

TB 9-6625-2350-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL MULTIMETER

AN/USM-486A

(KEITHLY, MODEL 197A)

Headquarters, Department of the Army, Washington, DC

6 November 2003

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 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		Paragraph	Page
I.	IDENTIFICATION AND DESCRIPTION		
	Test instrument identification.....	1	2
	Forms, records, and reports.....	2	2
	Calibration description.....	3	2
II.	EQUIPMENT REQUIREMENTS		
	Equipment required.....	4	3
	Accessories required.....	5	3
III.	CALIBRATION PROCESS		
	Preliminary instructions.....	6	4
	Equipment setup.....	7	4
	DC voltage.....	8	5
	AC voltage.....	9	7
	Resistance.....	10	10
	dB display.....	11	13
	DC current.....	12	13
	AC current.....	13	14
	Final procedure.....	14	15

**SECTION I
IDENTIFICATION AND DESCRIPTION**

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Multimeter, AN/USM-486A (Keithley, Model 197A). TM 11-6625-3277-14 and 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. 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 listed in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications					
Dc voltage	Range: 0 to 1000 V in 5 ranges Accuracy: 200 mV range; $\pm 0.05\%$ +10 counts 2, 20, 200, 1000 V ranges; 0.05% + 30 counts					
Dc current	Range: 0 to 10 A in 6 ranges Accuracy: 200 μ A, 2 mA, 20 mA, 200 mA; $\pm 0.2\%$ + 10 counts 2000 mA, 10 A; $\pm 0.5\%$ + 20 counts					
Ac voltage	Range: 0 to 750 V in 5 ranges Accuracy: \pm (% of input + counts)					
	Frequency					
		20-50 Hz	50 Hz- 10 kHz	10-20 kHz	20 - 50 kHz	50-100 kHz
	200 mV;	1.5 + 100	0.5 + 100	1.0 + 100	2.0 + 500	29.2 + 0
	2 V;	1.5 + 100	0.5 + 100	1.0 + 100	2.0 + 500	29.2 + 0
	20 V;	1.5 + 100	0.5 + 100	1.0 + 100	2.0 + 500	29.2 + 0
	200 V;	1.5 + 100	0.5 + 100	1.0 + 100	2.0 + 500	29.2 + 0
750 V;	1.5 + 100	0.5 + 100	1.0 + 100	2.0 + 500	29.2 + 0	

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications
Ac current	Range: 0 to 10 A in 6 ranges Accuracy: ± (% of input + counts) Frequency 20 Hz – 50 Hz 50 Hz – 20 kHz 200 µA 2.0 + 250 2.0 + 500 2 mA 2.0 + 250 2.0 + 500 20 mA 2.0 + 250 2.0 + 500 200 mA 2.0 + 250 2.0 + 500 2000 mA 2.0 + 250 2.0 + 500 10 A 2.0 + 250 2.0 + 250
Resistance	Range: 0 to 20 MΩ in 6 ranges ¹ Accuracy: 200 Ω, 2 kΩ; ±0.1% of input + 10 counts 20 kΩ, 200 kΩ; ±0.05% of input + 10 counts 2 MΩ, 20 MΩ; ± 0.2% of input + 20 counts
dBm	Range: -58 dBm to 30 dBm ,20 Hz to 20 kHz Accuracy: -58 dBm to -48 dBm; ±2.0 dBm -48 dBm to -32 dBm; ±1.0 dBm -32 dBm to +10 dBm; ±0.5 dBm +10 dBm to +30 dBm; ±0.25 dBm

¹ Appropriate range selected automatically in MΩ.

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: 0 to 1000 V Accuracy: $\pm 0.0125\%$ Dc current: Range: 200 μA to 5 A Accuracy: $\pm 0.05\%$ Ac voltage: Range: 0 to 1000 V Frequency: 20 Hz to 100 kHz Accuracy: $\pm 0.125\%$ Ac current: Range: 200 μA to 5 A Frequency: 20 Hz to 30 kHz Accuracy: $\pm 0.5\%$ Resistance: Range: 190 Ω to 100 M Ω Accuracy: $\pm 0.0125\%$	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 as needed to make adjustments. Replace cover after completing the adjustments.
- b. Connect TI to a 115 V ac source.
- c. Press TI **POWER** pushbutton to in position (on) and allow at least 1 hour for warm-up.
- d. Position TI controls as listed in (1) through (3) below:
 - (1) **AC DC** to **DC** (out position).
 - (2) Function to **V** (in position).
 - (3) Range to **200m** (in position).

8. DC Voltage

a. Performance Check

- (1) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.
- (2) Set calibrator for an output of 0 mV.
- (3) Press TI **REL** pushbutton and verify TI displays 000.000 mV ± 1 count.

NOTE

Leave TI in **REL** mode for entire DC voltage check.

- (4) Change calibrator output to 190 mV. If TI does not indicate within limits specified in first row of table 3, perform **b** below.
- (5) Press TI **2** range pushbutton (in position).
- (6) Repeat technique of (4) and (5) above for remaining calibrator outputs and TI range settings in table 3. If TI does not indicate within limits specified in table 3, perform **b** below.

Table 3. Dc Voltage Accuracy

Calibrator output	Test instrument		
	Range	Indication limits	
		Min	Max
190 mV	200 mV	189.895	190.105
-190 mV	200 mV	-189.895	-190.105
1.9 V	2 V	1.89875	1.90125
-1.9 V	2 V	-1.89875	-1.90125
19 V	20 V	18.9875	19.0125
-19 V	20 V	-18.9875	-19.0125
190 V	200 V	189.875	190.125
-190 V	200 V	-189.875	-190.125
1000 V	1000 V	999.20	1000.80
-1000 V	1000 V	-999.20	-1000.80

- (7) Set calibrator output to minimum.

b. Adjustments.

- (1) Disconnect equipment setup.

- (2) Set **CALIBRATION** switch on TI rear panel to **ENABLED**.
- (3) Press TI **REL** and **dB** pushbuttons simultaneously and ensure TI **C** annunciator is displayed.
- (4) Press TI **200m** pushbutton (in position).
- (5) Short TI **INPUT HI** and **LO** terminals.
- (6) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (7) Remove short at TI **INPUT HI** and **LO** terminals.
- (8) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.
- (9) Set calibrator output to 190.000 mV.

NOTE

TI **STO/CLR** button increments displayed reading and **RCL** button decrements displayed reading.

- (10) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 190.000.
- (11) Press TI **2** range pushbutton (in position).
- (12) Change calibrator output to 1.90000 V.
- (13) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 1.90000.
- (14) Change calibrator output to -1.90000 V.
- (15) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of -1.90000.
- (16) Change calibrator output to minimum and disconnect calibrator **OUTPUT HI** and **LO** from TI **INPUT HI** and **LO**.
- (17) Press TI **20** range pushbutton (in position).
- (18) Short TI **INPUT HI** and **LO** terminals.
- (19) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (20) Remove short at TI **INPUT HI** and **LO** terminals.
- (21) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.
- (22) Set calibrator output to 19.0000 V.
- (23) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 19.0000.
- (24) Change calibrator output to minimum and disconnect calibrator **OUTPUT HI** and **LO** from TI **INPUT HI** and **LO**.
- (25) Press TI **200** range pushbutton (in position).
- (26) Short TI **INPUT HI** and **LO** terminals.
- (27) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (28) Remove short at TI **INPUT HI** and **LO** terminals.
- (29) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.

- (30) Set calibrator output to 190.000 V.
- (31) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 190.000.
- (32) Change calibrator output to minimum and disconnect calibrator **OUTPUT HI** and **LO** from TI **INPUT HI** and **LO**.
- (33) Press TI **1000** range pushbutton (in position).
- (34) Short TI **INPUT HI** and **LO** terminals.
- (35) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (36) Remove short at TI **INPUT HI** and **LO** terminals.
- (37) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.
- (38) Set calibrator output to 1000.00 V.
- (39) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 1000.00.
- (40) Change calibrator output to minimum and disconnect calibrator **OUTPUT HI** and **LO** from TI **INPUT HI** and **LO**.

NOTE

The following steps will store calibration constants.

- (41) Press TI **REL** and **dB** pushbuttons simultaneously and ensure TI **STOR** annunciator is displayed.
- (42) Set **CALIBRATION** switch on TI rear panel to **DISABLED**.

9. AC Voltage

a. Performance Check

- (1) Set TI pushbuttons as listed in (a) through (c) below:
 - (a) **AC DC** to **AC** (in position).
 - (b) **REL** to off.
 - (c) Range **200m** (in position).
- (2) Set calibrator for an output of 190.00 mV at a frequency of 20 Hz. If TI does not indicate within limits specified in first row of table 4, perform **b** below.
- (3) Repeat technique of (1) © and (2) above for remaining calibrator outputs and TI range settings in table 4. If TI does not indicate within limits specified in table 4, perform **b** below.

Table 4. AC Volts Accuracy

Calibrator output		Test instrument		
Amplitude	Frequency	Range	Indication limits	
			Min	Max
190 mV	20 Hz	200 mV	187.050 mV	192.950 mV
190 mV	9 kHz	200 mV	188.950 mV	191.050 mV
190 mV	19 kHz	200 mV	188.000 mV	192.000 mV
190 mV	45 kHz	200 mV	185.700 mV	194.300 mV
190 mV	100 kHz	200 mV	134.520 mV	245.480 mV
1.9 V	20 Hz	2 V	1.87050 V	1.92950 V

Table 4. AC Volts Accuracy – Continued

Calibrator output		Test instrument		
Amplitude	Frequency	Range	Indication limits	
			Min	Max
1.9 V	9 kHz	2 V	1.88950 V	1.91050 V
1.9 V	19 kHz	2 V	1.88000 V	1.92000 V
1.9 V	45 kHz	2 V	1.85700 V	1.94300 V
1.9 V	100 kHz	2 V	1.34520 V	2.45480 V
19 V	20 Hz	20 V	18.7050 V	19.2950 V
19 V	9 kHz	20 V	18.8950 V	19.1050 V
19 V	19 kHz	20 V	18.8000 V	19.2000 V
19 V	45 kHz	20 V	18.5700 V	19.4300 V
19 V	100 kHz	20 V	13.4520 V	24.5480 V
190 V	20 Hz	200 V	187.050 V	192.950 V
190 V	9 kHz	200 V	188.950 V	191.050 V
190 V	19 kHz	200 V	188.000 V	192.000 V
190 V	51 kHz	200 V	185.700 V	194.300 V
750 V	40 Hz	1000 V	737.75 V	762.25 V
750 V	9 kHz	1000 V	745.25 V	754.75 V

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

b. Adjustments.

(1) Disconnect equipment setup.

(2) Set **CALIBRATION** switch on TI rear panel to **ENABLED**.

(3) Press TI **REL** and **dB** pushbuttons simultaneously and ensure TI **C** annunciator is displayed.

(4) Ensure TI **AC DC** is set to **AC** (in position).

(5) Press TI **200m** pushbutton (in position).

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

(7) Set calibrator for an output of 190.000 mV at a frequency of 500 Hz.

NOTE

TI **STO/CLR** button increments displayed reading and **RCL** button decrements displayed reading.

(8) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 190.000.

(9) Press TI **dB** pushbutton and ensure TI **dB** annunciator is displayed.

(10) Change calibrator output to 19.000 mV at a frequency of 500 Hz.

(11) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 19.000.

(12) Press TI **REL** pushbutton and ensure TI **dB** annunciator is off.

(13) Press TI **2** range pushbutton (in position).

(14) Change calibrator output to 1.90000 V at a frequency of 500 Hz.

(15) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 1.90000.

- (16) Press TI **20** range pushbutton (in position).
- (17) Change calibrator output to 19.0000 V at a frequency of 500 Hz.
- (18) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 19.0000.
- (19) Press TI **200** range pushbutton (in position).
- (20) Change calibrator output to 190.000 V at a frequency of 500 Hz.
- (21) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display of 190.000.
- (22) Change calibrator output to minimum and disconnect calibrator **OUTPUT HI** and **LO** from TI **INPUT HI** and **LO**.

NOTE

The following steps will store calibration constants.

- (23) Press TI **REL** and **dB** pushbuttons simultaneously and ensure TI **STOR** annunciator is displayed.
- (24) Set **CALIBRATION** switch on TI rear panel to **DISABLED**.

NOTE

Replace cover as necessary after each of the following adjustments to prevent drift in readings due to temperature change.

- (25) Press TI **1000** range pushbutton (in position).
- (26) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.
- (27) Set calibrator for an output of 500.00 V at a frequency of 500 Hz.
- (28) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (29) Change calibrator output to 500.00 V at a frequency of 20 k Hz.
- (30) Adjust C103 (fig. 1) for a display of 0000.00 ± 150 counts (R).
- (31) Set calibrator output to minimum.
- (32) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (33) Press TI **200** range pushbutton (in position).
- (34) Set calibrator for an output of 100.00 V at a frequency of 500 Hz.
- (35) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (36) Change calibrator output to 100.00 V at a frequency of 20 k Hz.
- (37) Adjust C105 (fig. 1) for a display of 000.000 ± 200 counts (R).
- (38) Set calibrator output to minimum.
- (39) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (40) Press TI **20** range pushbutton (in position).
- (41) Set calibrator for an output of 10.00 V at a frequency of 500 Hz.
- (42) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.

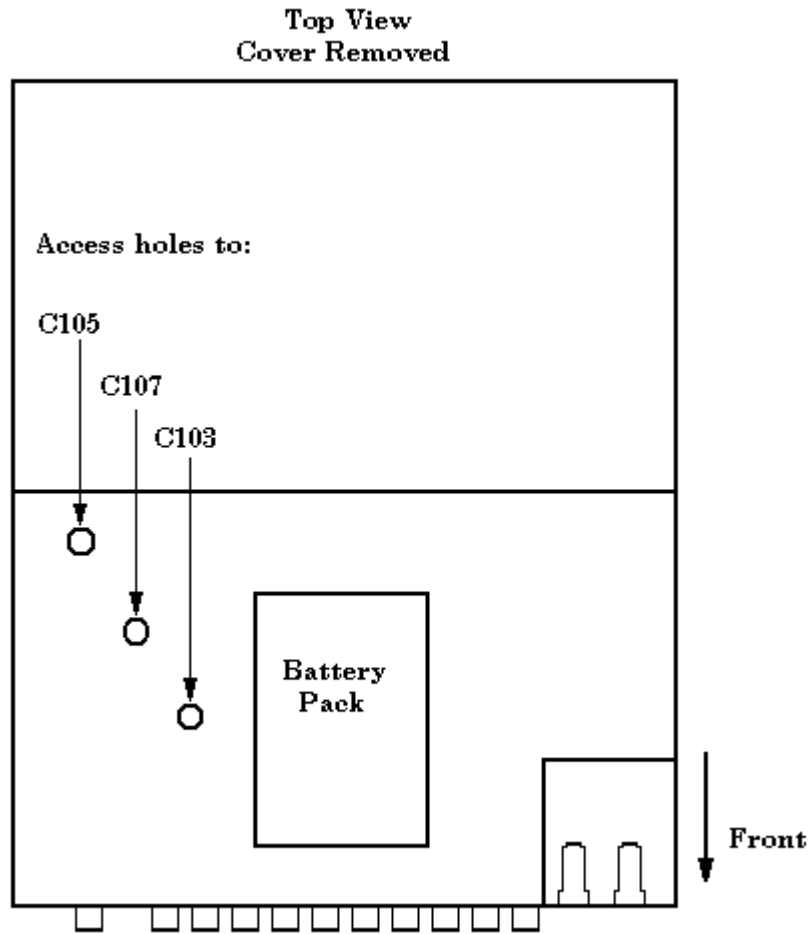


Figure 1. Adjustment locations.

- (43) Change calibrator output to 10.00 V at a frequency of 20 k Hz.
- (44) Adjust C107 (fig. 1) for a display of 00.0000 ± 200 counts (R).
- (45) Set calibrator output to minimum and disconnect equipment setup.
- (46) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.

10. Resistance

a. Performance Check

- (1) Set TI pushbuttons as listed in (a) through (c) below:
 - (a) **AC DC** to **DC** (out position).
 - (b) Function to **Ω** (in position).
 - (c) Range to **200** (in position).
- (2) Connect calibrator to TI as follows:
 - (a) Calibrator **OUTPUT HI** to TI **INPUT HI**.
 - (b) Calibrator **OUTPUT LO** to TI **INPUT LO**.

- (c) Calibrator **SENSE HI** to TI **Ω SENSE HI**.
- (d) Calibrator **SENSE LO** to TI **Ω SENSE LO**.
- (3) Set calibrator for a 0 Ω nominal output (**EXT SNS: ON** and **2-wire comp: OFF**).
- (4) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed (leave TI in **REL** mode for entire resistance performance check).
- (5) Displayed indication will be 000.000.
- (6) Change calibrator output to 190 Ω nominal.
- (7) Rotate calibrator knob below **EDIT FIELD** pushbutton to adjust calibrator display indication to equal TI indication. If calibrator **Err** display indication is not within limits specified in first row of table 5, perform **b** below.
- (6) Repeat technique of (1) (c), (6) and (7) above, using calibrator outputs in table 5. If calibrator **Err** display indication is not within limits specified in table 5, perform **b** below.

Table 5. Resistance Accuracy

Test instrument Range	Calibrator	
	Nominal output	Err indication ± (%)
200 Ω	190 Ω	.105
2 kΩ	1.9 kΩ	.105
20 kΩ	19 kΩ	.055
200 kΩ	190 kΩ	.055
2 MΩ ¹	1.9 MΩ	.210
20 MΩ ¹	19 MΩ	.210

¹ Appropriate range selected automatically in MΩ.

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

b. Adjustments

- (1) Connect calibrator to TI as follows:
 - (a) Calibrator **OUTPUT HI** to TI **INPUT HI**.
 - (b) Calibrator **OUTPUT LO** to TI **INPUT LO**.
 - (c) Calibrator **SENSE HI** to TI **Ω SENSE HI**.
 - (d) Calibrator **SENSE LO** to TI **Ω SENSE LO**.
- (2) Set **CALIBRATION** switch on TI rear panel to **ENABLED**.
- (3) Press TI **REL** and **dB** pushbuttons simultaneously and ensure TI **C** annunciator is displayed.
- (4) Press TI **200** range pushbutton (in position).
- (5) Set calibrator for a 0 Ω nominal output (**EXT SNS: ON** and **2-wire comp: OFF**).
- (6) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (7) Displayed indication will be 000.000.
- (8) Change calibrator output to 190 Ω nominal.

NOTE

TI **STO/CLR** button increments displayed reading and **RCL** button decrements displayed reading.

- (9) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display equal to calibrator displayed output value (rounded to TI display resolution).
- (10) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (11) Press TI **2k** range pushbutton (in position).
- (12) Change calibrator output to 0 Ω nominal.
- (13) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (14) Change calibrator output to 1.900 k Ω nominal.
- (15) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display equal to calibrator displayed output value (rounded to TI display resolution).
- (16) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (17) Press TI **20k** range pushbutton (in position).
- (18) Change calibrator output to 0 Ω nominal.
- (19) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (20) Change calibrator output to 19.000 k Ω nominal.
- (21) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display equal to calibrator displayed output value (rounded to TI display resolution).
- (22) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (23) Disconnect calibrator **SENSE HI** from TI **Ω SENSE HI** and calibrator **SENSE LO** to TI **Ω SENSE LO**.
- (24) Press TI **200k** range pushbutton (in position).
- (25) Change calibrator output to 0 Ω nominal.
- (26) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (27) Change calibrator output to 190.000 k Ω nominal.
- (28) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display equal to calibrator displayed output value (rounded to TI display resolution).
- (29) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (30) Press TI **M Ω** range pushbutton (in position).
- (31) Change calibrator output to 0 Ω nominal.
- (32) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (33) Change calibrator output to 1.9 M Ω nominal.
- (34) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display equal to calibrator displayed output value (rounded to TI display resolution).
- (35) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.
- (36) Change calibrator output to 0 Ω nominal.

- (37) Press TI **REL** pushbutton and ensure TI **REL** annunciator is displayed.
- (38) Change calibrator output to 19 M Ω nominal.
- (39) Press TI **STO/CLR** and **RCL** buttons as necessary for a TI display equal to calibrator displayed output value (rounded to TI display resolution).

NOTE

The following steps will store calibration constants.

- (40) Press TI **REL** and **dB** pushbuttons simultaneously and ensure TI **STOR** annunciator is displayed.
- (41) Set **CALIBRATION** switch on TI rear panel to **DISABLED**.
- (42) Set calibrator output to minimum and disconnect equipment setup.

11. dB Display

a. Performance Check

- (1) Connect calibrator **OUTPUT HI** to TI **INPUT HI** and calibrator **OUTPUT LO** to TI **INPUT LO**.
- (2) Press TI pushbuttons as listed in (a) through (d) below:
- Function to **V** (in position).
 - AC DC** to **AC** (in position).
 - Range to **AUTO** (in position).
 - dB** (**dB** annunciator displayed).
- (3) Set calibrator for an output of -55 dBm at a frequency of 1 kHz. TI will indicate within limits specified in first row of table 6.
- (4) Repeat technique of (3) above, using calibrator outputs in table 6. TI will indicate within limits specified in table 6.

Table 6. dBm Accuracy

Calibrator output		Test instrument indication limits	
dBm	Frequency	Min	Max
-55	1 kHz	-57	-53
-45	1 kHz	-46	-44
-30	1 kHz	-30.5	-29.5
-5	1 kHz	-5.5	-4.5
5	1 kHz	4.5	5.5
15	1 kHz	14.75	15.25
28	1 kHz	27.75	28.25

b. Adjustments. None

12. DC Current

a. Performance Check

- (1) Press TI pushbuttons as listed in (a) through (c) below:

- (a) Function to **A** (in position).
- (b) **AC DC** to **DC** (out position).
- (c) Range to **200μ** (in position).
- (2) Set calibrator for a 0 μA DC output.
- (3) Press TI **REL** pushbutton and verify TI displays 000.000 μA ± 1 count.

NOTE

Leave TI in **REL** mode for entire DC current check.

(4) Change calibrator output to 190 μA. TI will indicate within limits specified in first row of table 7.

(5) Repeat technique of (1) (c) and (4) above, using calibrator outputs and TI ranges in table 7. TI will indicate within limits specified in table 7.

Table 7. DC Current Accuracy

Calibrator output	Test instrument		
	Range	Indication limits	
		Min	Max
190 μA	200 μA	189.610 μA	190.390 μA
1.9 mA	2.0 mA	1.89610 mA	1.90390 mA
19 mA	20 mA	18.9610 mA	19.0390 mA
190 mA	200 mA	189.610 mA	190.039 mA
1900 mA	2000 mA	1890.30 mA	1909.70 mA

(6) Reduce calibrator output to minimum and move connection from TI **INPUT HI** to TI **10A** input.

- (7) Press TI **10** range pushbutton (in position).
- (8) Set calibrator output to 9.9 A. TI will indicate between 9.8485 and 9.9515 A.
- (9) Reduce calibrator output to minimum and disconnect equipment setup.
- (10) Press TI **REL** pushbutton and ensure TI **REL** annunciator is off.

b. Adjustments. None

13. AC Current

a. Performance Check

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

(2) Press TI **AC DC** pushbutton to **AC** (in position) and **200μ** range pushbutton (in position).

(3) Set calibrator for an output of 190.00 μA at a frequency of 20 Hz. TI will indicate within limits specified in first row of table 8.

(4) Repeat technique of (2) and (3) above, using calibrator outputs and TI ranges in table 8. TI will indicate within limits specified in table 8.

Table 8. AC Current Accuracy

Calibrator output		Test instrument		
Current	Frequency	Range	Indication limits	
			Min	Max
190 μ A	20 Hz	200 μ A	185.950 μ A	194.050 μ A
190 μ A	10 kHz	200 μ A	185.700 μ A	194.300 μ A
1.90000 mA	10 kHz	2 mA	1.85700 mA	1.94300 mA
1.90000 mA	20 Hz	2 mA	1.85950 mA	1.94050 mA
19.0000 mA	20 Hz	20 mA	18.5950 mA	19.4050 mA
19.0000 mA	10 kHz	20 mA	18.5700 mA	19.4300 mA
190.000 mA	10 kHz	200 mA	185.700 mA	194.300 mA
190.000 mA	20 Hz	200 mA	185.950 mA	194.050 mA
1900.00 mA	40 Hz	2000 mA	1859.50 mA	1940.50 mA
1900.00 mA	5 kHz	2000 mA	1857.00 mA	1943.00 mA

(5) Reduce calibrator output to minimum and move connection from TI INPUT HI to TI 10A input.

(6) Press TI 10 range pushbutton (in position).

(7) Set calibrator output to 9.9 A at a frequency of 40 Hz. TI will indicate within limits specified in first row of table 9.

(8) Repeat technique of (7) above, using calibrator outputs in table 9. TI will indicate within limits specified in table 9.

Table 9. AC Current Accuracy

Calibrator output		Test instrument		
Current	Frequency	Range	Indication limits	
			Min	Max
9.9 A	40 Hz	10 A	9.6770 A	10.123 A
9.9 A	5 kHz	10A	9.677 A	10.123 A

(9) Reduce calibrator output to minimum and disconnect equipment setup.

14. 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

0325101

Distribution:

To be distributed in accordance with IDN 344793, requirements for calibration procedure TB 9-6625-2350-35.

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: 081048-000