

CHAPTER 8

TRANSMISSION (6X6)

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TRANSMISSION (6X6)

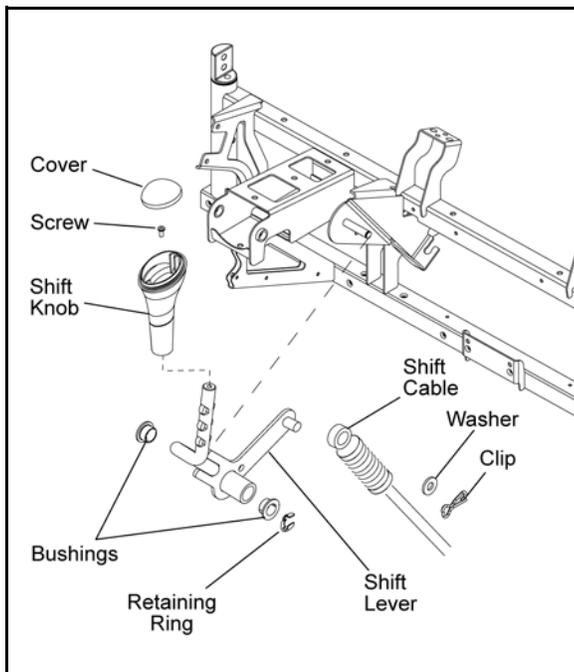
TORQUE SPECIFICATIONS

ITEM	TORQUE VALUE
Transmission Fill Plug	10-14 ft. lbs. (14-19 Nm)
Transmission Drain Plug	10-14 ft. lbs. (14-19 Nm)
Transmission Case Bolts	27-34 ft. lbs. (37-46 Nm)
Transmission Mounting Bolts	40 ft. lbs. (54 Nm)
Bell Crank Nut	12-18 ft. lbs. (16-24 Nm)
Bell Crank Gear Cover	7-9 ft. lbs. (10-12 Nm)

SHIFT LEVER

Removal

1. Remove the (2) push rivets retaining the dash panel and remove the panel from the dash to access the shift lever.
2. Remove the shift knob cover, retaining screw and shift knob from the shift lever.



3. Remove grommet around shift lever from the dash.
4. Remove clip and washer retaining shift cable to the shift lever. Disconnect the cable end from the lever.

5. Remove the retaining ring, outer washer, and both bushings from the shift lever.
6. Slide the shift lever off the mounting bracket and out from the frame.

Installation

1. Repeat the steps in reverse order to install the gear shift lever.

SHIFT CABLE

Inspection

Shift cable adjustment is necessary when symptoms include:

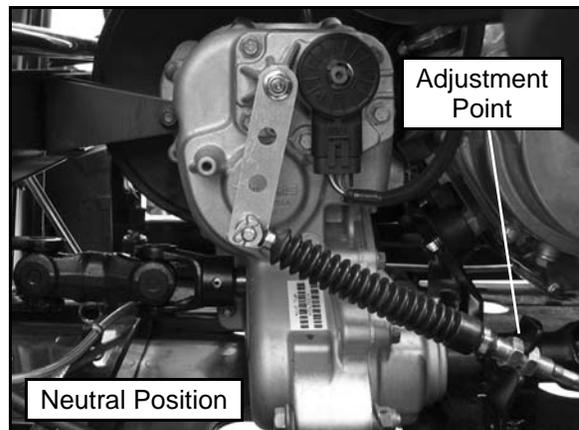
- Noise on deceleration
- Inability to engage a gear
- Excessive gear lash (noise)
- Gear selector is moving out of desired range

Inspect shift cable, clevis pins, and pivot bushings and replace if worn or damaged.

Adjustment

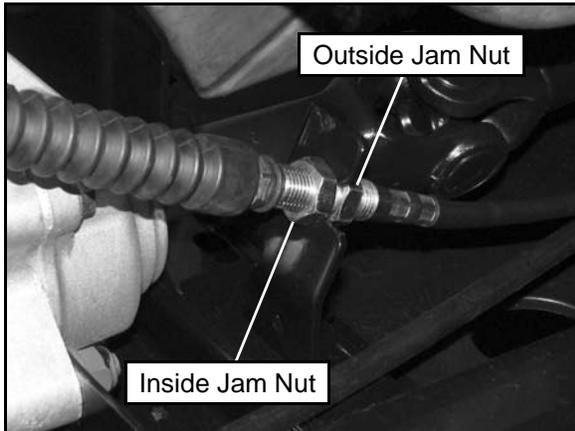
NOTE: The shift cable should be adjusted at the rear adjustment point located near the transmission. If adjustment is needed beyond that, remove the dash panel to access the shift cable adjustment point located underneath the shift lever.

1. Place gear selector in neutral. Make sure the transmission bell crank is engaged in the neutral position detents.



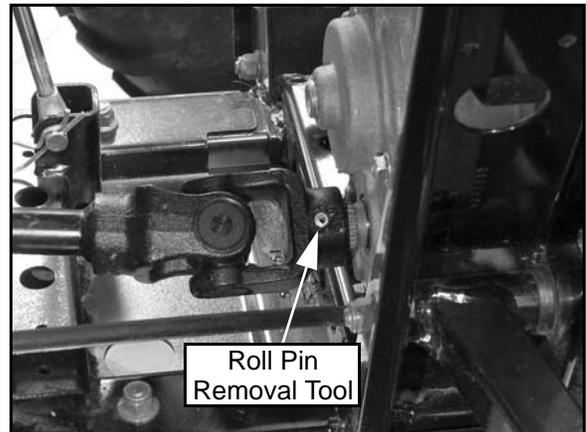
2. Locate the shift cable adjustment point attached to the frame in front of the transmission.

3. With two open-end wrenches loosen the outside jam nut counterclockwise. Turn the outside jam nut 1 1/2 turns.

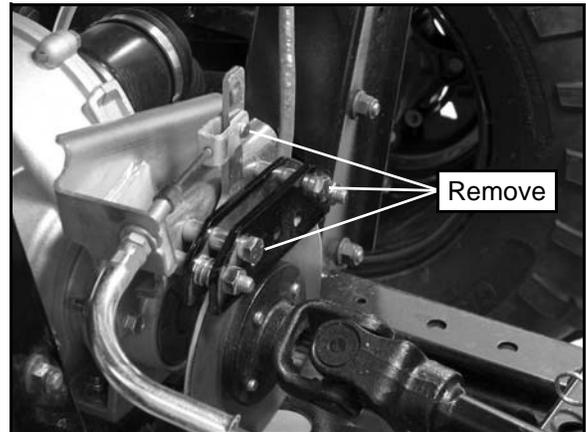


4. After turning the outside jam nut 1 1/2 turns. Hold the outside jam nut with a wrench and tighten the inside jam nut clockwise, until it is tight against the bracket.
5. Repeat Step 3 and Step 4 until the proper adjustment is made for the transmission cable.
6. Use this procedure to loosen or tighten the shift linkage cable as needed.

2. Drive the roll pin from the rear propshaft yoke located at the mid gearcase.



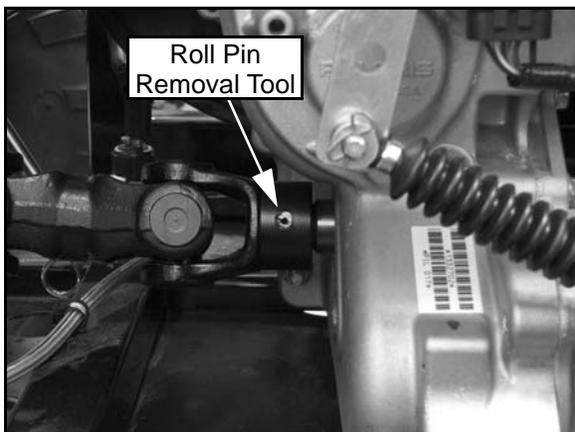
3. Remove parking brake caliper assembly from caliper mount bracket to allow the rear propshaft to slide back on the rear gearcase input shaft during removal.



TRANSMISSION SERVICE

Transmission Removal

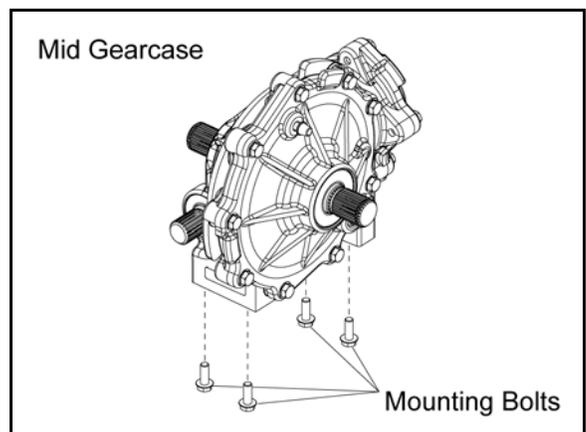
1. Drive the roll pin from the mid propshaft yoke located at the transmission.



Roll Pin Removal Tool (PN 2872608)

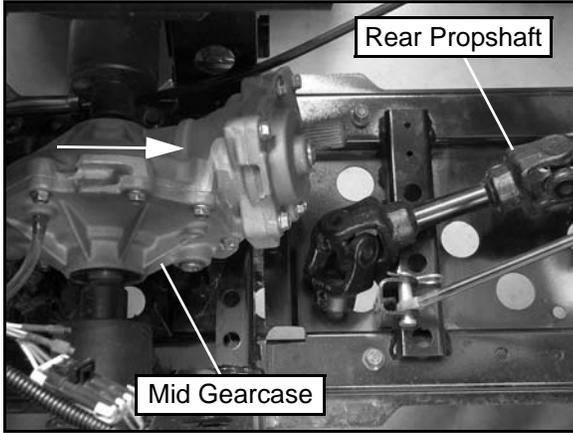
NOTE: The front propshaft yolk slides off during the transmission removal.

4. Slide rear propshaft back on rear gearcase input shaft and remove the propshaft from the mid gearcase.
5. Loosen the (4) bolts retaining the mid gearcase to the frame.

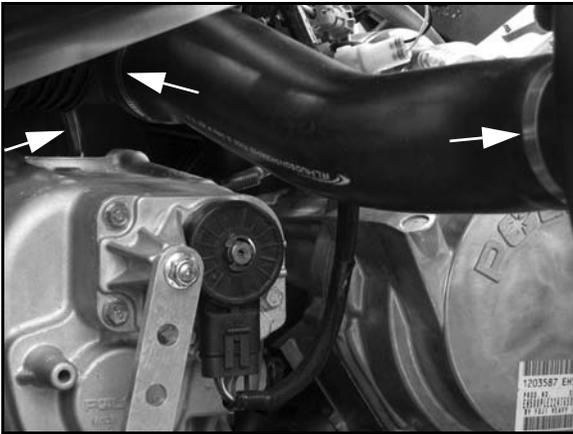


TRANSMISSION (6X6)

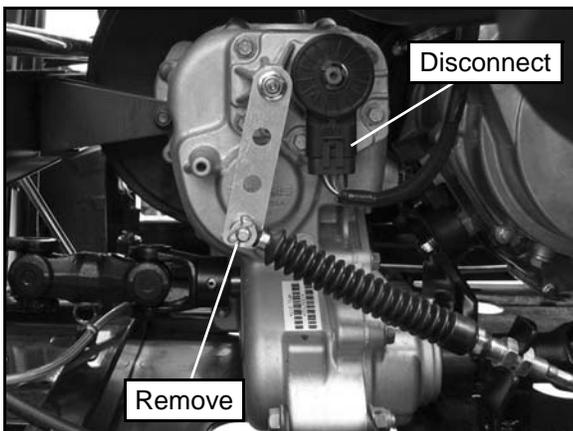
6. Slide the mid gearcase forward. Lift up on the gearcase to clear the frame and slide the gearcase towards the rear of the vehicle to remove the mid propshaft from the transmission.



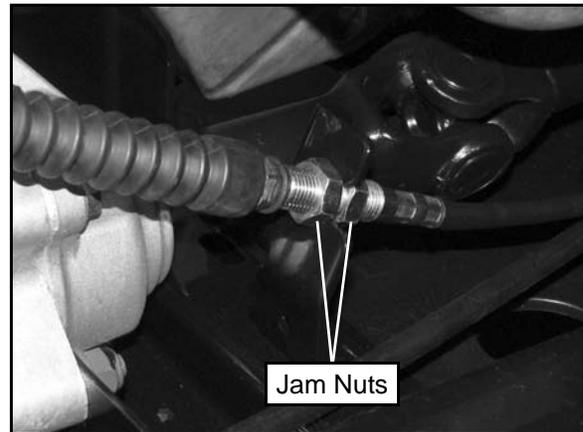
7. Remove the air intake hose from the air box and air intake baffle. Remove vent line from the top of transmission.



8. Disconnect the transmission switch and remove the pin clip from the shift cable end. Remove the washer and shift cable from the bellcrank.



9. Loosen the transmission shift cable jam nuts. Remove the cable from the mounting bracket.

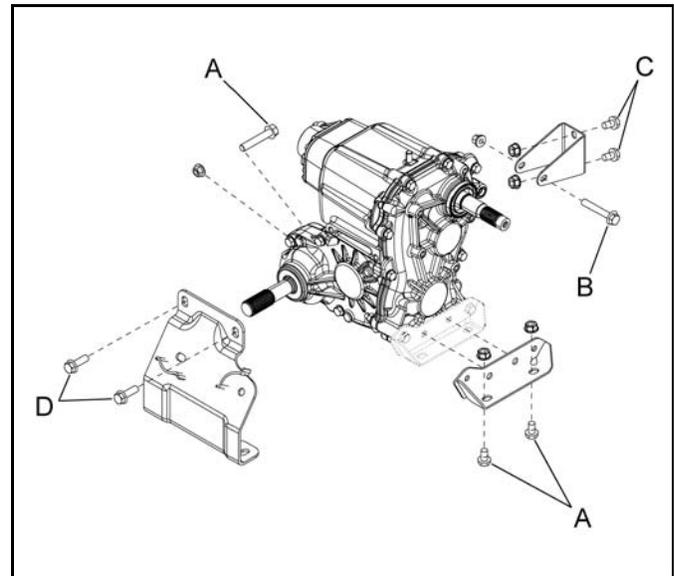


10. Remove the PVT system from the left side of the transmission (see Chapter 6 "Clutching").

11. Remove the transmission to frame bolts (A).

12. Remove the rear transmission mount bolt (B) and remove the rear transmission mount bracket bolts (C).

13. Remove the front transmission-to-engine mount bolts (D).

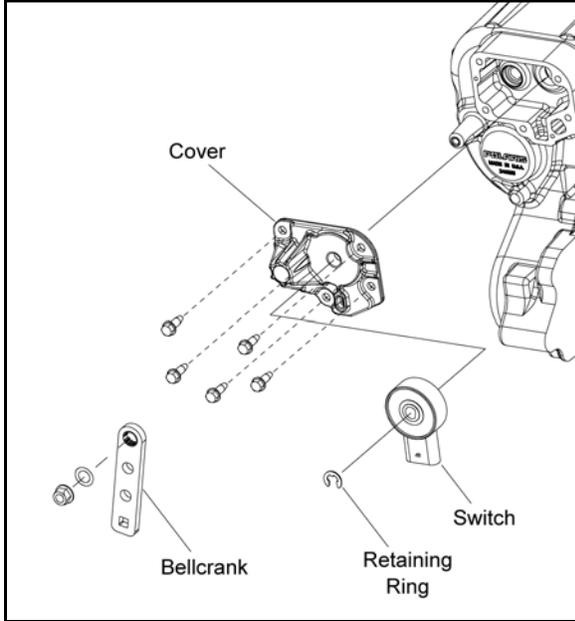


14. Remove transmission from right side of frame.

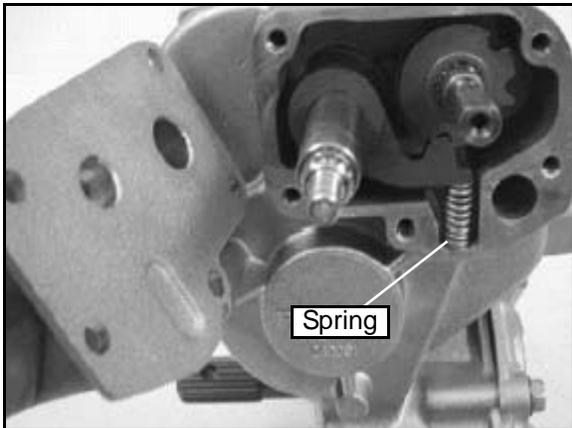
Transmission Disassembly

NOTE: Refer to the exploded view at the end of this chapter.

1. Remove the retaining ring and transmission switch.
2. Remove the nut and washer that secure the bell crank and remove the bellcrank.

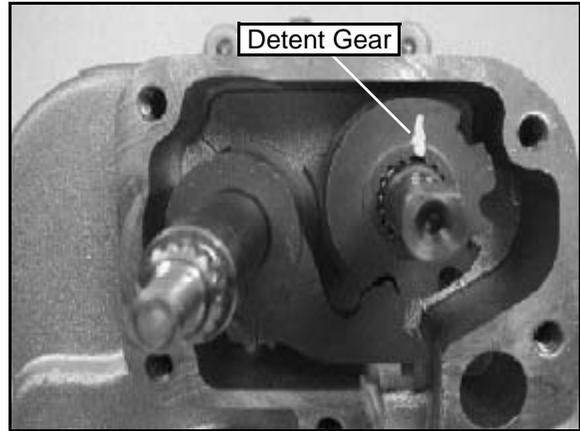


3. Remove the five bolts that secure the cover and remove the cover from the transmission.
4. Remove the detent spring.



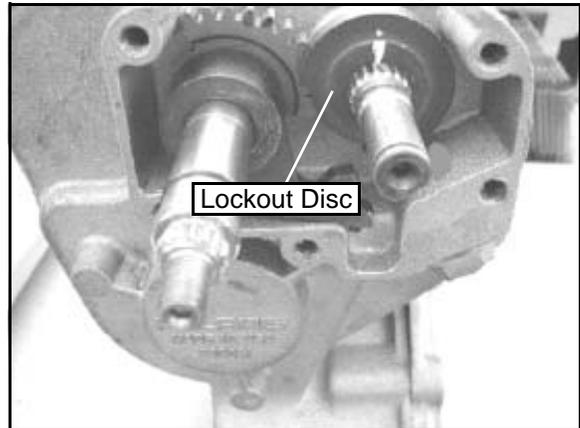
5. Mark the detent gear with a white pen. Remove the detent gear from the case.

NOTE: It may be helpful to place a mark just above the keyed spline.

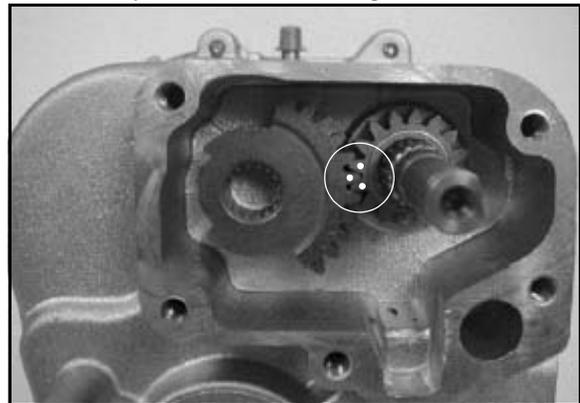


6. Mark the lockout disc, this will indicate which side of the disc faces outward during assembly. Remove the disc.

NOTE: It may be helpful to place a mark just above the keyed spline. Note the raised edge on the detent.



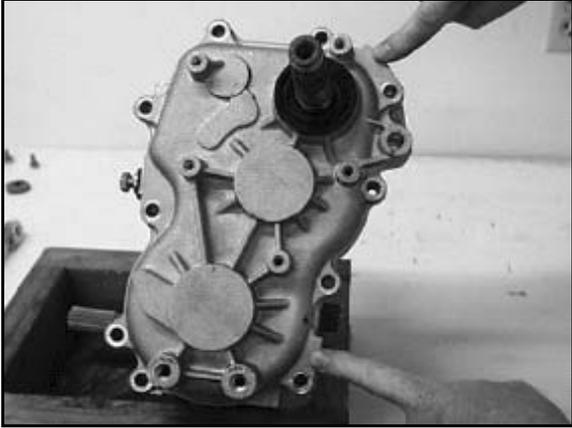
7. Remove the shift shaft and detent lever.
8. Note the transmission gear position and mark the two shift gears before removing them to aid with reassembly. Remove the shift gears from the case.



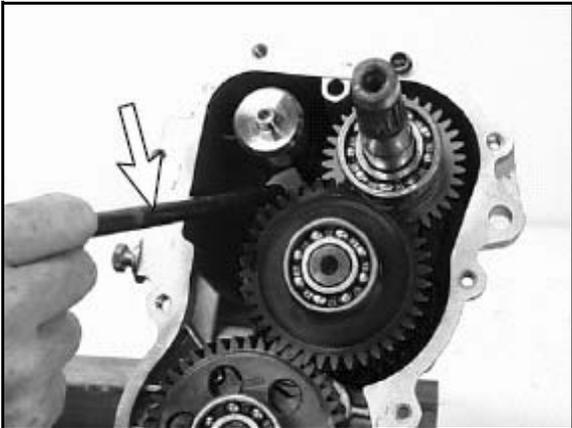
TRANSMISSION (6X6)

NOTE: Depending on what gear the transmission is in upon disassembly, the stamped timing marks may not be lined up. To avoid confusion, mark the two gears as described in Step 8.

9. Remove the bolts on the LH transmission case cover. Tap the cover off with a soft face hammer if necessary.

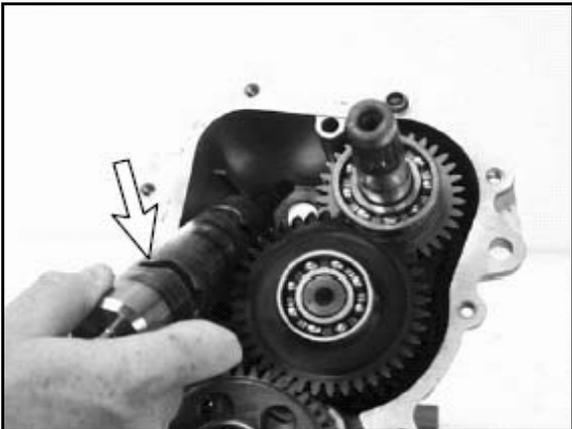


10. Lift shift rail 0.5"-1" (12.70-25.40 mm). Then rotate the shift rail / forks and shift drum, so the fork pins disengage from the drum.

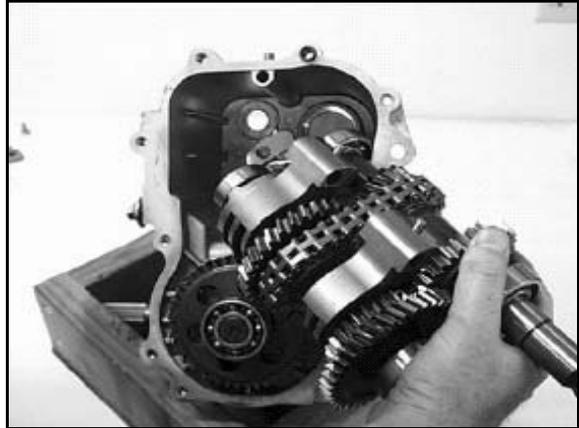


11. Remove the shift drum.

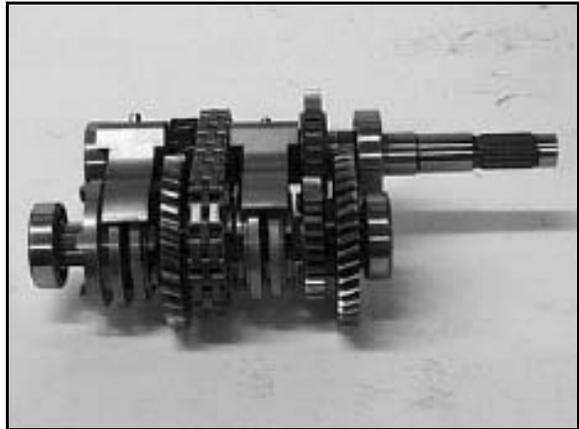
NOTE: You may have to tap the shift drum from the backside of the case to aid in removal.



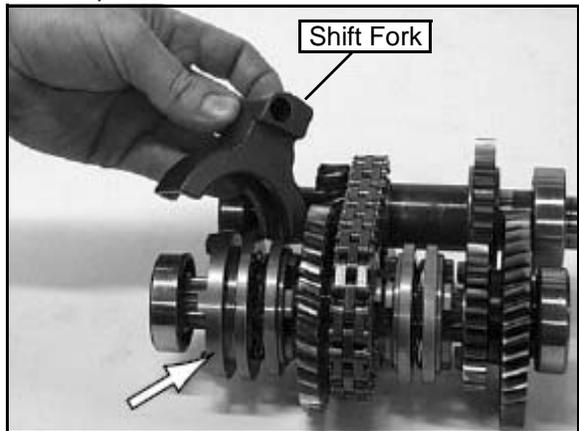
12. Remove the upper gear cluster and shift forks. You may need to move the assembly back and forth to aid in removal



13. Set the upper gear cluster on a flat surface and inspect the components.

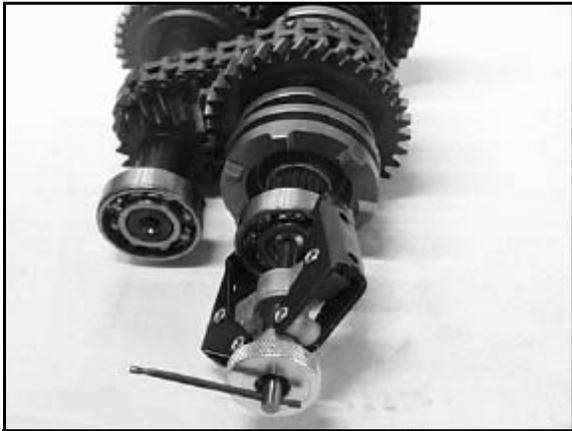


14. Remove the shift forks from the assembly. Note the correct position of each fork.

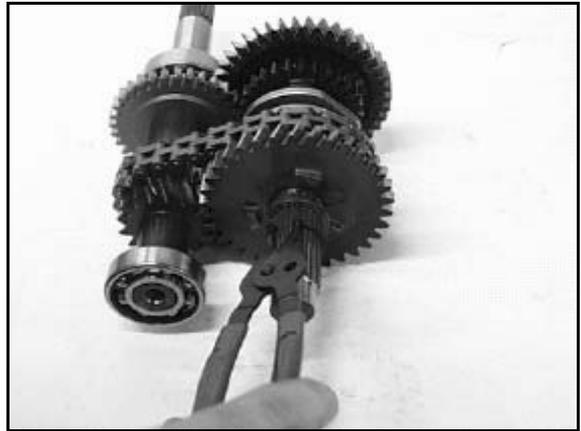


NOTE: The picture above depicts a transmission with a "Park" engagement dog on the end of the shaft instead of a regular engagement dog. The transmission will have a regular engagement dog in the location indicated by the arrow in the photo.

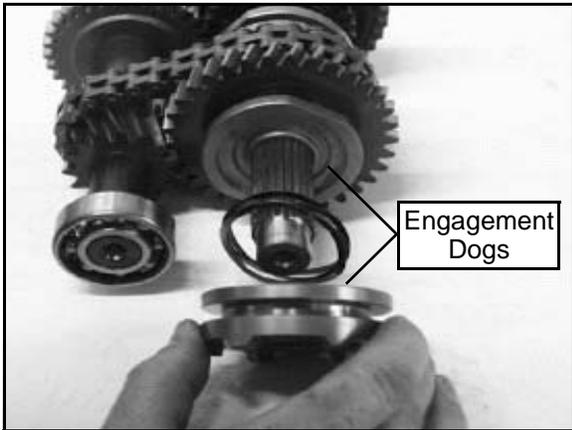
15. Remove the bearing from the reverse shaft with a puller.



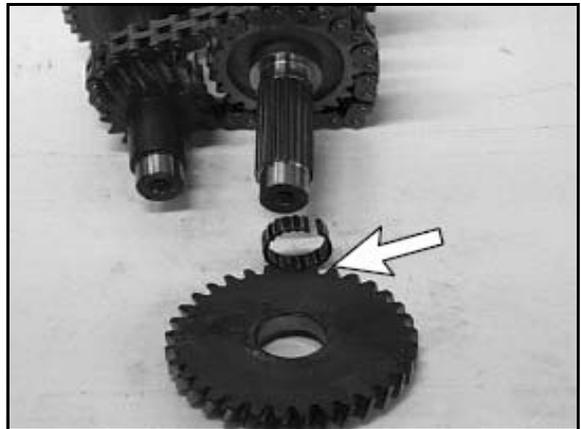
18. Remove the snap ring and washer from the reverse shaft.



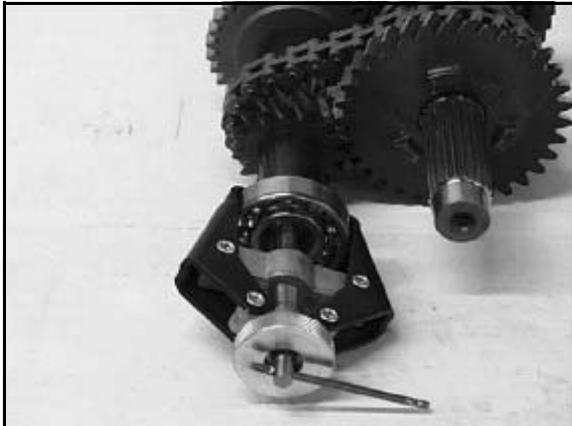
16. Remove the engagement dog. Remove the wave spring and reverse engagement dog.



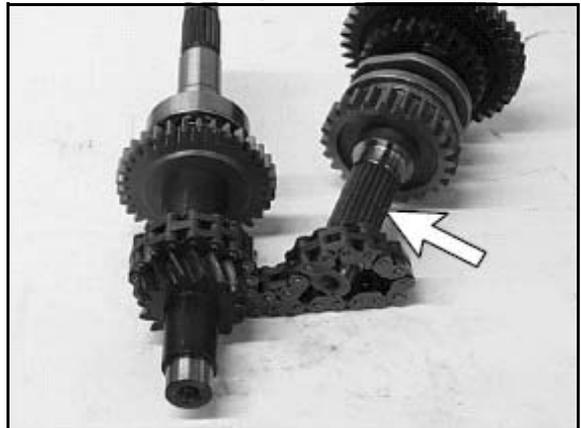
19. Remove low gear (33T) and the needle bearing.



17. Remove the bearing from the input shaft with a puller.



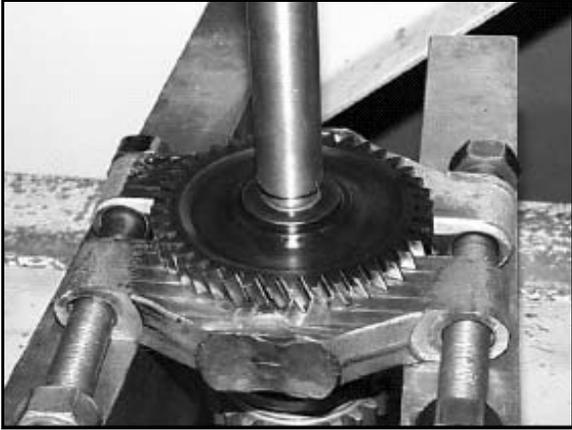
20. Remove the reverse gear shaft.



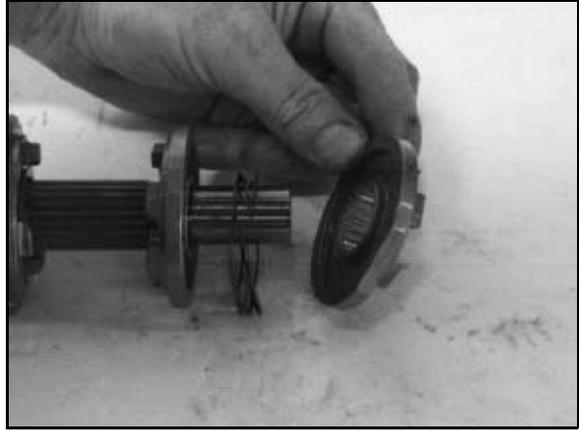
21. Remove the rest of the bearings from the shafts.

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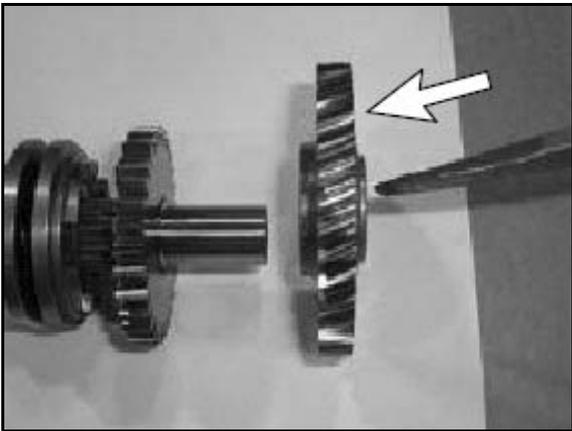
22. Use a press to remove the gear from the shaft.



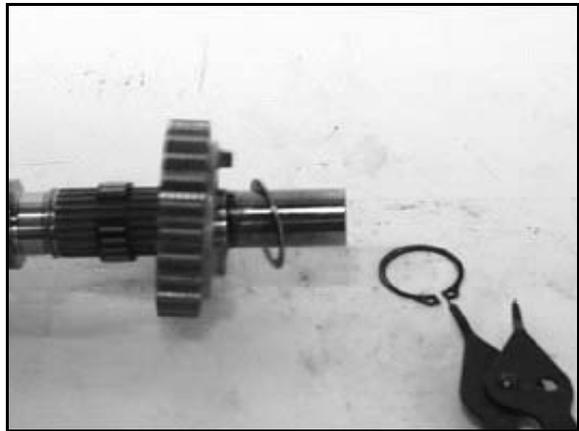
25. Slide off the shift dogs and wave springs.



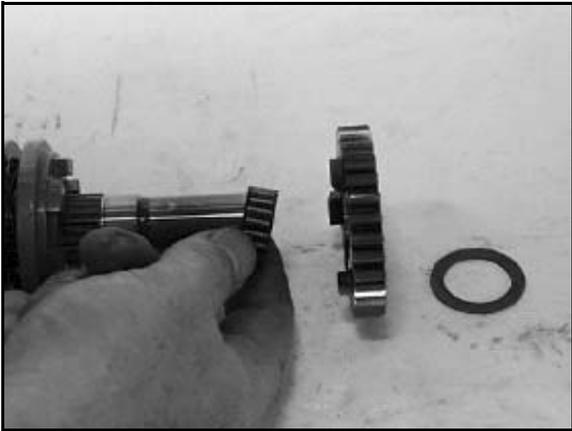
23. Make note of the direction of the gear and hub location.



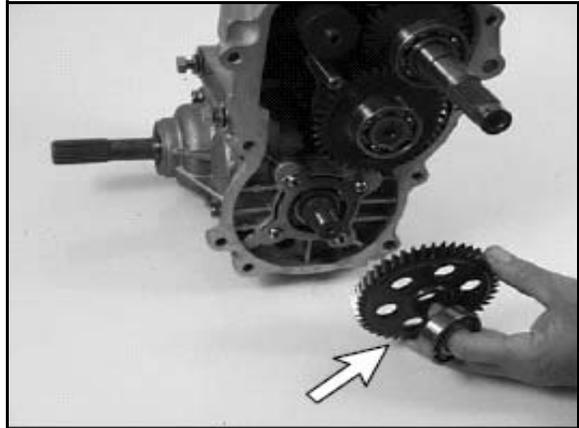
26. Remove the snap ring, washer, gear, and split bearing.



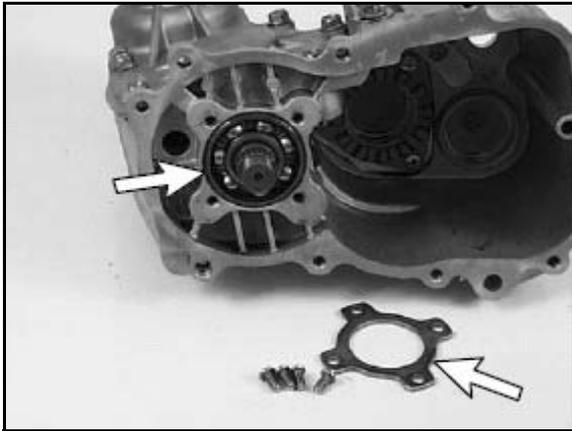
24. Remove the gear, split bearing, and washer from the reverse shaft.



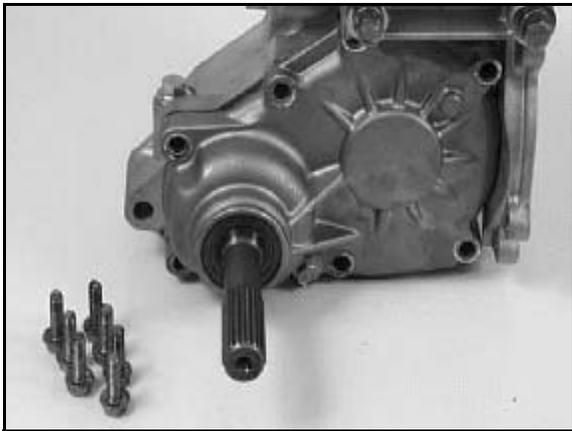
27. Remove bearing and the helical gear.



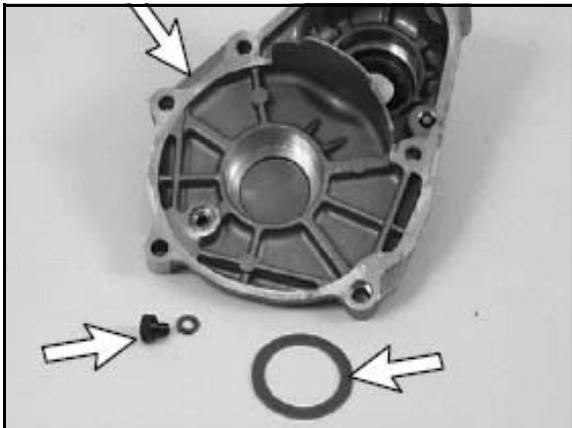
28. Remove the pinion shaft retainer plate and the pinion shaft.



29. Remove the front housing cover screws.



30. Remove the front housing cover, shim, thrust button, and thrust button shim.



31. Remove the shafts as an assembly.

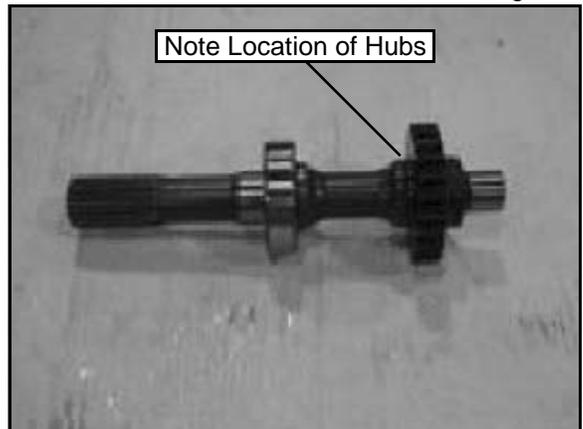


32. Remove the silent chain from the assembly for shaft inspection.

33. Clean all components in a parts washer and inspect for wear.

34. Inspect engagement dogs of gears and replace if edges are rounded.

35. Inspect gear teeth for wear, cracks, chips or broken teeth. Note the location of the hubs on the gear.



36. Remove seals from transmission case.

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

37. Inspect bearings for smooth operation. Check for excessive play between inner and outer race.

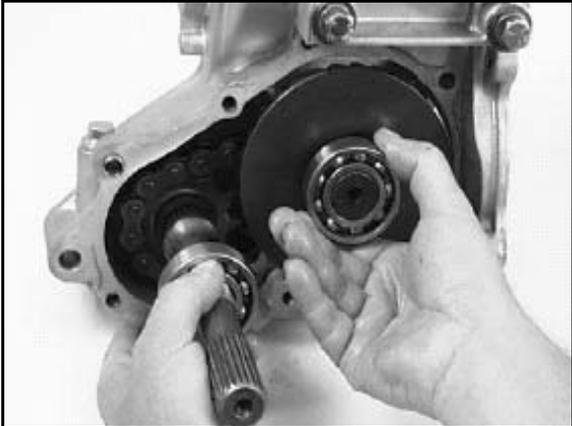
TRANSMISSION (6X6)

Transmission Assembly

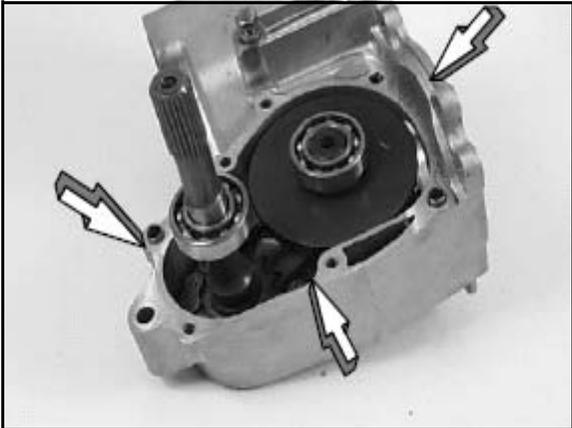
1. Reinstall the chain onto the front output shaft and rear output shaft.



2. Install front and rear output shafts into the case.



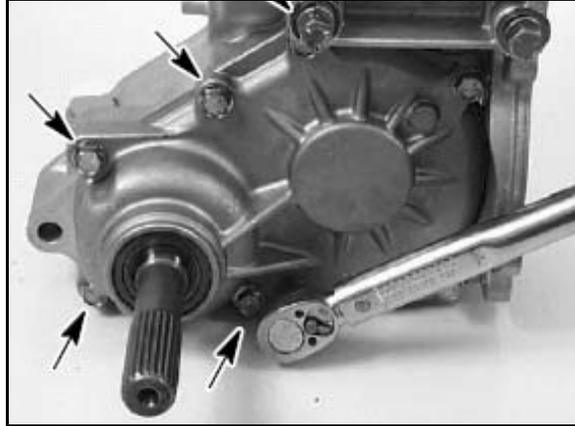
3. Before installing the cover make sure the sealing surfaces are clean and dry, and shafts are fully seated in the transmission case. Apply Polaris Crankcase Sealant to the mating surfaces.



**Crankcase Sealant
(PN 2871557)**

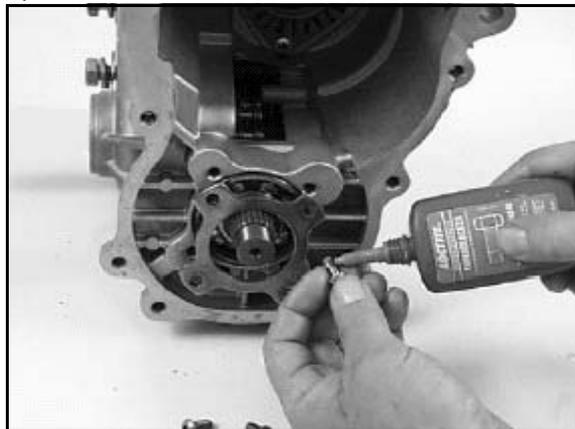
4. Reinstall the thrust button shim, thrust button, and other shims into the cover. Reinstall cover and torque bolts in a criss-cross pattern in 3 steps to 27-34 ft. lbs. (37-46 Nm).

NOTE: Make sure that the case locating pins (knock pipes) are in place.



**Front Cover Bolts:
27-34 ft. lbs. (37-46 Nm)**

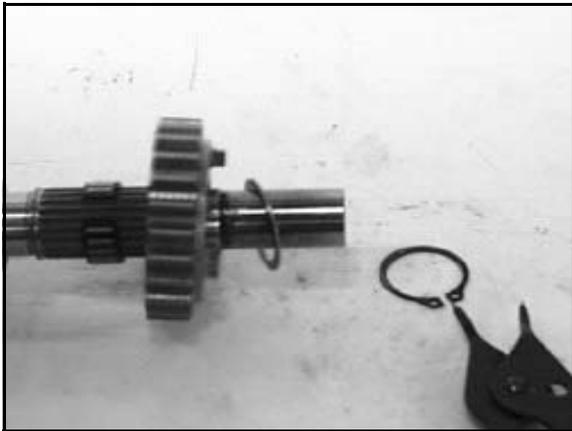
5. Apply grease to the seal lips. Apply electricians tape or somehow cover the splines of the shaft to protect the seal lips during installation. Install new front and rear output shaft seals.
6. Install pinion shaft with bearing.
7. Install retainer plate with flat side toward bearing.
8. Apply Loctite™ 262 (Red) (PN 2871951) to screw threads and torque the pinion retainer plate screws to specification.





Pinion Retainer Plate Screws:
6-12 ft. lbs. (8-16 Nm)

9. Install a new needle bearing, the 38T reverse sprocket, washer, and a new snap ring. Install the shift dogs and wave spring. Install the washer, a new needle bearing and the high gear. Install the press fit gear and ball bearing.
10. Install a new snap ring at this time. When installing the new snap ring, open the snap ring just far enough to go over the shaft, to avoid stressing the snap ring. If the snap ring is overstressed it could come off the shaft and cause internal damage to the transmission.



11. Slide the reverse shaft assembly through the silent chain.



12. Install a new needle bearing, the low gear, the thrust washer and the snap ring. Use of a new snap ring is recommended.
13. Install the engagement dogs, wave springs, and bearing.

14. Install the ball bearing onto the end of the input shaft.



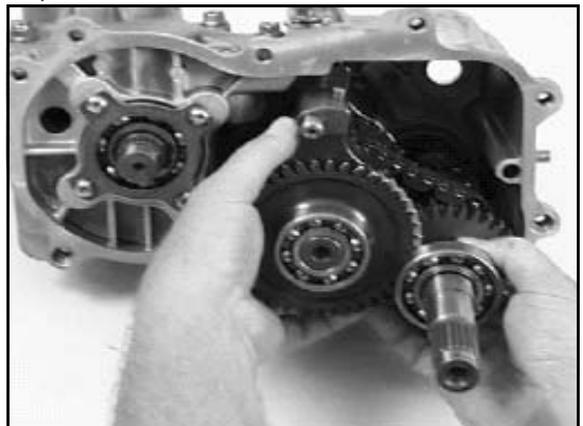
15. As the engagement dogs are installed onto the shaft, place the wave springs into the spring groove. Keep the spring in place while the fork is being installed on the shaft and while placing the shafts into the case.

NOTE: Use caution when installing the fork, the spring can easily fall out.



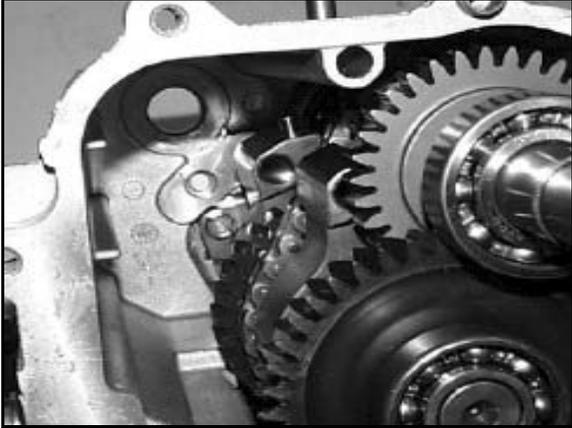
NOTE: Installing the shift rail will aid in keeping the shift forks, shift dogs, and the springs in place.

16. Carefully install the shaft assembly and gear cluster as a unit into their respective bearing case recesses. Tap with a soft face hammer to seat shaft assemblies.



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17. Position the shift forks up and so the pins point toward the 9 o'clock position, before installing the shift drum assembly.



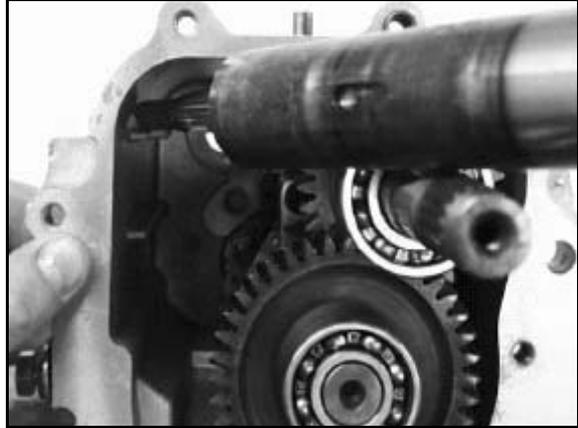
18. Replace and grease the O-rings on the shift drum before installation.



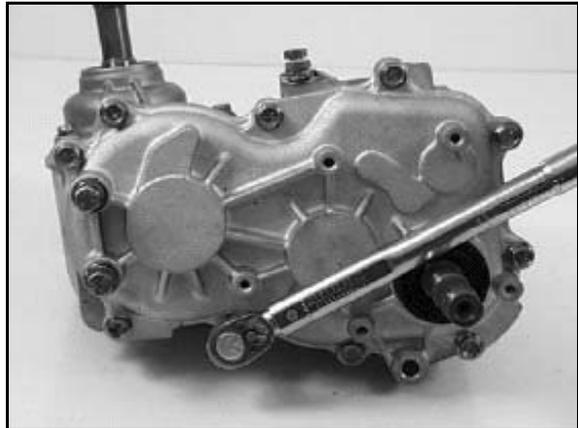
19. Install the shift drum into the case.

NOTE: Make sure shift shaft pins are properly positioned in the slot on selector arms.

20. Lift the shift rail slightly and rotate the rail/fork assembly so it meshes with the tracks on the shift drum. Be sure the wave springs are properly in place and that the shift rail is seated into the pocket on the backside of the case.



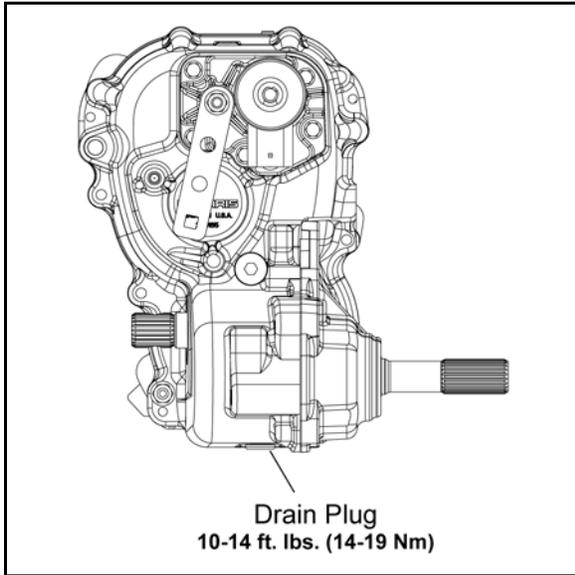
21. Install the helical gear and bearing onto the pinion shaft.
22. Clean the mating surfaces of the case and cover. Apply Crankcase Sealant (PN 2871557) to the mating surfaces. Be sure the locating pins (knock pipes) are in place. Reinstall cover and torque bolts in a criss-cross pattern in 3 steps to **27-34 ft. lbs. (37-46 Nm)**.
23. Reinstall the lower left-hand mount bracket if previously removed.



Front Cover Bolts:
27-34 ft. lbs. (37-46 Nm)

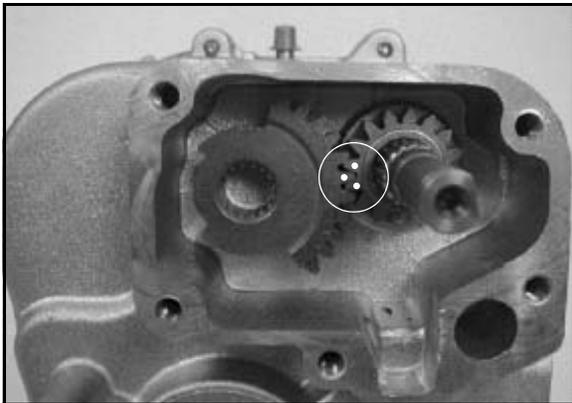
24. Grease the seal lips of the input shaft seal. Apply electricians tape or somehow cover the splines of the shaft to protect the seal lips during installation. Install new input shaft seal.

25. Install drain plug with a new sealing washer. Torque to specification.



Drain Plug:
10-14 ft. lbs. (14-19 Nm)

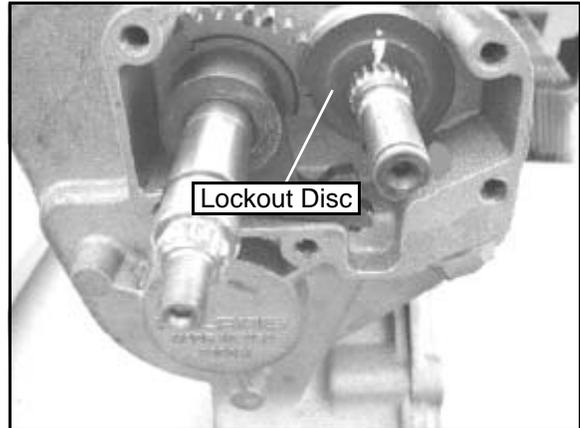
26. Place a small amount of grease (PN 2871551) into the pocket before installing the sector gear. Install the shift gear (16T) on the shift drum shaft. Install the sector gear in the bushing pocket on the left side. Align the timing marks you made on the gears during disassembly.



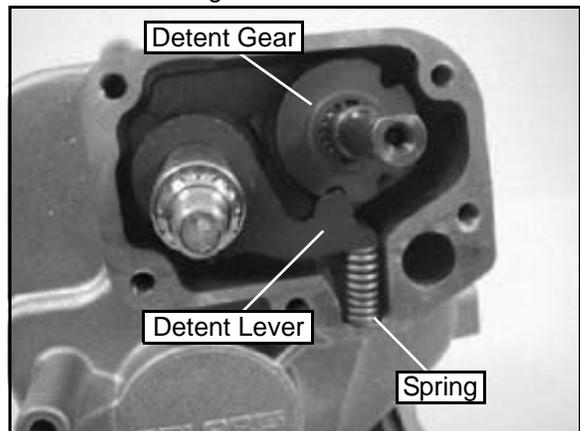
IMPORTANT: Note the location of the skip tooth on the splines. Apply a light coating of grease on the gear teeth.

27. Install the shift shaft along with the detent lever.

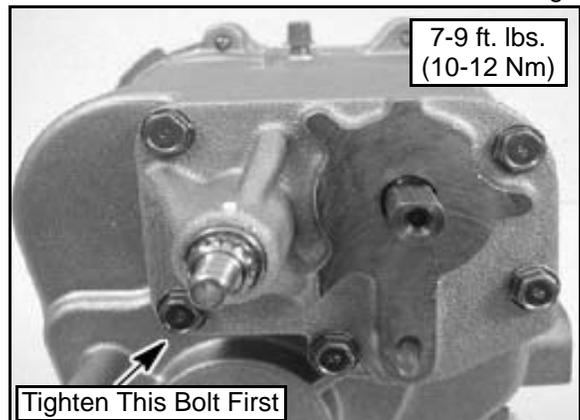
28. Install the lockout disc with the raised edge facing outward. Use the white mark that was previously applied for reference.



29. Install the detent gear with the raised edge facing outward. Note the keyed spline on the end of the shaft.
30. Install the detent lever spring. Install a new O-ring onto the shift shaft after the detent lever is assembled to the shaft. Place a small amount of grease on the small O-ring on the shift shaft and on the detent gear. Grease the O-ring on the end of the shift drum.



31. Install cover and hand tighten all of the bolts. Tighten the bolt indicated in the picture below first and torque the bolt to **7-9 ft. lbs. (10-12 Nm)**. This helps to align the cover and shaft to ensure smoother shifting.

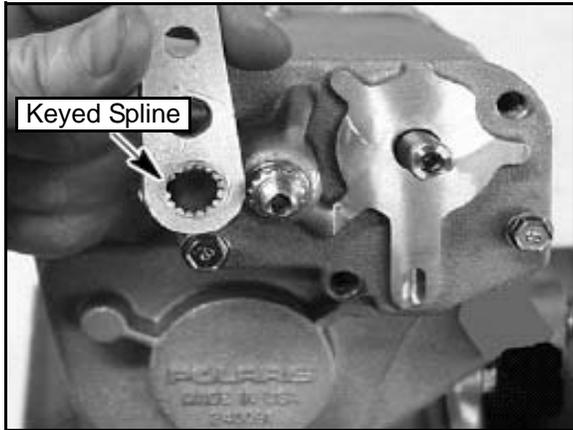


TRANSMISSION (6X6)

32. Torque the remaining cover bolts to specification.

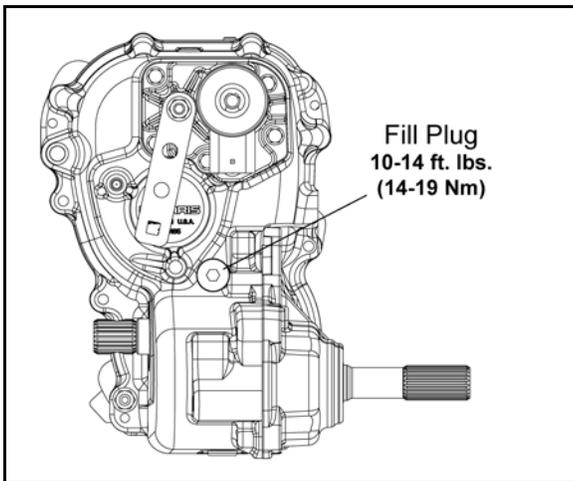
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Cover Bolts: 7-9 ft. lbs. (10-12 Nm)

33. Install the bellcrank onto the shift shaft. Note the keyed spline on the bellcrank and shaft. Install the washer and nut. Torque bellcrank nut to specification.



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Bellcrank Nut: 12-18 ft. lbs. (16-24 Nm)

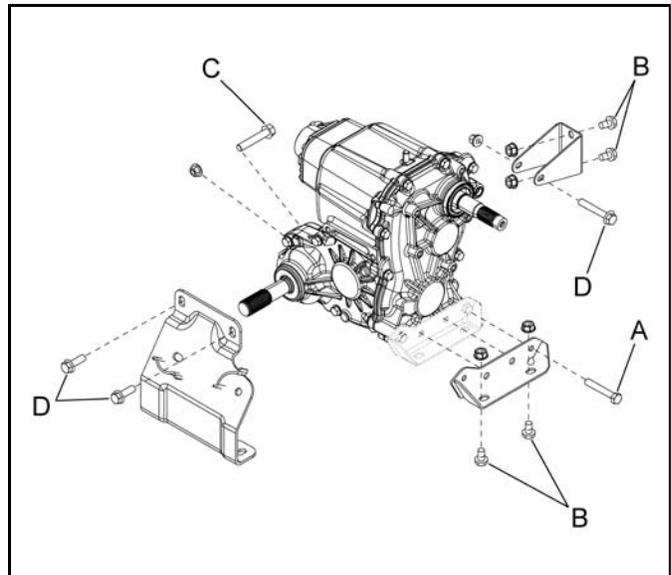
34. Install the transmission and add the recommended gearcase lubricant. Torque fill plug to specification.



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Recommended Transmission Lubricant: AGL Plus (PN 2878068) 43.6 oz. (1290 ml)

Transmission Installation

1. Install transmission from right side of vehicle.
2. Align the front output shaft to the front propshaft yoke on the vehicle and install the propshaft.
3. Install the mid propshaft onto the transmission output shaft and align the roll pin holes. Drive a NEW roll pin into the propshaft yoke.
4. Slide the mid gearcase forward in the frame. Install the mid propshaft onto the mid gearcase input shaft.
5. Position transmission in frame.
6. Loosely install the front transmission to frame bolts.
7. Loosely install the rear transmission to frame bolt.
8. Loosely install the three bottom transmission to frame bolts.
9. Tighten mounting fasteners in order A-D as shown.



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Transmission Mounting Bolts: B, C, D 40 ft. lbs. (54 Nm)

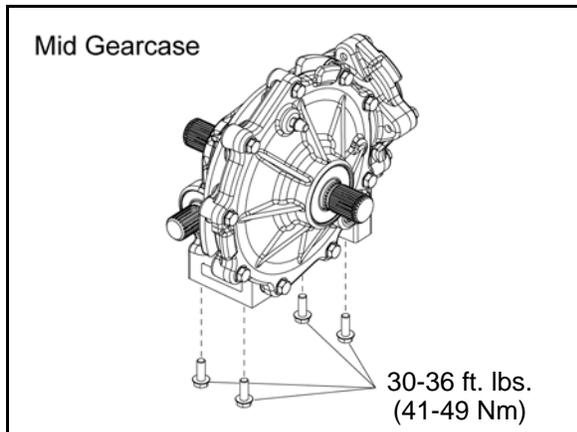
NOTE: Be sure to tighten the lower transmission bolts first, this ensures that the transmission is tight against the lower frame and helps to properly align the transmission.

10. Reinstall transmission switch, shift cable, air intake hose and the vent hose on top of the transmission.

11. Reinstall the PVT system (see Chapter 6 “Clutching” for assembly procedure).

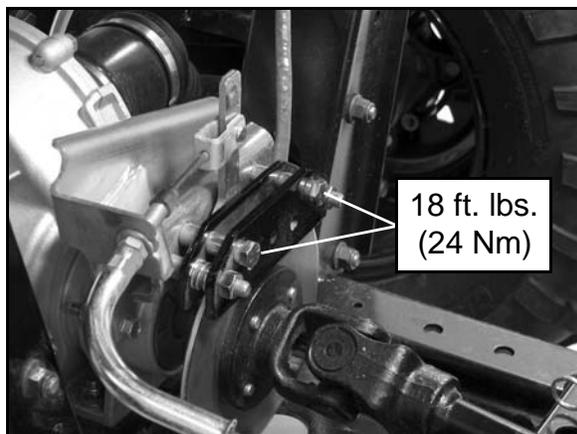
NOTE: Align clutches as outlined in Chapter 6.

12. Position the mid gearcase and install the (4) mounting bolts. Torque the bolts to specification.



Mid Gearcase - Mounting Bolts:
30-36 ft. lbs. (41-49 Nm)

13. Install the rear propshaft onto the mid gearcase and drive a NEW roll pin into the propshaft yoke.
14. Install the parking brake caliper assembly. Tighten the two mounting bolts in increments and torque to specification.



Parking Brake Caliper - Mounting Bolts:
18 ft. lbs. (24 Nm)

TROUBLESHOOTING

Troubleshooting Checklist

Check the following items when shifting difficulty is encountered.

- Shift cable adjustment/condition
- Idle speed (throttle cable routing)
- PVT alignment
- Transmission lubricant type/quality
- Drive belt deflection (where applicable)
- Loose fasteners on rod ends
- Loose fasteners on sector gear cover
- Worn rod ends, clevis pins, or pivot arm bushings
- Linkage rod adjustment and rod end positioning
- Shift selector rail travel
- Worn, broken or damaged internal transmission components (see NOTE below).

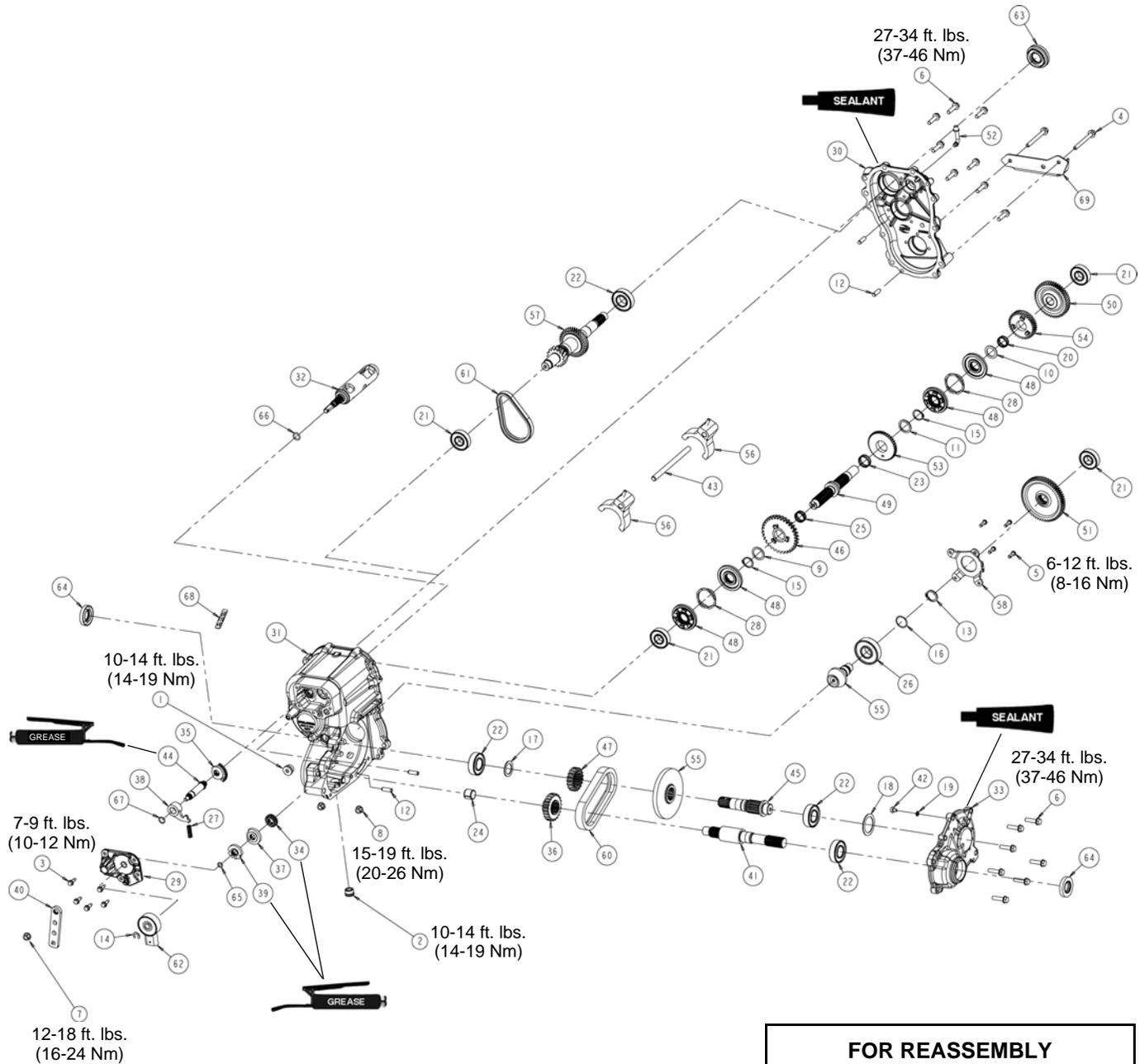
NOTE: To determine if shifting difficulty or problem is caused by an internal transmission problem, isolate the transmission by disconnecting linkage rod from transmission bellcrank. Manually select each gear range at the transmission bellcrank, and test ride vehicle. If it functions properly, the problem is outside the transmission.

If transmission problem remains, disassemble transmission and inspect all gear dogs for wear (rounding), damage. Inspect all bearings, circlips, thrust washers and shafts for wear.

TRANSMISSION (6X6)

TRANSMISSION EXPLODED VIEW

RANGER 6x6 800 (PN 1332702)



FOR REASSEMBLY



Apply White Lithium Based Grease.



Apply Polaris Crankcase Sealant.



Apply Loctite™ 262 to the bolt threads.

Exploded View, Continued

Ref.	Qty.	Description	Ref.	Qty.	Description
1.	1	Plug, Fill	36.	1	Sprocket, 22T
2.	1	Plug, Drain, Magnetic	37.	1	Lockout Disc
3.	5	Screw, Self-Tapping 1/4-20	38.	1	Detent Pawl
4.	2	Screw, 5/16-18	39.	1	Detent Star
5.	4	Screw, 1/4-20	40.	1	Bellcrank, Shift Drum
6.	15	Screws, Self-Tapping 5/16-18	41.	1	Output Shaft, Front Main
7.	1	Nut, Nylon Lock	42.	1	Trust Button
8.	2	Nut, Nylon Lock	43.	1	Rail, Shift Shaft
9.	1	Washer	44.	1	Shift Shaft
10.	1	Washer	45.	1	Output Shaft, Rear Main
11.	1	Washer	46.	1	Gear, 33T
12.	4	Dowel Pin	47.	1	Sprocket, 19T
13.	1	Retaining Ring, External	48.	4	Engagement Dog, 6 Face
14.	1	Retaining Ring, External	49.	1	Reverse Shaft
15.	2	Retaining Ring, External	50.	1	Gear, Mid-Output, 47T
16.	1	Spacer	51.	1	Gear, Mid-Output, 60T
17.	1	Thrust Washer	52.	1	Vent Tube
18.	1	Shim	53.	1	Sprocket, 38T
19.	1	Shim	54.	1	Gear, 36T
20.	1	Needle Bearing	55.	1	Gear Set, 10T/31T
21.	4	Ball Bearing	56.	2	Shift Fork w/Pin
22.	4	Ball Bearing	57.	1	Input Shaft, 37/19/15
23.	1	Needle Bearing	58.	1	Cover, Center Drive Bearing
24.	1	Plain Bearing	59.	-	N/A
25.	1	Needle Bearing	60.	1	Silent Chain, 11W/40P
26.	1	Ball Bearing	61.	1	Chain
27.	1	Spring, Compression	62.	1	Switch, Rotary; 6-Pin (2011); 2-Pin (2012)
28.	2	Spring, Wave	63.	1	Seal, Dual Lip
29.	1	Cover, Sector Gear	64.	2	Seal, Triple Lip
30.	1	Cover, LH Input	65.	1	O-Ring
31.	1	Gearcase, Main	66.	1	O-Ring
32.	1	Shift Drum	67.	1	O-Ring
33.	1	Cover, Output	68.	-	N/A
34.	1	Sector Gear, 16T	69.	1	Bracket, Transmission Mount
35.	1	Sector Gear, 31T			

