

Subject: Premium Quality Oil Seals**No.:** 20 (Rev. 1)**Models:** All**Date:** July, 1983**Effective Date:** March 1983**Description of Changes(s):**

Eaton has introduced new high performance oil seals for input, output, and drive pinion shafts on all axle models. These new seals have virtually eliminated oil seal leakage in test fleets, and commercial carrier vehicles across North America.

Several seal designs made of various materials were studied and tested in Eaton's engineering laboratory and on the road. From these tests, Eaton selected a set of premium quality oil seals to be used as standard equipment on all production axles. The seal lip is pre-greased on both production units and service parts.

The new seals for class 8 axles have a unique dust lip that is very effective in keeping dirt out. These seals are made of a Viton® material that is tougher and more durable than other seal materials.

Viton® maintains excellent sealing performance over a very broad range of temperatures and will not deteriorate under extreme operating temperatures caused by friction. Viton® also has a superior resistance to breakdown or swell when exposed to harsh oil additives.

Medium duty, class 6 and 7 axles were the subject of a separate test program that also resulted in new premium quality oil seals. These medium duty seals have many of the same improvements as the new class 8 seals and are made of polyacrylic material.

During testing, Eaton found that improper installation practices are a major contributing factor to seal leakage. If a seal gets cocked, bent, or cut during installation, it will leak.

Proper Seal Installation

- Check the seal for any cuts or damage.
- Check the bore and shaft. Remove any burrs, nicks, or grooves to obtain a smooth surface.
- The best tools to use when installing a seal are a seal driver, an arbor press, or a hydraulic press. These tools will apply uniform pressure against the seal.

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**Insist on Eaton Quality.
Use Genuine Eaton Replacement Parts.**

- Next best is a round tool such as a bearing cup that is approximately the same diameter as the seal case.
- Seals which are to be flush with the outside of the housing can be pressed in with a block of wood.
- Never strike a seal directly with a hammer.
- Use a soft-faced hammer or mallet to avoid dislodging the garter spring.
- A direct blow on one side of the seal distorts the case and can cause the lip to be pressed against the shaft.
- Whatever tool is used, the seating force must be spread out around the entire circumference.

! CAUTION: SEAL DAMAGE MAY RESULT THROUGH IMPROPER YOKE INSTALLATION TECHNIQUE ON AXLES WITH LOOSE-FIT PINION BEARINGS. ON THESE UNITS, IT IS EXTREMELY IMPORTANT TO ENSURE THAT THE YOKE IS CAREFULLY INSERTED WITH THE CHAMFER WELL PAST THE SEAL LIPS BEFORE ANY FORCE OR "BUMPING" IS APPLIED. NUT CAN THEN BE TIGHTENED ONCE THE SEALING SURFACE OF THE YOKE IS IN CONTACT WITH THE SEAL LIP.

The new seals are directly interchangeable with original design seals. The original seals will no longer be available and their part numbers are being superseded. The new seals will be available on a service basis at the same time as the production seals. Eaton will be the exclusive aftermarket source for the new seals.

<u>AXLE MODEL</u>	<u>APPLICATION</u>	<u>ORIGINAL PART NUMBER</u>	<u>NEW PART NUMBER</u>	<u>AVAILABILITY</u>
D341,381,401 D340,380,400	Input Shaft	64656	119429	March 1983
D341,381,401 D340,380,400 30,34,38,42D	Output Shaft	63910	119431	March 1983
30,34,38,42D	Input Shaft	63910	119431	March 1983
R341,381,401 R340,380,400 34,38,42R	Pinion Shaft	79470	119427	March 1983
D440,480,580,650,44D	Input Shaft	78857	119430	April 1983
D440,480,580,650,44D	Output Shaft	64656	119429	March 1983
R440,480,580,650,44R	Pinion Shaft	90623	119432	April 1983
19,23,26,35 Series	Pinion Shaft	90623	119432	April 1983
17,18,22 Series	Pinion Shaft	79470	119427	March 1983
16244	Pinion Shaft	79470	119427	June 1983
16120,16220,16320,30R	Pinion Shaft	81673	119459	June 1983
13,15 Series	Pinion Shaft	81480	119458	June 1983

Subject: RING GEAR AND PINION TOOTH CONTACT PATTERNS

Number: 87-102

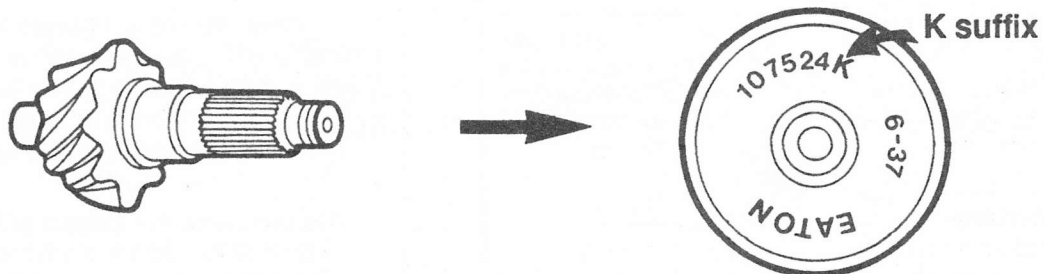
Models: ALL EATON DRIVE AXLES

Date: MARCH 1987

Eaton Drive Axles require adjustment of ring gear and pinion tooth contact at overhaul or any time the axle has been disassembled. Most Eaton Axles require the same distinctive pattern, described in our service publications, which we will refer to as our "standard" tooth contact pattern.

Our first axles with hypoid-type gearing, the E2300, 23105 and 30105 models, require a tooth contact pattern different from our standard pattern. This is due to the manufacturing process used to cut the gear teeth and is not a result of the hypoid gearing as is often assumed. This unique pattern will soon be required by several axle models that have previously required our "standard" pattern. Affected models will be identified by the addition of a letter "K" suffix on the pinion part number (see illustration below). The unique contact pattern required will be referred to as the "K Pattern."

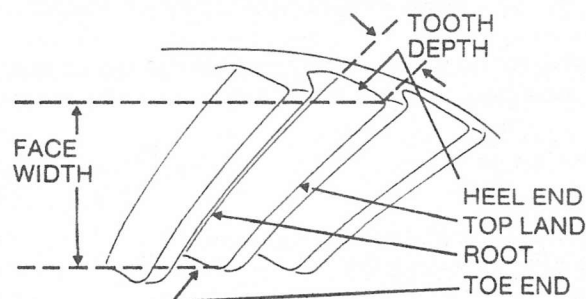
The Standard Pattern is used on all Eaton Drive Axles except those requiring the K Pattern. The K Pattern is used on all axles with a K suffix on the pinion part number and models E2300, 23105, and 30105, with or without a K. Illustrations of these two contact patterns appear on the following pages.



For more complete instructions on contact pattern adjustment refer to the appropriate service manual for the axle being serviced.

After differential bearing preload and gear backlash adjustments are complete, check gear tooth contact pattern and adjust if necessary. Tooth contact patterns are a function of the relative positions of the ring gear and pinion. An improper pattern will require relocation of either or both. Always adjust pinion position first, if necessary, then ring gear position. Recheck backlash when done.

Refer to this illustration for proper ring gear tooth nomenclature.



K Pattern

For Eaton Axles with "K" suffix on pinion part number and all Eaton E2300, 23105 and 30105 axles (with or without "K" identification).

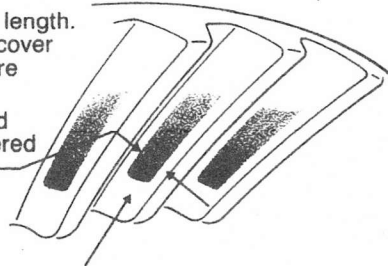
Correct Pattern

Note: Before adjusting ring gear position in the following procedures, loosen the thrust screw locknut and back off the thrust screw to allow ring gear movement.

New Gearing

Paint ring gear teeth with marking compound and roll the gear to obtain a contact pattern. The correct pattern is well-centered on the ring gear tooth with lengthwise contact up off the toe. The length of the pattern in an unloaded condition is approximately one-half to two-thirds of the ring gear tooth in most models and ratios.

- Could vary in length. Pattern should cover 1/2 tooth or more (face width).
- Pattern should be evenly centered between tooth top land and root.



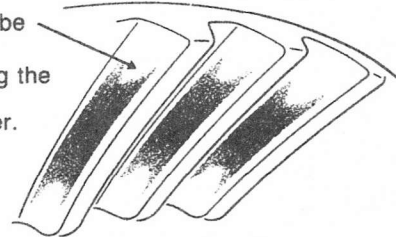
- Pattern should be up off of the tooth toe.

Used Gearing

Used gearing may not display the square, even contact pattern found in new gear sets. The gear will normally have a "pocket" at the end of the gear tooth. The more use a gear has had, the more the pocket becomes the dominant characteristic of the pattern.

Adjust used gear sets to display the same contact pattern observed before disassembly. A correct pattern is up off the toe and centers evenly along the face width between the top land and root. Otherwise, the length and shape of the pattern are highly variable and are considered acceptable as long as they do not run off the tooth at any point.

- Pocket may be extended.
- Pattern along the face width could be longer.



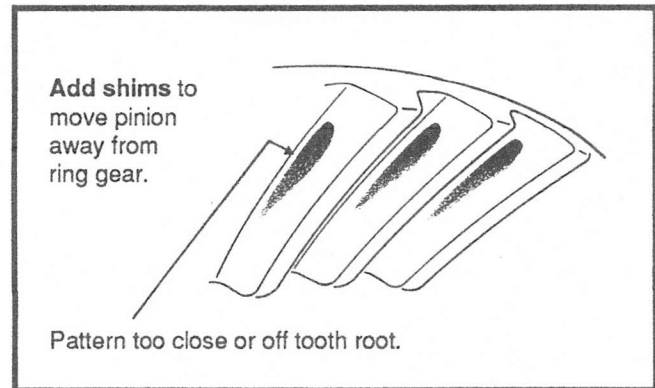
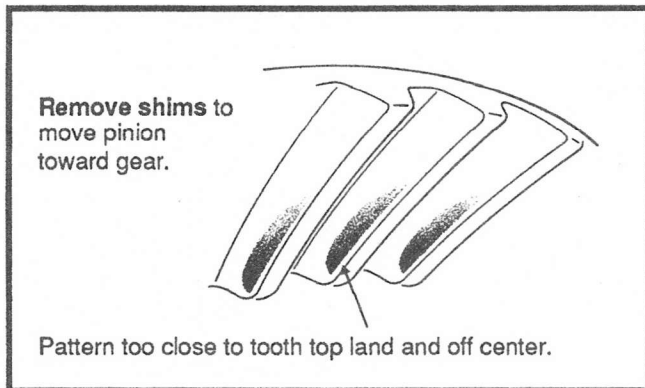
If necessary, adjust the contact pattern by moving the ring gear or drive pinion. Ring gear position controls the backlash. This adjustment moves the contact pattern along the face width of the gear tooth. Pinion position is determined by the size of the pinion bearing cage shim pack and controls tooth depth contact.

These adjustments are interrelated. As a result, they must be considered together even though the pattern is altered by two distinct operations. When making adjustments, first adjust the pinion, then the backlash. Continue this sequence until the pattern is satisfactory.

K Pattern

Incorrect Pattern - Adjust Pinion Position

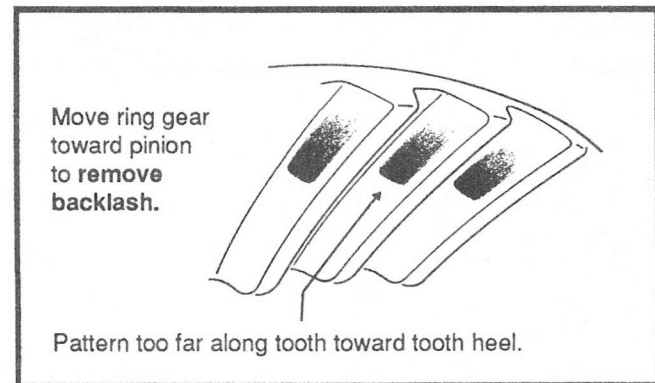
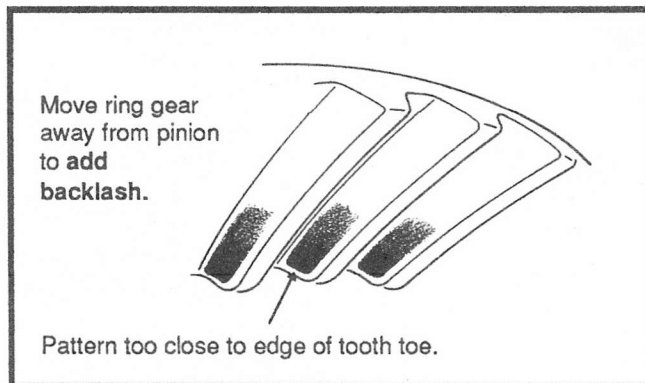
If the gear pattern shows incorrect tooth depth contact, change drive pinion position by altering the shim pack. Used gears should achieve proper contact with the same shims removed from the axle at disassembly.



Note: Check ring gear backlash after each shim change and adjust if necessary to maintain 0.008" to 0.018" (0.203 to 0.457 mm) backlash.

Incorrect Pattern - Adjust Backlash

If the gear shows incorrect face width contact, change backlash.



Add backlash by loosening the bearing adjuster on the teeth side of the ring gear several notches. Loosen the opposite adjuster one notch.

Return to adjuster on teeth side of ring gear and tighten adjuster until it contacts the bearing cup. Continue tightening the same adjuster 2 or 3 notches. Recheck backlash.

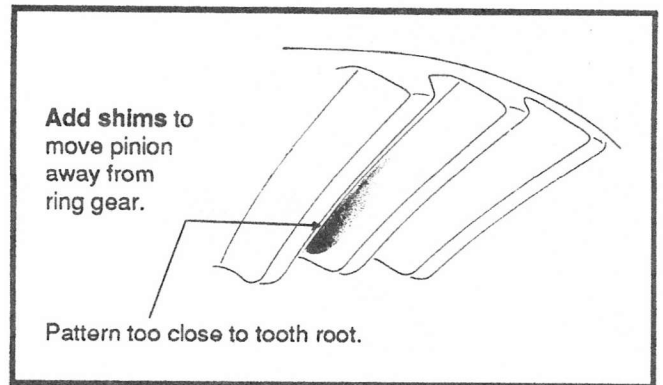
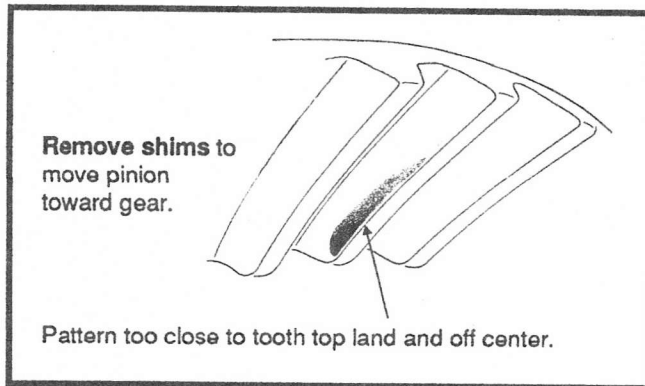
Remove backlash by loosening the bearing adjuster on the teeth side of ring gear several notches. Tighten the opposite adjuster one notch.

Return to adjuster on teeth side of ring gear and tighten adjuster until it contacts the bearing cup. Continue tightening the same adjuster 2 or 3 notches. Recheck backlash.

Standard Pattern

Incorrect Pattern - Adjust Pinion Position

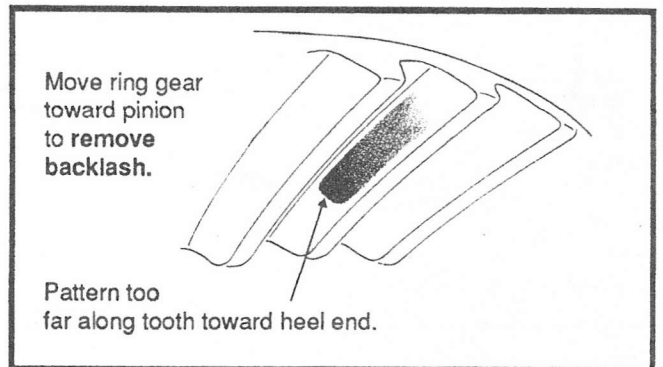
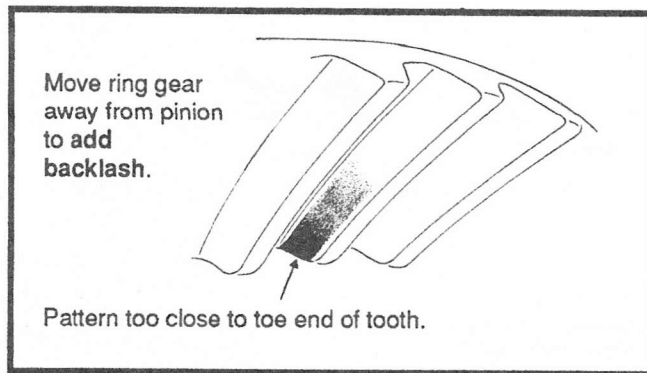
If the contact pattern shows incorrect tooth depth contact, change drive pinion position by altering the shim pack. Used gears should achieve proper contact with the same shims removed from the axle at disassembly.



Note: Check ring gear backlash after each shim change and adjust if necessary to maintain correct backlash (see appropriate service manual). Always recheck tooth contact pattern after making shim pack changes.

Incorrect Pattern - Adjust Backlash

If the contact pattern shows incorrect face width contact, change backlash and recheck the contact pattern.



Add backlash by loosening the bearing adjuster on the teeth side of ring gear several notches. Loosen the opposite adjuster one notch.

Return to adjuster on teeth side of ring gear and tighten adjuster until it contacts the bearing cup. Continue tightening the same adjuster 2 or 3 notches. Recheck backlash.

Remove backlash by loosening the bearing adjuster on the teeth side of ring gear several notches. Tighten the opposite adjuster one notch.

Return to adjuster on teeth side of ring gear and tighten adjuster until it contacts the bearing cup. Continue tightening the same adjuster 2 or 3 notches. Recheck backlash.

THIS KIT CONTAINS A TORQUE PREVAILING LOCKNUT. THE NUT IS TO BE USED ONLY ON DRIVE PINIONS, INPUT & OUTPUT SHAFTS THAT DO NOT HAVE A COTTERPIN HOLE DRILLED THRU THE THREADS.

THE FOLLOWING TORQUE SPECIFICATIONS SHOULD BE USED:

<u>PART NO.</u>	<u>THD SIZE</u>	<u>TORQUE FT. LBS.</u>
95205	1-1/4-12	540 ± 60