INSTALLATION MANUAL

POWERTRAX GRIP LOK

EXTREME TRACTION SYSTEM

- The Latest Design in Traction Technology
- Fully Automatic Mechanically Actuated Locking Action
- Fully Forged, Machined Steel Case
- Our Strongest Locking Differential

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IMPORTANT APPLICATION NOTE

Before installing the ring gear and pressing the bearings on to the differential, the following two (2) items need to be checked:

1. Ensure that your axle shaft mates with the differential side gear. Some models have different spline counts depending on the year of manufacture.
2. Check the differential flange position (bearing shoulder to flange face) to ensure that it is correct. You may compare it to your old one. The differential flange position depends only on the gear ratio that you are using. This flange position may change at certain gear ratios. Some aftermarket ring gear and pinion sets specify the differential case "series" that is required.

If you feel that you have the wrong differential for your application, contact your place of purchase and make the necessary arrangements to exchange the differential for the correct one.

Once the differential has had bearings and/or a ring gear installed, it can no longer be considered new and therefore cannot be exchanged for a new one.

IMPORTANT LUBRICANT NOTE

The Powertrax® GRIP LOK™™ limited-slip differential design uses helical cut gears to transfer power to the wheel with the most traction. Always use an 80W-90 mineral/petroleum based gear oil with at least a GL-5 rating. Synthetic oil and oils that contain friction modifiers are NOT recommended.

SPECIAL NOTES

-Ford® 9" Part# LK109028 & LK109031 applications require the use of open style ring gear bolts part# D8OZ4216B and the following carrier bearings:
2.8910" 3rd Member LM102949 Cone
2.8910" 3rd Member LM102910 Cup
3.0625" 3rd Member LM603049 Cone
3.0625" 3rd Member LM603011 Cup

-Ford® 9" Part# LK109035 applications require the use of open style ring gear bolts part# D8OZ4216B and the following carrier bearings:
3.2500" 3rd member LM104949 Cone
3.2500" 3rd member LM104911 Cup

-Dana® 35 Part# LK443527 & LK443530 applications might require the pinion gear to be modified to clearance the carrier case.

-GM® 10.5" Part# LK2A1430 applications require the use of an open carrier case. Do not remove the wing nut until installation.

INTRODUCTION

Ring and pinion backlash and differential carrier bearing preload are two items of concern when installing a differential.

These items are typically adjusted by means of shims or threaded adjusters. The shims or adjusters will determine the position of the ring gear, which determines the backlash of the ring and pinion set. When installing a differential, the backlash should be set to the original backlash setting,

measured prior to disassembly. To increase the backlash, adjust the shim packs or threaded adjusters to move the ring gear further away from the drive pinion gear. To decrease backlash, move the ring gear closer to the drive pinion gear.

Bearing preload refers to the amount of interference (press) fit of the differential case and bearings into the carrier housing. Adjust the bearing preload by adding or removing shim pack thickness or by tightening or loosening the threaded adjusters. Too much bearing preload will cause premature bearing failure. Insufficient bearing preload will allow the differential to 'walk' in the housing causing damage to the ring and pinion set and other components.

These instructions are intended as an aid for the experienced automobile mechanic in properly installing the limited-slip differential. It is expected that the installer be equipped with the proper tools, equipment, and experience before attempting the installation.

It's a good idea to have an extensive selection of shims or adjustable shim packs on hand to properly install the differential. Threaded adjuster applications do not require shims.

MAINTENANCE

It is recommended that the axle lubricant be changed as required by your vehicle's service schedule. Lubrication breakdown can lead to accelerated wear on all rear axle components. See **IMPORTANT LUBRICATION NOTE** on page 3 for oil and additive requirements.

INSTRUCTIONS

1. Raise and safely support vehicle.

2. Remove wheels and brake drums or brake rotors

3. Drain lubricant from carrier and remove cover.

4. Remove axle shafts from housing. If your axles have "C" clips, do the following:

A. Remove pinion shaft lock screw and pinion shaft.

B. Push flanged end of axle shaft toward the center of the housing and remove the "C" clip from the button end of the axle shaft. Repeat for other axle shaft.

C. Remove axle shafts from housing. Be careful not to damage the oil seals.

If your axles are non-"C" clip style, do the following:

A. Remove axle shaft bearing retaining plate nuts and remove the retaining plate.

B. Use a slide-hammer to remove the axle shafts. Be careful not to damage the oil seals.

Note: Some axles use shims or adjuster nuts to set the axle shaft end play. Refer to the vehicle service manual for the proper removal and installation procedures for the axle

shafts.

5. For removable carriers, disconnect the drive shaft from the pinion yoke and remove the third member from the axle housing.

Figure 1

6. Prior to further disassembly, measure and record the ring and pinion backlash. Mount an indicator as shown in **Figure 1**. Hold the drive pinion stationary and rotate the ring gear in both directions to measure the amount of backlash or free play. Check the backlash at three to four points around the ring gear and record for later use.

7. Mark bearing caps "R" and "L" to make sure that they will be reassembled in their original position.

8. If equipped with adjuster nuts, remove adjuster nut locks and loosen adjuster nuts.
Chrysler® tool: C-4164
Ford® tool: T70P4067-A

9. Remove bearing cap bolts and bearing caps.

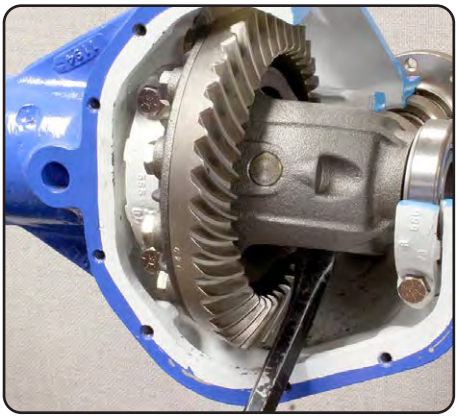

Figure 2

10. Remove differential case. It may be necessary to use a pry bar as shown in **Figure 2**. Exercise caution when prying on the carrier so that the gasket sealing surface is not damaged. Place shims/adjuster nuts and bearing cups with their respective bearing cap.
Note: Adjuster nuts will stay in the housing in some axles.

11. The following steps are for GRIP LOK™ Part# LK2A1430 GM 10.5". For other units skip to step 12.

Note: It is important to re-assemble the differential case halves in their original relative positions.

A. Place punch marks near each other on each half before disassembly. Note that some cases may already have been marked at the factory.

B. Remove and discard the ring gear bolts. With a non- metallic hammer or brass drift punch, drive the ring gear loose from the differential

case pilot and remove.

C. Tap apart the carrier case.

D. Remove all open internal parts including all thrust washers.

E. Insert GRIP LOK™ part# LK2A1430 into the open style carrier case.

F. Line up the alignment marks on the top and bottom halves of the case and carefully lower the top half over the side gear hub onto the bottom half.

G. Heat the ring gear with a heat lamp or by submersing in hot water. Do not exceed 300º F. Do not use a torch!

H. Install the ring gear while hot onto the differential. Use ring gear bolts to align the ring gear to the differential as shown in Figure 5.

I. Using new ring gear bolts, alternately tighten each ring gear bolt to 100 lb ft.

J. Remove the wing nut, (2) flat washers, and the bolt holding the GRIP LOK™ together

12. Remove and discard the ring gear bolts. With a non- metallic hammer or brass drift punch, drive the ring gear loose from the differential case pilot and remove.

13. Remove anti-lock brake tone wheel if applicable. Consult vehicle service manual for proper procedure.

14. Remove differential bearing cones from the differential using the proper bearing puller and adapter. See **Figure 3**.

Figure 3

15. Clean all parts in a suitable cleaning solvent and dry thoroughly. Clean axle housing by pushing a clean rag through the axle tube with a wooden rod. Push the rag from the end of the axle tube to the center of the axle housing. Wipe down the inside of the housing with a clean rag. **CAUTION:** Do not spin-dry the bearings with compressed air. Serious damage or injury may result.

16. Remove any burrs from all machined surfaces in the axle housing, bearing cap and ring gear.

17. Inspect axle shaft bearing surface, bearings and seals. Replace if needed.

18. Inspect differential bearings and replace if needed. Always replace both the cup and cone as a set from the same manufacturer.

19. Thoroughly clean the differential

bearing hubs and ring gear mounting flange prior to installation of the bearings and ring gear.

Figure 4

20. Install the differential bearing cones onto the bearing hubs of the differential case using the proper installation tool. See **Figure 4**.

Note: Many Dana® applications use shims between the bearing cone and the differential case bearing hub shoulder. The bearing cones must be removed to make adjustments to the shim pack thickness.

21. For adjuster nuts, skip to Step 24.

22. Install differential with the bearing cups and shims into the differential housing. Adjust the shim pack as necessary to create a slip fit of the differential into the differential housing. A slip fit is the thickest shim pack that can be installed by hand with slight resistance. It will be necessary to rotate the differential case after each shim thickness change to seat the bearings.

23. Remove the differential from the differential housing. Measure the combined thickness of the shims. This total shim thickness is what is needed for installing the differential (prior to adding preload to the bearings).

24. Heat the ring gear and anti-lock tone wheel (if applicable) with a heat lamp or by submersing in hot water. Do not exceed 300º F. Do not use a torch!

25. Install anti-lock tone wheel (if applicable) while hot onto the outside diameter of the differential ring gear flange as stated in the vehicle service manual.

Figure 5

26. Install the ring gear while hot onto the differential. Use pilot studs to align the ring gear to the differential as shown in **Figure 5**.

27. Using new ring gear bolts,

alternately tighten each ring gear bolt to the proper torque:

3/8" Bolts = 50 lb ft
7/16" Bolts = 80 lb ft
1/2" Bolts = 100 lb ft

28. For adjuster nuts, skip to Step 36. For shims, continue to Step 29.

29. Select two shims of approximately equal size whose total thickness is equal to the shim pack thickness determined in Step 22.

30. Place the differential assembly with the ring gear, bearing cups and shims into the differential housing. Install bearing caps and bolts in their proper position and tighten bolts. While tightening bearing cap bolts, continuously rock the ring gear back and forth to confirm backlash. If at any time the backlash becomes reduced to zero, remove bearing caps and adjust the shim packs by removing .010" from the ring gear side and adding .010" to the opposite side. Repeat as needed until both bearing caps can be torqued to the proper torque value and ring and pinion backlash is confirmed.

31. Rotate the differential case several revolutions to seat the bearings. Check the backlash as described in Step 6.

32. Compare the backlash reading to the original reading taken in Step 6 and adjust as needed. To increase backlash, remove shim thickness from the ring gear side and add an equal amount of shim thickness to the opposite side. To decrease backlash, add shim thickness to the ring gear side and remove an equal amount of shim thickness from the opposite side.

Note: approximately .001" of shim equals .001" of backlash.

33. Once the correct backlash reading has been established, add .004" of shim thickness to both shim packs to preload the differential bearings. It will be necessary to drive the shims into position. Do not hit the bearing cups. It is advantageous to use a Case Spreader to install the differential.

34. Torque the bearing cap bolts to the proper value and rotate the differential case several revolutions to seat the bearings. Recheck the backlash and correct if necessary.

35. With shims and bearing cap bolts properly installed, skip to Step 48.

36. Place the differential assembly with ring gear and bearing cups into the differential carrier.

37. Apply a light coat of axle oil to the bearings and adjuster nut threads.

38. Install the bearing caps in their original position and hand tighten the bearing cap bolts.

39. Install the adjuster nuts (unless still in the differential housing) being careful not to cross thread the adjuster nuts causing thread damage.

40. With the adjuster nuts installed

and the bearings in position, torque the bearing cap bolts to the proper torque value.

41. For Chrysler® 8-1/4" & 9-1/4", skip to Step 47.

42. Loose the RH adjuster nut (opposite the ring gear) until it is away from the bearing cup. Tighten the LH adjuster nut (ring gear side) until the ring gear is slightly forced into the drive pinion (zero backlash). Rotate the differential several revolutions to ensure no binding is present. Recheck RH adjuster nut to be sure that it is not against the RH bearing cup. Use an appropriate tool to turn adjuster nuts.

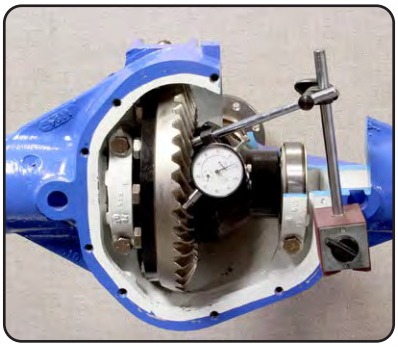

Figure 6

43. Install indicator as shown in **Figure 6**. Tighten RH adjuster nut until a case spread of .008 - .012 is measured. Rotate drive pinion several times in each direction to seat the bearings and to be sure that binding does not occur. It may be necessary to readjust the case spread by tightening the RH adjuster nut.

44. Measure the backlash as done in Step 6. If necessary, adjust the backlash until it matches the original reading taken in Step 6. Increase backlash by loosening the LH adjuster and tightening the RH adjuster the same amount. Decrease backlash by loosening the RH adjuster nut and tightening the LH adjuster nut the same amount. When making adjustments, always make the final adjustment in the tightening direction. For example, if the adjuster need to be loosened one notch, loosen it two notches and tighten it one. When the proper backlash has been established, install the adjuster nut locks.

45. Install third member into axle housing using a new gasket or silicone sealer and tighten nuts. Reinstall drive shaft.

46. Skip to Step 48.

47. For Chrysler® 8-1/4" and 9-1/4" applications, using tool C-4164, adjust the position of the differential until the proper backlash reading has been established. Refer to Step 6 for the backlash checking procedure and original backlash reading. Alternately tighten each adjuster nut and rotate the differential case several revolutions to seat the bearings. Being careful not to change the backlash, repeat until each adjuster nut has been tightened to 70 lb ft. Recheck backlash and correct if necessary. Install adjuster nut locks.

48. Install axle shafts into housing being careful not to damage the oil seals. If your axles have "C" clips, do the following:

A. Loosen and remove the pinion shaft lock screw as seen in **Figure 7** and then pull out the pinion shaft. See **Figure 8.**

B. With the port now clear as seen in **Figure 9**, push flanged end of axle shaft toward the center of the housing and install the "C" clip onto the button end of the axle shaft. See **Figure 10**. Next, pull axle shaft outward so the shaft and C-Clip seat in the counter-bore of the side gear. Repeat for the other axle shaft.

C. Install pinion shaft back into and through the case making sure to align the lock screw hole in the shaft with the lock screw hole in the carrier case. Then, install lock screw and torque to 20-25 lb./ft.

Figure 7

Figure 8

Figure 9

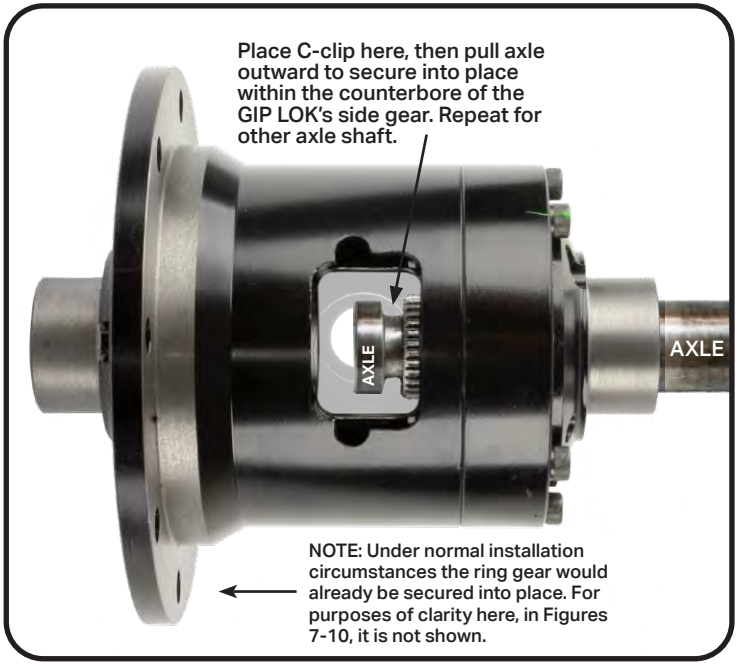

Figure 10

WARRANTY

POWERTRAX® warrants that all new POWERTRAX® products, will be free from defects in material and workmanship for the first 24 Months (2 YEARS) or 100,000 miles, whichever comes first.

THIS WARRANTY WILL NOT APPLY IF ANY PART HAS BEEN MODIFIED, DAMAGED OR IS DEFECTIVE AS A RESULT OF ANY ACCIDENT, MISUSE, USE IN COMPETITIVE APPLICATIONS, IMPROPER INSTALLATION, NEGLIGENCE, REPAIR OR ALTERATION. COMPETITION PARTS ARE SOLD "AS IS", WITHOUT ANY WARRANTY WHATSOEVER. IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED; THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF SUCH PARTS IS WITH THE BUYER. SHOULD SUCH PARTS PROVE DEFECTIVE FOLLOWING THEIR PURCHASE, THE BUYER AND NOT THE MANUFACTURER, DISTRIBUTOR OR RETAILER, ASSUMES THE ENTIRE COST OF ALL NECESSARY SERVICING OR REPAIR.

The POWERTRAX® parts warranty is voided if the part is used for competition or if it has been modified. To make a warranty claim on parts used in non-competitive applications, distributors should contact POWERTRAX®, and individuals should contact their POWERTRAX® distributor for a Return Goods Authorization (RGA) Number. No returns will be accepted without an RGA Number. All parts should be returned to POWERTRAX® freight prepaid. POWERTRAX® will issue a credit equal to the original purchase price for all defective parts covered by this warranty. In the event that a warranty claim cannot be substantiated by POWERTRAX®, the parts will be returned to the customer freight collect.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND IN NO EVENT WILL MIDWEST BE LIABLE FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, ANY LABOR COSTS.

PART #: MANUAL-GRIPLOK