

FZJ80 Front Knuckle Rebuild

Suggested Tools and supplies:

Tools:

1/2" Ratchet
1/2" 18" breaker bar (*or pipe to extend ratchet, might not need this*)
1/2" 3" extension
1/2" 17mm socket (1 shallow & 1 deep)
1/2" 14mm socket (*3/8" would work too, for spindle bolts, which were really tight*)
3/8" Ratchet
3/8" 3" extension
3/8" 12mm socket
3/8" 10mm socket
E12 Torx socket (*if installing new style steering arm studs*)
Snap-ring pliers
Punch, brass drift (7-8" long)
54mm hub nut socket (*3/8" drive recommended*)
Heavy hammer, something solid, 2+lb maul or something
Good slot screwdriver
1/2" Impact wrench
1/2" Torque wrench (ft/lbs)
Race & seal driver set (*rent from Auto Zone*)

Supplies:

5-6 rolls of paper towels
Several large trashcan bag
Cheap zip lock bags & a sharpie for separating and labeling lose nut & bolts
Oil drain pan to catch grease and axle oil
1 or 2 large pieces of cardboard to place under vehicle & work on
6 cans of Brake Cleaner
1/2 gallon degreaser solvent or paint thinner (*WD-40 was the cheapest option & worked very well*)
Tube of Loctite for lower steering knuckle studs installed or reinstalled

Lubricants:

3qts of 80w/90 gear oil for front diff
5 containers of GC-LB rated Moly Fortified grease for birfs and bearings

Parts:

Front knuckle rebuild kit which includes:

- Seals, gaskets, felt/rubber wipers, backing plates, lock washers and knuckle &

You May also want to consider adding the following:

- Inner & outer c-clips, lock nuts, wheel bearings & races, thrust washers, Torx head knuckle stud kit (*if needed*)

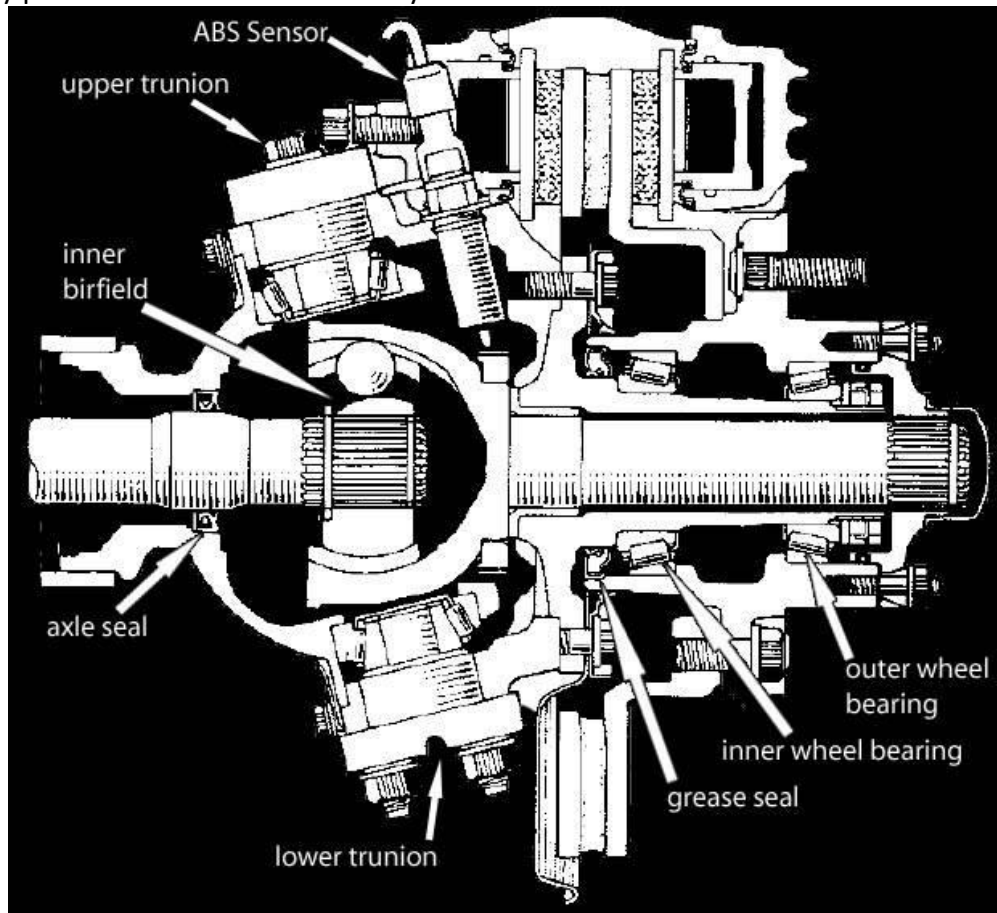
- **NOTE:** Lots of folks recommend having the front diff locked if you have that option before removing the axle. makes it easier to re-install

This write up assumes you do not pull the tie rods and leave it with original preload.

Table full of parts and supplies needed for the job



This is a cut-away pic of front knuckle & hub assy



Be sure to clean the entire inboard face of the brake dust shield, top of axle housing and entire area around the axle ends. Then, ideally, soak them with quality foaming engine degreaser for 10 minutes while sitting at the local car wash bay. Blast them clean. Recoat with the degreaser for 10 minutes. Blast them again and drive home to start the work. There is a lot of nasty greasy grit collected in the ABS sensor area and it takes only a half hour to clean both sides down to bare metal by doing this.

Place the Vehicle up on Jack stands. Jack stands need to be on both side of the front axle.

Place a block behind the rear tire.

Loosen the (19MM) lug nuts & remove the front tires

Remove the (24MM) Fill & Drain plugs on the Front differential and drain the fluid. Look at the drain plug to see if there are any metal particles or shavings.

- **NOTE:** Some substantial metal chips can come off the front diff drain plug - up to the size and shape of a pinkie nail. I showed mine to the Landcruiser Chief of engineering in a baggie and he declared them normal and that's why the huge magnetic plugs. So don't sweat it if you find chips.

Remove the Brake Caliper by removing the (17MM) bolts on the backside. I zip tied the caliper to the springs.

- **NOTE:** Bag stuff separately in zip locks.
- **NOTE:** The trunnion cap bolts and caliper bolts are very similar in appearance, but the caliper bolts are 1.25 thread pitch and the trunnion cap bolts are 1.5 thread pitch. Be sure to separate and label accordingly.

Using a Screwdriver and a hammer, remove the grease cap from the flange. The Grease cap is the metal cap in the center shown there in the first two pics and gone in the third.

Using the c-clip pliers, remove the c-clip on the end of the axle (*under the grease cap*)

Remove the 6 (12MM) nuts on the flanges. Using a Brass Drift placed against the flange bolt heads, hit the drift with a hammer until the cone washers back out and you can remove them by hand

- **NOTE:** If you don't have a brass drift, you can loosen the nuts to be flush with the bolt ends, and tap with a mallet to loosen the cone washer

Tire removed



Brake Caliper removed and then cone washers nuts removed from the drive plate. Remove C-Clip



With the cone washers removed from the Flange, remove the Drive Plate.



Next you will see a lock washer, use a screwdriver to remove this by bending the tabs to the middle position, even with the rest of the washer

Use the (54MM) Hub Socket, remove the Lock nut.

Then remove the Lock Washer.



Using the 54MM Hub Socket, remove the adjusting nut (Used later for preload)

Then remove the thrust washer.

Remove the Hub and Rotor Disk together as one piece with the outer bearing.

It is OK to leave outer bearing in Hub for now. It will all be cleaned up later.

Remove the 8 (14MM) bolts, dust seal and dust cover. Start with the lower two to allow excess fluid to drain.
Dust cover & related items on



Dust cover & related items off



Remove the oil seal set on the back of the knuckle.

There will be the following:

1. Metal retainer held on by 6 (10MM) bolts.
2. Felt dust seal,
3. Rubber seal
4. Steel ring.

- **NOTE:** the order they are installed and the direction of the ridge on the rubber seal when removing it.

Loosen the (12MM) bolt and remove the ABS Sensor and place it carefully into the spring or something else so that it won't fall & get damaged.



Using a brass bar and hammer, tap the knuckle spindle to free it from the knuckle.

Remove the knuckle spindle, the gasket and the bushing that is between the birf and the inside of the spindle.

The birfield in the knuckle will be exposed.

Notice the condition of the sludge in the knuckle. If it is real wet, then your seal had given out mixing diff fluid with grease. Good thing you're changing it.

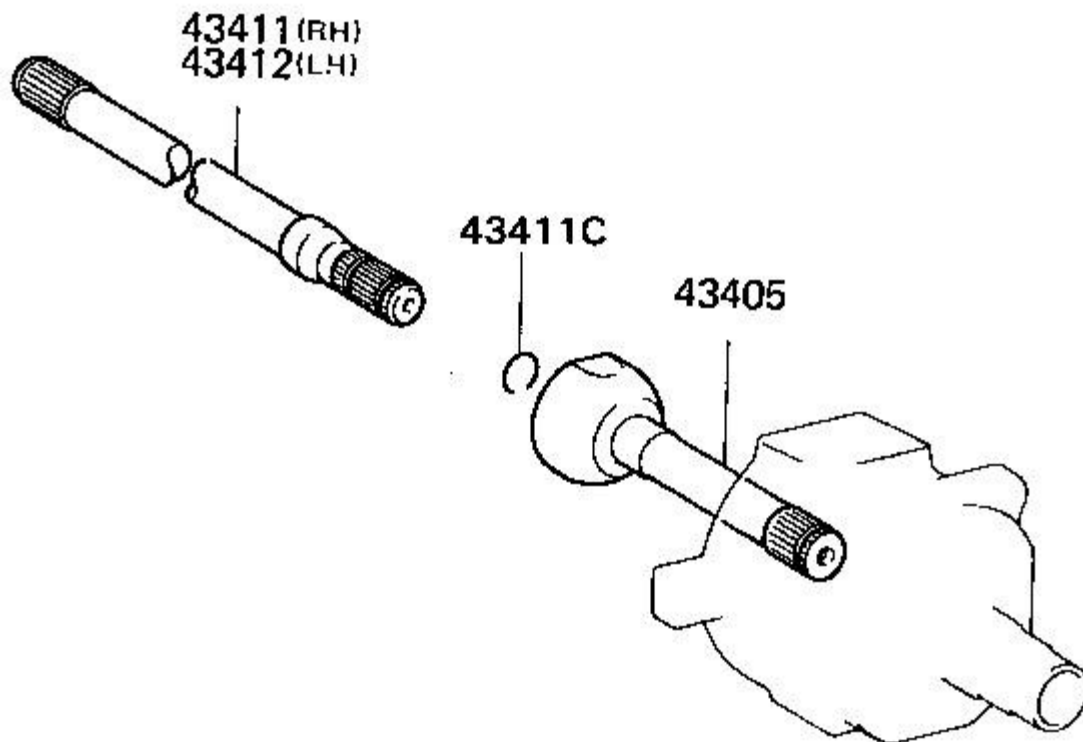
This picture shows very soupy mix. This is very bad.



This picture isn't great, but this is more typical.



Now Remove the birf and axle and lay it somewhere clean



Remove the two bolts (17MM) holding the upper bearing cap housing to the knuckle.

The bearing cap housing can now be gently pried off.

Be careful of the shim, which varies in thickness between trucks.

- **NOTE:** If you encounter difficulties, try using two flat head screw drivers at the same time at either end so that it lifts off evenly.



Loosen the 4 nuts (17MM) that attach the lower control arm/bearing housing to the knuckle

Using the brass drift and hammer, tap on the 4 bolt heads and remove the cone washers.

Pull off the steering arms from the bottom of the knuckle. You may need to pound on the steering arm to loosen the cones and remove the arm.

- **NOTE:** If you don't have a brass drift, you can loosen the nuts to be flush with the bolt ends, and tap with a rubber mallet to loosen the cone washer



Now it should be very easy to remove the Knuckle Housing.

This is where you start using all the paper towels. Start wiping all the grease out from the inside of the knuckle. You can get it clean later with Brake Cleaner.

- **NOTE:** It is important that ALL old grease is removed. Mixing old and fresh grease or mixing different brands/types of grease can cause the greases to break down to a liquid.

Removing the inner axle seal...

- **NOTE:** Prior to removing the oil seal, reach in with your finger tip and pull out the spring that is on inside rear of the inner lip - to prevent the possibility of it falling into the axle tube.

The easiest way to remove the oil seal is to use a sharp flat screwdriver and a hammer to bend the edge in. The screwdriver can then be rotated and the side of the oil seal will collapse and the oil seal will just pop out. You can see this has been done below and the seal will now just pull out.

- **NOTE:** Once the seal is out, oil will start leaking into the knuckle again - just jack that side of the vehicle up a bit.



Shine a flashlight into the axle housing and look around. There should be nothing visible loose in the housing and there should be an index ring about 2 inches from the oil seal flush against the inner lip of the machined surface (it may look like part of the housing). This ring can occasionally come loose. If it has it will likely be lying in the housing and you will need to reseal it somehow (there are posts on this).

Remove the trunnion bearings and the races located on the top and bottom of the inner knuckle.

Use a socket extension, punch or brass drift to knock the old races out.



Now comes the cleaning part.

Start cleaning the inner knuckle starting by scraping the large build-up with a flat screwdriver, then a hand-held wire brush, then a wire brush drill attachment and finally with brake cleaner and blue shop towels.

Clean everything you can. When you're done it should look like this:



Pic below is a good view of the index ring inside the axle tube:



Soaking the birfs in degreaser solvent for cleaning



At this point some will dis-assemble the birf from the axle. A benefit to doing this is to swap sides. The birfs wear on one side and swapping sides extends the life in some cases.

Separating the birfield and inner axle.

Buy a 4' piece of 1.5" inner diameter ABS pipe (the black plastic stuff). Cut it so it is 4"-6" longer than the long side inner axle shaft

Place the inner axle shaft into the pipe so the birfield sits on the top end of the pipe.

Place a heavy folded up shop blanket on the floor (or stuff the bottom end of the pipe with a couple of shop rags). *This will prevent damage to the splines on the differential end of the inner axle when you slam the end of the pipe against the floor/blanket.*

Hold the pipe in one hand and the stub shaft of the birfield in the other and slam the end of the pipe against the floor/blanket. Repeat until the inner axle separates from the birfield and drops to the bottom of the pipe.

Remove the old snap ring from the axle shaft, disassemble the birfield, and clean all the old grease off.

This is a good stopping point if you want to break the job into two days.

Birfield Reassembly

- After the birfields have been fully cleaned

Fill birfield with approximately 8oz of molly grease

Clamp cir-clip tight to axle shaft with a zip tie or hose clamp

Feed axle shaft into birfield up to zip tie/clamp

“Lightly” slam the axle shaft onto shop towels (*or whatever was used to remove birfields*)

Once cir-clip is feed into birfield splines, remove zip tie/clamp

If not fully seated, continue tapping axle & birfield down again until cir-clip is fully seated (*should feel click*)

Finish packing the birfield with moly grease until it starts to ooze out from all sides prior to reinstallation

Axle/Knuckle Reassembly

All parts cleaned and spread out in preparation for reinstallation



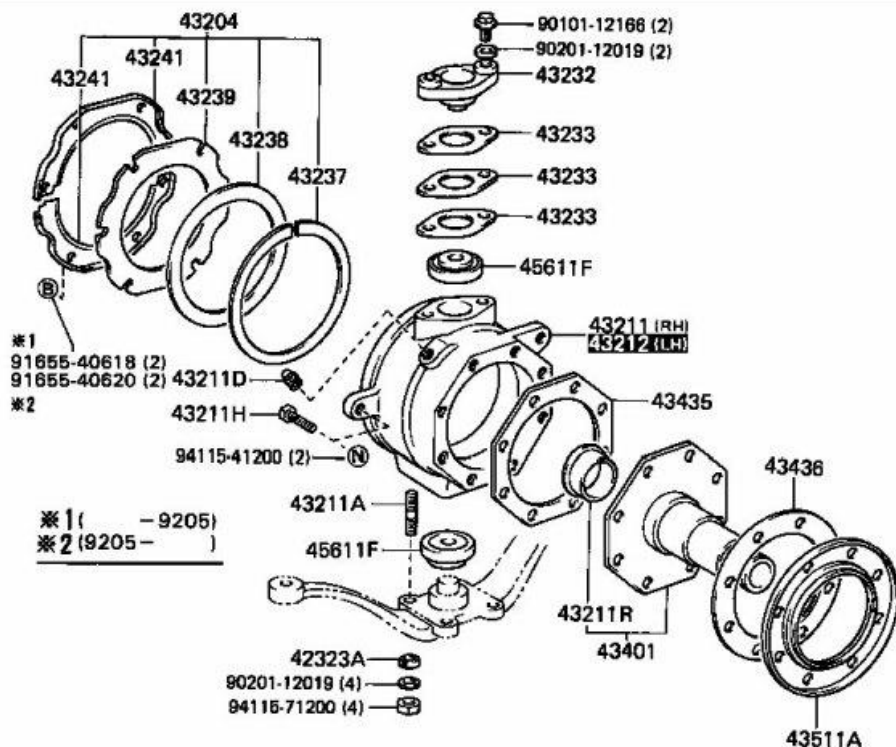
Install new studs in lower knuckle - Use Loctite

Install the inner axle oil seal with seal/race driver kit. Pack backside w/grease to help retain spring

Pack felt wiper with moly grease to prevent water wicking

Slide the wiper seal kit over the inner knuckle. Starting with closest to the center of the truck, the order is: Felt wiper, rubber seal (*with ridge facing towards the differential*) then the metal seal.

The images below show the knuckle and associated parts



Install the upper and lower races for the trunnion bearings using the seal/race driver kit. Use a rubber mallet to help seat them correctly. You may also need a brass drift and hammer.

Pack the new upper & lower trunnion bearings until you see grease come out the inside all the way around.

Install the upper bearing

Have the outer knuckle housing handy and install the bottom bearing. Place the outer knuckle housing on the axle

- **NOTE:** You may need to make adjustments to make sure bearings are seated properly & centered before bolting the outer housing back on.

Set upper bearing cap & shim by gently pushing cap down into knuckle housing. Do not fully tighten the (17MM) bolts at this point

Set steering arm/lower bearing housing into place loosely while installing cone washers, flat washers and (17MM) nuts on the studs. Hand tighten.

Torque top (17MM) housing/cap bolts to 71 lb-ft

- **NOTE:** The trunnion pre-load is almost always within spec if the original shims are re-used

Torque lower (17MM) steering arm/bearing housing nuts to 71 lb-ft

- **NOTE:** RE: loosening of the 4 nuts/studs on the bottom of the knuckle - Use a hammer to tap the arm upward every few turns of the nuts, preventing it from binding. It works perfectly to ensure it is perfectly tight and fully seated.

Check knuckle rotation to make sure it isn't too tight or too loose

Installing Oil Seal Set (Knuckle wipers)

Push metal retainer ring and rubber wiper into the knuckle recess

Line up metal retainer ring for oil seal set with the felt wiper and feed two of the (10MM) bolts through the ring and the felt wiper to help line everything up.

Now tighten the 6 bolts just until the retaining ring touches the knuckle.

Then tighten just hand tight (ONLY 4 ft-lbs)

Reinstalling the Birfield

- If you haven't already, put a generous amount of grease on backside of axle seal to retain metal ring

Verify that you have fully packed the Birf where it attaches to the axle prior to reinstalling

A spatula, or the palm of a hand, can be used to force fresh grease down through one side of the joint until it comes up through the other side

Birfield should be completely full



Wipe a light coating of grease over the length of the axle to reduce friction while feeding axle past oil seal

Slide inner axle carefully through the seal to avoid damage (*do short side first as it is easier*)

Insert birfield with flat mark on birfield bell housing at the top until bell seats all the way into knuckle. Be patient. This can take a few tries.

Pack the inner knuckle with grease.

HOW MUCH GREASE GOES IN THE CAVITY?

There is some controversy over how full the cavity should be. Suffice to say that it should NOT be totally filled.

The FSM says to **pack 3/4's of the knuckle** – More can be added later via inspection hole on top of knuckle

- **NOTE:** Overfilling will inevitably lead to premature leaks at wiper seals, and possibly the forcing of grease through the axle seal into diff housing and through the spindle into the wheel-bearing cavity.

This is probably too much depending on how full it is further in towards the axle



Install the 2- 10MM x 1.25' pitch studs in the knuckle to help with positioning the following items

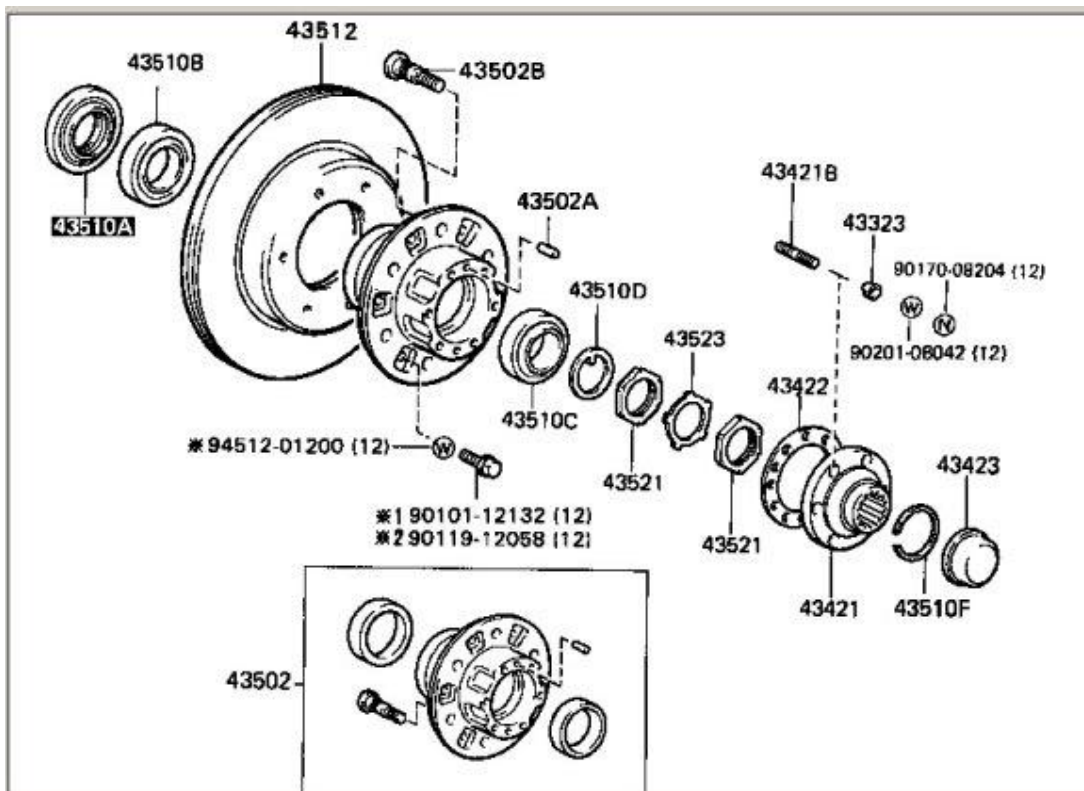
Place a new Gasket in the position on the knuckle along with the bushing on the end of the axle and install the spindle.

Grease the brass spindle bushing and install spindle and related gasket/seal

- **NOTE:** NOT fully packing the spindle bushing with grease is the cause of all of the "Grrrrr sound" posts are coming from - dry spindle bushings that just got a wipe of grease. There are crisscrossing grease grooves in that bushing to hold grease. Pack this area liberally and thickly and also coat the part of the axle that runs in there.

Place the dust cover, dust seal and a new gasket on the spindle.

Torque the 8 (14MM) bolts to 34 ft-lbs.



Clean off the ABS sensor and re-install it. Torque the (12MM) bolts to 13 lb-ft

- **NOTE:** If you are replacing the rotor, the torque setting for the hub to disc bolts is 54lb-ft

Pack the inside of the axle hub with grease (Should have been cleaned prior to this).

Pack the inner and outer bearings with grease

Install the inner bearing into the hub and then install a new oil seal onto the hub.

Coat the oil seal with grease

Axle hub with disc brake rotor removed:



Hub with new disc brake rotors installed



Place the axle hub / disc assy onto the spindle (hub side out)

Install the outer bearing

Install the thrust washer

- **NOTE:** RE: Wheel bearings coming loose – Pay extremely close attention to making sure the rotor is all the way seated before setting up the bearings. When you're putting the disc / hub assy back on with the new grease seal on the back, it feels like you've solidly seated it all the way on, but you may not have. Grab a couple fresh rags and really get aggressive with pushing the disc/hub assy onto the spindle. Listen for a solid “thunk” to be sure it is seated properly. It may require extreme measures, up to and including some hammer blows with a brass or plastic hammer to seat it. I don't know what it is that catches back there but I think it's simply the precise fit of the inner bearing on the spindle.

Disc/hub assy seated onto spindle & ready for setting pre-load



Set pre-load. This step has a difference of opinion. Some folks use a fish scale and some do it by feel. Most agree that the way they do it is the right one.

FSM Method: *(JD used this method, minus the fish scale step)*

Install the adjusting nut.

You adjust the pre-load using the 54MM socket. Torque the adjusting nut to 43 ft-lbs

Turn the hub to the right two or three times. Torque the adjusting nut to 43 ft-lbs again.

Loosen the nut until the hub can be turned by hand.

Torque nut to 4 ft-lbs (Yes that's just a 4) and make sure there is no play.

Using a spring tension gauge (*Fish scale*) measure the pre-load. Resistance should be between 6.4-12.6lbs. Adjust as required. You do this by hooking one end of the scale to the hub and seeing how much it takes to move the hub.

Alt Method 1/ Robbies:

Bearing preload rotate then tighten again, rotate. Then we would back off to the point that the nut was loose. Hand tighten, then check to see how much the washer would move back and forth with a screw driver. If no movement then loosen, if real easy movement not tight enough. this was a trial and error until you got good at it. when it was just right you put the lock washer on then the lock nut and tighten to whatever the man spec's were. Then check to see if you could move the washer with some force, not two handed force but some more force than it took with just the jam nut. Sound hazy but works real well. I have been using this method for over 20 years and it is what I use in the shop today. It takes a feel and it may take a couple of times doing it but will serve well. The way you would tell if it is too loose(before driving the truck) is with the tire and wheel on, with everything on the ground and you shake the tire(from the top) back and forth and you have looseness, the bearing preload is not enough, do it over or you will have problems.

Alt Method 2/Gumby's:

Tighten the inner nut to 45 lbs/ft, Rotate, back off and repeat, then just until you feel resistance. Install the lock washer, then torque the outer nut to 45 lbs/ft.

I use a torque wrench for Cruisers because you need to use the socket. It's easy to get carried away with a 1/2 ratchet.

Alt Method 3/Jonsey's:

Tighten pre-load nut BY HAND (no wrench, but with 54mm socket). Turn rotor, back pre-load nut off, turn rotor again, then turn it as tight as your hand can get it. Add lock washer, then tighten lock nut with socket and wrench "hand tight" with the socket and wrench.

- **NOTE:** No matter which method is used, you do not want any "wobble" from the hub at all

Double-check that the axle hub turns smoothly and the bearing has no play.

Place a new gasket in position over the axle hub.

- **NOTE:** Grease the splines on the drive plate/flange

Install the flange on the axle hub.

Install the 6 cone washers, plate washers and nuts.

Torque the (12MM) nuts to 26 in-lbs (*this seemed like a lot to me and I think I stripped one stud*)

- **NOTE:** Go super easy on tightening the tiny nuts on the drive plate and cone washers. The torque is in INCH pounds, so easy to break right off.

After the drive flange is fitted and the cone washer nuts are torqued (see above) the cir-clip can be fitted. Screw an 8x1.25 pitch bolt into the axle to pull it out and expose the cir-clip groove.

Using a snap ring expander, install a new snap ring and remove the bolt.

Coat the inside of the cap with moly grease and tap it on using a rubber hammer or a drift and hammer.

Re-install the (17MM) brake caliper. Torque bolts to 90 lb-ft

During the re-installation of the caliper is a great time to replace the brake pads if required.

- **NOTE: 100 series pads last longer on the front**



Re-install the tires. Make sure you torque the rims to the following specs depending on which rim you have:

Steel wheel and Alloy wheel with conical seat lug nuts, 109 lb-ft.

Late alloy wheel with shank nuts, 76 lb-ft.

Don't forget to reinstall the (21MM) drain plug refill the front Diff with 90wt gear oil. You can accidentally swap the drain & fill plugs, so be careful not to.

After test drive, 100 miles and again sometime after that; jack up one side of car and wiggle tire to see if tire moves top to bottom. This will give a rough test if your bearings have loosened up on you.