*TB 9-6625-1314-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIGITAL VOLTMETER, HEWLETT-PACKARD MODEL 3440A WITH 3444A AND 3445A PLUG-INS AND DIGITAL MULTIMETER, DATA TECHNOLOGY MODEL 360

Headquarters, Department of the Army, Washington, DC
28 April 2008

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.

			Paragraph	Page
SECTION	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	4
		Accessories required	5	4
	III.	CALIBRATION PROCESS FOR DIGITAL VOLTMETER, HEWLETT-PACKARD MODEL 3440A WITH PLUG IN MODELS 3444A OR 3445A		
		Preliminary instructions	6	5
		Equipment setup	7	5
		Dc volts and stability	8	6
		Resistance (3444A only)	9	9
		Dc current (3444A only)	10	10
		Ac Volts (3445A only)	11	10
		Power supply	12	12
		Final procedure	13	12

*This bulletin supersedes TB 9-6625-1314-35, dated 30 August 1979, including all changes.

		Paragraph	Page
IV.	CALIBRATION PROCESS FOR DIGITAL MULTIMETER, DATA TECHNOLOGY MODEL 360		
	Preliminary instructions	14	12
	Equipment setup	15	13
	Dc volts and stability	16	14
	Dc current	17	15
	Ac volts	18	15
	Ac current	19	16
	Resistance	20	17
	Final procedure	21	17

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Digital Voltmeter, Hewlett-Packard Model 3440A with 3444A and 3445A plug-ins, and Digital Multimeter, Data Technology Model 360. 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. Variations among models are indicated in the text, tables, and figures.

b. Time and Technique. The time required for this calibration is approximately 4 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. 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 which pertain to this calibration are in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications	
Hewlett-Packard 3440A with Plug-in 3444A		
Dc volts	Ranges: 100 mV, 1000 mV, 10 V, 100 V, 1000 V	
	Range	Accuracy
	99.99 mV to 999.9 mV	± (0.1% of reading + 1 digit)
	9.999 V to 999.9 V	± (0.05% of reading + 1 digit)
Dc current	Ranges: 100 μA, 1000 μA, 10 mA, 100 mA, 1000 mA	
	Range	Accuracy
	99.99 μA to 999.9 mA	± (0.2% of reading + 1 digit)
Resistance	Ranges: 1000 Ω, 10 kΩ, 100 kΩ, 1000 kΩ, 10 MΩ	
	Range	Accuracy
	500 Ω to 1.0 MΩ	± (0.3% of reading + 1 digit)
	10 MΩ	± (1.0% of reading + 1 digit)
Hewlett-Packard 3440A with Plug-in 3445A		
Dc volts	Ranges: 10 V, 100 V, 1000 V	
	Range	Accuracy
	0 to 999.9 V	± (0.05% of reading + 1 digit)
Ac Volts	Ranges: 10 V, 100 V, 1000 V	
	Frequency	Accuracy
	50 Hz to 20 kHz	± (0.1% of reading + 2 counts)
	20 kHz to 50 kHz	± (0.1% of F.S. + 2 counts)
	50 kHz to 100 kHz	Linearly derated ± ((0.1%-0.3%) of F.S. + 2 counts)
	100 kHz	± (0.3% of F. S. + 2 counts)
Data Technology Model 360		
Dc volts	Range	Accuracy
	200 mV and 1000 mV	± (0.1% of reading + 0.2% of FS)
	2 V, 20 V, and 200 V	± (0.1% of reading + 0.1% of FS)
Dc current	Range	Accuracy
	0.2mA, 2mA, 20mA, and 200mA	± (0.2% of reading + 0.2% of FS)
	2000 mA	± (0.5% of reading + 0.3% of FS)
Ac volts	Ranges: 200 mV, 2 V, 20 V, 200 V, 2000 (750) Vac	
	Range @ Frequency	Accuracy
	200 mV–750 V ac @ 50 Hz – 10 kHz	± (0.7% of reading + 0.3% FS)
	0.2 V and 2 V @ 10 kHz – 20 kHz	± (2.0% of reading + 0.4% FS)
	0.2 V and 2 V @ 20 kHz -100 kHz	± (5.0% of reading + 0.6% FS)
Ac current	Ranges: 0.2 mA, 2 mA, 20 mA, 200 mA, 2000 mA	
	Frequency	Accuracy
	50 Hz – 1 kHz	± (0.7% of reading + 0.3% FS)
Resistance	Range	Accuracy
	200 Ω, 2 kΩ, 20 kΩ, 200 kΩ	± (0.3% of reading + 0.2% of FS)
	2000 kΩ	± (0.5% of reading + 0.2% of FS)

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. Where the four-to-one ration 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 the calibration procedure.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
AUTOTRANSFORMER	105 Vac to 125 Vac ± 1% Accuracy	Ridge, Model 9020A (9020A)
CALIBRATOR	Dc voltage: Range: 0 V to 1000 V Accuracy: ±0.0125% Dc current: Range: 100 μA to 2 A Accuracy: ±0.05% Ac voltage: Range: 200 mV to 1000 V Frequency: 20 Hz to 100 kHz Accuracy: ±0.125% Ac current: Range: 200 μA to 2 A Frequency: 20 Hz to 1 kHz Accuracy: ±0.125%	Fluke, Model 5720A (5720A) (p/o MIS-35947); w/amplifier, Fluke, Model 5725A/AR (5725A/AR)
MULTIMETER	Dc voltage: Range: 35 V Accuracy: ± 0.01%	Fluke, Model 8840A/AF05 (AN/GSM-64D)
RESISTANCE STANDARD	Range: 100 Ω through 1 MΩ Accuracy: ±0.075%	Biddle Gray, Model 71-631 (7910328)
RESISTANCE STANDARD	Range: 10 MΩ in 1 MΩ steps Accuracy: ±0.25%	Beckman, Model CR10M (8598965)

SECTION III
CALIBRATION PROCESS FOR DIGITAL VOLTMETER, HEWLETT-PACKARD MODEL 3440A WITH PLUG IN MODELS 3444A OR 3445A

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 section 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. When indications specified in paragraphs **8** through **11** are not within tolerance, perform the power supply check (paragraph **12**) prior to making adjustments. After adjustments are made, repeat paragraphs **8** through **11**. Do not perform power supply check if all other parameters are within tolerance.

e. 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 checks where applicable.

a. Remove TI protective cover as required for adjustments.

b. Install TI plug-in (model 3444A or 3445A) into TI main frame (model 3440A).

c. If necessary, set the TI 115-220 V **LINE SELECTOR** switch, located on rear panel, to 115 V.

d. Connect TI to autotransformer.

e. Connect autotransformer to ac power source and adjust for 115 V output.

f. Turn TI on and adjust the **SAMPLE RATE** control to the desired rate, and allow at least 30 minutes for warm-up.

8. Dc Volts and Stability

a. Performance Check

(1) Set **FUNCTION** switch to **VOLTS** (3445A to **DC**) and **RANGE** switch to **10 V**.

(2) Place a short between the TI High (red) and Common **INPUT** terminals.

(3) Adjust TI rear panel **ZERO** adjustment to obtain an indication of 0.000 on TI. If 0.000 cannot be obtained, perform **b** (1) through **b** (7) below.

NOTE

Optimum adjustment is indicated by alternate flashing of the + (plus) and - (minus) lights.

(4) Model 3444A only, set **RANGE** switch to **100 mV** and adjust front panel **ZERO**, to obtain an indication of 00.00 on TI. Set **RANGE** switch to **10 V**.

(5) Remove short from **INPUT** terminals.

(6) Depress and hold **INT CHECK 8000** pushbutton and adjust **INT CHECK 8000** adjustment to obtain an indication of -8.000. Release **INT CHECK 8000** pushbutton.

(7) Connect calibrator to TI **INPUT** terminals.

(8) Set **RANGE** switch to **100 mV** (model 3444A) and adjust output of calibrator to obtain an indication of 99.99mV on TI. If calibrator does not indicate between 99.880 mV and 100.10 mV, perform **b** (8) through **b** (35) below. For model 3445A, adjust output of calibrator to obtain an indication of 9.000 on TI. If calibrator does not indicate between 8.9945 and 9.0055 V, perform **b** (8) through **b** (21) below.

(9) Adjust autotransformer between 105 and 125 V while repeating (8) above.

(10) Adjust autotransformer to 115 V.

(11) Repeat technique of (8) above, using **RANGE** switch settings and indications listed in table 3. If calibrator does not indicate within limits specified, set **RANGE** switch to **10 V** and perform (**b** (8) through **b** (35) for model 3444A) and (**b** (8) through **b** (21) for model 3445A) below.

Table 3. Dc Volts

Test instrument		Calibrator indications (V dc)	
RANGE switch setting	Indication	Min	Max
1000 mV[1]	999.9 mV	0.99880	1.0010
10 V	9.999 V	9.9930	10.0050
10 V	9.000	8.9945	9.0055
10 V	8.000 V	7.9950	8.0050
10 V	7.000 V	6.9955	7.0045
10 V	6.000 V	5.9960	6.0040
10 V	5.000 V	4.9965	5.0035
10 V	4.000 V	3.9970	4.0030
10 V	3.000 V	2.9975	3.0025

Table 3. Dc Volts - Continued

Test instrument		Calibrator indications (V dc)	
RANGE switch setting	Indication	Min	Max
10 V	2.000 V	1.9980	2.0020
10 V	1.000 V	0.9985	1.0015
100 V	99.99 V	99.930	100.050
1000 V	999.9 V	999.30	1000.50

[1] 3444A only

(12) If 3444A proceed to paragraph **9**, for 3445A proceed to paragraph **11**.

b. Adjustments

NOTE

TI **INPUT** terminals should have short from step **8 a (**2) above.

(1) Set rear panel **ZERO** adjustment to its mechanical midposition.

(2) Adjust A2R70 COMPARATOR BALANCE ADJ (fig. 1) to obtain an indication of 0.000 on TI (R).

(3) Adjust rear panel **ZERO** adjustment to obtain an indication of 0.000 on TI with + (plus) and - (minus) indication lights flashing alternately.

(4) Adjust A2R40 CHARGE RESTORER ADJ (fig. 1) to obtain an indication of 0.000 on TI with + (plus) and - (minus) indicator lights flashing alternately (R).

(5) Set **SAMPLE RATE** control for a TI indication of approximately one sample per second. If TI indication does not remain at 0.000 repeat **a** (2) and **b** (1) through (5) above.

(6) Repeat **8 a** (2) and **8 a** (3) above.

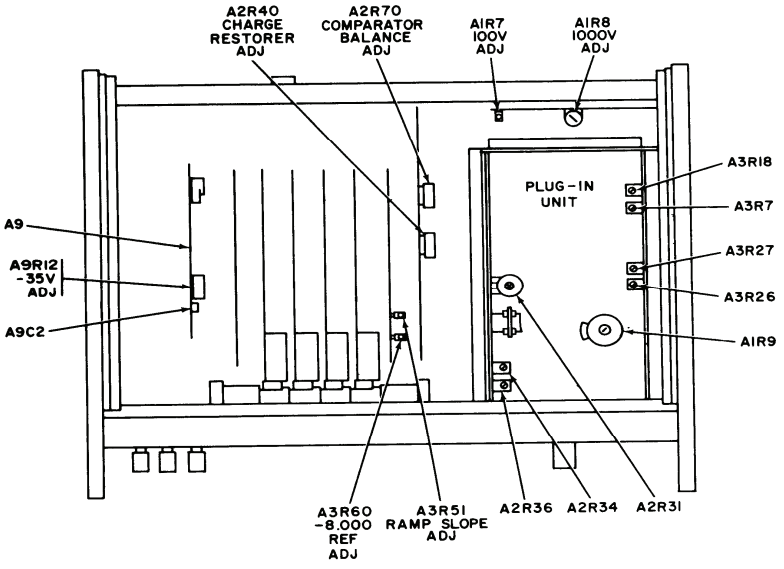

Figure 1. Digital voltmeter - top view.

(7) Remove short from **INPUT** terminals, and connect calibrator (in standby mode) to TI **INPUT** terminals.

(8) Set **INT CHECK 8000** adjustment to its mechanical midrange (approximately five turns from fully cw (clockwise) position).

(9) Adjust calibrator for an output of 8.000 V.

(10) Adjust A3R51 RAMP SLOPE ADJ (fig. 1) to obtain an indication of 8.000 on TI. Adjust **INT CHECK 8000** for fine adjustment if required (R).

(11) Set **RANGE** switch to **100 V**.

(12) Adjust calibrator for an output of 80.000 V.

(13) Adjust A1R7 100V ADJ (fig. 1) to obtain an indication of 80.00 on TI (R).

(14) Set **RANGE** switch to **1000 V**.

(15) Adjust calibrator for an output of 800.00 V.

(16) Adjust A1R8 1000V ADJ (fig. 1) to obtain an indication of 800.00 on TI (R).

(17) Adjust calibrator for a negative output of - 8.000 V.

(18) Set **RANGE** switch to **10 V**.

(19) Adjust **INT CHECK 8000** adjustment to obtain an indication of -8.000 on TI (R).

(20) Press and hold **INT CHECK 8000** pushbutton.

(21) Adjust A3R60 -8.000 REF ADJ (fig. 1) to obtain an indication of -8.000 on TI (R). Release **INT CHECK 8000** pushbutton.

NOTE

If plug in model 3445A go to paragraph **11**, for 3444A continue with next step (22).

(22) Adjust calibrator output to standby and remove. Short TI **INPUT** terminals.

(23) Set **RANGE** switch to **100 MV** and adjust front panel **ZERO** adjust to obtain an indication of 00.00 on TI (R).

(24) Set **RANGE** switch to **1000 MV** and adjust A2R31 (fig. 1) to obtain an indication of 0000 (R).

(25) Remove short installed in (22) above and connect calibrator.

(26) Adjust calibrator for an output of 800.0 mV.

(27) Adjust A2R36 (fig. 1) to obtain an indication of 800.0 (R).

(28) Set calibrator for negative output and repeat (26) above.

(29) If required, readjust A2R36 and repeat (25) through (28) above until TI indicates between 799.9 and 800.1 for both positive and negative outputs of calibrator.

(30) Connect calibrator for positive output.

(31) Adjust calibrator for an output of 80.00 mV.

(32) Set **RANGE** switch to **100 mV**.

(33) Adjust A2R34 (fig. 1) to obtain an indication of 80.00 on TI (R).

(34) Connect calibrator for negative output and repeat (31) above.

(35) If required, readjust A2R34 and repeat (30) through (34) above until TI indicates between 79.99 and 80.01 for both positive and negative outputs of calibrator.

9. Resistance (3444A only)

a. Performance Check

(1) Remove calibrator and short TI input terminals. Set TI **RANGE** switch to **100 MV** (function switch **VOLTS**). If necessary, adjust front panel **ZERO** adjustment to obtain an indication of 00.00 on TI, remove short.

(2) Press **INT CHECK 8000** pushbutton and if necessary, adjust **INT CHECK 8000** adjustment to obtain an indication of 8000 on TI. Release **INT CHECK 8000** pushbutton.

(3) Set **FUNCTION** switch to **OHMS** and **RANGE** switch to **1000 Ω.**

(4) Connect the appropriate resistance standard to TI **INPUT** terminals.

(5) Adjust resistance standard to obtain an indication of 100.0 on TI. If resistance standard does not indicate between 99.60 and 100.40 ohms, perform **b** (1) through **b** (7) below.

(6) Repeat technique of (5) above using **RANGE** switch settings and indications listed in table 4. If resistance standard does not indicate within limits specified, perform **b** (1) through **b** (7) below.

Table 4. Resistance

Test instrument		Resistance standard[1] indication			
RANGE switch	Indication	Min		Max	
1000 Ω	500.0	498.40	Ω	501.60	Ω
1000 Ω	999.9	996.80	Ω	1003.0	Ω
10 K Ω	9.999	9.9680	kΩ	10.030	kΩ
100 K Ω	99.99	99.680	kΩ	100.30	kΩ
1000 K Ω	999.9	996.80	kΩ	1003.0	kΩ
10 M Ω	9.000	8.9090	MΩ	9.0910	MΩ

[1]Use appropriate resistance standard as required.

b. Adjustments

(1) Set **RANGE** switch to **10 K Ω**.

(2) Set resistance standard to 10,000 ohms.

(3) Adjust A3R18 (fig. 1) to obtain an average indication of 0.000 (R).

NOTE

0.000 is an indication of 10,000 ohms.

(4) Set TI **RANGE** switch to **10 M Ω**.

(5) Set resistance standard to 9 megohms.

(6) Adjust A3R7 (fig. 1) to obtain an indication of 9.000 on TI (R).

(7) Repeat **a** (3) through **a** (6) above.

10. Dc Current (3444A only)

a. Performance Check

(1) Set **FUNCTION** switch to **VOLTS** and **RANGE** switch to **100 MV**. If necessary, adjust front panel **ZERO** adjust to obtain an indication of 00.00 on TI.

(2) Connect TI inputs to calibrator current outputs.

(3) Set TI **FUNCTION** switch to **AMPS** and **RANGE** switch to **100 μA**.

(4) Adjust calibrator output to obtain an indication of 99.99 on TI. If calibrator output does not indicate between 99.780 mA and 100.21 mA, perform **b** below.

(5) Repeat technique of (3) and (4) above using values fisted in table 5. If calibrator output does not indicate within limits specified, perform **b** below.

Table 5. Dc Current

Test Instrument		Calibrator output indication (mV)	
RANGE switch setting	Indication	Min	Max
1000 μA	999.9	997.8 μA	1.0021 mA
10 MA	9.999	9.978 mA	10.021 mA
100 MA	99.99	99.78 mA	100.21 mA
1000 MA	999.9	997.8 mA	1.0021 A

b. Adjustments

(1) Set **RANGE** switch to **100 MA**.

(2) Set calibrator to 100 mA.

(3) Adjust A3R26 *(*fig. 1) to obtain an average indication of 00.00 on TI (R).

(4) Set **RANGE** switch to **1000 MA**.

(5) Set calibrator to 1000 mA.

(6) Adjust A3R27 (fig. 1) to obtain an over range indication of 000.0 on TI (R).

(7) Repeat **a** (1) through **a** (5) above.

11. Ac Volts (3445A only)

a. Performance Check

(1) Connect calibrator to TI **INPUT**.

(2) Set TI **FUNCTION** switch to **AC** and **RANGE** switch to **10 V**.

(3) Adjust calibrator frequency to 1 kHz and voltage output to obtain an indication of 9.000 on TI. If calibrator output does not indicate between 8.9890 V and 9.0110 V, perform **b** (1) and **b** (2) below.

(4) Repeat technique of (3) above at frequencies and settings listed in table 6. If calibrator does not indicate within limits specified, perform appropriate adjustments listed in the table 6.

Table 6. Ac Volts

Test instrument		Calibrator			Adjustments	
RANGE switch setting	Indication	Frequency	Indications Min	Indications Max	Optimum value (V)	Adjustments (fig. 4)
10 V	8.000	1000 Hz	7.9900	8.0100	- - -	- - -
10 V	6.000	1000 Hz	5.9920	6.0080	- - -	- - -
10 V	4.000	1000 Hz	3.9940	4.0060	- - -	- - -
10 V	2.000	1000 Hz	1.9960	2.0040	- - -	- - -
10 V	9.000	50 Hz	8.9890	9.0110	- - -	- - -
10 V	9.000	20 kHz	8.9890	9.0110	9.0000	A1C1 (R)
10 V	9.000	50 kHz	8.9880	9.0120	- - -	- - -
10 V	9.000	100 kHz	8.9680	9.0320	9.000	A1L2 (R)
100 V	90.00	1000 Hz	89.890	90.110	90.000	A2R2 (R)
100 V	90.00	50 Hz	89.890	90.110	- - -	- - -
100 V	90.00	20 kHz	89.890	90.110	90.000	A2C7 (R)
100 V	90.00	50 kHz	89.880	90.120	- - -	- - -
100 V	90.00	100 kHz	89.680	90.320	- - -	- - -
1000 V	900.0	1000 Hz	898.90	901.10	900.00	A2R4 (R)
1000 V	900.0	50 Hz	898.90	901.10	- - -	- - -
1000 V	900.0	20 kHz	898.90	901.10	900.00	A2C4 (R)
1000 V	900.0	50 kHz	898.80	901.20	- - -	- - -
1000 V	900.0	100 kHz	896.80	903.20	- - -	- - -

b. Adjustments

(1) Adjust calibrator for an output of 9.0000 V.

(2) Adjust A4R30 (fig. 2) to obtain an indication of 9.000 on TI.

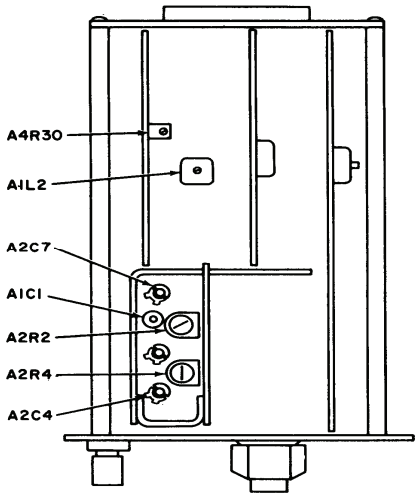

Figure 2. Ac/dc range unit - adjustment locations.

12. Power Supply

a. Performance Check

NOTE

Do not perform power supply check if all other parameters are within tolerance.

(1) Set **SAMPLE RATE** (on 3440A) control to **HOLD**.

(2) Connect multimeter between terminal 15 of A9 (negative end of A9C2, fig. 1) and chassis ground. If multimeter does not indicate between -34.65 and -35.35 V dc, perform **b** below.

b. Adjustments. Adjust A9R12 -35V ADJ (fig. 1) to obtain an indication of -35.00 V on multimeter.

13. 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 DIGITAL MULTIMETER, DATA TECHNOLOGY MODEL 360

14. Preliminary Instructions

a. The instructions outlined in paragraphs **14** and **15** are preparatory to the calibration process. Personnel should become familiar with the entire section 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.

15. 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 checks where applicable.

a. Connect TI to autotransformer.

b. Connect autotransformer to ac power source and adjust for 115 V output.

c. Set TI POWER switch to **ON** and allow at least 30 minutes for warm-up.

d. Press **D.C.** function and **.2** range switch.

e. Connect TI **VOLT** and **COM** terminals.

f. If necessary adjust ZERO control (fig 3) to obtain an indication of 000.0 (00.0 on some models) on TI.

g. Remove lead from **VOLT** and **COM** terminals.

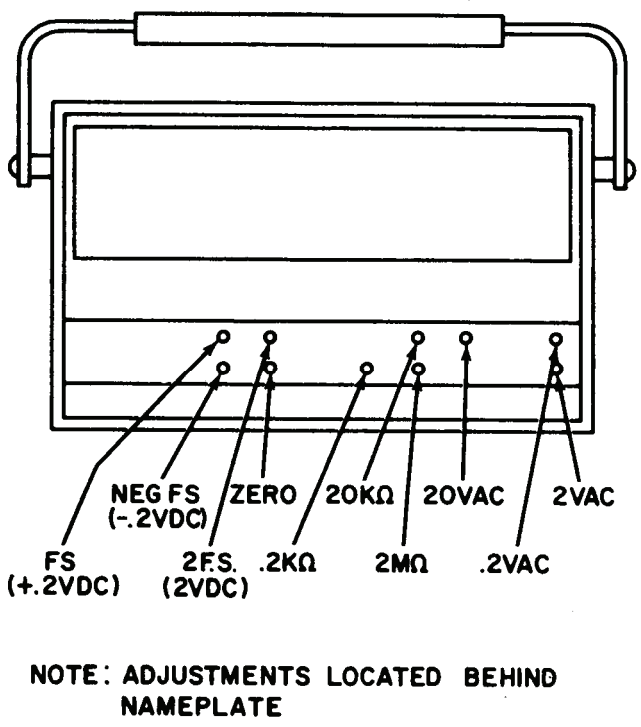

Figure 3. Digital multimeter - adjustment locations.

16. Dc Volts and Stability

a. Performance Check

(1) Connect calibrator **HI** and **LO** outputs to TI **VOLT** and **COM** terminals.

(2) Adjust output of calibrator to obtain an indication of +199.9 on TI. If calibrator does not indicate between 199.3 mV and 200.5 mV, perform **b** (1) and **b** (2) below.

(3) Adjust calibrator output to obtain an indication of -199.9 on the TI. If calibrator does not indicate between -199.3 mV and -200.5 mV, perform **b** (1) and **b** (3) below.

(4) Press **2** range pushbutton.

(5) Adjust output of calibrator to obtain an indication of +1.999 on TI. If calibrator does not indicate between 1.995 V and 2.003 V, perform **b** (4) and **b** (5) below.

(6) Adjust autotransformer from 105 to 125 V while repeating (5) above.

(7) Adjust autotransformer to 115 V.

(8) Press TI range pushbuttons as listed in table 7 and adjust calibrator output for corresponding indications. Calibrator indications will be within limits in table 7.

Table 7. Dc Volts Range and Tracking

Test instrument		Calibrator indications V	
Range pushbutton	Indication	Min	Max
20	19.99	19.950 V	20.030 V
20	18.88	18.841 V	18.919 V
20	17.77	17.732 V	17.808 V
20	16.66	16.623 V	16.697 V
20	15.55	15.514 V	15.586 V
20	14.44	14.405 V	14.474 V
20	13.33	13.296 V	13.363 V
20	12.22	12.187 V	12.252 V
20	11.11	11.078 V	11.141 V
200	199.9	199.5 V	200.3 V
2000	999	994 V	1004 V

b. Adjustments

NOTE

Only need to perform the following steps (adjustments) on the ranges which are out of tolerance. If performing all of the adjustments, press the correct range pushbutton prior to applying the calibrator output.

(1) Adjust calibrator for an output of 199.90 mV.

(2) Adjust FS (+.2 VDC) (fig. 3) to obtain an indication of +199.9 on TI.

(3) (Calibrator output to – 199.9 mV). Adjust NEG FS (-.2VDC) (fig. 3) to obtain an indication of -199.9 on TI.

(4) Adjust calibrator for an output of 1.9990 V.

(5) Adjust 2 F.S. (2VDC) (fig. 3) to obtain an indication of 1.9990 on TI.

17. Dc Current

a. Performance check

(1) Connect TI **COM** and **MA/KΩ** terminals to calibrator current outputs.

(2) Press TI **M.A.** function pushbutton and **.2** range pushbutton.

(3) Adjust calibrator to obtain a 199.9 indication on TI. Calibrator will indicate between 199.1 mA and 200.7 mA.

(4) Repeat technique of (2) and (3) above using settings and indications listed in table 8. Calibrator will indicate within limits specified in table 8.

Table 8. Dc Current

Test instrument		Calibrator output indication	
Range pushbutton	Indication (mA)	Min	Max
2	1.999	1.9910 mA	2.0070 mA
20	19.99	19.910 mA	20.070 mA
200	199.9	199.10 mA	200.70 mA
2000	1999	1.9830 A	2.0150 A

b. Adjustments. No adjustments can be made.

18. Ac Volts

a. Performance Check

(1) Connect calibrator **HI** and **LO** outputs to TI.**VOLT** and **COM** terminals.

(2) Press TI **A.C.** function and **2** range pushbuttons.

(3) Adjust calibrator output frequency to 100 Hz and voltage to obtain an indication of 1.999 on TI. If calibrator output does not indicate between 1.9790 V and 2.0190 V ac, perform **b** (1) and **b** (2) below.

(4) Repeat technique of (2) and (3) above using settings and indications listed in table 9. Ac voltage calibrator will indicate within limits specified.

Table 9. Ac Volts

Test instrument		Calibrator output indications (V ac)		
Range pushbutton	Indication	Frequency	Min	Max
2	1.999	50 Hz	1.9790	2.0190
2	1.999	1 kHz	1.9790	2.0190
2	1.999	10 kHz	1.9790	2.0190
2	1.999	20 kHz	1.9510	2.0470
2	1.999	100 kHz	1.8870	2.1110

Table 9. Ac Volts - Continued

Test instrument		Calibrator output indications (V ac)		
Range pushbutton	Indication	Frequency	Min	Max
0.2[1]	199.9	100 Hz	0.1979	0.2019
0.2	199.9	50 Hz	0.1979	0.2019
0.2	199.9	1 kHz	0.1979	0.2019
0.2	199.9	10 kHz	0.1979	0.2019
0.2	199.9	20 kHz	0.1951	0.2047
0.2	199.9	100 kHz	0.1887	0.2111
20[2]	19.99	100 Hz	19.790	20.190
20	19.99	50 Hz	19.790	20.190
20	19.99	1 kHz	19.790	20.190
20	19.99	2 kHz	19.790	20.190
20	19.99	10 kHz	19.790	20.190
200	199.9	100 Hz	197.90	201.90
200	199.9	50 Hz	197.90	201.90
200	199.9	1 kHz	197.90	201.90
200	199.9	10 kHz	197.90	201.90
2000	700	100 Hz	689.1	710.9
2000	700	50 Hz	689.1	710.9
2000	700	1 kHz	689.1	710.9
2000	700	10 kHz	689.1	710.9

[1]If not within tolerance, perform **b** (3) and **b** (4) below.
[2]If not within tolerance, perform **b** (5) and **b** (6) below.

b. Adjustments

(1) Adjust calibrator output for 1.9990 V.

(2) Adjust 2VAC (fig. 3) to obtain an indication of 1.999 on TI (R).

(3) Adjust calibrator output for 0.1999 V.

(4) Adjust .2VAC (fig. 3) to obtain an indication of 199.9 on TI (R).

(5) Adjust calibrator output for 19.990.

(6) Adjust 20VAC (fig. 3) to obtain an indication of 19.99 on TI (R).

19. Ac Current

a. Performance Check

(1) Press TI **.2** range pushbutton.

(2) Connect calibrator current outputs to TI **COM** and **MA/KΩ** terminals.

(3) Adjust calibrator frequency to 400 Hz and current output to obtain an indication of 199.9 on TI. Calibrator will indicate between 197.90 mA and 201.90 mA.

(4) Repeat (3) above with calibrator output frequency set to 60 Hz. Calibrator output will remain between 197.90 mA and 201.90 mA.

(5) Repeat technique of (1) through (4) above using settings and indications listed in table 10. Calibrator will indicate within limits specified.

Table 10. Ac Current

Test instrument		Electrical test set indications (mA)	
Range pushbutton	Indications (mA)	Min	Max
2	1.999	1.9790	2.0190
20	19.99	19.790	20.190
200	199.9	197.90	201.90
2000	1999	1979.0	2019.0

b. Adjustments. No adjustments can be made.

20. Resistance

a. Performance Check

(1) Press **KΩ** pushbutton and **.2** range pushbutton.

(2) Connect resistance standard between TI **COM** and **MA/KΩ** terminals.

(3) Adjust resistance standard to obtain an indication of 199.9 on TI. If decade resistance standard does not indicate between 198.9 and 200.9 ohms, perform **b** below.

(4) Repeat technique of (3) above using settings and indications listed in table 11. If decade resistance standard does not indicate within limits perform corresponding adjustments listed in table 11.

Table 11. Resistance Accuracy

Test instrument		Resistance standard indication (kΩ)		
Range pushbutton	Indication	Min	Max	Adjustment (fig. 3)
2	1.999	1.989 kΩ	2.009 kΩ	- - -
20	19.99	19.89 kΩ	20.09 kΩ	20 K OHM ADJ (R)
200	199.9	198.9 kΩ	200.9 kΩ	- - -
2000	1999	1985 kΩ	2013 kΩ	2 M OHM ADJ (R)

b. Adjustments

(1) Adjust decade resistance standard to 199.90 ohms.

(2) Adjust .2kΩ (fig. 3) to obtain an indication of 199.9 on TI (R).

21. 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

0806002

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342126, requirements for calibration procedure TB 9-6625-1314-24.

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.