DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR FUEL INJECTION PUMP TESTERS JERED, MODELS 8718994 AND 7003330

Headquarters, Department of the Army, Washington, DC
2 August 1983

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SECTION I

IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Fuel Injection Pump Testers, Jered, Models 8718994 and 7003330. The manufacturer's manuals were used as the prime data sources 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 2 hours, using the physical technique.

2. DA Form 2416 (Calibration Data Card)

*This bulletin supersedes TB 9-4910-517-50, 16 August 1974, including all changes.

a. Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25-1. DA Form 2416 must be annotated in accordance with TB 750-25-1 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
Tachometer	Range: 0 to 4000 rpm Accuracy: ±20 rpm
Absolute pressure gage	Range: 0 to 80 in. Hg, absolute Accuracy: ±2% FS (1.6 in. Hg)
Pressure gage	Range: 0 to 200 psi Accuracy: ±5 psi
Temperature gage	Range: -100 to +300°F Accuracy: ±501

[1]This specification verified from ambient to +2500 only.

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-287. 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.

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: 7.46 to 751 ms Accuracy: ±0.1%	Hewlett-Packard, Model 5345A(MIS-28754/1 Type 1) w/K87-59992A (K87-59992A)
A2	PNEUMATIC PRESSURE STANDARD	Range: 0 to 81.6 in. Hg Accuracy: ±0.4 in. Hg Vacuum: ±0.3 in. psi pressure	Cybersystems, Inc., Model ZA00225A1 (MIS-30859)
A3	PRESSURE GAGE TESTER	Range: 0 to 200 psi Accuracy: ±1.25 psi	Mansfield and Green, Model 10-10525 (8598963)
A4	TEMPERATURE POTENTIOMETER	Range: 0.93 to 6.42 mV Accuracy: ±0.5% at 250°F	James G. Biddle, Model 72-311 (7915891)
A5	THERMOMETER	Range: 50 to 90°F Accuracy: ±1.25°	Instrulab, Inc., Type 4100 PT100F-C-D-PS2-1-1 (7915890)

Table 3. Accessories Required

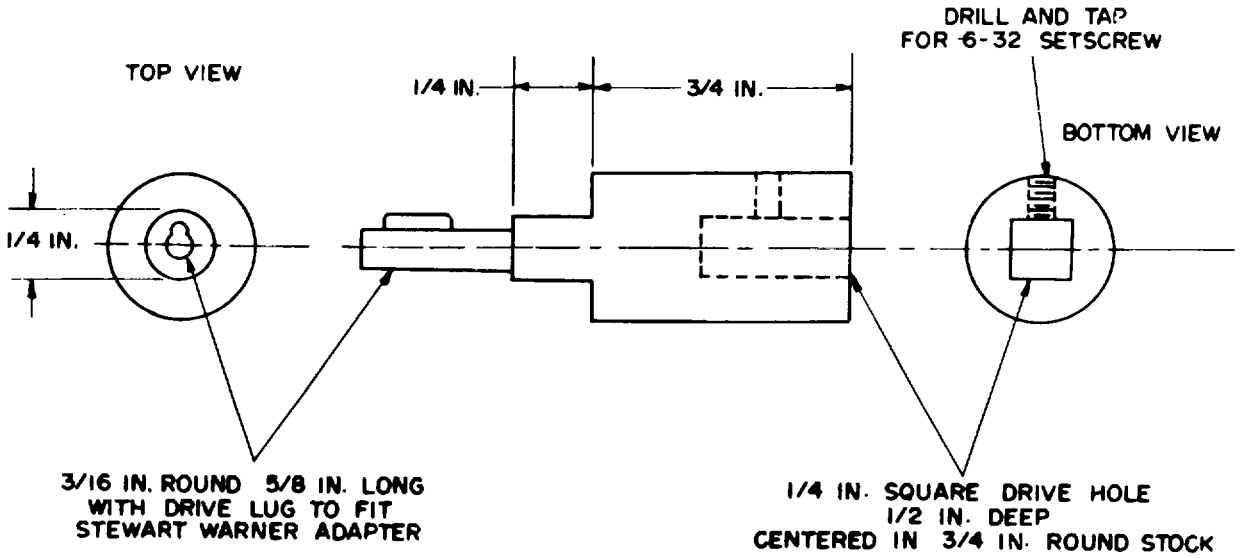
Item	Common name	Description (part number)
B1	ADAPTER	Fabrication required (see figure 1)
B2	ADAPTER	Male 1/2-2° UNF to female 7/8 UNF (p/o 8598963)
B3	ADAPTER	Male 7/8-14 UNF with "O" ring to female 3/8-18 NPT (p/o 8598963)
B4	ADAPTER	Male 3/8-18 NPT to female 1/4-18 NPT (p/o 8598963)
B5	ADAPTER CABLE	Fabrication required (see figure 2)
B6	CABLE	36-in., RG-58/U; BNC plug to two alligator clips (7909410)

Table 3. Accessories Required - Continued

Item	Common name	Description (part number)
B7	CONNECTOR	Stainless steel, female, 1/4-18 NPT to male 7/16-20 UNF 37° flare (p/o 7913310)
B8	CONNECTOR	Stainless steel, female, 1/8-27 NPT to male 7/16-20 UNF, 37° flare (p/o 7913310)
B9	CONNECTOR	4-4G, BTX-SS, 1/4-in., female NPT to male 1/4-in. AN (p/o 7913310)
B10	ELECTRICAL LEAD	24-in., No. 18; single banana plug terminations (black) (7907498)
B11	HOSE	3-ft., 3000 psi operating pressure; female 7/16-20 NF ends for 37° angle fittings (p/o 7913310)
B12	HOSE	5-ft., 5000 psi operating pressure (p/o 7913310)
B13	HOSE ASSEMBLY	(p/o pressure gage tester 8598963)
B14	NITROGEN TANK	Compressed cylinder (7916197)
B15	PNEUMATIC PRESSURE CONTROLLER	0 to 80 in. Hg, Volumetries, 20890, BNC-I 1000 (MIS-10324)
B16	PRESSURE ACCESSORY KIT	Pressure accessory kit; secondary transfer (7913310)
B17	REGULATOR	Water pump regulator (MIS-10325 Type 2)
B18	RUBBER TUBING	1/4-in., ID 1/8-in. wall rubber tubing (7909926) (p/o 7913310)
B19	RUBBER TUBING	7/16-in., ID rubber tubing (18204-6) (p/o 7913310)
B20	TACHOMETER CALIBRATOR	Stewart-Warner, Model 650A and 650H (7910009)
B21	TEE	Stainless steel swivel nut (8491696) (p/o 7913310)
B22	TEST LEAD	24-in., No. 18; single banana plug termination (red) (7907497)
B23	TIP JACK	Single banana jack to spade lug (black) (7907502-1)
B24	TIP JACK	Single banana jack to spade lug (red) (7907502-2)
B25	TUBE	1/4-in., AN back to back; female 7/16-20 UNF 37° flare both ends (7913309) (p/o 7913310)

Table 3. Accessories Required - Continued

Item	Common name	Description (part number)
B26	TUBE ASSEMBLY	P/o pressure gage tester (8598963) (10-10525)
B27	TUBE CONNECTOR	1/2-in., ID hose to 1/4-in., ID hose (p/o 7913310)
B28	VACUUM PUMP	Welch Scientific, Model 1400 BG (7915322)



MATERIAL LIST

MATERIAL	3/4 IN. ROUNDSTOCK (T6 ALUMINUM OR EQUAL
SETSCREW	6-32 X 5/16 IN. LONG

MSC00146

Figure 1. Adapter B1.

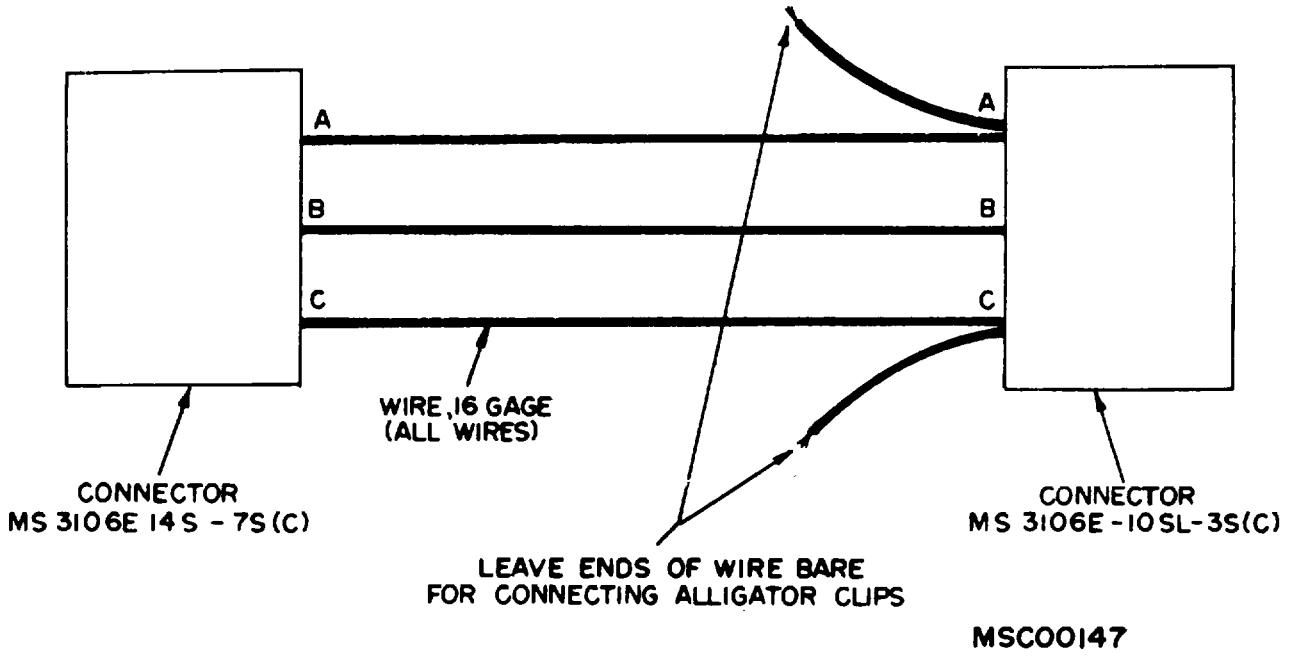


Figure 2. Adapter cable B5.

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.

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. Connect equipment as shown in figure 3.

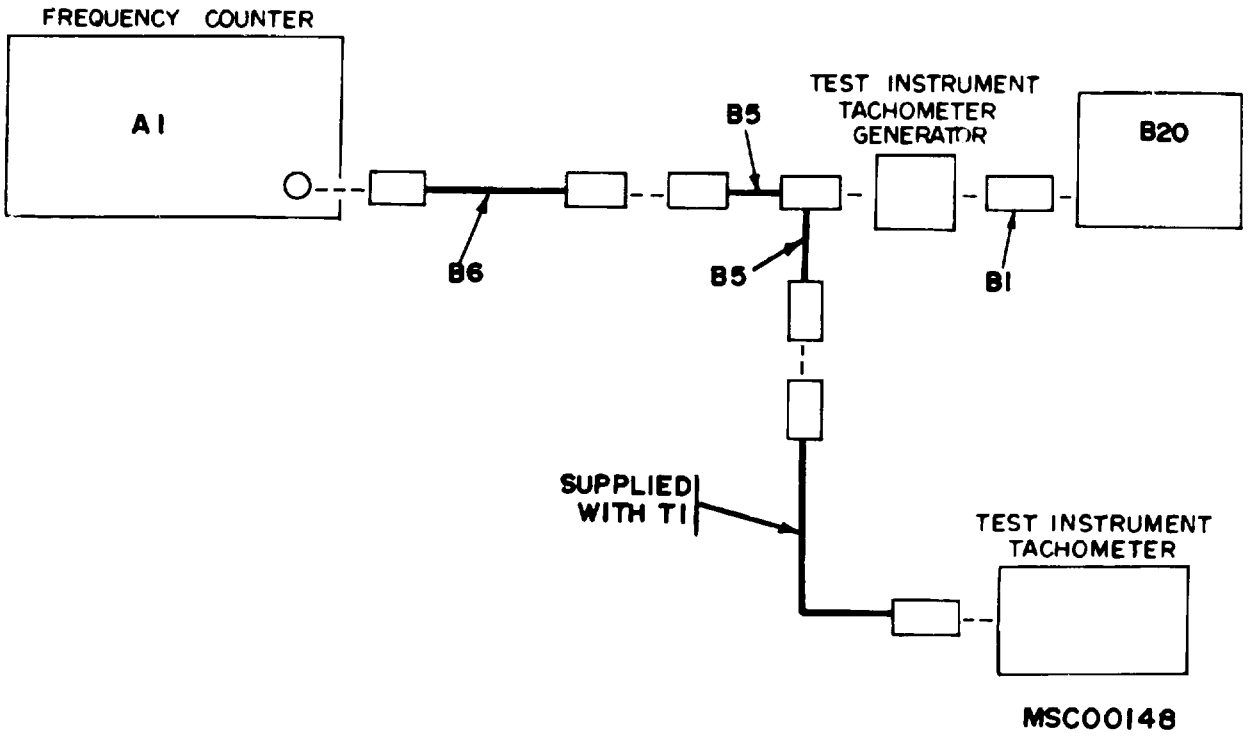


Figure 3. Tachometer calibration - equipment setup.

b. Secure tachometer generator to bench so that input shaft alines with tachometer calibrator output adapter. Use "C" clamp or other suitable means.

8. Engine Rpm Gage

a. Performance Check

(1) Adjust tachometer calibrator until tachometer indicates 300 rpm. Frequency counter (A 1) will indicate between 187.50 and 214.28 ms.

(2) Repeat technique of (1) above using settings listed in table 4. Frequency counter indications will be within limits specified.

Table 4. Engine Rpm Gage Check.

Test instrument indications (rpm)	Frequency counter indications (ms)	
	Min	Max
500	115.38	125.00
1000	58.82	61.22
2000	29.70	30.30
3000	19.86	20.13
4000	14.92	15.07

b. Adjustments. No adjustments can be made.

9. Absolute Manifold Pressure Gage

a. Performance Check

(1) Connect equipment as shown in figure 4.

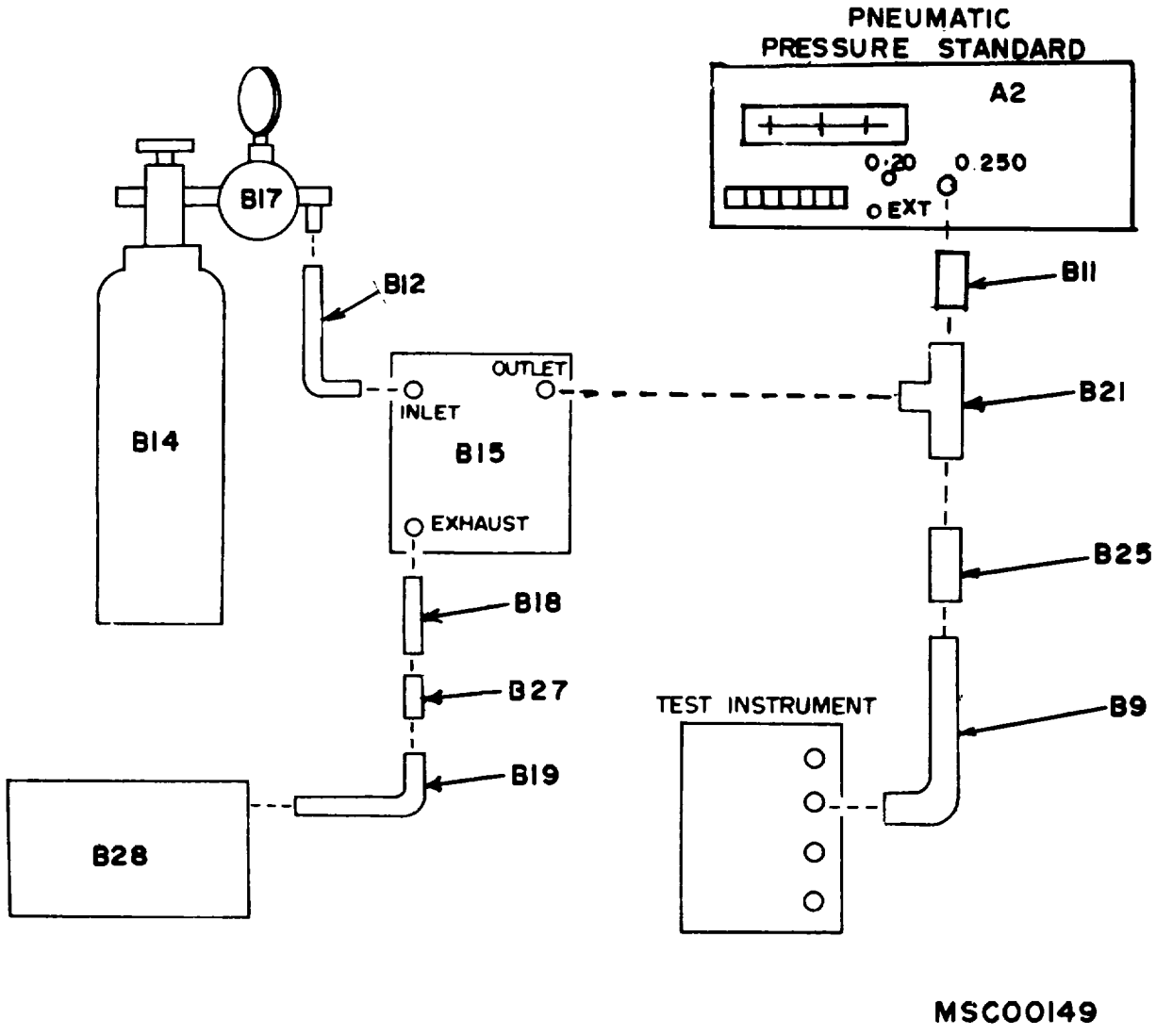


Figure 4. Absolute manifold pressure gage - equipment setup.

NOTE

Insure that pneumatic pressure standard's transducer has been zeroed within the last 8 hours.

NOTE

Insure that hose (B11) is connected to 0-250 PSIA inlet port of pneumatic pressure standard (A2).

WARNING

To prevent injury to personnel or damage to equipment, make certain all components are within range of unit to be calibrated and all connections are securely sealed prior to applying pressure to TI. Never attempt to tighten connections with pressure applied.

(1) Position controls on pneumatic pressure standard as indicated in (a) through (f) below:

(a) POWER switch to ON (allow 1 minute for warmup).

(b) SOURCE pushbutton to INT.

(c) UNITS DISPLAYED switch to IN HG.

(d) RANGE pushbutton to 0-250.

(e) SENSITIVITY pushbutton to LOW.

(f) Press RESET pushbutton.

(2) Adjust regulator (B17) fully ccw.

(3) Open nitrogen tank (B14) valve and adjust regulator until output gage indicates 50 psi.

(4) Energize vacuum pump (B28).

(5) Exercise pneumatic pressure standard three times over range 0-80 psi.

(6) Adjust pneumatic pressure controller (B15) until TI ABSOLUTE MANIFOLD PRESSURE gage indicates 80 inches of mercury absolute. Pneumatic pressure standard will indicate between 78.4 and 81.6 inches of mercury.

(7) Repeat (6) above for TI ABSOLUTE MANIFOLD PRESSURE gage indications listed in table 5. Pneumatic pressure standard will indicate within limits specified.

Table 5. Absolute Manifold Pressure Gage

Test instrument ABSOLUTE MANIFOLD PRESSURE gage indications	Pneumatic pressure standard indications (in. Hg)	
	Min	Max
70	68.4	71.6
60	58.4	61.6
50	48.4	51.6
40	38.4	41.6
30	28.4	31.6
20	18.4	21.6
10	8.4	11.6
5	3.4	6.6

b. Adjustments. No adjustments can be made.

10. Nozzle Pressure Gage

a. Performance Check

(1) Connect equipment as shown in figure 5.

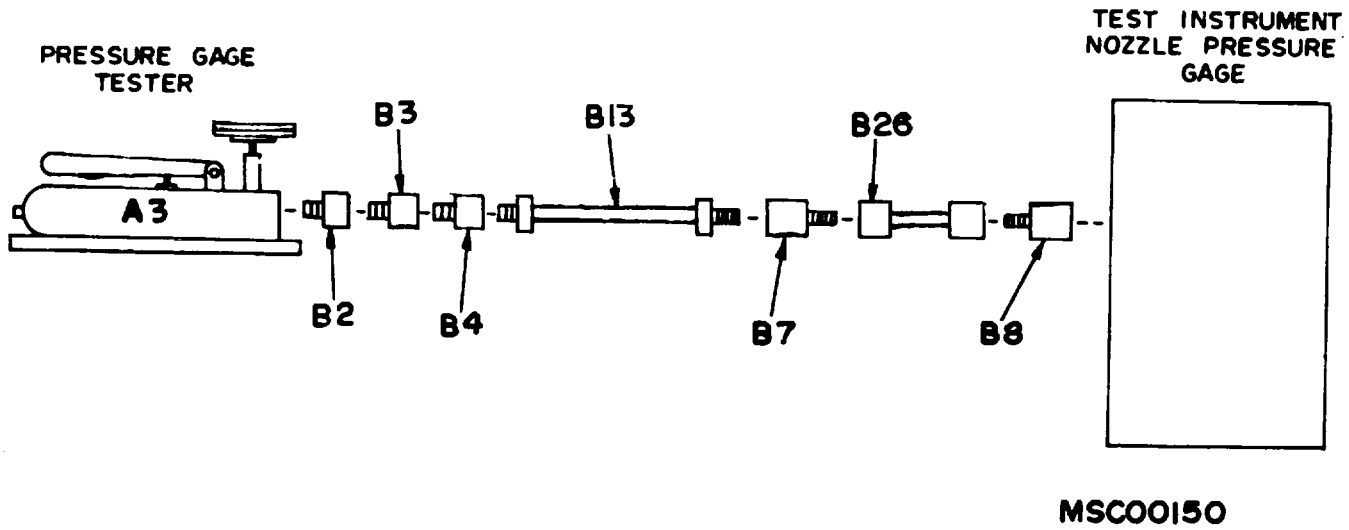


Figure 5. Nozzle pressure gage - equipment setup

(2) Install low-range cylinder and piston on pressure gage tester (A3).

(3) Place 15 pounds combination of weights on weight table.

NOTE

The low-range piston and weight table have a nominal weight of 0.5 pound, which develops a nominal pressure of 5 psi. This pressure developed by piston and weight table must be considered when selecting weights for a given developed pressure.

(4) Apply pressure to equipment setup, using handpump. Slowly rotate weights and weight table until weight table floats.

(5) Visually inspect equipment setup for leakage.

(6) Release pressure from equipment setup.

(7) Place one 2-pound weight (20 psi) on weight table. Apply pressure, using handpump. TI NOZZLE PRESSURE gage will indicate between 20 and 30 psi (2-pound weight plus 0.5-pound weight of weight table).

(8) Repeat technique of (7) above, using weights listed in table 6. TI NOZZLE PRESSURE gage will indicate within limits specified.

Table 6. Nozzle Pressure Gage.

Weights (lbs)	Nozzle pressure gage indications (psi)[1]	
	Min	Max
4 (40 psi)	40	50
6 (60 psi)	60	70
8 (80 psi)	80	90
10 (100 psi)	100	110
12 (120 psi)	120	130
14 (140 psi)	140	150
16 (160 psi)	160	170
18 (180 psi)	180	190

[1]Piston and weight table adds 0.5 pound or 5 psi.

b. Adjustments. No adjustments can be made.

11. Manifold Temperature Gage

a. Performance Check

(1) Place probe of thermometer (A5) near TI MANIFOLD TEMPERATURE gage thermocouple in a draft free area and allow thermometer to stabilize.

(2) Record thermometer indication. TI MANIFOLD TEMPERATURE gage should agree with thermometer indication.

(3) If necessary, adjust pointer adjustment screw, located on TI MANIFOLD TEMPERATURE gage face, until TI MANIFOLD TEMPERATURE gage indicates the value recorded in (2) above.

(4) Set OHM rheostat on temperature potentiometer (A4) run-up box to 2 ohms.

(5) Connect equipment as shown in figure 6.

NOTE

Disconnect thermocouple leads from TI MANIFOLD TEMPERATURE gage and temporarily store thermocouple in bottom section of TI.

(6) Using technical manual furnished with temperature potentiometer, determine and record millivolt indication for ambient temperature recorded in (2) above.

NOTE

The thermocouple furnished with TI is a type J iron constant thermocouple. The degrees Fahrenheit versus millivolts for the type J thermocouple are located in appropriate tables in Thermocouple Temperature Millivolt Conversion Tables 6035T (or NBS Monograph 125). One degree is equal to about .05 mV in the table.

(7) From the degrees Fahrenheit versus millivolts tables, record millivolt indication for 95 degrees.

(8) Subtract millivolt indication recorded in (6) above from millivolt indication recorded for 95 degrees in (7) above. Record this difference as "true indication."

(9) Adjust temperature potentiometer run-up box to true indication computed in (8) above. TI MANIFOLD TEMPERATURE gage will indicate 90 to 100 degrees.

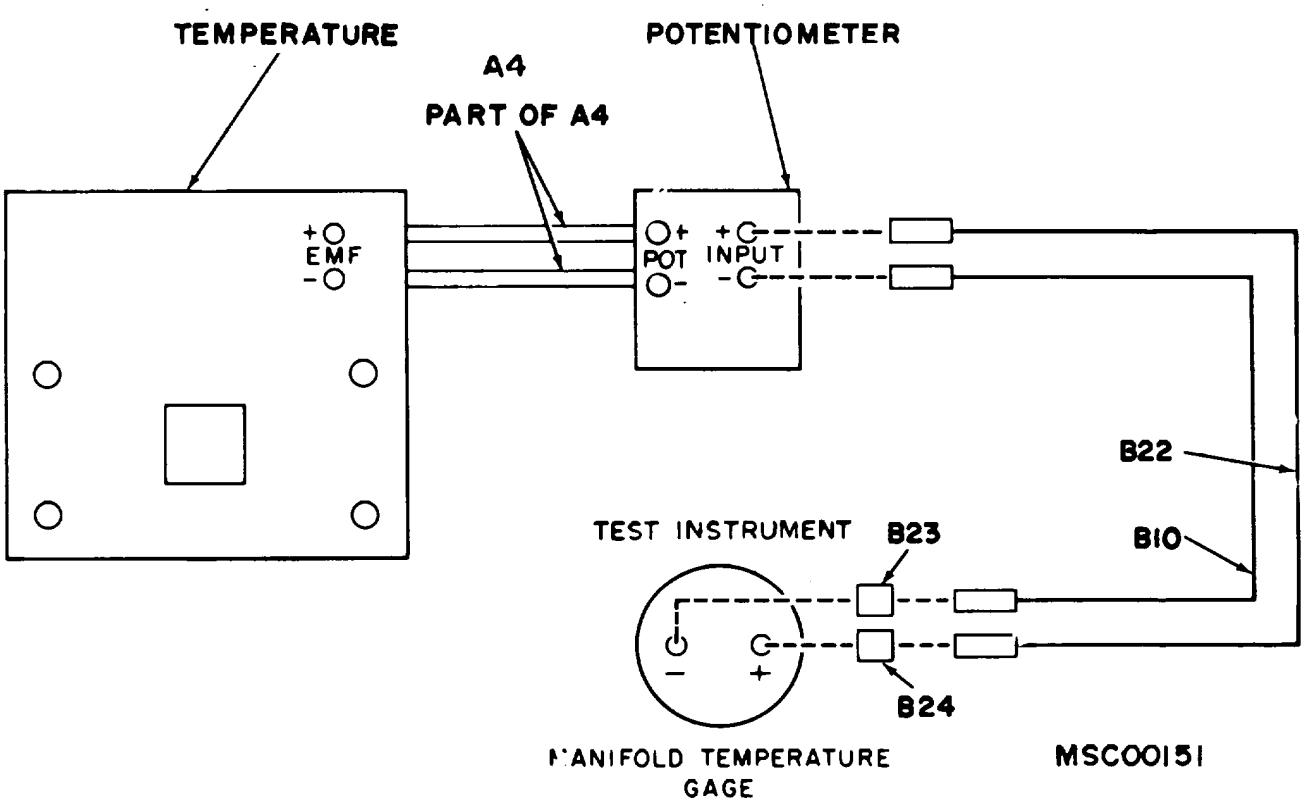


Figure 6. Manifold temperature gage - equipment setup.

NOTE

Tap meter before reading manifold temperature.

(10) Repeat technique of (7) and (8) above for 195 degrees.

(11) Adjust millivolt run-up box to "true indication" (after subtracting and millivolt indication for ambient temperature recorded in (6) above). TI MANIFOLD TEMPERATURE gage will indicate 190 to 200 degrees.

(12) Repeat technique of (7) through (9) above for 245 degrees.

(13) Adjust temperature potentiometer run-up box to "true indication" (after subtracting millivolt indication for ambient temperature obtained in (6) above). TI MANIFOLD TEMPERATURE gage will indicate 240 to 250 degrees.

(14) Deenergize and disconnect temperature potentiometer and run-up box. Reinstall thermocouple leads on TI MANIFOLD TEMPERATURE gage.

b. Adjustments. No adjustments can be made.

12. Final Procedure

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

b. When all parameters are within tolerance, annotate and affix DA Label 80 (US Army Calibrated Instrument). When the TI receives limited or special calibration, annotate and affix DA Label 163 (US 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 Form 2417 (US Army Calibration System Rejected Instrument) and inform the owner/user accordingly in accordance with TB 750-25-1.

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