SECTION RFD
REAR FINAL DRIVE

CONTENTS

C200

H233B

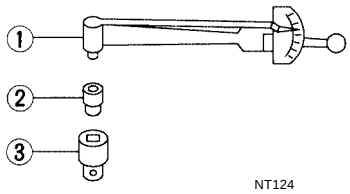
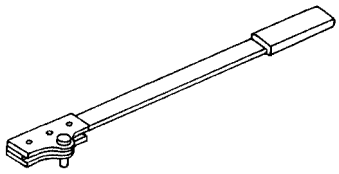
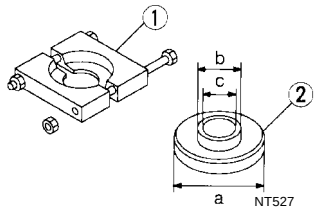
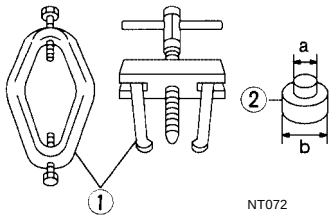
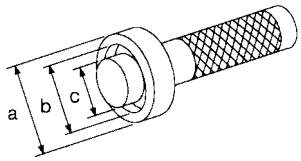
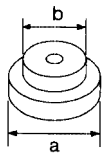
PREPARATION

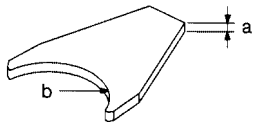
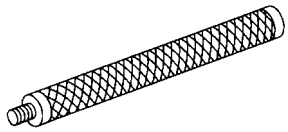
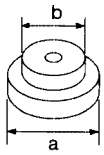
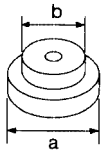
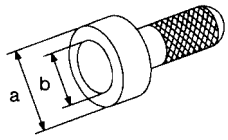
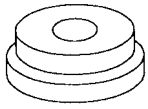
PFP:00002

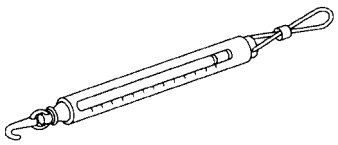
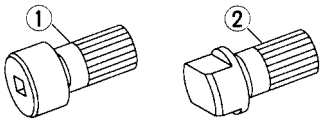
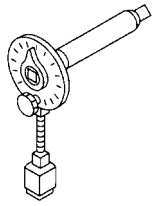
Special Service Tools

EDS0012P

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
ST3127S000 (See J25765-A) Preload gauge 1 GG91030000 (J25765) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT124	Measuring pinion bearing preload and total preload
KV38108300 (J44195) Companion flange wrench	 NT771	Removing and installing propeller shaft lock nut and drive pinion lock nut
ST3090S000 (—) Drive pinion rear inner race puller set 1 ST30031000 (J22912-01) Puller 2 ST30901000 (J26010-01) Base	 NT527	Removing and installing drive pinion rear inner cone **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35 mm (1.38 in) dia.**
ST3306S001 Differential side bearing puller set 1 ST33051001 (J22888-20) Body 2 ST33061000 (J8107-2) Adapter	 NT072	Removing and installing differential side bearing inner cone **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST33230000 (J25805-01) Differential side bearing drift	 NT085	Installing side bearing inner cone **a: 51 mm (2.01 in) dia.** **b: 41 mm (1.61 in) dia.** **c: 28.5 mm (1.122 in) dia.**
ST33081000 (—) Side bearing puller adapter	 NT073	Installing side bearing inner cone and removing and installing differential case couple bolts· **a: 43 mm (1.69 in) dia.** **b: 33.5 mm (1.319 in) dia.**

Tool number (Kent-Moore No.) Tool name		Description
KV38100600 (J25267) Side bearing spacer drift	 NT528	Installing side bearing spacer **a: 8 mm (0.31 in)** **b: R42.5 mm (1.673 in)**
ST30611000 (J25742-1) Drift	 NT090	Installing pinion rear bearing outer race
ST30621000 (J25742-5) Drift	 NT073	Installing pinion rear bearing outer race **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30613000 (J25742-3) Drift	 NT073	Installing pinion front bearing outer race **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
KV38100500 (J25273) Gear carrier front oil seal drift	 NT115	Installing front oil seal **a: 85 mm (3.35 in) dia.** **b: 60 mm (2.36 in) dia.**
(J34309) Differential shim selector	 NT134	Adjusting bearing pre-load and gear height
(J25269-4) Side bearing discs (2 Req'd)	 NT136	Selecting pinion height adjusting washer

Tool number (Kent-Moore No.) Tool name		Description
(J8129) Spring gauge	 NT127	Measuring carrier turning torque
KV381051S0 (—) Rear axle shaft dummy 1 KV38105110 (—) Torque wrench side 2 KV38105120 (—) Vise side	 NT142	Checking differential torque on limited slip differential
KV10112100 (BT8653-A) Angle wrench	 S-NT014	Tightening side bearing cap bolts

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EDS0012Q

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

			Reference page	Rough gear tooth	Improper gear contact	Tooth surface worn	Incorrect backlash	Companion flange excessive runout	Improper gear oil	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVESHAFT	BRAKES	STEERING
			Possible cause and SUSPECTED PARTS	RFD-21 , RFD-21	RFD-20	RFD-20	RFD-14	—	MA-12	PR-3	FAX-4,RAX-5 , FSU-4 , RSU-4	WT-3		RAX-5	BR-6	PS-5
Symptom	DIFFERENTIAL	Noise		×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

FRONT OIL SEAL

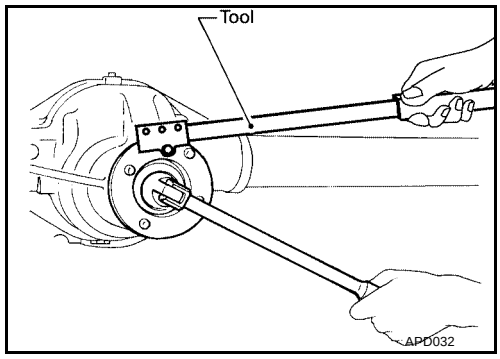
PFP:38189

Removal and Installation

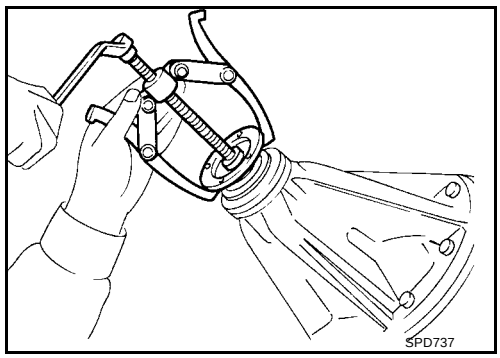
EDS0012R

1. Remove propeller shaft. Refer to PR-8, "Removal and Installation" .
2. Loosen drive pinion nut while holding companion flange using Tool.

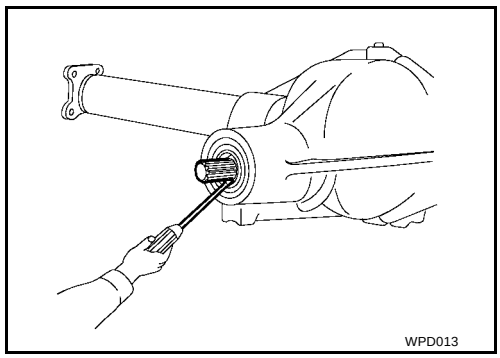
   Tool number : KV38108300 (J-44195)



3. Remove companion flange using a suitable tool.
4. Remove ABS sensor and rear wheel sensor rotor.



5. Remove front oil seal.



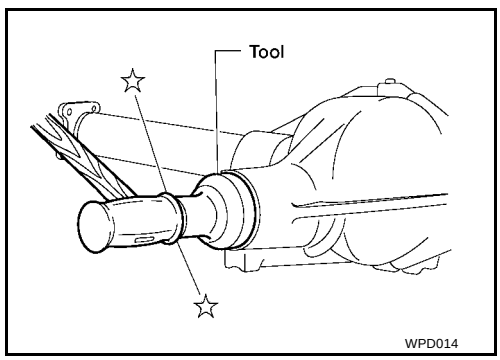
6. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier using Tool.

   Tool number : KV38100500 (J25273)

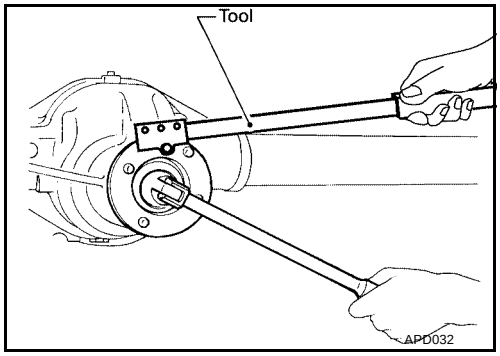
7. Install ABS sensor and rear wheel sensor rotor.

   ABS sensor bolts : 18 - 24 N·m (1.8 - 2.4 kg-m, 13 - 17 lb-ft)

8. Install companion flange.



9. Hold the companion flange using Tool and tighten drive pinion nut.



Tool number : KV38108300 (J-44195)

Drive pinion nut : 127 - 294 N·m (13 - 30 kg-m, 94 - 217 ft-lb)

10. Install rear propeller shaft. Refer to PR-8, "Removal and Installation" .

REAR COVER GASKET

PFP:38320

Removal and Installation

EDS0012S

1. Drain gear oil. Refer to MA-40, "Changing Differential Gear Oil" .
2. Remove rear cover and rear cover gasket.
3. Install new rear cover gasket and rear cover.
4. Tighten rear cover bolts.

Rear cover bolts	**: 44 - 54 N·m (4.5 - 5.5 kg-m, 33 - 39 ft-lb)**

5. Fill final drive with recommended gear oil. Refer to MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS" .

REAR FINAL DRIVE ASSEMBLY

PFP:38300

Removal and Installation

EDS0012T

REMOVAL

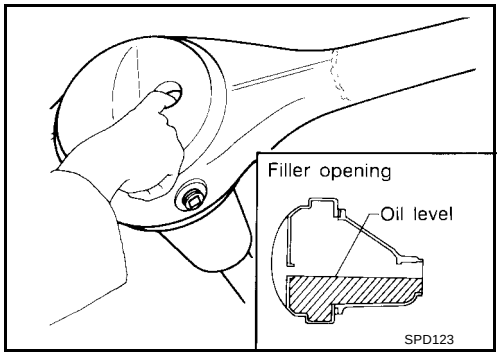
CAUTION:

- **Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft.**
- **Before removing the final drive assembly or rear axle assembly, disconnect the ABS sensor harness connector from the assembly and move it away from the final drive/rear axle assembly area. Failure to do so may result in the sensor wires being damaged and the sensor becoming inoperative.**

1. Remove propeller shaft. Refer to PR-8, "Removal and Installation" .
   - **Plug front end of transfer.**
2. Remove axle shaft. Refer to RAX-8, "Removal" .

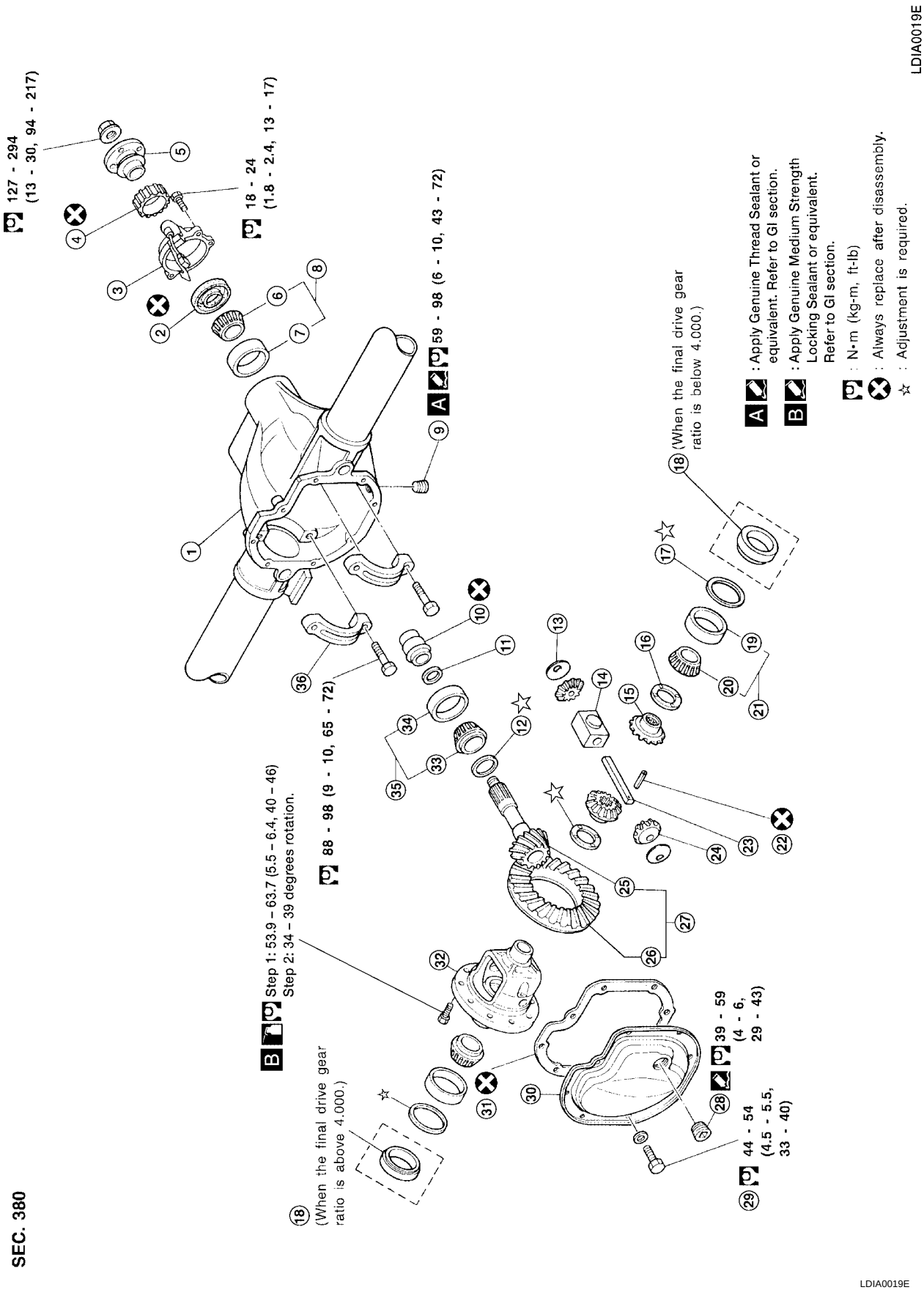
INSTALLATION

- Installation is in the reverse order of removal.
- Fill final drive with recommended gear oil to the specified level shown. Refer to MA-39, "Checking Differential Gear Oil" .

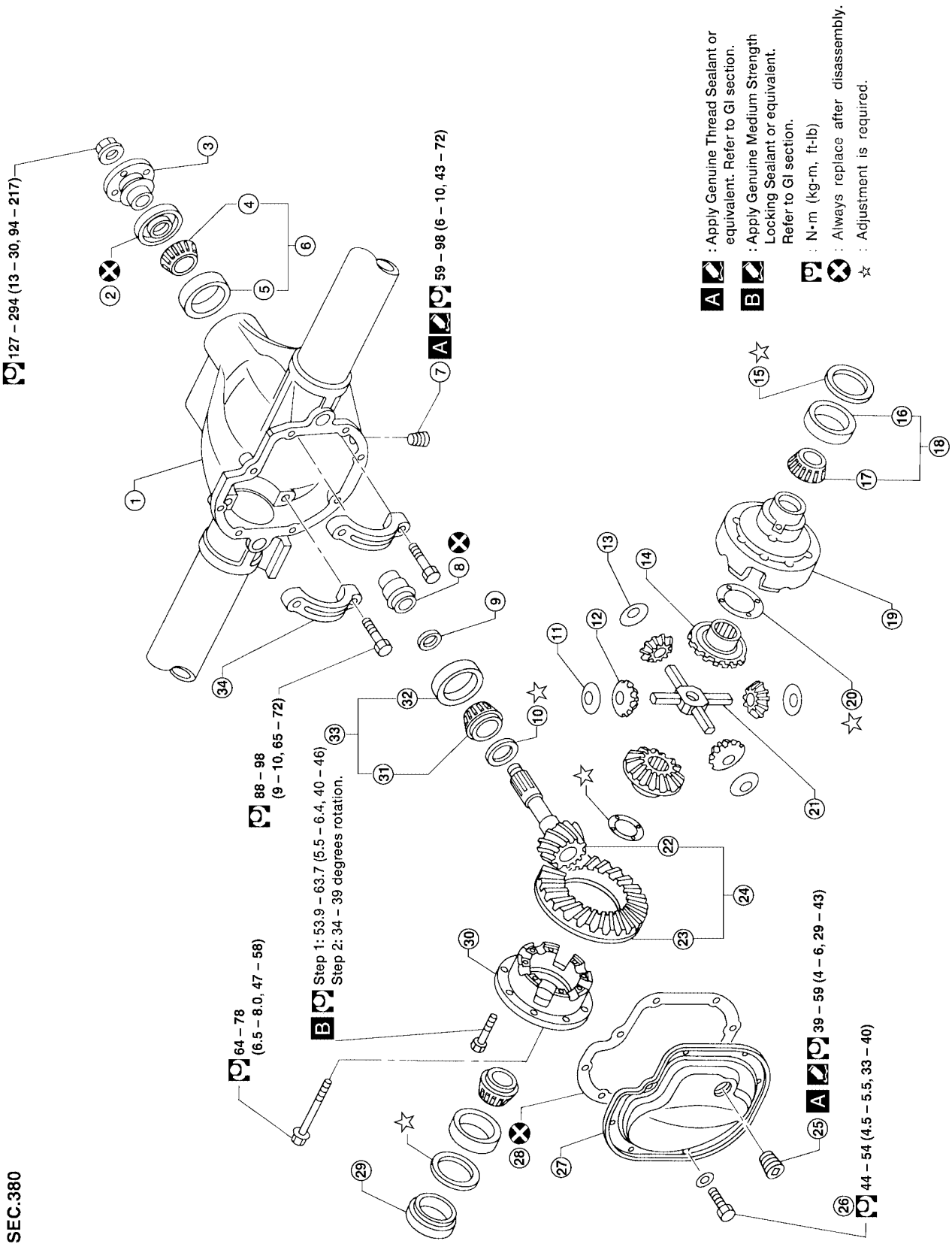


Components

EDS0012U



1. Axle case
2. Front oil seal
3. ABS sensor unit
4. Rear wheel sensor rotor
5. Companion flange
6. Inner cone
7. Outer race
8. Drive pinion front bearing
9. Drain plug
10. Collapsible spacer
11. Washer
12. Pinion height adjusting washer
13. Pinion mate thrust washer
14. Thrust block
15. Side gear
16. Side gear thrust washer
17. Side bearing adjusting shim
18. Side bearing spacer
19. Outer race
20. Inner cone
21. Side bearing
22. Lock pin
23. Pinion mate shaft
24. Pinion mate gear
25. Drive pinion
26. Ring gear
27. Hypoid gear set
28. Filler plug
29. Carrier cover bolt
30. Carrier cover
31. Carrier cover gasket
32. Differential case
33. Inner cone
34. Outer race
35. Drive pinion rear bearing
36. Side bearing cap



1. Axle case
2. Front oil seal
3. Companion flange
4. Inner cone
5. Outer race
6. Drive pinion front bearing

7. Drain plug
8. Collapsible spacer
9. Washer
10. Pinion height adjusting washer
11. Pinion mate thrust washer
12. Pinion mate gear
13. Pinion mate thrust washer
14. Side gear
15. Side bearing adjusting shim
16. Outer race
17. Inner cone
18. Side bearing
19. Differential case A
20. Side gear thrust washer
21. Pinion mate shaft
22. Drive pinion
23. Ring gear
24. Hypoid gear set
25. Filler plug
26. Carrier cover bolt
27. Carrier cover
28. Carrier cover gasket
29. Side bearing spacer
30. Differential case B
31. Inner cone
32. Outer race
33. Drive pinion rear bearing
34. Side bearing cap

Pre-Inspection

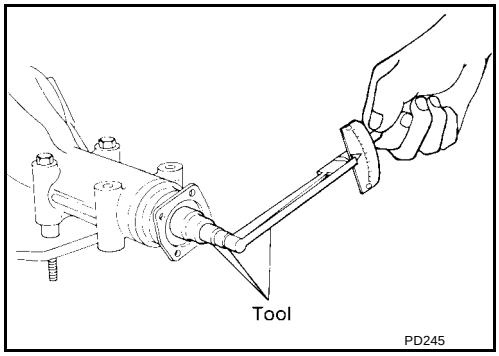
EDS0012V

Before disassembling final drive, perform the following inspections.

TOTAL PRELOAD

1. Turn drive pinion in both directions several times to set bearing rollers.
2. Check total preload with Tool number ST3127S000 (J25765-A).

Total preload : 1.4 - 2.9 N·m (15 - 29 kg-cm, 13 - 25 in-lb)



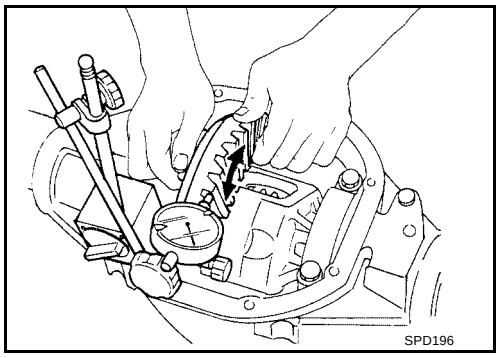
RING GEAR-TO-DRIVE PINION BACKLASH

Check backlash of ring gear with a dial indicator at several points.

Ring gear-to-drive pinion backlash

Gear ratio 4.636 : 0.10 - 0.15 mm (0.0041 - 0.0059 in)

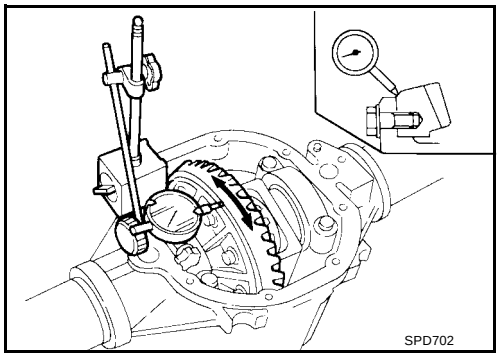
Gear ratio 3.900, 4.625 : 0.13 - 0.18 mm (0.0051 - 0.0071 in)



RING GEAR RUNOUT

Check runout of ring gear with a dial indicator.

Runout limit : 0.08 mm (0.0031 in)



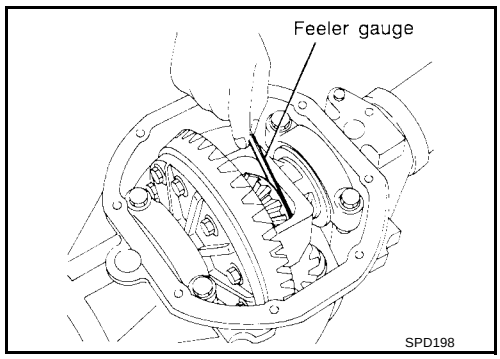
TOOTH CONTACT

Check tooth contact. Refer to RFD-29, "TOOTH CONTACT" .

SIDE GEAR-TO-PINION MATE GEAR BACKLASH

Measure clearance between side gear thrust washer and differential case with a feeler gauge.

Clearance between side gear thrust washer and differential case	**: 0.10 - 0.20 mm (0.0039 - 0.0079 in)**

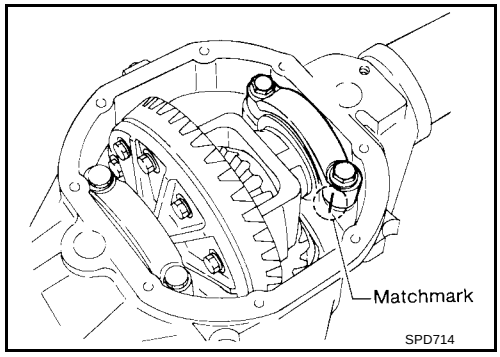


Disassembly and Assembly

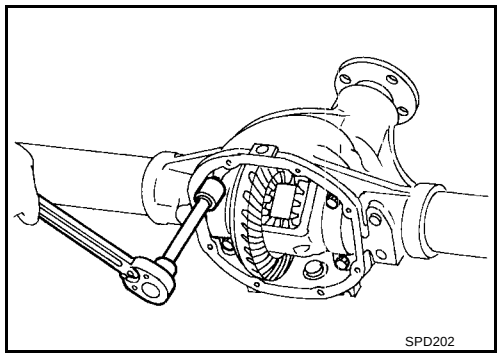
EDS0012W

REMOVAL OF DIFFERENTIAL CASE

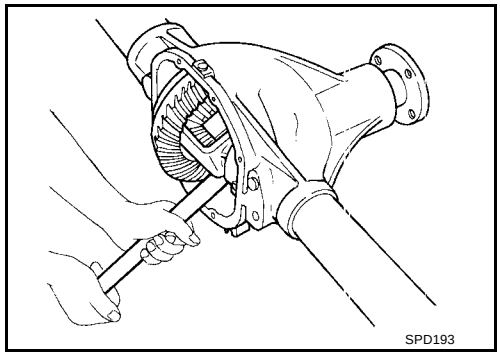
1. Remove rear cover and rear cover gasket.
2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.
   - **Bearing caps are line-bored during manufacture and should be put back in their original places.**



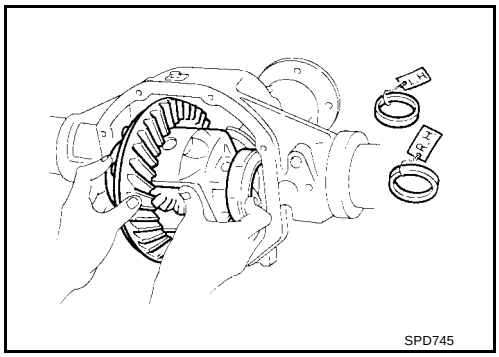
3. Remove side bearing caps.



4. Remove differential case assembly with pry bar.



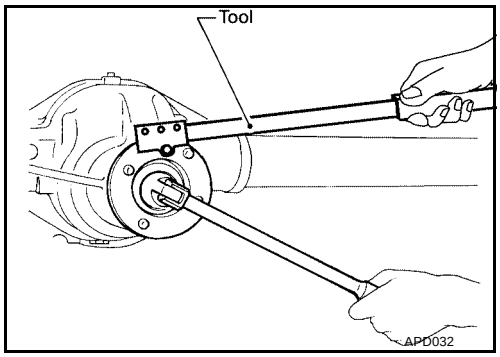
NOTE:
Keep the side bearing outer races together with their respective inner cones — do not mix them up.



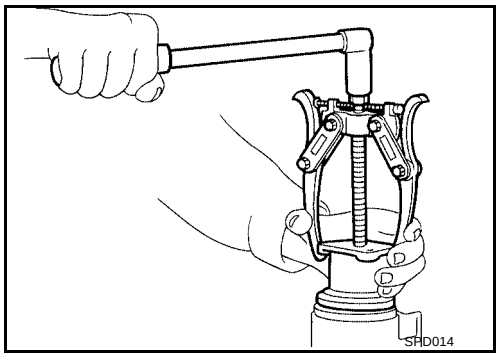
REMOVAL OF DRIVE PINION ASSEMBLY

1. Remove pinion nut while holding the companion flange using Tool.

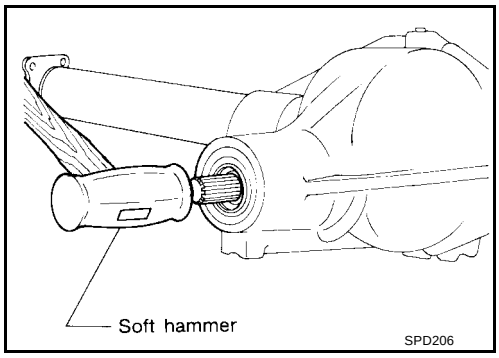
   Tool number : KV38108300 (J44195)



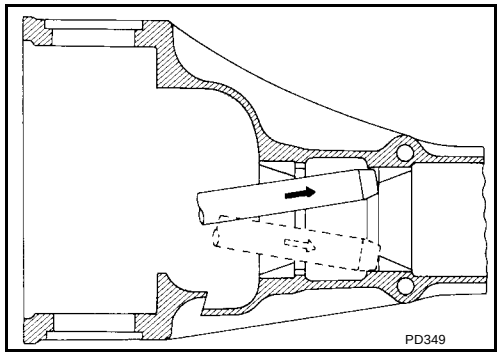
2. Remove companion flange with puller.
3. Remove ABS sensor and sensor rotor.



4. Remove drive pinion with soft hammer.
5. Remove front oil seal and pinion front bearing inner cone.

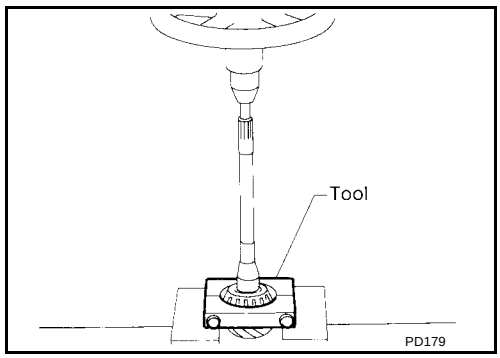


6. Remove pinion bearing outer races with a brass drift.



7. Remove pinion rear bearing inner cone and pinion height adjusting washer.

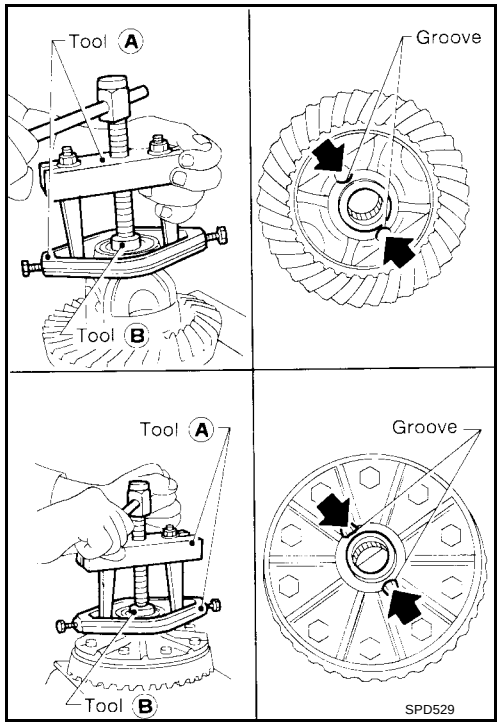
Tool number : ST30031000 (J22912-01)



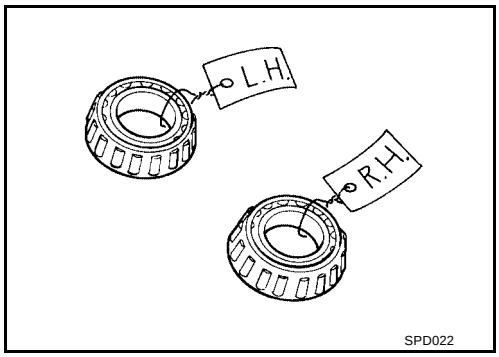
DISASSEMBLY OF DIFFERENTIAL CASE (WITHOUT LSD)

1. Remove side gears, pinion mate gears and thrust washers into differential case
2. Remove side bearing inner cones using Tool.
   - **To prevent damage to bearing, engage puller jaws in grooves.**

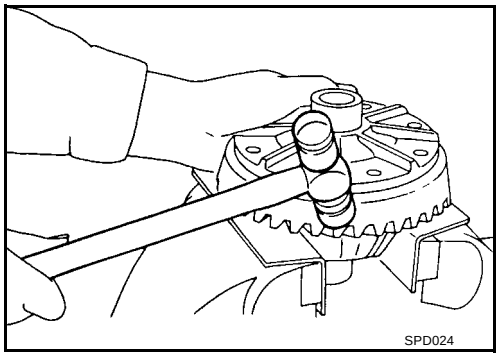
Tool number A : ST33051001 (J22888-20)
Tool number B : ST33061000 (J8107-2)



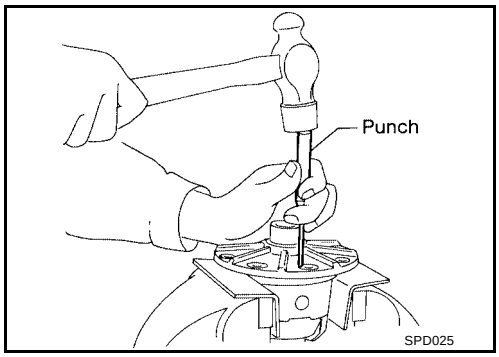
NOTE:
Be careful not to confuse the right-hand and left-hand parts.



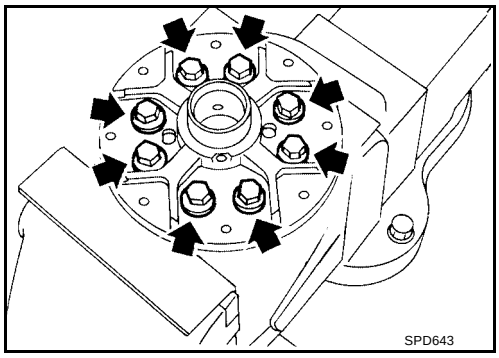
3. Loosen ring gear bolts in a crisscross fashion.
4. Tap ring gear off the differential case with a soft hammer.
   - **Tap evenly all around to keep ring gear from binding.**



5. Punch off pinion mate shaft lock pin from differential case.
   - **Lock pin is caulked at pinhole mouth on differential case.**



6. Disassemble the LH and RH differential case (4WD models).



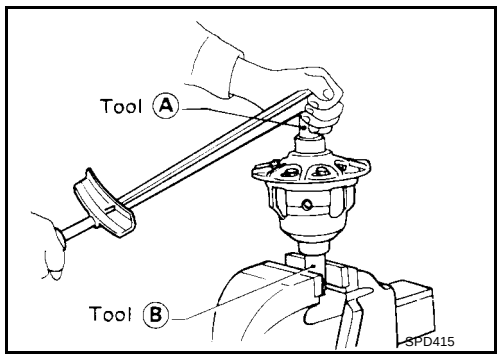
DISASSEMBLY OF DIFFERENTIAL CASE (WITH LSD)

Checking Differential Torque

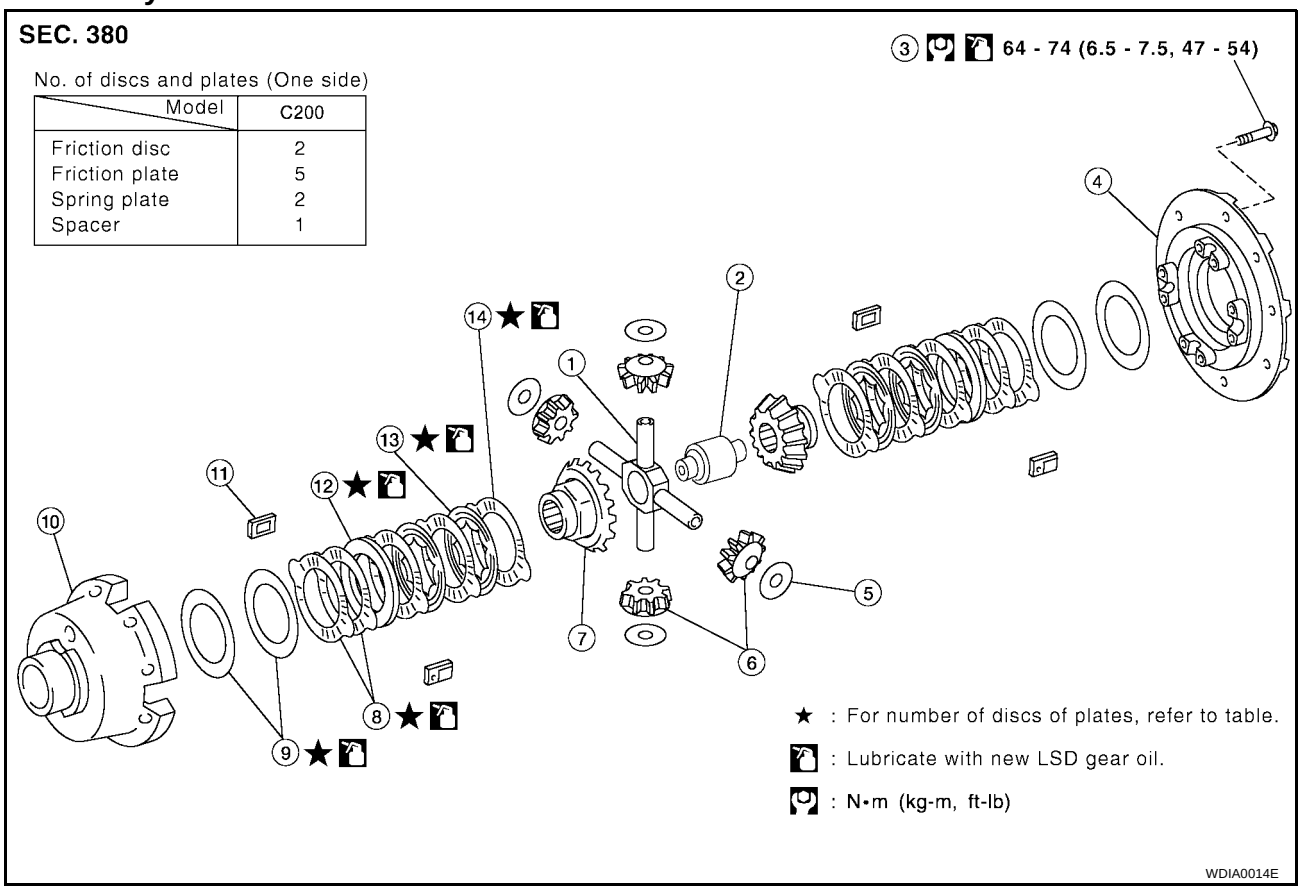
- Measure differential torque with Tool.

Differential torque : 40 - 58 N·m (4 - 6 kg-m, 29 - 43 ft-lb)
Tool number A : KV38105110 (—)
Tool number B : KV38105120 (—)

- If it is not within the specifications, inspect components of limited slip differential.



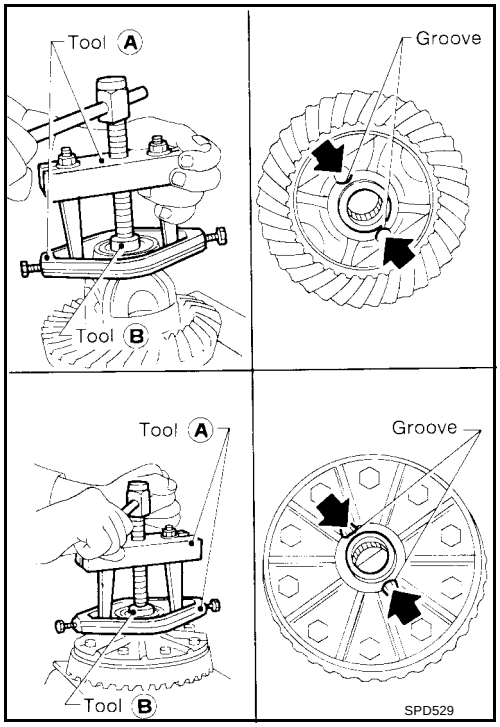
Disassembly



1. Pinion mate shaft
2. Thrust block
3. Differential case couple bolt
4. Differential case B
5. Pinion mate thrust washer
6. Pinion mate gear
7. Side gear
8. Friction plate
9. Spring plate
10. Differential case A
11. Friction plate guide
12. Spacer
13. Friction disc
14. Friction plate

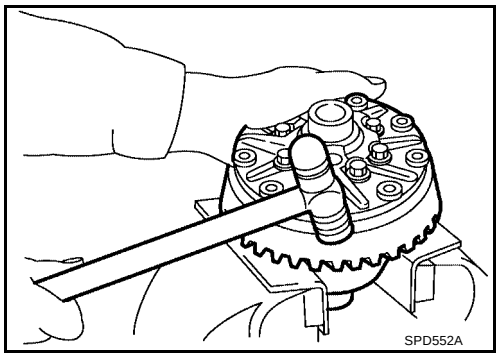
1. Remove side bearing inner cones.
   - **To prevent damage to bearing, engage puller jaws in groove.**

   Tool number A : ST33051001 (J22888–20)
   Tool number B : ST33061000 (J8107–2)



2. Loosen ring gear bolts in a crisscross pattern.

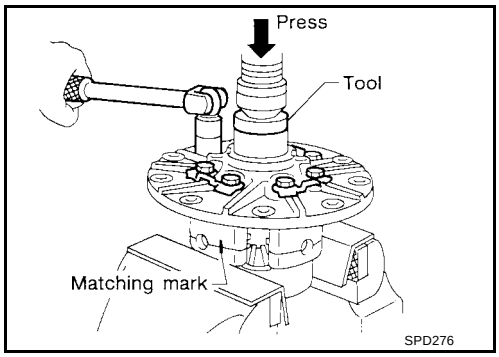
3. Tap ring gear off gear case with a soft hammer.
   - **Tap evenly all around to keep ring gear from binding.**



4. Remove couple bolts on differential cases A and B with a press.

   Tool number : ST33081000 (—)

5. Separate differential case A and B.
6. Remove component parts (discs and plates, etc.).
   - **Put matchmarks on gears and pressure rings so that they can be reinstalled in their original positions from which they are removed.**



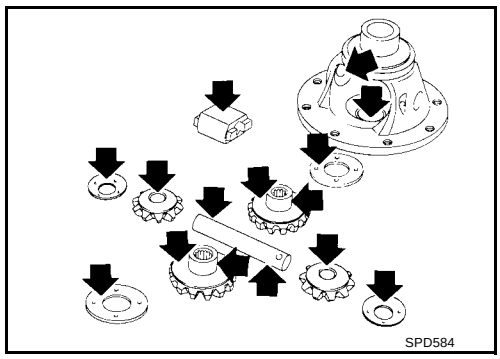
INSPECTION

Ring Gear and Drive Pinion

Check gear teeth for scoring, cracking or chipping. If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).

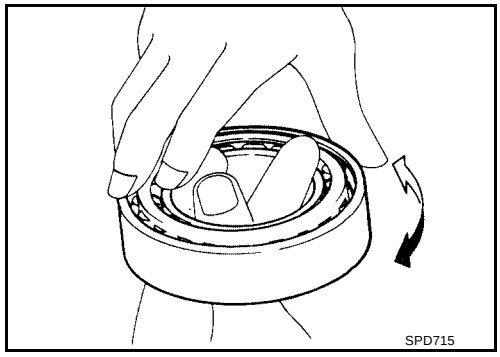
Differential Case Assembly (Non LSD)

Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, thrust block and thrust washers.



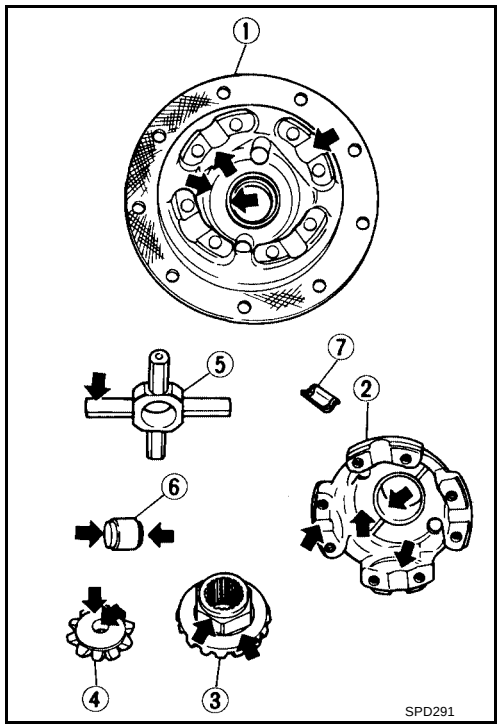
Bearing

1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner race as a set.



Contact Surfaces (With LSD)

1. Clean the disassembled parts in suitable solvent and blow dry with compressed air.
2. If following surfaces are found with burrs or scratches, smooth with oil stone.
   1 Differential case B
   2 Differential case A
   3 Side gear
   4 Pinion mate gear
   5 Pinion mate shaft
   6 Thrust block (2WD and 4WD without ABS only)
   7 Friction plate guide



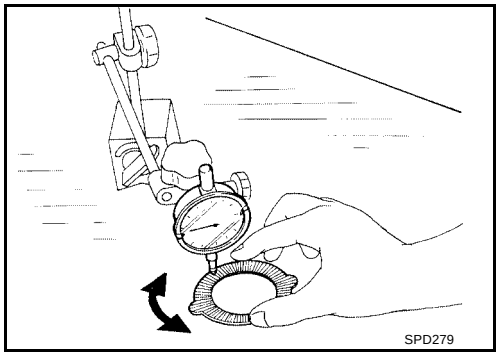
Disc and Plate (With LSD)

1. Clean the discs and plates in suitable solvent and blow dry with compressed air.
2. Inspect discs and plates for wear, nicks and burrs.

3. Check friction discs or plates for warpage.

Allowable warpage : 0.08 mm (0.0031 in)

- If it exceeds limits, replace with a new plate or disc to eliminate possibility of clutch slippage or sticking.

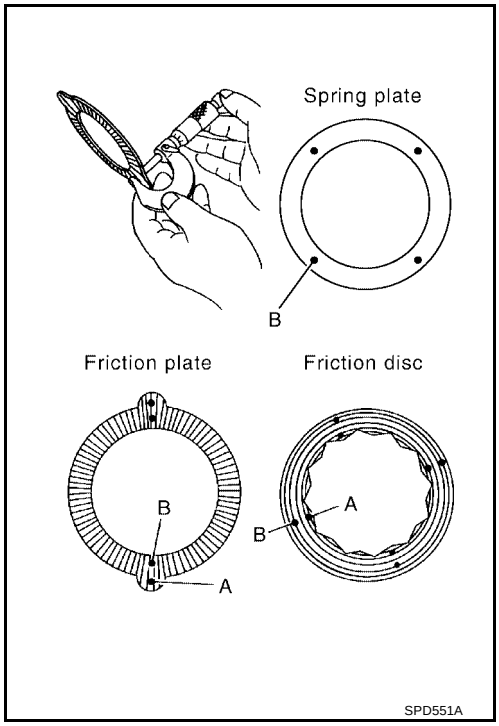


4. Measure frictional surfaces and projected portions of friction disc, friction plate, spring plate, and determine each part's differences to see if the specified wear limit has been exceeded.
   - Measuring points:
   - A: Projected portion
   - B: Frictional surface

Wear limit

A – B = Wear limit mm (in) : 0.1 mm (0.004 in) or less

- If any part has worn beyond the wear limit, and is deformed or fatigued, replace it with a new one that is the same thickness as the projected portion.



ADJUSTMENT OF DIFFERENTIAL CASE (WITH LSD)

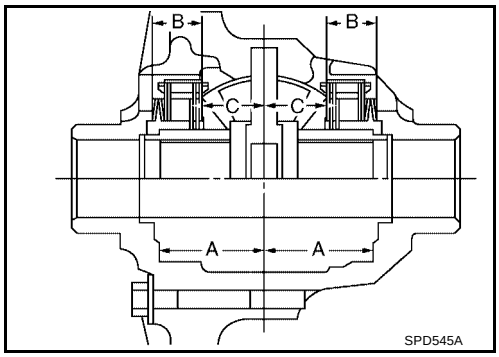
1. End play of friction disc and friction plate can be calculated by using following equation and should be adjusted within following range.

- Adjustment can be made by selecting friction disc having two different thicknesses.

E = A – (B + C)

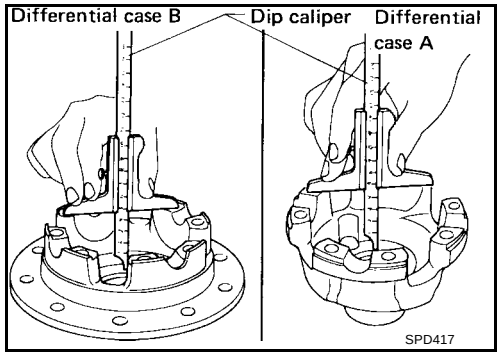
End play E : 0.05 - 0.15 mm (0.0020 - 0.0059 in)

A: Length of differential case contact surface to differential case inner bottom.
B: Total thickness of friction discs, friction plates, spring disc and spring plate in differential case on one side.
C: Length of differential case contact surface to back side of side gear.



2. Measure values of the length of the differential case contact surface to the differential case inner bottom.

Standard length A : 49.50 - 49.55 mm (1.9488 - 1.9508 in)

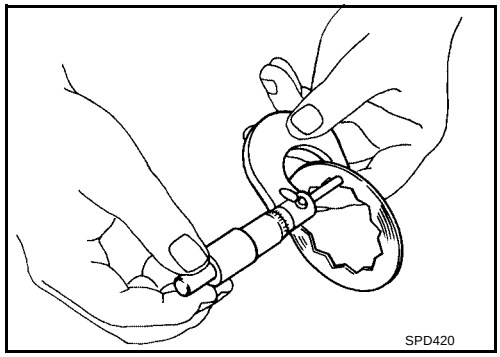


3. Measure thickness of each disc and plate. Number of discs and plates (One side), Friction disc 5, Friction plate 6 and Spring plate 2.

Total thickness "B" : 18.57 - 20.43 mm (0.7311 - 0.8043 in)

No. of discs and plates (One side)

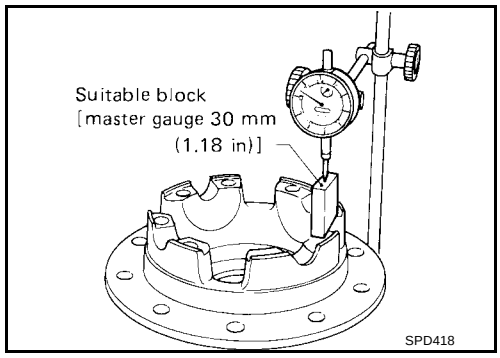
Friction discs	**: 2**
Friction plates	**: 5**
Spring plate	**: 2**
Spacer	**: 1**



4. Measure the length of differential case contact surface to back side of side gear.

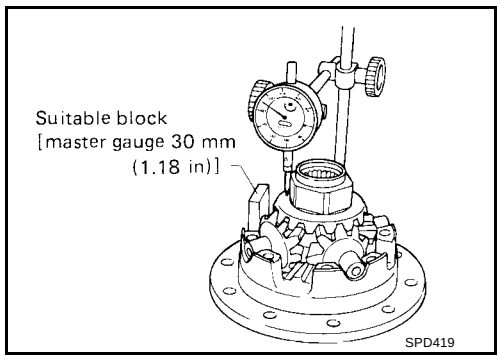
a. Attach a dial indicator to the base plate.

b. Place differential case B on rear of the base plate, and install a master gauge on case B.
Then adjust the dial indicator scale to zero with its tip on the master gauge.



c. Install pinion mate gears, side gears and pinion mate shaft in differential case B.

d. Set dial indicator tip on the side gear, and read the indication.
Example:
E = A – D = A – (B + C) = 0.05 to 0.15 mm
A = 49.52 mm
B = 19.45 mm
C = 29.7 mm
D = B + C
49.15 (D) = 19.45 (B) + 29.7 (C)
E = A – D
0.37 (E) = 49.52 (A) – 49.15 (D)

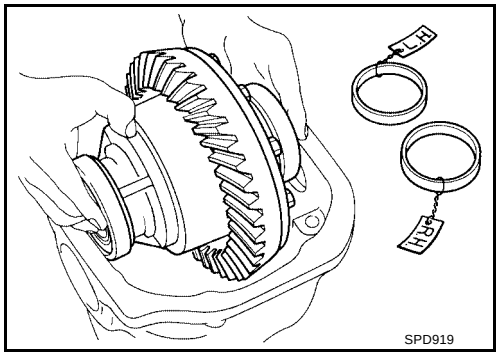


From the above equation, end play of 0.37 mm exceeds the specified range of 0.05 to 0.15 mm.
Select suitable discs and plates to adjust correctly.

SIDE BEARING PRELOAD

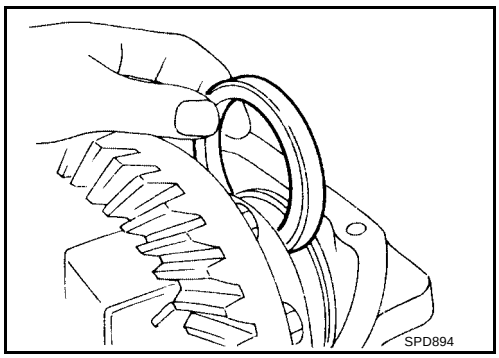
A selection of side bearing adjusting shims is required for successful completion of this procedure.

1. Make sure all parts are clean. Also make sure the bearings are well lubricated with light oil or "DEXRON™ " automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.



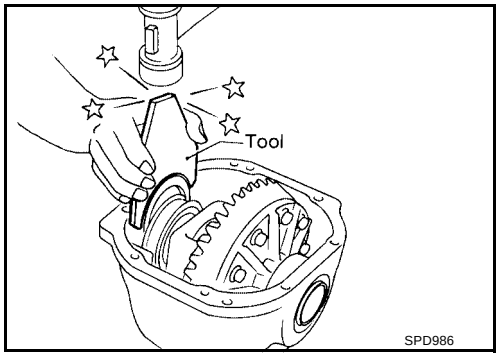
3. Put the side bearing adjusting shim in place.

CAUTION:
Side bearing adjusting shim is placed on either the right or left depending upon final drive gear ratio. Be sure to place it on the correct side.



4. Use Tool to place original carrier side bearing adjusting shims on the carrier end, opposite the ring gear.

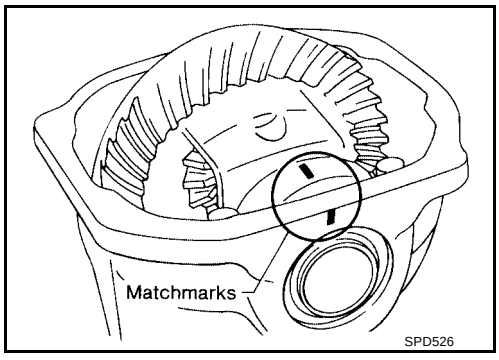
Tool number : KV38100600 (J25267)



5. Install the side bearing caps in their correct locations using the matchmarks made during removal, and tighten the bearing cap bolts to specification.

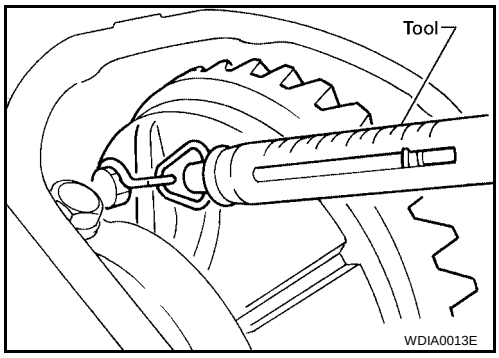
Bearing cap bolts	**: 88 - 98 N·m (9.0 - 10.0 kg-m, 65 - 72 ft-lb)**

6. Turn the carrier several times to seat the bearings.



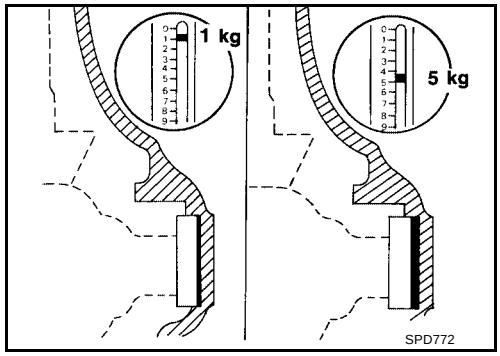
7. Measure the turning resistance of the differential carrier assembly at the ring gear retaining bolts with Tool.

Tool number	**: J8129**
Differential carrier assembly turning resistance	**: 34.3 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb)**



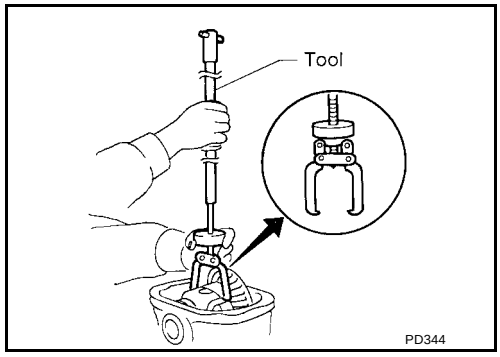
8. If the turning resistance is not within the specification, correct as follows:
   - If the turning resistance is less than the specified range, install thicker side bearing adjusting shims.
   - If the turning resistance is greater than the specification, install thinner side bearing adjusting shims.

Side bearing adjustment	**Refer to RFD-39, "SIDE BEARING ADJUSTMENT" .**



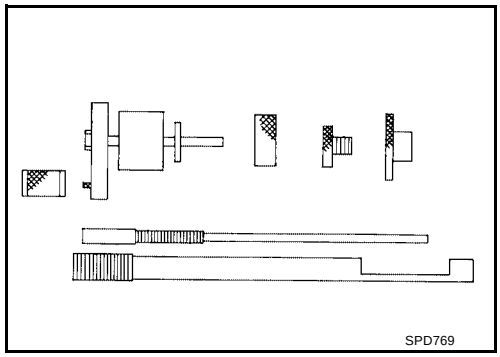
9. Record the total amount of shim thickness required for the correct carrier side bearing preload.

10. Remove the carrier from the final drive housing. Save the selected adjusting shims for later use during the assembly of the final drive unit.

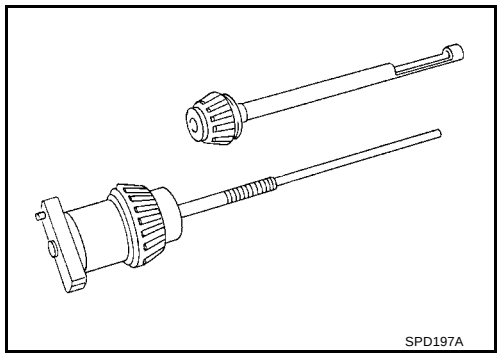


PINION GEAR HEIGHT

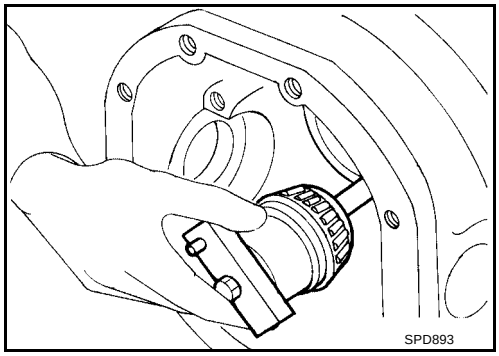
1. Make sure all parts are clean and that the bearings are well lubricated.



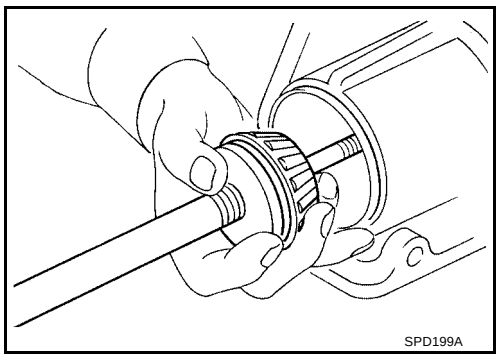
2. Assemble the pinion gear bearings into the pinion preload shim selector Tool, J34309.
   - **Front pinion bearing** — make sure the J34309-3 front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.
   - **Rear pinion bearing** — the rear pinion bearing pilot, J34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J34309-4, is used to lock the bearing to the assembly.



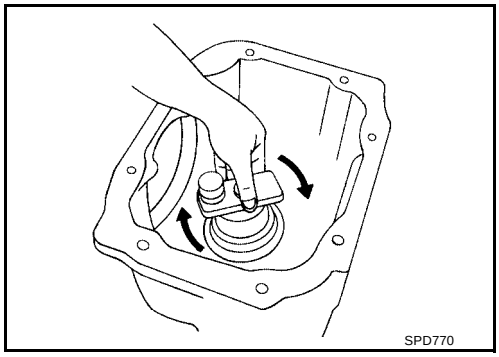
3. Install the pinion rear bearing inner cone into the final drive housing. Then place the pinion preload shim selector Tool, J34309-1, on gauge screw assembly.


SPD893

4. Assemble the front pinion bearing inner cone and the J34309-2 gauge anvil. Assemble them together with the J34309-1 gauge screw in the final drive housing. Make sure that the pinion height gauge plate, J34309-16, will turn a full 360 degrees. Tighten the two sections together by hand.

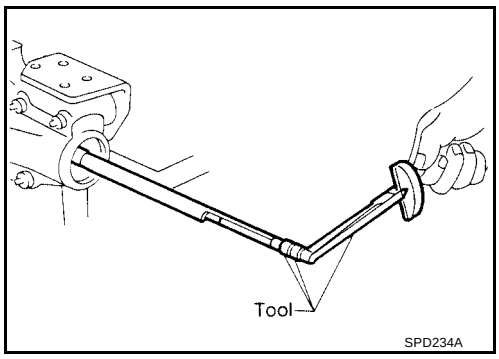

SPD199A

5. Turn the assembly several times to seat the bearings.


SPD770

6. Measure the turning torque at the end of the J34309-2 gauge anvil using Tool.

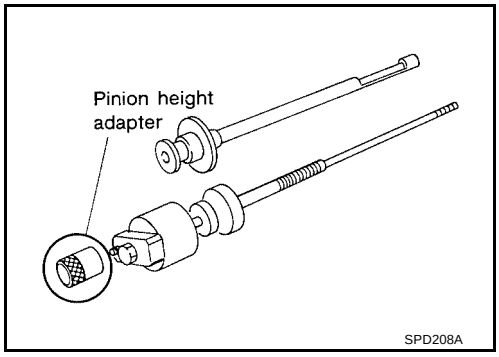
Tool number : ST3127S000 (J25765-A)
Drive pinion preload without front oil seal : 1.0 - 1.3 N·m (10 - 13 kg-cm, 8.7 - 11.3 in-lb)



SPD234A

7. Place the J34309-11 pinion height adapter onto the gauge plate and tighten it by hand.

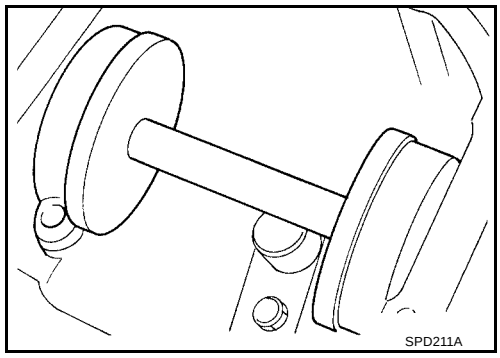
CAUTION:
Make sure all machined surfaces are clean.



SPD208A

Pinion Height Adjusting Washer Selection

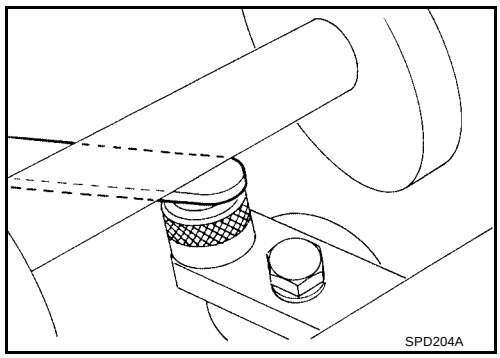
1. Now, position the side bearing discs, J25269-4, and arbor firmly into the side bearing bores.



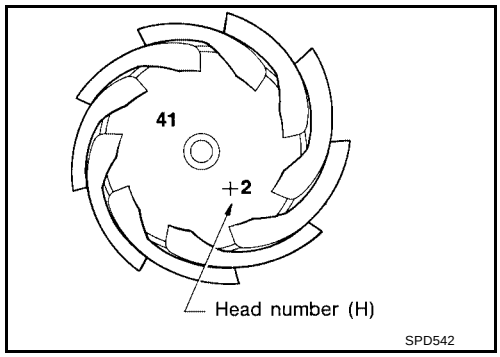
2. Install the side bearing caps and tighten the side bearing cap bolts to proper torque.

Side bearing cap bolts : 93 - 103 N·m (9.5 - 10.5 kg-m, 69 - 76 ft-lb)

3. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and J34309-101 feeler gauge. Measure the distance between the J34309-11 pinion height adapter including the standard gauge and the arbor.
4. Write down the exact measurement (the value of feeler gauge).



5. Correct the pinion height adjusting washer size by referring to the “pinion head number”.
   - **There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set. This number should be the same as the number on the ring gear. The second number is the “pinion head height number”. It refers to the ideal pinion height from standard for quietest operation.**
   - **Use the following chart to determine the correct pinion height adjusting washer:**



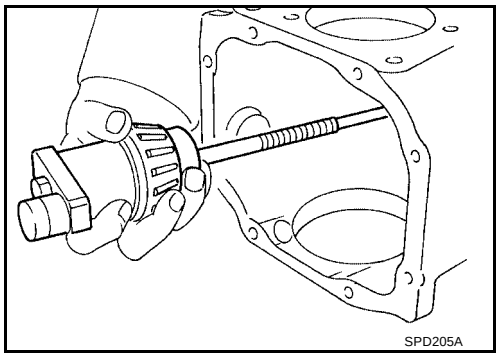
Pinion head height number	Add or remove from the standard pinion height adjusting washer thickness measurement
–6	Add 0.06 mm (0.0024 in)
–5	Add 0.05 mm (0.0020 in)
–4	Add 0.04 mm (0.0016 in)
–3	Add 0.03 mm (0.0012 in)
–2	Add 0.02 mm (0.0008 in)
–1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+1	Subtract 0.01 mm (0.0004 in)
+2	Subtract 0.02 mm (0.0008 in)
+3	Subtract 0.03 mm (0.0012 in)
+4	Subtract 0.04 mm (0.0016 in)

Pinion head height number	Add or remove from the standard pinion height adjusting washer thickness measurement
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

6. Select the correct pinion height adjusting washer.

Pinion height adjusting washer : **RFD-39, "DRIVE PINION HEIGHT ADJUSTMENT"** .

7. Remove the J34309 pinion preload shim selector Tool from the final drive housing. Then disassemble to retrieve the pinion bearings.

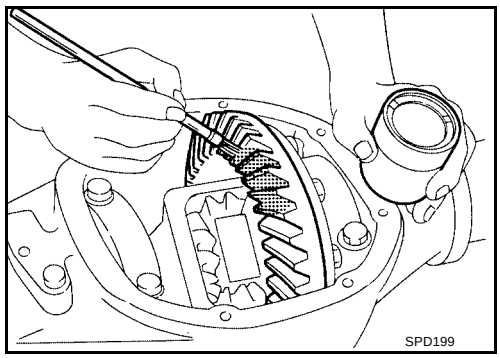


TOOTH CONTACT

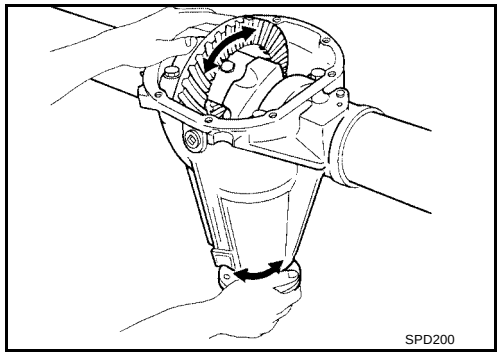
Checking gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion.

Hypoid gear set which is not positioned properly may be noisy, or have short life or both. With the checking or gear tooth contact pattern, the most desirable contact for low noise level and long life can be assured.

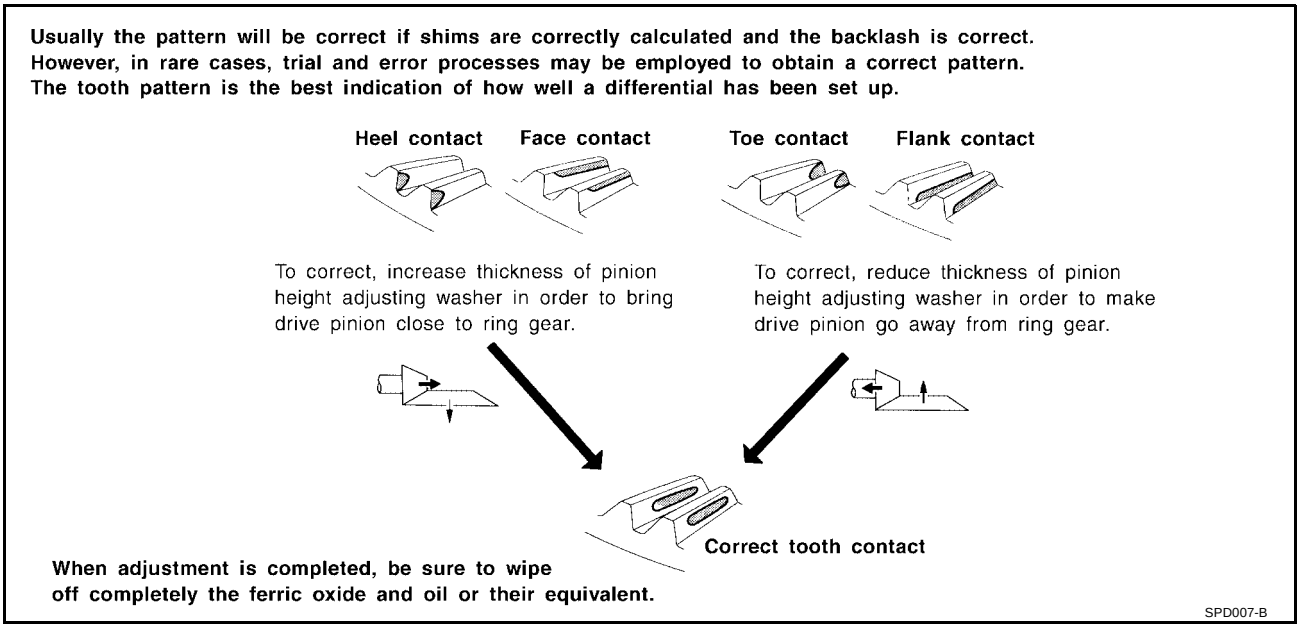
1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.



3. Hold companion flange steady and rotate the ring gear in both directions.



Usually the pattern will be correct if shims are correctly calculated and the backlash is correct. However, in rare cases, trial and error processes may be employed to obtain a correct pattern. The tooth pattern is the best indication of how well a differential has been set up.

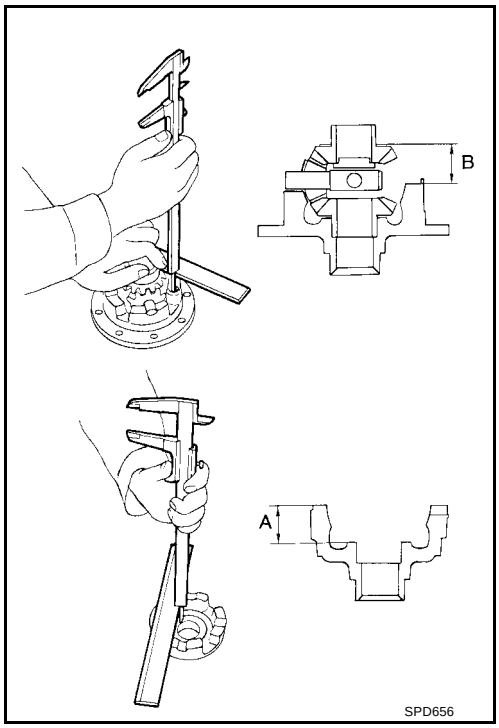


ASSEMBLY OF DIFFERENTIAL CASE (WITHOUT LSD)

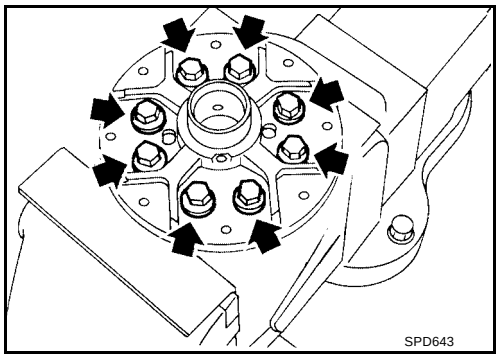
1. Measure clearance between side gear thrust washer and differential case (4WD models).

   Clearance between side gear thrust washer and differential case (A – B) : **0.10 - 0.20 mm (0.0039 - 0.0079 in)**

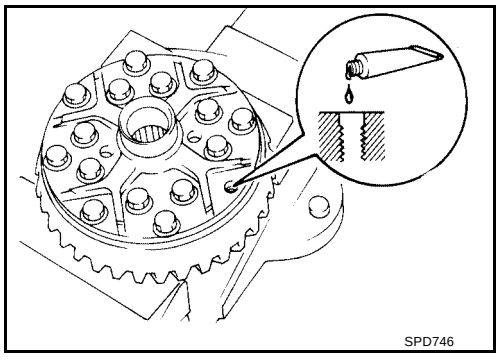
   The clearance can be adjusted with side gear thrust washer. Refer to RFD-38, "SIDE GEAR ADJUSTMENT (WITHOUT LSD)" .



2. Install side gears, pinion mate gears and thrust washers into differential case
3. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see that they turn properly.
4. Install differential case LH and RH (4WD models).



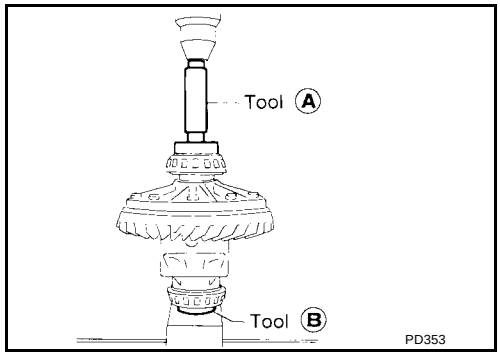
5. Place differential case on ring gear.
6. Apply Genuine Medium Strength Locking Sealant or equivalent to ring gear bolts, and install them.
   - Refer to MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS" .
   - **Tighten bolts in a crisscross pattern.**



Tool number	**KV10112100 (BT8653-A)**
Ring gear bolts	
Step 1	**: 53.9 - 63.7 N·m (5.5 - 6.4 kg-m, 40 - 46 ft-lb)**
Step 2	**: 34° - 39° degrees rotation**

7. Press-fit side bearing inner cones on differential case with Tool.

Tool number A : ST33230000 (J25805-01)
Tool number B : ST33061000 (J8107-2)

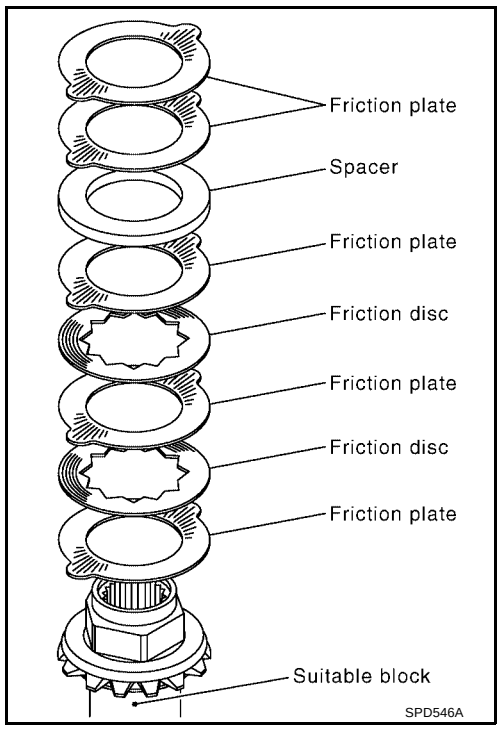


ASSEMBLY OF DIFFERENTIAL CASE (WITH LSD)

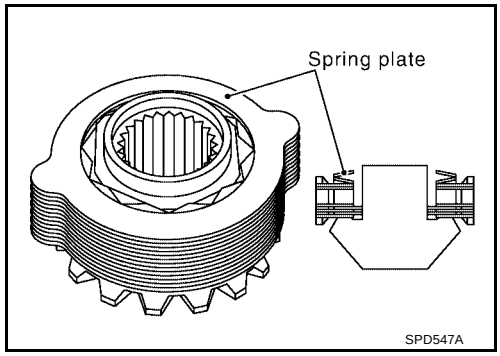
- Prior to assembling discs and plates, properly lubricate them by dipping them in limited slip differential oil. Refer to MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS" .

1. Alternately position specified number of friction plates and friction discs on rear of side gear.
   - **Always position a friction plate first on rear of side gear.**

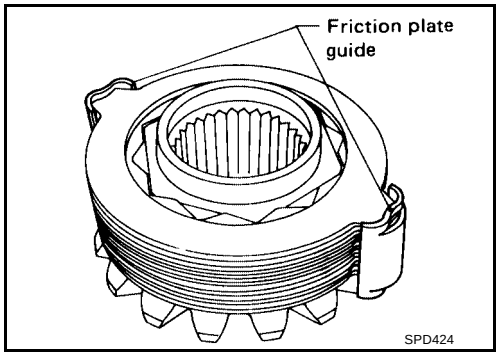
Friction discs : 2
Fiction plates : 5
Spacer : 1



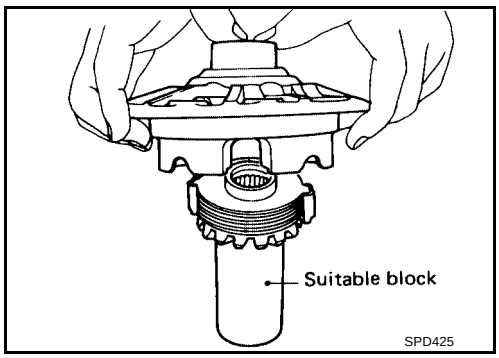
2. Install two spring plates.



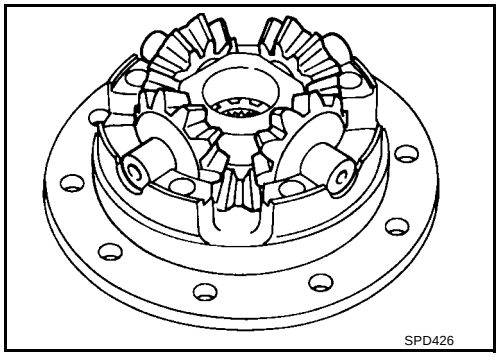
3. Install friction plate guides.
   - **Correctly align the raised portions of friction plates, and apply LSD gear oil to inner surfaces of friction plate guides to prevent them from falling.**



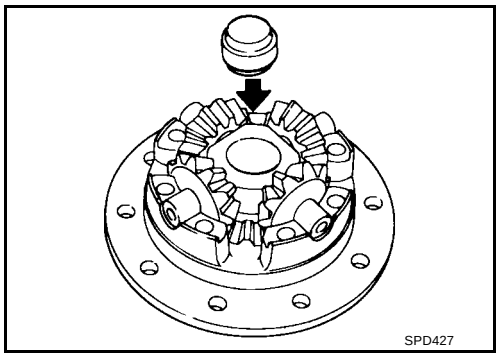
4. Install differential case B over side gear, discs, plates and friction plate guide assembly.
   - **Install differential case B while supporting friction plate guides with your middle finger inserted through oil hole in differential case.**
   - **Be careful not to detach spring disc from the hexagonal part of the side gear.**



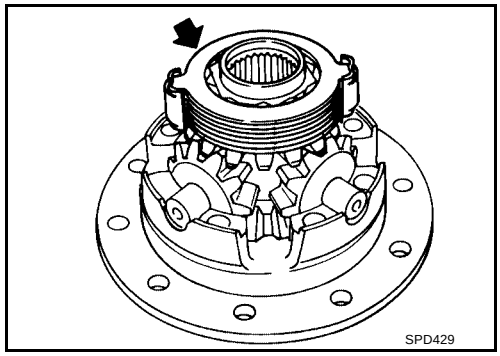
5. Install pinion mate gears and pinion mate thrust washers on pinion mate shaft, then install pinion mate shaft in differential case B.
6. Install side gear to pinion mate gears.



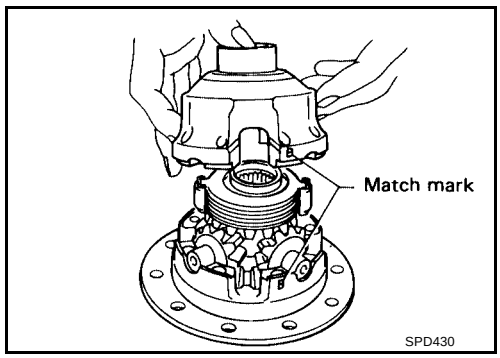
7. Install thrust block.
   - Equipped on 2WD vehicle and 4WD without ABS only.



8. Install each disc and plate.
   - **Use same procedures as outlined in steps 1 through 4.**



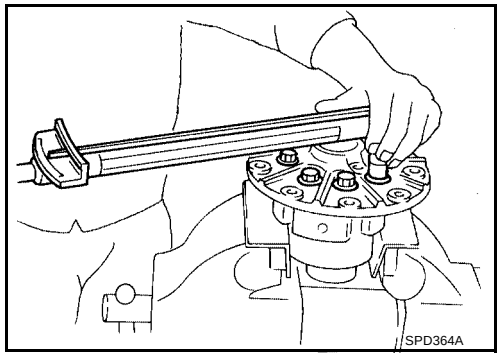
9. Install differential case A.
   - **Position differential cases A and B by correctly aligning the matchmarks stamped on cases.**



10. Tighten differential case couple bolts.

Differential case couple bolts	**: 64 - 74 N·m (6.5 - 7.5 kg-m, 47 - 54 ft-lb)**

11. Place ring gear on differential case and tighten ring gear bolts.
    - **Tighten bolts in a crisscross pattern.**



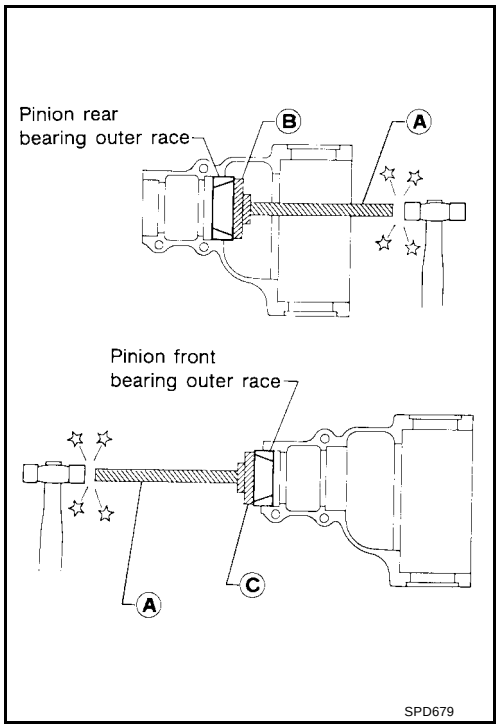
Tool number	**KV10112100 (BT8653-A)**
Ring gear bolts	
Step 1	**: 53.9 - 63.7 N·m (5.5 - 6.4 kg-m, 40 - 46 ft-lb)**
Step 2	**: 34° - 39° degrees rotation**

12. Install side bearing inner race.
13. Check differential torque. Refer to RFD-19, "Checking Differential Torque" .

INSTALLATION OF DRIVE PINION ASSEMBLY

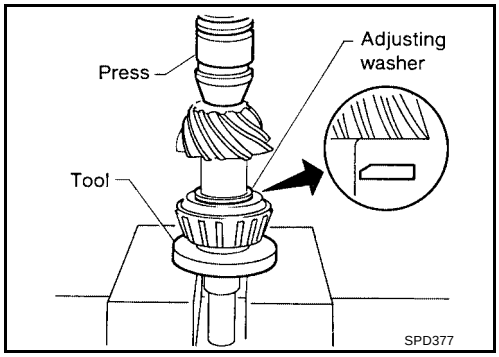
1. Press-fit front and rear bearing outer races with Tools.

Tool number A : ST30611000 (J25742-1)
Tool number B : ST30621000 (J25742-5)
Tool number C : ST30613000 (J25742-3)

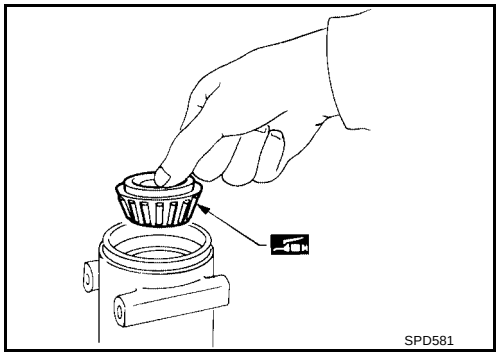


2. Select pinion height adjusting washer. Refer to RFD-25, "PINION GEAR HEIGHT" .
3. Install pinion height adjusting washer in drive pinion, and press-fit rear bearing inner cone in it, with press and Tool.

Tool number : ST30901000 (J26010-01)

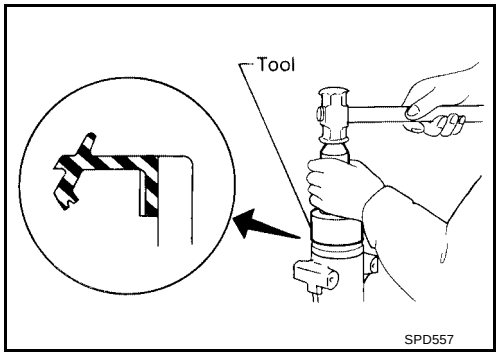


4. Place pinion front bearing inner cone in gear carrier.

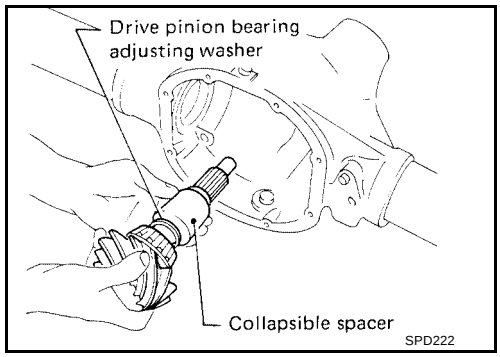


5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

Tool number : KV38100500 (J25273)



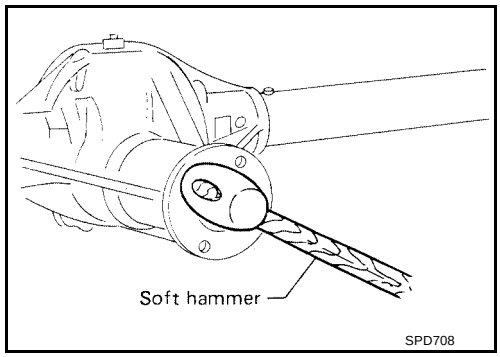
6. Place drive pinion bearing spacer, drive pinion bearing adjusting washer and drive pinion in gear carrier.



7. Install ABS sensor unit and sensor rotor.

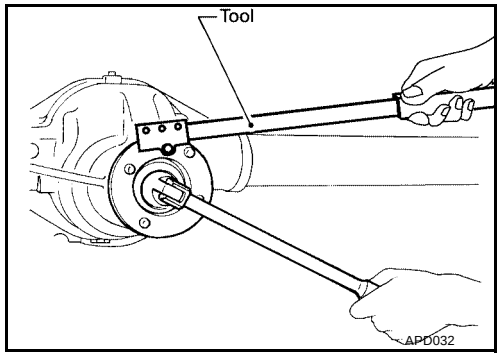
ABS sensor unit bolt : 18 - 24 N·m (1.8 - 2.4 kg-m, 13 - 17 ft-lb)

8. Insert companion flange onto drive pinion by tapping the companion flange with a soft hammer until fully seated.



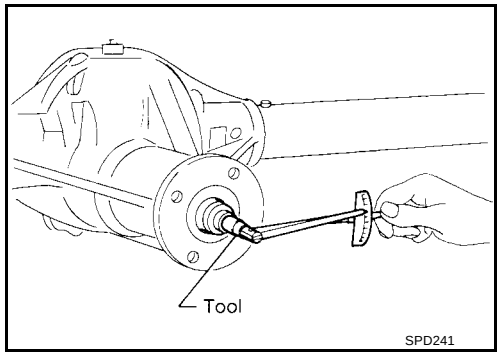
9. Hold companion flange using Tool and tighten the pinion nut.
The threaded portion of drive pinion and pinion nut should be free from oil or grease.

Tool number : KV38108300 (J44195)
Pinion nut : 127 - 294 N·m (13 - 30 kg-m, 94 - 217 ft-lb)



10. Tighten the pinion nut by very small degrees until the specified preload is achieved. When checking the preload, turn the drive pinion in both directions several times to set the bearing rollers.

Tool number : ST3127S000 (J25765-A)
Pinion bearing preload : 1.1 - 1.4 N·m (12 - 14 kg-cm, 10 - 12 in-lb)

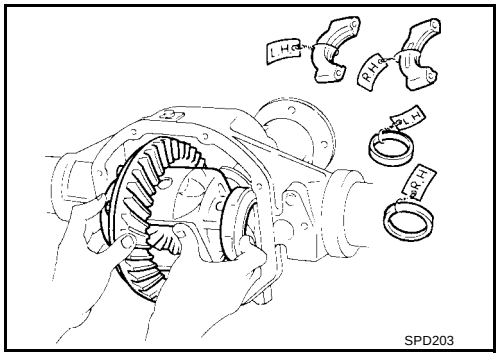


INSTALLATION OF DIFFERENTIAL CASE

This procedure will have to be repeated if:

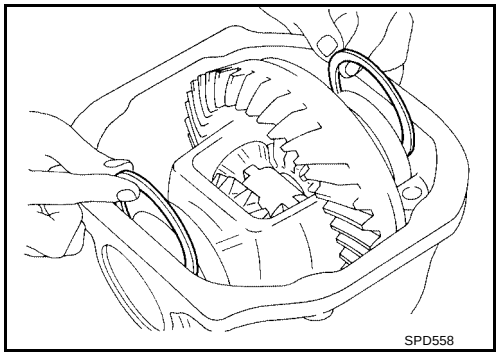
- **Maximum preload is achieved before the minimum pinion nut torque is reached.**
- **Minimum preload is not achieved before maximum pinion nut torque is reached.**

1. Select side bearing adjusting shim. Refer to RFD-23, "SIDE BEARING PRELOAD" .
2. Install differential case assembly with side bearing outer races into gear carrier.



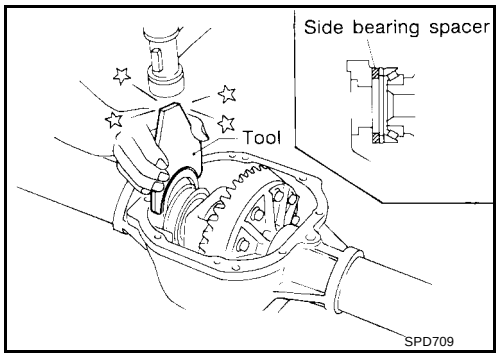
SPD203

3. Insert left and right side bearing adjusting shims in place between side bearing outer races and differential carrier assembly.


SPD558

4. Drive in side bearing spacer with Tool.

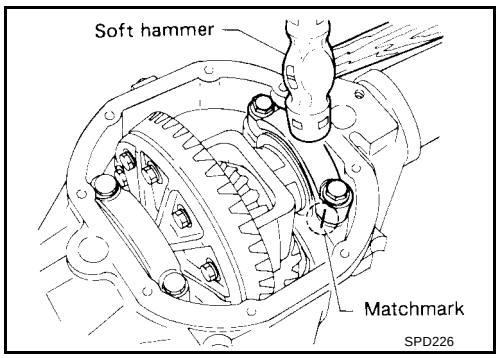
   Tool number : KV38100600 (J25267)



SPD709

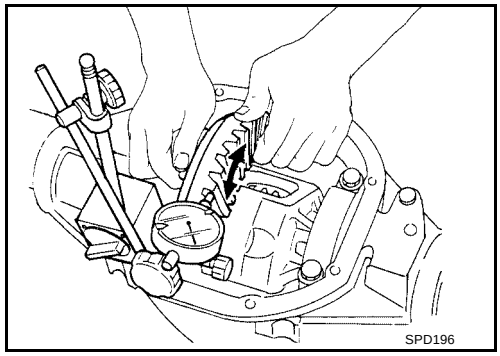
5. Align matchmark on bearing cap with that on differential gear carrier and install side bearing cap on gear carrier with soft hammer.

   Side bearing cap bolts : 93 - 103 N·m (9.5 - 10.5 kg-m, 69 - 76 ft-lb)



SPD226

6. Measure ring gear-to-drive pinion backlash with a dial indicator.

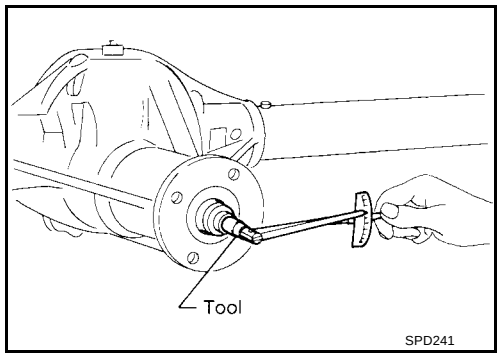


Ring gear-to-drive pinion backlash

Gear ratio 3.900, 4.625	**: 0.13 - 0.18 mm (0.0051 - 0.0071 in)**
Gear ratio 4.636	**: 0.10 - 0.15 mm (0.0041 - 0.0059 in)**

- If backlash is too small, decrease thickness of right shim and increase thickness of left shim by the same amount.
- If backlash is too great, reverse the above procedure.
- **Never change the total amount of shims as it will change the bearing preload.**

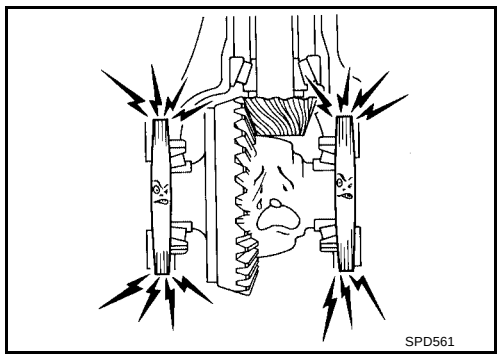
7. Check total preload with Tool.
   - **When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.**



Total preload **: 1.4 - 2.9 N·m (15 - 29 kg-cm, 13 - 25 in-lb)**

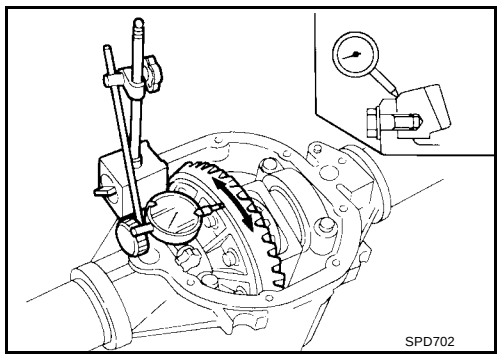
Tool number **: ST3127S000 (J25765-A)**

- If preload is too great, remove the same amount of shim from each side.
- If preload is too small, add the same amount of shim to each side.
- **Never add or remove a different number of shims for each side as it will change ring gear-to-drive pinion backlash.**



8. Recheck ring gear-to-drive pinion backlash because increase or decrease in thickness of shims will cause change of ring gear-to-pinion backlash.

9. Check runout of ring gear with a dial indicator.



Ring gear runout limit **: 0.08 mm (0.0031 in)**

- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

10. Check tooth contact. Refer to RFD-29, "TOOTH CONTACT" .
11. Install new rear cover gasket and rear cover.
12. Tighten rear cover bolts.

Rear cover bolts **: 44 - 54 N·m (4.5 - 5.5 kg-m, 33 - 40 ft-lb)**

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

C200

EDS0012X

GENERAL SPECIFICATIONS

2WD Models

Engine	KA24DE		VG33E	
Vehicle grade	XE		XE, SE	
Rear final drive	M/T	A/T	Standard	Optional
	C200			
	2 Pinion		4 Pinion	LSD
Gear ratio	3.900	4.625	4.636	
Number of teeth (Ring gear drive pinion)	39/10	37/8	51/11	
Oil capacity (Approx.) ℓ (US pt., Imp pt)	1.3 (2 3/4, 2 1/4)			

4WD Model

Engine	VG33E	
Vehicle Grade	XE	
Transmission	Standard	Optional
Rear final drive	Standard	
	C200	
	4-Pinion	LSD
Gear ratio	4.636	
Number of teeth (Ring gear/drive pinion)	51/11	
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.3 (2-3/4, 2-1/4)	

RING GEAR RUNOUT

Ring gear runout limit mm (in)	0.08 (0.0031)

SIDE GEAR ADJUSTMENT (WITHOUT LSD)

Side gear backlash (Clearance between side gear thrust washer and differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)
Available side gear thrust washers (2wd)	
Thickness mm (in)	Part number*
0.75 (0.0295)	38424-N3110
0.78 (0.0307)	38424-N3111
0.81 (0.0319)	38424-N3112
0.84 (0.0331)	38424-N3113
0.87 (0.0343)	38424-N3114
0.90 (0.0354)	38424-N3115
0.93 (0.0366)	38424-N3116
Available side gear thrust washers (4wd)	
Thickness mm (in)	Part number*
0.75 (0.0295)	38424-0C000
0.78 (0.0307)	38424-0C001
0.81 (0.0319)	38424-0C002
0.84 (0.0331)	38424-0C003
0.87 (0.0343)	38424-0C004
0.90 (0.0354)	38424-0C005
0.93 (0.0366)	38424-0C006

*Always check with the Parts Department for the latest parts information.

SIDE BEARING ADJUSTMENT

Differential carrier assembly turning resistance N (kg, lb)		34.3 - 39.2 (3.5 - 4.0, 7.7 - 8.8)
	Thickness mm (in)	Part number*
Available side bearing adjusting shims	2.00 (0.0787)	38453-N3100
	2.05 (0.0807)	38453-N3101
	2.10 (0.0827)	38453-N3102
	2.15 (0.0846)	38453-N3103
	2.20 (0.0866)	38453-N3104
	2.25 (0.0886)	38453-N3105
	2.30 (0.0906)	38453-N3106
	2.35 (0.0925)	38453-N3107
	2.40 (0.0945)	38453-N3108
	2.45 (0.0965)	38453-N3109
	2.50 (0.0984)	38453-N3110
	2.55 (0.1004)	38453-N3111
	2.60 (0.1024)	38453-N3112

*Always check with the Parts Department for the latest parts information.

TOTAL PRELOAD ADJUSTMENT

Total preload N·m (kg-cm, in-lb)		1.4 - 2.9 (15 - 29, 13 - 25)
Ring gear-to-drive pinion backlash mm (in)	Gear ratio 3.900, 4.625	0.13 - 0.18 (0.0051 - 0.0071)
	Gear ratio 4.636	0.10 - 0.15 (0.0041 - 0.0059)

DRIVE PINION HEIGHT ADJUSTMENT

	Thickness mm (in)	Part number*
Available drive pinion height adjusting washers	3.09 (0.1217)	38154-P6017
	3.12 (0.1228)	38154-P6018
	3.15 (0.1240)	38154-P6019
	3.18 (0.1252)	38154-P6020
	3.21 (0.1264)	38154-P6021
	3.24 (0.1276)	38154-P6022
	3.27 (0.1287)	38154-P6023
	3.30 (0.1299)	38154-P6024
	3.33 (0.1311)	38154-P6025
	3.36 (0.1323)	38154-P6026
	3.39 (0.1335)	38154-P6027
	3.42 (0.1346)	38154-P6028
	3.45 (0.1358)	38154-P6029
	3.48 (0.1370)	38154-P6030
	3.51 (0.1382)	38154-P6031
	3.54 (0.1394)	38154-P6032
	3.57 (0.1406)	38154-P6033
	3.60 (0.1417)	38154-P6034
	3.63 (0.1429)	38154-P6035
	3.66 (0.1441)	38154-P6036

*Always check with the Parts Department for the latest parts information.

DRIVE PINION PRELOAD ADJUSTMENT

Drive pinion bearing preload adjusting method	Collapsible spacer
Drive pinion preload with front oil seal N·m (kg-cm, in-lb)	1.1 - 1.4 (12 - 14, 10 - 12)
Drive pinion preload without front oil seal N·m (kg-cm, in-lb)	1.0 - 1.3 (11 - 13, 9 - 11)

DIFFERENTIAL TORQUE ADJUSTMENT (WITH LSD)

Differential torque N·m (kg-m, ft-lb)	40 - 58 (4.0 - 6.0, 29 - 43)
Number of discs and plates	
Friction disc	2
Friction plate	5
Spring plate	2
Spacer	1

Wear limit of plate and disc mm (in)		0.1 (0.004)	
Allowable warpage of friction disc and plate mm (in)		0.08 (0.0031)	
Total thickness mm (in))		18.57 - 20.43 (0.7311 - 0.8043)	
Available discs and plates (one side)	Part name	Thickness mm (in))	Part number*
	Friction disc	1.4 (0.055)	38433-C6004 (adjusting type)
		1.5 (0.059)	38433-C6002 (standard type)
		1.6 (0.063)	38433-C6003 (adjusting type)
	Friction plate	1.4 (0.055)	38432-C6002
		1.5 (0.059)	38432-C6001
		1.6 (0.063)	38432-C6003
	Spring plate	1.5 (0.059)	38435-S9200
	Spacer	6.0 (0.236)	38454-S9200

*Always check with the Parts Department for the latest parts information.

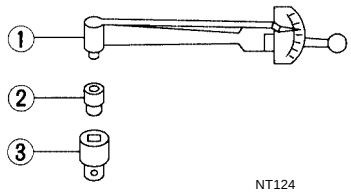
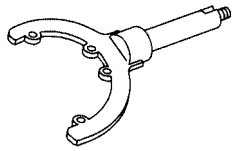
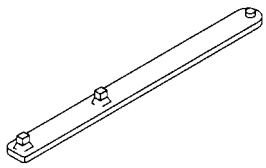
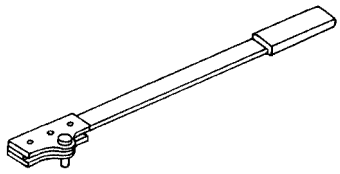
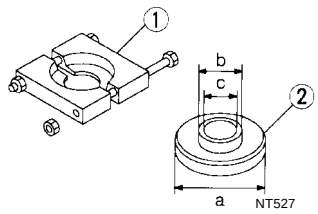
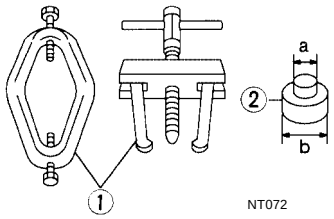
PREPARATION

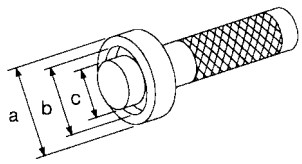
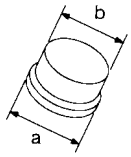
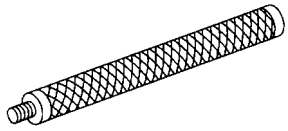
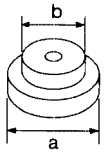
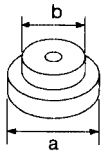
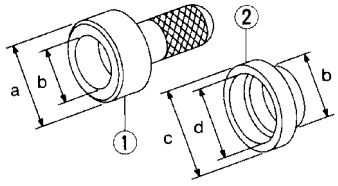
PFP:00002

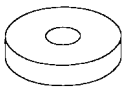
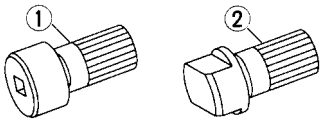
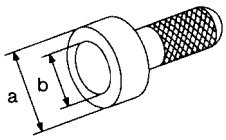
Special Service Tools

EDS0012Y

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
ST3127S000 (J25765-A) Preload gauge 1 GG91030000 (J25765) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT124	Measuring pinion bearing preload and total preload
ST06340000 (J24310, J34310) Differential attachment	 NT140	Mounting final drive
ST32580000 (J34312) Differential side bearing adjusting nut wrench	 NT141	Adjusting side bearing preload and backlash (ring gear-drive pinion)
KV38108300 (J-44195) Companion flange wrench	 NT771	Removing and installing propeller shaft lock nut, and drive pinion lock nut
ST3090S000 (—) Drive pinion rear inner race puller set 1 ST30031000 (J22912-01) Puller 2 ST30901000 (J26010-01) Base	 NT527	Removing and installing drive pinion rear inner cone **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35 mm (1.38 in) dia.**
ST3306S001 Differential side bearing puller set 1 ST33051001 (J22888-20) Body 2 ST33061000 (J8107-2) Adapter	 NT072	Removing and installing differential side bearing inner cone **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**

Tool number (Kent-Moore No.) Tool name		Description
ST33190000 (J25523) Differential side bearing drift	 NT085	Installing side bearing inner cone **a: 52 mm (2.05 in) dia.** **b: 45.5 mm (1.791 in) dia.** **c: 34 mm (1.34 in) dia.**
ST33081000 (—) Side bearing puller adapter	 NT431	Installing side bearing inner cone and remov-ind and installing differential case couple bolts **a: 43 mm (1.69 in) dia.** **b: 33.5 mm (1.319 in) dia.**
ST30611000 (J25742-1) Drift	 NT090	Installing pinion rear bearing outer race (Use with ST30621000 or ST30613000)
ST30621000 (J25742-5) Drift	 NT073	Installing pinion rear bearing outer race **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30613000 (J25742-3) Drift	 NT073	Installing pinion front bearing outer race (Use with ST30611000) **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
KV381025S0 (—) Oil seal fitting tool 1 ST30720000 (J25405) Drift bar 2 KV38102510 (—) Drift	 NT525	Installing front oil seal **a: 77 mm (3.03 in) dia.** **b: 55 mm (2.17 in) dia.** **c: 71 mm (2.80 in) dia.** **d: 65 mm (2.56 in) dia.**
(J34309) Differential shim selector	 NT134	Adjusting bearing pre-load and gear height

Tool number (Kent-Moore No.) Tool name		Description
(J25269-18) Side bearing discs (2 Req'd)	 NT135	Selecting pinion height adjusting washer
KV381052S0 (—) Rear axle shaft dummy 1 KV38105210 (—) Torque wrench side 2 KV38105220 (—) Vise side	 NT142	Checking differential torque on limited slip differential
KV38100500 (J25273) Gear carrier front oil seal drift	 NT115	Installing front oil seal **a: 85 mm (3.35 in) dia.** **b: 60 mm (2.36 in) dia.**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EDS0012Z

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			RFD-56,RFD-57	RFD-56	RFD-56	RFD-49	—	MA-12	PR-3	FAX-4,RAX-5 , FSU-4 , RSU-4	WT-3		RAX-5	BR-6	PS-5
Possible cause and SUSPECTED PARTS			Rough gear tooth	Improper gear contact	Tooth surface worn	Incorrect backlash	Companion flange excessive runout	Improper gear oil	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVESHAFT	BRAKES	STEERING
Symptom	DIFFERENTIAL	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

FRONT OIL SEAL

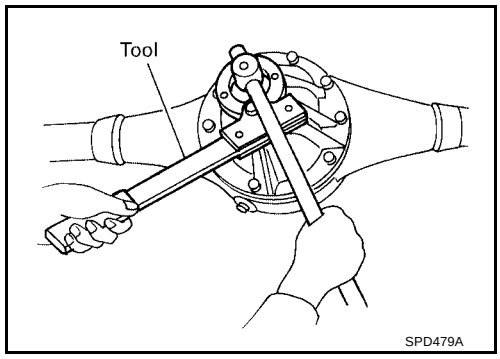
PFP:38189

Removal and Installation

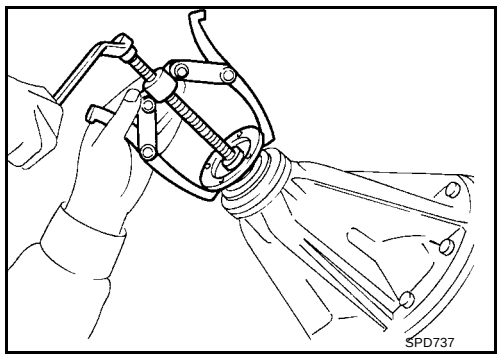
EDS00130

1. Remove propeller shaft. Refer to PR-8, "Removal and Installation" .
2. Hold companion flange using Tool and loosen drive pinion nut.

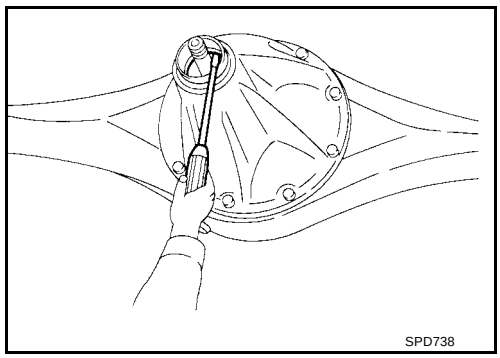
Tool number : KV38108300 (J-44195)



3. Remove companion flange.
4. Remove ABS sensor and sensor rotor (2WD models).

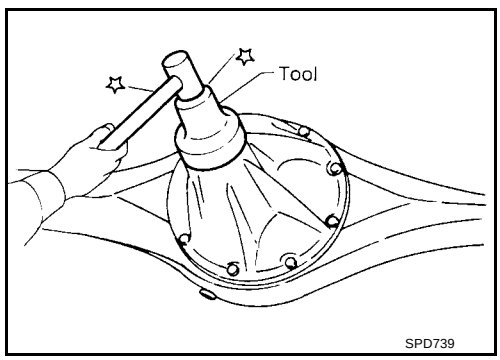


5. Remove front oil seal.



6. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier using Tool.

Tool number : KV38100500 (J25273)



7. Install ABS sensor and sensor rotor (2WD models).

NOTE:
Always install a new sensor rotor.

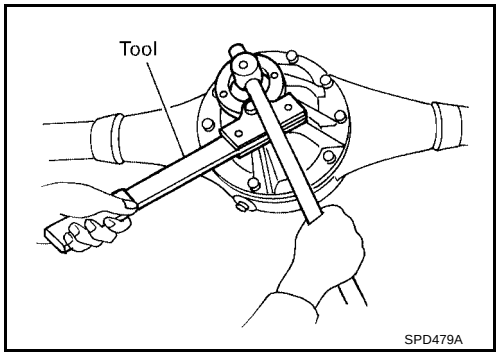
ABS sensor bolt : 8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)

8. Install companion flange and drive pinion nut.

9. Hold companion flange using Tool and tighten drive pinion nut.

Tool number : KV38108300 (J-44195)

Drive pinion nut : 127 - 294 N·m (13.0 - 30.0 kg-m, 94 - 217 lb-ft)



10. Install rear propeller shaft. Refer to PR-8, "Removal and Installation" .

REAR FINAL DRIVE ASSEMBLY

PFP:38300

Removal and Installation

EDS00131

REMOVAL

CAUTION:

Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft.
Before removing the final drive assembly or rear axle assembly, disconnect the ABS sensor harness connector from the assembly and move it away from the final drive/rear axle assembly area. Failure to do so may result in the sensor wires being damaged and the sensor becoming inoperative.

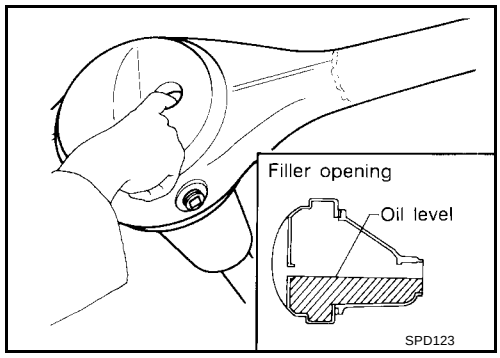
1. Remove rear propeller shaft. Refer to PR-8, "Removal and Installation" .
   - Plug front end of transfer.
2. Remove axle shaft. Refer to RAX-8, "Removal" .
3. Remove rear final drive nuts.

INSTALLATION

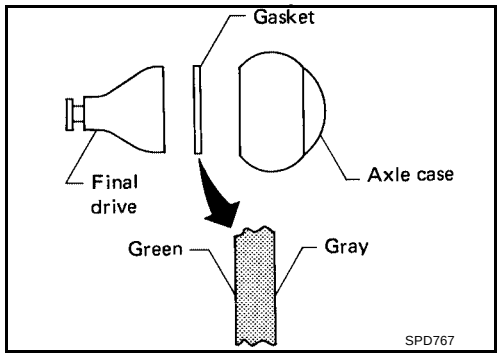
Installation is in the reverse order of removal.

Rear final drive mounting nuts : Refer to RFD-48, "Components" .

- Fill final drive with recommended gear oil. Refer to MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS" .



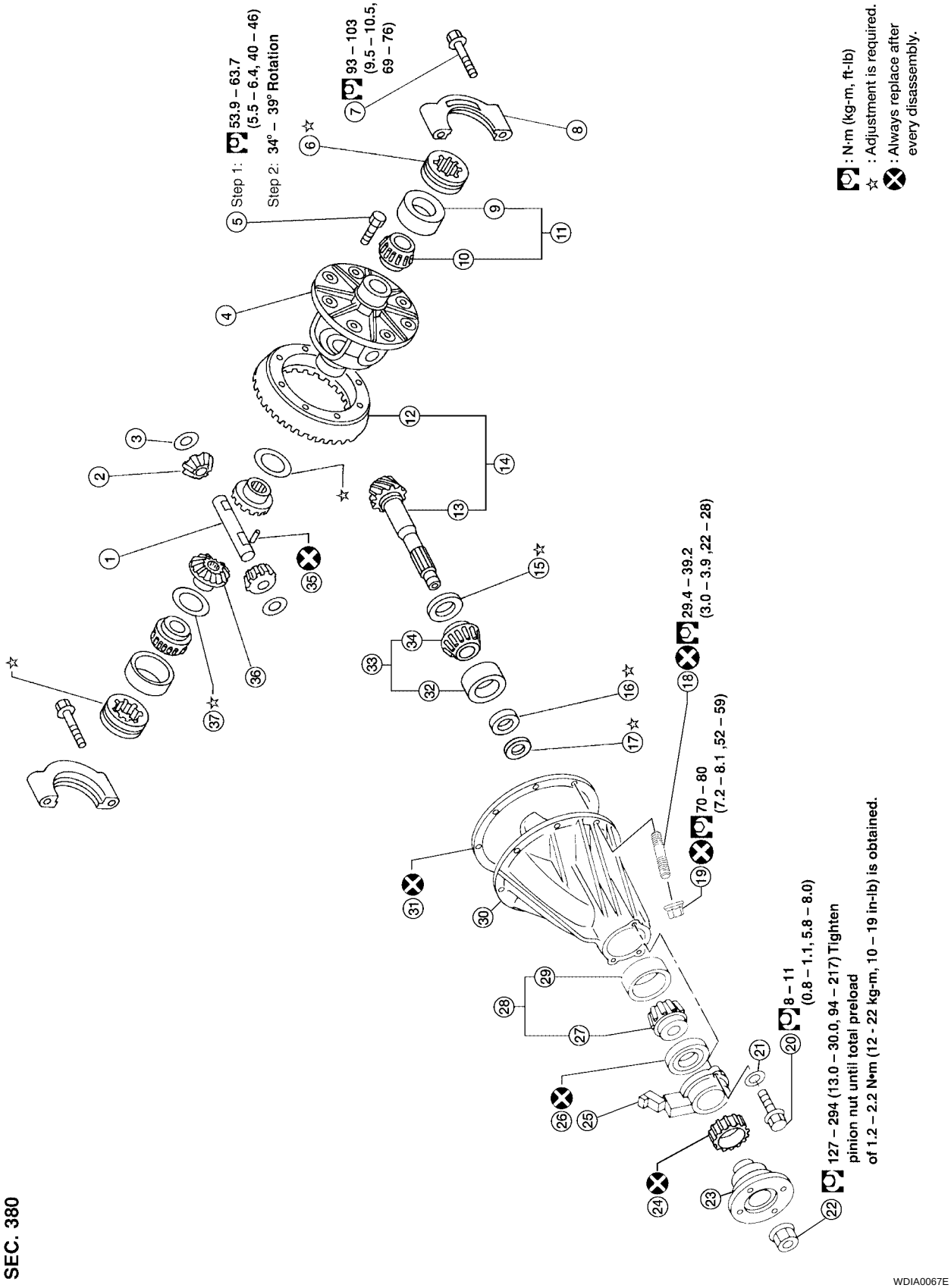
- Pay attention to the direction of gasket.



Components

EDS00132

H233B



1. Pinion mate shaft
2. Pinion mate gear
3. Pinion mate thrust washer
4. Differential case
5. Ring gear bolt
6. Side bearing adjuster
7. Side bearing cap bolt
8. Side bearing cap
9. Outer race
10. Inner cone
11. Side bearing
12. Ring gear
13. Drive pinion
14. Hypoid gear set
15. Drive pinion height adjusting washer
16. Drive pinion bearing adjusting spacer
17. Drive pinion bearing adjusting shim
18. Rear final drive mounting stud
19. Rear final drive mounting nut
20. ABS sensor mounting bolt
21. Washer
22. Pinion nut
23. Companion flange
24. Rear wheel sensor rotor (2WD models)
25. ABS sensor unit (2WD models)
26. Front oil seal
27. Inner cone
28. Pinion front bearing
29. Outer race
30. Gear carrier
31. Gasket
32. Outer race
33. Drive pinion rear bearing
34. Inner cone
35. Lock pin
36. Side gear
37. Side gear thrust washer

Pre-Inspection

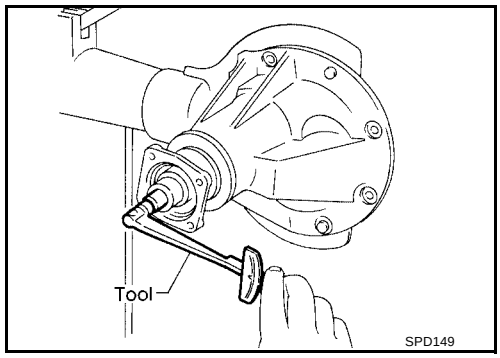
EDS00133

Before disassembling the final drive, perform the following inspections.

TOTAL PRELOAD

1. Turn the drive pinion in both directions several times to seat bearing rollers correctly.
2. Check total preload with Tool.

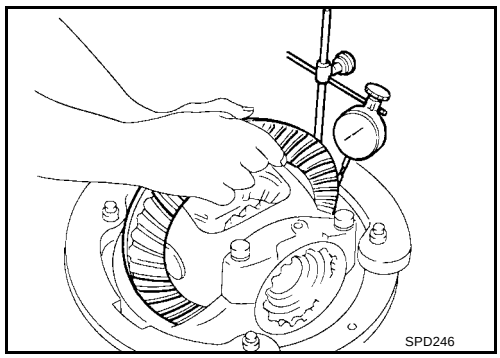
Tool number : ST3127S000 (J-25765-A)
Total preload : 1.7 - 2.5 N·m (17 - 25 kg-cm, 15 - 22 in-lb)



RING GEAR TO DRIVE PINION BACKLASH

- Check backlash of ring gear with a dial indicator at several points.

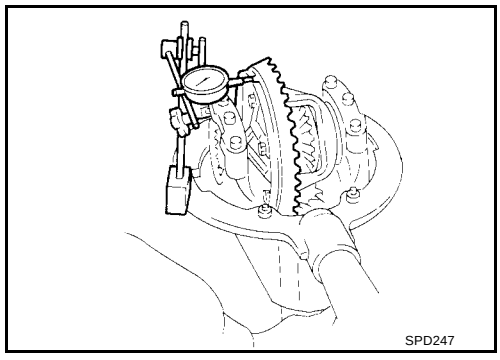
Ring gear-to-drive pinion backlash : 0.13 - 0.18 mm (0.0051 - 0.0071 in)



RING GEAR RUNOUT

- Check runout of ring gear with a dial indicator.

Runout limit : 0.08 mm (0.0031 in)



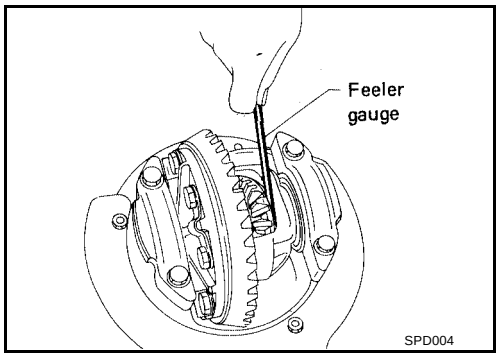
TOOTH CONTACT

- Check tooth contact. Refer to RFD-63, "TOOTH CONTACT" .

SIDE GEAR TO PINION MATE GEAR BACKLASH

- Measure clearance between side gear thrust washer and differential case with a feeler gauge.

Clearance between side gear thrust washer and differential case : 0.10 - 0.20 mm (0.0039 - 0.0079 in)



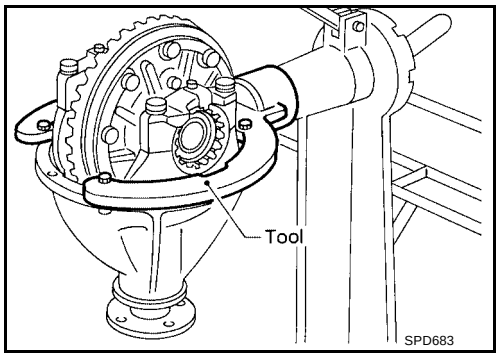
Disassembly and Assembly

EDS00134

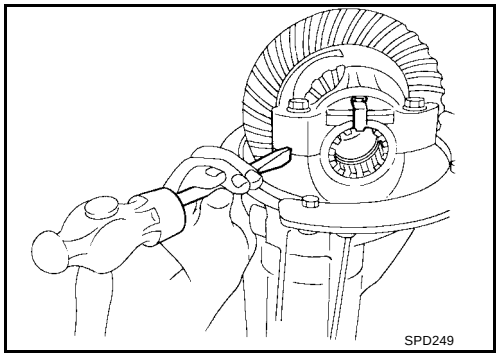
REMOVAL OF DIFFERENTIAL CASE ASSEMBLY

1. Mount final drive assembly on Tool.

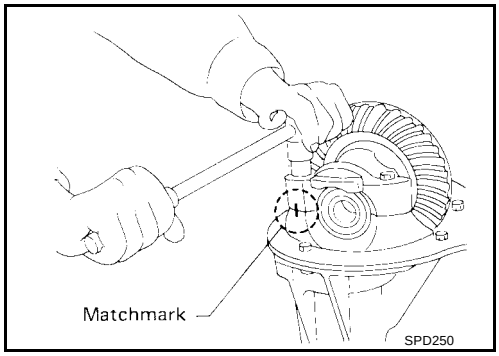
Tool number : ST06340000 (J-24310, J-34310)



2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

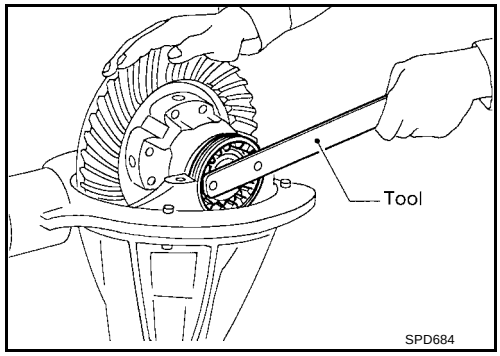


3. Remove side lock fingers and side bearing caps.
   - Bearing caps are line-bored during manufacture and should be put back in their original places.

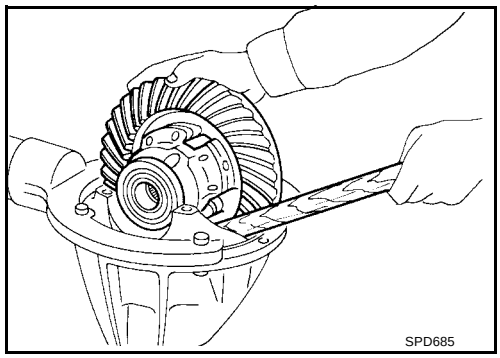


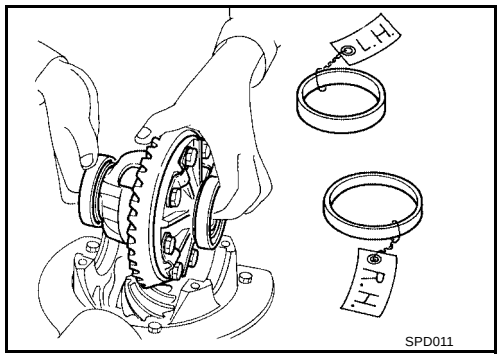
4. Remove side bearing adjuster using Tool.

Tool number : ST32580000 (J-34312)



5. Remove differential case assembly with a pry bar.
   - Keep the side bearing outer races together with their respective inner cones — do not mix them up.



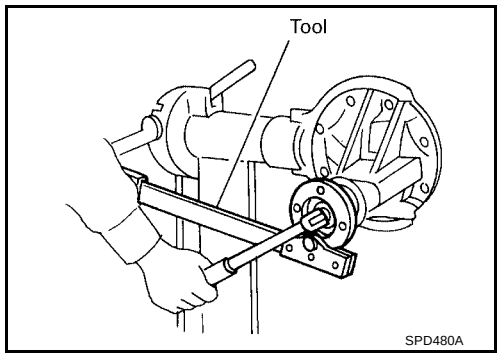


REMOVAL OF DRIVE PINION ASSEMBLY

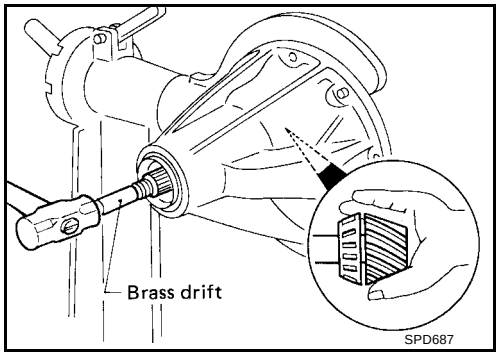
1. Hold companion flange using Tool and remove drive pinion nut.

Tool number : KV38108300 (J-44195)

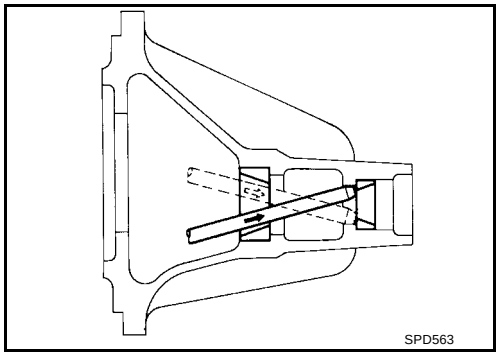
2. Remove companion flange with puller.
3. Remove ABS sensor unit and sensor rotor (2WD models).



4. Take out drive pinion together with pinion rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting shim.

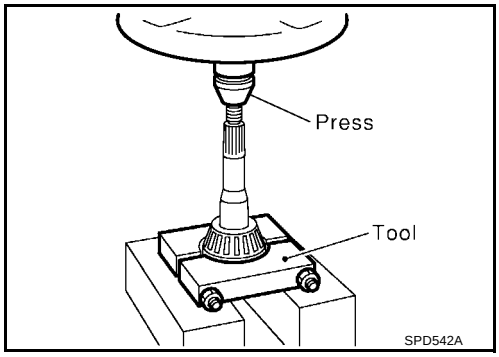


5. Remove front oil seal and pinion front bearing inner cone.
6. Remove pinion bearing outer races with a brass drift.



7. Remove pinion rear bearing inner cone and drive pinion adjusting washer.

Tool number : ST30031000 (J-22912-01)

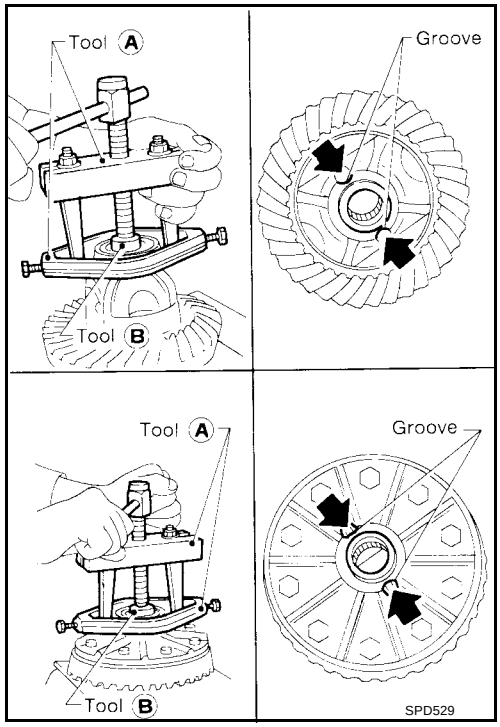


DISASSEMBLY OF DIFFERENTIAL CASE (NON LSD)

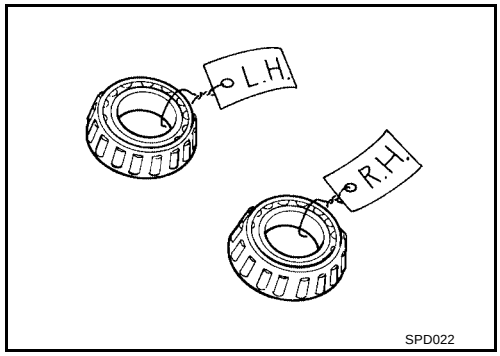
1. Remove lock pin and remove the side gears, pinion mate gears and pinion mate shaft.
2. Remove side bearing inner cones.

Tool number A: ST33051001 (J-22888-20)
Tool number B: ST33061000 (J-8107-2)

To prevent damage to bearing, engage puller jaws in groove.

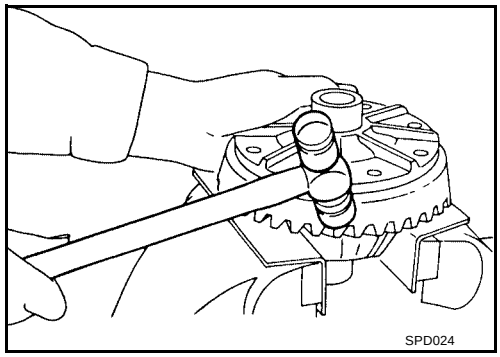


- Be careful not to confuse the left-hand and right-hand parts.
- Keep bearing and bearing race for each side together.

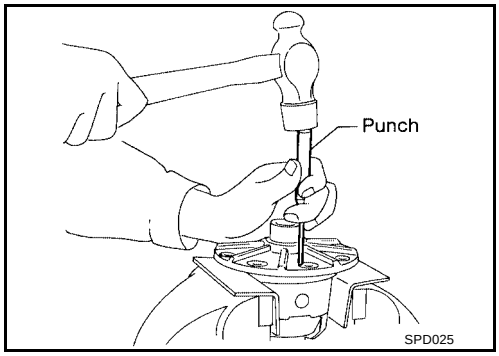


3. Loosen ring gear bolts in a crisscross pattern.

4. Tap ring gear off differential case with a soft hammer.
   - Tap evenly all around to keep ring gear from binding.



5. Drive out pinion mate shaft lock pin, with punch from ring gear side.
   - Lock pin is caulked at pinhole mouth on differential case.



DISASSEMBLY OF DIFFERENTIAL CASE (WITH LSD)

Checking Differential Torque

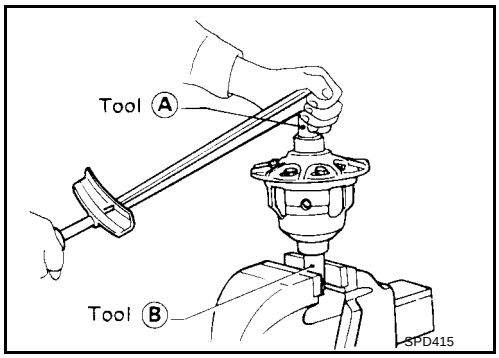
CAUTION:

Do not run engine when only one wheel (rear) is off the ground.

- Measure differential torque with Tool.

Differential torque	**: 40 - 58 N·m (4 - 6 kg-m, 29 - 43 ft-lb)**
Tool number	**A: KV38105210 (—)**
Tool number	**B: KV38105220 (—)**

- If it is not within the specifications, inspect components of limited slip differential.

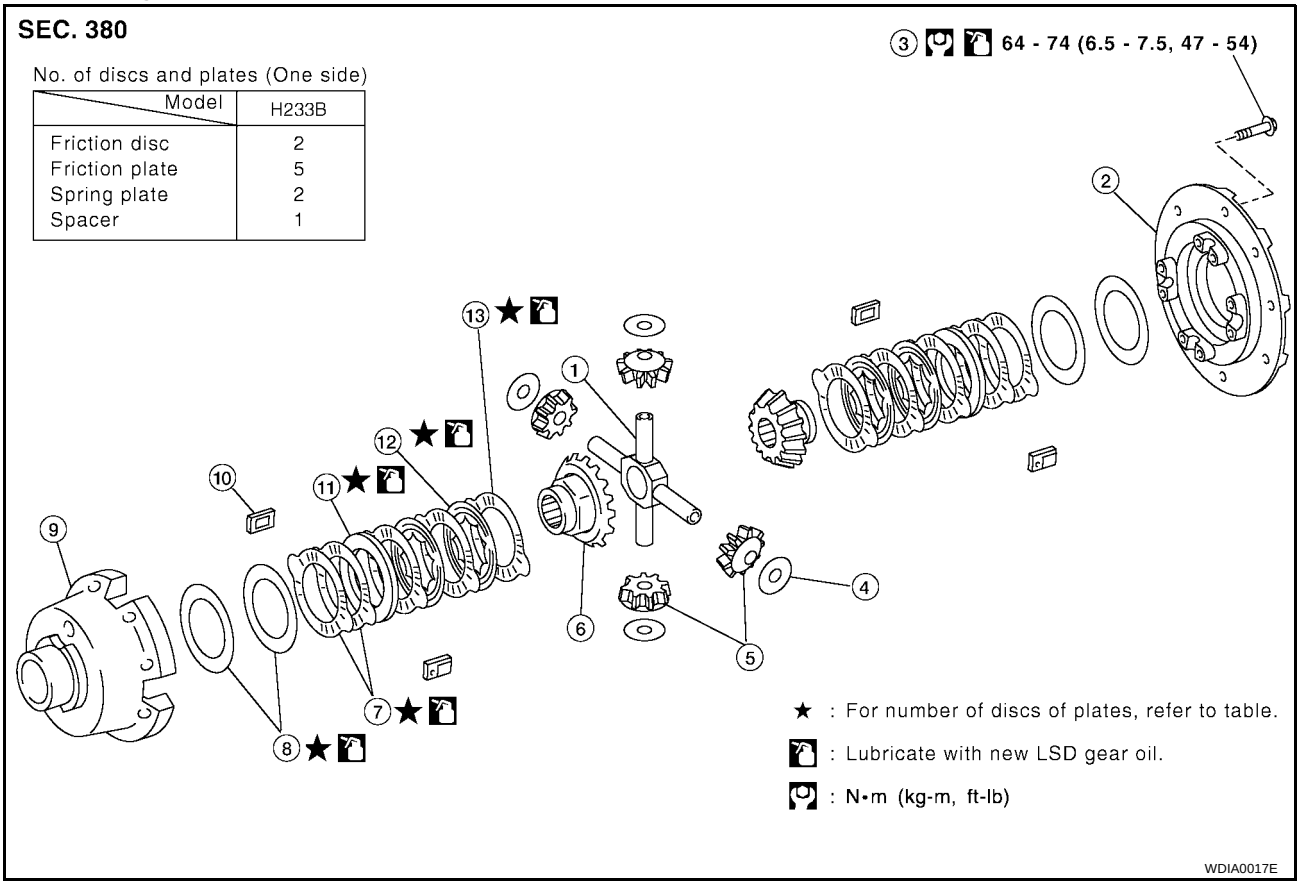


Disassembly

SEC. 380

No. of discs and plates (One side)

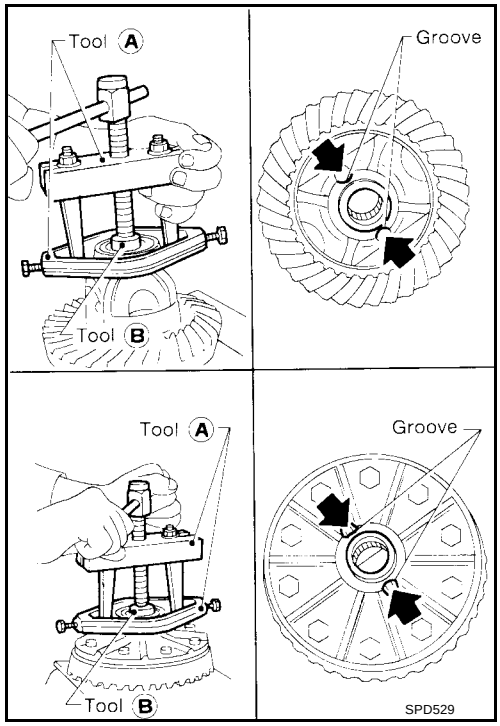
Model	H233B
Friction disc	2
Friction plate	5
Spring plate	2
Spacer	1



1. Pinion mate shaft
2. Differential case B
3. Differential case couple bolt
4. Pinion mate thrust washer
5. Pinion mate gear
6. Side gear
7. Friction plate
8. Spring plate
9. Differential case A
10. Friction plate guide
11. Spacer
12. Friction disc
13. Friction plate
14.

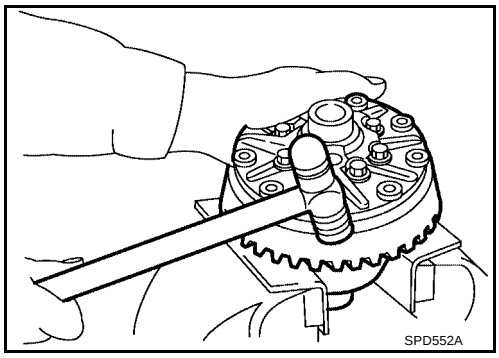
1. Remove side bearing inner cones.
   - To prevent damage to bearing, engage puller jaws in groove.

Tool number A: ST33051001 (J-22888–20)
Tool number B: ST33061000 (J-8107–2)



2. Loosen ring gear bolts in a crisscross pattern.

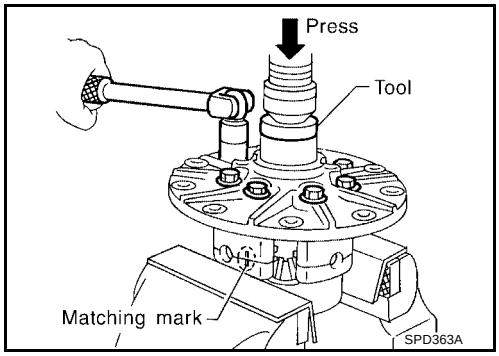
3. Tap ring gear off gear case with a soft hammer.
   - Tap evenly all around to keep ring gear from binding.



4. Remove differential case couple bolts with a press.

   Tool number : ST33081000 (—)

5. Separate differential case A and B.
6. Remove component parts (discs and plates, etc.).
   - Put matching marks on component parts so that they can be reinstalled in their original positions from which they were removed.



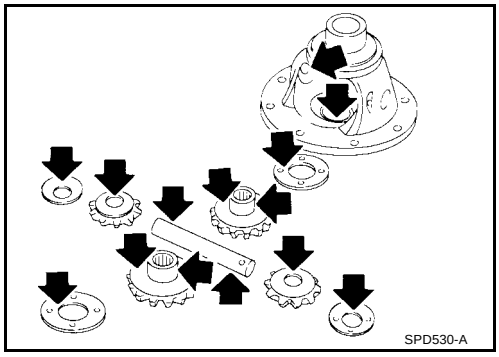
INSPECTION

Ring Gear and Drive Pinion

Check gear teeth for scoring, cracking or chipping.
If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).

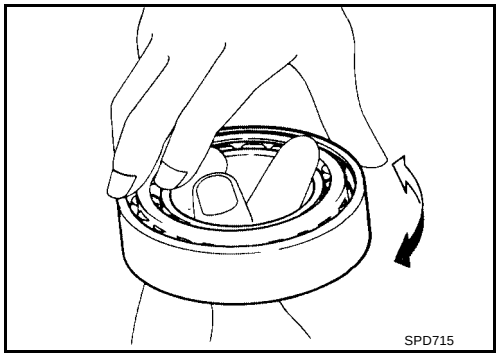
Differential Case Assembly (Non LSD)

Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, and thrust washers.



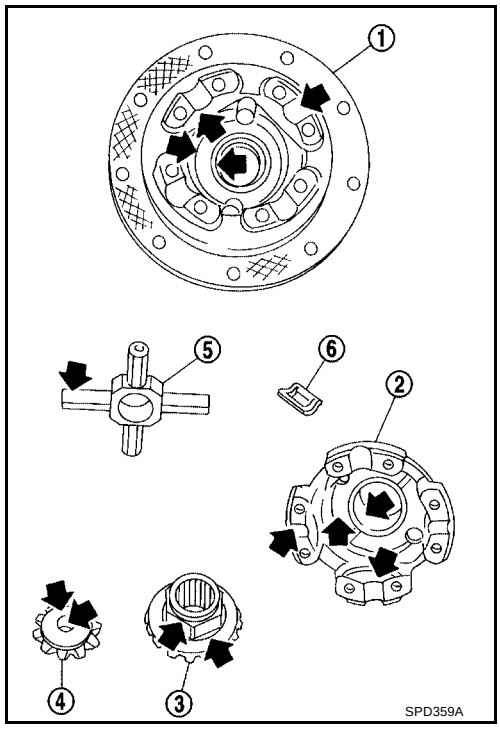
Bearing

1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.



Contact Surfaces (With LSD)

1. Clean the disassembled parts in suitable solvent and blow dry with compressed air.
2. If following surfaces are found with burrs or scratches, smooth with oil stone.
   1 Differential case B
   2 Differential case A
   3 Side gear
   4 Pinion mate gear
   5 Pinion mate shaft
   6 Friction plate guide

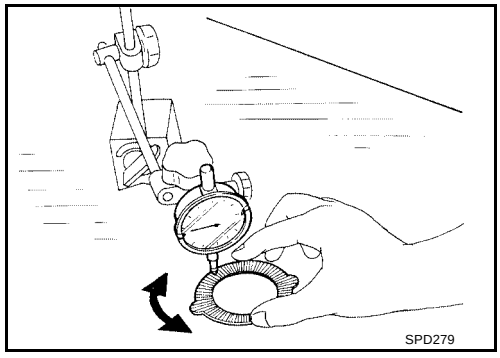


Disc and Plate (With LSD)

1. Clean the discs and plates in suitable solvent and blow dry with compressed air.
2. Inspect discs and plates for wear, nicks and burrs.
3. Check friction discs or plates for any warping.

   Maximum allowable warping : 0.08 mm (0.0031 in)

   - If it exceeds limits, replace with a new plate to eliminate possibility of clutch slippage or sticking.

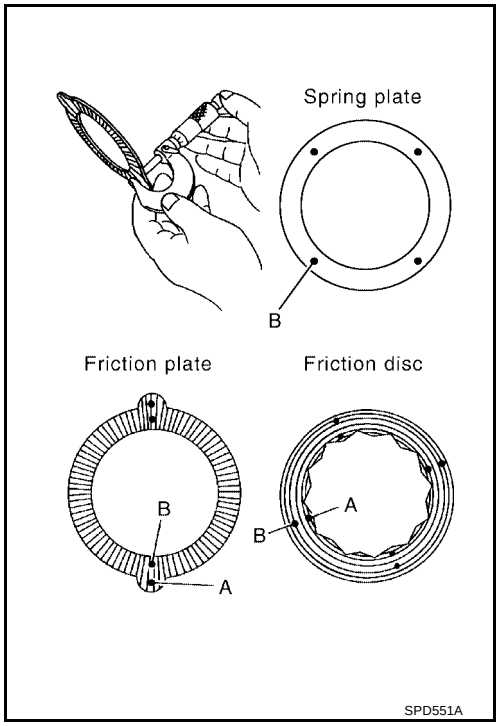


4. Measure frictional surfaces and projected portions of friction disc, friction plate, spring plate, and determine each part's differences to see if the specified wear limit has been exceeded.
   - Measuring points:
   - A: Projected portion
   - B: Frictional surface

   Wear limit

   A – B = Wear limit mm (in) : 0.1 mm (0.004 in) or less

   - If any part has worn beyond the wear limit, and deformed or fatigued, replace it with a new one that is the same thickness as the projected portion.



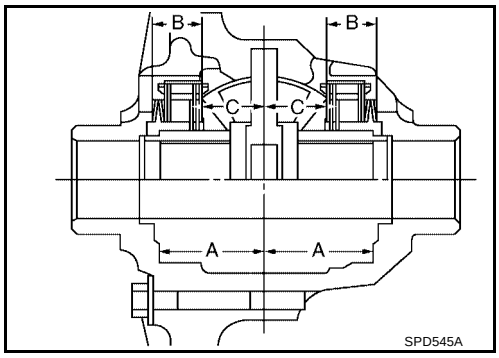
ADJUSTMENT OF DIFFERENTIAL CASE (WITH LSD)

1. End play of friction disc and friction plate can be calculated by using following equation and should be adjusted within following range.

- Adjustment can be made by selecting friction disc or friction plate having three different thicknesses.

E = A – (B + C)
(one side)

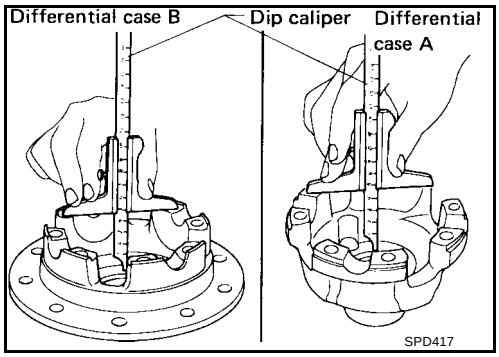
End play E : 0.05 - 0.15 mm (0.0020 - 0.0059 in)



A: Length of differential case contact surface to differential case inner bottom.
B: Total thickness of friction discs, friction plates, spring plate and spacer in differential case on one side.
C: Length of differential case contact surface to back side of side gear.

2. Measure values of the length of differential case contact surface to differential case inner bottom.

Standard length A : 49.50 - 49.55 mm (1.9488 - 1.9508 in)

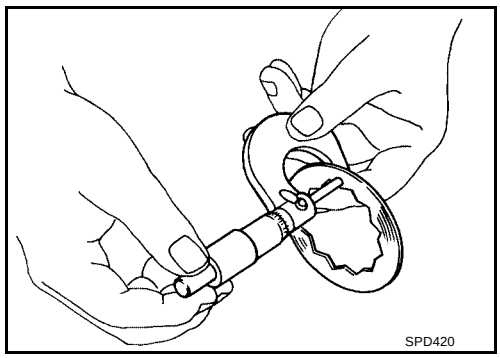


3. Measure thickness of each disc and plate. Number of discs and plates (One side), Friction disc 5, Friction plate 6 and Spring plate 2.

Total thickness "B" : 18.57 - 20.43 mm (0.7311 - 0.8043 in)

No. of discs and plates (One side)

Friction disc	**: 2**
Friction plates	**: 5**
Spring plates	**: 2**
Spacer	**: 1**

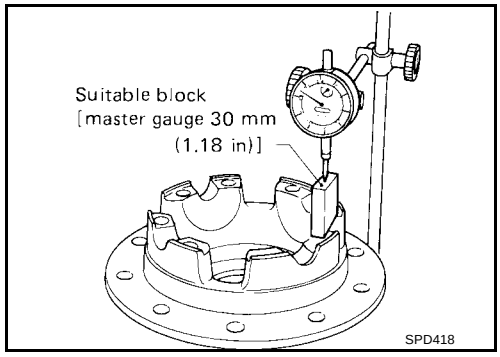

SPD420

4. Measure values of the length of differential case contact surface to back side of side gear.

a. Attach a dial indicator to the base plate.

b. Place differential case B on the base plate, and install a master gauge on case B.

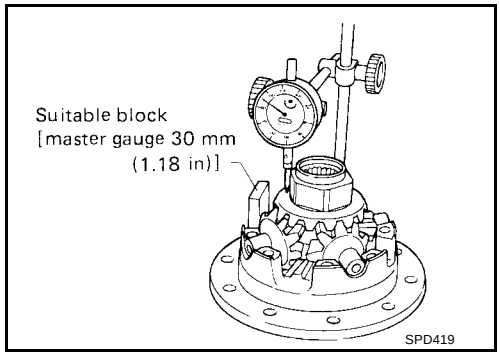
- **Then adjust the dial indicator scale to zero with its tip on the master gauge.**



SPD418

c. Install pinion mate gears, side gears and pinion mate shaft in differential case B.

d. Set dial indicator tip on the rear of side gear, and read the indication.
Example:
E = A – D = A – (B + C) = 0.05 to 0.15 mm
A = 49.52 mm
B = 19.45 mm
C = 29.7 mm
D = B + C
49.15 (D) = 19.45 (B) + 29.7 (C)
E = A – D
0.37 (E) = 49.52 (A) – 49.15 (D)

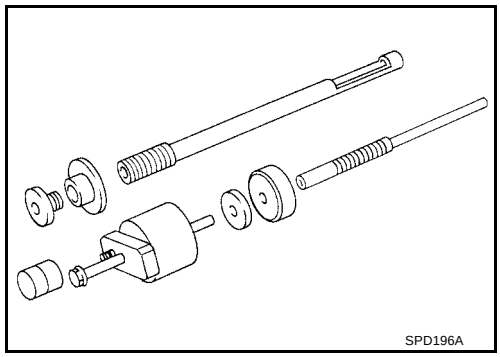


SPD419

From the above equation, end play of 0.37 mm exceeds the specified range of 0.05 to 0.15 mm.
Select suitable discs and plates to adjust correctly.

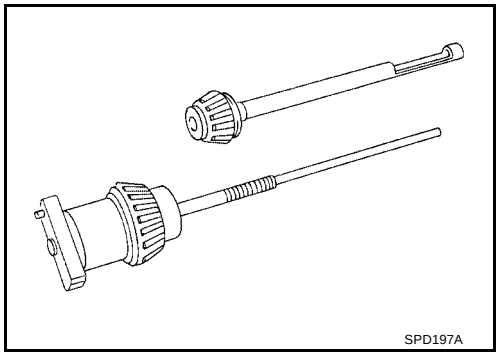
PINION GEAR HEIGHT

1. Make sure all parts are clean and that the bearings are well lubricated.

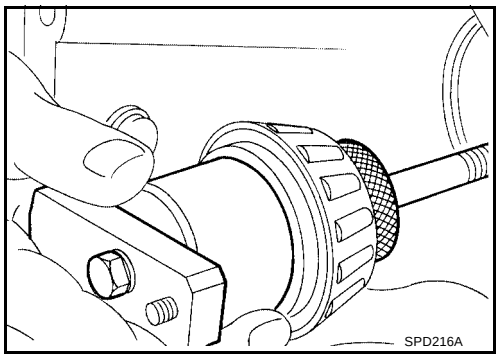

SPD196A

2. Assemble the pinion gear bearings into the pinion pre-load shim selector tool, J34309.

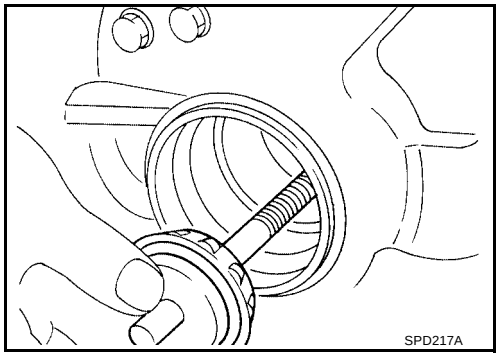
- **Rear Pinion Bearing** — the rear pinion bearing pilot, J34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J34309-4, is used to lock the bearing to the assembly.
- **Front Pinion Bearing** — make sure the J34309-3, front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.


SPD197A

3. Place the pinion preload shim selector tool gauge screw assembly, J34309-1, with the pinion rear bearing inner cone installed, into the final drive housing.

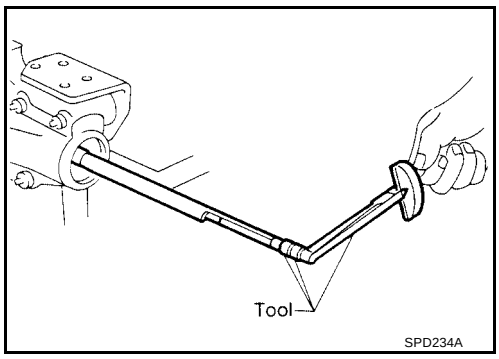

SPD216A

4. Install the J34309-2 gauge anvil with the front pinion bearing into the final drive housing and assemble it to the J34309-1 gauge screw. Make sure that the J34309-16 gauge plate will turn a full 360 degrees, and tighten the two sections by hand to set bearing preload.
5. Turn the assembly several times to seat the bearings.


SPD217A

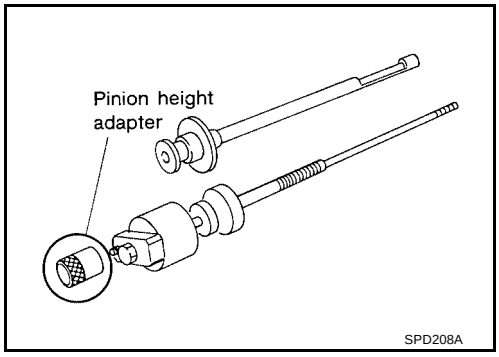
6. Measure the turning torque at the end of the J34309-2 gauge anvil using Tool.

Tool number : ST3127S000 (J25765-A)
Pinion bearing preload (Without front oil seal) : 1.2 - 1.5 N·m (12 - 15 kg-cm, 10 - 13 in-lb)



SPD234A

7. Place the J34309-12 “H233B” pinion height adapter onto the gauge plate and tighten it by hand.



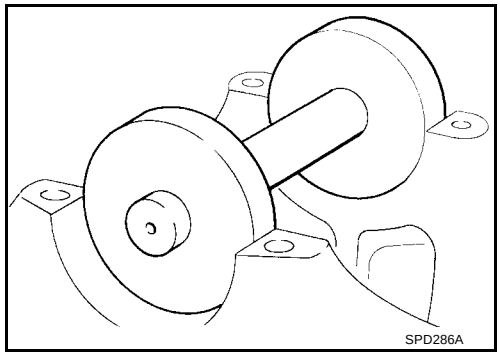
SPD208A

PINION HEIGHT ADJUSTING WASHER SELECTION

CAUTION:

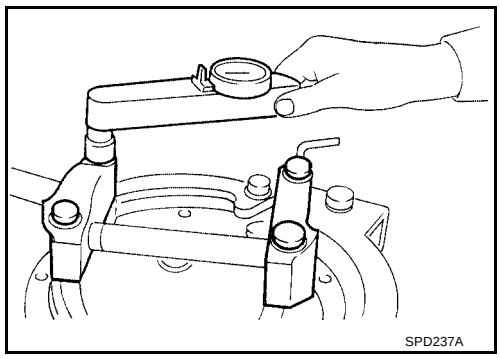
Make sure all machined surfaces are clean.

8. Position the J25269-18 side bearing discs and the arbor into the side bearing bores.

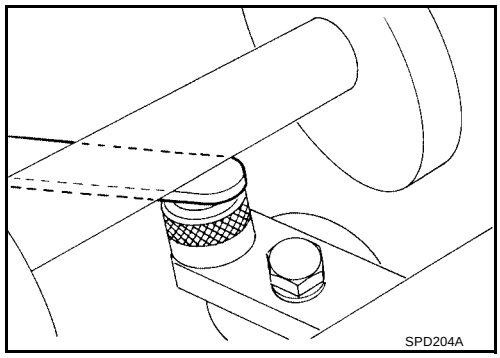

SPD286A

9. Install the bearing caps and tighten the bearing cap bolts.

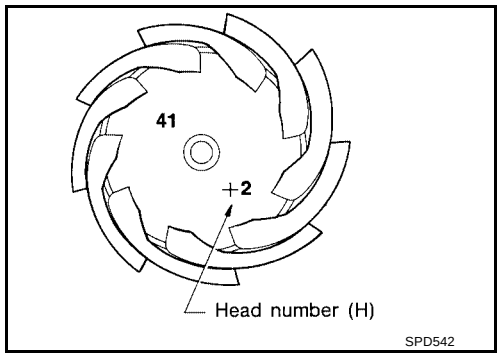
Side bearing cap bolts : Refer to RFD-48, "Components" .


SPD237A

10. Select the correct standard pinion height adjusting washer thickness using a standard gauge of 2.5, 3.0, or 3.5 mm (0.098, 0.118, or 0.138 in) and the J34309-101 feeler gauge.
Measure the distance between the J34309-12 “H233B” pinion height adapter and the arbor.
11. Write down the exact total measurement (the value of feeler gauge).


SPD204A

12. Correct the drive pinion height adjusting washer size by referring to the “pinion head height number”.
    - There are two numbers painted on the drive pinion. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the “pinion head height number”, and it refers to the ideal pinion height from standard for the quietest operation. Use the following chart to determine the correct drive pinion height adjusting washer. Refer to RFD-72, "Drive Pinion Height Adjustment" .

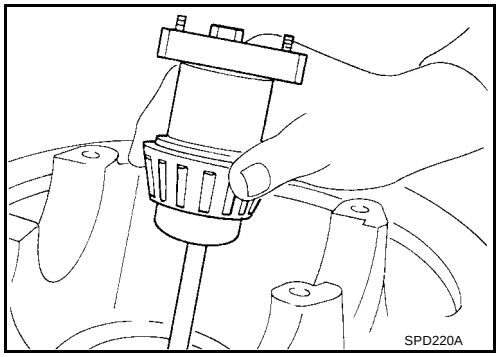


SPD542

Pinion head height number	Add or remove from the selected standard drive pinion height adjusting washer thickness measurement
–6	Add 0.06 mm (0.0024 in)
–5	Add 0.05 mm (0.0020 in)
–4	Add 0.04 mm (0.0016 in)
–3	Add 0.03 mm (0.0012 in)
–2	Add 0.02 mm (0.0008 in)
–1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+1	Subtract 0.01 mm (0.0004 in)

Pinion head height number	Add or remove from the selected standard drive pinion height adjusting washer thickness measurement
+2	Subtract 0.02 mm (0.0008 in)
+3	Subtract 0.03 mm (0.0012 in)
+4	Subtract 0.04 mm (0.0016 in)
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

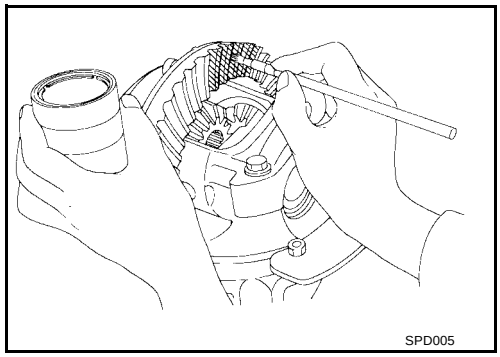
13. Select the correct drive pinion height adjusting washer. Refer to RFD-72, "Drive Pinion Height Adjustment" .
14. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.



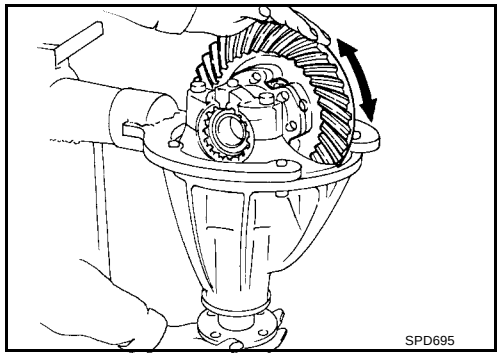
TOOTH CONTACT

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion. Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life, or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

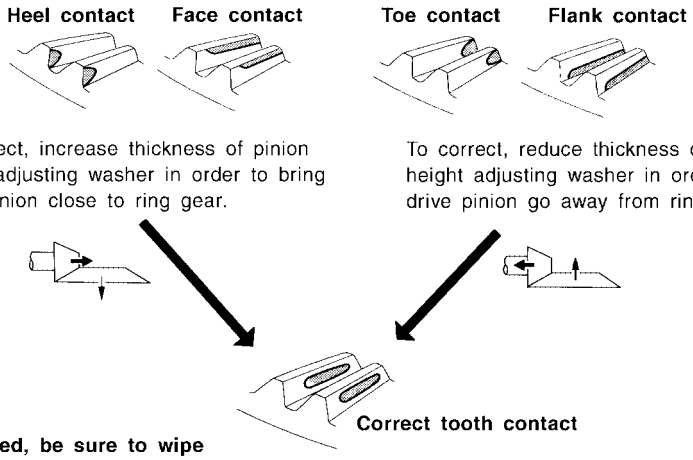
1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.


SPD005

3. Hold companion flange steady by hand and rotate the ring gear in both directions.


SPD695

Usually the pattern will be correct if shims are correctly calculated and the backlash is correct. However, in rare cases, trial and error processes may be employed to obtain a correct pattern. The tooth pattern is the best indication of how well a differential has been set up.

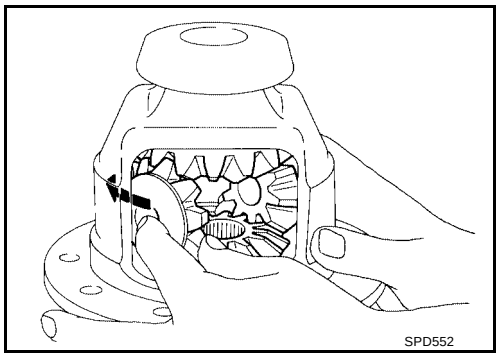


When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007-B

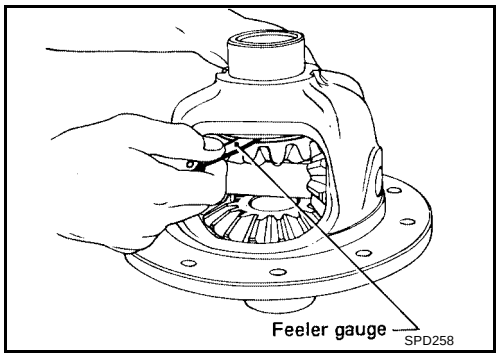
ASSEMBLY OF DIFFERENTIAL CASE (NON LSD)

1. Install side gears, pinion mate gears and thrust washers into differential case.
   The clearance can be adjusted with side gear thrust washer. Refer to RFD-71, "Side Gear Adjustment" .



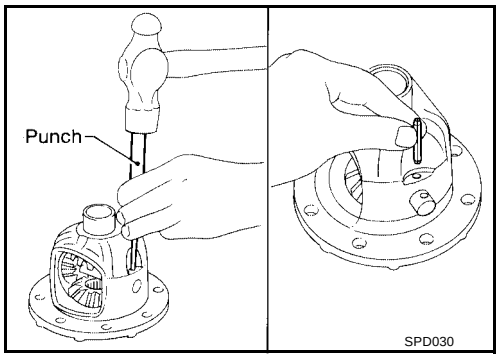
2. Fit pinion mate shaft to differential case so that it meets lock pinholes.
3. Adjust backlash between side gear and pinion mate gear by selecting side gear thrust washer.

Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case)	**: 0.10 – 0.20 mm (0.0039 – 0.0079 in)**

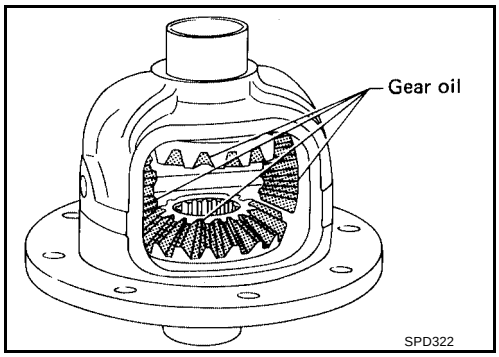


4. Install a new pinion mate shaft lock pin with a punch.

NOTE:
- Always use a new lock pin.
- Make sure lock pin is flush with case.



5. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see that they turn properly.

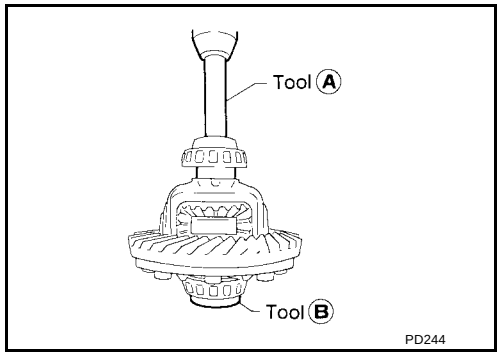


6. Install ring gear on differential case and tighten ring gear bolts.
   - Tighten bolts in a crisscross pattern.

Tool number	**KV10112100 (BT-8653-A)**
Ring gear bolts	
Step 1	**: 53.9 - 63.7 N·m (5.5 - 6.4 kg-m, 40 - 46 lb-ft)**
Step 2	**: 34° - 39° degrees rotation**

7. Press-fit side bearing inner races on differential case with Tool.

Tool number **A: ST33190000 (J-25523)**
Tool number **B: ST33081000 (—)**

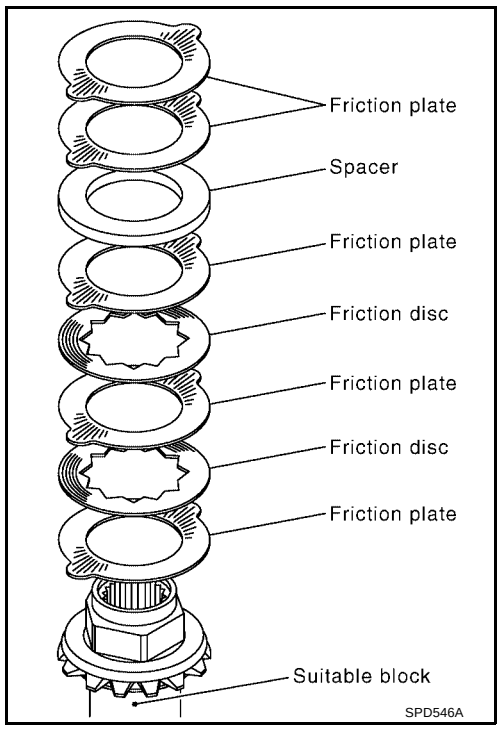


ASSEMBLY OF DIFFERENTIAL CASE (WITH LSD)

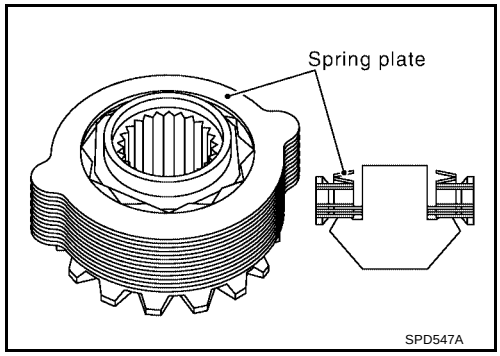
- Prior to assembling discs and plates, properly lubricate them by dipping them in limited slip differential oil. Refer to MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS" .

1. Position specified number of friction plates, friction discs and spacer on rear of side gear.
   - Always position a friction plate first on rear of side gear.

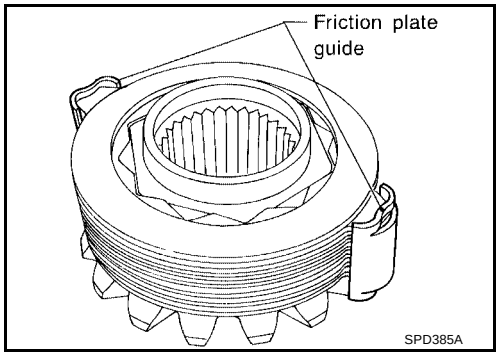
No. of discs and plates (One side)
Friction disc : 2
Friction plates : 5
Spacer : 1



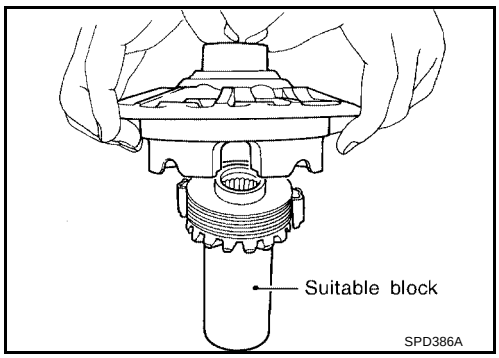
2. Install two spring plates.



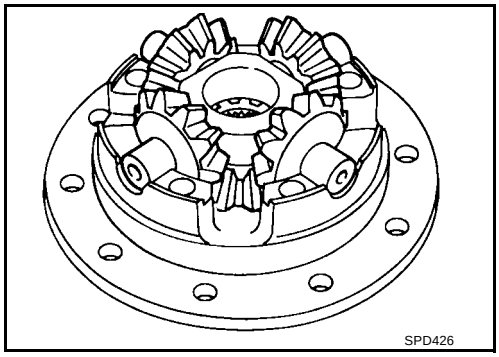
3. Install friction plate guides.
   - **Correctly align the raised portions of friction plates, and apply LSD gear oil to inner surfaces of friction plate guides to prevent them from falling.**



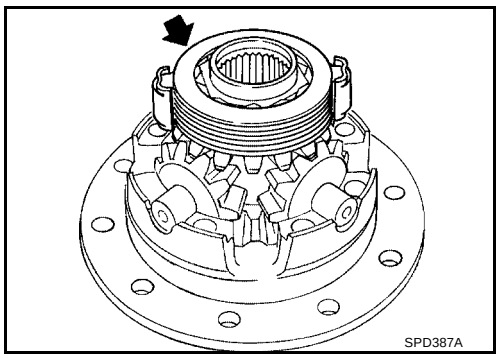
4. Install differential case B over side gear, discs, plates, spacer and friction plate guide assembly.
   - Install differential case B while supporting friction plate guides with your middle finger inserted through oil hole in differential case.
   - Be careful not to detach spring plate from the hexagonal part of the side gear.



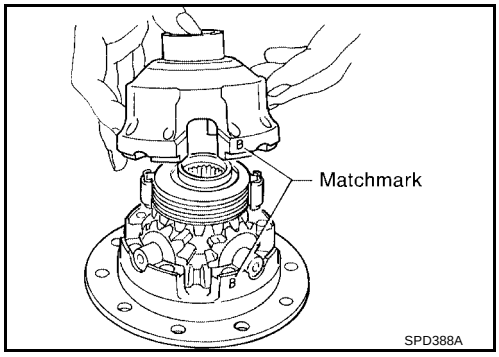
5. Install pinion mate gears and pinion mate thrust washers on pinion mate shaft, then install pinion mate shaft in differential case B.
6. Install side gear to pinion mate gears.



7. Install each disc and plate.
   - Use same procedures as outlined in steps 1 through 4 above.

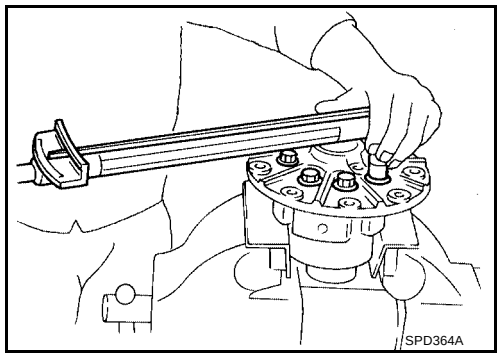


8. Install differential case A.
   - Position differential cases A and B by correctly aligning marks stamped on cases.



9. Tighten differential case couple bolts.

Differential case couple bolts	**: 64 - 74 N·m (6.5 - 7.5 kg-m, 47 - 54 ft-lb)**



10. Place ring gear on differential case and tighten ring gear bolts.

Tool number	**KV10112100 (BT-8653-A)**
Ring gear bolts	
Step 1	**: 53.9 - 63.7 N·m (5.5 - 6.4 kg-m, 40 - 46 lb-ft)**
Step 2	**: 34° - 39° degrees rotation**

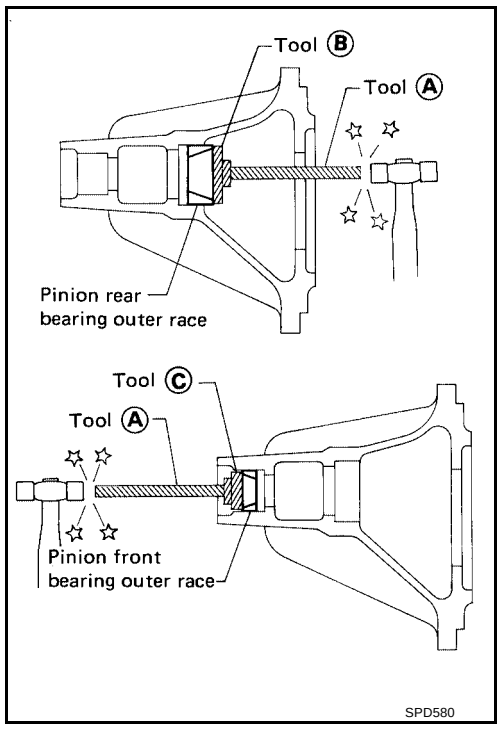
- **Tighten bolts in a crisscross pattern.**

11. Install side bearing inner race.
12. Check differential torque. Refer to RFD-54, "Checking Differential Torque" .

INSTALLATION OF DRIVE PINION ASSEMBLY

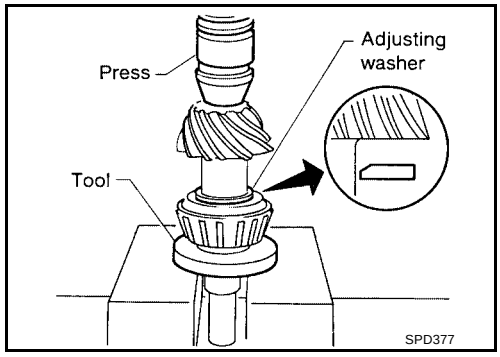
1. Press-fit front and rear bearing outer races with Tools.

Tool number	**A: ST30611000 (J25742-1)**
Tool number	**B: ST30621000 (J25742-5)**
Tool number	**C: ST30613000 (J25742-3)**

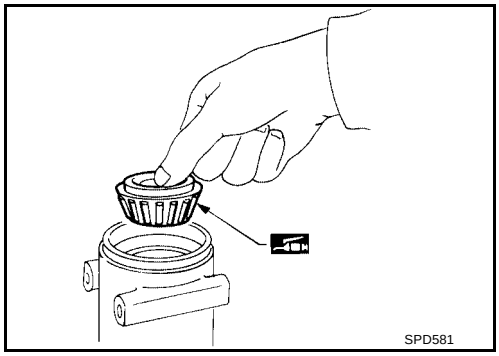


2. Select drive pinion height adjusting washer. Refer to RFD-72, "Drive Pinion Height Adjustment" .
3. Install drive pinion adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, with press and Tool.

Tool number	**: ST30901000 (J-26010-01)**

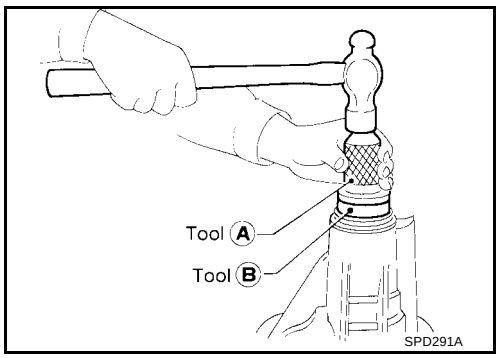


4. Place pinion front bearing inner cone in gear carrier.

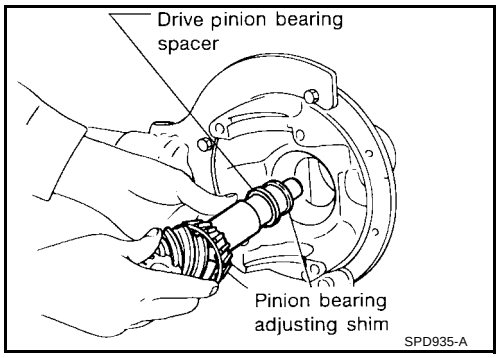


5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

Tool number A: ST30720000 (J-25405)
Tool number B: KV38102510 (—)



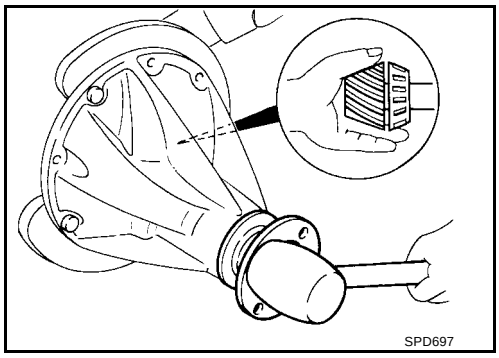
6. Install drive pinion bearing spacer, pinion bearing adjusting shim and drive pinion in gear carrier.



7. Install ABS sensor unit and sensor rotor (2WD models).

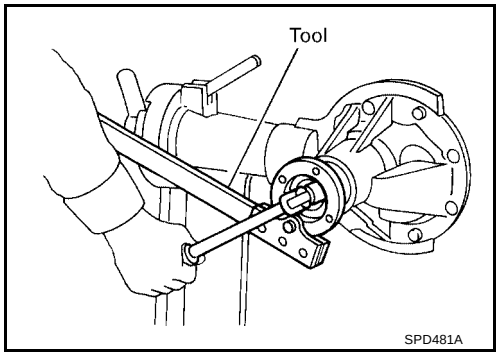
ABS sensor unit bolt : 8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)

8. Insert companion flange onto drive pinion. Tap the companion flange with a soft hammer until fully seated

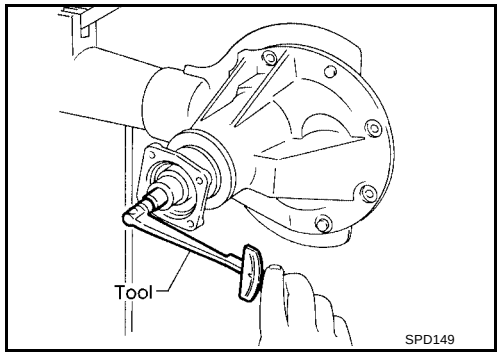


9. Tighten pinion nut until total preload is within specification.
   - **The threaded portion of drive pinion and pinion nut should be free from oil or grease.**

Tool number : KV38108300 (J-44195)
Pinion nut : 127 - 294 N·m (13.0 - 30.0 kg-m, 94 - 217 ft-lb)
Pinion preload : 1.2 - 2.2 N·m (12 - 22 kg-m, 10 - 19 in-lb)



10. Turn drive pinion in both directions several times, and measure pinion bearing preload using Tool.



Tool number	**: ST3127S000 (J-25765-A)**
Pinion bearing preload (With front oil seal)	**: 1.4 - 1.7 N·m (14 - 17 kg-cm, 12 - 15 in-lb)**
Pinion bearing preload (Without front oil seal)	**: 1.2 - 1.5 N·m (12 - 15 kg-cm, 10 - 13 in-lb)**

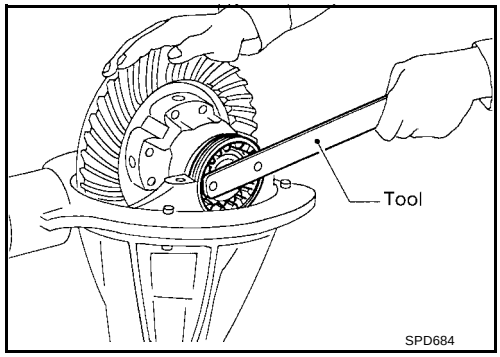
If preload is out of specification, adjust the thickness of spacer and shim combination by replacing shim and spacer with thinner one.

- Start from the combination of thickest spacer and shim.
- Combine each spacer and shim thickness one by one until the correct specification are achieved.

Drive pinion bearing preload adjusting spacer and shim	**: Refer to RFD-73, "Drive Pinion Preload Adjustment" .**

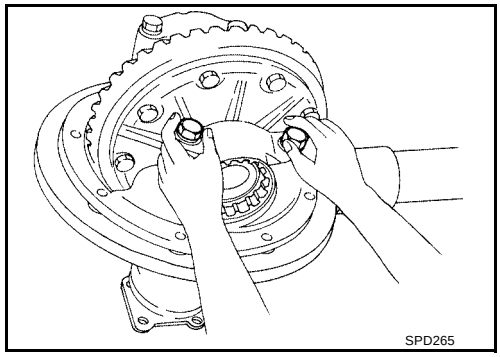
INSTALLATION OF DIFFERENTIAL CASE

1. Install differential case assembly with side bearing outer races into gear carrier.
2. Position side bearing adjusters on gear carrier with threads properly engaged; using Tool, screw in adjusters lightly at this stage of assembly.

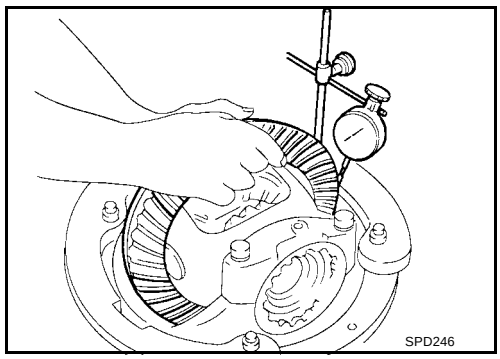


Tool number	**: ST32580000 (J-34312)**

3. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.
   - Do not tighten at this point. This allows further tightening of side bearing adjusters.



4. Tighten both right and left side bearing adjusters alternately and measure ring gear backlash and total preload at the same time. Adjust right and left side bearing adjusters by tightening them alternately so that proper ring gear backlash and total preload can be obtained.

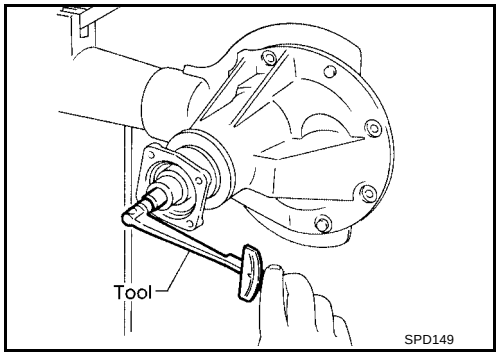


Ring gear-to-drive pinion backlash	**: 0.13 - 0.18 mm (0.0051 - 0.0071 in)**

- **When checking preload, turn drive pinion in both directions several times to set bearing rollers using Tool.**

Tool number : ST3127S000 (J-25765-A)

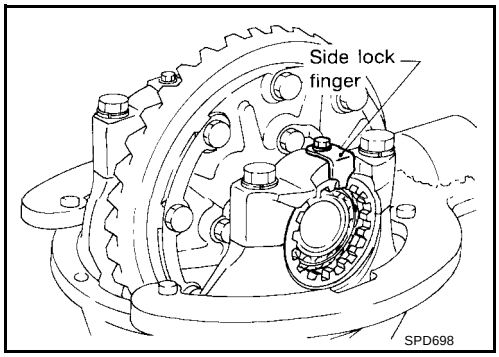
Total preload : 1.7 - 2.5 N·m (17 - 25 kg-cm, 15 - 22 in-lb)



5. Tighten side bearing cap bolts.

Side bearing cap bolts : Refer to RFD-48, "Components" .

6. Install side lock finger in place to prevent rotation during operation.

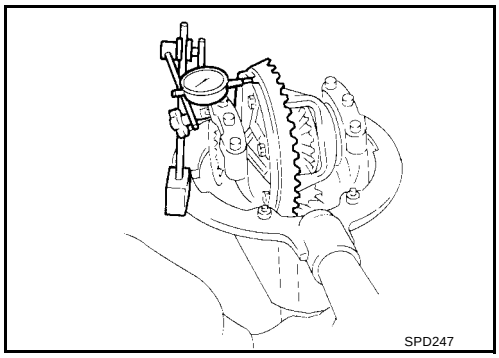


7. Check runout of ring gear with a dial indicator.

Ring gear runout limit : 0.08 mm (0.0031 in)

- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

8. Check tooth contact. Refer to RFD-63, "TOOTH CONTACT" .



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

EDS00135

2WD MODEL

Engine	VG33E				VG33ER
Vehicle grade	XE		SE		SC
Rear final drive	Standard	Optional*	Standard		Standard
	H233B				
	2-pinion	LSD	2-pinion	LSD	LSD
Gear ratio	4.636		4.900		4.363
Number of teeth (Ring gear/drive pinion)	51/11		49/10		48/11
Oil capacity (Approx.) ℓ (US pt, Imp pt)	2.8 (5-7/8, 4-7/8)				

*: Standard on Canada models.

4WD MODEL

Engine	VG33E				VG33ER
Vehicle grade	XE		SE		SC
Rear final drive	Standard	Optional	Standard	Optional*	Standard
	H233B				
	2-pinion	LSD	2-pinion	LSD	LSD
Gear ratio	4.636	4.900	4.900		4.900
Number of teeth (Ring gear/drive pinion)	51/11	49/10	49/10		49/10
Oil capacity (Approx.) ℓ (US pt, Imp pt)	2.8 (5-7/8, 4-7/8)				

*: Standard on Canada models.

Ring Gear Runout

EDS00136

Ring gear runout limit mm (in)	0.08 (0.0031)

Side Gear Adjustment

EDS00137

Side gear backlash (Clearance between side gear thrust washer and differential case) mm (in)		0.10 - 0.20 (0.0039 - 0.0079)
Available side gear thrust washers	Thickness mm (in)	Part number*
	1.75 (0.0689) 1.80 (0.0709) 1.85 (0.0728)	38424-T5000 38424-T5001 38424-T5002

*Always check with the Parts Department for the latest parts information.

Differential Torque Adjustment (LSD Models)

EDS00138

Differential torque N·m (kg-m, ft-lb)	40 - 58 (4.0 - 6.0, 29 - 43)
Number of discs and plates Friction disc Friction plate Spring plate Spacer	 2 5 2 1
Wear limit of plate and disc mm (in)	0.1 (0.004)
Allowable warping of friction disc and plate mm (in)	0.8 (0.0031)
Total thickness mm (in)	18.57 - 20.43 (0.7311 - 0.8043)

	Part name	Thickness mm (in))	Part number*
Available discs and plates (one side)	Friction disc	1.4 (0.055)	38433-C6004 (adjusting type)
		1.5 (0.059)	38433-C6002 (standard type)
		1.6 (0.063)	38433-C6003 (adjusting type)
	Friction plate	1.4 (0.055)	38432-C6002
		1.5 (0.059)	38432-C6001
		1.6 (0.063)	38432-C6003
	Spring plate	1.5 (0.059)	38435-S9200
	Spacer	6.0 (0.236)	38454-S9200

*Always check with the Parts Department for the latest parts information.

Total Preload Adjustment

EDS00139

Total preload N·m (kg-cm, in-lb)	1.7 - 2.5 (17 - 25, 15 - 22)
Ring gear to drive pinion backlash mm (in)	0.13 - 0.18 (0.0051 - 0.0071)
Side bearing adjusting method	Side adjuster

Drive Pinion Height Adjustment

EDS0013A

	Thickness mm (in)	Part number*
Available pinion height adjust washers	2.58 (0.1016)	38151-01J00
	2.61 (0.1028)	38151-01J01
	2.64 (0.1039)	38151-01J02
	2.67 (0.1051)	38151-01J03
	2.70 (0.1063)	38151-01J04
	2.73 (0.1075)	38151-01J05
	2.76 (0.1087)	38151-01J06
	2.79 (0.1098)	38151-01J07
	2.82 (0.1110)	38151-01J08
	2.85 (0.1122)	38151-01J09
	2.88 (0.1134)	38151-01J10
	2.91 (0.1146)	38151-01J11
	2.94 (0.1157)	38151-01J12
	2.97 (0.1169)	38151-01J13
	3.00 (0.1181)	38151-01J14
	3.03 (0.1193)	38151-01J15
	3.06 (0.1205)	38151-01J16
	3.09 (0.1217)	38151-01J17
	3.12 (0.1228)	38151-01J18
	3.15 (0.1240)	38151-01J19
	3.18 (0.1252)	38151-01J60
	3.21 (0.1264)	38151-01J61
	3.24 (0.1276)	38151-01J62
	3.27 (0.1287)	38151-01J63
	3.30 (0.1299)	38151-01J64
	3.33 (0.1311)	38151-01J65
	3.36 (0.1323)	38151-01J66
	3.39 (0.1335)	38151-01J67
	3.42 (0.1346)	38151-01J68
	3.45 (0.1358)	38151-01J69
	3.48 (0.1370)	38151-01J70
	3.51 (0.1382)	38151-01J71
	3.54 (0.1394)	38151-01J72
	3.57 (0.1406)	38151-01J73
	3.60 (0.1417)	38151-01J74
	3.63 (0.1429)	38151-01J75
	3.66 (0.1441)	38151-01J76

*Always check with the Parts Department for the latest parts information.

Drive Pinion Preload Adjustment

EDS0013B

Drive pinion bearing preload adjusting method		Adjusting shim and spacer
Drive pinion preload without front oil seal N·m (kg-cm, in-lb)		1.2 - 1.5 (12 - 15, 10 - 13)
Drive pinion preload with front oil seal N·m (kg-cm, in-lb)		1.4 - 1.7 (14 - 17, 12 - 15)
Available front drive pinion bearing adjusting shims	Thickness mm (in)	Part number*
	2.31 (0.0909)	38125-82100
	2.33 (0.0917)	38126-82100
	2.35 (0.0925)	38127-82100
	2.37 (0.0933)	38128-82100
	2.39 (0.0941)	38129-82100
	2.41 (0.0949)	38130-82100
	2.43 (0.0957)	38131-82100
	2.45 (0.0965)	38132-82100
	2.47 (0.0972)	38133-82100
	2.49 (0.0980)	38134-82100
	2.51 (0.0988)	38135-82100
	2.53 (0.0996)	38136-82100
	2.55 (0.1004)	38137-82100
	2.57 (0.1012)	38138-82100
	2.59 (0.1020)	38139-82100
Available drive pinion bearing adjusting spacers	Thickness mm (in)	Part number*
	4.50 (0.1772)	38165-76000
	4.75 (0.1870)	38166-76000
	5.00 (0.1969)	38167-76000
	5.25 (0.2067)	38166-01J00
	5.50 (0.2165)	38166-01J10

*Always check with the Parts Department for the latest parts information.