TB 9-6625-2321-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

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

Headquarters, Department of the Army, Washington, DC
14 September 1998

Approved for public release; distribution is unlimited

REPORTING OF ERRORS

You can help improve this publication by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028, Recommended Changes to Publications, should be mailed directly to Commander, U. S. Army Aviation and Missile Command, ATTN: AMSAM-TMD-EP. You may also contact this office electronically. E-mail address: tmde-e@redstone.army.mil. FAX to DSN 788-2313 (256-842-2313). A reply will be furnished directly to you.

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. The AN/PSM-95 and current shunt, National Instruments CSM-200ma (part of TI) will be required for this procedure.

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 applications that pertain to this calibration are in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Dc voltage	Range: .2 to 200 V Accuracy: ±1% of range
Ac voltage	Range: .2 to 200 V Frequency: 1000Hz Accuracy: ± 3% of range
Resistance	Range: 0 to 20 M 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)

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 item 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	Range: .200 V dc to 200 V dc Accuracy: ±.25% Range: .200 V ac to 200 V ac Accuracy: ±.75% Frequency: 1000 Hz Range: 0 to 20 MΩ Accuracy: ±.25% Range: 20 to 200 mA dc Accuracy: ±.25% Range: 20 to 200 mA ac Accuracy: ±.75% Frequency: 1000 Hz	John Fluke, Model 5700A (p/o MIS-35947

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.

a. Open back tray of AN/PSM-95.

b. Insert TI into back tray.

c. Connect test probes to TI.

d. Close back tray.

e. Press **OFF/ON** pushbutton.

f. When the Windows 95 desk top appears, double click on the **SPORT DIAGNOSTIC UTILITY** icon.

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

h. When the message "**Passed the self test for the digital multimeter PC card**" appears, click on the **EXIT** button.

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

j. Connect calibrator **OUTPUT** terminals to TI red (+) and black (-) connection.

8. Dc Voltage

a. Performance Check

(1) 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 Maintenance Disk' that has been issued to each support facility. Perform the procedure below for each range out of tolerance

(1) Place the SPORT maintenance disk in the CD drive of the AN/PSM-95.

(2) Click on the **START** button.

(3) Click on **RUN.**

(4) Type in d:\dmmcal\usercal.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.

(5) Follow on-screen instructions.

9. Ac Voltage

a. Performance Check

(1) 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 **9b** above.

10. Resistance

a. Performance Check

(1) 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 **9b**. above.

11. Dc Current

a. Performance Check

(1) Disconnect calibrator **OUTPUT** terminals from the TI red (+) and black (-) connection.

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

(3) Connect calibrator **OUTPUT** 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. If TI indications are not within the limits in table 6, perform **b** below.

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

(1) Set calibrator output and TI controls to values listed in table 7. If TI indications are not within the limits in table 7, perform **b** below.

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.

TB 9-6625-2321-35

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army

04968

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 344664, requirements for TB 9-6625-2321-35.

US GOVERNMENT PRINTING OFFICE: 1998-633-280/60248

PIN NO: 076723-000