

## TD-3 MICROWAVE RADIO TRANSMITTER-RECEIVER BAY TRANSMITTER TESTS USING PORTABLE TEST EQUIPMENT

### 1. GENERAL

**1.01** This section describes procedures for making tests on the broadband transmitter portion of the TD-3 radio system, using portable test equipment.

**1.02** The alignment is performed by supplying an IF signal from the Kruse Electronics IF-RF Sweeper using the 5007-1 IF plug-in assembly. Gain and amplitude response measurements are made at the output of the transmitter TWT. If overall transmission requirements are not met, tests are made in sequence at the output of the IF carrier resupply, transmitter modulator, and TWT amplifier

### 2. APPLICATION

**2.01** Section 411-400-501 should be completed prior to this section and the results used as a guide to possible sources of trouble.

**2.02** Preliminary checks should be made on the microwave generator and voltage regulator per Section 411-402-900 LL to establish the correct levels before performing tests in this section.

**2.03** If IF RETURN LOSS measurements are to be made, they should be done before the tests in this section.

### 3. PRECAUTIONS

**3.01** These tests are to be performed only on an out-of-service basis.

**3.02** Do not open waveguide joints without first removing the IF signal from the input of the transmitter modulator.

**3.03** Before performing any of the tests in this section, remove the transmitter 1322-type bandpass filter, FL4, located above the 24B directional coupler. Connect a 522A termination at the output

of the 24B directional coupler DC3. Place a shorting plate on the flexible waveguide attached to the channel combining network Z4. Reconnect cable removed in Step 3.02.

### 4. CONTENTS

#### 4.01

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### 5. APPARATUS

IF TEST PANEL (J68425A-1)

POWER METER (GENERAL MICROWAVE 460-N420C)

OSCILLOSCOPE (HEWLETT PACKARD H02-1202A)

FREQUENCY COUNTER (SYSTRON DONNER 7018-8)

IF, RF SWEEPER (KRUSE-STORKE, 5000)

MISCELLANEOUS GENERAL PURPOSE TEST COMPONENTS

IF MAIN AMPLIFIER (J683875-1)

**CHART 1**  
**IF CARRIER RESUPPLY CHECKS**

| STEP | PROCEDURE   |
|------|---|
|      | <b>FREQUENCY AND OUTPUT POWER CHECKS</b>  |
| 1    | Remove the normal connection from the IF IN jack of the IF Limiter.   |
| 2    | Prepare for test in accordance with Figure 1. Measure the output power of the carrier resupply.<br><br><i>Requirement:</i> $-8.0 \text{ dBm} \pm 0.2 \text{ dB}$ . This corresponds to $-7.0 \pm 0.2 \text{ dBm}$ at the resupply IF OUT jack. If this requirement is not met, adjust the 70 MC LEV control on the carrier resupply. If the requirement still is not met, replace the carrier resupply with a spare unit.   |
| 3    | Rearrange Figure 1 for options (U and Y) and measure the resupply frequency.<br><br><i>Requirement:</i> Between 69.996 and 70.004 MHz. This frequency should be noted for entry in the Transmitter Log. If requirement is not met, replace carrier resupply.  |
| 4    | Rearrange Figure 1 for options (W, X, S, and V).  |
| 5    | Adjust EXT AMP GAIN control on the IF TEST PANEL to obtain the same power meter reading as in Step 2, ie, $-8.0 \text{ dB} \pm 0.2 \text{ dB}$ . This calibrates the amplifier gain.  |
| 6    | Rearrange Figure 1 for options (Z, X, S, and V) and change power meter range to 0 dBm.  |
| 7    | For a regular channel carrier resupply operating at 61 MHz and set ATTEN to 0.<br><br><i>Requirement:</i> $0 \text{ dBm} \pm 0.2 \text{ dB}$ . For a protection channel carrier resupply operating at 63 MHz set IF TEST PANEL ATTEN to 7 dB.<br><br><i>Requirement:</i> $0 \text{ dBm} \pm 0.2 \text{ dB}$ .<br><br>If the requirement is not met, adjust the 61-63 MC LEV control on the carrier resupply for 0 dBm.<br><br>If the requirement cannot be met, replace the carrier resupply with a spare unit. |
| 8    | Change option ( <b>S</b> ) to option ( <b>T</b> ) and measure the frequency.<br><br><i>Requirement:</i> Regular channel: 60.996—61.004 MHz<br>Protection channel: 62.996—63.004 MHz.<br><br>If the requirement is not met, replace the carrier resupply.  |
| 9    | Return carrier resupply connections to normal. Prepare the test setup in accordance with Figure 2.  |

| CHART 1 (Cont) |  |
|----------------|--|
| STEP           | PROCEDURE  |
| 10             | <p>Note the Transmitter Control panel meter readings for CRS 70 MC LEV and CRS 61-63 MC LEV.</p> <p><b>Requirement:</b> Between 45 and 75.</p> <p>If this requirement is not met, remove the carrier resupply cover on the side nearest the power connector. Adjust R38 (70 MHz) or R21 (61-63 MHz) for an indication of 60 on the panel meter. Replace the cover.</p>   |
| 11             | <p>Note the transmitter carrier resupply alarm should be released when the 70 MHz input is connected (as indicated by the CRS SW V on the Transmitter Control Panel).</p>  |
| 12             | <p>Read the CRS SW VOLTS on the transmitter control panel meter.</p> <p><b>Requirement:</b> Within five units of the penciled reading.</p> <p>If the requirement is not met, it may indicate that the oscillator is being swept. Verify OSC MODE selector is in CW position. If panel meter still reads 0, adjust trip control on the carrier resupply fully clockwise. If panel meter still reads 0, replace the carrier resupply.</p>  |
| 13             | <p>Rearrange Figure 2 for option (X). Set the portable 24B Attenuator for minimum attenuation. Readjust the OSC RF LEVEL for a power meter indication of <math>-10</math> dBm.</p>   |
| 14             | <p>Slowly increase the 24B ATTEN until panel meter drops to 0. Measure the power.</p> <p><b>Requirement:</b> @ <math>-13</math> dBm <math>+0.5</math> dB.</p> <p>If this requirement is not met, adjust ATTEN for a power meter reading of <math>-13</math> dBm <math>+0.2</math> dB and then adjust the trip control so that the carrier resupply just trips.</p>   |
| 15             | <p>Slowly decrease the attenuation of the 24B ATTEN until panel meter indicates upscale. Measure the power.</p> <p><b>Requirement:</b> @ <math>-10</math> dBm <math>\pm 0.5</math> dB.</p> <p>If this requirement is not met and the power is less than <math>-10</math> dBm, adjust the Restore Control clockwise. If the requirement is not met and the power is more than <math>-10</math> dBm, adjust the Restore Control counterclockwise. Repeat Steps 13, 14, and 15 until the requirements are met. If the requirements cannot be met, replace the carrier resupply and repeat all resupply tests.</p> |
| 16             | <p>Rearrange Figure 2 for option (T) and set oscillator for <math>-7</math> dBm on the power meter, using options (Y) and (Z) not the Limiter Output power.</p>  |
| 17             | <p>Readjust the IF TEST PANEL ATTEN for 15 dB.</p>   |

## CHART 1 (Cont)

| STEP | PROCEDURE  |
|------|--|
| 18   | <p>Remove the cable from the LIMITER MON jack.</p> <p><b>Requirement:</b> The power shall drop by at least 20 dB from that obtained in Step 15.</p> <p>If the requirement is not met, the trouble could be in either the carrier resupply or the limiter. Try replacing the limiter first.</p>   |
| 19   | <p>Reconnect the cables between the limiter and carrier resupply. Reset IF TEST PANEL ATTEN to 6 dB. Depress the alarm reset switch and note that no alarms are present. Remove the input from the IF IN jack on the limiter.</p> <p><b>Requirement:</b> A TRMTR ALARM shall occur between 40 and 60 seconds after the cable is removed. If this requirement is not met, adjust the DELAY ADJ control. (Clockwise rotation increases the time delay.) If the requirement cannot be met, replace the carrier resupply.</p> <p><b>Note:</b> On initial installation proceed to Charts 3 and 4.</p> |

## CHART 2

## OVERALL TRANSMISSION

## APPARATUS:

1—Set of portable test equipment per BTL Drawing L-802190

| STEP | PROCEDURE   |
|------|---|
| 1    | <p>Observe the CATHODE CURRENT meter on the TWT power supply.</p> <p><b>Requirement:</b> <math>40 \pm 0.5</math> mA.</p> <p>Proceed with Step 2 even if this requirement is not met. However, observe the note associated with Step 2.</p>  |
| 2    | <p>Prepare for test in accordance with Figure 3 and connection option (Y). Remove the MON 2 or MON 3 detector from the 24B directional coupler at the output of the TWT and measure the transmitter power output by connecting to option (V) of Figure 3.</p> <p><b>Requirement:</b> <math>+27.5</math> dBm <math>\pm 0.2</math> dB minus the calibrated loss of the 24B directional coupler.</p> |

| CHART 2 (Cont) |   |
|----------------|---|
| STEP           | PROCEDURE   |
| 3              | <p><b>Note:</b> If the requirement of Step 1 was not met, first adjust the TWT voltages in accordance with Step 5 of Chart 5 to obtain 40 mA of cathode current. Then check that the output power meets the above requirement.</p> <p>If this requirement is not met, adjust the 31A attenuator AT3 or AT4 ahead of the TWT to obtain the required power. If the requirement still cannot be met, perform Charts 3, 4, 5, and 6 in sequence.</p> <p>Rearrange test connections per Figure 3, options (Y) and (T) and adjust oscilloscope DC BALANCE. Change the attenuation of the variable pad from 1.0 dB to 1.5 dB and adjust the oscilloscope vertical sensitivity and position controls for a change of ten divisions. Center the trace. The oscilloscope is not calibrated for 0.05 dB per division. The test trace displays the combined amplitude response of the limiter, carrier resupply, transmitter modulator, and TWT amplifier.</p> <p><b>Requirement 1:</b> Flat to within 0.06 dB over the <math>\pm 6</math> MHz band with the rolloff at <math>\pm 10</math> MHz not to exceed 0.10 dB.</p> <p><b>Requirement 2:</b> There shall be no evidence of carrier resupply switching between 60 and 80 MHz. See Figure 6 for an example of this condition.</p> <p>If these requirements are not met, perform Charts 3, 4, 5, and 6 in sequence. Do not be tempted to adjust any unit in order to meet the requirements because it may be compensating for some other trouble.</p> |
| 4              | <p>Reconnect the MON 2 or MON 3 detector and press the TRMTR OUT pushbutton.</p> <p><b>Requirement:</b> The meter reading shall be the same as that previously recorded on the control panel.</p> <p>If this requirement is not met, erase the previously recorded reading, record the new reading, and perform its transmitter output alarm adjustment in Chart 6, Steps 3 through 7.</p>  |
| 5              | <p>If all requirements in this chart have been met, remove the IF cable from the IF IN jack of the IF DRIVER-AMP to remove the transmitted carrier. Remove the 522A termination and the shorting plate and replace the 1322-type filter. Restore the IF cable connections to the IF DRIVER-AMP and IF limiter. The transmitter can be placed in service.</p>  |

**CHART 3**  
**IF LIMITER-AMPLIFIER**

| STEP | PROCEDURE   |
|------|---|
| 1    | Prepare for test in accordance with Figure 4.   |
| 2    | <p>Rearrange the test setup to include the IF LIM and CARR RESUPPLY (option V).</p> <p><b>Requirement:</b> The test trace shall coincide with Reference and shall be flat to within 0.03 dB between 60 and 80 MHz.</p> <p>If the requirement is met, proceed with Step 5. If the requirement is not met, adjust GAIN, SLOPE 1 or SLOPE 2 control on the IF Limiter to bring the test trace within limits. (GAIN controls the output power and is adjusted for trace coincidence at 70 MHz. SLOPE 1 controls the high end slope. SLOPE 2 controls the slope across the band.) If requirements still cannot be met, proceed with Step 3.</p>                                  |
| 3    | <p>Establish test connections as in Figure 4, option (Z), and measure the amplitude response.</p> <p><b>Requirement:</b> The test trace shall coincide with Reference at 70 MHz. If not, adjust the GAIN control. The test trace shall be flat to within 0.03 dB between 60 and 80 MHz.</p> <p>If requirement cannot be met by adjusting the controls as in Step 2, replace the IF Limiter and repeat Step 2. If requirement is met, change from option (Z) to option (V) and proceed to Step 4.</p>  |
| 4    | <p>Note the separation between test trace and Reference at 70 MHz. Compare the amplitude response to that obtained in Step 3.</p> <p><b>Requirement 1:</b> The amplitude response shall not differ from that of Step 3 by more than 0.02 dB between 60 and 80 MHz.</p> <p><b>Requirement 2:</b> The separation of traces at 70 MHz shall be less than 0.2 dB (obtain by moving sensitivity back to 2 as in Step 7 in Preparation for Test.)</p> <p>If either of these requirements is not met, replace cable between limiter IF OUT jack and carrier resupply IF IN jack and retest as in Step 2. If either requirement is still not met, replace the carrier resupply.</p> |
| 5    | <p>Set the scope vertical sensitivity to 2MV/DIV and recalibrate the scope for 1 dB per division sensitivity. Reset trace to Reference with scope offset. Replace 10 dB pad between oscillator and limiter IF IN jack with a 20 dB pad.</p> <p><b>Requirement:</b> The test trace shall be within 3 divisions of Reference (3 dB).</p>  |
| 6    | Return 10 dB pad between IF OSC and IF IN jack of limiter. Restore normal connection to carrier resupply IF OUT jack.   |

## CHART 4

## TRANSMITTER MODULATOR

| STEP | PROCEDURE  |
|------|--|
|      | <p>The adjustment procedure for main and repeater station bays is the same; however, the filter, isolator, and attenuator designations are different.</p> <p><b>POWER/GAIN ADJUSTMENT</b></p> <p>1 Disconnect and remove isolator A7 (main) or A6 (repeater) and the flexible waveguide connected to tuner Z2.</p> <p><i>Note:</i> Cover Z2 to prevent foreign objects from entering.</p> <p>2 Attach a 24A transducer to the output of attenuator AT4 (main) or AT3 (repeater).</p> <p>3 Prepare the test in accordance with Figure 3, options (Y) and (U).</p> <p>4 Set AT4 (main) or AT3 (repeater) for minimum attenuation and measure the power.</p> <p><i>Requirement:</i> The power meter shall indicate between <math>-2.0</math> and <math>+4.0</math> dBm. (This corresponds to a power between <math>+8</math> and <math>+14</math> dBm at ATTN output.) At this point refer to Section 411-406-503, Chart 1, for beat-suppression test.</p> <p>5 Adjust AT4 (main) or AT3 (repeater) for a power meter reading of <math>-3.5</math> dBm.</p> <p>6 On the transmitter control panel, record (in pencil in the space provided) the meter indications obtained for the TRMTR MOD 1 and TRMTR MOD 2.</p> <p><i>Requirement:</i> Between 0 and 35; if greater than 35, refer to Section 411-406-503.</p> <p><b>AMPLITUDE RESPONSE</b></p> <p>7 Prepare for test in accordance with Figure 3, options (Y) and (S). Set scope sensitivity to 1MV/DIV. With the scope Vertical Position Control at midrange, set the scope display on the upper graticule with the scope offset. Calibrate scope by moving adjustable RF ATTEN between 1 and 1.5 dB Cal scope for 10 division vertical sensitivity. Then recenter trace with vertical position control. This calibrates scope for 0.05 dB/DIV. Measure the amplitude response.</p> <p><i>Requirement:</i> The amplitude shall be flat within 0.03 dB at <math>\pm 10</math> MHz about the RF channel center frequency with inband irregularities being less than 0.02 dB. The objective here is to obtain the same amplitude response as seen at the output of the carrier resupply Step 2, Chart 3.</p> <p>If the requirement is not met, adjust the HIGH SLOPE, LOW SLOPE and GAIN controls on the IF Driver Amplifier. It may be necessary to adjust AT4 (main) or AT3 (repeater) to maintain <i>reference</i>. If this requirement still is not met, refer to Section 411-406-503.</p> |

## CHART 4 (Cont)

| STEP | PROCEDURE   |
|------|---|
| 8    | If adjustments were required in Step 7, repeat Step 5 to check that the modulator has its required power.   |
| 9    | Measure the power at the transducer as shown in Figure 3, option (U) and adjust AT4 (main) or AT3 (repeater) for $-5.0$ dBm on the power meter. This corresponds to $+5$ dBm at the output of the attenuator. |
| 10   | Remove the transducer connected to AT4 or AT3 and reconnect the isolator and flexible waveguide.  |

## CHART 5

## TWT AMPLIFIER ADJUSTMENT

## APPARATUS:

1—Set of portable test equipment per BTL Drawing L-802190

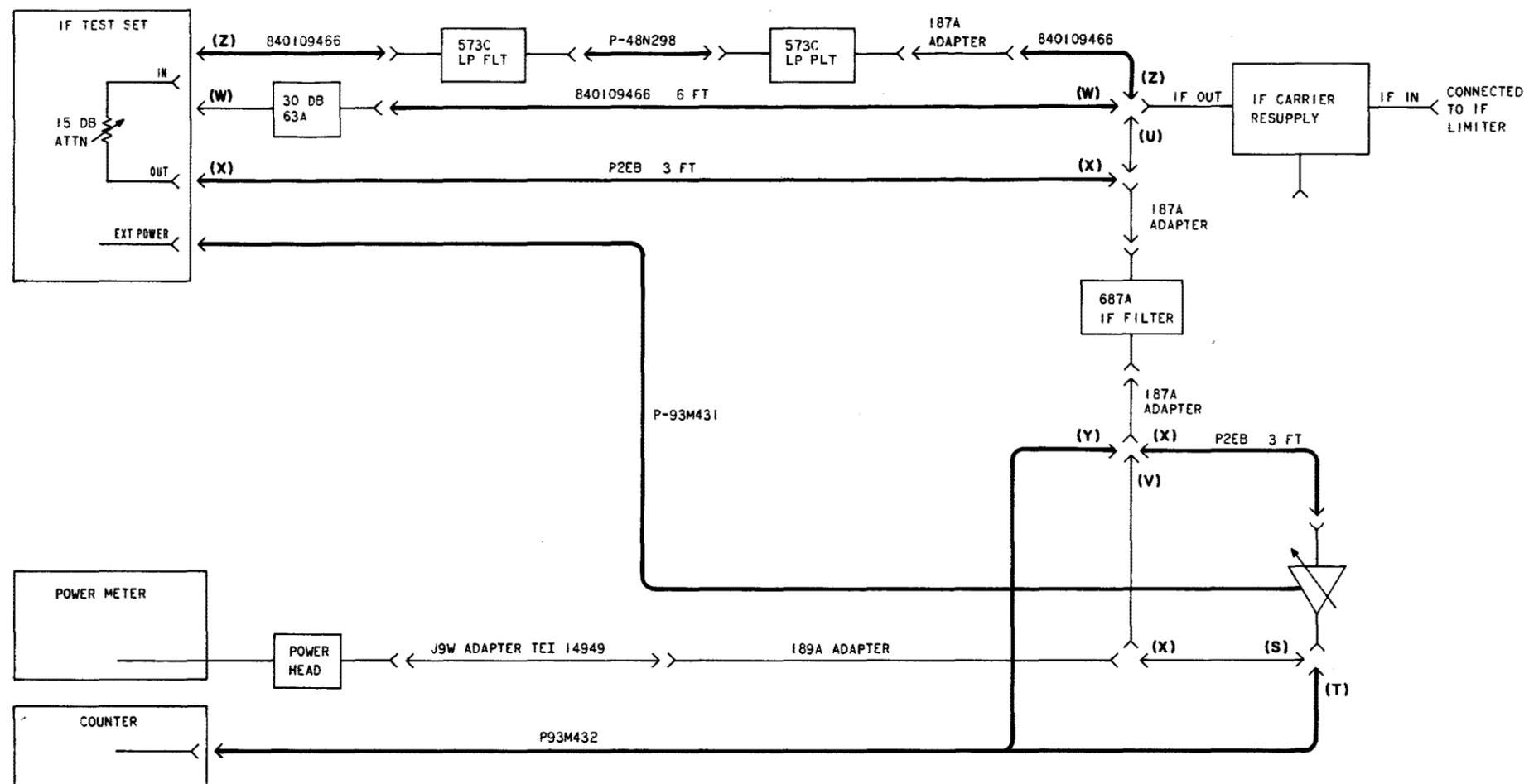
| STEP | PROCEDURE   |
|------|---|
|      | <p><b>Note:</b> The TWT should have been on for at least 30 minutes in order that it be at normal operating temperature before performing any test in this chart.</p>   |
| 1    | Press the TRMTR OUT pushbutton and, if necessary, adjust the 31A attenuator AT3 or AT4 ahead of the TWT to obtain the recorded meter indication. If the recorded meter indication cannot be obtained, proceed with Step 4.  |
| 2    | <p>Read the CATHODE CURRENT on the TWT power supply.</p> <p><b>Requirement:</b> <math>40 \pm 0.5</math> mA.</p> <p>If this requirement is not met, proceed with Step 4.</p>   |
| 3    | <p>Prepare for test in accordance with Figure 3, options (Y) and (T) and adjust oscilloscope DC BALANCE. Change the attenuation of the variable pad from <math>1.0</math> dB to <math>1.5</math> dB and adjust the oscilloscope sensitivity and position controls for a change of ten divisions. Center the trace. The oscilloscope is now calibrated for <math>0.05</math> dB per division. The test trace displays the combined amplitude response of the limiter, carrier resupply, transmitter modulator, and TWT amplifier.</p> <p><b>Requirement:</b> Flat to within <math>0.06</math> dB over the <math>\pm 6</math> MHz band and the rolloff shall not exceed <math>0.09</math> dB at the <math>\pm 10</math> MHz points.</p> |

## CHART 3 (Cont)

| STEP | PROCEDURE  |
|------|--|
|      | <p>The objective here is that the TWT shall be flat to within 0.02 dB over the <math>\pm 6</math> MHz band. Since the output of the transmitter modulator was flat to within 0.03 dB, the combination of transmitter modulator and TWT should at least be flat to 0.05 dB. The ideal characteristic at this point would be the same response as was obtained at the output of the transmitter modulator.</p> <p>If this requirement is met, proceed with Step 9. If the requirement is not met, proceed with Step 4.</p> <p>4 Remove the MON 2 or MON 3 detector from the 24B directional coupler at the output of the TWT and connect options (Y) and (V). Adjust Input Tuner Z2 and Output Tuner Z3 for maximum power output.</p> <p>5 Adjust the HELIX ADJ control on the inverter and heater regulator unit for maximum power output, while simultaneously adjusting the ANODE VOLTAGE ADJ control to keep the CATHODE CURRENT meter at 40 mA.</p> <p><b>Note:</b> For some tubes, the ANODE VOLTAGE ADJ control may run out of range against the counterclockwise stop during this adjustment. In these cases, it is recommended that the ANODE VOLTAGE ADJ control be left in the maximum counterclockwise position and the HELIX ADJ control be used to obtain a CATHODE CURRENT meter reading of 40 mA. This may not result in peak power output from the tube but will give the maximum power available under these conditions.</p> <p>If the conditions of this step are not met, refer to Section 411-406-504 for TWT power supply test information. A check of the TWT power supply will permit determining whether the power supply or the TWT amplifier is at fault.</p> <p>6 Adjust attenuator AT4 (main) or AT3 (repeater) to obtain (+27.5 -L) dBm. "L" is the calibrated loss of DC3.</p> <p>If the required power output cannot be obtained with the attenuator at minimum and the requirements of Chart 4 have been met, either the TWT amplifier or power supply is at fault. Refer to Section 411-406-504 for TWT power supply test information and for TWT amplifier replacement procedure.</p> <p><b>Note 1:</b> If the power output cannot be reduced to this value, repeat the test in Chart 4 with the following changes: decrease the transmitter modulator output power as low as possible with the GAIN control while still maintaining the required transmission flatness using the HIGH SLOPE and LOW SLOPE controls.</p> <p><b>Note 2:</b> If the attenuator has to be set to minimum to obtain this power output, it will not be possible to meet the final output setting specified in Step 8. In some cases, it may be possible to defer the replacement of a low gain TWT by obtaining more power output from the transmitter modulator. To do this, readjust the transmitter modulator as in Note 1, in this case using the GAIN control to increase the power output.</p> |

| CHART 5 (Cont)   |   |
|--|---|
| STEP   | PROCEDURE   |
| 7  | <p>Change test connections from option (V) to option (T) and adjust the oscilloscope vertical position control to position the 70 MHz point of the trace on the center graticule. Adjust Output Tuner Z3 to flatten the test trace.</p> <p><b>Note:</b> This adjustment will reduce the output power. Since the oscilloscope is calibrated for 0.05 dB per division, the decrease in output power can be determined by the amount of change at 70 MHz.</p> <p><b>Requirement 1:</b> The output power shall not be reduced by more than 1 dB.</p> <p><b>Requirement 2:</b> The flatness requirement of Step 3 shall be met.</p> <p>If either of these requirements are not met, replace the TWT amplifier in accordance with Section 411-406-504 and repeat the tests of this chart.</p> |
| 8  | Adjust AT4 (main) or AT3 (repeater) to return the trace to the center graticule at the 70 MHz point. This restores the TWT output power to the value set in Step 6 (+37.5 dBm in the through arm of DC3).   |
| 9  | Disconnect option (Y). Perform the transmitter output alarm adjustment in Chart 6 starting with Step 3.   |
| <b>CHART 6</b><br><b>TRANSMITTER OUTPUT ALARM ADJUSTMENT</b>                   |   |
| <b>APPARATUS:</b><br>1—Set of portable test equipment per BTL Drawing L-802190 |   |
| STEP   | PROCEDURE   |
| 1  | Replace the MON 2 or MON 3 detector on the 24B directional coupler DC3 and connect option (Y) of Figure 3. Adjust AT3 (repeater) or AT4 (main) to obtain the recorded indication for the TRMTR OUT position.  |
| 2  | <p>Remove the MON 2 or MON 3 detector from directional coupler DC3. Connect option (V) in Figure 3 and measure the power.</p> <p><b>Requirement:</b> (+27.5 -L) dBm <math>\pm</math>0.2 dB. "L" is the calibrated loss of DC3.</p> <p>If the requirement is met, it can be assumed that the 3 dB drop sensitivity has not changed; proceed with Step 8. If the requirement is not met, proceed with Step 3.</p>   |

| CHART 6 (Cont) |   |
|----------------|---|
| STEP           | PROCEDURE   |
| 3              | Adjust AT4 (or AT3) to obtain (+24.5 -L) dBm. "L" is the calibrated loss of DC3. Replace the MON 2 or MON 3 detector.   |
| 4              | Adjust the TRMTR OUT ALM SET control until the Sensitrol just trips.  |
| 5              | Disconnect the MON 2 or MON 3 detector and reconnect the power meter. Adjust AT4 (or AT3) to obtain (+27.5 -L) dBm. "L" is the calibrated loss of DC3.                      |
| 6              | Remove the cable connection to DC3 and replace the MON 3 or MON 2 detector. Operate the ALARM RESET button.<br><br><b>Requirement:</b> The transmitter alarm shall release. |
| 7              | Press the TRMTR OUT pushbutton on the transmitter control panel; record the meter indication in the space provided; and remove the test connections.                        |
| 8              | Remove the transmitted carrier by disconnecting the input cable to the IF driver amplifier. Remove the 522A termination from DC3 and replace the filter FL4.                |
| 9              | Reconnect the IF cable to the IF driver amplifier and restore the normal connections to the IF limiter input.   |



PREPARATION FOR TEST

1. OPERATE THE CONTROLS ON THE TEST SETS AS FOLLOWS:

IF TEST PANEL

ATTEN                    15 DB  
 EXT AMPL GAIN        MAX CW

POWER METER

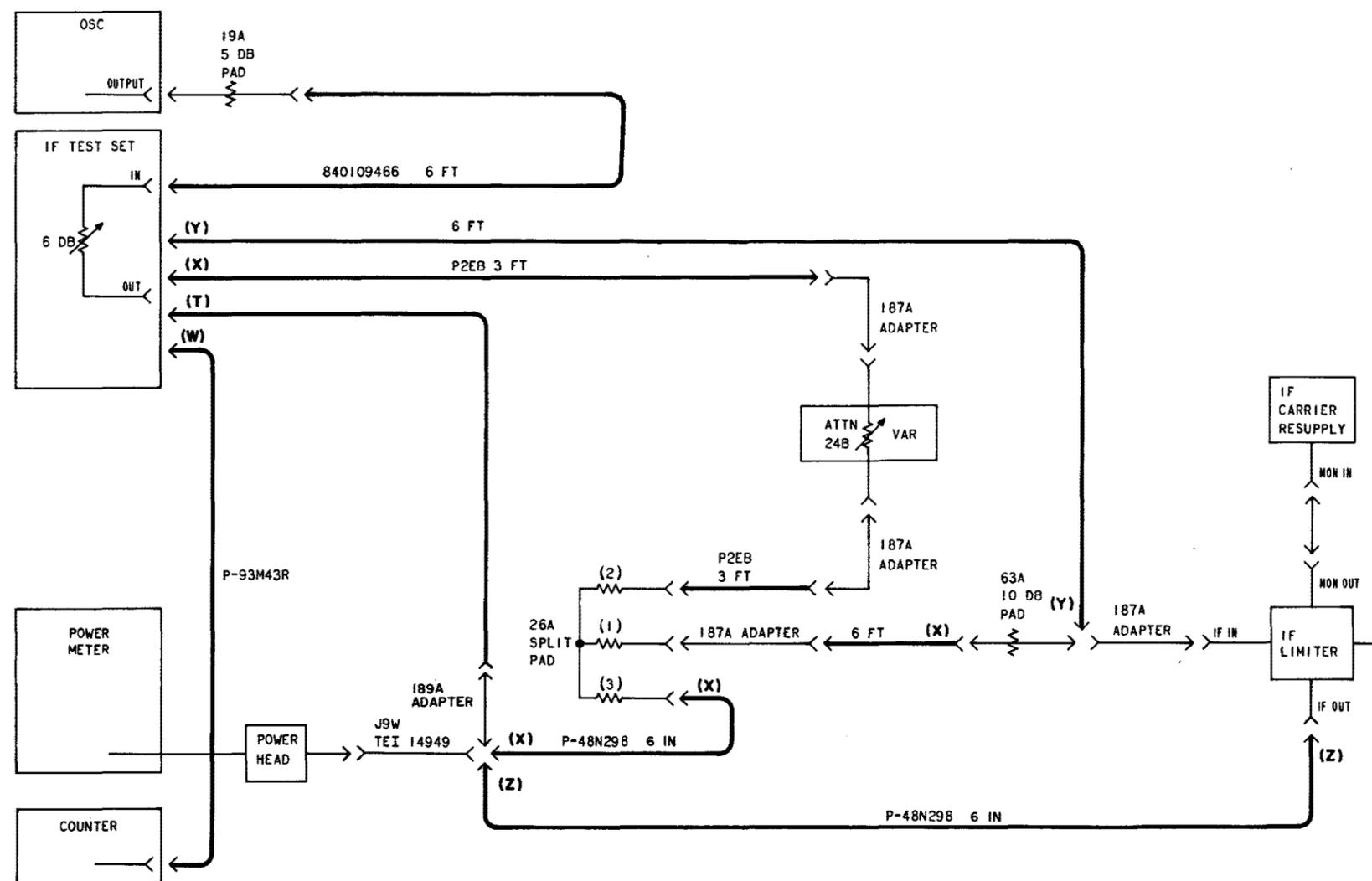
SET METER RANGE TO THE -25 DBM SCALE.  
 ZERO THE METER (BLACK SCALE) WITH THE  
 ZERO ADJUST CONTROL.

COUNTER

TIME                    MAX CCW  
 GAIN                    MAX CW  
 FREQUENCY            1 MS  
 INPUT B                INT OSC  
 COUNT A                NORMAL

2. ESTABLISH TEST CONNECTIONS USING OPTIONS (U) AND (V).
3. SET METER RANGE TO THE -5 DBM SCALE.

Fig. 1—TD-3 IF Carrier Resupply Output Power and Frequency Test Setup



PREPARATION FOR TESTS  
 1. OPERATE THE CONTROLS ON THE TEST SETS AS FOLLOWS:

OSC  
 INSERT IF PLUG-IN 5007-1 AND ATTACH PROPER SCALE.

|                       |                 |
|-----------------------|-----------------|
| F1 START              | 60MC            |
| F2 STOP               | 80MC            |
| MARKER 1              | 64MC            |
| MARKER 3              | 76MC            |
| MARKER 2FC            | 70MC            |
| VERNIER               | MAX CCW         |
| RF LEVEL              | MIDSCALE        |
| 1KHZ-OFF              | OFF             |
| LEVELER               | LEVELER OR INT* |
| RETRACE               | RETRACE OR ON   |
| MARKERS               | MARKERS OR ON   |
| MARKERS ADJ           | MIDSCALE        |
| RECUR-TRIG-LINE       | RECUR           |
| MODE                  | CW              |
| FC ± F VERNIER        | CALIBRATE       |
| SWEEP SECONDS         | 0.01            |
| SWEEP SECONDS VERNIER | MAX CW          |

\* ON OSCILLATORS HAVING THE LEVELER SWITCH DESIGNATED "LEVELER-EXT", OPERATE SWITCH TO "LEVELER" POSITION; ON OSCILLATORS HAVING THE LEVELER SWITCH DESIGNATED "INT-OFF-EXT", OPERATE SWITCH TO "INT" POSITION.

POWER METER

SET THE METER RANGE TO -25 DBM SCALE. ZERO METER (BLACK SCALE) WITH ZERO ADJUST CONTROL. RESET METER RANGE TO -5 DBM SCALE.

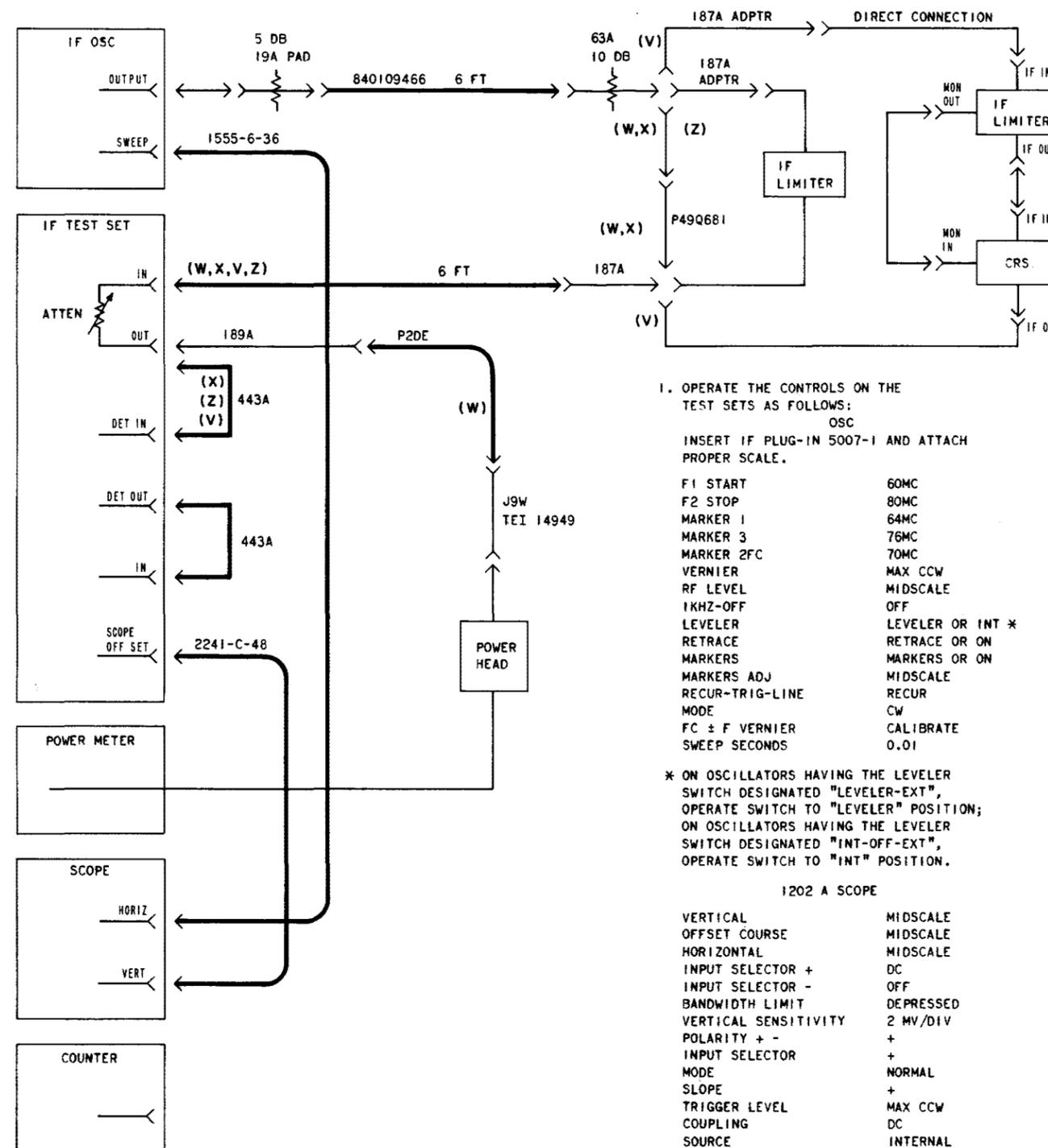
COUNTER

|           |         |
|-----------|---------|
| TIME      | MAX CCW |
| GAIN      | MAX CW  |
| FREQUENCY | IMS     |
| INPUT B   | INT OSC |
| COUNT A   | NORMAL  |

2. SET UP OPTION (T).
3. ADJUST THE IF TEST PANEL ATTN FOR 6 DB.
4. ADJUST THE RF DSC LEVEL CONTROL FOR -7 DBM ON POWER METER.
5. SET UP OPTION (W) AND ADJUST OSC MARKER 2 FC FREQUENCY FOR 70 ± 0.2 MHZ.
6. REARRANGE THE TEST SETUP FOR OPTION (Y).

Fig. 2—TD-3 IF Carrier Resupply Trip and Restore Point Test Setup



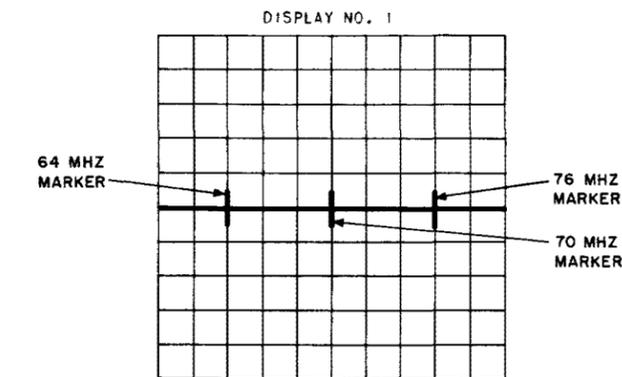


1. OPERATE THE CONTROLS ON THE TEST SETS AS FOLLOWS:
 

|   |                  |
|---|------------------|
| OSC   |                  |
| INSERT IF PLUG-IN 5007-1 AND ATTACH PROPER SCALE. |                  |
| F1 START  | 60MC             |
| F2 STOP   | 80MC             |
| MARKER 1  | 64MC             |
| MARKER 3  | 76MC             |
| MARKER 2FC  | 70MC             |
| VERNIER   | MAX CCW          |
| RF LEVEL  | MIDSCALE         |
| 1KHZ-OFF  | OFF              |
| LEVELER   | LEVELER OR INT * |
| RETRACE   | RETRACE OR ON    |
| MARKERS   | MARKERS OR ON    |
| MARKERS ADJ                                       | MIDSCALE         |
| RECUR-TRIG-LINE                                   | RECUR            |
| MODE  | CW               |
| FC ± F VERNIER                                    | CALIBRATE        |
| SWEEP SECONDS                                     | 0.01             |

\* ON OSCILLATORS HAVING THE LEVELER SWITCH DESIGNATED "LEVELER-EXT", OPERATE SWITCH TO "LEVELER" POSITION; ON OSCILLATORS HAVING THE LEVELER SWITCH DESIGNATED "INT-OFF-EXT", OPERATE SWITCH TO "INT" POSITION.

- 1202 A SCOPE
- |                         |               |
|-------------------------|---------------|
| VERTICAL                | MIDSCALE      |
| OFFSET COURSE           | MIDSCALE      |
| HORIZONTAL              | MIDSCALE      |
| INPUT SELECTOR +        | DC            |
| INPUT SELECTOR -        | OFF           |
| BANDWIDTH LIMIT         | DEPRESSED     |
| VERTICAL SENSITIVITY    | 2 MV/DIV      |
| POLARITY + -            | +             |
| INPUT SELECTOR          | +             |
| MODE                    | NORMAL        |
| SLOPE                   | +             |
| TRIGGER LEVEL           | MAX CCW       |
| COUPLING                | DC            |
| SOURCE                  | INTERNAL      |
| HORIZ SELECTOR (OUTER)  | EXT HORIZ 0.5 |
| HORIZ SELECTOR (MIDDLE) | ANY POSITION  |
| HORIZ SELECTOR (INNER)  | MIDRANGE      |



- PREPARATION FOR TESTS
- POWER METER
- SET THE METER RANGE TO THE -25 DBM SCALE. ZERO THE METER (BLACK SCALE) WITH THE ZERO ADJUST CONTROL. RESET THE METER RANGE TO THE -5 DBM SCALE.
- COUNTER
- |           |         |
|-----------|---------|
| TIME      | MAX CCW |
| GAIN      | MAX CCW |
| FREQUENCY | IMS     |
| INPUT B   | INT OSC |
| COUNT A   | NORMAL  |
2. SET UP OPTION (W).
  3. ADJUST IF TEST PANEL ATTENUATOR TO 0 DB.
  4. ADJUST THE OSC LEVEL FOR A POWER METER READING OF -7 DBM.
  5. SET OSC MODE TO WIDE F1-F2.
  6. CHANGE TO OPTION (X) AND ADJUST SCOPE OFFSET ON IF TEST PANEL FOR DISPLAY SIMILAR TO DISPLAY NO. 1 ABOVE. ADJUST OSCILLOSCOPE DC BALANCE.
  7. ADJUST SCOPE VERTICAL POSITION FOR DISPLAY ON THE UPPER GRADICULE.
  8. WHILE CHANGING ATTEN FROM 0 TO 1 DB ADJUST VERTICAL SENSITIVITY AND VERTICAL POSITION FOR 10 DIVISIONS PER DB (0.1 DB = 1 DIV).
  9. WHEN CALIBRATED FOR 10 DIVISIONS PER DB, CHANGE SENSITIVITY FROM 2 TO 0.2 SCALE. RECENTER TRACE WITH OFFSET CONTROL (0.01 DB = 1 DIV).
  10. ADJUST IF TEST PANEL SLOPE TO FLATTEN TRACE WITHIN 0.01 DB. THIS IS NOW REFERENCE. DO NOT READJUST THE SCOPE OFFSET, VERTICAL SENSITIVITY OR POSITION CONTROLS.

Fig. 4—TD-3 IF to IF Amplitude Response Setup