TB 9-6625-2363-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR SIGNAL GENERATOR AGILENT, MODEL E4433B

Headquarters, Department of the Army, Washington, DC
5 July 2005

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, US Army Aviation and Missile Command, AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via e-mail, fax, or the World Wide Web. Our FAX number is: DSN 788-6546 or Commercial 256-842-6546. Our e-mail address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual. For the World Wide Web, use: https://amcom2028.redstone.army.mil.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Signal Generator, Agilent, Model E4433B. 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 4 hours, using the dc and low frequency and microwave technique.

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

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

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Frequency	Range: 250 kHz to 4 GHz Accuracy: ±0.1 PPM Line stability: ±0.1 PPM, +5%, –10% line change[1]
RF output	Range: 13 to –136 dBm[2] Accuracy: ±0.5 dB (250 kHz to 2 GHz) ±0.9 dB (2 GHz to 4 GHz)
Spectral purity	Harmonics range: Accuracy: 250 kHz to 4 GHz ≤+4 dBm, <-30 dBc Spurious signal range: Accuracy: 250 kHz to 4 GHz <–65 dBc
Pulse modulation	Pulse on/off ratio: Accuracy ≤ 3 GHz >80 dB > 3 GHz > 60 dB
Amplitude modulation	Frequency range: 250 kHz to 4 GHz Depth: 0 to 100% Accuracy: < ± (6% of setting + 1%) Distortion: < 1.5%, (30% depth, 1 kHz rate)
Frequency modulation	Frequency response: dc/20 Hz to 100 kHz Deviation Accuracy: < ± (3.5% of FM deviation + 20 Hz) Distortion: < 1%
Phase modulation	Deviation accuracy: < ± (5% of deviation + 0.01 radians) (1 kHz rate, normal BW mode) Distortion: < 1% (1 kHz rate, normal BW mode)

[1]Line stability verified to +5%, –8.7% line change.
[2]Range verified +7 dBm to –110 dBm.

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-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 is shown in parenthesis.

5. Accessories Required. The accessories required for the 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)
AUDIO ANALYZER	Distortion capability: $\leq$ .25% Range: 20 Hz to 10 kHz	Boonton, Model 1121 (1121)
AUTOTRANSFORMER	Range: 105 to 125 V ac Accuracy: $\pm$1%	Ridge, Model 9020A (9020A)
FREQUENCY COUNTER	Range: 0 Hz to 300 MHz Accuracy: + 0.025 ppm	Fluke, Model PM6681/ 656 (PM6681/656)
MEASURING RECEIVER	Power measurement: (+7 dB to -110 dB) ± 0.125 dB	Hewlett-Packard, Model 8902A w/sensors, Hewlett-Packard, Model 11722A (11722A) and 11792A (11792A), and microwave converter, model 11793A (11793A), and signal generator, Anritsu, Model 68369NV (68369NV)
MICROWAVE FREQUENCY COUNTER	Range: 300 MHz to 4 GHz Accuracy: ± 0.025 ppm	Hewlett-Packard, Model 5352B-001 (5352B-001)
PULSE GENERATOR	Amplitude: 5 V Period: 10 ms to 20 µs Width: 5 ms to 6 µs	LeCroy, Model 9210 (9210) w/plug-ins, LeCroy Models 9211 (9211) and 9215 (9215) (MIS-45839)
SPECTRUM ANALYZER	Range: 250 kHz to 4 GHz (13 to -80 dB) Accuracy: $\pm$1.0 dB/10 dB step, 1.0 dB maximum	(AN/USM-677)
TIME/FREQUENCY WORKSTATION	Range: 1 MHz Accuracy: 5 parts in 10^9	Datum , Model ET6000-75 (13589305)

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.

NOTE

Before connecting TI, the protective earth terminal of the instrument must be connected to the protective conductor of the line power cord. The line plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding). Grounding of a one conductor to a two conductor outlet is not sufficient protection.

NOTE

When indications specified in this procedure are not within tolerance, perform the power supply check prior to making adjustments.

NOTE

Throughout this procedure soft keys are identified by the use of brackets **[ ]** around the key.

a. Connect TI to autotransformer.

b. Connect autotransformer to a 115 V ac source and adjust autotransformer to 115 V ac.

c. Press TI ⏻ pushbutton to on and allow at least 45 minutes for TI to stabilize.

d. Connect equipment as shown in figure 1.

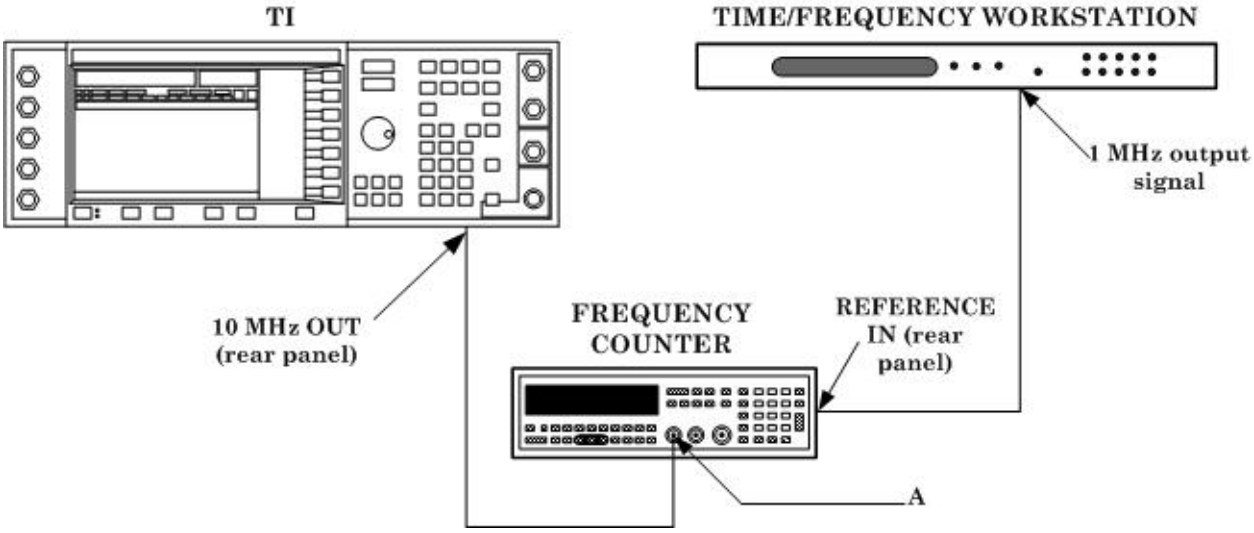

Figure 1. Internal oscillator equipment setup.

e. Set frequency counter controls to measure frequency with 50 Ω input.

f. On TI press **Preset**, **Utility**, **[Instrument Adjustments]**, **[Reference Oscillator Adjustment]**, **[Ref Osc Fine]**.

g. Set the fine tuning DAC for 128.

h. Press TI **[Ref Osc Course]** and adjust course tuning DAC for a counter display as close as possible 10 MHz.

i. Press TI **[Ref Osc Fine]** and adjust fine tuning DAC for a counter display of 10 MHz ± 0.1 Hz.

j. Press TI **[Store Ref Osc Setting]**, **[Confirm Store]**.

k. Disconnect equipment setup.

8. Line Stability

a. Performance Check

(1) Connect frequency counter input **A** to TI **RF OUTPUT 50 Ω**.

(2) Set frequency counter controls to measure frequency with 50 Ω input.

(3) Press TI pushbuttons as listed in (a) through (d) below:

(a) **Preset**.
(b) **Frequency**, **1**, **0**, **0**, **[MHz]**.
(c) **Amplitude**, **0**, **[dBm]**.
(d) **RF On/Off** to on.

(4) Record frequency counter indication.

(5) Vary autotransformer to 120 V ac. Frequency counter will indicate within ±0.2 Hz of recorded value in (4) above.

(6) Vary autotransformer to 105 V ac. Frequency counter will indicate within ±0.2 Hz of recorded value in (4) above.

(7) Adjust autotransformer to 115 V ac.

(8) Reduce outputs to minimum and disconnect equipment setup.

b. Adjustments. No adjustments can be made.

9. Frequency Accuracy

a. Performance Check

(1) Connect equipment as shown in figure 2.

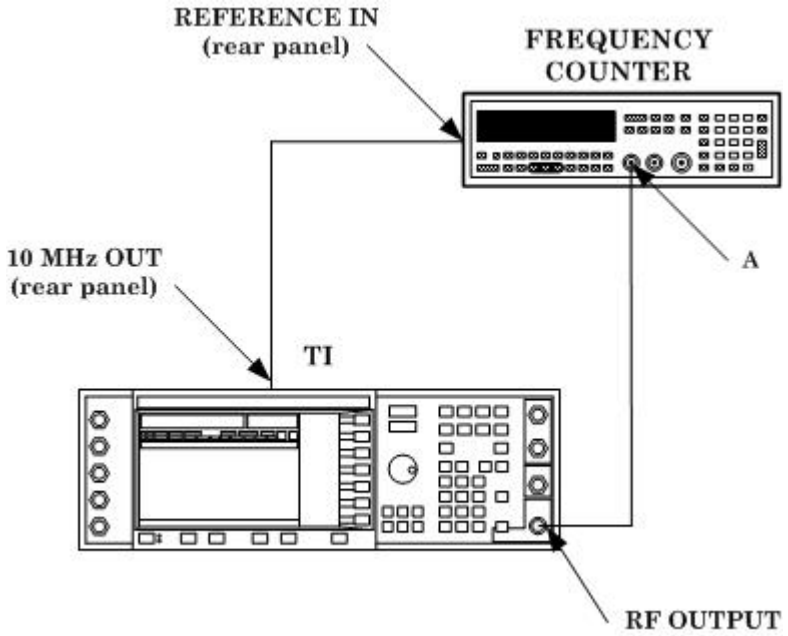

Figure 2. Frequency accuracy equipment setup.

(2) Set frequency counter controls to measure frequency with 50 Ω input.

(3) Press TI pushbuttons as listed in (a) through (d) below:

(a) **Preset**.
(b) **Frequency**, **2**, **5**, **0**, **[kHz]**.
(c) **Amplitude**, **0**, **[dBm]**.
(d) **RF On/Off** to on.

(4) Frequency counter will indicate within limits specified in first row of table 3.

(5) Repeat technique of (3) (b) above for remaining frequencies listed in table 3. Frequency counter will indicate within limits specified in table 3.

Table 3. Frequency Accuracy

Test instrument **Frequency**		Frequency counter indications	
		Min	Max
250	kHz	249.999975 kHz	250.000025 kHz
500	kHz	499.99995 kHz	500.00005 kHz
1	MHz	.9999999 MHz	1.0000001 MHz
5	MHz	4.999995 MHz	5.0000005 MHz
10	MHz	9.999999 MHz	10.000001 MHz
50	MHz	49.999995 MHz	50.000005 MHz
100	MHz	99.99999 MHz	100.00001 MHz
500[1]	MHz	499.99995 MHz	500.00005 MHz
1	GHz	.9999999 GHz	1.0000001 GHz
2	GHz	1.9999998 GHz	2.0000002 GHz
3	GHz	2.9999997 GHz	3.0000003 GHz
4	GHz	3.9999996 GHz	4.0000004 GHz

[1]Replace frequency counter with microwave frequency counter.

(6) Reduce outputs to minimum and disconnect equipment setup.

b. Adjustments. No adjustments can be made.

10. RF Output

a. Performance Check

NOTE

If necessary, perform measuring receiver and sensor module (11792A) ZERO and CALIBRATE.

(1) Set measuring receiver as listed in (a) through (d) below:

(a) Press **INSTR PRESET** pushbutton.
(b) Press **RF POWER** pushbutton.
(c) Press **LOG/LIN** to **LOG** (dBm) pushbutton.
(d) Enter **32.0 SPCL** (0.01 dB resolution).

(2) Connect sensor module (11722A) to TI **RF OUTPUT** and TI **10 MHz OUT** (rear panel) to measuring receiver **TIME BASE 10 MHz INPUT** (rear panel).

(3) Press TI pushbuttons as listed in (a) through (d) below:

(a) **Preset**.
(b) **Frequency**, **1**, **0**, **0**, **[MHz]**.
(c) **Amplitude**, **7**, **[dBm]**.
(d) **RF On/Off** to on.

(4) Using measuring receiver and RF power measurement techniques, measuring receiver will indicate within limits specified in first row of table 4.

(5) Repeat technique of (3) (c) above, using the amplitude level and indications listed in table 4. TI will indicate within limits specified in table 4.

Table 4. 100 MHz RF Output

Test instrument **Amplitude** level	Measuring receiver indications (dB)	
	Min	Max
7 dBm	6.5	7.5
5 dBm	4.5	5.5
0 dBm[1]	–0.5	0.5
-10 dBm	-10.5	-9.5
-20 dBm	-20.5	-19.5
-30 dBm	-30.5	-29.5
-40 dBm	-40.5	-39.5
-50 dBm	-50.5	-49.5
-60 dBm	-60.5	-59.5
-70 dBm	-70.5	-69.5
-80 dBm	-80.5	-79.5
-90 dBm	-90.5	-89.5
-100 dBm	-100.5	-99.5
-110 dBm	-110.5	-109.5

[1]Setup measuring receiver for tuned RF level cal techniques and calibrate. Recal as necessary.

(6) Set TI **RF OUTPUT** to off and disconnect sensor module (11722A). On measuring receiver exchange sensor module (11792A) for (11722A) and connect sensor module (11792A) to TI **RF OUTPUT**.

(7) Press TI pushbuttons as listed in (a) through (d) below:

(a) **Preset**.
(b) **Frequency**, **3**, **[GHz]**.
(c) **Amplitude**, **7**, **[dBm]**.
(d) **RF On/Off** to on.

(8) Using measuring receiver and RF power measurement techniques, measuring receiver will indicate within limits specified in first row of table 5.

(9) Repeat technique of (7) (c) above, using the amplitude level and indications listed in table 5. TI will indicate within limits specified in table 5.

(10) Reduce all outputs to minimum and disconnect equipment setup.

b. Adjustments. No adjustments can be made.

Table 5. 3 GHz RF Output

Test instrument **Amplitude** level	Measuring receiver indications (dB)	
	Min	Max
7 dBm	6.1	7.9
5 dBm	4.1	5.9
0 dBm[1]	-0.9	0.9
-10 dBm	-10.9	-9.1
-20 dBm	-20.9	-19.1
-30 dBm	-30.9	-29.1
-40 dBm	-40.9	-39.1
-50 dBm	-50.9	-49.1
-60 dBm	-60.9	-59.1
-70 dBm	-70.9	-69.1
-80 dBm	-80.9	-79.1
-90 dBm	-90.9	-89.1
-100 dBm	-100.9	-99.1
-110 dBm	-110.9	-109.1

[1]Setup measuring receiver for tuned RF level cal techniques and calibrate. Recal as necessary.

11. Spectral Purity

a. Performance Check

(1) Connect spectrum analyzer **INPUT 50 Ω** to TI **RF OUTPUT**.

(2) Connect TI **10 MHz OUT** (rear panel) to spectrum analyzer **10 MHz REF IN** (rear panel).

(3) Press TI pushbuttons as listed in (a) through (d) below:

(a) **Preset**
(b) **Frequency**, **2**, **5**, **0**, **[kHz]**.
(c) **Amplitude**, **4**, **[dBm]**.
(d) **RF On/Off** to on.

(4) Set spectrum analyzer controls as listed in (a) through (g) below:

(a) **Preset**.
(b) **AMPLITUDE**, **[Ref Level]**, **4**, **[dBm]**.
(c) **FREQUENCY**, **[Center Freq]**, **2**, **5**, **0**, **[kHz]**.
(d) **BW/Avg**, **[Res BW]**, **1**, **0**, **[kHz]**.
(e) **[Video BW]**, (Auto).
(f) **SPAN**, **1**, **[MHz]**.
(g) **Marker**, **[Off]**.

(5) Allow display to sweep a few times then set spectrum analyzer controls as listed in (a) through (d).

(a) **Peak Search**.
(b) **Marker→**, **[Mkr→CF]**.
(c) **Marker**, **[Delta]**.
(d) **FREQUENCY**, **[Center Freq]**, (harmonic frequency listed in table 6) **[MHz]**.

(6) Spectrum analyzer **Mkr1** will indicate less than dBc limit listed in first row of table 6.

(7) Set TI frequency and spectrum analyzer center frequency to next frequency listed in table 6 and repeat (4) (g) through (6) above.

(8) Repeat (7) above for remaining frequencies listed in table 6. Spectrum analyzer **Mkr1** will indicate less than dBc limit listed in table 6.

Table 6. Harmonics

Test instrument		Spectrum analyzer		
DATA ENTRY level (dBm)	**DATA ENTRY** frequency (MHz)	Harmonic frequency (MHz)	Harmonic number	dBc
4	.250	.500	2[d]	<-30
4	.250	.750	3[d]	<-30
4	.500	1.00	2[d]	<-30
4	.500	1.50	3[d]	<-30
4	1	2	2[d]	<-30
4	1	3	3[d]	<-30
4	166.666665	333.333330	2[d]	<-30
4	166.666665	499.999995	3[d]	<-30
4	250	500	2[d]	<-30
4	333.333335	666.666670	2[d]	<-30
4	333.333335	1000.000005	3[d]	<-30
4	500	1000	2[d]	<-30
4	2000	1000	.5	<-30
4	2000	4000	2[d]	<-30
4	3000	1500	.5	<-30
4	3000	6000	2[d]	<-30
4	4000	2000	.5	<-30
4	4000	8000	2[d]	<-30

(9) Press TI pushbuttons as listed in (a) through (d) below:

(a) **Preset**.
(b) **Frequency**, **1**, **[MHz]**.
(c) **Amplitude**, **4**, **[dBm]**.
(d) **RF On/Off** to on.

(10) Using spectrum analyzer, verify that all non-harmonic spurious signals are less than dBc limit listed in first row of table 7.

(11) Repeat (9) (b) and (10) for remaining frequencies listed in table 7.

Table 7. Spurious Signals

Test instrument		Spectrum analyzer
Amplitude (dBm)	**Frequency** (MHz)	Spurious signal level
4	1 MHz	<-65 dBc
4	5 MHz	<-65 dBc
4	10 MHz	<-65 dBc
4	50 MHz	<-65 dBc
4	100 MHz	<-65 dBc
4	200 MHz	<-65 dBc
4	500 MHz	<-65 dBc

(12) Reduce all outputs to minimum and disconnect equipment setup.

b. Adjustments. No adjustments can be made.

12. Pulse Modulation

a. Performance Check

(1) Connect equipment as shown in figure 3.

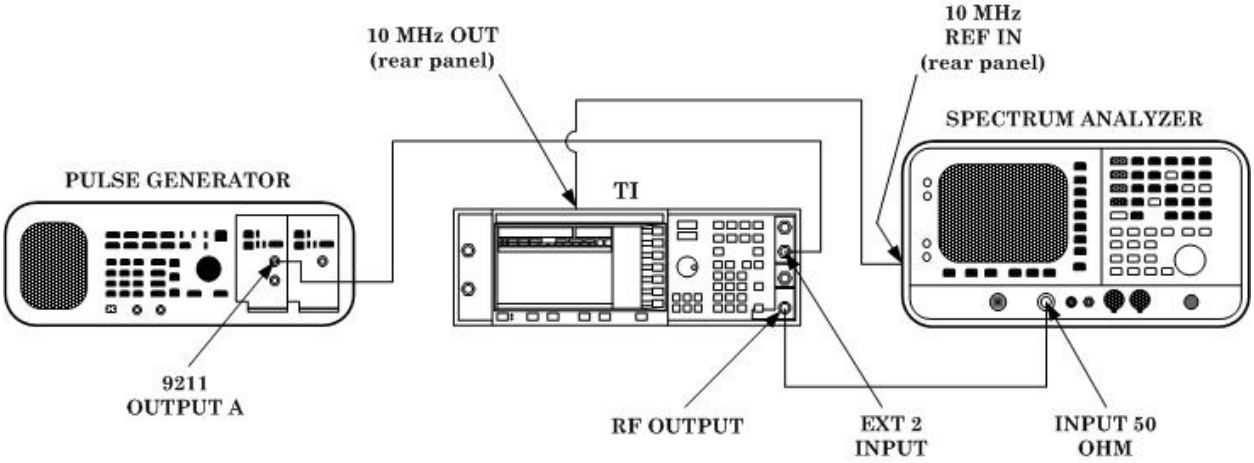

Figure 3. Pulse modulation on/off ratio equipment setup.

(2) Press pulse generator pushbuttons for a pulse output as listed in (a) through (h) below:

(a) **CHANNEL A**.
(b) **Period** and enter **10m/kHz** from data keyboard.
(c) **Width** and enter **5 m/kHz** from data keyboard.
(d) **Vhigh** and select **5**, **Enter/Hz** from data keyboard.
(e) **Vlow** and select **0**, **Enter/Hz** from data keyboard.
(f) **Delay** and select **0**, **n/GHz** from data keyboard.
(g) **2 Pulse** and press **Enter/Hz** from data keyboard to ensure an **OFF** indication.
(h) On 9211 output module, disable (red light extinguished).

(3) Press TI pushbuttons as listed in (a) through (f) below:

(a) **Preset**.
(b) **Frequency**, **1**, **[GHz]**.
(c) **Amplitude**, **1**, **0**, **[dBm]**.
(d) **MENUS Pulse**, **[Pulse Source]**, **[EXT2 DC-Coupled]**.
(e) **[Pulse Off On]** to On.
(f) **RF On/Off** to RF on.

(4) Press spectrum analyzer pushbuttons as listed in (a) through (d) below:

(a) **Preset**.
(b) **AMPLITUDE**, **[Ref Level]**, **1, 0, [dBm]**.
(c) **FREQUENCY**, **[Center Freq]**, **1**, **[GHz]**.
(d) **SPAN**, **1**, **.**, **5**, **[MHz]**.

(5) Press spectrum analyzer pushbuttons as listed in (a) through (j) below:

(a) **BW Avg**, **[Res BW]**, **1**, **0**, **0**, **[kHz]**.
(b) **[Video BW]**, **1**, **[kHz]**.
(c) **MARKER**.
(d) **SPAN**, **0**, **[Hz]**.
(e) **Sweep**, **[Sweep Time]**, **3**, **0**, **[ms]**.
(f) **Trig**, **[Video]**, **1**, **0**, **[-dBm]**.
(g) **Marker**.
(h) Using rotary knob, adjust marker to top of square wave.
(i) **Marker**, **[Delta]**.
(j) Using rotary knob, adjust delta marker to bottom of square wave.

(6) Using spectrum analyzer, measure top to bottom of square wave in dB. Pulse on/off ratio will indicate within limits specified in table 8.

Table 8. Pulse Modulation @ 1 GHz

Spectrum analyzer >dB
80

(7) Set TI frequency and spectrum analyzer center frequency to 3.5 GHz.

(8) Repeat technique of (5) (g) through (6) above. Pulse on/off ratio will indicate within limits specified in table 9.

Table 9. Pulse Modulation @ 3.5 GHz

Spectrum analyzer >dB
60

(9) Reduce all outputs to minimum and disconnect equipment setup.

b. Adjustments. No adjustments can be made.

13. Amplitude Modulation

a. Performance Check

(1) Connect equipment as shown in figure 4.

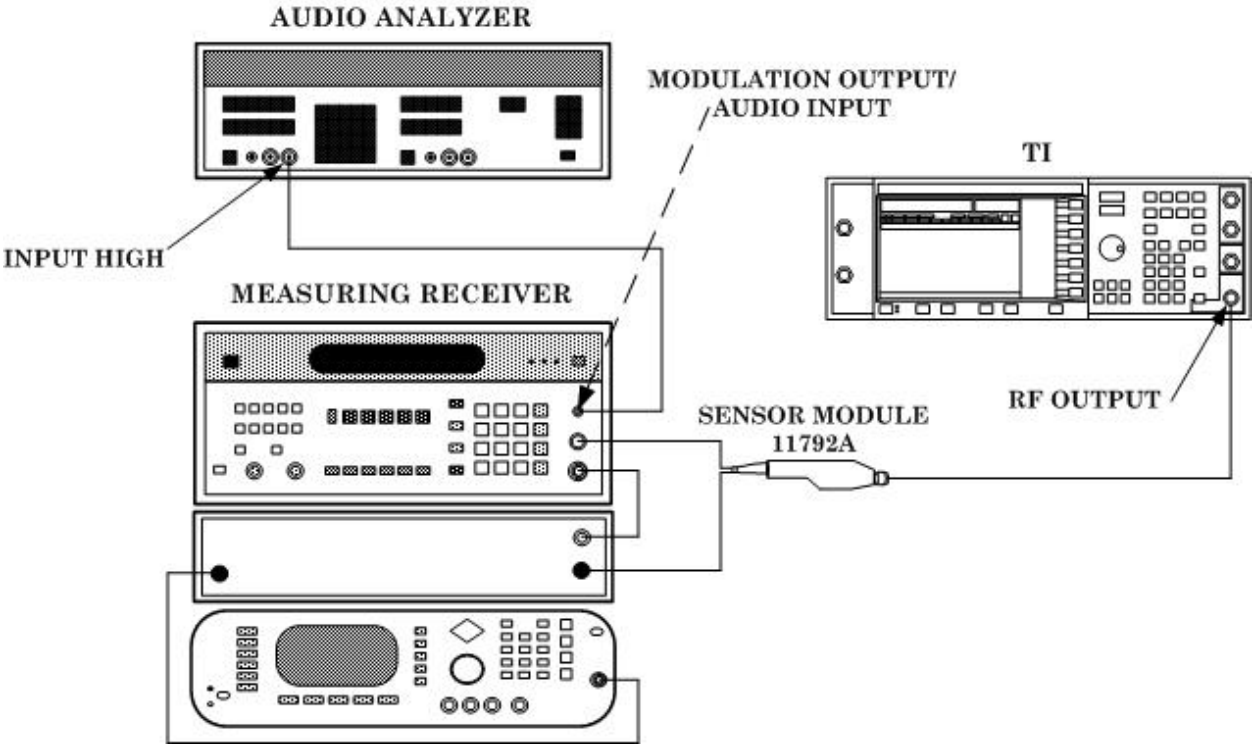

Figure 4. AM equipment setup.

(2) Press TI pushbuttons as listed in (a) through (g) below:

(a) **Preset**.
(b) **Frequency**, **1**, **[GHz]**.
(c) **Amplitude**, **0**, **[dBm]**.
(d) **MENUS AM**, **[AM Depth]**, **3**, **0**, **[%]**.
(e) **[AM Rate]**, **1**, **0**, **[kHz]**.
(f) **[AM Off/On]** to on.
(g) **RF On/Off** to on.

(3) Set measuring receiver to measure AM with 15 kHz low-pass filter and a 300 Hz high-pass filter.

(4) Using measuring receiver, measure AM percent of modulation. Measuring receiver will indicate within limits specified in first row of table 10.

(5) Repeat technique of (2) (d) and (4) above using the AM Depth and measuring receiver indications listed in table 10. TI will indicate within limits specified in table 10.

Table10. Internal AM Modulation Accuracy

Test instrument **AM Depth** (%)	Measuring receiver modulation indications (%)	
	Min	Max
30%	27.2	32.8
60%	55.4	64.6
90%	83.6	96.4

(6) Press TI **[AM Depth]**, **3**, **0**, **[%]**. Using audio analyzer, measure AM distortion. Audio analyzer will indicate within limit specified in table 11.

Table 11. Internal AM Modulation Distortion

Test instrument **AM Depth**	Audio analyzer distortion indications (<%)
30%	1.5

(7) Reduce all outputs to minimum.

b. Adjustments. No adjustments can be made.

14. Frequency Modulation

a. Performance Check

(1) Press TI pushbuttons as listed in (a) through (g) below:

(a) **Preset**.
(b) **Frequency**, **2**, **5**, **0**, **[MHz]**.
(c) **Amplitude**, **0**, **[dBm]**.
(d) **MENUS FM/ΦM**, **[FM Rate]**, **1**, **[kHz]**.
(e) **[FM Dev]**, **5**, **0**, **[kHz]**.
(f) **[FM Off On]** to FM on.
(g) **RF On/Off** to RF on.

(2) Set up measuring receiver to measure FM with a + PEAK detector, no high-pass filter and no low-pass filter.

(3) Set up audio analyzer to measure distortion with a slow detecting noise rejecting filter.

(4) Audio analyzer will indicate within limits specified in table 12.

Table 12. FM Audio Distortion

Audio analyzer distortion indication (%)
< 1%

(5) Press TI **Frequency**, **[FM Rate]**, and **[FM Dev]** keys for values listed in table 13. Using measuring receiver, measure FM deviation. Measuring receiver will indicate within limits specified in table 13.

Table 13. FM Deviation

Test instrument			Measuring receiver indication limits (kHz)	
Frequency (MHz)	**FM Rate** (kHz)	**FM Dev** (kHz)	Min	Max
2500	1	300	289.48	310.52
1500	1	100	96.48	103.52
500	1	50	48.23	51.77
250	1	25	24.105	25.895
100	1	50	48.23	51.77

(6) Reduce all outputs to minimum.

b. Adjustments. No adjustments can be made.

15. Phase Modulation

a. Performance Check

(1) Press TI pushbuttons as listed in (a) through (g) below:

(a) **Preset**.
(b) **Frequency**, **1**, **0**, **[MHz]**.
(c) **Amplitude**, **1**, **0**, **[dBm]**.
(d) **FM/ΦM**, **[FM/ΦM]**, (highlight **[ΦM]**), **[ΦM Rate]**, **1**, **[kHz]**.
(e) **[ΦM Dev]**, **9**, **0**, **[rad]**.
(f) **[ΦM Off On]** to on.
(g) **RF On/Off** to RF on.

(2) Set measuring receiver to measure PM with a + PEAK detector, 15 kHz low-pass filter and a 300 Hz high-pass filter.

(3) Using measuring receiver, measure phase modulation. Measuring receiver phase modulation indication will be within limits specified in first row of table 14.

(4) Repeat technique of (1) (b) and (e) above using the TI frequency and ΦM dev settings and measuring receiver indications listed in table 14. TI will indicate within limits specified in table 14.

Table 14. PM accuracy

Test instrument **Frequency**	Test instrument **ΦM Dev**	Measuring receiver phase modulation indications (rad)	
		Min	Max
10 MHz	90 rad	85.49	94.51
500 MHz	45 rad	42.74	47.26
1 GHz	90 rad	85.49	94.51
2 GHz	180 rad	170.99	189.01
4 GHz	360 rad	341.99	378.01

(5) Press TI pushbuttons as listed in (a) through (g) below:

(a) **Preset**.

(b) **Frequency**, **1**, **0**, **[MHz]**.
(c) **Amplitude**, **1**, **0**, **[dBm]**.
(d) **FM/ΦM**, **[FM/ΦM]**, **[ΦM]**, **[ΦM Rate]**, **1**, **[kHz]**.
(e) **[ΦM Dev]**, **9**, **0**, **[rad]**.
(f) **[ΦM], [ΦM Off On]** to on.
(g) **RF On/Off** to RF on.

(6) Using audio analyzer, measure the audio distortion. Distortion will indicate within limits specified in first row of table 15.

(7) Repeat technique of (5) (b) and (e) above using the TI frequency and ΦM dev settings and audio analyzer indications listed in table 15. TI will indicate within limits specified in table 15.

Table 15. Audio Distortion at 1 kHz Modulation Frequency

Test instrument **DATA** carrier frequency	Test instrument **DATA** phase modulation	Audio analyzer distortion indications (< %)
10 MHz	90 rad	1
500 MHz	45 rad	1
1 GHz	90 rad	1
2 GHz	180 rad	1
4 GHz	360 rad	1

(8) Reduce all outputs to minimum.

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

16. 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:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army

0512905

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 344814, requirements for calibration procedure TB 9-6625-2363-35.

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.