*TB 9-6625-2190-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER AN/PSM-45A

Headquarters, Department of the Army, Washington, DC
13 April 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, 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 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.

*This bulletin supersedes TB 9-6625-2190-35, dated 16 April 2001.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, AN/PSM-45A. TM 11-6625-3199-14 and Army Specification No. 3002838 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 1 hour, using 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
Dc voltage	Range: 0 to 1000 V in 5 ranges (5000 V using high voltage probe) Accuracy: ±(0.1% of reading + 1 digit) ±(1% of reading using high voltage probe)
Dc current	Range: 0 to 10 A in 5 ranges Accuracy: ±(0.75% of reading + 2 digits)
Ac voltage	Range: 0 to 1000 V in 5 ranges Accuracy: 20 to 40 Hz; ±(1.5% of reading + 5 digits) 40 Hz to 1 kHz; ±(0.5% of reading + 5 digits) 1 to 5 kHz; ±(5% of reading + 5 digits)
Ac current[1]	Range: 0 to 10 A in 5 ranges Accuracy: All ranges: 20 to 40 Hz; ±(2% of reading + 5 digits) 40 Hz to 1 kHz; ±(1.5% of reading + 5 digits)
Resistance	Range: 0 Ω to 32 MΩ in 6 ranges Accuracy: 320 Ω range; ±(0.3% of reading + 2 digits) 3.2 kΩ to 3.2 MΩ ranges; ±(0.25% of reading + 1 digit) 32 MΩ range; ±(1% of reading + 1 digit)

[1]Ac current verified by dc current check because current measurements of ac and dc are made using same shunt resistor.

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. Alternate items may be used by the calibrating activity. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and TI. Where the four-to-one ratio cannot be met, the actual accuracy of the equipment selected is shown in parenthesis.

5. Accessories Required. The accessories required for this calibration are common usage accessories issued as indicated in **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)
CALIBRATOR	Dc voltage: Range: 300 mV to 1000 V Accuracy: ±0.025% Dc current: Range: 300 μA to 5 A Accuracy: ±0.2% Ac voltage: Range: 300 mV to 1000 V Frequency: 20 Hz to 5 kHz Accuracy: ±0.125% Resistance: Range: Accuracy: 190 Ω ±0.01% 190 kΩ to 1.9 MΩ ±0.077% 19 MΩ ±0.262%	Fluke, Model 5720A (5700A/EP) (p/o MIS-35947); w/amplifier, Fluke, Model 5725A/AR (5725A/AR)

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 TM 11-6625-3199-14 for this TI.

d. Unless otherwise specified, all control 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 protective cover from TI as necessary to gain access to adjustments.

b. For some checks throughout this procedure, it may be necessary to manually set TI range by pressing **RANGE** pushbutton.

8. Dc Voltage

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **VΩ** and **COM**.

(2) Set function switch to dc mV.

(3) Set TI and calibrator for settings listed in table 3. If TI does not indicate within limits specified, perform **b** below.

Table 3. Dc Voltage

Test instrument range settings	Calibrator settings	Test instrument indications	
		Min	Max
300 mV	300 mV	299.6	300.4
3 V[1]	3 V	2.996	3.004
30 V	30 V	29.96	30.04
300 V	300 V	299.6	300.4
1000 V	1000 V	998	1002
3 V[2]	1000 V	.990	1.010

[1]Set function switch to dc V.

[2]Connect high voltage probe (80K-6) (supplied with TI) between TI **VΩ** and **COM** and calibrator **OUTPUT HI** and **LO**. If high voltage probe is not supplied with TI, disregard this step.

b. Adjustments

(1) Set function switch to dc V.

(2) Set calibrator for a 3 V dc output.

(3) Press **RANGE** pushbutton for 3 V range.

(4) Adjust R19 (fig. 1) until TI indicates 3.000 V dc (R).

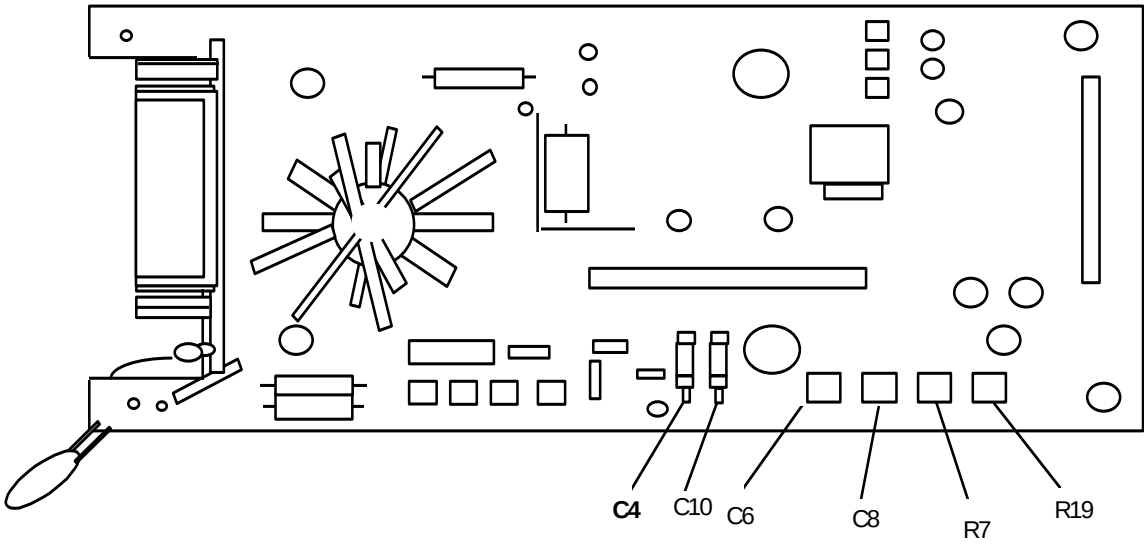

Figure 1. Adjustment locations.

9. Dc Current

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **mA/μA** and **COM**.

(2) Set function switch to dc μA.

(3) Set TI and calibrator for settings listed in table 4. TI will indicate within limits specified.

Table 4. Dc Current

Test instrument range settings	Calibrator settings	Test instrument indications	
		Min	Max
300 μA	300 μA	297.5	302.5
3000 μA	3000 μA	2975	3025
30 mA[1]	30 mA	29.75	30.25
300 mA	300 mA	297.5	302.5
30 mA[2]	5 A	4.94	5.06

[1]Set function switch to dc mA/A.
[2]Connect amplifier **CURRENT OUTPUT HI** and **LO** to TI **A** and **COM**.

b. Adjustments.

No adjustments can be made.

10. Ac Voltage

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **VΩ** and **COM**.

(2) Set function switch to ac mV.

(3) Set TI and calibrator for settings listed in table 5. If TI does not indicate within limits specified, perform **b** below.

Table 5. Ac Voltage

Test instrument range settings	Calibrator settings		Test instrument indications	
	Voltage	Frequency	Min	Max
300 mV	300 mV	20 Hz	295.0	305.0
300 mV	300 mV	100 Hz	298.0	302.0
300 mV	300 mV	900 Hz	298.0	302.0
300 mV	300 mV	5 kHz	284.5	315.5
3 V[1]	3 V	20 Hz	2.950	3.050
3 V	3 V	100 Hz	2.980	3.020
3 V	3 V	900 Hz	2.980	3.020
3 V	3 V	5 kHz	2.845	3.155
30 V	30 V	20 Hz	29.50	30.50
30 V	30 V	100 Hz	29.80	30.20
30 V	30 V	900 Hz	29.80	30.20
30 V	30 V	5 kHz	28.45	31.55
300 V	300 V	40 Hz	295.0	305.0
300 V	300 V	100 Hz	298.0	302.0
300 V	300 V	900 Hz	298.0	302.0
300 V	300 V	5 kHz	284.5	315.5
1000 V	1000 V	40 Hz	980	1020
1000 V	1000 V	100 Hz	990	1010
1000 V	1000 V	900 Hz	990	1010
1000 V	1000 V	5 kHz	945	1055

[1]Set function switch to ac V and press **RANGE** pushbutton for remaining range settings.

b. Adjustments

(1) Set function switch to ac V.
(2) Set calibrator for a 3 V, 100 Hz output.
(3) Press **RANGE** pushbutton for 3 V range.
(4) Adjust R7 (fig. 1) for a 3.000 V ac ±0.001 V ac TI indication (R).
(5) Press **RANGE** pushbutton for 300 V range.
(6) Set calibrator for a 300 V, 5 kHz output.
(7) Adjust C4 (fig. 1) for a 300.0 V ac ±0.1 V ac TI indication (R).
(8) Press **RANGE** pushbutton for 1000 V range.
(9) Set calibrator for a 1000 V, 5 kHz output.
(10) Adjust C10 (fig. 1) for a 1000 V ac ±1 V ac TI indication (R).
(11) Set calibrator for a 30 V, 5 kHz output.

(12) Press **RANGE** pushbutton for 30 V range.

(13) Adjust C8 (fig. 1) for a 30.00 V ac ±0.01 V ac TI indication (R).

(14) Set calibrator for a 3 V, 5 kHz output.

(15) Press **RANGE** pushbutton for 3 V range.

(16) Adjust C6 (fig. 1) for a 3.000 V ac ±0.001 V ac TI indication (R).

(17) Set calibrator for a 3 V, 100 Hz output. If TI does not indicate between 2.980 and 3.020 V ac, repeat (4) through (16) above as necessary.

11. Resistance

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **VΩ** and **COM**.

(2) Set function switch to **Ω**.

(3) Set TI and calibrator for settings listed in table 6. At each setting, use calibrator output adjustment controls to set calibrator control display **Reading** equal to TI indication. Calibrator control display **Error** indications will be within limits specified in table 6.

Table 6. Resistance

Test instrument range settings	Calibrator Settings	**Error** indications ±(%)
300 Ω	190 Ω[1]	0.42
3 kΩ	1.9 kΩ	0.31
30 kΩ	19 kΩ	0.31
300 kΩ	190 kΩ[2]	0.31
3 MΩ	1.9 MΩ	0.31
30 MΩ	19 MΩ	1.05

[1]Set calibrator **2 wire Comp** to **ON**.
[2]Set calibrator **2 wire Comp** to **OFF**.

b. Adjustments.

No adjustments can be made.

12. Final Procedure

a. Deenergize and disconnect all equipment.

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

By Order of the Secretary of the Army:

Official:

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

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0404902

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342275, requirements for calibration procedure TB 9-6625-2190-35.

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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.