

---

**TD-3 MICROWAVE RADIO**  
**J68386G AND J68386H 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.

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 and to add Chart 4 to correct the former measurement procedure which permitted measuring through IF cables.

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

---

CHART	PAGE
1—IF Main Amplifier . . . . .	2
2—IF Preamplifier . . . . .	3
3—IF Networks . . . . .	3
4—♦Interconnecting Bay Cables♦ . . . . .	4

## CHART 1

## IF MAIN AMPLIFIER

## APPARATUS:

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

## STEP

## PROCEDURE

- 1 Prepare the test set in accordance with Fig. 1.
- 2 Operate the MAN-AGC switch on the IF main amplifier to the MAN position.
- 3 Press the RCVD CARR PWR pushbutton on the meter panel.

**Requirement:** Between 70 and 90

If the requirement is not met, adjust the MAN GAIN control until the meter indicates 80.

- 4 Connect the unit under test to the UNKNOWN terminal of the return loss bridge in accordance with Fig. 1, option (Z).
- 5 Measure the return loss at the IF IN and IF OUT jacks as directed in the measurement procedure in Fig. 1.

**Requirement:** Input return loss at the IF IN jack: greater than 30 dB between 60 and 80 MHz. Output return loss at the IF OUT jack: greater than 30 dB between 60 and 80 MHz.

If the requirement is not met for input return loss, adjust RL1 until the requirement is met.

If the requirement is not met for output return loss, adjust RL2 until the requirement is met. It may be necessary to terminate the IF IN jack with the 442A plug provided in the test set when measuring the output return loss.

If either requirement cannot be met, replace the IF main amplifier.

---

**CHART 2**
**IF PREAMPLIFIER**


---

**APPARATUS:**

- 1—J68392A Transmitter-Receiver Test Set
  - 1—KS-20481, L1 Adjusting Tool
- 

**STEP**
**PROCEDURE**


---

- 1 Remove the flexible waveguide section from between the 1433 receiver channel network and the 19A isolator.
- 2 Connect a shorting plate ahead of the 19A isolator and terminate the 1433 receiver channel network with a shorting plate.
- 3 Prepare the test set in accordance with Fig. 1.
- 4 Remove the cable from the IF OUT jack on the IF preamplifier and connect the UNKNOWN plug of the return loss bridge to the IF OUT jack.
- 5 Measure the output return loss as directed in the measurement procedure in Fig. 1.

**Requirement:** 33 dB minimum between 60 and 80 MHz

**Caution:** Use the proper adjusting tool to avoid damaging the RL control.

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 411-504-503 and return the defective unit to a maintenance center.

- 6 Reconnect the cable to the IF OUT jack on the IF preamplifier.
  - 7 Remove the shorting plates and replace the flexible waveguide section.
- 

**CHART 3**
**IF NETWORKS**


---

**APPARATUS:**

- 1—J68392A Transmitter-Receiver Test Set

---

**CHART 3 (Cont)**


---

STEP	PROCEDURE
1	Prepare the test set in accordance with Fig. 1.
2	Connect to the UNKNOWN plug on the return loss bridge in accordance with option (Z) in Fig. 1.
3	Terminate the other jack of the network with a 368A plug except when testing the 1042A network. Terminate the other jack of the 1042A network with a 442A plug.
4	Using the measurement procedure in Fig. 1, measure the return loss and check for conformance with the requirements listed in Table A.  If the requirement is not met, replace the network.
5	Restore all cable connections.

---

**CHART 4****INTERCONNECTING BAY CABLES****APPARATUS:**

1—J68392A Transmitter-Receiver Test Set

---

STEP	PROCEDURE
1	Prepare the test set in accordance with Fig. 1.
2	Connect the cable to the UNKNOWN plug on the return loss bridge in accordance with option (Z) in Fig. 1.
3	Terminate the other end in a 368A or 442A plug using the appropriate adapter.
4	Using the measurement procedure in Fig. 1, measure the return loss.  <b>Requirement:</b> Greater than 32 dB between 60 and 80 MHz
5	Repeat Steps 2 through 4 for the other end of the cable. If the requirement in Step 4 cannot be met, replace the cable.

---

**CHART 4 (Cont)**


---

STEP	PROCEDURE
6	Restore all cable connections.◀

---

TABLE A

## IF NETWORK – RETURN LOSS REQUIREMENTS

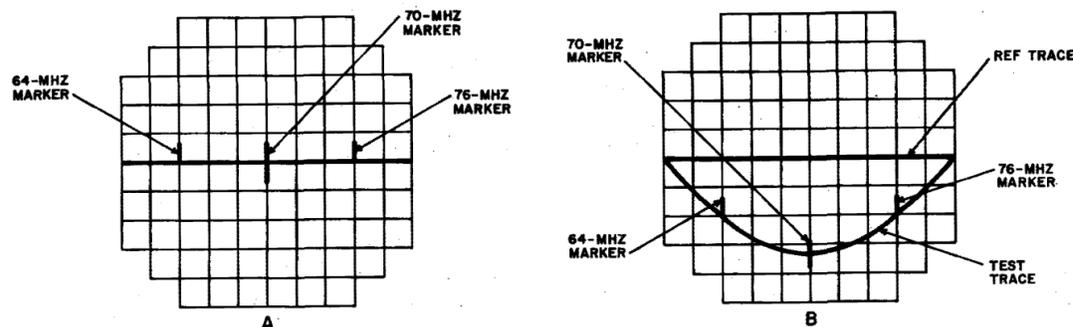
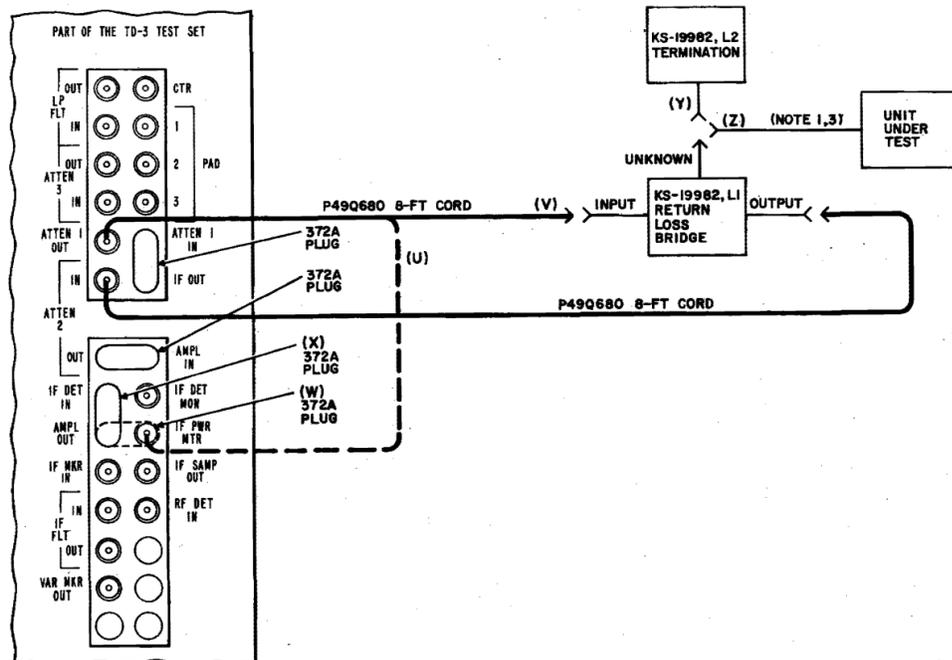
NETWORK	FREQUENCY	MINIMUM REQUIREMENT—dB	
		INPUT	OUTPUT
918A	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
918B	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
918C	Between 60 and 80 MHz	30	30
919A	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
919B	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
920A	Between 62 and 78 MHz	30	30
	Between 60 and 80 MHz	27	27
1042A	Between 62 and 78 MHz	25	25
	Between 60 and 80 MHz	23	23

## PREPARATION FOR TEST

- Operate the test set controls to the following positions:

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

- Set ATTEN 1 to 14 dB and ATTEN 2 to 50 dB.
  - Establish the test connections using option (U).
  - Adjust ATTEN 1 for a power meter indication of  $-4.0 \pm 0.5$  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  $70 \pm 0.2$  MHz indication on the counter.
  - Adjust the IF SWEEP WIDTH and IF CENTER FREQ controls to obtain the oscilloscope display shown in A.
- 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.
  - 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.



- 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.

- Disconnect option (Y).

## MEASUREMENT PROCEDURE

- Connect option (Z) and adjust ATTEN 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.

- The magnitude of the return loss at the frequency where the test trace crosses the reference trace 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 →zero← on the meter. Return the POWER RANGE DBM switch to the position shown in Step 1.

*Note 3:* A 190A adapter is required when connecting the return loss bridge to either jack on the IF main amplifier → or the 1042A network. ← Either a 188A adapter or a P49Q681 back-to-back adapter is required when connecting to a bay cable.

Fig. 1—IF Return Loss Measurement