
TD-3 MICROWAVE RADIO
J68386A AND J68386B TRANSMITTER-RECEIVER BAYS
RECEIVER TESTS
IF RETURN LOSS MEASUREMENT

This section describes the procedures for measuring the return loss of the various IF units in the receiver portion of the radio bay. This section is reissued to incorporate changes necessary for 1500 message circuit loading.

The preliminary checks in Section 411-402-500 must be completed before performing the tests in this section.

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

This reissue does not affect the Equipment Test List.

Caution: 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.

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CHART 1

IF MAIN AMPLIFIER

APPARATUS:

- 1—J68392A Transmitter-Receiver Test Set

CHART 1 (Cont)

STEP

PROCEDURE

IF Input

- 1 On the receiver control panel, press the AGC switch to light the pushbutton indicating MANUAL. Open the IF door by loosening the captive fastener located above the AGC unit.
- 2 On the receiver control panel, press the AGC REF pushbutton and adjust the MANUAL GAIN control for a meter indication of 60.
- 3 Prepare the test set in accordance with Fig. 1.
- 4 **▶**At the IF main amplifier remove the cables from the IF OUT and MON OUT jacks and insert 368A plugs. Disconnect the cable between the IF IN jack and the preceding filter at the filter end of the cable. **▶**
- 5 Connect option (Z), Fig. 1.
- 6 Measure the return loss through the cable connected to the IF IN jack using a P-49Q681 back-to-back adapter.

Requirement: 34 dB minimum over the 60- to 80-MHz band

Note: See measurement procedure on Fig. 1.

If the requirement is not met, adjust the IN RL 1 and IN RL 2 controls on the IF main amplifier. If the requirement still is not met, measure the return loss at the IF IN jack.

If the requirement is now met, replace the interconnecting cable. If the requirement still is not met, replace the IF main amplifier and repeat Steps 2 through 6.

IF Output

- 7 Terminate the IF IN and MON jacks and measure the return loss at the IF OUT jack.

Requirement: 32 dB minimum over the 60- to 80-MHz band

Note: The return loss bridge can be connected directly to the IF OUT jack by partially closing the swinging panel.

If the requirement is not met, adjust the OUT RL control on the IF main amplifier. If the requirement still is not met, replace the IF main amplifier and repeat Steps 2 through 7.

IF Monitor

- 8 Terminate the IF IN and IF OUT jacks and measure the return loss at the MON jack.

CHART 1 (Cont)

STEP**PROCEDURE**

Requirement: 29 dB minimum over the 60- to 80-MHz band

Note: The return loss bridge can be connected directly to the IF MON jack by partially closing the swinging panel.

If the requirement is not met, adjust the MON RL control. If the requirement still is not met, replace the IF main amplifier and repeat this chart.

- 9 Remove the 368A plugs and restore the cable connections to the IF main amplifier.
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CHART 2**AGC AMPLIFIER****APPARATUS:**

1—J68392A Transmitter-Receiver Test Set

STEP**PROCEDURE****IF Input**

- 1 Disconnect the cable between the AGC amplifier IF IN jack and the IF main amplifier MON jack at the MON jack end. Prepare for test in accordance with Fig. 1.
- 2 Measure the return loss at the input to the cable using a P-49Q681 back-to-back adapter.

Requirement: 29 dB minimum over the 60- to 80-MHz band

If this requirement is not met, adjust the IN RL 1 and IN RL 2 controls on the AGC amplifier. If the requirement still is not met, measure the return loss with the return loss bridge connected directly to the IF IN jack. If the requirement is now met, replace the interconnecting cable. If the requirement still is not met, replace the AGC amplifier and repeat Step 2.

- 3 Restore the normal connections to the IF IN jack.

CHART 3

RECEIVER MODULATOR AND IF PREAMPLIFIER

APPARATUS:

1—J68392A Transmitter-Receiver Test Set

STEP

PROCEDURE

IF Output

- 1 ◆ Remove the 1322- or 1336-type filter which is located between the channel dropping network and the isolator in the receiver input waveguide run. Attach a 24A transducer to the isolator and place a shorting plate on the drop arm of the channel dropping network.◆
- 2 Remove the cable from the IF OUT jack on the IF PREAMP.
- 3 Measure the return loss at the IF OUT jack (Fig. 1).

Requirement 1: 34 dB minimum over the 60- to 80-MHz band for the J68387P modulator

If the requirement is not met, adjust the RL control. If the requirement still is not met, replace the defective unit in accordance with Section 411-404-503 and return the defective unit to the maintenance center.

Requirement 2: 29 dB minimum over the 60- to 80-MHz band for the J68387C receiver modulator.

If the requirement is not met, replace the defective unit in accordance with Section 411-404-504 and return the defective unit to the maintenance center.

- 4 ◆ Reconnect the cable to the IF OUT jack on the IF PREAMP unit. Remove the 24A transducer and shorting plate and reconnect the 1322- or 1336-type filter.◆
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CHART 4

IF NETWORKS

APPARATUS:

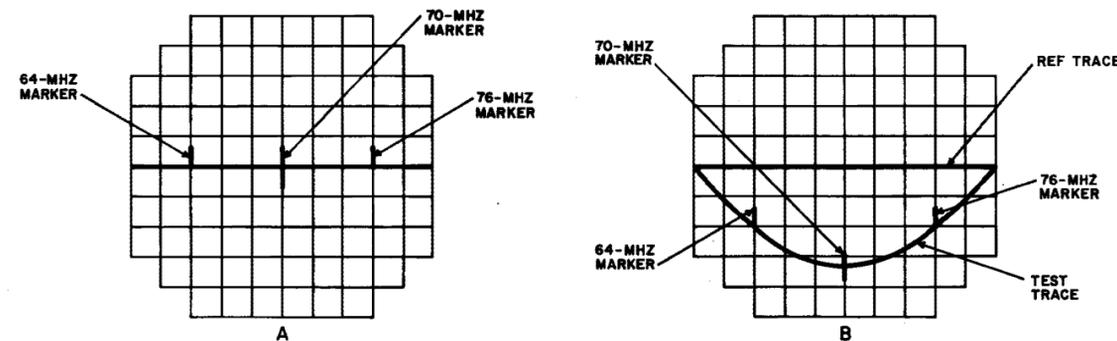
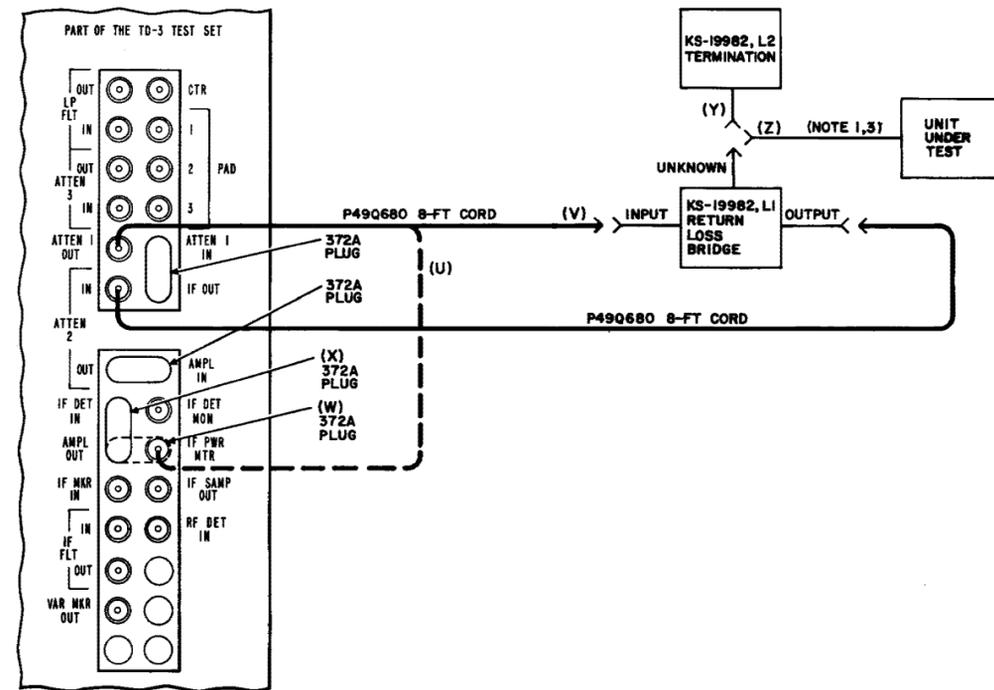
1—J68392A Transmitter-Receiver Test Set

CHART 4 (Cont)

STEP	PROCEDURE
1	<p>◆If trouble is suspected in one or more of the IF networks, begin by connecting the return loss bridge to the appropriate port of each network to be tested through the coaxial cable normally connected to that port of the network.</p> <p><i>Note 1:</i> The return loss requirements specified for the networks (Table A) do not allow for the worst possible addition of the lowest network return loss and lowest interconnecting cable return loss which might be encountered. For this reason, measurement through the interconnecting cable, although very convenient and useful when first troubleshooting, may result in return losses which fail to meet the specified network requirements.</p> <p><i>Note 2:</i> In bays modified for 1500 circuit loading, access to the output port of the 400A or 400B equalizer and the input cable on the 1080A filter may be gained by first removing the mounting bracket for the equalizer-filter assembly and then removing the individual networks from the bracket. Connection of the return loss bridge to the input cable of the 1080A filter can be accomplished through a P-49Q681 6-inch cable assembly.◆</p>
2	<p>Terminate the other port of the network with a 368A plug.</p> <p><i>Note:</i> ◆When measuring the output (J2) of the 1080A filter, terminate the input cable (J1) of the filter with a KS-19982, L2 termination.◆</p>
3	<p>Measure the return loss and check for conformance with the requirements listed in Table A.</p> <p>If any of the requirements are not met, measure the return loss directly at the port in question. It may be necessary to remove the network for access. If the requirement still is not met, replace the network. ◆If the requirement is met, check the interconnecting cable as specified in Step 4.◆</p>
4	<p>◆To check an interconnecting cable, measure the return loss at each end of the cable with the far end of the cable terminated with a KS-19982, L2 termination.</p> <p>Requirement: At least 32 dB, 60 to 80 MHz</p> <p>If this requirement is not met, the cable should be replaced.</p>
5	<p>Remount any networks that were removed for test and restore all connections to normal.◆</p>

TABLE A
IF NETWORK – RETURN LOSS REQUIREMENTS

NETWORK	FREQUENCY	MINIMUM REQUIREMENT – DB	
		INPUT	OUTPUT
◆400A or 400B Equalizer	Between 62 and 78 MHz	25	25
	Between 60 and 80 MHz	22	22 ◆
747A Filter	Between 64 and 76 MHz	27	27
	Between 60 and 80 MHz	24	24
745A Filter	Between 64 and 76 MHz	26	25
	Between 62 and 78 MHz	24	24
	Between 61 and 79 MHz	17	17
793A or 794A Equalizer	Between 62 and 78 MHz	25	25
	Between 60 and 80 MHz	22	22
918A	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
918B	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
918C	Between 60 and 80 MHz	30	30
919A	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
919B	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
920A	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
◆1080A Filter	Between 60 and 90 MHz	27	32 ◆



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
Differential amplifier unit	POSITION	Midrange
	BANDWIDTH	4
	AMPLIFIER	DC
	VERNIER	Midrange
	SENSITIVITY	10 MV/CM
	AC-DC-OFF (+INPUT)	DC
Power meter	INPUT CHANNEL	IF (Note 2)
	POWER RANGE DBM	0

- Set ATTEN 1 to 14 dB and ATTEN 2 to 50 dB.
- Establish test connections using option (U).
- Adjust ATTEN 1 for a power meter indication of -4.0 ± 0.5 dBm.
- Connect options (V) and (W) and set the power meter POWER RANGE DBM switch to -5.
- Adjust the AMPL GAIN control on the control panel to obtain -7 dBm.
- Change option (W) to option (X).
- Adjust the TEST TRACE and REF TRACE controls to center the trace on the oscilloscope.
- Adjust the SWEEP TIME, VERNIER, and POSITION controls on the oscilloscope time base unit for approximately 10 centimeters horizontal deflection.
- Adjust the IF MARKER FREQ control for a 70 ± 0.2 MHz indication on the counter.
- 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.
- 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 ATTEN 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 ATTEN 2 by 1 dB. This calibrates the oscilloscope for 0.5 dB per centimeter.

14. Connect option (Y) and set ATTEN 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

- Connect option (Z) and adjust ATTEN 2 until the uppermost part of the test trace in B shown at left just touches the reference trace at the desired frequency.
- The magnitude of the return loss is determined by subtracting the ATTEN 2 setting from 50 dB.

Note 1: A back-to-back adapter (P49Q681) is required between the return loss bridge and the unit under test whenever the return loss measurement is made through a connecting 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 the METER ZERO control for an indication of 0 on the meter. Return the POWER RANGE DBM switch to the position shown in Step 1.

Fig. 1—IF Return Loss Measurement