



Setup & Operating INSTRUCTIONS

for

SUNNEN® AG-300 PRECISION GAGE

(FOR PIN FITTING AND ROD RECONDITIONING)

AG-300 Precision Bore Gage

Range: .375 to 2.687 in.

Graduation of Dial: .0001 in.

Scale Range on Dial: .005 in.

Magnification: 550:1

AG-140 & AG-140L Midget Point Set

Range: .375 to .750 in.

AG-340 Extra Large Point Set

Range: 2.625 to 3.375 in.

"SUNNEN AND THE SUNNEN LOGO ARE REGISTERED TRADEMARKS OF SUNNEN PRODUCTS COMPANY."

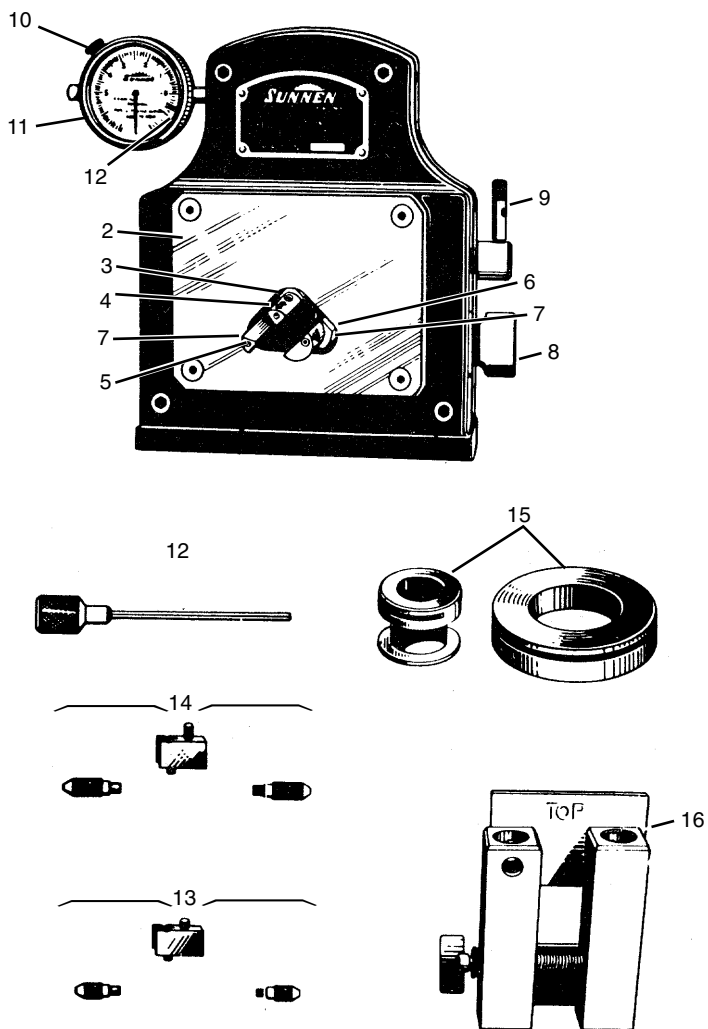


FIGURE 1

GENERAL

Sunnen AG-300 Precision Gage is a transfer or comparator type gage. Any desired diameter within the range can be transferred to gage. The gage indicator dial then reads in tenths of a thousandth of an inch over or under desired diameter.

This Precision Gage takes all guesswork out of pin fits. It measures finished hole to within a tenth, and therefore is suitable for both clearance fits and press-fit type pin fits. It is excellent also for use in rod reconditioning and other work where accurate gaging is required. This gage is accurate to within a tenth throughout its range.

The Gage as shipped has three diameter ranges with a total of .720 to 2¹¹/₁₆ in. Gage is shipped with standard range points installed. Two sets of extension points are furnished, for medium and large ranges. A Midget Range set and an Extra Large Range extension point set are available on separate order.

NOTE: Standard range points should not be removed when using extension points.

| | |
|-------------------|----------------------------------|
| MIDGET RANGE | .375 - .750 in. (9,5 - 19 mm) |
| STANDARD RANGE* | .720 - 1.530 in. (18,0 - 39 mm) |
| MEDIUM RANGE* | 1.500 - 2.250 in. (38,0 - 57 mm) |
| LARGE RANGE* | 1.932 - 2.687 in. (49,0 - 68 mm) |
| EXTRA LARGE RANGE | 2.625 - 3.375 in. (67,0 - 86 mm) |

**Included with Gage*

For best results use each point set only for range intended.

For location of gage feature refer to following (see Figure 1):

1. Dial Indicator- Reads directly in tenths of thousandths of an inch. Numbers indicate thousandths.
2. Gage Face Plate- Accurately ground and polished.
3. Centralizer Finger- Properly positions hole to be measured.
4. Standard Range Centralizer Point- Contacts top of hole.
5. Size Indicating Finger- Transfers hole size to indicator dial.
6. Adjustable Gaging Finger- Adjusts for transferring desired hole size to gage.
7. Standard Range Gaging Points- Contact hole surface for measuring diameter.
8. Adjusting Knob- Positions adjustable gaging finger for transferring desired hole size to gage.
9. Locking Lever - Locks gage size adjustment.
10. Dial Clamp - Locks dial indicator face in position.
11. Adjustable Limit Marker- Set to indicate finished hole size tolerance.

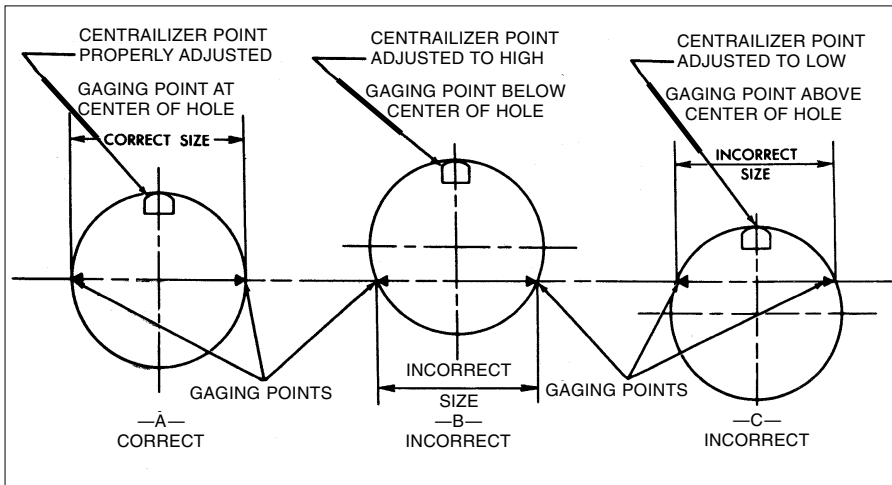


FIGURE 2

CALIBRATION OF GAGE

NOTE: Centralizer point must be checked and adjusted as explained below before gage is put into use.

When measuring diameter of any hole gaging points must be located on centerline of hole to obtain its true diameter (see Figure 2). The gage is equipped with a centralizer finger and point which positions hole being gaged so that gaging points are always on center line of hole.

Centralizer point is adjustable for accurate calibration and to compensate for wear of points. A calibrator ring is provided for accurately adjusting centralizer point.

To calibrate standard centralizer point

1. Clean centralizer finger, centralizer point, gaging fingers, face of gage and calibrator ring care fully.
2. Release size adjusting mechanism by turning locking lever counter-clockwise until lever is loose.
3. Turn adjusting knob to adjust gaging fingers to approximately $7/8$ in. across points.
4. Place calibrator ring flat against face plate on gage as shown with wrench slot at bottom and directly under centralizer point (see Figure 3).
5. While holding calibrator ring lightly against face of gage, expand gaging fingers by turning adjusting knob counterclockwise until dial indicator hand reaches approximately 3 o' c lock position.

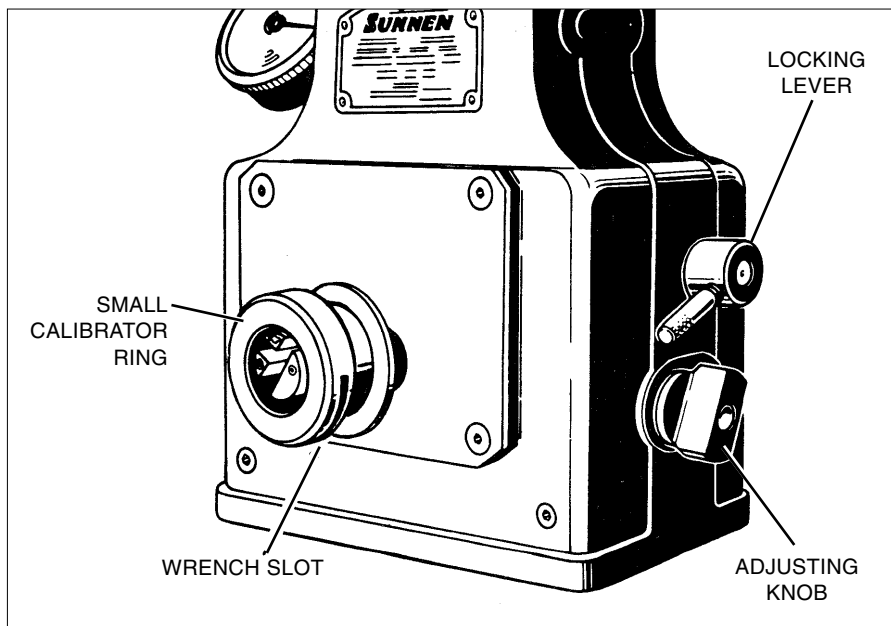


FIGURE 3

6. Insert Allen wrench through slot in bottom of calibrator ring, and into hex socket in bottom of threaded centralizer point. While applying a very light downward finger pressure to top of calibrator ring and side pressure to adjustable finger, screw centralizer point up or down to obtain maximum clockwise position of indicator hand.

NOTE: Under normal conditions this adjustment will not require more than one full turn in either direction from factory setting.

CAUTION

Do not push upward with wrench.

7. Gage is now ready for use.

SETTING GAGE

For measuring bore diameters from .720 to 1.530 in.

For piston pin fitting in pistons and rods, two pins from set being fitted are used with setting fixture to enable you to set gage to pin size. Adjustable Limit Marker can then be used to read desired pin clearance or interference.

Only first quality pins should be used, to assure uniformity of size and absence of burrs or "build up" on ends.

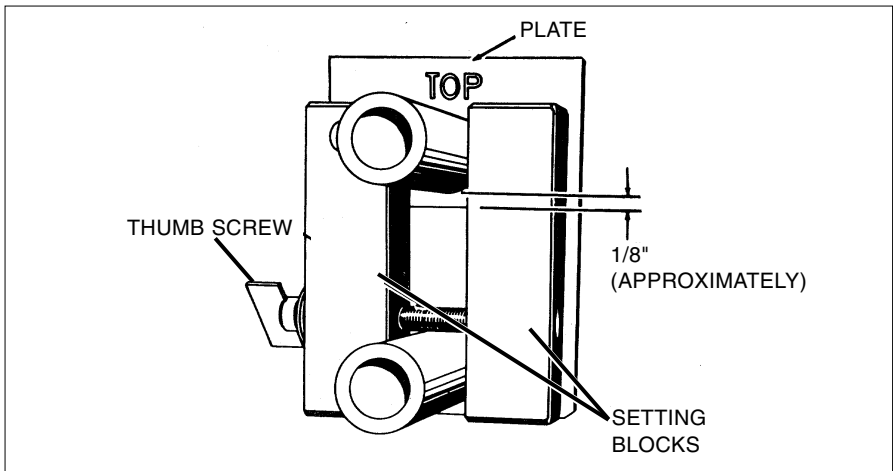


FIGURE 4

Assembling piston pins in setting fixture

1. Clean blocks and pins (see Figure 4).
2. Insert one pin between setting blocks with end of pin against plate of setting fixture and side of pin against clamp screw.
3. Insert second pin between setting blocks parallel to first pin, with end of pin against plate and with side of pin approximately 1/8 in. from side of opening in plate of setting fixture.
4. Tighten thumb screw firmly using finger pressure only. Do not use pliers or wrench.
5. Then back off thumb screw 1/8 to 1/4 turn. procedure eliminates possibility of distortion in setting blocks or piston pins.

Adjusting gage to read pin size

1. Unlock gage adjusting mechanism by turning locking lever counter-clockwise until lever is loose.
2. Retract gaging finger by turning adjusting knob clockwise, until points in gaging fingers will go between setting blocks.
3. With pins assembled in setting fixture, place on gage with "TOP" up (thumb screw handle on left), and only brass wear buttons against face of gage. Allow setting fixture to rest on centralizer arm straight up and down (see Figure 5).

IMPORTANT

If gaging fingers are bumped or jarred in set-up or gaging operation, be sure to check gage with setting fixture and with calibrator ring if necessary.

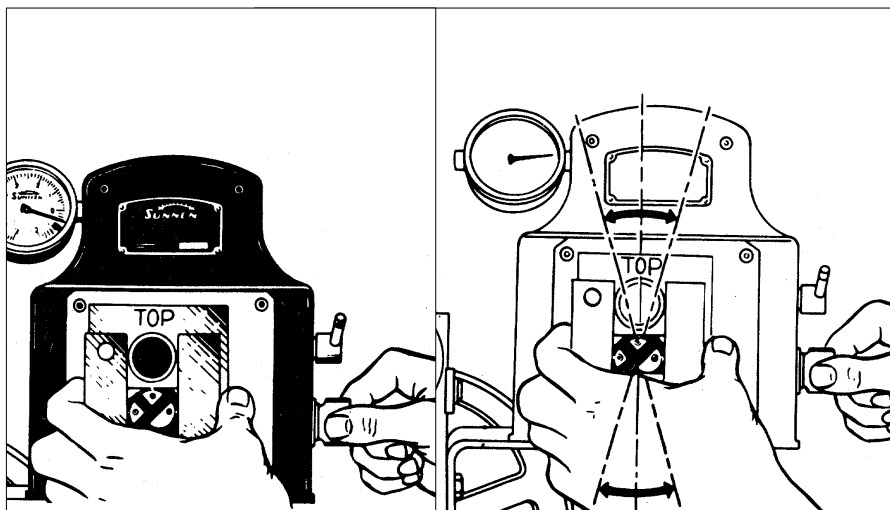


FIGURE 5

FIGURE 6

4. Expand gaging fingers by turning adjusting knob counterclockwise until gaging points just contact setting blocks, as indicated by a slight movement of dial indicator hand.

NOTE: Keep a very light pressure to left, to prevent moving sensitive gaging finger accidentally.

While rocking setting fixture slightly clockwise and then counterclockwise, further expand gaging points until maximum counter clockwise swing of indicator hand reaches approximately 3 o'clock position (see Figure 6).

5. Release adjusting knob tension by reversing rotation approximately 1/2 turn until knob is free. This prevents "creep" during gaging. Lock gage adjusting mechanism by rotating locking lever clockwise until finger tight. indicator hand may move slightly when gage adjustment is locked but this movement will not affect accuracy of gage.

6. Again rock setting fixture as described above and when minimum indicator reading (maximum counter-clockwise movement of indicator hand) is determined, loosen dial clamp and rotate indicator dial face to set "0" under indicator hand. Lock dial clamp. minimum indicator reading obtained by rocking setting fixture represents pin size.

Setting gage to desired pin clearance or interference

Rotate front bezel of indicator to set adjustable limit marker to maximum allowable pin clearance or interference. (Refer to Sunnen Pin-Fitting Chart.)

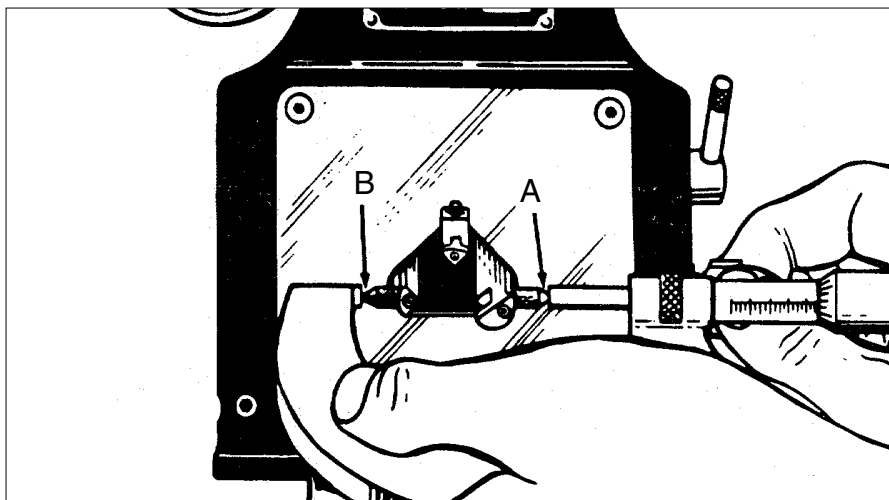


FIGURE 7

Example: If piston and pin are to be fitted with a clearance of 3 to 5 tenths, first, place pins in setting fixture. Then rock fixture on gage to obtain minimum indicator reading. Next, rotate dial face until "0" lines up with indicator hand at minimum indicator reading. Zero now indicates pin size. Lock dial clamp. Set limit marker (by rotating outer dial bezel) to 5 tenths in clearance (green) area of indicator dial. Hone piston pin hole until indicator hand stops in clearance (green) area between 3 tenths and limit marker. Piston and pin will now have desired clearance.

NOTE: A micrometer can be used to set gage for large pins, or when only one pin is available (see Figure 7).

USING EXTENSION POINTS

For measuring hole diameters from $1\frac{1}{2}$ to $2\frac{11}{16}$ in.

For measuring hole diameters from $1\frac{1}{2}$ to $2\frac{1}{4}$ in. use medium range extension points, and for diameters from $1\frac{15}{16}$ to $2\frac{11}{16}$ in. use large range extension points (see Figure 8).

NOTE: Always use silver colored extension point with silver colored gaging finger. These are colored for your convenience and will assure identical assembly of extension points each time they are used.

Install medium or large range extension points

CAUTION

Do not remove standard range gaging points.

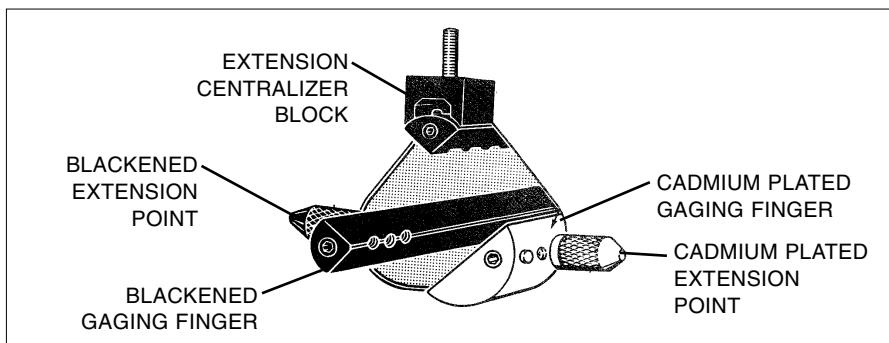


FIGURE 8

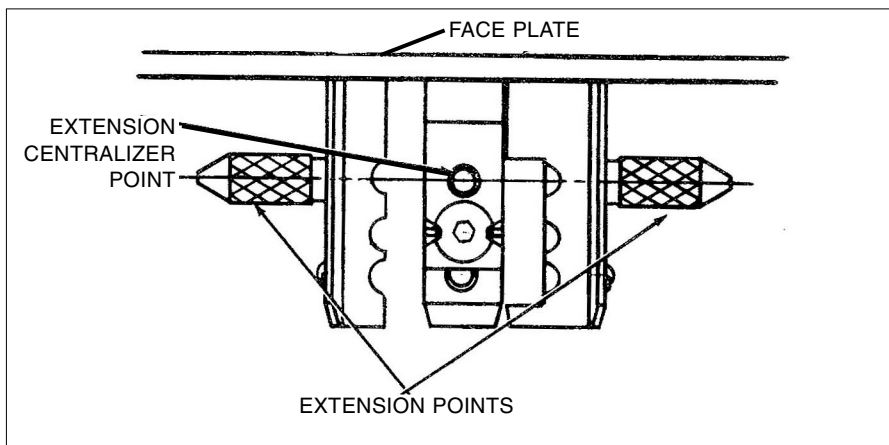


FIGURE 9

1. Clean gaging fingers and centralizer finger carefully. Make sure tapped holes and counter bored seats located behind standard range gaging points are clean.
2. Clean threads and seats of gaging points care fully; and screw into rear tapped holes in gaging fingers until finger tight (see Figure 9). Assemble proper centralizer block to centralizer arm - - captive screw goes in center threaded hole. To identify proper centralizer block (refer to Figure 8).
3. Extension centralizer point must now be calibrated before using gage.

Calibrate medium or large range extension points

Use large calibrator ring. Set gaging points to approximately $\frac{1}{8}$ in. less than ring diameter, and follow same calibrating procedure used for standard centralizer points.

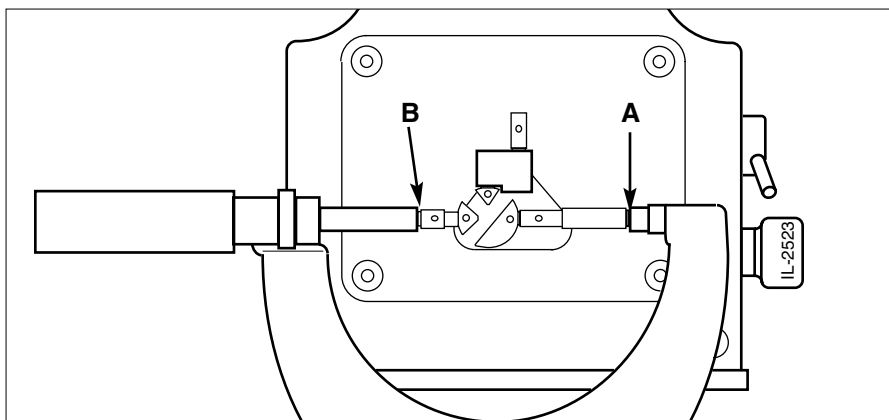


FIGURE 10

CAUTION

Always be sure calibrator ring is flat against face plate. If proper side is out, wrench slot will be directly under centralizer point being calibrated.

Adjusting gage for known size

When using extension points on Gage, setting fixture cannot be used to transfer a size to gage because its range stops at 1 1/2 in. Several methods may be used to transfer a given size to Gage.

1. A micrometer may be used as follows (see Figure 10):

Lock micrometer at desired size. Hold one anvil of micrometer against extension point "A" and expand gage until extension gaging point "B" just contacts other anvil of micrometer. Hold micrometer steady against extension point "A," slowly move second anvil of micrometer across extension point "B" in all directions, and expand gage further until minimum indicator reading (maximum counter-clockwise movement of indicator hand) reaches approximately 3 o'clock position.

Hold micrometer in position and lock gage by turning locking lever clockwise until finger tight. Indicator hand may move slightly while locking adjustment, but this will not affect accuracy of gage.

Unlock dial clamp and rotate dial to set zero to minimum indicator reading (maximum counterclockwise movement of hand). Indicator will now read directly in tenths of thousandths over and under size set on micrometer.

2. Standard gage blocks, ring gages, and parts with holes of known size may also be used to transfer a given size to Gage.

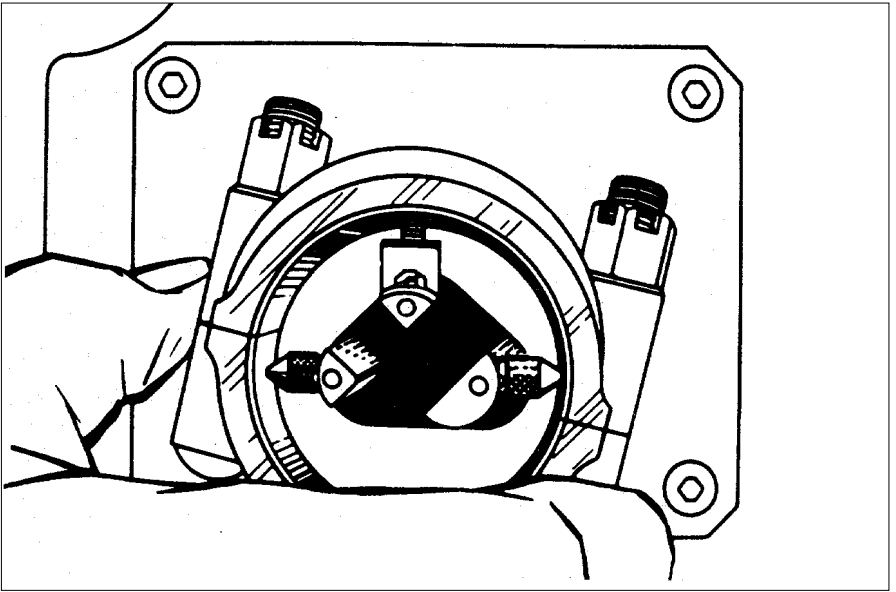


FIGURE 11

Gaging bores from $1\frac{1}{2}$ to $2\frac{11}{16}$ in.

(Journal end of con-rods)

After gage has been adjusted to a known size, place hole to be gaged on gaging points and hold rod flat against face plate of gage. Allow part being gaged to rest on centralizer point.

When measuring large ends of connecting rods, measure hole in one direction, then rotate rod approximately $\frac{1}{4}$ turn to take a second reading across hole (see Figure 11). Be careful that gaging points or centralizer point do not enter any oil holes in grooves.

"SUNNEN AND THE SUNNEN LOGO ARE REGISTERED TRADEMARKS OF SUNNEN PRODUCTS COMPANY."

Sunnan® reserves the right to change or revise specifications and product design in connection with any feature of our products contained herein. Such changes do not entitle the buyer to corresponding changes, improvements, additions, or replacements for equipment, supplies or accessories previously sold. Information contained herein is considered to be accurate based on available information at the time of printing. Should any discrepancy of information arise, Sunnen recommends that user verify the discrepancy with Sunnen before proceeding.



SUNNEN PRODUCTS COMPANY
7910 Manchester Ave., St. Louis, MO 63143 U.S.A.
Phone: 314-781-2100 Fax: 314-781-2268
U.S.A. Toll-Free Sales and Service -
Automotive: 1-800-772-2878 • Industrial: 1-800-325-3670
International Division Fax: 314-781-6128

<http://www.sunnen.com>
e-mail: sunnen@sunnen.com

SUNNEN PRODUCTS LIMITED

No. 1 Centro, Maxted Road
Hemel Hempstead, Herts HP2 7EF ENGLAND
Phone: ++ 44 1442 39 39 39 Fax: ++ 44 1442 39 12 12

SUNNEN AG

Fabrikstrasse 1
8586 Ennetach-Erlen, Switzerland
Phone: ++ 41 71 648 16 16 Fax: ++ 41 71 648 31 31

SHANGHAI SUNNEN MECHANICAL CO., LTD.

889 Kang Qiao East Road, PuDong
Shanghai 201319, P.R. China
Phone: 86 21 5 813 3322 Fax: 86 21 5 813 2299

SUNNEN ITALIA S.R.L.

Viale Stelvio 12/15
20021 Ospiate di Bollate (MI) Italy
Phone: 39 02 383 417 44 Fax: 39 02 383 417 50