DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR ELECTRONIC VOLTIMETER ME-262/U

Headquarters, Department of the Army, Washington, D.C.
28 June 1976

REPORTING OF ERRORS

You can help improve this publication by calling attention to errors and by recommending improvements and stating your reason for the recommendations. Report such recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms), and mail it direct to Commander, US Army Electronics Command, AITN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished directly to you.

*This bulletin supersedes TB 116625624-35/1, 22 September 1966

SECTION I

INTRODUCTION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instruction for the calibration of Electronic Voltmeter ME-262/U. The manufacturer's instruction 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. Variations among models are described in text.

b. Time and Technique. The time required for this calibration is approximately 3 hours, using the dc and low frequency technique.

2. Calibration Data Card, DA Form 2416. *a.* Forms, records, and reports required for calibration personnel at all levels are prescribed by TM 38-750. DA Form 2416 must be annotated in accordance with TM 38-750 for each calibration performed.

b. Adjustments to be reported on DA Form 2416 are designated (R) at the end of the sentence in which they appear. When adjustments are in tables, the (R) will follow 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*
Voltage range	1 millivolt to 1000v p-p.
Accuracy	±2%, 20 Hz to 200 kHz ±4%, 5 Hz to 500 kHz.[1]
Stability	Satisfactory performance with any line voltage between 105 and 125 v.

[1]Not verified below 20 Hz.

SECTION II
EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment used in this calibration procedure. This equipment is issued with Secondary Transfer Standards Calibration Set AN/GSM-256, NSN 4931-00- 525-8175 and standards set TOE 29-134H and is to be used when performing this procedure. Alternate items may be used by the calibrating activity *when the equipment listed in table 2 is not available. 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 accuracy 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 listed in table 3 are issued with Secondary Transfer Standards Calibration Set AN/GSIM-256, NSN 4931-00-525-8175, and standards set TOE 29-134H and are to be used in this calibration procedure. When necessary, these items may be substituted by equivalent items unless specifically prohibited.

Table 2. Minimum Specifications of Equipment Required

Item	Common name	Minimum Use specifications	*Manufacturer, Model and Part Number*	
			TOE 29-134H	**AN/GSM-256**
A1	Auto Transformer1	Range: 105 to 125 vac1 Accuracy: ±1%	TF-510l.	General Radio, Model W10MIT3AS3 (7910809).
A2	Electronic Voltmeter	Range: 96 to 104 mvac Accuracy: +0.25%	ME-30 U (6625-00-669-0742).	Not required.
A3	Electronic Voltmeter	Range: 347 to 361 mvac Accuracy: ±0.25%a	ATE-202 U (6625-00-7090288).	Not required
A4	Meter Calibrator	Range: [1]1.21 to 360 v Range: [2]3.4.3 my to 1020 v Accuracy: ± 0.25%c	TS-682 GSMI-1 (662500-669-0747).	Ballantine, Model 421A-S2 (6625-00-10.5-8198).
A5	Ratio Transformer	Range: 0.001 to 0.1 Accuracy: +0.25%	TF-.384'U (6625-00-733-5914).	Not required.
A6	Signal Generator	Range: 20 Hz to 500 kHz Flatness: ±0.25%C	SG-71 FCC (6625-00-66902.55).	Hewlett-Packard, Model 652A (MIS-I 0224).

[1]Required for TOE 29-134H.
[2]Required for AN/,GSM-256.

Table 3. Accessories Required

Item	Common name	Description and part number	
		TOE 29-134h	**AN/GSM-256**
B1	Adapter	Single banana jack to Alligator clip (P:O Test Lead Set CX-1331 U).	Not required.
B2	Cable[1]	3O-in., RG-58:U with double banana plug terminations (493100-846-0010).	30-in., R-58/U with double banana plug terminations (7907470).
B3	Cable	Not required	36-in., RG-58K U with double banana and BNC plug termina-tions (7907471).
B4	Lead	24-in., with single banana plug termina-tions (red) (7907197).	Not required.
B5	Lead	24-in., with single banana plug termina-tions (blk) (7907498).	Not required.
B6	Termination	Not required.	50ohbm feed-thru Hewlett-Packard, M0DEL 11048B (11048B) P/OM.IS 10224).

[1]Two required for TOE 29134H.

SECTION III
PRELIMINARY OPERATIONS

6. Preliminary Instructions. *a.* The instructions outlined in this section are preparatory to the calibration process. Personnel should become familiar with sections I through IV when using standards set TOE 29-134H; sections I, II, and III and V when using Secondary Transfer Standards Calibration Set AN/ GSM-256 before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name and item identification number as listed in tables 2 and 3. For the identification of equipment referenced by item numbers prefixed with A, see table 2, and for prefix B, see table 3.

WARNING

HIGH VOLTAGE is used during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions.

7. Equipment Setup. *a.* If TI meter does not indicate zero, adjust to zero, using adjusting screw located below meter face.

b. Connect TI to autotransformer (Al).

c. Connect autotransformer to 115-volt a.c. source and adjust controls of autotransformer to 115 volts.

d. Set TI ON-OFF switch to ON and allow at least 30 minutes for warmup.

SECTION IV
CALIBRATION PROCESS, USING TOE 29-134H

NOTE

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met before continuing with the calibration.

8. Frequency Response. *a. Performance Check*:

(1) Connect signal generator (A6) and electronic voltmeter (A2) to TI input, using two cables (B2)

(2) Position TI controls as listed in (a) (b), and (c) below.

(a) FULL SCALE switch to 100 MILLIVOLTS.

(b) POSITIVE-NEGATIVE switch to POSITIVE.

(c) Function switch to PEAK TO PEAK.

(3) Adjust signal generator frequency to 50 Hz and output amplitude for an indication of 100 millivolts on TI meter. Record electronic voltmeter indication.

(4) Increase signal generator frequency to 200 kHz keeping output amplitude to value recorded in (3) above. If TI meter does not indicate between 98 and 102 millivolts, perform b(1) through (5) below.

(5) Increase signal generator frequency to 500 kHz, keeping output amplitude to value recorded in (3) above. If TI does not indicate between 96 and 104 millivolts, perform b(l) through (5) below.

b. Adjustments.

(1) Adjust signal generator frequency to 400 kHz, keeping output amplitude to value recorded in a(3) above.

(2) Adjust C6 and C20 (fig. 1) in equal amounts until TI indicates 100 millivolts (R).

(3) Turn POSITIVE-NEGATIVE switch to NEGATIVE.

(4) Adjust C15 (fig. 1) until TI indicates 100 millivolts (R).

(5) Turn POSITIVE-NEGATIVE switch to POSITIVE.

(6) Repeat a(3), (4), and (5) above.

9. Meter Accuracy. *a. Performance Check*.

(1) Connect electronic voltmeter (A3) and signal generator (A6) to TI input, using two cables (B2).

(2) Turn TI FULL SCALE switch to 1000 MILLIVOLTS.

(3) Adjust signal generator frequency to 1000 Hz and output amplitude for an indication of 1000 millivolts on TI meter. If electronic voltmeter does not indicate between 346.5 and 360.5 millivolts, perform b(1) through (6) below.

(4) Turn TI FULL SCALE switch to 3.5 VOLTS. If TI does not indicate 1 volt, perform b(4) through (6) below.

(5) Turn TI FULL SCALE switch to 1000 MILLIVOLTS and function switch to PEAK. If TI does not indicate 500 millivolts, perform b(7) below.

b. Adjustments.

(1) Adjust signal generator output amplitude for an indication of 354 millivolts as indicated on electronic voltmeter.

(2) Adjust TI CAL ADJ until TI indicates 1000 millivolts.

(3) Turn TI FULL SCALE switch to 3.5 VOLTS.

(4) Adjust TI SCALE ADJ until TI meter indicates 1 volt.

NOTE

Tap meter lightly during adjustment.

(5) Turn TI FULL SCALE switch to 1000 MILLIVOLTS.

(6) Repeat (1) through (5) above until no further adjustments are required.

(7) Adjust PEAK ADJ until TI indicates 500 millivolts.

10. Meter Range. *a. Performance Check.*

(1) Connect ratio transformer (A5) output to TI input, using cable (B2).

(2) Connect ratio transformer input terminals to meter calibrator (A4) ac volts and common terminals, using leads (B4 and B5), adapter (B1), and cable supplied with meter calibrator.

(3) Turn TI FULL SCALE switch to 3.5 MILLIVOLTS and function switch to PEAK TO PEAK.

(4) Adjust ratio transformer to .001000.

(5) Adjust meter calibrator for an indication of 3.5 millivolts on TI meter. Meter calibrator will indicate between 1.212 and 1.262 volts rms.

(6) Repeat (3), (4), and (5) above at values listed in table 4. Meter calibrator will indicate within limits specified.

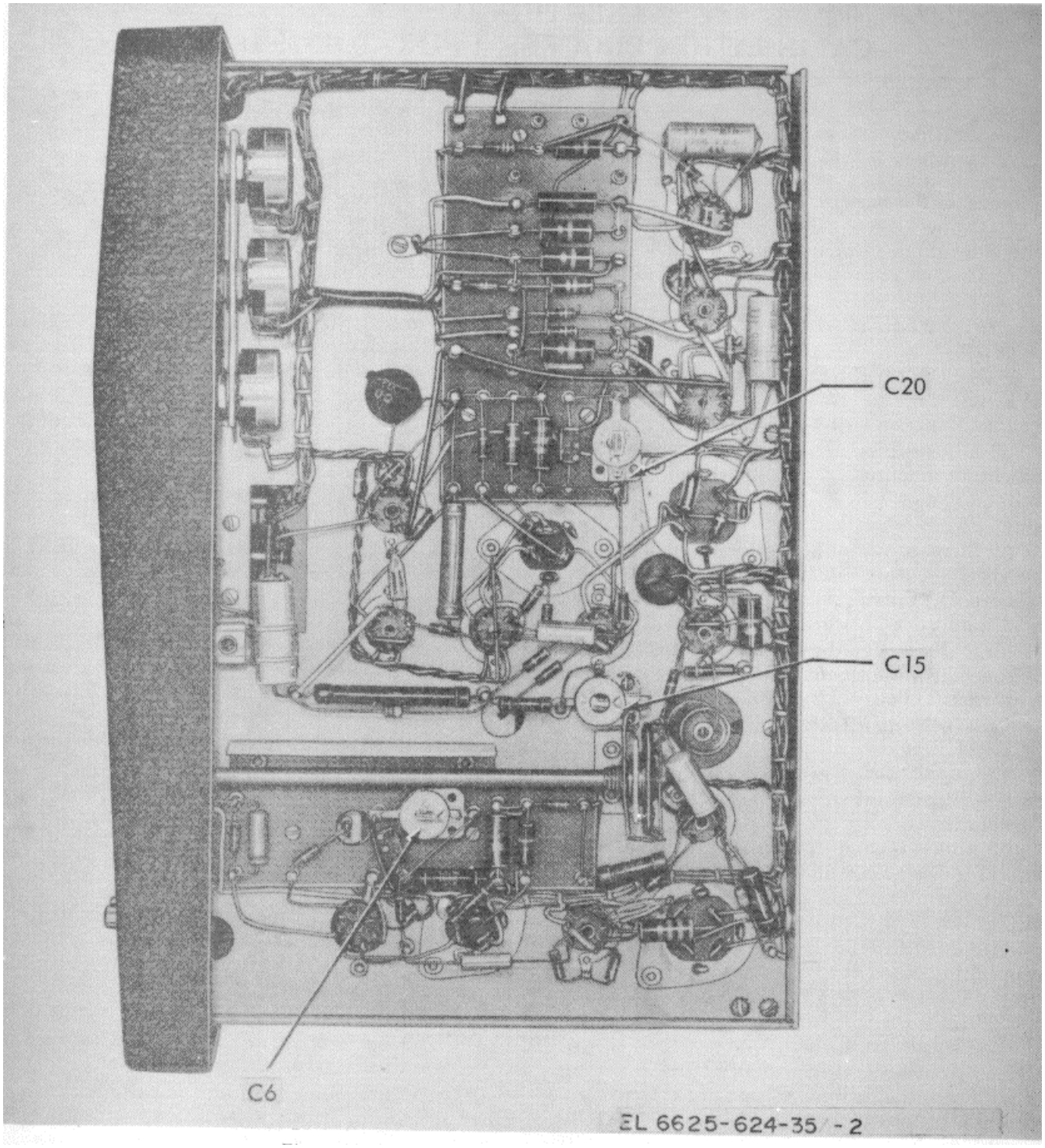

Figure 1. Electronic Voltmeter - right view or bottom view for rack mounted models.

Table 4. Meter Range

Test instrument		Ratio transformer setting	Meter calibrator indication	
L SCALE switch position	Meter indication		Min	Max
10 MILLIVOLTS	10 mv	.001000	3.465	3.605
35 MILLIVOLTS	35 mv	.010000	1.212	1.262
100 MILLIVOLTS	100 mv	.010000	3.465	3.605
350 MILLIVOLTS	350 mv	.100000	1.212	1.262
1000 MILLIVOLTS	400 mv	.100000	1.386	1.442
1000 MILLIVOLTS	600 mv	.100000	2.079	2.163
1000 MILLIVOLTS	800 mv	.100000	2.771	2.885
1000 MILLIVOLTS	1000 mv	.100000	3.465	3.605
3.5 VOLTS[1]	3.5 v	N/A	1.212	1.262
10 VOLTS	10 v	N/A	3.465	3.605
35 VOLTS	35 v	N/A	12.12	12.62
100 VOLTS	100 v	N/A	34.65	36.05
350 VOLTS	350 v	N/A	121.2	126.2
1000 VOLTS	1000 v	N/A	346.5	360.5

[1]Disconnect ratio transformer and connect meter calibrator directly to TI.

b. Adjustments. No adjustments can be made.

11. Final Procedure. *a.* Deenergize and disconnect all equipment and replace TI within protective cover.

b. In accordance with TM 38-750, annotate and affix DA Label 80 (U.S. Army Calibration System). When the TI cannot be adjusted within tolerance, annotate and affix DA Form 2417 (Unserviceable or Limited Use) tag.

NOTE

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met before continuing with the calibration.

12. Scale Linearity and Stability. *a. Performance Check.*

(1) Connect meter calibrator (A4) to TI input terminals, using cable (B2).

(2) Position TI controls as listed in ((t), (1), and (c) below.

(a) POSITIVE-NEGATIVE switch to POSITIVE.

(b) Function switch to PEAK TO PEAK.

(c) FULL SCALE switch to 1000 MILLIVOLTS.

(3) Adjust meter calibrator frequency to 1000 Hz and output voltage for an indication of 10 on TI meter upper scale.

(4) Turn FULL SCALE switch to 3.5 VOLTS. If TI meter does not indicate 1 on 1 to 3.5 scale, adjust SCALE ADJ until TI meter indicates 1 on 1 to 3.5 scale, then repeat (2), (3), and (4) above.

NOTE

Tap meter face lightly to reduce friction.

(5) Turn TI FULL SCALE switch to 1000 MILLIVOLTS.

(6) Adjust meter calibrator output voltage to 0.354 volt rms. If TI meter does not indicate to 10 on upper scale, adjust CAL ADJ until TI meter indicates 10 on upper scale.

NOTE

Tap meter face lightly when making adjustment.

(7) Adjust autotransformer (Al) to 105 volts.

(8) Adjust meter calibrator output voltage for an indication of 10 on TI meter upper scale. Meter cali bration output voltage will be between 0.347 and 0.361 volt rms.

(9) Repeat (8) above at autotransformer setting of 125 volts.

(10) Adjust autotransformer to 115 volts.

(11) Adjust meter calibrator output voltage for an indication of 10 on TI meter upper scale.

(12) Turn TI function switch to PEAK. If TI meter does not indicate 5 on upper scale, adjust PEAK ADJ. until TI meter indicates 5.

b. Adjustments. No adjustments can be made.

13. Frequency Response. *a. Performance Check.*

(1) Connect signal generator (A6) to TI input, using cable (B3) and termination (B6).

(2) Turn TI function switch to PEAK TO PEAK and FULL SCALE switch to 100 MILLIVOLTS.

(3) Adjust signal generator' frequency to 1000 Hz

(5) Turn TI FULL SCALE switch to 1000 MIL-LIVOLTS.

and output amplitude for an indication of 8 on TI upper scale.

(4) Adjust signal generator to expand mode.

(5) Vary signal generator frequency between 20 Hz and 200 kHz, keeping output amplitude to 8 on TI upper scale. If signal generator does not remain within +2 percent, perform b(1), (2), and (3) below.

(6) Vary signal generator frequency between 200 kHz and 500 kHz, keeping output amplitude to 8 on TI upper scale. If signal generator does not remain within +4 percent, perform b(l) through (4) below.

(7) Turn TI FULL SCALE switch to 1000 MILLIVOLTS.

(8) Adjust signal generator frequency to 1000 Hz and output amplitude for an indication of 8 on TI meter upper scale.

(9) Adjust signal generator to expand mode.

(10) Turn POSITIVE-NEGATIVE switch to NEGATIVE.

(11) Adjust signal generator output amplitude for an indication of 8 on TI meter upper scale. If signal generator does not indicate within +0.5 percent, perform b(5) and (6) below.

b. Adjustments.

(1) Adjust signal generator frequency to 400 kHz and output amplitude to zero percent.

(2) Adjust C6 and C20 (fig. 1) until TI meter indicates within 0.5 to 1 percent below indication of 8 on TI meter upper scale (R).

NOTE

Adjust C6 and C20 so both capacitors will have approximately the same capacitance.

(3) Repeat a (3), (4), and (5) above.

(4) Repeat a(6) above.

(5) Adjust signal generator output amplitude until TI meter indicates zero percent.

(6) Adjust C15 (fig. 1) until TI meter indicates 8 on upper scale (R).

14. Attenuator Accuracy. *a. Performance Check.*

(1) Turn TI POSITIVE-NEGATIVE switch to POSITIVE and FULL SCALE switch to 10 VOLTS.

(2) Adjust signal generator (A6) frequency to 1000 Hz and output amplitude for an indication of 8 on TI meter upper scale.

(3) Adjust signal generator to expand mode.

(4) Adjust frequency of signal generator to 200 kHz while maintaining an indication of 8 on TI meter upper scale. If signal generator does not indicate within ±2 percent, perform b(1) and (2) below.

(6) Repeat (2), (3), and (4) above, except if signal generator does not indicate within ±2 percent, perform b(l) and (3) below.

b. Adjustments.

(1) Adjust signal generator to 0 percent indication.

(2) Adjust C2 (fig. 2) until TI meter indicates 8 on upper scale (R).

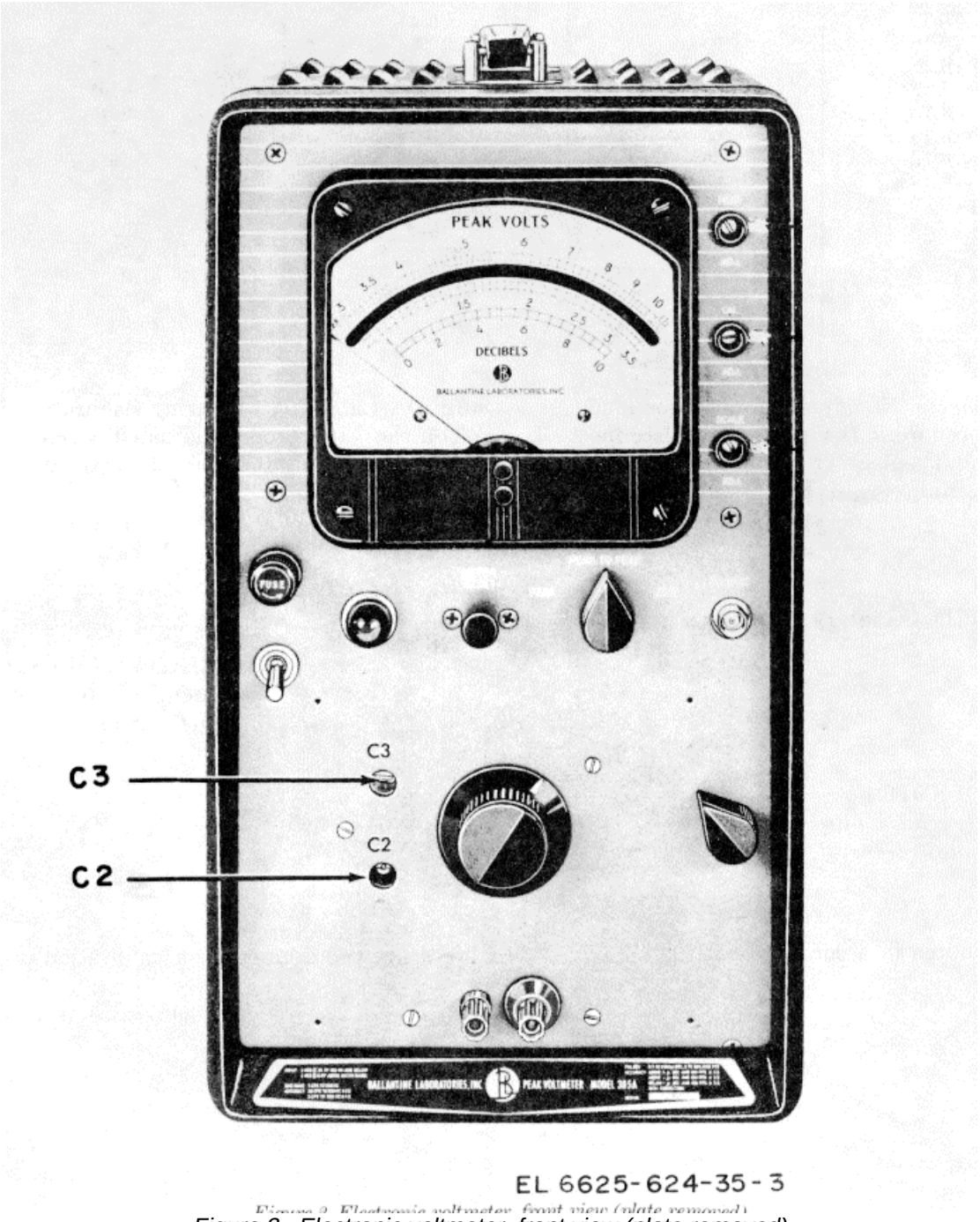

Figure 2. Electronic voltmeter, front view (plate removed)

(3) Adjust C3 (fig. 2) until TI meter indicates 8 on upper scale (R).

15. Meter Range. *a. Performance Check.*

(1) Connect meter calibrator (A4) to TI input, using cable (B2).

(2) Turn FULL SCALE switch to 3.5 MILLIVOLTS.

(3) Adjust meter calibrator frequency to 400 Hz and output amplitude for an indication of 3.5 millivolts on TI meter. Meter calibrator will indicate between 3.43 and 3.57 millivolts peak to peak.

(4) Repeat (2) and (3) above at TI FULL SCALE switch positions and meter indications listed in table

5. Meter calibrator will indicate within limits specified.

Table 5. Meter Ranges

Test instrument			Meter calibrator indication (volts peak-to peak)	
FULL SCALE switch position		Meter indication	Min	Max
10	MILLIVOLTS	10 mV	0.0098	0.0102
35	MILLIVOLTS	35 my	0.0343	0.0357
100	MILLIVOLTS	100 mV	0.098	0.102
350	MILLIVOLTS	350 mV	0.343	0357
1000	MILLIVOLTS	300 mV	0294	0306
1000	MILLIVOLTS	500 mV	0.490	0.510
1000	MILLIVOLTS	700 mV	0.686	0.714
1000	MILLIVOLTS	900 mV	0.882	0.918
1000	MILLIVOLTS	1000 mV	0.98	1.02
3.5	VOLTS	3.5 v	3.43	3.57
10	VOLTS	10 v	9.8	102
35	VOLTS	35 v	34.3	35.7
100	VOLTS	100 v	98	102
350	VOLTS	350 v	343	357
1000	VOLTS	1000 v	980	1020

b. Adjustments. No adjustments can be made.

16. Final Procedure. *a.* Deenergize and disconnect all equipment and replace TI within protective cover.

b. In accordance with TM 38-750, annotate and affix DA Label 80 (U.S. Army Calibration System). When the TI cannot be adjusted within tolerance, annotate and affix DA Form 2417 (Unserviceable or Limited Use) tag.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-34A literature requirements for calibration procedures publications.

*** U.S. GOVERNMENT PRINTING OFFICE: 1976-665668/633**

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ▸ ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

PIN: 031933