
TD-3 MICROWAVE RADIO
J68386A AND J68386B TRANSMITTER-RECEIVER BAYS
RECEIVER TESTS
USING KRUSE 52011 RF/IF TEST SET
IF RETURN LOSS MEASUREMENT

This appendix describes the procedures for measuring the return loss of the various IF units in the receiver position of the radio bay.

It is reissued to change procedures in Charts A and B, revise Exhibit 1, and correct the IF/RF test designation to RF/IF.

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

The recommended maintenance interval for these tests is given in 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 A
IF MAIN AMPLIFIER

APPARATUS:

- 1—Kruse 52011 RF/IF Test Set
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STEP	PROCEDURE
1	IF Input 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.

CHART A (Contd)

STEP	PROCEDURE
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 test set in accordance with Preparation for Test Steps 1 through 3 in Exhibit 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 unit under test per Exhibit 1.
→ 6	Measure the return loss through the cable connected to the IF IN jack using a P-49Q681 back-to-back adapter. Follow procedures under Preparation for Test Steps 4 through 8 in Exhibit 1.
	<i>Requirement:</i> 34 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 IF main amplifier. If it 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.
	<i>Requirement:</i> 32 dB minimum over the 60- to 80-MHz band.
	<i>Note:</i> The return loss bridge can be connected directly to the IF OUT jack by partially closing the swinging panel.
	If this requirement is not met, adjust the OUT RL control on the IF main amplifier. If it 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.
	<i>Requirement:</i> 29 dB minimum over the 60- to 80-MHz band
	<i>Note:</i> The return loss bridge can be connected directly to the IF MON jack by partially closing the swinging panel.
	If this requirement is not met, adjust the MON RL control. If it 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.

CHART B
AGC AMPLIFIER

APPARATUS:

1—Kruse 52011 RF/IF Test Set

STEP	PROCEDURE
	<p>IF Input</p> <p>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 Preparation for Test Steps 1 through 3 in Exhibit 1. Then connect unit under test.</p> <p>2 Measure the return loss at the input to the cable using a P-49Q681 back-to-back adapter. Follow procedures under Preparation for Test Steps 4 through 8 in Exhibit 1.</p> <p><i>Requirement: 29 dB minimum over the 60- to 80-MHz band</i></p> <p>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 connecting cable. If the requirement still is not met, replace the AGC amplifier and repeat Step 2.</p> <p>3 Restore the normal connections to the IF IN jack.</p>

CHART C
RECEIVER MODULATOR AND IF PREAMPLIFIER

APPARATUS:

1—Kruse 52011 RF/IF Test Set

STEP	PROCEDURE
	<p>IF Output</p> <p>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.</p> <p>2 Remove the cable from the IF OUT jack on the IF PREAMP.</p>

CHART C (Contd)

STEP	PROCEDURE
3	<p>Measure the return loss at the IF OUT jack (Exhibit 1).</p> <p><i>Requirement 1:</i> 34 dB minimum over the 60- to 80-MHz band for the J68387P modulator.</p> <p>If this requirement is not met, adjust the RL control. If it still is not met, replace the defective unit in accordance with Section 411-404-503 and return the defective unit to the maintenance center.</p> <p><i>Requirement 2:</i> 29 dB minimum over the 60- to 80-MHz band for the J68387C receiver modulator.</p> <p>If this requirement is not met, replace the defective unit in accordance with Section 411-404-504 and return the defective unit to the maintenance center.</p>
4	<p>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.</p>

CHART D

IF NETWORKS

APPARATUS:

→ 1—Kruise 52011 RF/IF Test Set

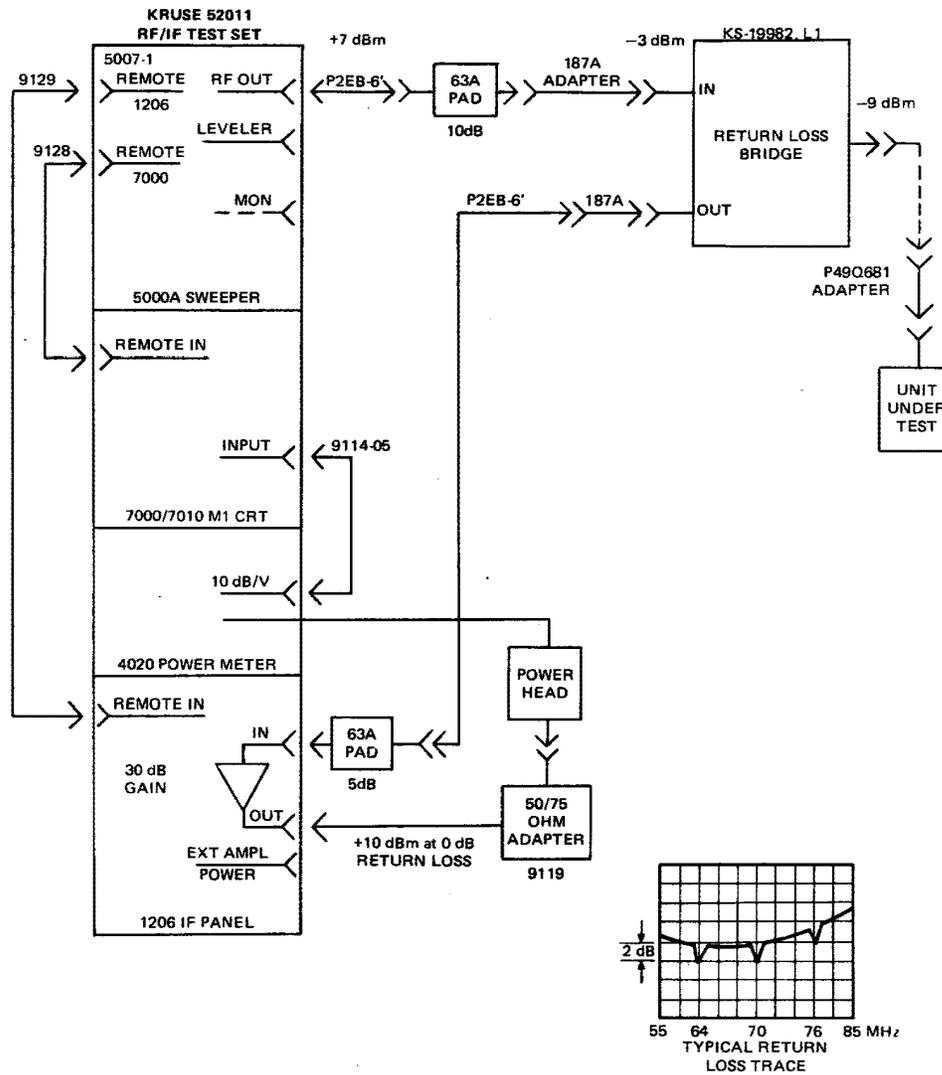
STEP	PROCEDURE
1	<p>If trouble is suspected in one or more of the IF networks, begin by connecting the return loss bridge to the appropriate port of each network to be tested through the coaxial cable normally connected to that port of the network.</p> <p><i>Note 1:</i> The return loss requirements specified 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>

CHART D (Contd)

STEP	PROCEDURE
3	<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> <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><i>Requirement:</i> 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
745 A 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
1080 Filter	Between 60 and 90 MHz	27	32



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	64 MHz
	MARKER 2-Fc	70 MHz
	MARKER 3	76 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 ± Δ F VERNIER	MAX CW
SWEEP SECONDS	.01	
SWEEP SECONDS VERNIER	MAX CW	
EXT/INT'L SWEEP (REAR)	INT'L	
OFFSET	MIDSCALE (DO NOT READJUST)	
7000-M1/ 7010-M1 CRT DISPLAY SCOPE	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. Remove connection from unknown jack on return loss bridge. Adjust sweeper RF level control for power meter reading of +10.0 dBm. This is 0 dB return loss.
4. 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 64, 70, and 76 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**