

**TD-3 MICROWAVE RADIO
TRANSMITTER-RECEIVER BAY
RECEIVER TESTS
J68387C RECEIVER MODULATOR—IF PREAMPLIFIER**

This section contains the procedures to be followed in checking the J68387C receiver modulator—IF preamplifier (see Fig. 1) when the requirements specified in Section 411-404-501 for diode currents, return loss, gain, amplitude response, or noise figure are not met.

Caution: Before performing these tests, check that the receiver is not in service.

The following sections may be used as additional information if required:

General Test Information—411-400-500

Transmitter-Receiver Bay Level Diagrams—411-400-502

Receiver Tests, Gain, and Amplitude Response—411-404-501.

CHART	PAGE
1—Diode Currents And Diode Replacement	1
2—IF Preamplifier Replacement	4
3—Gain And Amplitude Response Tests	4
4—Noise Figure Tests	6

**CHART 1
DIODE CURRENTS AND DIODE REPLACEMENT**

STEP	PROCEDURE
1	Check the diode current meter readings by pressing, one at a time, the RCVR MOD 1 and RCVR MOD 2 pushbuttons on the receiver control panel.

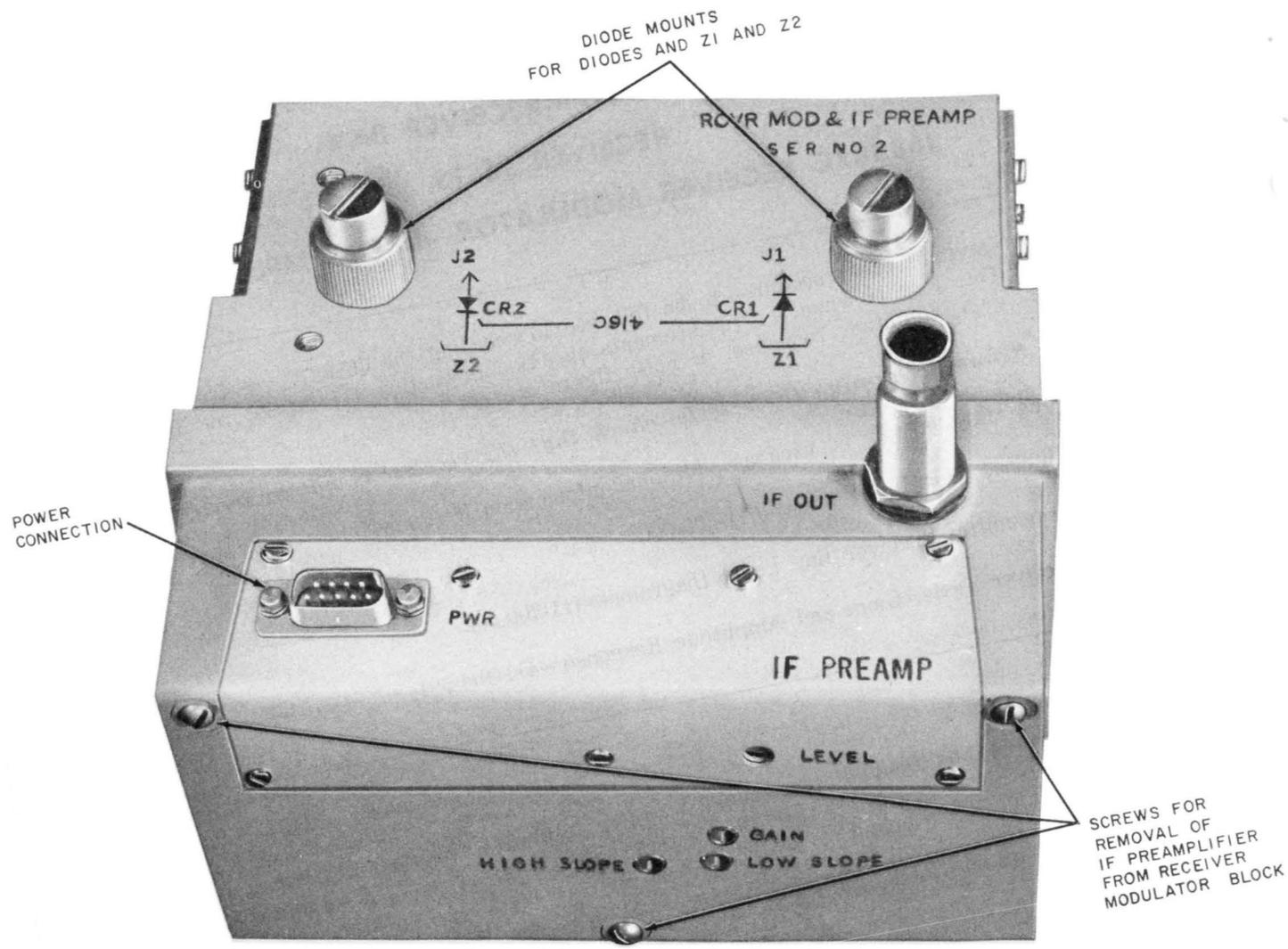


Fig. 1—J68387C Receiver Modulator—IF Preamplifier

CHART 1 (Cont)

STEP	PROCEDURE
	<p>Requirement 1: The readings shall be 42 ± 8 units.</p> <p>Note: Adjust attenuator AT2 for repeater station, or AT3 for main station, to set current readings within these limits and centered about 42.</p> <p>Requirement 2: By removing additional loss from AT2 or AT3, it shall be possible to reach full-scale indication on the meter for both pushbutton positions.</p> <p>Note: A zero indication on the meter for one or both pushbutton positions most likely indicates a defective diode(s) but also may indicate a defective monitoring lead(s) in the IF preamplifier unit. Diode replacement is covered in Step 3 and IF preamplifier replacement is covered in Chart 2, Step 1.</p>
2	<p>If the requirements in Step 1 are not met, perform the following checks in sequence.</p> <p>(a) Press the MWV GEN OUT pushbutton and check that the meter indication is within ± 2 units of the recorded value. If not, check the microwave generator as outlined in Section 411-402-501.</p> <p>(b) Press the SHIFT OSC, SHIFT MOD 1, and SHIFT MOD 2 pushbuttons, one at a time, and check that the meter indications are within ± 3 units of the recorded values. If not, check the 40-MHz oscillator—shift modulator circuit as outlined in Section 411-402-503.</p>
3	<p>If the requirements in Step 1 still are not met, replace the 416C diodes in the receiver modulator block (must be replaced in pairs).</p> <p>Note 1: Care should be taken to prevent static discharge through the diodes when mounting them in the diode holders and when mounting the diode holders in the modulator. The diode holder shall be grounded, by holding it against the modulator block, immediately before inserting it into the block.</p> <p>Note 2: Check the center conductor fingers which hold the diodes to ensure that they are not broken or bent. If these fingers are found to be defective, replace the receiver modulator block and return the defective unit to the maintenance center.</p>
4	<p>If the requirements of Step 1 still are not met, replace the 416C diodes in the shift modulator (must be replaced in pairs). Observe the notes in Step 3.</p>

CHART 2

IF PREAMPLIFIER REPLACEMENT

STEP	PROCEDURE
1	Remove the IF preamplifier from the receiver modulator by disconnecting the power plug and removing the three retaining screws (see Fig. 1). Replace the IF preamplifier with a spare unit.
2	Repeat the receiver modulator—IF preamplifier tests given in Section 411-404-501.
3	Return the defective IF preamplifier to the maintenance center.

CHART 3

GAIN AND AMPLITUDE RESPONSE TESTS

APPARATUS:

1—J68392A Transmitter-Receiver Test Set

1—P48Q348 IF Test Jig

1—P49Q685 Cable Assembly

STEP	PROCEDURE
1	If the gain and amplitude response requirements of the receiver modulator—IF preamplifier were not met, remove the IF preamplifier from the modulator block, using the procedure given in Chart 2, Step 1.
2	Connect the IF preamplifier to the P48Q348 IF test jig. Power for the IF preamplifier is available at the EXT DC PWR jack on the test set by means of a P49Q685 patch cable.
3	Prepare the test set in accordance with Fig. 2.
4	Increase the setting of ATTEN 2 by 15 dB and change to options (U) and (Y).
5	Adjust the LEVEL control on the IF preamplifier for maximum output.
6	Adjust the GAIN, LOW SLOPE, and HIGH SLOPE controls to meet the amplitude response and gain requirements.

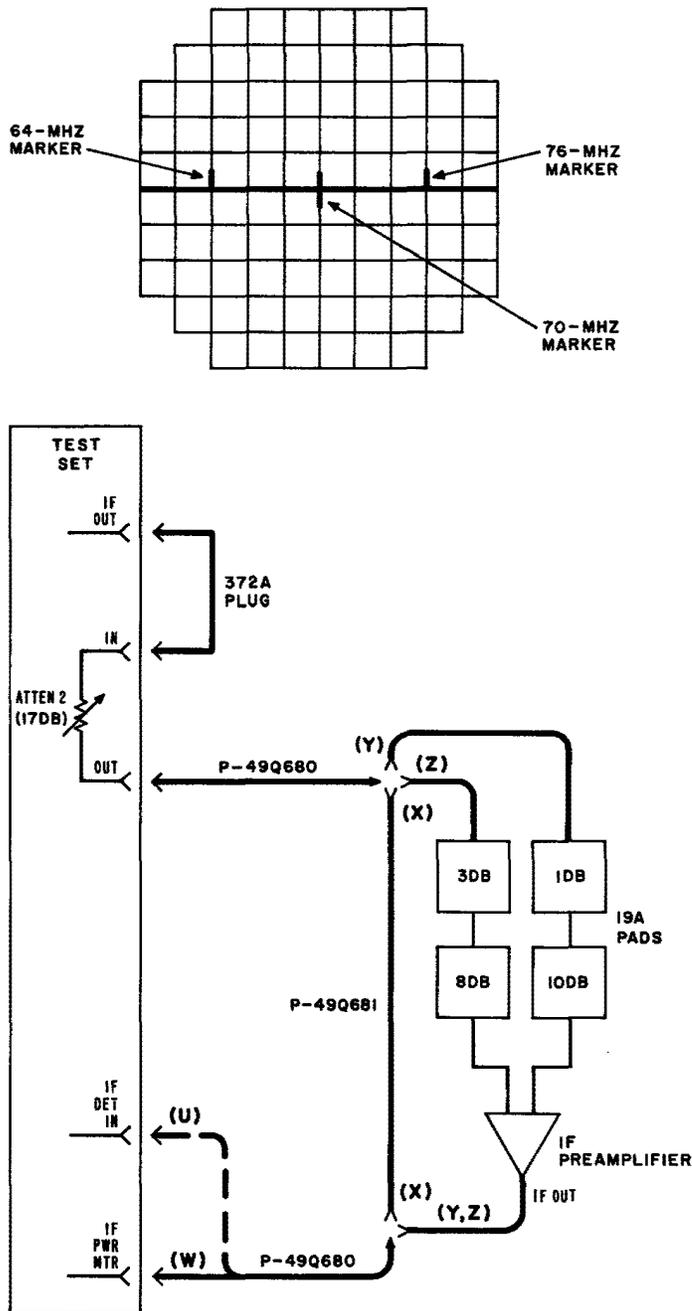


Fig. 2—IF-to-IF Transmission—Test Setup

PREPARATION FOR TEST

1. SET ATTENUATOR 2 AS INDICATED.
2. ESTABLISH TEST CONNECTIONS USING OPTIONS (W) AND (X).
3. OPERATE THE CONTROLS ON THE TEST SET TO THE FOLLOWING POSITIONS:

UNIT	CONTROL	POSITION
CONTROL PANEL	FUNCTION IF SWEEP WIDTH IF MARKER AM. CTR	IF-IF MIDRANGE MIDRANGE MKR FREQ
OSCILLOSCOPE TIME BASE	POSITION MAGNIFIER SWEEP TIME VERNIER SINGLE-NORMAL	MIDRANGE X10 EXT MIDRANGE NORMAL
OSCILLOSCOPE DIFFERENTIAL AMPLIFIER	POSITION BANDWIDTH AMPLIFIER VERNIER SENSITIVITY AC-DC-OFF (+ IN.) AC-DC-OFF (- IN.)	MIDRANGE 4 DC MIDRANGE 2 MV/CM DC OFF
POWER METER	INPUT CHANNEL POWER RANGE DBM	IF -5 DBM

4. ADJUST ATTEN 2 FOR A -7 DBM INDICATION ON THE POWER METER.
5. CHANGE CONNECTIONS TO OPTIONS (X) AND (U).
6. ADJUST THE TEST TRACE CONTROLS ON THE CONTROL PANEL TO CENTER THE TRACE ON THE OSCILLOSCOPE.
7. ADJUST THE VERNIER AND POSITION CONTROLS ON THE OSCILLOSCOPE TIME BASE UNIT FOR 10 CENTIMETERS HORIZONTAL DEFLECTION ON THE OSCILLOSCOPE.
8. ADJUST THE IF MARKER FREQ CONTROL ON THE CONTROL PANEL FOR A 70-MHZ INDICATION ON THE COUNTER.
9. ADJUST THE IF SWEEP WIDTH AND IF CENTER FREQ CONTROLS ON THE CONTROL PANEL TO OBTAIN OSCILLOSCOPE DISPLAY SHOWN AT LEFT.
10. ADJUST THE REF TRACE CONTROLS ON THE CONTROL PANEL TO BRING THE REFERENCE TRACE INTO COINCIDENCE WITH THE TEST TRACE AT 70 MHZ.
11. INCREASE THE ATTENUATION OF ATTEN 2 BY 0.1 DB AND ADJUST THE VERNIER CONTROL ON THE OSCILLOSCOPE DIFFERENTIAL AMPLIFIER FOR 2 CENTIMETERS DEFLECTION BETWEEN THE TWO TRACES; THEN RETURN ATTEN 2 TO ITS PREVIOUS SETTING. THIS CALIBRATES THE OSCILLOSCOPE FOR 0.05 DB PER CENTIMETER.

REQUIREMENT: THE TEST TRACE SHALL BE FLAT WITHIN 0.01 DB BETWEEN 60 AND 80 MHZ.

IF THIS REQUIREMENT IS NOT MET, ADJUST THE IF DET SLOPE CONTROL ON THE CONTROL PANEL FOR FLAT TEST TRACE; THEN RECOINCIDE THE TRACES WITH THE TEST TRACE CONTROLS.

CHART 3 Cont)

STEP	PROCEDURE
6	<p>Requirement 1: The IF OUT level shall be a minimum of -7 dBm. If the level goes higher than -7 dBm, adjust the LEVEL control to maintain a -7 dBm output.</p> <p>Requirement 2: The amplitude response shall be flat within 0.01 dB from 64 to 76 MHz and flat within 0.03 dB from 60 to 80 MHz.</p>
7	<p>Without adjusting any controls, change to options (U) and (Z).</p> <p>Requirement: The IF OUT level shall not deviate by more than ± 0.50 dB from that obtained in Step 6.</p>
8	<p>If the IF preamplifier amplitude response and gain requirements per Steps 2 through 7 are not met, replace the preamplifier with a spare unit and repeat Steps 2 through 7. Return the defective IF preamplifier to the maintenance center.</p>
9	<p>Reconnect the IF preamplifier to the modulator block in the bay.</p>
10	<p>Repeat the tests on the receiver modulator—IF preamplifier given in Section 411-404-501.</p>
11	<p>If the amplitude response and gain requirements still cannot be met, replace the 416C diodes as described in Chart 1 and repeat the tests on the receiver modulator—IF preamplifier given in Section 411-404-501.</p>

CHART 4

NOISE FIGURE TESTS

APPARATUS:

1—J68392A Transmitter-Receiver Test Set

STEP	PROCEDURE
1	<p>If the receiver modulator—IF preamplifier fails to meet the noise figure requirements, determine that the shorting plate is on the drop arm of the Z1 channel dropping network and that the microwave sweeper in the test set is turned off.</p>

CHART 4 (Cont)	
STEP	PROCEDURE
2	<p>Inspect for and tighten any loose waveguide joints in the beat oscillator and signal paths and recheck the noise figure.</p> <p><i>Note:</i> Leakage often can be detected by observing the power meter while moving a hand across waveguide flange connections and other joints.</p>
3	<p>If the noise figure requirement still is not met, replace the 416C diodes per Chart 1. Retest the receiver modulator—IF preamplifier, and measure the receiver noise figure as described in Section 411-404-501.</p>
4	<p>If Step 3 does not improve the noise figure, reinsert the original 416C diodes and replace the IF preamplifier unit as described in Chart 2. Perform the receiver modulator—IF preamplifier tests, and measure the receiver noise figure as described in Section 411-404-501.</p>
5	<p>If Step 4 does not improve the noise figure, replace the receiver modulator. Using the original IF preamplifier, perform the receiver modulator—IF preamplifier tests, and measure the receiver noise figure as described in Section 411-404-501.</p>
6	<p>Return the defective unit(s) to the maintenance center.</p>