



# INSTRUCTION & MAINTENANCE MANUAL

## UNIVERSAL TAPER COMPARTOR

**#5101000**



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## 1.0 INTRODUCTION

### 1.1 Product Overview

The Edmunds Universal Taper Comparator is a rugged metrology instrument designed for the precise measurement of internal and external diameters and tapers.

A welded steel base supports a steel worktable with serrated steel anvils to support the work piece. A separate column locking control secures the finger height and a two speed, dual knob elevating mechanism allows for the exploration of diameters for taper, barrel and bellmouth conditions.

Two auxiliary "soak" tables are mounted adjacent to the worktable to allow for the reference gage block set up or sequential work pieces to be stored and stabilized for temperature prior to measurement.

The inch/millimeter unit selection and .0005" through .020" range selection of the Trendsetter column's E8032 module offer greater flexibility to the exactness of the measurement for a variety of applications.



**Figure 1 - Overall View**

## 2.0 GETTING STARTED

Due to the size and weight of the comparator, the unit is broken down at the factory prior to shipment. The unit has been carefully packed, and some components may be packaged in separate cartons within the shipping crate. Verify that you have unpacked all the components before discarding any of the shipping containers.

### 2.1 Selecting a Location

The performance of the comparator is directly related to the location where it is installed in your facility. Careful consideration should be given to the location including vibration isolation, temperature and humidity control and operator access. We suggest a spot within a laboratory or controlled environment or at a minimum, isolated from heat, sunlight, and any industrial "smog" environment.

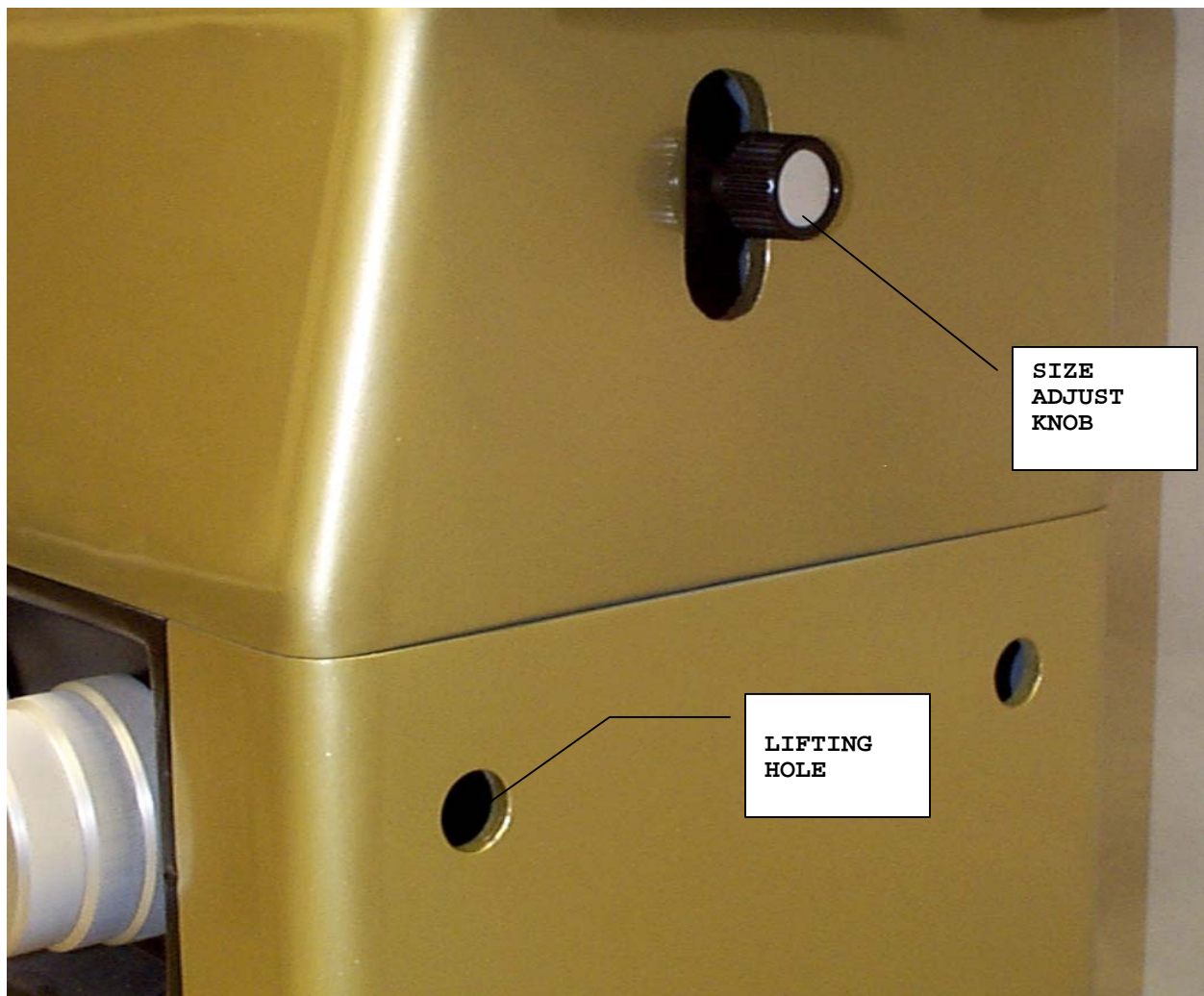
### 2.2 Unpacking Your Comparator

To facilitate shipment without damage, portions of the comparator have been disassembled after testing and prior to shipment from our Farmington, CT. USA facility.

<b>THE FOLLOWING STEPS MUST BE PERFORMED PROIR TO OPERATION OF THE COMPARATOR!</b>
--

1. Remove the (4) protective caps from the lifting holes located in the comparator base. (See Figure 2).
2. Insert the (2) supplied rigging bars through the lifting holes provided and lift the unit from the shipping skid.
3. Locate and install the four leveling feet packed within the comparator base in the tapped holes provided in the base bottom.
4. Transport the unit with the use of the rigging bars and lower in the location of choice onto the leveling feet.
5. Carefully remove the blocking bar between the contact finger slides by loosening the finger locking screws and sliding the clamps to the sides of the slides.
6. Unpack the readout support and attach to the rear of the base frame using the screws provided. **NOTE:** Be sure to install the rubber isolation pads between the comparator base and the readout support.
7. Level the unit with the use of the double axis bubble level included within the accessory kit by adjusting the heights of the leveling feet.

8. Install the readout mount bracket to the rear of the base with the screws provided.
9. Unpack the Trendsetter readout and mount it to the mounting bracket.
10. Locate and connect the gage probe cable from within the base to the "A" connector on the rear of the column.
11. Unpack and place the height fixture in its nest on the mounting bracket. Locate and connect the gage probe cable from the fixture to the "B" connector on the rear of the column.
12. Install the two soak tables at each side of the work table.
13. Connect power to the Trendsetter column from any 110VAC source and wait approximately 15 minutes before proceeding to calibrate the unit. The readout may remain ON at all times due to its extremely low power consumption.



**Figure 2 - Lifting Holes**

### 3.0 HARDWARE

#### 3.1 Comparator Specifications

Size .....	56.0"H x 20.0"W x 16.0"D
Weight .....	Approx. 675 lbs.
Measuring Range .....	Internal .125" to 12.0" External 0.0" to 11.0"
Contact Pressure .....	0 to 8 oz. adjustable
Contact Elevation Range .....	1.625" Max
Work Table Size .....	11.0" x 16.0"

#### 3.2 Product Listing

Universal Taper Comparator	5101000
Trendsetter Column	E8000/E8032/E8005
Accessory Kit (complete)	5101046

##### Accessory Kit Components:

Auxiliary Table Plate	5100003
Finger Wrench	5100004
Screwdriver	5100005
Cross-Level	5100006
Outside Caliper Jaw Set	5100007
(2) .100 Dia. Rolls	5101051
Finger Storage Box	5102004

##### Gaging Finger Sets:

###### Standard:

Set #0 (.125" to .250" internal range)	5100025
Set #1 (.250" to .500" internal range)	5100026
Set #2 (.500" to 1.00" internal range)	5100027
Set #3 (1.00" to 12.00" internal range)	5100028



## 4.0 FUNCTIONAL DESCRIPTION

### 4.1 Gaging Fingers

A series of carbide and diamond tipped gaging fingers are included in the standard accessory kit. These fingers allow for internal diameter measurement from .125" to 12.000" or for 0.000" to 11.000" external diameter measurements, depending on their orientation in the measuring machine.

The fingers are constructed to precise "paired" dimensions to ensure contact on a common plane or elevation. If damage to any finger is incurred, BOTH fingers in the set must be returned to Edmunds for repair to maintain the correct alignment.

The gaging fingers will allow for maximum exploration depths from the worktable as follows:

<u>Set #</u>	<u>Internal Range</u>	<u>Max Depth</u>	<u>P/N</u>
0	.125" - .250"	.437"	5100025
1	.250" - .500"	.750"	5100026
2	.500" - 1.000"	1.125"	5100027
3	1.000" - 12.000"	1.625"	5100028

Special depths may be quoted based upon application.

### 4.2 Worktable

The worktable is solidly mounted to the comparator base. There are (2) hardened steel serrated anvils mounted on either side of the gaging fingers for support of the workpiece.

An auxiliary free sitting table plate is provided in the accessory kit for use while measuring smaller gaging diameters. (.040" - .500") This plate is placed over the gaging fingers resting on the worktable.

Two .100" diameter rolls are also provided to allow easier centering of the workpiece around the gaging fingers.

### 4.3 Two Speed Elevator

Located on the left side of the front of the comparator's base are two concentric dials that control the vertical travel of the gaging fingers for diameter exploration. Each of these dials is connected to a precision rack and pinion gear train for consistent movement of the gaging fingers.

The smaller inner dial is a rapid, coarse adjustment knob to allow rough positioning of the gaging finger height.

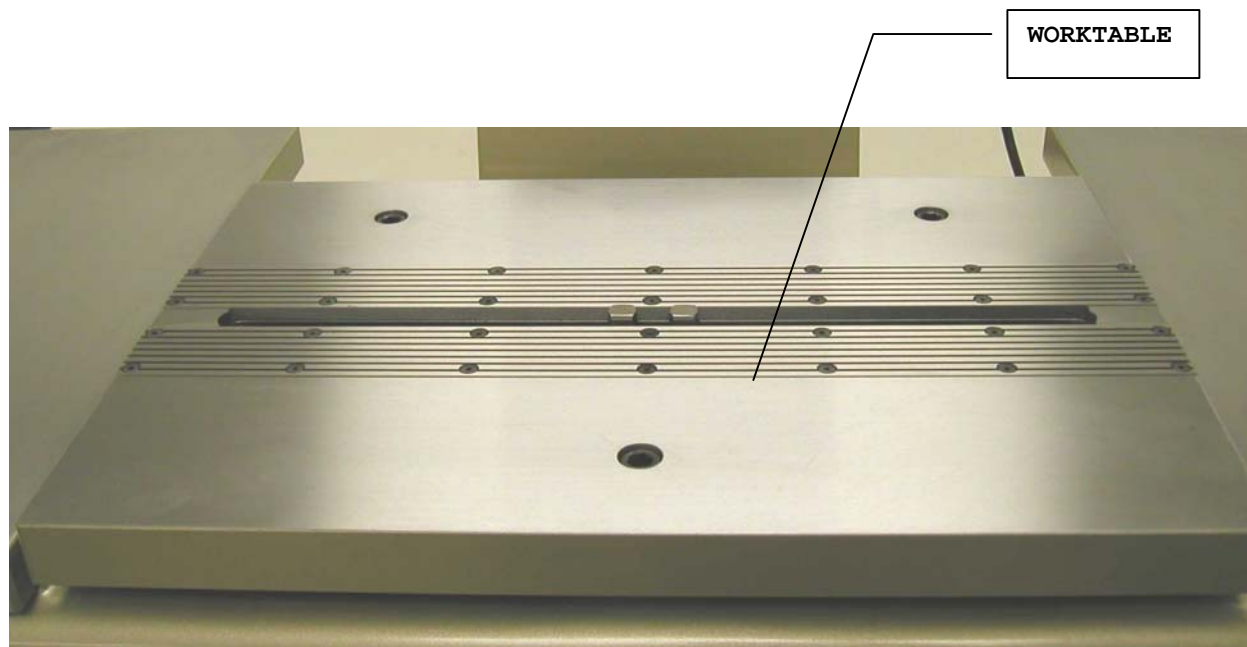
The large outer dial provides a slower, more precise movement of the gaging fingers for taper or bellmouth exploration. (See Figure 4)

### 4.4 Column Lock

The provision for locking the height of the gaging fingers is provided by the Column Lock knob located on the right side of the front of the comparator base.

Tightening this knob when the appropriate gaging finger height is obtained will lock the fingers in position. The column lock must be released when any vertical movement of the gaging fingers is desired.

**Figure 3 - Work Table**





**Figure 4 – Two Speed Elevator & Column Lock**

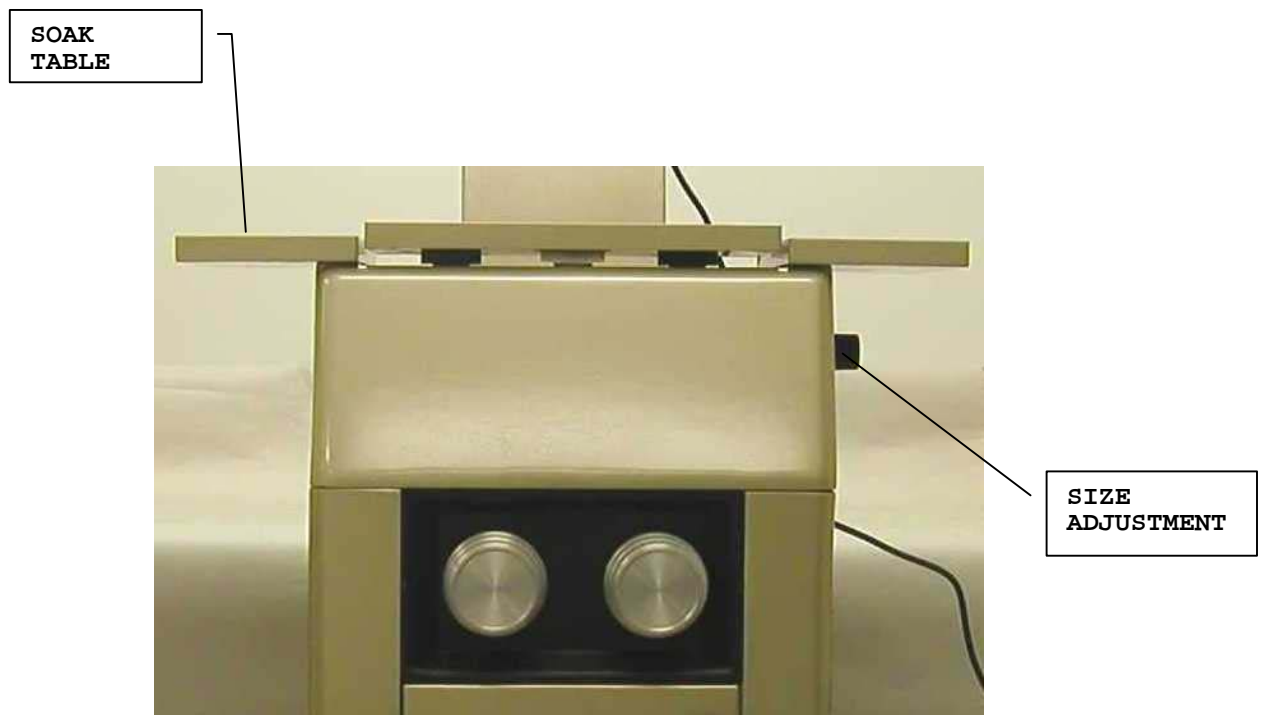
#### 4.5 Size Actuator

The knob located at the right side of the comparator base under the soak table controls the movement of the gaging fingers in the plane of measurement. This adjusting knob has a limited range and is used primarily for the final setting of the gaging fingers to a known size.

Counter-clockwise rotation of this knob will decrease the gaging finger spacing, while clockwise rotation will increase the spacing. (See Figure 5)

#### 4.6 Soak Tables

Two rugged steel tables are provided for mounting at each side of the worktable for storage of the master and workpiece. These tables are used as the preparation area for succeeding workpieces and masters to stabilize them to the temperature and relative humidity of the work area. This is known as "soaking in" before the pieces are measured. (See Figure 5)



**Figure 5 - Size Adjustment, Soak Table**

#### 4.7 Accessory Kit

The comparator comes complete with a multiple piece accessory kit, which includes all of the components necessary for diameter measurements. The kit includes the following components:

<u>Part Name</u>	<u>Part #</u>
Auxiliary Table Plate	5100003
Finger Wrench	5100004
Screwdriver	5100005
Cross Level	5100006
Outside Caliper Jaw Set	5100007
(2) .100 Dia. Rolls	5101051
Finger Storage Box	5102004
<u>Gaging Finger Sets</u>	<u>Part #</u>
#0 (.125" - .250" ID)	5100025
#1 (.250" - .500" ID)	5100026
#2 (.500" - 1.00" ID)	5100027
#3 (1.00" - 12.00" ID & all OD)	5100028

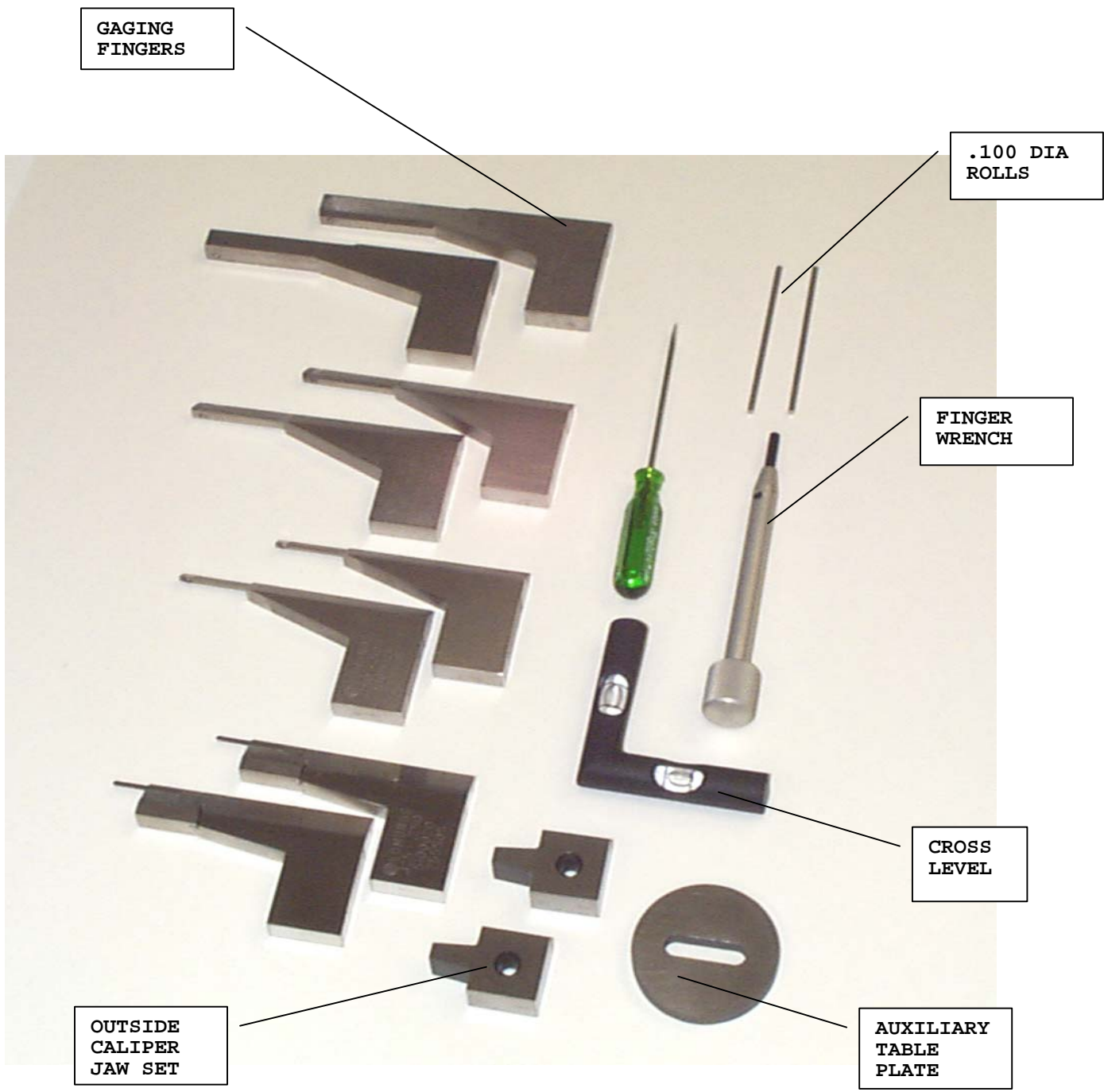


Figure 6 - Accessory Kit





Figure 7- Accessory Kit Storage



## 5.0 TRENDSETTER COLUMN

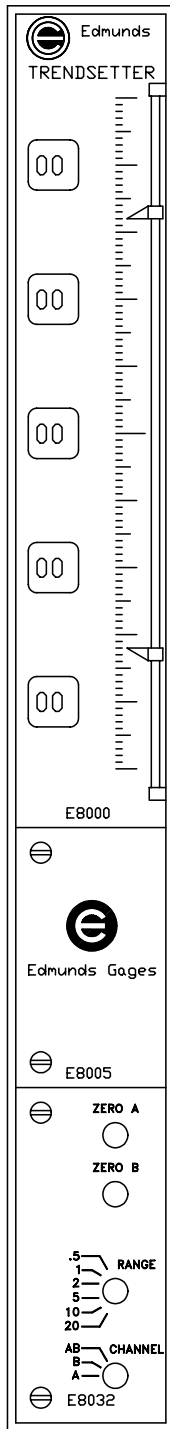
### 5.1 Specifications

#### E8000 Mainframe

Size	21.25"H x 2.50"W x 9.00"D
Weight	4.5 lbs.
Display	10 Inch, 101 Point Bargraph
Line Voltage/Power	85-240 VAC @ 50-60Hz
Power	35 Watts Max 15 Watts Typ
Fuse Type	5mm x 20 mm - 10 Amp
Transducer Excitation	2.000 VRMS @ 5000 HZ
Probe Inputs	(2) LVDT
Resolution	1% of Full Scale

#### E8032 Module

Ranges	.0005"/.01 mm .001"/.02 mm .002"/.04 mm .005"/.10 mm .010"/.20 mm .020"/.40 mm
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**Figure 8 – Trendsetter Front Panel**

## 5.2 Preparing For Use

Carefully unpack the Trendsetter readout. Place the Trendsetter on the mounting plate. Secure the Trendsetter to the plate with three SHCS provided.

Plug the power cord into the receptacle located on the back of the Trendsetter readout and connect it to a 85-240 VAC 50/60 Hz power supply. Plug the gage head connector from the comparator base into the "A" receptacle located on the rear of the Trendsetter readout. Plug the gage head connector from the height fixture into the "B" receptacle located on the rear of the Trendsetter readout.

Turn the power switch located on the rear of the Trendsetter cabinet "ON".

### 5.3 Front Panel Magnification Adjustment

The Trendsetter column is shipped from the factory with the front panel magnification pre-set. Adjustment will be required if the internal gage transducer or LVDT is replaced.

Reference pages 5 and 6 of the Trendsetter manual for illustrations and other information relevant to front panel mag adjustment.

- 1) Select the .0005" range on the Trendsetter E8032 module.
- 2) Select Channel "B" on the Trendsetter E8032 module.
- 3) Select two gage blocks with a difference in size of .0004".
- 4) Place the smallest size gage block on the work table anvil.
- 5) Remove the Height Fixture from its nest and place it on the work table anvil, positioning it so that the LVDT gage tip contacts the gage block.
- 6) Adjust the "ZERO B" knob on the Trendsetter E8032 module until the display reads (-).00025".
- 7) Replace the smallest gage block with the larger size gage block.
- 8) Observe the display. The reading should reflect the difference between the gage blocks (deviation included).
- 9) If the display does not correspond to the correct value, use a small blade screw driver and adjust the Front Panel Magnification Trim pot located under the "ZERO B" knob on the E8032 module until the display reads the correct value.

#### 5.4 E8000 Main Frame Assembly

Reference pages 14-16 of the Trendsetter manual for illustrations and other information relevant to the E8000 main frame assembly.

#### 5.5 E8032 (2) Channel LVDT module

Reference pages 32-34 of the Trendsetter manual for illustrations and other information relevant to the E8032 signal conditioning module.

## 6.0 OPERATING ADJUSTMENTS

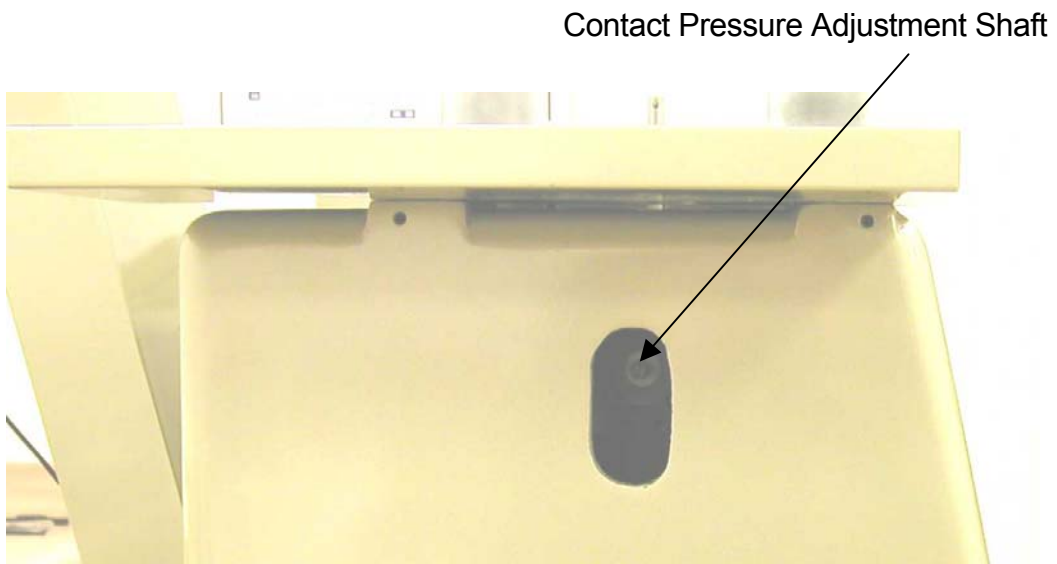
### 6.1 Contact Pressure Adjustment

The contact pressure of the gaging fingers is set using the contact pressure adjustment shaft accessible from the left hand side of the machine. The shaft has a screwdriver slot for adjustment. See figure 9 below. The recommended contact pressure is 3 ounces (85 grams). The contact pressure is set using the scale and point on the left had finger mount that can be viewed through the finger slot in the anvil. See figure 10 below. Note that one end of the scale is marked "INT" and on end of the scale is marked "EXT".

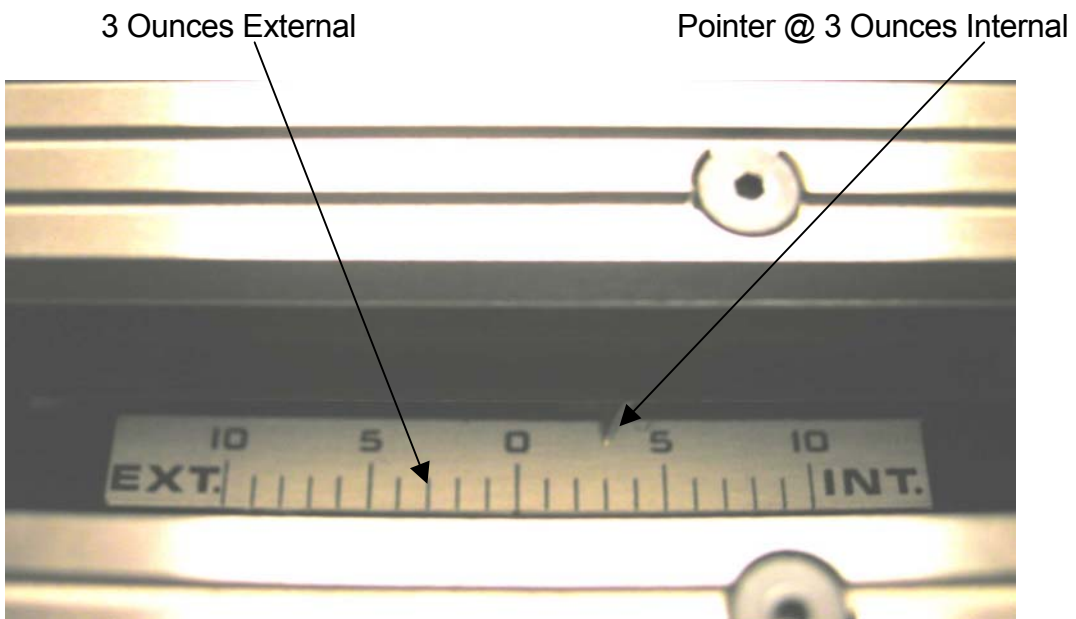
<p><b>NOTE: THE CONTACT PRESSURE MUST BE SET TO "INT" FOR I.D. MEASUREMNT OR "EXT" FOR O.D. MEASUREMENT.</b></p>
--

#### Setting contact pressure

- 1) Using a screwdriver rotate the contact pressure adjustment shaft until the pointer is aligned with the 3 ounce mark on the "INT" side of the scale for ID measurement or the 3 ounce mark on the "EXT" side of the scale for OD measurement.



**Figure 9 – Contact Pressure Adjustment Shaft**



**Figure 10 – Contact Pressure Scale & Pointer**

## 6.2 Contact Finger Installation

### 6.2.1 Internal Finger Installation

1. Select the respective finger set for the diameter range to be measured from the accessory kit.
2. Collapse the current gaging fingers in the machine, or if there are none, the finger mounts by rotating the size actuator knob counter-clockwise to its most min position.
3. Loosen the finger clamp screws by inserting the finger wrench through the slot in the worktable. Once the screw is fully loosened, slide each finger out from under the clamp screw and lift the finger out of the comparator. **DO NOT REMOVE THE CLAMP SCREWS.** Place the fingers in their respective storage areas in the accessory kit.
4. Carefully lower the right and left fingers into the finger mounts and position them so that the contacts are positioned slightly smaller than the inner diameter to be measured. Tighten the clamp screws.

**NOTE: BE SURE THE GAGING FINGER CONTACT IS POSITIONED FOR THE TYPE OF MEASUREMENT BEING TAKEN.**

#### **INTERNAL - CONTACTS FACE OUTWARD**

5. Verify the gaging pressure is set for 3 ounces on the INTERNAL side of the pressure scale. See Section 6.1 for gage pressure setting.
6. Rotate the size actuator knob clockwise until the fingers expand to approximately the size to be measured. If the size actuator knob reaches the most max position and the contacts are not close to the size to be measured then return the size actuator knob to the most min position, loosen the clamp screws for the left and right contact fingers and reposition the fingers at a wider position. Rotate the size actuator knob clockwise until the fingers expand to approximately the size to be measured. Repeat if necessary.
7. Place the setting master over the contact fingers. Continue rotating the size actuator knob until the bargraph displays "0".



## 6.2.2 External Finger Installation

1. Select the respective finger set for the diameter range to be measured from the accessory kit.
2. Open the current gaging fingers in the machine, or if there are none, the finger mounts by rotating the size actuator knob clockwise to its most max position.
3. Loosen the finger clamp screws by inserting the finger wrench through the slot in the worktable. Once the screw is fully loosened, slide each finger out from under the clamp screw and lift the finger out of the comparator. **DO NOT REMOVE THE CLAMP SCREWS.** Place the fingers in their respective storage areas in the accessory kit.
4. Carefully lower the right and left fingers into the finger mounts and position them so that the contacts are positioned slightly larger than the outer diameter to be measured. Tighten the clamp screws.

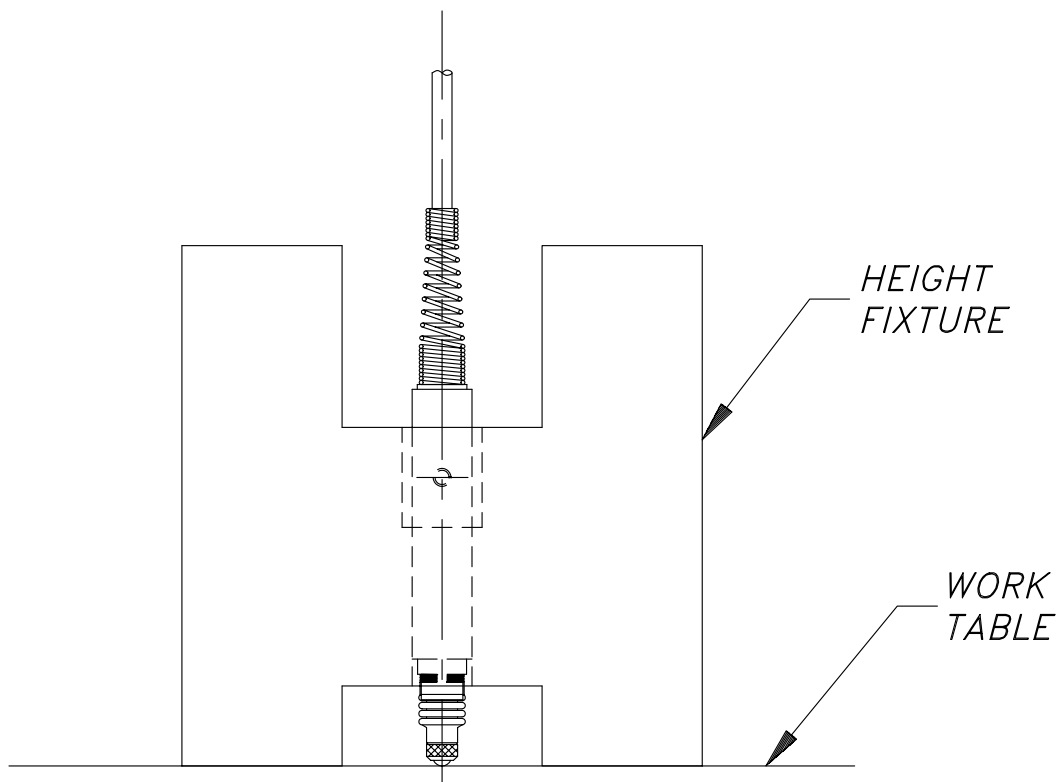
**NOTE: BE SURE THE GAGING FINGER CONTACT IS POSITIONED FOR THE TYPE OF MEASUREMENT BEING TAKEN.**

### **EXTERNAL - CONTACTS FACE INWARD**

5. Verify the gaging pressure is set for 3 ounces on the INTERNAL side of the pressure scale. See Section 6.1 for gage pressure setting.
6. Rotate the size actuator knob counter-clockwise until the fingers collapse to approximately the size to be measured. If the size actuator knob reaches the most min position and the contacts are not close to the size to be measured then return the size actuator knob to the most max position, loosen the clamp screws for the left and right contact fingers and reposition the fingers at a narrower position. Rotate the size actuator knob counter-clockwise until the fingers collapse to approximately the size to be measured. Repeat if necessary.
7. Place the setting master between the contact fingers. Continue rotating the size actuator knob until the bargraph display reads "0".

### 6.3 Height Fixture Setup

- 1) Select channel "B" on the Trendsetter E8032 module.
- 2) Remove the Height Fixture from its nest and place it on the work table anvil, position the fixture so that the LVDT gage tip and the serrated surface of the height gage fixture are on the same surface of the work table anvil
- 3) Select the .0005" range on the Trendsetter E8032 module.
- 4) Adjust the "Zero B" knob on the Trendsetter E8032 module until the display reads "0.000".



HEIGHT FIXTURE SETUP

**Figure 11 – Height Fixture Setup**

## 6.4 Finger Height Setup

- 1) Determine the gaging finger height required for the work piece to be calibrated using the formula:

Finger Height (Gage Block Stack Height) =

Distance from datum surface to 1<sup>st</sup> cal point

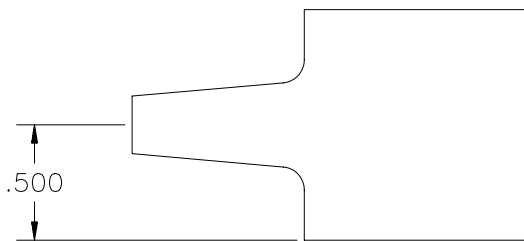
+ .100" (carbide roll)

+ Distance between cal points

+ 1/2 diameter of gage contact

+ .500" (distance from bottom of Outside Caliper Jaw to cal point on OCJ)

**NOTE: Add the .500" for internal taper setups only**



OUTSIDE CALIPER JAW

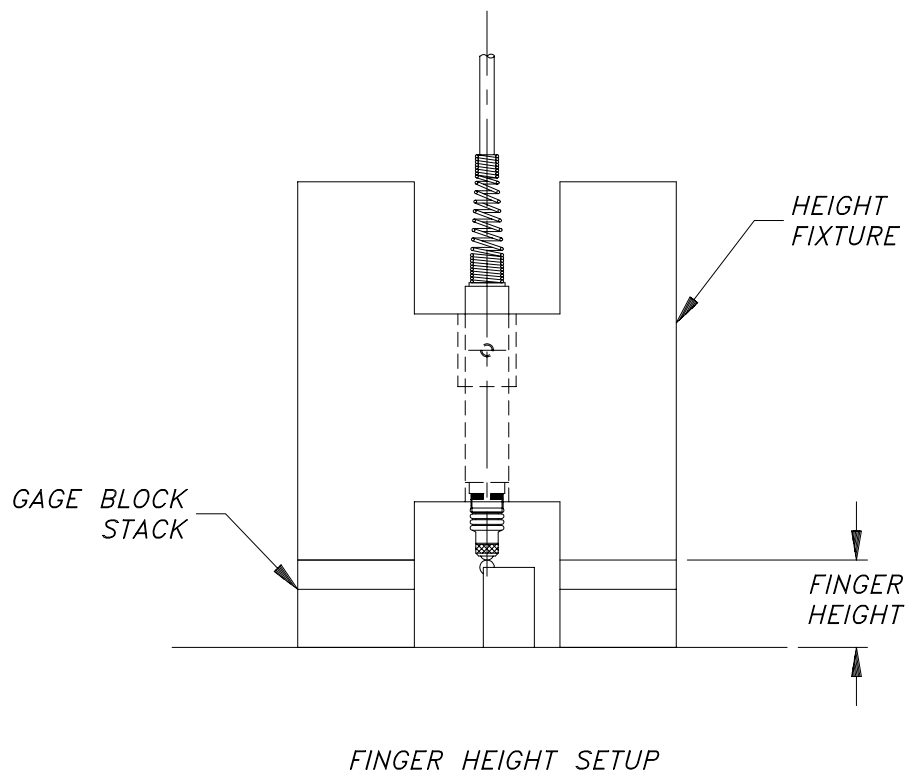
The table below will supply the contact diameter:

Gaging Finger Set	Contact Diameter
#1 (.250" - .500")	.125"
#2 (.500" - 1.00")	.125"
#3 (1.00" - 12.00")	.125"

- 2) Select a gage finger height which will allow for an appropriate gage block stack setup.
- 3) Prepare two gage block stacks equal to the gage finger height.
- 4) Select channel "B" on the Trendsetter E8032 module.
- 5) Install the two gage block stacks on the work table straddling one of the gage fingers.
- 6) Remove the height fixture from its nest and place it on the gage block stacks. Position the fixture so that the LVDT gage tip is over the contact ball on the gage finger.
- 7) Select the .020" range on the Trendsetter.

(Cont.)

- 8) Unlock the column assembly using the right hand lock knob located on the machine base.
  - 9) Using the two speed elevating knob, raise the gage fingers until the display reads as close to "0" as possible.
  - 10) Select the .0005" range on the Trendsetter.
  - 11) Using the two speed elevating knob, raise the gage fingers until the display reads "0".
  - 12) Lock the column assembly using the right hand lock knob located on the machine base.
- NOTE: DO NOT ADJUST THE "ZERO B" KNOB ON THE TRENDSETTER TO OBTAIN THE "0" READING. THIS WILL INVALIDATE THE HEIGHT FIXTURE SET UP.**



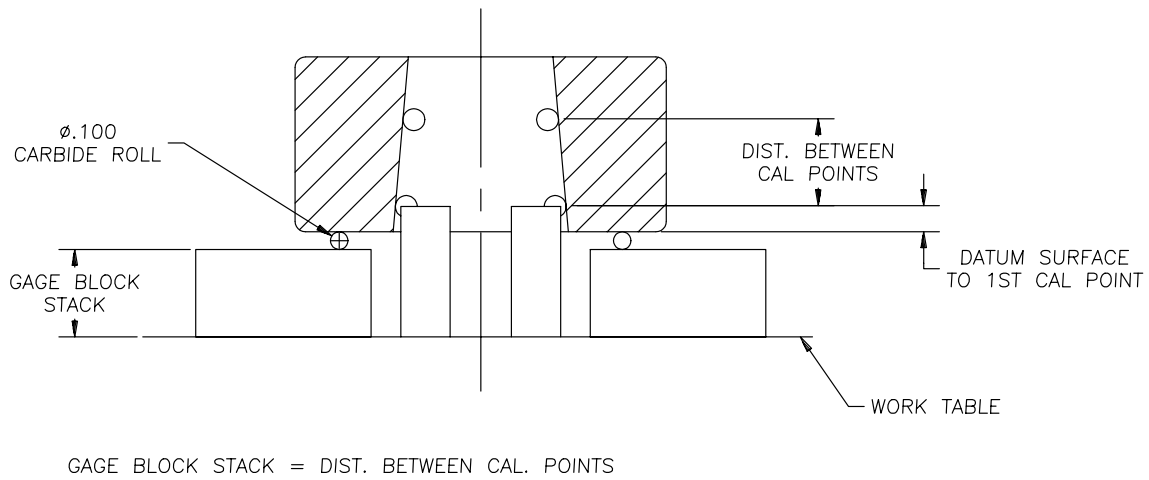
**Figure 12 – Finger Height Setup**

## 7.0 MEASUREMENT PROCEDURES

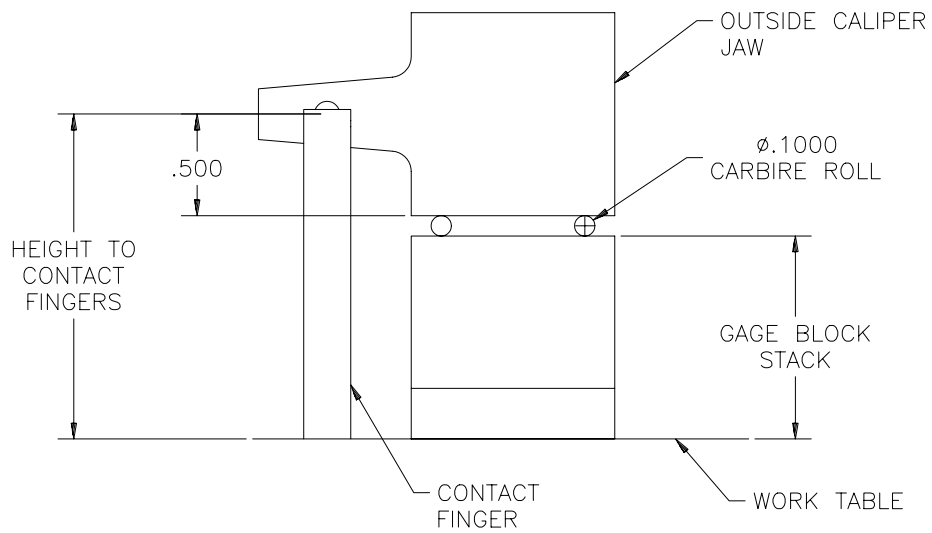
### 7.1 Internal Tapers

1. Select the proper set of gaging fingers for the diameter size being measured and install per the installation instructions in section 6.2 making sure the contacts are facing outward.
2. Set the correct finger pressure per section 6.1.
3. Set up the height fixture per section 6.3.
4. Set the correct finger height per section 6.4. After the finger height has been set, select channel "A" on the Trendsetter E8032 module.
5. Prepare a gage block set up utilizing the caliper jaws supplied with the accessory kit for the **Maximum** gage diameter. Total the deviation (+ or -) of the individual gage blocks and record the reading.
6. Prepare a gage block set up utilizing the caliper jaws supplied with the accessory kit for the **Minimum** gage diameter. Total the deviation (+ or -) of the individual gage blocks and record the reading.
7. Place two gage block stacks on the work table anvil and place two .100" diameter carbide rolls on the top surface of the gage block stacks. The height of the gage block stacks and the rolls must be setup so that the gage fingers will contact the caliper jaws when the maximum gage block set up is placed on the carbide rolls.
8. Place the Maximum gage block set up on the carbide rolls with the caliper jaws positioned over the contacts on the gaging fingers.
9. Tap the gage block set up to align the finger contacts and the calipers jaws and observe the bargraph display. The correct alignment will occur when the display is at its most minus reading. This indicates the set up is perpendicular to the gage contacts, therefore measuring the actual set up size.
10. Utilizing the "ZERO A" knob on the Trendsetter E8032 module, set the reading on the display to the recorded deviation from Step 5. Remove the set up. The taper comparator is now calibrated to measure the maximum diameter. To check the calibration, place the gage block set up back onto the gage and align as in step 8. The bargraph display should read "0" as the most minus reading.
11. Remove the two gage block stacks used in step 7 and place two gage block stacks equal to the distance between the calibration points on the work table. Place the work piece over the gage fingers with the datum surface of the work piece on the carbide rolls.

12. Align the work piece in the same manner as the gage block set up. The most minus reading obtained is the deviation of the work piece from the size of the gage block set up. Record the deviation of the maximum diameter.
13. Remove the work piece from the carbide rolls. Remove the .100" carbide rolls.
14. Remove the gage block stacks from the table anvil.
15. Place the two gage block stacks from check 7 on the work table and place the two .100" diameter carbide rolls on the gage block stacks.
16. Rotate the size actuator knob counter-clockwise to collapse the fingers to fit the minimum diameter.
17. Place the minimum gage block set up for the minimum diameter to be measured over the contact fingers. Continue rotating the size actuator knob until the Trendsetter bargraph displays as close to "0" as possible.
18. Tap the gage block set up to align the finger contacts and the calipers jaws and observe the bargraph display. The correct alignment will occur when the display is at its most minus reading. This indicates the set up is perpendicular to the gage contacts, therefore measuring the actual set up size.
19. Utilizing the "ZERO A" knob on the Trendsetter E8032 module, set the reading on the display to the recorded deviation from Step 6. Remove the set up. The taper comparator is now calibrated to measure the maximum diameter. To check the calibration, place the gage block set up back onto the gage and align as in step 19. The bargraph display should read "0" as the most minus reading.
20. Remove the gage block stacks and place the .100" diameter carbide rolls on the work table. Place the work piece over the gage fingers with the datum surface of the work piece on the carbide rolls.
21. Align the work piece in the same manner as the gage block set up. The most minus reading obtained is the deviation of the work piece from the size of the gage block set up. Record the deviation of the maximum diameter.



**Figure 13 – Internal Tapers**

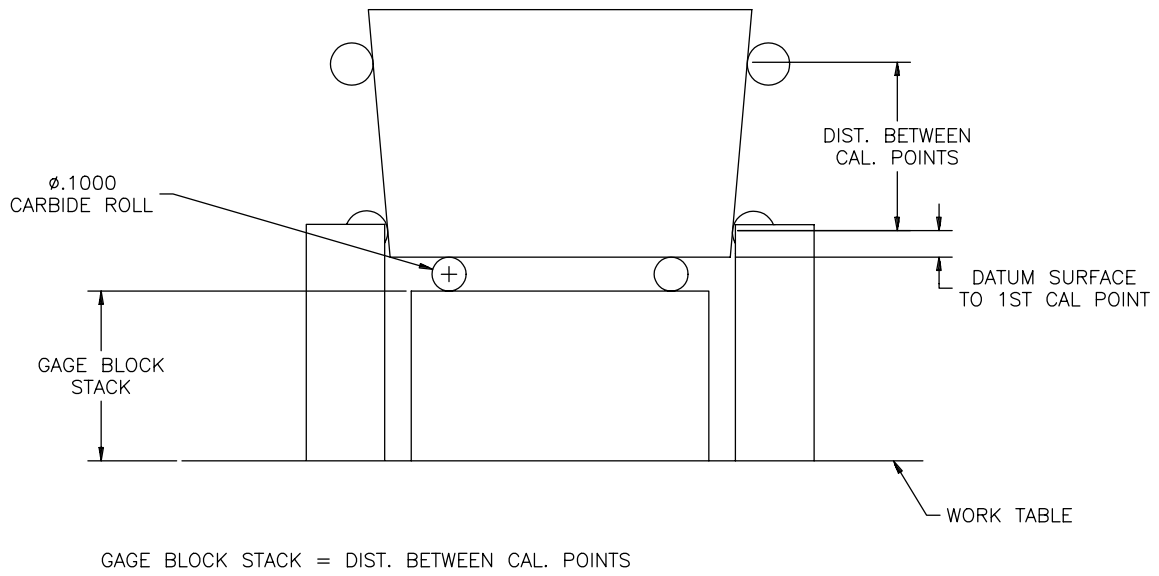


## 7.2 External Tapers

1. Select the proper set of gaging fingers for the diameter size being measured and install per the installation instructions in section 6.2 making sure the contacts are facing inward.
2. Set the correct finger pressure per section 6.1.
3. Set up the height fixture per section 6.3.
4. Set the correct finger height per section 6.4. After the finger height has been set, select channel "A" on the Trendsetter E8032 module.
5. Prepare a gage block set up for the **Maximum** gage diameter. Total the deviation (+ or -) of the individual gage blocks and record the reading.
6. Prepare a gage block set up for the **Minimum** gage diameter. Total the deviation (+ or -) of the individual gage blocks and record the reading.
7. Place two gage block stacks on the work table anvil and place two .100" diameter carbide rolls on the top surface of the gage block stacks. The height of the gage block stacks and the rolls must be setup so that the gage fingers will contact the caliper jaws when the maximum gage block set up is placed on the carbide rolls.
8. Place the Maximum gage block set up on the carbide rolls with the caliper jaws positioned over the contacts on the gaging fingers.
9. Tap the gage block set up to align the finger contacts and the calipers jaws and observe the bargraph display. The correct alignment will occur when the display is at its most minus reading. This indicates the set up is perpendicular to the gage contacts, therefore measuring the actual set up size.
10. Utilizing the "ZERO A" knob on the Trendsetter E8032 module, set the reading on the display to the recorded deviation from Step 5. Remove the set up. The taper comparator is now calibrated to measure the maximum diameter. To check the calibration, place the gage block set up back onto the gage and align as in step 8. The bargraph display should read "0" as the most minus reading.
11. Remove the two gage block stacks used in step 7 and place two gage block stacks equal to the distance between the calibration points on the work table. Place the work piece over the gage fingers with the datum surface of the work piece on the carbide rolls.



12. Align the work piece in the same manner as the gage block set up. The most maximum reading obtained is the deviation of the work piece from the size of the gage block set up. Record the deviation of the maximum diameter.
13. Remove the work piece from the carbide rolls. Remove the .100" carbide rolls.
14. Remove the two gage block stacks from the work table anvil.
15. Place the two gage block stacks from check 7 on the work table and place the two .100" diameter carbide rolls on the gage block stacks.
16. Rotate the size actuator knob counter-clockwise to collapse the fingers to fit the minimum diameter.
17. Place the gage block set up for the minimum diameter to be measured over the contact fingers. Continue rotating the size actuator knob until the Trendsetter bargraph displays as close to "0" as possible.
18. Tap the gage block set up to align the finger contacts and the calipers jaws and observe the bargraph display. The correct alignment will occur when the display is at its most maximum reading. This indicates the set up is perpendicular to the gage contacts, therefore measuring the actual set up size.
19. Utilizing the "ZERO A" knob on the Trendsetter E8032 module, set the reading on the display to the recorded deviation from Step 6. Remove the set up. The taper comparator is now calibrated to measure the maximum diameter.
20. Remove the gage block stacks and place the .100" diameter carbide rolls on the work table. Place the work piece over the gage fingers with the datum surface of the work piece on the carbide rolls.
21. Align the work piece in the same manner as the gage block set up. The most minus reading obtained is the deviation of the work piece from the size of the gage block set up. Record the deviation of the maximum diameter.



**Figure 14 –External Tapers**

## 8.0 MAINTENANCE

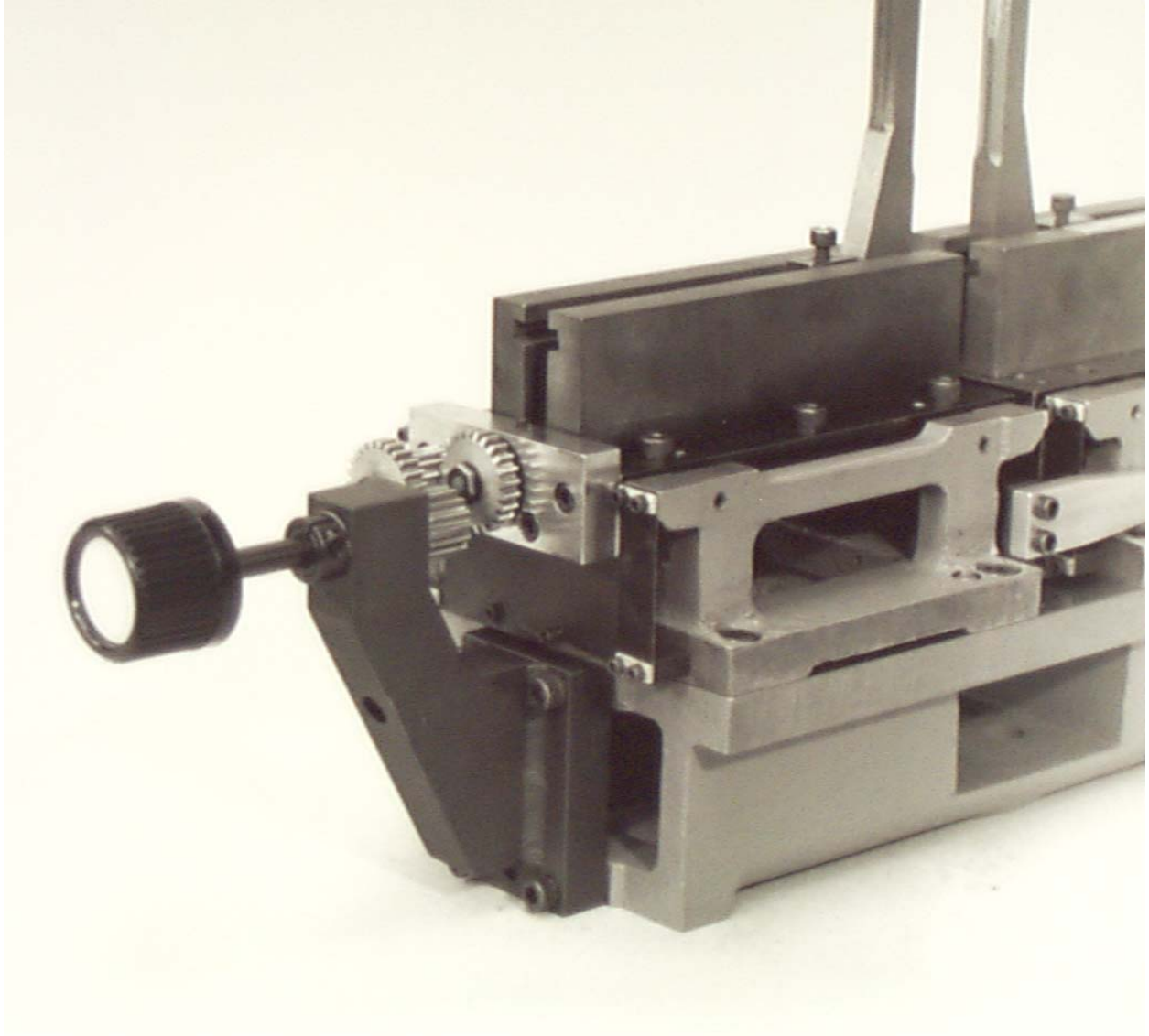
Due to the high accuracy and extreme sensitivity of the comparator, gaging pressure and magnification have a direct relationship to each other especially in the smaller gaging ranges.

After long periods of comparator use, or if the gage head has been replaced, it may become necessary to readjust the pre-travel and overtravel screws and the gage head core, all of which have a direct bearing on the comparator magnification.

NOTE: It will be necessary to remove the table to gain access to all adjustments. Removal of the front plate will also facilitate adjustment of the finger assemblies.

### 8.1 Pre-travel Over-travel Screw Adjustments

1. Set the Trendsetter range to the .002" range.
2. Disconnect the two gaging pressure springs.
3. Tighten two opposing guide screws on the left-hand finger assembly so that the assembly cannot move. Allow the gage head to "settle". It should read approximately "0".
4. By hand, move the right-hand finger assembly to the right and hold it against the stop.
5. Adjust the pre-travel screw for the right-hand finger assembly until the display reads plus (+).0007".
6. By hand, move the right-hand finger assembly to the left and hold it against the stop.
7. Adjust the over-travel screw for the right-hand finger assembly until the display reads minus (-) .0007".
8. Release the right-hand finger assembly and allow it to settle.
9. Release the two opposing guide screws on the left-hand finger assembly.
10. Repeat steps 2-8 for the left-hand finger assembly.
11. Reconnect the two gaging pressure springs.
12. Set the gaging pressure as described in Section 6.1.



**Figure 15 - Pre-Travel/Overtravel Screws**

## 9.0 TROUBLESHOOTING

### 9.1 Symptoms and Causes

<u>Symptom</u>	<u>Cause</u>
Non-repeatability of Comparator Reading.	Gaging pressure too light.
	Bent reed in finger assembly.
	Gaging ball slide gummed up with a foreign substance.
	Broken/disconnected gaging pressure spring.
Non-linearity of Scale	Trendsetter Magnification not properly calibrated.
Gaging Fingers will not raise.	Broken counterweight spring(s).
	Column lock engaged.