*TB 9-6625-2321-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER NATIONAL INSTRUMENTS, MODEL DAQCARD-4050

Headquarters, Department of the Army, Washington, DC
26 October 2007

Distribution Statement A: Approved for public release; distribution is unlimited.

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 send in your comments electronically to our E-mail address: 2028@redstone.army.mil or by fax 256-842-6546/DSN 788-6546. For the World Wide Web use: https://amcom2028.redstone.army.mil. Instructions for sending an electronic 2028 can be found at the back of this manual.

*This bulletin supersedes TB 9-6625-2321-35, dated 6 May 2005.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, National Instruments, Model DAQCard-4050. 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 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 in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Dc voltage	Range: 0.2 to 200 V Accuracy: ±1% of range
Ac voltage	Range: 0.2 to 200 V Frequency: 1000 Hz Accuracy: ± 3% of range
Resistance	Range: 0 to 20 MΩ Accuracy: ±1% of range
Dc current[1]	Range: 20 to 200 mA dc Accuracy: ±1% of range
Ac current[1]	Range: 20 to 200 mA ac Frequency: 1000 Hz Accuracy: ± 3% of range

[1]Current measurements require current shunt CSM-200ma (part of TI).

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 Sets AN/GSM-286, AN/GSM-287 or 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. The following peculiar accessories are required for this calibration: AN/PSM-95 or AN/PSM-95A and current shunt, National Instruments CSM-200ma (part of TI).

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
CALIBRATOR	Range: 0.200 V dc to 200 V dc Accuracy: ±0.25% Range: 0.200 V ac to 200 V ac Accuracy: ±0.75% Frequency: 1000 Hz Range: 0 to 20 MΩ Accuracy: ±0.25% Range: 20 to 200 mA dc Accuracy: ±0.25% Range: 20 to 200 mA ac Accuracy: ±0.75% Frequency: 1000 Hz	Fluke, Model 5720A (5720A) (p/o MIS-35947); w/amplifier, Fluke 5725A/AR (5725A/AR)

SECTION III
CALIBRATION PROCESS

6. Preliminary Instructions

a. The instructions outlined in paragraph **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 manufacturer's manual for this TI.

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

e. Unless otherwise specified, on screen controls will be accessed by using the trackball controls to move the arrow over the icon, virtual instrument controls, etc., and clicking the left button.

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.

NOTE

The instructions below will apply to both the AN/PSM-95 (SPORT) and AN/PSM-95A (MSD). You can use either to calibrate the DAQCARD-4050.

a. Insert TI into AN/PSM-95 or AN/PSM-95A PCMCIA slot.

b. Connect test probes to TI.

c. Power up AN/PSM-95 or AN/PSM-95A.

d. When the Windows OS desk top appears, double click on the **SELF TEST PC Cards** icon.

e. When the diagnostic utility screen appears, click on the **DMM** button.

f. When you receive a message stating that the self-test has passed, click on the **EXIT** button.

g. When the Windows OS desk top appears, double click on the **DMM** icon. If the TI is properly installed in the AN/PSM-95 or AN/PSM-95A, this will bring up the virtual display for the TI. Use it the same way as a stand alone DMM.

h. Connect calibrator **OUTPUT HI** and **LO** terminals to TI red (+) and black (-) test probes.

8. Dc Voltage

a. Performance Check. Set calibrator output and TI controls to values listed in table 3. If TI indications are not within the limits in table 3, perform **b** below.

Table 3. Dc Voltage

Test instrument range pushbutton settings (V)	Calibrator output settings (V)	Test instrument indications (V)	
		Min	Max
200 m	190 m	188.00 m	192.00 m
2	1.90	1.8800	1.9200
25	19.0	18.800	19.200
250	190	188.00	192.00

b. Adjustments

NOTE

The alignment procedure for the TI is contained on the CD-ROM entitled 'SPORT/MSD DMM Maintenance Disk' that has been issued to each support facility. Perform the procedure below for each range out of tolerance.

(1) Place the maintenance disk in the CD drive.

(2) Software should autostart, if not, navigate to the CD drive and execute 'SPORT_MSD_CAL.exe'.

NOTE

The alignment screen will show the functions/ranges boxes that can be adjusted. The default setting will have all of them selected. Only the function/range box that is out of tolerance should be performed. Use the trackball controls to de-select all of the boxes not required.

(3) Follow on-screen instructions to execute DAQCARD-4050 calibration software.

9. Ac Voltage

a. Performance Check

Set calibrator output and TI controls to values listed in table 4. If TI indications are not within the limits in table 4, perform **b** below.

Table 4. Ac Voltage

Range pushbutton settings (V)	Calibrator output settings @ 1000 Hz (V)	Test instrument indications (V)	
		Min	Max
200 m	190 m	184.00 m	196.00 m
2	1.90	1.8400	1.9600
25	19.0	18.400	19.600
250	190	184.00	196.00

b. Adjustments. Perform the procedure as outlined in **8 b** above.

10. Resistance

a. Performance Check. Set calibrator output and TI controls to values listed in table 5. If TI indications are not within the limits in table 5, perform **b** below.

Table 5. Resistance

Range pushbutton settings (Ω)	Calibrator output settings (Ω)	Test instrument indications (Ω)	
		Min	Max
200	190	188.00	192.00
2 k	1.90 k	1.8800 k	1.9200 k
20 k	19.0 k	18.800 k	19.200 k
200 k	190 k	188.00 k	192.00 k
2 M	1.90 M	1.8800 M	1.9200 M
20 M	19.0 M	18.800 M	19.200 M

b. Adjustments. Perform the procedure as outlined in **8 b** above.

11. Dc Current

a. Performance Check

(1) Disconnect TI red (+) and black (-) test probes from calibrator **OUTPUT HI** and **LO** terminals.

(2) Connect current shunt (CSM-200 ma) to TI red (+) and black (-) test probes.

(3) Connect calibrator **OUTPUT HI** and **LO** terminals to current shunt (CSM-200 ma) red (+) and black (-) connection.

(4) Click on **Edit** menu at the top of the DMM display.

(5) Click on **Settings**.

(6) Click on **Current and Resistance** tab.

(7) Enter 1.000 in **Current Shunt Resistor** window.

(8) Set calibrator output and TI controls to values listed in table 6.

Table 6. Dc current

Test instrument range pushbutton settings (mA)	Calibrator output settings (mA)	Test instrument indications (mA)	
		Min	Max
20	19.0	18.800	19.200
200	190	188.00	192.00

b. Adjustments. No adjustments can be made.

12. Ac Current

a. Performance Check

Set calibrator output and TI controls to values listed in table 7.

Table 7. Ac current

Test instrument range pushbutton settings (mA)	Calibrator output settings @ 1000 Hz (mA)	Test instrument indications (mA)	
		Min	Max
20	19.0	18.400	19.600
200	190	184.00	196.00

b. Adjustments. No adjustments can be made.

13. 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:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0723904

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 344664 requirements for calibration procedure TB 9-6625-2321-24.

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.