

Hello All: Time to work on those CV's/axles/hubs/l- rods/radius rods etc.

I know you thought you were only replacing a torn boot, BUT (but- "means throw a-way everything mentioned before the word appears") as with anything you touch on these machines there's just a little more to it. You could just replace the boot and if you in the field doing so would be the way to go. Since you're in the garage now may the time to address other items or at least check them out as you go.

Let's start by reviewing the manual sections used to work on this area of the pilot.

Sections:

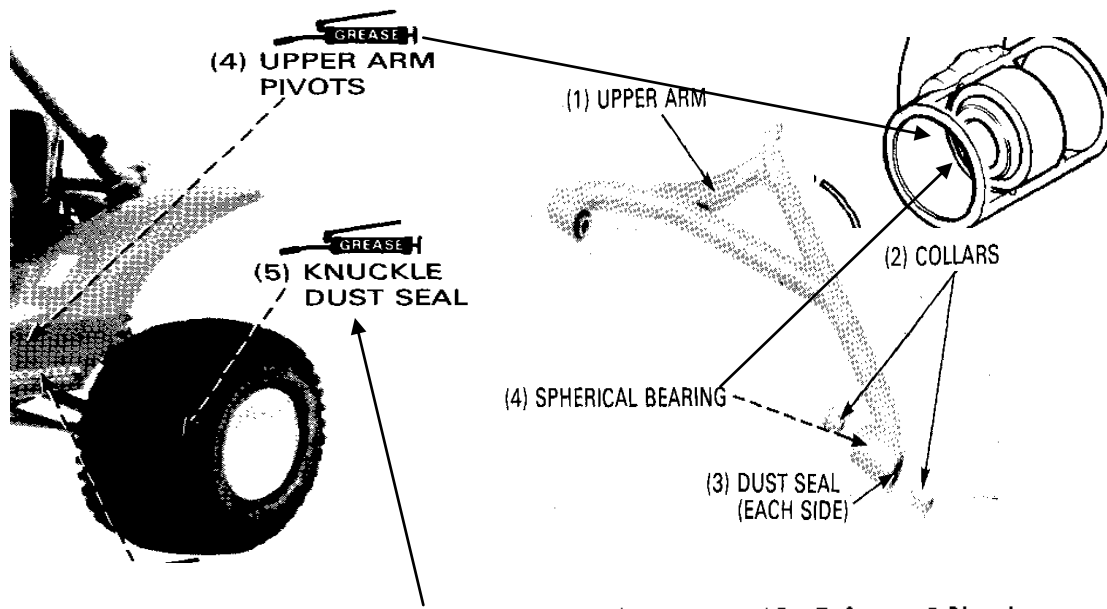
1-General information

2- Lubrication

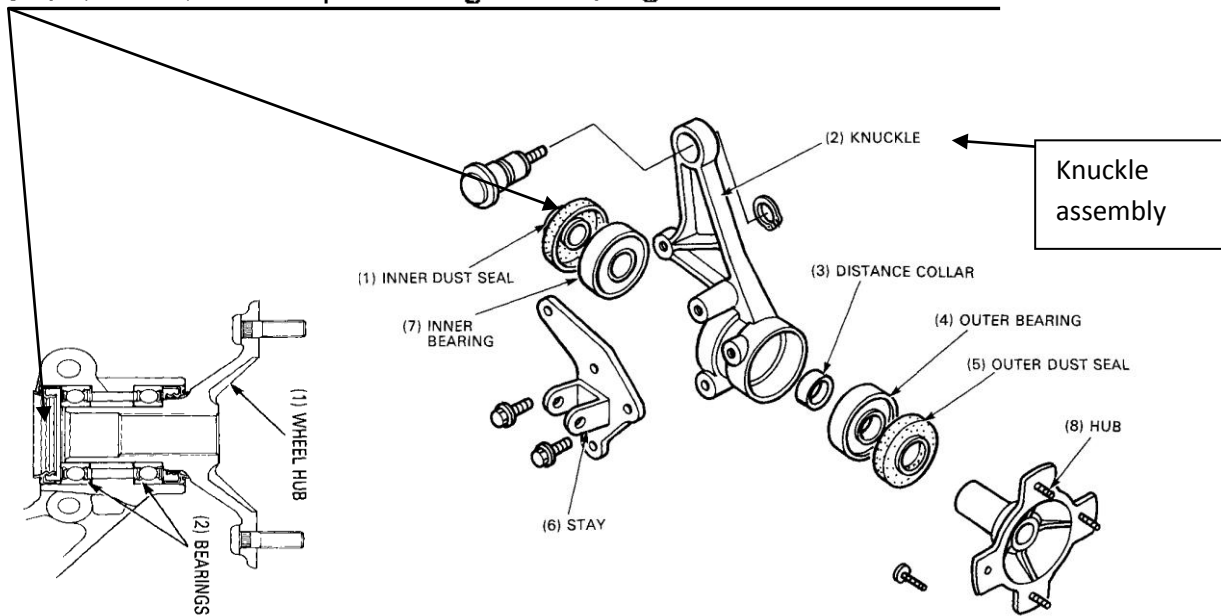
13- Rear Wheel/Suspension/Drive Shaft

Torque specifications listed above are for specific tightening points. If a specification is not listed, follow the standard torque values below.

Item	Q'ty	Thread Dia (mm)	Torque N•m (kg-m, ft-lb)
Rear axle nut	2	18	80-120 (8.0-12.0, 58-87)
Rear shock absorber upper nut	2	10	45 (4.5, 33)
Rear shock absorber lower bolt	2	10	45 (4.5, 33)
Radius rod nut (frame side)	2	12	65 (6.5, 47)
(knuckle side)	2	12	65 (6.5, 47)
Rear upper arm nut	4	10	40 (4.0, 29)
Rear lower rod nut (frame side)	4	12	65 (6.5, 47)
(knuckle side)	2	12	65 (6.5, 47)
Rear shock absorber stay bolt	4	12	55 (5.5, 40)



Fill the dust seal lips with grease (1 gram/0.04 oz Min.)

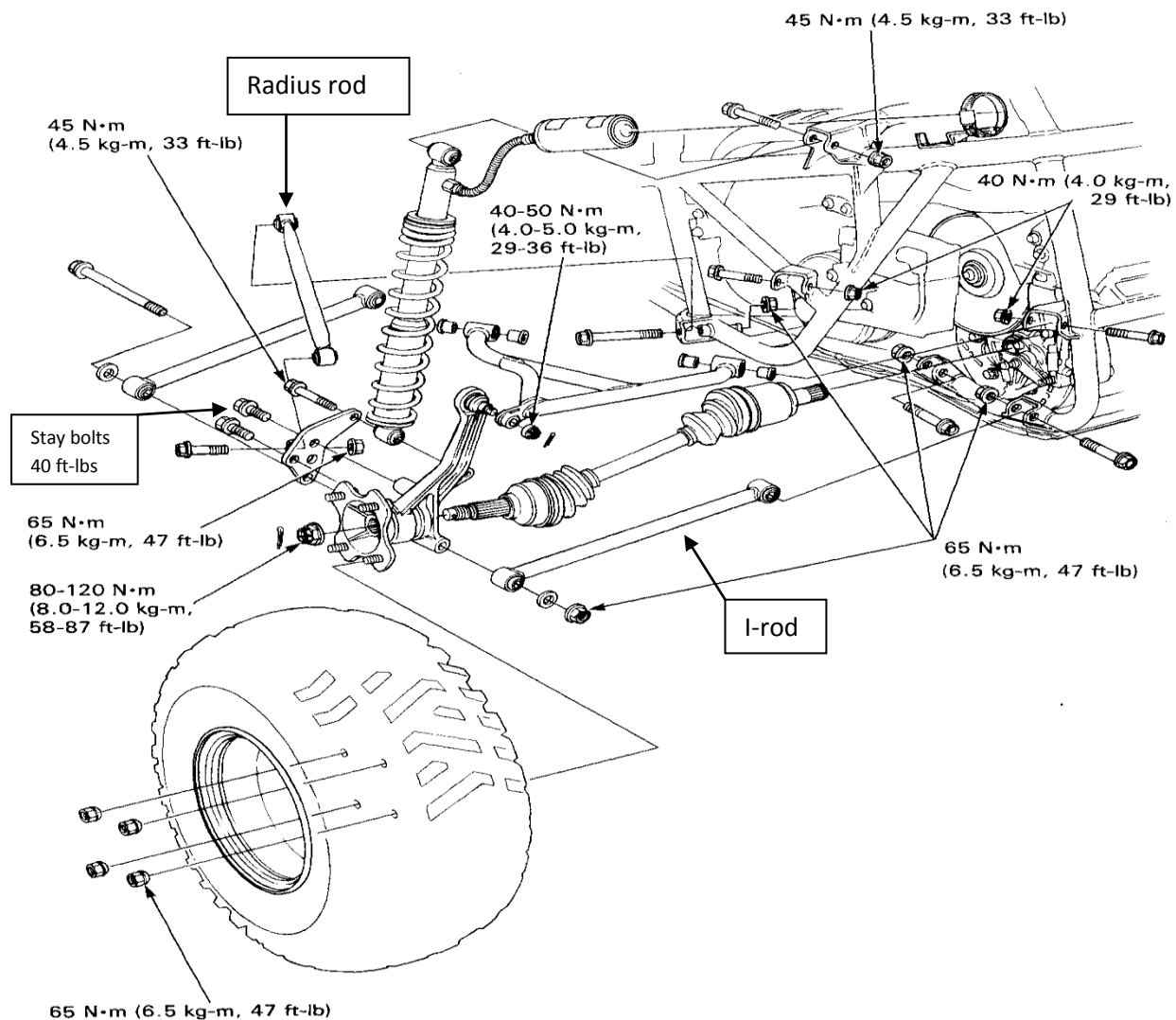


Knuckle assembly:

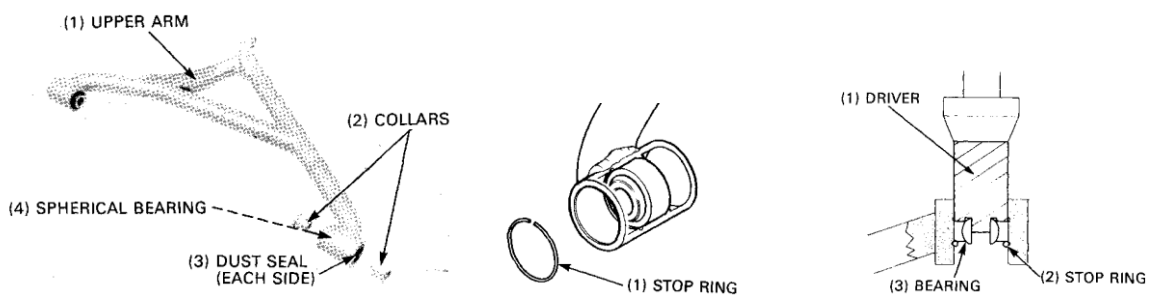
The outer axle cup rotates with in the inner dust seal (1). The axle shaft slides into the hub (8). Hub (8) slides into outer dust seal (5) then outer bearing (4) and through Distance collar (4) then into Inner bearing (7) as an assembly. This Knuckle/ Wheel Hub assembly should not come apart as you remove the axle from the hub. **This is to say the bearings are a press fit into the knuckle and the wheel hub is a press fit into the knuckle/wheel hub bearings.**

Before moving on let's do a quick recap of sections, General information (1) and Lubrication (2). We covered the torque values of the bolt and nuts in question for the scope of work. We also covered the lubrication points of related part while disassembled prior to assembly according to the manual. **This will not cover the axle shaft its self or its assembly nor will it cover the inspection of the related parts.**

This diagram (from Chassis, section 13) will cover most of the parts in question for removal of the axle for repair. This also shows bolt/nut orientation and the torque values. The rear driveline/arm assembly consists of one upper a-arm assembly, two lower I- rods, one radius rod, one knuckle assembly, one drive axle assembly, one shock absorber and one rear tire/wheel combination

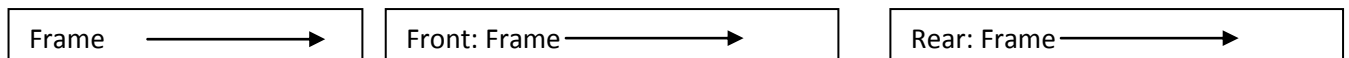


Before loosening of any parts do post ride inspection. This inspection should consist of visual walk around looking parallel with the travel direction of the car. Looking for bent rods/arm or miss aligned rear wheel. Even if the a-arm and or rods are straight the wheel can have some miss alignment caused by bent/wore bolts or dislodged spherical bearings in the upper a- arm (see drawing above of a-arm) or bent frame. One should also do a wiggle test of the upper a-arm and the rear wheel to make sure the spherical bearings are tight in the a-arm (s) and the bearings have no axial play in the knuckle. A worn bearing (s) here can cause deflection in the rear assembly causing steering issues at speed through rough terrain and be a serious issue and which could cause knuckle, axle and CV damage. The spherical bearings in the upper a- arm (s) can become dislodged due harsh side load force imposed on the upper a-arm. It causes the bearings retainer stop ring (s) to pop out of its slot and allow the bearing (s) to move within the arms pivot. With a visual inspection of the upper a-arm pivots one can spot this quickly as the pivot (s) will be future to one side of the mount than the other. This can easily corrected after the a-arm is removed by removing the two spacers and the dust seals then placing a socket of OD size to the arm tubing then just tap it back into place. This normally will also rest the stop ring into its slot as well.



Then grease and reinstall the dust seals and spacer ready for reassembly. The pre removal inspection of the Radius and I-rods should consist of their straightness or flaking paint at the welds and the orientation of the way they sit in the frame mounts and the knuckles and knuckles stay. The radius rod and I-rods should be future inspected after they are removed looking for torn rubber between the inner spacer and the rods outer tube at each end. The knuckle assembly/wheel hub bearings will be covered later in this paper.

Before removal of the assembly mark orientation of the Radius rod and I-Rods, you can use a piece of masking tape on top of the rods with an arrow always pointing toward frame. On the two lower I-rods mark them Front and Rear.



If you working with only one side at a time no future marking is required. If you doing both at once then add a right and left side marking to all the parts appropriately.

Dissemble Precautions:

When removing a part be sure to reinstall the bolt and nut removed back into that part or mounting point. An example would be removing upper a-arm, take the bolt and nut and put it back into the frame mount where it was removed from before moving on to the next part. The manual make note of installing new nuts in certain area's be sure to do so or use a locking agent if the bolt and nut are in an acceptable shape. What to look for here is the shape of the bolt as far as wear on the bolts surface and it threads. If the bolt is bad assume the nut is as well and replace both. Everywhere you remove parts from the frame inspect the frame mounting point as well. This will also cause deflection in the assembly and or failure. Elongating of the bolt hole or hair line fracture at the mounting points could accrue at these points. Either can be fixed easily with a washer welded in place or replacement/repair of the bad mounting point. If this is encountered the **bolt and nut at that mounting point will also need to be replace no questions ask.**

Before moving on, at this time review above material and then read through **section 13** of the service manual. This should get you ready for the dissemble process and aid in reassembly.

Ready-set-go: read above material (check), read through service manual (check), got cold ones (double check).

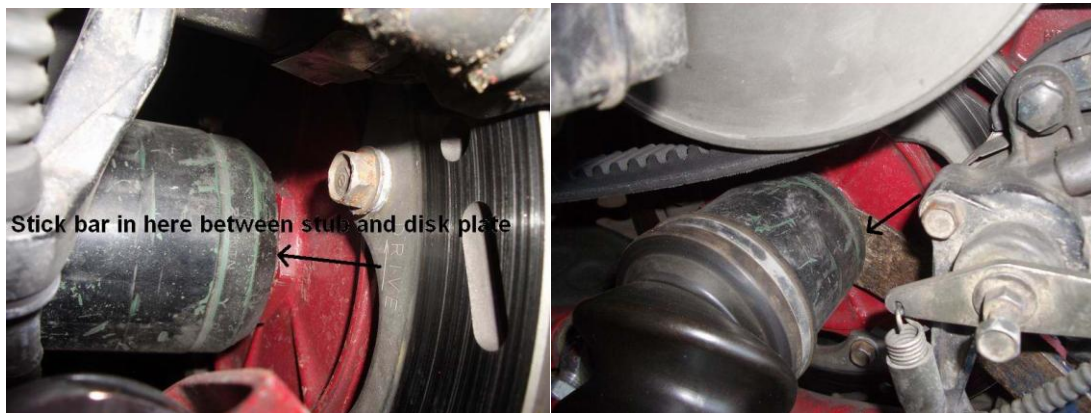
We have not talked much about the axle assembly its self and that ok for now as we need to remove it first.

Step 1: With the pilot sitting on the ground with the tires and wheels still on it do an inner CV cup (Inboard Joint) wiggle test on the **left hand side (driver side)** to see if we can use the flat bar to pop it loose. Even if the boot is torn on the **right side (passenger side)** I strongly urge removing the **left side (driver side)** first as not to damage the transmission case or its bearings and seals. We accomplish this test by trying to move the cup in and out (away and towards the case) to see if the cup is seized in the final drive of the transmission. There should be a little play between the back side of the cup and the final drive caused by the retainer ring (stop ring) on the axle stub and the way it sets inside the final drive. Here is a picture of the CV cup with the retainer ring on it and a picture inside the final drive. You can see where the stop ring set between the two sets of splines and hold the axle in the final drive.



If there is play or it moves a little then go to step (2). **IF NOT STOP and CALL ME as the shaft may be frozen in the final drive (final shaft) and optional removal instructions are required.** Skip step 2 and go to step 3 through 10 then go to step 14 through 15 and remove axle from inboard joint. Pilotodyssey.com has many documented ways to remove CV cup (s).

Step 2: Place flat bar as shown in pictures supplied and pop the axles stub loose from the final drive (final shaft) also shown in the pictures supplied. If you not real comfortable with this or doing it for the first time you may want to remove the rear brake caliper to make it easier and also reduce risk of damage to the calipers e-brake. **ONLY apply pressure** to the CV cup and the nut of the disk plate or damage will accrue to the disk holding plate. **If not comfortable with method**, use optional method and get a puller on the CV cup.



Step 3: Raise pilot up off of floor, place jack stands under the frame to support car then remove tire and wheel assembly.

Step 4: Remove cotter pin from axle at the hub and break loose the axle nut and loosen it a ¼" **(do not remove the nut at this time).**

Step 5: Take a dead blow mallet and tap the end of the axle to see if it moves. You only want to move it the ¼" that the **axle nut still on** will allow. You're just trying to get it loose or see if it is frozen in the hub. This will loosen up both ends of the axle shaft assembly prior to disassembling the suspension to make it easier to remove the axle shaft assembly.

Step 6: With the axle assembly loose, **loosen** up the a-arms bolts and nuts and the radius rods and I-rods bolts and nuts.

Step 7: Remove the shock.

Step 8: Remove the axle nut

Step 9: **Read 9 – 12 first before doing.** Remove the Radius rod and I rods from the knuckle and the a-arm at the frame, supporting the knuckle and the upper a-arm as not to tear the boot at the knuckle.

Step 10: This should remove all knuckles attachment points from the frame. Double check by looking then get a good hold on the knuckle and a-arm and make sure pilot is supported good from the floor and pull the knuckle and upper a-arm from the axle stub. You may need to tap on the end of the axle to get it going. Then lay the knuckle/a-arm down being careful not to damage the discontinued pivot boot on the knuckle.

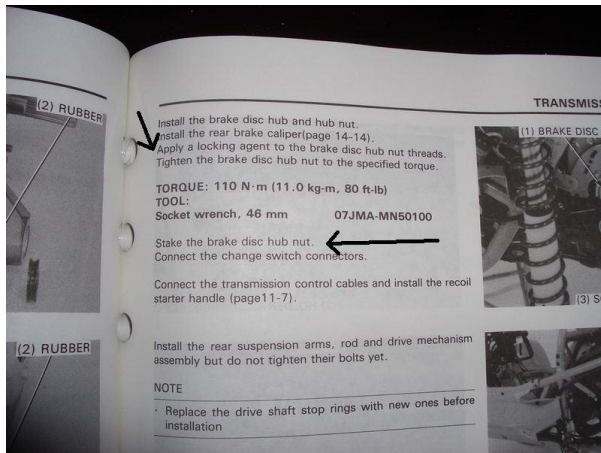
Step 11: If this is the side that has torn boot wrap it up with something so it does not throw grease everywhere. Grab the axle and yank it out if it did not come out as you were trying to remove the knuckle.

Step 12: In case it's the **right side (passenger side)** that has the tore boot you can now use a good round tapered tipped chisel (look at the end of the axle shaft you removed for fitment of chisel end) or bar that will slide into the final drive (final shaft) and smack it dislodging the other axle shaft assembly loose from it's retainer then use the above procedure to remove. Be sure to wrap up whatever you use to punch it out with or do like myself cut a piece of rubber tubing that will fit inside the final drive then slid in the chisel/bar.

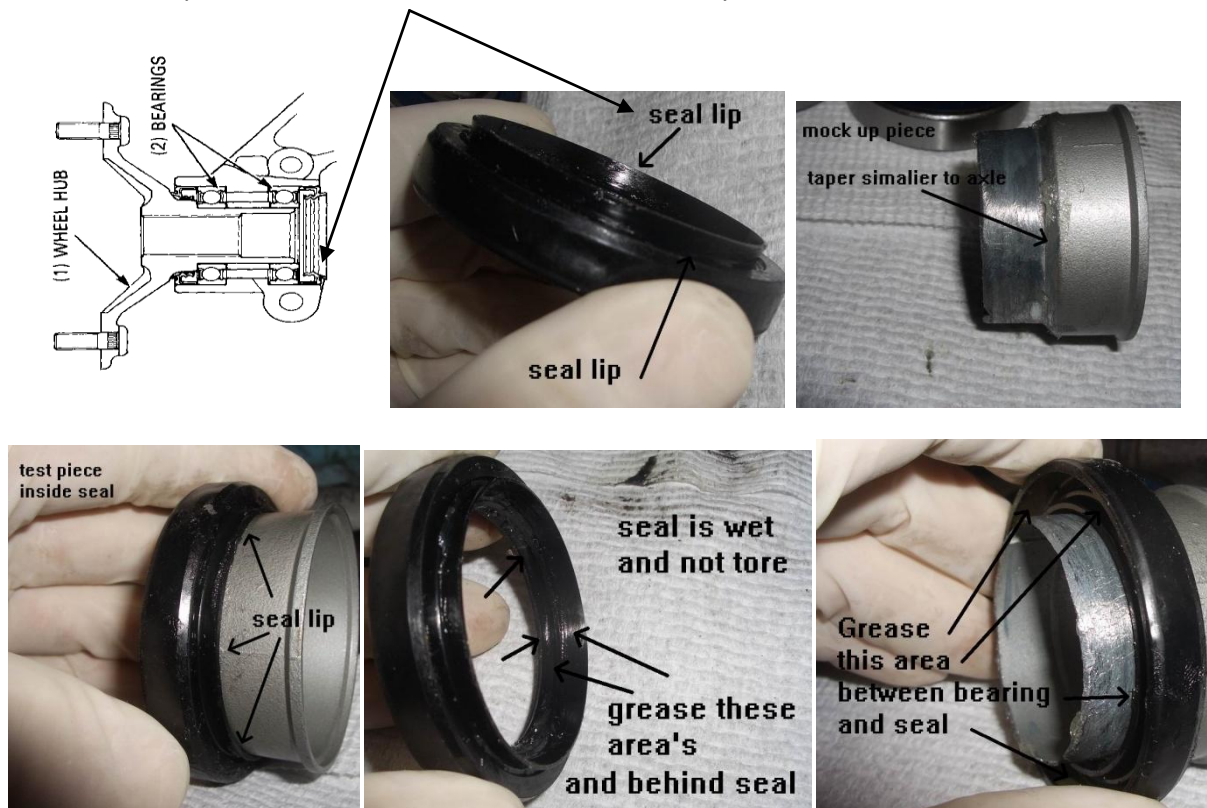


Here is some pictures and information of the final drive (final shaft) covered in section 11 of the manual and CV cups (inboard joint's) showing how they look and set in the final drive which is inside the transmission. You will notice that there no retainer ring (stop ring) on the CV cups in the pictures. FYI the goo on the cups is anti seize and will be covered under assemble. The side of the final drive (shaft) with the threads on it is the **left hand side (driver side)** as you sitting in the pilot. There is also some pictures of the seals and there orientation.





Before moving onto the boot replacement let's take a look at the knuckle assemble. Now that we have it off the pilot and benched and the axle has been removed we need to take a closer look at the hub/axle seal lip where the axle sets inside of to see if it's dry or tore.



If the seal is still wet (non dried grease) then most likely one can re-lube as covered above before you assemble, if not now is the time to replace the seal(s) if it looks bad, dry or tore. Next we want to look down the hole from the seal side and see if the spacer between the bearings looks ok.

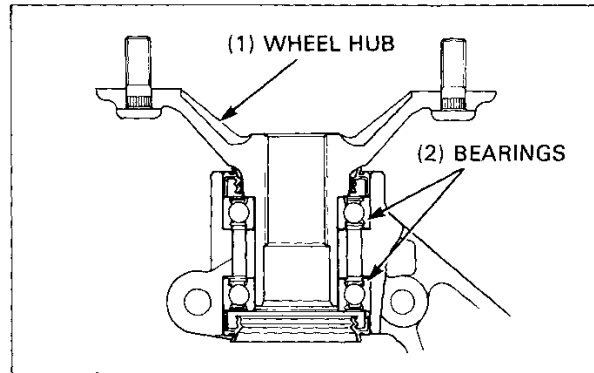


INSPECTION

Turn the wheel hub with your hand.
The wheel hub should turn smoothly and quietly.

Replace the knuckle bearings if the wheel hub does not turn smoothly and quietly.

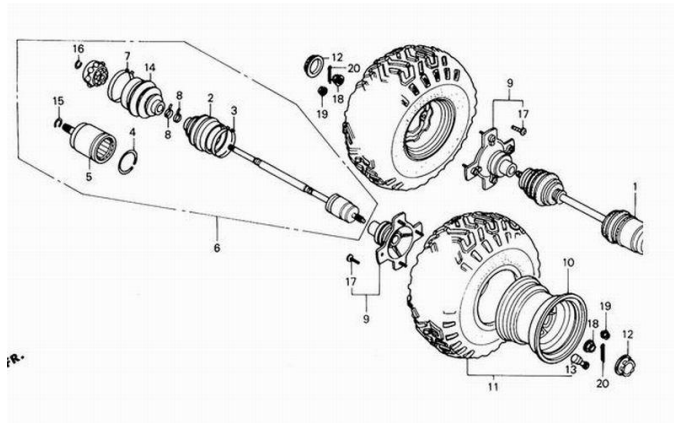
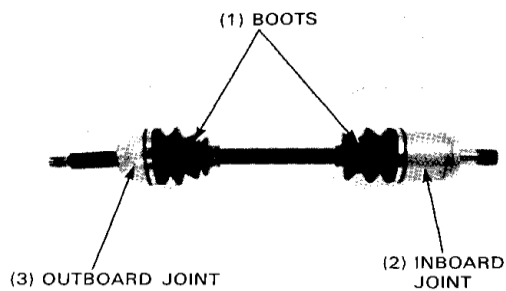
Bearing replacement; see next page.



Now turn the hub by hand to see if it rotates smooth and quiet with slight resistance and do a push/pull test. What you listening for are bearing noise and what you're feeling for is bearing grind or seal bump. The seal bump will be either heard or felt if the outer seal (hub side) has a rip, tear or part of it missing. The slight resistance is two things; one being the seal making contact with the hub as it rotates and two being the bearings clearance in there races or preload. If it just spins freely with rotational resistance or is hard to turn then both the outer seal and the bearings are bad. The push/pull test will also indicate a bad or bad set of bearings. Holding the hub in one hand and the knuckle assembly held stationary via bench vise or other method, push and pull on the hub. Any play will indicate the bearing clearances in there races are out of tolerance and the preload has diminished or the bearings have lost their press fit in the knuckle and failure will occur and damage the knuckle and, or hub.

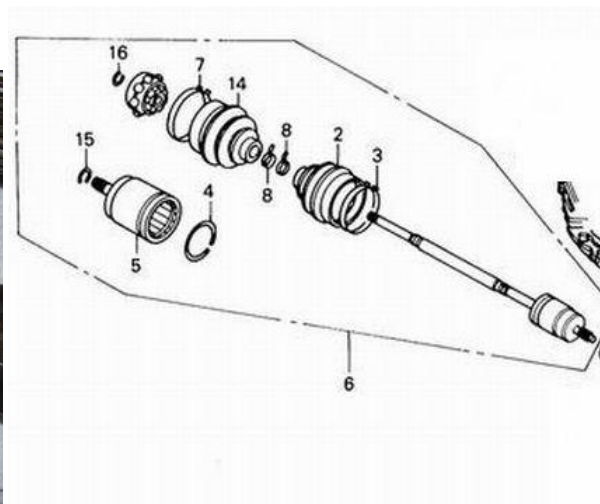
The bearing fit in the knuckle can be check as you remove the hub from the knuckle. The hub should be pushed out and the bearing should (usually) stay in the knuckle if the outer bearing comes out with the hub then look at the outer bearings outer race to see if there is scoring marks where it has spun in the knuckle. Then check the inner bearings fit in the knuckle by hand before removing to see if its loose, if not then remove and inspect the outer race as well to see if has scoring marks to see if it has spun in the knuckle. One thing to look for as you remove the hub is the amount of force required to push the hub through the bearings inner races. If it pushes real easy very little force then look the hub and the inner bearings race surfaces and spacer being more concerned with the hub and spacer as most likely the bearings are being replaced. If no visible signs of hub and knuckle and spacer damage, then reassemble the knuckle and hub with new bearing keeping in mind there a press fit and preload must be achieved and check to see if noise and play has been removed.

Finally, the axle assembly:



As you can see from the pictures the axle assemble consist of a few parts. The inboard joint (CV cup) which goes into the final drive of the transmission and the outboard joint which goes into the wheel hub/knuckle assembly. If you look at the above picture #6 shows the breakdown of the assembly for the most part. What it does not show is how to remove the outboard joint from the axle and what holds it in place. I will not cover that at this time unless need be for your repair.

Step 13: By now you have the axle assemblies removed and on the bench and you have noticed the (part #15) keeper (stop ring) on the end of the axle that goes into the final drive, be sure it's there if not locate it. You now can remove this from the end of the CV cup so the groove can be cleaned and prepped later for ease of reinstallation. If not cleaned the ring cannot collapse correctly upon installation and can become dislodge from its grove and damage the final drive/CV cup or cause the axle to pop out of the final drive later on its own doing massive damage. I also recommend wrapping a shop towel around the boot that is not being replaced as to protect it from damage.

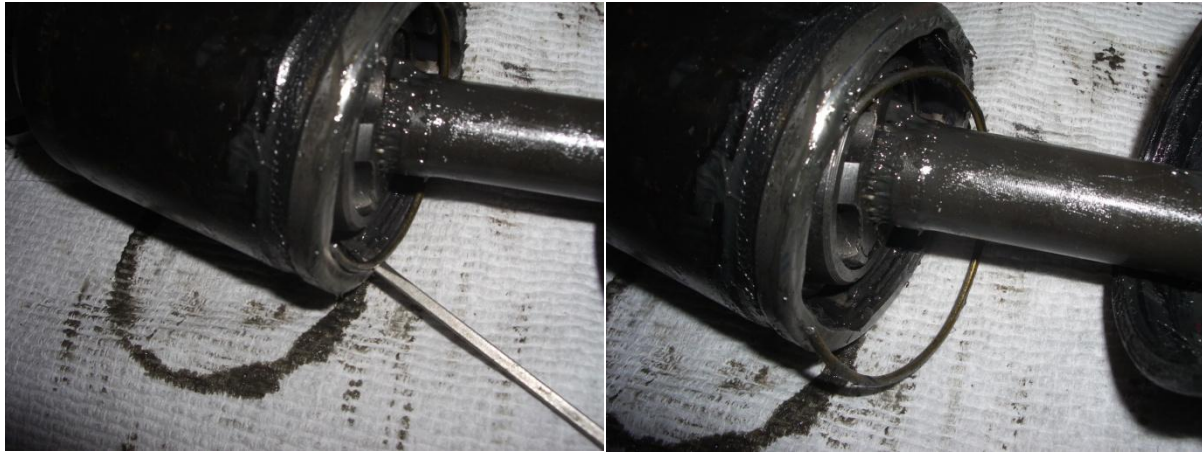


Step 14: Now you can take loose the inboard joint boot bands (#7 & 8) and remove #7 from the joint. Take note of the orientation of the band on the axle boots to its rotational direction with the car moving in a forward direction. See pictures below for bending of tabs for removal. DO NOT straighten the tabs, leave them at about a 45 degree bend to make it easier upon reinstallation if you reuse or save as spares.

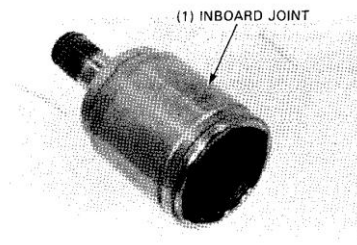
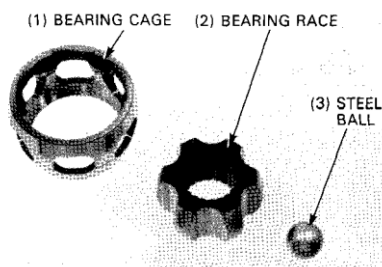


Step 15: This will allow you to slide the CV boot (#14) towards the outboard joint. This will allow you to remove the internal keeper (stop ring) inside the inboard joint (#4) and allow the CV cup to slide off the axle assembly.





Step 16: Removal of CV bearing assembly from the axle shaft. The bearing assembly consists of three parts, bearing cage, bearing race and steel balls. You will also notice there is no part number reference to these three parts which are part of the inboard joint assembly and is Honda part# 42220-HE0-003 for the 1989 FL400 and superseded to 42220-HE0-013 for the 1990 FL400. This part is still available as of 12-12-2013.



Remove the snap ring from the end of the axle shaft noting which side of the snap ring set against the bearing and be sure to reinstall it the same way. Then remove the CV bearing by sliding it off the end of the axle shaft and note the orientation of the bearing direction on the axle and be sure to put it back on the same way. Be careful with this bearing assembly as the balls can and will come out while cleaning or mis-handled. The balls are a very slight press fit.



Step 17: Remove boot(s), clean, relube then replace boot (s). As you replace the boots **DO NOT FORGET** to install the small boot band (s) as you go. Refer to the manual for grease capacities.

If you clean the outboard joint be sure to pack it back full before putting the boot back on and filling the boot. If you have removed the shaft from the outboard joint you can simply fill the joint full through the hole then install the axle shaft this will squeeze the grease through the bearing then install the boot and small boot band on the axle shaft then fill boot with the proper amount of grease and install boot and bands.

Edited, 12/14/2013: boot inspection (Adnoh)

Before installing a new or old boot for that matter look both over to be sure there is no issues or potential issues. Use new Honda clamps if available or clamps that come with your CV Boot kit and save your old clamp if not broke for field repair and spares. The stock clamp tends to break at where they bend over especially on the small one.





END of edit 12/14/2013, (Adnoh)

Edited, 12/14/2013: boot band (Adnoh)

As mentioned above about the boot band removal. *“DO NOT straighten the tabs, leave them at about a 45 degree bend to make it easier upon reinstallation if you reuse or save as spares.”* When reinstalling the bands either by using the old ones or new ones by leaving the tabs bent or bending the new ones, it will ease in the final step of the installation. With the axle assembly placed on the bench or with the assembly setting on a jack stand supporting the axle near the outboard joint boot (if the inboard joint is still in the transmission final drives). Clean the outer CV cup and the inner part of the boot where it sets on the CV cup (this after the boot has been filled with grease) then slid the boot onto the cup then be sure the boot sets in the lip of the CV cup. Now slid the old or new clamp onto the boot at its correct orientation with the rotating assemble and make your first bend of the clamp.



Now you can finish bending the clamp over into the pre bent lips and then simply pound down the lips one at a time. I use the end of punch I used to knock out the right side inboard joint from the final shaft. Be sure it is not bugged up on the end as to rip/tare etc the new boot.

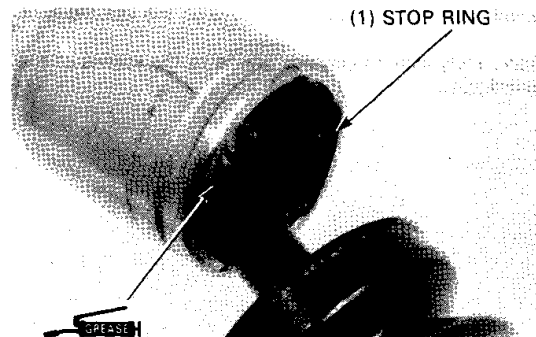


END of edit 12/14/2013, (Adnoh)

On the inboard joint fill the CV cup half full of grease then install the small boot band and then the boot on the axle shaft then install the bearing and snap ring. Now slid in the axle shaft into the cup squeezing the grease through the bearing. Then install the internal keeper (stop ring) and fil boot with grease. Install boot on CVcup and fasten the boot bands. Then install the external stop ring on the end of the axle shaft.

Apply grease to the bearing and inside of the inboard joint.

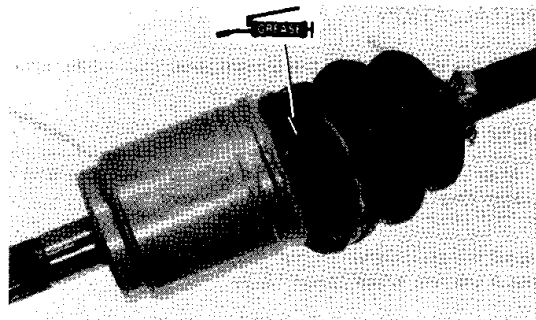
Install the inboard joint to the drive shaft.
Install the stop ring in the joint groove.



Pack the boots with grease and pull them on the joints.

GREASE CAPACITY:

Inboard boot: 90-110 grams (3.2-3.9 oz)
Outboard boot: 75-95 grams (2.6-3.4 oz)



Step 18: Time to clean up the inside of the final drive. This area need to be cleaned expecially the area where the keeper (snap ring) sets. Once this is done get out your anti sieze and lube up the inside of the final drive and the end of the axle shaft including the end where the snap ring sets.

Step 19: Installing the axle assembly. Start by installing the hub nut flush backwards onto the axle then making sure the inboard joint bearing is fully depressed into the CV cup then slide it into the final drive aligning up the splines until it hits the snap ring then either push like heck or smack the end of the axle assembly with a dead blow hammer. Don't knock it off the stands. Then remove axle nut lube up with anti seize and reassembly in reverse order of removal. Do not forget to grease up the parts covered earlier. Do not tighten up any parts until they are all installed then torque to specs. Saving the wheels for last.

I hope you find this helpful and if all else fails refer the Honda manual and Pilotodyssey .com for further help. Some of the content is from the manual and the Honda parts list. As always I'm not a professional in any way just a back yard hacker.

Adnho.