*TB 9-5985-316-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR VARIABLE ATTENUATOR TECH LABS, PART NUMBER C-8756

Headquarters, Department of the Army, Washington, DC
8 January 2004

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this manual. If you find any mistakes or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, US Army Aviation and Missile Command, 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.

*This technical bulletin supersedes TB 9-5985-316-35, dated 28 August 1995.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Variable Attenuator, Tech Labs, Part Number C-8756. The MIS-35949 requirement 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 1 hour, using the dc and low frequency technique.

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

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		
Attenuation	Range: 0 to 10 dB dial Frequency: Dc to 1 kHz Accuracy: ±0.6% Frequency: 1 kHz to 1 MHz Accuracy: ±3.0% Range: 10 to 100 dB dial Accuracy: See table below		
	Frequency	Test instrument dial positions	Accuracy (%)
	Dc to 150 kHz	10	+0.6%
	1 kHz	20, 30, 40, 50	+0.6%
	1 kHz	60, 80	+3.0%
	1 kHz	70	+1.5%
	20 kHz	20, 30, 40	+6.0%
	30 kHz	20, 30, 40, 50, 60	+6.0%
	Frequencies from dc to 1 MHz not listed above	10 to 100	+9.0%

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. Alternate items may be used by the calibrating activity. The item 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 paragraph **4** above, and are not listed in the calibration procedure. The following peculiar accessories are also required for this calibration: Decade Resistor, Winslow, Model 336 (7907234) or Clarostat, Model 240C (240C) and voltage divider, 600 Ω, double banana plug to triple banana jack (11047A) (7911560).

NOTE

The voltage divider accuracy of 1.0 percent is critical in calibration process.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
CALIBRATOR	Dc voltage Range: 30 V Accuracy: ±0.15% Ac voltage Range: 0.3162 to 31.62 V Frequency: 1.0 kHz to 1.0 MHz Accuracy: Varying between ±0.15% @ 1.0 kHz to ±2.25% @ 1.0 MHz.	John Fluke, Model 5720A (p/o MIS-35947); w/power amplifier, John Fluke, Model 5725A (5725A)
MULTIMETER	Range: 0.5 mV to 30 V dc Accuracy: ±0.15%	Hewlett-Packard, Model 3458A (3458A)
TRUE RMS VOLTMETER	Range: 0.3 to 316.2 mV ac Frequency: 1.0 kHz to 1.0 MHz Accuracy: Nominal	John Fluke, Model 8922A/AA (8922A/AA)

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.

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. Set TI **DB** dials to **0**.

b. Connect equipment as shown in figure 1.

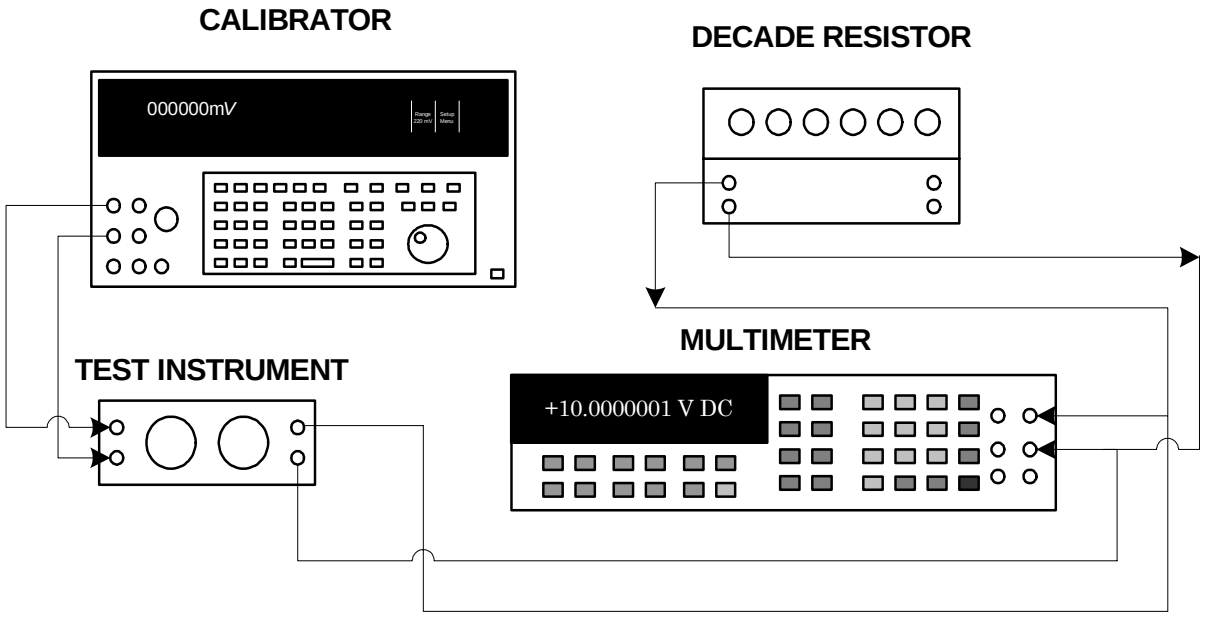

Figure 1. Attenuator range and accuracy.

8. Attenuator Range and Accuracy

a. Performance Check

(1) Set decade resistor to 600 Ω.

(2) Energize equipment and allow sufficient time for warm-up.

(3) Adjust calibrator for an indication of 25 V dc on multimeter.

NOTE

Power capacity of calibrator is 1.5 W maximum. Do not apply more than 1.5 W input which corresponds to approximately 30 V dc or rms. Damage may also occur to TI by applying input power to the output terminal.

(4) Set TI **0 to 10 DB** dial to **1**. Multimeter will indicate between 22.148 and 22.415 V dc.

(5) Set TI **DB** dials to positions listed in table 3. Multimeter will indicate within limits specified.

Table 3. Attenuator Accuracy

Test instrument **DB** dial settings		Multimeter indications (dc)	
0 to 10 dial	10 to 100 dial	Min	Max
2	0	19.739	19.977
3	0	17.592	17.805
4	0	15.679	15.869
5	0	13.974	14.143
6	0	12.455	12.605
7	0	11.100	11.234
8	0	9.8930	10.012
9	0	8.8171	8.9236
10	0	7.8583	7.9531
0	10	7.8583	7.9531
0	20	2.2750	2.7250
0	30	.71942	.86172
0	40	.22750	.27250
0	50	.07194	.08617
0	60	.02275	.02725
0	70	.007194	.008617
0	80	.002275	.002725
0	90	.000719	.000862
0	100	.000228	.000273

b. Adjustments. No adjustments can be made.

9. Frequency Response

a. Performance Check

(1) Connect equipment as shown in figure 2.

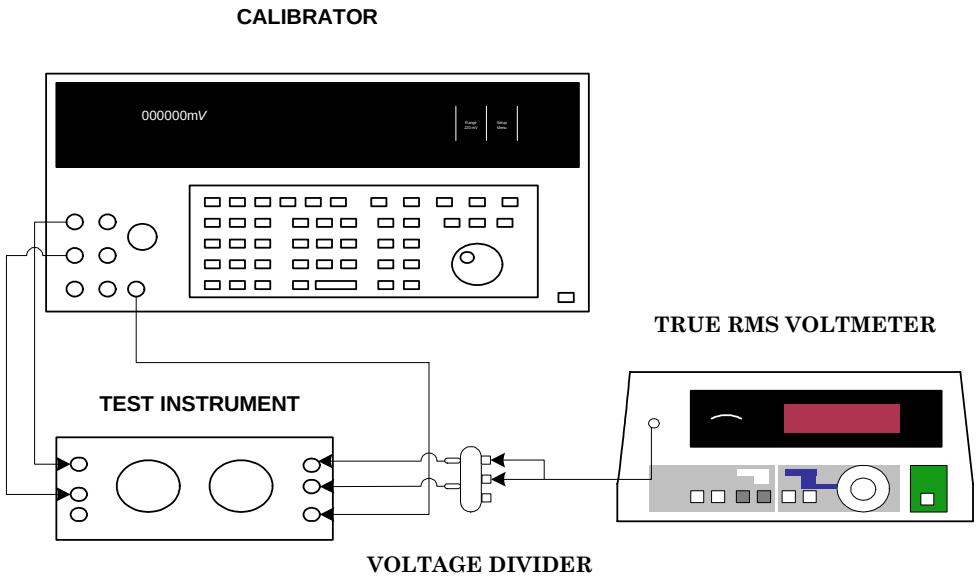

Figure 2. Frequency response.

(2) Set TI **DB** dials to **0**.

(3) Adjust calibrator for a .3162 volt, 1 kHz output.

(4) Record true rms voltmeter indication.

(5) Set TI **0 to 10 DB** dial to **1**.

(6) Adjust calibrator output until true rms voltmeter indicates value recorded in (4) above. Calibrator will indicate between 0.3527 and 0.3569 V ac.

(7) Repeat steps (5) and (6) above for remaining dial settings at 1 kHz, listed in table 4 below. Calibrator will indicate within limits specified.

(8) Set calibrator output to minimum; then set TI dials to **0**.

(9) Repeat technique of (3) through (8) above for 100 kHz, 1.0 MHz, 20 kHz and 30 kHz as listed in table 4.

b. Adjustments. No adjustments can be made.

Table 4. Frequency Response

Test instrument dial settings		Calibrator voltage indications					
		@ 1.0 KHz		@ 100 KHz		@ 1.0 MHz	
0 to 10	0 to 100	Min	Max	Min	Max	Min	Max
1	0	0.3527	0.3569	0.3441	0.3654	0.3441	0.3654
2	0	0.3957	0.4005	0.3861	0.4100	0.3861	0.4100
3	0	0.4440	0.4494	0.4332	0.4600	0.4332	0.4600
4	0	0.4981	0.5041	0.4861	0.5162	0.4861	0.5162
5	0	0.5589	0.5657	0.5454	0.5792	0.5454	0.5792
6	0	0.6271	0.6347	0.6120	0.6498	0.6120	0.6498
7	0	0.7036	0.7121	0.6866	0.7291	0.6866	0.7291
8	0	0.7895	0.7990	0.7704	0.8181	0.7704	0.8181
9	0	0.8858	0.8965	0.8644	0.9179	0.8644	0.9179
10	0	0.9939	1.0059	0.9699	1.0300	0.9699	1.0300
0	10	0.9939	1.0059	0.9939	1.0059	0.9099	1.0899
0	20	3.1430	3.1810	2.877	3.447	2.877	3.447
0	30	9.939	10.059	9.099	10.899	9.099	10.899
0	40 [1]	31.430	31.801	28.774	34.466	28.774[3]	34.466[3]
0	50	0.9939	1.0059	0.9099	1.0899	0.9099	1.0899
0	60	3.0671	3.2569	2.8774	3.4466	2.8774	3.4466
0	70	9.849	10.149	9.099	10.899	9.099	10.899
0	80 [2]	30.671	32.569	28.774	34.466	28.774	34.466
0	90	9.099	10.899	9.099	10.899	---	---
0	100	28.774	34.466	28.774	34.466	---	---

Test instrument dial settings		Calibrator voltage indications			
		@ 20 KHz		@ 30 KHz	
0 to 10	0 to 100	Min	Max	Min	Max
0	10	0.9939	1.0059	0.9939	1.0059
0	20	2.972	3.352	2.972	3.352
0	30	9.399	10.599	9.399	10.599
0	40 [1]	29.723	33.517	29.723	33.517
0	50	---	---	0.9399	1.0599
0	60	---	---	2.9723	3.3517
0	70	---	---	9.099	10.899

[1]At completion of this check, with TI dial remaining on 40, set calibrator voltage output to 0.3162 Vac.
[2]At completion of this check, with TI dial remaining on 80, set calibrator voltage output to 3.162 Vac.
[3]Set calibrator frequency to 600 KHz due to V-Hz product limit for calibrator.

10. 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
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Secretary of the Army

0331606

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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: 065259-000