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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR SPECTRUM ANALYZER HEWLETT-PACKARD, MODEL 3585B

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

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedure, please let us know. Mail your letter or DA Form 2028 to: Commander, U. S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-LS-LP, Redstone Arsenal, AL 35898-5230. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: ls-lp@redstone.army.mil or by FAX (256) 842-6546/DSN 788-6546.

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SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This procedure provides instructions for the calibration of Spectrum Analyzer, Hewlett-Packard, Model 3585B. 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 6 hours, using the dc and low frequency 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. 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
Marker frequency	Range: 20 Hz to 40.1 MHz Counter accuracy: ±0.3 Hz Readout accuracy: ±0.2% of frequency span ± resolution bandwidth setting
Range calibration	Frequency: 150 kHz Range: -25 to +30 dB Accuracy: ±0.4 dB
Amplitude linearity	Range: 0 to -95 dB Accuracy: 0 to -20 dB: ±0.3 dB -20 to -50 dB: ±0.6 dB -50 to -80 dB: ±1.0 dB -80 to -95 dB: ±2.0 dB
Reference level	Range: +10 to -90 dBm Accuracy: +10 to -50 dBm: ±0.4 dB -50 to -70 dBm: ±0.7 dB -70 to -90 dBm: ±1.5 dB
50Ω flatness	Frequency: 20 Hz to 40.1 MHz Flatness: ±0.5 dB

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications
1 MΩ flatness	Frequency range: 20 Hz to 10 MHz Flatness: ±0.7 dB Frequency range: 10 Hz to 40.1 MHz Flatness: ±1.5 dB
Noise	Resolution bandwidth setting / Average indication (dBm) 30 kHz <-100 10 kHz <-104 3 kHz <-108 1 kHz <-111 300 Hz <-115 100 Hz <-122 30 Hz <-127 10 Hz <-132 3 Hz <-137 40 Hz <-123 dBm (1 Hz)
Low frequency response	Frequencies: Pwr line freq., 5 kHz, 100 kHz, 1 MHz, and 10 MHz Accuracy: <-120 dBm
Local oscillator sideband	Spurious responses: <-80 dB
Harmonic distortion	Spurious responses: <-80 dB for 50Ω input <-70 dB for 1 MΩ input
Bandwidth	Frequency range: 3 Hz to 30 kHz Accuracy: ±20% of BW settings at 3 dB points Selectivity (shape factor): <11:1 (60 dB BW/3 dB BW)
Tracking generator flatness	Flatness: ±0.7 dB

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 Set AN/GSM-287. 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.

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)
LOW PASS FILTER NO. 1	Frequency: 13.31 MHz	TLC 14-3EF (TLC 14-3EF)
LOW PASS FILTER NO. 2	Frequency: 20.01 MHz	TLC30-4EF7 (TLC30-4EF7)
OSCILLATOR	Frequency range: 3.2 to 6.4 kHz Amplitude range: -15 dBm Distortion: <90 dB	Tektronix, Type SG505 (MIS-30526/11)
SYNTHESIZER/ FUNCTION GENERATOR	Frequency range: 20 Hz to 100 kHz Amplitude range: -25 dBm Amplitude accuracy: ±0.2 dB	Hewlett-Packard, Model 3325A (3325A)
SYNTHESIZER/ LEVEL GENERATOR	Frequency range: 100 kHz to 40.1 MHz Amplitude range: -80 to +10.5 dBm Accuracy: ±0.075 dB Flatness: 100 kHz to 20.1 MHz: ±0.07 dB 25.1 to 40.1 MHz: ±0.15 dB	Hewlett-Packard, Model 3335AOPT 001-K06 (MIS-35958)

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 manuals for this TI.

d. When indications specified in paragraphs **8** through **19** are not within tolerance, refer to the manufacturer's manual and perform a complete alignment.

e. 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. Ensure TI rear panel **OVEN REF OUT** is connected to **EXT REF IN**.

b. Connect TI to a 115 V ac power source.

c. Set **LINE** switch to on and allow TI at least 20 minutes for warm-up.

d. Connect TI rear panel **10 MHz REF OUTPUT** to synthesizer/level generator rear panel **40/N MHz REF INPUT**. Maintain connection for remainder of this procedure.

8. Counter and Marker Frequency

a. Performance Check

(1) Connect synthesizer/level generator **OUTPUT 50Ω** to TI **50-75Ω**.

(2) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **ENTRY INSTR PRESET**.

(b) **SWEEP ENTRY MANUAL** to **9 MHz**.

(c) **MARKER/CONTINUOUS ENTRY COUNTER** to on.

(3) Set synthesizer/level generator for a 9 MHz, 0 dBm output.

(4) TI counter frequency indication will be between 8999999.7 and 9000000.3 Hz.

(5) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **ENTRY INSTR PRESET**.

(b) **RBW-VBW-ST ENTRY RES BW** to **1 kHz**.

(c) **ENTRY FREQUENCY SPAN** to **10 MHz**.

(d) **ENTRY dB/DIV** to **1 dB**.

(6) Set synthesizer/level generator for a 20 MHz, 0 dBm output.

(7) Press **SWEEP SINGLE** key twice. When sweeping is complete, press **MARKER/CONTINUOUS ENTRY PEAK SEARCH** key. TI marker frequency indication will be between 19980000 and 20020000 Hz.

b. Adjustments. Refer to paragraph **6d**.

9. Range Calibration

a. Performance Check

(1) Connect synthesizer/level generator **OUTPUT 50Ω** to TI **50-75Ω** input.

(2) Set frequency/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **150 kHz**.

(b) **AMPTD INCR** to **5 dBm**.

(c) **AMPLITUDE** to **-45 dBm**.

(3) Press keys and enter values using **ENTRY** keys as listed in (a) through (e) below:

(a) **ENTRY INSTR PRESET**.

(b) **SWEEP ENTRY MANUAL** to **150 kHz**.

(c) **ENTRY REFERENCE LEVEL** to **-44.5 dBm**.

(d) **ENTRY dB/DIV** to **1 dB**.

(e) **RBW-VBW-ST ENTRY RES BW** to **30 kHz**.

(4) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Difference will be between -0.4 and +0.4 dBm.

(5) Press **INPUT ENTRY RANGE** key.

(6) Press **ENTRY STEP** ⇑ key.

(7) Press synthesizer/level generator **INCR** ⇑ key.

(8) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Difference will be between -0.4 and +0.4 dBm.

(9) Repeat (6) through (8) above for remaining **INPUT ENTRY RANGE** settings listed in table 3.

(10) Set synthesizer/level generator **AMPLITUDE** to **-45 dBm**.

(11) Press TI keys and enter values using **ENTRY** keys as listed in (a) and (b) below:

(a) **INPUT ENTRY RANGE** to **–25 dBm** using **ENTRY STEP** ⇓.

(b) **RBW-VBW-ST ENTRY RES BW** to **10 kHz**.

(12) Repeat (4) through (9) above.

(13) Repeat (10) through (12) above for remaining TI **RWB-VWB-ST RES BW** settings listed in table 3.

Table 3. Range Calibration

Test instrument												
	INPUT ENTRY RANGE settings (dBm)											
RBW-VBW-ST ENTRY RES BW settings	-25	-20	-15	-10	-5	.0	5	10	15	20	25	30
30 kHz												
10 kHz												
3 kHz												
1 kHz												
300 Hz												
100 Hz												
30 Hz												
10 Hz												
3 Hz												

b. Adjustments. Refer to paragraph **6d**.

10. Amplitude Linearity

a. Performance Check

(1) Connect synthesizer/level generator **OUTPUT 50Ω** to TI **50-75Ω** input.

(2) Press keys and enter values using **ENTRY** keys as listed in (a) through (e) below:

(a) **ENTRY INSTR PRESET**.

(b) **SWEEP ENTRY MANUAL** to **1 MHz**.

(c) **RWB-VBW-ST ENTRY RES BW** to **3 Hz**.

(d) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(e) **INPUT ENTRY RANGE** to **10 dBm** using **ENTRY STEP** ⇑ or ⇓.

(3) Set synthesizer/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **1 MHz**.

(b) **AMPLITUDE** to **10 dBm**.

(c) **AMPTD INCR** to **0.1 dBm**.

(4) Adjust synthesizer/level generator amplitude, using **INCR** ⇑ or ⇓ keys, until TI marker amplitude indicates 10.0 dBm.

(5) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(6) Set synthesizer/level generator **AMPTD INCR** to **10 dBm**.

(7) Press synthesizer/level generator **INCR** ⇓ key.

(8) TI marker amplitude indication will be between –9.7 and –10.3 dB.

(9) Repeat (7) above for remaining synthesizer/level generator settings listed in table 4. TI marker amplitude indications will be within limits specified in table 4.

Table 4. Amplitude Linearity

Synthesizer/level generator approximate settings (dBm)	Test instrument marker amplitude indications (dB)	
	Min	Max
-10	-19.4	-20.6
-20	-29.4	-30.6
-30	-39.4	-40.6
-40	-49.0	-51.0
-50	-59.0	-61.0
-60	-69.0	-71.0
-70	-78.0	-82.0
-80	-88.0	-92.0

b. Adjustments.

Refer to paragraph **6d**.

11. Reference Level

a. Performance Check

(1) Connect synthesizer/level generator **OUTPUT 50Ω** to TI **50-75Ω** input.

(2) Press keys and enter values using **ENTRY** keys as listed in (a) through (h) below:

(a) **ENTRY INSTR PRESET**.

(b) **INPUT ENTRY RANGE** to **.0 dBm** using **ENTRY STEP** ⇑ or ⇓.

(c) **ENTRY REFERENCE LEVEL** to **10 dBm**.

(d) **INPUT REF LVL TRACK** to off.

(e) **ENTRY dB/DIV** to **2 dB**.

(f) **RBW-VBW-ST ENTRY RES BW** to **30 kHz**.

(g) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(h) **SWEEP ENTRY MANUAL** to **9.53 MHz**.

(3) Set synthesizer/level generator as listed in (a) through (c) below.

(a) **FREQUENCY** to **9.53 MHz**.

(b) **AMPLITUDE** to **10.0 dBm**.

(c) **AMPTD INCR** to **10 dBm**.

(4) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Record difference in table 5.

(5) Press synthesizer/level generator **INCR** ⇓.

(6) Press **ENTRY REFERENCE LEVEL** key and enter **0 dBm** using **ENTRY** keys.

(7) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Record difference in table 5.

(8) Repeat technique of (5) through (7) above for each **ENTRY REFERENCE LEVEL** setting listed in table 5 through –40 dBm setting.

(9) Press **ENTRY dB/DIV** key and enter **5 dB** using **ENTRY** keys.

(10) Repeat technique of (5) through (7) above for **ENTRY REFERENCE LEVEL** –50 dBm and –60 dBm settings listed in table 5.

(11) Press keys and enter values using **ENTRY** keys as listed in (a) and (b) below:

(a) **INPUT ENTRY RANGE** to **20 dBm** using **ENTRY STEP** ⇑.

(b) **ENTRY dB/DIV** to **10 dB**.

(12) Set synthesizer/level generator amplitude to -50 dBm.

(13) Press **ENTRY REFERENCE LEVEL** key and enter **-50 dBm** using **ENTRY** keys.

(14) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Record difference in table 5 for **ENTRY REFERENCE LEVEL** –70 dBm setting.

(15) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **RBW-VBW-ST ENTRY RES BW** to **10 kHz**.

(b) **INPUT ENTRY RANGE** to **.0 dBm** using **ENTRY STEP ⇓**.

(c) **ENTRY REFERENCE LEVEL** to **10 dBm**.

(d) **ENTRY dB/DIV** to **2 dB**.

(16) Set synthesizer/level generator amplitude to 10 dBm.

(17) Repeat (4) through (14) above.

(18) Press synthesizer/level generator **INCR ⇓**.

(19) Press **ENTRY REFERENCE LEVEL** key and enter **-60 dBm** using **ENTRY** keys.

(20) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Record difference in table 5 for **ENTRY REFERENCE LEVEL** –80 dBm setting.

(21) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **RBW-VBW-ST ENTRY RES BW** to **3 kHz**.

(b) **INPUT ENTRY RANGE** to **.0 dBm** using **ENTRY STEP ⇓**.

(c) **ENTRY REFERENCE LEVEL** to **10 dBm**.

(d) **ENTRY dB/DIV** to **2 dB**.

(22) Set synthesizer/level generator amplitude to 10 dBm.

(23) Repeat (17) through (20) above.

(24) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **RBW-VBW-ST ENTRY RES BW** to **1 kHz**.

(b) **INPUT ENTRY RANGE** to **.0 dBm** using **ENTRY STEP ⇓**.

(c) **ENTRY REFERENCE LEVEL** to **10 dBm**.

(d) **ENTRY dB/DIV** to **2 dB**.

(25) Set synthesizer/level generator amplitude to 10 dBm.

(26) Repeat (17) through (20) above.

(27) Press synthesizer/level generator **INCR ⇓**.

(28) Press **ENTRY REFERENCE LEVEL** key and enter **-70 dBm** using **ENTRY** keys.

(29) Subtract synthesizer/level generator amplitude from TI marker amplitude indication. Record difference in table 5 for **ENTRY REFERENCE LEVEL** –90 dBm setting.

(30) Repeat technique of (24) through (29) above for remaining **RWB-VBW-ST ENTRY RES BW** settings listed in table 5.

(31) Values recorded in table 5 will be within limits specified in (a) through (c) below:

(a) 10 to -50 dBm: ±0.4 dB.

(b) -50 to -70 dBm: ±0.7 dB.

(c) -70 to -90 dBm: ±1.5 dB.

Table 5. Reference Level Accuracy

Test instrument											
RBW-VBW-ST ENTRY RES BW settings	**ENTRY REFERENCE LEVEL** settings (dBm)										
	10	0	-10	-20	-30	-40	-50	-60	-70	-80[1]	-90[2]
30 kHz										XXXX	XXXX
10 kHz											XXXX
3 kHz											XXXX
1 kHz											
300 Hz											
100 Hz											
30 Hz											
10 Hz											
3 Hz											

[1]Not performed at 30 kHz setting.
[2]Not performed at 30, 10, and 3 kHz settings.

b. Adjustments. Refer to paragraph **6d**.

12. 50Ω Flatness

a. Performance Check

(1) Connect synthesizer/level generator rear panel **10 MHz OUTPUT** to synthesizer/function generator rear panel **EXT REF IN**.

(2) Disconnect synthesizer/level generator **OUTPUT 50Ω** from TI **50-75Ω** input.

(3) Connect synthesizer/function generator **SIGNAL** to TI **50-75Ω** input.

(4) Press keys and enter values using **ENTRY** keys as listed in (a) through (k) below:

(a) **ENTRY INSTR PRESET**.

(b) **INPUT AUTORANGE** to off.

(c) **INPUT ENTRY RANGE** to **-25 dBm** using **ENTRY STEP** ⇑ or ⇓.

(d) **ENTRY REFERENCE LEVEL** to **-22 dBm**.

(e) **ENTRY START FREQ** to **0 Hz**.

(f) **ENTRY STOP FREQ** to **40.1 MHz**.

(g) **ENTRY dB/DIV** to **1 dB**.

(h) **RBW-VBW-ST ENTRY RES BW** to **3 Hz** and wait for TI to calibrate (≈10 sec).

(i) **INPUT REF LVL TRACK** to off.

(j) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(k) **ENTRY SAVE** and then **1**.

(5) Set synthesized/function generator for a sinewave, 20 Hz, -25 dBm output.

(6) Press **SWEEP ENTRY MANUAL** key and enter **20 Hz** using **ENTRY** keys.

(7) Record TI marker amplitude indication in table 6.

(8) Repeat technique of (5) through (7) above using remaining settings listed in table 6.

Table 6. 50Ω Flatness

Synthesizer/function generator frequency and TI **SWEEP ENTRY MANUAL** settings	Test instrument marker amplitude indications (dBm)
20 Hz	
2 kHz	
20 kHz	
50 kHz	
100 kHz	

(9) Disconnect synthesizer/function generator **SIGNAL** from TI **50-75Ω** input.

(10) Connect synthesizer/level generator **OUTPUT 50Ω** to TI **50-75Ω** input.

(11) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **ENTRY RECALL** and then **1**.

(b) **RBW-VBW-ST ENTRY RES BW** to **10 Hz**.

(c) **ENTRY** blue shift and then **ENTRY CAL ON**.

(d) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(12) Set synthesizer/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **100 kHz**.

(b) **AMPLITUDE** to **–25 dBm**.

(c) **AMPTD INCR** to **0.1 dBm**.

(13) Press keys and enter values using **ENTRY** keys as listed in (a) and (b) below:

(a) **SWEEP ENTRY MANUAL** to **100 kHz**.

(b) **INPUT ENTRY RANGE** to **-25 dBm** using **ENTRY STEP** ⇑ or ⇓.

(14) Adjust synthesizer/level generator amplitude, using **INCR** ⇑ or ⇓ keys, until TI marker amplitude indication is as close as possible to TI marker amplitude indication recorded in table 6 for 100 kHz setting.

(15) Set synthesizer/level generator frequency to 1.1 MHz.

(16) Press **SWEEP ENTRY MANUAL** key and enter **1.1 MHz** using **ENTRY** keys.

(17) Record TI marker amplitude indication in table 7.

(18) Repeat technique of (15) through (17) above using remaining settings listed in table 7.

Table 7. 50Ω Flatness

Synthesizer/level generator frequency and TI **SWEEP ENTRY MANUAL** settings	Test instrument marker amplitude Indications (dBm)
1.1 MHz	
5.1 MHz	
9.53 MHz	
10.1 MHz	
15.1 MHz	
20.1 MHz	
25.1 MHz	
30.1 MHz	
35.1 MHz	
40.1 MHz	

(19) Record the most negative TI marker amplitude indication from table 6 and table 7 combined.

(20) Record the most positive TI marker amplitude indication from table 6 and table 7 combined.

(21) Subtract indication recorded in (19) above from indication recorded in (20) above. Difference will be ≤ 1 dB.

(22) Repeat technique of (2) through (21) above for remaining TI **INPUT ENTRY RANGE** settings.

(23) Disconnect synthesizer/level generator rear panel **10 MHz OUTPUT** from synthesized/function generator rear panel **EXT REF IN**.

(24) Disconnect synthesizer/level generator **OUTPUT 50Ω** from TI **50-75Ω** input.

b. Adjustments. Refer to paragraph **6d**.

13. 1 MΩ Flatness

a. Performance Test

(1) Press keys and enter values using **ENTRY** keys as listed in (a) through (l) below:

(a) **ENTRY INSTR PRESET**.

(b) **INPUT ENTRY RANGE** to **-5 dBm** using **ENTRY STEP** ⇑ or ⇓.

(c) **ENTRY REFERENCE LEVEL** to **-6 dBm**.

(d) **INPUT REF LVL TRACK** to off.

(e) **ENTRY dB/DIV** to **1 dB**.

(f) **ENTRY START FREQ** to **20 Hz**.

(g) **ENTRY STOP FREQ** to **1 kHz**.

(h) **RBW-VBW-ST ENTRY RES BW** to **3 Hz** and wait for TI to calibrate (≈10 sec).

(i) **RBW-VBW-ST ENTRY VIDEO BW** to **10 kHz**.

(j) **RBW-VBW-ST ENTRY SWEEP TIME** to **30 sec**.

(k) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(l) **ENTRY SAVE** and then **1**.

(2) Connect TI **TRACKING GENERATOR** output to **50-75Ω** input.

(3) Adjust **TRACKING GENERATOR AMPLITUDE** control to position trace in the center of crt display.

(4) Press **SWEEP SINGLE** key twice and allow sweep to complete.

(5) Press keys as listed in (a) through (d) below:

(a) **TRACE STORE A → B**.

(b) **TRACE A - B** to on.

(c) **TRACE VIEW B** to off.

(d) **INPUT IMPEDANCE 1 MΩ**.

(6) Disconnect **TRACKING GENERATOR** output from **50-75Ω** input.

(7) Connect **TRACKING GENERATOR** output to **1 MΩ** input using a 50Ω feedthrough termination.

(8) Press **SWEEP SINGLE** key twice and allow sweep to complete.

(9) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to the point on trace with the largest deviation from .00 dB. TI marker amplitude indication will be between -0.7 and 0.7 dB.

(10) Press **INPUT ENTRY RANGE** key and **ENTRY STEP** ⇑ key to **15 dBm**.

(11) Repeat (8) and (9) above.

(12) Disconnect **TRACKING GENERATOR** output from **1 MΩ** input and 50Ω feedthrough termination.

(13) Press keys and enter values using **ENTRY** keys as listed in (a) through (h) below:

(a) **ENTRY RECALL** and then **1**.

(b) **ENTRY** blue shift and then **ENTRY CAL ON**.

(c) **ENTRY START FREQ** to **1 kHz**.

(d) **ENTRY STOP FREQ** to **100 kHz**.

(e) **RBW-VBW-ST ENTRY RES BW** to **300 Hz** and wait for TI to calibrate (≈10 sec).

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **10 kHz**.

(g) **RBW-VBW-ST ENTRY SWEEP TIME** to **2 sec**.

(h) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(14) Repeat (2) through (12) above.

(15) Press keys and enter values using **ENTRY** keys as listed in (a) through (h) below:

(a) **ENTRY RECALL** and then **1**.

(b) **ENTRY** blue shift and then **ENTRY CAL ON**.

(c) **ENTRY START FREQ** to **100 kHz**.

(d) **ENTRY STOP FREQ** to **10 MHz**.

(e) **RBW-VBW-ST ENTRY RES BW** to **3 kHz** and wait for TI to calibrate (≈10 sec).

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **300 Hz**.

(g) **RBW-VBW-ST ENTRY SWEEP TIME** to **2 sec**.

(h) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(16) Repeat (2) through (12) above.

(17) Press keys and enter values using **ENTRY** keys as listed in (a) through (f) below:

(a) **ENTRY RECALL** and then **1**.

(b) **ENTRY START FREQ** to **10 MHz**.

(c) **ENTRY STOP FREQ** to **40.1 MHz**.

(d) **RBW-VBW-ST ENTRY RES BW** to **3 kHz** and wait for TI to calibrate (≈10 sec).

(e) **RBW-VBW-ST ENTRY VIDEO BW** to **300 Hz**.

(f) **RBW-VBW-ST ENTRY SWEEP TIME** to **2 sec**.

(18) Repeat (2) through (12) above. TI marker indication will be between –1.5 and 1.5 dB in (9) above.

b. Adjustments. Refer to paragraph **6d**.

14. Noise

a. Performance Check

(1) Ensure TI front panel inputs are open.

(2) Press and enter values using **ENTRY** keys as listed in (a) through (e) below:

(a) **ENTRY INSTR PRESET**.

(b) **SWEEP ENTRY MANUAL** to **39.123456 MHz**.

(c) **ENTRY REFERENCE LEVEL** to **-60 dBm**.

(d) **RBW-VBW-ST ENTRY RES BW** to **30 kHz**.

(e) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(3) Average TI marker amplitude indication will be < -100 dBm.

(4) Press **RBW-VBW-ST ENTRY RES BW** key.

(5) Press **ENTRY STEP** ⇓ key.

(6) Average TI marker amplitude indication will be < -104 dBm.

(7) Repeat technique of (5) and (6) above for remaining TI settings and indications listed in table 8.

Table 8. Noise

Test instrument	
RBW-VBW-ST ENTRY RES BW settings	Average marker amplitude indications (dBm)
3kHz	< -108
1kHz	< -111
300 Hz	< -115
100 Hz	< -122
30Hz	< -127
10Hz	< -132
3Hz	< -137

(8) Press and enter values using **ENTRY** keys as listed in (a) and (b) below:

(a) **RBW-VBW-ST ENTRY RES BW** to **30 kHz**.

(b) **ENTRY REFERENCE LEVEL** to **–45 dBm**.

(9) Repeat (3) through (7) above.

(10) Press and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **ENTRY REFERENCE LEVEL** to **-60 dBm**.

(b) **RBW-VBW-ST ENTRY RES BW** to **30 kHz**.

(c) **SWEEP ENTRY MANUAL** to **300 kHz**.

(11) Average TI marker amplitude indication will be <-100 dBm.

(12) Repeat technique of (10)(b), (c), and (11) above for remaining TI settings and indications listed in table 9.

Table 9. Noise

RBW-VBW-ST ENTRY RES BW settings	**SWEEP ENTRY MANUAL** settings (kHz)	Average marker amplitude indications (dBm)
10 kHz	100	<-104
3 kHz	30	<-108
1 kHz	10	<-111
300 Hz	10	<-115
100 Hz	10	<-122
30 Hz	10	<-127
10 Hz	10	<-132
3 Hz	10	<-137

(13) Press keys and enter values using **ENTRY** keys as listed in (a) through (e) below:

(a) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(b) **SWEEP ENTRY MANUAL** to **40 Hz**.

(c) **RBW-VBW-ST ENTRY RES BW** to **3 Hz**.

(d) **ENTRY** blue shift and then **ENTRY CAL ON**.

(e) **MARKER/CONTINUOUS ENTRY NOISE LVL** to on.

NOTE

Wait until **(1 Hz)** is displayed behind TI marker amplitude dBm indication before proceeding to (14) below.

(14) Average TI marker amplitude indication will be <-123 dBm.

b. Adjustments. Refer to paragraph **6d**.

15. Low Frequency Response

a. Performance Check

(1) Ensure TI front panel inputs are open.

NOTE

60 Hz represents power line frequency; if power line frequency is different than 60 Hz, use current power line frequency in (2)(g) and (h) below.

(2) Press keys and enter values using **ENTRY** keys as listed in (a) through (i) below:

(a) **ENTRY INSTR PRESET**.

(b) **INPUT AUTORANGE** to off.

(c) **INPUT ENTRY RANGE** to **-25 dBm** using **ENTRY STEP** ⇓.

(d) **ENTRY REFERENCE LEVEL** to **-75 dBm**.

(e) **RBW-VBW-ST ENTRY RES BW** to **3 Hz**.

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(g) **SWEEP ENTRY MANUAL** to **60 Hz**.

(h) **ENTRY CF STEP SIZE** to **60 Hz**.

(i) **TRACE CLEAR A**.

(3) Average TI marker amplitude indication will be <-120 dBm.

(4) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. Average TI marker amplitude indication will be <-120 dBm.

(5) Press **ENTRY STEP** ⇑ key. Average TI marker amplitude indication will be <-120 dBm.

(6) Press **ENTRY STEP** ⇑ key. Average TI marker amplitude indication will be <-120 dBm.

(7) Repeat (6) above six times.

(8) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **SWEEP ENTRY MANUAL** to **5 kHz**.

(b) **ENTRY CF STEP SIZE** to **5 kHz**.

(c) **TRACE CLEAR A**.

(9) Repeat (3) through (7) above.

(10) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **SWEEP ENTRY MANUAL** to **100 kHz**.

(b) **ENTRY CF STEP SIZE** to **100 kHz**.

(c) **TRACE CLEAR A**.

(11) Repeat (3) through (7) above.

(12) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **SWEEP ENTRY MANUAL** to **1 MHz**.

(b) **ENTRY CF STEP SIZE** to **1 MHz**.

(c) **TRACE CLEAR A**.

(13) Repeat (3) through (7) above.

(14) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **SWEEP ENTRY MANUAL** to **10 MHz**.

(b) **ENTRY CF STEP SIZE** to **10 MHz**.

(c) **TRACE CLEAR A**.

(15) Repeat (3) through (6) above.

b. Adjustments. Refer to paragraph **6d**.

16. Local Oscillator Sideband Accuracy

a. Performance Check

(1) Disconnect rear panel **OVEN REF OUT** from **EXT REF IN**.

(2) Connect rear panel **OVEN REF OUT** to **50-75Ω** input.

(3) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY CENTER FREQUENCY** to **10 MHz**.

(c) **MARKER/CONTINUOUS ENTRY COUNTER** to on.

NOTE

Proceed when TI counter frequency indication is stable.

NOTE

60 Hz represents power line frequency; if power line frequency is different than 60 Hz, use current power line frequency in (4)(k) below.

(4) Press keys and enter values using **ENTRY** keys as listed in (a) through (m) below:

(a) **ENTRY** blue shift and then **MARKER/CONTINUOUS ENTRY MKR OFS → STEP**.

(b) **SWEEP ENTRY MANUAL** to **0 Hz**.

(c) **SWEEP ENTRY MANUAL** and then **ENTRY STEP ⇑**.

(d) **MARKER/CONTINUOUS ENTRY COUNTER** to off.

(e) **MARKER/CONTINUOUS ENTRY OFFSET** to on.

(f) **MARKER/CONTINUOUS ENTRY ENTER OFFSET**.

(g) **ENTRY REFERENCE LEVEL** to **-50 dBm**.

(h) **RBW-VBW-ST ENTRY RES BW** to **3 Hz**.

(i) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(j) **ENTRY SAVE** and then **1**.

(k) **ENTRY CF STEP SIZE** to **60 Hz**.

(l) **SWEEP ENTRY MANUAL**.

(m) **ENTRY STEP** ⇓.

(5) Average TI marker amplitude indication will be <-80 dB.

(6) Press **ENTRY STEP** ⇓ key. Average TI marker amplitude indication will be <-80 dB.

(7) Repeat (6) above three times.

(8) Press **ENTRY STEP** ⇑ key six times. Average TI marker amplitude indication will be <-80 dB.

(9) Press **ENTRY STEP** ⇑ key. Average TI marker amplitude indication will be <-80 dB.

(10) Repeat (9) above three times.

(11) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **ENTRY RECALL** and then **1**.

(b) **ENTRY CF STEP SIZE** to **5 kHz**.

(c) **SWEEP ENTRY MANUAL**.

(d) **ENTRY STEP** ⇓.

(12) Repeat (5) through (10) above.

(13) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **ENTRY RECALL** and then **1**.

(b) **ENTRY CF STEP SIZE** to **100 kHz**.

(c) **SWEEP ENTRY MANUAL**.

(d) **ENTRY STEP** ⇓.

(14) Repeat (5) through (10) above.

(15) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **ENTRY RECALL** and then **1**.

(b) **ENTRY CF STEP SIZE** to **1 MHz**.

(c) **SWEEP ENTRY MANUAL**.

(d) **ENTRY STEP** ⇓.

(16) Repeat (5) through (10) above.

(17) Disconnect rear panel **OVEN REF OUT** from **50-75Ω** input.

(18) Reconnect rear panel **OVEN REF OUT** to **EXT REF IN**.

b. Adjustments. Refer to paragraph **6d**.

17. Harmonic Distortion

a. Performance Check

(1) Connect synthesizer/level generator **OUTPUT 50Ω** to low pass filter No. 1 input and connect low pass filter No. 1 output to TI **50-75Ω** input.

(2) Press keys and enter values using **ENTRY** keys as listed in (a) through (g) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(c) **ENTRY STOP FREQ** to **40.1 MHz**.

(d) **RBW-VBW-ST ENTRY RES BW** to **30 Hz**.

(e) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(f) **INPUT ENTRY RANGE** to **-15 dBm** using **ENTRY STEP** ⇑ or ⇓.

(g) **ENTRY REFERENCE LEVEL** to **-15 dBm**.

(3) Set synthesizer/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **13.31 MHz**.

(b) **AMPLITUDE** to **-15 dBm**.

(c) **AMPTD INCR** to **0.1 dBm**.

(4) Press keys or set controls to values as listed in (a) through (d) below:

(a) **SWEEP ENTRY MANUAL** to **13.31 MHz**.

(b) **ENTRY CF STEP SIZE** to **13.31 MHz**.

(c) **ENTRY** blue shift and then **ENTRY CAL ON** and wait for TI to calibrate.

(d) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(5) Adjust synthesizer/level generator amplitude, using **INCR** ⇑ or ⇓ keys, until TI marker amplitude indicates -15 dBm.

(6) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(7) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-80 dBm.

(8) Press **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-80 dBm.

(9) Disconnect low pass filter No. 1 from TI and synthesizer/level generator.

(10) Connect synthesizer/level generator **OUTPUT 50Ω** to low pass filter No. 2 input and connect low pass filter No. 2 output to TI **50-75Ω** input.

(11) Set synthesizer/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **20.01 MHz**.

(b) **AMPLITUDE** to **-15 dBm**.

(c) **AMPTD INCR** to **0.1 dBm**.

(12) Press keys or set controls to values as listed in (a) through (e) below:

(a) **MARKER/CONTINUOUS ENTRY OFFSET** to off.

(b) **SWEEP ENTRY MANUAL** to **20.01 MHz**.

(c) **ENTRY CF STEP SIZE** to **20.01 MHz**.

(d) **ENTRY** blue shift and then **ENTRY CAL ON** and wait for TI to calibrate.

(e) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(13) Adjust synthesizer/level generator amplitude, using **INCR** ⇑ or ⇓ keys, until TI marker amplitude indicates -15 dBm.

(14) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(15) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. TI **OFFSET** amplitude indication will be <-80 dBm.

(16) Disconnect low pass filter No. 2 from TI and synthesizer/level generator.

(17) Connect synthesizer/level generator **OUTPUT 50Ω** to low pass filter No. 1 input and connect low pass filter No. 1 output to TI **1 MΩ** input using a 50Ω feedthrough termination.

(18) Press keys and enter values using **ENTRY** keys as listed in (a) through (h) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(c) **ENTRY STOP FREQ** to **40.1 MHz**.

(d) **RBW-VBW-ST ENTRY RES BW** to **30 Hz**.

(e) **RBW-VBW-ST ENTRY VIDEO BW** controls to **1 Hz**.

(f) **INPUT ENTRY RANGE** to **-15 dBm** using **ENTRY STEP** ⇑ or ⇓.

(g) **ENTRY REFERENCE LEVEL** to **-15 dBm**.

(h) **INPUT IMPEDANCE 1 MΩ** to on.

(19) Set synthesizer/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **13.31 MHz**.

(b) **AMPLITUDE** to **-15 dBm**.

(c) **AMPTD INCR** to **0.1 dBm**.

(20) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **SWEEP ENTRY MANUAL** to **13.31 MHz**.

(b) **ENTRY CF STEP SIZE** to **13.31 MHz**.

(c) **ENTRY** blue shift and then **ENTRY CAL ON** and wait for TI to calibrate.

(d) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(21) Adjust synthesizer/level generator amplitude, using **INCR** ⇑ or ⇓ keys, until TI marker amplitude indicates -15 dBm.

(22) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(23) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. TI **OFFSET** amplitude indication will be <-70 dBm.

(24) Press **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-70 dBm.

(25) Disconnect low pass filter No. 1 from TI, 50Ω feedthrough termination, and synthesizer/level generator.

(26) Connect synthesizer/level generator **OUTPUT 50Ω** to low pass filter No. 2 input and connect low pass filter No. 2 output to TI **1 MΩ** input using a 50Ω feedthrough termination.

(27) Set synthesizer/level generator as listed in (a) through (c) below:

(a) **FREQUENCY** to **20.01 MHz**.

(b) **AMPLITUDE** to **-15 dBm**.

(c) **AMPTD INCR** to **0.1 dBm**.

(28) Press keys or set controls to values as listed in (a) through (e) below:

(a) **MARKER/CONTINUOUS ENTRY OFFSET** to off.

(b) **SWEEP ENTRY MANUAL** to **20.01 MHz**.

(c) **ENTRY CF STEP SIZE** to **20.01 MHz**.

(d) **ENTRY** blue shift and then **ENTRY CAL ON** and wait for TI to calibrate.

(e) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(29) Adjust synthesizer/level generator amplitude, using **INCR** ⇑ or ⇓ keys, until TI marker amplitude indicates -15 dBm.

(30) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(31) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. TI **OFFSET** amplitude indication will be <-70 dBm.

(32) Disconnect low pass filter No. 2 from TI, 50Ω feedthrough termination, and synthesizer/level generator.

(33) Connect oscillator **OUTPUT** to TI **50-75Ω** input.

(34) Press keys and enter values using **ENTRY** keys as listed in (a) through (h) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY STOP FREQ** to **20 kHz**.

(c) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(d) **SWEEP ENTRY MANUAL** to **6.4 kHz**.

(e) **RBW-VBW-ST ENTRY RES BW** to **300 Hz**.

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(g) **MARKER/CONTINUOUS ENTRY COUNTER** to on.

(h) **INPUT ENTRY RANGE** to **-15 dBm** using **ENTRY STEP** ⇑ or ⇓.

(35) Adjust oscillator frequency and level controls until TI counter frequency indication is as close as possible to 6400 Hz and amplitude indication is as close as possible to –15 dBm.

(36) Press keys and enter values using **ENTRY** keys as listed in (a) through (g) below:

(a) **ENTRY** blue shift and then **MARKER/CONTINUOUS ENTRY MKR OFS → STEP**.

(b) **ENTRY** blue shift and then **ENTRY CAL ON**.

(c) **SWEEP ENTRY MANUAL** to **0 Hz**.

(d) **SWEEP ENTRY MANUAL** and then **ENTRY STEP** ⇑.

(e) **MARKER/CONTINUOUS ENTRY COUNTER** to off.

(f) **MARKER/CONTINUOUS ENTRY OFFSET** to on.

(g) **MARKER/CONTINUOUS ENTRY ENTER OFFSET**.

(37) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-80 dBm.

(38) Press **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-80 dBm.

(39) Press keys and enter values using **ENTRY** keys as listed in (a) through (h) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY STOP FREQ** to **20 kHz**.

(c) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(d) **SWEEP ENTRY MANUAL** to **3.2 kHz**.

(e) **RBW-VBW-ST ENTRY RES BW** to **300 Hz**.

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(g) **MARKER/CONTINUOUS ENTRY COUNTER** to on.

(h) **INPUT ENTRY RANGE** to **-15 dBm** using **ENTRY STEP** ⇑ or ⇓.

(40) Adjust oscillator frequency and level controls until TI counter frequency indication is as close as possible to 3200 Hz and amplitude indication is as close as possible to –15 dBm.

(41) Press keys and enter values using **ENTRY** keys as listed in (a) through (g) below:

(a) **ENTRY** blue shift and then **MARKER/CONTINUOUS ENTRY MKR OFS → STEP**.

(b) **ENTRY** blue shift and then **ENTRY CAL ON**.

(c) **SWEEP ENTRY MANUAL** to **0 Hz**.

(d) **SWEEP ENTRY MANUAL** and then **ENTRY STEP** ⇑.

(e) **MARKER/CONTINUOUS ENTRY COUNTER** to off.

(f) **MARKER/CONTINUOUS ENTRY OFFSET** to on.

(g) **MARKER/CONTINUOUS ENTRY ENTER OFFSET**.

(42) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key twice. TI marker amplitude indication will be <-80 dBm.

(43) Disconnect oscillator from TI **50-75Ω** input.

(44) Connect oscillator **OUTPUT** to TI **1 MΩ** input using a 50Ω feedthrough termination.

(45) Press keys and enter values using **ENTRY** keys as listed in (a) through (i) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY STOP FREQ** to **20 kHz**.

(c) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(d) **SWEEP ENTRY MANUAL** to **6.4 kHz**.

(e) **RBW-VBW-ST ENTRY RES BW** to **300 Hz**.

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(g) **MARKER/CONTINUOUS ENTRY COUNTER** to on.

(h) **INPUT ENTRY RANGE** to **-15 dBm** using **ENTRY STEP** ⇑ or ⇓.

(i) **INPUT IMPEDANCE 1 MΩ** to on.

(46) Adjust oscillator frequency and level controls until TI counter frequency indication is as close as possible to 6400 Hz and amplitude indication is as close as possible to –15 dBm.

(47) Press keys and enter values using **ENTRY** keys as listed in (a) through (g) below:

(a) **ENTRY** blue shift and then **MARKER/CONTINUOUS ENTRY MKR OFS → STEP**.

(b) **ENTRY** blue shift and then **ENTRY CAL ON**.

(c) **SWEEP ENTRY MANUAL** to **0 Hz**.

(d) **SWEEP ENTRY MANUAL** and then **ENTRY STEP** ⇑.

(e) **MARKER/CONTINUOUS ENTRY COUNTER** to off.

(f) **MARKER/CONTINUOUS ENTRY OFFSET** to on.

(g) **MARKER/CONTINUOUS ENTRY ENTER OFFSET**.

(48) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-70 dBm.

(49) Press **ENTRY STEP** ⇑ key. TI marker amplitude indication will be <-70 dBm.

(50) Press keys and enter values using **ENTRY** keys as listed in (a) through (i) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY STOP FREQ** to **20 kHz**.

(c) **ENTRY** blue shift and then **ENTRY CAL OFF**.

(d) **SWEEP ENTRY MANUAL** to **3.2 kHz**.

(e) **RBW-VBW-ST ENTRY RES BW** to **300 Hz**.

(f) **RBW-VBW-ST ENTRY VIDEO BW** to **1 Hz**.

(g) **MARKER/CONTINUOUS ENTRY COUNTER** to on.

(h) **INPUT ENTRY RANGE** to **-15 dBm** using **ENTRY STEP** ⇑ or ⇓.

(i) **INPUT IMPEDANCE 1 MΩ** to on.

(51) Adjust oscillator frequency and level controls until TI counter frequency indication is as close as possible to 3200 Hz and amplitude indication is as close as possible to –15 dBm.

(52) Press keys and enter values using **ENTRY** keys as listed in (a) through (g) below:

(a) **ENTRY** blue shift and then **MARKER/CONTINUOUS ENTRY MKR OFS → STEP**.

(b) **ENTRY** blue shift and then **ENTRY CAL ON**.

(c) **SWEEP ENTRY MANUAL** to **0 Hz**.

(d) **SWEEP ENTRY MANUAL** and then **ENTRY STEP** ⇑.

(e) **MARKER/CONTINUOUS ENTRY COUNTER** to off.

(f) **MARKER/CONTINUOUS ENTRY OFFSET** to on.

(g) **MARKER/CONTINUOUS ENTRY ENTER OFFSET**.

(53) Press **SWEEP ENTRY MANUAL** key and then **ENTRY STEP** ⇑ key twice. TI marker amplitude indication will be <-70 dBm.

(54) Disconnect oscillator from TI and 50Ω feedthrough termination.

b. Adjustments. Refer to paragraph **6d**.

18. Bandwidth

a. Performance Check

(1) Connect synthesizer/level generator **OUTPUT 50Ω** to TI **50-75Ω** input.

(2) Set synthesizer/level generator for a 10 MHz, -25 dBm output.

(3) Press keys and enter values using **ENTRY** keys as listed in (a) through (f) below:

(a) **ENTRY INSTR PRESET**.

(b) **ENTRY CENTER FREQUENCY** to **10 MHz**.

(c) **ENTRY REFERENCE LEVEL** to **-24.5 dBm**.

(d) **ENTRY dB/DIV** to **1 dB**.

(e) **RBW-VBW-ST RES BW HOLD** to on.

(f) **INPUT AUTORANGE** to off.

(4) Press keys and enter values using **ENTRY** keys as listed in (a) through (c) below:

(a) **RBW-VBW-ST ENTRY RES BW** to **3 Hz**.

(b) **ENTRY FREQUENCY SPAN** to **10 Hz**.

(c) **RBW-VBW-ST ENTRY SWEEP TIME** to **15 sec**.

(5) Allow one complete sweep to occur.

(6) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to the most positive point on trace using marker amplitude indication.

(7) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(8) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker down the left side of trace until marker amplitude indication is between –2.97 and -3.03 dB.

(9) Press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(10) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to the right side of trace until marker amplitude indication is between 0.03 and -0.03 dB.

(11) TI marker offset frequency indication will be within limits specified in table 10. Record TI actual marker offset frequency indication in table 10.

(12) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to off.

(13) Repeat (4) through (12) above for remaining TI settings and indications listed in table 10.

Table 10. 3 dB Bandwidth

Test instrument					
RBW-VBW-ST ENTRY RES BW settings	**ENTRY FREQUENCY SPAN** settings	**RBW-VBW-ST ENTRY SWEEP TIME** settings (sec)	Marker offset frequency indications		Actual marker offset frequency indications
			Min	Max	
3 Hz	10 Hz	15	2.4 Hz	3.6 Hz	
10 Hz	30 Hz	8	8.0 Hz	12.0 Hz	
30 Hz	100 Hz	7	24.0 Hz	36.0 Hz	
100 Hz	200 Hz	6	80.0 Hz	120.0 Hz	
300 Hz	1 kHz	6	240.0 Hz	360.0 Hz	
1 kHz	2 kHz	6	800.0 Hz	1200.0 Hz	
3 kHz	10 kHz	6	2.4 kHz	3.6 kHz	
10 kHz	20 kHz	6	8.0 kHz	12.0 kHz	
30 kHz	100 kHz	6	24.0 kHz	36.0 kHz	

(14) Press keys and enter values using **ENTRY** keys as listed in (a) through (d) below:

(a) **ENTRY dB/DIV** to **10 dB**.

(b) **RBW-VBW-ST ENTRY RES BW** to **3 Hz**.

(c) **ENTRY FREQUENCY SPAN** to **100 Hz**.

(d) **RBW-VBW-ST ENTRY SWEEP TIME** to **23 sec**.

(15) Allow one complete sweep to occur.

(16) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to the most positive point on trace using marker amplitude.

(17) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(18) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker down the left side of trace until marker amplitude indication is between -59.6 and -60.4 dB.

(19) Press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(20) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to the right side of trace until marker amplitude indication is between 0.4 and -0.4 dB.

(21) Record TI actual marker offset frequency indication in table 11.

(22) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to off.

(23) Repeat (14) through (22) above for remaining TI settings and indications listed in table 11.

Table 11. 60 dB Bandwidth

Test instrument			
RBW-VBW-ST ENTRY RES BW settings	**ENTRY FREQUENCY SPAN** settings	**RBW-VBW-ST ENTRY SWEEP TIME** settings (sec)	Actual marker offset frequency indications
3 Hz	100 Hz	23	
10 Hz	200 Hz	15	
30 Hz	500 Hz	10	
100 Hz	2 kHz	8	
300 Hz	5 kHz	5	
1 kHz	20 kHz	5	
3 kHz	50 kHz	5	
10 kHz	100 kHz	5	
30 kHz	500 kHz	5	

(24) Divide first TI actual marker offset frequency indication recorded in table 11 by first TI actual marker offset frequency indication recorded in table 10. Results will be < 11 to 1 ratio.

(25) Repeat (24) above for remaining TI actual marker offset frequency indications recorded in tables 11 and 10.

(26) Disconnect synthesizer/level generator **OUTPUT 50Ω** from TI **50-75Ω** input.

b. Adjustments. Refer to paragraph **6d**.

19. Tracking Generator Flatness

a. Performance Check

(1) Press keys and enter values using **ENTRY** keys as listed in (a) through (g) below:

(a) **ENTRY** blue shift and then **604**.

(b) **ENTRY INSTR PRESET**.

(c) **ENTRY dB/DIV** to **1 dB**.

(d) **INPUT ENTRY RANGE** to **-20 dBm** using **ENTRY STEP** ⇑ or ⇓.

(e) **ENTRY START FREQ** to **100 kHz**.

(f) **ENTRY STOP FREQ** to **40.1 MHz**.

(g) **TRACE CLEAR A**.

(2) Allow one complete sweep to occur.

(3) Press keys and enter values using **ENTRY** keys as listed in (a) through (f) below:

(a) **TRACE STORE A → B**.

(b) **TRACE VIEW B** to off.

(c) **ENTRY SAVE** and then **1**.

(d) **ENTRY INSTR PRESET**.

(e) **ENTRY RECALL** and then **1**.

(f) **INPUT ENTRY RANGE** to **.0 dBm** using **ENTRY STEP** ⇑.

(4) Connect TI **TRACKING GENERATOR** output to **50-75Ω** input.

(5) Adjust **TRACKING GENERATOR AMPLITUDE** control to position trace in the middle of crt display.

(6) Press **TRACE CLEAR A** key and allow one complete sweep to occur.

(7) Press **TRACE A - B** key to on.

(8) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to most negative point on trace using TI marker amplitude indication.

(9) Press **MARKER/CONTINUOUS ENTRY OFFSET** key to on and then press **MARKER/CONTINUOUS ENTRY ENTER OFFSET** key.

(10) Adjust **MARKER/CONTINUOUS ENTRY** knob to move marker to most positive point on trace using TI marker amplitude indication. TI marker amplitude indication will be ≤1.4 dB.

b. Adjustments. Refer to paragraph **6d**.

20. Final Procedure

a. Deenergize and disconnect all equipment.

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

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Distribution:

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