TB 9-6625-2210-35

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR TRANSMISSION TEST SET AN/USM-608

Headquarters, Department of the Army, Washington, DC
5 April 2004

TB 9-6625-2210-35, 1 March 2004, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages	Insert pages
5 and 6	5 and 6
7 and 8	7 and 8

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

Official:

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General, United States Army
Chief of Staff

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Administrative Assistant to the Secretary of the Army

0403503

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1 March 2004

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.

			Paragraph	Page
SECTION	I.	IDENTIFICATION AND DESCRIPTION		
		Test instrument identification	1	2
		Forms, records, and reports	2	2
		Calibration description	3	2
	II.	EQUIPMENT REQUIREMENTS		
		Equipment required	4	3
		Accessories required	5	3
	III.	CALIBRATION PROCESS FOR TRANSMISSION TEST SET AN/USM-608		
		Preliminary instructions	6	4
		Equipment setup	7	4
		DSP board	8	5
		Self test	9	7
		Receiver	10	7
		Transmitter output level, frequency and flatness	11	8
		Distortion	12	10
		Final procedure	13	10

*This technical bulletin supersedes TB 9-6625-2210-35, dated 24 Dec 2003.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Transmission Test Set, AN/USM-608. TM 11-6625-3187-10 and TM 11-6625-3187-24 were used as the prime data sources in compiling these instructions. The equipment being calibrated will be referred to as the TI (test instrument) throughout this bulletin.

a. Model Variations. None.

b. Time and Technique. The time required for this calibration is approximately 4 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 adjustment. Report only those adjustments made and designated with (R).

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

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Receiver:	
Frequency	Range: 20 Hz to 110 kHz Accuracy: ±l Hz, 20 Hz to 100 kHz ±5 Hz, 100 to 110 kHz
Level	Range: -40 to 10 dBm Accuracy: ±0.5 dBm, 20 to 200 Hz ±0.2 dBm, 200 Hz to 15 kHz ±0.5 dBm, 15 to 110 kHz ±0.l dBm, 100 kHz, -19 to 0 dBm
Transmitter:	
Frequency	Range: 20 Hz to 110 kHz Accuracy: ±l Hz, 20 to 9999 Hz ±10 Hz, 10 to 110 kHz ±0.05 Hz, 1004 Hz
Level	Range: -40 to 10 dBm Flatness: ±0.5 dB, 20 to 200 Hz ±0.2 dB, 200 Hz to 15 kHz ±0.3 dB, 15 to 110 kHz ±0.l dB, 1004 Hz
Distortion	Less than -50 dBm at 1004 Hz, 0 dBm reference

See footnote at end of table.

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications
Filters:[1] C-message 3 kHz flat 15 kHz flat Program 50 kbit 1010 Hz notch	Range: As per Bell Pub 41009 Accuracy: As per Bell Pub 41009
Noise:[1]	Range: 0 to 90 dBm Accuracy: ± 1 dB
P/AR:[1]	Range: 0 to 120 units Accuracy: ± 4, 0 to 30 units ± 2, 30 to 110 units ± 4, 110 to 120 units

[1]Parameters are set and checked by software on alignment diskette.

SECTION II
EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment to be used in this calibration procedure. This equipment is issued with Secondary Transfer Calibration Standards Set AN/GSM-286, AN/GSM-287, or AN/GSM-705. Alternate items may be used by the calibrating activity. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and TI. Where the four-to-one ratio cannot be met, the actual accuracy of the equipment is shown in parenthesis.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
AUDIO ANALYZER	Range: 0 to -50 dB Accuracy: ± 3%	Boonton, Model 1121 (1121)
CALIBRATOR	Range: 20 Hz to 110 kHz 7 mV to 8 V Accuracy: ± 0.28%	Fluke, Model 5720A (5700A/EP) (p/o MIS-35947)
FREQUENCY COUNTER	Range: 20 Hz to 85 kHz Accuracy: ± 0.01%	Fluke PM6681/656 (PM6681/656)
MULTIMETER	Range: 7 mV to 4 V ac 0.3 to 28 mV dc Accuracy: ± 0.28% 1004 Hz ± 0.8% 110 kHz	Hewlett-Packard, Model 3458A (3458A)

5. Accessories Required. The accessories required for this calibration are common usage accessories, issued as indicated in paragraph **4** above, and are not listed in this calibration procedure. The following peculiar accessories are also required for this calibration: DSP CALIBRATION DISKETTE REV 9.9 (40244/03 000035).

SECTION III
CALIBRATION PROCESS FOR
TRANSMISSION TEST SET AN/USM-608

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 TM 11-6625-3187-10 and TM 11-6625-3187-24.

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

7. Equipment Setup

WARNING

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

a. Remove TI upper protective cover.

b. Connect TI to 115 V ac source and switch power on.

c. When main menu appears, select **F2: TIMS/RL**.

d. Select **B: LEVEL/FREQ/ENV DELAY** from **TRANSMISSION MEASUREMENT** menu, and set parameters as listed in (1) through (7) below:

(1) **4 Wire/2 Wire** to **4 Wire**.

(2) **RECEIVE IMPEDANCE** to **600 OHMS**.

(3) **RECEIVE TERMINATED/BRIDGED** to **TERMINATED**.

(4) **RECEIVE TLP/ABS** to **ABSOLUTE**.

(5) **TRANSMIT IMPEDANCE** to **600 OHMS**.

(6) **TRANSMIT TERMINATED/BRIDGED** to **TERMINATED**.

(7) **TRANSMIT TLP/ABS** to **ABSOLUTE**.

e. Press **Pg Dn** key and set parameters as listed in (1) through (10) below:

(1) **SF SKIP** to **ON**.

(2) **INCR RATE** to **3.0**.

(3) **SWEEP** to **OFF**.

(4) **LO FREQ** (Band g (4) below must be **VOICE**) to **20 Hz**.

(5) **HI FREQ** to **200 Hz**.

(6) **FREQ INCR** to **10 Hz**.

(7) **Y-LO** to **-01.0**.

(8) **Y-HI** to **+01.0**.

(9) **LIMITS** to **C4**.

(10) **PLOT** to **OFF**.

f. Press **Pg Dn** key and set parameters as listed in (1) through (4) below:

(1) **TRANSMIT LEVEL** to **00.0 dBm**.

(2) **TRANSMIT FREQ** to **1000 Hz**.

(3) **60 Hz FILTER** to **OUT**.

(4) **BAND** to **VOICE**.

g. Allow 5 minutes for warm-up before beginning test.

8. DSP Board

a. Performance Check

(1) Remove disk drive cover by removing two screws, top half of cover, turning lever to vertical, and pulling remainder of cover directly forward.

(2) Insert calibration disk into slot with label to left and return lever to horizontal position.

(3) Press the following keys:

(a) **HOME**.

(b) **HOME**.

(c) **F10**.

(d) **A**.

(e) **:**.

(f) **RETURN**.

(4) Use type 310 phone plug and cable to connect XMT 2W/4W connector to multimeter.

(5) Type **DSPCAL,** press **RETURN** key, and follow instructions as printed on TI screen.

NOTE

EEPROM is write enabled by changing the settings of switch 1 **(S1)** and switch 2 **(S2)** (fig. 1). This is performed in the following manner:

1. Set **S2** (nearest rear) to **ON** (up).

2. Set **S1** (nearest front) to **OFF** (down)**.**

WARNING

Never allow both **S1** and **S2** to be **OFF** (down) at the same time. Having both **OFF** will damage **DSP** board.

(6) The test set will display the following**:**

"Writing calibration data to EEPROM. Calibration sequences completed. Please write protect EEPROM. Dump calibration data? (y/n):"

NOTE

When instructed to write protect, do so by first setting **S1** to **ON** (up), and then setting **S2** to **OFF** (down). See **WARNING** above.

(7) Type the following: **N**

The test set will display the following: **A:\>**

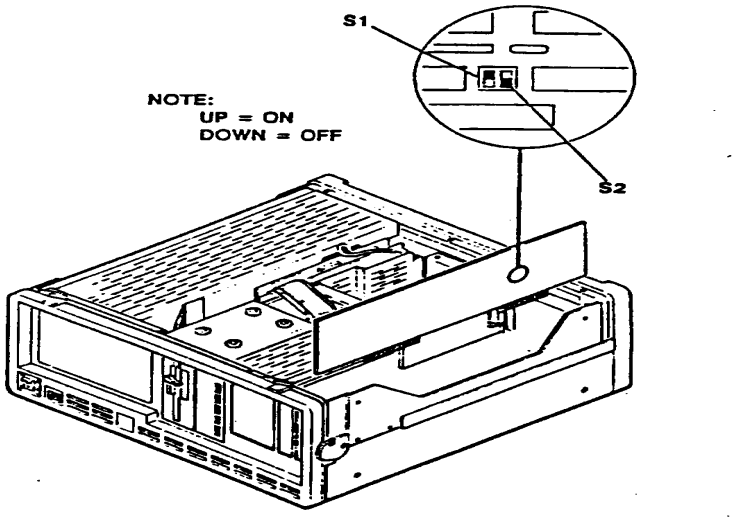

Figure 1. Adjustment locations.

(8) Type **WBEDDCAL**, press return key, and follow instructions on TI screen.

(9) The test set will display the following**:**

"Writing calibration data to EEPROM. Calibration sequences completed. Please write protect EEPROM. Dump calibration data? (y/n):"

(a) Type the following: **N**

(b) The test set will display the following: **A:\>**

(10) Remove calibration disk and replace in protective jacket.

(11) Switch power off. Replace cover and disk drive cover.

b. Adjustments. No further adjustments can be made.

9. Self Test

a. Performance Check

(1) Switch TI power on and wait for main menu to appear on screen.

(2) Connect TI **RCV** to **XMT 2W/4W** using type 310 phone plug and cable.

(3) Select **F2: TIME/RL** from main menu and **H: SELF TEST** from **TRANSMISSION MEASUREMENT FUNCTIONS** menu.

(4) Select **A: P/AR** from **SELF TEST** menu and press **Run/Halt** key when **P/AR SELF TEST** menu appears.

(5) After **PASS** appears in both right hand boxes, press **Run/Halt** then **Home** keys.

(6) Select **B**: **ENVELOPE DELAY** and press **Run/Halt** key when **ENVELOPE DELAY SELF TEST** screen appears.

(7) After **PASS** appears in three boxes on right of screen, press **Run/Halt** then **Home** keys.

(8) Select **C: INTERMODULATION DISTORTION** and press **Run/Halt** key when **INTERMODULATION SELF TEST** screen appears.

(9) After **PASS** appears in the three boxes on right of screen, press **Run/Halt** then **F1** keys.

(10) Disconnect cable from TI.

b. Adjustments. No adjustments can be made.

10. Receiver

a. Performance Check

(1) Connect calibrator to TI **RCV** connector using a 310 phone plug and cable.

(2) Select **F2: TIMS/RL** from main menu and **B: LEVEL/FREQ/ENV DELAY** from **TRANSMISSION MEASUREMENT FUNCTIONS** menu.

(3) Press **Pg Dn** key two times and adjust calibrator for **2.313 V** and **1000 Hz**.

(4) Press **Run/Halt** key. TI will display **9.4** to **9.6 dBm** and **999** to **1001 Hz**.

(5) Vary calibrator frequency from 20 to 200 Hz. TI will display **9.0** to **10.0 dBm**.

(6) Vary calibrator frequency from 200 to 4000 Hz. TI will display **9.3** to **9.7 dBm**.

(7) Press **Run/Halt** key and change **BAND** to **WIDE.**

(8) Press **Run/Halt** key and vary calibrator frequency from 4000 to 15,000 Hz. TI will display **9.3** to **9.7 dBm**.

(9) Vary calibrator frequency from 15,000 to 110,000 Hz. TI will display **9.0** to **10.0 dBm.**

(10) Press **Run/Halt** once, then **Pg Dn** twice, change **Receive Terminated/Bridge** to **Bridge.**

(11) Press **Pg Dn** twice then **Run/Halt** once.

(12) Adjust calibrator for **8.204 mV**.

(13) Vary calibrator from 15,000 to 110,000 Hz. TI will display **-39.0** to **-40.0 dBm.**

(14) Vary calibrator frequency from 4000 to 15,000 Hz. TI will display **-39.3** to **-39.7 dBm.**

(15) Press **Run/Halt** key, change **BAND** to **VOICE,** and press **Run/Halt** key.

(16) Vary calibrator frequency from 200 to 4000 Hz. TI will display from **-39.3** to -**39.7 dBm**.

(17) Vary calibrator frequency from 20 to 200 Hz. TI will display from **-39.0** to **-40.0 dBm.**

(18) Adjust calibrator for **1004 Hz**. TI will display **-39.4** to -**39.6 dBm.**

b. Adjustments. No adjustments can be made.

11. Transmitter Output Level, Frequency, and Flatness

a. Performance Check

(1) Connect equipment with a 600 Ω termination to output of TI as shown in figure 2.

(2) Press **Run/Halt** and **Pg Up** keys to view **SWEEP CONTROL** menu.

(3) Change **SWEEP** to **CONT** and press **Pg Dn** key.

(4) Press **Run/Halt** key. As TI sweeps from 20 to 200 Hz, multimeter display will remain between **0.73127** and **0.82049 V ac**.

(5) Press **Run/Halt** and **Pg Up** keys to view **SWEEP CONTROL** menu.

(6) Change **LO FREQ** to **199 Hz**, **HI FREQ** to **4000 Hz**, and **FREQ INCR** to **50 Hz**.

(7) Press **Pg Dn** and **Run/Halt** keys. As TI sweeps from **199** to **4000 Hz**, multimeter display will remain between **0.75697** and **0.79264 V ac**.

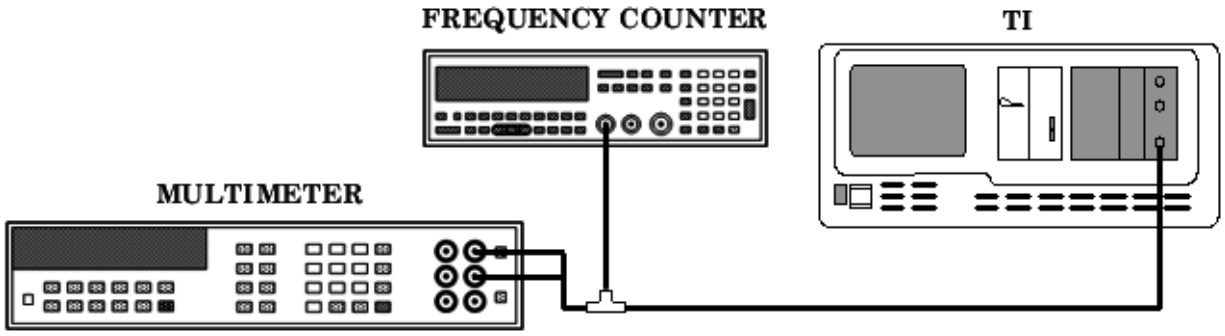

Figure 2. Transmitter flatness accuracy - equipment setup.

(8) Press **Run/Halt** key and change **BAND** to **WIDE**. Press **Pg Up** key to view **SWEEP CONTROL** menu.

(9) Change **LO FREQ** to **249 Hz, HI FREQ** to **15,000 Hz**, and **FREQ INCR** to **100 Hz**.

(10) Press **Pg Dn** and **Run/Halt** keys. As TI sweeps from 249 to 15,000 Hz, multimeter display will remain between **0.75697** and **0.79264 V ac**.

(11) Press **Run/Halt** and **Pg Up** keys to view **SWEEP CONTROL** menu.

(12) Change **HI FREQ** to **110,000** and **FREQ INCR** to **1000 Hz**.

(13) Press **Pg Dn** and **Run/Halt** keys. As TI sweeps from 249 to 110,000 Hz, multimeter display will remain between **0.74830** and **0.80182 V ac**.

(14) Press **Run/Halt** and **Home** keys.

(15) Select **E: NOISE** from **TRANSMISSION MEASUREMENT FUNCTIONS** menu.

(16) Change **RECEIVE** and **TRANSMIT CIRCUIT INTERFACE 1** parameters to **600 OHMS**, **TERMINATED**, and **ABSOLUTE**.

(17) Press **Pg Dn** key to view **NOISE** display. Set parameters as listed in (a) through (d) below:

(a) **FILTERS** to **3 kHz**.

(b) **MODE** to **S/N**.

(c) **RESPONSE** to **NORMAL**.

(d) **TRANSMIT** to **00.0 dBm**.

(18) Press **Run/Halt** key. Multimeter will display from **0.76563** to **0.78357 V ac**, and frequency counter from **1003.05** to **1004.05 Hz**.

b. Adjustments. No adjustments can be made.

12. Distortion

a. Performance Check

(1) Connect TI **XMT 2W/4W** connector to audio analyzer.

(2) Audio analyzer will indicate less than -50.0 dBm distortion level (greater than 50 dB less than 1004 Hz 0.0 dBm reference).

b. Adjustments. No adjustments can be made.

13. Final Procedure

a. Deenergize and disconnect all equipment.

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

By Order of the Secretary of the Army:

Official:

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

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army

0400503

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342289, requirements TB 9-6625-2210-35.

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.