*TB 9-4920-363-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR PITOT AND STATIC SYSTEM TESTERS, UNITED MANUFACTURING, MODEL PST TYPE 2, PART NO. 7365, AND SATELLITE ENGINEERING, MODEL S6-21312

Headquarters, Department of the Army, Washington, DC
7 July 2006

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 technical bulletin supersedes TB 9-4920-363-35, dated 23 June 1990.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Pitot and Static System Testers, United Manufacturing, Model PST Type 2, Part No. 7365, and Satellite Engineering, Model S6-21312. The manufacturers' manuals and MIL-T-58078 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. All models are similar except for airspeed indicator and altimeter ranges. In addition, case leak valves on some models are accessible from top of instrument, while on others, access is through rear of indicator panel. All pitot and static system testers will be modified during overhaul to remove the manifold pressure and fuel pressure gages.

b. Time and Technique. The time required for this calibration is approximately 3 hours, using the 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
Airspeed	Range: 0 to 250 knots or 20 to 400 knots Accuracy: Refer to table 5 for tolerances
Altimeter	Range: -1000 to 50,000 ft Accuracy: Refer to table 3 for tolerances
Rate of climb	Range: 0 to ±4500 ft/minute (maximum) Accuracy: Refer to table 4 for tolerances

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; AN/GSM-421; 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)
PNEUMATIC PRESSURE STANDARD	Range: 0 to 120 inH_2O Accuracy: ±0.1% of FS pressure Range: 0 to 24.5 psi 0.6 to 75.6 inHg abs Accuracy: ±0.05 psi, ±0.033 inHg	Druck, Model DPI145/R (MIS-45842)

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

a. Place TI on a level platform or bench.

b. Remove protective cover from TI.

c. Position TI controls as listed in (1) through (5) below:

(1) **VACUUM** selector control valve to **OFF**.

(2) **PRESSURE** selector control valve to **OFF**.

(3) **VACUUM** and **PRESSURE INCREASE** and **DECREASE** control valves fully closed.

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

(5) Case leak selector valves closed (fully cw).

d. Connect TI to ac or dc power cable, and connect power cable to a 115 V ac source or 28 V dc source.

CAUTION

When using a 115 V ac source, the TI case must be grounded to prevent electrical shock.

CAUTION

During all operations, insure that the vacuum and pressure selector valves are not moved from their positions and that air lines are not disconnected while the pump motor is running or while any indication other than zero can be observed on the instruments. (The indications will be zero on the rate of climb indicator, local ground level on the altimeter, zero knots on the airspeed indicator.) Failure to observe this precaution will result in serious damage to the master instruments and any external instruments connected to the TI.

e. Check TI oil level located in reservoir through sight glass on right side panel. If oil level is low, fill reservoir as indicated in (1) through (7) below:

CAUTION

To avoid damage to equipment, do not force-tighten needle valves.

(1) Remove cover plate in right side panel of TI.

(2) Unscrew TI cap nut from filler valve port and turn **FILL-RUN-DRAIN** valve control to **FILL**.

(3) Attached one end of filler hose (part of TI) to filler valve port and other end to container of MIL-H-5606 fluid.

(4) Set TI **POWER** switch to **ON**. When TI reservoir level is within points indicated on sight glass, set **POWER** switch to **OFF**.

(5) Turn **FILL-RUN-DRAIN** control to **RUN**.

(6) Remove filler hose and replace filler valve port cap.

(7) Replace cover plate removed in (1) above.

f. Adjust altimeter barometric indicator for 29.92 inHg.

NOTE

Before making an accurate test, run each performance check through its complete range of pressure or vacuum twice. This exercising of the TI and standard will normalize a small amount of hysteresis in diaphragms of TI so that correction card errors will apply when values of function (altitude,

airspeed, absolute pressure) are approached in an increasing direction. In addition, the operator can see if excessive friction has developed in instruments. This exercise will also reduce friction on subsequent test runs. Any leaks detected during this exercise must be corrected before continuing.

CAUTION

If relief valves open for any reason during a test on any instrument, test must be halted and readings on all instruments returned to normal before proceeding with test. If a relief valve opens before highest indication is reached, corrective maintenance is required.

g. Review each TI calibration chart and insure that a chart is available for each TI meter. If a correction chart is incorrect or missing, a new correction chart must be made and attached to the TI. The correction chart will show standard indications when the TI indicates nominal values.

8. Altimeter

a. Performance Check

(1) Connect pneumatic pressure standard **17 PSIA** inlet port to TI **RATE OF CLIMB** altimeter connector, using hose assembly supplied with TI.

(2) Set controls on pneumatic pressure standard to indicate altitude in feet.

NOTE

TI **VACUUM UP** and **DOWN** control valves must be open when operating pressure side. **PRESSURE UP** and **DOWN** valves must be open when operating vacuum sides.

(3) Position TI controls as listed in (a) through (f) below:

(a) **ALTIMETER** case control valve to **OPEN**.

(b) **VACUUM** selector control valve to **OFF**.

(c) **PRESSURE** selector control valve to **NET ALT**.

(d) **VACUUM INCREASE** and **DECREASE** control valves to open position.

(e) **PRESSURE INCREASE** and **DECREASE** control valves to closed position.

(f) **POWER** switch to **ON**.

CAUTION

Some TI models do not have independent case leak valves for both altimeter and climb rate indicators. When calibrating altimeter indicator on these models**,** avoid exceeding range of climb rate indicator while adjusting TI for altimeter indications.

(4) Slowly adjust **PRESSURE INCREASE** and **DECREASE** control valves until pneumatic pressure standard indicates zero (zero feet altitude). Adjust knob (on front of TI) for a reading of 29.92 on TI barometric indicator. If TI **ALT** meter does not indicate zero feet, perform **b** below.

(5) Slowly adjust TI **PRESSURE INCREASE** and **DECREASE** control valves until TI **ALT** meter indicates -500 feet. Pneumatic pressure standard will indicate between -470 and -530 feet.

(6) Slowly adjust TI **PRESSURE INCREASE** and **DECREASE** control valves until TI **ALT** meter indicates -1000 feet. Pneumatic pressure standard will indicate between -970 and -1030 feet.

NOTE

If local elevation exceeds 500 feet above sea level, pressure instead of vacuum must be applied to TI to obtain indications below local elevations.

(7) Position TI controls as listed in (a) through (g) below:

(a) **PRESSURE INCREASE** and **DECREASE** control valves as necessary to obtain atmospheric pressure.

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

(c) **PRESSURE** selector control valve to **OFF**.

(d) **PRESSURE INCREASE** and **DECREASE** control valves to open position.

(e) **VACUUM** selector control valve to **ALTIMETER 50,000 FT RATE OF CLIMB**.

(f) **VACUUM INCREASE** and **DECREASE** control valve to closed position.

(g) **POWER** switch to **ON**.

(8) Slowly adjust **VACUUM INCREASE** and **DECREASE** valves until TI **ALT** meter indicates 500 feet. Pneumatic pressure standard will indicate between 465 and 535 feet.

NOTE

Tap indicator gently to reduce friction.

(9) Repeat technique of (8) above for TI altimeter indications listed in table 3. Pneumatic pressure standard will indicate within limits specified.

(10) Position TI controls as listed in (a) through (d) below**:**

(a) **VACUUM INCREASE** and **DECREASE** controls as necessary to obtain atmospheric pressure.

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

(c) **VACUUM** and **PRESSURE** selector control valves to **OFF**.

(d) **VACUUM** and **PRESSURE INCREASE** and **DECREASE** control valves fully ccw.

Table 3. Altimeter Accuracy Check

Test instrument indications (ft)	Pneumatic pressure standard indications (ft)	
	Min	Max
1000	965	1035
2000	1960	2040
4000	3950	4050
6000	5940	6060
8000	7930	8070
10,000	9920	10,080
12,000	11,910	12,090
14,000	13,900	14,100
16,000	15,890	16,110
18,000	17,880	18,120
20,000	19,870	20,130
22,000	21,860	22,140
25,000	24,845	25,155
30,000	29,820	30,180
35,000	34,795	35,205
40,000[1]	39,770	40,230
45,000	44,745	45,255
50,000	49,720	50,280

[1]Readings above 35,000 feet are supplied in event equipment application requires greater range.

b. Adjustments

(1) Adjust TI **PRESSURE INCREASE** and **DECREASE** control valves until pneumatic pressure standard indicates zero feet.

(2) Adjust **ALT** meter barometer adjustment locking screw, located at bottom left corner of **ALT** meter ccw until ridge clears meter case.

CAUTION

Do not remove screw.

(3) Press **ALT** meter barometer adjustment locking screw to the left and turn cw to release indicator adjuster.

(4) Adjust indicator adjuster for zero indication on **ALT** meter.

(5) Pull out and adjust indicator adjuster until **ALT** meter indicates 29.92 inHg (abs).

NOTE

It may be necessary to repeat (4) and (5) above until no further adjustments are required.

(6) Push indicator adjuster in and secure **ALT** meter barometer adjustment locking screw.

9. Rate of Climb Indicator

a. Performance Check

(1) Set pneumatic pressure standard to indicate rate of climb in feet per minute.

(2) Turn **RATE OF CLIMB** case leak selector valve to **OPEN**.

(3) Adjust TI rate of climb zero adjustment screw for zero indication.

(4) Turn safety control valve (located on rear of TI) to closed position.

NOTE

Some models do not have safety control valve.

(5) Set **PRESSURE** selector control to **OFF** and **VACUUM** selector control to **ALTIMETER AND RATE OF CLIMB** position.

(6) Adjust **VACUUM INCREASE** and **DECREASE** valves fully cw and turn **PRESSURE INCREASE** and **DECREASE** valves fully cw.

(7) Set TI **POWER** switch to **ON.**

(8) Slowly adjust **VACUUM INCREASE** and **DECREASE** controls until TI rate of climb indicator shows 500 feet per minute.

(9) Press RATE OF CLIMB pushbutton on pneumatic pressure standard. After 1 minute, light will stop flashing. Record indication on pneumatic pressure standard.

(10) Repeat (9) above two times and average the three readings**.** The average reading will be between 400 and 600 feet per minute.

(11) Repeat technique of (8) through (10) above for TI rate of climb indications in table 4. Pneumatic pressure standard will indicate within limits specified.

(12) Position TI controls as listed in (a) through (e) below:

(a) **VACUUM INCREASE** and **DECREASE** control valves for zero feet/ minute indication.

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

(c) **VACUUM INCREASE** and **DECREASE** control valves fully ccw.

(d) **VACUUM** and **PRESSURE** selector control valves to **OFF**.

(e) **RATE OF CLIMB** case leak selector valve to **CLOSED**.

b. Adjustments. No adjustments can be made.

Table 4. Rate of Climb Accuracy Check

Test instrument indications (fpm)	Pneumatic pressure standard indications (fpm)	
	Min	Max
1000	800	1200
2000	1700	2300
3000	2700	3300
4000	3600	4400
4500[1]	4050	4950
-500	-400	-600
-1000	-800	-1200
-2000	-1700	-2300
-3000	-2700	-3300
-4000	-3600	-4400
-4500	-4050	-4950

[1]Maintain climb rate indication of 4500 fpm for 3 minutes, close both vacuum control valves (fully cw), set power switch to **OFF**, and proceed to -500 fpm indication.

10. Airspeed Indicator

a. Performance Check

(1) Connect pneumatic pressure standard 5 psid inlet port to TI airspeed connector, using TI hose assembly.

(2) Set pneumatic pressure standard to indicate airspeed in knots.

(3) Position TI controls as listed in (a) through (f) below:

(a) **VACUUM** selector valve to **OFF**.

(b) **PRESSURE** selector valve to **AIRSPEED**.

(c) **AIRSPEED** case leak control **valve** to **OPEN.**

(d) **VACUUM INCREASE** and **DECREASE** control valves to open position.

(e) **PRESSURE INCREASE** and **DECREASE** control valves to closed position.

(f) **POWER** switch to **ON**.

(4) Slowly adjust TI **PRESSURE INCREASE** and **DECREASE** control valves until TI indicates 50 knots. Pneumatic pressure standard will indicate between 48 and 52 knots.

(5) Slowly adjust TI **PRESSURE INCREASE** and **DECREASE** control valves for each TI indication as listed in table 5. Pneumatic pressure standard will indicate within the limits specified.

Table 5. Airspeed Indicator Accuracy

Test instrument indications (knots)	Pneumatic pressure standard indications (knots)	
	Min	Max
60	58.0	62
100	98.0	102
110	108.0	112
140	137.5	142.5
160	157.5	162.5
200	196.0	204.0
250	246.0	254.0
300	296.0	304.0
350	345.0	355.0
390	385.0	395.0

(6) Position TI controls as indicated in (a) through (e) below:

(a) Slowly adjust **PRESSURE INCREASE** and **DECREASE** control valves until zero knots is obtained.

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

(c) **PRESSURE** selector control valve to **OFF**.

(d) **PRESSURE INCREASE** and **DECREASE** control valves to open position.

(e) **AIRSPEED** case leak selector valve to **CLOSED**.

b. Adjustments. No adjustments can be made.

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:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army

0613101

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342050, requirements for calibration procedure TB 9-4920-363-24.

Instructions for Submitting an Electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however, only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" whomever@redstone.army.mil
To: <2028@redstone.army.mil

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.