

TB 9-5210-207-50

Change 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR MICROMETERS, INSIDE (GENERAL)

Headquarters, Department of the Army, Washington, DC
26 August 1986

TB 9-5210-207-50, 20 July 1976, is changed as follows:

Page 1, Reporting of Errors Block. Change address to read "Commander, U. S. Army TMDE Support Group, ATTN: AMXTM-LPP, Redstone Arsenal, AL 35898-5400."

Paragraph 2. In lines 3 and 5, change "TM 38-750" to read "TB 750-25."

Page 9, paragraph 10. Supersede as follows:

10. Final Procedure

a. At the option of the calibrating laboratory, individual items within a set may be oiled to prevent rust and sealed in polyethylene film. Upon recalibration, those items with unbroken seals and no evidence of damage may remain sealed until used.

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

By Order of the Secretary of the Army:

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General, United States Army
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Distribution

To be distributed in accordance with DA Form 12-34C, Block No. 319, requirements for calibration procedures publications.

PIN NO: 010260-001

REPRINT INCLUDES CHANGE 1

*TB 9-5210-207-50

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Headquarters, Department of the Army, Washington, DC
20 July 1976

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.

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SECTION I
IDENTIFICATION AND DESCRIPTION

1. Instrument Identification. This bulletin provides instructions for the calibration of Micrometers, Inside (General) (figures 1 through 4). Specification GGG-C-105B 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. Variations among models are described in text.

b. Time and Technique. The time required for this calibration is approximately 1 hour, using the physical technique.

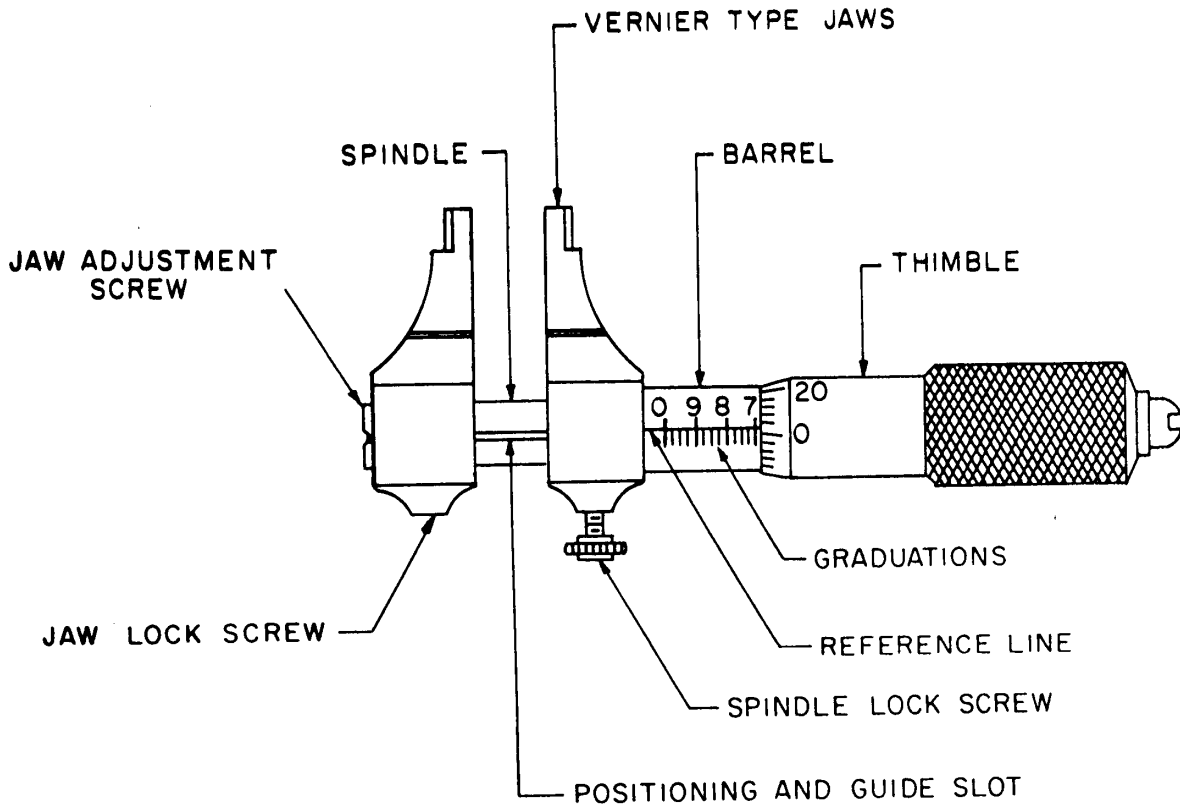


Figure 1. Micrometer, caliper, with jaws, type II, class 1.

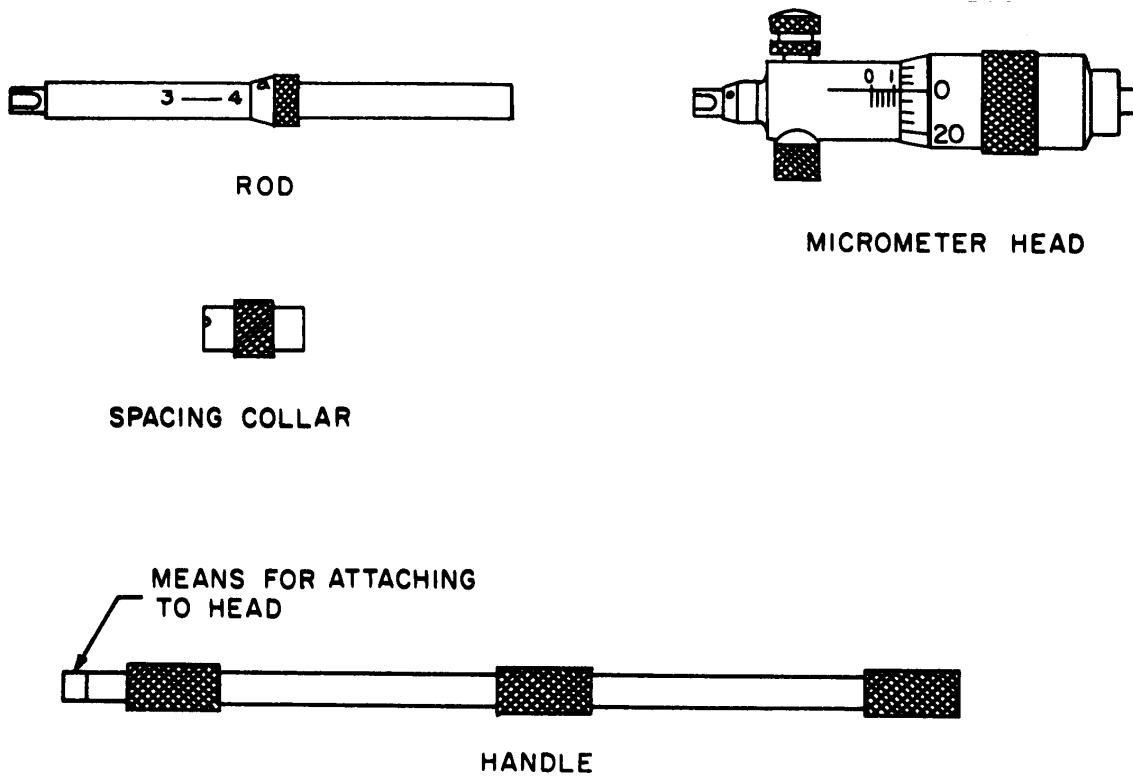


Figure 2. Inside micrometer, rod and sleeve, type II, class 2.

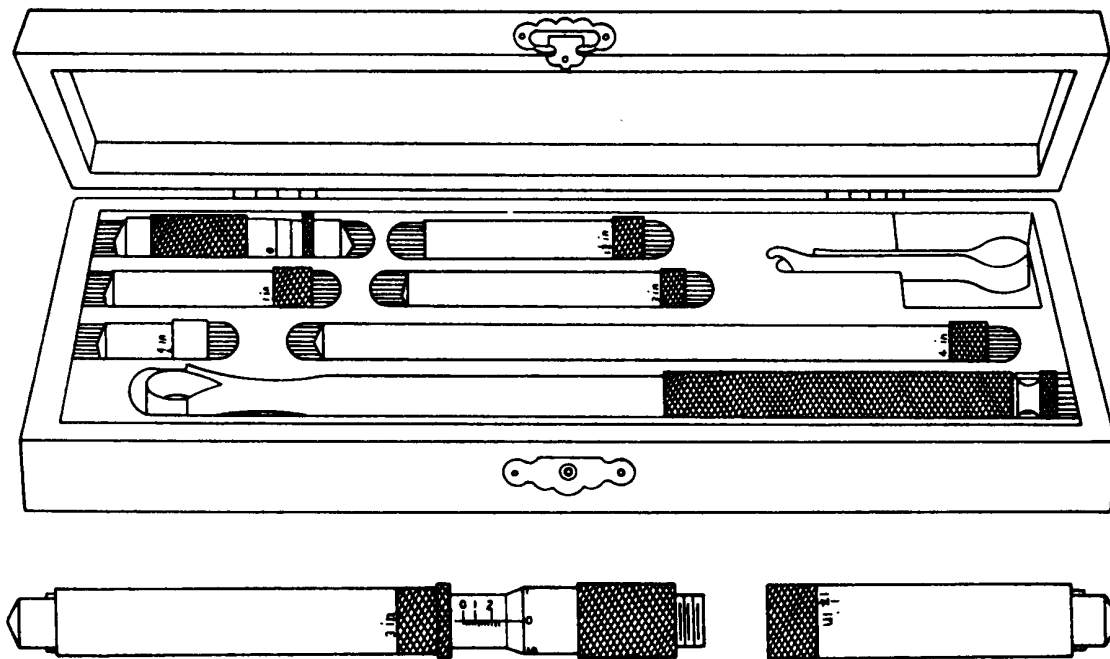


Figure 3. Inside micrometer, tubular, interchangeable, type II, class 3, style A.

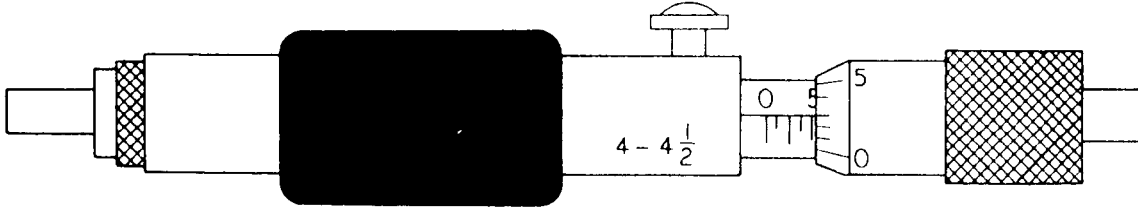


Figure 4. Inside micrometer, tubular, fixed head, type II, class 3, style B.

2. Calibration Data Card, DA Form 2416. Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25. DA Form 2416 must be annotated in accordance with TB 750-25 for each calibration performed.

3. Calibration Description. TI parameters and performance specifications which to this calibration are listed in table 1.

Table 1. Calibration Description

Test Instrument Parameters	Performance Specifications
Length (English)	Range: 1½ to 40 Accuracy: ±0.001 (without vernier Scale). ±0.0001 (with Vernier Scale).
Length (Metric)	Range: 25 to 800 mm Accuracy: ±0.01 mm

SECTION II EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment used in this calibration procedure. This equipment is issued with secondary transfer standards calibration sets NSN 6695-00-621-7877 and 4931-00-525-8175 (AN/GSM-256), 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. None.

Table 2. Minimum Specifications of Equipment Required

Item	Common Name	Minimum Use Specifications.	Manufacturer, Model and Part Number
A1	GAGEBLOCK SET.	Range: 1 to 40 in. Accuracy: Grade B	(7901372) (7901961)

**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 table 2. For the identification of equipment referenced by item numbers prefixed with A, see table 2.

NOTE

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

7. Equipment Setup

a. Prepare a clean work area and allow equipment and TI to stabilize at room temperature for 1 hour.

b. Observe that the TI is free of nicks and burrs.

c. Push and pull the TI micrometer head laterally to insure that there is no excessive backlash in the threads. If backlash is indicated, refer to paragraph **8b** below.

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.

8. Micrometer Head Calibration

a. Performance Check

(1) Select the appropriate gage blocks required to verify the range of the TI from gage block set(A1).

(2) Assemble the gage blocks as shown in figure 5. Each stack of gage blocks must have an inside caliper jaw at each end of the gage blocks to serve as end stops for the TI. The gage blocks and end stops must be firmly wrung together and secured with the tie rods supplied with the gage block set.

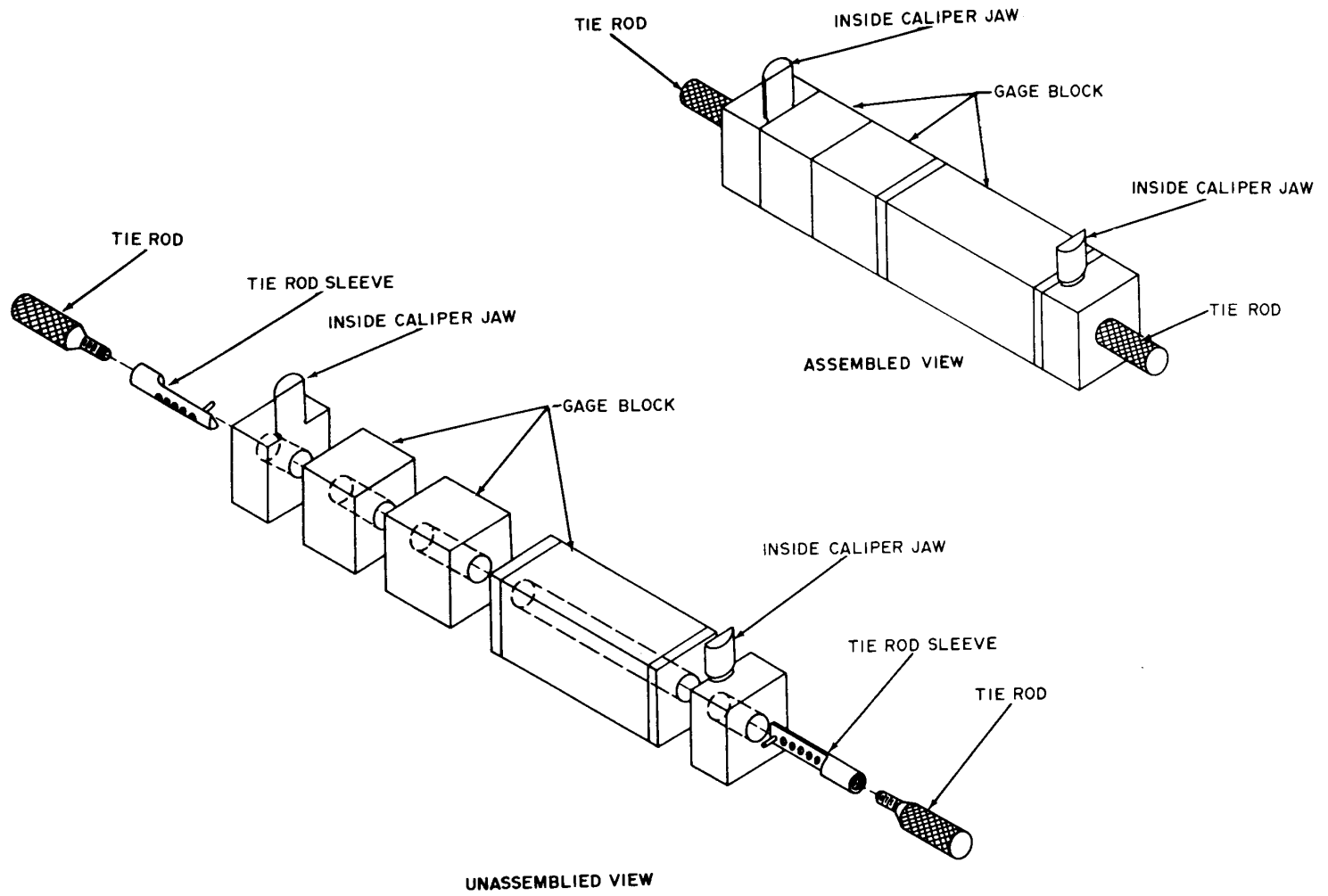
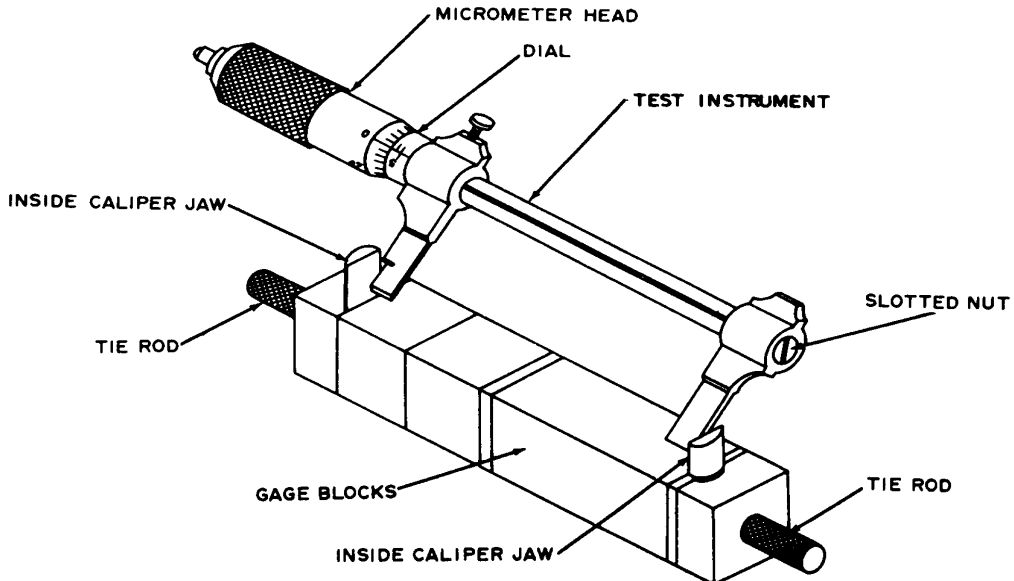


Figure 5. Gage block assembly.

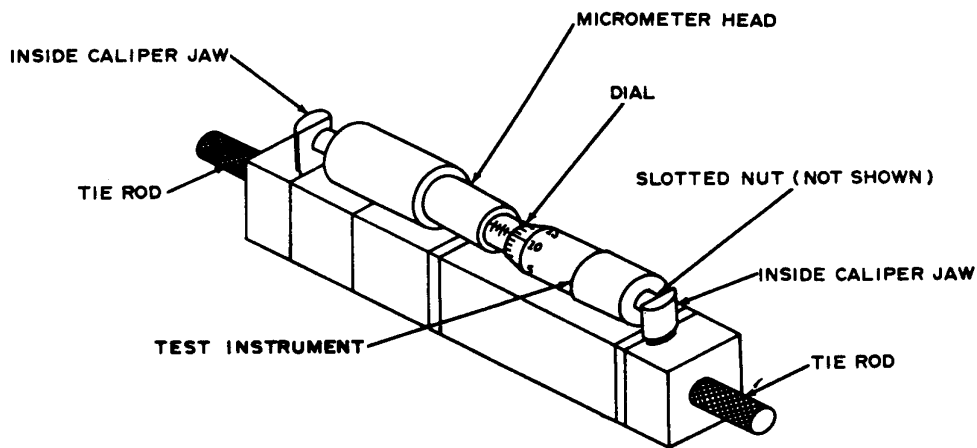
NOTE

Before a TI graduated in metric units can be calibrated, the metric units must first be converted to inches. The formula is 1 inch = 25.4 millimeters, and 1 millimeter = 0.03937 inch.

- (3) Set up the TI to be calibrated as shown in figure 6.



MICROMETER (VERNIER JAW TYPE) TYPICAL VIEW



MICROMETER (FIXED HEAD TYPE) TYPICAL VIEW

Figure 6. Micrometer head calibration.

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(4) Using the dimensions listed in table 3, verify the TI micrometer head at each check point. If the TI does not indicate zero (0) ± 0.0002 (or zero ± 0.0005 for TI's without vernier), perform **b** below.

Table 3. Gage Block Stacks

	Micrometer Head Check Point.	Equivalent Gage Block Stacks Between End Stops.
1/2 in. micrometer head movement.	0	1.500
	.125	1.625
	.242	1.742
	.250	1.750
	.258	1.758
	.375	1.875
	.500	2.000
1 in. micrometer head movement.	0	2.000
	.125	2.125
	.242	2.242
	.250	2.250
	.258	2.258
	.375	2.375
	.500	2.500
	.625	2.625
	.742	2.742
	.750	2.750
	.758	2.758
	.875	2.875
	1.000	3.000

b. Adjustments

(1) Tighten slotted nut on TI to remove any backlash.

(2) Zero set TI micrometer head at its minimum size in accordance with the manufacturer's instructions.

9. Length Calibration

a. Performance Check

(1) Verify each extension rod and/or caps in combination with micrometer head, using the techniques in paragraph **8a**(1) through (3) above. Verify only the minimum indication for each combination.

(2) The gage block dimensions used to verify each setup must be equal to the minimum length of the extension rod, micrometer head, and end-cap combination (size marked on each extension rod) to be verified.

(3) The permissible error in length will not exceed the applicable tolerances specified in tables 4 through 10.

Table 4. Inside Micrometer, Caliper, with Jaws, (English Measure) Permissible Error - Inches.

Size	Range	Length (±)	
		0.001 Graduations	0.0001 Graduations
1	0.200 to 1	0.0005	0.0002
1 1/2	0.500 to 1 1/2	0.0005	0.0002
2	1 to 2	0.0005	0.0002

Table 5. Inside Micrometer, Rod and Sleeve (English Measure) Permissible Error - Inches.

Range	Length(±)	
	0.001 Graduations	0.0001 Graduations
1 to 2	0.0005	0.0003
2 to 8	0.0005	0.0004
2 to 12	0.0005	0.0005
8 to 32	0.001	0.001
8 to 36	0.001	0.001

Table 6. Inside Micrometer, Rod and Sleeve (Metric Measure) Permissible Error - Millimeters.

Range	Length(±)
25 to 50	0.0075
50 to 200	0.010
50 to 300	0.0125
200 to 800 or 900	0.025

Table 7. Inside Micrometer, Tubular, Interchangeable Head (English Measure) Permissible Error -Inches.

Range	Movement of Head	Length(±)	
		0.001 Graduations	0.0001 Graduations
1 1/2 to 8	1/2	0.0005	0.0005
1 1/2 to 12	1/2	0.0005	0.0005
4 to 24	1	0.001	0.0007
4 to 32	1	0.001	0.0009
4 to 40	1	0.001	0.001
1 1/2 to 32 (two heads)	1/2 and 1	0.001	0.0015

Table 8. Inside Micrometer, Tubular, Interchangeable Head (Metric Measure) Permissible Error - Millimeters.

Range	Movement of Head	Length(±)
40 to 200	13	.012
40 to 300	13	.012
100 to 600	25	.018
100 to 800	25	.022
100 to 1000	25	.022
40 to 800 (two heads)	13 and 25	.035

Table 9. Inside Micrometer, Tubular, Fixed head (English Measure) Permissible Error - Inches.

Range	Movement of Head	Length(±)	
		0.001 Graduations	0.0001 Graduations
2 to 2 1/2	1/2	0.0005	0.0003
2 1/2 to 3	1/2	0.0005	0.0003
3 to 3 1/2	1/2	0.0005	0.0003
3 1/2 to 4	1/2	0.0005	0.0003
4 to 4 1/2	1/2	0.0005	0.0003
4 1/2 to 5	1/2	0.0005	0.0003
5 to 12 (in inch increments).	1/2	0.0005	0.0003

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Table 10. Inside Micrometer, Tubular, Fixed Head (Metric Measure) Permissible Error - Millimeters.

Range	Movement of Head	Length (\pm)
50 to 63	13	0.007
63 to 75	13	0.007
75 to 88	13	0.007
88 to 100	13	0.007
100 to 113	13	0.007
113 to 125	13	0.007
125 to 300 (in 25mm increments)	25	0.010

b. Adjustments. Adjust contact points on each extension rod as required, for zero indication, when fit is the same as when zero setting micrometer head.

10. Final Procedure

a. At the option of the calibrating laboratory, individual items within a set may be oiled to prevent rust and sealed in polyethylene film. Upon recalibration, those items with unbroken seals and no evidence of damage may remain sealed until used.

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.

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By Order of the Secretary of the Army:

FRED C. WEYAND
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Distribution:

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