
TD-3 MICROWAVE RADIO
TRANSMITTER-RECEIVER BAY
RECEIVER TESTS
USING KRUSE 52011 IF/RF TEST SET
J68387C RECEIVER MODULATOR-IF PREAMPLIFIER

This appendix contains the procedures to be followed in checking the J68387C receiver modulator-IF preamplifier (see Fig. 1 of main section) 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

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CHART A
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 RVCR MOD 2 pushbuttons on the receiver control panel.

Requirement 1: The readings shall be 42 ± 8 units.

NOTICE
Not for use or disclosure outside the
Bell System except under written agreement

CHART A (Contd)

STEP	PROCEDURE
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Note: Adjust attenuator AT2 for repeater station, or AT3 for main station, to set current readings within these limits and centered about 42.

Requirement 2: By removing additional loss from AT2 and AT3, it shall be possible to reach full-scale indication on the meter for both pushbutton positions.

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 B, Step 1.

- 2 If the requirements in Step 1 are not met, perform the following checks in sequence.
 - (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.
 - (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.
- 3 If the requirements in Step 1 still are not met, replace the 416C diodes in the receiver modulator block (must be replaced in pairs).

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.

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.
- 4 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.

CHART B

IF PREAMPLIFIER REPLACEMENT

STEP	PROCEDURE
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- 1 Remove the IF preamplifier from the receiver modulator by disconnecting the power plug and removing the three retaining screws (see Fig. 1 of the main section). Replace the IF preamplifier with a spare unit.

CHART B (Contd)

STEP	PROCEDURE
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 C

GAIN AND AMPLITUDE RESPONSE TESTS

APPARATUS:

- 1—Kruse 52011 IF/RF Test Set
 - 1—P48Q348 IF Test Jig
 - 1—P49Q685 Cable Assembly
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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 B, 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 Exhibit 1.
4	Change to option (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. <i>Requirement 1:</i> 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. <i>Requirement 2:</i> 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.
7	Without adjusting any controls, change to options (U) and (Z). <i>Requirement:</i> The IF OUT level shall not deviate by more than ± 0.50 dB from that obtained in Step 6.

CHART C (Contd)

STEP	PROCEDURE
8	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.
9	Reconnect the IF preamplifier to the modulator block in the bay.
10	Repeat the tests on the receiver modulator-IF preamplifier given in Section 411-404-501.
11	If the amplitude response and gain requirements still cannot be met, replace the 416C diodes as described in Chart A and repeat the tests on the receiver modulator-IF preamplifier given in Section 411-404-501.

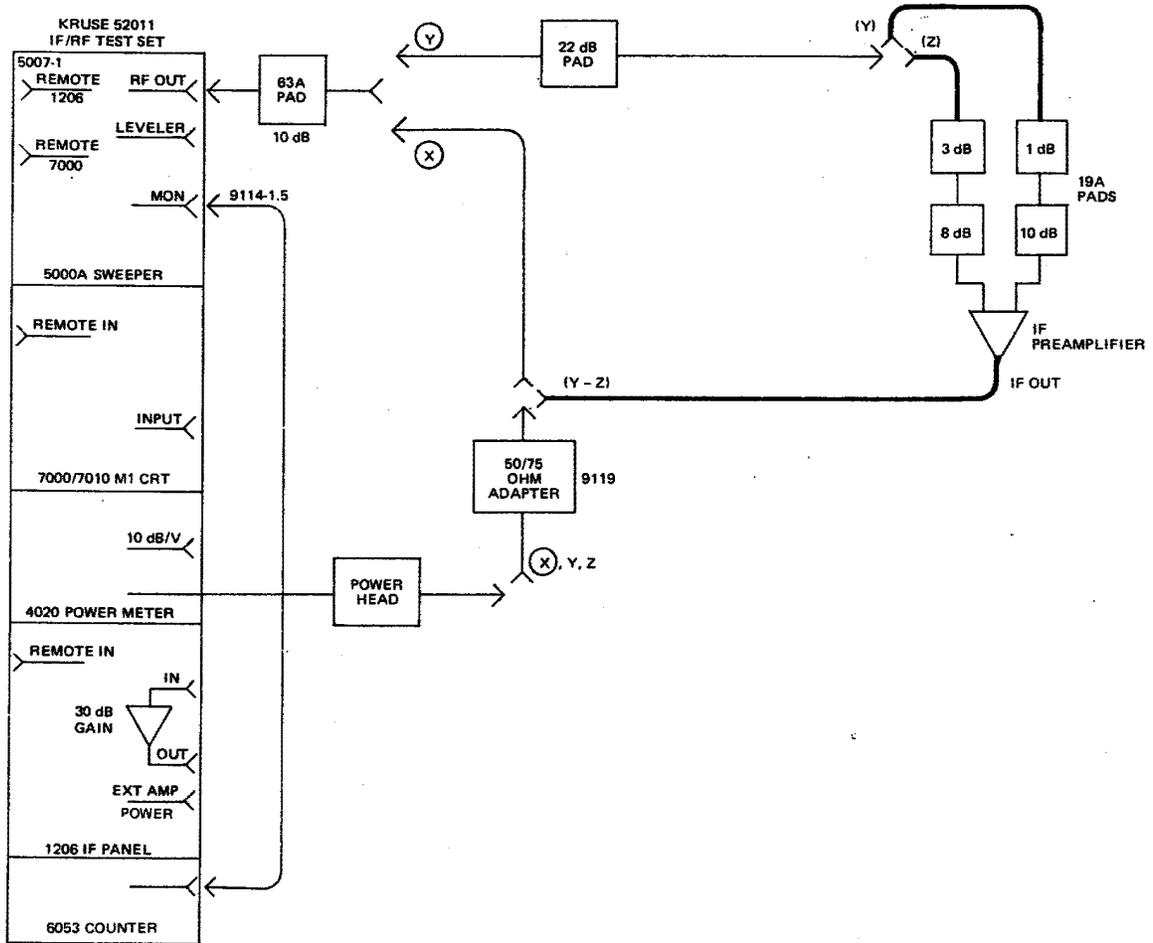
CHART D

NOISE FIGURE TESTS

APPARATUS:

1—Kruse 52011 IF/RF Test Set

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



PREPARATION FOR TEST

1. Allowing 5 minutes warm-up, operate controls on the test set as follows:

UNIT	CONTROL	POSITION
5000A SWEEPER WITH 50007-1 IF PLUG-IN	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	CCW
	1 KHz	OFF
	LEVELER	INT
	RETRACE	ON
	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	
4020 POWER METER	LEVEL	10 DB/V
	GROUNDING	INT
	OFFSET	MID-SCALE
COUNTER	ATTENUATOR	X1
	RESOLUTION	1K
	EXT/INT (REAR)	INT

OSCILLOSCOPE CALIBRATION

1. Set scope controls:

CONTROL	POSITION
OFFSET	MID-SCALE (DO NOT READJUST)
GAIN	X1
POLARITY	+UP
BW	30 kHz
INPUT	DC
DB/DIV AT 10 DB/V	.05 DB/DIV - 5 MV/DIV
VARIABLE (RED)	MAX CW DETENT

- Adjust sweeper MODE control to WIDE F1-F2 position.
- Adjust power meter OFFSET control to position trace on center of oscilloscope.
- Adjust HORIZONTAL POS and GAIN controls to position trace ends at each extreme of horizontal scale. The horizontal scale calibration is 3 MHz/div with markers at 61, 70, and 79 MHz.
- Switch vertical sensitivity control on scope to .05 dB/div - 5 mV/div. (This calibrates scope for 0.05 dB/div.)

- 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 option (X) and adjust sweeper RF LEVEL control for 0 dBm power meter reading.
- Connect option (Y).

**IF-to-IF Transmission—Test Setup
Exhibit 1**