*TB 9-6625-2253-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER JOHN FLUKE, MODELS 8024A AND 8024B

Headquarters, Department of the Army, Washington, DC
6 November 2003

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 9-6625-2253-35, dated 13 December 1994.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, John Fluke, Models 8024A and 8024B. The manufacturers' manuals 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.

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 ±(percent of reading plus digits)
Dc voltage	Range: 0 to 1000 V in 5 ranges Accuracy: ±(0.1% +1)
Dc current	Range: 0 to 2000 mA in 4 ranges Accuracy: ±(0.75% +1)
Ac voltage	Range: 0 to 750 V in 5 ranges Accuracy: 200 mV, 2, 20, 200 V ranges, 45 Hz to 1 kHz ±(0.75% +2) 1 to 2 kHz (1.5% +3) 200 mV, 2, 20 V ranges 2 to 5 kHz ± (5% +5) 750 V range 45 Hz to 1 kHz ±(1% +2)
Ac current[1]	Range: 0 to 2000 mA in 4 ranges Accuracy: 2 mA range, 45 to 450 Hz ±(3% +2) 20 to 2000 mA ranges 45 Hz to 1 kHz ±(1.5% +2)
Resistance	Range: 0 to 20 MΩ in 6 ranges Accuracy: 200Ω range ±(0.2% +3) 2, 20 200 kΩ ±(0.1% +1) 2000 kΩ ±(0.15% +1) 20 MΩ ±(2% +1)
Conductance	Range: 200 nS Accuracy: ±(2.0% +10)

[1]Ac current verified by dc current check. Because current measurements of ac and dc are made using same shunt resistors, a check of ac current is not made.

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 and 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.

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: 190 mV to 1000 V Accuracy: ±.039% Dc current: Range: 1.9 mA to 1.9 A Accuracy: ±.2% Ac voltage Range: 190 mV to 750V Frequency: 45 Hz to 5 kHz Accuracy: ±.214% Resistance: Range: 190Ω to 10 MΩ Accuracy: ±0.039%	John Fluke, Model 5720A/CT (p/o MIS-35947), w/power amplifier, John Fluke, Model 5725A/CT (5725A/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 with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturers' manuals 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 only when necessary to make adjustments. Replace cover after completing the adjustments.

b. Position TI controls as follows:

(1) **POWER** switch to **ON**.

(2) **PEAK HOLD** switch to **OFF**.

(3) **200 mV** pushbutton to in position.

(4) All other pushbuttons to out position.

8. Dc Voltage

a. Performance Check

(1) Connect TI **V/Ω/S** and **COMMON** to calibrator.

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

(3) Repeat technique of (2) 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 output	Test instrument		
	Range setting	Indication limits	
		Min	Max
190 mV	200 mV	189.7 mV	190.3 mV
–190 mV	200 mV	–190.3 mV	–189.7 mV
1.9 V	2 V	1.897 V	1.903 V
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 V	1002 V

(4) Set calibrator output to minimum and disconnect equipment setup.

b. Adjustment. Set calibrator output for 190.0 mV and adjust **DC CAL R6** (fig. 1) until TI indicates 190.0 (R).

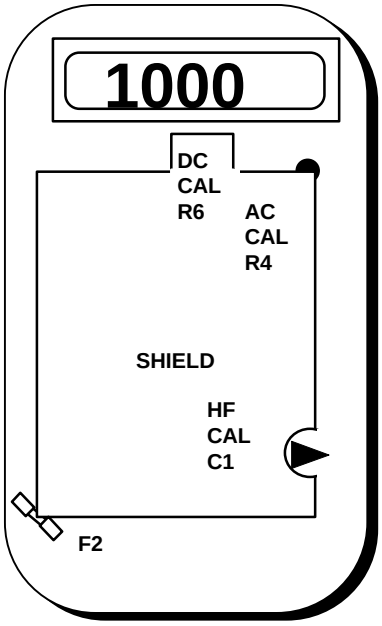

Figure 1. Adjustment locations.

9. Dc Current

a. Performance Check

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

(2) Set TI to measure **DC mA** and press the **2 mA** range pushbuttons.

(3) Set calibrator for a 1.9 mA output. TI will indicate within limits specified in first row of table 4.

(4) Repeat technique of (2) and (3) above, using settings and indications listed in table 4. TI will indicate within limits specified in table 4.

Table 4. Dc Current Accuracy

Calibrator output (mA)	Test instrument		
	Range setting (mA)	Indication limits (mA)	
		Min	Max
1.9	2	1.885	1.915
19	20	18.85	19.15
190	200	188.5	191.5
1900	2000	1885	1915

(5) Set calibrator output to minimum and disconnect equipment setup.

b. Adjustments

. No adjustments can be made.

10. Ac Voltage

a. Performance Check

(1) Set TI to measure **AC V** and press **200 mV** range pushbutton.

(2) Connect TI **V/Ω/S** and **COMMON** to calibrator.

(3) Set calibrator for an output amplitude of 190 mV at an output frequency of 45 Hz. If TI does not indicate within limits specified in first row of table 5, perform **b** (1) below.

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

Table 5. Ac Voltage Accuracy

Calibrator output		Test instrument		
Amplitude	Frequency	Range	Indication limits	
			Min	Max
190 mV	45 Hz	200 mV	188.4 mV	191.6 mV
190 mV	900 Hz	200 mV	188.4 mV	191.6 mV
190 mV	1.9 kHz	200 mV	186.8 mV	193.2 mV
190 mV	5 kHz	200 mV	180.0 mV	199.9 mV
1.9 V	45 Hz	2 V	1.884 V	1.916 V
1.9 V	900 Hz	2 V	1.884 V	1.916 V
1.9 V	1.9 kHz	2 V	1.868 V	1.932 V
1.9 V[1]	5 kHz	2 V	1.800 V	1.999 V
0.19 V	5 kHz	2 V	0.175 V	0.205 V
19 V	45 Hz	20 V	18.84 V	19.16 V
19 V	900 Hz	20 V	18.84 V	19.16 V
19 V	1.9 kHz	20 V	18.68 V	19.32 V
19 V	5 kHz	20 V	18.00 V	19.99 V
190 V	45 Hz	200 V	188.4 V	191.6 V
190 V	900 Hz	200 V	188.4 V	191.6 V
190 V	1.9 kHz	200 V	186.8 V	193.2 V
750 V	45 Hz	750 V	740 V	760 V
750 V	100 Hz	750 V	740 V	760 V
750 V	1 kHz	750 V	740 V	760 V

[1]If TI does not indicate within limits specified, perform **b** (2) below.

b. Adjustments

(1) Set calibrator for an output amplitude of 190 mV at an output frequency of 45 Hz and adjust **AC CAL R4** (fig. 1) for a TI indication of 190.0 (R).

(2) Set calibrator for an output amplitude of 1.9 V at an output frequency of 5 kHz and adjust **HF CAL C1** (fig. 1) for a TI indication of 1.900 (R).

11. Resistance/Conductance

a. Performance Check

(1) Set TI to measure resistance and press the **200Ω** range pushbutton.

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

(3) 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.

(4) Repeat technique of (2) and (3) 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	0.37
2 kΩ	1.9 kΩ	0.16
20 kΩ	19 kΩ	0.16
200 kΩ	190 kΩ	0.16
2000 kΩ	1.9 MΩ	0.21
20 MΩ	10 MΩ	2.1
200 nS	10 MΩ	3.0

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

0325201

Distribution:
To be distributed in accordance with IDN 344123, requirements for calibration procedure TB 9-6625-2253-35.

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.

PIN: 046083-000