SECTION RFD
REAR FINAL DRIVE

CONTENTS

PRECAUTIONS

PFP:00001

Precautions for Servicing Rear Final Drive

EDS001M2

- Before starting diagnosis of the vehicle, understand the symptoms well. Perform correct and systematic operations.
- Check for the correct installation status prior to removal or disassembly. When matching marks are required, be certain they do not interfere with the function of the parts they are applied to.
- Overhaul should be done in a clean work area, a dust proof area is recommended.
- Before disassembly, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Always use shop paper for cleaning the inside of components.
- Avoid using cotton gloves or a shop cloth to prevent the entering of lint.
- Check appearance of the disassembled parts for damage, deformation, and abnormal wear. Replace them with new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time the unit is disassembled.
- Clean and flush the parts sufficiently and blow them dry.
- Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mounting surface; then remove any moisture, oil, and foreign materials from the application and mounting surfaces.
- In principle, tighten nuts or bolts gradually in several steps working diagonally from inside to outside. If a tightening sequence is specified, observe it.
- During assembly, observe the specified tightening torque.
- Add new differential gear oil, petroleum jelly, or multi-purpose grease, as specified.

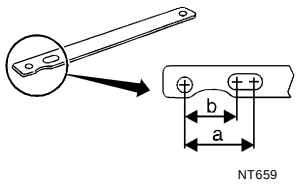
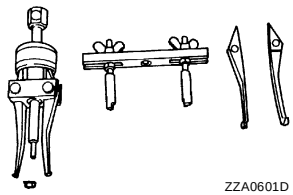
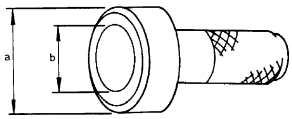
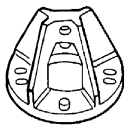
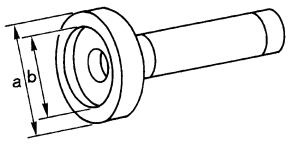
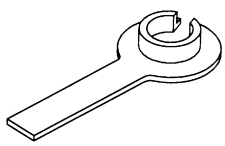
PREPARATION

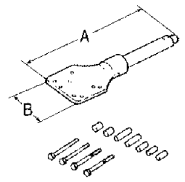
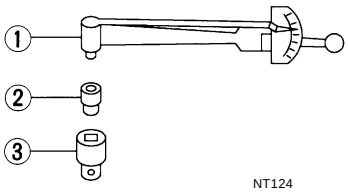
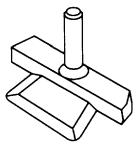
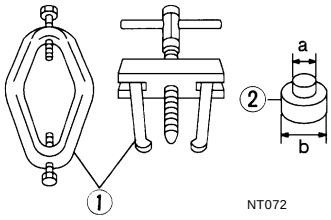
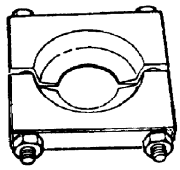
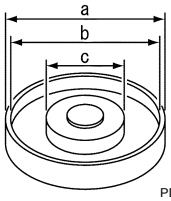
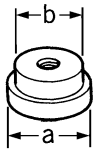
PFP:00002

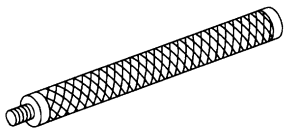
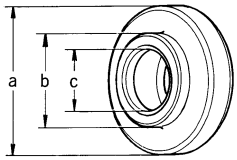
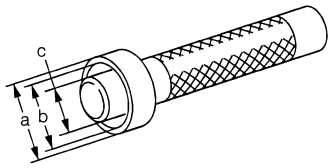
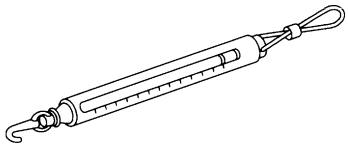
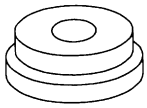
Special Service Tools

EDS001M3

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

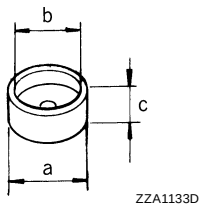
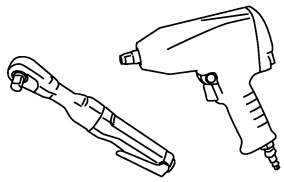
Tool number (Kent-Moore No.) Tool name	Description
KV40104000 (—) Flange wrench  NT659	Removing and installing drive pinion lock nut **a: 85 mm (3.35 in) dia.** **b: 65 mm (2.56 in) dia.**
KV381054S0 (J-34286) Puller  ZZA0601D	Removing front oil seal
ST30720000 (J-25405) Drift  ZZA0811D	● Installing front oil seal ● Installing pinion rear bearing outer race **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
KV40104100 (—) Attachment  ZZA0804D	Removing side flange
ST36230000 (J-25840-A) Sliding hammer  ZZA0803D	Removing side flange
KV38100200 (J-26233) Drift  ZZA1143D	Installing side oil seal **a: 65 mm (2.56 in) dia.** **b: 49 mm (1.93 in) dia.**
KV38107900 (J-39352) Protector  S-NT129	Installing side flange

Tool number (Kent-Moore No.) Tool name		Description
KV38100800 (J-25604-01) Attachment	 SDIA0267E	Fixing unit assembly **a: 541 mm (21.30 in)** **b: 200 mm (7.87 in)**
ST3127S000 (J-25765-A) Preload gauge 1: GG91030000 (J-25765) Torque wrench 2: HT62940000 (—) Socket adapter (1/2″) 3: HT62900000 (—) Socket adapter (3/8″)	 NT124	Measuring pinion bearing preload and total preload
KV10111100 (J-37228) Seal cutter	 S-NT046	Removing rear cover
ST3306S001 (—) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base	 NT072	Removing and installing side bearing inner race **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST30031000 (J-22912-01) Puller	 ZZA0700D	Removing pinion rear bearing inner race
KV40105230 (—) Drift	 PDIA0591E	Installing pinion rear bearing outer race **a: 92 mm (3.62 in) dia.** **b: 86 mm (3.39 in) dia.** **c: 45 mm (1.77 in) dia.**
ST30613000 (J-25742-3) Drift	 ZZA1000D	Installing pinion front bearing outer race **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description
ST30611000 (J-25742-1) Drift bar  S-NT090	Installing pinion front bearing outer race (Use with ST30613000)
ST30901000 (J-26010-01) Drift  ZZA0978D	Installing pinion rear bearing inner race **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35.2 mm (1.386 in) dia.**
KV38100300 (J-25523) Drift  ZZA1046D	Installing side bearing inner race **a: 54 mm (2.13 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 32 mm (1.26 in) dia.**
(J-8129) Spring gauge  NT127	Measuring turning torque
(J-34309) Differential shim selector tool  NT134	Adjusting bearing preload and pinion gear height
(J-25269-4) Side bearing disc (2 Req'd)  NT136	Selecting pinion height adjusting washer

Commercial Service Tools

EDS001M4

Tool name	Description
Spacer  ZZA1133D	Installing pinion front bearing inner race **a: 60 mm (2.36 in) dia.** **b: 36 mm (1.42 in) dia.** **c: 30 mm (1.18 in)**
Power tool  PBIC0190E	Loosening nuts and bolts

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EDS001M5

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

Reference page		—	Refer to RFD-18, "Tooth Contact" .	—	Refer to RFD-19, "Backlash" .	Refer to RFD-20, "Companion Flange Runout" .	Refer to RFD-9, "Checking Differential Gear Oil" .	NVH in PR section.	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in PS section.
Possible cause and SUSPECTED PARTS		Gear tooth rough	Gear contact improper	Tooth surfaces worn	Backlash incorrect	Companion flange excessive runout	Gear oil improper	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

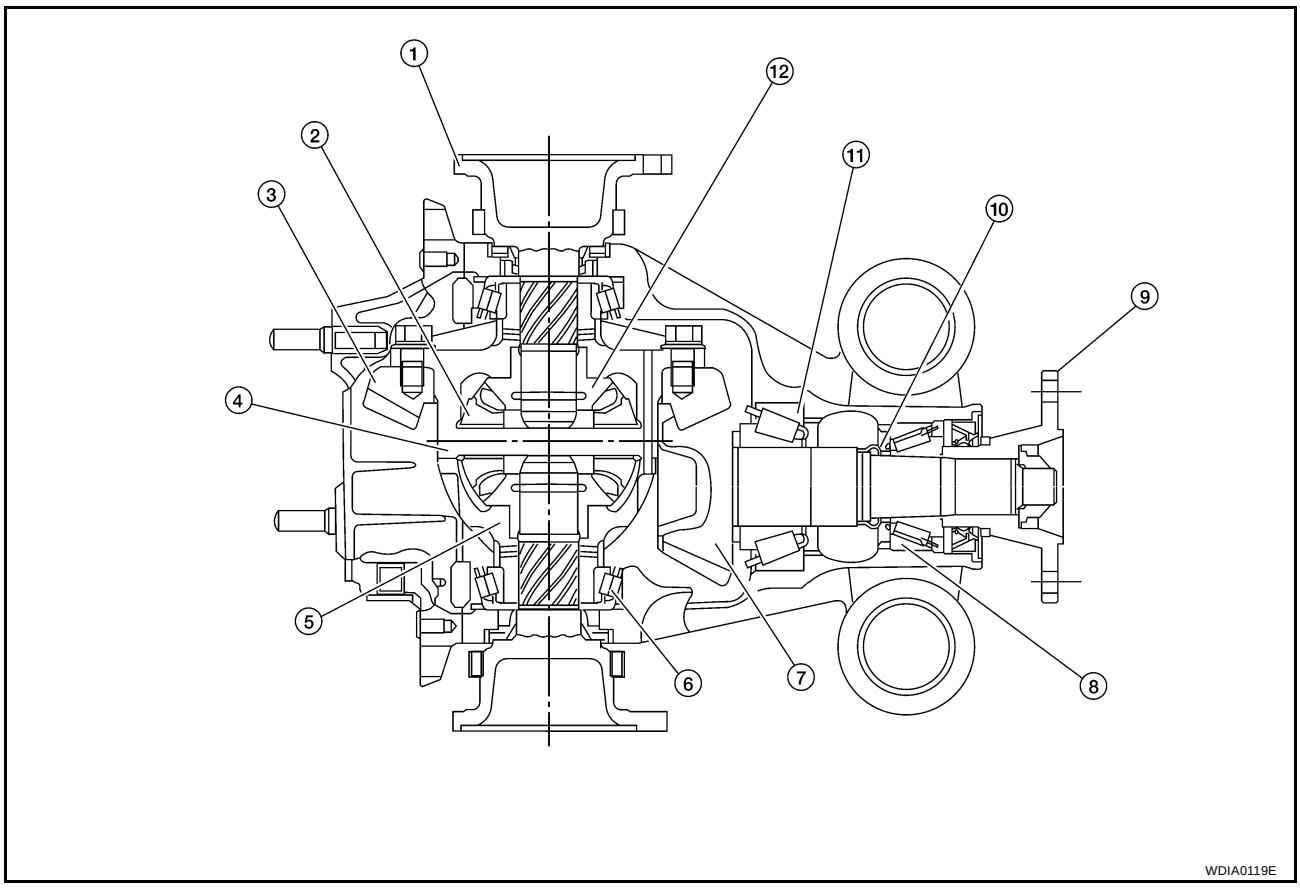
×: Applicable

DESCRIPTION

PFP:00000

Cross-Sectional View

EDS001M6



1. Side flange	2. Pinion mate gear	3. Drive gear
4. Pinion mate shaft	5. Differential case	6. Side bearing
7. Drive pinion	8. Pinion front bearing	9. Companion flange
10. Collapsible spacer	11. Pinion rear bearing	12. Side gear

DIFFERENTIAL GEAR OIL

PFP:KLD30

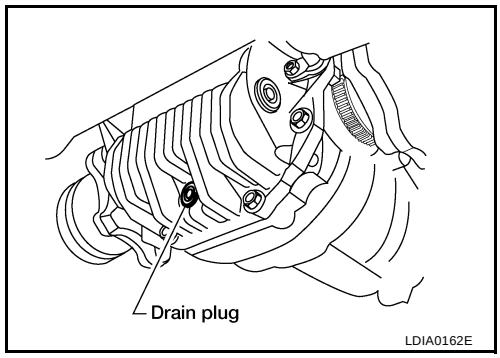
Changing Differential Gear Oil

EDS001M7

DRAINING

1. Stop the engine.
2. Remove the drain plug and gasket. Drain the gear oil.
3. Install the drain plug with a new gasket to the final drive assembly. Tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .

CAUTION:
Do not reuse gasket.



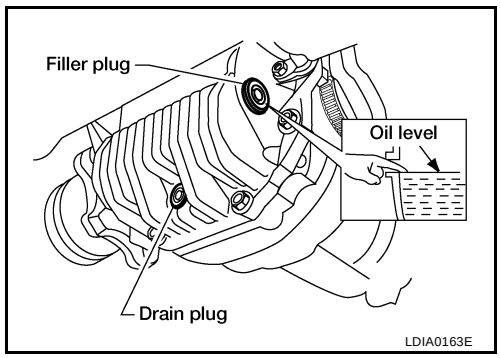
FILLING

1. Remove the filler plug and gasket. Fill with new gear oil until the oil level reaches the specified level near the filler plug hole.

Oil grade : Refer to MA-11, "Fluids and Lubricants" .
Oil capacity : Approx. 1.4 ℓ (3 US pt, 2-1/2 Imp pt)

2. After refilling oil, check the oil level. Install the filler plug with a new gasket to the final drive assembly. Tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .

CAUTION:
Do not reuse gasket.



Checking Differential Gear Oil

EDS001M8

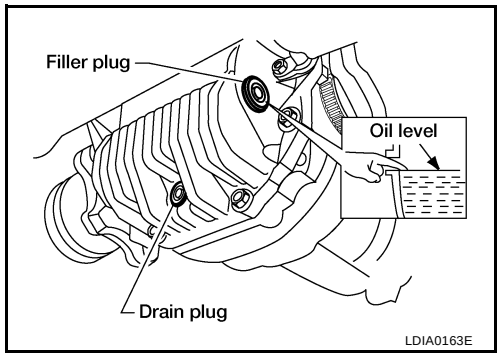
OIL LEAKAGE AND OIL LEVEL

1. Make sure that oil is not leaking from the final drive assembly or around it.
2. Check the oil level from the filler plug hole as shown.

CAUTION:
Do not start engine while checking oil level.

3. Install the filler plug with a new gasket to the final drive assembly. Tighten to the specified torque. Refer to RFD-16, "COMPONENTS" .

CAUTION:
Do not reuse gasket.



FRONT OIL SEAL

PFP:38189

Removal and Installation

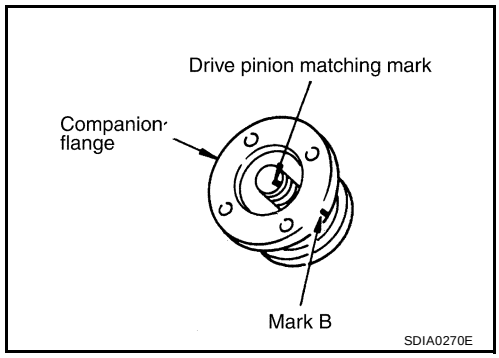
EDS001M9

REMOVAL

1. Remove the rear propeller shaft. Refer to PR-10, "REMOVAL" .
2. Put a matching mark on the end of the drive pinion in line with the matching mark B on the companion flange.

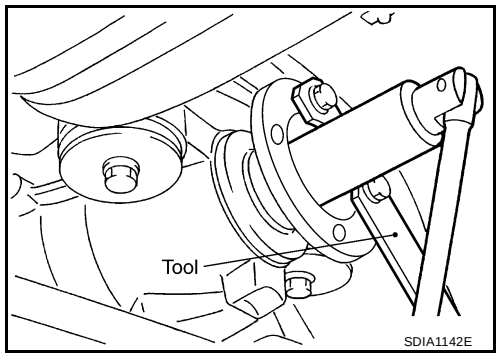
   CAUTION:
   Use paint to make the matching mark on the drive pinion. Do not damage the companion flange or drive pinion.

   NOTE:
   The matching mark B on the final drive companion flange indicates the maximum vertical runout position.

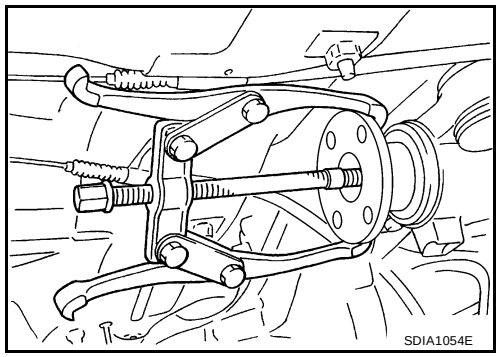


3. Remove the drive pinion lock nut, using Tool.

   Tool number : KV40104000 (—)

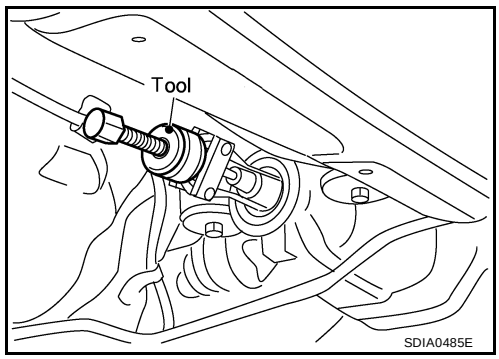


4. Remove the companion flange, using suitable tool.



5. Remove the front oil seal, using Tool.

   Tool number : KV381054S0 (J-34286)



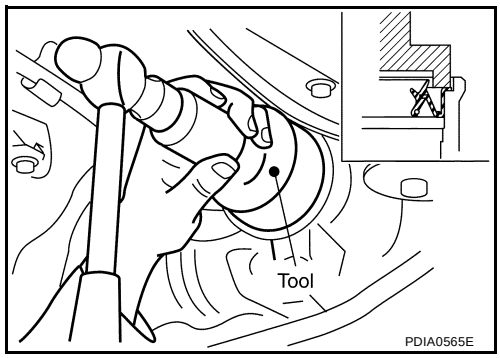
INSTALLATION

1. Install the front oil seal as shown, using Tool.

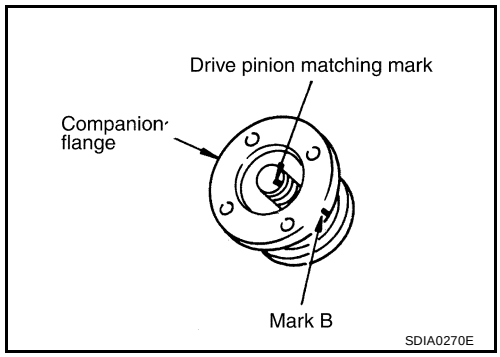
Tool number : ST30720000 (J-25405)

CAUTION:

- **Do not reuse oil seal.**
- **Do not incline oil seal when installing.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



2. Align the matching mark of the drive pinion with the matching mark B of the companion flange, then install the companion flange.



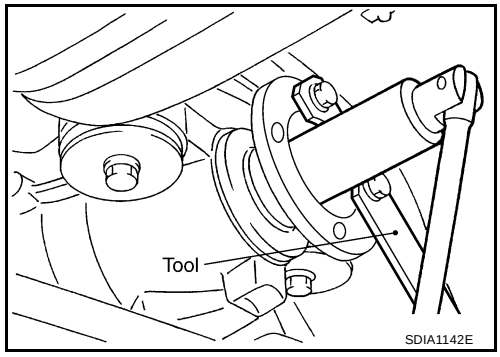
3. Install the drive pinion lock nut. Tighten to the specified torque, using Tool. Refer to RFD-16, "COMPONENTS" .

Tool number : KV40104000 (—)

CAUTION:

Do not reuse drive pinion lock nut.

4. Install the rear propeller shaft. Refer to PR-11, "INSTALLATION" .



SIDE OIL SEAL

PFP:33142

Removal and Installation

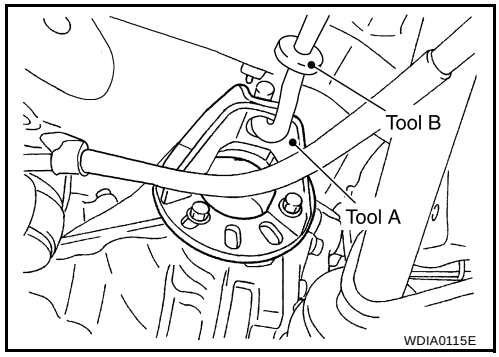
EDS001MA

REMOVAL

1. Remove the rear wheel sensor. Refer to BRC-60, "REMOVAL" .
2. Remove the drive shaft from the final drive, using power tool. Then suspend it using suitable wire. Refer to RAX-7, "REMOVAL" .
3. Remove the side flange, using Tools.

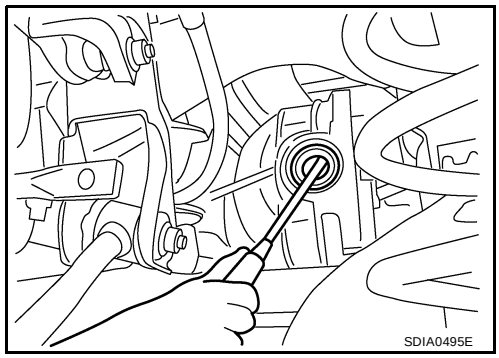
Tool numbers **A: KV40104100 (—)**
B: ST36230000 (J-25840-A)

NOTE:
Circlip installation position: Final drive side



4. Remove the side oil seal, using suitable tool.

CAUTION:
Do not to damage gear carrier.

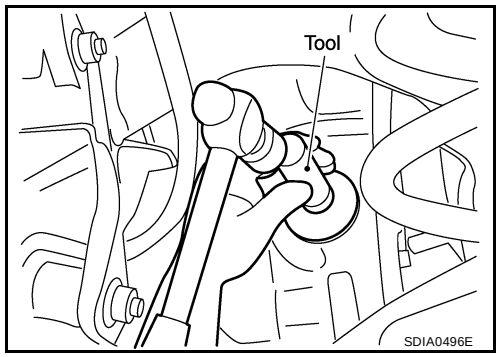


INSTALLATION

1. Drive in the side oil seal until it becomes flush with the case end, using Tool.

Tool number **: KV38100200 (J-26233)**

CAUTION:
- **Do not reuse oil seal.**
- **Do not incline oil seal when installing.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



2. Install the side flange with the following procedure.

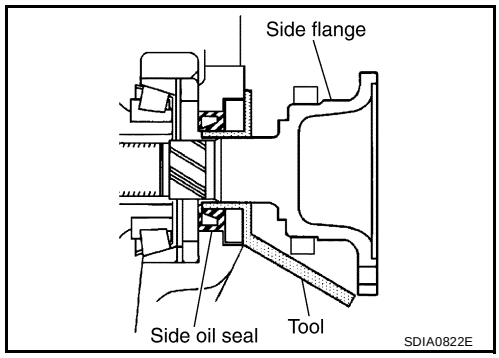
a. Attach the Tool to the side oil seal.

Tool number **: KV38107900 (J-39352)**

b. After the side flange is inserted and the serrated part of the side flange has engaged the serrated part of the side gear, remove the Tool.

c. Drive in the side flange.

NOTE:
Installation is completed when the driving sound of the side flange turns into a sound which seems to affect the whole final drive.



3. Install the drive shaft. Refer to RAX-8, "INSTALLATION" .
4. Install the rear wheel sensor. Refer to BRC-60, "INSTALLATION" .

REAR FINAL DRIVE ASSEMBLY

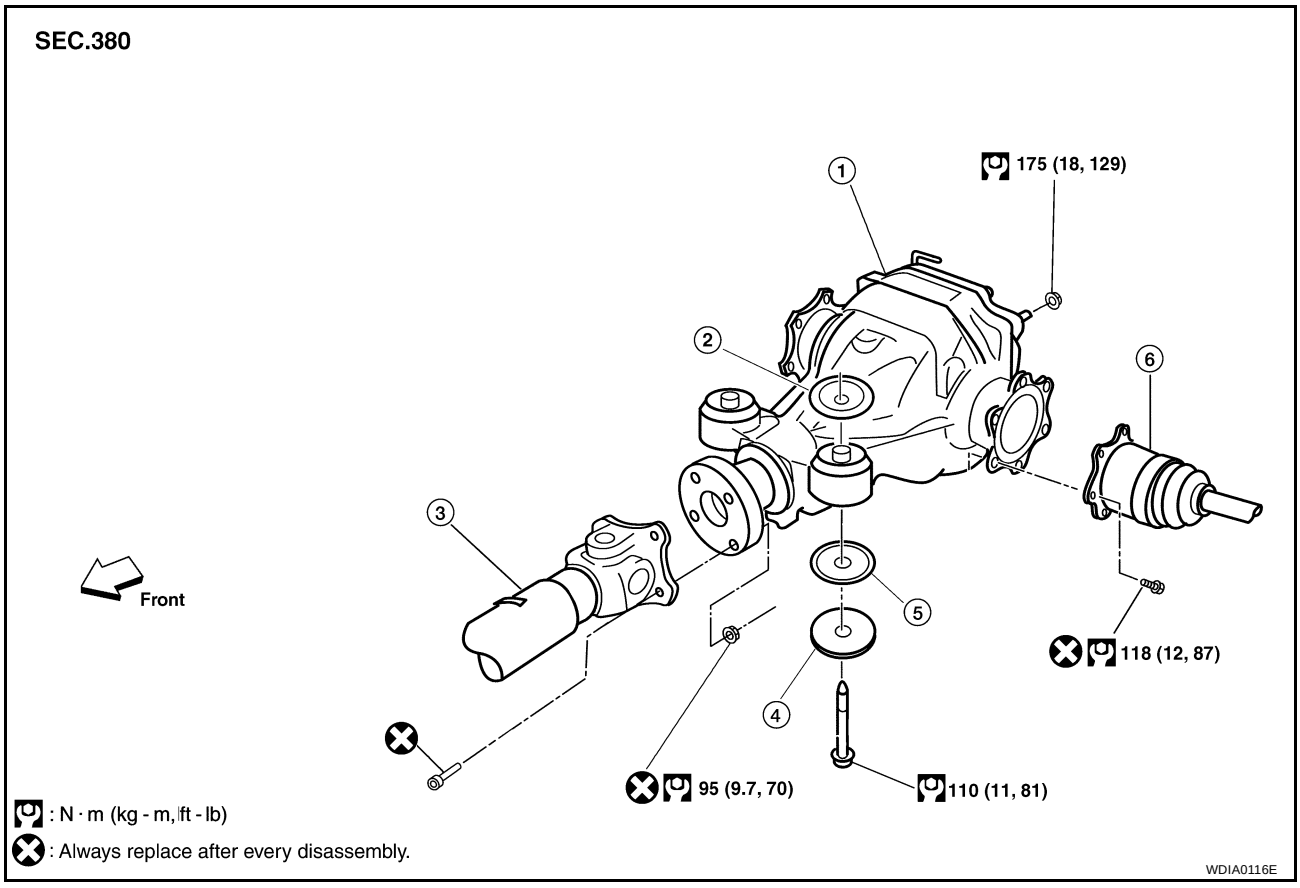
PFP:38300

Removal and Installation

EDS001MB

COMPONENTS

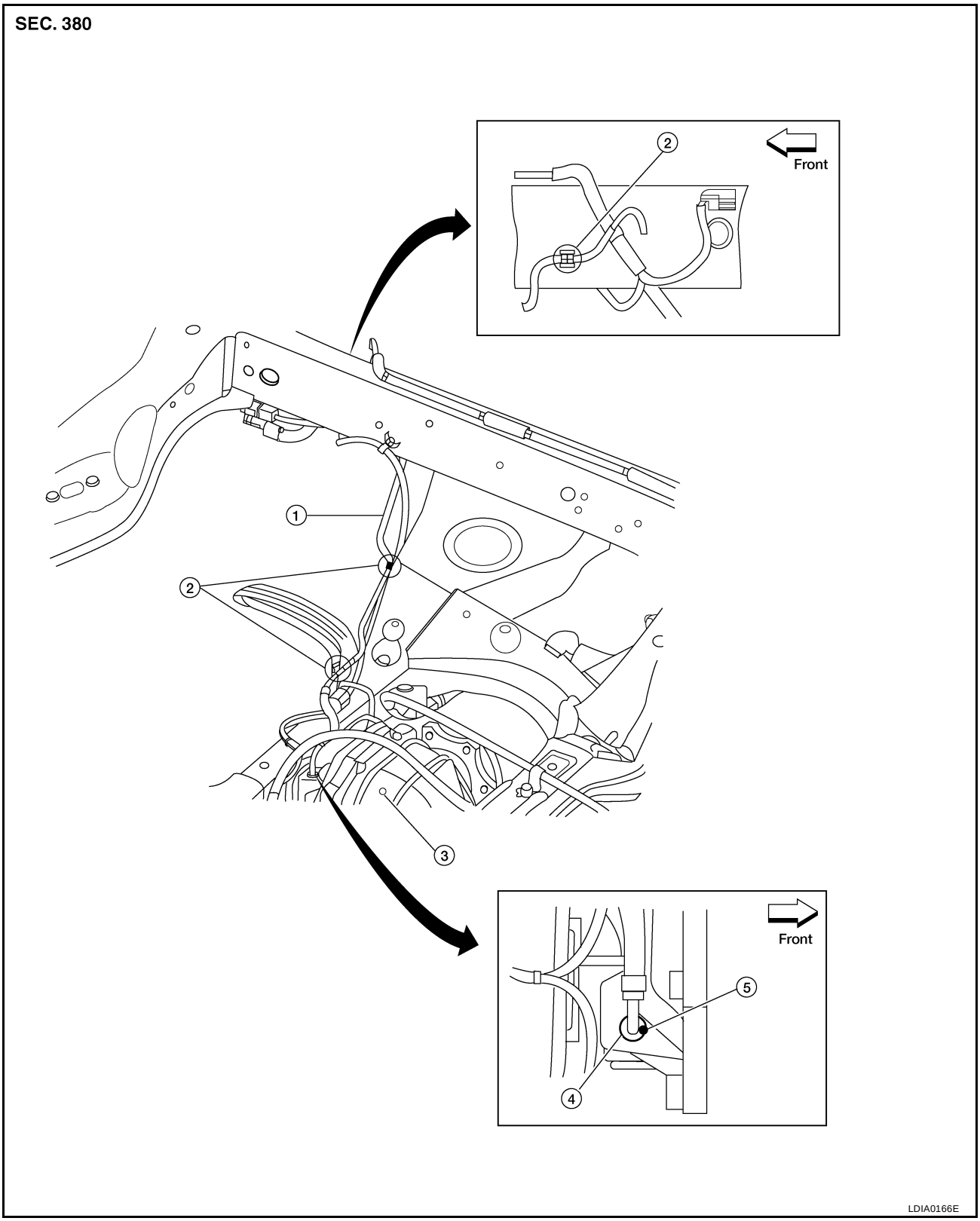
Rear Final Drive



1. Rear final drive assembly
2. Upper stopper
3. Propeller shaft
4. Washer
5. Lower stopper
6. Drive shaft

Rear Final Drive Breather Hose

SEC. 380

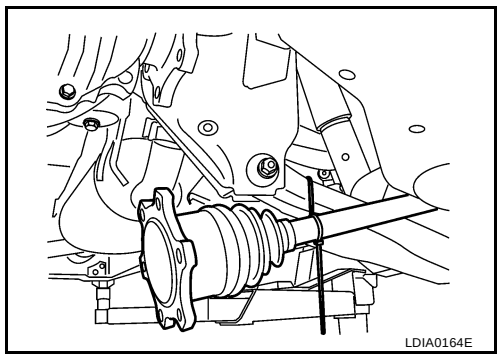


1. Rear final drive breather hose
2. Plastic connectors
3. Rear final drive assembly
4. Metal connector
5. Paint mark

REMOVAL

1. Remove the spare tire.
2. Remove the rear stabilizer bar, using power tool. Refer to RSU-20, "REMOVAL" .
3. Remove the rear propeller shaft from the final drive. Refer to PR-10, "REMOVAL" .

4. Remove the drive shafts from the final drive, using power tool. Then suspend them using suitable wire. Refer to RAX-7, "REMOVAL" .
5. Disconnect the breather hose from the final drive.
6. Remove the rear wheel sensors. Refer to BRC-60, "REMOVAL" .

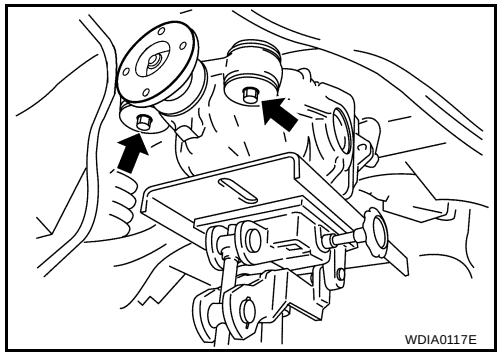


7. Place a suitable jack under the rear final drive assembly.

CAUTION:
Do not place the jack on the rear cover (aluminum case).

8. Remove the bolts and nuts and remove the rear final drive assembly.

CAUTION:
Secure rear final drive assembly to the jack while removing it.



INSTALLATION

Installation is in the reverse order of removal.

- Install the breather hose using the specified routing. Refer to RFD-13, "COMPONENTS" .

CAUTION:

- **Make sure the painted marking on the metal end of breather hose is to the front of the vehicle and there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.**
- **Make sure the breather hose plastic connectors are in the appropriate holes.**
- **Check the rear final drive oil level after installation. Refer to RFD-9, "Checking Differential Gear Oil" .**

Disassembly and Assembly

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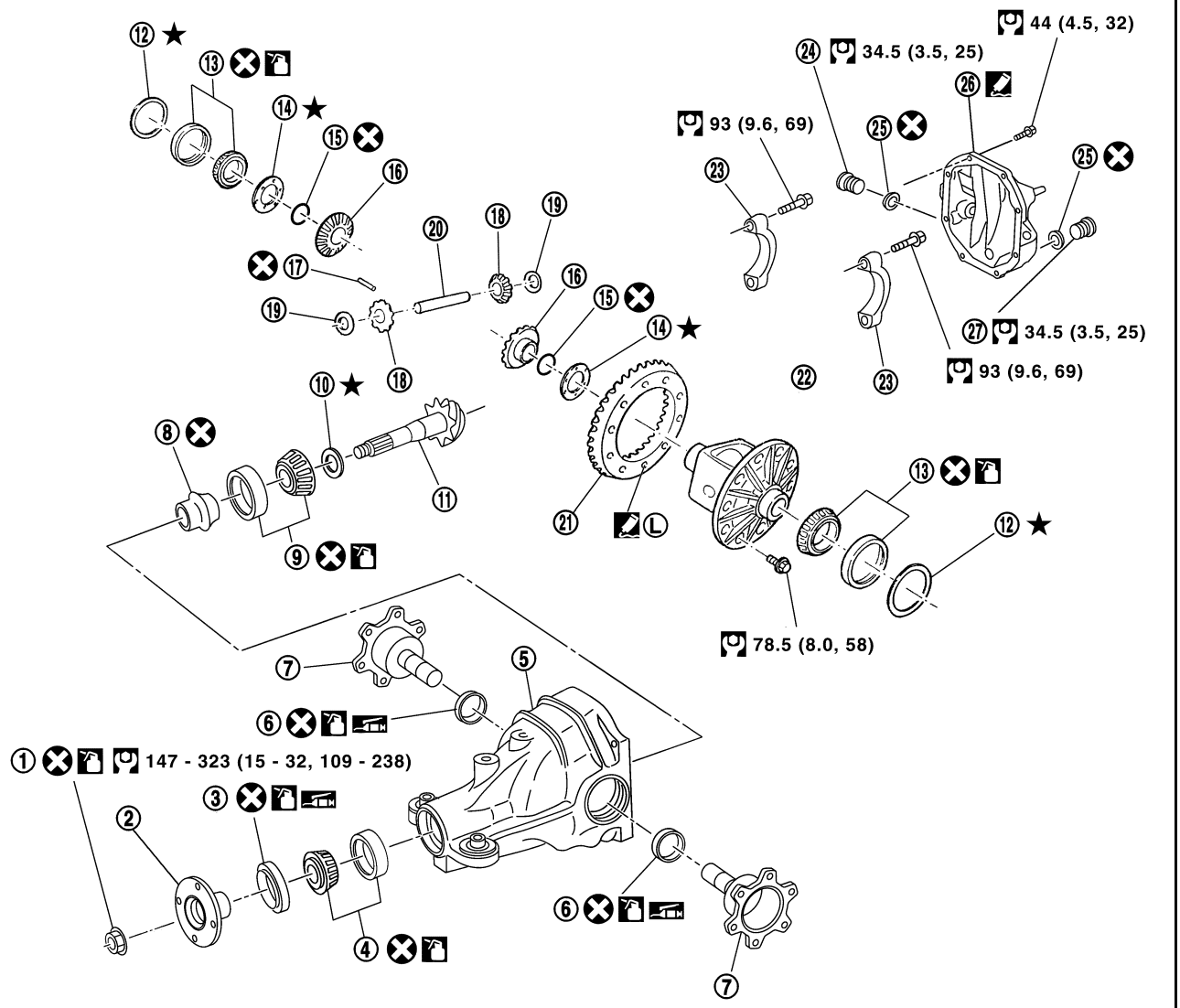
COMPONENTS

SEC.380



1. Drive pinion lock nut
2. Companion flange
3. Front oil seal
4. Pinion front bearing
5. Gear carrier
6. Side oil seal
7. Side flange (with ABS sensor rotor)
8. Collapsible spacer
9. Pinion rear bearing
10. Pinion height adjusting washer
11. Drive pinion
12. Side bearing adjusting washer
13. Side bearing
14. Side gear thrust washer
15. Circlip
16. Side gear
17. Lock pin
18. Pinion mate gear
19. Pinion mate thrust washer
20. Pinion mate shaft
21. Drive gear
22. Differential case
23. Bearing cap
24. Filler plug
25. Gasket
26. Rear cover
27. Drain plug

ASSEMBLY INSPECTION AND ADJUSTMENT

- Before inspection and adjustment, drain the gear oil.

Total Preload Torque

1. Secure the final drive assembly onto the Tool.

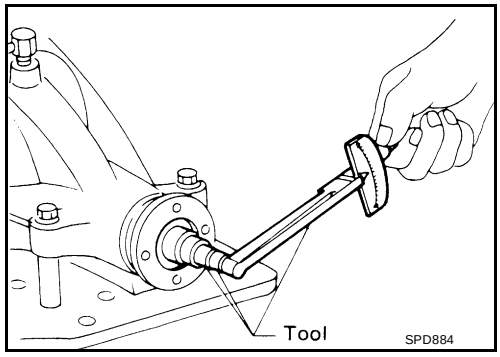
Tool number : KV38100800 (J-25604-01)

2. Remove the side flanges using Tools.

Tool numbers : KV40104100 (—)
: ST36230000 (—)

3. Rotate the drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
4. Rotate the drive pinion at least 20 times to check for smooth operation of the bearing.
5. Measure total preload, using Tool.

Tool number : ST3127S000 (J-25765-A)



Total preload torque (With oil seal):
2.84 - 3.75 N·m (0.29 - 0.38 kg-m, 26 - 33 in-lb)

NOTE:
Total preload torque = Pinion bearing torque + Side bearing torque

- If the measured value is out of the specification, disassemble it to check and adjust each part. Adjust the pinion bearing preload and side bearing preload. Adjust the pinion bearing preload first, then adjust the side bearing preload.

When the preload torque is greater than specification

On pinion bearings: Replace the collapsible spacer.

On side bearings: Use thinner side bearing adjusting washers by the same amount to each side. Refer to RFD-37, "Side Bearing Adjusting Washer" .

When the preload torque is less than specification

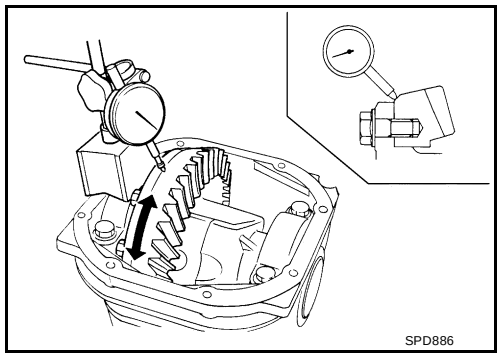
On pinion bearings: Tighten the drive pinion nut.

On side bearings: Use thicker side bearing adjusting washers by the same amount to each side. Refer to RFD-37, "Side Bearing Adjusting Washer" .

Drive Gear Runout

1. Remove the rear cover. Refer to RFD-20, "Differential Assembly" .
2. Fit a dial indicator to the drive gear back face.
3. Rotate the drive gear to measure runout.

Runout limit : 0.05 mm (0.0020 in) or less



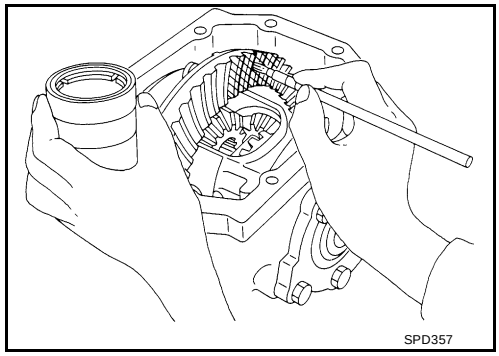
- If the runout is outside of the limit, check the condition of the drive gear assembly. Foreign material may be caught between the drive gear and differential case, or the differential case or drive gear may be deformed.

CAUTION:
Replace drive gear and drive pinion gear as a set.

Tooth Contact

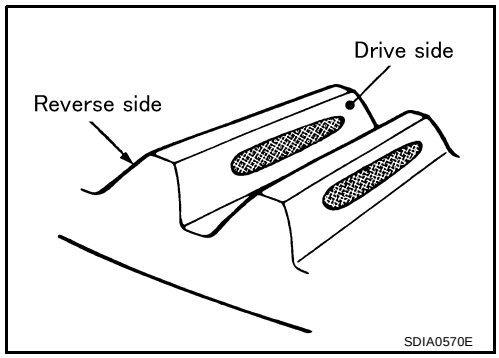
1. Remove the rear cover. Refer to RFD-20, "Differential Assembly" .
2. Apply red lead to the drive gear.

   NOTE:
   Apply red lead to both faces of 3 to 4 gears, at 4 locations evenly spaced on the drive gear.



3. Rotate the drive gear back and forth several times. Check the drive pinion gear to drive gear tooth contact.

   CAUTION:
   Check tooth contact on drive side and reverse side.



Tooth contact condition		Pinion height adjusting washer selection valve [mm (in)]		Adjustment (Yes/No)	Possible cause
Drive side	Back side				
Heel side Toe side	Toe side Heel side	Thicker ↑	+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
			+0.06 (+0.0024)		Occurrence of noise when accelerating.
			+0.03 (+0.0012)	No	–
			0		
			-0.03 (-0.0012)		
		Thinner ↓	-0.06 (-0.0024)	Yes	Occurrence of noise at constant speed and decreasing speed.
			-0.09 (-0.0035)		Occurrence of noise and scoring sound in all speed ranges.

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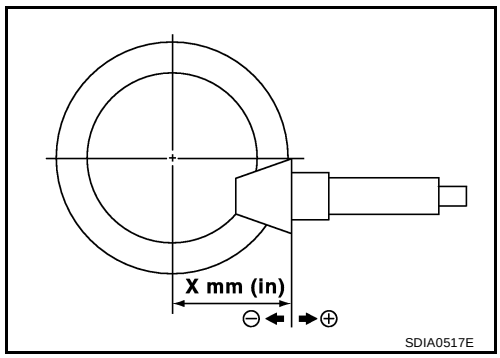
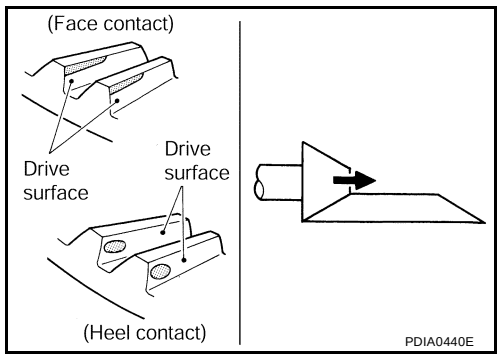
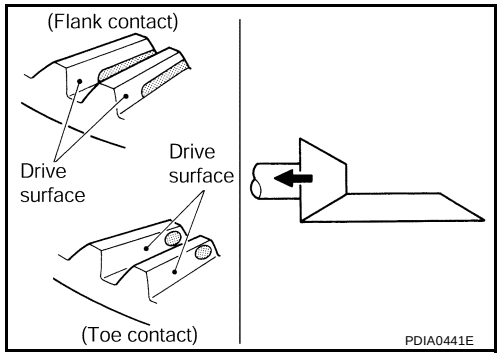
4. If the tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height (dimension X).



- If the tooth contact is near the face (face contact), or near the heel (heel contact), use thicker pinion height adjusting washers to move the drive pinion closer to the drive gear.
  Refer to RFD-37, "Pinion Height Adjusting Washer" .



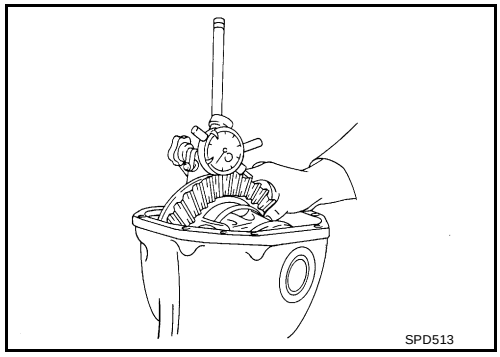
- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), use thinner pinion height adjusting washers to move the drive pinion farther from the drive gear.
  Refer to RFD-37, "Pinion Height Adjusting Washer" .



Backlash

1. Remove the rear cover. Refer to RFD-20, "Differential Assembly" .
2. Fit a dial indicator to the drive gear face to measure the backlash.

Backlash : 0.10 - 0.15 mm (0.0039 - 0.0059 in)



- If the backlash is outside of the specification, change the thickness of the side bearing adjusting washer.

When the backlash is greater than specification:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount. Refer to RFD-37, "Side Bearing Adjusting Washer" .

When the backlash is less than specification:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount. Refer to RFD-37, "Side Bearing Adjusting Washer" .

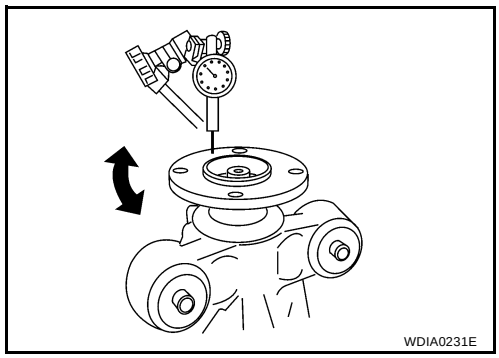
CAUTION:

Do not change the total thickness of washers as it will change the bearing preload.

Companion Flange Runout

1. Fit a test indicator to the outer side of the companion flange.
2. Rotate the companion flange to check for runout.

Runout limit : 0.08 mm (0.0031 in) or less



3. If the runout is outside of the limit, follow the procedure below to adjust.

a. Rotate the companion flange on the drive pinion by 90°, 180° and 270°, while checking for the position where the runout is minimum.

b. If the runout value is still outside of the limit after rotating the companion flange, replace the companion flange.

c. If the runout value is still outside of the limit after the companion flange has been replaced, possible cause will be an assembly malfunction of the drive pinion and pinion bearing, or a malfunctioning pinion bearing.

DISASSEMBLY

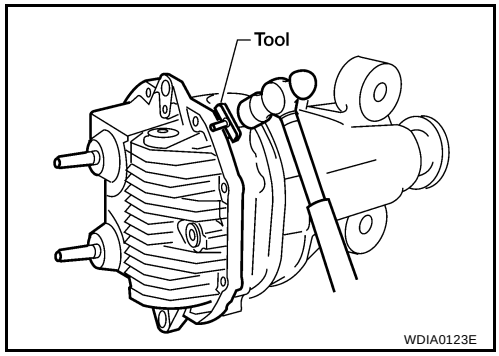
Differential Assembly

1. Drain the gear oil, if necessary.
2. Remove the side flanges.
3. Remove the rear cover bolts.
4. Separate the rear cover from the gear carrier, using Tool.

Tool number : KV10111100 (J-37228)

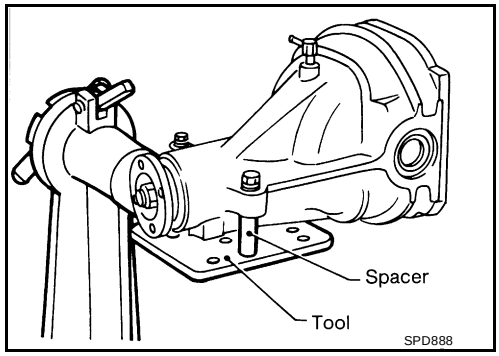
CAUTION:

- **Do not damage the mating surface.**
- **Do not insert flat-bladed screwdriver, this will damage the mating surface.**



5. Mount the carrier on the Tool using two 45 mm (1.77 in) spacers.

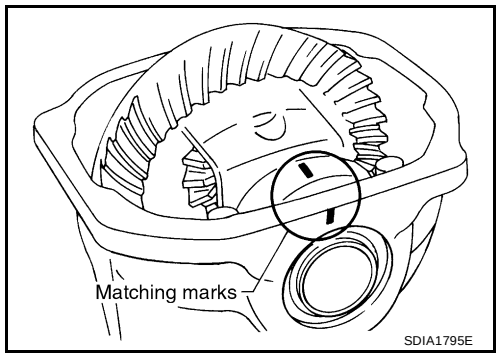
Tool number : KV38100800 (J-25604-01)



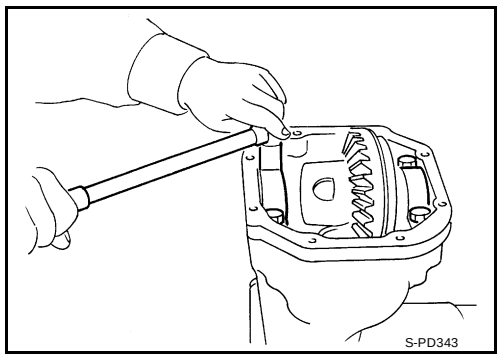
6. For proper reinstallation, paint matching marks on one side of the bearing cap.

CAUTION:

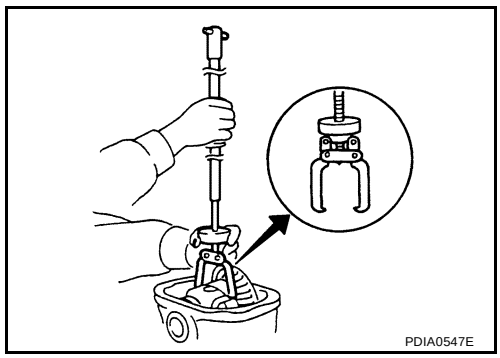
- **Use paint for matching mark. Do not damage bearing caps or gear carrier.**
- **Bearing caps are line-bored during manufacture. The matching marks are used to reinstall them in their original positions.**



7. Remove the bearing caps.

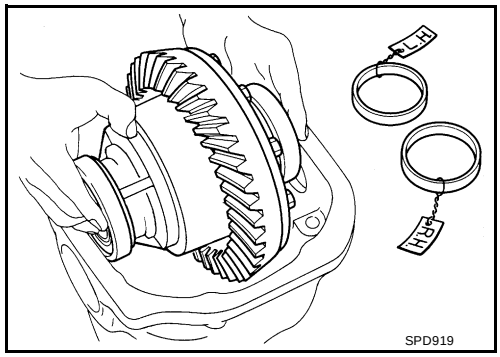


8. Lift the differential case assembly out, using suitable tool.



CAUTION:

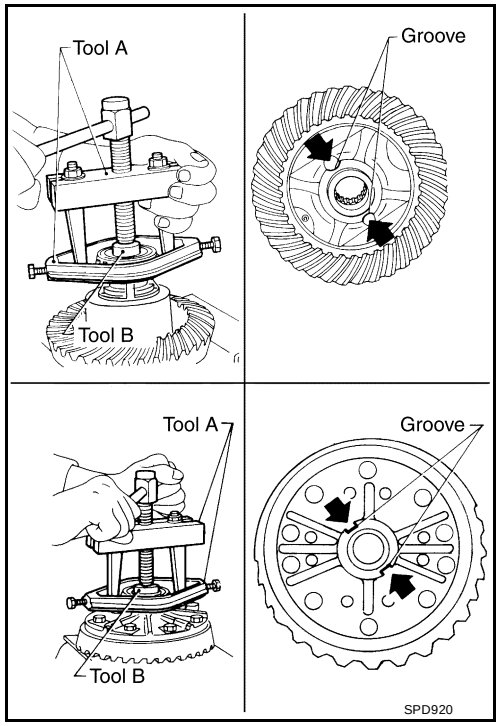
- **Keep side bearing outer races together with inner race. Do not mix them up.**
- **Keep side bearing adjusting washers together with bearings.**



9. Remove the side bearing inner race, using Tools.

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

CAUTION:
- **Engage Tool jaws in bearing groove to prevent damage.**
- **Place copper plates between the side bearing and drive gear and the vise to prevent damage.**
- **Do not remove side bearing inner race unless it is being replaced.**

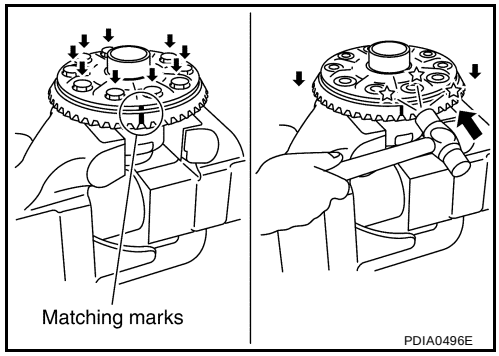


10. For proper reinstallation, paint a matching mark on one side of the differential case assembly.

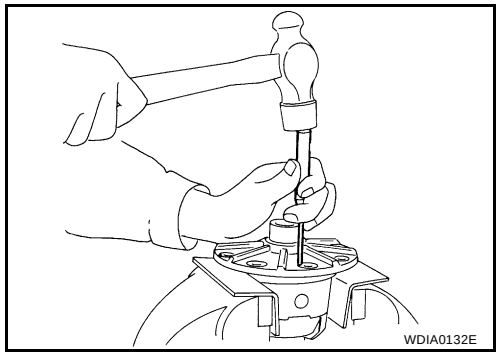
CAUTION:
Use paint for matching mark. Do not damage differential case or drive gear.

11. Remove the drive gear bolts.
12. Tap the drive gear off the differential case assembly.

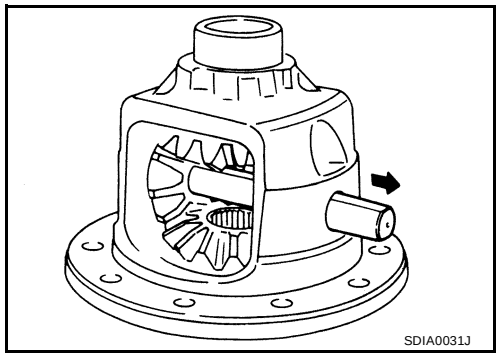
CAUTION:
Tap evenly all around to keep drive gear from bending.



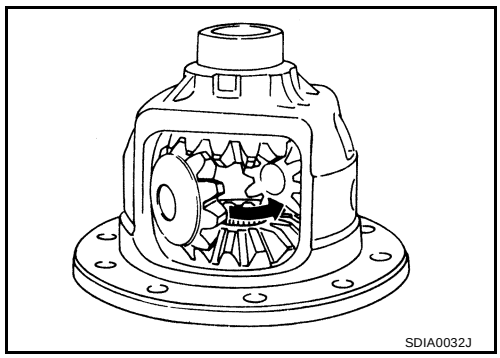
13. Remove the lock pin of the pinion mate shaft from the drive gear side.



14. Remove the pinion mate shaft.



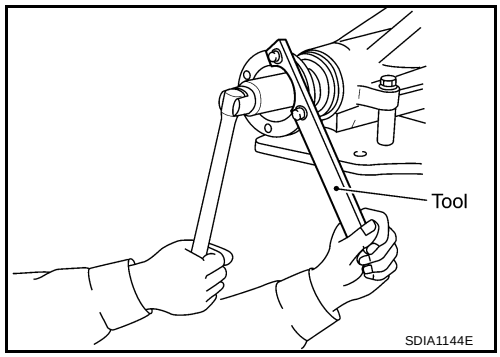
15. Turn the pinion mate gear, then remove the pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from the differential case.



Drive Pinion Assembly

1. Remove the differential assembly. Refer to RFD-20, "Differential Assembly" .
2. Remove the drive pinion lock nut, using Tool.

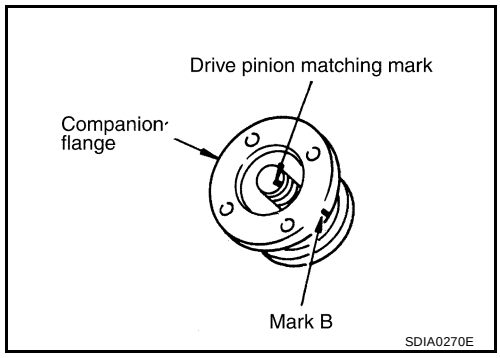
Tool number : KV40104000 (—)



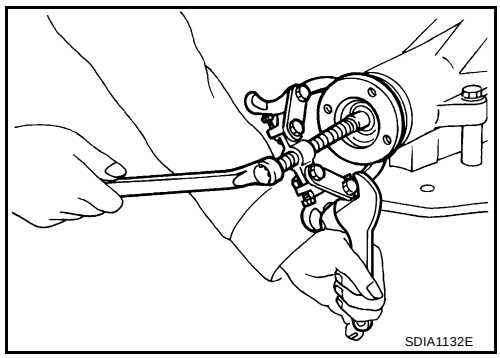
3. Put a matching mark on the end of the drive pinion in line with the matching mark B on the companion flange.

CAUTION:
Use paint for matching mark. Do not damage companion flange or drive pinion.

NOTE:
The matching mark B on the final drive companion flange indicates the maximum vertical runout position.
When replacing the companion flange, a matching mark is not necessary.



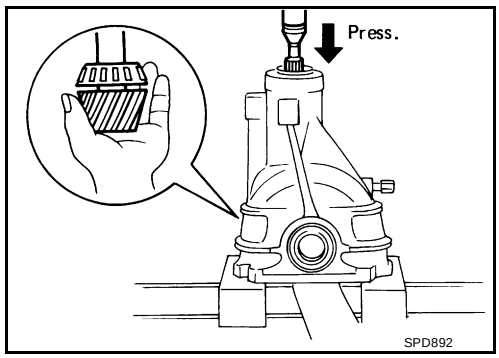
4. Remove the companion flange, using suitable tool.



5. Press the drive pinion assembly out of the gear carrier.

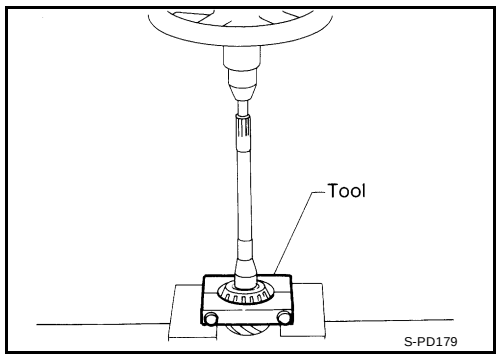
CAUTION:
Do not drop drive pinion assembly.

6. Remove the front oil seal.
7. Remove the side oil seal.
8. Remove the pinion front bearing inner race.
9. Remove the collapsible spacer.



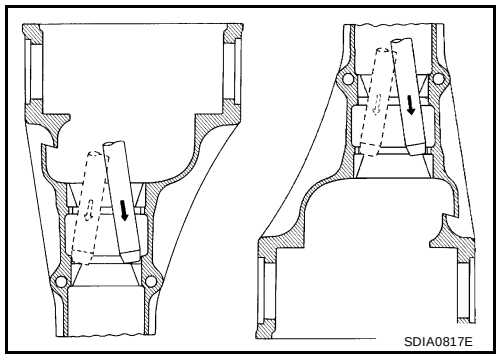
10. Remove the pinion rear bearing inner race and drive pinion height adjusting washer, using Tool.

Tool number : ST30031000 (J-22912-01)



11. Remove the pinion front/rear bearing outer races by tapping them uniformly.

CAUTION:
Do not damage gear carrier.



INSPECTION AFTER DISASSEMBLY

Clean the disassembled parts. Then inspect the parts for wear or damage. If wear or damage are found, follow the measures below.

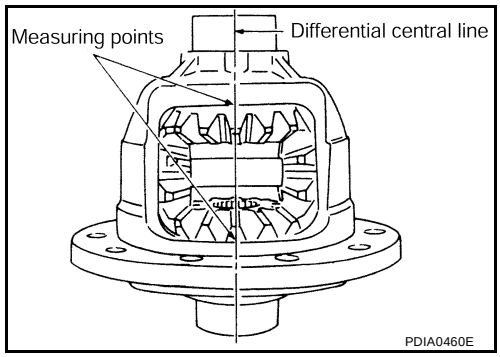
Content	Conditions and Measures
Hypoid gear	● If the gear teeth do not mesh or line-up correctly, determine the cause and adjust or replace as necessary. ● If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.
Bearing	● If any chipped (by friction), pitted, worn, rusted or scratched mark, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).
Side gear and Pinion mate gear	● If any cracks or damage on the surface of the tooth is found, replace. ● If any worn or chipped mark on the contact sides of the thrust washer is found, replace.
Side gear thrust washer and pinion mate thrust washer	● If it is chipped (by friction), damaged, or unusually worn, replace.
Oil seal	● Whenever disassembled, replace. ● If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.
Differential case	● If any wear or crack on the contact sides of the differential case is found, replace.
Companion flange	● If any chipped mark (about 0.1 mm, 0.004 in) or other damage on the contact sides of the lips of the companion flange is found, replace.

ADJUSTMENT AND SELECTION ADJUSTING WASHERS

Differential Side Gear Clearance

- Assemble the differential parts if they are disassembled. Refer to RFD-32, "Differential Assembly" .

1. Place the differential case straight up so that the side gear to be measured is upward.



2. Using feeler gauges, measure the clearance between the side gear back and differential case at three different points, while rotating the side gear. Average the three readings to calculate the clearance. (Measure the clearance of the other side as well.)

   Side gear back clearance specification:

   0.2 mm (0.008 in) or less.
   (Each gear should rotate smoothly without excessive resistance during differential motion.)

   CAUTION:
   Insert feeler gauges with the same thickness on both sides to prevent side gear from tilting.

3. If the back clearance is outside of the specification, use a thicker/thinner side gear thrust washer to adjust. Refer to RFD-36, "Side Gear Thrust Washer" .

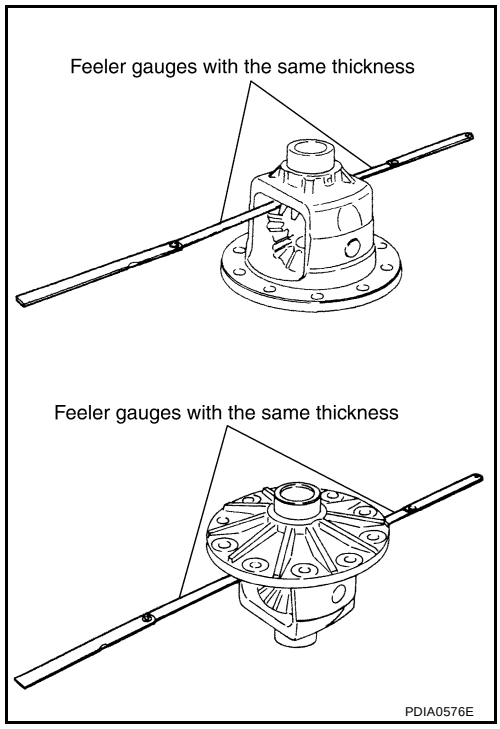
   When the back clearance is greater than specification:

   Use a thicker thrust washer.

   When the back clearance is less than specification:

   Use a thinner thrust washer.

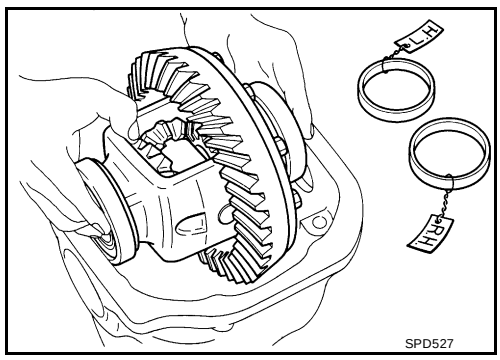
   CAUTION:
   Select a side gear thrust washer for right and left individually.



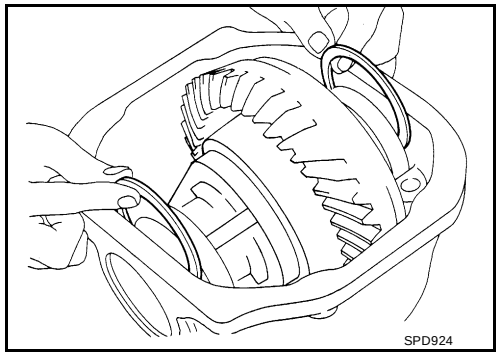
Side Bearing Preload

- A selection of carrier side bearing adjusting washers is required for successful completion of this procedure.

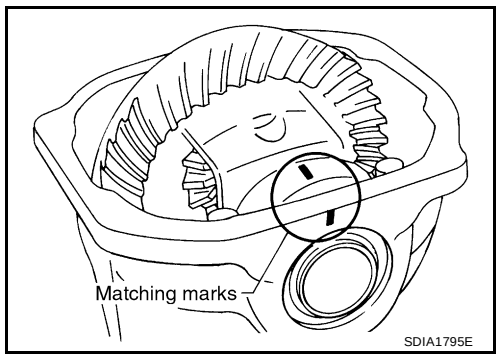
1. Make sure all parts are clean and the bearings are well lubricated with gear oil.
2. Place the differential case, with the side bearings and bearing races installed, into the gear carrier.



3. Insert the left and right original side bearing adjusting washers in place between the side bearings and gear carrier.



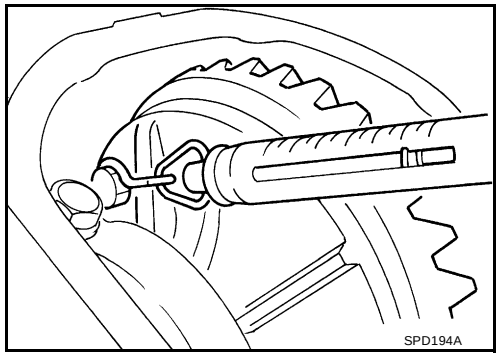
4. Install the bearing caps in their correct locations. Tighten the bearing cap bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .
5. Turn the carrier several times to seat the bearings.



6. Measure the turning torque of the carrier at the drive gear bolts, using Tool.

Tool number : — (J-8129)

Specification :34.2 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb) of pulling force at the drive gear bolt



7. If the turning torque is outside the specification, use a thicker/ thinner side bearing adjusting washer to adjust. Refer to RFD-37, "Side Bearing Adjusting Washer" .

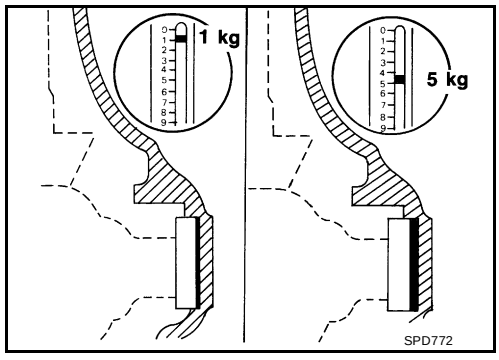
If the turning torque is less than the specification:

Use a thicker thrust washer.

If the turning torque is greater than the specification:

Use a thinner thrust washer.

CAUTION:
Select a side bearing adjusting washer for right and left individually.

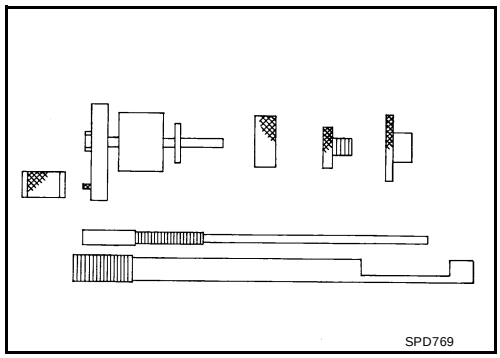


8. Record the total amount of washer thickness required for the correct carrier side bearing preload.

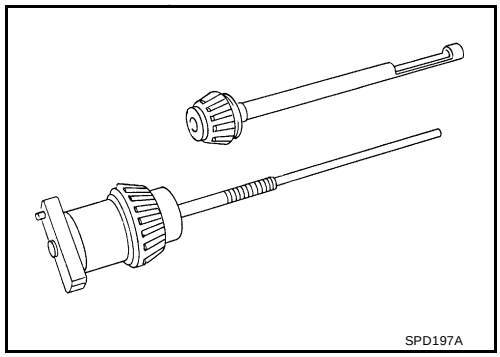
Pinion Gear Height

1. Make sure all parts are clean and that the bearings are well lubricated with gear oil.
2. Assemble the pinion gear bearings into the Tool.

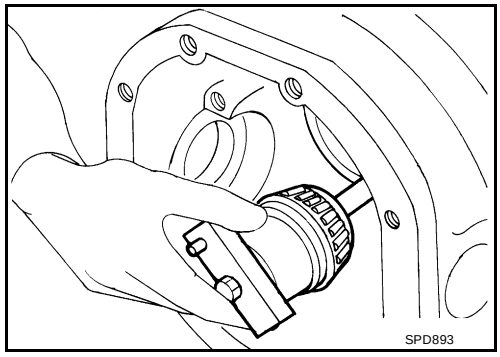
Tool number : — (J-34309)



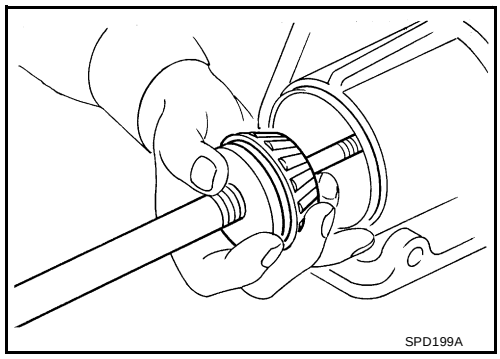
- **Pinion front bearing;** make sure the J-34309-3 pinion front bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the pinion front bearing pilot, J-34309-5, to secure the bearing in its proper position.
- **Pinion rear bearing;** the pinion rear bearing pilot, J-34309-8, is used to center the pinion rear bearing only. The pinion rear bearing locking seat, J-34309-4, is used to lock the bearing to the assembly.
- **Installation of J-34309-9 and J-34309-16;** place a suitable 2.5 mm (0.098 in) thick plain washer between J-34309-9 and J-34309-16. Both surfaces of J-34309-9 and J-34309-16 must be parallel with a clearance of 2.5 mm (0.098 in).



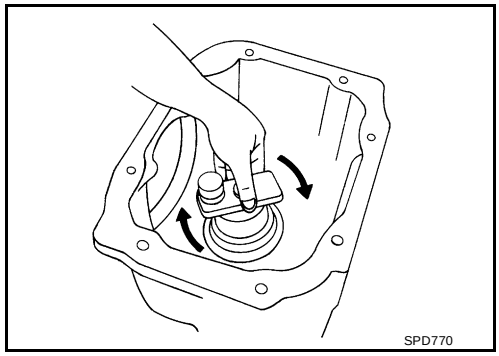
3. Install the pinion rear bearing inner race into the gear carrier. Then insert the pinion preload shim selector tool, J-34309-1 gauge screw assembly.



4. Assemble the pinion front bearing inner race and the J-34309-2 gauge anvil. Assemble them together with the J-34309-1 gauge screw in the gear carrier. Make sure that the pinion height gauge plate, J-34309-16, will turn a full 360 degrees. Tighten the two sections together by hand.



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

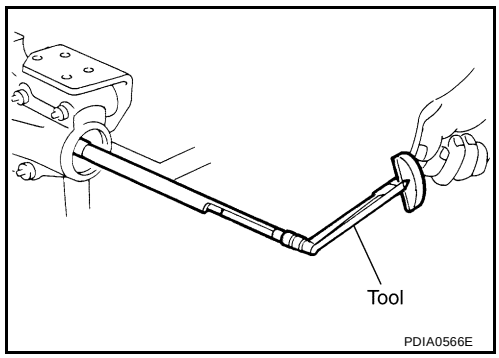


6. Measure the turning torque at the end of the J-34309-2 gauge anvil, using Tool.

Tool number : ST3127S000 (J-25765- A)

Turning torque specification:

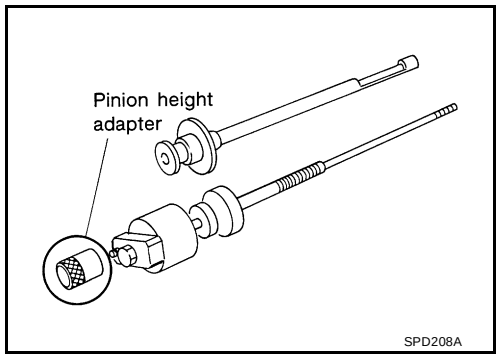
1.0 - 1.3 N·m (0.11 - 0.13 kg-m, 9 - 11 in-lb)



7. Place the J-34309-11 “R200A” pinion height adapter onto the gauge plate and tighten it by hand.

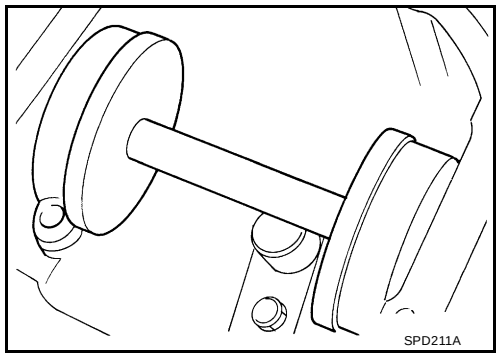
CAUTION:

Make sure all machined surfaces are clean.

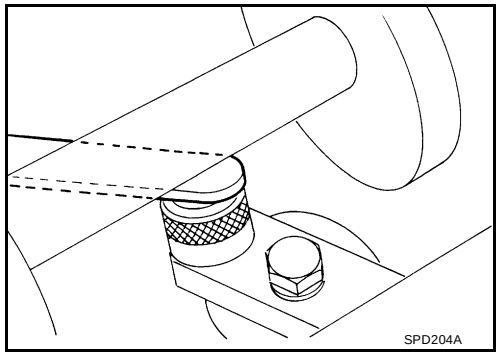


8. Position the side bearing discs, Tool, and arbor firmly into the side bearing bores. Install the bearing caps and tighten the bearing cap bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .

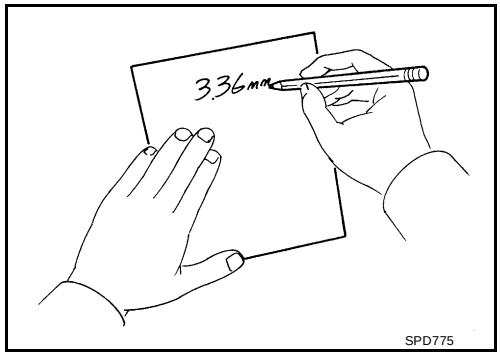
Tool number : — (J-25269-4)



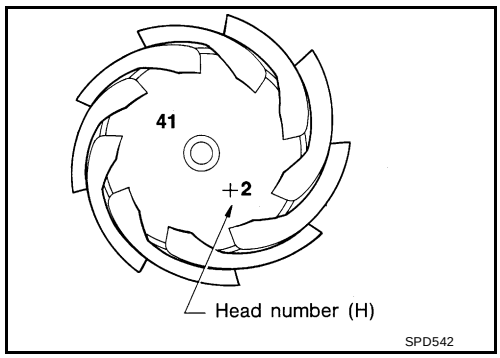
9. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and your J-34309-101 feeler gauge. Measure the distance between the J-34309-11 pinion height adapter (including the standard gauge) and the arbor.



10. Write down the exact measurement (the value of feeler gauge).

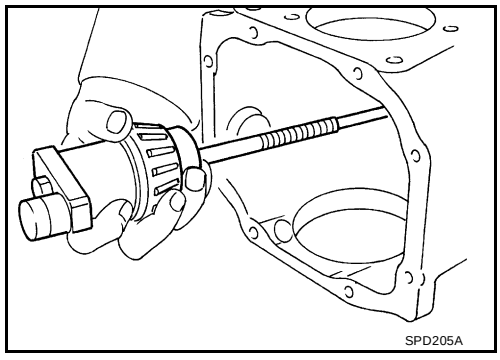


11. Correct the pinion height washer size by referring to the “pinion head number”.
There are two numbers painted on the drive pinion. The first one refers to the drive pinion and drive gear as a matched set. This number should be the same as the number on the drive gear. The second number is the “pinion 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 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)
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

12. Select the correct pinion height adjusting washer. Refer to RFD-37, "Pinion Height Adjusting Washer" .
13. Remove the J-34309 differential shim selector tool from the final drive housing. Then disassemble it to retrieve the pinion bearings.

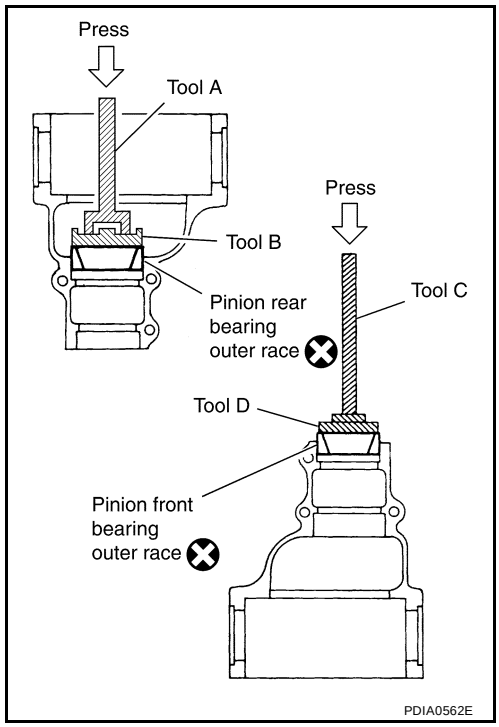


ASSEMBLY

Drive Pinion Assembly

1. Install the front and rear bearing outer races, using Tools.

Tool number **A: ST30720000 (J-25405)**
B: KV40105230 (—)
C: ST30611000 (J-25742-1)
D: ST30613000 (J-25742-3)

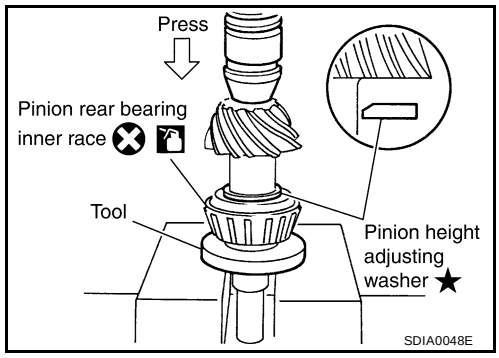


CAUTION:
- **First tap the bearing outer race until it becomes flat to the gear carrier.**
- **Do not reuse pinion front and rear bearing outer race.**

2. Select a drive pinion height adjusting washer. Refer to RFD-27, "Pinion Gear Height" .

3. Install the selected drive pinion height adjusting washer to the drive pinion. Press the pinion rear bearing inner race to it, using Tool.

Tool number : ST30901000 (J-26010-01)

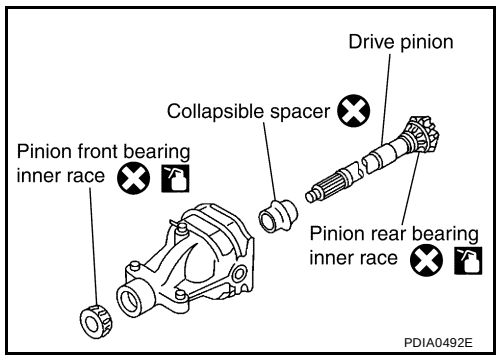


CAUTION:
- **Install the pinion height adjusting washer in the proper direction as shown.**
- **Do not reuse pinion rear bearing inner race.**

4. Assemble the collapsible spacer to the drive pinion.

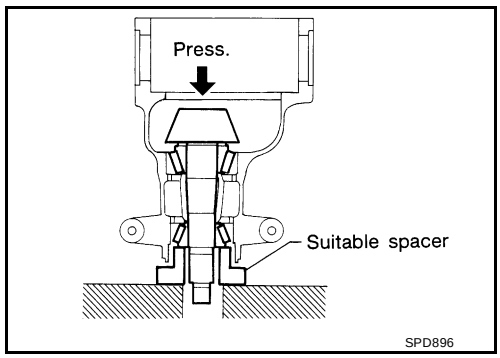
CAUTION:
Do not reuse collapsible spacer.

5. Apply gear oil to the pinion rear bearing, and assemble the drive pinion into the gear carrier.
6. Apply gear oil to the pinion front bearing, and assemble the pinion front bearing inner race to the drive pinion assembly.



CAUTION:
Do not reuse pinion front bearing inner race.

7. Press the pinion front bearing inner race to the drive pinion, using suitable spacer. Press the pinion front bearing as far as the drive pinion nut can be tightened.

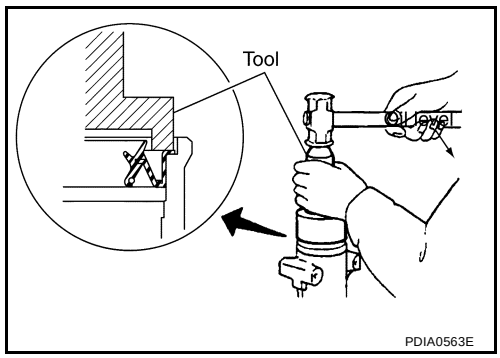


8. Install the front oil seal, using Tool.

Tool number : ST30720000 (J-25405)

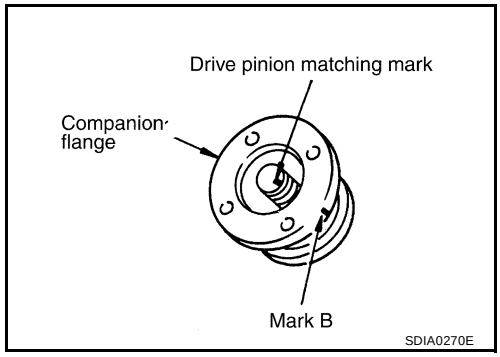
CAUTION:

- **Do not reuse oil seal.**
- **Do not incline oil seal when installing.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



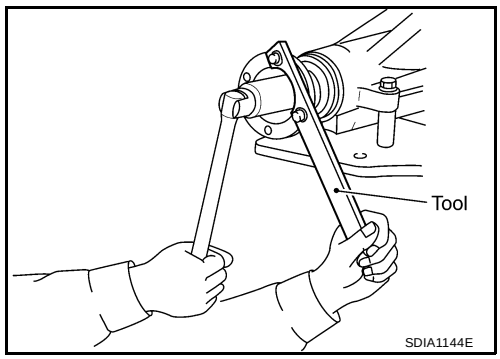
9. Install the companion flange.

NOTE:
When reusing the drive pinion, align the matching mark of the drive pinion with the matching mark B of the companion flange, then install the companion flange.

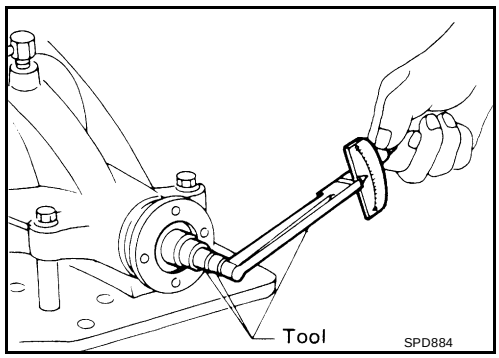


10. Apply anti-corrosive oil to the thread and seat of the drive pinion lock nut. Temporarily tighten the drive pinion lock nut to the drive pinion.

CAUTION:
Do not reuse drive pinion lock nut.



11. Adjust the drive pinion lock nut tightening torque and pinion bearing preload torque, using Tools.



Tool number **A: KV40104000 (—)**
B: ST3127S000 (J-25765-A)

Drive pinion lock nut tightening torque:
147 - 323 N·m (15 - 32 kg-m, 109 - 238 ft-lb)

Drive pinion bearing preload:
2.65 - 3.23 N·m (0.27 - 0.32 kg-m, 24 - 28 in-lb)

CAUTION:
- **Adjust the lower limit of the drive pinion lock nut tightening torque first.**
- **If the preload torque exceeds the specified value, replace the collapsible spacer and tighten it again to adjust. Do not loosen the drive pinion lock nut to adjust the preload torque.**
- **After adjustment, rotate the drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.**

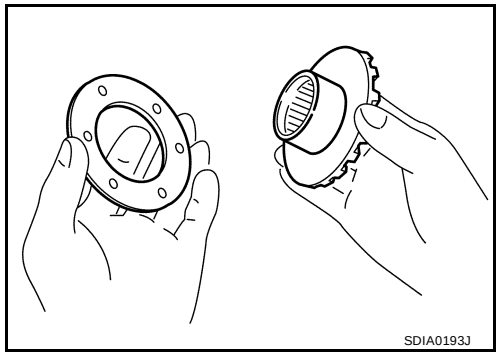
12. Install the differential case assembly. Refer to RFD-32, "Differential Assembly" .

CAUTION:
Do not install rear cover yet.

13. Check and adjust the drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to RFD-17, "Drive Gear Runout" , RFD-18, "Tooth Contact" , RFD-19, "Backlash" , RFD-20, "Companion Flange Runout" .
Recheck the above items.
14. Install the rear cover. Refer to RFD-32, "Differential Assembly" .
15. Check the total preload torque. Refer to RFD-17, "Total Preload Torque" .

Differential Assembly

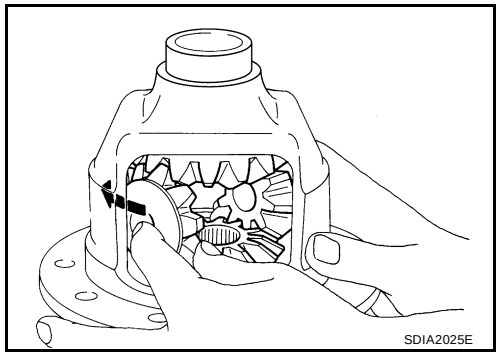
1. Install side gear thrust washers with the same thickness as the ones installed prior to disassembly, or reinstall the old ones on the side gears.



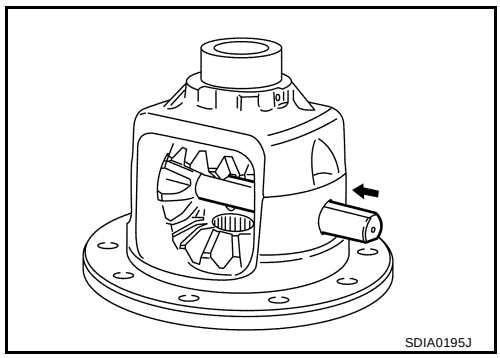
2. Install the side gears and thrust washers into the differential case.

CAUTION:
Make sure that the circlip is installed to side gears.

3. Install the thrust washers to the two pinion mate gears. Then install the pinion mate gears with the thrust washers by aligning them in diagonally opposite positions and rotating them into the differential case.

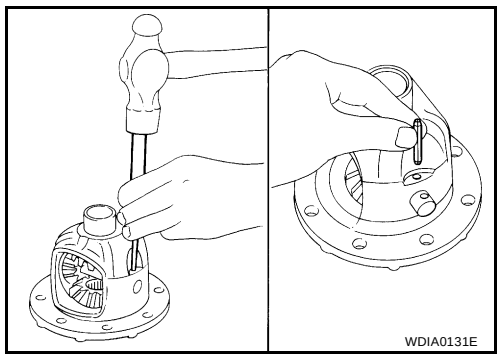


4. Align the lock pin holes on the differential case with the shaft, and install the pinion mate shaft.
5. Measure the side gear end play. If necessary, select the appropriate side gear thrust washers. Refer to RFD-25, "Differential Side Gear Clearance" .

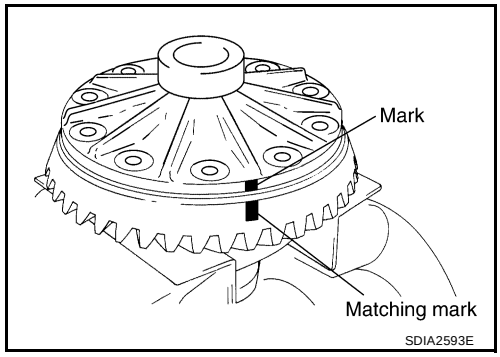

SDIA0195J

6. Drive a lock pin into the pinion mate shaft. Make sure the lock pin is flush with the differential case.

CAUTION:
Do not reuse lock pin.


WDIA0131E

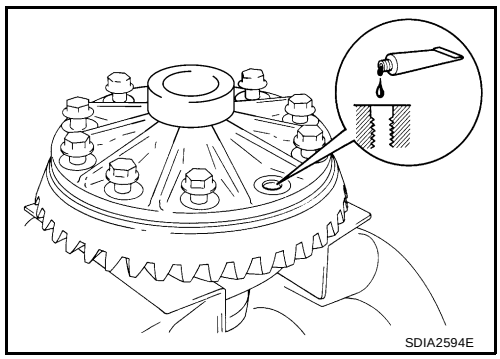
7. Align the matching mark of the differential case with the mark of the drive gear, then place the drive gear onto the differential case.



SDIA2593E

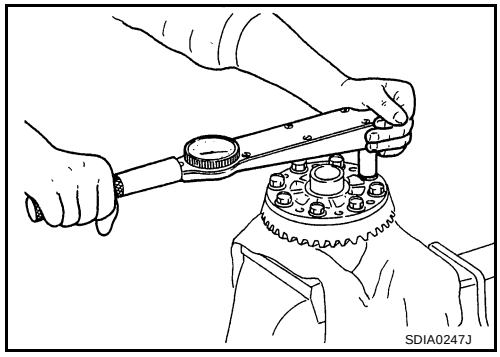
8. Apply thread locking sealant into the threaded holes of the drive gear, and install the bolts.
   - **Use Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .**

CAUTION:
Make sure the drive gear back and threaded holes are clean.


SDIA2594E

9. Tighten the drive gear bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .

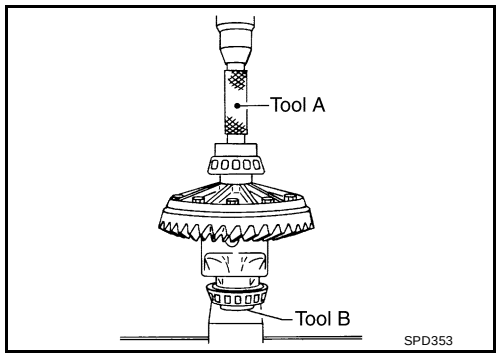
CAUTION:
- **Tighten bolts in a crisscross pattern.**
- **After tightening the bolts to the specified torque, tighten the bolts an additional 31 to 36 degrees.**


SDIA0247J

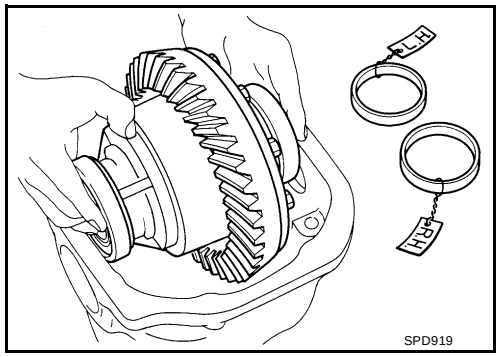
10. Press the side bearing inner races into the differential case, using Tools.

Tool number **A: KV38100300 (J-25523)**
B: ST33061000 (J-8107-2)

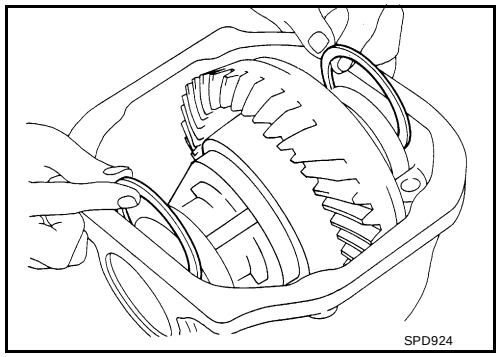
CAUTION:
Do not reuse side bearing inner race.



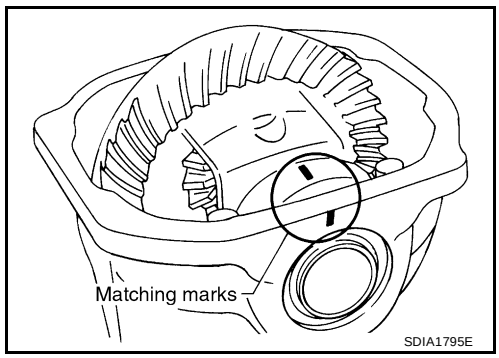
11. Install the differential case assembly with the side bearing outer races into the gear carrier.
12. Measure the side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to RFD-25, "Side Bearing Preload" .



13. Insert the selected left and right side bearing adjusting washers in place between the side bearings and gear carrier.



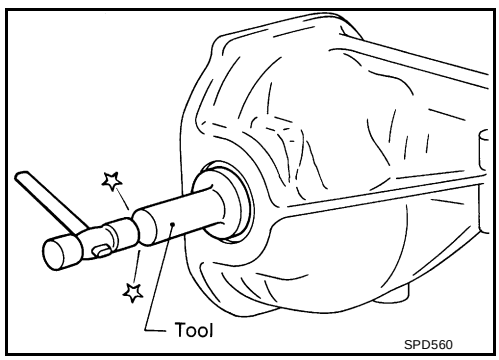
14. Align the matching mark on the bearing cap with the matching mark on the gear carrier.
15. Install the bearing caps. Tighten the bearing cap bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .



16. Drive in the side oil seals until they become flush with the case end, using Tool.

Tool number **: KV38100200 (J-26233)**

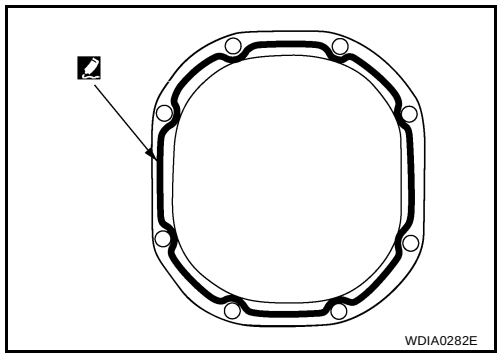
CAUTION:
- **Do not reuse oil seal.**
- **Do not incline oil seal when installing.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



17. Check and adjust the drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to RFD-17, "Drive Gear Runout" , RFD-18, "Tooth Contact" , RFD-19, "Backlash" , RFD-17, "Total Preload Torque" .
Recheck the above items.
18. Apply a 3.2mm (0.126 in) bead of sealant to the mating surface of the rear cover. Use Genuine Silicone RTV or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"

CAUTION:
Remove any old sealant adhering to the mounting surfaces. Also remove any moisture, oil, or foreign material adhering to the application and mounting surfaces.

19. Install the rear cover onto the gear carrier. Tighten the bolts to the specified torque. Refer to RFD-16, "COMPONENTS" .



20. Install the side flanges using the following procedure.

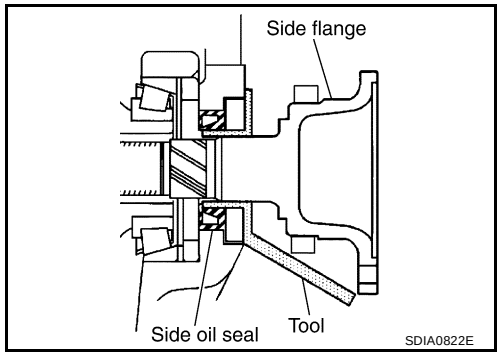
a. Attach the Tool to the side oil seal.

Tool number : KV38107900 (J-39352)

b. After the side flange is inserted and the serrated part of the side flange has engaged the serrated part of the side gear, remove the Tool.

c. Drive in the side flange.

NOTE:
Installation is completed when the driving sound of the side flange turns into a sound which seems to affect the whole final drive.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

EDS001MD

Engine	VQ40DE	
Axle type	2WD	4WD
Final drive model	R200	
Gear ratio	3.133	3.357
Number of teeth (Drive gear/Drive pinion)	47/15	47/14
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.4 (3, 2-1/2)	
Number of pinion gears	2	
Drive pinion adjustment spacer type	Collapsible	

Inspection and Adjustment

EDS001ME

DRIVE GEAR RUNOUT

Unit: mm (in)

Item	Runout limit
Drive gear back face	0.05 (0.0020) or less

DIFFERENTIAL SIDE GEAR CLEARANCE

Unit: mm (in)

Item	Specification
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.008) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)

PRELOAD TORQUE

Unit: N·m (kg-m, in-lb)

Item	Specification
Pinion bearing (P_1)	2.65 - 3.23 (0.27 - 0.32, 24 - 28)
Side bearing (P_2)	0.20 - 0.52 (0.02 - 0.05, 2 - 4)
Side bearing to pinion bearing (Total preload) (Total preload = P_1 + P_2)	2.84 - 3.75 (0.29 - 0.38, 26 - 33)

BACKLASH

Unit: mm (in)

Item	Specification
Drive gear to drive pinion gear	0.10 - 0.15 (0.0039 - 0.0059)

COMPANION FLANGE RUNOUT

Unit: mm (in)

Item	Runout limit
Outer side of the companion flange	0.08 (0.0031) or less

SELECTIVE PARTS

Side Gear Thrust Washer

Unit: mm (in)

Thickness	Part number*	Thickness	Part number*
0.75 (0.0295)	38424 0C000	0.87 (0.0343)	38424 0C004
0.78 (0.0307)	38424 0C001	0.90 (0.0350)	38424 0C005
0.81 (0.0319)	38424 0C002	0.93 (0.0366)	38424 0C006
0.84 (0.0331)	38424 0C003		

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

Pinion Height Adjusting Washer

Unit: mm (in)

Thickness	Part number*	Thickness	Part number*
3.05 (0.1201)	38154 0C000	3.17 (0.1248)	38154 0C004
3.08 (0.1213)	38154 0C001	3.20 (0.1260)	38154 0C005
3.11 (0.1224)	38154 0C002	3.23 (0.1272)	38154 0C006
3.14 (0.1236)	38154 0C003	3.26 (0.1283)	38154 0C007

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

Side Bearing Adjusting Washer

Unit: mm (in)

Thickness	Part number*	Thickness	Part number*
2.00 (0.0787)	38453 N3100	2.35 (0.0925)	38453 N3107
2.05 (0.0807)	38453 N3101	2.40 (0.0945)	38453 N3108
2.10 (0.0827)	38453 N3102	2.45 (0.0965)	38453 N3109
2.15 (0.0846)	38453 N3103	2.50 (0.0984)	38453 N3110
2.20 (0.0866)	38453 N3104	2.55 (0.1004)	38453 N3111
2.25 (0.0886)	38453 N3105	2.60 (0.1024)	38453 N3112
2.30 (0.0906)	38453 N3106	2.65 (0.1043)	38453 N3113

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