF MARKER FREQ control for a 70 ± 0.2 MHz indication on the counter.
 11. Adjust the IF SWEEP WIDTH and IF CENTER FREQ controls to obtain the oscilloscope display shown in A at left.
- Note:* An extraneous marker will appear at 89 MHz.
12. Adjust the TEST and REF TRACE controls to bring the reference trace into coincidence with the test trace at 70 MHz.
 13. Increase the attenuation of ATTN 2 by 1 dB and adjust the SENSITIVITY-VERNIER and POSITION controls on the oscilloscope differential amplifier for 2 centimeters deflection between traces. Reduce the attenuation of ATTN 2 by 1 dB. This calibrates the oscilloscope for 0.5 dB per centimeter.
 14. Connect option (Y) and set ATTN 2 to 0.

Requirement: The test trace shall be below the reference trace between 60 and 80 MHz.

Note: It may be necessary to move the traces up on the oscilloscope using the differential amplifier POSITION control to ensure that the test trace is below the reference trace.

15. Disconnect option(Y).

MEASUREMENT PROCEDURE

1. Connect option (Z) and adjust ATTN 2 until the test trace crosses the reference trace at the desired frequency. A typical display, showing the trace crossing at 60 and 80 MHz is shown in B.
 2. The magnitude of the return loss at the frequency where the traces cross is equal to 50 dB minus the setting of ATTN 2.
- Note 1:* A 190A adapter is required when connecting the return loss bridge directly to jacks on the IF limiter-carrier resupply or IF driver amplifier. A 188A adapter is required when connecting to either circuit through a bay cable.
- Note 2:* With the INPUT CHANNEL switch set to IF, determine that no input is connected; then zero the power meter by setting the POWER RANGE DBM switch to -25 and adjusting METER ZERO control for an indication of zero on the meter. Return the POWER RANGE DBM switch to the position shown in Step 1.

Fig. 1—IF Return Loss Measurements

CHART 2

IF DRIVER AMPLIFIER

APPARATUS:

- 1—J68392A Transmitter-Receiver Test Set
- 1—KS-20114, L2 Adjusting Tool

STEP

PROCEDURE

Caution: Step 1 should always be performed before connecting or disconnecting test apparatus to the output of the 30A integrated circuit in order to prevent potentially hazardous RF power radiating from that port while it is unterminated.

- 1 Remove drive to the transmitter by disconnecting plug P14 from the IF IN jack of the IF driver amplifier.
- 2 Remove the flexible waveguide section located at the output of the 30A integrated circuit.
- 3 Using a KS-19751, L20 flexible waveguide bend, connect a 522A termination to the output of the 30A integrated circuit.
- 4 Terminate the waveguide going to the 1432 transmitter channel network with a shorting plate.
- 5 Prepare the test set in accordance with Fig. 1.
- 6 Measure the return loss at the input to the cable normally connected to the IF driver amplifier IF IN jack as directed in the measurement procedure in Fig. 1.

Requirement: Greater than 30 dB between 60 and 80 MHz.

If the requirement is not met, adjust RL1 and RL2 for the best return loss.

If the requirement still is not met, replace the IF driver amplifier with a spare as directed in Section 411-506-503.

- 7 Restore all normal connections. Connect plug P14 to the IF IN jack of the IF driver amplifier only after the flexible waveguide section has been replaced.