# *TB 9-6625-2372-24

**DEPARTMENT OF THE ARMY TECHNICAL BULLETIN**

# CALIBRATION PROCEDURE FOR NAV/COMM TEST SET, AEROFLEX, MODEL IFR 4000

Headquarters, Department of the Army, Washington, DC
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**REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS**

You can improve this manual. If you find any mistakes or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MLD-MT, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also send in your comments electronically to our E-mail address: 2028@redstone.army.mil or by fax 256-842-6546/DSN 788-6546. For the World Wide Web use: https://amcom2028.redstone.army.mil. Instructions for sending an electronic 2028 can be found at the back of this manual.



*This bulletin supersedes TB 9-6625-2372-24, dated 13 November 2012.

## SECTION I
## IDENTIFICATION AND DESCRIPTION

**1. Test Instrument Identification.** This bulletin provides instructions for the calibration of Nav/Comm Test Set, Aeroflex, Model IFR 4000. The manufacturers' manuals were used as the prime data sources in compiling these instructions. The equipment being calibrated will be referred to as the TI (test instrument) throughout this bulletin.

**a. Model Variations.** None.

**b. Technique.** Microwave.

**2. Forms, Records, and Reports.** Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25.

**3. Calibration Description.** TI parameters and performance specifications which pertain to this calibration are listed in table 1.

Table 1. Calibration Description.

| Test instrument parameters | Performance specifications |
|---|---|
| RF SIGNAL GENERATOR | |
| Output Frequency: | |
| Range: | |
| VOR | 107 to 118 MHz |
| LOC | 107 to 113 MHz |
| Marker Beacon | 72 to 78 MHz |
| Comm AM | 118 to 400 MHz |
| G/S | 327 to 337 MHz |
| Comm FM | 155 to 175 MHz |
| Accuracy | time base<br>±1 ppm after autocal |
| Output Level: | |
| ANT Connector | |
| Single Carrier | |
| Range | -67 to +13 dBm |
| Accuracy | ±3 dB |
| Flatness | ≤ 1 dB |

Table 1. Calibration Description – Continued.

| Test instrument parameters | Performance specifications |
|---|---|
| RF SIGNAL GENERATOR - CONTINUED | |
| RF I/O Connector: | |
| Single Carrier | |
| Range | -130 to -12 dBm |
| Accuracy | ±3 dB from -120 to -95 dBm |
| | ±2 dB from -94.5 to -40 dBm |
| | ±2.5 dB from -39.5 to -12 dBm |
| Flatness | ≤ 1 dB |
| VSWR | 10 to ≤300 MHz: <1.3:1 |
| | >300 to 400 MHz: <1.35:1 |
| Spectral Purity: | |
| Harmonics | |
| Range | 72 to 401 MHz |
| Accuracy | <-20 dBc |
| Non-Harmonics | |
| Range | 75 to 400 MHz |
| Accuracy | <-35 dBc |
| VOR MODE | |
| Tone Frequency: | |
| Range | 30 Hz Ref, 30 Hz Var, 1020 and 9960 Hz |
| Accuracy | ±0.02 % |
| AM Modulation: | |
| Range | 30% for 30, 1020 and 9960 Hz |
| Accuracy | In CAL position |
| Modulation | ±2% AM |
| Distortion | < 2.5% THD |
| FM Modulation: | |
| Range | 30 Hz Ref @ ± 480 Hz pk deviation on 9960 Hz sub-carrier |
| Accuracy | ±25 Hz pk deviation |
| Bearing: | |
| Range | 0.0 to 359.9 degrees |
| Accuracy | ±0.1 degrees |
| LOC MODE | |
| Tone Frequency: | |
| Range | 90, 150 and 1020 Hz |
| Accuracy | ±0.02% of setting |
| Modulation | |
| Range | 20% AM for 90 and 150 Hz |
| | 30% AM for 1020 audio tone |
| Accuracy | In CAL position |
| Modulation | ±2% AM |
| Distortion | <2.5% THD |

Table 1. Calibration Description – Continued.

| Test instrument parameter | Performance specifications |
|---|---|
| LOC MODE | |
| DDM: | |
| Fixed | |
| Range | ±0.093, 0.155 or 0.200 DDM and Tone Delete |
| Accuracy | ±(0.0015 DDM+3% 0f setting) for output levels ≤+10 dBm |
| Variable | |
| Range | ±0.4 DDM |
| Accuracy | ±(0.0025 DDM+3% 0f setting) for output levels ≤+10 dBm |
| G/S MODE | |
| Tone Frequency: | |
| Range | 90 and 150 Hz |
| Accuracy | ±0.02% |
| Modulation: | |
| Range | 40% AM for 90 and 150 Hz |
| Accuracy | In CAL position |
| Modulation | ±2% AM |
| Distortion | <2.5 THD |
| DDM: | |
| Fixed | |
| Range | ±0, 0.091, 0.175 or 0.400 DDM and Tone Delete |
| Accuracy | ±(0.0048 DDM+3% 0f setting) for output levels ≤+10 dBm |
| Variable | |
| Range | ±0.8 DDM |
| Accuracy | ±(0.0048 DDM+3% 0f setting) for output levels ≤+10 dBm |
| MARKER MODE | |
| Tone Frequency: | |
| Range | 400, 1300 and 3000 Hz |
| Accuracy | In CAL position |
| Modulation | ±5% AM |
| Distortion | <2.5% THD, single carrier |
| COMM MODE | |
| Tone Frequency: | |
| Range | 1020 Hz |
| Accuracy | ±0.02% of setting |
| Modulation: | |
| Range | 30% AM, 1020 Hz |
| Accuracy | In CAL position |
| Modulation | ±2% AM |
| Distortion | <2.5% THD |
| FREQUENCY COUNTER | |
| ANT & RF I/O Input Connectors: | |
| Range | 10 to 400 MHz |
| Resolution | 100 Hz |
| Accuracy | (±1ppm ±1 count) |
| AUX I/O Connector: | |
| Range | 1 to 10 MHz |
| Resolution | 1 Hz |
| Accuracy | (±1ppm ±1 count) |

Table 1. Calibration Description – Continued.

| Test instrument parameter | Performance specifications |
|---|---|
| AM METER | |
| Range | 50 to 3000 Hz<br>10 to 99% mod |
| Accuracy | ±10% of reading |
| FM METER | |
| Range | 50 to 3000 Hz<br>1 to 15 kHz dev |
| Accuracy | ±(0.4 kHz + 8% of reading) |
| SWR METER | |
| Range | 10 to 400 MHz |
| Accuracy | ±0.2 ±20% of reading |
| SWR Connector: | |
| VSWR | 10 to ≤300 MHz: <1.3:1<br>>300 to 400 MHz: <1.35:1 |
| POWER METER | |
| Range | 118.0 TO 400 MHz |
| Resolution | 0.1 to 300 W<br>0.01 from 0.1 to <1 W<br>0.1 from 1 to <100 W |
| Accuracy | ±(8% of reading + 1 digit) for CW only |

## SECTION II
## EQUIPMENT REQUIREMENTS

**4. Equipment Required.** Table 2 identifies the specific equipment to be used in this calibration procedure. This equipment is issued with Secondary Transfer Calibration Standards Set AN/GSM-286; AN/GSM-287; or AN/GSM-440 and Secondary Reference Calibration Standards Set, NSN 4931-00-621-7878. Alternate items may be used by the calibrating activity. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and TI. Where the four-to-one ratio cannot be met, the actual accuracy of the equipment selected is shown in parentheses.

**5. Accessories Required.** The accessories required for this calibration are common usage accessories, issued as indicated in paragraph **4** above, and are not listed in this calibration procedure. The following peculiar accessories are also required for this calibration: Adapter Kit, Agilent, Model 83059CK01; and Precision 50 ohm N(m) Open/Short, Anritsu, Model 22N50, NSN:5985-01-254-9468, or equivalent.

Table 2. Minimum Specifications of Equipment Required.

| Common name | Minimum use specifications | Manufacturer and model (part number) |
|---|---|---|
| FREQUENCY COUNTER | Frequency range: 10 Hz to 400 MHz<br>Accuracy: ±0.25 ppm | Spectracom, Model CNT-90\OCXO\RA (CNT-90\OCXO\RA) |

Table 2. Minimum Specifications of Equipment Required – Continued.

| Common name | Minimum use specifications | Manufacturer and model (part number) |
|---|---|---|
| FUNCTION GENERATOR | Frequency: 1 kHz to 40 kHz<br>Accuracy: ±0.5 ppm | Agilent, Model 33250A (33250A) |
| MEASURING RECEIVER<br>Power Measurement:<br><br><br>FM:<br><br><br>AM:<br><br><br>CW Frequency:<br>Audio Frequency:<br>Bearing:<br><br>AM:<br><br><br>FM:<br><br><br>Deviation<br>DDM: | <br>Range: 75 MHz to 1.5 GHz<br>-127 to +13 dB<br>Accuracy: ±0.5 dB<br><br>Range: 165 MHz<br>1 to 13 kHz<br>Accuracy: (±1%± 1 digit)<br><br>Range: 400 MHz<br>30 to 90% @ 1 kHz rate<br>Accuracy: (±1% ±1 digit)<br><br>Range: 75 to 335 MHz<br>Range: 29 to 9962 Hz<br>Range: 0.00 to 359.99°<br>Accuracy: ≤0.025<br><br>Range: 400 MHz<br>30 to 90%<br>Accuracy: (1% of reading ±1 count)<br><br>Range: ±505 Peak Deviation<br>Accuracy: (1% of reading ±1 count)<br><br>Range: ±0.415<br>Accuracy: ±0.001 | Measuring receiver system N5530S consisting of: Spectrum Analyzer, Agilent Model E4440A (E4440A), Power meter, Agilent Model E4419B (E4419B), Sensor module, Agilent Model N5532A opt. 504 (504) and U3030-H06 Avionics Measuring Receiver (AMR) Software for VOR / ILS Measurements |
| MISMATCH STANDARDS | Frequency range: 100 to 400 MHz<br>VSWR: 1.06 +0.00, -0.06<br>1.2 ±0.08<br>1.50 ±0.10<br>2.00 ±0.15 | Maury Microwave Kit, 9476N04 or 9476N05 |
| POWER METER | Frequency: 75 to 400 MHz<br>Power<br>Range: -40 to -20 dBm<br>Accuracy: ±0.5 dB | Agilent, Model E4419B (E4419B) or Agilent, Model N1911A (N1911A) with Power Sensor E9304AH18 |
| RF POWER AMPLIFIER | Frequency: 100 MHz to 300 MHz<br>Output: 0.3 to 25 W<br>Accuracy: N/A | Ophir, RF, Model XRF733 (XRF733) |
| RF POWER METER | Frequency: 100 MHz to 300 MHz<br>Output: 0.3 to 25 W<br>Accuracy: ±0.5 dB | Bird, Model 4421 (4421) w/ Directional power sensor, Model 4022 (4022) |
| RF REFERENCE SOURCE | Frequency: 100 MHz to 300 MHz<br>Output: 0.1 W<br>Accuracy: ±0.5 dB | Fluke, Model 9640A-LPN |

Table 2. Minimum Specifications of Equipment Required – Continued.

| Common name | Minimum use specifications | Manufacturer and model (part number) |
|---|---|---|
| SIGNAL GENERATOR | Range: -5 to 0 dBm<br>Frequency: 118 to 400 MHz<br>Accuracy: (<1 ppm)<br>AM range: 30 to 90%AM @ 1kHz rate<br>FM range: 1 to 13 kHz deviation @ 1 kHz rate<br>Accuracy: N/A | Aeroflex, Model 2023B (2023B) |
| TIME/FREQUENCY WORKSTATION | Frequency: 10 MHz<br>Accuracy: <2.5 parts in 10-11 | Symmetricom Inc., Model 1510-602-142-AR (1510-602-142-AR) |
| VSWR BRIDGE | Frequency range: 75 to 400 MHz<br>Directivity: 40 dB | Wiltron, Model 60NF50 (7916686) |

## SECTION III
## CALIBRATION PROCESS

### 6. Preliminary Instructions

**a.** The instructions outlined in paragraphs **6** and **7** are preparatory to the calibration process. Personnel should become familiar with the entire bulletin before beginning the calibration.

**b.** Items of equipment used in this procedure are referenced within the text by common name as listed in table 2.

**c.** Unless otherwise specified, verify the result of each test, and whenever the test requirement is not met take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in the procedure.

**d.** Unless otherwise specified, all controls and control setting refer to the TI.

**e.** Throughout this procedure hard keys will be denoted in **bold** font, soft keys will be in [**brackets**], submenus will be **underlined**, and menu values will be in ***italics***.

**f.** Use the main ▲, ▼, ◄, ► keys whenever required to change a field setting (submenu) or enter a value.

**g.** All TI adjustments are performed by following the prompts within the **CALIBRATION** menu. Press the following TI keys in (1) through (4) below to access the **CALIBRATION** menu screen:

(1) **SETUP** ..... Setup Menu screen
(2) **[H/W TOOLS]** ..... Hardware Tools screen
(3) **[CAL]** ..... Calibration password prompt screen

(4) Enter password (**3524**) using the soft keys.

**h.** All measurement data derived from this calibration procedure will be recorded in the corresponding calibration data spreadsheet. This spreadsheet is located in the TB folder for this procedure (or is generated by TBs performed with automated procedures). A template for a calibration certificate is also included if requested by the customer.

## 7. Equipment Setup

**WARNING**

HIGH VOLTAGE is used or exposed during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions. REDUCE OUTPUT(S) to minimum after each setup within the performance check where applicable.

**NOTE**

Before starting this procedure, verify TI firmware by pressing TI **SETUP** and [**INFO**] keys. If TI firmware version is 2.16 or earlier, install version 2.17 from the folder IFR4000_V2_17 located in the TB 9-6625-2372-24 procedure folder on the USATA website. Otherwise proceed with procedures in TB if TI firmware is 2.17 or above.

**a.** Connect TI to a 115 V ac source using the supplied external dc power supply.

**b.** Press **POWER** ⏻ key to on and allow 15 minutes for equipment warm-up.

**c.** Disconnect all cables from TI before running self test.

**d.** Press the self test key sequence listed in (1) through (5) below:

| | | |
|---|---|---|
| (1) | **SETUP** ..... | Displays Setup Menu screen |
| (2) | [**H/W TOOLS**] ..... | Displays Hardware Tools screen |
| (3) | [**DIAGS**] ..... | Displays Diagnostics screen |
| (4) | [**SELFTEST**] ..... | Displays Self Test screen |
| (5) | [**RUN**] ..... | Initiates Self Test |

**e.** If any of the self tests fail, refer to manufacturer's manual for maintenance.

**f.** Press [**RETURN**] three times to return to **SETUP** Menu.

**g.** From the **SETUP** menu, press instrument preset key sequence as follows:

| | | |
|---|---|---|
| (1) | [**STORE/RECALL**] ..... | Displays Store/Recall Menu |
| (2) | **PRESET SETTINGS** ..... | Displays Preset Conditions |
| (3) | [**RECALL**] ..... | Recalls Preset Settings |
| (4) | [**RETURN**] ..... | Returns to previous menu |

**8. RF Generator Frequency**

**a. Performance Check**

(1) Connect TI **ANT** connector to frequency counter **CHANNEL A** input.

(2) Set the frequency counter input to 50 Ω.

(3) Press **SETUP**, as needed, to display **SETUP** menu.

(4) Press [**NEXT PARAM**], as needed, to select **PORT** field.

(5) Press ▲, ▼ keys , as needed, to set **PORT** to ***ANT***.

(6) Press the following TI keys, as needed, in (a) through (c) below.

(a) **MODE** to display **VOR** mode screen.
(b) **FREQ** to set **FREQ** to ***108.000 MHz***.
(c) **M MOD** to set **M MOD** to ***0%***.

(7) Press **RF LVL** and use ▲, ▼, ◄, ► keys to set **RF LVL** to ***0.0 dbm***.

(8) Adjust frequency counter for a stable indication. If frequency counter does not indicate within the limits for the first mode setting in table 3, perform **b** below.

(9) Repeat step (6) above to obtain the remaining mode settings in table 3.

Table 3. RF Generator Frequency.

| MODE | FREQ | M MOD | LIMITS (Hz) |
|---|---|---|---|
| VOR | 108.000 MHz | 0% | 107999892.0 to 108000108.0 |
| LOCALIZER | 108.100 MHz | 0% | 108099891.9 to 108100108.1 |
| MARKER BEACON | 75.000 MHz | N/A | 74999925.0 to 75000075.0 |

(10) Press **MODE** until **SELCAL** mode screen is displayed.

(11) Press **RF LVL** and set **RF LVL** to ***0.0 dbm***.

(12) Press the following keys, as needed, in (a) through (d) below to change the **FREQ** field setting from ***PRESET*** to ***VAR***.

(a) **SETUP** to display **SETUP** menu.
(b) [**NEXT PARAM**] until **FREQ** field is selected.
(c) ▲ key to set **FREQ** field to ***VAR***.
(d) Press **MODE** or **SETUP** to exit setup screen.

(13) Press **FREQ** to select **FREQ** field.

(14) Use ▲, ▼, ◄, ► keys to set **FREQ** to ***118.001 MHz***. If frequency counter does not indicate within the limits in the first row of table 4 perform **b** below.

(15) Repeat step (14) above for the remaining settings in table 4.

(16) Perform step (12) above to change **FREQ** field from ***VAR*** back to ***PRESET***.

(17) Press the following TI keys, as needed, in (a) through (c) below.

(a) **MODE** until **COMM AM** mode screen is displayed.
(b) **TONE** to set **MOD TONE** to ***OFF***.
(c) [**SWITCH GEN/RX**] to set **COMM AM** mode to ***GENERATING***.

Table 4. SELCAL Frequency Accuracy.

| FREQ | LIMITS (Hz) |
|---|---|
| 118.001 MHz | 118000882.0 to 118001118.0 |
| 118.002 MHz | 118001882.0 to 118002118.0 |
| 118.003 MHz | 118002882.0 to 118003118.0 |
| 118.004 MHz | 118003882.0 to 118004118.0 |

(18) Press **FREQ**, as needed, to set **FREQ** to ***118.000 MHz***. If frequency counter does not indicate within the limits for the first setting in table 5 perform b below.

(19) Repeat step (18) above for the remaining settings in table 5.

Table 5. COMM AM Frequency Accuracy.

| FREQ | LIMITS (Hz) |
|---|---|
| 118.0000 MHz | 117999882.0 to 118000118.0 |
| 137.0000 MHz | 136999863.0 to 137000137.0 |
| 156.0000 MHz | 155999844.0 to 156000156.0 |
| 225.0000 MHz | 224999775.0 to 225000225.0 |
| 312.0000 MHz[1] | 311999688.0 to 312000312.0 |
| 400.0000 MHz | 399999600.0 to 400000400.0 |

[1]Switch frequency counter connection to Channel C.

(20) Press **MODE** until **GLIDE SLOPE** mode screen is displayed.

(21) Press **M MOD**, as needed, to set **M MOD** to ***0%***.

(22) Press **FREQ** and set **FREQ** to ***334.700 MHz***. If frequency counter does not indicate between 334699665.3 and 334700334.7 Hz perform **b** below.

(23) Reduce **RF LVL** to ***-67.0 dBm*** and disconnect equipment setup.

**b. Adjustments**

(1) Perform paragraph **6 g** above to access **CALIBRATION** menu screen.

(2) Press [**MISC CALS**] to display **MISC CALS** screen.

(3) Press [**TCXO**] to display **TCXO CAL** screen.

(4) Connect time/frequency workstation 10 MHz output to TI **AUX I/O** connector.

(5) Press [**START**] to begin the **TCXO CAL** sequence.

(6) When **TCXO CAL** sequence is complete, press [**SAVE & RETURN**].

(7) Press [**RETURN**] 3 times to return to setup menu.

(8) Disconnect 10 MHz reference signal.

**9. RF Generator Output Level Accuracy and Flatness (ANT Connector)**

**a. Performance Check**

(1) Repeat paragraph **7 g** to preset TI.

(2) Zero and calibrate measuring receiver and ensure that sensor module calibration factors are loaded.

(3) Connect measuring receiver to TI **ANT** connector.

(4) Press the following TI keys, as needed, in (a) through (e) below.

(a) **MODE** until **GLIDE SLOPE** mode screen is displayed.

(b) **FREQ** and use main ▲, ▼ keys to set **FREQ** to ***334.700 MHz***.

(c) **M MOD** to set **M MOD** to ***0%***.

(d) **RF LVL** to select **RF LVL** field.

(e) Use main ▲, ▼, ◄, ► keys to set **RF LVL** to ***0.0 dBm.***

(5) Setup measuring receiver for tuned RF absolute power measurement (do not set reference).

(6) Use TI main ▲, ▼, ◄, ► keys to step **RF LVL** down to ***-30.0 dBm***. If measuring receiver does not indicate between -33.0 and -27.0 dBm, perform **b** below.

(7) Setup measuring receiver for RF power measurement.

(8) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** until **VOR** mode screen is displayed.

(b) **FREQ** to set **FREQ** to ***108.000 MHz***.

(c) **TONE** to set **MOD TONE** to ***OFF***.

(d) **M MOD** to set **M MOD** to ***0%***.

(9) Press **RF LVL** and use main ▲, ▼, ◄, ► keys to set **RF LVL** to ***13.0 dBm***. If measuring receiver does not indicate within the limits in table 6, perform b below.

(10) Set **RF LVL** to the remaining RF levels in table 6. If measuring receiver does not indicate within the limits in table 6, perform **b** below.

(11) Setup measuring receiver for RF power measurement.

**NOTE**

The measuring receiver indications for the 10 dBm and -10 dBm settings in table 6 must be recorded in appendix A, in order to verify flatness in steps (29) and (30) below.

Table 6. Output Accuracy.

| **RF LVL** (dBm) | Measuring receiver indications | |
|---|---|---|
| | Min (dBm) | Max (dBm) |
| 13.0 | 10.0 | 16.0 |
| 10.0[1] | 7.0 | 13.0 |
| 0.0[2] | -3.0 | 3.0 |
| -10.0[3] | -13.0 | -7.0 |
| -30.0 | -33.0 | -27.0 |

[1] Record measuring receiver indication in 10 dBm column of appendix A.
[2] Setup measuring receiver for tuned RF absolute power measurement.
[3] Record measuring receiver indication in -10 dBm column of appendix A.

(12) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** to display **MARKER BEACON** mode screen.
(b) **FREQ** to set **FREQ** to ***75.000 MHz***.
(c) **TONE** to set **MOD TONE** to ***OFF***.
(d) **M MOD** to set **M MOD** to ***0%***.

(13) Repeat steps (9) through (11) above.

(14) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** to display **COMM AM** mode screen.
(b) **TONE** to set **MOD TONE** to ***OFF***.
(c) **M MOD** to set **M MOD** to ***0%***.
(d) [**SWITCH GEN/RX**] to set **COMM AM** mode to ***GENERATING***.

(15) Press **FREQ** and ▲, ▼ keys, as needed, to set **FREQ** to ***400.000 MHz***.

(16) Repeat steps (9) through (11) above.

(17) Set **FREQ** to ***312.000 MHz***.

(18) Repeat steps (9) through (11) above.

(19) Set **FREQ** to ***225.000 MHz***.

(20) Repeat steps (9) through (11) above.

(21) Set **FREQ** to ***156.000 MHz***.

(22) Repeat steps (9) through (11) above.

(23) Set **FREQ** to ***137.000 MHz***.

(24) Repeat steps (9) through (11) above.

(25) Set **FREQ** to ***118.000 MHz***.

(26) Press RF LVL to select RF LVL field.

(27) Use ▲, ▼, ◄, ► keys to set **RF LVL** to ***13.0 dBm***. If measuring receiver does not indicate within the limits in table 7, perform **b** below.

(28) Use ▲, ▼, ◄, ► keys to set **RF LVL** to remaining settings in table 7. If TI does not indicate within the limits specified for each setting, perform **b** below.

**NOTE**

The measuring receiver indications for the 10 dBm and -10 dBm settings in table 7 must be recorded in appendix A for use in steps (29) and (30) below to verify flatness.

(29) Subtract lowest recorded 10 dBm indication from the highest recorded 10 dBm indication in appendix A. The difference (flatness) should not exceed 1 dB.

(30) Subtract lowest recorded -10 dBm indication from the highest recorded -10 dBm indication in appendix A. The difference (flatness) should not exceed 1 dB.

*Example*:
If lowest -10 dBm indication = -10.9 dBm
and highest -10 dBm indication = -10.1 dBm,
then, -10.1dB-(-10.9 dB) =0.8 dB flatness

Table 7. Comm AM Output Accuracy.

| TI **RF LVL** (dBm) | Measuring receiver indications | |
|---|---|---|
| | Min (dBm) | Max (dBm) |
| 13.0 | 10.0 | 16.0 |
| 10.0[1] | 7.0 | 13.0 |
| 3.0 | 0.0 | 6.0 |
| 0.0[2] | -3.0 | 3.0 |
| -7.0 | -10.0 | -4.0 |
| -10.0[3] | -13.0 | -7.0 |
| -17 | -20.0 | -14.0 |
| -27.0 | -30.0 | -24.0 |
| -37.0 | -40.0 | -34.0 |
| -47.0 | -50.0 | -44.0 |
| -57.0 | -60.0 | -54.0 |
| -67.0 | -70.0 | - 64.0 |

[1] Record measuring receiver indication in appendix A 10 dBm column.
[2] Setup measuring receiving for tuned RF measurement.
[3] Record measuring receiver indication in appendix A -10 dBm column.

(31) Disconnect measuring receiver from TI **ANT** connector.

**b. Adjustments**

(1) Connect measuring receiver to signal generator and calibrate measuring receiver in tuned RF mode at the frequencies listed in table 8, storing the calibrations in the locations indicated.

Table 8. Stored Calibration Levels.

| Storage Location | Frequency (MHz) |
|---|---|
| 1 | 113.000 |
| 2 | 75.000 |
| 3 | 225.000 |
| 4 | 332.000 |
| 5 | 400.000 |
| 6 | 175.000 |
| 7 | 250.000 |
| 8 | 108.000 |

(2) Connect the measuring receiver **MODULATION OUTPUT/AUDIO INPUT** to the audio analyzer **HIGH INPUT**.

(3) Set audio analyzer to measure distortion.

(4) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(5) Press [**AMP LVL CALS**] to display **AMPL LEVEL CAL** menu screen.

**NOTE**

If only **MARKER BEACON** level is out of tolerance, then proceed to step (16) below.

(6) Press [**MAIN**] to display **MAIN AMPL LEVEL** sequence screen.

(7) Connect measuring receiver to TI **ANT** connector.

(8) Switch between tuned RF level and AM mode on the measuring receiver as necessary. For AM measurements use Peak ± /2 detector and 3 kHz LP filter. For distortion measurements use 80 kHz LP filter on audio analyzer.

(9) Follow the on-screen prompts and recall stored calibration levels from table 8 when necessary. For **MAIN AMPL LEVEL** sequence, the AM modulation setting error must be <0.5% and the amplitude setting error must be <0.1 dB.

(10) Reference the following during the **MAIN AMPL LEVEL** sequence.

(a) In **Step 1** of **MAIN AMPL LEVEL** sequence, turn TI **Modulation: OFF** to set and check RF level. Toggling the TI **Modulation** field between **OFF** and **ON** and the measuring receiver between AM and tuned RF level several times may be necessary to meet the requirements of this step.

(b) In **Step 2**, once the **VALUE:** field has been set for minimum distortion, press [**PREV**] to return to **Step 1**.

**NOTE**

Steps 1 and 2 are interactive; toggling between the two is required to meet the requirements of the steps.

(c) In **Steps 3 to 6**, follow the on-screen prompts and recall the necessary calibrations on the measuring receiver.

(d) In **Steps 7 to 26**, connect measuring receiver to the **RF I/O** connector.

(e) In **Step 27**, entering 140 MHz on the measuring receiver displays **UNCAL** and **RECAL**. Press the measuring receiver calibrate button and allow the cal routine to complete before setting the TI **VALUE**: field.

(f) In **Steps 28 to 29**, follow the on-screen prompts and recall the necessary calibrations on the measuring receiver.

(11) When the calibration sequence is complete, press [**SAVE & RETURN**] to return to **AMPL LEVEL CAL** screen.

(12) Press [**LOC**] to display the **LOC AMPL LEVEL** sequence screen.

(13) Follow the on-screen prompts and recall stored calibration levels on the measuring receiver. The AM modulation setting error must be <0.5% and the amplitude setting error must be <0.1 dB.

(14) Reference the following during the **LOC AMPL LEVEL** calibration sequence.

(a) In **Step 1** of **LOC AMPL LEVEL** sequence, turn TI modulation **OFF** to set and check RF level. Toggling the TI modulation field between **OFF** and **ON** and the measuring receiver between AM and tuned RF level several times may be necessary to meet the requirements of this step.

(b) In **Step 2**, once the **VALUE:** field has been set for minimum distortion, press [**PREV**] to return to **Step 1**.

**NOTE**

Steps 1 and 2 are interactive; toggling between the two is required to meet the requirements of the steps.

(15) When the **LOC AMPL LEVEL** calibration sequence is complete, press [**SAVE & RETURN**] to return to **AMPL LEVEL CAL** screen.

(16) Press [**MKR**] to display **MKR AMPL LEVEL** calibration sequence screen.

(17) Connect 10 dB attenuator between measuring receiver and TI **ANT** connector.

(18) Follow the on-screen prompts and recall stored calibration levels on the measuring receiver. The AM modulation setting error must be <1.0% and the amplitude setting error must be <0.1 dB (taking into account the 10 dB attenuator).

(19) Reference the following during the **MKR AMPL LEVEL** calibration sequence:

(a) In **Step 1 to 2**, turn TI modulation **OFF** to set and check RF level. Toggling the TI modulation field between **OFF** and **ON** and the measuring receiver between AM and tuned RF level several times may be necessary to meet the requirements of these steps.

(b) In **Step 3**, select 15 kHz LP filter on the measuring receiver.

(20) When the calibration sequence is complete, press [**SAVE & RETURN**] to return to **AMPL LEVEL CAL** screen.

(21) Press [**RETURN**] to return to the **CALIBRATION** screen.

**10. RF Generator Output Level Accuracy and Flatness (RF I/O Connector)**

**a. Performance Check**

(1) Connect power sensor to power meter and ensure that sensor calibration factors are loaded in power meter.

(2) Zero and calibrate power meter.

(3) Connect power meter to TI **RF I/O** connector.

(4) Press **SETUP**, as needed, to display **SETUP** menu.

(5) Press [**NEXT PARAM**], as needed, to select **PORT** field and set to ***RF I/O***.

(6) Press the following TI keys, as needed, in (a) through (c) below.

(a) **MODE** until **GLIDE SLOPE** mode screen is displayed.

(b) **M MOD** to set **M MOD** to ***0%***.

(c) **FREQ** and use main ▲, ▼ keys to set **FREQ** to ***334.700 MHz***.

(7) Enter TI frequency (334.700 MHz) into power meter to enable sensor calibration factor.

(8) Press **RF LVL** and use ▲, ▼, ◄, ► main keys to set TI **RF LVL** to ***-40.0 dBm***. If power meter does not indicate between -42.0 and -38 dBm perform b below.

(9) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** until **VOR** mode screen is displayed.
(b) **TONE** to set **MOD TONE** to ***OFF***.
(c) **M MOD** to set **M MOD** to ***0%***.
(d) **FREQ** to set **FREQ** to ***108.000 MHz***.

(10) Enter TI frequency into power meter to enable sensor calibration factor.

(11) Press **RF LVL** and use ▲, ▼, ◄, ► main keys to set **RF LVL** to ***-40.0 dBm***. If power meter does not indicate between -42.0 and -38 dBm perform **b** below.

(12) Record the power meter indication from step (11) above in the -40 dbm column of appendix A.

(13) Set TI **RF LVL** to ***-20.0 dBm*** and record power meter indication in the -20 dBm column of appendix A.

**NOTE**

The -40 dBm and -20 dBm values recorded in appendix A will be used in steps (32) and (33) below to verify flatness.

(14) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** until **MARKER BEACON** mode screen is displayed.
(b) **TONE** to set **MOD TONE** to ***OFF***.
(c) **M MOD** to set **M MOD** to ***0%***.
(d) **FREQ** to set **FREQ** to ***75.000 MHz***.

(15) Repeat steps (10) through (13) above.

(16) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** until **COMM AM** mode screen is displayed.
(b) **TONE** to set **MOD TONE** to ***OFF***.
(c) **M MOD** to set **M MOD** to ***0%***.
(d) [**SWITCH GEN/RX**] to set **COMM AM** mode to ***GENERATING***.

(17) Press **FREQ** to set **FREQ** to ***400.0000 MHz***.

(18) Enter TI frequency into power meter to enable sensor calibration factor.

(19) Press **RF LVL** and use ▲, ▼, ◄, ► main keys to set **RFLVL** to ***-40.0 dBm***. If power meter does not indicate between -42.0 and -38 dBm perform **b** below.

(20) Record the power meter indication from step (19) above in the -40 dbm column of appendix A.

(21) Set TI **RF LVL** to ***-20.0 dBm*** and record power meter indication in the -20 dBm column of appendix A.

(22) Press **FREQ** to set **FREQ** to ***312.0000 MHz***.

(23) Repeat steps (18) through (21) above.

(24) Set **FREQ** to ***225.0000 MHz***.

(25) Repeat steps (18) through (21) above.

(26) Set **FREQ** to ***156.0000 MHz***.

(27) Repeat steps (18) through (21) above.

(28) Set **FREQ** to ***137.0000 MHz***.

(29) Repeat steps (18) through (21) above.

(30) Set **FREQ** to ***118.0000 MHz***.

(31) Repeat steps (18) through (21) above.

(32) Subtract lowest recorded -40 dBm indication from the highest recorded -40 dBm indication in appendix A. The difference (flatness) should not exceed 1 dB.

(33) Subtract lowest recorded -20 dBm indication from the highest recorded -20 dBm indication in appendix A. The difference (flatness) should not exceed 1 dB.

(34) Disconnect power meter from TI **RF I/**O connector.

(35) Connect measuring receiver to TI **RF I/O** connector.

(36) Press **RF LVL** and set **RF LVL** to ***-12.0 dBm***.

(37) Setup measuring receiver for 118.000 MHz tuned RF measurement.

(38) Verify that measuring receiver indication is within the limits specified in table 9.

(39) Set TI **RF LVL** to remaining settings in table 9 and verify that measuring receiver indication is within the limits specified.

Table 9. Comm AM Output Accuracy.

| TI **RF LVL** (dBm) | Measuring receiver indications | |
|---|---|---|
| | Min (dBm) | Max (dBm) |
| -12.0 | -14.5 | -9.5 |
| -22.0 | -24.5 | -19.5 |
| -32.0 | -34.5 | -29.5 |
| -42.0 | -44.0 | -40.0 |
| -52.0 | -54.0 | -50.0 |
| -62.0 | -64.0 | -60.0 |
| -72.0 | -74.0 | -70.0 |
| -82.0 | -84.0 | -80.0 |
| -92.0 | -94.0 | -90.0 |
| -102.0 | -105.0 | -99.0 |
| -112.0 | -115.0 | -109.0 |
| -120.0 | -123.0 | -117.0 |

(40) Disconnect measuring receiver from TI.

**b. Adjustments.** Same as paragraph **9 b** above. If adjustments in paragraph **9 b** were already performed, then no further adjustments can be made.

**11. Spectral Purity Harmonics and Spurious**

**a. Performance Check**

(1) Connect measuring receiver to the TI **ANT** connector.

(2) Press **SETUP** and repeat paragraph **7 g** to preset TI.

(3) Press **MODE** until **VOR** mode screen is displayed.

(4) Press **FREQ** and set **FREQ** to ***108.000 MHz***.

(5) Press **TONE**, as needed, to set **MOD TONE** to ***OFF***.

(6) Press **M MOD,** as needed, to set **M MOD** to ***0%***.

(7) Press **RF LVL** and set **RF LVL** to ***0.0 dBm***.

(8) Setup measuring receiver in spectrum analyzer mode to view the peak of the TI carrier frequency and at least four harmonics.

(9) Verify that harmonics are <-20 dBc.

(10) Verify that all spurious signals are <-35 dBc.

(11) Press **MODE** until **LOCALIZER** mode screen is displayed.

(12) Press **FREQ** to set **FREQ** to ***108.100 MHz***.

(13) Repeat steps (6) through (10) above.

(14) Press **MODE** until **GLIDE SLOPE** mode screen is displayed.

(15) Press **FREQ** and set **FREQ** to ***334.700 MHz***.

(16) Repeat steps (6) through (10) above.

(17) Press **MODE** until **MARKER BEACON** mode screen is displayed.

(18) Press **FREQ** to set **FREQ** to ***75.000 MHz***.

(19) Repeat steps (6) through (10) above.

(20) Press **MODE** until **COMM AM** mode screen is displayed.

(21) Press [**SWITCH GEN/RX**] to set **COMM AM** mode to ***GENERATING***.

(22) Press **FREQ** to set **FREQ** to ***137.0000 MHz***.

(23) Repeat steps (5) through (10) above.

(24) Press **FREQ** to set **FREQ** to ***400.0000 MHz***.

(25) Repeat steps (6) through (10) above.

(26) Reduce output to minimum and disconnect test equipment.

**b. Adjustments.** No adjustments can be made.

**12. VSWR (RF I/O and SWR Connectors)**

**a. Performance Check**

(1) Connect equipment as shown in figure 1 with short connected to the Device Under Test (DUT) port of VSWR bridge.

(2) Set signal generator output level to 0.00 dBm and frequency to first frequency listed in table 10.

(3) Configure measuring receiver, in spectrum analyzer mode, to measure first frequency listed in table 10.

(4) On measuring receiver, press PEAK SEARCH, MARKER, and [DELTA] to set up delta marker reference measurement.

(5) Remove short installed on VSWR bridge Device Under Test (DUT) port and connect VSWR bridge Device Under Test (DUT) port to TI **RF I/O** port.

(6) Measuring receiver delta marker will indicate within limits in table 10.

(7) Repeat steps (1) through (6) above for the remaining settings in table 10.

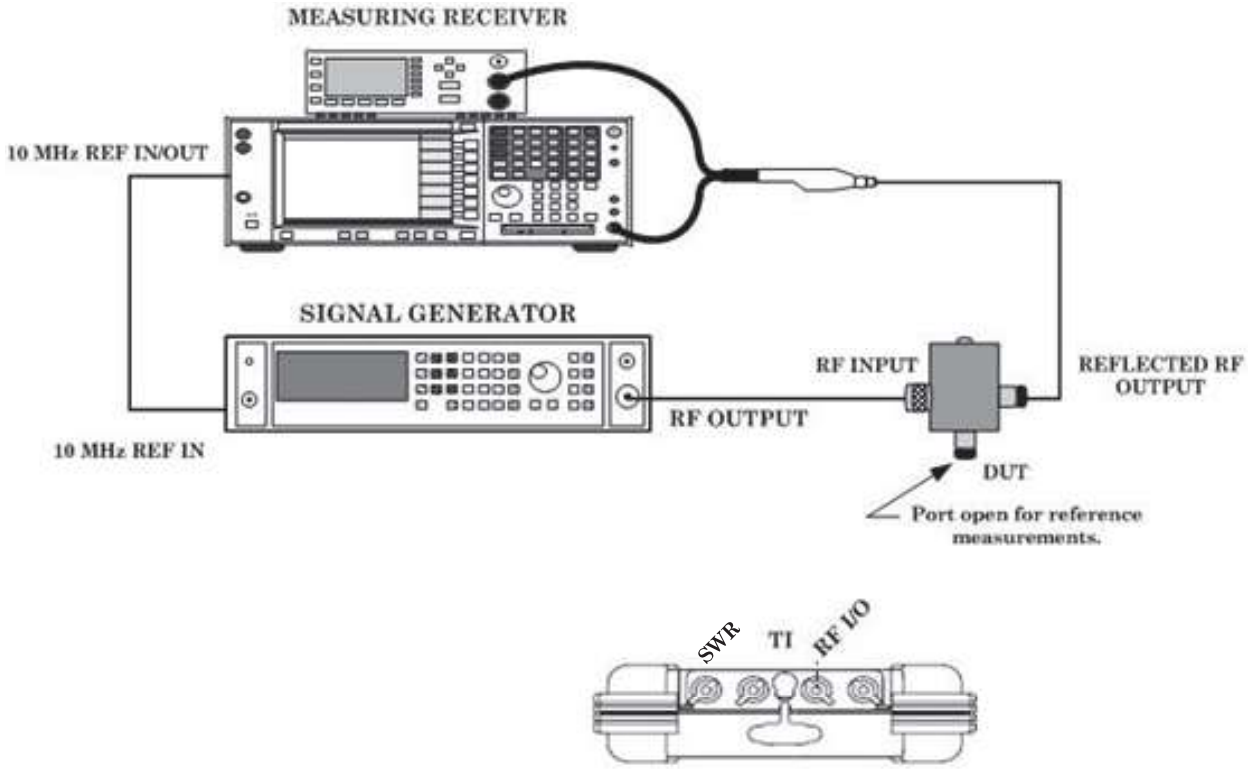


Figure 1. VSWR Setup.

(8) Disconnect VSWR bridge Device Under Test (DUT) port from TI **RF I/O** connector.

(9) Repeat steps (1) through (7) above for TI **SWR** connector using the settings in table 10.

(10) Measuring receiver will indicate within the limits in table 10.

Table 10. VSWR.

| Freq (MHz) | Limits (dB) | Equivalent VSWR limits |
|---|---|---|
| 75 | <-17.7 | <1.30 |
| 225 | <-17.7 | <1.30 |
| 400 | <-16.5 | <1.35 |

(11) Disconnect equipment setup.

**b. Adjustments.** No adjustments can be made.

**13. VOR**

**a. Performance Check**

(1) Connect measuring receiver to RF input TI **ANT** connector.

(2) Repeat paragraph **7 g** to preset TI.

(3) Press the following TI keys, as needed, in (a) through (g) below.

(a) **MODE** to display **VOR** mode screen.
(b) **FREQ** to set **FREQ** to ***108.000 MHz***.
(c) **RF LVL** and set **RF LVL** to ***10.0 dBm***.
(d) **TONE** to set **MOD TONE** to ***1020 Hz***.
(e) **M MOD** to set **M MOD** to ***CAL (90%)***.
(f) [**30 MOD**] and set **30 Hz MOD** to ***0%***.
(g) [**9960 MOD**] and set **9960 Hz MOD** to ***0%***.

(4) Configure measuring receiver for AM measurement.

(5) Verify that measuring receiver indicates within the frequency, AM depth and distortion limits in table 11 for the 1020 Hz Tone. If AM depth is not within limits, perform **b** below.

Table 11. VOR.

| **TONE** (Hz) | Limits | | | | |
|---|---|---|---|---|---|
| | Frequency (Hz) | | AM % | | Distortion (%) |
| | Min | Max | Min | Max | |
| 1020 | 1019.796 | 1020.204 | 28 | 32 | <2.5 |
| 30 | 29.994 | 30.006 | 28 | 32 | <2.5 |
| 9960 | 9958.008 | 9961.992 | 28 | 32 | <2.5 |

(6) Press **TONE,** to set **MOD TONE** to ***OFF***.

(7) Press [**30 MOD**] and set **30 Hz MOD** to ***30%***.

(8) Repeat step (5) above for 30 Hz Tone.

(9) Set **30 Hz MOD** to ***0%***.

(10) Press [**9960 MOD**] and set **9960 Hz MOD** to ***30%***.

(11) Repeat step (5) above for 9960 Hz Tone.

(12) Press [**30 MOD**] and set **30 Hz MOD** to ***30%***. If measuring receiver does not indicate between 56% and 64% AM, perform **b** below.

(13) Configure measuring receiver for VOR measurement. If measuring receiver does not indicate between 455 and 505 Hz, perform **b** below.

(14) Press the following TI keys, as needed, in (a) through (d) below.

(a) **SETUP** to display **SETUP** mode screen.
(b) [**NEXT PARAM**] until **VOR BRG** is selected and set to ***FIXED***.
(c) **MODE** to display **VOR** mode screen.
(d) [**TO/FROM**] to set **TO/FROM** to ***TO***.

(15) Press [**BRG**] and set **BRG** to the first value in table 12. Measuring receiver should indicate within the limits in table 12. No adjustments can be made.

(16) Repeat step (15) above for the remaining values listed in table 12.

Table 12. Bearing (TO).

| **BRG** (degrees) | Limits (degrees) | |
|---|---|---|
| | Min | Max |
| 0.0 | 179.9 | 180.1 |
| 30 | 209.9 | 210.1 |
| 60 | 239.9 | 240.1 |
| 90 | 269.9 | 270.1 |
| 120 | 299.9 | 300.1 |
| 150 | 329.9 | 330.1 |
| 180 | 359.9 | 0.1 |
| 210 | 29.9 | 30.1 |
| 240 | 59.9 | 60.1 |
| 270 | 89.9 | 90.1 |
| 300 | 119.9 | 120.1 |
| 330 | 149.9 | 150.1 |

(17) Press [**TO/FROM**] and set **TO/FROM** to ***FROM***.

(18) Press [**BRG**] and set **BRG** to the first value in table 13. Measuring receiver should indicate within the limits in table 13. No adjustments can be made.

Table 13. Bearing (FROM).

| **BRG** (degrees) | Limits (degrees) | |
|---|---|---|
| | Min | Max |
| 0.0 | 359.9 | 0.1 |
| 30 | 29.9 | 30.1 |
| 90 | 89.9 | 90.1 |
| 150 | 149.9 | 150.1 |
| 210 | 209.9 | 210.1 |
| 270 | 269.9 | 270.1 |
| 330 | 329.9 | 330.1 |

(19) Press **SETUP** to display **SETUP** mode screen.

(20) Press [**NEXT PARAM**] until **VOR BRG** is selected and set to ***VAR***.

(21) Press **MODE** to display **VOR** mode screen.

(22) Press [**BRG**] to select **BRG** field.

(23) Use ▲, ▼, ◄, ► to set **BRG** to the first value in table 14. Measuring receiver should indicate within the limits in table 14. No adjustments can be made.

(24) Repeat step (23) above for the remaining values in table 14.

Table 14. Bearing (VAR).

| **BRG** (degrees) | Limits | |
|---|---|---|
| | Min | Max |
| 1.0 | 0.9 | 1.1 |
| 2.0 | 1.9 | 2.1 |
| 10.1 | 10.0 | 10.2 |
| 10.2 | 10.1 | 10.3 |

(25) Leave measuring receiver connected to TI **ANT** connector.

**b. Adjustments**

(1) Perform paragraph **6 g** above to access **CALIBRATION** menu screen.

(2) Press [**MOD CALS**] to display **MODULATION CAL** menu screen.

(3) Press [**VOR**] to display **VOR CAL** sequence screen.

(4) Follow the on-screen prompts and recall stored calibration levels from table 8 when necessary. For **VOR CAL** sequence, the AM modulation setting error must be <0.5% and the amplitude setting error must be <0.1 dB.

(5) Reference the following during the **VOR CAL** sequence:

(a) In **STEP 2**, select 15 kHz LP filter on measuring receiver.
(b) In **STEP 3**, select 3 kHz LP filter on measuring receiver.

(6) When the calibration sequence is complete, press [**SAVE & RETURN**].

(7) Press [**RETURN**], as needed, to return to the SETUP menu screen.

(8) Press [**MODE**], to return to the **VOR** mode screen.

**14. Localizer**

**a. Performance Check**

(1) Repeat paragraph **7 g** to preset TI.

(2) Configure measuring receiver for AM measurement.

(3) Press the following TI keys, as needed, in (a) through (f) below.

(a) **MODE** to display **LOCALIZER** mode screen.
(b) **FREQ** to set **FREQ** to ***108.1000 MHz***.
(c) **RF LVL** and set **RF LVL** to ***-20.0 dBm***.
(d) **TONE** to set **MOD TONE** to ***1020 Hz***.
(e) **M MOD** to set **M MOD** to ***CAL (70%)***.
(f) [**TONE DEL**] to set **TONE DEL** to ***90 & 150***. This will change M MOD to CAL (30%).

(4) Verify that measuring receiver indications are within the frequency, AM depth and distortion limits in table 15 for the 1020 Hz Tone. If AM depth is not within the limits in table 15, then perform **b** below.

Table 15. Localizer.

| **TONE** (Hz) | Limits | | | | |
|---|---|---|---|---|---|
| | Frequency (Hz) | | AM % | | Distortion (%) |
| | Min | Max | Min | Max | |
| 1020 | 1019.8 | 1020.2 | 28 | 32 | <2.5 |
| 90 | 89.982 | 90.018 | 18 | 22 | <2.5 |
| 150 | 149.97 | 150.03 | 18 | 22 | <2.5 |

(5) Press **TONE,** to set **MOD TONE** to ***OFF***.

(6) Press [**TONE DEL**] to set **TONE DEL** to ***150***.

(7) Repeat step (4) above for 90 Hz Tone.

(8) Press [**TONE DEL**] to set **TONE DEL** to ***90***.

(9) Repeat step (4) above for 150 Hz Tone.

(10) Press [**TONE DEL**] to set **TONE DEL** to **---**.

(11) Configure measuring receiver for ILS-Localizer measurement.

(12) Press **DDM/µA LOC** ◄, ► keys, as needed, to obtain the first setting in table 16. Measuring receiver should indicate within the limits in table 16.

(13) Repeat step (12) above for the remaining settings in table 16.

Table 16. LOC DDM.

| **LOC DDM** | Limits | |
|---|---|---|
| | Min | Max |
| 0.000 CENTER | -0.0015 | + 0.0015 |
| 0.093 LEFT | -0.0973 | -0.0887 |
| 0.155 LEFT | -0.1612 | -0.1489 |
| 0.200 LEFT | -0.2075 | -0.1925 |
| 0.200 RIGHT | 0.1925 | 0.2075 |
| 0.155 RIGHT | 0.1488 | 0.1612 |
| 0.093 RIGHT | 0.0887 | 0.0973 |

(14) Press [**DEV STEP**] and set **DEV STEP** to ***VAR***.

(15) Press **DDM/µA LOC** ◄ key to select **LOC DDM**.

(16) Use main ▲, ▼, ◄, ► to set **LOC DDM** to first value in table 17. Measuring receiver should indicate within the limits listed.

(17) Repeat step (16) above for remaining settings in table 17.

Table 17. LOC DDM (Variable).

| **LOC DDM** | Limits | |
|---|---|---|
| | Min | Max |
| 0.094 | 0.0887 | 0.0993 |
| 0.095 | 0.0897 | 0.1004 |
| 0.096 | 0.0906 | 0.1014 |
| 0.097 | 0.0916 | 0.1024 |

(18) Press [**DEV STEP**] and set **DEV STEP** to ***FIXED***.

(19) Press **DDM/µA LOC** ◄ to set **LOC DDM** to ***0.000 CENTER***.

(20) Press **[90/150 Hz]** to select **90/150 Hz** field.

(21) Press ▲, ▼, as needed, to set **90/150 Hz** field to first setting in table 18. measuring receiver AMR should indicate within the limits in table 18.

(22) Repeat step (21) above for remaining settings in table 18.

Table 18. LOC Phase.

| **90/150 Hz** (degrees) | Limits | |
|---|---|---|
| | Min | Max |
| 120 | -0.5 | 0.5 |
| 80 | 39.5 | 40.5 |
| 40 | -40.5 | -39.5 |
| 20 | -20.5 | -19.5 |
| 10 | -10.5 | -9.5 |
| 5 | -5.5 | -4.5 |
| 0 | -0.5 | 0.5 |

**b. Adjustments**

(1) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(2) Press [**MOD CALS**] to display **MODULATION CAL** menu screen.

(3) Press [**MAIN LOC**] to display **MAIN PATH LOC** calibration sequence screen.

(4) Connect multimeter to the **AUX I/O** connector and set multimeter for AC measurement.

(5) Follow the on-screen prompts.

(6) When the calibration sequence is complete, press [**SAVE & RETURN**] to return to **MODULATION CAL** screen.

(7) Press [**LOC LOC**], to display to the **LOC PATH LOC** calibration screen.

(8) Setup measuring receiver to measure AM with a 110.05 MHz carrier signal, using 3 kHz LP filter.

(9) Follow the on-screen prompts.

(10) When the calibration sequence is complete, press [**SAVE & RETURN**] to return to **MODULATION CAL** screen.

(11) Press [**RETURN**], as needed, to return to the **SETUP** menu screen.

(12) Press [**MODE**], to return to the **LOCALIZER** mode screen.

**15. Glide Slope**

**a. Performance Check**

(1) Configure measuring receiver for AM measurement.

(2) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** to display **GLIDE SLOPE** mode screen.
(b) **FREQ** to set **FREQ** to ***334.7000 MHz***.
(c) **RF LVL** and set **RF LVL** to ***10.0 dBm***.
(d) [**TONE DEL**] to set **TONE DEL** to ***90***.

(3) Verify that measuring receiver indications are within the frequency, AM depth and distortion limits in table 19 for the 150 Hz Tone.

Table 19. Glide Slope.

| **TONE** (Hz) | Limits | | | | |
|---|---|---|---|---|---|
| | Frequency (Hz) | | AM % | | Distortion (%) |
| | Min | Max | Min | Max | |
| 150 | 149.97 | 150.03 | 38 | 42 | <2.5 |
| 90 | 89.982 | 90.018 | 38 | 42 | <2.5 |

(4) Press [**TONE DEL**] to set **TONE DEL** to ***150***.

(5) Repeat step (3) above for 90 Hz Tone.

(6) On measuring receiver for ILS-Glideslope measurement.

(7) Press [**TONE DEL**] to set **TONE DEL** to **---**.

(8) Press **DDM/µA G/S** ▲, ▼, as needed, to set **G/S DDM** to first setting in table 20. If measuring receiver is not within the limits listed, perform **b.** below.

(9) Repeat step (8) above for the remaining settings in table 20.

(10) Press [**DEV STEP**] and set **DEV STEP** to ***VAR***.

(11) Press **DDM/µA G/S** ▼ key to select **G/S DDM** field.

(12) Use ▲, ▼, ◄, ► to set **G/S DMM** to first setting in table 21. Measuring receiver will indicate within the limits listed in table 21.

(13) Repeat step (8) above for the remaining settings in table 21.

Table 20. G/S DDM.

| **G/S DDM** | Limits | |
|---|---|---|
| | Min | Max |
| 0.000 CENTER | -0.0030 | 0.0030 |
| 0.091 UP | -0.0967 | -0.0853 |
| 0.175 UP | -0.1833 | -0.1667 |
| 0.400 UP | -0.4150 | -0.3850 |
| 0.400 DOWN | 0.3850 | 0.4150 |
| 0.175 DOWN | 0.1667 | 0.1833 |
| 0.091 DOWN | 0.0853 | 0.0967 |

Table 21. G/S DDM (Variable).

| **G/S DDM** | Limits | |
|---|---|---|
| | Min | Max |
| 0.176 DOWN | 0.1659 | 0.1861 |
| 0.177 DOWN | 0.1669 | 0.1871 |
| 0.178 DOWN | 0.1679 | 0.1881 |
| 0.179 DOWN | 0.1688 | 0.1892 |

(14) Set **G/S DDM** to ***0.000 CENTER***.

(15) Press [**DEV STEP**] and set **DEV STEP** to ***FIXED***.

(16) Press **90/150 Hz** and set **90/150 Hz** to first setting in table 22. Modulation analyzer will indicate within the limits listed.

(17) Repeat step (16) above for remaining settings in table 22.

Table 22. G/S Phase.

| **90/150 Hz** (degrees) | Limits | |
|---|---|---|
| | Min | Max |
| 0 | -0.5 | 0.5 |
| 5 | -5.5 | -4.5 |
| 10 | -10.5 | -9.5 |
| 20 | -20.5 | -19.5 |
| 40 | -40.5 | -39.5 |
| 80 | 39.5 | 40.5 |
| 120 | -0.5 | 0.5 |

**b. Adjustments**

(1) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(2) Press [**MOD CALS**] to display **MODULATION CAL** menu screen.

(3) Press [**MAIN G/S**] to display **MAIN PATH G/S** calibration sequence screen.

(4) Set measuring receiver input frequency to 332.000MHz and activate 3 kHz LP filter.

(5) Follow on-screen prompts.

(6) When the calibration sequence is complete, press [**SAVE & RETURN**] to return to **MAIN PATH G/S** calibration sequence screen.

(7) Press [**RETURN**], as needed, to return to the **SETUP** menu screen.

(8) Press [**MODE**], to return to the **GLIDE SLOPE** mode screen.

**16. Marker Beacon**

**a. Performance Check**

(1) Connect measuring receiver to TI **ANT** connector.

(2) Configure measuring receiver for AM measurement.

(3) Repeat paragraph **7 g** to preset TI.

(4) Press the following TI keys, as needed, in (a) through (e) below.

(a) **MODE** to display **MARKER BEACON** mode screen.
(b) **FREQ** to set **FREQ** to ***75.000 MHz***.
(c) **RF LVL** and set **RF LVL** to ***10.0 dBm***.
(d) **TONE** to set **MOD TONE** to ***400 Hz***.
(e) **M MOD** to set **M MOD** to ***CAL (95%)***.

(5) Verify that measuring receiver indications are within the limits in table 23 for the set **MOD TONE**.

Table 23. Marker Beacon Mod Tone.

| **MOD TONE** (Hz) | Limits | | | | |
|---|---|---|---|---|---|
| | Frequency (Hz) | | AM % | | Distortion (%) |
| | Min | Max | Min | Max | |
| 400 | 399.02 | 400.08 | 90 | 100 | <2.5 |
| 1300 | 1299.74 | 1300.26 | 90 | 100 | <2.5 |
| 3000 | 2999.40 | 3000.60 | 90 | 100 | <2.5 |

(6) Press **TONE** to set **MOD TONE** to ***1300 Hz***.

(7) Repeat step (5) above.

(8) Set **MOD TONE** to ***3000*** Hz and repeat step (5) above.

(9) Disconnect test equipment.

**b. Adjustments.** No adjustments can be made.

**17. ILS**

**a. Performance Check**

(1) Repeat paragraph **7 g** to preset TI.

(2) Connect measuring receiver to TI **ANT** connector using a 10 db attenuator.

(3) Configure Measuring receiver for AM measurement.

(4) Press the following TI keys, as needed, in (a) through (d) below.

(a) **MODE** until **ILS** mode screen is displayed.
(b) **FREQ** and set **FREQ** to ***108.100 MHz***.
(c) **RF LVL** and set **G/S LVL** to ***-30.0 dBm***.
(d) **TONE** to set **MOD TONE** to ***400 Hz Marker On***.

(5) Verify that measuring receiver indicates between 74.99993 and 75.00008 MHz.

(6) Verify that measuring receiver indicates within the limits in table 24 for 400 Hz Mod Tone.

Table 24. ILS MOD TONE.

| **MOD TONE** (Hz) | Limits | | | | |
|---|---|---|---|---|---|
| | Frequency (Hz) | | AM Depth (%) | | Distortion % |
| | Min | Max | Min | Max | |
| 400 | 399.02 | 400.08 | 90 | 100 | <5.0 |
| 1300 | 1299.7 | 1300.3 | 91.25 | 98.75 | <3.75 |
| 3000 | 2999.4 | 3000.6 | 91.25 | 98.75 | <3.75 |
| 1020 | 1019.8 | 1020.2 | 28.00 | 32.00 | <2.5 |
| 90 | 89.980 | 90.020 | 18.00 | 22.00 | <2.5 |
| 150 | 149.97 | 150.03 | 18.00 | 22.00 | <2.5 |

(7) Set **MOD TONE** to ***1300 Hz Marker On***.

(8) Verify that measuring receiver indicates within the limits in table 24 for 1300 Hz Mod Tone.

(9) Set **MOD TONE** to ***3000 Hz Marker On***.

(10) Repeat step (8) above for 3000 Hz Mod Tone.

(11) Set **MOD TONE** to ***1020 Hz***.

(12) Press [**TONE DEL**] to set **TONE DEL** to ***90 & 150***.

(13) Verify that measuring receiver indicates between 108.09989 and 108.10011 MHz.

(14) Configure measuring receiver for power measurement. Measuring receiver will indicate between -12.5 and -7.5 dBm.

(15) Configure measuring receiver for AM measurement and verify that measuring receiver indicates within the 1020 Hz limits in table 24.

(16) Press [**TONE DEL**] to set **TONE DEL** to ***150***.

(17) Press **TONE** to set **MOD TONE** to ***OFF***.

(18) Verify that measuring receiver indicates within the 90 Hz limits in table 24.

(19) Press [**TONE DEL**] to set **TONE DEL** to ***90***.

(20) Verify that measuring receiver indicates within the 150 Hz limits in table 24.

(21) Set **TONE DEL** to **---**.

(22) Configure measuring receiver for ILS-Localizer measurement.

(23) Press DDM/µA LOC ◄, ► keys, as needed, to obtain the first setting in table 25. If measuring receiver does not indicate within the limits listed, perform b below.

(24) Repeat step (23) above for the remaining settings in table 25.

Table 25. ILS DDM.

| LOC DDM | Limits | |
|---|---|---|
| | Min | Max |
| 0.000 CENTER | -0.0015 | + 0.0015 |
| 0.093 LEFT | -0.0973 | -0.0887 |
| 0.155 LEFT | -0.1612 | -0.1489 |
| 0.200 LEFT | -0.2075 | -0.1925 |
| 0.200 RIGHT | 0.1925 | 0.2075 |
| 0.155 RIGHT | 0.1488 | 0.1612 |
| 0.093 RIGHT | 0.0887 | 0.0973 |

(25) Press [**DEV STEP**] and set **DEV STEP** to ***VAR***.

(26) Press **DDM/µA LOC** ◄ key to select **LOC DMM**.

(27) Use ▲, ▼, ◄, ► to set **LOC DMM** to first value in table 26. Measuring receiver should indicate within the limits listed.

(28) Repeat step (27) above for remaining settings in table 26.

Table 26. ILS DDM (Variable).

| LOC DDM | Limits | |
|---|---|---|
| | Min | Max |
| 0.094 | 0.0887 | 0.0993 |
| 0.095 | 0.0897 | 0.1004 |
| 0.096 | 0.0906 | 0.1014 |
| 0.097 | 0.0916 | 0.1024 |

(29) Set **LOC DMM** to ***0.000 CENTER***.

(30) Press [**DEV STEP**] and set **DEV STEP** to ***FIXED***.

(31) Press [**90/150 Hz**] to select **90/150 Hz** field.

(32) Press ▲, ▼, as needed, set **90/150 Hz** field to first setting in table 27.

(33) Repeat step (32) above for remaining settings in table 27.

Table 27. ILS

| **90/150 Hz** (degrees) | Limits | |
|---|---|---|
| | Min | Max |
| 0 | -0.5 | 0.5 |
| 5 | -5.5 | -4.5 |
| 10 | -10.5 | -9.5 |
| 20 | -20.5 | -19.5 |
| 40 | -40.5 | -39.5 |
| 80 | 39.5 | 40.5 |
| 120 | -0.5 | 0.5 |

(34) Set **90/150 Hz** field to **---**.

(35) Disconnect 10 dB attenuator and modulation analyzer from TI **ANT** connection.

(36) Connect measuring receiver to TI **ANT** connector.

(37) Press TI **RF LVL** and set **G/S LVL** to ***0.0 dBm***.

(38) Calibrate measuring receiver for 334.700 MHz in tuned RF mode.

(39) Press **RF LVL** and set **G/S LVL** to ***-10.0 dBm***. Measuring receiver should indicate between -13 and -7 dBm.

(40) Set **G/S LVL** to ***-30.0 dBm***. Measuring receiver should indicate between -33 and -27 dBm

(41) Disconnect measuring receiver from TI **ANT** connector.

**b. Adjustments**

(1) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(2) Press [**MOD CALS**] to display **MODULATION CAL** menu screen.

(3) Press [**LOC LOC**] to display **LOC PATH LOC** calibration sequence screen.

(4) Follow on-screen prompts.

**18. COMM AM**

**a. Performance Check**

(1) Connect measuring receiver to TI **ANT** connector.

(2) Configure measuring receiver for AM measurement.

(3) Press the following TI keys, as needed, in (a) through (f) below.

(a) **MODE** to display **COMM AM** mode screen.
(b) **FREQ** to set **FREQ** to ***137.0000 MHz***.
(c) **RF LVL** and set **RF LVL** to ***10.0 dBm***.
(d) **TONE** to set **MOD TONE** to ***1020 Hz***.
(e) **M MOD** to set **M MOD** to ***CAL (30%)***.
(f) [**SWITCH GEN/RX**] to set **COMM AM** mode to ***GENERATING***.

(4) Verify measuring receiver indicates between 1019.80 and 1020.20 Hz with <10% distortion and 28 to 32% AM.

(5) Press **FREQ** to set **FREQ** to ***312.0000 MHz***.

(6) Repeat step (4) above.

(7) Disconnect measuring receiver from TI.

**b. Adjustments.** No adjustments can be made.

**19. Frequency Counter**

**a. Performance Check**

(1) Press [**SWITCH GEN/RX**] to set **COMM AM** mode to ***RECEIVING***.

(2) Connect signal generator to TI **ANT** connector.

(3) Set signal generator output level to -35 dBm.

(4) Set signal generator frequency to the first setting in table 28. If TI indication is not within the limits listed, perform **b** below.

(5) Repeat step (4) above for remaining settings in table 28.

Table 28. Frequency Counter Accuracy.

| **FREQ** (MHz) | Limits (MHz) | |
|---|---|---|
| | Min | Max |
| 10.000 | 9.9999 | 10.0001 |
| 10.001 | 10.0009 | 10.0011 |
| 100.101 | 100.1008 | 100.1012 |
| 399.999 | 399.9985 | 399.9995 |

(6) Press **SETUP** to display **SETUP** mode screen.

(7) Press ▲ key to set **PORT** to ***RF I/O***.

(8) Press **MODE** to return to **COMM AM** mode screen.

(9) Move signal generator connection from TI **ANT** to **RF I/O** connector.

(10) Set signal generator output level to 0 dBm.

(11) Repeat steps (4) and (5) above.

(12) Press **MODE** until **FREQUENCY COUNTER** mode screen is displayed.

**NOTE**

Do not disconnect signal generator from TI **RF I/O** connector.

(13) Connect function generator to TI **AUX I/O** connector.

(14) Set function generator output to 50 Ω and 1 Vp-p.

(15) Set function generator to the first frequency listed in table 29. TI will indicate within the limits listed.

(16) Repeat step (15) above for the remaining settings in table 29.

Table 29. Frequency Counter.

| **FREQ** (MHz) | Limits (MHz) | |
|---|---|---|
| | Min | Max |
| 1.000 | 0.999998 | 1.000002 |
| 1.00001 | 1.000008 | 1.000012 |
| 5.10001 | 5.100004 | 5.100016 |
| 9.99999 | 9.999979 | 10.000011 |

(17) Disconnect both signal generator and function generator from TI.

**b. Adjustments.** No adjustments can be made.

**20. AM Meter**

**a. Performance Check**

(1) Repeat paragraph **7 g** to preset TI.

(2) Press **MODE** until **COMM AM** mode screen is displayed.

(3) Connect equipment as shown in figure 2.

(4) Configure measuring receiver for a 400 MHz measurement.

(5) Set signal generator output to 0 dBm adjust for a 400 MHz indication on measuring receiver.

(6) Configure measuring receiver for AM measurement with 300 Hz HP and 3 kHz LP filters and PEAK ± /2 detectors on.

(7) Press TI **FREQ** and set **FREQ** to ***400.0000 MHz***.

(8) Set signal generator to AM with a 1 kHz modulation frequency.

(9) Adjust signal generator AM modulation level until a measuring receiver indicates first value in table 28. TI **TX MOD** should indicate within the limits in table 30.

(10) Repeat step (9) above for the remaining settings in table 30.

Table 30. AM Meter.

| AM (%) | Limits (%) | |
|---|---|---|
| | Min | Max |
| 30.0 | 27 | 33 |
| 50.0 | 45 | 55 |
| 90.0 | 81 | 99 |

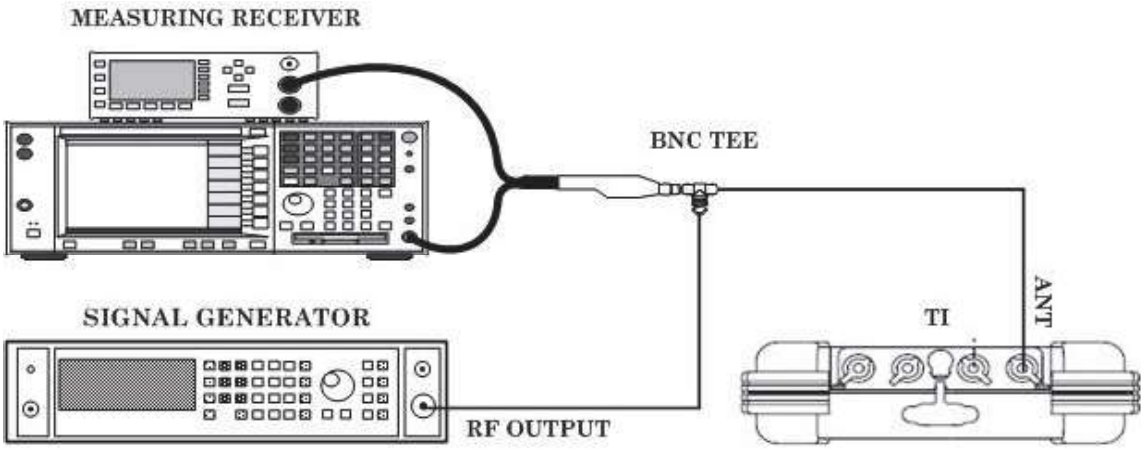


Figure 2. AM/FM Meter Setup.

(11) Press **SETUP** to display **SETUP** mode screen.

(12) Set **PORT** to ***RF I/O***.

(13) Press **MODE** to return to **COMM AM** mode screen.

(14) Move connection from TI **ANT** to **RF I/O** connector.

(15) Adjust signal generator output level to +21 dBm for 30% and 50% modulation levels and +19.5 dBm for 90% modulation level. Adjust signal generator AM modulation level until measuring receiver indicates setting in table 30. TI **TX MOD** should indicate within the limits in table 30.

(16) Repeat step (15) above for remaining settings in table 30.

**b. Adjustments.** No adjustments can be made.

**21. FM Meter**

**a. Performance Check**

(1) Press the following TI keys, as needed, in (a) through (e) below.

(a) MODE until COMM FM mode screen is displayed.
(b) FREQ and set FREQ to *165.000 MHz*.
(c) SETUP to display SETUP mode screen.
(d) ▲ key to set PORT to *ANT*.
(e) MODE to return to COMM FM mode screen.

(2) Connect equipment as shown in figure 2.

(3) Set signal generator to -20.0 dBm at 165 MHz.

(4) Configure measuring receiver for a 165 MHz measurement.

(5) Set signal generator FM on and modulation frequency to 400 Hz.

(6) Configure measuring receiver for FM measurement with 50 Hz HP and 3 kHz LP filters on.

(7) Vary signal generator FM deviation frequency until measuring receiver indicates the first setting in table 31. If **TX DEV** does not indicate within the limits in table 31, perform b below.

(8) Repeat step (7) above for the remaining FM settings in table 31.

Table 31. FM Meter

| FM (kHz) | Limits (kHz) | |
|---|---|---|
| | Min | Max |
| 1 | 0.6 | 1.5 |
| 10 | 8.8 | 11.2 |
| 15 | 13.4 | 16.6 |

(9) Set signal generator modulation frequency to 1 kHz.

(10) Repeat steps (7) and (8) above.

(11) Press **SETUP** to display **SETUP** mode screen.

(12) Set **PORT** to ***RF I/O***.

(13) Press **MODE** to return to **COMM FM** mode screen.

(14) Move connection from TI **ANT** to **RF I/O** connector.

(15) Set signal generator output to +6 dBm.

(16) Repeat steps (7) and (8) above.

(17) Disconnect test equipment.

**b. Adjustments**

(1) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(2) Press the following TI keys in (a) through (c) below.

(a) [**MISC CALS**] to display **MISC CALS** screen.
(b) [**FM CAL**] to display **FM CAL** screen.
(c) [**FM DEV**] to display **FM DEV CAL** screen.

(3) Follow the on-screen prompts.

**NOTE**

After changing deviation levels, wait several seconds to allow the TI to average the modulation before pressing [NEXT].

(4) When FM deviation calibration is complete, press [**SAVE & RETURN**].

(5) Press [**RETURN**], as needed, to return to **SETUP** menu.

**22. SWR Meter**

**a. Performance Check**

(1) Press **SETUP** to display **SETUP** mode screen.

(2) Repeat paragraph **8 a** (12) to change **FREQ** field to ***VAR***.

(3) Press **MODE** until **SWR** mode screen is displayed.

(4) Press [**CAL**] and follow TI on-screen instructions using 1.0 VSWR mismatch standard when prompted for 50 Ω load.

(5) When cal sequence is complete, press [**SAVE & RETURN**] to return to **SWR** MODE screen.

(6) Leave 1.0 VSWR mismatch standard connected to TI **SWR** connector.

(7) Press **FREQ** and set **FREQ** to first setting in table 32. If TI does not indicate within the limits in table 32, perform **b** below.

(8) Repeat step (7) above for the remaining frequency settings in table 32.

Table 32. SWR Meter Accuracy.

| **FREQ** (MHz) | Limits (VSWR) |
|---|---|
| 75 | ≤1.5 |
| 137 | ≤1.5 |
| 225 | ≤1.5 |
| 312 | ≤1.5 |
| 400 | ≤1.5 |

(9) Disconnect 1.0 VSWR mismatch standard and connect 1.20 VSWR mismatch standard to TI **SWR** connector.

(10) Set TI **FREQ** to first setting in table 33. If TI does not indicate within the limits in table 33, perform b below.

(11) Repeat step (10) above for the remaining frequency settings in table 33.

Table 33. SWR Meter Accuracy.

| **FREQ** (MHz) | Limits (VSWR) |
|---|---|
| 400 | ≤1.7 |
| 312 | ≤1.7 |
| 225 | ≤1.7 |
| 137 | ≤1.7 |
| 75 | ≤1.7 |

(12) Disconnect 1.20 VSWR mismatch standard and connect 1.50 VSWR mismatch standard to TI **SWR** connector.

(13) Set TI **FREQ** to first setting in table 34. If TI does not indicate within the limits in table 34, perform b below.

(14) Repeat step (13) above for the remaining frequency settings in table 34.

Table 34. SWR Meter Accuracy.

| **FREQ** (MHz) | Limits (VSWR) | |
|---|---|---|
| | Min | Max |
| 75 | 1.1 | 2.1 |
| 137 | 1.1 | 2.1 |
| 225 | 1.1 | 2.1 |
| 312 | 1.1 | 2.1 |
| 400 | 1.1 | 2.1 |

(15) Disconnect 1.50 VSWR mismatch standard and connect 2.00 VSWR mismatch standard to TI **SWR** connector.

(16) Set TI **FREQ** to first setting in table 35. If TI does not indicate within the limits in table 35, perform b below.

(17) Repeat step (16) above for the remaining frequency settings in table 35.

Table 35. SWR Meter Accuracy.

| **FREQ** (MHz) | Limits (VSWR) | |
|---|---|---|
| | Min | Max |
| 400 | 1.5 | 2.8 |
| 312 | 1.5 | 2.8 |
| 225 | 1.5 | 2.8 |
| 137 | 1.5 | 2.8 |
| 75 | 1.5 | 2.8 |

(18) Disconnect 2.00 VSWR mismatch standard from TI **SWR** connector.

**b. Adjustments**

(1) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(2) Press [**MISC CALS**] to display **MISC CALS** screen.

(3) Press [**SWR**] to display **SWR CAL** sequence screen.

(4) Follow on-screen prompts.

(5) When cal sequence is complete, press [**SAVE & RETURN**] to return to **MISC CALS** screen.

(6) Press [**RETURN**], as needed, to return to **SETUP** menu.

**23. Power Meter**

**a. Performance Check**

(1) Press **SETUP** to display **SETUP** mode screen.

(2) Set **PORT** to ***RF I/O***.

(3) Press **MODE** until **COMM AM** mode screen is displayed.

(4) Connect RF reference source to TI **RF I/O** connector.

(5) Set RF reference source for a 100 MHz, 100 mW output. If TI ***TX PWR*** does not indicate between 0.08 and 0.12 W, perform **b** below.

(6) Change RF reference source frequency to 300 MHz. If TI ***TX PWR*** does not indicate between 0.08 and 0.12 W, perform **b** below.

(7) Disconnect RF reference source from TI **RF I/O** connector.

(8) Connect equipment as shown in figure 3.

(9) Set signal generator to first frequency listed in table 36.

(10) Adjust both signal generator and RF power amplifier outputs, as necessary, to obtain first rf power meter indication in table 36. If TI ***TX PWR*** does not indicate within the limits listed in table 36, perform **b** below.

**CAUTION**

The TI is not rated for continuous power >10 W. Complete these steps as quickly as possible and reduce input power settings to allow power termination to cool. Ensure that the temperature indicated on the TI does not exceed 35 C degrees.

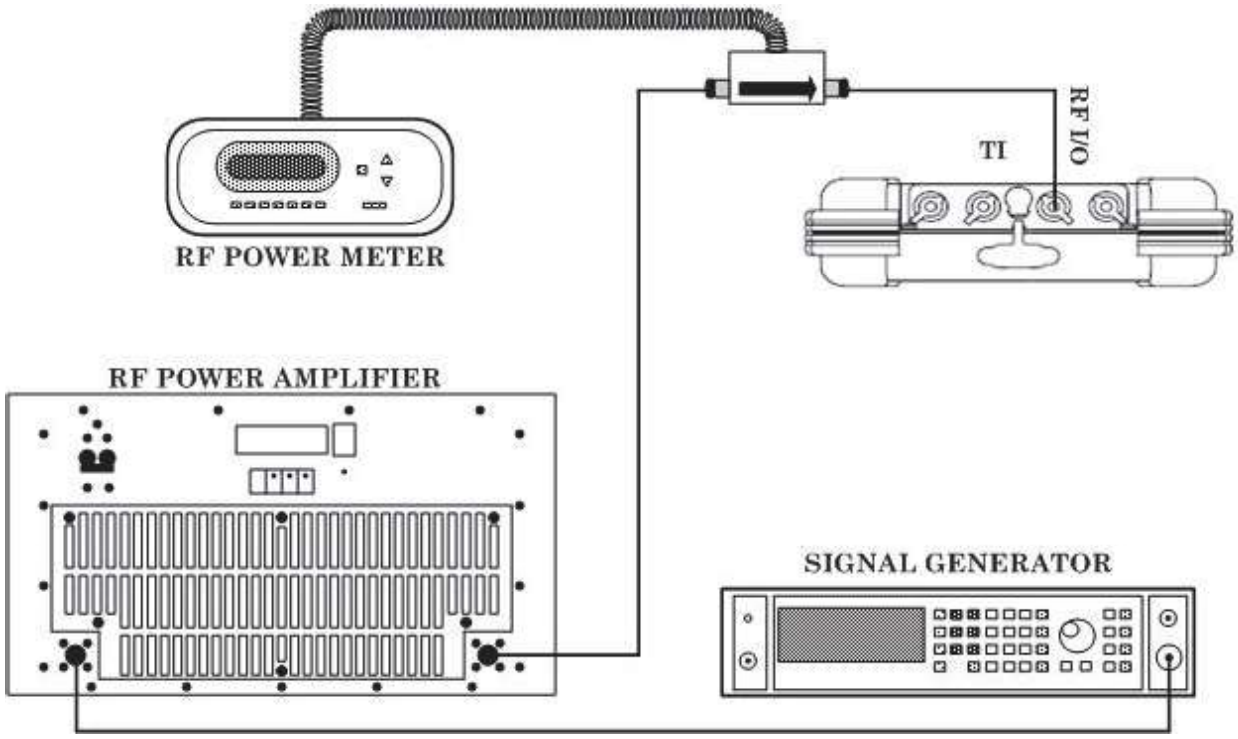


Figure 3. Power Meter Setup.

(11) Repeat steps (9) and (10) above for the remaining settings in table 36.

Table 36. Power Meter.

| **FREQ** (MHz) | Power (W) | Limits (W) | |
|---|---|---|---|
| | | Min | Max |
| 100 | 1.0 | 0.8 | 1.2 |
| 100 | 5.0 | 4.5 | 5.5 |
| 100 | 10.0 | 9.1 | 10.9 |
| 100 | 20.0 | 18.3 | 21.7 |
| 100 | 25.0 | 22.9 | 27.1 |
| 300 | 1.0 | 0.8 | 1.2 |
| 300 | 5.0 | 4.5 | 5.5 |
| 300 | 10.0 | 9.1 | 10.9 |
| 300 | 20.0 | 18.3 | 21.7 |
| 300 | 25.0 | 22.9 | 27.1 |

(12) Deenergize and disconnect all test equipment.

**b. Adjustments**

(1) Perform paragraph **6 g** to access **CALIBRATION** menu screen.

(2) Press [**MISC CALS**] to display **MISC CALS** screen.

(3) Press [**POWER METER**] to display **POWER METER CAL** sequence screen.

(4) Disconnect test equipment from TI **RF I/O** connector.

(5) Follow on screen prompts.

(6) In **STEP 2**, when prompted to connect equipment to **RF I/O** port, reconnect equipment as shown in figure 3.

(7) When calibration sequence is completed, press [**SAVE & RETURN**] to return to the **MISC CAL** screen.

(8) Press [**RETURN**], as needed, to return to **SETUP** menu.

**24. Final Procedure**

**a.** Deenergize and disconnect all equipment.

**b.** Annotate and affix DA label/form in accordance with TB 750-25.

# APPENDIX A
# FLATNESS VERIFICATION TABLE

| MODE | FREQ (MHz) | RF LVL (ANT) | | RF LVL (RF I/O) | |
|---|---|---|---|---|---|
| | | 10 dBm | -10 dBm | -40 dBm | -20 dBm |
| VOR | 108.000 | | | | |
| MARKER BEACON | 75.000 | | | | |
| COMM AM | 400.0000 | | | | |
| conCOMM AM | 312.0000 | | | | |
| COMM AM | 225.0000 | | | | |
| COMM AM | 156.0000 | | | | |
| COMM AM | 137.0000 | | | | |
| COMM AM | 118.0000 | | | | |
| Max reading | | | | | |
| Min Reading | | | | | |
| Flatness (Max-Min) ≤ 1 dB | | | | | |

**TB 9-6625-2372-24**
**26 November 2018**

By Order of the Secretary of the Army:

**MARK A. MILLEY**
*General, United States Army*
*Chief of Staff*

Official:

**KATHLEEN S. MILLER**
*Administrative Assistant*
*to the Secretary of the Army*
1830952

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From: “Whomever” whomever@wherever.army.mil
To: 2028@redstone.army.mil

Subject: DA Form 2028

1 ***From: Joe Smith***
2 *Unit: home*
3 ***Address: 4300 Park***
4 ***City***: Hometown
5 ***St: MO***
6 ***Zip: 77777***
7 ***Date Sent***: 19-OCT-93
8 ***Pub no***: 55-2840-229-23
9 ***Pub Title: TM***
10 ***Publication Date***: 04-JUL-85
11 *Change Number*: 7
12 *Submitter Rank*: MSG
13 ***Submitter FName***: Joe
14 *Submitter MName*: T
15 ***Submitter LName***: Smith
16 ***Submitter Phone***: 123-123-1234
17 ***Problem: 1***
18 *Page: 2*
19 *Paragraph: 3*
20 *Line: 4*
21 *NSN: 5*
22 *Reference: 6*
23 *Figure: 7*
24 *Table: 8*
25 *Item: 9*
26 *Total: 123*

27 ***Text***:
This is the text for the problem below line 27.

## RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 25-30; the proponent agency is OAASA.

DATE: 20160610

**INSTRUCTIONS FOR SUBMITTING THE DA FORM 2028**

After completing the DA Form 2028 (Recommended Changes to Publications and Blank Forms), you may send it via Mail, Email, or Web. Preferred methods of submission are Web and Email. A reply will be furnished directly to you. To submit via the World Wide Web use https://amcom2028.redstone.army.mil. E-mail directly to 2028@redstone.army.mil or by fax (256) 842-6546 or DSN 788-6546. Mail directly to Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MLD-MT, Redstone Arsenal, AL, 35898-5230. **Part II** *(page 2)* is for changes to Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

**DETERMINING AND SELECTING THE PROPER PROPONENT**

You can identify the proper proponent for any publication or form by searching for the its title using DA Pam 25-30, which can be accessed at: http://www.apd.army.mil/pamdocs/APD_Search.asp

| **TO:** *(Forward to proponent of publication or form) (Include ZIP Code)* | **FROM:** *(Activity and location) (Include ZIP Code)* |
|---|---|
| COMMANDER<br>U.S. ARMY AVIATION AND MISSILE COMMAND<br>ATTN: AMSAM-MLD-MT<br>REDSTONE ARSENAL, AL 35898 | MSG, JANE Q. DOE<br>1234 ANY STREET<br>NOWHERE TOWN, AL 34567 |

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

| PUBLICATION/FORM NUMBER | DATE | TITLE |
|---|---|---|
| TM 9-1005-433-24 | 20020916 | Machine Gun, .50 Caliber M3P and M3P Machine Gun Electrical Test Set Used on Avenger Air Defense |

| ITEM | PAGE NO. | PARA-GRAPH | LINE NO.* | FIGURE NO. | TABLE NO. | RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible). |
|---|---|---|---|---|---|---|
| 1 | WP 0005-3 | | 2 | | | Test or Corrective Action column should identify a different WP number. |



| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION | SIGNATURE |
|---|---|---|
| MSG, JANE Q. DOE | 788-1234 | |

| **TO:** *(Forward direct to addressee listed in publication)* | **FROM:** *Activity and location) (Include ZIP Code)* | **DATE** |
|---|---|---|
| COMMANDER<br>U.S. ARMY AVIATION AND MISSILE COMMAND<br>ATTN: AMSAM-MLD-MT | MSG, JANE Q. DOE<br>1234 ANY STREET<br>NOWHERE TOWN, AL 34567 | 20160610 |

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

| PUBLICATION NUMBER | DATE | TITLE |
|---|---|---|
| TM 9-1005-433-24 | 20020916 | Machine Gun, .50 Caliber M3P and M3P Machine Gun Electrical Test Set Used on Avenger Air Defe |

| PAGE NO. | COL. NO. | LINE NO. | NATIONAL STOCK NUMBER | REFERENCE NO. | FIGURE NO. | ITEM NO. | TOTAL NO. OF MAJOR ITEMS SUPPORTED | RECOMMENDED ACTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*



| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION | SIGNATURE |
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## RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 25-30; the proponent agency is OAASA.

DATE

**INSTRUCTIONS FOR SUBMITTING THE DA FORM 2028**

After completing the DA Form 2028 (Recommended Changes to Publications and Blank Forms), you may send it via Mail, Email, or Web. Preferred methods of submission are Web and Email. A reply will be furnished directly to you. To submit via the World Wide Web use https://amcom2028.redstone.army.mil. E-mail directly to 2028@redstone.army.mil or by fax (256) 842-6546 or DSN 788-6546. Mail directly to Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MLD-MT, Redstone Arsenal, AL, 35898-5230. **Part II** *(page 2)* is for changes to Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

**DETERMINING AND SELECTING THE PROPER PROPONENT**

You can identify the proper proponent for any publication or form by searching for the its title using DA Pam 25-30, which can be accessed at: http://www.apd.army.mil/pamdocs/APD_Search.asp

| **TO:** *(Forward to proponent of publication or form) (Include ZIP Code)* | **FROM:** *(Activity and location) (Include ZIP Code)* |
|---|---|
| COMMANDER<br>U.S. ARMY AVIATION AND MISSILE COMMAND<br>ATTN: AMSAM-MLD-MT<br>REDSTONE ARSENAL, AL 35898 | |

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

| PUBLICATION/FORM NUMBER | DATE | TITLE |
|---|---|---|
| | | |

| ITEM | PAGE NO. | PARA-GRAPH | LINE NO.* | FIGURE NO. | TABLE NO. | RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible). |
|---|---|---|---|---|---|---|
| | | | | | | |

| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION | SIGNATURE |
|---|---|---|
| | | |

| **TO:** *(Forward direct to addressee listed in publication)* | **FROM:** *Activity and location) (Include ZIP Code)* | **DATE** |
|---|---|---|
| COMMANDER<br>U.S. ARMY AVIATION AND MISSILE COMMAND<br>ATTN: AMSAM-MLD-MT | | |

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

| PUBLICATION NUMBER | DATE | TITLE |
|---|---|---|
| | | |

| PAGE NO. | COL. NO. | LINE NO. | NATIONAL STOCK NUMBER | REFERENCE NO. | FIGURE NO. | ITEM NO. | TOTAL NO. OF MAJOR ITEMS SUPPORTED | RECOMMENDED ACTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION | SIGNATURE |
|---|---|---|
| | | |

## The Metric System and Equivalents

### Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

### Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

### Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. Ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

### Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. Inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. Inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

| To change | To | Multiply by | To change | To | Multiply by |
|---|---|---|---|---|---|
| inches | centimeters | 2.540 | ounce-inches | Newton-meters | .007062 |
| feet | meters | .305 | centimeters | inches | .394 |
| yards | meters | .914 | meters | feet | 3.280 |
| miles | kilometers | 1.609 | meters | yards | 1.094 |
| square inches | square centimeters | 6.451 | kilometers | miles | .621 |
| square feet | square meters | .093 | square centimeters | square inches | .155 |
| square yards | square meters | .836 | square meters | square feet | 10.764 |
| square miles | square kilometers | 2.590 | square meters | square yards | 1.196 |
| acres | square hectometers | .405 | square kilometers | square miles | .386 |
| cubic feet | cubic meters | .028 | square hectometers | acres | 2.471 |
| cubic yards | cubic meters | .765 | cubic meters | cubic feet | 35.315 |
| fluid ounces | milliliters | 29,573 | cubic meters | cubic yards | 1.308 |
| pints | liters | .473 | milliliters | fluid ounces | .034 |
| quarts | liters | .946 | liters | pints | 2.113 |
| gallons | liters | 3.785 | liters | quarts | 1.057 |
| ounces | grams | 28.349 | liters | gallons | .264 |
| pounds | kilograms | .454 | grams | ounces | .035 |
| short tons | metric tons | .907 | kilograms | pounds | 2.205 |
| pound-feet | Newton-meters | 1.356 | metric tons | short tons | 1.102 |
| pound-inches | Newton-meters | .11296 | | | |

## Temparature (Exact)

| | | | |
|---|---|---|---|
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius °C temperature |