*TB 9-6625-2243-35

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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER JOHN FLUKE, MODELS 75 AND 77

Headquarters, Department of the Army, Washington, DC
3 March 1995

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*This bulletin supersedes TB 9-6625-2243-35, dated 26 June 1990.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, John Fluke, Models 75 and 77. 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 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		
Dc voltage	Range	Accuracy ±(% of readings + counts)	
		Model 75	Model 77
	320 mV 3.2 V 32 V 320 V	0.5% + 1	0.3% + 1
	1000 V	0.6% + 1	0.4% + 1
Ac voltage	Range	Accuracy ±(% of readings + counts)	
	3.2 V	2% + 2 45 to 500 Hz	
	32 V 320 V 750 V	2% + 2 45 Hz to 1 kHz	
Resistance	Range	Accuracy ±(% of readings + counts)	
	320Ω	0.7% + 2	0.5% + 2
	3200Ω 32 kΩ 320 kΩ 3.2 MΩ	0.7% + 1	0.5% + 1
	32 MΩ	2.5% + 1	2.0% + 1

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications		
Ac current[1]	Range	Accuracy ±(% of readings + counts)	
		Model 75	Model 77
	32 mA 320 mA 10 A	3% + 2 45 Hz to 1 kHz	
Dc current	Range	Accuracy ±(% of readings + counts)	
	32 mA	1.5% + 2	
	320 mA 10 A	2% + 2 1.5% + 2	

[1]Ac current verified by dc current check because current measurements of ac and dc are made using the 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 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: 300 mV to 900 V dc Accuracy: ±.0833% Ac voltage: Range: 3 to 700 V Frequency: 45 Hz to 1 kHz Accuracy: ±.516% Resistance: Range: 100Ω to 10 MΩ Accuracy: ±.15% Dc current: Range: 30 mA to 10 A Accuracy: ±.375%	John Fluke, Model 5700A/CT (p/o MIS-35947); w/power amplifier, John Fluke, Model 5215A/CT (5215A/CT); w/ transconductance amplifier, John Fluke, Model 5220A/CT (5220A/CT)

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 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.

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

b. Set function switch to 300 mV.

8. Dc Voltage

a. Performance Check

(1) Connect TI **VΩ** and **COM** jacks to calibrator output.

(2) Set calibrator for an output of .3000 V dc. If TI does not indicate between 298.4 and 301.6 mV (for model 77, indication will be between 299.0 and 301.0 mV), perform **b**(1) through (5) below.

(3) Set function switch to V⎓.

(4) Set calibrator for an output of 3.000 V dc.

(5) If TI does not indicate between 2.984 and 3.016 V (for model 77, indication will be between 2.990 and 3.010 V), perform **b**(3) through (5) below.

(6) Adjust calibrator for settings as listed in table 3. TI will indicate within limits specified.

Table 3. Dc Voltage Accuracy

Calibrator settings (V dc)	Test instrument indications (V dc)			
	Model 75		Model 77	
	Min	Max	Min	Max
30.00	29.84	30.16	29.90	30.10
300.0	298.4	301.6	299.0	301.0
900	894	906	896	904

b. Adjustments

(1) Set function switch to V⎓.

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

(3) Adjust R8 (fig. 1) for a TI indication of 3.000 V dc.

(4) Set calibrator for an output of .3000 V dc.

(5) Set function switch to 300 mV; perform **a**(2) through (6) above.

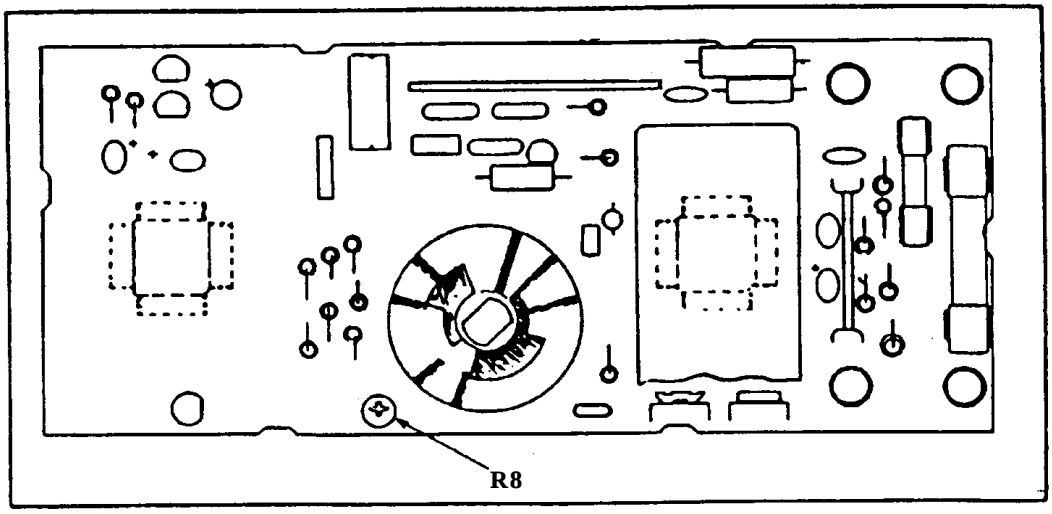

Figure 1. Dc voltage - adjustment location.

9. Ac Voltage

a. Performance Check

(1) Set function switch to V~.

(2) Connect TI **VΩ** and **COM** jacks to calibrator.

(3) Adjust calibrator frequency for 45 Hz and output for 3.000 V. TI will indicate between 2.938 V ac and 3.062 V ac.

(4) Adjust calibrator for settings as listed in table 4. TI will indicate within limits specified.

b. Adjustments. No adjustments can be made.

Table 4. Ac Voltage Accuracy

Calibrator settings		Test instrument indications (V ac)	
V ac	Frequency	Min	Max
3.000	450 Hz	2.938	3.062
30	450 Hz	29.38	30.62
30	45 Hz	29.38	30.62
30	1 kHz	29.38	30.62
300	1 kHz	293.8	306.2
300	450 Hz	293.8	306.2
300	50 Hz	293.8	306.2
700	50 Hz	684	716
700	450 Hz	684	716
700	1 kHz	684	716

10. Resistance

a. Performance Check

(1) Set function switch to Ω.

(2) Connect TI **VΩ** and **COM** jacks to calibrator.

(3) Set calibrator to the nominal resistance outputs as listed in table 5. At each resistance output, set the TI to the proper range and adjust the calibrator output adjustment control knob for a calibrator control display reading equal to the TI indication. The calibrator control display **ERROR** indication will be within the specified limits of table 5.

b. Adjustments. No adjustments can be made.

Table 5. Resistance Accuracy

Calibrator		
Output nominal resistance value	**ERROR** display indication ± (%)	
	Model 75	Model 77
100Ω	.9	.7
1000Ω	.8	.6
10 kΩ	.8	.6
100 kΩ	.8	.6
1 MΩ	.8	.6
10 MΩ	2.6	2.1

11. Dc Current

a. Performance Check

(1) Set function switch to A ⎓, and set TI to 32 mA range.

(2) Connect TI **300 mA** and **COM** jacks to calibrator output.

(3) Adjust calibrator for a 30 mA output. TI will indicate between 29.53 and 30.47 mA dc.

(4) Set TI to 320 mA range, and adjust calibrator for a 300 mA output. TI will indicate between 293.8 and 306.2 mA dc.

(5) Remove TI lead from **300 mA** jack and put it in the **10 A** jack. Connect TI to transconductance amplifier.

(6) Set TI to 10 A range and adjust calibrator for a 5 A output. TI will indicate between 4.90 and 5.10 A dc.

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.

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By Order of the Secretary of the Army:

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