

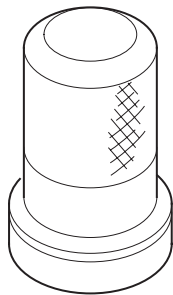
Rear Differential

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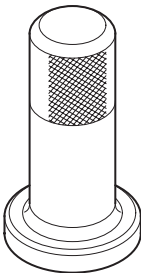


Special Tools

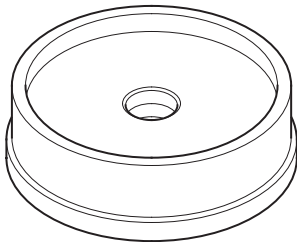
Ref. No.	Tool Number	Description	Qty
1	07GAD-PH70201	Oil Seal Driver 64	
2	07JAD-PL90100	Oil Seal Driver 65	
3	07NAD-PX40100	Attachment, 78 x 80 mm	
4	07PAB-0020000	Companion Flange Holder	
5	07749-0010000	Driver 15 x 135L	



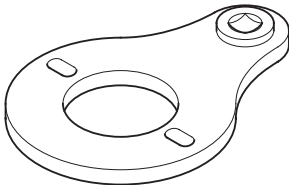
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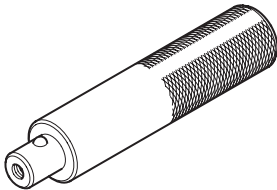
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System Description

Outline

The Real-time 4WD-Dual Pump System model has a hydraulic clutch and a differential mechanism in the rear differential assembly. Under normal conditions, the vehicle is driven by the front wheels. However, depending on the driving force of the front wheels and the road conditions, the system instantly transmits appropriate driving force to the rear wheels without requiring the driver to switch between 2WD (front wheel drive) and 4WD (four wheel drive). The switching mechanism between 2WD and 4WD is integrated into the rear differential assembly to make the system light and compact.

In addition, the dual-pump system switches off the rear-wheel-drive force when braking in a forward gear. This allows the braking system to work properly on models equipped with an Anti-lock Braking System (ABS).

Construction

The rear differential assembly consists of the torque control differential case assembly and the rear differential carrier assembly. The torque control differential case assembly consists of the differential clutch assembly, the companion flange, and the oil pump body assembly. The rear differential carrier assembly consists of the differential mechanism. The differential drive and driven gears are hypoid gears.

The oil pump body assembly consists of the front oil pump, the rear oil pump, the hydraulic control mechanism, and the clutch piston. The clutch piston has a disc spring that constantly provides the differential clutch assembly with a preset torque to prevent abnormal sound.

The clutch guide in the differential clutch assembly is connected to the propeller shaft via the companion flange, and it receives the driving force from the transfer assembly. The clutch guide rotates the clutch plate and the front oil pump in the oil pump body.

The clutch hub in the differential clutch assembly has a clutch disc that is splined with the hypoid drive pinion gear. The hypoid drive gear drives the rear oil pump.

The front and rear oil pumps are trochoidal pumps. The rear oil pump capacity is 2.5 percent larger than the front oil pump to handle the rotation difference between the front and rear wheels caused by worn front tires and tight corner braking. The oil pumps are designed so the fluid intake works as a fluid discharge when the oil pumps rotate in reverse. Honda DPSF (Dual Pump System Fluid) is used instead of differential fluid.

Operation

When there is a difference in rotation speed between the front wheels (clutch guide) and rear wheels (hypoid driven gear), hydraulic pressure from the front and rear oil pumps engages the differential clutch, and drive force from the transfer assembly is applied to the rear wheels.

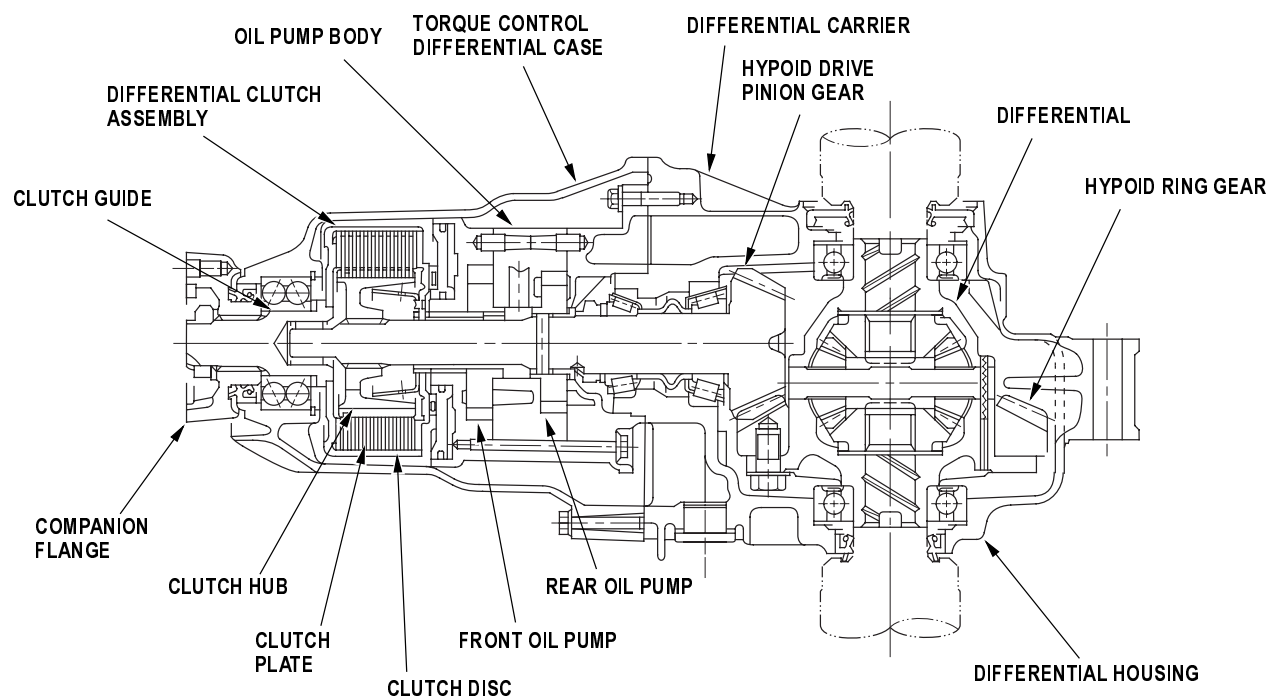
The hydraulic pressure control mechanism in the oil pump body selects 4WD mode when the vehicle is started abruptly, or when accelerating in a forward or reverse gear (causing rotation difference between the front and rear wheels), or when braking in reverse gear (when decelerating). It switches to 2WD mode when the vehicle is driven at a constant speed in forward or reverse gear (when there is no rotation difference between the front and rear wheels), or when braking in a forward gear (when decelerating).

To protect the system, the differential clutch assembly is lubricated by hydraulic pressure generated by the oil pumps in both 4WD and 2WD modes. Also, the thermal switch relieves the hydraulic pressure on the clutch piston and cancels 4WD mode if the temperature of the differential fluid rises above normal.

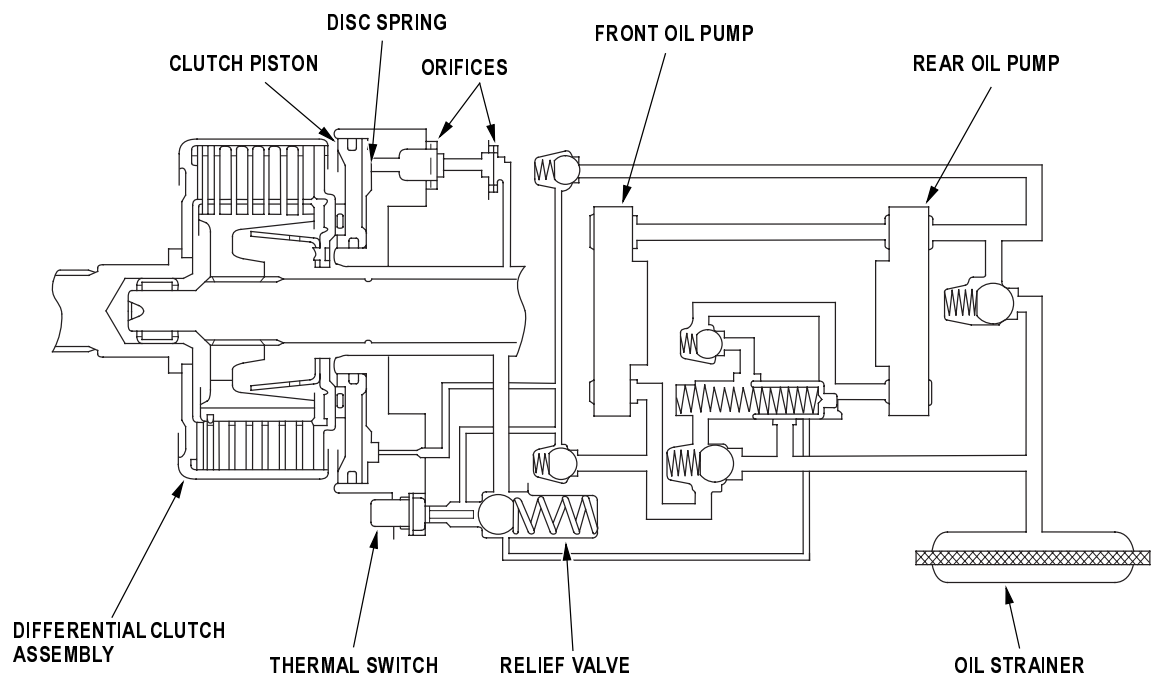
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System Description (cont'd)

REAR DIFFERENTIAL ASSEMBLY



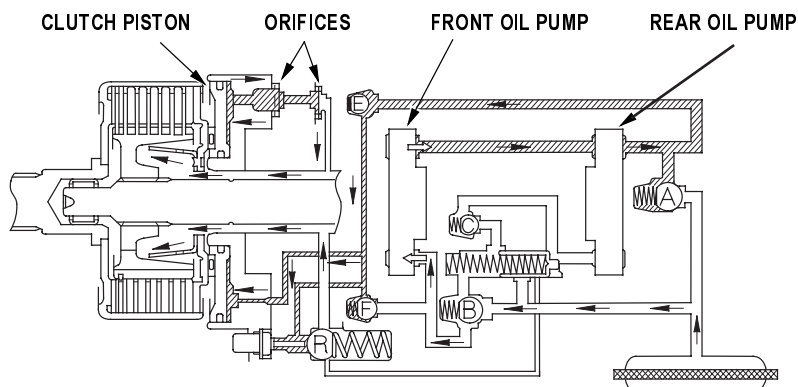
HYDRAULIC CONTROL SYSTEM





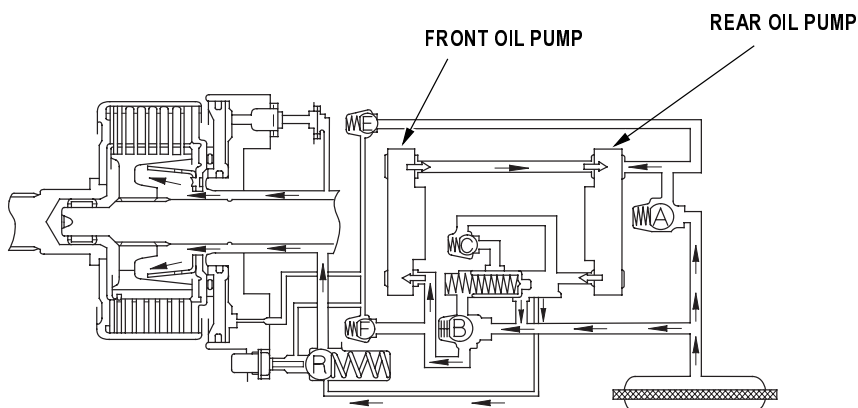
Forward Start and Acceleration (4WD)

During a forward start and forward acceleration, the dual pump system can engage four wheel drive. If the front wheels spin faster than the rear wheels, the front oil pump spins faster than the rear oil pump. The front pump draws fluid through check valve B and discharges it. Some of the discharged fluid is drawn in by the rear oil pump. The remaining fluid will pass through check valve E into the clutch piston. There, hydraulic pressure is regulated by two orifices. The regulated hydraulic pressure at the clutch piston pushes the plates and discs of the clutch together to form a connection. The engaged clutch then passes driving force from the transfer assembly to the rear wheels, producing 4WD.



Forward Driving at Constant Speed (2WD)

When driving forward at a constant speed (cruising), the dual pump system functions in two wheel drive mode. The rotation speed of the front and rear wheels is the same, so the speed of the front and rear pumps is also the same. Fluid discharged by the front oil pump is drawn in by the rear oil pump and is circulated through the system. Because there is no pressure built up at the clutch piston, the clutch does not engage, and the vehicle remains in 2WD (front wheel drive).

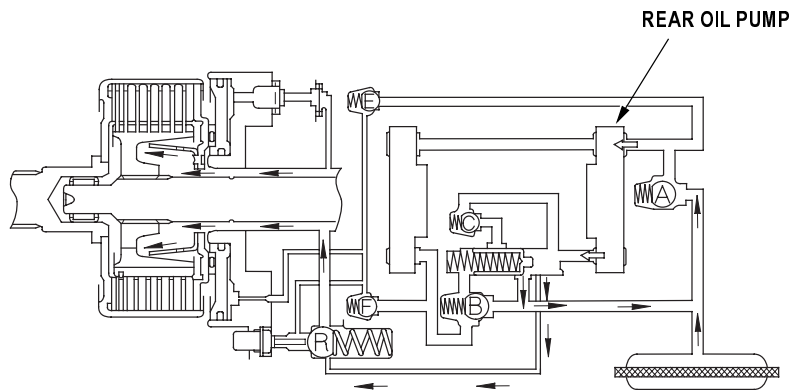


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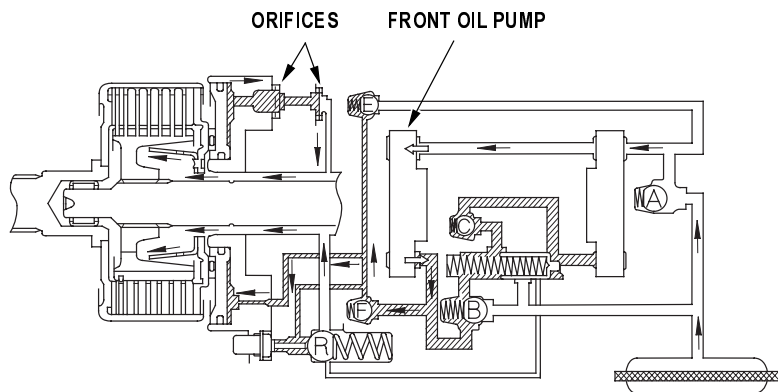
Forward Deceleration (2WD)

During forward deceleration, the dual pump system functions in two wheel drive mode. Because of braking characteristics, the speed of the rear wheels may exceed the speed of the front wheels during deceleration. If so, the rear oil pump spins faster than the front oil pump. Fluid discharged by the rear oil pump is simply drawn in again by the rear pump and recirculated. Because there is no pressure built up at the clutch piston, the clutch piston does not engage, and the vehicle remains in 2WD (front wheel drive).



Reverse Start and Acceleration (4WD)

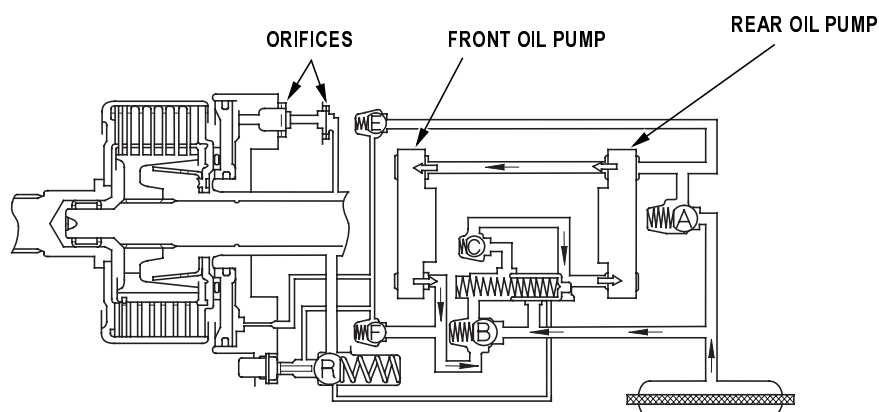
During reverse start and reverse acceleration, the dual pump system can engage four wheel drive. If the front wheels spin faster than the rear wheels, the front oil pump spins faster than the rear oil pump. The front oil pump draws in fluid through check valve A and discharges it. (Note that in reverse, the direction of the pumps is the opposite of that during forward driving.) Some of the fluid that is discharged by the front oil pump is drawn in by the rear oil pump. The remaining fluid passes through check valve F into the cylinder of the clutch piston, where it is regulated by two orifices. The regulated hydraulic pressure at the clutch piston may force the plates and discs of the clutch together to form a connection. The engaged clutch passes driving force from the transfer assembly to the rear wheels, producing 4WD.





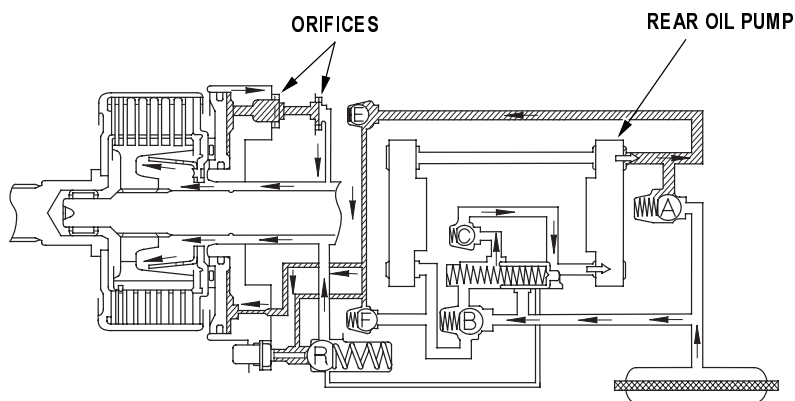
Reverse Driving at Constant Speed (2WD)

When driving in reverse at a constant speed, the dual pump system functions in two wheels drive mode. The rotation speed of the front and rear wheels is the same, so the speed of the front and rear pumps is also the same. Fluid discharged by the front oil pump is drawn in by the rear oil pump and is circulated through the system. But, because there is a difference in the capacity between the two pumps, fluid flows through check valve E, and then through orifices. This fluid lubricates and cools the clutch assembly and bearings. In this condition, only a low pressure is built up at the clutch piston. Therefore the clutch does not engage, and the vehicle remains in 2WD (front wheel drive).



Reverse Deceleration (4WD)

During reverse deceleration, the dual pump system can engage four wheel drive. When decelerating in reverse direction, the speed of the rear wheels may exceed the speed of the front wheels (due to engine braking). In this condition, the rear oil pump draws fluid through check valves B and C. Fluid discharged from the rear oil pump then flows through check valve E to the clutch piston. There, pressure is regulated by two orifices. The regulated hydraulic pressure at the clutch piston may force the plates and discs of the clutch together to form a connection. The engaged clutch passes driving force from the transfer assembly to the rear wheels, producing 4WD.

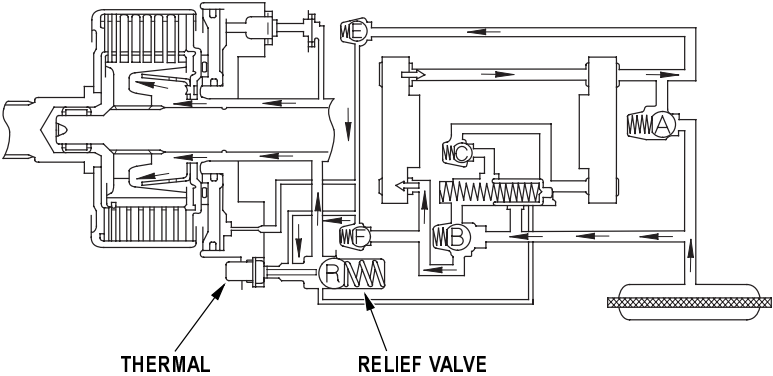


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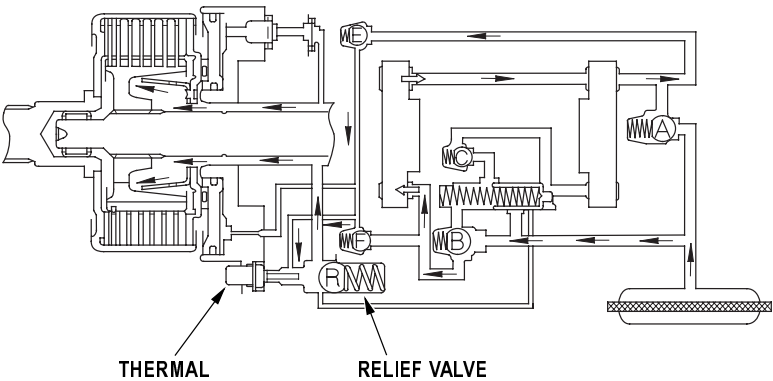
Thermal Switch Operation (2WD)

During 4WD operation, pressure-regulated fluid is in contact with the clutch piston and the thermal switch. If the temperature of the fluid in the differential goes too high, the thermal switch pushes open the relief valve R. This causes the pressure in the clutch piston to drop, and 4WD mode is disengaged.



Relief Valve Operation

When the fluid pressure goes higher than the relief valve spring force, check valve R opens. Pressure applied at the clutch piston is held constant. This feature adds stability by preventing the rear wheel drive system from experiencing excessive torque.



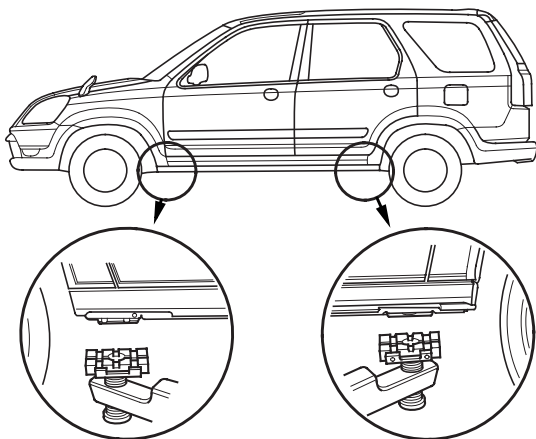


Dual Pump System Function Test

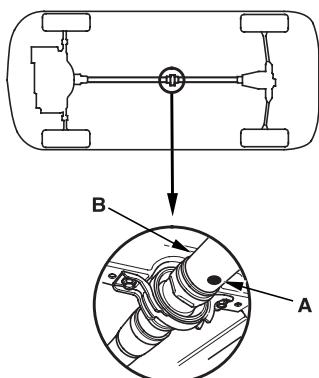
Automatic Transmission

When starting and accelerating in forward gears (4WD mode)

1. Lift up the vehicle so all four wheels are off the ground (see page 01-7).



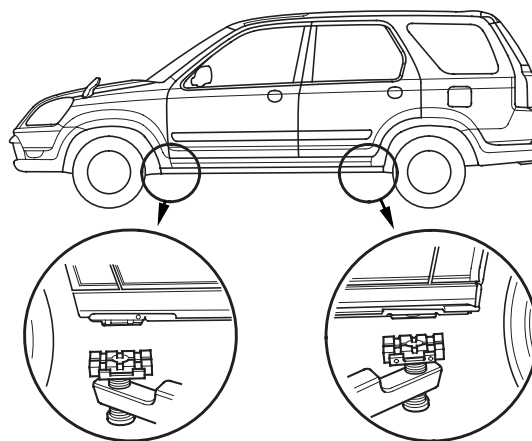
2. Make a mark (A) on either No. 1 or No. 2 propeller shaft (B).



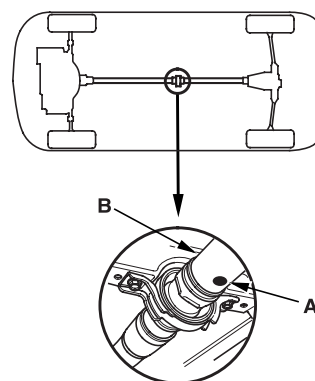
3. Start the engine, and let it run until it warms up (the radiator fan comes on at least twice).
4. With the engine at idle, shift to the [1] position.
5. Apply the parking brake firmly, and measure the time it takes the propeller shaft to rotate 10 times.
 - If the measured time is more than 10 seconds, the 4WD system is normal.
 - If the time is less than 10 seconds, there is a problem in 4WD system. Check the differential fluid. If the differential fluid is normal, replace the torque control differential (TCD) case kit.

When starting and accelerating in reverse gear (4WD mode)

1. Lift up the vehicle so all four wheels are off the ground (see page 01-7).



2. Make a mark (A) on either No. 1 or No. 2 propeller shaft (B).



3. Start the engine, and let it run until it warms up (the radiator fan comes on at least twice).
4. With the engine at idle, shift to the [R] position.
5. Apply the parking brake firmly, and measure the time it takes the propeller shaft to rotate 10 times.
 - If the measured time is more than 10 seconds, the 4WD system is normal.
 - If the time is less than 10 seconds, there is a problem in 4WD system. Check the differential fluid. If the differential fluid is normal, replace the torque control differential (TCD) case kit.

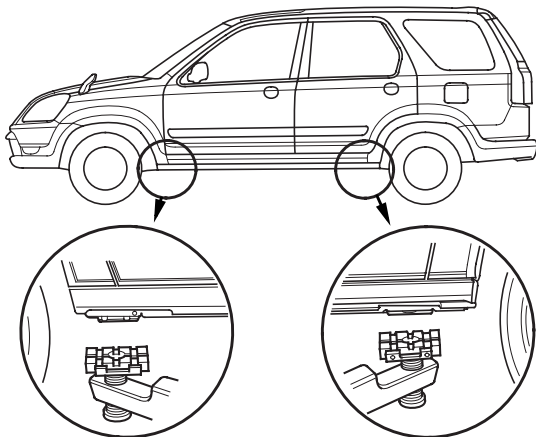
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Troubleshooting (cont'd)

Manual Transmission

When starting and accelerating in forward gears (4WD mode)

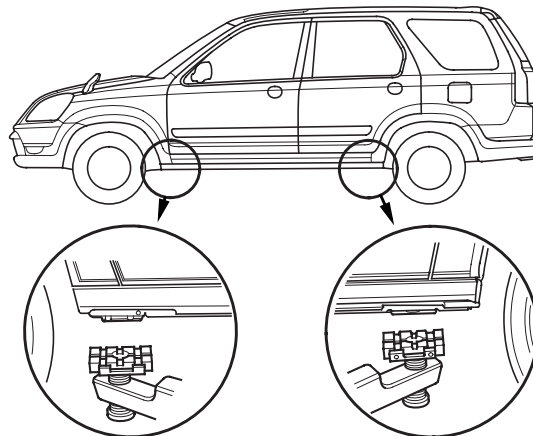
1. Lift up the vehicle so all four wheels are off the ground ([see page 01-7](#)).



2. Start the engine, and let it run until it warms up (the radiator fan comes on at least twice).
3. With the engine at idle, shift into 1st gear and release the clutch.
4. Apply the parking brake firmly.
 - If the engine stalls, the 4WD system is normal.
 - If the engine continues running, there is a problem in 4WD system. Check the differential fluid. If the differential fluid is normal, replace the torque control differential (TCD) case kit.

When starting and accelerating in reverse gears (4WD mode)

1. Lift up the vehicle so all four wheels are off the ground ([see page 01-7](#)).



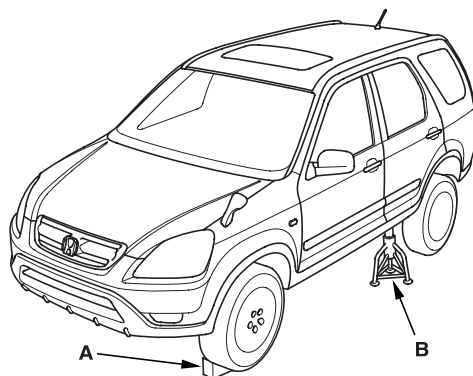
2. Start the engine, and let it run until it warms up (the radiator fan comes on at least twice).
3. With the engine at idle, shift into reverse gear and release the clutch.
4. Apply the parking brake firmly.
 - If the engine stalls, the 4WD system is normal.
 - If the engine continues running, there is a problem in 4WD system. Check the differential fluid. If the differential fluid is normal, replace the torque control differential (TCD) case kit.



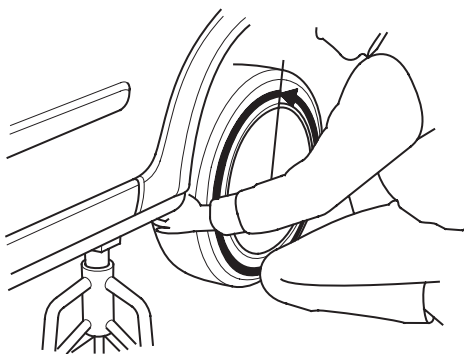
Automatic Transmission/Manual Transmission

When decelerating in a forward gears (2WD mode)

1. Block the front wheels (A) raise the left rear wheel, and support it with a safety stand (B) as shown.

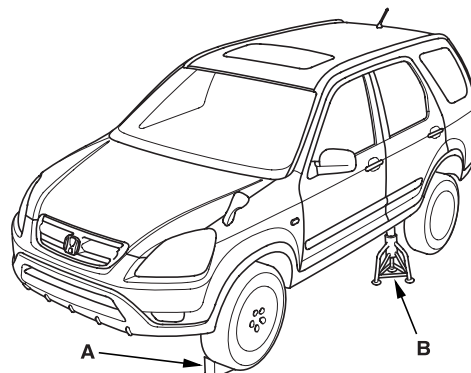


2. Hold the tire and turn it counterclockwise continuously for more than one rotation.
 - If the rotation of the wheel does not gradually feel heavy while rotating, the 2WD system when decelerating in a forward gear is normal.
 - If the rotation of the wheel gradually feels heavy, there is a problem in the system. Check the differential fluid. If the fluid is normal, replace the torque control differential (TCD) case kit.

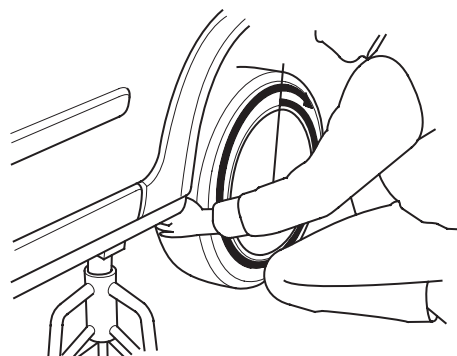


When decelerating in reverse gears (4WD mode)

1. Block the front wheels (A), raise the left rear wheel, and support it with a safety stand (B) as shown.



2. Hold the tire and turn it clockwise continuously for more than one rotation.
 - If the rotation of the wheel gradually feels heavy, the 4WD system when decelerating in reverse gear is normal.
 - If the rotation of the wheel does not gradually feel heavy, there is a problem in the system. Check the differential fluid. If the fluid is normal, replace the torque control differential (TCD) case kit.



Symptom Troubleshooting Index

Most problems in the unit are to be diagnosed by identifying noises from the gears or bearings.

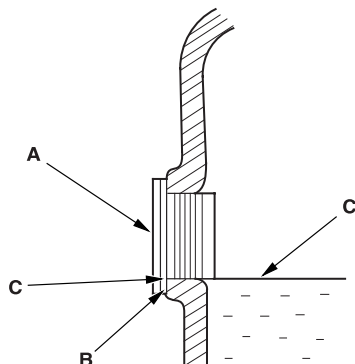
Care should be taken during diagnosis not to confuse differential noises with those from other drivetrain components.

Symptom	Probable Cause	Remedy
Will not go into 4WD mode	<ul style="list-style-type: none"> Fluid level too low Incorrect fluid type 	<ul style="list-style-type: none"> Add fluid Replace
Will not return to 2WD mode	Incorrect fluid type	Drain and fill the differential
Gear or bearing noises	<ul style="list-style-type: none"> Fluid level too low Incorrect or worn out fluid Damaged or chipped gears 	<ul style="list-style-type: none"> Add fluid Drain and fill the differential Replace the differential carrier assembly
Overheating	<ul style="list-style-type: none"> Fluid level too low Incorrect fluid type 	<ul style="list-style-type: none"> Add fluid Drain and fill the differential
Fluid leak	<ul style="list-style-type: none"> Fluid level too high Clogged breather hose Worn or damaged oil seal Damaged sealing washer Loose mounting bolts or inadequate sealing 	<ul style="list-style-type: none"> Lower to proper level Clean or replace Replace Replace Recheck torque or apply sealant

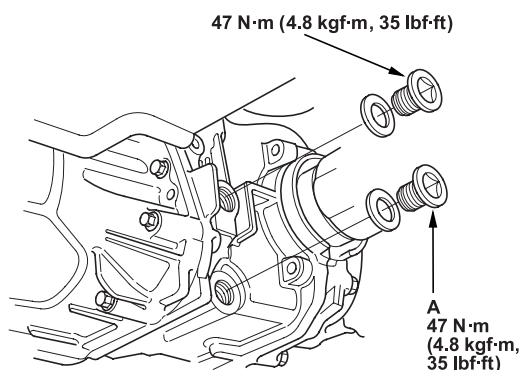


Differential Fluid Inspection and Replacement

1. With the vehicle on level ground, inspect the differential fluid with engine OFF.
2. Remove the oil filler plug (A) and sealing washer (B), then check the condition of the fluid, and make sure the fluid is at the proper level (C).



3. The fluid level must be up to the fill hole. If it is below the hole, add the recommended fluid until it runs out, then reinstall the oil filler plug with a new sealing washer.
4. If the differential fluid is dirty, remove the drain plug (A), and drain the fluid.



5. Clean the drain plug, then reinstall it with a new sealing washer, and refill the differential with the recommended fluid to the proper level.

NOTE: If you disassembly the differential, check the fluid level again after the 4WD system check is finished. Add fluid if necessary.

Fluid Capacity

1.0 / (1.1 US qt, 0.9 Imp qt) at fluid change

1.2 / (1.3 US qt, 1.1 Imp qt) at overhaul

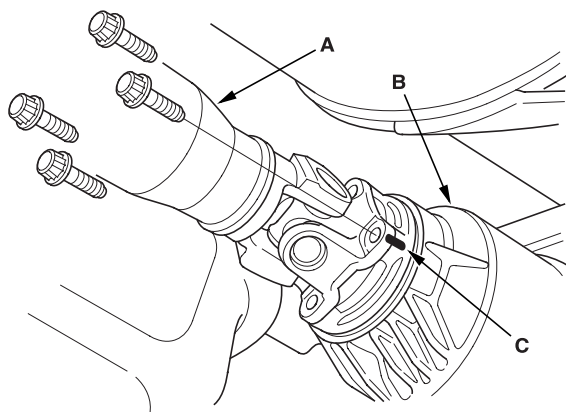
Recommended fluid:

Honda DPSF (Dual Pump System Fluid)

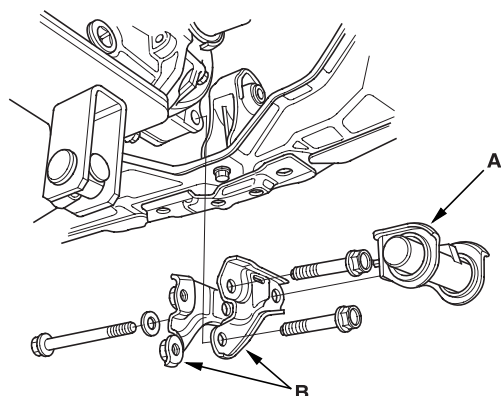
6. Reinstall the oil filler plug with a new sealing washer.

Differential Removal

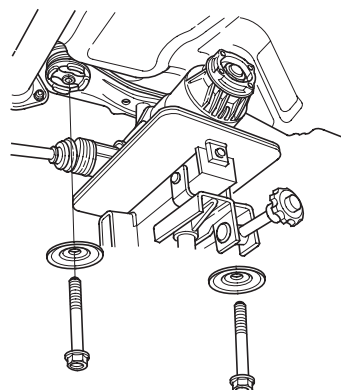
1. Drain the differential fluid ([see page 15-13](#)).
2. Mark the propeller shaft (A) and companion flange of the rear differential assembly (B) so they can be reinstalled in their original positions (C).



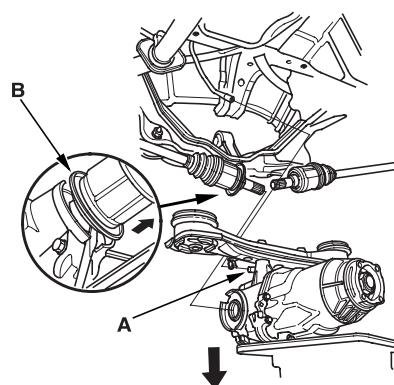
3. Remove the propeller shaft from the rear differential assembly.
4. Remove the EVAP canister assembly with bracket ([see page 11-199](#)).
5. Remove the rear differential damper (A).
6. Place a transmission jack under the rear differential assembly, then remove the right mounting bracket B (B) and the left mounting bracket B (B).



7. Remove the mounting bolts and the plate.



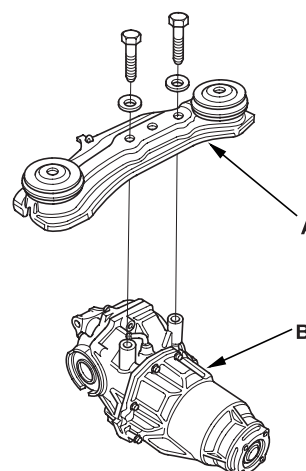
8. Remove the breather tube (A) from the breather tube fitting.



9. Lower the rear differential assembly while pulling both driveshaft inner joints out of the rear differential assembly.

NOTE: Be careful not to damage the driveshaft ring (B) when prying out the differential inboard joints.

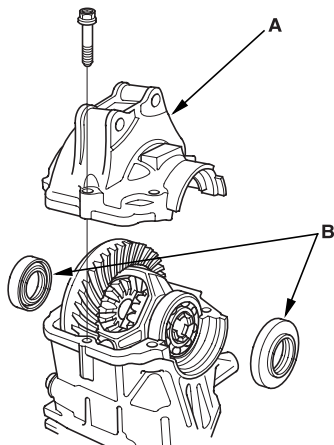
10. Remove the rear differential mount assembly A (A) from the rear differential assembly (B).





Differential Housing Assembly Removal and Installation

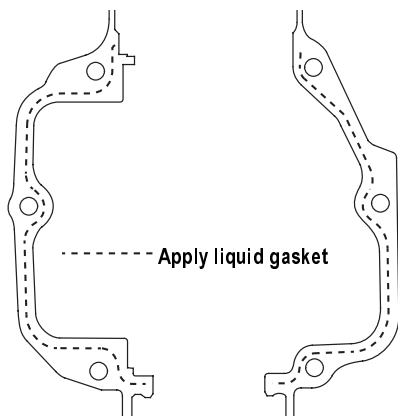
1. Remove the six mounting bolts in a crisscross pattern in several steps, then remove the differential housing assembly (A) and oil seals (B).



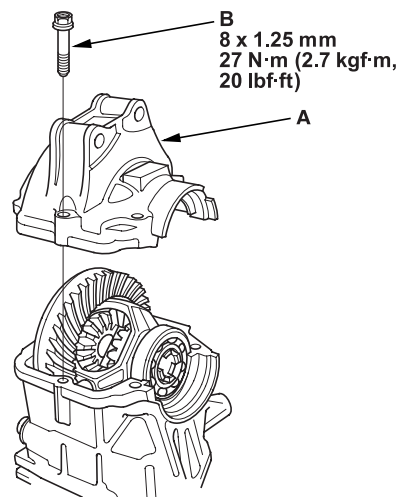
2. Remove the dirt and oil from the sealing surfaces. Apply liquid gasket (P/N08C70-K0234M) to the sealing surface. Be sure to seal the entire circumference of the bolt holes to prevent oil leakage.

NOTE:

- If 5 minutes have passed after applying liquid gasket, reapply it and assemble the housings.
- Allow it to cure at least 20 minutes after assembly before filling the differential with fluid.



3. Install the differential housing assembly (A), then torque the six mounting bolts (B) in a crisscross pattern in several steps.



4. Install the oil seals.

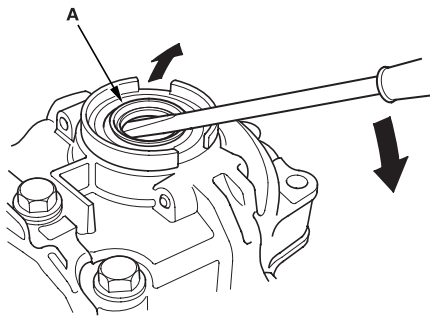
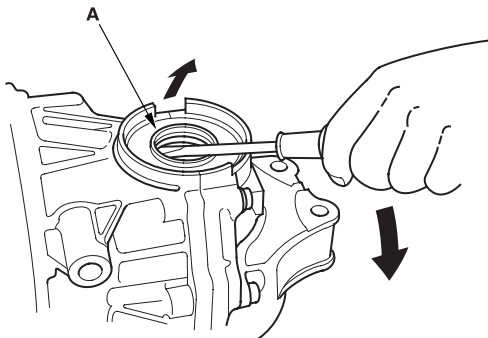
Oil Seal Replacement

Special Tools Required

- Driver 07749-0010000
- Attachment, 78 x 80 mm 07NAD-PX40100

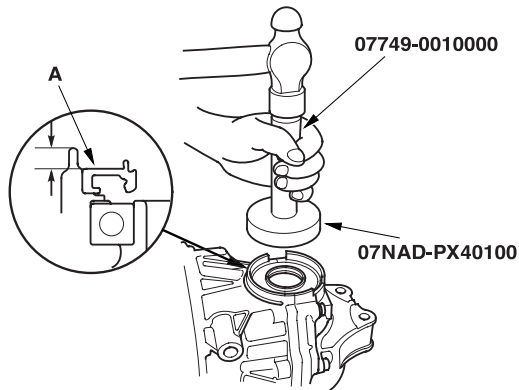
1. Remove the oil seals (A) from the differential housing.

NOTE: Be careful not to damage the differential carrier while prying out the seals.

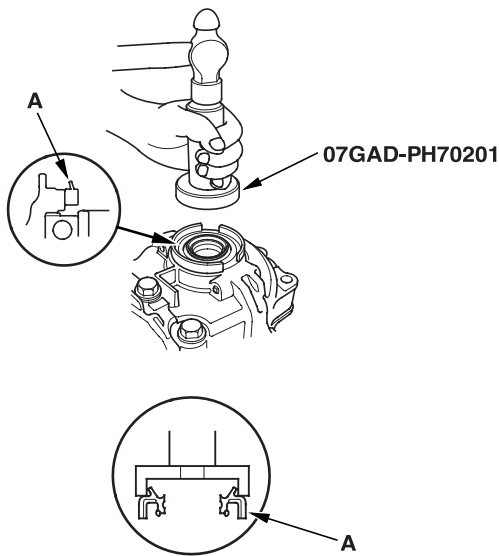


2. Install the oil seals (A) squarely using the special tools. Be careful not to damage the lip of the oil seals.

Right side: Installation depth of the oil seal is 9 mm (0.35 in.) below the edge of the differential carrier assembly.



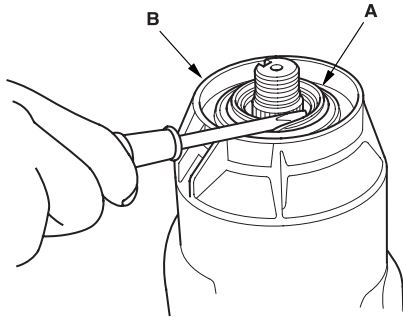
Left side: Install the oil seal (A) flush with the edge of the differential carrier assembly.



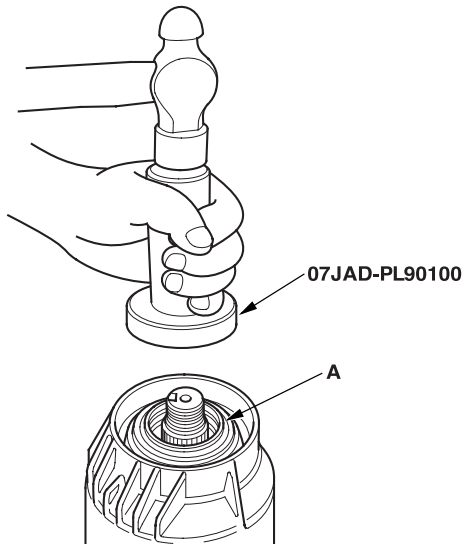


3. Remove the oil seal (A) from the torque control differential case (B).

NOTE: Be careful not to damage the shaft or case while prying out the seal.



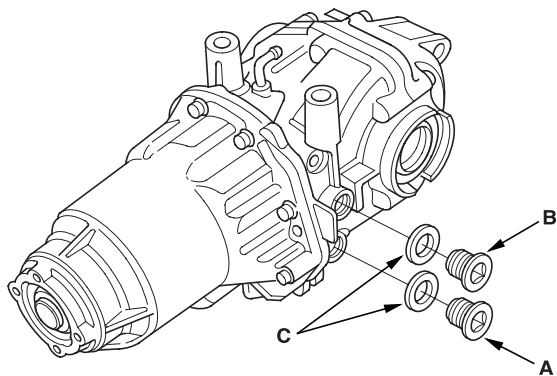
4. Install the oil seal (A) squarely using the special tool. Be careful not to damage the lip of the oil seal.



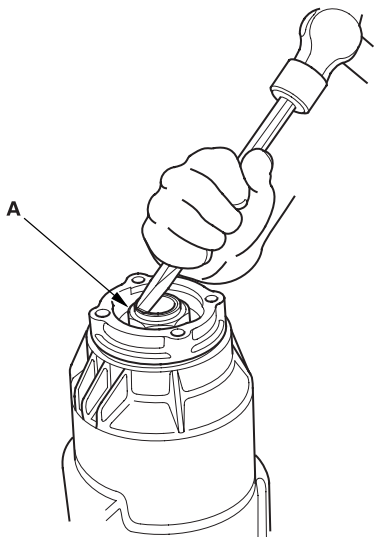
Differential Disassembly

Special Tools Required
Companion Flange Holder 07PAB-0020000

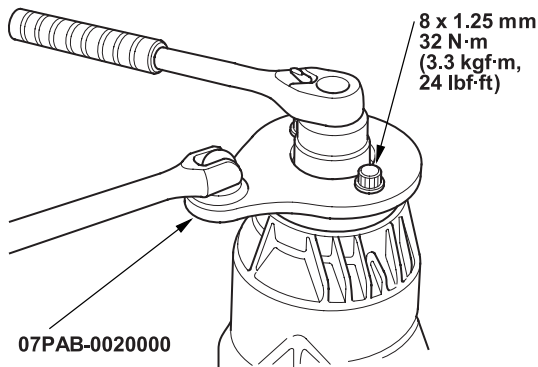
1. Remove the drain plug (A) and the oil filler plug (B) with sealing washers (C).



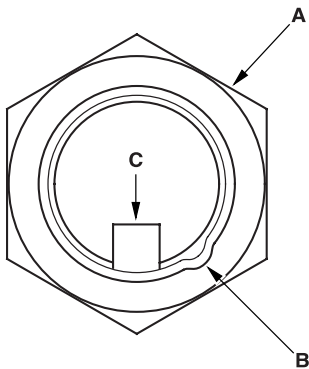
2. Raise the locknut tub (A) from the groove of the clutch guide, making sure that the tab completely clears the groove to prevent damaging the clutch guide.



3. Install the special tools on the companion flange.

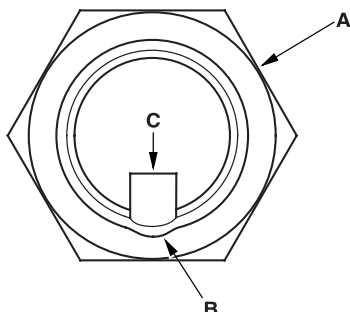


4. Loosen the locknut (A) counterclockwise so that its tab (B) comes out from the groove (C) in the clutch guide.

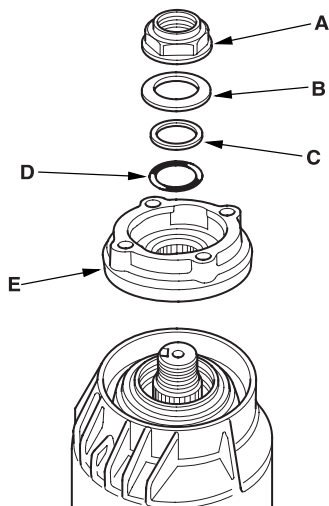




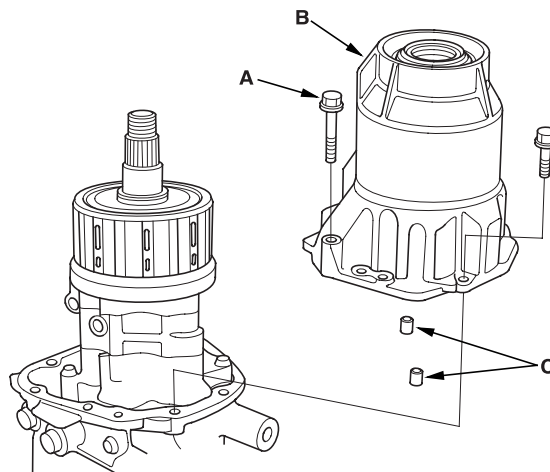
5. Tighten the locknut (A) until its tab (B) aligns with the groove (C).
6. Remove any dirt from inside of the groove in the clutch guide, then loosen the locknut.



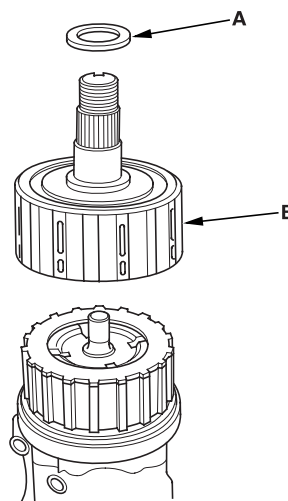
7. Remove the locknut (A), the disc spring washer (B), the back-up ring (C), the O-ring (D) and the companion flange (E).



8. Remove the eight mounting bolts (A) in a crisscross pattern in several steps, then remove the torque control differential case (B) and the dowel pin (C).



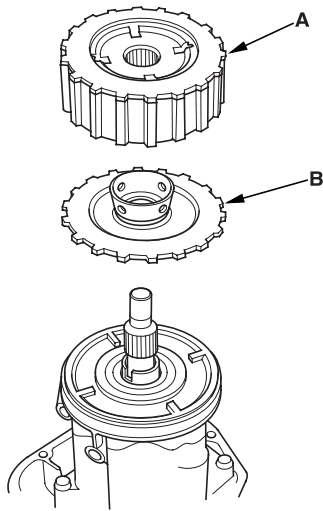
9. Remove the shim (A) and the clutch guide (B).



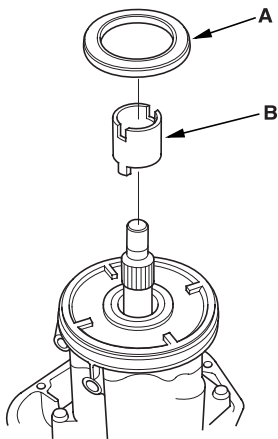
(cont'd)

Differential Disassembly (cont'd)

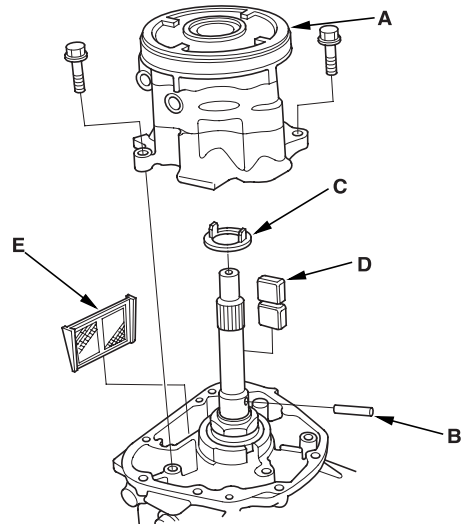
10. Remove the clutch hub/plates/discs (A) and the pressure plate (B).



11. Remove the thrust needle bearing (A) and the oil pump driveshaft (B).



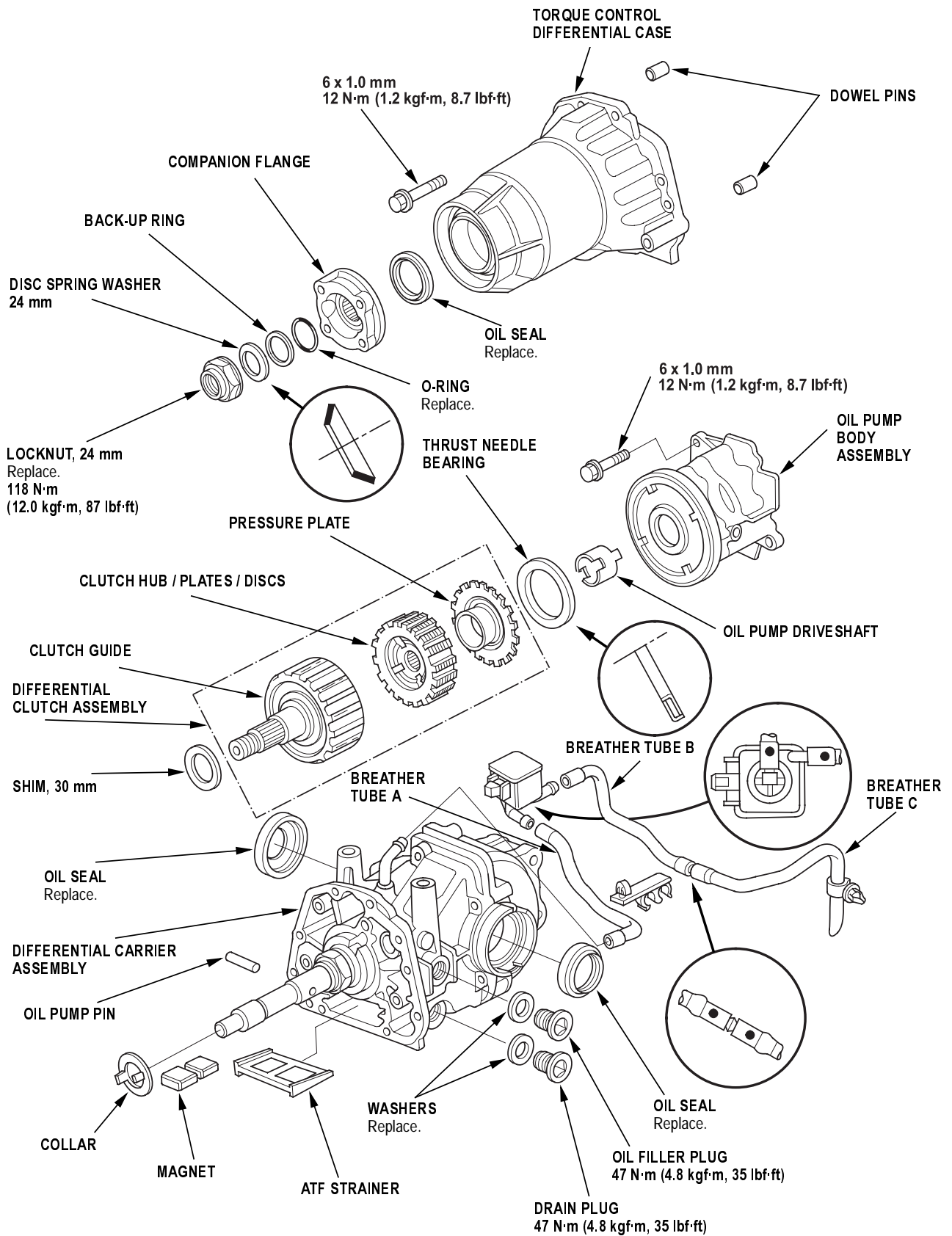
12. Remove the oil pump body assembly (A), the oil pump pin (B), the collar (C), the magnet (D), and the ATF strainer (E).





Differential Reassembly

Exploded View



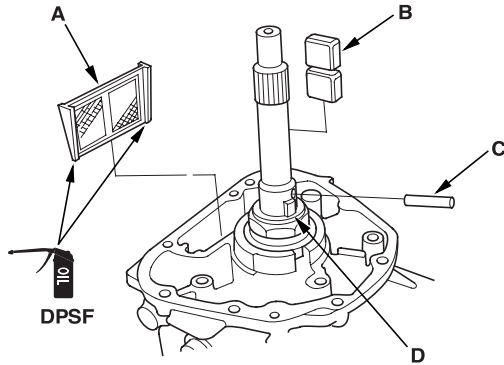
(cont'd)

Differential Reassembly (cont'd)

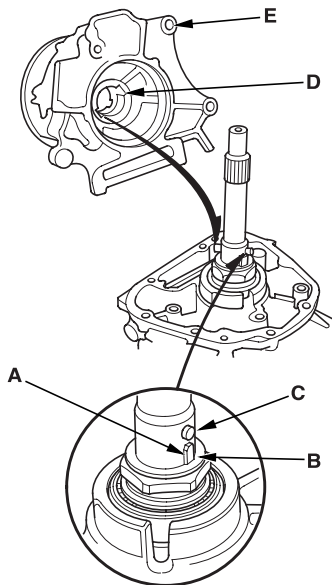
Special Tools Required

Companion Flange Holder 07PAB-0020000

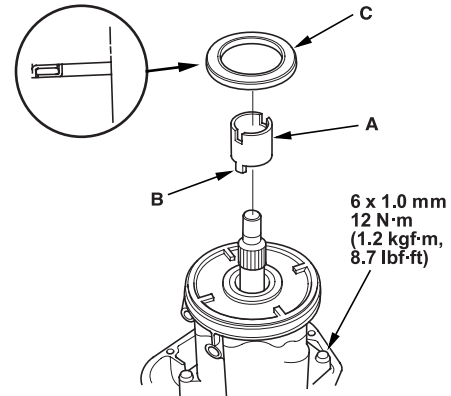
1. Apply DPSF to the rubber of the ATF strainer (A), then install the ATF strainer, the magnet (B), and the oil pump pin (C), and the collar (D) to the differential carrier assembly.



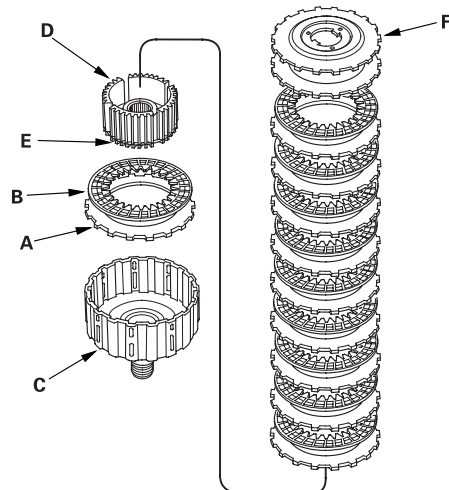
2. Align the tabs (A) of the collar (B) with the oil pump pin (C). Align the grooves (D) of the rear oil pump with the oil pump pin and collar tabs, then install the oil pump body assembly (E) to the differential carrier assembly.



3. Tighten the oil pump body assembly mounting bolts.
4. Install the oil pump driveshaft (A) by aligning the projection (B) of the oil pump driveshaft with the groove of the front oil pump in the oil pump body assembly.

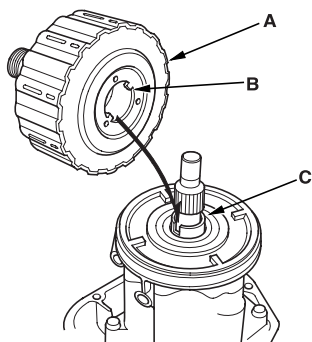


5. Install the thrust needle bearing (C).
6. If necessary, reassemble the differential clutch, and note these items:
 - Install on metal clutch plate (A) and one fiber clutch disc (B) in the clutch guide (C), then install the clutch hub with snap ring (D) into the clutch guide.
 - Make sure the splines of the clutch hub and fiber clutch disc line up below the snap ring (E).
 - Install the remaining metal clutch plates and fiber clutch discs alternately until you installed a total of eleven plates and ten discs, then install the pressure plate (F).





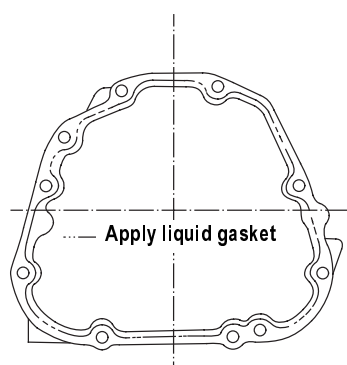
7. Install the differential clutch assembly (A) by aligning the tabs of the pressure plate (B) with the grooves in the oil pump driveshaft (C).



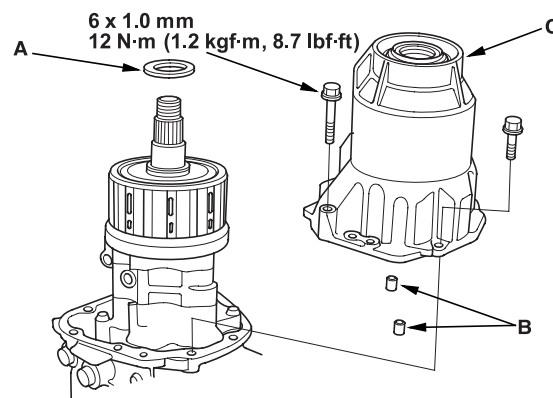
8. Remove the dirt and oil from the sealing surfaces. Apply liquid gasket (P/N08C70-K0234M) to the sealing surface. Be sure to seal the entire circumference of the bolt holes to prevent oil leakage.

NOTE:

- If 5 minutes have passed after applying liquid gasket, reapply it and assemble the housings.
- Allow it to cure at least 20 minutes after assembly before filling the differential with oil.

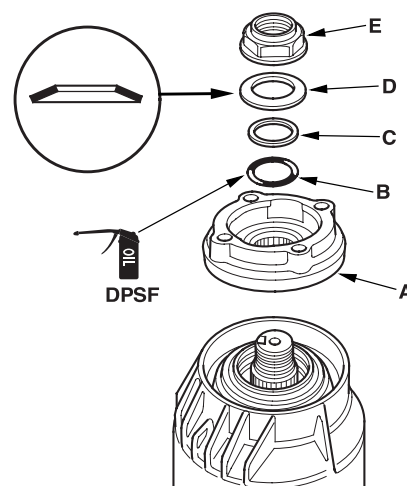


9. Install the 30 mm shim (A), the 6 x 1.0 mm dowel pins (B), and the torque control differential case (C). Torque the eight mounting bolts in a crisscross pattern in several steps.



10. Install the companion flange (A), O-ring (B), back-up ring (C), disc spring washer (D), and the locknut (E).

NOTE: Apply DPSF to the O-ring.

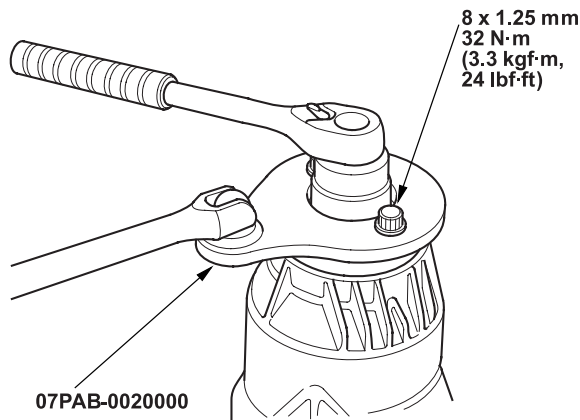


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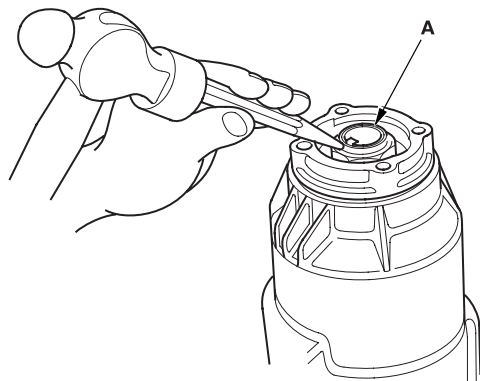
Differential Reassembly (cont'd)

11. Install the special tools to the companion flange, then tighten the new locknut to specified torque.

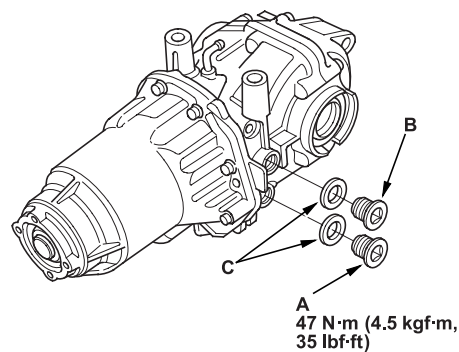
TORQUE: 118 N·m (12.0 kgf·m, 87 lbf·ft)



12. Stake the locknut tab (A) into the groove in the clutch guide.



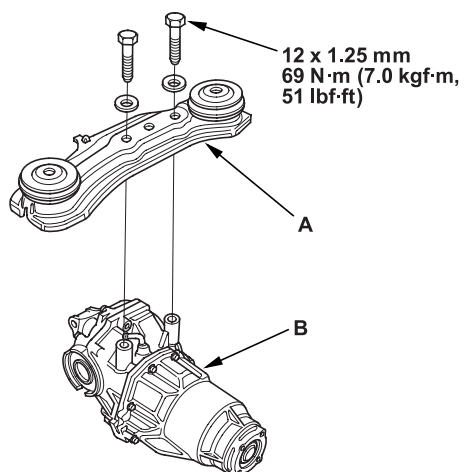
13. Install the drain plug (A) and the oil filler plug (B) with new washers (C).



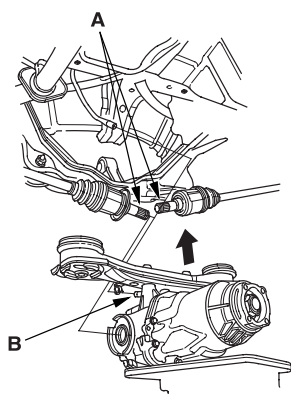


Differential Installation

1. Install the rear differential mount assembly A (A) to the rear differential assembly (B).

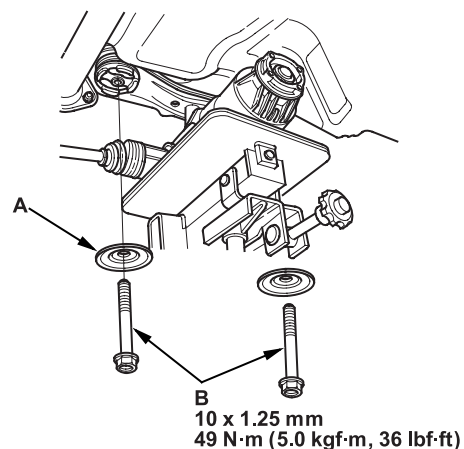


2. Jack up the rear differential.
3. Install the new set rings (A) on to the driveshafts, then install the driveshaft into the rear differential.

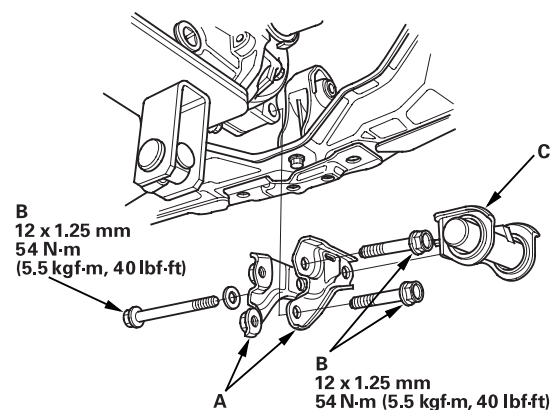


4. Lift the rear differential up into position, then push on both driveshafts to lock the set rings into place. Connect the breather tube (B).

5. Install the plates (A) and torque the rear differential mount assembly mounting bolts (B).



6. Install the right and left rear differential mount brackets B (A) then torque the bolts (B) and damper (C).

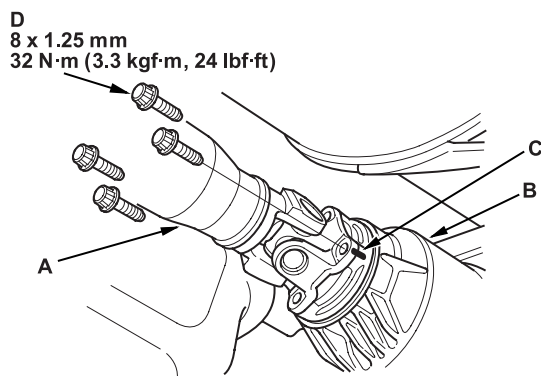


7. Install the EVAP canister assembly with bracket (see page 11-199).

(cont'd)

Differential Installation (cont'd)

8. Install the No. 2 propeller shaft (A) onto the rear differential (B) by aligning the reference mark (C). Be sure to use new mounting bolts (D).



9. Fill the rear differential with the specified amount of DPSF ([see page 15-13](#)).



Differential Mount Replacement

Exploded View

