TB 9-6625-2353-35

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER, AN/PSM-45 AND (SIMPSON, MODEL 467) AND SIMPSON, MODEL 467E

Headquarters, Department of the Army, Washington, DC

7 October 2004

TB 9-6625-2353-35, 15 April 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

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

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

0422214

Distribution:

To be distributed in accordance with IDN 344797, requirements for calibration procedure TB 9-6625-2353-35.

*TB 9-6625-2353-35

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CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER, AN/PSM-45 AND (SIMPSON, MODEL 467) AND SIMPSON, MODEL 467E

Headquarters, Department of the Army, Washington, DC
15 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, 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.

*This bulletin, together with TB 9-6625-2352-35, dated 15 April 2004 and TB 9-6625-2354-35, dated 15 April 2004, supersedes TB 9-6625-2147-35, dated 3 April 1985, including all changes, in its entirety.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, AN/PSM-45 and (Simpson, Model 467) and Simpson, Model 467E. The manufacturers' manuals or TMs 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. Variations among models are described in text, tables, and figures.

b. Time and Technique. The time required for this calibration is approximately 1 hour, 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	
Dc voltage	Range: Accuracy:	0 to ±1000 V in 5 ranges w/probe 5000 V ±(0.1% of input +1 count) probe ±5%
Ac voltage	Range: Accuracy:	0 to 750 V in 5 ranges w/probe 0-5000 V 200 mV, 2, 20, and 200 V ranges, 20 to 40 Hz, ±(1.5% of input +5 counts); 40 Hz to 1 kHz, ±(0.5% of input +5 counts); 1 to 5 kHz, ±(5% of input +5 counts) 750 V range, 20 to 40 Hz, ±(1.5% of input +5 counts); 40 to 400 Hz, ±(0.5% of input +5 counts) probe ±5%[1]
Dc current	Range: Accuracy:	0 to ±2000 mA in 5 ranges. 10 A w/shunt 200 µA, 2 and 20 mA ranges, ±(0.5% of input +1 count) 200 and 2000 mA ranges, 10 A w/shunt ±(0.75% of input +1 count) ±.25% for shunt
Ac current[2]	Range: Accuracy:	0 to ±2000 mA in 5 ranges. 10 A w/shunt 200 µA, 2 and 20 mA ranges, ±(0.5% of input +1 count) 200 and 2000 mA ranges, 10 A w/shunt ±(0.75% of input +1 count) ±.25% for shunt
Resistance	Range: Accuracy:	0 to 20 MΩ in 6 ranges 200Ω, 2, 20, 200, and 2000 kΩ, ±(0.25% of input +1 count) 20 MΩ, ±(1% of input +1 count)

[1] Probe not calibrated on Ac.
[2] 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 or AN/GSM-287. 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 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)
CALIBRATOR	Dc voltage: Range: 0 to 1100 V Accuracy: ±0.038% Dc current: Range: 50 µA to 10 A Accuracy: ±0.14% Ac voltage: Range: 0 to 1100 V Frequency: 60 Hz to 100 Hz Accuracy: ±0.14%	Fluke, Model 5720A (5700A/EP) (p/o MIS-35947); w/amplifier, Fluke 5725A/AR (5725A/AR)
POWER SUPPLY	Range: 0 to 5250 V dc Accuracy: ±1.25%	Fluke, Model 410B/AT (MIS-10230) (MIS-45839)

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 manufacturers' manuals and/or technical manuals 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.

a. Remove protective cover from TI only when necessary to make adjustments. Replace cover after completing the adjustments.

b. Position TI controls as listed in (1) through (5) below:

(1) **POWER** pushbutton to **ON** (in).

(2) **PEAK HOLD** pushbutton to out position.

(3) **AC DC** pushbutton to **DC** (out).

(4) **V** pushbutton to in position.

(5) **200 mV, 200 µA, 200 Ω** pushbutton to in position.

8. Dc Voltage

a. Performance Check

(1) Connect TI **V-Ω** input to calibrator **OUTPUT HI** and TI **COM** input to calibrator **OUTPUT LO**.

(2) Set calibrator output for 0 V. If TI bar graph displays a segment or any portion of a segment, perform **b** (1) below (AN/PSM 45 and Simpson 467 only).

(3) Set calibrator output for 200 mV. If TI bar graph does not display 20 segments, perform **b** (2) below (AN/PSM 45 and Simpson 467 only).

(4) Set calibrator output for 190.0 mV. If TI does not indicate within limits specified in first row of table 3, perform **b** (3) below.

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

Table 3. Dc Voltage Accuracy

Calibrator	Test instrument		
	Range	Indication limits	
Output	setting	Min	Max
190 mV	200 mV	189.7 mV	190.3 mV
1.9 V	2 V	1.897 V	1.903 V
1.4 V	2 V	1.398 V	1.402 V
1.0 V	2 V	0.998 V	1.002 V
0.8 V	2 V	0.798 V	0.802 V
0.4 V	2 V	0.399 V	0.401 V

Table 3. Dc Voltage Accuracy - Continued

Calibrator	Test instrument		
	Range	Indication limits	
Output	setting	Min	Max
19 V	20 V	18.97 V	19.03 V
190 V	200 V	189.7 V	190.3 V
1000 V	1000 V	998.0 V	1002 V
5000[1, 2, 3]	1000 V (200) V	474.0 (94.8) V	526.0 (105.2) V

[1] Perform only if probe is supplied with TI.
[2] Replace calibrator with power supply. Connect probe to TI **V-Ω** and **COM** inputs and to power supply observing polarity. After probe check is complete, reduce output to minimum and connect TI **V-Ω** and **COM** inputs to calibrator **OUTPUT HI** and **OUTPUT LO** observing polarity.
[3] Verify to 1000 V if power supply is not available. Values in parenthesis are for 1000 V.

b. Adjustments.

(1) Short leads and adjust R111 (fig. 1) for a TI bar graph display of 0 segments.

(2) Set calibrator for an output amplitude of 200 mV and adjust R126 (fig. 1) for a TI bar graph display of 20 segments.

(3) Set calibrator for an output amplitude of 190 mV and adjust R227 (fig. 1) for a TI indication of 190.0 (R).

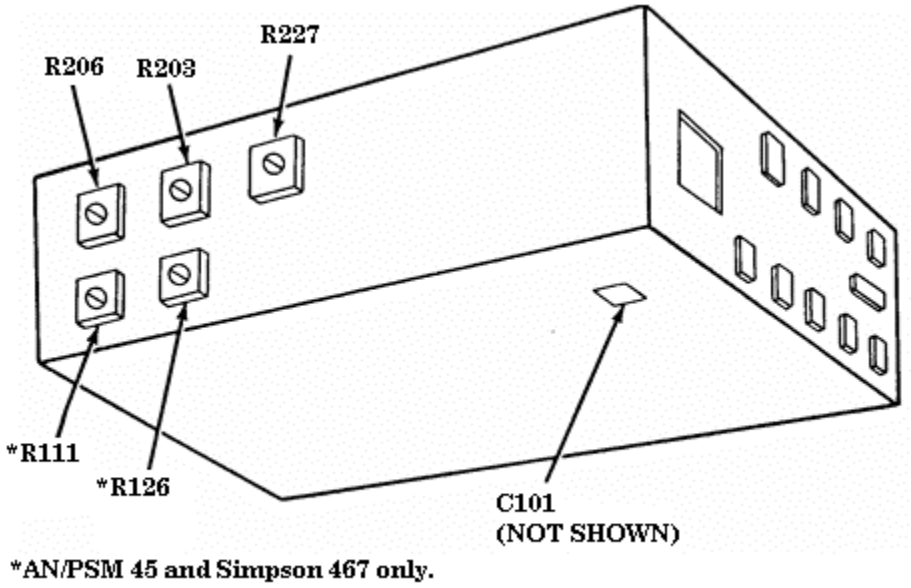

Figure 1. Adjustment locations.

9. Ac Voltage

a. Performance Check

(1) Position TI controls as listed in (a) and (b) below:

(a) **AC DC** pushbutton to **AC** (in).
(b) **200 mV**, **200 µA**, **200 Ω** pushbutton to in position.

(2) Short TI leads. If TI display does not indicate between –00.5 and +00.5 perform **b** (1) below.

(3) Connect TI **V-Ω** input to calibrator **OUTPUT HI** and TI **COM** input to calibrator **OUTPUT LO**. Set calibrator for an output amplitude of 190 mV at an output frequency of 1 kHz. If TI does not indicate within limits specified in first row of table 4, perform **b** (2) below.

(4) Repeat technique of (1) (b) and (3) above, using the settings and indications listed in table 4. TI will indicate within limits specified in table 4.

Table 4. Ac Voltage Accuracy

Calibrator		Test instrument		
Output amplitude	Output frequency	Range	Indication limits	
			Min	Max
190 mV	1 kHz	200 mV	188.6 mV	191.5 mV
190 mV	30 Hz	200 mV	186.7 mV	193.4 mV
190 mV	100 Hz	200 mV	188.6 mV	191.5 mV
190 mV	5 kHz	200 mV	180.0 mV	200.0 mV
1.90 V	5 kHz	2 V[1]	1.800 V	2.000 V
1.90 V	100 Hz	2 V	1.886 V	1.915 V
1.90 V	30 Hz	2 V	1.867 V	1.934 V
19.00 V	30 Hz	20 V	18.67 V	19.34 V
19.00 V	100 Hz	20 V	18.86 V	19.15 V
19.00 V	5 kHz	20 V	18.00 V	20.00 V
190.0 V	1 kHz	200 V	188.6 V	191.5 V
190.0 V	100 Hz	200 V	188.6 V	191.5 V
190.0 V	30 Hz	200 V	186.7 V	193.4 V
750 V	40 Hz	750 V	734 V	766 V
750 V	400 Hz	750 V	741 V	759 V

[1] If TI does not indicate within limits specified perform **b** (3) below.

b. Adjustments.

(1) Short TI leads and adjust R206 (fig. 1) for a TI indication of 0.00.

(2) Set calibrator for an output amplitude of 190.0 mV at a frequency of 1 kHz and adjust R203 (fig. 1) for a TI indication of 190.0 mV (R).

(3) Set TI to 2 V range and set calibrator for an output amplitude of 1.900 V at a frequency of 5 kHz and adjust C101 (fig. 1) for a TI indication of 1.900 V (R).

10. Dc Current

a. Performance Check

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

(a) **AC DC** pushbutton to **DC** (out).
(b) **mA** pushbutton to in position.
(c) **200 mV**, **200 µA**, **200 Ω** pushbutton to in position.

(2) Connect TI **mA** input to calibrator **OUTPUT HI** and TI **COM** input to calibrator **OUTPUT LO**.

(3) Set calibrator for a 190 µA output. TI will indicate within limits specified in first row of table 5.

(4) Repeat technique of (1) (c) and (3) above, using settings and indications listed in table 4. TI will indicate within limits specified in table 5.

Table 5. Dc Current Accuracy

Calibrator	Test instrument		
	Range	Indication limits	
Output	setting	Min	Max
190 µA	200 µA	188.9	191.0
1.9 mA	2 mA	1.889	1.910
19 mA	20 mA	18.89	19.10
190 mA	200 mA	188.5	191.5
1.9 A	2000 mA	1885	1915
10 A	200 mV[1]	99.2	100.8

[1] External 10 A shunt supplied with TI. Set TI range to 200 mV DC.

b. Adjustments. No adjustments can be made.

11. Resistance

a. Performance Check

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

(a) **AC DC** pushbutton to **DC** (out).
(b) **Ω** pushbutton to **ON** (in).
(c) **200mV**, **200µA**, **200Ω** pushbutton to in position.

(2) Connect TI **V-Ω** input to calibrator **OUTPUT HI** and TI **COM** input to calibrator **OUTPUT LO**.

(3) Set calibrator output to 190.0 Ω nominal (**2-wire comp: ON**).

(4) Rotate calibrator knob below **EDIT FIELD** pushbutton to adjust calibrator display indication to equal TI indication. Calibrator **err** display indication will be within limits specified in first row of table 6.

(5) Repeat technique of (1) (c), (3), and (4) above, using the settings and indications listed in table 6. Calibrator **err** display indication will be within limits specified in table 6.

Table 6. Resistance Accuracy

Test instrument	Calibrator	
Range	Output	**err** indication ± (%)
200 Ω	190.0 Ω	0.302
2 kΩ	1.9 kΩ	0.302
20 kΩ	19 kΩ	0.302
200 kΩ	190 kΩ[1]	0.302
2000 kΩ	1.9 MΩ	0.302
20 MΩ	19 MΩ	1.05

[1] 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 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

0404907

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To be distributed in accordance with the IDN 344797, requirements for calibration procedure TB 9-6625-2353-35.

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.

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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**

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