TB 9-4920-452-35

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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR HYDRAULIC SYSTEMS TEST SET BOEING, MODELS 114G1038-31 AND 114G1038-71

Headquarters, Department of the Army, Washington, DC
30 December 1991

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*This bulletin supersedes TB 9-4920-452-35, 15 January 1986, including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Hydraulic Systems Test Set, Boeing, Models 114G1038-31 and 114G1038-71. 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. Utility system and APU system pressure gage ranges are different (reversed).

b. Time and Technique. The time required for this calibration is approximately 3 hours, using the dc and low frequency and physical 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
Pressure gage	Range: 0 to 5000 psi Accuracy: ±1 % at 1250 to 3750 psi ±1.5% at 0 to 1250 psi and 3750 to 5000 psi
Pressure gage	Range: 0 to 10,000 psi Accuracy: ±1% at 2500 to 7500 psi ±1.5% at 0 to 2500 and 7500 to 10,000 psi
Frequency meter	Range: 200 to 300 Hz Accuracy: ±3.5 Hz
Pyrometer	Range: 0 to 400 °F Accuracy: ±1% FS

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 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.

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)
CALIBRATOR	Ac voltage: Range: 200 to 300 Hz at 28 V Dc voltage: Range: 0.89 to 10.13 mV Accuracy: ±.25%	John Fluke, Model 5700A/CT (p/o MIS-35947)
FREQUENCY COUNTER	Range: 196.5 to 303.5 Hz Accuracy: ±.29%	Hewlett-Packard, Model 5345A (MIS-28754/1 Type 1) w/5355A (5355A)
PRESSURE GAGE TESTER	Range: 500 to 9000 psi Accuracy: ±0.25%	Mansfield and Green, Model 10-10525 (10-10525)
RESISTANCE STANDARD	Range: 1.0Ω Accuracy: +1%	Biddle-Gray, Model 71-631 (7910328)
THERMOMETER INDICATOR	Range: Ambient temperature Accuracy: ±1 °F	Instru lab, Inc., Model 4101-10X (7915890)

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 the manufacturer's manual for this TI.

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

7. Equipment Setup

NOTE

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. Remove the individual TI pressure gages from TI case and connect each gage to pressure gage tester.

b. Using hand pump on pressure gage tester, apply pressure to dead weight cylinder until piston is approximately 9/16th of an inch above dead weight cylinder.

c. Visually inspect equipment connections for any signs of leakage. If required, release pressure and apply oil free anti-seize compound to leaking connection and repeat **b** and **c** above.

8. Pressure Gage

a. Performance Check

(1) Apply sufficient weights to pressure gage tester to obtain a 90 percent cardinal point indication on TI gage. Indication as observed on TI will be within limits specified in applicable table 3 or 4.

Table 3. Pressure Gage (10,000 psi)

Pressure gage tester (psi)	Test instrument indications (psi)	
	Min	Max
9000	8865	9135
8000	7880	8120
7000	6930	7070
6000	5940	6060
5000	4950	5050
4000	3960	4040
3000	2970	3030
2000	1970	2030
1000	985	1015
4500	4433	4567
4000	3940	4060
3500	3465	3535
3000	2970	3030
2500	2475	2525
2000	1980	2020
1500	1485	1515
1000	985	1015
500	492	508

(2) Repeat technique in (1) above to obtain a 10, 20, 30, 40, **50,** 60, 70, and 80 percent cardinal point on TI. Indications as observed on TI will be within limits specified in applicable table 3 or 4.

(3) Repeat technique in (1) and (2) above for remaining TI gage to be calibrated. Indications as observed on TI will be within limits specified in applicable table 3 or 4.

b. Adjustments. No adjustments can be made.

9. Frequency Meter

a. Performance Check

(1) Connect equipment as shown in figure 1.

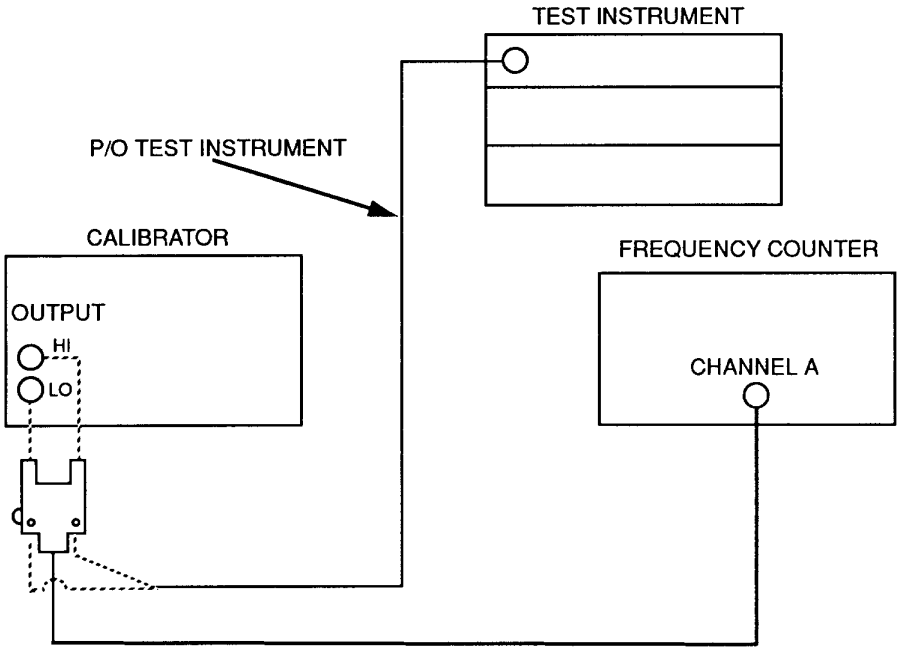

Figure 1. Frequency meter - test equipment hookup.

(2) Set frequency counter **CHANNEL A 50Ω/1MΩ** switch to **1MΩ** and **CHECK/ COMA/SEP** switch to **SEP.**

WARNING

Do not exceed maximum input VOLTAGE to frequency counter. Ensure frequency counter **CHANNEL A 50Ω/1 MΩ** switch is set to **1MΩ** and **CHECK/COMA/SEP** switch is set to **SEP.**

(3) Adjust calibrator for a 28 V output level and a frequency setting of 200 Hz as indicated on TI frequency meter.

(4) Observe indication on frequency counter. Frequency counter will indicate between 196.5 and 203.5 Hz.

(5) Repeat (3) and (4) above while adjusting output frequency on calibrator as indicated in table 3 and maintaining a voltage output level at 28 V. Frequency counter will indicate within limits specified in table 5.

b. Adjustments. No adjustments can be made.

Table 5. Frequency Meter Accuracy

Calibrator frequency (Hz) setting as indicated on test instrument frequency meter	Frequency counter indications (Hz)	
	Min	Max
220	216.5	223.5
240	236.5	243.5
260	256.5	263.5
280	276.5	283.5
300	296.5	303.5

10. Pyrometer

a. Performance Check

(1) Connect equipment as shown in figure 2.

(2) Set calibrator controls for a minimum output and resistance standard to 1.0Ω.

(3) With no voltage applied (momentarily disconnect one lead), set TI indication to red line.

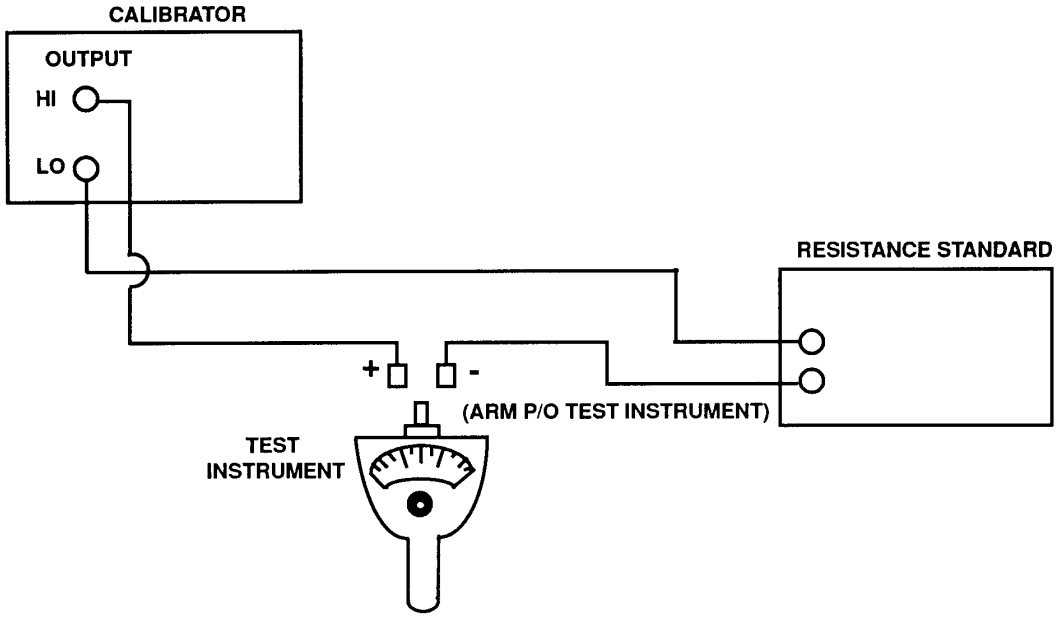

Figure 2. Thermocouple indicator - test equipment setup.

(4) Set calibrator controls for a 0.89 mV dc output. Temperature as indicated on TI will be within 96 and 104 °F.

(5) Set calibrator controls for voltage output as indicated in table 6. Temperature as indicated on TI will be within limits specified in table 6.

(6) Remove test equipment and connect thermocouple (p/o of TI) to the extension arm.

(7) Place thermocouple (p/o TI) near thermometer and allow 1 hour for stabilization.

(8) Set TI ambient temperature by adjusting set screw on the face of the indicator to temperature indicated on thermometer.

b. Adjustments. No adjustments can be made.

Table 6. Thermocouple Indicator

Calibrator applied voltage (mV dc)	Test instrument temperature indications (°F)	
	Min	Max
3.92	196	204
7.01	296	304
8.57	346	354
10.13	396	404

11. 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:

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