

# TB 9-6625-2373-24

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

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## CALIBRATION PROCEDURE FOR SPECTRUM ANALYZER, ANRITSU, MODEL MS2711D

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Headquarters, Department of the Army, Washington, DC  
26 September 2008

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*Distribution Statement A: Approved for public release; distribution is unlimited.*

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Headquarters, Department of the Army, Washington, DC  
15 July 2008

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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-MMC-MA-NP, 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](mailto: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.

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## SECTION I IDENTIFICATION AND DESCRIPTION

**1. Test Instrument Identification.** This bulletin provides instructions for the calibration of Spectrum Analyzer, Anritsu, Model MS2711D. The manufacturer's manual was used as the prime data source 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. Time and Technique.** The time required for this calibration is approximately 3 hours, using the microwave technique.

### 2. Forms, Records, and Reports

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

**b.** Adjustments to be reported are designated (R) at the end of the sentence in which they appear. When adjustments are in tables, the (R) follows the designated adjustment. Report only those adjustments made and designated with (R).

**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
Frequency Accuracy	Range: 2000 MHz Accuracy: $\pm 4$ kHz
Phase Noise Accuracy	$\leq -75$ dBc/Hz @ 1000 MHz
Second Harmonic Distortion Accuracy	$\leq -45$ dBc @ -30 dBm
Residual Spurious Response	Range: 100 kHz to 2000 MHz Accuracy: $\leq -90$ dBm
Resolution Bandwidth Accuracy	Range: 100 Hz to 1 MHz Accuracy: $\pm 5\%$
Measurement Accuracy: Level Accuracy with Frequency	Range: 30 to 2925 MHz @ 0 and -39 dBm Accuracy: $\pm 1.5$ dB <sup>1</sup>
Level Accuracy with Power Test	Range: +3 to -60 dBm @ 50 MHz Accuracy: $\pm 1.5$ dB

<sup>1</sup> $\pm 1$  dB for TIs with serial number 405039 and below.

## 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-705. 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 parenthesis.

**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.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
ATTENUATOR SET (FIXED)	Range: 0.01 to 18 Ghz Accuracy: test report	Weinschel, Model 9918, 9918-6dB, 9918-10dB, 9918-20dB, 9918-30dB, and 9918-60dB (9918)
MEASURING RECEIVER	Range: +3 to -60 dBm @ 50 MHz Accuracy: ± 0.25 dB (± 0.375 dB)	Hewlett-Packard, Model 8902A w/sensor, Hewlett-Packard, Model 11722A (11722A),
POWER METER	Frequency Range: 50 MHz to 3 GHz Power Range: 0 dBm and -39 dBm Accuracy: ± 3% for 0 dBm ± 1.9% for -39 dBm from 50 MHz to 1 GHz ± 1.8% for -39 dBm from 1 GHz to 3 GHz	Hewlett-Packard, Model 437B (13440045) with power sensor, Hewlett-Packard, Model 8482A (13440043), and power sensor, Hewlett-Packard, Model 8485D (8485D) with 30 dB attenuator, Hewlett-Packard, Model 11708A (11708A)
POWER SPLITTER	Range: 10 MHz to 3 GHz Output tracking between ports: ± 0.15 dB	Weinschel, Model 1870A (7916839)
SYNTHESIZED SIGNAL GENERATOR	Range: 10 MHz to 3 GHz Accuracy: <sup>1</sup>	Anritsu, Model 68347M (68347M)
TIME/FREQUENCY WORKSTATION	Range: 10 MHz Accuracy: 5 parts in 10 <sup>-10</sup> per day	Datum, Model ET6000-75 (13589305)

<sup>1</sup>Output monitored using measuring receiver.

### 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 this procedure. Additional maintenance information is contained in the manufacturer’s manual for this TI.

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

## 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 step within the performance check where applicable.

- a. Connect equipment as shown in figure 1.

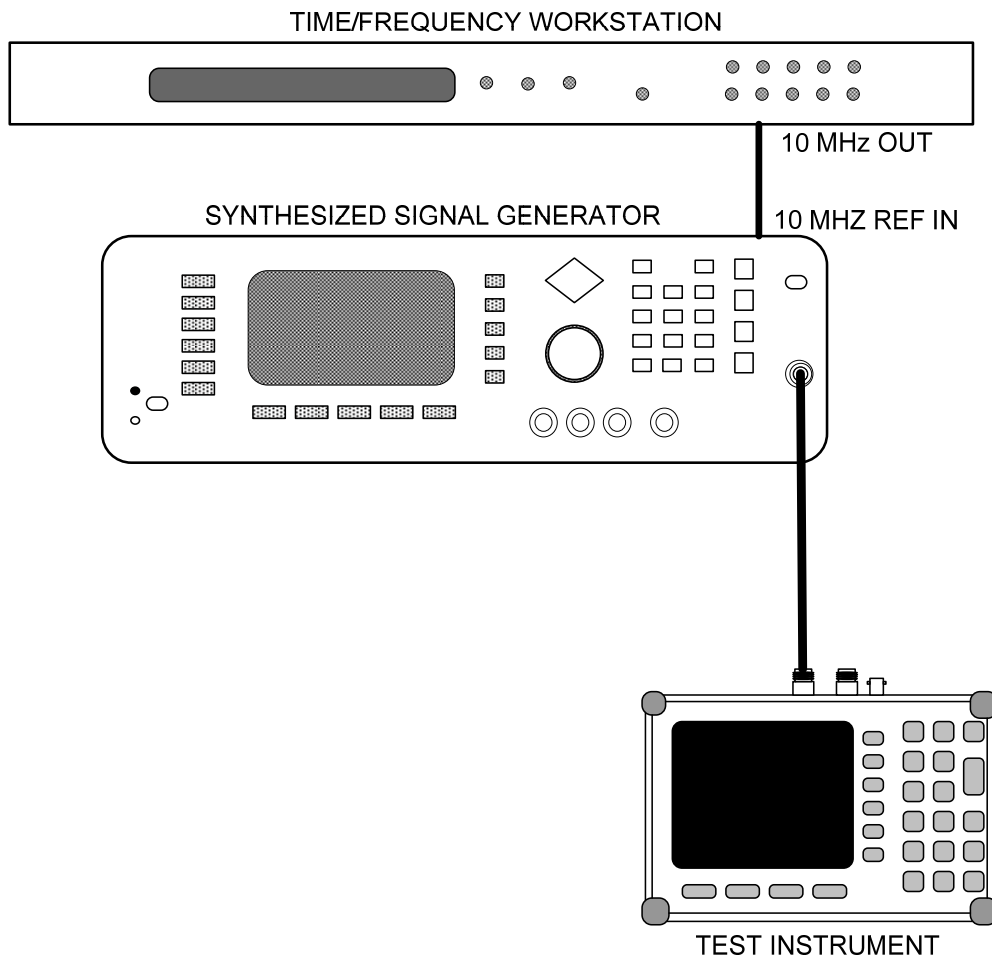


Figure 1. Frequency accuracy, phase noise, and resolution bandwidth accuracy - equipment setup.

- b. Connect the external power supply to the TI.
- c. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.

### NOTE

This sets the TI to factory preset conditions.

- d. Energize equipment and allow 30 minutes for equipment to warm-up and stabilize.

## 8. Frequency Accuracy

### a. Performance Check

#### NOTE

1. [ ] Denotes softkey on display.
2. [ ] Softkeys and keys will be referred to as keys in this procedure.

- (1) Set synthesized signal generator for a frequency of 2000 MHz and an output of 0 dBm.
- (2) Ensure **RF OFF/ON** is set to **ON**.
- (3) Press TI keys as listed in (a) through (f) below:
  - (a) **AMPLITUDE**, [**Ref Level**], **2, 0, ENTER**.
  - (b) **FREQ/SPAN**, [**Center**], **2, 0, 0, 0, ENTER**.
  - (c) [**Span**], **2, 0, [kHz]**.
  - (d) **BW/SWEEP**, [**Bandwidth**], [**RBW Manual**], Up/Down arrow key (to select 100 Hz), **ENTER**.
  - (e) [**VBW Manual**], Up/Down arrow key (to select 30 Hz), **ENTER**.
  - (f) **MARKER**, [**M1**].
- (5) Press TI [**Edit**] key and use the Up/Down arrow key to center the marker on the waveform.
- (6) If TI display does not indicate 2000 MHz  $\pm$  4 kHz, perform **b** below.

### b. Adjustments

- (1) Connect equipment as shown in figure 1.
- (2) Set synthesized signal generator for a frequency of 2000 MHz and an output of 0 dBm.
- (3) Press TI keys as listed in (a) through (c) below:
  - (a) **AMPLITUDE**, [**Ref Level**], **2, 0, ENTER**.
  - (b) **FREQ/SPAN**, [**Center**], **2, 0, 0, 0, ENTER**.
  - (c) [**Span**], **2, 0, [kHz]**.
- (4) Confirm the **RBW** is 100 Hz and the **VBW** is 30 Hz.
- (5) Turn TI off.
- (6) Press and hold the **1, 5, and 9** keys together, and press the **ON/OFF** key to turn TI back on.
- (7) Press TI [**SA Tests**] key, and then [**Tune Freq**] key.
- (8) Use the Up/Down arrow key to increase/decrease the **Tune Freq Level** number, then **ENTER** key.

#### NOTE

If increasing the **Tune Freq Level** moves the response further away from center, decreasing the **Tune Freq Level** number will move it closer to center.

- (9) Repeat (8) until the response is centered on the display.
- (10) Turn TI off and back on to exit the service mode.

## 9. Phase Noise Verification

### a. Performance Check

- (1) Connect equipment as shown in figure 1.
- (2) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (3) Set the synthesized signal generator for a frequency of 1000 MHz and an output of -30 dBm.
- (4) Press TI keys as listed in (a) through (h):
  - (a) **BW/SWEEP**, [**Bandwidth**].
  - (b) [**RBW Manual**], Up/Down arrow key (to select 1 kHz), **ENTER**.
  - (c) [**VBW Manual**], Up/Down arrow key (to select 30 Hz), **ENTER**.
  - (d) **FREQ/SPAN**, [**CENTER**], 1, 0, 0, 0, **ENTER**.
  - (e) [**SPAN**], 0, ., 1, **ENTER**.
  - (f) **AMPLITUDE**, [**REF LEVEL**], -, 2, 7, **ENTER**.
  - (g) **MARKER**, [**M1**], [**Edit**], 1, 0, 0, 0, **ENTER**.
  - (h) [**BACK**], [**M2**], [**Edit**], 1, 0, 0, 0, ., 0, 3, **ENTER**.
- (5) Press [**Delta (M2-M1)**] key, **SINGLE/CONT** key and record the **Δ2** reading.
- (6) Press **SINGLE/CONT** key five times, recording the **Δ2** reading after each time.
- (7) Average the five readings.
- (8) Subtract 30 dB from the average of the five readings and verify result is greater than or equal to -75 dBc/Hz.
- (9) Press the TI [**Back**] and [**M3**] keys.
- (10) Press the TI [**Edit**], 9, 9, 9, ., 9, 7, and [**MHz**] keys.
- (11) Press the TI [**Delta (M3-M1)**] and **SINGLE/CONT** keys and record the **Δ3** reading.
- (12) Repeat steps (6) through (8) above, substituting the **Δ3** reading for the **Δ2** reading.

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

## 10. Second Harmonic Distortion

### a. Performance Check

- (1) Connect equipment as shown in figure 2.
- (2) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (3) Adjust synthesized signal generator for a frequency of 35 MHz and an output of -30 dBm.
- (4) Press TI keys as listed in (a) through (g):
  - (a) **AMPLITUDE**, [**Scale**], 7, and **ENTER**.



- (b) **[Atten/Preamp]**, **[Manual]**, **0**, **ENTER**.
- (c) **FREQ/SPAN**, **[Center]**, **3**, **5**, **[MHz]**.
- (d) **[Span]**, **0**, **.**, **2**, **[MHz]**.
- (e) **BW/SWEEP**, **[Bandwidth]**, **[RBW Manual]**, Up/Down arrow key (to select 10 kHz), **ENTER**.
- (f) **[VBW Manual]**, Up/Down arrow key (to select 3 kHz), **ENTER**.
- (g) **MARKER**, **[M1]**, **[Edit]**, **3**, **5**, **[MHz]**.

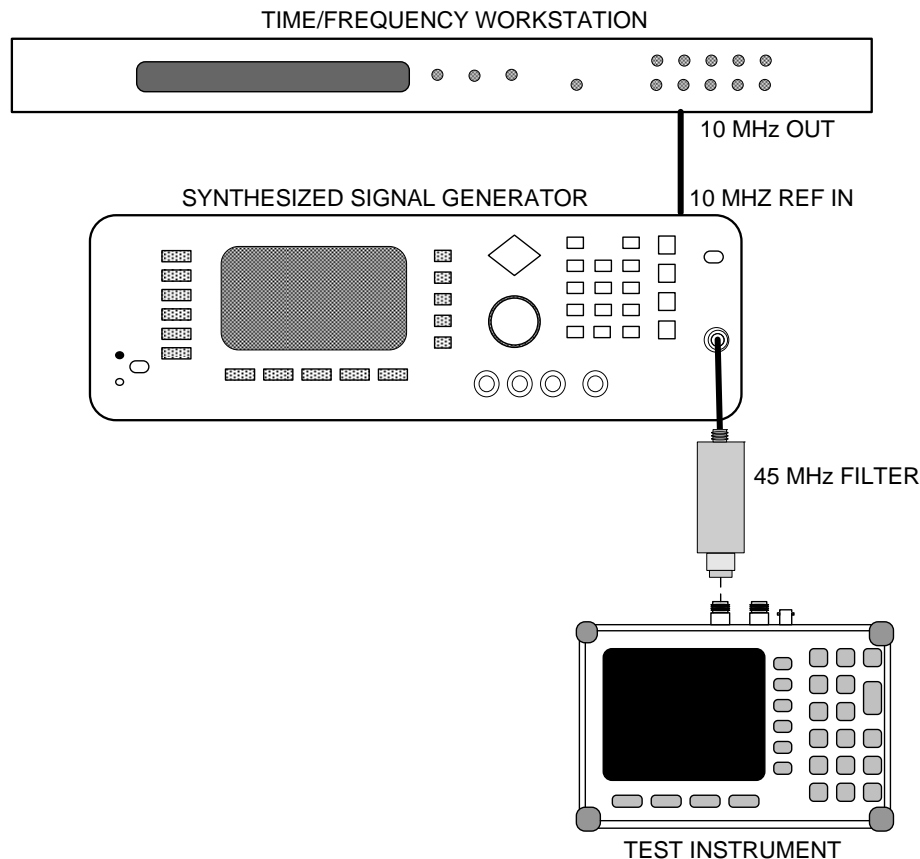


Figure 2. Second harmonic distortion - equipment setup.

- (5) Adjust the synthesized signal generator output level for a TI **M1** reading of -30 dBm at 35 MHz.
- (6) Press TI **FREQ/SPAN** and **[Center]** keys.
- (7) Press TI **7**, **0**, and **[MHz]** keys.
- (8) Press TI **MARKER**, **[M1]**, **[Edit]**, **7**, **0**, and **[MHz]** keys.
- (9) TI indication will represent a greater than -45 dBc from initial TI **M1** reading.

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

## 11. Residual Spurious Response

### a. Performance Check

- (1) Connect a 50 ohm termination to the TI **RF Input** port.
- (2) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (3) Press TI keys as listed in (a) through (f):
  - (a) **AMPLITUDE**, [**Ref Level**], -, **7**, **5**, **ENTER**.
  - (b) [**Scale**], **5**, **ENTER**.
  - (c) **BW/SWEEP**, [**Bandwidth**], [**RBW Manual**], Up/Down arrow key (to select 10 kHz), **ENTER**.
  - (d) [**VBW Manual**], Up/Down arrow key (to select 3 kHz), **ENTER**.
  - (e) **FREQ/SPAN**, [**Start**], **1**, **0**, **0**, [**kHz**].
  - (f) [**Stop**], **1**, **0**, [**MHz**].
- (4) Wait for TI to complete one full sweep.
- (5) Press TI **MARKER**, [**M1**], and [**Marker To Peak**] keys.
- (6) Verify the **M1** amplitude reading is less than or equal to -90 dBm.

#### NOTE

If a spur with an amplitude larger than -80 dBm occurs, wait another full sweep and observe whether the spur occurs at the same point on the second sweep. If the spur does not occur at the same point on the second sweep, then the spur on the first sweep was not real.

- (7) Repeat steps (3) (e) through (6) above for TI start and stop frequencies listed in table 3.

Table 3. Residual spurious response

Start frequency	Stop frequency	Test instrument <b>M1</b> reading
10 MHz	1000 MHz	< -90 dBm
1000 MHz	2000 MHz	< -90 dBm
2000 MHz	3000 MHz	< -90 dBm

- (8) Wait for TI to complete one full sweep.

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

## 12. Resolution Bandwidth Accuracy

### a. Performance Check

- (1) Connect equipment as shown in figure 1.
- (2) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (3) Adjust synthesized signal generator for a frequency of 1 GHz and an output of -30 dBm.

- (4) Press TI keys as listed in (a) through (c):
  - (a) **AMPLITUDE**, [**Ref Level**], -, **2**, **7**, **ENTER**.
  - (b) [**Scale**], **3**, **ENTER**.
  - (c) **FREQ/SPAN**, [**Center**], **1**, [**GHz**].
- (5) Press TI keys as listed in (a) through (e):
  - (a) [**Span**], **1**, ., **5**, [**MHz**].
  - (b) **BW/SWEEP**, [**Bandwidth**], [**RBW Manual**], Up/Down arrow key (to select 1 MHz), and **ENTER**.
  - (c) [**VBW Manual**], Up/Down arrow key (to select 3 kHz), **ENTER**, [**Back**].
  - (d) **MEAS**, [**OBW**], [**dBc**], **ENTER**.
  - (e) [**Measure**], **MARKER**, [**M2**], [**Delta (M2-M1)**].
- (6) The displayed  $\Delta 2$  frequency will be within the limits specified in table 4 for the 1 MHz [**RBW Manual**] and [**SPAN**] settings under test.
- (7) Repeat technique of (5) and (6) above for the remaining [**RBW Manual**] and [**Span**] settings listed in table 4.

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

Table 4. Resolution Bandwidth Accuracy

Test instrument			
[ <b>RBW Manual</b> ] setting	[ <b>SPAN</b> ] setting	$\Delta 2$ indication	
		Min	Max
1 MHz	1.5 MHz	0.95 MHz	1.05 MHz
300 kHz	450 kHz	285 kHz	315 kHz
100 kHz	150 kHz	95 kHz	105 kHz
30 kHz	45 kHz	28.5 kHz	31.5 Hz
10 kHz <sup>1</sup>	15 kHz	9.5 kHz	10.5 Hz
3 kHz	4.5 kHz	2.85 kHz	3.15 kHz
1 kHz	1.5 kHz	0.95 kHz	1.05 kHz
300 Hz	450 Hz	285 Hz	315 Hz
100 Hz	150 Hz	95 Hz	105 Hz

1. Set VBW to 30 Hz for remaining RBW settings.

### 13. Measurement Accuracy (Level Accuracy with Frequency)

#### a. Performance Check

**NOTE**

When necessary, perform power meter and power sensor ZERO and CAL.

- (1) Connect equipment as shown in figure 3.

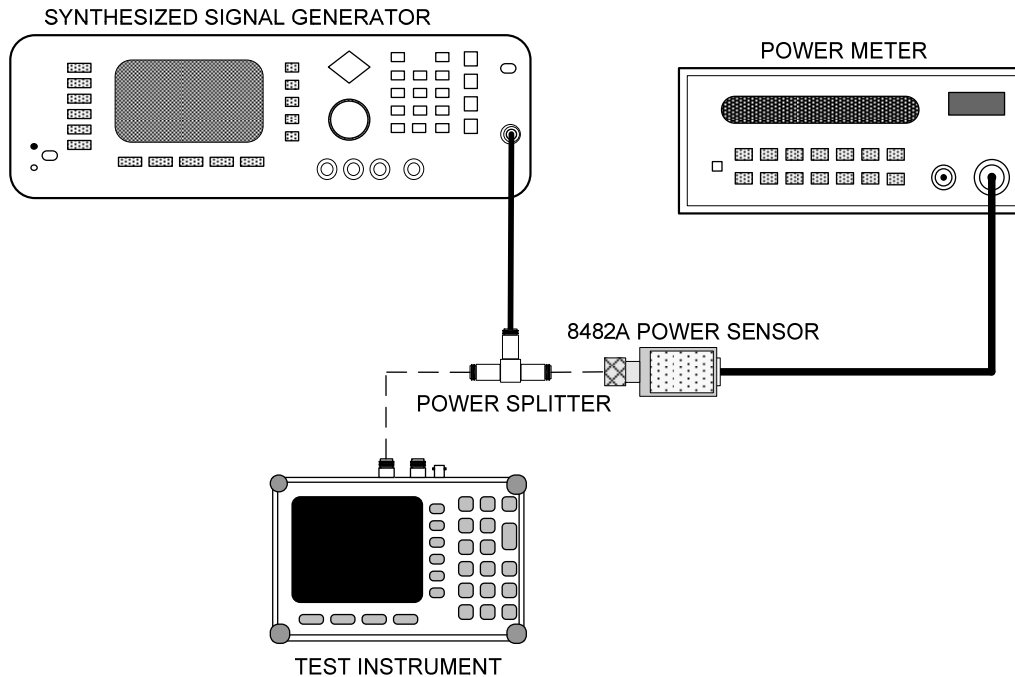


Figure 3. Measurement accuracy – equipment setup.

- (2) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (3) Press TI keys as listed in (a) through (d):
  - (a) **BW/SWEEP**, [**Bandwidth**], [**RBW Manual**], Up/Down arrow key (to select 1 kHz), and **ENTER**.
  - (b) [**VBW Manual**], Up/Down arrow key (to select 100 Hz), **ENTER**.
  - (c) **FREQ/SPAN**, [**Span**], **0**, **.**, **1**, [**MHz**].
  - (d) **AMPLITUDE**, [**Ref Level**], **1**, **0**, **ENTER**.
- (4) Set synthesized signal generator frequency for 50 MHz and output level for 6.00 dBm.
- (5) Set power meter to measure power in dBm at 50 MHz.
- (6) Adjust synthesized signal generator power level for a power meter indication of 0.00 dBm.
- (7) Press TI **FREQ/SPAN**, [**Center**], **5**, **0**, and [**MHz**] keys.
- (8) Press TI **MARKER**, [**M1**], and [**Marker To Peak**] keys.
- (9) The displayed **M1** reading will be within the limits specified in table 5.
- (10) Repeat technique of (4) through (8) above for the remaining frequencies listed in table 5.

Table 5. Level Accuracy With Frequency

Synthesized signal generator	Test instrument		
	[Center] setting	M1 indication <sup>1</sup>	
		Min	Max
50 MHz	50 MHz	-1.5 dBm (-1.0 dBm)	1.5 dBm (1.0 dBm)
550 MHz	550 MHz	-1.5 dBm (-1.0 dBm)	1.5 dBm (1.0 dBm)
1000 MHz	1000 MHz	-1.5 dBm (-1.0 dBm)	1.5 dBm (1.0 dBm)
1244 MHz	1244 MHz	-1.5 dBm (-1.0 dBm)	1.5 dBm (1.0 dBm)
1411 MHz	1411 MHz	-1.5 dBm (-1.0 dBm)	1.5 dBm (1.0 dBm)
2000 MHz	2000 MHz	-1.5 dBm (-1.0 dBm)	1.5 dBm (1.0 dBm)
2512 MHz	2512 MHz	-1.5 dBm	1.5 dBm
2925 MHz	2925 MHz	-1.5 dBm	1.5 dBm

<sup>1</sup>Indication in parenthesis is for TI's with serial number 405039 and below.

#### NOTE

Switch from the 8482A sensor to the 8485D sensor for the following measurements.

- (11) Set synthesized signal generator frequency for 2925 MHz and output level for -33.00 dBm.
- (12) Set power meter to measure power in dBm at 2925 MHz.
- (13) Press TI **AMPLITUDE**, [**Ref Level**], -, **3, 0, ENTER**.
- (14) Adjust synthesized signal generator power level for a power meter indication of -39.00 dBm.
- (15) Press TI **FREQ/SPAN**, [**Center**], **2, 9, 2, 5**, and [**MHz**] keys.
- (16) Press TI **MARKER**, [**M1**], and [**Marker To Peak**] keys.
- (17) The displayed **M1** reading will be within the limits specified in table 6.
- (18) Repeat technique of (14) through (17) above for remaining frequencies listed in table 6.

Table 6. Level Accuracy with Frequency

Synthesized signal generator	Test instrument		
	[Center] setting	M1 indication <sup>1</sup>	
		Min	Max
2925 MHz	2925 MHz	-40.5 dBm	-37.5 dBm
2512 MHz	2512 MHz	-40.5 dBm	-37.5 dBm
2000 MHz	2000 MHz	-40.5 dBm (-40.0 dBm)	-37.5 dBm (-38.0 dBm)
1411 MHz	1411 MHz	-40.5 dBm (-40.0 dBm)	-37.5 dBm (-38.0 dBm)
1244 MHz	1244 MHz	-40.5 dBm (-40.0 dBm)	-37.5 dBm (-38.0 dBm)
1000 MHz	1000 MHz	-40.5 dBm (-40.0 dBm)	-37.5 dBm (-38.0 dBm)
550 MHz	550 MHz	-40.5 dBm (-40.0 dBm)	-37.5 dBm (-38.0 dBm)
50 MHz	50 Hz	-40.5 dBm (-40.0 dBm)	-37.5 dBm (-38.0 dBm)

<sup>1</sup>Indication in parenthesis is for TI's with serial number 405039 and below.

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

## 14. Measurement Accuracy (Level Accuracy with Power)

### a. Performance Check

#### NOTE

If necessary, perform measuring receiver and sensor module ZERO and CALIBRATE.

- (1) Connect equipment as shown in figure 4.

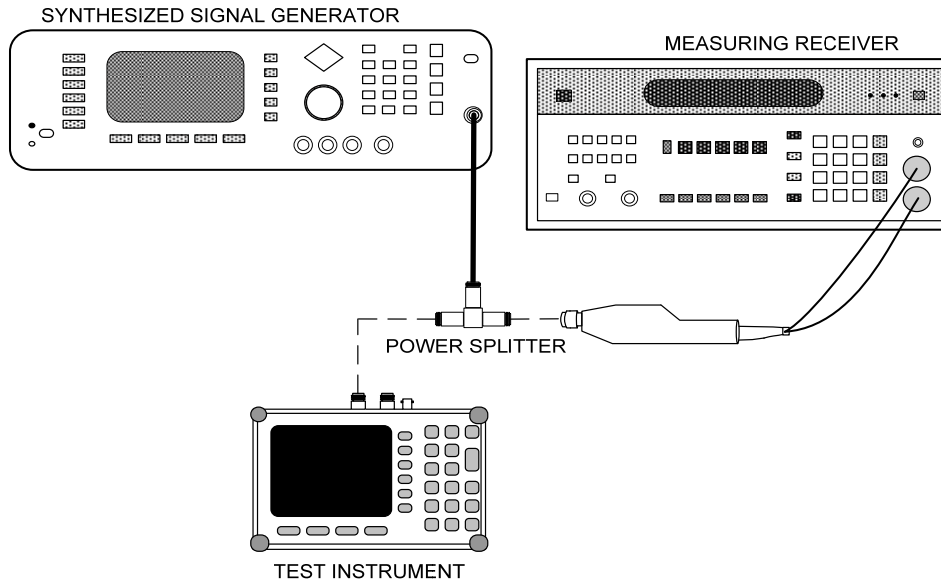


Figure 4. Measurement Accuracy – equipment setup.

- (2) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (3) Set synthesized signal generator frequency for 50 MHz and output level for 3.00 dBm.
- (4) Press TI keys as listed in (a) through (e):
  - (a) **BW/SWEEP**, [**Bandwidth**], [**RBW Manual**], Up/Down arrow key (to select 1 kHz), and **ENTER**.
  - (b) [**VBW Manual**], Up/Down arrow key (to select 100 Hz), **ENTER**.
  - (c) **FREQ/SPAN**, [**Span**], **0**, **.**, **1**, [**MHz**].
  - (d) **AMPLITUDE**, [**Ref Level**], **1**, **0**, **ENTER**.
  - (e) **FREQ/SPAN**, [**Center**], **5**, **0**, [**MHz**].

#### NOTE

Set measuring receiver to tuned rf level mode before moving on to step (5).

- (5) Adjust synthesized signal generator amplitude for a measuring receiver indication of + 3.00 dBm.
- (6) Press TI **MARKER**, [**M1**], and [**Marker To Peak**] keys.
- (7) The displayed **M1** reading will be within the limits specified in table 7.

(8) Repeat technique of and (5) through (7) above for remaining measuring receiver indication and reference levels listed in table 7.

Table 7. Level Accuracy with Power

Measuring receiver indication (dBm)	Test instrument		
	[Ref Level] (dBm)	M1 indication <sup>1</sup>	
		Min	Max
+3.00	+10	1.5 (2.0)	4.5 (4.0)
0.00	+10	-1.5 (-1.0)	1.5 (1.0)
-11.00	-10	-12.5 (-12.0)	-9.5 (-10.0)
-13.00	-10	-14.5 (-14.0)	-11.5 (-12.0)
-19.00	-10	-20.5 (-20.0)	-17.5 (-18.0)
-27.00	-20	-28.5 (-28.0)	-25.5 (-26.0)
-32.00	-30	-33.5 (-33.0)	-30.5 (-31.0)
-39.00	-30	-40.5 (-40.0)	-37.5 (-38.0)
-49.00	-40	-50.5 (-50.0)	-47.5 (-48.0)
-51.00	-40	-52.5 (-52.0)	-49.5 (-50.0)
-53.00	-50	-54.5 (-54.0)	-51.5 (-52.0)
-60.00	-50	-61.5 (-61.0)	-58.5 (-59.0)

<sup>1</sup>Indication in parenthesis is for TIs with serial number 405039 and below.

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

## 15. Transmission Power Verification

### a. Performance Check

(1) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.

(2) Press TI **MODE** key, Up/Down arrow key (to highlight **Transmission Measurement**), and **ENTER** key to select Transmission Measurement mode.

(3) Verify the **Trans. Meas Cal off** message is displayed and the **RBW** is 1 MHz, the **VBW** is 300 kHz, the **Ref level** is 0.0 dBm, and **Atten** is Dynamic.

(4) Connect TI **RF In** port to the TI **RF Out** port.

(5) Press TI **LIMIT**, [**Single Limit**], [**Edit**], -, **2**, **1**, and **ENTER** keys.

(6) Verify the signal is above the -21 dBm limit line.

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

## 16. Insertion Loss Verification

### a. Performance Check

(1) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.

(2) Press TI **MODE** key, Up/Down arrow key (to highlight **Transmission Measurement**), and **ENTER** key to select Transmission Measurement mode.

(3) Press TI **BW/SWEEP** and [**Calibrate TM**] keys.

(4) Connect TI **RF In** port to the TI **RF Out** port and press **ENTER** to calibrate.

**NOTE**

The TI will beep when one sweep is complete.

- (5) Connect a 20 dB attenuator between the **RF In** port and the TI **RF Out** port using the same cable used in step (4) above.
- (6) Press TI keys listed in (a) through (d):
  - (a) **AMPLITUDE**, [**Ref Level**], -, **1**, **5**, and **ENTER**.
  - (b) [**Scale**], **1**, and **ENTER**.
  - (c) **LIMIT**, [**Multiple Upper Limits**], [**Segment 1**], [**Edit**], **2**, **5**, **ENTER**, -, **1**, **8**, **.**, **5**, **ENTER**, **3**, [**GHz**], -, **1**, **8**, **.**, **5**, and **ENTER**.
  - (d) **LIMIT**, [**Multiple Lower Limits**], [**Segment 1**], [**Edit**], **2**, **5**, **ENTER**, -, **2**, **1**, **.**, **5**, **ENTER**, **3**, [**GHz**], -, **2**, **1**, **.**, **5**, and **ENTER**.
- (7) Verify the trace is within the -18.5 and -21.5 limit lines.

**NOTE**

If Lower Limit blue line does not appear. Select [**Next Segment**] key.

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

**17. Isolation Test**

**a. Performance Check**

- (1) Turn TI off. Press and hold the **ESCAPE/CLEAR** key and the **ON/OFF** key simultaneously to turn on the TI.
- (2) Press TI **MODE** key, Up/Down arrow key (to highlight **Transmission Measurement**), and **ENTER** key to select Transmission Measurement mode.
- (3) Press TI **BW/SWEEP** and [**Calibrate TM**] keys.
- (4) Connect TI **RF In** port to the TI **RF Out** port and press **ENTER** to calibrate.

**NOTE**

The TI will beep when one sweep is complete.

- (5) Disconnect the cable from **RF IN** port and connect the 50 ohm termination.
- (6) Press TI **LIMIT**, [**Multiple Upper Limits**], [**Segment 1**], [**Edit**], **2**, **5**, **ENTER**, -, **8**, **0**, **ENTER**, **1**, [**GHz**], -, **8**, **0**, and **ENTER** keys.

**NOTE**

For instruments with serial number 525001 and above, set the end frequency to 2 GHz.

- (7) Press TI [**Next Segment**] key and verify Segment: 2 Upper appears at the bottom left corner of the display.
- (8) Press TI [**Edit**], **1**, [**GHz**], -, **6**, **0**, **ENTER**, **3**, [**GHz**], -, **6**, **0**, and **ENTER** keys.
- (9) Verify the trace is below the limit lines.



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

**18. Final Procedure**

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

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



By Order of the Secretary of the Army:

Official:



JOYCE E. MORROW  
*Administrative Assistant to the  
Secretary of the Army*

0813509

GEORGE W. CASEY, JR.  
*General, United States Army  
Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 344915 requirements for calibration procedure TB 9-6625-2373-24.



## INSTRUCTIONS FOR SUBMITTING AN ELECTRONIC 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however, only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" [whomever@redstone.army.mil](mailto:whomever@redstone.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.





