DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR CONDUCTIVE FLOOR, SHOE AND PERSONNEL TESTER (ASSOCIATED RESEARCH MODEL 2269)

Headquarters, Department of the Army, Washington, DC
15 October 1980

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished to you.

		Paragraph	Page
Section I.	**IDENTIFICATION AND DESCRIPTION**		
	Test instrument identification	1-1	2
	Calibration data card, DA Form 2416	1-2	2
	Calibration description	1-3	2
Section II.	**EQUIPMENT REQUIREMENTS**		
	Equipment required	2-1	2
	Accessories required	2-2	2
Section III.	**PRELIMINARY OPERATIONS**		
	Preliminary instructions	3-1	4
	Equipment setup	3-2	4
Section IV.	**CALIBRATION PROCESS**		
	Meter Accuracy (Floor and Equipment)	4-1	4
	Meter Accuracy (Personnel)	4-2	7
	Final Procedure	4-3	8

Section I. IDENTIFICATION AND DESCRIPTION

1-1. Test Instrument Identification. This bulletin provides instruction for the calibration of Conductive Floor, Shoe and Personnel Tester (Associated Research Model 2269).

a. *Model Variations*. The pin terminal marked PERSONNEL is changed to a banana clip terminal when the tester is used as a component of APE 1953.

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

1-2. 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).

1-3. Calibration Description. Test instrument parameters and performance specifications which pertain to this calibration are listed in Table 1-1.

Table 1-1. Calibration Description

Test Instrument Parameters.	Performance Specifications.
Conductive floor resistance	5 megohms ± 2%
Personnel resistance	1 megohm ± 20/o

Section II. EQUIPMENT REQUIREMENTS

2-1. Equipment Required. Table 2-1 identifies the specific equipment used in this calibration procedure. This equipment is issued with the secondary transfer calibration standards set and is to be used in performing this procedure. Alternate items may be used by the calibrating activity when the equipment listed in table 2-1 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 2-1. The accuracies listed in table 2-1 provide a four-to-one accuracy ratio between the standard and test instrument. Where the four-to-one ratio cannot be met, the actual accuracy of the equipment selected is shown in parentheses.

2-2. Accessories Required. The accessories listed in table 2-2 are issued with the secondary transfer calibration standards set and are to be used in this calibration procedure. When necessary, these items may be substituted by equivalent items unless specifically prohibited.

Table 2-1. Minimum Specifications of Equipment Required

Item	Common Name	Minimum Use Specifications	Manufacturer, Model and Part Number or Equivalent
A1	DECADE RESISTOR	000,000 to 999,999.99 ohms ± 0.5%	Biddle Instrument Co, Model 601147-1 (7910328)
A2	RESISTANCE STANDARD	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, megohm ± 0.5%	Beckman Instrument Inc. Model CR-1OM (8598965)
A3	POWER SUPPLY	0 to 36 VDC Output Range, 0 to 30 Amps	NJE Corp Part No. CS36CR30 (7907346-2)
A4	DIGITAL VOLTMETER	Range 0 to 525 Volts DC ± 0.5%	Dana Corp Part No. 5703-S-2127 (7911058-3)

Table 2-2. Accessories Required

Item	Common Name	Description and Part Number
B1	ADAPTER *	Banana jack to pin plug (black) (7907528)
B2	ADAPTER *	Banana jack to pin plug (red) (7907517)
B3	LEAD *	24 inch, No. 18; single banana plug termination (black) (7907498)
B4	LEAD	24 inch, No. 18; single banana plug termination (red) (7907497)
B5	JACK	Jack, Tip (red) (7907499)
B6	JACK	Jack, Tip (black) (7907502-1)

* Two required.

Section III. PRELIMINARY OPERATIONS

3-1. Preliminary Instructions.

a. The instructions outlined in this section 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 as listed in tables 2-1 and 2-2. For identification of equipment referenced by item numbers prefixed with A, see table 2-1, and for prefix B, see table 2-2.

WARNING

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

NOTE

Do not activate tester for periods exceeding five seconds. Wait 20 seconds between measurements.

3-2. Equipment Setup. Remove the test instrument cover.

Section IV. CALIBRATION PROCESS

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.

NOTE

Do not activate tester for periods exceeding five seconds. Wait 20 seconds between measurements.

4-1. Meter Accuracy (Floor and Equipment).

a. *Performance Check.*

(1) Short COMMON and FLOOR AND EQUIPMENT terminals on the test instrument.
(2) Push PRESS TO TEST button on test instrument and zero the meter. Release button.
(3) Remove shorting lead from test instrument.
(4) Connect equipment as shown on Figure 4-1 for calibration of test instrument up to but not including 1 megohm.

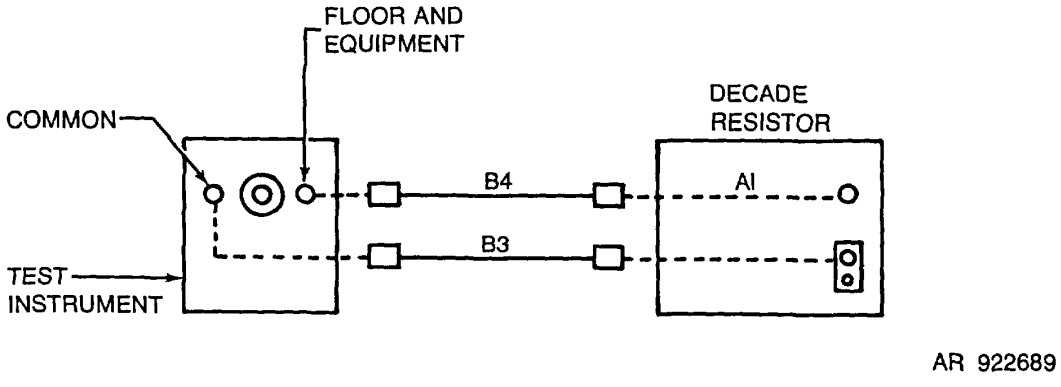

Figure 4-1. Performance check setup for less than 1 megohm (floor and equipment)

(5) Push PRESS TO TEST button. Adjust decade resistor until test instrument indicates value shown in column 1 of Table 4-1. Decade resistor settings will be between MIN and MAX values shown in Table 4-1. Release button. If the decade resistor does not indicate between the values shown in Table 4-1, perform b below.
(6) Remove test leads from the decade resistor.
(7) Short COMMON and FLOOR AND EQUIPMENT terminals on the test instrument.
(8) Push PRESS TO TEST button on test instrument and zero the meter. Release button.
(9) Remove shorting lead from test instrument.
(10) Connect equipment as show in Figure 4-2 for calibration of test instrument at 1 megohm and greater.

Table 4-1. Performance Check-Floor And Equipment (Less Than 1 Megohm)

TEST INSTRUMENT INDICATION	TOTAL RESISTANCE OF DECADE RESISTOR IN OHMS	
	MINIMUM	MAXIMUM
0	0	50
10K	9,800	10,200
50K	49,000	51,000
100K	98,000	102,000
200K	196,000	204,000
500K	490,000	510,000
1 MEG	980,000	SEE TABLE 4-2

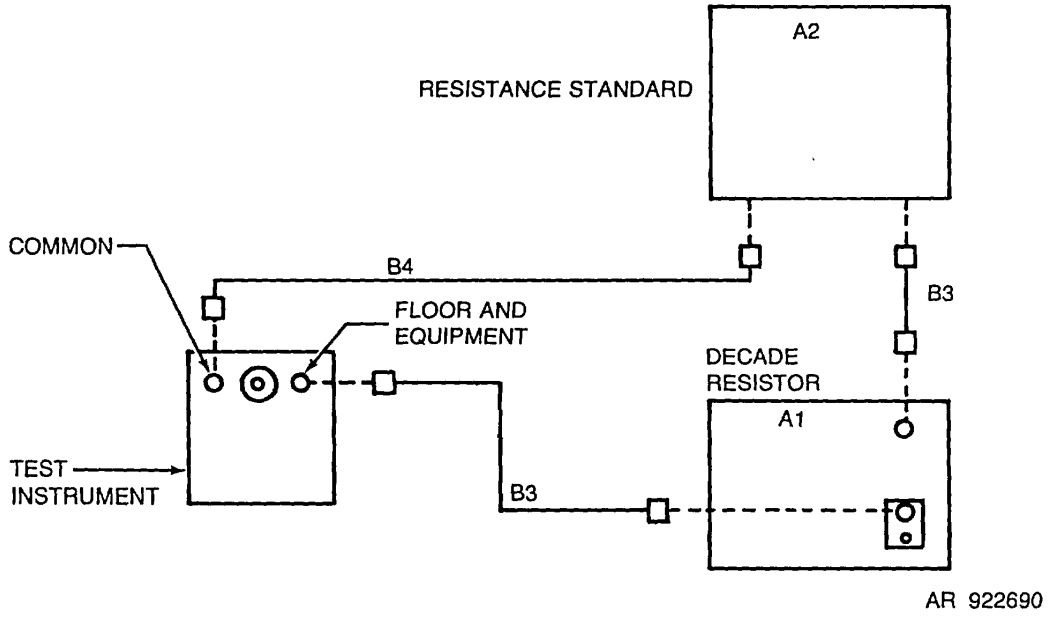

Figure 4-2. Performance check setup for 1 megohm and greater (floor and equipment)

(11) Push PRESS TO TEST button. Adjust decade resistor until test instrument indicates value shown in column 1 of Table 4-2. Decade resistor settings will be between MIN and MAX values shown in Table 4-2. Release button. If the decade resistor does not indicate between the values shown in Table 4-2 perform b below.

(12) Remove test leads and adapters from test instrument, decade resistor and resistance standard.

b. Adjustments.

(1) Remove four flathead screws from side of top flange of the test instrument. Remove test instrument from case.

(2) Remove battery from test instrument.

(3) Remove four pan head screws from test instrument face. Remove test instrument face and circuitry from inner case.

(4) Connect power supply (A3) to battery leads using leads (B3 and B4) and jacks (B5 and B6).

(5) Energize power supply and adjust output to 3.0 volts.

(6) Connect digital voltmeter across R1 on shunt assembly printed circuit board shown in Figure 4-3.

Table 4-2. Performance Check-Floor And Equipment (1 Megohm And Greater)

TEST INSTRUMENT INDICATION	TOTAL RESISTANCE OF DECADE RESISTOR AND RESISTANCE STANDARD IN OHMS	
	MINIMUM	MAXIMUM
1 MEG	SEE TABLE 4-1	1,020,000
5 MEG	4,900,000	5,100,000

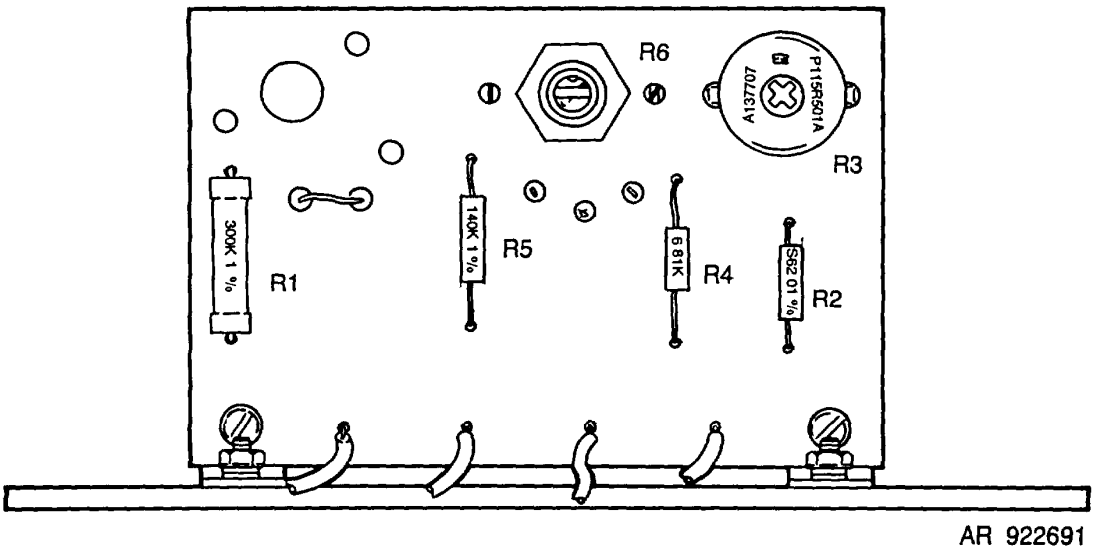

Figure 4-3. Shunt assembly printed circuit board

(7) Adjust series calibration potentiometer R6 (Fig. 4-3) to mid-position. (R)
(8) Push PRESS TO TEST pushbutton on test instrument. Adjust panel ZERO control until digital voltmeter reads 500 to 525 volts. (R)
(9) Disconnect digital voltmeter from test instrument. Be sure not to disturb ZERO control setting on panel.
(10) Connect the COMMOX terminal on the test instrument to the LOW terminal of decade resistor (A1) using adapters (B1) and lead (B3).
(11) Connect the FLOOR AND EQUIPMIENT terminal on the test instrument to the HIGH terminal of decade resistor using adapters (B2) and lead (B4).
(12) Set decade resistor at 000,000.00 ohms.
(13) Push PRESS TO TEST pushbutton on test instrument. Adjust R3 (Fig. 4-3) to zero meter. Release PRESS TO TEST pushbutton. (R)
(14) Set decade resistor at 250,000 ohms.
(15) Push PRESS TO TEST pushbutton on test instrument. Adjust R6 in a direction to double the error (Higher or lower than 250,000 ohms). Release PRESS TO TEST pushbutton. (R)
(16) Repeat (12) through (15) above until no further adjustment is required.
(17) Repeat Performance Check (Paragraph 4-1a above).
(18) Turn off power supply. Remove all connections to test instrument. Place instrument and circuitry in inner case and assemble four panhead screws.
(19) Connect batteries to battery leads. Place inner case in test instrument case. Assemble four flathead screws.

4-2. Meter Accuracy (Personnel).

a. *Performance Check*

(1) Short COMMON and PERSONNEL terminals on the test instrument.
(2) Push PRESS TO TEST button on test instrument and zero the meter. Release button.
(3) Remove shorting lead from test instrument.
(4) Connect equipment as shown in Figure 4-4 for calibration of test instrument

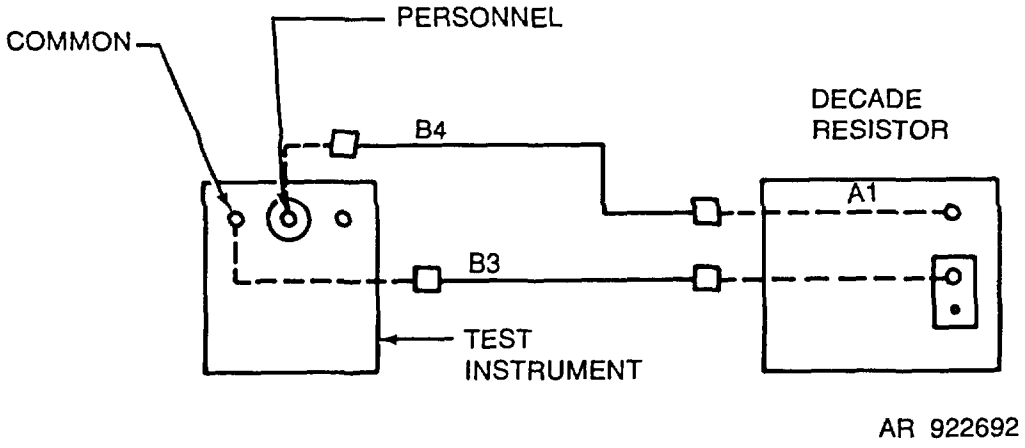

Figure 4-4. Performance check. setup for less than 1 megohm (personnel)

(5) Push PRESS TO TEST button. Adjust decade resistor until test instrument indicates value shown in column 1 of Table 4-3. Decade resistor setting must be greater than minimum value shown in Table 4-3 and less than the maximum value shown in Table 4-3. Release button.

b. *Adjustments*. No adjustments can be made.

4-3. Final Procedure.

a. Disconnect leads and adapters and secure test equipment. Place cover on test instrument.

b. In accordance with TM 38-750, annotate and affix DA Label 80 (US Army Calibration System). When the test instrument does not perform within tolerance, annotate and affix DA Form 2417 (Unserviceable or Limited Use) tag.

Table 4-3. Performance Check-Personnel

TEST INSTRUMENT INDICATION	TOTAL RESISTANCE OF DECADE RESISTOR IN OHMS	TOTAL RESISTANCE OF DECADE RESISTOR IN OHMS
	MINIMUM	MAXIMUM
1 MEG	980,000	1,020,000

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