*TB 9-4920-360-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR TEMPERATURE-SPEED SIMULATOR TEST SET HOWELL MODEL H296A-1

Headquarters, Department of the Army, Washington, DC
10 March 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 bulletin supersedes TB 9-4920-360-35, 20 February 1984 including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Temperature-Speed Simulator Test Set, Howell Model H296A-1. 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 procedure.

a. Model Variations. None.

b. Time and Technique. The time required for this calibration is approximately 2 hours, 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 specifications which pertain to this calibration are listed in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Power input requirement	Range: 105 to 125 V ac, 50 to 400 Hz
Temperature	Range: 400 to 800°C Accuracy: ±6°C
Percent rpm	Range: 50 110% rpm (239.52 to 5531.04 Hz) Accuracy: ±0.2%

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 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.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
AUTOTRANSFORMER	Range: 105 to 125 V ac Accuracy: ±1%	General Radio, Model W10MT3AS3 (7910809)
FREQUENCY COUNTER	Range: 250 to 5531 Hz Accuracy: ±0.05%	Fluke, Model PM6681/656 (PM6681/656)
MULTIMETER	Range: 16.140 to 33.523 mV dc Accuracy: ±1.5%	Hewlett-Packard, Model 3458A (3458A)
THERMOMETER	Range: 15 to 30°C Accuracy: ±1.5°	Azonix, Model A1012 (MIS38958)

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. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in 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. Position controls as listed in (1) through (4) below:

(1) **POWER** switch to **OFF**.

(2) **FUNCTION SWITCH** to **0%**.

(3) **VAR FREQ ADJ** switch to **0**.

(4) **TEMP** switch to **NORM**.

b. Connect TI to autotransformer, using power cable supplied with TI.

c. Connect autotransformer to a 115 V ac power source and adjust for 115 V output.

d. Set **POWER** switch to **ON** and allow at least 15 minutes for warm-up.

8. Temperature

a. Performance Check

(1) Connect multimeter to **SIGNAL OUTPUT (J2)** pin **E** (+) and pin **D** (-).

(2) Place probe end of thermometer adjacent to terminals of **J2**. Wait 10 minutes for thermometer to stabilize.

NOTE

Constantly check thermometer temperature values to insure proper millivolt values.

(3) Set **TEMP OUTPUT** control for 400°C plus value in degrees C as indicated on thermometer. If multimeter indication is not between 16.14 and 16.65 mV dc, perform **b** (1) below.

(4) Set **TEMP OUTPUT** control for 800°C plus value in degrees C as indicated on thermometer. If multimeter indication is not between 33.031 and 33.523 mV dc, perform **b** (2) and (3) below.

(5) Repeat technique of (4) above at **TEMP OUTPUT** control settings listed in table 3. Multimeter indications will be within limits specified.

Table 3. Temperature Check

Temp output control settings	Multimeter indications (mV dc)	
	Min	Max
500	20.385	20.896
600	24.646	25.157
700	28.877	29.380

b. Adjustments

(1) Adjust R40 (fig. 1) for 16.400 mV dc indication on multimeter (R).

(2) Adjust R42 (fig. 1) for 33.257 mV dc indication on multimeter (R).

(3) Repeat **a** (3) and (4) and **b** (1) and (2) above, as necessary, for best in-tolerance compromise.

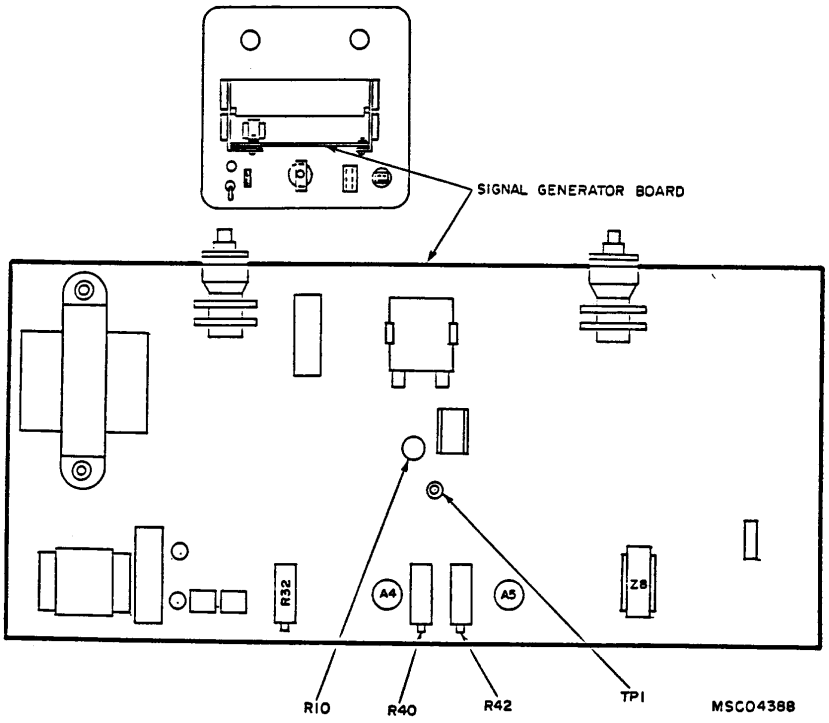

Figure 1. Test instrument - rear view.

9. Percent Rpm

a. Performance Check

(1) Set **POWER** switch to **OFF**.

(2) Connect frequency counter positive to pin **A** and negative to pin **B** of **SIGNAL OUTPUT (J2)**.

(3) Set **POWER** switch to **ON**.

(4) Set **FUNCTION SWITCH** to **5%**. Frequency counter will indicate between 4.058 and 4.175 ms.

(5) Set **FUNCTION SWITCH** and **FREQ** switch to settings listed in table 4. Frequency counter will indicate within limits specified.

Table 4. Percent Rpm

Test instrument		Frequency counter indications (Hz)	
FUNCTION SWITCH settings (%RPM)	**FREQ** adjustments switch settings	Min	Max
5	+5	2.079 ms[1]	2.087 ms
5	-4	20.791 ms[1]	20.875 ms
5	-5	20.791 ms[1]	20.875 ms
15	0	718.56	721.44
70	0	3353.28	3366.72
90	0	4311.36	4328.64
110	0	5269.44	5290.56
110	-5	5029.92	5050.08
110	-4	5077.82	5098.18
110	-3	5125.73	5146.27
110	-2	5173.63	5194.37
110	-1	5221.54	5242.46
110	+1	5317.34	5338.66
110	+2	5365.25	5386.75
110	+3	5413.15	5434.85
110	+4	5461.06	5482.94
110	+5	5508.96	5531.04

[1]Set frequency counter for period measurement. When the **FUNCTION SWITCH** is at 5 percent and the variable frequency adjustment is at -5, the frequency output is 1 percent rpm (not 0 percent rpm), equivalent to 48 Hz or 20,833 ms.

b. Adjustments

(1) Connect frequency counter to TP1 (fig. 1).

(2) Adjust R10 (fig. 1) for indication of 1 MHz on frequency counter.

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:

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From: "Whomever" whomever@redstone.army.mil
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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.