

**SERVICE BULLETIN NUMBER 2**

**GEAR SETTING AND ADJUSTMENT**

The importance of setting the gears correctly cannot be overemphasized if the maximum performance is desired. To obtain quiet operation and long life, the gears must be mounted so that they will have proper backlash and tooth marking. **NEVER OPERATE WITHOUT SUFFICIENT BACKLASH, AS THIS WILL PREVENT ADEQUATE LUBRICATION OF THE GEAR TEETH, AND RESULT IN DESTRUCTION.**

The gears are etched with the gear set number, mounting distance, and required backlash. SEE FIGURE 2. The gear set number can be disregarded, as it bears no relation to the serial number of the gear drive.

**(A) MOUNTING DISTANCE OBTAINED BY SHIMS**

The gears are adjusted to the correct settings by means of shims (PART 47 AND 75 ). When mounting distance on new gear is greater than mounting distance of old gear, add shims to a corresponding thickness.

<b>EXAMPLE:</b>	<b>M.D. New Gear</b>	<b>6.500"</b>
	<b>M.D. Old Gear</b>	<b>6.490"</b>
	<b>Difference</b>	<b>.010"</b>

Add shims of .010" total thickness to original shim pack between main housing (46) and horizontal housing (28) or thrust bearing cage (19).

When mounting distance on new gear is less than mounting distance of old gear, decrease the thickness of the existing shim pack by a corresponding amount.

<b>EXAMPLE:</b>	<b>M.D. New Gear</b>	<b>6.500"</b>
	<b>M.D. Old Gear</b>	<b>6.510"</b>
	<b>Difference</b>	<b>.010"</b>

Reduce thickness on original shim pack between main housing (46) and horizontal housing (28) or thrust bearing cage (19) by removing a .010" shim.

**CAUTION:** Original shims should be replaced if they are damaged. Also, on older units, paper gasket was used in lieu of shims, part number (47) and (75). Shim pack part number (20) and (40) was used on these units and must be replaced before following the above instructions.

**(B) BACKLASH DETERMINATION**

After the drive is reassembled, the gears should be checked for backlash, which should agree with that marked on the gears. Depending on available tools, this check can be accomplished by two methods as illustrated in FIGURE 1.

1. Place an indicator at the extreme diameter of the gear teeth and rotate the shaft back and forth while holding the other shaft stationary by means of a clamp. The indicated backlash should agree within -.000 and +.005 of that shown on the gears.
2. A feeler may be inserted between two mate teeth at the pitch line to determine the width of space should an indicator not be available.

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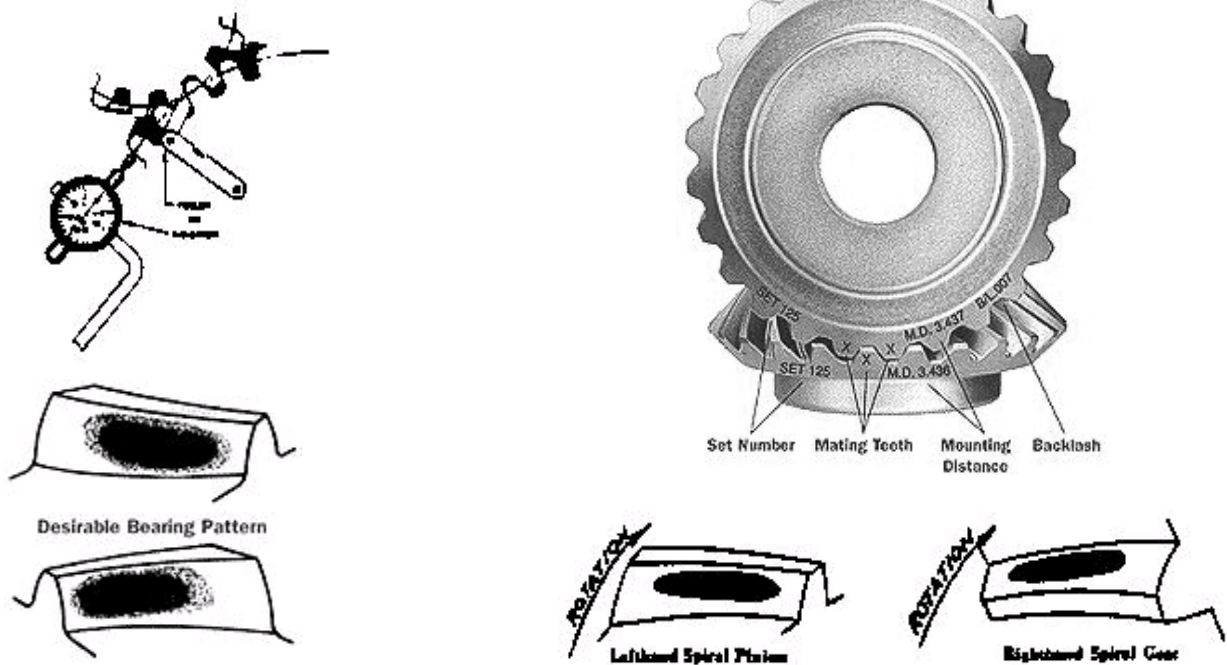
### (C) CHECKING THE TOOTH CONTACT

Spiral bevel gears used in Johnson Right Angle Gear Drives are furnished only in pairs, each standard pair consisting of a right-hand gear and a left-hand pinion. (The pinion is the smaller of the two gears, except in 1:1 ratio when both gears are the same size.) The hand refers to the direction of the spiral tooth form and can be compared to a right or left-hand screw. The ideal tooth contact of the gears shows slightly high on the left-hand spiral pinion and low on the right-hand spiral gear. The tooth bearing should be approximately three quarters of the tooth length, and be nearest to the small end of the tooth.

1. Note the tooth bearing shown on gears, as evidence by polish if previously used, or lap marks if the gear set is new. Contact should show as per FIGURE 3 and 4, and should be duplicated in the assembled drive.
2. Paint several teeth of the right-hand spiral gear teeth with mixture of red lead powder and a few drops of oil, and then rotate the drive shaft several times in both directions while holding the other shaft tightly. Keep the red lead too liquid from becoming too dry, which will prevent true markings. This technique will mark the left-hand spiral pinion with red and also give evidence of tooth contact on the right-hand spiral gear. Conditions should appear as per FIGURE 3 and 4.
3. When the backlash and tooth marking as determined above are both correct, no further adjustments will be required. When these conditions are incorrect, adjustments must be made following the procedure as described under tooth contact adjustments.

After a suitable tooth bearing has been obtained, the backlash should be rechecked as per FIGURE 1. Should the amount of the backlash be unsatisfactory, it will be necessary to correct the position of both right-hand spiral gear and left-hand spiral pinion by proportionate amounts. Move the gears outward from the cone center to increase and inward to decrease the backlash. The amount of relative movement depends on the number of teeth or ratio of the gears. I.E. With a 1:2 ratio, the right-hand spiral gear would need to be moved twice as far as the left-hand spiral pinion. Do not make adjustments in excess of .005 at any one trial.

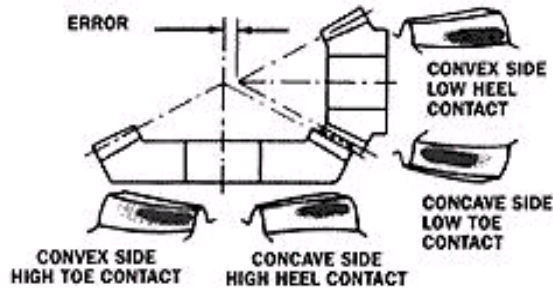
Re-check the tooth bearing before completing assembly of drive. Occasionally several adjustments are required before a desirable tooth bearing is obtained.



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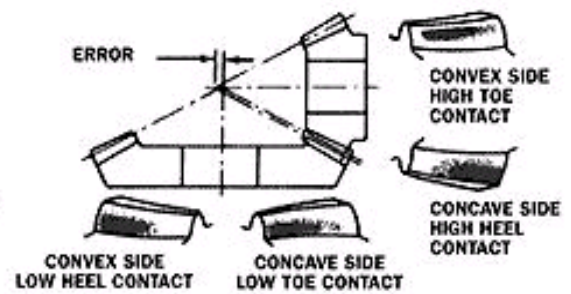
## PROFILE ERROR

To correct: decrease mounting distance



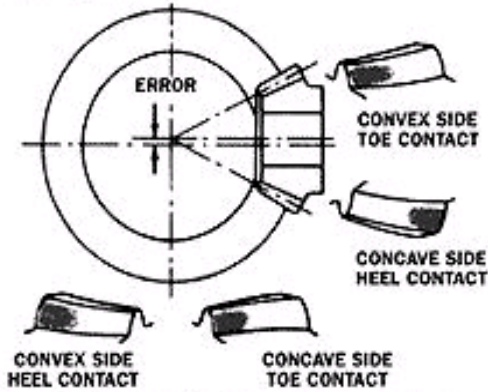
## PROFILE ERROR

To correct: increase mounting distance



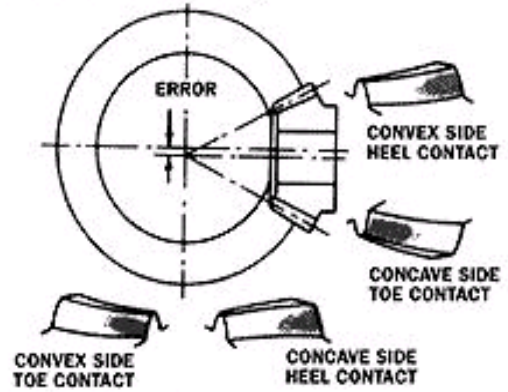
## CROSS CONTACT

To correct: move pinion down



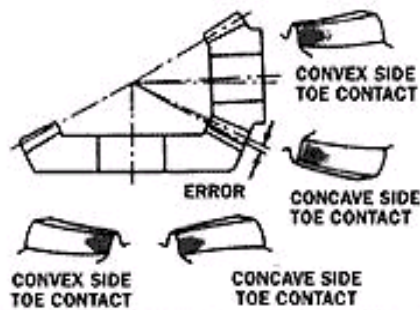
## CROSS CONTACT

To correct: move pinion up



## SHAFT ANGLE ERROR

To correct: decrease shaft angle



## SHAFT ANGLE ERROR

To correct: increase shaft angle

