TB 9-6685-371-40

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR THERMOMETER READOUT, FLUKE 1529-R WITH PLATINUM RESISTANCE THERMOMETER (PRT), FLUKE 5627-12-M

Headquarters, Department of the Army, Washington, DC

5 December 2007

TB 9-6685-371-40, 6 June 2007, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages	**Insert Pages**
5 and 6	5 and 6

2. File this change sheet in front of the publication for reference purposes.

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

0728802

Distribution:

To be distributed in accordance with STD IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-6685-371-40.

TB 9-6685-371-40

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR THERMOMETER READOUT, FLUKE 1529-R WITH PLATINUM RESISTANCE THERMOMETER (PRT), FLUKE 5627-12-M

Headquarters, Department of the Army, Washington, DC
6 June 2007

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, 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.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of the Thermometer Readout, Fluke 1529-R With Platinum Resistance Thermometer (PRT), Fluke 5627-12-M. 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. Variations among models are described in text.

b. Time and Technique. The time required for calibration of the Fluke 1529-R is approximately 2 hours, using dc & low and physical techniques. The time required for calibration of the Fluke 5627-12-M is approximately 6 hours, using dc & low and physical techniques.

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
Resistance	0 Ohm $\pm$ 0.001 Ohm 100 Ohm $\pm$ 0.005 Ohm
Temperature	0 deg C $\pm$ 0.1 deg C 100 deg C $\pm$ 0.25 deg C

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 Reference Calibration Standards Set, NSN 4931-00-621-7878. 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)
MIDDLE TEMPERATURE BATH	Range: 0 deg C, 100 deg C	Hart Scientific 7341
MULTIMETER	Range: 100 to 200 Ohm Accuracy: ± 50 ppm	Hewlett-Packard, Model 3458A (3458A)
RESISTANCE STANDARD	100 Ohm Accuracy: ± 10 ppm	L&N, Model 4030B (8616291)
SPRT	Range: 0 deg to 100 deg C Accuracy: ± 0.02 deg C [1]	Rosemont 162CE or 162C
SUPER THERMOMETER	Range: 0 deg to 100 deg C Accuracy: ± 0.02 deg C [1]	Hart Scientific 1590

[1] Combined accuracies of the super thermometer and SPRT.

SECTION III
CALIBRATION PROCESS FOR THEMOMETER READOUT, FLUKE 1529-R

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 manufacturer's manual for this TI.

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

7. Equipment Setup

NOTE

Turn instrument power off prior to connecting or disconnecting to the channel inputs (rear panel).

a. Connect the PRT to CH1 (rear panel) of the TI.

b. Energize equipment and wait for self check to complete.

8. Thermometer Readout

a. Performance Check

NOTE

Some available temperature baths do not have a range of 0 degrees C to 100 degrees C. A separate ice bath can be used for (1) and (2) below, and the middle temperature bath can be used for (3) and (4) below.

(1) Place both the PRT and the SPRT into the middle temperature bath. Set the middle temperature bath to 0 degrees C.

(2) Allow the middle temperature bath to stabilize at 0 degrees C. The TI reading will equal the super thermometer reading $\pm$ 0.1 degrees C, if not perform **b** below.

(3) Set the middle temperature bath to 100 degrees C.

(4) Allow the middle temperature bath to stabilize at 100 degrees C. The TI reading will equal the super thermometer reading $\pm$ 0.25 degrees C, if not perform **b** below.

(5) Repeat (1) through (4) above for each TI channel.

b. Adjustments

(1) Remove the PRT from the TI and connect a shorting wire (0 Ω resistance) to the TI channel being calibrated as shown in figure 1.

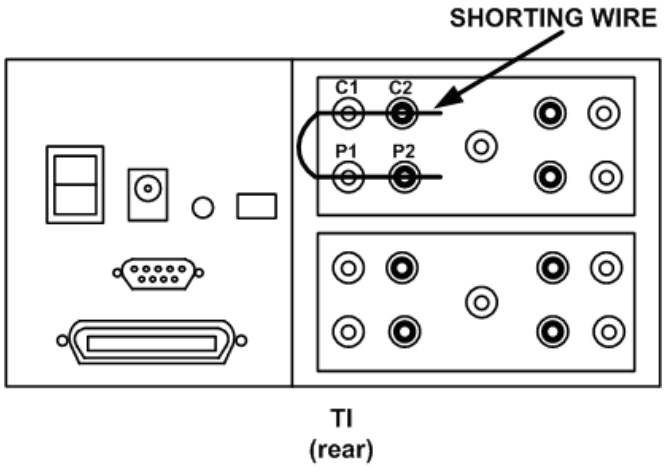

Figure 1. 0 ohm connection.

(2) Record the average displayed value in ohms (display panel **INP:**) for the channel being calibrated.

(3) Determine the **C0** parameter by subtracting the average displayed value recorded in (2) above.

Example: The input is 0.0000 Ω and the average displayed value recorded was - 0.0011 Ω, then the value of the **C0** parameter is +0.0011.

(4) Record the **C0:** value for use in (14) below.

(5) Remove the shorting wire from the TI and connect the 100 Ω resistance standard to the TI channel being calibrated as shown in figure 2.

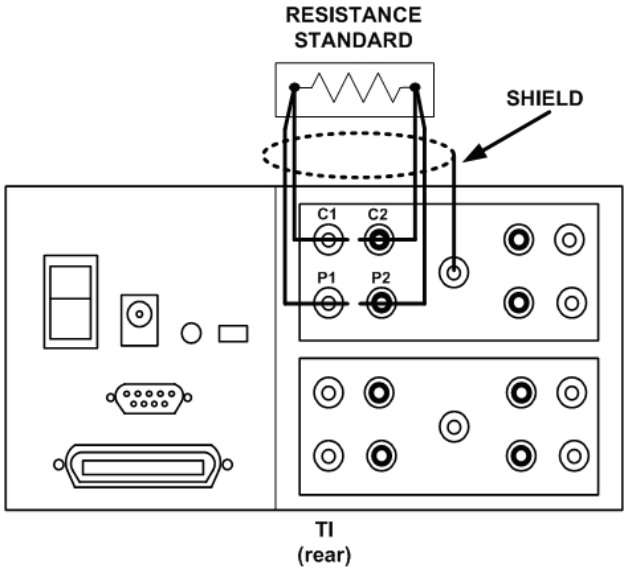

Figure 2. 100 ohm connection.

(6) Record the average displayed value in ohms (display panel **INP:**) for the channel being calibrated.

(7) Determine the **C100** parameter by subtracting the average displayed value recorded in (6) above from the standard test report value.

Example: The standard resistor test report value is 100.0000 Ω and the average displayed value recorded was 100.0295 Ω, then the C100 parameter is (100 - 100.0295) = -0.0295.

(8) Record the **C100** value for use in (16) below. Disconnect the 100Ω resistance standard from the TI.

(9) Press **ENTER/MENU**, press ◆◆ to highlight **SYSTEM**, press **ENTER/MENU**.

(10) Press ◆◆ to highlight **CALIBRATION**, press **ENTER/MENU**. Follow on-screen instructions.

(11) Press ◆◆ and ▼▲ to enter the password (default is 1529). Press **ENTER/MENU**.

(12) Press ◆◆ to highlight channel being calibrated, press **ENTER/MENU** to view calibration parameters.

(13) Press ▼▲ to highlight the **C0:** value.

(14) Press ◆◆ and ▼▲ to set the new **C0:** value recorded in (4) above, then press **ENTER/MENU** to accept this value.

(15) Press ▼▲ to highlight the **C100:** value.

(16) Press  and to set the new **C100:** value recorded in (8) above, then press **ENTER/MENU** to accept this value.

(17) Press **ENTER/MENU** until **DUE:** is selected then enter due date.

(18) Press **ENTER/MENU** then press **EXIT** until readout returns to default temperature display.

9. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA label/form in accordance with TB 750-25.

SECTION IV
CALIBRATION PROCESS FOR PLATINUM RESISTANCE THERMOMETER (PRT), FLUKE 5627-12-M

10. 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 manufacturer's manual for this TI.

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

11. Equipment Setup. Energize the thermometer readout and wait for self check to complete.

12. Platinum Resistance Thermometer (PRT)

a. Performance Check

NOTE

The steps in paragraph **12** characterize the PRT coefficients and are performed one time only for each probe. The coefficients will be copied to the other channels.

(1) Download the file "PRTCoefficient.exe" from the USATA Web page (Publication/Controller Automated Tools/Procedure/RTDcoefficient.exe). Select the page "**0 to 156 C; a10**" of this excel file. Follow the instructions in the spreadsheet to generate the Rtpw and the a10 coefficients for the PRT. Record the Rtpw and a10 coefficient for use in (6) (c) and (6) (d) below.

(2) Press **ENTER/MENU**, press ◆◆ to highlight **PROBE**, press **ENTER/MENU** to select it.

(3) **EDIT PROBE** is highlighted, press **ENTER/MENU**.

(4) Press ▲▲ to highlight **SERIAL:** and press ◆◆ , ▲▲ to enter probe serial number.

(5) Press **ENTER/MENU**. **TYPE ITS-90** will be highlighted. If **TYPE** is not **ITS-90**, use ◆◆ to change it to **ITS-90**. Press **ENTER/MENU**.

(6) Press ◆◆ , ▲▲ and **ENTER/MENU** to highlight and set each **ITS-90** parameter as listed in (a) through (d) below:

(a) **RANGE** to 100 Ω.
(b) **WIRES** to 4.
(c) **RTPW** to the Rtpw value recorded in (1) above.
(d) **A** to the a10 value recorded in (1) above.

(7) Set all other **ITS-90** parameters to **0**. Press **EXIT** repeatedly until Probe Characterization Functions is displayed.

(8) Highlight **COPY PROBE**, press **ENTER/MENU**.

(9) Press ◆◆ to select **FROM CH: CHAN1**, press **ENTER/MENU**.

(10) Press ◆◆ to select **TO CH: ALL**. Press **ENTER/MENU** twice.

(11) Press **EXIT** to return to default temperature display.

(12) Perform paragraphs **7** and **8** to verify that TI meets specified tolerances.

b. Adjustments. No further 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

0708102

Distribution:

To be distributed in accordance with the STD IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-6685-371-40.

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.