*TB 9-6625-2143-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR SELECTIVE VOLTMETER HEWLETT-PACKARD, MODEL 3581C

Headquarters, Department of the Army, Washington, DC
6 December 2007

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 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 9-6625-2143-35, dated 5 September 1985, including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Selective Voltmeter, Hewlett-Packard, Model 3581C. 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 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. When adjustments are in tables, the (R) follows the designated adjustments. 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: Tracking oscillator Display	 Range: 0 Hz to 50 kHz Accuracy: ±1 Hz Accuracy: ±3 Hz
AFC	Pull-in range: >5 times bandwidth for 3 through 100 Hz bandwidths >800 Hz for 300 Hz bandwidth Hold-in range: ±800 Hz Lock frequency: Center of passband ±1 Hz
Span	Range: 0 to 50 kHz in 11 steps Accuracy: ±2% of setting
Input amplitude: Display	Range: 0.1 μV to 30 V rms in 18 ranges and +30 to -70 dBV/dBm in 11 ranges Accuracy: Volts scale ±2%, log scale ±2 dB Range: 0 to -70 dB Accuracy: ±1 dB Range: 0.1 μV to 30 V rms Accuracy: 0.3 dB Range: 15 Hz to 50 kHz Accuracy: Volts scale ±4%, log scale ±0.4 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 Standards Set AN/GSM-286, AN/GSM-287, and AN/GSM-705. Alternate items may be used by the calibrating activity when the equipment listed in table 2 is not available. 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. 5. 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 accessory is also required for this calibration: Extender board, 10-pin (HP-5060-0091).

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number
FREQUENCY COUNTER	Range: 9.5 to 10.5 kHz Accuracy: ±0.25 Hz	Fluke, Model PM6681/656 (PM6681/656)
FUNCTION/ARBITRARY GENERATOR	Frequency range: 15 Hz to 50 kHz Resolution: 0.1 Hz Amplitude range: +3.01 to +23.01 dBm Accuracy: ±0.1 dB	Agilent, Model 33250A (33250A)
MULTIMETER	Range: 0 to 10.5 V dc 100 to 150 mV ac Accuracy: ±0.025%	Agilent, Model 3458A (3458A)
SYNTHESIZER LEVEL GENERATOR	Frequency range: 10 kHz Accuracy: ±0.1 Hz Amplitude range: -67.99 to +13.01 dB Accuracy: ±0.1 dB	Agilent, Model 3335AOPT 001K-06 (MIS-35938)

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. When indications specified in paragraphs **8** through **13** are not within tolerance, perform the power supply check prior to making adjustments. After adjustments are made, repeat paragraphs **8** through **13**. Do not perform power supply check if all other parameters are within tolerance.

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

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.

7. Equipment Setup

a. Connect TI to 115 V ac source.

b. Set **POWER** switch to on and allow 5 minutes for warm-up and stabilization.

8. Frequency Display

a. Performance Check

(1) Position controls as listed in (a) through (m) below:

(a) **SCALE LOG 10 dB** pushbutton pressed. **AFC** pushbutton released.
(b) **AMPLITUDE REF LEVEL** control to **0 dB** (normal).
(c) Calibration switch to **dBm 900Ω /LIN**.
(d) **INPUT SENSITIVITY** control to **0 dB**.
(e) **INPUT SENSITIVITY** vernier (amplitude) to midrange.
(f) **INPUT MODE** switch to **UNBAL**.
(g) **RESOLUTION BANDWIDTH** control to **3 Hz**.
(h) **DISPLAY SMOOTHING** control to **MIN**.
(i) **FREQ SPAN** control to **50 Hz**.
(j) **SWEEP MODE** control to **MAN**.
(k) **MANUAL VERNIER** control to mid-range.
(l) **OUTPUT MODE** switch (rear panel) to **TRACKING OSC**.
(m) **LEVEL control** (rear panel) fully cw.

(2) Connect frequency counter to rear panel **OUTPUT**.

(3) Set frequency counter controls to measure frequency of 10 kHz with 0.1 Hz resolution.

(4) Connect function/arbitrary generator to **INPUT** using 50 Ω feedthrough termination.

(5) Set function/arbitrary generator frequency to **10 kHz** and adjust output for **+12.55 dBm** (0.949 V rms).

(6) Adjust **FREQUENCY** control for 10,000 Hz indication on frequency display.

(7) Adjust **MANUAL VERNIER** for peak meter indication. If frequency counter does not indicate between 9999 and 10,001 Hz, perform **b** (1) through (4) below. Record indication.

(8) TI frequency display will indicate between 9997 and 10,003.

(9) Press **AFC** pushbutton.

(10) Press reset button on frequency counter. If **AFC** does not lock frequency to within $\pm$1 Hz of indication recorded in (7) above, perform **b** (5) through (7) below.

(11) Press **SCALE LOG 90 dB** pushbutton and release **AFC** pushbutton.

(12) Set **VERNIER** (amplitude) control to **CAL** and **RESOLUTION BANDWIDTH** control to **300 Hz**.

(13) Adjust **FREQUENCY** control for 9200 Hz indication on TI display.

(14) Press **AFC** pushbutton. If the **AFC** does not tune TI to 10 kHz input signal and **b** (5) through (7) was not performed in (10) above, perform **b** (5) through (7) below.

(15) Release **AFC** pushbutton and adjust F**REQUENCY** control for 10,800 Hz indication on TI display.

(16) Repeat (14) above.

(17) Set **RESOLUTION BANDWIDTH** control to **3 Hz**.

(18) Release **AFC** pushbutton and adjust **FREQUENCY** control for 9985 Hz indication on TI display.

(19) Press **AFC** pushbutton. If the **AFC** does not tune TI to 10 kHz input signal and **b** (5) through (7) was not performed in (10) above, perform **b** (5) through (7) below.

(20) Repeat (18) and (19) above at 10,015 Hz.

(21) Set **RESOLUTION BANDWIDTH** control to **100 Hz**.

(22) Release **AFC** pushbutton and adjust **FREQUENCY** control for 10,500 Hz and press **AFC** pushbutton.

(23) Pull out **FREQUENCY** control and rotate control ccw until **AFC UNLOCK** light first comes on.

(24) Release **AFC** pushbutton. If frequency display does not indicate 9200 Hz or less and **b** (5) through (7) below was not performed in (10) above, perform **b** (5) through (7) below.

(25) Adjust **FREQUENCY** control for **9500 Hz** and press **AFC** pushbutton.

(26) Pull out **FREQUENCY** control and rotate control cw until **AFC UNLOCK** light first comes on. Then, rotate control ccw until light goes out.

(27) Release **AFC** pushbutton. If frequency display does not indicate 10,800 Hz or greater and **b** (5) through (7) above was not performed in (10) above, perform **b** (5) through (7) below.

b. Adjustments

(1) Set **INPUT SENSITIVITY** control to **+10 dB**, amplitude **VERNIER** to midrange, and **SWEEP MODE** control to **RESET**.

(2) Connect rear panel **OUTPUT** to front panel **INPUT**.

(3) Adjust A2C4 (fig. 1) for peak meter indication. (R)

(4) Disconnect cable connected in (2) above.

(5) Set **INPUT SENSITIVITY** and **VERNIER** controls to **CAL**, **RESOLUTION BANDWIDTH** control to **10 Hz**, and **SWEEP MODE** control to **OFF**.

(6) Adjust **FREQUENCY** control for exactly 10,000 Hz indication on TI display. Press **AFC** pushbutton.

(7) Connect multimeter to A3TP7 (fig. 1) and chassis ground and adjust A3R1 (fig. 1) for multimeter indication of 0 ±0.5 V dc. (R)

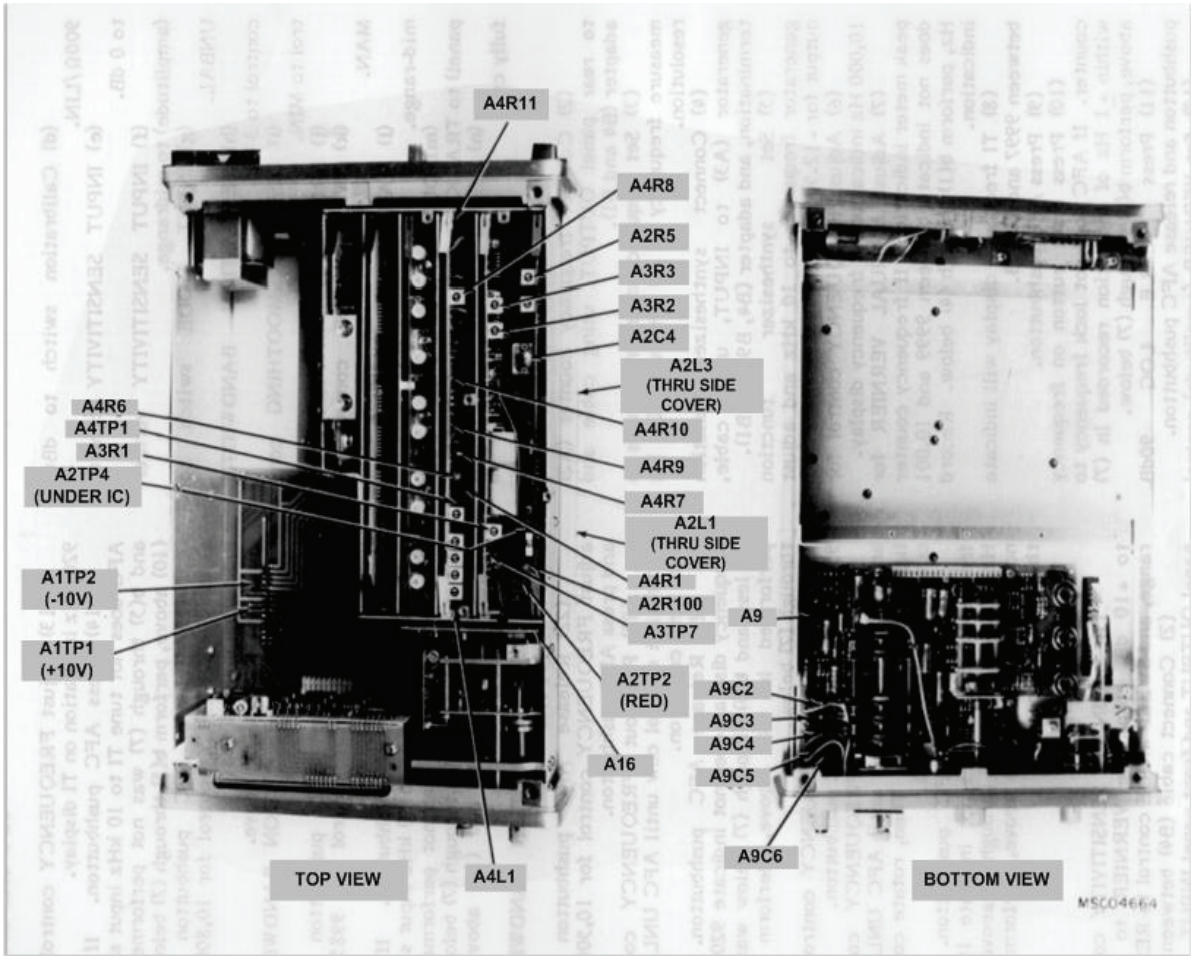

Figure 1. Adjustments.

9. Frequency Span

a. Performance Check

(1) Position controls as listed in (a) through (n) below:

(a) **SCALE LOG l0 dB** pushbutton pressed.
(b) **AFC** pushbutton released.
(c) **AMPLITUDE REF LEVEL** control to **0 dB** (NORMAL).
(d) Calibration switch to **dBm 900Ω**.
(e) **INPUT SENSITIVITY** control to **0 dB**.
(f) **INPUT SENSITIVITY** vernier (amplitude) to midrange.
(g) **INPUT MODE** switch to **UNBAL**.
(h) **RESOLUTION BANDWIDTH** control to **3 Hz**.
(i) **DISPLAY SMOOTHING** control to **MIN**.
(j) **FREQ SPAN** control to **50 Hz**.
(k) **SWEEP MODE** control to **MAN**.
(l) **MANUAL VERNIER** control fully ccw.
(m) **OUTPUT MODE** switch (rear panel) to **TRACKING OSC**.
(n) **LEVEL** control (rear panel) fully cw.

(2) Disconnect function/arbitrary generator from TI.

(3) Adjust **FREQUENCY** control until TI display indicates 1000 Hz.

(4) Rotate **MANUAL VERNIER** control fully cw. If TI display does not indicate between 1049 and 1051 Hz, perform **b** (l) through (12) below.

(5) Repeat technique of (4) above for settings and indications listed in table 4.

Table 4. Frequency Span

Test instrument		
FREQ SPAN control settings	Display indications	
	Min	Max
100 Hz	1098	1102
200 Hz	1196	1204
500 Hz	1490	1510
1 kHz	1980	2020
2 kHz	2960	3040
5 kHz	5900	6100
10 kHz	10,800	11,200
20 kHz	20,600	21,400
50 kHz	50,000	52,000

b. Adjustments

(1) Set **RESOLUTION BANDWIDTH** control to **300 Hz**, **FREQ SPAN** control to **0 Hz**, **SWEEP MODE** control to **RESET**, and **MANUAL VERNIER** control fully ccw.

(2) Remove card nest cover to gain access to board A2.

(3) Short red lead at A2TP2 (RED) (fig. 1) to chassis ground.

(4) Adjust A2L3 (fig. 1) for 0 to 5 Hz indication on TI display. Remove short from A2TP2 (RED). (R)

(5) Adjust **FREQUENCY** control for 10 Hz indication on TI display.

(6) Set **FREQ SPAN** control to **50 kHz** and adjust A3R2 (fig. 1) for 10 Hz indication on TI display. (R)

(7) Set **SWEEP MODE** control to **MAN** and **MANUAL VERNIER** control fully ccw.

(8) Adjust **FREQUENCY** control for 0 Hz indication on TI display.

(9) Connect multimeter to A2TP4 (fig. 1) and adjust A2L1 (fig. 1) for multimeter indication between -1.49 and -1.51 V dc. (R)

(10) Position **MANUAL VERNIER** control fully cw.

(11) Adjust **FREQUENCY** control for 50,000 Hz indication on TI display.

(12) Adjust A2R100 (fig. 1) for -1.5 V indication on multimeter. (R)

10. Amplitude Display

a. Performance Check

(1) Connect synthesizer level generator 50 Ω output to TI **INPUT** using a 50 Ω feedthrough termination.

(2) Position controls as listed in (a) through (e) below:

(a) **SCALE LOG 90 dB** pushbutton pressed.
(b) **AFC** pushbutton released.
(c) **INPUT SENSITIVITY** to **0 dB**.
(d) **VERNIER** (amplitude) control to **CAL**.
(e) **RESOLUTION BANDWIDTH** control to **30 Hz**.

(3) Set synthesizer level generator output for **10 kHz** and **+13.01 dBm** (l V rms, 0 dBV).

(4) Adjust **FREQUENCY** control for indication near 10,000 Hz and press **AFC** pushbutton.

(5) Adjust amplitude **VERNIER** control for full-scale meter indication.

(6) Set synthesizer level generator for **10 dB step** increase/decrease.

(7) Step synthesizer level generator to **+3.01 dBm** (0.3162 V rms) output. If TI meter does not indicate between -8 and -12 dB, perform **b** (l) through (39) below.

(8) Repeat technique of (7) above for outputs and indications listed in table 5. Use step function on synthesizer level generator. If any indication listed is not within the limits specified, perform **b** (1) through (39) below:

NOTE

If **AFC** unlocks when amplitude setting is changed, release **AFC** pushbutton, retune to 10,000 Hz, and press **AFC** pushbutton. For the -80 dB measurement release the **AFC** pushbutton and manually tune for a peak meter reading.

Table 5. Amplitude Display (Log Scale)

Synthesizer level generator output		Test instrument indications (dB)	
dBm	Volts	Min	Max
-6.99	0.1 V	-18	-22
-16.99	31.6 mV	-28	-32
-26.99	10 mV	-38	-42
-36.99	3.16 mV	-48	-52
-46.99	1 mV	-58	-62
-56.99	0.316 mV	-68	-72
-66.99	0.1 mV	-78	-82

(9) Step synthesizer level generator to **+ 13.0 1 dBm** out put.

(10) Set **SCALE** control to **VOLTS** and **VERNIER** (amplitude) control to **CAL**.

(11) Adjust **FREQUENCY** control for indication near 10,000 Hz and press **AFC** pushbutton.

(12) Adjust front panel **CAL 10 kHz** potentiometer for a full-scale meter indication.

(13) Adjust synthesizer level generator for **+12-10 dBm** (0.9 V rms) output. If TI meter does not indicate between 0.88 and 0.92 V, perform **b** (1) through (39) below.

(14) Repeat technique of (13) above for outputs and indications listed in table 6. If any indication listed is not within limits specified, perform **b** (1) through (39) below.

Table 6. Amplitude Display (Volts Scale)

Synthesizer level generator output		Test instrument indications (V)	
dBm/50Ω	Volts	Min	Max
+11.07	0.8	0.78	0.82
+9.91	0.7	0.68	0.72
+8.51	0.6	0.58	0.62
+6.99	0.5	0.48	0.52
+5.05	0.4	0.38	0.42
+2.55	0.3	0.28	0.32
-0.97	0.2	0.18	0.22
-6.99	0.1	0.08	0.12

b. Adjustments

(1) Perform meter mechanical zero adjustment on TI.

(2) Set **POWER** switch to off. Place A4 board on two extender boards and set **POWE**R switch to on.

(3) Position controls as listed in (a) through (j) below:

(a) **SCALE VOLTS** pushbutton pressed.
(b) **AFC** pushbutton released.
(c) **AMPLITUDE REF LEVEL** control to **X 1**.
(d) Calibration switch to **dBm 900Ω/LIN**.
(e) **INPUT SENSITIVITY** control to **-20 dB**.
(f) **VERNIER** (amplitude) control to **CAL**.

(g) Input mode switch to **UNBAL**.
(h) **RESOLUTION BANDWIDTH** control to **300 Hz**.
(i) **DISPLAY SMOOTHING** control to **MIN**.
(j) **SWEEP MODE** control to **OFF**.

(4) Set synthesizer level generator output to **10 kHz** and **-6.99 dBm** (0.1 V rms).

(5) Adjust **FREQUENCY** control for indication near 10,000 Hz and press **AFC** pushbutton.

(6) Set front panel **CAL 10 kHz** control fully ccw.

(7) Connect multimeter to A4TP1 (fig. 1). Record ac voltage indication on multimeter.

(8) Adjust front panel **CAL 10 kHz** control for multimeter indication 1.26 times the value recorded in (7) above (see table 7).

Table 7. Gain and Linearity Adjustments

Test instrument	
100 mV x 1.26 = 126 mV	117 mV x 1.26 = 147 mV
101 mV x 1.26 = 127 mV	118 mV x 1.26 = 149 mV
102 mV x 1.26 = 129 mV	119 mV x 1.26 = 150 mV
103 mV x 1.26 = 130 mV	120 mV x 1.26 = 151 mV
104 mV x 1.26 = 131 mV	121 mV x 1.26 = 152 mV
105 mV x 1.26 = 132 mV	122 mV x 1.26 = 154 mV
106 mV x 1.26 = 134 mV	123 mV x 1.26 = 155 mV
107 mV x 1.26 = 135 mV	124 mV x 1.26 = 158 mV
108 mV x 1.26 - 136 mV	125 mV x 1.26 = 158 mV
109 mV x 1.26 = 137 mV	126 mV x 1.26 = 159 mV
110 mV x 1.26 = 139 mV	127 mV x 1.26 - 160 mV
111 mV x 1.26 = 140 mV	128 mV x 1.26 = 161 mV
112 mV x 1.26 = 141 mV	129 mV x 1.26 = 163 mV
113 mV x 1.26 = 142 mV	130 mV x 1.26 = 164 mV
114 mV x 1.26 = 144 mV	131 mV x 1.26 = 165 mV
115 mV x 1.26 = 145 mV	132 mV x 1.26 = 166 mV
116 mV x 1.26 = 146 mV	133 mV x 1.26 = 168 mV

(9) Disconnect multimeter.

(10) Adjust **VERNIER** (amplitude) control for midscale indication on TI.

(11) Using non-metallic alignment tool, adjust A4L1 (fig. 1) for peak meter indication on TI. (R)

(12) Set **POWER** switch to off, replace A4 board and set **POWER** switch to on.

(13) If **AFC** is unlocked, release **AFC**.

(14) Set amplitude **VERNIER** control to **CAL** (fully cw) position.

(15) Connect multimeter to **RECORDER Y**-axis output (rear panel).

(16) Disconnect synthesizer level generator from TI **INPUT** and adjust A4R11 (fig. 1) for multimeter of 0 + 0.001 V dc. (R)

(17) Reconnect synthesizer level generator to TI **INPUT**, and set synthesizer level generator amplitude to **-7.45 dBm**.

(18) If **AFC** is unlocked, release **AFC** pushbutton and repeat (5) above.

(19) Set multimeter to 100 V range.

(20) Press **SCALE LOG 90 dB** pushbutton and record multimeter indication.

(21) Press **SCALE LOG l0 dB** pushbutton and adjust A4R8 (fig. 1) for same indication recorded in (20) above. (R)

(22) Repeat (20) and (21) above until multimeter indicates the same for both log scale settings. Multimeter will indicate between 4.85 and 5.15 V dc.

(23) Press **SCALE LOG (0 dB)** pushbutton and adjust A3R3 (fig. 1) for full-scale (0 dB) indication. (R)

(24) Set synthesizer level generator amplitude to **-67.99 dBm** (0.095 mV).

NOTE

To minimize extraneous pickup, place mV card nest cover over all boards when observing -60 dB indication. Make adjustments, then replace cover to observe results.

NOTE

The **AFC** should remain locked to the -60 dB input signal. If not, release the **AFC** pushbutton and manually tune for a peak meter reading at 10 kHz.

(25) Press **SCALE LOG 90 dB** pushbutton and adjust A4R9 (fig. 1) for a -60 dB indication.

(26) Set synthesizer level generator amplitude to **-7.45 dBm**.

(27) Press **SCALE LOG l0dB** pushbutton and adjust A4R7 (fig. 1) for a full-scale indication. (R)

(28) Repeat (24) through (27) above until indication in (25) above is exactly -60 dB.

(29) Press **SCALE LOG 90 dB** pushbutton.

(30) Set synthesizer level generator amplitude to **-27.45 dBm**. If TI meter indicates between -19.5 and -20.5 dB, go to (36) below. If not, record error and proceed to (31) below.

(31) Adjust A4R10 (fig. 1) until error recorded in (30) above is about 3 times its original value. (Example: If TI meter indication is -21 dB (1 dB error) adjust A4R10 for -23 dB indication.) (R)

(32) Set synthesizer level generator amplitude to **-7.45 dBm** (0.0949 V).

(33) Press **SCALE LOG 10 dB** pushbutton and adjust A4R7 for full-scale TI indication. (R)

(34) Repeat (29) through (33) above until indication in (30) above is between - 19.5 and -20.5 dB.

(35) Repeat (24) through (30) above.

(36) Press **SCALE VOLTS** pushbutton.

(37) Set synthesizer level generator amplitude to **-6.99 dBm** (0.1 V rms) and adjust A4R6 (fig. 1) for full-scale indication. (R)

(38) Set **INPUT SENSITIVITY** switch to **CAL** position. (**AFC** should lock TI to 10 kHz signal.)

(39) Adjust A2R5 (fig. 1) for full scale indication on TI. (R)

11. Reference Level

a. Performance Check

(1) Release **AFC** pushbutton and set **DISPLAY SMOOTHING** switch to **MAX**.

(2) Set synthesizer level generator output for **10 kHz** and **+13.01 dBm** (1 V rms, 0 dBV).

(3) Adjust **FREQUENCY** control for indication near 10,000 Hz and press **AFC** pushbutton.

(4) Adjust amplitude **VERNIER** control for 0.9 V indication on TI meter.

(5) Adjust synthesizer level generator amplitude to **+3.01 dBm** (0.316 V rms).

(6) Set **AMPLITUDE REF LEVEL** control to **-10 dB**. TI meter will indicate between 0.87 and 0.93 V.

(7) Repeat technique of (2) through (6) above for settings listed in table 8. TI meter will indicate between 0.87 and 0.93 V on all input sensitivity settings except -70 dB setting which will be between 0.80 and 1.00 V.

Table 8. Amplitude Reference Level Tests

Synthesizer level generator output			Test instrument
dBm	Volts		**AMPLITUDE REF LEVEL**
-6.99	0.1	V	-20 dB
-16.99	31.6	mV	-30 dB
-26.99	10	mV	-40 dB
-36.99	3.16	mV	-50 dB
-46.99	1	mV	-60 dB
-56.99	0.316	mV	-70 dB

b. Adjustments. No adjustments can be made.

12. Input Attenuator

a. Performance Check

(1) Release **AFC** pushbutton and set **DISPLAY SMOOTHING** switch to **MIN**.

(2) Set **AMPLITUDE REF LEVEL** control to -**40 dB** and **INPUT SENSITIVITY** control to **+30 dB**.

(3) Set synthesizer level generator output for **10 kHz** and **+3.01 dBm** (0.32 V rms, -10 dBV).

(4) Adjust **FREQUENCY** control for indication near 10,000 Hz and press **AFC** pushbutton.

(5) Adjust amplitude **VERNIER** control for **-5 dB** (0 dB to -10 dB scale).

(6) Set **AMPLITUDE REF LEVEL** control to **-30 dB**.

(7) Set synthesizer level generator output to **+ 13.01 dBm** (1 V rms) and record TI meter indication.

(8) Set synthesizer level generator output to **+ 3.01 dBm** (0.3162 V rms).

(9) Without disturbing amplitude **VERNIER** setting, set **INPUT SENSITIVITY** control to **+20 dB**. TI meter indication will be within +0.3 dB of indication recorded in (7) above.

(10) Repeat (5) above.

(11) Set **AMPLITUDE REF LEVEL** control to **-20 dB**.

(12) Set synthesizer level generator output for **+ 13.01 dBm** and record TI meter indication.

(13) Set synthesizer level generator output for **+ 3.01 dBm**.

(14) **Set INPUT SENSITIVITY** control to **+10 dB**. TI meter will indicate within ± 0.3 dB of indication recorded in (12) above.

(15) Readjust amplitude **VERNIER** control for -5 dB meter indication.

(16) Set **AMPLITUDE REF LEVEL** to **-10 dB**.

(17) Set synthesizer level generator output for **+13.01 dBm** and record TI meter indication.

(18) Set synthesizer level generator output for **+ 3.01 dBm** and **INPUT SENSITIVITY** control to **0 dB**. TI meter indication will be within +0.3 dB of indication recorded in (17) above.

(19) Set **AMPLITUDE REF LEVEL** to **0 dB**.

(20) Set synthesizer level generator output for **+13.01 dBm**.

(21) Readjust amplitude **VERNIER** control to -5 dB meter indication.

(22) Set synthesizer level generator output for +3.01 dBm.

(23) Set **INPUT SENSITIVITY** control to **-10 dB**. TI meter indication will be between -4.7 and -5.3 dB.

(24) Set synthesizer level generator output and **INPUT SENSITIVITY** controls to settings listed in table 9. TI meter indication will be between -4.7 and -5.3 dB.

Table 9. Input Attenuator

Synthesizer level generator output			Test instrument **INPUT SENSITIVITY** settings
dBm	Volts		
-6.99	0.1	V	-20 dB
-16.99	31.6	mV	-30 dB
-26.99	10	mV	-40 dB
-36.99	3.16	mV	-50 dB
-46.99	1	mV	-60 dB
-56.99	0.316	mV	-70 dB

b. Adjustments. No adjustments can be made.

13. Frequency Response

a. Performance Check

(1) Set **INPUT SENSITIVITY** control to **0 dB** and **RESOLUTION BANDWIDTH** control to **3 Hz**.

(2) Connect function/arbitrary generator to TI **INPUT** using 50 Ω feedthrough termination.

(3) Set function/arbitrary generator output for **15 Hz** and **+ 13.01 dBm** (1 V rms).

(4) Adjust **FREQUENCY** control for indication on frequency display near 15 Hz and press **AFC** pushbutton.

(5) Press **SCALE LOG l0 dB** pushbutton and adjust amplitude **VERNIER** control for **-5 dB** (0 dB to -10 dB scale) TI meter indication.

(6) Release **AFC** pushbutton.

(7) Set function/arbitrary generator and TI to **50 Hz** and press **AFC** pushbutton. If TI meter indication is not between -4.6 and -5.4 dB, perform **b** below.

(8) Repeat technique of (5) and (6) above at 100 and 500 Hz, 1, 2, 5, 10, 20, 30, 40, and 50 kHz. If TI meter indication is not between -4.6 and -5.4 dB, perform **b** below.

(9) Set **AMPLITUDE REF LEVEL** control to **-40 dB** and **INPUT SENSITIVITY** control to **+30 dB**.

(10) Set function/arbitrary generator for **1 kHz** and **+ 3.01 dBm** output.

(11) Release **AFC** pushbutton.

(12) Adjust **FREQUENCY** control to **1000 Hz** and press **AFC** pushbutton.

(13) Adjust amplitude **VERNIER** control for **-5 dB** meter indication on TI.

(14) Set function/arbitrary generator frequency to **50 kHz**.

(15) Release **AFC** pushbutton.

(16) Adjust **FREQUENCY** control for indication on frequency display near 50,000 Hz and press **AFC** pushbutton. If TI meter indication is not between -4.6 and -5.4 dB, perform **b** below.

(17) Repeat technique of (10) through (16) above for each setting listed in table 10.

Table 10. Frequency Response

Test instrument	
AMPLITUDE REF LEVEL	**INPUT SENSITIVITY**
-30 dB	+20 dB
-20 dB	+10 dB
0 dB	-10 dB

b. Adjustments

(1) Position controls as listed in (a) through (e) below:

(a) **SCALE LOG l0dB** pushbutton pressed.
(b) **AFC** pushbutton released.
(c) **AMPLITUDE REF LEVEL** control to **-20 dB**.

(d) **INPUT SENSITIVITY** control to **+30 dB**.
(e) **MANUAL VERNIER** control to mid-range.

(2) Set function/arbitrary generator output for **1 kHz** and **+23.01 dBm**.

(3) Adjust **FREQUENCY** control to near 1000 Hz and press **AFC** pushbutton.

(4) Adjust amplitude **VERNIER** control for -5 dB meter indication.

(5) Set function/arbitrary generator frequency to **40 kHz**.

(6) Release **AFC** pushbutton, adjust **FREQUENCY** control for **40,000 Hz**, and press **AFC** pushbutton.

(7) Adjust A9C6 (fig. 1) for -5 dB meter indication on TI. (R)

(8) Set **AMPLITUDE REF LEVEL** control to **-10 dB** and **INPUT SENSITIVITY** control to **+20 dB**.

(9) Release **AFC** pushbutton and repeat technique of (2) through (6) above. Adjust A9C5 (fig. 1) for -5 dB meter indication on TI. (R)

(10) Set **AMPLITUDE REF LEVEL** control to **0 dB** and **INPUT SENSITIVITY** control to **+10 dB**.

(11) Release **AFC** pushbutton and repeat technique of (2) through (6) above. Adjust A9C4 (fig. 1) for -5 dB meter indication on TI. (R)

(12) Set function/arbitrary generator amplitude to +13.01 dBm.

(13) Set **AMPLITUDE REF LEVEL** and **INPUT SENSITIVITY** control to **0 dB**.

(14) Release **AFC** pushbutton and repeat (3) through (6) above. Adjust A9C3 (fig. 1) for -5 dB meter indication on TI. (R)

(15) Set function/arbitrary generator amplitude to **+ 3.01 dB**.

(16) Set **INPUT SENSITIVITY** control to **-10 dB**.

(17) Release **AFC** pushbutton and repeat (3) through (6) above. Adjust A9C2 (fig. 1) for -5 dB meter indication on TI. (R)

14. Power Supply

a. Performance Check

(1) Remove top outer cover from TI.

(2) Connect multimeter between A1TP1 (+10V) (fig. 1) and chassis ground. Multimeter will indicate between +9.95 and +10.05 V dc.

(3) Connect multimeter between A1TP2 (10 V) (fig. 1) and chassis ground. Multimeter will indicate between -9.95 and -10.05 V dc.

b. Adjustments. No adjustments can be made.

15. 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:

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

Official:

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

0728201

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342246, requirements for calibration procedure TB 9-6625-2143-24.

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
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.

PIN: 084379-000