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This Technical Service Bulletin describes service procedures for Inner Axle Seal Replacement on 1999-2004 Ford Super Duty F250, F350, F450, and F550 4x4 trucks. This TSB also covers axle shaft to knuckle seal replacement which is required anytime the front axle shafts are removed. See TSB4610 for Axle Shaft service, TSB4591 for Ball Joint Service, and TSB4594 for Front Hub service (order from 4x4repairmanuals.com). Special front axle service tools for your Ford Super Duty can be found at www.4x4tools.com. (See tool note on page 4.)

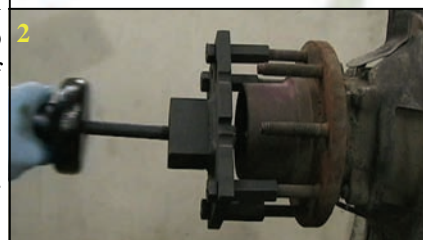
1999-2004 4x4 Ford Super Duty Inner Axle Seal Replacement

Axle Shaft Removal

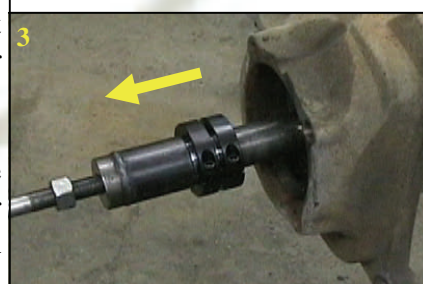
1. **ALWAYS WEAR EYE PROTECTION!** (see safety note page 5)
2. Raise and safely support vehicle.
3. Remove front tire and wheel assemblies.
4. Remove front differential cover to drain oil.
5. Remove brake calipers and wire to frame. **DO NOT LET CALIPERS HANG FROM HOSES!**
6. Remove brake pads and brake caliper supports.
7. Dual rear wheel vehicles: Remove hub extenders.
8. Remove brake rotor (should slip off).
9. Compress and remove snap ring retaining lockout hub in wheel hub.
10. Remove lockout hub. Once the snap ring is removed, you **SHOULD** be able to work the lockout hub out of the wheel hub. If the lockout hub will not slide out, use T1124 Hub Remover and a slide hammer to pull the lockout hub out of the wheel hub (figure 1).
11. Remove snap ring and 3 thrust washers from axle shaft.
12. On anti-lock brake equipped models, disconnect the connector by the frame and disengage the harness clips.
13. Remove 4 locknuts from inside knuckle that retain the wheel hub assembly to the knuckle.
14. Pull the hub out of the knuckle. The hub is designed to be a slip fit and it should be easily removed. If the hub will not separate from the knuckle, you may need to use a puller (figure 2). The brake shield should come off with the hub.
15. Remove large thrust washer from outer axle shaft.
16. Remove the axle shaft by either pulling it out of the knuckle with the T1123 Axle Shaft Puller and a slide hammer (figure 3), or use a brass punch to drive the axle shaft and seal from the knuckle. (Yes, the seal gets wrecked.) *Tech Tip: The axle shafts are held into the knuckle by the seals, there are **NO** retaining clips in the differential!*



Removing a stuck Stock Lockout Hub with T1124 Puller and QT9302 Slide Hammer



Pulling a stuck wheel hub with T1039A Hub Puller, T1146 Adapter Set, and T9303 10 lb. Slide Hammer



Using T1123 Axle Shaft Puller and QT9302 5 lb. Slide Hammer

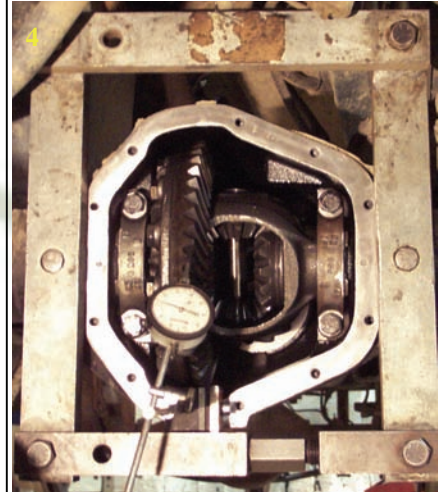
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17. Disconnect the vacuum hose from the knuckle (vacuum actuated auto-lock hubs only).
18. Remove and discard the black o-rings from the lockout hub assemblies, the large (usually yellow) o-rings from the wheel hub assemblies, and the large knuckle seals pressed on the outer axle shafts. Replacement of o-rings and seals is necessary to prevent water infiltration or vacuum loss (on models with vacuum lock hubs).

Inner Axle Seal Replacement

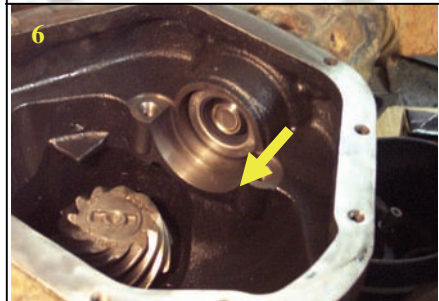
1. Match mark the differential bearing caps if not factory marked with letters.
2. Optional: Measure ring gear to pinion gear backlash with a dial indicator.
3. Remove the differential by pulling or prying it (*figure 5*) from the housing. Do not mix up the differential bearing cups. *Tech Tip: It is recommended you use Differential Case Spreader T1033 which will ease differential removal. It is used to spread the housing .015" which will relieve the bearing preload (figures 4, 5).*
4. Before removing the inner seals, take note of the seal depth by temporarily placing the T1126 Installer into the seals and looking at the back of the Seal Installer and noting the tool depth in the housing. *Tech Tip: Variable depth T1126 Installer will work on either Dana 50 or 60 Super Duty Axles. Optional fixed depth Installers are also available. Use T1127 for Dana 50 axles and T1128 for Dana 60 Axles.*
5. Remove the inner axle seals by driving them out with T1144 Remover and T1145 Handle. Attach T1144 to the longer handle section. Slide the remover assembly down the short axle tube until it slips through the axle guide and stops against the seal. Drive the seal out by striking the handle with a hammer. Assemble both T1145 Handle pieces and T1144 Remover. Drive the seal out of the long axle tube (*figure 6*). *Tech Note: In most cases the seals can not be driven out with a large diameter makeshift tool pushed down the axle tubes as there are plastic axle shaft guides just outboard of the inner axle seals.*
6. Clean the differential area and inside the axle tubes using a suitable solvent and compressed air.
7. **Apply a film of clean oil to the seal bores.**
8. Lubricate the press rod threads, nut treads, and washer with clean grease (*figure 7*).
9. Assemble a seal to the Installer. The steel side of the seal will fit the recess machined in the Installer (*figures 8, 9*).



Checking backlash before spreading housing with T1033 Differential Case Spreader. Left spring must be removed.



Removing Differential



Remove seals by driving them into the differential cavity with T1144 Remover and T1145 Handle

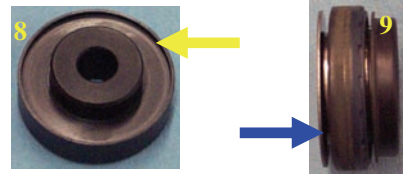


TS4643 Inner Axle Seal Installer for Super Duty Dana 50 front axles. This tool will also work on Super Duty Dana 60 axles if you replace T1129 Thrust Plate with T1130.

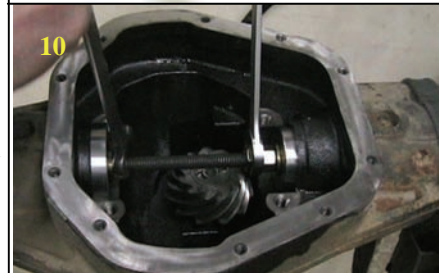
10. Place the Installer and seal in the housing. Push the thrust plate against the housing and move the seal and Installer over until the seal starts into the seal bore. Use T1129 Thrust Plate with Dana 50 axles, and T1130 Thrust Plate on Dana 60 axles.
11. Tighten the free nut while holding the fixed nut until the seal is pressed to the desired depth (*figure 10*). On most model 50 axles, the Installer will be flush with the differential bore face.
12. Back the nut off several inches and remove the Installer.
13. Repeat for the opposite side.
14. **Apply a film of clean grease to the seal lips.**
15. Install the differential (*figure 11*). *Tech Tip: Using Case Spreader T1133 and QT9018 Dead-Blow Hammer will make this job a lot easier!*
16. Apply 242 Threadlocker to the differential cap bolts.
17. Install the differential caps and bolts. Torque the bolts to 80 ft-lbs. (108 Nm) (*figure 12*).
18. Optional: Check the backlash with a dial indicator. Backlash should be .005”-.008”.
19. Apply 1/8”-1/4” bead of RTV sealant to the differential cover.
20. Install differential cover. Allow at least 1 hour for RTV to cure before adding oil. Torque cover bolts to 35 lb/ft (47 Nm) in a criss-cross pattern. *Tech Tip: Do not fill differential until after axle shafts are installed.*

Axle Reassembly

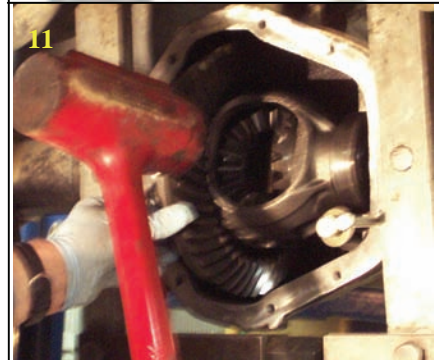
1. Clean the knuckle, axle shaft, axle shaft bearing in hub, etc..
2. Remove any rust or scale from the hub and brake rotor mating surfaces.
3. Install new knuckle seals to the correct depth on the outer axle shafts with the T1515 Seal Installer by driving the seal on until the Installer bottoms against the axle shaft face (*figures 13 and 14*). Damage free installation of these seals to the correct depth on both the axle shaft and into the knuckle is critical for satisfactory service.
4. Apply a thin uniform coat of Lithium Long Life or Exxon Ronex grease to the inner axle shaft dust seal lip that contacts the axle shaft tube to prevent squeaks and premature seal wear.
5. Lightly coat the outer diameter of the knuckle seal with clean oil.
6. Carefully slide the axle shaft through the knuckle and into the axle tube until the knuckle seal enters the knuckle. Seat the axle shaft and seal with the T1515 Installer. Drive the



Super Duty inner axle seal tools are recessed (*yellow arrow*) to clear the metal seal plate (*blue arrow*). Seals are of the oil bath type. The outer portion slides on the inner sleeve.



Pressing Seal into Position



Installing Differential



Once differential is seated in housing, torque differential cap bolts to: 80 ft-lbs.



Press or drive new knuckle seals onto the outer axle shafts using T1515 Knuckle Seal Installer.

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shaft in until the installer flange stops against the knuckle (figure 15).

7. Liberally coat the outer axle shaft and large plastic thrust washer with clean grease. Slide the thrust washer onto the axle shaft with the chamfer against the shaft.
8. Lubricate the small axle shaft needle bearing inside the hub with clean grease.
9. Install new o-rings on the lockout hubs and wheel hubs.
10. Apply a film of grease meeting Ford specification ESA-M1C198-A to the wheel hub o-ring and the outside diameter of the hub where it will contact the knuckle.
11. Assemble the brake shield to the hub and install the assembly into the knuckle.
12. Apply 242 Threadlocker to the hub retaining nuts. Install the four nuts and tighten in a criss-cross pattern to 133 lb/ft (180 Nm). *(Ford Factory Workshop Manuals through 2004 have a discrepancy in torque values for the hub to knuckle nuts. In the service section, the torque value given is 133 lb/ft (180 Nm). The torque tables specify only 55 lb/ft (74 Nm) for front hub and bearing-to-knuckle nuts. Ford corrected the table specification in the 2005 manual.)*
13. Lubricate the three axle shaft thrust washers with clean grease and install them on the axle shaft in this order: metal, plastic, metal. Install the axle shaft snap ring.
14. On ABS equipped models, apply some dielectric grease to the connectors, then connect the wire harness and attach the retaining clips.
15. Coat the lockout hub splines with a film of clean grease and install the lockout hub assemblies.
16. Apply a thin coating of anti-seize compound to the hub to brake rotor mating surface, making sure you do not get any anti-seize on the wheel stud threads.
17. Install the rotor to the hub.
18. Apply 242 Threadlocker to the caliper support bolts. Install the caliper supports. Torque the bolts to 166 lb/ft (225 Nm) for F250, F350 models; and 295 lb/ft (400 Nm) for F450, F550, and motorhome chassis.
19. Lubricate the sliding brake caliper pins and boots with Disc Brake Lube.
20. Install the brake pads, calipers, and anti-rattle hardware. Apply 242 Threadlocker to the caliper bolt threads. Install and torque the bolts to 42 lb/ft (56 Nm).
21. On dual wheel models, install the hub extensions. Torque the nuts to 130 lb/ft (176 Nm) in a criss-cross pattern.
22. Install the tire and wheel assemblies and torque to the specification listed in your owners manual.
23. Make sure differential is filled with oil.
24. Check brake operation and road test.



Seating the axle shaft in the knuckle with T1515 Installer

*T Prefix Super Duty Axle Service Tools Are Available From:
the www.4x4tools.com Ford Super Duty Tools Web Page

*Front Axle Parts and QT Prefix Super Duty Service Tools Are Available From:
www.quad4x4.com

Service Notes

Differential Oil Specification:	SAE 90 Premium Rear Axle Lubricant ESW-M2C105-A		
Differential Gear Backlash:	.005”-.008”	0.13mm-0.20mm	

1999-2004 Ford Super Duty Front Axle Torque Specifications

Fastener	Wrench Size	Torque (ft/lb)	Torque (Nm)
Differential Cap Bolts	3/4”	80	108
Differential Cover Bolts	9/16”	35	47
Hub to Knuckle Bolts	21mm	133	180
Brake Caliper Support (F250, F350)	21mm	166	225
Brake Caliper Support (F350, F450)		295	400
Brake Caliper		42	56



Tube Side

Replacement of the inner axle seal guides is usually not required if you use the tools and procedures covered in this TSB. If, for any reason the seal guides are damaged, you can drive them out of the tubes after you remove the inner axle seals. The guides are removed and installed through the axle tubes. The guides center the axle shaft during axle shaft installation.

Order Replacement Guide Set QU20039-2 from quad4x4.com



Diff Side



This Tech Service Bulletin is intended as an aide to performing a specific service procedure. It is not a replacement for vehicle manufactures or other service manuals.

Working on vehicles is dangerous. It has certain inherent risks, including serious bodily injury and death. This tech service bulletin is not a substitute for common sense, experience and careful preparation. You are responsible for taking appropriate safety precautions before and during working on your vehicle or vehicle components. If you do not already know how to safely work on your vehicle, please have the work done by a professional automotive technician. !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

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