DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR TELEPHONE TEST SET TA-885/U AND HEWLETT-PACKARD, MODEL 3555B

Headquarters, Department of the Army, Washington, DC
19 January 1987

TB 9-6625-2127-35, 16 November 1984, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages	Insert pages
7 and 8	7 and 8

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-34C, Block No. 319, requirements for calibration procedures publications.

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REPORTING OF ERRORS

You can help improve this publication by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028, Recommended Changes to Publications, should be mailed directly to Commander, US Army TMDE Support Group, ATTN: AMXTM-LPE, Redstone Arsenal, AL 35898-5400. A reply will be furnished directly to you.

*This bulletin supersedes TB 11-6625-2779-35, 12 December 1977, including all changes.

SECTION I

IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Telephone Test Set TA-885/U and Hewlett-Packard, Model 3555B. 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 7 hours, using the dc and low frequency technique.

2. DA Form 2416 (Calibration Data Card)

a. Forms, records, and reports required or calibration personnel at all levels are described by TB 750-25. DA Form 2416 must be annotated in accordance with TB 750-25 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) follows 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
Carrier level (30 Hz to 3 MHz)	Range: -61 dBm to +11 dBm
75 ohms unbalanced	Accuracy: +0.2 dB, 100 Hz to 600 kHz ±0.5 dB, 30 Hz to 1 MHz ±0.5 dB +10% of meter reading; 1 to 3 MHz
600 ohms balanced	±0.2 dB, 10 to 100 kHz ±0.5 dB, 1 to 150 kHz
135 ohms balanced	±0.2 dB, 10 to 300 kHz ±0.5 dB, 1 to 600 kHz
Voice level (20 Hz to 20 kHz)	Range: -80 dBm to +31 dBm Accuracy: ±0.2 dB, 40 Hz to 15 kHz (levels greater than -60 dBm) ±0.5 dB, 20 Hz to 20 kHz
Bridging loss	
Voice level	Less than 0.3 dB at 1 kHz
Carrier level	Less than 0.05 dB at 10 kHz

SECTION II

EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies he 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 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 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 as indicated in paragraph 4 above and are 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 and model (part number)
A1	FREQUENCY COUNTER	Range: 100 Hz to 2 kHz Accuracy: ±0.5%	Hewlett-Packard, Model 5245A (MIS-28754/1 Type 1) w/5255A and K87-59992A
A2	RESISTANCE STANDARD[1]	Range: 0 to 900 ohms Accuracy: ±0.25%	Biddle-Gray, Model 601147-1 (7910328)
A3	TEST OSCILLATOR	Range: 20 Hz to 3 MHz	Hewlett-Packard, Model 652A (MIS-10224)
A4	TRUE RMS VOLTMETER	Range: 30 Hz to 3 MHz -50 to +10 dBm Accuracy: ±0.05 dB Range: 2 mV 0.25 dB, 50 Hz to 10 kHz; 0.35 dB, 20 to 50 Hz; 0.4 dB, 10 kHz to 2 MHz; 0.5 db, 2 to 3 MHz Range: 20 mV 0.15 dB, 50 Hz to 200 kHz; 0.25 dB, 20 to 50 Hz and 200 kHz to 1 MHz; 0.4 dB, 1 to 2 MHz; 0.5 dB, 2 to 3 MHz Range: 200 mV, 2V, 20 V 0.1 dB, 50 Hz to 200 kHz; 0.15 dB, 20 to 50 Hz and 200 kHz to 1 MHz; 0.35 dB, 1 to 2 MHz; 0.5 dB, 2 to 3 MHz	John Fluke, Model 8922A/AA (8922A/AA)

[1]Two required.

Table 3. Accessories Required

Item	Common name	Description (part number)
B1	ADAPTER[1]	BNC T-type, 2 jacks, 1 plug (MS35173-274C)
B2	ADAPTER	BNC jack to 385 plug (supplied with TI)
B3	ADAPTER	BNC plug to double banana plug (7909400)
B4	CABLE[1]	30-in., RG-58/U; BNC plug terminations (7907467)
B5	CABLE[1]	36-in., RG-58/U; BNC plug to double banana plug terminations (7907471)
B6	LEAD[1]	24-in., No. 18; single banana plug terminations (red) (7907497)
B7	LEAD	24-in., No. 18; single banana plug terminations (black) (7907498)

[1]Two required.

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 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 or exposed during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions.

NOTE

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.

NOTE

Unless otherwise specified, all controls and control settings refer to the TI.

7. Equipment Setup

a. Set TI AC-BAT switch (left side) to AT.

b. Set POWER switch to ON.

c. Press FUNCTION DIAL BAT pushbutton. If TI meter indicates to the left of the BAT. GOOD mark, replace battery.

d. Set RESPONSE switch to NORM.

e. Set INPUT switch to TMS-TERM.

f. Press CARRIER 75 UNBAL pushbutton.

g. Set RANGE switch to -50 dBm.

8. Carrier Level (75 ohms)

a. Performance Check.

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

(2) Position true rms voltmeter (A4) controls as listed in **(a)** through **(c)** below.

(a) Set dBm REFERENCE switch to 75 ohms.

(b) Press dB/VOLTS pushbutton.

(c) Release REL/dBm pushbutton.

(3) Adjust test oscillator (A3) frequency for 20 kHz and output for 0-dBm meter indication on TI. If true rms voltmeter does not indicate between -50.2 and -49.8 dBm, perform b(1) and (2) below.

(4) Vary test oscillator frequency between 30 Hz and 3 MHz, keeping TI indication constant. If true rms voltmeter does not indicate within limits specified in **(a)** through **(d)** below, perform b(3) and (4) below.

(a) 30 to 100 Hz, ±0.5 dBm.
(b) 100 Hz to 600 kHz, ±0.2 dBm.
(c) 600 kHz to 1 MHz, ±0.5 dBm
(d) 1 to 3 MHz, ±1.5 dBm.

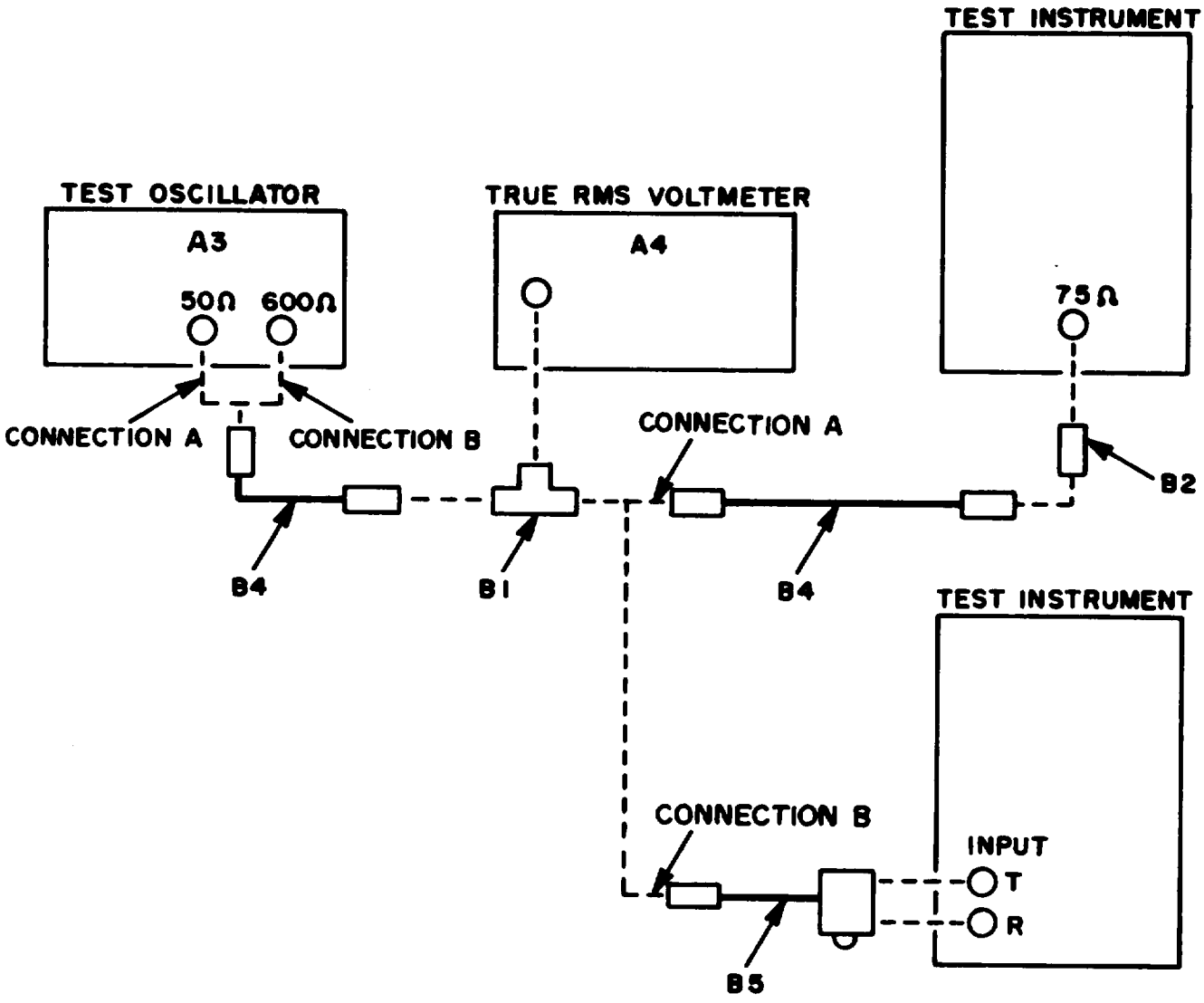

Figure 1. Level check - equipment setup.

(5) Repeat technique of (3) and (4) above at TI switch positions and for meter indications listed in table 4. If true rms voltmeter does not indicate within limits specified, perform b(5) and (6) below.

Table 4. Carrier Level (75 ohms)

Test instrument		True rms voltmeter indications (dBm)						
Range switch positions (dBm)	Meter indications (dBm)	30 to 100 Hz 600 kHz to 1 MHz		10 Hz to 600 kHz		1 MHz to 3 MHz		Adjustments [1] (fig. 2) (R)
		Min	Max	Min	Max	Min	Max	
-40	0	-40.5	-39.5	-40.2	-39.8	-41.5	-38.5	A2C12 (-40 dBm)
-30	0	-30.5	-29.5	-30.2	-29.8	-31.5	-28.5	A2C7 (-30 dBm)
-20	0	-20.5	-19.5	-20.2	-19.8	-21.5	-18.5	A2C4 (-20 dBm)
-10	0	-10.5	-9.5	-10.2	-9.8	-11.5	-8.5	---
0	0	-0.5	+0.5	-0.2	+0.2	-1.5	+1.5	---
+10	0	+9.5	+10.5	+9.8	+10.2	+8.5	+11.5	A2C1 (+10 dBm)

[1]Set test oscillator to 100 kHz for adjustments.

(6) Set RANGE switch to +10 dBm.

(7) Adjust test oscillator frequency for 20 kHz and output for TI meter indications listed in table 5. True rms voltmeter will indicate within limits specified.

Table 5. Meter Tracking

Test instrument meter indications (dBm)	True rms voltmeter indications (dBm)	
	Min	Max
-2	7.8	8.2
-4	5.8	6.2
-6	3.8	4.2
-8	1.8	2.2
-10	-0.2	+0.2

b. Adjustments

(1) Adjust test oscillator frequency for 10 kHz and output for a -50-dBm indication on true rms voltmeters.

NOTE

A3R43 (1 kHz) (Fig. 2) is accessible through battery compartment. Removal of chassis from case is not required.

(2) Adjust A3R43 (1 kHz) until TI meter indicates 0 dBm (R).

(3) Adjust test oscillator frequency for 3 MHz, keeping true rms voltmeter indication constant.

(4) Adjust A3C8 (fig. 2) until TI meter indication 0 dBm (R).

(5) Perform **(a)** through **(e)** below prior to making adjustments listed in table 4.

(a) Remove test board (fig. 2).
(b) Remove two screws located amplifier board (fig. 2). re
(c) Remove amplifier board.
(d) Remove function board (fig. 2 and replace with test board.
(e) Replace amplifier board.
(6) Perform (a) through (e) below after making adjustments.

(a) Remove amplifier board.
(b) Remove test board and replace with function board.
(c) Replace amplifier board.
(d) Replace two screws on amplifier board.
(e) Replace test board.

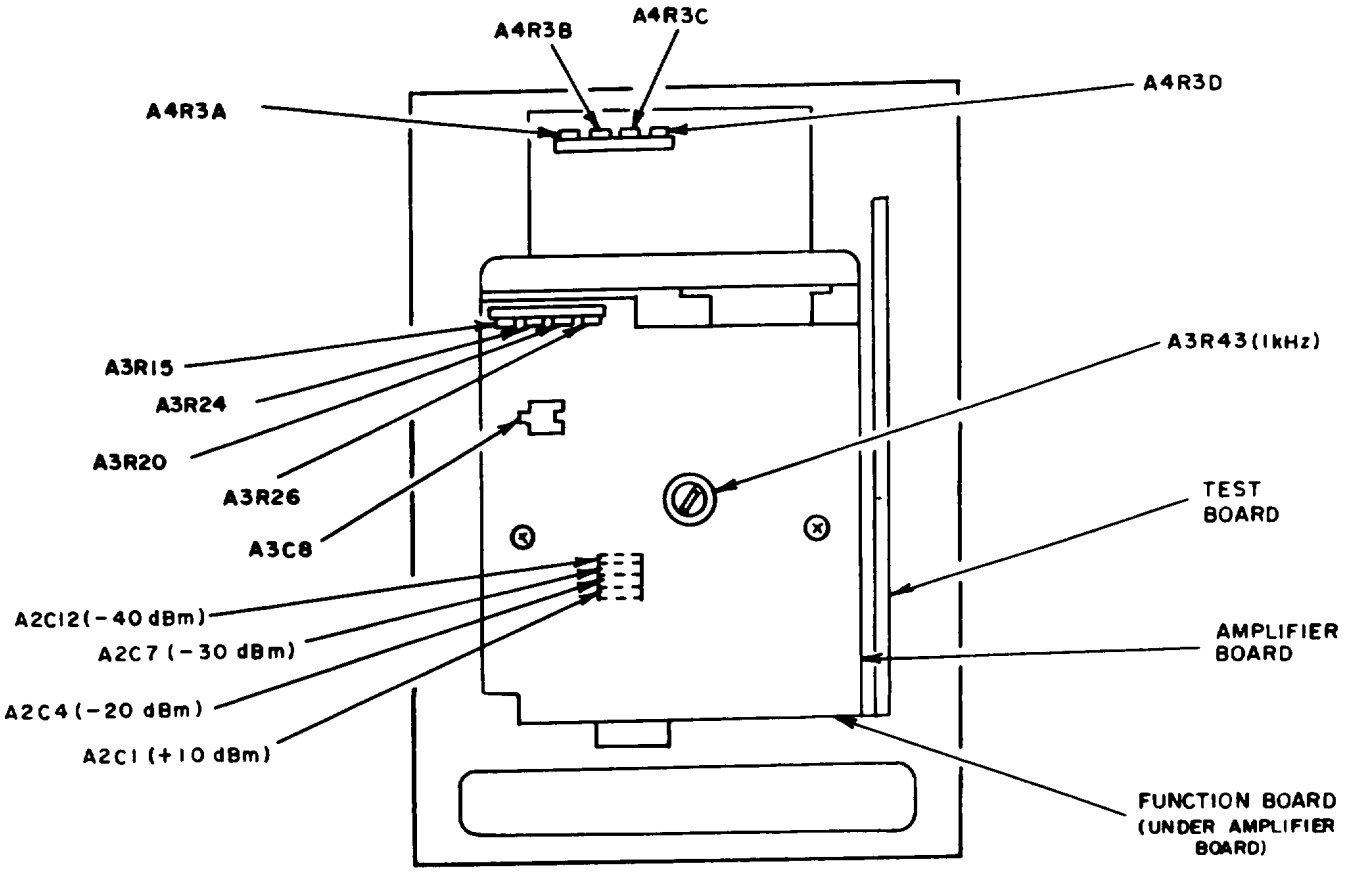

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Figure 2. Adjustment locations - rear view.

9. Carrier Levels (600 and 135 Ohms)

a. Performance Check

(1) Connect equipment as shown in figure 1, connection B.

(2) Set true rms voltmeter dBm REFERENCE switch to 600 ohms.

(3) Press CARRIER 600 BAL pushbutton and set RANGE switch to +10 dBm.

(4) Adjust test oscillator frequency or 20 kHz and output for a 0-dBm meter indication on TI. If true rms voltmeter does not indicate between 9.8 and 10.2 dBm, perform b(1) through (8) below.

(5) Vary test oscillator frequency between and 150 kHz, keeping TI indication constant. If true rms voltmeter does not indicate between 9.8 and 10.2 dBm (10 to 100 kHz) or 9.5 and 10.5 dBm (1 to 10 kHz and 100 to 150 kHz), perform b(1) through (8) below.

(6) Set true rms voltmeter dBm REFERENCE switch to 135 ohms.

(7) Press CARRIER 135 BAL pushbutton and set RANGE switch to +10 dBm.

(8) Adjust test oscillator frequency for 20 kHz and output for 0-dBm meter indication on TI. If true rms voltmeter does not indicate between 9.8 and 10.2 dBm, perform b(9) and (10) below.

(9) Vary test oscillator frequency between and 600 kHz, keeping TI indication constant. If true rms voltmeter does not indicate between 9.5 and 10.5 (1 to 0 kHz and 300 to 600 kHz) and 9.8 and 10.2 (10 to 300 kHz), perform b(9) and (10) below.

b. Adjustments

(1) Adjust test oscillator frequency for 10 kHz and output for a -50-dBm indication on true rms voltmeter.

(2) Set RANGE switch to -50 dBm.

(3) Adjust A3R15 (fig. 2) until TI meter indicates 0 dBm (R).

(4) Adjust test oscillator frequency for 1 kHz, keeping output constant.

(5) Press VF/Nm 600 BAL pushbutton. If TI meter does not indicate 0 dBm, readjust A3R15 to split the difference between 0 dBm and meter indication.

(6) Adjust test oscillator output for a -70-dBm indication on true rms voltmeter.

(7) Set RANGE switch to -70 dBm.

(8) Adjust A3R26 (fig. 2) until TI meter indicates 0 dBm (R).

(9) Adjust test oscillator frequency for 1 kHz and output for a +10-dBm indication on true rms voltmeter.

(10) Adjust A3R24 (fig. 2) until TI meter indicates 0 dBm (R).

10. Voice Levels

a. Performance Check

(1) Set true rms voltmeter (A4) dBm REFERENCE switch to 600 ohms.

(2) Press VF/Nm 600 BAL pushbutton and set RANGE switch to +10 dBm.

(3) Adjust test oscillator frequency for 1 kHz and output for a 0-dBm meter indication on TI. True rms voltmeter will indicate between 9.8 and 10.2 dBm.

(4) Vary test oscillator frequency between 20 Hz and 20 kHz, keeping TI indication constant. True rms voltmeter will indicate within limits specified in (a) through (c) below.

(a) 20 to 40 Hz; 9.5 and 10.5 dBm.

(b) 40 Hz to 15 kHz; 9.8 and 10.2 dBm.

(c) 15 to 20 kHz; 9.5 and 10.5 dBm.

(5) Set true rms voltmeter dBm REFERENCE switch to 900 ohms.

(6) Press VF/Nm 900 BAL pushbutton.

(7) Repeat (3) and (4) above. If TI meter does not indicate within limits specified, perform b below.

b. Adjustments

(1) Adjust test oscillator frequency for 1 kHz and output for a +10-dBm indication on true rms voltmeter.

(2) Adjust A3R20 (fig. 2) until TI meter indicates best in-tolerance condition

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11. Noise Weighting Filters Response

a. Performance Check

(1) Set true rms voltmeter (A4) dBm REFERENCE switch to 600 ohms.

(2) Position TI controls as listed in **(a)** through **(d)** below.

(a) Press VF/Nm 600 BAL pushbutton.

(b) Set INPUT switch to NOISE-BRDG.

(c) Set NOISE WTG switch to 3 kHz FLAT.

(d) Set RANGE switch to 0 dBm.

(3) Adjust test oscillator (A3) frequency for 1 kHz and output for a 0-dBm indication on TI meter. Record true rms voltmeter indication.

(4) Adjust test oscillator for frequencies listed in table 6, keeping true rms voltmeter indication constant at indication recorded in (3) above. If TI meter does not indicate within limits specified, perform **b**(1) through (7) below.

(5) Repeat technique of (3) and (4) above for remaining NOISE T\WTG switch positions listed in table 6. If TI meter does not indicate within limits specified, perform adjustments as designated in **(a)** through **(c)** below.

Table 6. Filter Response

Test oscillator frequency	Test instrument NOISE WTG switch positions and indications							
	3 kHz FLAT (dBm)		15 kHz FLAT (dBm)		C-MSG (dBm)		PROG (dBm)	
	Min	Max	Min	Max	Min	Max	Min	Max
60 Hz	-1.75	+1.75	-1.75	+1.75	-57.7 [1]	-53.7	---	---
200 Hz	---	---	---	---	-27	-23	-19.3 [1]	-15.3
250 Hz	-1	+1	-1	+1	---	---	---	---
500 Hz	---	---	---	---	-8.5	-6.5	-7.6	-5.6
1 kHz	0 (REF)		0 (REF)		0 (REF)		0 (REF)	
2 kHz	-2.25	+1.25	---	---	-2.3	-0.3	+2.8	+6.8
2.5 kHz	-3.5	+0.5	---	---	-2.4	-0.4	---	---
3 kHz	-6	0	---	---	---	---	+4.5	+8.5
4 kHz	---	---	---	---	-17.5	-11.5	+4.5	+8.5
5 kHz	---	---	-1	+1	-31.5	-25.5	+4.5	+8.5
6 kHz	---	---	---	---	---	---	+3.4	+9.4
8 kHz	---	---	---	---	---	---	+1	+7
10 kHz	---	---	-2.25	+1.25	---	---	-12.5	-4.5
12.5 kHz	---	---	-3.5	+0.5	---	---	---	---
15 kHz	---	---	-6.0	0.0	---	---	---	---

[1]Adjust TI RANGE switch as required for the following checks.

(a) For 15 kHz FLAT switch position, perform b(1) through (7) below.

(b) For C-MSG switch position, perform b(2) through (5) and (8) through (11) below.

(c) For PROG switch position, perform b(2) through (5) and (12) below.

b. Adjustments

(1) Set NOISE WTG switch to 3 kHz FLAT.

(2) Disconnect cable (B4) from test oscillator and connect frequency counter (A1) to test oscillator, using additional cable (B4).

(3) Adjust test oscillator frequency for a 1.000-kHz indication on frequency counter.

(4) Disconnect frequency counter from test oscillator and reconnect cable to test oscillator.

(5) Adjust test oscillator output for a 0-dBm indication on true rms voltmeter.

(6) Adjust A4R3C (fig. 2) until TI meter indicates 0 dBm (R).

(7) Set NOISE WTG switch to 15 kHz FLAT. If TI meter does not indicate 0 dBm, readjust A4R3C to split the difference between this indication and 0 dBm.

(8) Adjust A4R3A (fig. 2) until TI meter indicates 0 dBm (R).

(9) Repeat b(2) through (5) above, using 3.00 kHz.

(10) Adjust A4R3D (fig. 2) until TI meter indicates -2.15 dBm (R).

(11) Repeat b(2) through (5) and (8) through (10) above until TI meter indicates within tolerance.

(12) Adjust A4R3B (fig. 2) until TI meter indicates 0 dBm (R).

12. Bridging Loss

a. Performance Check

(1) Set INPUT switch to TMS-BRDG.

(2) Connect all equipment except TI shown in figure 3.

(3) Adjust resistance standard No. 1 (A2) to 600 ohms and resistance standard No. 2 (A2) to 0 ohms.

(4) Adjust test oscillator (A3) frequency for 1 kHz and output for a 0-dBm indication on true rms voltmeter (A4).

(5) Connect TI to equipment setup. True rms voltmeter will indicate 0 ±0.3 dBm.

(6) Disconnect TI from equipment setup.

(7) Press CARRIER 600 BAL pushbutton.

(8) Adjust test oscillator frequency 10 kHz and output for a 0-dBm indication on true rms voltmeter.

(9) Reconnect TI to equipment setup. True rms voltmeter will indicate 0 +0.5 dBm.

(10) Disconnect TI from equipment setup.

(11) Set true rms voltmeter dBm REFERENCE switch to 900 ohms.

(12) Adjust resistance standard No. 1 to 900 ohms and No. 2 to 300 ohms.

(13) Adjust test oscillator frequency 10 kHz and output for a 0-dBm indication on true rms voltmeter.

(14) Press VF/Nm 900 BAL pushbutton and connect TI to equipment setup. True rms voltmeter will indicate 0 ± 3 dBm.

b. Adjustments. No adjustments can be made.

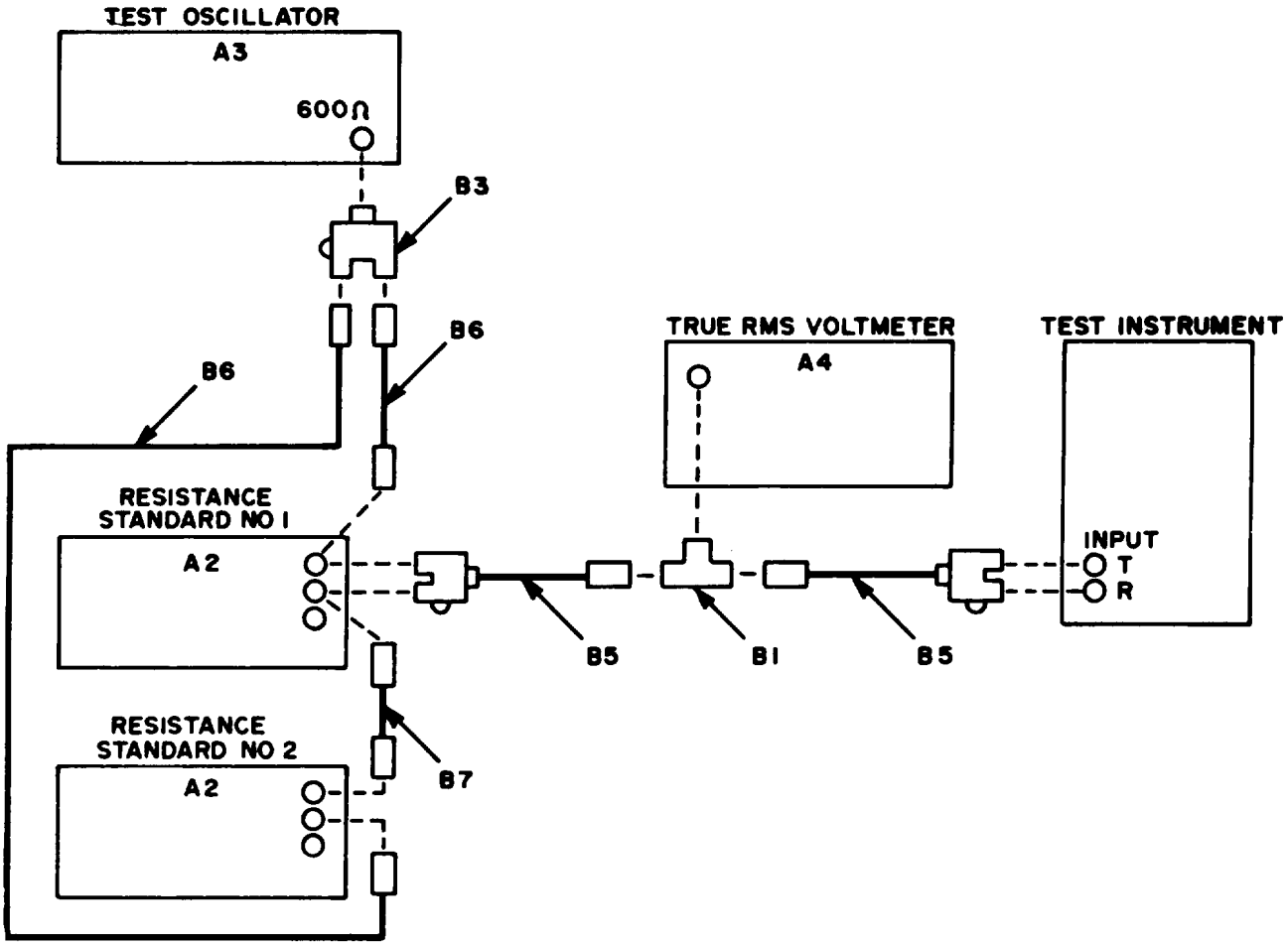

Figure 3. Bridging loss - equipment setup.

13. Final Procedure

a. Deenergize and disconnect all equipment and reinstall protective cover on TI.

b. When all parameters are within tolerance, annotate and affix DA Label 80 (U.S. Army Calibrated Instrument). When the TI receives limited or special calibration, annotate and affix DA Label 163 (U.S. Army Limited or Special Calibration). When the TI cannot be adjusted within tolerance, repair the TI in accordance with the maintenance manual. When repair is delayed for any reason or the TI cannot be repaired with local resources, annotate and affix DA For 2417 (U.S. Army Calibration System Rejected Instrument) and inform the owner/user accordingly in accordance with TB 750/25.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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