

***TB 9-5210-208-35**

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR VERNIER CALIPERS, TYPE 1 CLASSES 1, 2, AND 3 DIGITAL AND DIAL CALIPERS

Headquarters, Department of the Army, Washington, DC
23 July 2003

Approved for public release; distribution is unlimited.

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, U.S. Army Aviation and Missile Command, ATTN: 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 email, 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>.

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SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Vernier Calipers, Type 1, Classes 1, 2, and 3 Digital and Dial Calipers (fig. 1). The GSA Supply Catalog, and manufacturers' catalogs and specifications 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.

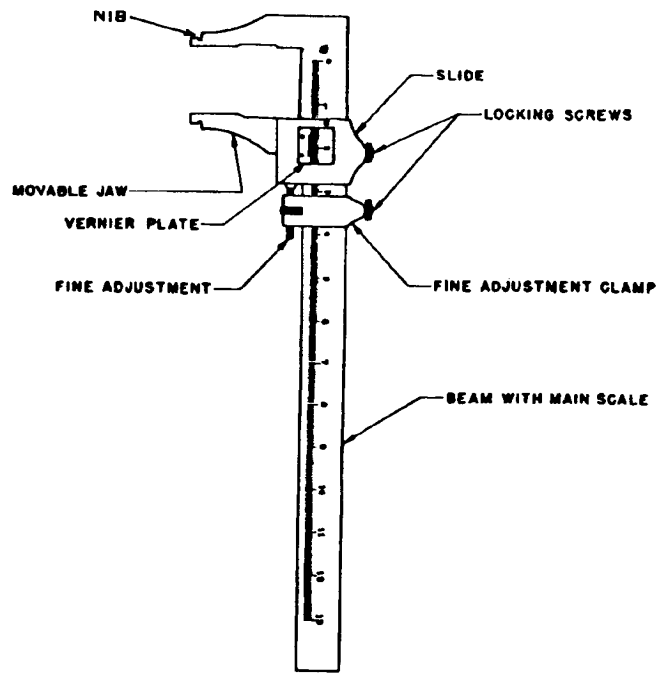


Figure 1. Caliper, vernier - typical view.

a. Model Variations. Type 1: Caliper, vernier; Class 1: English measure; Class 2: Metric measure; Class 3: English and metric measure.

b. Time and Technique. The time required for this calibration is approximately 1 hour, 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. 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
Length measurement Vernier	Range: Class 1: 0 to 48 in. Class 2: 0 to 900 mm Class 3: 0 to 36 in. and 0 to 900 mm Accuracy: ± 0.001 in. per each 6 in. of beam length ±0.02mm per each 300mm of beam length
Length measurement Dial	Accuracy ±0.001 in per each 6 in of beam length. ±0.02mm per each 150mm of beam length
Length measurement Digital	Accuracy ±0.001 in per each 6 in of beam length ±0.02mm per each 300mm of beam length

**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 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.

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)
GAGE BLOCKS (8 PIECE SET)	Range: 0 to 48 in Accuracy: Grade 3	(7915946)
GAGE BLOCK (81 PIECE SET)	Range: 0.050 to 4 in. Accuracy: Grade 3	(7901961)

**SECTION III
CALIBRATION PROCESS**

6. Preliminary Instructions

a. The instructions outlined in paragraphs 6 and are preparatory to the calibration process. Personnel should become familiar with the entire bulletin before beginning the calibration.

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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 manufacturers' manuals for this TI.

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

7. Equipment Setup

a. Remove TI from protective case.

b. Visually inspect TI for any damage that will affect the accuracy of measurement. Pay close attention to the rack on dial calipers. Using a magnifying glass, inspect the rack for missing or damaged teeth, dirt and metal chips. Inspect measurement contact surfaces for burrs, abrasion or imbedded dirt.

c. If necessary, clean TI and apply a small quantity of instrument oil.

d. Slide movable jaw along full length of beam to determine if roughness, binding, or irregularities occur.

e. Select a clean work area and allow TI and gage blocks to stabilize at existing temperature.

NOTE

To calibrate a TI graduated in the metric system, it will be necessary to convert the metric reading to applicable length in inches. Formula: 1 mm = 0.03937 inch, or 1 inch = 25.4 mm.

8. Outside Scale Vernier Calipers

a. Performance Check

(1) Close jaws of TI. Vernier scale marked "outside" should read 0.

(2) Use appropriate size gage blocks to check low-range, mid-range and full-range indications on TI.

(3) Lay gage block stack, firmly wrung together, on surface plate or table top with both ends of working surfaces exposed.

(4) Place inside of jaws of TI over ends of gage block working surfaces. If reading is not within ± 0.001 inch of total length of gage blocks (for first 6 inches of beam and ± 0.001 inch for each additional 6 inches of the beam), perform **b** below.

b. Adjustments

(1) Loosen screws that fasten outside vernier plate to slide assembly.

(2) Reposition vernier plate to position that best compensates for errors at 0, mid-range, and full range.

(3) Tighten screws to secure vernier plate.

9. Inside Scale Vernier Calipers

a. Performance Check

(1) Use appropriate size gage blocks to check, low-range, mid-range, and full-range indications on TI "inside" scale.

(2) Assemble gage blocks as shown in figure 2 with an inside caliper jaw at each end, which serves as an end stop. Wring blocks together firmly before applying tie rods. Place nibs of TI jaws between inside caliper jaws of assembled gage block stack. If reading is not within ± 0.001 inch of total length of gage blocks (for first 6 inches of beam and ± 0.001 inch for each additional 6 inches of the beam), perform **b** below.

NOTE

Any adjustment made in **b**. below will change the performance of the outside measurement function of TI.

b. Adjustments

(1) Loosen screws that fasten inside vernier plate to slide assembly.

(2) Reposition vernier plate to position that best compensates for errors at minimum scale, mid-scale, and full-scale.

(3) Tighten screws to secure vernier plate.

(4) Repeat **8a**(1) through (4) above.

10. Outside Function Dial and Digital Calipers

a. Performance Check.

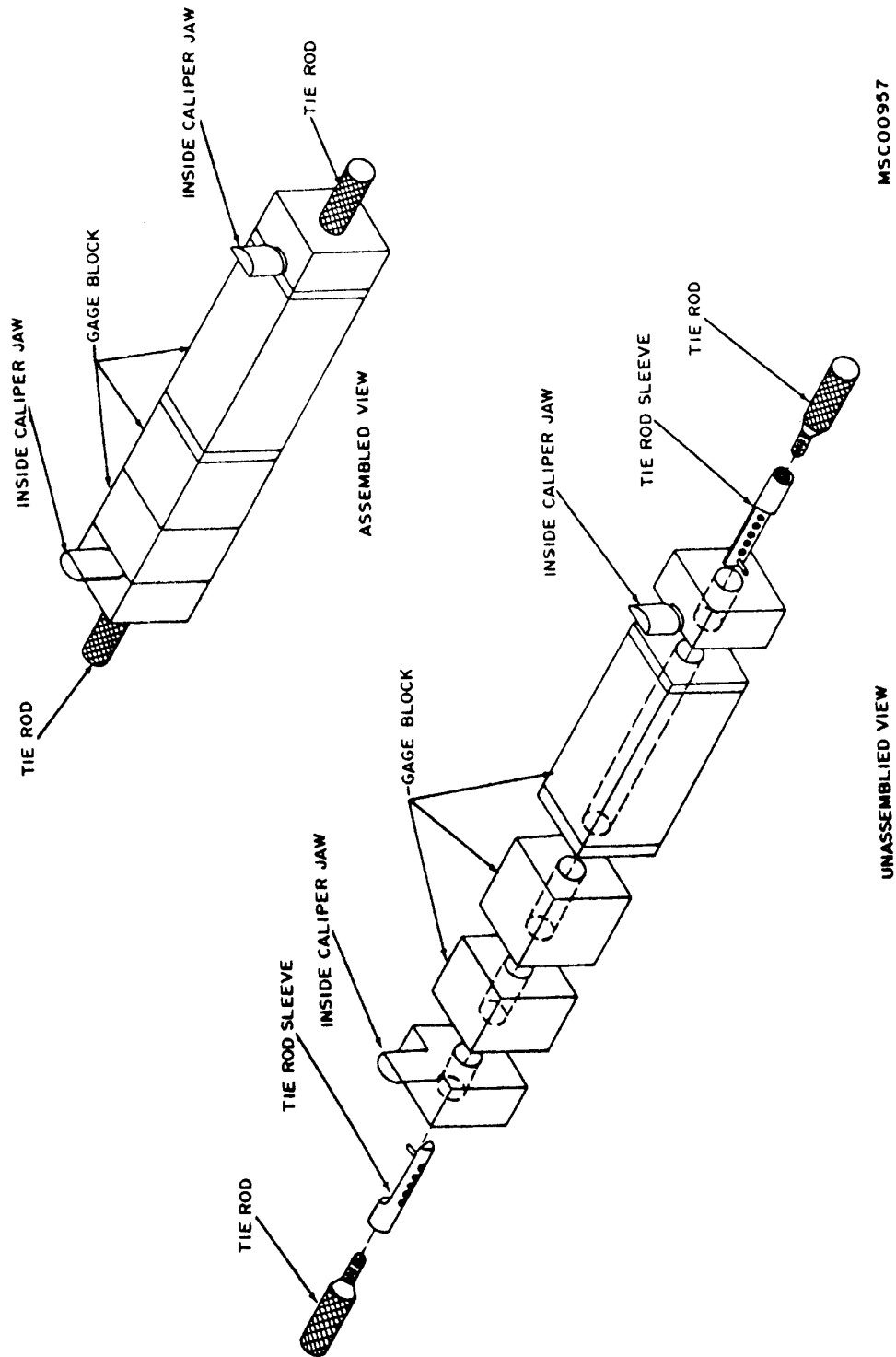
(1) Close jaws of TI and set the dial calipers for 0 using the bezel ring on the dial. The digital calipers are zeroed by pressing the **Zero** pushbutton.

(2) Using the technique in **8a**(2) and (3) above measure gage blocks at low-range, mid-range and full-scale. TI will be within ± 0.001 inch for first 6 inches and ± 0.001 inch for each additional 6 inches of beam length. No adjustment can be made.

11. Inside Function Dial and Digital Calipers

a. Performance Check

(1) Close jaws of TI and set the Dial Calipers for 0 using the bezel ring on the dial. Pressing the Zero button zeros the Digital Calipers. If there is a minimum inside nib width it will need to be added to reading.



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UNASSEMBLED VIEW

Figure 2. Block assembly.

(2) Using the technique in **9a(2)**, and(3) above, measure gage blocks at low range, mid-range and at full range. TI will be within ± 0.001 inch for first 6 inches of beam length and ± 0.001 inch for each additional 6 inches of beam length. No adjustment can be made.

12. Depth Function Dial and Digital

a. Performance Check

(1) Using the gage block triangle accessory, place the end of the TI beam flush on the triangle, then move the slide on the TI down and make contact on the surface of the triangle with the depth bar of TI. Zero the dial caliper with the bezel ring on the dial. The Digital Calipers are zeroed with the **ZERO** pushbutton.

(2) Make a depth measurement by ringing a gage block to the triangle accessory and contacting the beam to the top of the gage block and moving the slide down while guiding the depth bar through the hole in the gage block making contact with the triangle accessory

(3) Measure gage blocks at low range, mid-range and near full-range. TI will be with in ± 0.001 inch for first 6 inches of beam length and ± 0.001 inch for each additional 6 inches of beam length. No adjustment can be made.

13. Final Procedures

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA label/form in accordance with TB 750-25.

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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

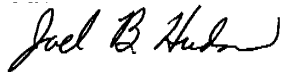
Subject: DA Form 2028

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.

By Order of the Secretary of the Army:

Official:



JOEL B. HUDSON

*Administrative Assistant to the
Secretary of the Army*

0314108

JOHN M. KEANE
*General, United States Army
Acting Chief of Staff*

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