*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
16 April 2001

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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-MA-NP, 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 FAX 256-882-6546/DSN 788-6546.

This bulletin supersedes TB 9-6625-2190-35, dated 19 December 1994.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, AN/PSM 45A. The 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 2 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 ± (percent of reading plus digits)
Dc voltage	Range: 0 to 1000 V in 5 ranges (5000 V using high voltage probe) Accuracy: (±.1% of reading +1 digit)
Dc current	Range: 0 to 10 A in 5 ranges Accuracy: (±.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 (±.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: 0Ω to 32 MΩ in 6 ranges Accuracy: 320Ω range; (±.3% of reading + 2 digits) 3.2 kΩ to 3.2 MΩ ranges; (±.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.

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: ±.025% Dc current: Range: 300 µA to 5 A Accuracy: ±.2% Ac voltage Range: 300 mV to 1000 V Frequency: 20 Hz to 5 kHz Accuracy: ±.125%	John Fluke, Model 5700A/CT (p/o MIS-35947); w/ac divider, John Fluke, Model 7405A-4207 (7405A-4207)
RESISTANCE STANDARD NO. 1	Range: 300Ω to 300 kΩ Accuracy: ±.06%	Biddle-Gray, Model 71-650 (71-650) (MIS-10264)
RESISTANCE STANDARD NO. 2	Range: 3.0 to 10 MΩ Accuracy: ±.08%	Beckman, Model CR10M (8598965)

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. 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.

a. Remove protective cover from TI as necessary to gain access to adjustments.

b. Set function switch to $\overline{\overline{\text{mV}}}$.

8. Dc Voltage

a. Performance Check

(1) Connect TI to calibrator.

(2) Set function switch to $\overline{\overline{\text{mV}}}$.

(3) Adjust calibrator output for 300.0 mV. If TI does not indicate between 299.6 and 300.4 mV, perform **b** below.

(4) Set function switch to $\overline{\overline{\text{V}}}$.

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

Table 3. Dc Voltage Accuracy

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

[1]Connect high voltage probe (80K-6) (supplied with TI) between TI's VΩ and COM jacks and calibrator. If high voltage probe is not supplied with TI, disregard this step.

b. Adjustments

(1) Set function switch to $\overline{\text{V}}$.

(2) Adjust calibrator for output of 3.000 V dc.

(3) Adjust DC VOLTS R19 (fig. 1) until TI indicates 3.000 V dc (R).

(4) Repeat a(2) through (4) above.

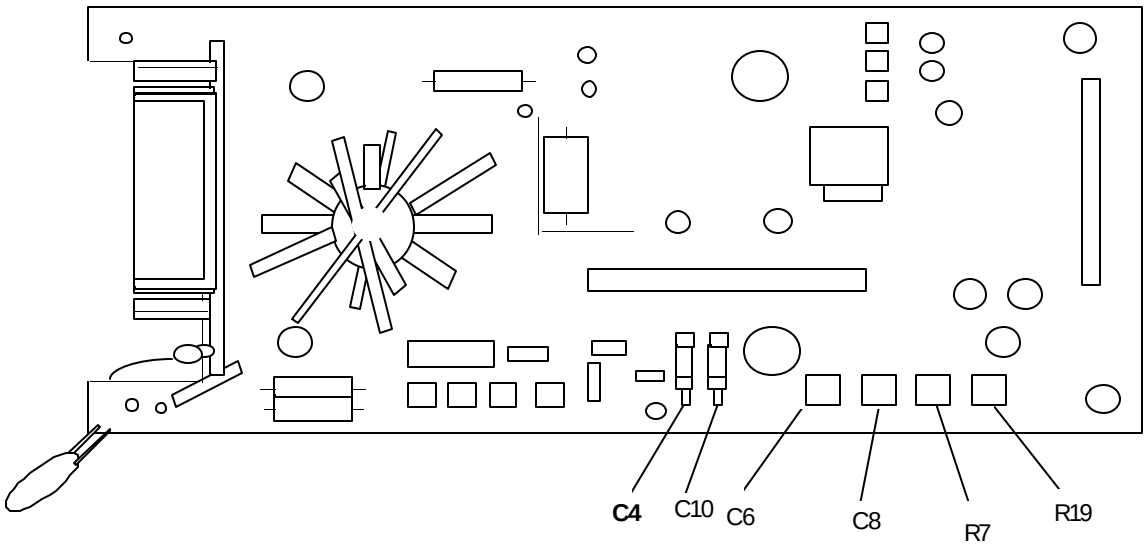

Figure 1. Adjustment locations.

9. Dc Current

a. Performance Check

(1) Connect calibrator to TI mA/μA and COMMON terminals.

(2) Set function switch to $\overline{\text{μA}}$.

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

b. Adjustments. No adjustments can be made.

Table 4. Dc Current Accuracy

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 $\overline{\text{mA/A}}$.

[2]Move positive lead to TI A terminal.

10. Ac Voltage

a. Performance Check

(1) Set function switch to mV.

(2) Connect VΩ and COM jacks to calibrator.

(3) Adjust calibrator frequency for 100 Hz and output for 300.0 mV. If TI does not indicate between 298.0 and 302.0 mV, perform **b**(1) through (5) below.

(4) Adjust calibrator and press **RANGE** ⦿ pushbutton for indications listed in table 5. TI will indicate within limits specified; if not, perform corresponding adjustments, using technique in **b**(2) and (3) below.

b. Adjustments

(1) Set function switch to $\tilde{}$ V.

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

(3) Adjust calibrator for 3.000 V output at 100 Hz.

(4) Adjust R7 (fig. 1) for 3.000 V ac indication on TI (R).

(5) Repeat **a**(1) through (3) above.

NOTE

If any adjustments are made in table 5, repeat table to check for any interaction between ranges.

Table 5. Ac Voltage Accuracy

Test instrument range settings	Calibrator settings		Test instrument indications		Adjustments (fig. 1)
	Voltage	Frequency	Min	Max	(R)
300 mV	300 mV	20 Hz	295.0	305.0	
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	C6
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	C8
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	C4
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	C10

[1]Set function switch to $\tilde{V}$.

11. Resistance

a. Performance Check

(1) Set function switch to Ω.

(2) Connect resistance standard No. 1 to TI VΩ and COM jacks.

(3) Press **RANGE** ⦿ for 300 Ω range.

(4) Adjust resistance standard to 300.0Ω. TI will indicate between 298.9Ω and 301.1Ω.

(5) Repeat technique of (3) and (4) above, using settings and indications listed in table 6.

b. Adjustments. No adjustments can be made.

Table 6. Resistance Accuracy

Test instrument range settings	Resistance standard No. 1 settings	Test instrument indications	
		Min	Max
3 kΩ	3 kΩ	2.991	3.009
30 kΩ	30 kΩ	29.91	30.09
300 kΩ	300 kΩ	299.1	300.9
3 MΩ	3 MΩ[1]	2.991	3.009
30 MΩ	10 MΩ	9.89	10.11

[1]Substitute resistance standard No. 2 for resistance standard No. 1

12. Final Procedure

a. Deenergize and disconnect all equipment.

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

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