

**TD-3 MICROWAVE RADIO**  
**J68386G AND J68386H TRANSMITTER-RECEIVER BAYS**  
**RECEIVER TESTS USING KRUSE 52011 IF/RF TEST SET**  
**IF RETURN LOSS MEASUREMENT**

This appendix supplements Section 411-504-502.

It is reissued to add:

- A caution to be observed when working on a system equipped with Hot Standby/Space Diversity Switching.
- Chart D to correct the former measurement procedure which permitted measuring through IF cables.

It describes the procedures for measuring the return loss of the various IF units in the receiver portion of the radio bay using the Kruse 52011 IF/RF Test Set.

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

The recommended maintenance interval for these tests is given in 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 A**

**IF MAIN AMPLIFIER**

**APPARATUS:**

- 1—Kruse 52011 IF/RF Test Set
- 1—KS-20114, L2 Adjusting Tool

STEP	PROCEDURE
1	Operate the MAN-AGC switch on the IF main amplifier to the MAN position.
2	Press the RCVD CARR PWR pushbutton on the meter panel.  <i>Requirement: Between 70 and 90.</i>  If this requirement is not met, adjust the MAN GAIN control until the meter indicates 80.

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4—Receiver Modulator and IF Preamplifier Replacement . . . . . 6

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

Section 411-500-500, Test—General

Section 411-500-502, Transmitter—Receiver Bay Level Diagrams

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**CHART 1**

**RETURN LOSS, GAIN AND AMPLITUDE RESPONSE**

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<b>STEP</b>	<b>PROCEDURE</b>
1	If the receiver modulator and IF preamplifier unit has failed the IF return loss test, replace the entire unit with a spare and perform Steps 5 and 6.
2	If the receiver modulator and IF preamplifier unit fails to meet the gain and amplitude response requirements, one cause may be the 497A diode.
3	Replace the diode using the procedure listed in Chart 3. Observe the notes and cautions listed there.
4	If the requirements still cannot be met, reinstall the original diode in the modulator housing and replace the modulator and IF preamplifier assembly in accordance with the instructions in Chart 4.
5	Repeat the receiver modulator and IF preamplifier tests given in Section 411-504-501.
6	Return the defective unit to the maintenance center.

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**CHART 2**

**NOISE FIGURE TESTS**

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<b>STEP</b>	<b>PROCEDURE</b>
1	If the receiver modulator and IF preamplifier fails to meet the noise figure requirements, determine that the shorting plate is on the drop arm of the 1433 channel network and that the microwave sweeper (if provided) in the test set is turned to STANDBY or to the OFF position. Ensure that the RCVR MOD BIAS requirement of Section 411-504-501 is met.

CHART B (Cont)	
STEP	PROCEDURE
5	<p>Measure the output return loss as directed in the measurement procedure in Exhibit 1.</p> <p><i>Requirement: 33 dB minimum between 60 and 80 MHz.</i></p> <p><i>Caution: Use the proper adjusting tool to avoid damaging the RL control.</i></p> <p>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.</p>
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 C**  
**IF NETWORKS**

**APPARATUS:**

1—Kruse 52011 IF/RF Test Set

STEP	PROCEDURE
1	Prepare test set in accordance with Exhibit 1.
2	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.
3	<p>Using the measurement procedure in Exhibit 1 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 network now meets requirements, check the cable and connectors for damage. Replace any damaged cables.</p>
4	Restore all cable connections.

## CHART 3 (Cont)

## STEP

## PROCEDURE

the diode, recheck both the BO power as specified in Section 411-502-500 and the adjustment of the DIODE BIAS control, as specified in Section 411-504-501.

- 2 Remove the 497A diode in accordance with the following procedure. Refer to Fig. 1 for identification of the parts. Before starting the procedure, turn the RCVR PWR switch on the bay to the OFF position.

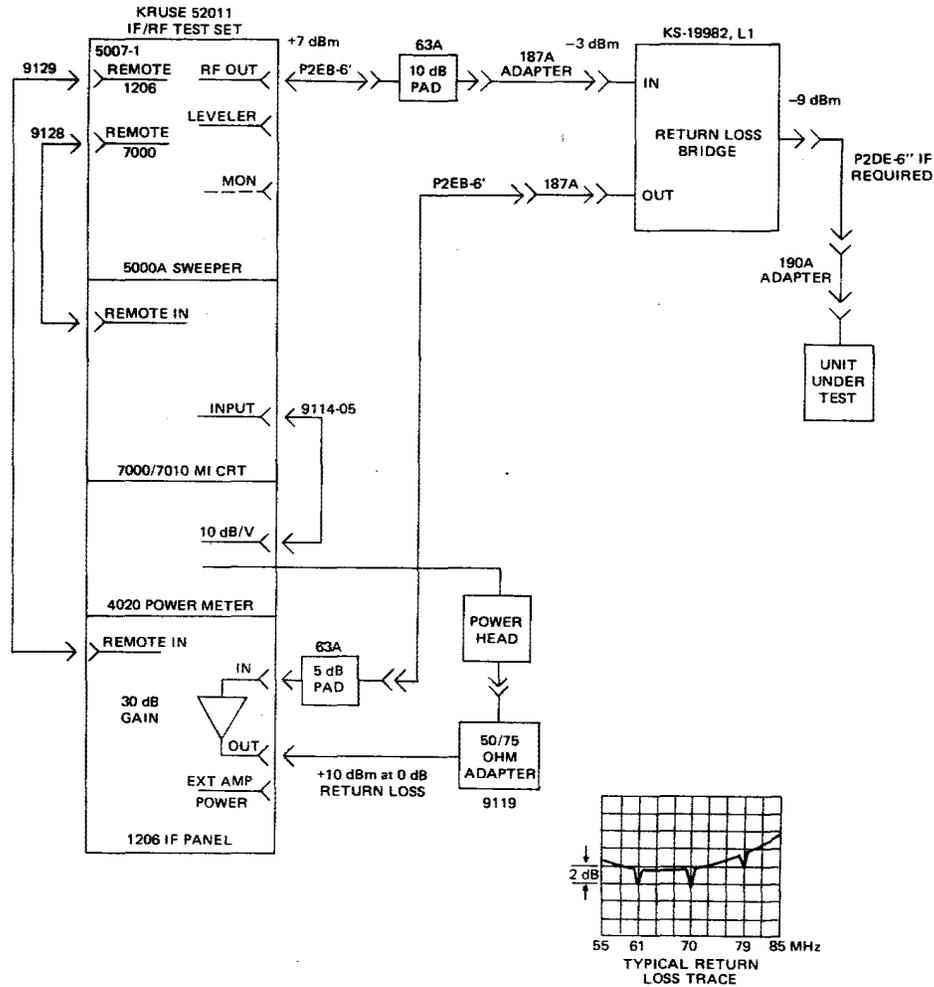
**Caution:** *The 497A diode is a fragile device, susceptible to damage from static discharge or mechanical shock. No attempt should be made to remove the diode from the housing unless it is absolutely necessary. Extreme care should be exercised in handling the diode and diode mount when removed from the modulator assembly.*

- (a) Remove the two screws that attach the spring to the modulator housing.
- (b) Lift the spring, sleeve, and collet assembly straight out of the modulator housing. The diode should still be held by the collet.
- (c) Hold the sleeve, with the diode upwards, and turn the spring just enough to loosen the diode in the collet. Do not completely remove the spring from the collet.
- (d) Remove the diode from the collet and insert the new diode. The end **without** the white dot goes into the collet.
- (e) Seat the diode in the collet. The white dot should still be visible on the external end of the diode.
- (f) With the diode upwards, hold the sleeve and turn the spring to tighten the collet onto the diode. Tighten firmly **without** using tools.
- (g) Touch the spring to the modulator assembly to remove any static charge.
- (h) Reinsert the spring, sleeve, and collet assembly (diode first) straight into the hole in the modulator housing.

**Note:** The screw holes in the spring should be aligned with the mounting holes before insertion of the spring assembly into the modulator housing. Rotation of the spring after the diode has been seated in the modulator may damage the internal mounting disc and/or the 497A diode.

- (j) Push lightly on the center of the spring assembly to seat the diode into the modulator. Note that the shoulder of the clinch nut is on the outside of the spring.
- (k) Reinsert the two mounting screws and tighten with a screwdriver.

**Note:** A loose joint will radiate RF energy. Therefore, the screws should be tightened **firmly** but not excessively.



**PREPARATION FOR TEST**

1. Insert IF plug-in 5007-1 into sweeper and operate controls on test set.

UNIT	CONTROL	POSITION
5000A SWEEPER	F-1 START	55 MHz
	MARKER 1	61 MHz
	MARKER 2-Fc	70 MHz
	MARKER 3	79 MHz
	F-2 STOP	85 MHz
	VERNIER	MAX CCW
	RF LEVEL	+7 dBm
	1 kHz	OFF
	LEVELER	INT
	RETRACE	ON
	MARKERS	OFF
	RECUR-TRIG-LINE	RECUR
	MODE	CW
	Fc ± ΔF VERNIER	MAX CW
SWEEP SECONDS	.01	
SWEEP SECONDS VERNIER	MAX CW	
EXT/INT'L SWEEP (REAR)	INT'L	
7000-M1/ 7010-M1 CRT DISPLAY SCOPE	OFFSET	MIDSCALE (DO NOT READJUST)
	GAIN	X1
	POLARITY	+UP
	BW	30 kHz
	INPUT	DC
	DB/DIV AT 10 DB/V	2 DB/DIV-200 MV/DIV
VARIABLE (RED)	MAX CW DETENT	
4020 POWER METER	LEVEL	10 DB/V
	GROUNDING	INT
	OFFSET	MIDSCALE

2. Connect power meter head to CAL OUT jack. Depress DBM CAL key and adjust its control for +10.00 dBm reading. Depress ZERO key and adjust its control for 00.00±.01 reading. Depress DBM 75 ohm key. Establish the connections shown.
3. Disconnect UNKNOWN on return loss bridge. Adjust sweeper RF level control for power meter reading of +10.0 dBm. This is 0 dB return loss.
4. Connect unit under test. Read 70 MHz return loss on power meter. Actual return loss is 10 dB greater than power meter reading. (Example: if power meter reading is -17 dBm, actual return loss is 27 dB.)
5. Set sweeper MODE switch to WIDE F1-F2 and center trace on scope using power meter OFFSET control and scope HORIZ and GAIN controls. Swept return loss between 55 and 85 MHz is now displayed with 2 dB/div calibration with markers at 61, 70, and 79 MHz.
6. Reference return loss at 70 MHz is the value read in 4 above. Reset power meter OFFSET to bring reference to center of scope. A display above reference indicates a return loss with a lower value than the 70 MHz reference.
7. The power meter reading during sweep is the average value across the band.
8. Return loss is measured at a level of -9 dBm into the unit under test.

**Test Setup – IF Return Loss  
Exhibit 1**