

# CHAPTER 5 FINAL DRIVE

## WARNING

The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each ATV model for spare parts information and service.

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**NOTE.** *ELECTRIC 4WD SHIFT---See CHAPTER 7 ELECTRICAL*

**5.1 WHEEL, HUB, AND SPINDLE TORQUE TABLE**

Item	Specification
Front Wheel Nuts	69 Ft.Lbs 96 N.m
Rear Wheel Nuts	69 Ft.Lbs 96 N.m
Front Hub Nut on Spindle/ outer CV joint	Refer to FRONT HUB INSTALLATION
Rear Hub Retaining Nut	ATV400: 101Ft.Lbs 137N.m

**CAUTION:** Locking nuts, and bolts with pre-applied locking agent should be replaced if removed. The self- locking properties of the nut or bolt are reduced or destroyed during removal.

**5.2 FRONT HUB DISASSEMBLY/INSPECTION**

1. Elevate front end and safely support machine under footrest/frame area.

**CAUTION**

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Check bearings for side play by grasping tire/wheel firmly and checking for movement. It should rotate smoothly without binding or rough spots.
3. Remove wheel nuts and wheel.
4. Remove brake caliper
5. Remove hub cap, cotter pin, front spindle nut, and washer.
6. Rotate each bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion. Replace bearing if moisture, dirt, corrosion, or roughness is evident.
7. Place a shop towel on hub to protect surface. Carefully pry seal out of hub. Do



not damage the surface of the seal. Clean the hub.

8. Drive bearing out through opposite side of hub and discard.
9. Drive other bearing out and discard.
10. Clean hub and spacer thoroughly.



**5.2 FRONT HUB REMOVAL/INSPECTION 4x4**

1. Elevate front end and safely support machine Under footrest/frame area.

**CAUTION:**

Serious injury may result if machine tips or falls, Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Check bearings for side play by grasping the tire/Wheel firmly and checking for movement. Grasp The top and bottom of the tire. The tire should rotate smoothly without binding or rough spots.
3. Remove wheel nuts and wheel.
4. Remove the two brake caliper attaching bolts.

**CAUTION:**

Do not hang the caliper by the brake Line. Use wire to hang the caliper to prevent. Possible damage to the brake line.

5. Remove hub cap, cotter pin, front spindle nut, and Washer.
6. Rotate each bearing by hand and check for smooth rotation. Visually inspect



bearing for moisture, dirt, or corrosion, or roughness is evident.



**5.3 FRONT HUB INSTALLATION 4X4**

1. Inspect the hub strut bearing surface for wear or damage.
2. Apply grease to drive axle spindle.
3. Install spindle through the backside of the hub strut. Install the hub onto the spindle.
4. Install spindle nut and tighten to specification.
5. Install a new cotter pin. Tighten nut slightly if necessary to align cotter pin holes.
6. Rotate wheel and check for smooth operation. Bend both ends of cotter pin around end of Spindle in different directions.
7. Install hub cap.
8. Rotate hub. It should rotate smoothly without binding or rough spots or side play.
9. Install brake caliper using new bolts. Tighten bolts to specified torque.



**CAUTION:** New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

10. Install wheel and wheel nuts and tighten evenly in a cross pattern to specified torque.



## **5.4 FRONT HUB BEARING REPLACEMENT 4X4**

1. Remove outer snap ring.
2. From the back side, tap on the outer bearing race with a drift punch in the relief as shown.
3. Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.
4. Inspect bearing.



**NOTE:** Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. inspect for rough spots, discoloration, The bearings should turn smoothly and quietly, no detectable up and down movement and minimal movement sideways between inner and outer race.

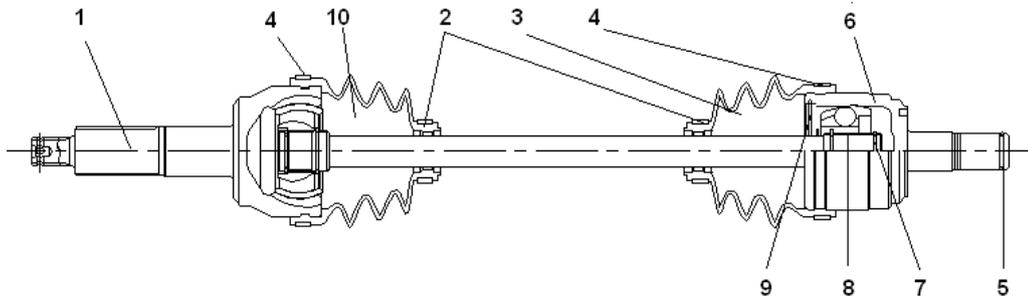
5. Inspect bearing housing for scratches, wear or damage. Replace housing if damaged.



**5.5 FRONT DRIVE AXLE (INNER AND OUTER CV JOINT) REMOVAL/**

**INSPECTION (4X4)**

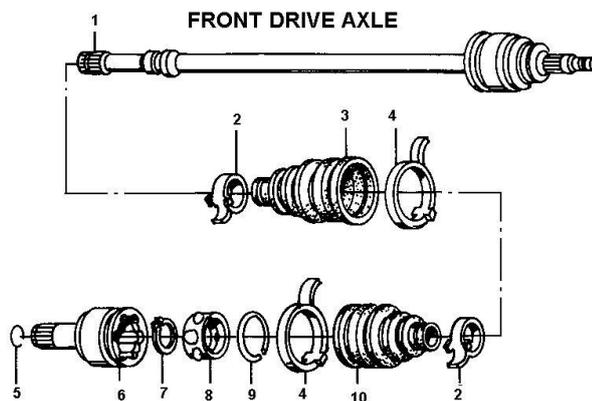
**FRONT DRIVE AXLE**



**NOTE**

The outer CV joint cannot be disassembled or repaired, if damage or faulty the drive axle assembly must be replace.

1. Drive axle/ outer CV joint assembly.
2. Boot band "A".
3. Outer board boot.
4. Boot band "B".
5. Stopper ring
6. Outer CV joint \*
7. Circlip
8. Bearing \*
9. stopper ring
10. Inboard boot.



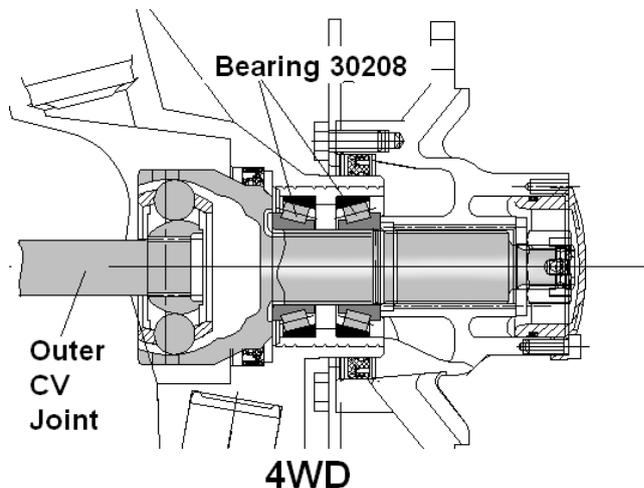
**NOTE:** Always order and replace 6 and 8 together.

**REMOVAL**

1. Place the vehicle on level ground and set the parking brake, Block the rear wheels so the vehicle will not roll in either direction.
2. Remove the front wheels, steering tie rods, disconnect the A arm on the ball joint end as described in this Chapter and Chapter 4.

**CAUTION**

To avoid damage to the front differential oil seal, hold the front drive shaft horizontal and straight out from the front differential during removal.

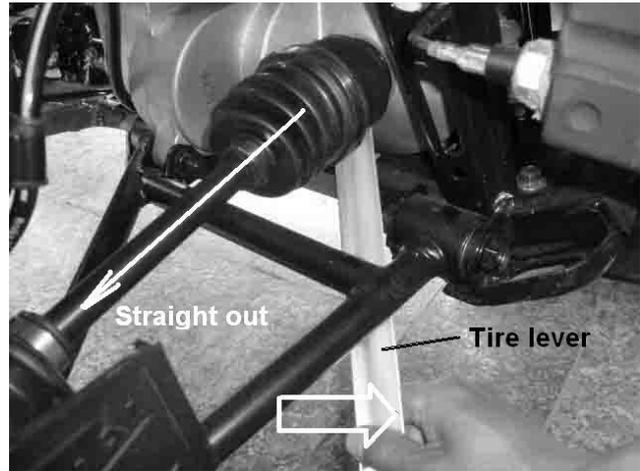


3. Hold the drive shaft straight out.
4. Place a tire lever between the inner CV joint and the differential housing, with a small piece of wood against the housing to help get "leverage" and protect the casting. "pop" the in inner CV joint out from the front differential.

**INSPECTION**

**NOTE** The boots are subjected to a lot of abuse if the vehicle is ridden in rough terrain. If the boots are damage and left un-repaired, the driveshaft joints will fair prematurely by allowing the joint to be exposed to dirt, mud and moisture. This also allow the loss of critical lubrication.

1. Check the rubber boots for wear, cuts or damage and replace if necessary as described under the Disassembly / Assembly procedure in this chapter.
2. Move each end of the drive shaft in a circular motion (and also a reciprocate for inner one) and check the drive shaft joints for excessive wear or play.
3. This inner CV joint (inboard pivot joint) can be serviced if there is wear or play. The outer CV joint (outboard pivot joint) cannot be serviced if worn or damage and if necessary, the drive shaft assembly must be replaced.

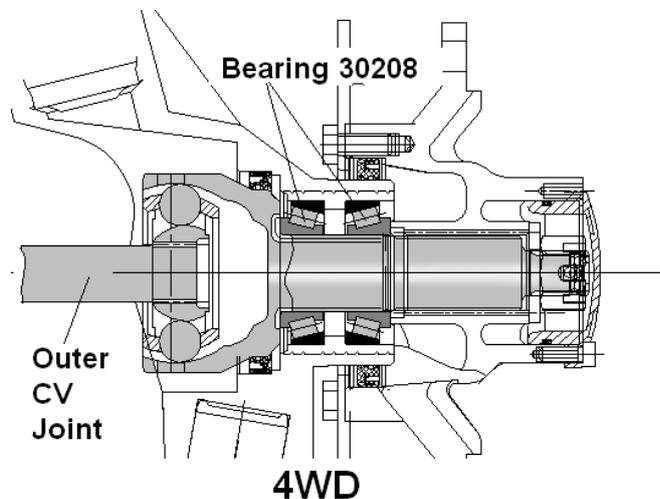


**5.6 FRONT DRIVE AXLE INSTALLATION (4X4)**

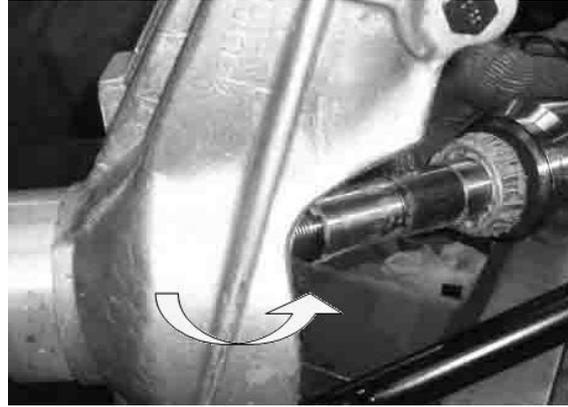
**CAUTION**

To avoid damage to the front differential oil seal and the strut oil seal, hold the front drive shaft horizontal and straight into the strut during installation.

1. Hold the drive shaft straight in from the front differential.
2. Push the drive shaft straight into the front differential and push it in all the way until it bottoms out. If necessary, carefully tap on the outer end of the drive shaft with a rubber mallet or soft-faced mallet.



3. After the drive shaft is installed, pull the inner CV joint a little to make sure the drive shaft stopper ring has locked into the front differential side gear groove.
4. Carefully install the outer CV joint (spindle) into the strut, install the front hub and wheel.
5. Install the ball joint on the A arm, the steering tie rods, the hubs and the wheels as described in this Chapter and Chapter 4.



**5.7 FRONT DRIVE AXLE DISASSEMBLY/ INSPECTION (4X4)**

**INNER CV JOINT DISASSEMBLY**

**NOTE**

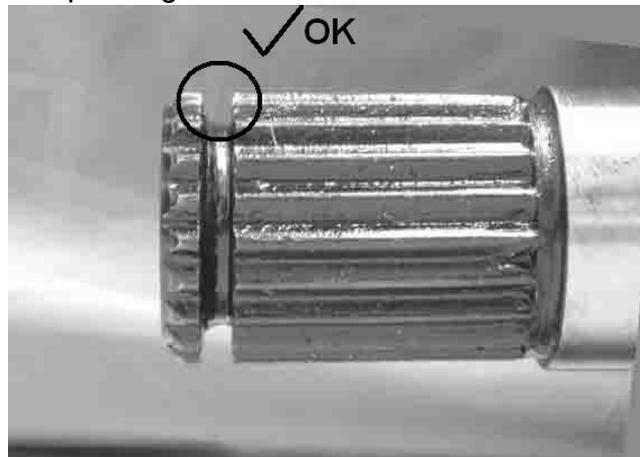
The outer CV joint cannot be disassembled or repaired, if damage or faulty the drive axle assembly must be replace.

1. Open the clamps on both boot band “A” and “B” on the inner CV joint, then remove boot band “B” .Discard the boot band, it cannot be reused.
2. Carefully slide the boot (A) onto the drive axle and off the inboard joint.
3. Wipe out all of the molybdenum disulfide grease within the inboard joint cavity.
4. Remove the stopper ring from the inboard joint.
5. Remove the inner CV joint.
6. Remove the circlip and slide off the bearing assembly. Be careful not to drop any of the steel balls from the bearing cage.
7. slide the inner CV off the drive axle and discard the boot band “A”, it cannot be reused.
8. If the outboard boot requires replacement, perform the following:
  - a. Open the clamps on both boot bands “A” and “B” on the outer CV joint, then remove boot band “B” .Discard the boot band, it cannot be reused.
  - b. Slide the outboard boot off the drive



Remove the stopper ring

Inspect groove

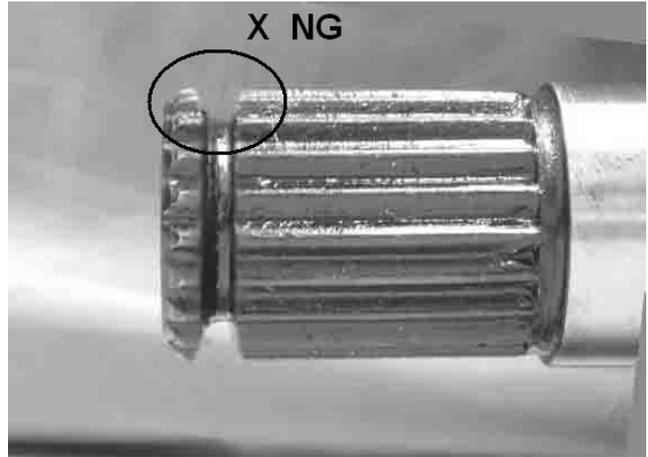


axle and discard the boot band “A” , it cannot be reused.

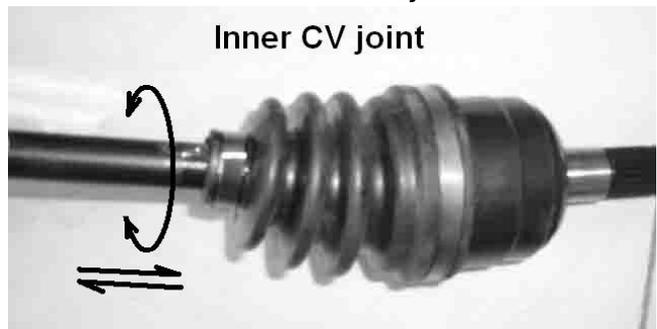
9. Inspect the drive axle as described in this chapter.

**INNER CV JOINT INSPECTION**

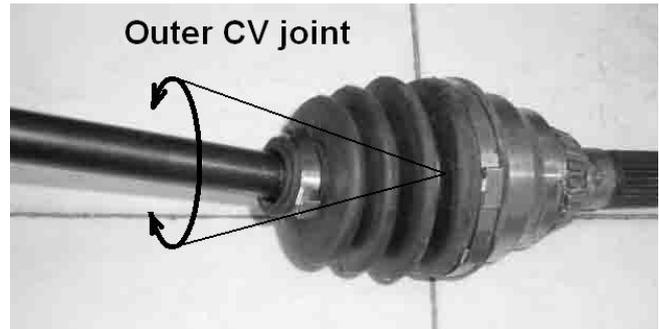
1. Clean the bearing assembly in solvent and thoroughly dry.
2. Inspect the steel balls, bearing case and the bearing race for wear or damage.
3. Check for wear or damage to the inner splines of the bearing race.
4. If necessary, disassembly the bearing assembly for further inspection. Carefully remove the steel balls from the bearing cage then remove the bearing race from the bearing cage.
5. If any of the components of the bearing assembly are damaged, replace the entire assembly as no replacement parts are available.
6. Clean the inner CV joint in solvent and thoroughly dry.
7. Inspect the interior of the inboard joint where the steel balls ride. Check for wear or damage and replace the joint if necessary.
8. Inspect the snap ring groove on the inboard joint for wear or damage.
9. Inspect the splines on the inner CV joint for wear or damage.
10. Check the stopper ring in the end of the inboard joint. Make sure it seats in the groove correctly, if damage the ring must be replaced.
11. Inspect the exterior of the inner CV joint for cracks or damage, replace if necessary. Check the movement of the joint for excessive play or noise by moving the drive axle in a circular and reciprocate direction.
12. Inspect the drive axle for bending, wear or damage.
13. Inspect the inner end splines, the outer end splines and the front hub cotter pin



Check the movement of the joint



hole for wear or damage. If any of these areas are worn or damaged, replace the drive axle.



**NOTE.** Inner CV joint must be replaced with the bearing as an assembly.

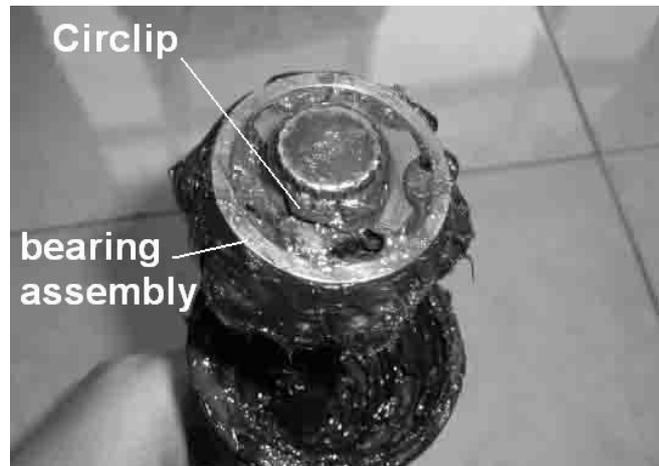
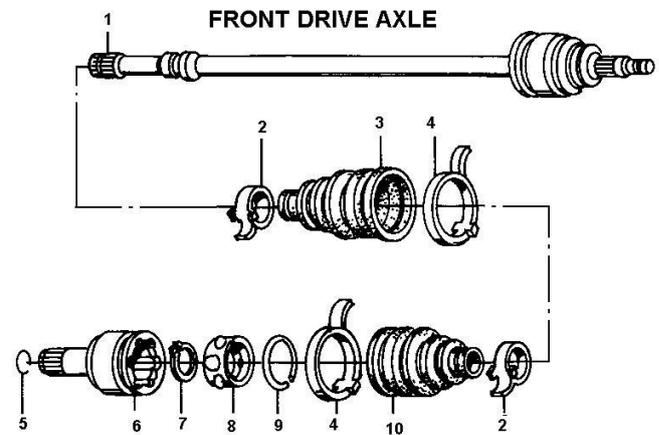
**5.8 FRONT DRIVE AXLE ASSEMBLY (4X4)**

1. The rubber boots are not identical and must be installed on the correct joint. The boots are marked as follows:
  - a. Inner CV joint boot : “inner”,
  - b. Outer CV joint boot: “outer”.
2. IF the outboard boot was removed, install a new boot onto the drive axle at this time.

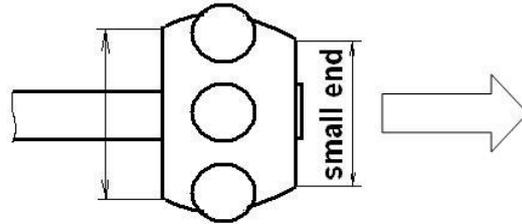
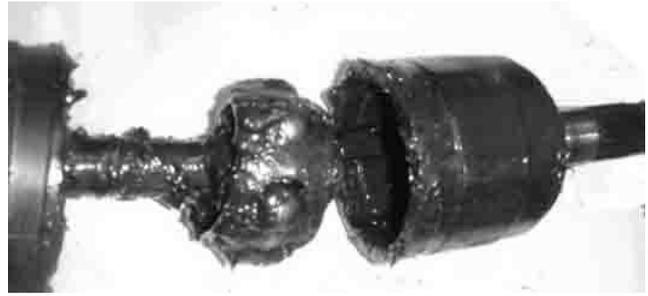
**NOTE**

Position the new boot bands with their tabs facing toward the rear of the vehicle.

3. Install 2 new small boot bands onto the drive axle.
4. Install the inboard boot and move the small boot band onto the boot. Bend down the tab on the boot band and secure the tab with the locking clips and tap them with a plastic hammer. Make sure they are locked in place.
5. If the bearing assembly was disassembled, assemble the bearing as follows:
  - a. Position the bearing race and install the race into the bearing case. Align the steel ball receptacles in both parts.
  - b. Install the steel balls into their receptacles in the bearing case.
  - c. Pack the bearing assembly with molybdenum disulfide grease. This will help hold the steel balls in place.



6. Position the bearing assembly with the small end of the bearing going on first and install the bearing onto the drive axle.
7. Push the bearing assembly on until it stops, then install the circlip, Make sure the circlip seats correctly in the drive axle groove.
8. Apply a liberal amount of molybdenum disulfide grease to the bearing assembly. Work the grease in between the balls, the race and the case. Make sure all voids are filled with grease.
9. Apply a liberal amount of molybdenum disulfide grease to the inner surfaces of the inboard joint.
10. Install the inboard joint over the bearing assembly and install the stopper ring. Make sure it is seated correctly in the inboard joint groove.
11. After the stopper ring is in place, fill the inboard joint cavity behind the bearing assembly with additional molybdenum disulfide grease.
12. Pack each boot with the following amounts of molybdenum disulfide grease:
  - a. Inboard boot:35-55grams(1.2-1.9oz.).
  - b. Outboard boot:30-50grams(1.1-1.8oz.).
13. Move the inboard boot onto the inner CV joint.
14. Move the inboard joint on the drive axle.



**NOTE**

Position the new boot bands with their tabs facing toward the rear of the vehicle .

15. Move the small boot band onto the boot. Bend down the tab on the boot band and secure the tab with the locking clips and tap them with a plastic hammer. Make sure they are locked in place.
16. Install the large boot bands onto each boot.

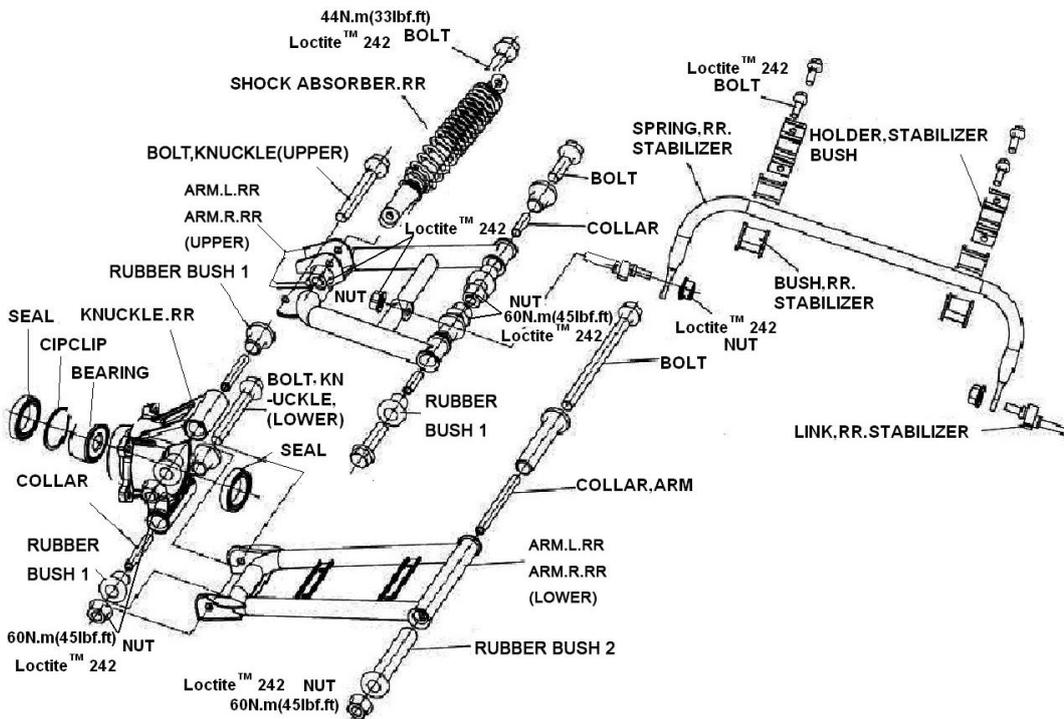
**CAUTION**

It is critical to avoid undue stress on the rubber boots after the drive axle is installed and the vehicle is run. Don't twist the boot, and always set the both ends in designed position.



17. Secure all large boot bands. Bend down the tab on the boot band and secure the tab with the locking clip and tap them with a plastic hammer. Make sure they are locked in place.
18. If removed, install the stopper ring and make sure it is seated correctly in the drive axle groove.
19. Apply molybdenum disulfide grease to the end splines.

**5.9 REAR HUB INSPECTION**



1. Remove rear wheel.
2. Remove the cotter pin on the rear wheel driving shaft nut, than remove the nut.
3. Remove the rear disc brake caliper.
4. Remove the link, RR. Stabilizer.
5. Remove the mounting bolt of rear shock absorber and upper and lower A-arm. Takedown the

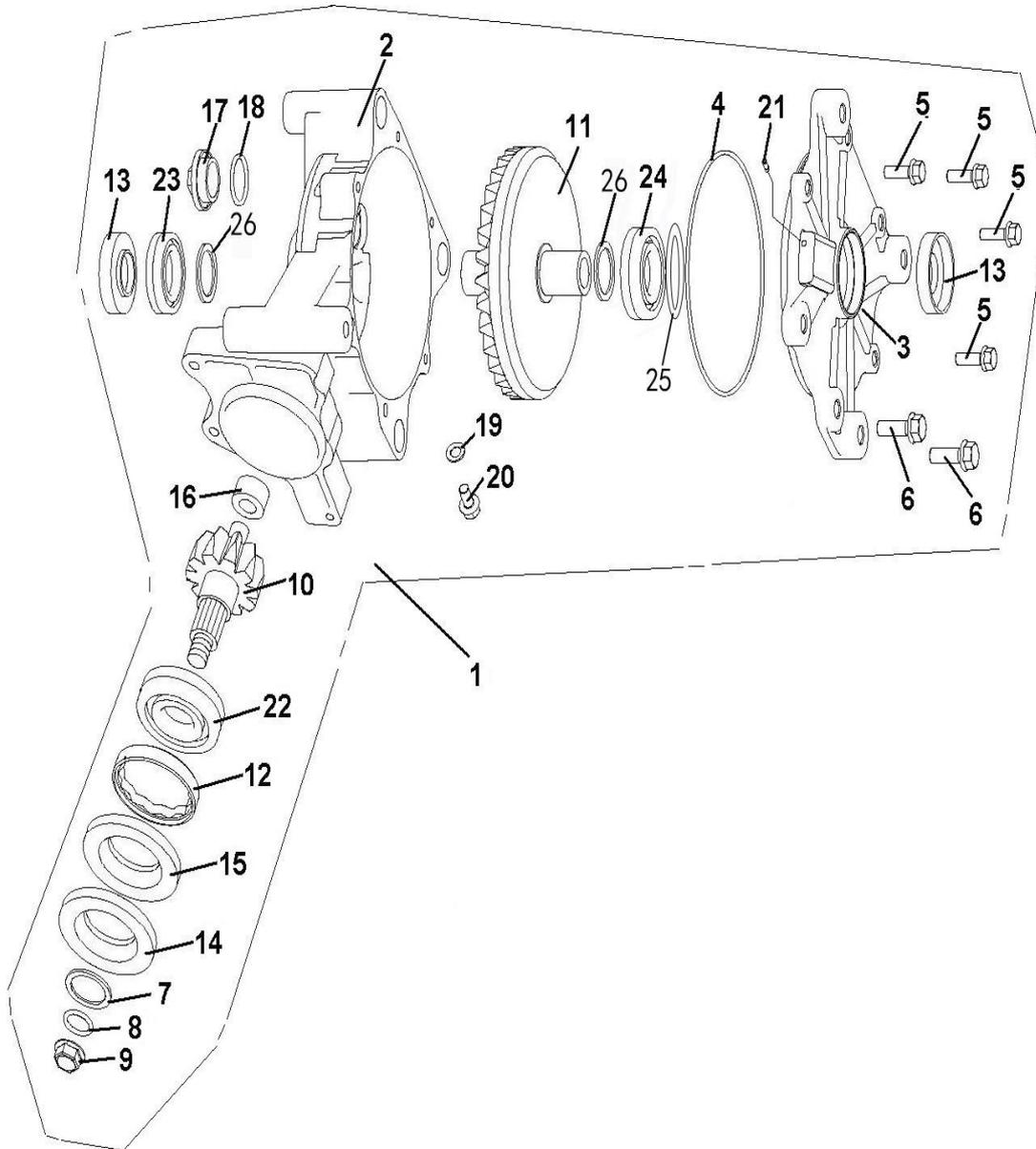
A-arm components.

6. Remove the mounting bolt of the rear hub, after that inspect bushes, A-arms and collar. Replace if worn. Discard hardware.



7. Using hub extractor to take down the rear hub.
8. Remove oil seal.
9. Remove the snap spring of the rear hub.
10. Using bearing extractor to take down the hub bearing.  
Notice: when reassembling hub bearing that were removed and rear hub, which are need replaced. (The method is in accordance with removing steering knuckle.)

**5.10 REAR GEARCASE DISASSEMBLY**



- |                                     |                                    |                                  |
|-------------------------------------|------------------------------------|----------------------------------|
| 1. REAR GEAR-BOX ASSY               | 2. DRIVE HOUSING                   | 3. OUTPUT COVER                  |
| 4. O-RING 160X2.65                  | 5. BOLT M8X28                      | 6. BOLT M10X1.25X28              |
| 7. WASHER 31                        | 8. O-RING 20X3                     | 9. NUT M16X1.5                   |
| 10. OUTPUT AXLE, RING REAR GEAR-BOX | 11. INPUT AXLE, RING REAR GEAR-BOX | 12. LOCK NUT                     |
| 13. SEAL 30X55X11                   | 14. SEAL 38X85X8                   | 15. SEAL 38X80X8                 |
| 16. BEARING 15NQ2815                | 17. OIL SCREEN CAP                 | 18. O-RING                       |
| 19. WASHER                          | 20. OIL PLUG                       | 21. TUBE, REAR GEAR-BOX BREATHER |
| 22. BEARING 6306                    | 23. BEARING 6006                   | 24. BEARING                      |
| 25. WASHER 53                       | 26. WASHER 31(B)                   |                                  |

1. Drain and properly dispose of used oil.
2. Loosen the cover bolts in a crisscross pattern in several steps and remove them.
3. Pry the cover at the prying points using a screw-driver and remove the output cover. Remove the o-ring.
4. Remove the ring gear and bearing assembly.
5. Remove the oil seals and o-ring.
6. Unstuck the pinion bearing lock nut with a drill or grinder. Remove the lock nut using the special tool.
7. Remove the pinion bearing assembly.



### **5.11.1 REAR GEARCASE ASSEMBLY**

1. Drive the pinion gear assembly into the drive housing.
2. Install a new lock nut and tighten it using the special tool.
3. Stake the lock into the case groove.
4. Coat a new O-ring with grease and install it onto the pinion gear shaft.
5. Apply grease to the lips of new oil seals. Install the inner oil seal into the drive housing until it is flush with the stepped edge.
6. Install the outer oil seal into the drive housing until with the drive housing outer surface.
7. Coat a new O-ring with grease and install it into the cover groove.
8. Install the outer cover onto the drive housing.
9. Install the cover bolts and tighten them in several steps until the cover evenly touches the drive housing. Then while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.  
TORQUE:  
10mm bolt: 45Nm  
8mm bolt: 20Nm
10. Check that the gear assembly turns smoothly without binding.



### 5.11.2 BACKLASH INSPECTION

1. Remove the oil filler cap.
2. Install the special tool into the pinion joint, and set the final drive assembly and tool in a vise.
3. Install the drive shaft into the final drive assembly and hold it.
4. Set a horizontal type dial indicator on the ring gear through the filler hole.
5. Turn the ring gear back and forth with the drive shaft to read backlash.

**STANDARD:0.05-0.25mm**

**SERVICE LIMIT:0.4mm**

6. Remove the dial indicator. Turn the ring gear 120° and measure backlash.
7. Repeat this procedure once more.
8. Compare the difference of the three measurements.

**SERVICE LIMIT:0.2mm**

9. If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed.
10. Inspect the bearings and case.
11. If the backlash is excessive, replace the ring gear right shim with a thinner one.
12. If the backlash is small, replace the ring gear right shim with a thicker one.
13. Backlash is changed by about 0.06mm when thickness of the spacer is changed by 0.12mm.



## 5.12 FRONT GEARCASE SLIP LIMIT TORQUE TEST

**CAUTION:** Slip limit torque relate to the preload on the differential (see 5.19 FRONT DIFFERENTIAL ASSEMBLY), and affect the Steering Effort (heavy steering). Always field test the ATV carefully and thoroughly after front gearcase and differential service for vehicle maneuvers and operation.

Mount the front gear case assembly to Torque Test Jig. The input shaft must be firmly held by the jig, and measure one side output shaft by turning with a torque gauge until another side start to spin counter wise.

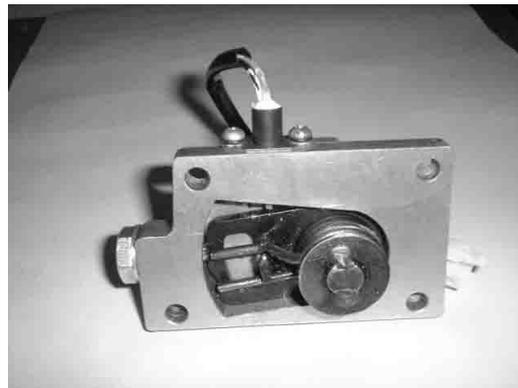
**Slip torque: 35---45N.m for Europe  
45---55N.m for USA**

**Note:** It is recommended to replace the FRONT DIFFERENTIAL as an assembly when out of specification.

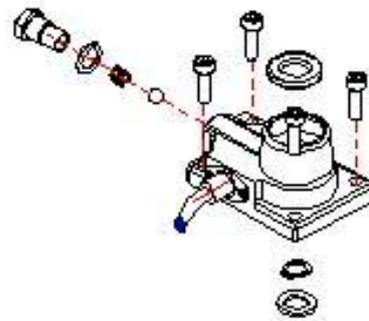


## 5.13 FRONT GEARCASE DISASSEMBLY/ INSPECTION

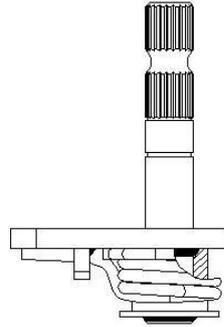
1. Drain and properly dispose of used oil.
2. Remove bolts and selector cover..



3. Remove screws and selector switch from the selector cover.
4. Remove bolt, washer, spring and detent ball from the selector cover.



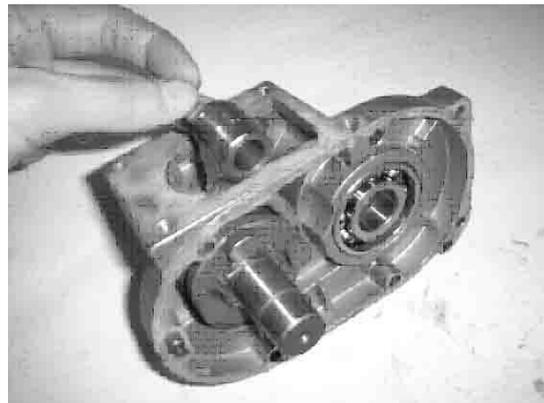
5. Remove seal, washers, circlip and selector shaft assembly from the selector cover.



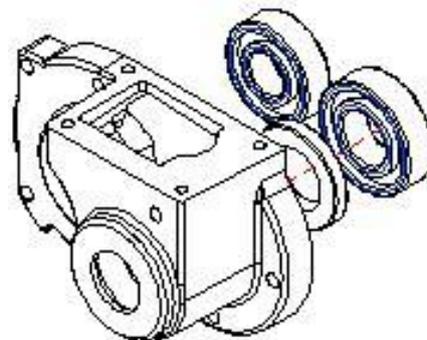
6. Remove bolts and diff case cover.  
7. Remove pins, gear and selector rail.



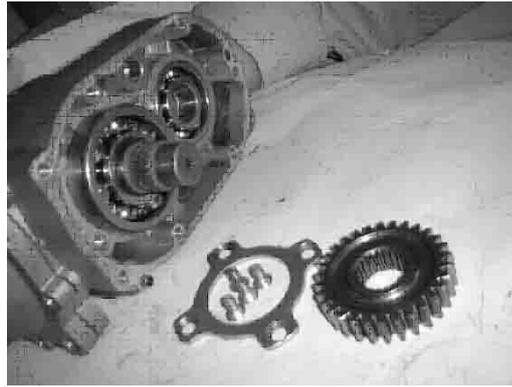
8. Remove selector fork, splined dog and input shaft.



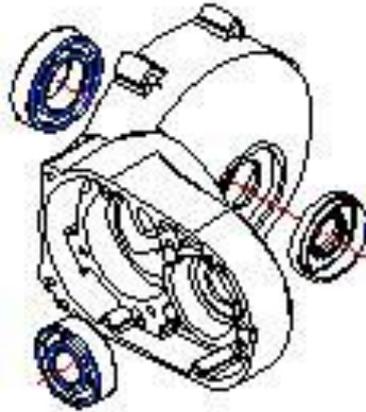
9. Remove bearing and seal.



10. Remove gear, screws, pinion shaft retainer plate and pinion shaft.



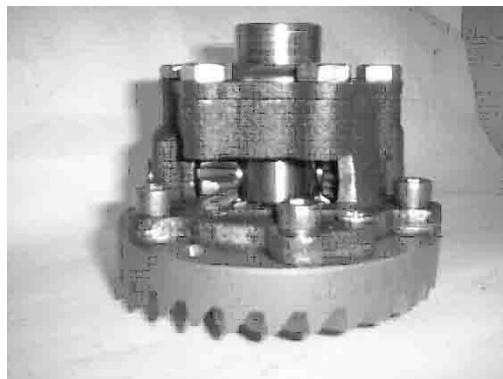
11. Remove seal from the case.



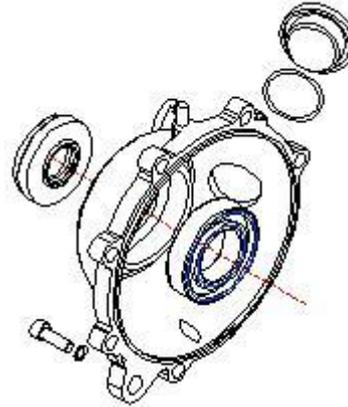
12. Remove bolts, left cover and differential.



Differential →



13. Remove seal from left cover.



14. Clean all components and inspect for wear. Inspect gears for wear, cracks, chips or broken teeth. Inspect engagement dogs and detent ball housing, replace if edges are rounded. Inspect casting for crack. Inspect bearings for smooth operation. Check for excessive play between inner and outer race. Inspect detent spring and finger spring for wear, cracks, relaxation. Replace part with any defects.

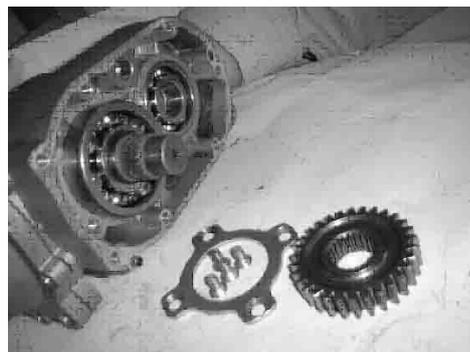
**IMPORTANT:** New seals should be installed after the transmission is completely assembled.

**5.14 FRONT GEARCASE ASSEMBLY**

- 1. Install pinion shaft with bearing.
- 2. Install retainer plate with flat side toward bearing and torque screws.

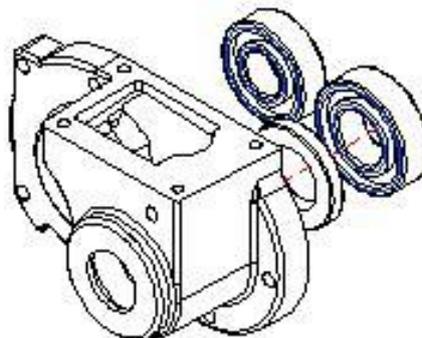
Apply Loctite™ 243(Blue) to screw threads and torque screws to 8ft.lbs. (12Nm)

- 3. Install gear.



- 4. Install oil seal.

**IMPORTANT:** New seals should be installed after the transmission is completely assembled.



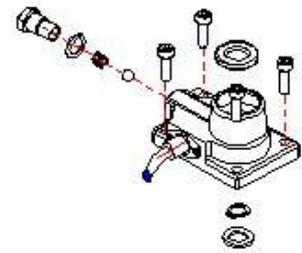
- 5. Install input shaft, splined dog, selector fork.
- 6. Install selector rail, gear and pins.



- 7. Apply LocTite™ 518 to mating surfaces, reinstall cover and torque bolts.  
8ft.lbs. (12Nm)



- 8. Install selector shaft assembly, washers, circlip, and new seal into the selector cover.
- 9. Install detent ball, spring, washer and bolt.
- 10. Install selector switch with new O-ring and screws.
- 11. Apply LocTite™ 518 to mating surfaces, reinstall selector cover and torque bolts.  
8ft.lbs. (12Nm)



- 12. Install differential into case.,  
Apply LocTite™ 518 to mating surfaces, reinstall left cover and torque bolts.  
14ft.lbs. (20Nm)
- 13. Install new seals.

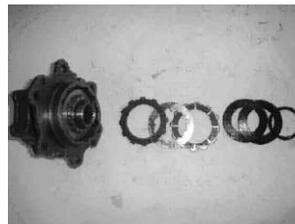
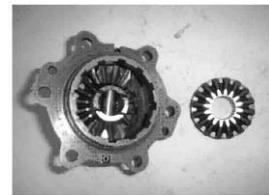


**5.15 FRONT DIFFERENTIAL DISASSEMBLY/ INSPECTION**

1. Remove bolts and bevel crownwheel.



- 2. Remove bolts and differential cap A.
- 3. Remove spring seat, springs, outer single clutch plate, differential plat, outer double clutch plate, bevel gear and gear axle washer.



4. Remove bolts and differential cap B.



5. Remove spring seat, springs, outer single clutch plate, differential plat, outer double clutch plate, bevel gear and gear axle washer.



6. Remove roll pin from center pin.  
7. Remove center pin, bevel pinion washers, bevel pinions and center spacer from differential housing.



8 Clean all components and inspect for wear. Inspect gears for wear, cracks, chips or broken teeth. Inspect inner and outer splines on the spider gears and friction plates, replace if edges are rounded. Inspect casting for crack. Inspect axletree for smooth operation, check for excessive play between inner and outer race. Inspect dish spring for wear, cracks, relaxation. Replace part with any defects.

**5.16 FRONT DIFFERENTIAL ASSEMBLY**

1. Install center pin, bevel pinion washers, bevel pinions and center spacer into differential housing.



2. Install bevel gear, gear axle washer, outer double clutch plate, differential plate, outer single clutch plate, springs, spring seat.



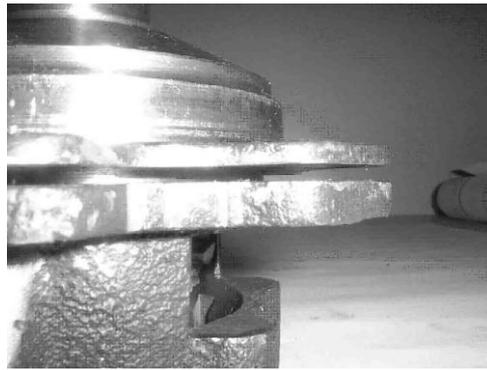
3. Install differential cap A.



4. Check the preload clearance.

**Clearance: 1.2—1.5mm**

Out of specification→ change spring seat, spring, .replace clutch plate as necessary,



5. Install bevel crownwheel, Apply Loctite™ 271 (red) to screw threads and torque bolts to 24ft.lbs. (32Nm)



6. Install bevel gear, gear axle washer, outer double clutch plate, differential plate, outer single clutch plate, springs, spring seat.

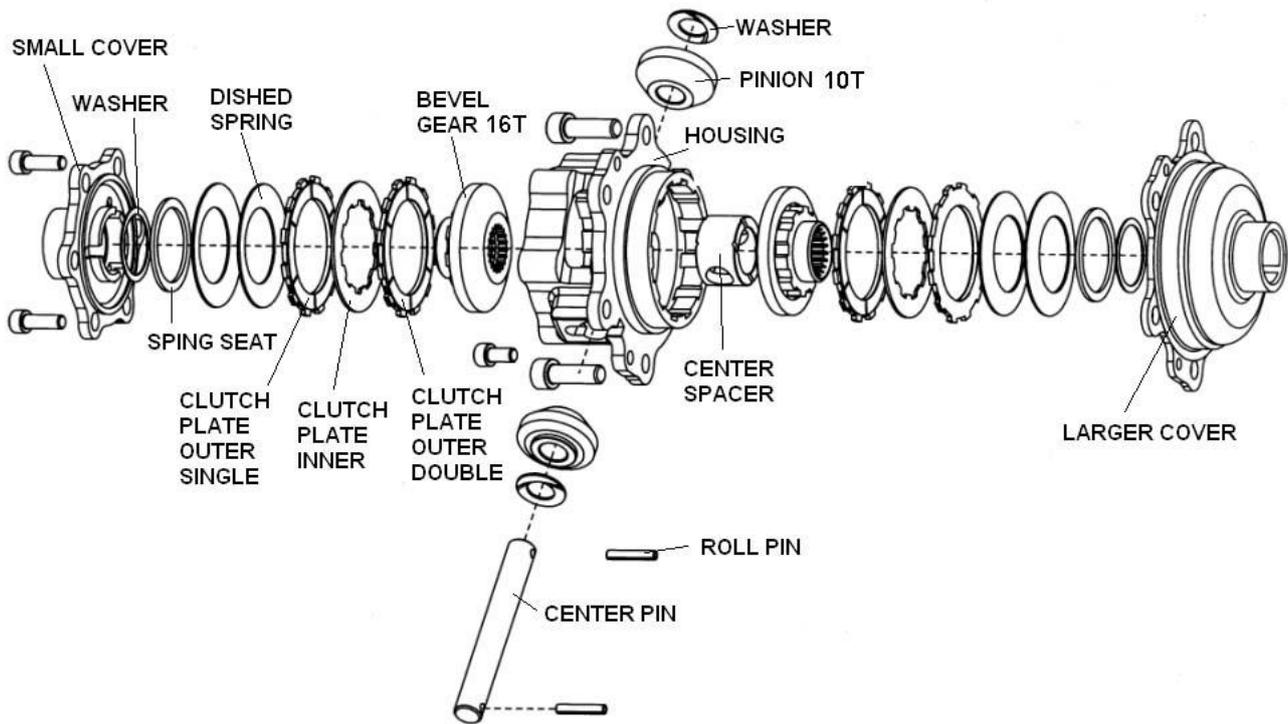


7. Install differential cap B.





DIFFERENTIAL CENTRE EXPLODED VIEW



**5.17 REAR, FRONT PROP SHAFT REMOVAL**

Using roll pin remover, remove the roll pin from prop shaft



Slide the prop shaft back and away from the gear case. (The swing arm must be disassembly from the frame before the rear prop shaft removal).

