# TB 9-5210-210-50

Change 1

**DEPARTMENT OF THE ARMY TECHNICAL BULLETIN**

# CALIBRATION PROCEDURE FOR DIAL INDICATORS (MIL-I-18422)

Headquarters, Department of the Army, Washington, DC
29 March 1977

TB 9-5210-210-50, 10 July 1975, is changed as follows:

***Page 2, paragraph 7***. The note following paragraph 7 is superseded as follows:

**NOTE**

During calibration of a style C TI, the lever arm shall not deviate more that 15° from the horizontal plane of the TI. To ensure that the lever arm down not deviate, the contact point lever must be positioned horizontally at midrange to minimize any cosine error.

By Order of the Secretary of the Army:

**BERNARD W. ROGERS**
General, United States Army
Chief of Staff

Official:

**PAUL T. SMITH**
*Major General, United States Army*
*The Adjutant General*

Distribution:

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Headquarters, Department of the Army, Washington, DC
10 July 1975

**REPORTING OF ERRORS**

You can help improve this publication by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028, Recommended Changes to Publications, should be mailed directly to Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-TMD-EP, Redstone Arsenal, AL 35898-5000. FAX to DSN 788-2313 (commercial 256-842-2313). A reply will be furnished directly to you.



*This bulletin supersedes TB 9-5210-210-50, 22 January 1973.

## SECTION I
## IDENTIFICATION AND DESCRIPTION

**1. Test Instrument Identification.** This bulletin provides instructions for the calibration of Dial Indicators (MIL-I-18422). The manufacturer's instruction manual was used as the prime data source in compiling these instructions. The dial indicators will be referred to as the "TI" test instrument throughout this bulletin.

**a. Model Variations**. Variations among models are described in text.

**b. Time and Technique**. The time required for this calibration is approximately 0.5 hour for each TI using the physical technique.

**2. Calibration Data Card, DA Form 2416.** Forms, records, and reports required for calibration personnel at all levels are prescribed by TM 38-750. DA Form 2416 must be annotated in accordance with TM 38-750 for each calibration performed.

**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 |
|---|---|
| Style[1] | |
| A | Spindle, parallel to dial |
| B | Spindle, right angle from back dial. |
| C | Universal, adjustment contact point. |
| Type[1] | |
| 1 | 1/10000 (0.0001) inch graduations |
| 2 | 5/10000 (0.0005) inch graduations |
| 3 | 1/1000 (0.001) inch graduations |
| 4 | 5/100000 (0.00005) inch graduations |
| Accuracy | ±1 graduation at any point within the range of the indicator except type I long range indicators (more than 2 1/3 revolutions) shall be ±1 graduation within the first 2 1/3 revolutions and ±5 graduations at any point beyond 2 1/3 revolutions |
| Repetition | ±1/5 graduation of readings. |

[1]This specification is for information only and is not verified in this bulletin.

## SECTION II
## EQUIPMENT REQUIREMENT

**4. Equipment Required.** Table 2 identifies the specific equipment used in this calibration procedure. This equipment is issued with the secondary transfer calibration standards set and is to be used in performing this procedure. 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 accuracy 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 used in this calibration procedure are furnished with dial indicator calibrator (A1, table 2).

Table 2. Minimum Specifications of Equipment Required.

| Item | Common Name | Minimum Use Specifications | Manufacturer, Model and Part Number |
|---|---|---|---|
| A1 | DIAL INDICATOR[1] CALIBRATOR | Range: 0.00005 to 1 in. Accuracy: ±0.00001 in. (±0.00004 in.) | Federal Products Corp., Model 400B-1 (MIS-10327) |

[1]Equipment limitation: accuracy ±0.00004 inch.

## SECTION III
## CALIBRATION PROCESS

**NOTE**

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met before continuing with the calibration.

### 6. Preliminary Instructions

**a.** The instructions outlined in this paragraph 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 table 2. For identification of equipment referenced by item numbers prefixed with A, see table 2.

**c.** Loosen bezel locking screw (fig. 1) and rotate bezel 360°.

**d.** Verify that there is no interference between the hands, dial face, and crystal and that the contact point is tight on TI spindle.

**e.** To verify that the TI is operating properly, perform the procedures listed in (1) and (2) below:

(1) Depress spindle or contact end to internal stop and release. Spindle or contact end should return to extended position freely and without hesitation.

(2) Record the position of the hand at the extended position and at the depressed position for future reference.

**NOTE**

During calibration of a style C TI, the lever arm shall not deviate more than 15o from the horizontal plane of the TI. To ensure that the level arm does not deviate, the contact point lever must be positioned horizontally at midrange to minimize any cosine error.

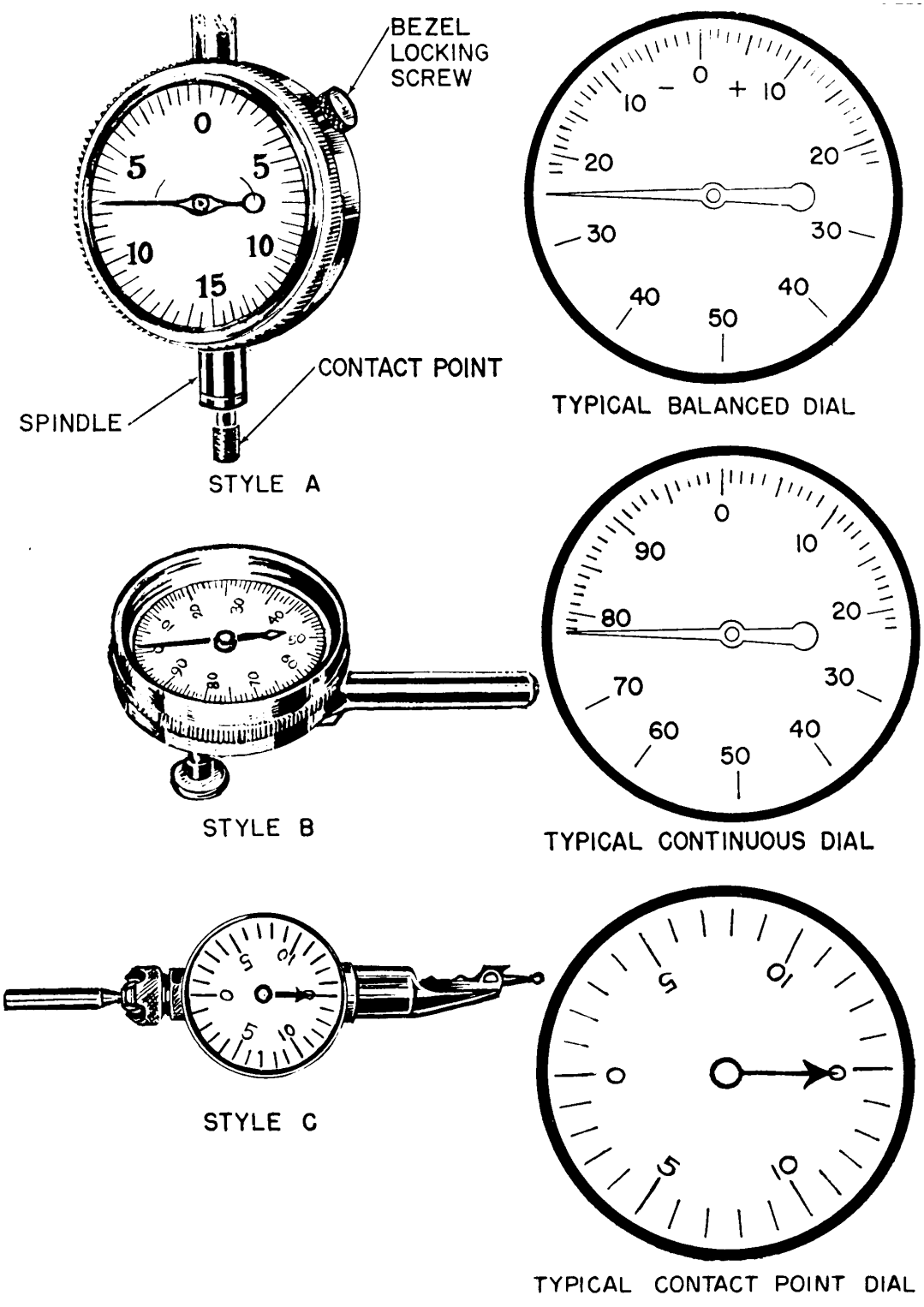


Figure 1. Dial indicators - typical view.

**f.** Fasten TI to dial indicator calibrator (A1), as shown in figure 2, using adapters supplied with TI and/or dial indicator calibrator.

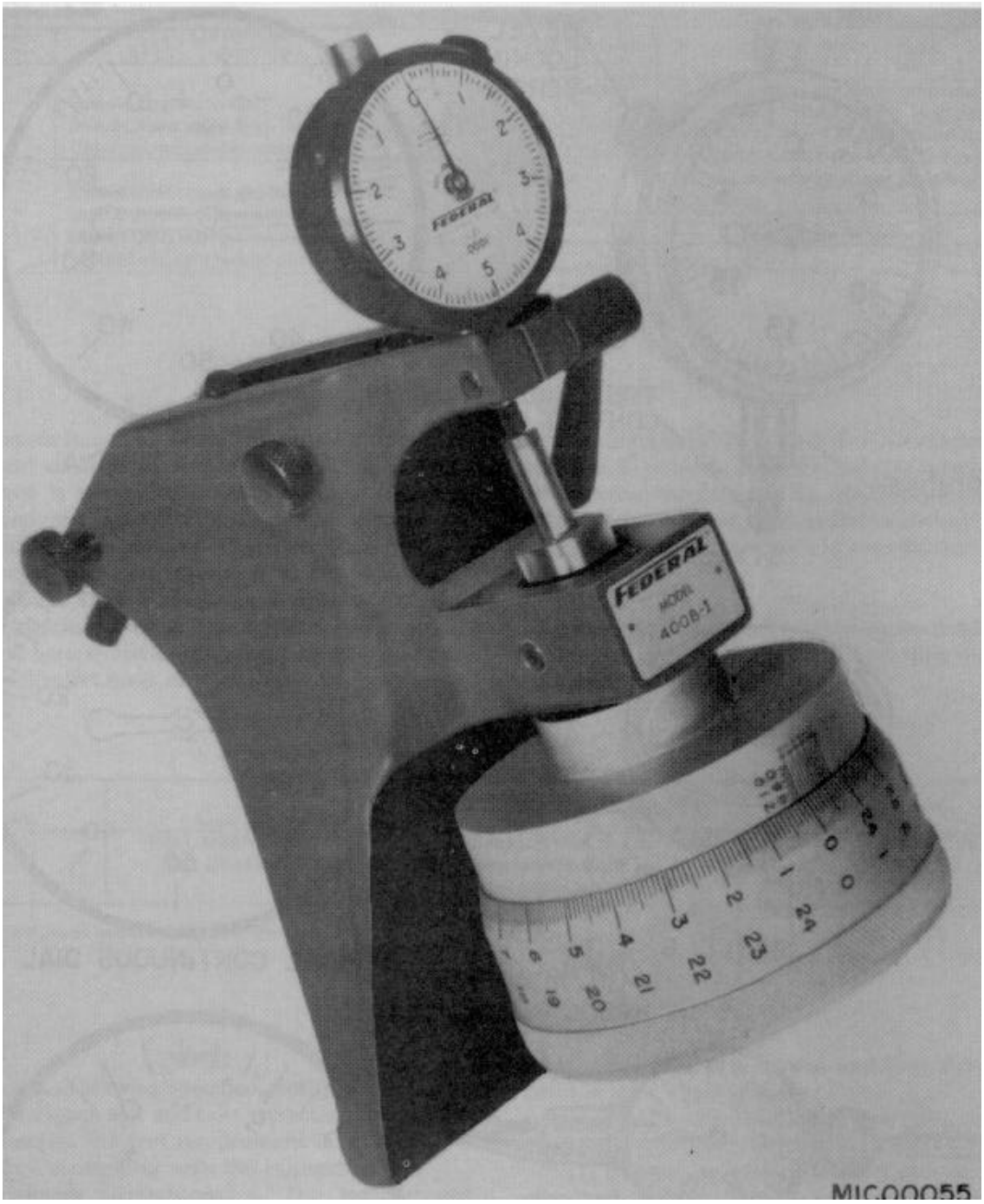


Figure 2. Dial indicator calibrator - equipment setup.

**NOTE**

Each style of the TI requires that the TI be placed in a specific position in the dial indicator calibrator prior to performing calibration. Style A is connected as shown in figure 2; style B must be connected with the dial face in a horizontal position. Style C must be connected with the dial face in a horizontal plane and contact point lever straight. During calibration of a style C TI, the lever arm shall not deviate more than 15° from the horizontal plane; to insure the lever arm does not deviate, the contact point lever must be positioned horizontally at midrange to minimize any cosine error.

## 7. Accuracy

### a. Performance Check

(1) Adjust mounting control on dial indicator calibrator (A1) to insure that contact point of TI is slightly above plunger on dial indicator calibrator.

(2) Adjust dial indicator calibrator to obtain a zero indication on the black scale.

(3) Adjust mounting control until the contact point makes contact with plunger on dial indicator calibrator.

(4) Set the TI to zero by rotating the bezel.

(5) Adjust dial indicator calibrator until the equivalent first-numbered division (inward deflection) on the TI is obtained on the dial indicator calibrator (25.4 mm = 1 in.).

**NOTE**

If the TI has been graduated in millimeter steps rather than inches, convert the millimeter-numbered division to inches and set dial indicator calibrator accordingly.

(6) The TI should indicate within the limits specified in table 1.

(7) Repeat (5) and (6) above at each numbered division within the range of the TI.

(8) Repeat (5) through (7) above at each numbered division on the TI in an outward deflection.

**NOTE**

Advance dial indicator calibrator slightly past last observed reading and then change direction to last observed reading; this will take up any backlash in calibrator.

**NOTE**

To calibrate TI which has a range greater than one-half inch, verify one-half of range, then set TI to zero on the point at one-half range and repeat check at each numbered division.

**b. Adjustments**. No adjustment can be made.

**8. Repetition**

**a. Performance Check**

(1) Set the dial indicator calibrator (A1) to obtain 25 percent of range indication on the TI.

(2) Move the TI contact point a distance equal to approximately 20 percent of the range of the TI away from the dial indicator calibrator plunger and allow contact point to return gently to the plunger.

(3) Repeat (1) and (2) above at least five times. The maximum deviation between the readings observed on the TI shall not exceed plus or minus one-fifth graduation.

(4) Repeat (1) through (3) above using 50 and 75 percent cardinal-numbered divisions.

**b. Adjustments**. No adjustment can be made.

**9. Final Procedure.** In accordance with TM 38-750, annotate and affix DA Label 80 (US Army Calibration System). When the TI cannot be adjusted within tolerance, annotate and affix DA Form 2417 (Unserviceable or Limited Use) tag.

By Order of the Secretary of the Army:

**FRED C. WEYAND**
*General, United States Army*
*Chief Of Staff*

Official:

**VERNE L. BOWERS**
*Major General, United States Army*
*The Adjutant General*

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