# TD-3 MICROWAVE RADIO

# J68386G AND J68386H TRANSMITTER-RECEIVER BAYS

# TESTS USING THE KRUSE 52011 IF/RF TEST SET

# 70A DETECTOR, 27A OR 28A INTEGRATED CIRCUIT

# REPLACEMENT

This appendix supplements Section 411-502-505.

It contains the procedures to be followed in checking and replacing, if necessary, the 70A detector, the 27A integrated circuit, or the 28A integrated circuit when trouble is experienced with one of these units. The tests in Section 411-502-500, Common Equipment Tests — Preliminary Checks, should be made before performing any of the procedures given in this appendix.

Begin the tests with Charts A, B, or C depending upon which circuit exhibits the trouble condition.

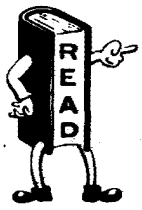
*Notes:*

1. The tests and procedures of this appendix are to be performed only when a trouble condition cannot be cleared with normal routine maintenance procedures. Some of the adjustments called for in this appendix involve redoing factory adjustments which are not normally meant to be field adjustable.

2. Spares are not normally provided for the circuits tested in this appendix.

*Caution 1: These tests are to be 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: When removing and replacing waveguide units, care should be exercised to prevent foreign matter from entering the waveguide. Handle all types of waveguide carefully in order to prevent damage to the mating surfaces. When connecting waveguide units, flange mating surfaces must be carefully aligned, and all screws tightened securely to prevent RF leakage.*




*Warning: DO NOT leave energized waveguides unterminated. The RF power density that may be encountered is potentially hazardous to the eyes and body tissue.*

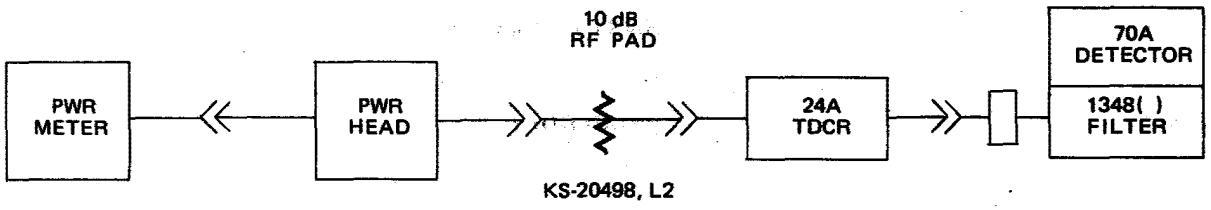
## CHART A

## 70A DETECTOR TESTS

**APPARATUS:**

1—Kruse 52011 IF/RF Test Set

| STEP | PROCEDURE |
|---|---|
| 1 | Remove the receiver modulator — IF preamplifier from the bay as directed in Chart 4 of Section 411-504-503 (Steps 1 through 4). |
| 2 | Connect test apparatus to the exposed port of the 1348-type filter in accordance with Fig. 1. |
| 3 | Set RCVR PWR switch on the bay to ON position. |
| 4 | Using the ATT 2 control on the 28A integrated circuit (main station bay) or the PWR ADJ control on the 40-MHz oscillator (repeater station bay), adjust the BO power for a power meter indication of +6 dBm minus loss of RF pad. |
| 5 | Read the SHIFT MOD OUT (repeater station bay) or MWV GEN OUT (RCVR) (main station bay) indication on the meter panel.<br><br>*Requirement:* 70±10.<br><br>If the requirement is met, proceed to Step 8; otherwise proceed with Step 6. |
| 6 | Adjust calibration control on the 70A detector for a SHIFT MOD OUT or MWV GEN OUT (RCVR) meter indication of 70.<br><br>If the requirement is met, proceed to Step 8; otherwise proceed with Step 7.<br><br>*Note:* The calibration control may have been secured at the factory with Glyptol; if so, it will be necessary to break the seal. |
| 7 | Replace the 70A detector as directed in Chart 4 in main section. Recalibrate the replacement by repeating Steps 4 and 6.<br><br>*Note:* Before replacing the detector, make sure that the problem does not lie in the meter circuit or bay wiring. |
| 8 | Set RCVR PWR switch on the bay to OFF position, and remove test apparatus connected to the bay. |
| 9 | Reinstall receiver modulator — IF preamplifier by reversing the procedure called for in Step 1. |




**Preparation For Test**

Depress power meter DBM 50 ohm key.

**70A Detector**
**Kruse 52011 IF/RF — Test Arrangement**
**Fig. 1**

**CHART B**

**27A INTEGRATED CIRCUIT TESTS**

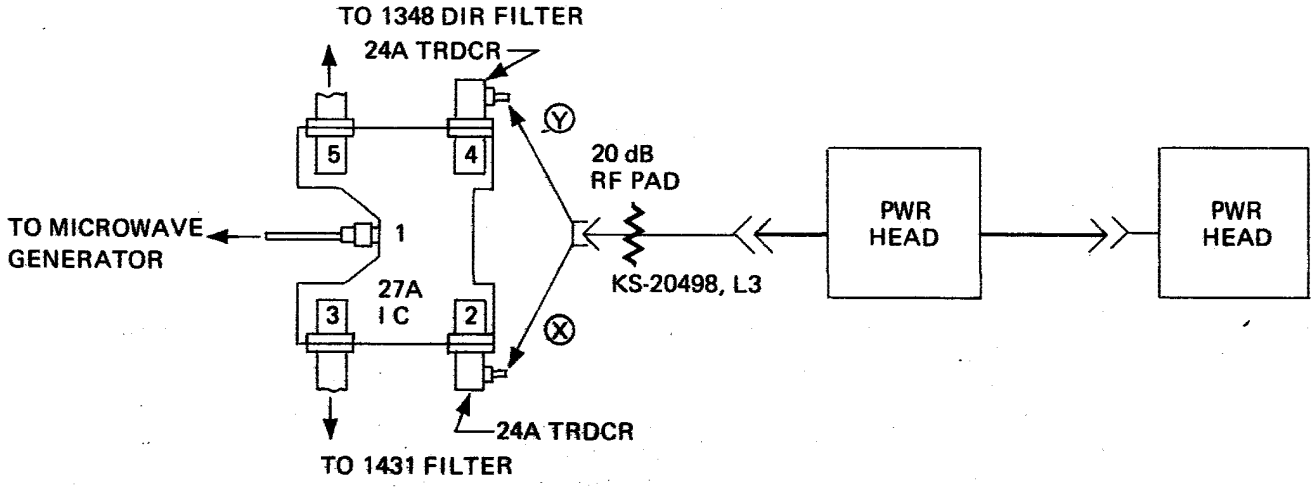
APPARATUS:

1—Kruse 52011 IF/RF Test Set
1—AT-7825 Screwdriver

| STEP | PROCEDURE |
|---|---|
| 1 | Remove the IF driver amplifier — transmitter modulator from the bay as directed in Section 411-506-503. |
| 2 | Connect test apparatus to the exposed port on the 27A integrated circuit in accordance with Fig. 2, option (X). |
| 3 | Set RCVR PWR switch on the bay to the ON position. |
| 4 | Using the LEV ADJ control on the microwave generator, adjust the BO power for a power meter indication of +18 dBm minus the calibrated loss of the 20 dB RF pad.<br><br>If unable to make the adjustment proceed to Step 14; otherwise proceed with Step 5. |
| 5 | Read the MWV GEN OUT indication on the meter panel.<br><br>*Requirement:* 70 ±10<br><br>If the requirement is met, proceed to Step 7; otherwise proceed with Step 6. |

**CHART B (Cont)**

| STEP | PROCEDURE |
|---|---|
| 6 | Adjust MON ADJ control on the 27A integrated circuit for a MWV GEN OUT meter indication of 70.<br><br>If unable to make the adjustment proceed to Step 14; otherwise proceed with Step 7.<br><br>*Note:* The MON ADJ control may have been secured at the factory with Glyptol; if so, it will be necessary to break the seal. |
| 7 | Set RCVR PWR switch on the bay to the OFF position, and remove the test apparatus connected to the bay. |
| 8 | Reinstall the IF driver amplifier — transmitter modulator by reversing the procedure called for in Step 1. |
| 9 | Remove 40-MHz oscillator — shift modulator from the bay as directed in Section 411-502-503. |
| 10 | Connect test apparatus to the exposed part on the 27A integrated circuit in accordance with Fig. 2, option (Y). |




**Preparation For Test**

Depress power meter DBM 50 ohm key.

**27A Network**
**Kruse 52011 IF/RF Test Set**
**Fig. 2**

**CHART B (Cont)**

| STEP | PROCEDURE |
|---|---|
| 11 | Set RCVR PWR switch on the bay to the ON position, and read RF power meter.<br><br>*Requirement:* +18.0 dBm ±1 dB minus the calibrated loss of the 20 dB RF pad.<br><br>If the requirement is met, proceed to Step 15; otherwise continue with Step 12. |
| 12 | Read and record MWV GEN OUT meter reading. |
| 13 | Adjust PWR SPLIT control on the 27A integrated circuit and LEV ADJ control on the microwave generator to meet the requirement in Step 11 while maintaining the MWV GEN OUT indication recorded in Step 12. (Some interplay between the two controls will probably be necessary.)<br><br>*Note:* The PWR SPLIT control may have been secured at the factory with Glyptol, if so, it will be necessary to break the seal.<br><br>If able to perform the adjustment, proceed to Step 15; otherwise continue with Step 14. |
| 14 | Replace the 27A integrated circuit as directed in Chart 4 in main section. Recalibrate replacement circuit by repeating Steps 1 through 13.<br><br>*Note:* Before replacing the 27A integrated circuit, make sure that the problem does not lie elsewhere in the bay, such as in the following:<br><br>(a) Meter circuit or bay wiring.<br><br>(b) Semirigid cable connecting the microwave generator to the integrated circuit.<br><br>(c) Microwave generator. |
| 15 | If able to meet the requirements and make the adjustments called for in this chart, the 27A integrated circuit is operating satisfactorily, and the trouble is elsewhere in the bay. |
| 16 | Set RCVR PWR switch on the bay to OFF position, and remove test apparatus connected to the bay. |
| 17 | Reinstall the 40-MHz oscillator — shift modulator by reversing the procedure called for in Step 9. |
| 18 | Before returning the bay to service, it should be routined as outlined in the following sections.<br><br>411-502-500 Preliminary Checks<br><br>411-504-501 Receiver Tests — Transmission<br><br>411-506-501 Transmitter Tests — Transmission |

**CHART C**

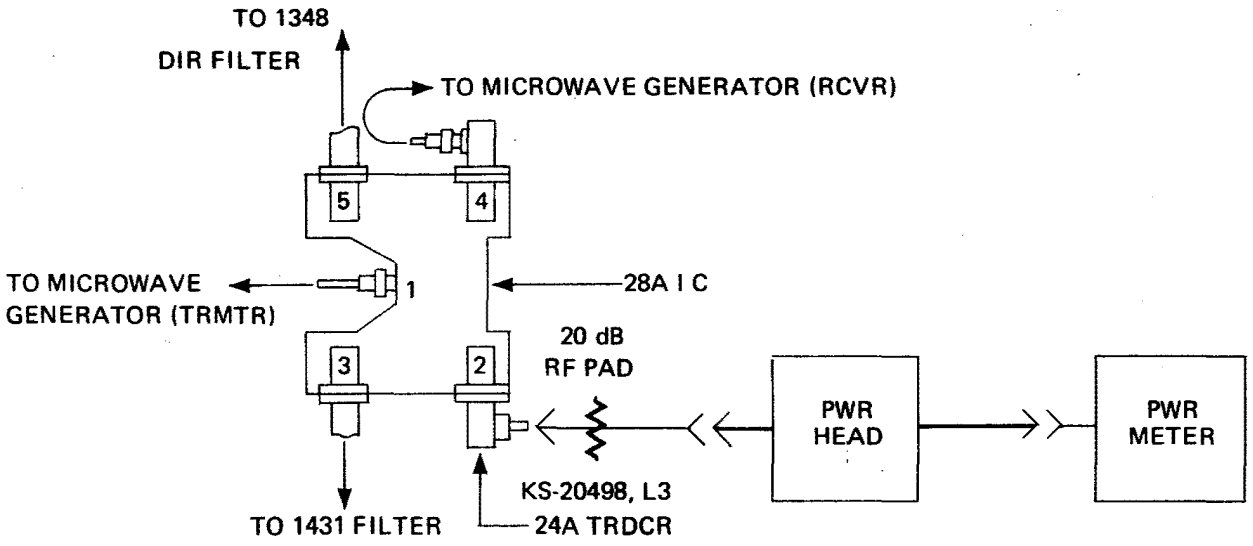
**28A INTEGRATED CIRCUIT TESTS**

**APPARATUS:**

1—Kruse 52011 IF/RF Test Set
1—AT-7825 Screwdriver

| STEP | PROCEDURE |
|---|---|
| | *Note:* If the trouble is associated with the main station receiver, begin with Step 7. If associated with the main station transmitter, begin with Step 1. |
| 1 | Remove the IF driver amplifier — transmitter modulator from the bay as directed in Section 411-506-503. |
| 2 | Connect test apparatus to the exposed port on the 28A integrated circuit in accordance with Fig. 3. |
| 3 | Set TRMTR PWR switch on the bay to the ON position. |
| 4 | Using the ATT 1 control on the 28A integrated circuit, adjust the BO output power for a power meter indication of +18.0 dBm minus the calibrated loss of the 20 dB RF pad.<br><br>If unable to make the adjustment, proceed to Step 11; otherwise proceed with Step 5. |
| 5 | Read the MWV GEN OUT (TRMTR) indication on the meter panel.<br><br>*Requirement:* 70 ±10<br><br>If the requirement is met, proceed to Step 12; otherwise proceed with Step 6. |
| 6 | Adjust MON ADJ control on the 28A integrated circuit for a MWV GEN OUT (TRMTR) meter indication of 70.<br><br>*Note:* The MON ADJ control may have been secured at the factory with Glyptol, if so, it will be necessary to break the seal.<br><br>If unable to make the adjustment proceed to Step 11; otherwise go to Step 12. |
| 7 | Remove the receiver modulator — IF preamplifier from the bay as directed in Section 411-504-503. |
| 8 | Connect test apparatus to the exposed port of the 1348-type filter in accordance with Fig. 1. |
| 9 | Set RCVR PWR switch on the bay to ON position. |

**CHART C (Cont)**




**Preparation For Test**

Depress power meter DBM 50 ohm key.

**28A Integrated Circuit — Test Arrangement**
**Fig. 3**

| CHART C (Cont) | |
|---|---|
| **STEP** | **PROCEDURE** |
| 10 | Using the ATT 2 control on the 28A integrated circuit, adjust the BO power for a power meter indication equal to the +6 dBm minus the loss of RF pad.<br><br>If able to make the adjustment, proceed to Step 12; otherwise proceed with Step 11. |
| 11 | Replace the 28A integrated circuit as directed in Chart 4 in main section. Recalibrate the replacement by repeating Steps 1 through 6.<br><br>*Note:* Before replacing the 28A integrated circuit, make sure that the problem does not lie elsewhere in the bay, such as in the following:<br><br>(a) Meter circuit or bay wiring.<br><br>(b) Semirigid cables connecting the microwave generators to the integrated circuit.<br><br>(c) Microwave generators. |
| 12 | If able to meet the requirements and make the adjustments called for in this chart, the 28A integrated circuit is operating satisfactorily, and the trouble is elsewhere in the bay. |
| 13 | Set RCVR PWR and TRMTR PWR switches on the bay to OFF position, and remove test apparatus connected to the bay. |
| 14 | Reinstall the receiver modulator — IF preamplifier and IF driver amplifier — transmitter modulator by reversing the procedures called for in Steps 1 and 7. |
| 15 | Before returning the bay to service, it should be routined as outlined in the following sections.<br><br>411-502-500 Preliminary Checks<br><br>411-504-501 Receiver Tests — Transmission<br><br>411-506-501 Transmitter Tests — Transmission |