*TB 9-4935-365-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER FLUKE, MODELS 8120A AND 8125A

Headquarters, Department of the Army, Washington, DC
11 May 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 supersedes TB 9-4935-365-35, dated 7 July 1988, including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, Fluke, Models 8120A and 8125A. The manufacturers' manuals and or technical 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, 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. 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 Model 8120A	Range: 0 to 1000 V in 5 ranges Accuracy: ±0.02% of Input + 0.01% of range for 1, 10, 100, and 1000 V ranges; ±0.05% of input +0.02% of range for 100 mV range
Model 8125A	Range: 0 to 1000 V in 4 ranges Accuracy: ±0.01 of input + 0.01% of range
Ac voltage and frequency response	Range: 0 to 1000 V in 4 (5 for model 8120A) ranges Accuracy: ±0.2% of input + 0.05% of range from 50 Hz to 10 kHz; ±0.5% of input, +0.1% of range from 30 to 50 Hz and 10 to 20 kHz
Dc current (model 8120A only)	Range: 0 to 1000 mA in 5 ranges Accuracy: ±0.1% of input + 0.02% of range
Resistance Model 8120A	Range: 0 to 10 MΩ in 5 ranges Accuracy: ±0.02% of input +0.01% of range on 1 to 1000 kΩ ranges; ±0.05% of input +0.01% of range on 10 MΩ range
Model 8125A	Accuracy: 0.05% of input +0.01% of range on 1 to 1000 kΩ ranges; 0.1% of input +0.01 of range on 10 MΩ range

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. 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 1000 V Accuracy: ±0.005% Ac voltage: Range: 0 to 1000 V Frequency: 30 Hz to 20 kHz Accuracy: ±0.0625% Dc current: Range: 100 μA to 1 A Accuracy: ±0.03% Resistance: Range: 1 kΩ to 10 MΩ Accuracy: ± .0075%	Fluke, Model 5720A (5700A/EP) (p/o MIS-35947), w/ amplifier, Fluke, 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 the manufacturers' manuals and/or technical manuals for the TI.

d. Unless otherwise specified, all controls and control settings refer to the TI.

WARNING

A possible safety hazard exists with test instrument if a three-to- two wire adapter is used, or if the instrument is powered from the optional battery pack with line cord disconnected. Safety problem is ac voltage potential between instrument case and ground. INSURE THAT THE INSTRUMENT CASE IS GROUNDED by connecting the ground lead between earth ground and the hinge pin on instrument case, using a test lead.

NOTE

Values shown in parenthesis throughout this procedure pertain to model 8120A.

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 to make adjustments and replace upon completion.

b. Connect TI to a 115 V ac source.

c. Set **POWER** switch to **ON** and allow at least 30 minutes for equipment to warm-up and stabilize.

d. Press function **V DC** and **RANGE 1** (**100 MV**) pushbuttons. For model 8125A only, press **FLTR ON-OFF** pushbutton to **ON**.

NOTE

Insure that ground strap is connected between INPUT LO and GD terminals.

e. Short **INPUT HI** and **LO** terminals. If TI does not indicate between +.0001 (+00.01) and -.0001 (-00.01) adjust ZERO (fig. 1) (for model 8120A, adjust DC ZERO (front panel) control to center range, and adjust ZERO (fig. 1) until TI indicates .0000 (00.00).

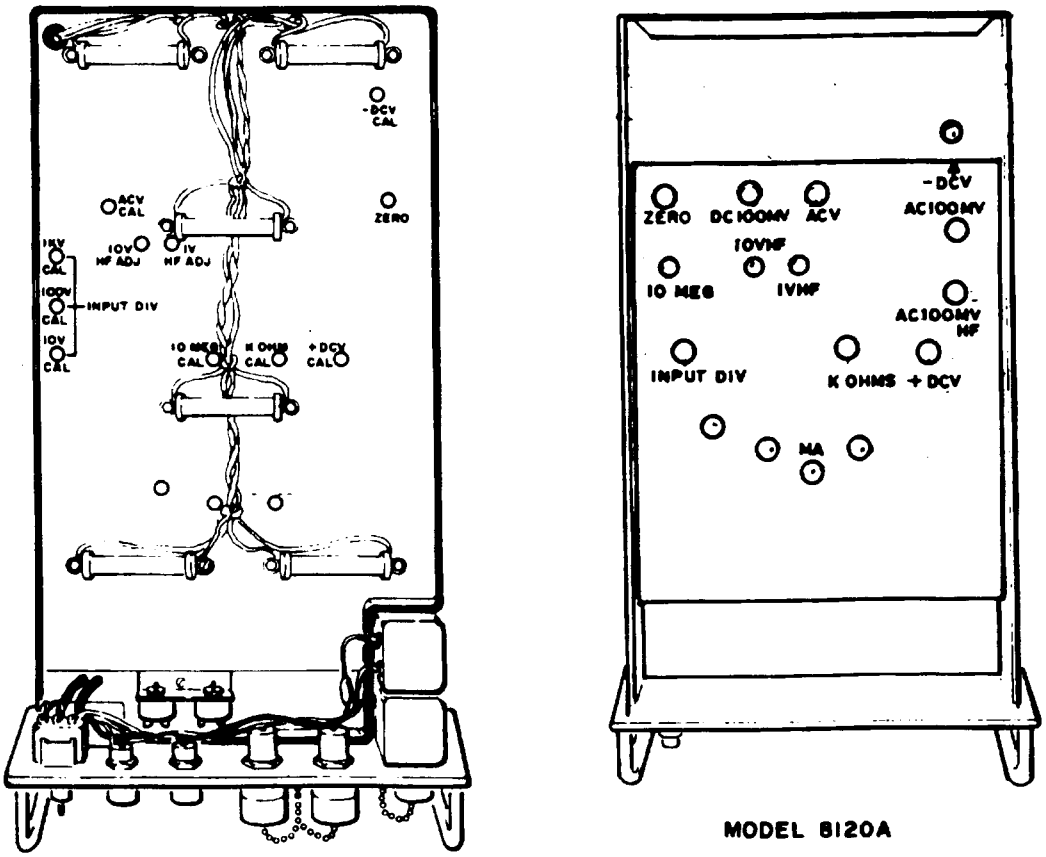

Figure 1. Test instrument - bottom view.

f. Remove short. For model 8120A, press **RANGE 1** pushbutton.

8. Dc Voltage

a. Performance Check

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

(2) Set calibrator for an output amplitude of 1.0000 Vdc. If TI does not indicate within limits specified in first row of table 3, perform corresponding adjustments in table 3.

(3) Repeat technique of (2) above, using calibrator outputs and TI range settings listed in table 3. If TI does not indicate within limits specified, perform corresponding adjustments in table 3.

Table 3. Dc Voltage

Calibrator	Test instrument			Adjustments (fig. 1) (R)
Output	Range setting	Indication limits (V dc) Min	Max	
1 V	1	.9998 (.9997)	1.0002 (1.0003)	+DCV CAL (+DCV)
100 mV	100 mV[1]	99.93	100.07	DC 100 MV
1 V	1	–.9998 (.9997)	–1.0002 (–1.0003)	-DCV CAL (-DCV)
100 mV	1	.0999 (.0999)	0.1001 (0.1001)	– – –
10 V	10	9.998 (9.997)	10.002 (10.003)	10 V CAL
100 V	100	99.98 (99.97)	100.02 (100.03)	100 V CAL (INPUT DIV)
1000 V	1000	999.8 (999.7)	1000.2 (1000.3)	1 KV CAL

[1] Model 8120A only.

(4) Set calibrator output to minimum.

b. Adjustments. No further adjustments can be made.

9. Ac Voltage

a. Performance Check

(1) Press function **V AC** and **RANGE 1** pushbuttons.

(2) Set calibrator for an output amplitude of 1.0000 V at an output frequency of 1 kHz. If TI does not indicate within limits specified in first row of table 4, perform corresponding adjustments in table 4.

(3) Repeat technique of (1) and (2) above, for settings and indications listed in table 4. If TI does not indicate within limits specified, perform corresponding adjustments in table 4.

Table 4. Ac Voltage

Calibrator		Test instrument			Adjustments (fig. 1) (R)
Output amplitude	Output frequency	Range	Indication limits Min	Max	
1 V	1 kHz	1	0.9975	1.0025	ACV CAL (ACV)
100 mV	1 kHz	100 mV[1]	99.75	100.25	AC 100 MV
100 mV	20 kHz	100 mV[1]	99.40	100.60	AC 100 MVHF
1 V	20 kHz	1	0.9940	1.0060	1 V HF ADJ(1 V HF)
1 V	10 kHz	1	0.9975	1.0025	– – –
1 V	30 Hz	1	0.9940	1.0060	– – –
10 V	30 Hz	10	9.940	10.060	– – –
10 V	20 kHz	10	9.940	10.060	10 V HF ADJ (10 V HF)
10 V	10 kHz	10	9.975	10.025	– – –
10 V	1 kHz	10	9.975	10.025	– – –
100 V	1 kHz	100	99.75	100.25	– – –
100 V	20 kHz	100	99.40	100.60	– – –
100 V	30 Hz	100	99.40	100.60	– – –
1000 V	30 Hz	1000	994.0	1006.0	– – –
1000 V	10 kHz	1000	997.5	1002.5	– – –
1000 V	20 kHz	1000	994.0	1006.0	– – –

[1]Model 8120A only.

(4) Set calibrator output to minimum.

b. Adjustments. No further adjustments can be made.

10. Dc Current (Model 8120A)

a. Performance Check

(1) Press **FUNCTION MA-DC** and **RANGE 1** pushbuttons.

(2) Set calibrator for an output amplitude of 1 mA dc. If TI does not indicate within limits specified in first row of table 5, perform corresponding adjustment in table 5.

(3) Repeat technique of (1) and (2) above using settings listed in table 5. TI will indicate within limits specified in table 5.

Table 5. Dc Current

Calibrator	Test instrument			Adjustment (fig. 1) (R)
	Range	Indication limits		
Output	setting (MA)	Min	Max	
1 mA	1	0.9988	1.0012	MA
100 μA	100 μA	99.88	100.12	– – –
10 mA	10	9.988	10.012	– – –
100 mA	100	99.88	100.12	– – –
1 A	1000	998.8	1001.2	– – –

(4) Set calibrator output to minimum.

b. Adjustments. No further adjustments can be made.

11. Resistance

a. Performance Check

(1) Press function **10 MΩ** pushbutton.

(2) Set calibrator for a 10 MΩ nominal output.

(3) Rotate calibrator knob below **EDIT FIELD** pushbutton to adjust calibrator display indication to equal TI indication. If calibrator **err** display does not indicate within limits specified in first row of table 6, perform corresponding adjustments in table 6.

(4) Repeat technique of (1) through (3) above, using outputs and settings listed in table 6. If calibrator **err** display does not indicate within limits specified in table 6, perform corresponding adjustments in table 6.

Table 6. Resistance

Test instrument	Calibrator		Adjustments (fig. 1) (R)
Range pushbutton settings	Nominal output	**err** display indication ±(%)[1]	
10 M	10 MΩ	0.06 (0.11)	10 MEG CAL (10 MEG)
100 (100k)	100 kΩ	0.03 (0.06)	K OHM CAL (K OHMS)
1 (1 k)	1 kΩ	0.03 (0.06)	– – –
10 (10 k)	10 kΩ	0.03 (0.06)	– – –
1000 (1 M)	1 MΩ	0.03 (0.06)	– – –

[1] Values in parenthesis apply to model 8120A.

b. Adjustments. No further adjustments can be made.

12. Final Procedure

a. De-energize 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

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0407101

Distribution:
To be distributed in accordance with the initial distribution number (IDN) 342876 requirements for calibration procedure TB 9-4935-365-35.

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.