

*TB 9-6625-2315-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR MULTIMETER HEWLETT-PACKARD, MODEL 34401A

Headquarters, Department of the Army, Washington, DC

30 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.

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*This bulletin supersedes TB 9-6625-2315-35 dated 2 October 2003, including all changes.

**SECTION I
IDENTIFICATION AND DESCRIPTION**

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Multimeter, Hewlett-Packard, Model 34401A. 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 2 hours, 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. TI uses closed-box electronic adjustments; no hardware adjustments are used. Report adjustments performed in **SECTION IV** using range and parameter failing performance test; i.e. 10 V dc, 100 ohms, etc.

3. Calibration Description. TI parameters and performance applications which pertain to this calibration are in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications				
Dc voltage	Range: 100 mV to 1000 V				
	Accuracy: \pm (% of reading + % of range) 6½ digits, 1 hour warm-up				
	Range		Accuracy		
	100.0000	mV	0.0050	+	0.0035
	1.000000	V	0.0040	+	0.0007
	10.00000	V	0.0035	+	0.0005
Resistance	Range: 100 Ω to 100 M Ω				
	Accuracy: \pm (% of reading + % of range) 6½ digits, 1 hour warm-up				
	Range		Accuracy ¹		
	100.0000	Ω	0.010	+	0.004
	1.000000	k Ω	0.010	+	0.001
	10.00000	k Ω	0.010	+	0.001
100.0000	k Ω	0.010	+	0.001	
1.000000	M Ω	0.010	+	0.001	
10.00000	M Ω	0.040	+	0.001	
100.0000	M Ω	0.800	+	0.010	

See footnotes at end of table.

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications																												
Dc Current	Range: 10 mA to 3 A Accuracy: \pm (% of reading + % of range) 6½ digits, 1 hour warm-up <table> <thead> <tr> <th>Range</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td>10.00000 mA</td> <td>0.050 + 0.020</td> </tr> <tr> <td>100.0000 mA</td> <td>0.050 + 0.005</td> </tr> <tr> <td>1.000000 A</td> <td>0.100 + 0.010</td> </tr> <tr> <td>3.000000 A</td> <td>0.120 + 0.020</td> </tr> </tbody> </table>	Range	Accuracy	10.00000 mA	0.050 + 0.020	100.0000 mA	0.050 + 0.005	1.000000 A	0.100 + 0.010	3.000000 A	0.120 + 0.020																		
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Ac Voltage	Range: 100 mV to 750 V Accuracy: \pm (% of reading + % of range) 6½ digits, 1 hour warm-up, slow ac filter, sinewave inputs > 5 % of range <table> <thead> <tr> <th>Range</th> <th>Frequency</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td rowspan="5">100.0000 mV</td> <td>3 Hz - 5 Hz</td> <td>1.00 + 0.04</td> </tr> <tr> <td>5 Hz - 10 Hz</td> <td>0.35 + 0.04</td> </tr> <tr> <td>10 Hz - 20 kHz</td> <td>0.06 + 0.04</td> </tr> <tr> <td>20 kHz - 50 kHz</td> <td>0.12 + 0.05</td> </tr> <tr> <td>50 kHz - 100 kHz</td> <td>0.60 + 0.08</td> </tr> <tr> <td rowspan="5">1.000000 V to 750.000 V</td> <td>3 Hz - 5 Hz</td> <td>1.00 + 0.03</td> </tr> <tr> <td>5 Hz - 10 Hz</td> <td>0.35 + 0.03</td> </tr> <tr> <td>10 Hz - 20 kHz</td> <td>0.06 + 0.03</td> </tr> <tr> <td>20 kHz - 50 kHz</td> <td>0.12 + 0.05</td> </tr> <tr> <td>50 kHz - 100 kHz</td> <td>0.60 + 0.08</td> </tr> <tr> <td></td> <td>100 kHz - 300 kHz</td> <td>4.00 + 0.50</td> </tr> </tbody> </table>	Range	Frequency	Accuracy	100.0000 mV	3 Hz - 5 Hz	1.00 + 0.04	5 Hz - 10 Hz	0.35 + 0.04	10 Hz - 20 kHz	0.06 + 0.04	20 kHz - 50 kHz	0.12 + 0.05	50 kHz - 100 kHz	0.60 + 0.08	1.000000 V to 750.000 V	3 Hz - 5 Hz	1.00 + 0.03	5 Hz - 10 Hz	0.35 + 0.03	10 Hz - 20 kHz	0.06 + 0.03	20 kHz - 50 kHz	0.12 + 0.05	50 kHz - 100 kHz	0.60 + 0.08		100 kHz - 300 kHz	4.00 + 0.50
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¹Specifications are for 4-wire ohms function, or 2-wire ohms using Math Null.

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.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)																																									
CALIBRATOR	Dc voltage: Range: 100 mV to 1000 V Accuracy: ± 0.001% Resistance: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Range</td> <td style="text-align: center;">Accuracy</td> </tr> <tr> <td style="text-align: center;">0 Ω</td> <td style="text-align: center;">≤0.001 Ω</td> </tr> <tr> <td style="text-align: center;">100 Ω to 1 MΩ</td> <td style="text-align: center;">±0.002 %</td> </tr> <tr> <td style="text-align: center;">10 MΩ</td> <td style="text-align: center;">±0.010 %</td> </tr> <tr> <td style="text-align: center;">100 MΩ</td> <td style="text-align: center;">±0.200 %</td> </tr> </table> Dc current: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Range</td> <td style="text-align: center;">Accuracy</td> </tr> <tr> <td style="text-align: center;">0 mA</td> <td style="text-align: center;">± 0.5 μA</td> </tr> <tr> <td style="text-align: center;">10 mA</td> <td style="text-align: center;">± 0.017 %</td> </tr> <tr> <td style="text-align: center;">100 mA</td> <td style="text-align: center;">± 0.013 %</td> </tr> <tr> <td style="text-align: center;">1 A</td> <td style="text-align: center;">± 0.027 %</td> </tr> <tr> <td style="text-align: center;">2 A</td> <td style="text-align: center;">± 0.037 %</td> </tr> </table> Ac voltage: Range: 100 mV to 750 V <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Frequency</td> <td style="text-align: center;">Accuracy</td> </tr> <tr> <td style="text-align: center;">10 Hz to 20 kHz</td> <td style="text-align: center;">±0.022 %</td> </tr> <tr> <td style="text-align: center;">20 to 50 kHz</td> <td style="text-align: center;">±0.042 %</td> </tr> <tr> <td style="text-align: center;">100 kHz</td> <td style="text-align: center;">±0.17 %</td> </tr> <tr> <td style="text-align: center;">300 kHz</td> <td style="text-align: center;">±1.12 %</td> </tr> </table> Ac Current: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Range</td> <td style="text-align: center;">Frequency</td> <td style="text-align: center;">Accuracy</td> </tr> <tr> <td style="text-align: center;">1 A</td> <td style="text-align: center;">1 kHz</td> <td style="text-align: center;">±.035 %</td> </tr> <tr> <td style="text-align: center;">2 A</td> <td style="text-align: center;">1 kHz</td> <td style="text-align: center;">±.052 %</td> </tr> </table>	Range	Accuracy	0 Ω	≤0.001 Ω	100 Ω to 1 MΩ	±0.002 %	10 MΩ	±0.010 %	100 MΩ	±0.200 %	Range	Accuracy	0 mA	± 0.5 μA	10 mA	± 0.017 %	100 mA	± 0.013 %	1 A	± 0.027 %	2 A	± 0.037 %	Frequency	Accuracy	10 Hz to 20 kHz	±0.022 %	20 to 50 kHz	±0.042 %	100 kHz	±0.17 %	300 kHz	±1.12 %	Range	Frequency	Accuracy	1 A	1 kHz	±.035 %	2 A	1 kHz	±.052 %	Fluke, Model 5720A (5720A) (p/o MIS-35947); w amplifier, Fluke 5725A/AR (5725A/AR)
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FUNCTION/ARBITRARY GENERATOR	Function: Sinewave Amplitude: 1 Vrms Frequency: 100 Hz to 100 kHz Accuracy: ±0.0025 %	Agilent, Model 33250A (33250A)																																									

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. **SECTION IV** contains the adjustments required to calibrate the TI. 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

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. Connect TI to a 115 V ac power source.

b. Press and hold down **Shift** key for more than 5 seconds after pressing **POWER ON/OFF** pushbutton to **ON** then release **Shift** key to start self-test. Self-test will complete in approximately 20 seconds. If self-test is successful, TI will briefly display **PASS** then go into dc voltage measurement mode.

c. Release **Terminals Front/Rear** pushbutton to **Front** and allow 1 hour for warm-up.

8. Dc Voltage

a. Performance Check

(1) Press **FUNCTION DC V** key.

(2) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.

(3) Short TI front and rear input terminals as shown in figure 1 using copper wire and allow 5 minutes for thermal offset voltage settling after handling input connections.

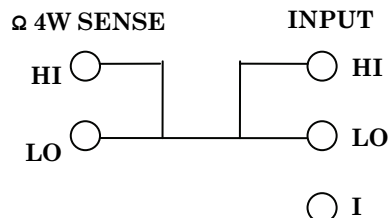


Figure 1. 4-wire short.

(3) Press **RANGE/DIGITS** \wedge or \vee key to select ranges listed in table 3. If TI does not indicate within limits specified, perform **b** below.

Table 3. DC V Zero Offset

Test instrument				
Ranges	Indications			
	Min		Max	
100 mV	-000.0035	mV	+000.0035	mV
1 V	-0.000007	V	+0.000007	V
10 V	-00.00005	V	+00.00005	V
100 V	-000.0006	V	+000.0006	V
1000 V	-0000.010	V	+0000.010	V

- (4) Press **Terminals Front/Rear** pushbutton to **Rear** and repeat (3) above for rear terminals.
- (5) Release **Terminals Front/Rear** pushbutton to **Front**.
- (6) Disconnect short from TI front and rear input terminals.
- (7) Connect calibrator **OUTPUT HI** and **LO** to TI front **Input HI** and **LO**.
- (8) Press **RANGE/DIGITS** \wedge or \vee key to select TI ranges and set calibrator output for settings listed in table 4. If TI does not indicate within limits specified, perform **b** below.

Table 4. Dc Voltage

Test instrument ranges	Calibrator output settings (V dc)	Test instrument indications	
		Min	Max
100 mV	0.1	99.9915 mV	100.0085 mV
1 V	1.0	0.999953 V	1.000047 V
10 V	10	9.9996 V	10.0004 V
10 V	-10	-9.9996 V	-10.0004 V
100 V	100	99.9949 V	100.0051 V
1000 V	1000	999.945 V	1000.055 V

b. Adjustments. Perform paragraphs 14 and 15 below.

9. Resistance

a. Performance Check

- (1) Connect calibrator **OUTPUT HI** and **LO** to TI front **Input HI** and **LO**.
- (2) Connect calibrator **SENSE HI** and **LO** to TI front **Ω4W Sense/Ratio Ref HI** and **LO**.
- (3) Press **Shift** key then **FUNCTION Ω 2W/Ω 4W** key.
- (4) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.
- (5) Set calibrator for a 0 Ω output, **EX SNS** on, and **2 wire Comp** off.
- (6) Press **RANGE/DIGITS** \wedge or \vee key to select ranges listed in table 5. If TI does not indicate within limits specified, perform **b** below.

Table 5. Ω 4W Zero Offset

Test instrument	
Ranges	Indications (\leq)
100 Ω	000.004 Ω
1 kΩ	0.00001 kΩ
10 kΩ	00.0001 kΩ
100 kΩ	000.001 kΩ
1 MΩ	0.00001 MΩ
10 MΩ	00.0001 MΩ
100 MΩ	000.01 MΩ

- (7) Press **RANGE/DIGITS** \wedge or \vee key to select 100 Ω range.
- (8) Set calibrator for a 100 Ω output. Using output adjustment controls set calibrator control display **Reading** equal to TI indication. If calibrator control display **Error** indication is not within limits specified in first row of table 6, perform **b** below.
- (9) Repeat technique of (7) and (8) above using TI ranges and calibrator output settings listed in table 6. If calibrator control display **Error** indications are not within limits specified in table 6, perform **b** below.

Table 6. Resistance

Test instrument ranges	Calibrator	
	Output settings	Control display Error indications ($\pm\%$)
100 Ω	100 Ω	0.014
1 kΩ	1 kΩ	0.011
10 kΩ	10 kΩ	0.011
100 kΩ	100 kΩ	0.011
1 MΩ	1 MΩ	0.011
10 MΩ	10 MΩ	0.041

- (10) Press **FUNCTION Ω 2W** key.
- (11) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.
- (12) Press **RANGE/DIGITS** \wedge or \vee key to select 100 MΩ range.

(13) Set calibrator **EX SNS** off and output to 100 MΩ. Using output adjustment controls set calibrator control display **Reading** equal to TI indication. Calibrator control display **Error** will indicate within ±0.81 percent.

b. Adjustments. Perform paragraphs 14 and 15 below.

10. Dc Current

a. Performance Check

- (1) Connect calibrator **OUTPUT HI** and **LO** to TI front **Input I** and **LO**.
- (2) Press **Shift** key then **FUNCTION DC V/DC I** key.
- (3) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.
- (4) Set calibrator for a 0 mA dc output.
- (5) Press **RANGE/DIGITS** \wedge or \vee key to select ranges listed in table 7. If TI does not indicate within limits specified, perform **b** below.

Table 7. Dc Current Zero Offset

Test instrument		
Ranges	Indications	
	Min	Max
10 mA	-00.002 mA	+00.002 mA
100 mA	-000.005 mA	+000.005 mA
1 A	-0.0001 A	+0.0001 A
3 A	-0.0006 A	+0.0006 A

- (6) Press **RANGE/DIGITS** \wedge or \vee key to select TI ranges and set calibrator output for settings listed in table 8. If TI does not indicate within limits specified, perform **b** below.

Table 8. Dc Current

Test instrument ranges	Calibrator output settings	Test instrument indications	
		Min	Max
10 mA	10 mA	9.993 mA	10.007 mA
100 mA	100 mA	99.945 mA	100.055 mA
1 A	1 A	0.9989 A	1.0011 A
3 A	2 A	1.997 A	2.003 A

b. Adjustments. Perform paragraphs 14 and 15 below.

11. Ac voltage

a. Performance Check

- (1) Connect calibrator **OUTPUT HI** and **LO** to TI **Input HI** and **LO**.
- (2) Press keys as listed in (a) through (f) below:
 - (a) **FUNCTION AC V.**

- (b) **Shift** then **MENU <**.
 - (c) **RANGE/DIGITS** \vee until **AC FILTER** is displayed.
 - (d) **RANGE/DIGITS** \vee until current filter setting is displayed.
 - (e) **MENU <** or **>** until **SLOW 3 HZ** is displayed.
 - (f) **RANGE/DIGITS Auto/Man**.
- (3) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.
- (4) Press **RANGE/DIGITS** \wedge or \vee key to select TI ranges and set calibrator output for settings listed in table 9. If TI does not indicate within limits specified, perform **b** below.

Table 9. Ac Voltage

Test instrument ranges	Calibrator output settings		Test instrument indications	
	Voltage	Frequency	Min	Max
100 mV	100 mV	20 Hz	99.9 mV	100.1 mV
100 mV	100 mV	15 kHz	99.9 mV	100.1 mV
100 mV	100 mV	40 kHz	99.83 mV	100.17 mV
100 mV	100 mV	90 kHz	99.32 mV	100.68 mV
100 mV	100 mV	300 kHz	95.5 mV	104.5 mV
1 V	1 V	20 Hz	0.9991 V	1.0009 V
1 V	1 V	15 kHz	0.9991 V	1.0009 V
1 V	1 V	40 kHz	0.9983 V	1.0017 V
1 V	1 V	90 kHz	0.9932 V	1.0068 V
1 V	1 V	300 kHz	0.955 V	1.045 V
10 V	10 V	10 Hz	9.991 V	10.009 V
10 V	10 V	15 kHz	9.991 V	10.009 V
10 V	10 V	40 kHz	9.983 V	10.017 V
10 V	10 V	90 kHz	9.932 V	10.068 V
10 V	10 V	300 kHz	9.55 V	10.45 V
100 V	100 V	20 Hz	99.91 V	100.09 V
100 V	100 V	15 kHz	99.91 V	100.09 V
100 V	100 V	40 kHz	99.83 V	100.17 V
100 V	100 V	90 kHz	99.32 V	100.68 V
100 V	100 V	200 kHz	95.5 V	104.5 V
750 V	750 V	40 Hz	749.325 V	750.675 V
750 V	750 V	90 kHz	744.9 V	755.1 V

b. Adjustments. Perform paragraphs 14 and 15 below.

12. Ac Current

a. Performance Check

- (1) Connect calibrator **OUTPUT HI** and **LO** to TI **Input I** and **LO**.
- (2) Press **Shift** key then **FUNCTION AC V/AC I** key.
- (3) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.

- (4) Press **RANGE/DIGITS** \wedge or \vee key to select 1 A range.
- (5) Set calibrator for a 1 A, 1 kHz output. If TI does not indicate between 0.9986 and 1.0014 A, perform **b** below.
- (6) Press **RANGE/DIGITS** \wedge or \vee key to select 3 A range.
- (7) Set calibrator for a 2 A, 1 kHz output. If TI does not indicate between 1.9952 and 2.0048 A, perform **b** below.

b. Adjustments. Perform paragraphs 14 and 15 below.

13. Frequency

a. Performance Check

- (1) Connect function/arbitrary generator **Output** to TI **Input HI** and **LO** using 50 Ω feedthrough termination.
- (2) Press **FUNCTION Freq** key.
- (3) Press **Shift** key then **RANGE/DIGITS Auto/Man** key to select 6½ digits resolution.
- (4) Press **RANGE/DIGITS** \wedge or \vee to select 1 V range.
- (5) Set function/arbitrary generator for a sine wave 100 Hz, 1 Vrms output. If TI does not indicate between 99.99 and 100.01 Hz, perform **b** below.
- (6) Set function/arbitrary generator frequency to 100 kHz. If TI does not indicate between 99.99 and 100.01 kHz, perform **b** below.

b. Adjustments. Perform paragraphs 14 and 15 below.

SECTION IV ADJUSTMENT PROCESS

14. Preliminary Instructions

- a. Disconnect TI input terminals from external equipment.
- b. Press **FUNCTION DCV** key and **RANGE/DIGITS** \wedge or \vee key to select 100 mV range.
- c. Press **Terminals Front/Rear** pushbutton to **Rear**.
- d. Short TI front and rear input terminals as shown in figure 1 using copper wire and allow 5 minutes for thermal offset voltage settling after handling input connections.
- e. Press **Shift** key then **MENU <** key to display **A: MEAS MENU**.
- f. Press **MENU <** or **>** key until **F: CAL MENU** is displayed.
- g. Press **RANGE/DIGITS** \vee until **1: SECURED** is displayed.
- h. Press **RANGE/DIGITS** \vee key until **^000000 CODE** is displayed.
- i. Press **MENU <** or **>** and **RANGE/DIGITS** \wedge or \vee keys until **034401** is displayed.
- j. Press **RANGE/DIGITS Auto/Man** key. TI is now in unsecure mode.

CAUTION

Never turn off the TI during adjustments. This may cause ALL calibration memory to be lost.

15. Zero Offset and Gain

a. Perform zero offset adjustment as listed in (1) through (9) below:

- (1) Press **Shift** key then **MENU <** key.
- (2) Press **MENU <** or **>** key until **F: CAL MENU** is displayed.
- (3) Press **RANGE/DIGITS ∨** until **1: UNSECURED** is displayed.
- (4) Press **MENU >** until **2: CALIBRATE** is displayed.
- (5) Press **RANGE/DIGITS ∨** until **PARAMETERS** is displayed.
- (6) Press **MENU <** or **>** and **RANGE/DIGITS ∧** or **∨** keys until **000.0000 mV DC** is displayed.
- (7) Press **RANGE/DIGITS Auto/Man** key. Zero adjustment takes approximately 5 minutes to complete then TI will return to measurement mode.
- (8) Release **Terminals Front/Rear** pushbutton to **Front** and repeat (1) through (7) above.
- (9) Remove short from TI front and rear input terminals.

b. Perform dc volt gain adjustments as listed in (1) through (11) below:

- (1) Connect calibrator **OUTPUT HI** and **LO** to TI **Input HI** and **LO**.
- (2) Set calibrator for a 0.10 V dc output.
- (3) Press **Shift** key then **MENU <** key.
- (4) Press **MENU <** or **>** key until **F: CAL MENU** is displayed.
- (5) Press **RANGE/DIGITS ∨** until **1: UNSECURED** is displayed.
- (6) Press **MENU >** until **2: CALIBRATE** is displayed.
- (7) Press **RANGE/DIGITS ∨** until **PARAMETERS** is displayed.
- (8) Press **MENU <** or **>** and **RANGE/DIGITS ∧** or **∨** keys until **+100.000 mV DC** is displayed.
- (9) Press **RANGE/DIGITS Auto/Man** key. Gain adjustment takes approximately 20 seconds to complete then TI will return to measurement mode.
- (10) Press **RANGE/DIGITS ∧** or **∨** key to select TI ranges and repeat technique of (2) through (9) above for remaining dc volt gain adjustments listed in table 10.

Table 10. Dc Volt Gain Adjustments

Test instrument ranges	Calibrator output	Value displayed in (8) above
1 V	1.0 V	+1.00000 V DC
10 V	10 V	+10.0000 V DC
100 V	100 V	+100.000 V DC
1000 V	1000 V	+1000.00 V DC

- (11) Press calibrator **RESET** key.
- c. Perform resistance gain adjustments as listed in (1) through (14) below:
- (1) Connect calibrator **OUTPUT HI** and **LO** to TI front **Input HI** and **LO**.
 - (2) Connect calibrator **SENSE HI** and **LO** to TI front **Ω 4W Sense/Ratio Ref HI** and **LO**.
 - (3) Press **Shift** key then **FUNCTION Ω 2W/ Ω 4W** key.
 - (4) Press **RANGE/DIGITS** \wedge or \vee key to select 100 Ω range.
 - (5) Set calibrator for a 100 Ω output, **EX SNS** on, and **2 wire Comp** off.
 - (6) Press **Shift** key then **MENU <** key.
 - (7) Press **MENU <** or **>** key until **F: CAL MENU** is displayed.
 - (8) Press **RANGE/DIGITS** \vee key until **1: UNSECURE** is displayed.
 - (9) Press **MENU >** key until **2: CALIBRATE** is displayed.
 - (10) Press **RANGE/DIGITS** \vee key until **PARAMETERS** is displayed.
 - (11) Press **MENU <** or **>** and **RANGE/DIGITS** \wedge or \vee keys until TI display equals calibrator output display rounded to TI digits of resolution.
 - (12) Press **RANGE/DIGITS Auto/Man** key. Adjustment takes approximately 20 seconds to complete then TI will return to measurement mode.
 - (13) Repeat technique of (4) through (12) above for remaining resistance gain adjustments listed in table 11.

Table 11. Resistance Gain Adjustments

Test instrument ranges	Calibrator output
1 k Ω	1 k Ω
10 k Ω	10 k Ω
100 k Ω	100 k Ω
1 M Ω	1 M Ω
10 M Ω	10 M Ω

- (14) Press calibrator **RESET** key.
- d. Perform dc current gain adjustments as listed in (1) through (18) below:
- (1) Connect calibrator **OUTPUT HI** and **LO** to TI front **Input I** and **LO**.
 - (2) Press **Shift** key then **FUNCTION DC V/DC I** key.
 - (3) Press **RANGE/DIGITS** \wedge or \vee key to select 100 mA range.
 - (4) Set calibrator for a 100 mA output.
 - (5) Press **Shift** key then **MENU <** key.
 - (6) Press **MENU <** or **>** key until **F: CAL MENU** is displayed.
 - (7) Press **RANGE/DIGITS** \vee key until **1: UNSECURED** is displayed.
 - (8) Press **MENU >** key until **2: CALIBRATE** is displayed.

- (9) Press **RANGE/DIGITS** \vee key until **PARAMETERS** is displayed.
 - (10) Press **MENU** $<$ or $>$ and **RANGE/DIGITS** \wedge or \vee keys until **+100.000 mA DC** is displayed.
 - (11) Press **RANGE/DIGITS Auto/Man** key. Adjustment takes approximately 20 seconds to complete then TI will return to measurement mode.
 - (12) Press **RANGE/DIGITS** \wedge or \vee key to select 1 A range.
 - (13) Set calibrator for a 1 A output and repeat (5) through (9) above.
 - (14) Press **MENU** $<$ or $>$ and **RANGE/DIGITS** \wedge or \vee keys until **+1.00000 A DC** is displayed. Repeat (11) above.
 - (15) Press **RANGE/DIGITS** \wedge or \vee key to select 3 A range.
 - (16) Set calibrator for a 2 A output and repeat (5) through (9) above.
 - (17) Press **MENU** $<$ or $>$ and **RANGE/DIGITS** \wedge or \vee keys until **+2.00000 A DC** is displayed. Repeat (11) above.
 - (18) Press calibrator **RESET** key.
- e. Perform ac volt gain adjustments as listed in (1) through (13) below:
- (1) Connect calibrator **OUTPUT HI** and **LO** to TI **Input HI** and **LO**.
 - (2) Press keys as listed in (a) through (e) below:
 - (a) **FUNCTION AC V**.
 - (b) **Shift** then **MENU** $<$.
 - (c) **RANGE/DIGITS** \vee until **AC FILTER** is displayed.
 - (d) **MENU** $<$ or $>$ until **SLOW 3 HZ** is displayed.
 - (e) **RANGE/DIGITS Auto/Man**.
 - (3) Press **RANGE/DIGITS** \wedge or \vee key to select 100 mV range.
 - (4) Set calibrator for a 100 mV, 1 kHz output.
 - (5) Press **Shift** key then **MENU** $<$ key.
 - (6) Press **MENU** $<$ or $>$ key until **F: CAL MENU** is displayed.
 - (7) Press **RANGE/DIGITS** \vee key until **1: UNSECURED** is displayed.
 - (8) Press **MENU** $>$ key until **2: CALIBRATE** is displayed.
 - (9) Press **RANGE/DIGITS** \vee key until **PARAMETERS** is displayed.
 - (10) Press **MENU** $<$ or $>$ and **RANGE/DIGITS** \wedge or \vee keys until **100.000 mV AC** is displayed.
 - (11) Press **RANGE/DIGITS Auto/Man** key. Adjustment takes approximately 20 seconds to complete then TI will return to measurement mode.
 - (12) Repeat technique of (3) through (11) above for remaining ac volt adjustments listed in table 12.

Table 12. Ac Volt Gain Adjustments

Test instrument ranges	Calibrator output		Value displayed in (10) above
	Voltage	Frequency	
100 mV	100 mV	50 kHz	100.000 mV AC
1 V	1 V	1 kHz	1.00000 V AC
10 V	10 V	1 kHz	10.0000 V AC
10 V	10 V	50 kHz	10.0000 V AC
10 V	10 V	10 Hz	10.0000 V AC
100 V	100 V	1 kHz	100.000 V AC
100 V	100 V	50 kHz	100.000 V AC
750 V	750 V	1 kHz	750.00 V AC
750 V	200 V	50 kHz	200.00 V AC

(13) Press calibrator **RESET** key and disconnect from TI.

f. Perform frequency adjustments as listed in (1) through (12) below:

(1) Connect function/arbitrary generator **Output** to TI **Input HI** and **LO** using 50 Ω feedthrough termination.

(2) Press **FUNCTION Freq** key.

(3) Press **RANGE/DIGITS** \wedge or \vee to select 1 V range.

(4) Set function/arbitrary generator for a sine wave 50 kHz, 1 Vrms output.

(5) Press **Shift** key then **MENU <** key.

(6) Press **MENU <** or **>** key until **F: CAL MENU** is displayed.

(7) Press **RANGE/DIGITS** \vee key until **1: UNSECURED** is displayed.

(8) Press **MENU >** key until **2: CALIBRATE** is displayed.

(9) Press **RANGE/DIGITS** \vee key until **PARAMETERS** is displayed.

NOTE

The calibration parameter initial display will be 0.000,000 HZ. HZ will have to be changed to 00.000,00 kHz in order to enter 50.000,00 kHz in (10) below.

(10) Press **MENU <** or **>** and **RANGE/DIGITS** \wedge or \vee keys until **50.000,00 kHz** is displayed.

(11) Press **RANGE/DIGITS Auto/Man** key. Adjustment takes approximately 20 seconds to complete then TI will return to measurement mode.

(12) Press function/arbitrary generator **Output** key to off and disconnect from TI.

g. Press TI keys as listed in (1) through (6) below:

(1) **Shift** then **MENU <** to display **A: MEAS MENU**.

(2) **MENU >** until **F: CAL MENU** is displayed.

(3) **RANGE/DIGITS** \vee until **1: UNSECURED** is displayed.

- (4) **RANGE/DIGITS** ∨ until **^000000 CODE** is displayed.
- (5) **MENU** < or > and **RANGE** ∧ and ∨ until **034401** is displayed.
- (6) **RANGE/DIGITS Auto/ Man.** TI is now in secure mode.

h. Perform paragraphs 8 through 13 above.

16. 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:



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

0724001

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

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 344604, requirements for calibration procedure TB 9-6625-2315-24.

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.

