

*TB 9-4931-401-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DC POWER SUPPLY FLUKE MODELS 410B AND 410B/AT

Headquarters, Department of the Army, Washington, DC

18 September 2007

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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 9-4931-401-35, dated 10 July 1995.

SECTION I IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Dc Power Supply, Fluke Models 410B and 410B/AT. 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. The model 410B/AT is electrically and functionally the same as model 410B. The model 410B/AT has a 4 foot high voltage cable, mating connector, spare lugs, and chassis slides included.

b. Time and Technique. The time required for this calibration is approximately 1 hour, using the dc and low frequency technique.

2. Forms, Records, and Reports

a. Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25.

b. Adjustments to be reported are designated (R) at the end of the sentence in which they appear. When adjustments are in tables, the (R) follows the designated adjustment. Report only those adjustments made and designated with (R).

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

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Dc voltage	Range: 0 to 10,000 V Accuracy: $\pm 0.25\%$ or 250 mV (whichever is greater with vernier at zero)
Ripple	Less than: 1 mV ac
Line regulation	Range: 10% line voltage change Accuracy: $\pm 0.001\%$ or 2 mV (whichever is greater)
Load regulation	Range: Full load change Accuracy: $\pm 0.001\%$ or 5 mV (whichever is greater)
Meter	Range: $\pm 10,000$ V dc Accuracy: $\pm 3\%$ 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; 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. The following peculiar accessory is also required for this calibration: Decade Resistor, Winslow, Model 336 (7907234) or Clarostat, Model 240C (240C).

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
AUTOTRANSFORMER	Range: 05 to 125 V ac Accuracy: $\pm 1\%$	Ridge, Model 9020A (9020A)
HIGH VOLTAGE DIVIDER	Range: 1000 to 1 Accuracy: ¹	Fluke, Model 80E10 (80E10)
MULTIMETER	Range: 30 mV to 902.25 V dc Accuracy: $\pm 0.0625\%$ ¹	Agilent, Model 3458A (3458A)
TRUE RMS VOLTMETER	Range: 0 to 1 mV ac Accuracy: $\pm 3\%$	Fluke, Model 8922A/AA (8922A/AA)

¹Combined accuracy of multimeter and high voltage divider must be $\pm 0.0625\%$

SECTION III CALIBRATION PROCESS

6. Preliminary Instructions

a. The instruction 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

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 autotransformer.

- b. Connect autotransformer to 115 V ac source and adjust for 115 V ac output.
- c. Position controls as listed in (1) through (4) below:
 - (1) **POLARITY** switch to **+** (positive).
 - (2) **OUTPUT VOLTAGE** controls to **0** (zero).
 - (3) **HIGH VOLTAGE** switch to **STANDBY RESET**.
 - (4) **POWER** switch to **ON**.
- d. Allow 30 minutes for TI to warm-up and stabilize.

8. Output Regulation and Ripple

a. Performance Check

- (1) Connect equipment as shown in figure 1.

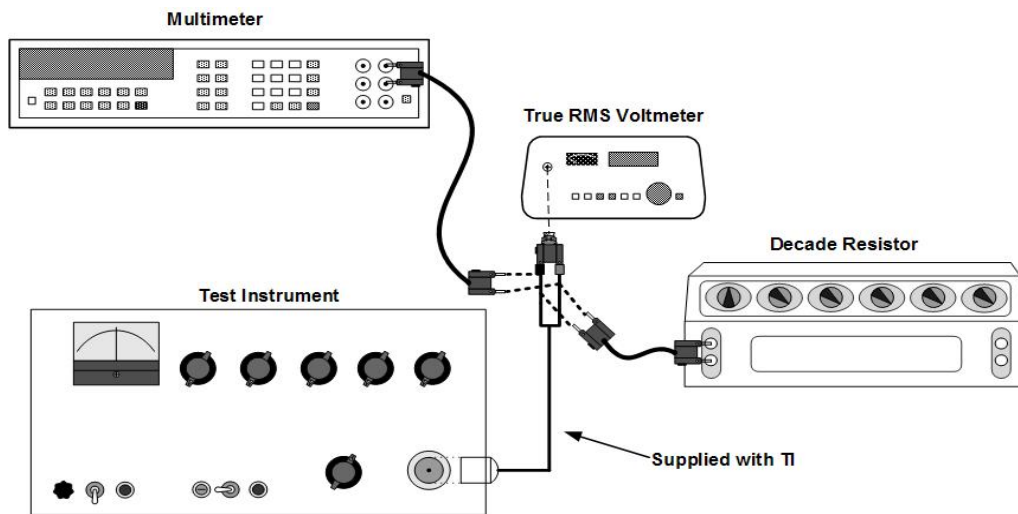


Figure 1. Regulation and ripple equipment setup.

- (2) Adjust decade resistor for maximum resistance (999,999?).
- (3) Set **HIGH VOLTAGE** switch to **ON**.
- (4) Adjust **OUTPUT VOLTAGE** controls to **90 V** and record multimeter indication. Ripple, as indicated on true RMS voltmeter, will be less than 1 mV rms.
- (5) Adjust autotransformer output to 125 V. Multimeter will indicate within ± 2 mV of value recorded in (4) above.
- (6) Adjust autotransformer to 105 V. Multimeter will indicate within ± 2 mV of value recorded in (4) above.
- (7) Adjust autotransformer to 115 V.

NOTE

To prevent over current trip out, maintain decade resistor value of at least 9,000? during this check.

(8) Adjust controls of decade resistor to 9,000?. Multimeter will indicate within ± 5 mV of value recorded in (4) above.

(9) Set **HIGH VOLTAGE** switch to **STANDBY RESET**.

b. Adjustments. No adjustments can be made.

9. Output Voltage Accuracy

a. Performance Check

(1) Connect equipment as shown in figure 2, Connection A.

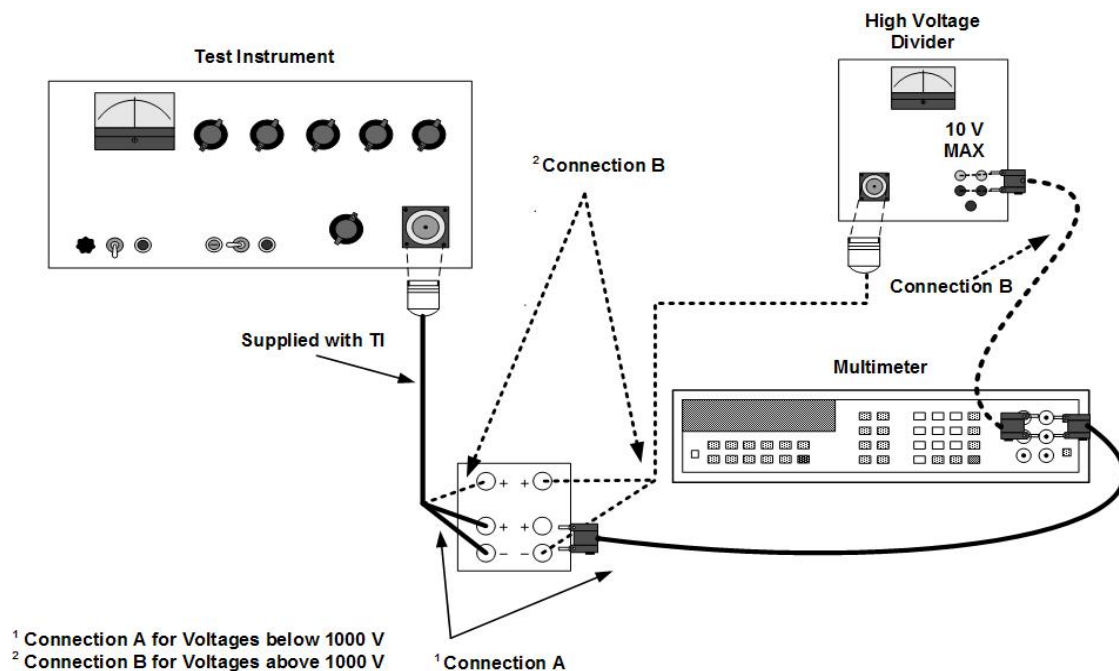


Figure 2. Output voltage - equipment setup.

CAUTION

The sampling string resistors in the TI are subject to damage if the output voltage is reduced too rapidly. Pause approximately 1/2 second in each switch position when reducing the setting of the 0 to 9,000 switch.

(2) Turn **OUTPUT VOLTAGE** controls to **0** (zero) and set **HIGH VOLTAGE** switch to **ON**. Multimeter will indicate less than 30 mV.

(3) Turn vernier control (0 to 1.2 V dial) fully cw. Multimeter will indicate at least 1 V.

(4) Turn vernier control to 0 (zero).

(5) Turn **OUTPUT VOLTAGE** switches to positions listed in table 4. If multimeter does not indicate within limits specified, perform **b** below.

Table 4. Output Voltage

Test instrument OUTPUT VOLTAGE switches					Multimeter indications (V dc)	
0 to 9000	0 to 900	0 to 90	0 to 9	0 to 1.2	Min	Max
Switch settings						
0	0	0	1	0	0.75	1.25
0	0	0	2	0	1.75	2.25
0	0	0	3	0	2.75	3.25
0	0	0	4	0	3.75	4.25
0	0	0	5	0	4.75	5.25
0	0	0	6	0	5.75	6.25
0	0	0	7	0	6.75	7.25
0	0	0	8	0	7.75	8.25
0	0	0	9	0	8.75	9.25
0	0	10	0	0	9.75	10.25
0	0	20	0	0	19.75	20.25
0	0	30	0	0	29.75	30.25
0	0	40	0	0	39.75	40.25
0	0	50	0	0	49.75	50.25
0	0	60	0	0	59.75	60.25
0	0	70	0	0	69.75	70.25
0	0	80	0	0	79.75	80.25
0	0	90	0	0	89.75	90.25
0	100	0	0	0	99.75	100.25
0	200	0	0	0	199.50	200.50
0	300	0	0	0	299.25	300.75
0	400	0	0	0	399.00	401.00
0	500	0	0	0	498.75	501.25
0	600	0	0	0	598.50	601.50
0	700	0	0	0	698.25	701.75
0	800	0	0	0	798.00	802.00
0	900	0	0	0	897.75	902.25
1000 ¹	0	0	0	0	0.9975	1.0025
2000	0	0	0	0	1.9950	2.0050
3000	0	0	0	0	2.9925	3.0075
4000	0	0	0	0	3.9900	4.0100
5000	0	0	0	0	4.9875	5.0125
6000	0	0	0	0	5.9850	6.0150
7000	0	0	0	0	6.9825	7.0175
8000	0	0	0	0	7.9800	8.0200
9000	0	0	0	0	8.9775	9.0225
9000	900	90	9	1	9.9750	10.0250

¹ Connect equipment as shown in figure 2, Connection B.

b. Adjustments

- (1) Connect equipment as shown in figure 2, Connection B if not already connected.
- (2) Set **OUTPUT VOLTAGE** switches to **99000**.
- (3) Using insulated screwdriver, adjust R104, accessible through hole on upper right-front side of TI until multimeter indicates 9.9 V (R).

10. Meter Accuracy

a. Performance Check

- (1) Connect equipment as shown in figure 2, Connection B.
- (2) Adjust **OUTPUT VOLTAGE** switches for indication of **9** on TI meter. If multimeter does not indicate between 8.70 and 9.30 V dc, perform **b** below.
- (3) Set **HIGH VOLTAGE** switch to **STANDBY RESET** and **POLARITY** switch to - (negative).
- (4) Set **HIGH VOLTAGE** switch to **ON** and repeat (2) above.

b. Adjustments

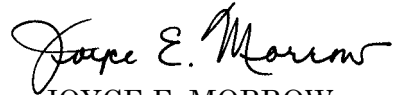
- (1) Adjust **OUTPUT VOLTAGE** switches for indication of **9.00 V** on multimeter.
- (2) Using insulated screwdriver, adjust R150 accessible through hole in bottom of chassis (under **OUTPUT** connector), for indication of **9** on TI meter (R).

11. 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*

0719903

GEORGE W. CASEY, JR.
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Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342846, requirements for calibration procedure TB 9-4931-401-24.

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.

