

SECTION **RFD**  
REAR FINAL DRIVE

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RFD

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# PRECAUTIONS

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## PRECAUTIONS

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### Precautions

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#### **CAUTION:**

- Before starting diagnosis of the vehicle, understand symptoms well. Perform correct and systematic operations.
- Check for the correct installation status prior removal or disassembly. When matching marks are required, be sure they do not interfere with the function of the parts they are applied to.
- Carry out an overhaul in a clean work place, Using a dust proof room is recommended.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and abnormal wear. If a malfunction is detected, replace it with a new one.
- Normally replace lock pins, oil seals, and bearings with new ones every times they are removed.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, observe it.
- Clean and flush the parts sufficiently and blow them dry.
- Be careful not to damage the sliding surfaces and mating surface.
- 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.
- Always use shop paper for cleaning the inside of components.
- Avoid using cotton gloves or a shop cloth to prevent entering of lint.
- During assembly, observe the specified tightening torque, and new differential gear oil, Vaseline, or multi-purpose grease, as specified for each vehicle, when necessary.

# PREPARATION

## PREPARATION

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### Special Service Tools

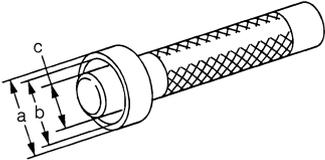
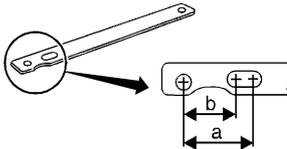
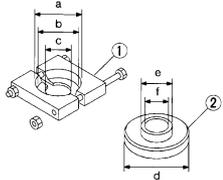
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The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

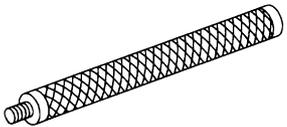
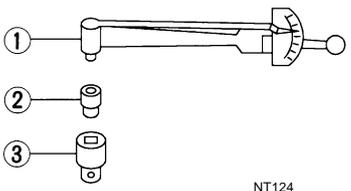
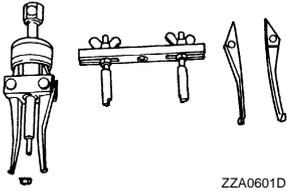
Tool number (Kent-Moore No.) Tool name	Description
ST30720000 (J25405) Drift a: 77 mm (3.03 in) dia. b: 55 mm (2.17 in) dia.	Installing front oil seal
KV38100200 (J26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.	Installing side oil seal
KV38107900 (J39352) Protector	Installing side flange
KV38100800 (J25604-01) Attachment a: 541 mm (21.30 in) b: 200 mm (7.87 in)	Fixing unit assembly
ST3306S001 ( ) Differential side bearing puller set 1.ST33051001 ( J22888-20 ) Puller 2.ST33061000 (J8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.	Removing and installing side bearing
ST30613000 (J25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.	Installing pinion front and rear bearing outer race

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# PREPARATION

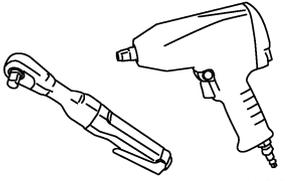
Tool number (Kent-Moore No.) Tool name	Description
KV38100300 (J25523) Drift a: 54 mm (2.13 in) dia. b: 46 mm (1.81 in) dia. c: 32 mm (1.26 in) dia.	Installing side bearing  <p style="text-align: right;">ZZA1046D</p>
KV40104000 ( — ) Drive pinion flange wrench a: 85 mm (3.35 in) dia. b: 65 mm (2.56 in) dia.	Removing and installing drive pinion lock nut  <p style="text-align: right;">NT659</p>
ST36230000 (J25840-A) Sliding hammer	Removing side flange  <p style="text-align: right;">ZZA0803D</p>
KV40104100 ( — ) Axle stand	Removing side flange  <p style="text-align: right;">ZZA0804D</p>
HT72400000 ( — ) Sliding hammer	Removing differential case assembly  <p style="text-align: right;">S-NT125</p>
ST3090S000 ( — ) Drive pinion rear inner race puller set 1. ST30031000 (J22912-01) Puller a: 90 mm (3.54 in) dia. b: 80 mm (3.15 in) dia. c: 50 mm (1.97 in) dia. 2. ST30901000 ( — ) Base d: 79 mm (3.11 in) dia. e: 45 mm (1.77 in) dia. f: 35 mm (1.38 in) dia.	Removing and installing drive pinion rear bearing inner race  <p style="text-align: right;">S-NT640</p>

# PREPARATION

Tool number (Kent-Moore No.) Tool name	Description	
ST30611000 (J25742-1) Drift	 <p style="text-align: center;">S-NT090</p>	A B C
ST3127S000 (J25765-A) Preload gauge 1. GG91030000 (J25765) Torque wrench 2. HT62940000 ( — ) Socket adapter (1/2") 3. HT62900000 ( — ) Socket adapter (3/8")	 <p style="text-align: center;">NT124</p>	RFD E F G
ST33290001 (J34286) Side bearing outer race puller	 <p style="text-align: center;">ZZA0601D</p>	H I
— (J34309) Differential shim selection	 <p style="text-align: center;">NT134</p>	J K

## Commercial Service Tools

ADS000D8

Tool name	Description	
Power tool	 <p style="text-align: center;">PBIC0190E</p>	L M

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

FFP:00003

### NVH Troubleshooting Chart

ADS000D9

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

Symptom	DIFFERENTIAL	Noise													
Reference page				<a href="#">RFD-23</a>	<a href="#">RFD-30</a>	<a href="#">RFD-23</a>	<a href="#">RFD-16</a>	—	<a href="#">MA-21</a>						
Possible cause and SUSPECTED PARTS			Rough gear tooth	Improper gear contact	Tooth surfaces worn	Incorrect backlash	Companion flange excessive runout	Improper gear oil	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
			×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

# FRONT OIL SEAL

## FRONT OIL SEAL

PFP:38189

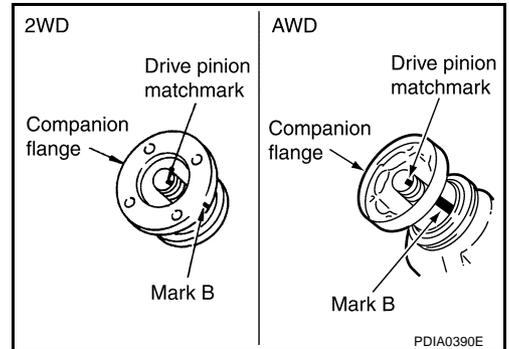
### Removal and Installation

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1. Remove the propeller shaft. Refer to [PR-4, "REAR PROPELLER SHAFT"](#).
2. Put a mark on the end of the drive pinion corresponding to the B position mark on the final drive companion flange.

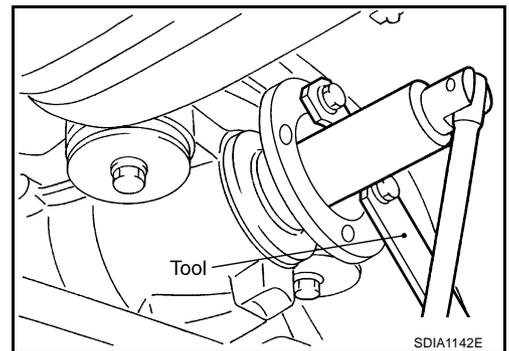
#### CAUTION:

- For matchmark, use paint. Never damage drive pinion.
- The mark on the final drive companion flange indicates the maximum vertical runout position.



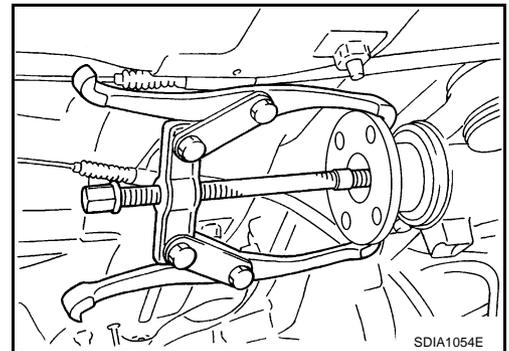
3. Remove drive pinion lock nut with tool.

**Tool number** : KV40104000 ( — )



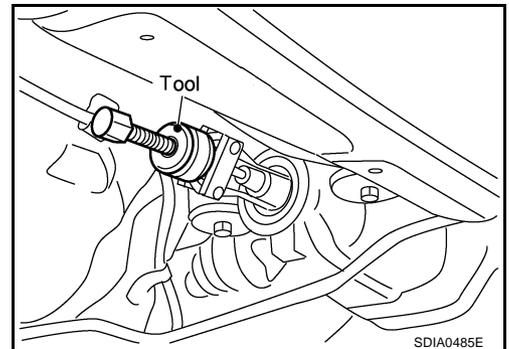
4. Remove the companion flange using puller.

**Tool number** : Commercial service tool



5. Remove front oil seal with tool.

**Tool number** : ST33290001 (J34286)



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# FRONT OIL SEAL

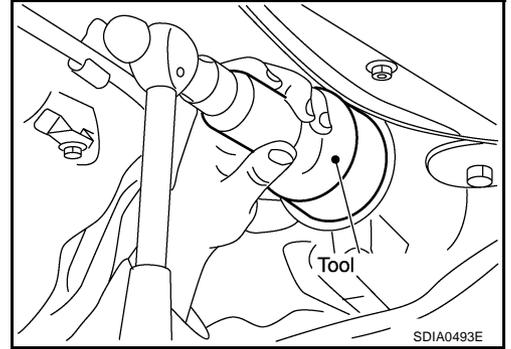
## INSTALLATION

1. Apply multi-purpose grease to sealing lips of oil seal. Press front oil seal into carrier with tool.

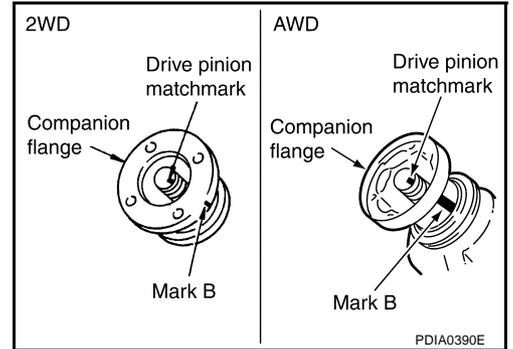
**Tool number** : ST30720000 (J25405)

### CAUTION:

- When installing the oil seal, be careful not to get it inclined.
- Discard the old oil seal. Always replace with new one.



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



3. Apply oil or grease on the screw part of drive pinion and the seating surface of drive pinion lock nut.
4. Install drive pinion lock nut with tool. Refer to [RFD-13, "R200 2-PINION"](#) or [RFD-15, "R200V VISCOUS"](#).

**Tool number** : KV40104000 ( — )

### CAUTION:

**The drive pinion lock nut is not reusable. Never reuse drive pinion lock nut.**

5. Install propeller shaft. Refer to [PR-4, "REAR PROPELLER SHAFT"](#).

# SIDE OIL SEAL

## SIDE OIL SEAL

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### Removal and Installation

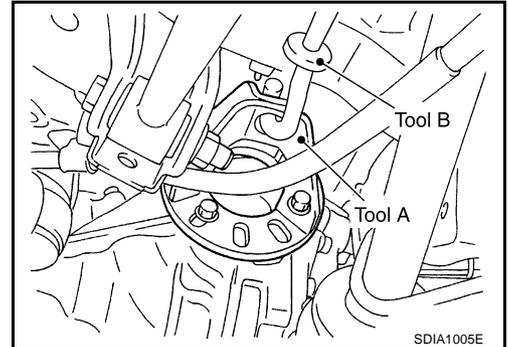
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1. Remove side flange with the following procedure for press-fitting.
  - a. Remove rear wheel sensor. Refer to [BRC-65, "WHEEL SENSOR"](#) .
  - b. Remove drive shaft and axle assembly. Refer to [RAX-10, "REAR DRIVE SHAFT"](#) and [RAX-6, "WHEEL HUB"](#) .
  - c. Install axle stand to side flange.

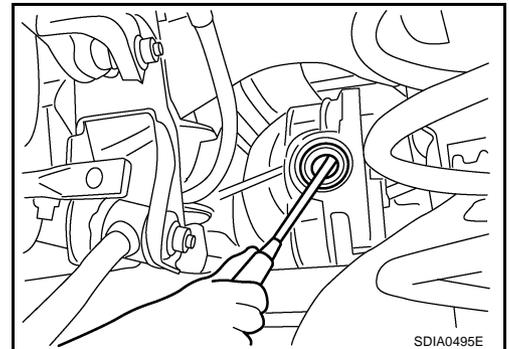
**Tool number A** : KV40104100 ( — )

- d. Using a sliding hammer, pull out the side flange.

**Tool number B** : ST36230000 (J25840-A)



2. Remove oil seal using a flat-bladed screwdriver.



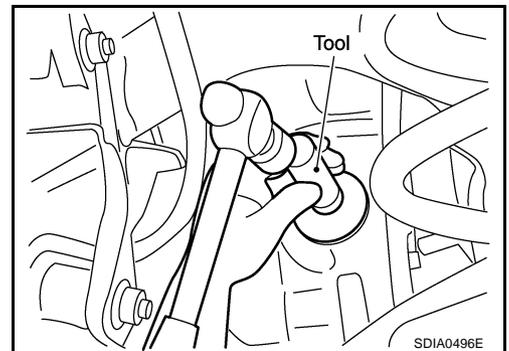
### INSTALLATION

1. Apply multi-purpose grease to sealing lips of side oil seal.
2. Using the drift, press-fit side oil seal so that its surface comes face to face with the end surface of the case.

**Tool number** : KV38100200 (J26233)

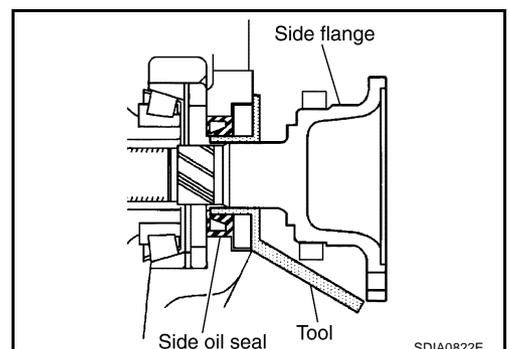
#### CAUTION:

- When installing the oil seal be careful not to get it inclined.
- Discard the old oil seal. Always replace with new one.



3. Install the side flange with the following procedure.
  - a. Attach the protector to side oil seal.

**Tool number** : KV38107900 (J39352)
  - b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.



## SIDE OIL SEAL

- c. Put suitable drift on the center of side flange, then drive it until sound changes.

**NOTE:**

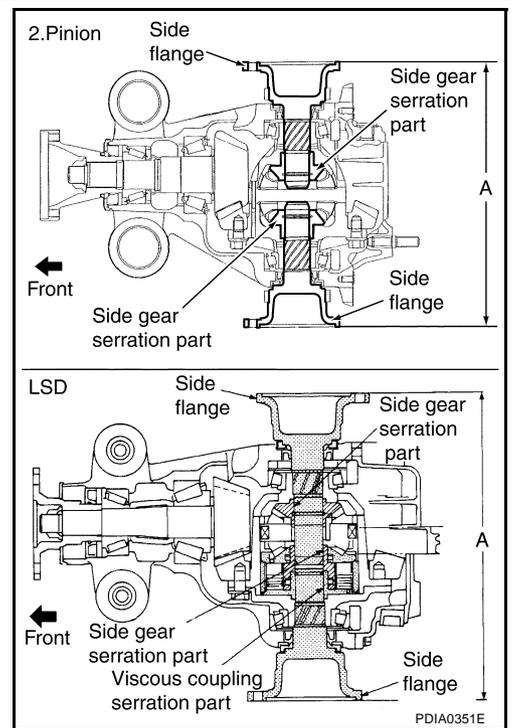
When installation is completed, driving sound of the side flange turns into a sound which seems to affect the whole final drive.

4. Confirm that the dimension of the side flange installation (Measurement A) in the illustration comes into the following.

**Measurement A**

**: Approx. 326 - 328 mm (12.83 - 12.91 in)**

5. Install the drive shaft and axle assembly. Refer to [RAX-6, "WHEEL HUB"](#) , and [RAX-10, "REAR DRIVE SHAFT"](#) .



6. Align the installing position of the wheel sensor. Refer to [BRC-65, "WHEEL SENSOR"](#) .

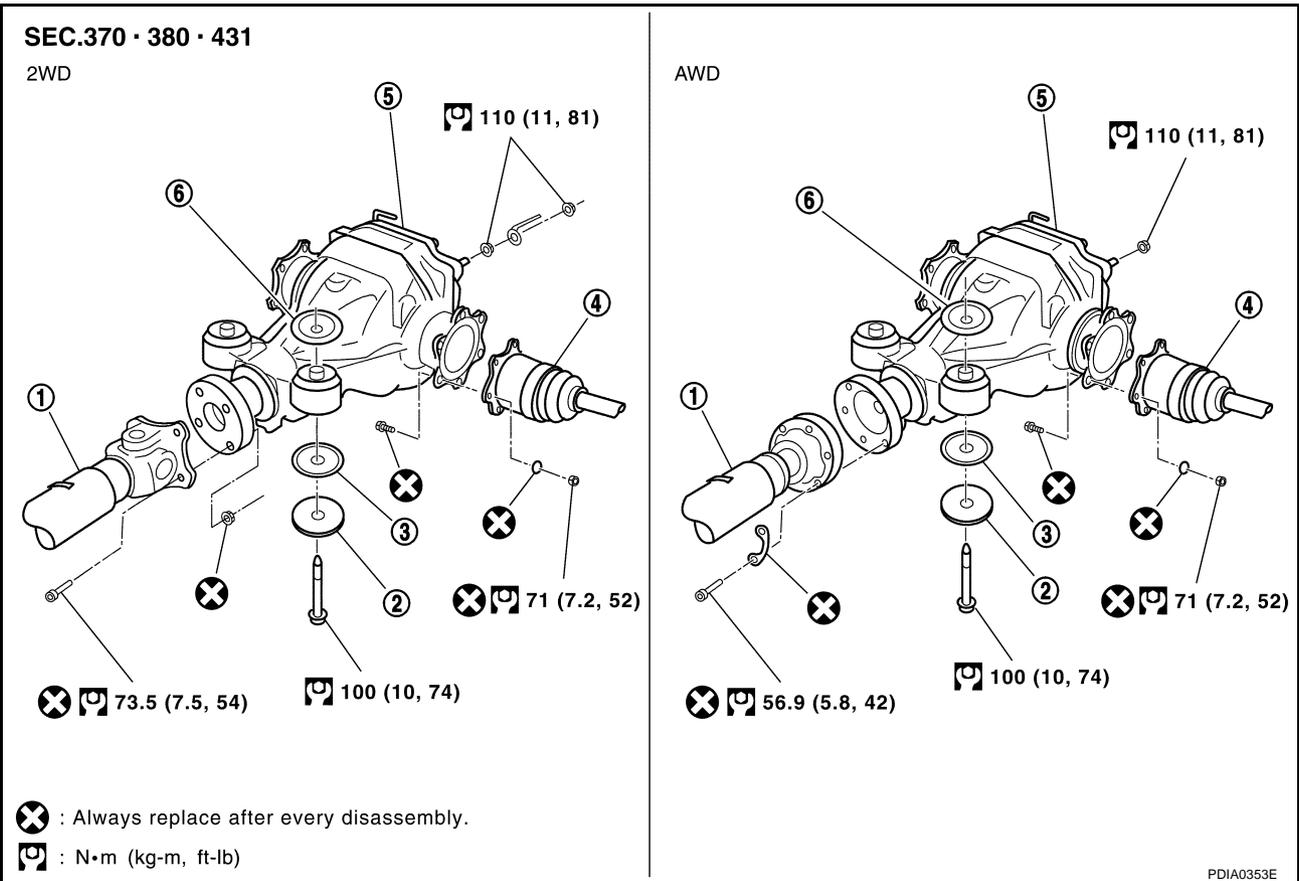
# REAR FINAL DRIVE ASSEMBLY

## REAR FINAL DRIVE ASSEMBLY

PFP:38300

### Removal and Installation

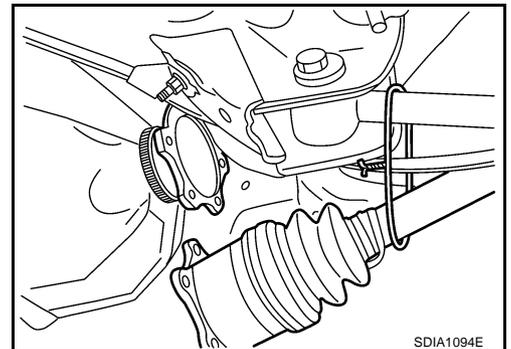
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- |                         |                              |                  |
|-------------------------|------------------------------|------------------|
| 1. Rear propeller shaft | 2. Washer                    | 3. Lower stopper |
| 4. Drive shaft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

### REMOVAL

1. Remove exhaust center tube with power tool. [EX-3, "EXHAUST SYSTEM"](#).
2. Remove rear stabilizer bar with power tool. Refer to [RSU-16, "STABILIZER BAR"](#).
3. Remove rear propeller shaft from the final drive. Refer to [PR-5, "Removal and Installation"](#) (2WD) or [PR-17, "Removal and Installation"](#) (AWD).
4. Remove rear drive shaft from final drive. Then suspend it by wire etc. Refer to [RAX-10, "REAR DRIVE SHAFT"](#).



5. Remove wheel sensor. Refer to [BRC-65, "WHEEL SENSOR"](#).
6. Place a transmission jack on the final drive.  
**CAUTION:**  
**Do not place a transmission jack on the rear cover (aluminum case).**

7. Remove the mounting bolts and nuts connecting to the suspension member, and remove the rear final drive.

## REAR FINAL DRIVE ASSEMBLY

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### INSTALLATION

Install in the reverse order of removal.

**CAUTION:**

After installation, check the final drive oil level. Refer to [MA-24, "Checking Differential Gear Oil"](#) .

# REAR FINAL DRIVE ASSEMBLY

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## Components R200 2-PINION

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: Apply genuine medium strength locking sealant or equivalent. Refer to G1 section.

: N•m (kg-m, ft-lb)

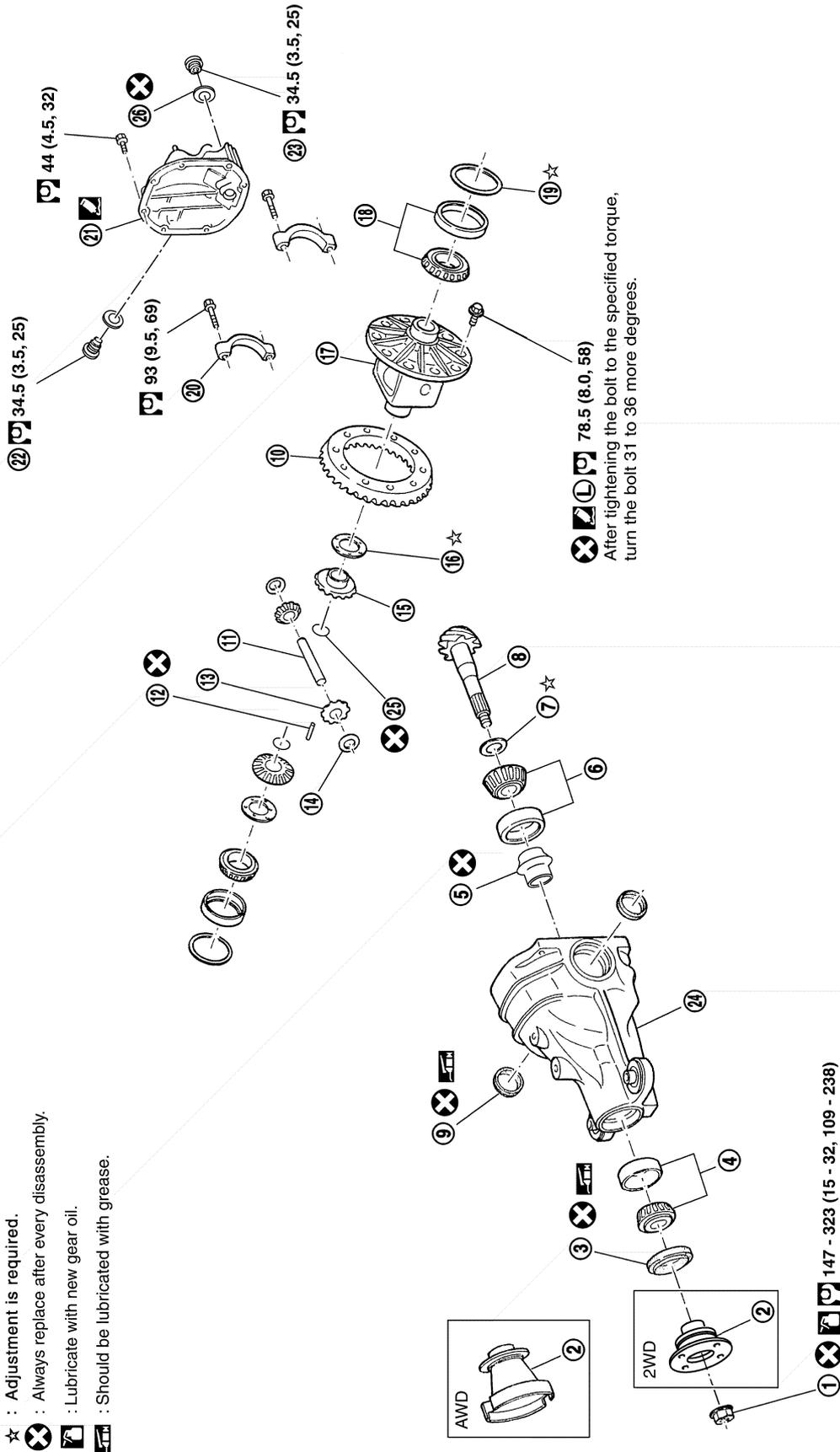
: Apply genuine thread sealant or equivalent. Refer to G1 section.

: Adjustment is required.

: Always replace after every disassembly.

: Lubricate with new gear oil.

: Should be lubricated with grease.



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## REAR FINAL DRIVE ASSEMBLY

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



# REAR FINAL DRIVE ASSEMBLY

- |                                   |   |                                   |
|-----------------------------------|---|-----------------------------------|
| 1. drive pinion lock nut          | 2. Companion flange                                     | 3. Front oil seal                 |
| 4. Pinion front bearing           | 5. Pinion bearing adjusting spacer (Collapsible spacer) | 6. Pinion rear bearing            |
| 7. Pinion height adjusting washer | 8. Drive pinion   | 9. Side oil seal                  |
| 10. Drive gear                    | 11. Pinion mate shaft                                   | 12. Pinion mate gear              |
| 13. Pinion mate thrust washer     | 14. Side gear thrust washer                             | 15. Side gear                     |
| 16. Viscous coupling              | 17. Side gear thrust washer                             | 18. Differential case B           |
| 19. Differential case A           | 20. Side bearing  | 21. Side bearing adjusting washer |
| 22. Bearing cap                   | 23. Rear cover  | 24. Filler plug                   |
| 25. Drain plug                    | 26. Gear carrier  | 27. Circular clip                 |
| 28. Gasket                        |   |                                   |

## Pre-Inspection

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Before disassembling final drive, drain off oil from final drive assembly and remove the rear cover. Then, perform the following inspection.

### TOTAL PRELOAD

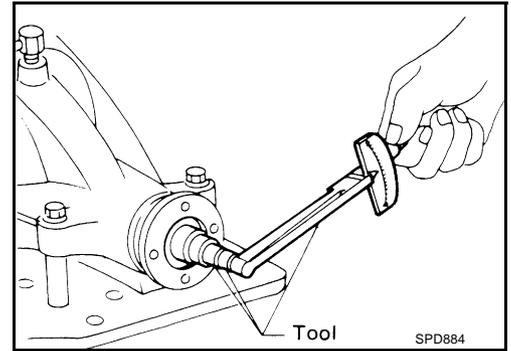
1. Turn drive pinion in both directions several times to set bearing rollers.
2. Check total preload with tool.

#### Tool number

: ST3127S000 (J25765-A)

#### Total preload (With oil seal)

: 2.84 - 3.75 N·m (0.29 - 0.38 kg·m, 26 - 33 in·lb)

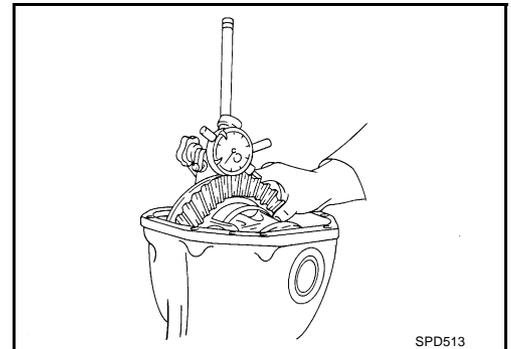


### DRIVE GEAR TO DRIVE PINION BACKLASH

Check drive gear to drive pinion backlash with a dial gauge at several points.

#### Drive gear backlash

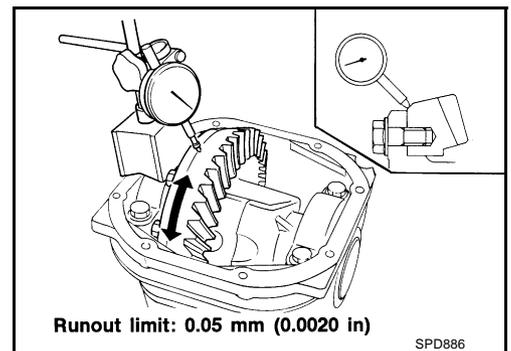
: 0.10 - 0.15 mm (0.0039 - 0.0059 in)



### DRIVE GEAR RUNOUT

Check runout of drive gear with a dial gauge.

Runout limit : 0.05 mm (0.0020 in)



# REAR FINAL DRIVE ASSEMBLY

## COMPANION FLANGE RUNOUT (2WD)

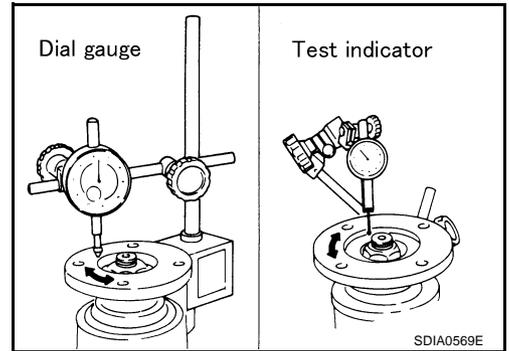
1. Fit a dial gauge onto the companion flange face (inner side of the propeller shaft mounting bolt holes).
2. Rotate the companion flange to check for runout.

**Runout limit : 0.08 mm (0.0031 in)**

3. Fit a test indicator to the inner side of the companion flange (socket diameter).
4. Rotate the companion flange to check for runout.

**Runout limit : 0.08 mm (0.0031 in)**

5. If the runout value is outside the repair limit, follow the procedure below to adjust.
  - a. Check for runout while changing the phase between companion flange and drive pinion gear by 90° step, and search for the point where the runout is the minimum.
  - b. If the runout value is still outside of the limit after the phase has been changed, 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 gear and the electronically controlled coupling, malfunctioning coupling bearing, or malfunctioning electronically controlled coupling.

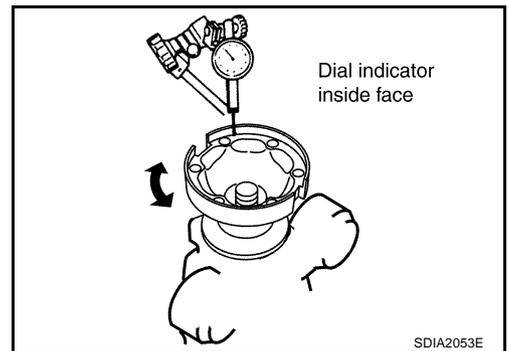


## COMPANION FLANGE RUNOUT (AWD)

1. Fit a test indicator to the inner side of the companion flange (socket diameter).
2. Rotate the companion flange to check for runout.

**Runout limit : 0.08 mm (0.0031 in)**

3. If the runout value is outside the repair limit, follow the procedure below to adjust.
  - a. Check for runout while changing the phase between companion flange and drive pinion gear by 90° step, and search for the point where the runout is the minimum.
  - b. If the runout value is still outside of the limit after the phase has been changed, replace the companion flange.
  - c. If the runout value still outside of the limit after the companion flange has been replaced, check pinion bearing and drive pinion assembly.



## TOOTH CONTACT

Check tooth contact. Refer to [RFD-30, "TOOTH CONTACT"](#) .

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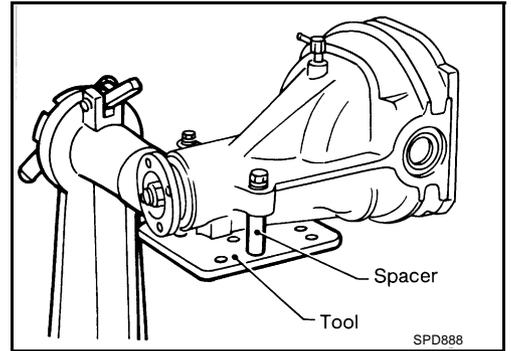
# REAR FINAL DRIVE ASSEMBLY

ADS000F0

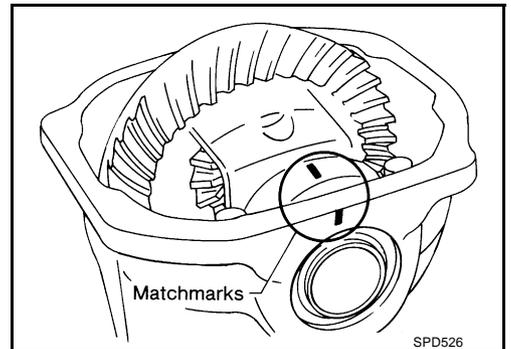
## Disassembly and Assembly REMOVAL OF DIFFERENTIAL CASE ASSEMBLY

1. Using two 45 mm (1.77 in) spacers, mount carrier on tool.

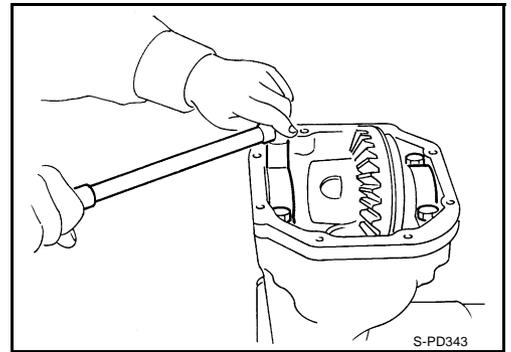
**Tool number : KV38100800 (J25604-01)**



2. For proper reinstallation, paint matchmarks on one side of the bearing cap.  
Bearing caps are line-board during manufacture. Replace them in their proper positions.

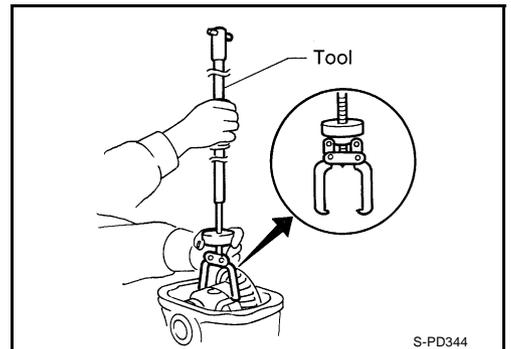


3. Remove bearing caps.



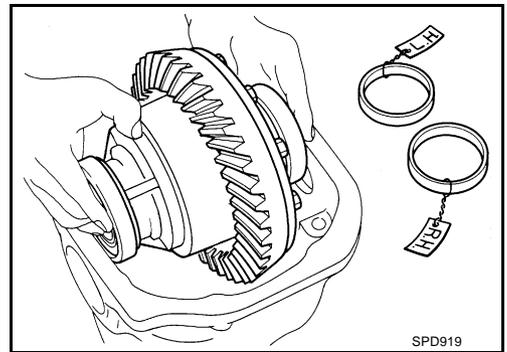
4. Lift differential case assembly out with tool.

**Tool number : HT72400000 ( — )**



## REAR FINAL DRIVE ASSEMBLY

- Keep the side bearing outer races together with inner races. Do not mix them up. Also, keep adjusting washers together with bearings.



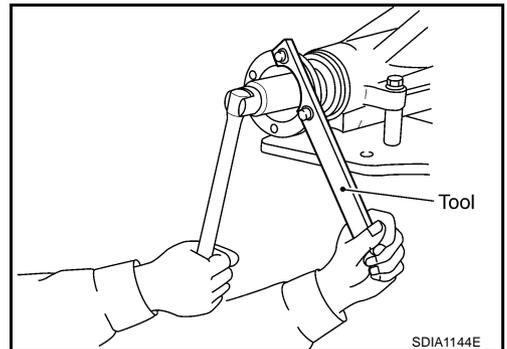
A  
B  
C

RFD

### REMOVAL OF DRIVE PINION ASSEMBLY

1. Put match marks on companion flange and drive pinion with paint.
2. Loosen drive pinion lock nut with tool.

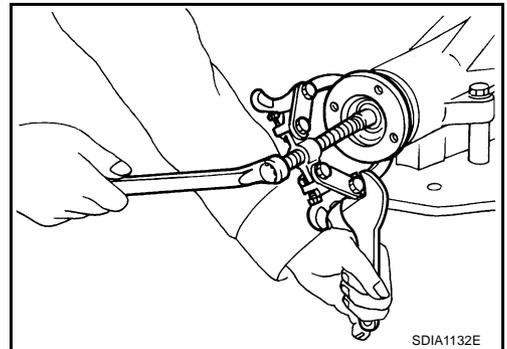
**Tool number** : KV40104000 ( — )



E  
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G

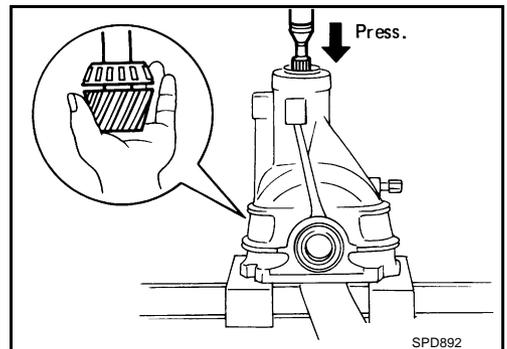
3. Using the puller remove companion flange.

**Tool number** : Commercial service tool



H  
I  
J  
K

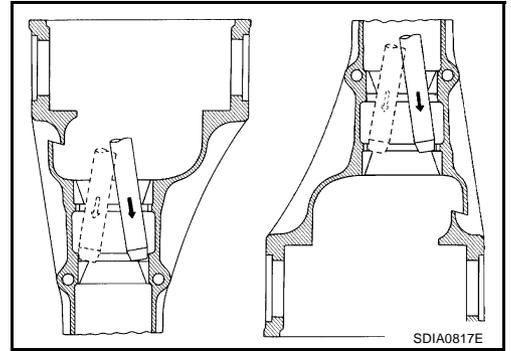
4. Take out drive pinion (together with rear bearing inner race, bearing adjusting spacer).
5. Remove front oil seal. Refer to [RFD-7, "FRONT OIL SEAL"](#)
6. Remove pinion front bearing inner race.
7. Remove side oil seal. Refer to [RFD-9, "SIDE OIL SEAL"](#)



L  
M

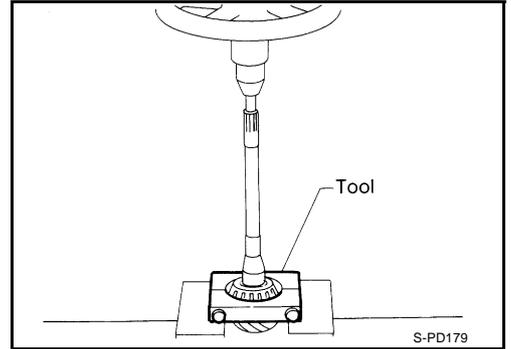
# REAR FINAL DRIVE ASSEMBLY

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



9. Remove pinion rear bearing inner race and drive pinion height adjusting washer with tool.

**Tool number:** : ST30031000 (J22912-01)



## DISASSEMBLY OF DIFFERENTIAL CASE ASSEMBLY (R200 2-PINION)

1. Remove side bearing inner races.

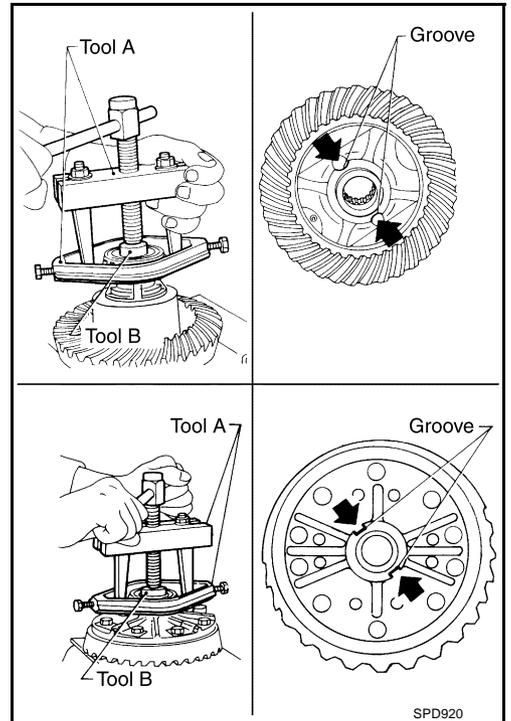
- To prevent damage to bearing, engage puller jaws in groove.

**Tool number** : A ST33051001 (J22888-20)

: B ST33061000 (J8107-2)

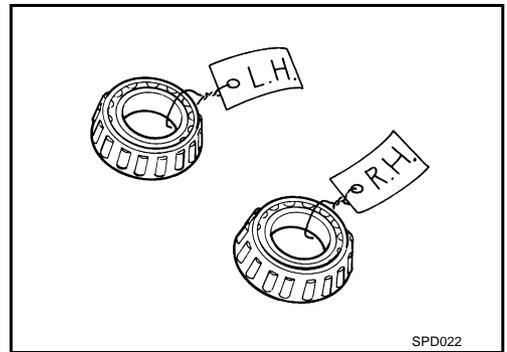
### CAUTION:

- To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.
- It is not necessary to remove side bearing except it is replaced.



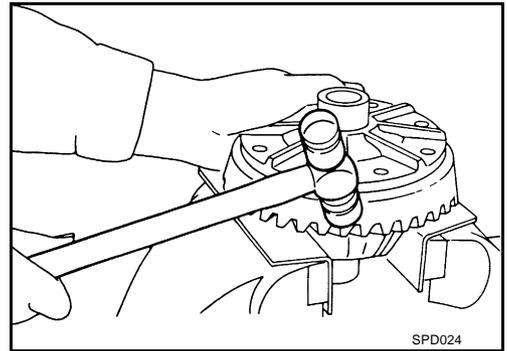
# REAR FINAL DRIVE ASSEMBLY

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



A  
B  
C

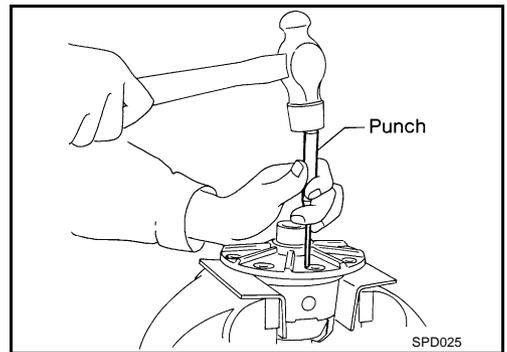
2. Loosen drive gear bolts in a criss-cross fashion.
3. Tap drive gear off the differential case with a soft hammer. Tap evenly all around to keep drive gear from binding.



RFD

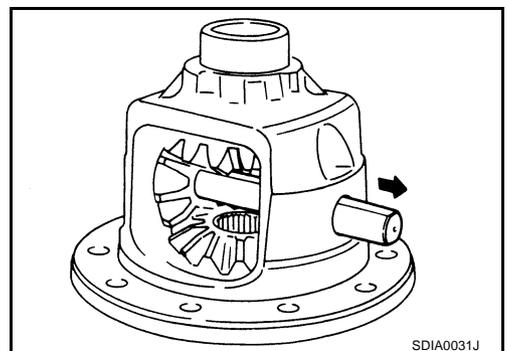
E  
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G

4. Drive out pinion mate shaft lock pin with punch from drive gear side.



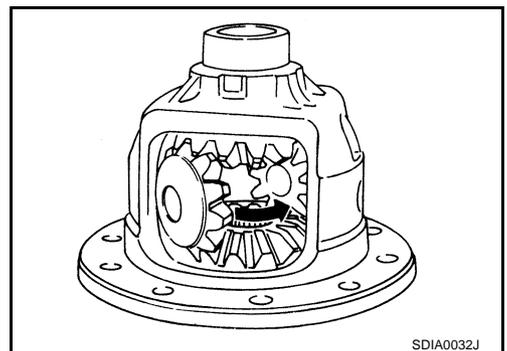
H  
I  
J

5. Remove the pinion mate shaft.



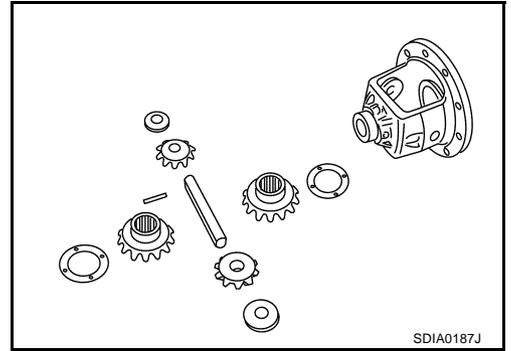
K  
L  
M

6. 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.



# REAR FINAL DRIVE ASSEMBLY

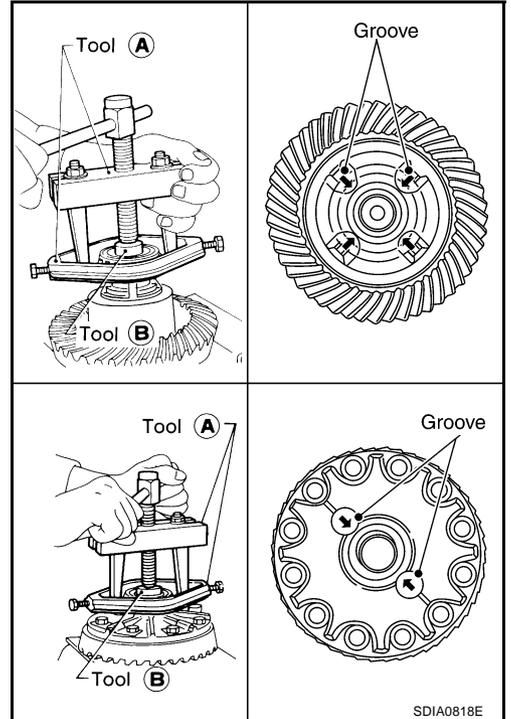
7. Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft and thrust washers.



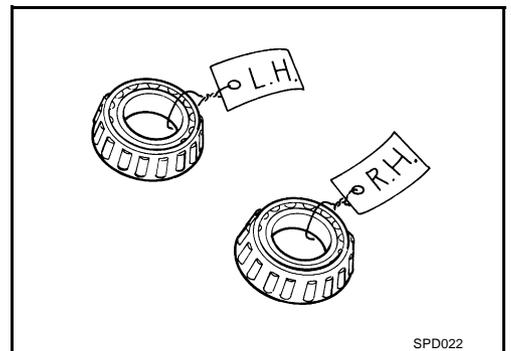
## DISASSEMBLY OF DIFFERENTIAL CASE ASSEMBLY (R200V)

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

**Tool number** : A ST3305S001 ( — )  
: B ST33061000 (J8107-2)

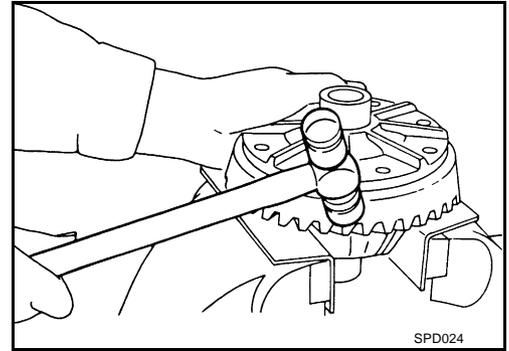


- Be careful not to confuse left- and right-hand parts.

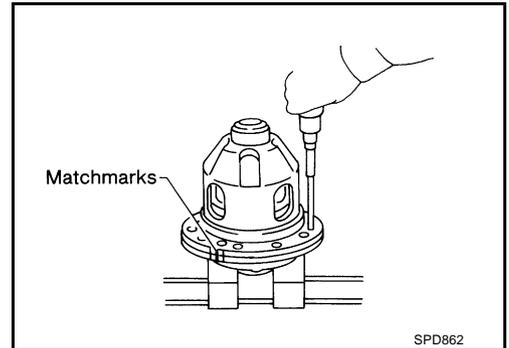


# REAR FINAL DRIVE ASSEMBLY

2. Loosen drive gear bolts in a criss-cross fashion.
3. Tap ring gear off the differential case with a soft hammer.
  - Tap evenly all around to keep drive gear from binding.



4. Put matchmarks with paint
5. Loosen screws on differential cases A and B.
6. Separate differential cases A and B.



## INSPECTION

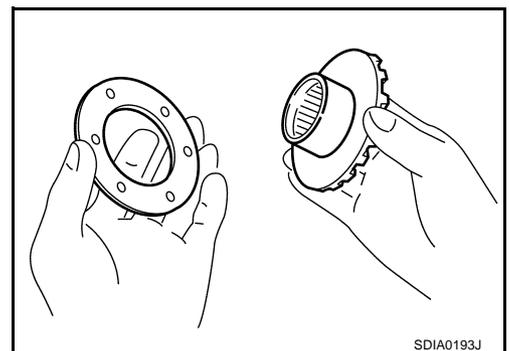
Clean up the disassembled parts. Then, inspect the parts for wear and damage. If the parts are worn or damaged, follow the measures below.

Content	Measures
Hypoid gear	<ul style="list-style-type: none"> <li>● If the gear teeth do not mesh or line-up correctly, determine the cause and adjust, repair, or replace as necessary.</li> <li>● If the gear are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with a new gears.</li> </ul>
Bearing	<ul style="list-style-type: none"> <li>● If found any chipped (by friction), pitted, worn, rusted, scratched mark, or unusual noise from the Bearing, replace with a new bearing ASSY (as a new set).</li> </ul>
Side gear thrust washer and Pinion mate thrust washer	<ul style="list-style-type: none"> <li>● Replace with a new one if found any cracks or damage on the surface of the tooth.</li> <li>● Replace with a new one if found any worn or chipped mark on the contact sides of the thrust washer.</li> </ul>
Side gear and Pinion mate thrust washer	<ul style="list-style-type: none"> <li>● Replace with a new one if found that it is chipped (by friction), damaged, or unusual worn.</li> </ul>
Oil seal	<ul style="list-style-type: none"> <li>● Oil seals must be replaced with a new one whenever disassembled.</li> </ul>
Differential case	<ul style="list-style-type: none"> <li>● Replace with a new one if found any wear or cracks on the contact sides of the Differential case.</li> </ul>
Companion flange	<ul style="list-style-type: none"> <li>● Replace with a new one if found any chipped marks (about 0.10mm, 0.0039in) or other damage on the contact sides of the Lips of the Companion flange.</li> </ul>

## ADJUSTMENT OF DIFFERENTIAL CASE (R200 2-PINION)

### Thrust Washer Selection

1. Apply gear oil to contact surfaces of each gear, thrust washers and differential case.
2. Install the removed thrust washer or same thickness washer to side gear.



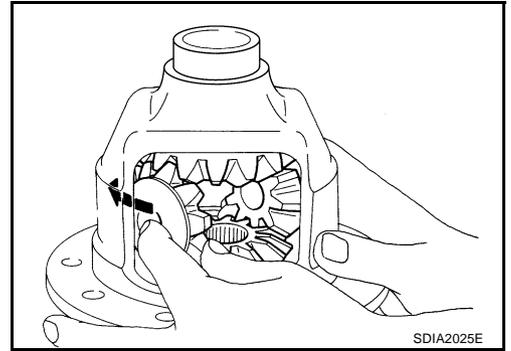
A  
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# REAR FINAL DRIVE ASSEMBLY

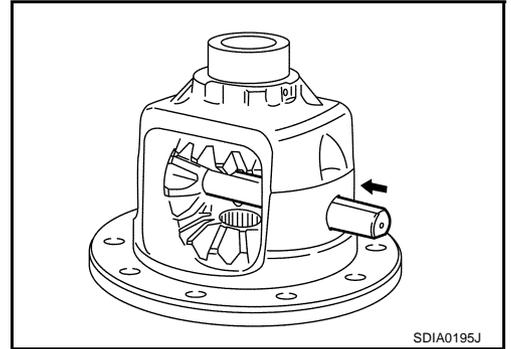
3. Install the side gears, thrust washers, pinion mate gears, thrust washers into differential case.

**CAUTION:**

**Install the circlip equipped side gear to the side retainer side.**



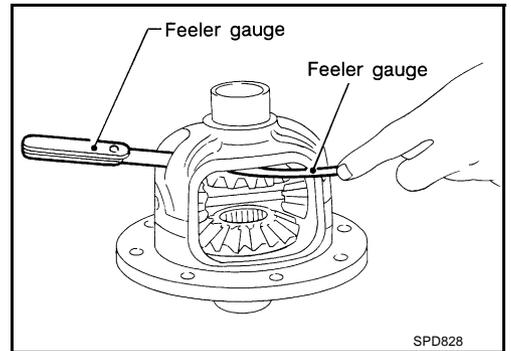
4. Fit pinion mate shaft to differential case so that it meets lock pin holes.



5. Adjust clearance between rear face of side gear and thrust washer by selecting side gear thrust washer. Refer to [RFD-38, "AVAILABLE PINION HEIGHT ADJUSTING WASHERS"](#). Use two feeler gauges to prevent leaning of side gear as showing figure.

**Clearance between side gear thrust washer and differential case**

**: 0.20 mm (0.0079 in) or less**

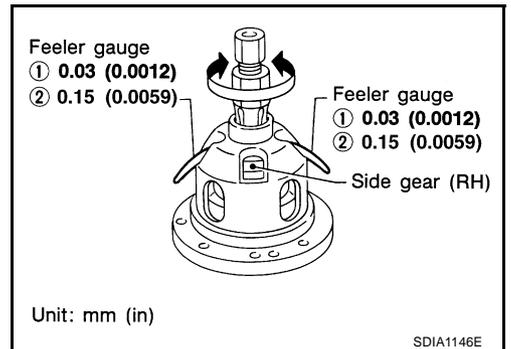


## ADJUSTMENT OF DIFFERENTIAL CASE (R200V)

### Side Gear Thrust Washer Selection

Whenever side gears or pinion mate gears are replaced, select suitable thrust washers as follows:

1. Clean side gears and pinion mate gears using white gasoline.
2. Before assembling gears, apply hypoid gear oil to frictional surfaces.
3. Install the previously removed thrust washer on right side gear. On left side gear, install a suitable thrust washer. Temporarily tighten differential cases using two screws.
4. Position differential assembly so that right side gear is on the upper side. Place feeler gauge of 0.03 mm (0.0012 in) thickness between right side gear and thrust washer as shown.
  - Do not place feeler gauge at groove side of differential case.
5. Also place a 0.03 mm (0.0012 in) additional feeler gauge between right side gear and thrust washer so that it is positioned diagonal to (180° apart from) the feeler gauge described previously.
6. Rotate right side gear with a suitable tool attached to splines. If hard to rotate, replace thrust washer on left side gear with a thinner one.
7. Replace both 0.03 mm (0.0012 in) feeler gauges with 0.15 mm (0.0059 in) gauges. At this point, make sure right side gear does not rotate. If it rotates, replace thrust washer on left side gear with a thicker one to prevent rotation.



# REAR FINAL DRIVE ASSEMBLY

8. As explained in above example, select suitable thrust washers to ensure that:
  - a. Both side gears rotate. [0.03 mm (0.0012 in) feeler gauges are used in this case.]
  - b. Side gear is held stationary. [0.15 mm (0.0059 in) feeler gauges are used in this case.]

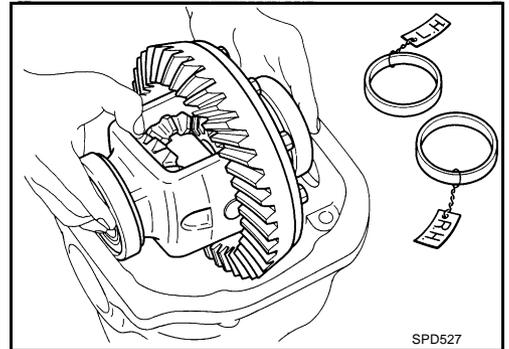
For quiet and reliable final drive operation, the following five adjustments must be made correctly.

1. Side bearing preload
2. Pinion gear height
3. Pinion bearing preload
4. Drive gear to pinion backlash.
5. Drive and pinion gear tooth contact pattern

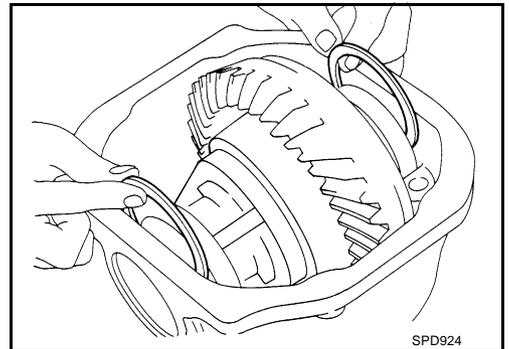
## SIDE BEARING PRELOAD

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

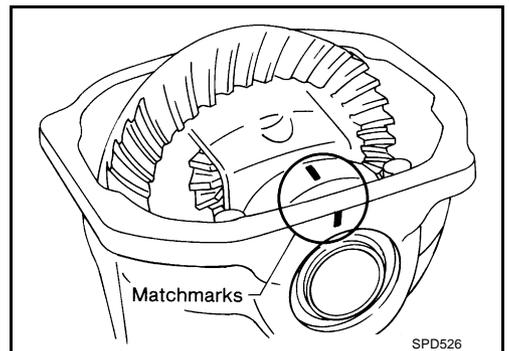
1. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.



3. Insert left and right side bearing adjusting washer in place between side bearings and carrier.



4. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts. Refer to [RFD-13, "R200 2-PINION"](#) or [RFD-15, "R200V VISCOUS"](#).
5. Turn the carrier several times to seat the bearings.



A  
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RFD

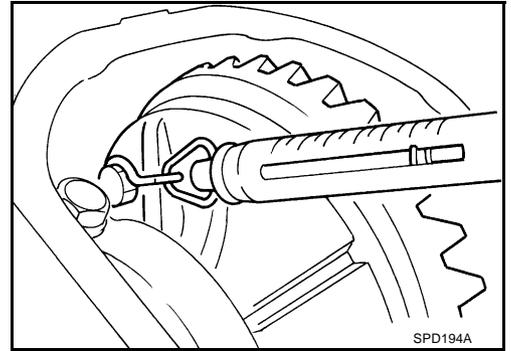
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# REAR FINAL DRIVE ASSEMBLY

6. Measure the turning torque of the carrier at the drive gear retaining bolts with a spring gauge, J8129.

### Specification

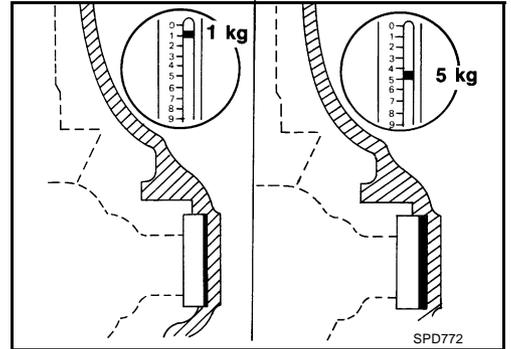
**: 34.2 - 39.2 N·m (3.5 - 4 kg, 7.7 - 8.8 lb)  
of pulling force at the drive gear bolt**



7. If the turning torque is not within the specifications, correct the torque as follows:

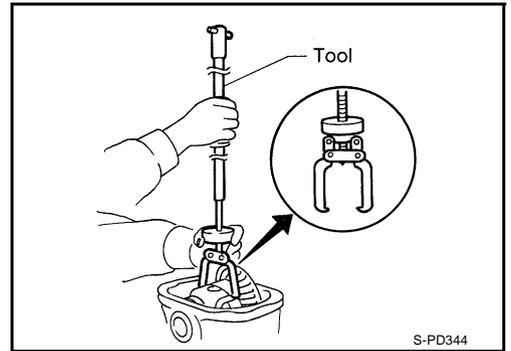
- If the turning torque is less than the specified range, install washers of greater thickness.
- If the turning torque is greater than the specification, install thinner washers.
- See the SDS section for washer dimensions and part numbers.

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



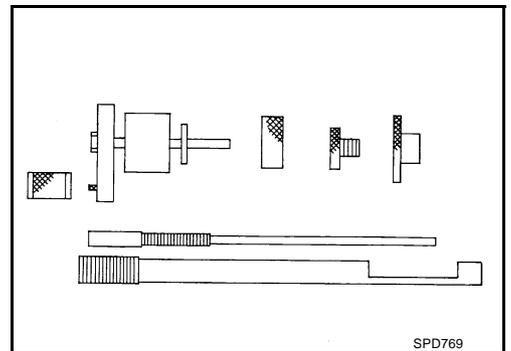
9. Remove the carrier from the final drive housing. Save the selected washers for later use during the assembly of the final drive unit.

**Tool number : HT72400000 ( — )**



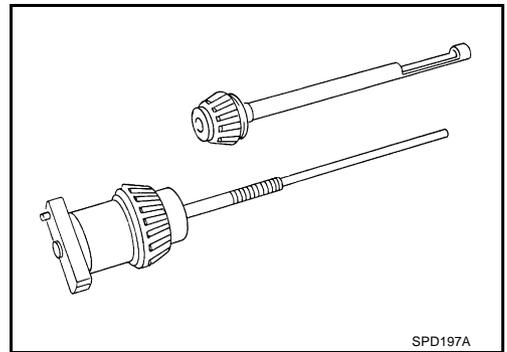
## PINION GEAR HEIGHT

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion bearings into the differential shim selection tool, J34309.

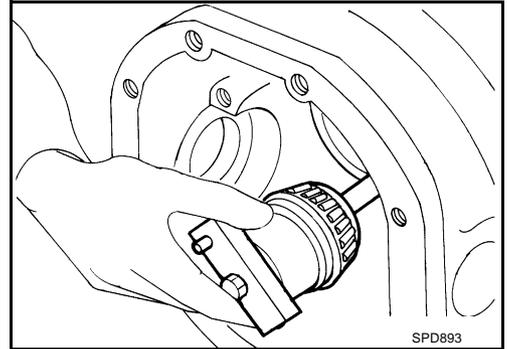


## REAR FINAL DRIVE ASSEMBLY

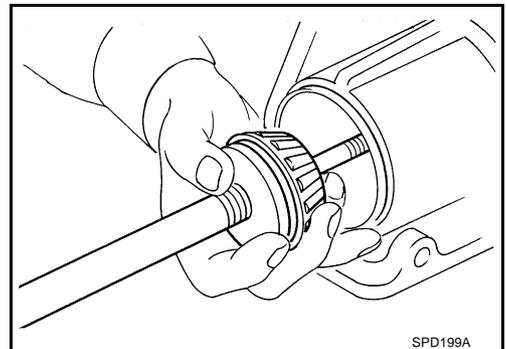
- Pinion front bearing; make sure the J34309-3 pinion front bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the pinion front bearing pilot, J34309-5, to secure the bearing in its proper position.
- Rear pinion bearing; the pinion rear bearing pilot, J34309-8, is used to center the pinion rear bearing only. The pinion rear bearing locking seat, J34309-4, is used to lock the bearing to the assembly.
- Installation of J34309-9 and J34309-16; place a suitable 2.5 mm (0.098 in) thick plain washer between J34309-9 and J34309-16. Both surfaces of J34309-9 and J34309-16 must be parallel with a clearance of 2.5 mm (0.098 in).



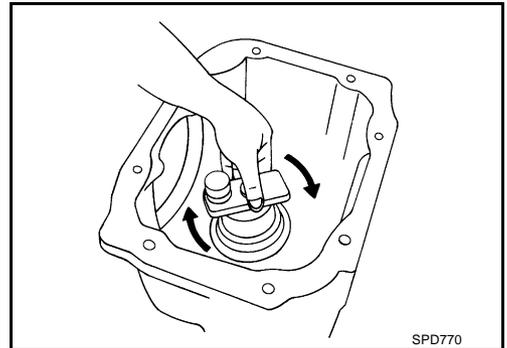
3. Install the pinion rear bearing inner race into the final drive housing. Then place the pinion preload shim selector tool, J34309-1, gauge screw assembly.



4. Assemble the front pinion bearing inner race 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.



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



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B  
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RFD

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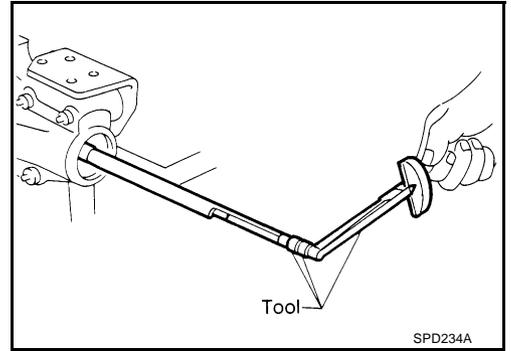
## REAR FINAL DRIVE ASSEMBLY

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

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

**Turning torque specification**

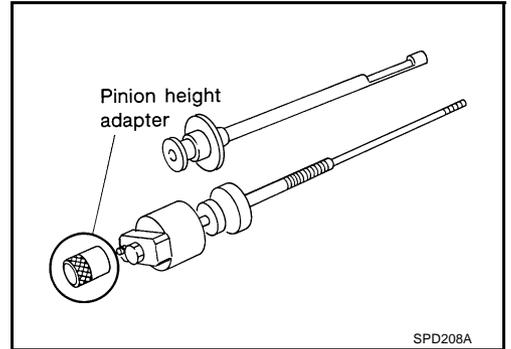
**: 1.0 - 1.3 N·m (0.11 - 0.13 kg·m, 9 - 11 in·lb)**



7. Place the J34309-11 "R200A" pinion height adapter onto the gauge plate and tighten it by hand.

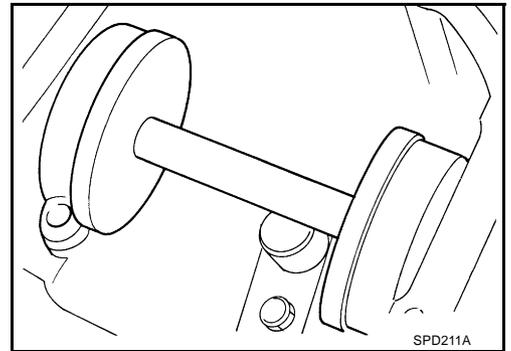
**CAUTION:**

**Make sure all machined surfaces are clean.**

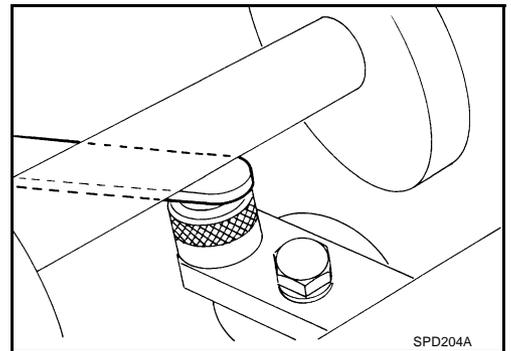


### Pinion Height Adjusting Washer Selection

1. Now, position the side bearing discs, J25269-4, and arbor firmly into the side bearing bores. Install the bearing caps and tighten the cap bolts to proper torque.

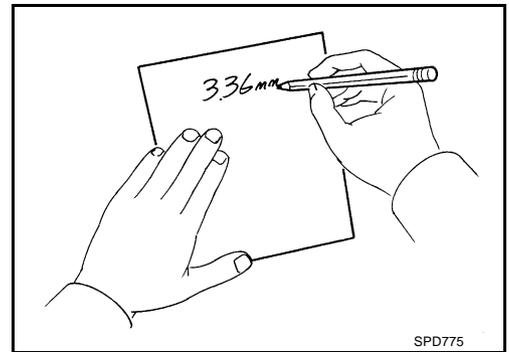


2. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and your J34309-101 feeler gauge. Measure the distance between the J34309-11 pinion height adapter including the standard gauge and the arbor.

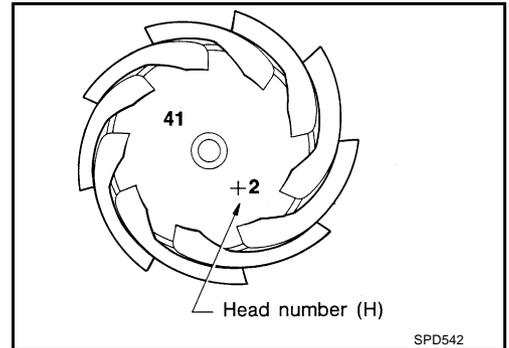


# REAR FINAL DRIVE ASSEMBLY

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



4. Correct the pinion height washer size by referring to the “pinion head number”.

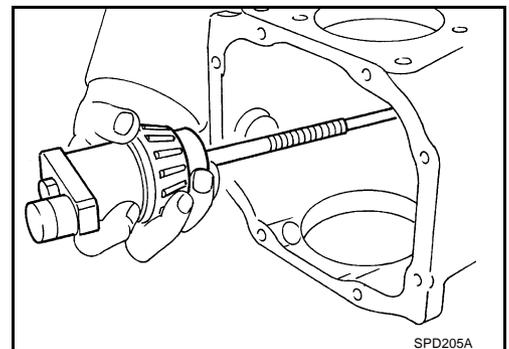


There are two numbers painted on the drive pinion gear. The first one refers to the drive pinion and drive gear as a matched set. This number should be the same as the number on the drive gear. The second number is the “pinion head height number”. It refers to the ideal pinion height from standard for 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 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)

5. Select the correct pinion height washer as follows. Refer to [RFD-38, "AVAILABLE PINION HEIGHT ADJUSTING WASHERS"](#).

6. Remove the J34309 pinion differential shim selection tool from the final drive housing. Then disassemble to retrieve the pinion bearings.



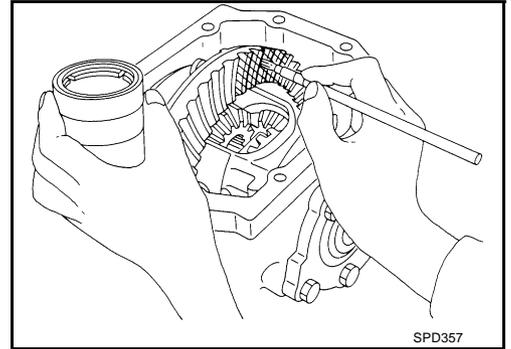
# REAR FINAL DRIVE ASSEMBLY

## TOOTH CONTACT

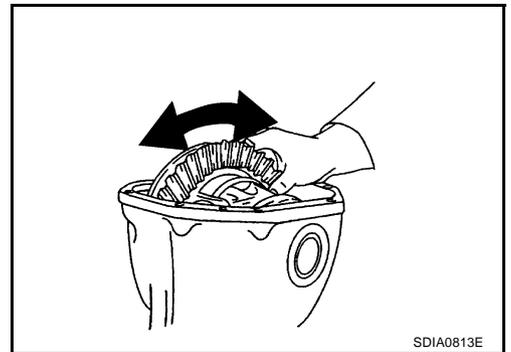
Checking gear tooth contact pattern is necessary to verify correct relationship between drive gear and drive pinion.

Hypoid gears which are not positioned in proper arrangement may be noisy and/or have a short life. Check gear tooth contact pattern to obtain the best contact for low noise and long life.

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

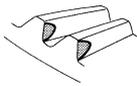


3. Hold companion flange steady by hand and rotate the drive gear in both directions.



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.

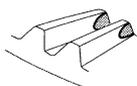
Heel contact



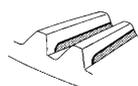
Face contact



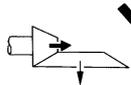
Toe contact



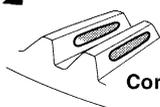
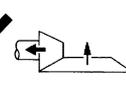
Flank contact



To correct, increase thickness of pinion height adjusting washer in order to bring drive pinion close to Drive gear.



To correct, reduce thickness of pinion height adjusting washer in order to make drive pinion go away from Drive gear.



Correct tooth contact

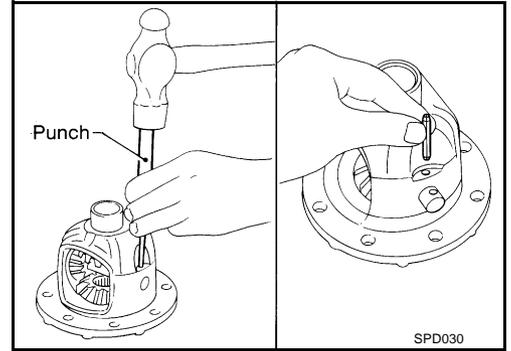
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SDIA1910E

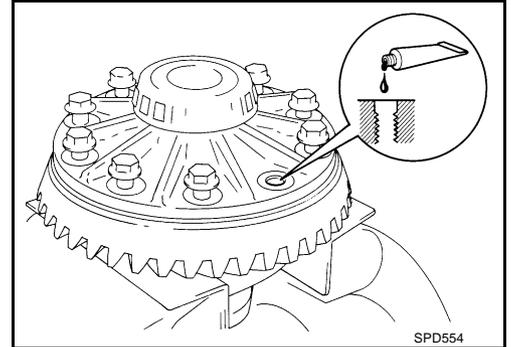
# REAR FINAL DRIVE ASSEMBLY

## ASSEMBLY OF DIFFERENTIAL CASE ASSEMBLY (R200 2-PINION)

1. Install pinion mate shaft lock pin with a punch.  
Make sure lock pin is flush with case.

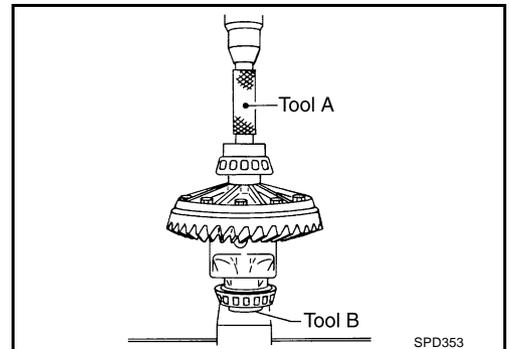


2. Place differential case on drive gear.
3. Apply genuine medium strength locking sealant or equivalent. Refer to [GI-46, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) to drive gear bolts, and install them.
  - Tighten bolts in a criss-cross fashion.
  - After tightening the bolt to the specified torque, turn the bolt 31 to 36 more degrees.



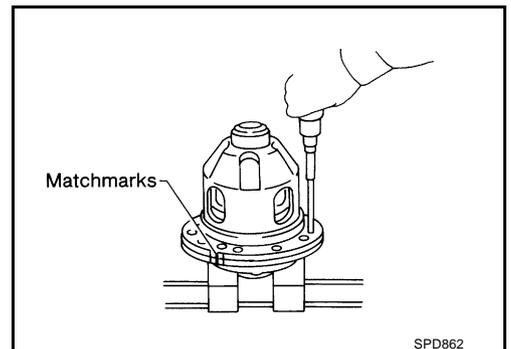
4. Press-fit side bearing inner races on differential case with tool.

**Tool number** : A KV38100300 (J25523)  
: B ST33061000 (J8107-2)



## ASSEMBLY OF DIFFERENTIAL CASE ASSEMBLY (R200V)

1. Install differential cases A and B. Refer to [RFD-13, "R200 2-PINION"](#) or [RFD-15, "R200V VISCOUS"](#).



A  
B  
C

RFD

E  
F  
G

H

I

J

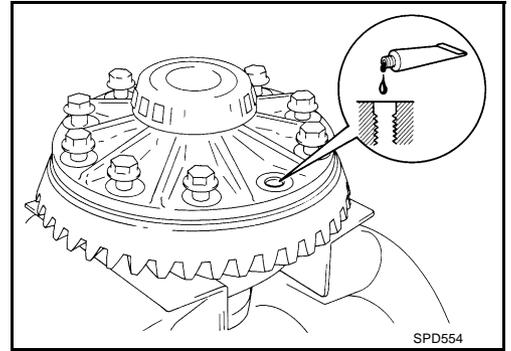
K

L

M

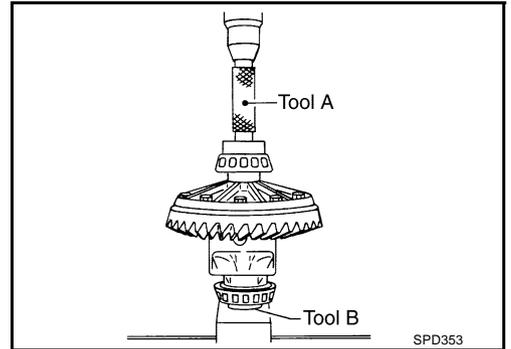
## REAR FINAL DRIVE ASSEMBLY

- Place differential case on drive gear.
- Apply genuine medium strength locking sealant or equivalent. Refer to [GI-46, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) to drive gear bolts, and install them.
- Tighten bolts in a criss-cross fashion.
- After tightening the bolt to the specified torque, turn the bolt 31 to 36 more degrees.



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

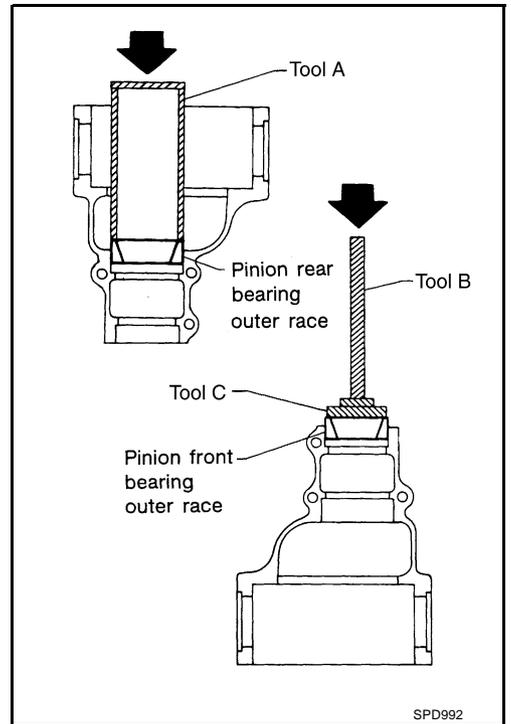
**Tool number** : A KV38100300 (J25523)  
: B ST33061000 (J8107-2)



### INSTALLATION OF DRIVE PINION ASSEMBLY

- Press-fit pinion front and rear bearing outer races with tools.

**Tool number** : A Suitable tool  
: B ST30611000 (J25742-1)  
: C ST30613000 (J25742-3)

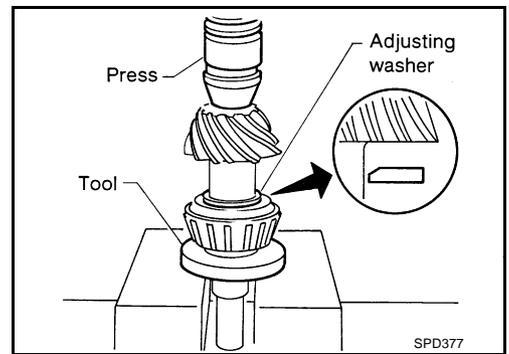


- Select pinion height adjusting washer. Refer to [RFD-28, "Pinion Height Adjusting Washer Selection"](#).

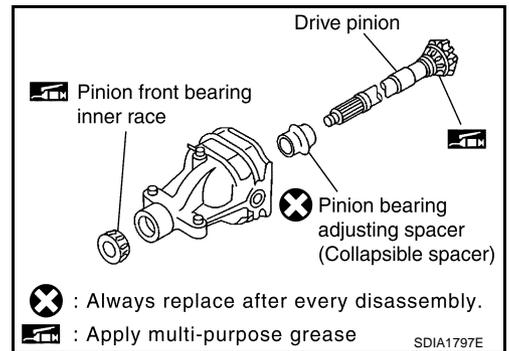
## REAR FINAL DRIVE ASSEMBLY

3. Install selected pinion height adjusting washer in drive pinion. Using press and tool, press-fit pinion rear bearing inner race into it.

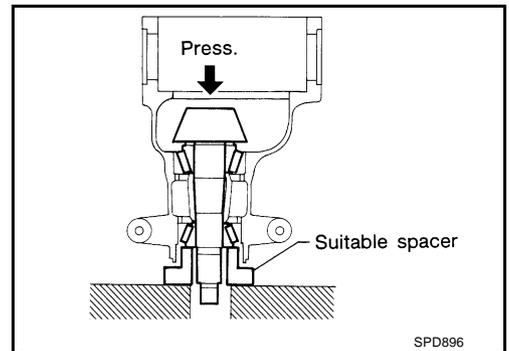
Tool number : ST30901000 ( — )



4. Apply multi-purpose grease to pinion rear bearing inner race and pinion front bearing inner race.



5. Set drive pinion assembly (as shown in figure) in differential carrier and install drive pinion, with press and suitable tool. Stop when drive pinion touches bearing.



6. Install front oil seal with tool.

Tool number : ST30720000 (J25405)

**CAUTION:**

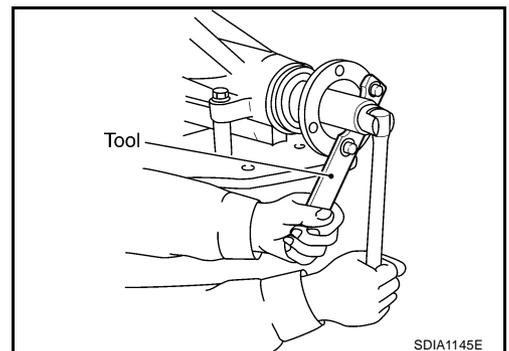
- When installing the oil seal, be careful not to get it inclined.
- Discard the old oil seal. Always replace with new one.

7. Install companion flange, and tighten pinion nut to minimum. Ascertain that threaded portion of drive pinion and drive pinion lock nut are free from oil or grease.

Tool number : KV40104000 ( — )

**CAUTION:**

The drive pinion lock nut is not reusable. Never reuse drive pinion lock nut.



## REAR FINAL DRIVE ASSEMBLY

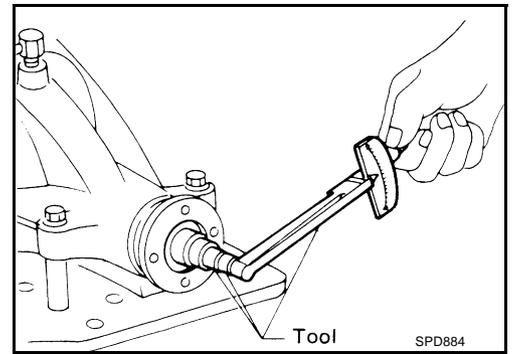
8. Tighten the drive pinion lock nut by very small degrees until the specified preload is achieved, when checking the preload, turn drive pinion in both directions several times.

**Tool number**

**: ST3127S000 (J25765-A)**

**Pinion bearing preload**

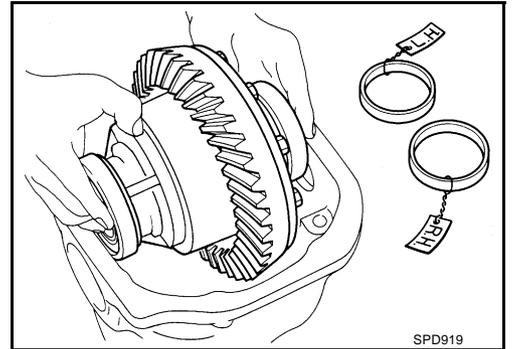
**: 2.65 - 3.23 N-m (0.27 - 0.32 kg-m, 24 - 28 in-lb)**



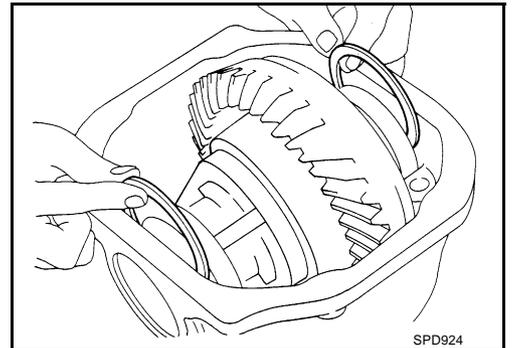
- If pinion bearing preload is too small, tighten the drive pinion lock nut more.
- If pinion bearing preload is too great, replace pinion bearing adjusting spacer.

### INSTALLATION OF DIFFERENTIAL CASE ASSEMBLY

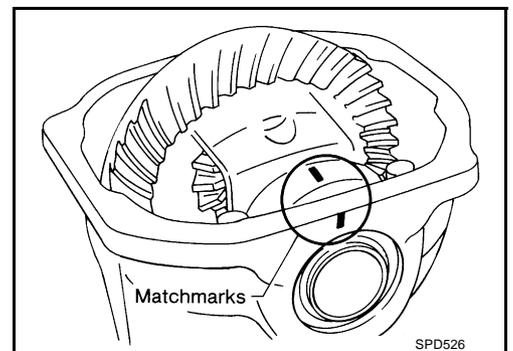
1. Select side bearing adjusting washer. Refer to [RFD-25, "SIDE BEARING PRELOAD"](#).
2. Install differential case assembly with side bearing outer races into gear carrier.



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



4. Align mark on bearing cap with that on gear carrier.
5. Install the side bearing cap. Refer to [RFD-13, "R200 2-PIN-ION"](#) or [RFD-15, "R200V VISCOUS"](#).



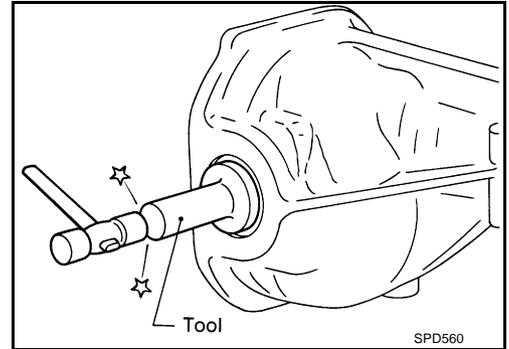
## REAR FINAL DRIVE ASSEMBLY

6. Install side oil seal with tool.

**Tool number : KV38100200 (J26233)**

**CAUTION:**

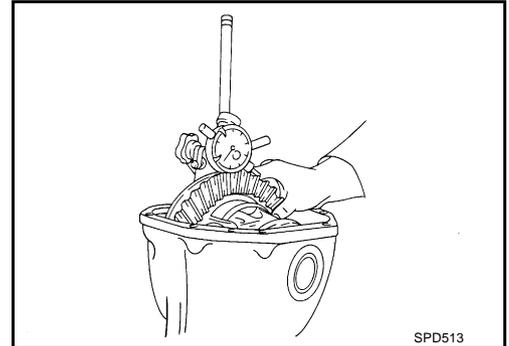
- When installing the oil seal, be careful not to get it inclined.
- Discard the old oil seal. Always replace with new one.



7. Measure drive gear-to-drive pinion backlash with a dial gauge at several point.

**Drive gear backlash**

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



- If backlash is too small, adjustment of washer thickness is required. Decrease thickness of left shim and increase thickness of right by the same amount. If backlash is too great, reverse the above procedure.
- Never change the total amount of washers as it will change the bearing preload.

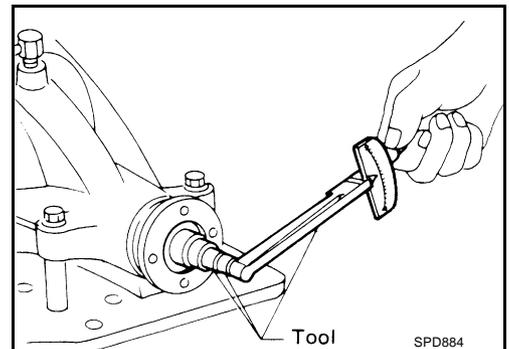
8. Check total preload with tool.

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

When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.

**Total preload**

**: 2.84 - 3.75 N·m (0.29 - 0.38 kg-m, 26 - 33 in-lb)**



- if preload is too great, remove the same amount of washer to each side.
  - if preload is too small, add the same amount of washer to each side. Never add or remove a different number of washer for each side. Difference in number of washers will change drive gear to drive pinion backlash.
9. Recheck drive gear to drive pinion backlash. Increase or decrease in thickness of shims will cause change to drive gear to pinion backlash.
- Check whether the backlash varies excessively in different places. Foreign matter may be caught between the drive gear and the differential case causing the trouble.
  - The backlash can vary greatly even when the drive gear runout is within a specified range. In that case, replace the hypoid gear set or differential case.

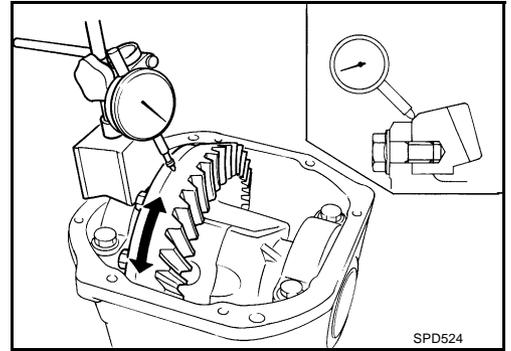
## REAR FINAL DRIVE ASSEMBLY

10. Check runout of drive gear with a dial gauge.

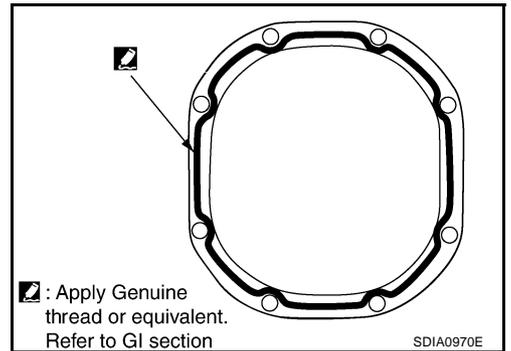
**Runout limit : 0.05 mm (0.0020 in)**

11. Check tooth contact.

Refer to [RFD-30, "TOOTH CONTACT"](#).



12. Install rear cover. Apply liquid sealant to rear cover side and install gear carrier.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PPF:00030

### General Specifications

ADS000DG

#### 2WD MODEL

Applied model	VQ35DE engine	
	A / T	M/T
Final drive model	R200 (2-pinion)	R200V (LSD)
Gear ratio	3.357	3.538
Number of teeth (Drive gear / drive pinion)	47 / 14	46/13
Oil capacity (Approx.)	1.4 liter (3 US pt, 2 - 1/2 Imp pt)	

#### AWD MODEL

Applied model	VQ35DE engine	
	A / T	
Final drive model	R200 (2 - pinion)	
Gear ratio	3.357	
Number of teeth (Drive gear / drive pinion)	47 / 14	
Oil capacity (Approx.)	1.4 liter (3 US pt, 2 - 1/2 Imp pt)	

#### Drive Gear Runout

ADS000DH

Unit: mm (in)

Type	R200, R200V
Drive gear runout limit	0.05 (0.0020)

#### Side Gear Adjustment

ADS000DI

Unit: mm (in)

Type	R200	R200V
Clearance limit between side gear and differential case mm (in)	0.20 (0.0079) or less	0.15 (0.0059)

# SERVICE DATA AND SPECIFICATIONS (SDS)

## AVAILABLE SIDE GEAR THRUST WASHERS

Unit: mm (in)

Type	R200		R200V	
	Thickness	Part number	Thickness	Part number
Thrust washer	0.75 (0.0295)	38424 0C000	0.80 (0.0315)	38424 40F60
	0.78 (0.0307)	38424 0C001	0.83 (0.0327)	38424 40F61
	0.81 (0.0319)	38424 0C002	0.86 (0.0339)	38424 40F62
	0.84 (0.0331)	38424 0C003	0.89 (0.0350)	38424 40F63
	0.87 (0.0343)	38424 0C004	0.92 (0.0362)	38424 40F64
	0.90 (0.0350)	38424 0C005	0.95 (0.0374)	38424 40F65
	0.93 (0.0366)	38424 0C006	0.98 (0.0386)	38424 40F66
			1.07 (0.0421)	38424 40F69
			1.10 (0.0433)	38424 40F70
			1.13 (0.0445)	38424 40F71
			1.16 (0.0457)	38424 40F72
			1.19 (0.0469)	38424 40F73
			1.22 (0.0480)	38424 40F74
			1.25 (0.0492)	38424 40F75
			1.28 (0.0504)	38424 40F76
			1.31 (0.0516)	38424 40F77
			1.34 (0.0528)	38424 40F78
			1.37 (0.0539)	38424 40F79
		1.40 (0.0551)	38424 40F80	
		1.43 (0.0563)	38424 40F81	
		1.46 (0.0575)	38424 40F82	
		1.49 (0.0587)	38424 40F83	

## Drive Pinion Height Adjustment AVAILABLE PINION HEIGHT ADJUSTING WASHERS

ADS000DJ

Unit: mm (in)

Type	R200, R200V	
	Thickness	Part number
Adjusting washer	3.05 (0.1201)	38154 0C000
	3.08 (0.1213)	38154 0C001
	3.11 (0.1224)	38154 0C002
	3.14 (0.1236)	38154 0C003
	3.17 (0.1248)	38154 0C004
	3.20 (0.1260)	38154 0C005
	3.23 (0.1272)	38154 0C006
	3.26 (0.1283)	38154 0C007

## Drive Pinion Preload Adjustment

ADS000DK

Type	R200, R200V
Drive pinion preload	2.65 – 3.23 N·m (0.27 – 0.32 kg–m, 24 – 28 in lb)

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Side Bearing Preload Adjustment

ADS000DL

Type	R200, R200V
Side bearing preload <Reference value>	0.20 – 0.52 N·m (0.02 – 0.05 kg–m, 2 – 4 in lb)
Torque by spring gauge	34.2 – 39.2 N (3.5 – 4 kg, 7.7 – 8.8 lb)

## SIDE BEARING ADJUSTING WASHERS

Unit: mm (in)

Type	R200, R200V			
	Thickness	Part number	Thickness	Part number
Adjusting washer	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

## Total Preload Adjustment

ADS000DM

Type	R200, R200V
Total preload with oil seal	2.84 – 3.75 N·m (0.29 – 0.38 kg–m, 26 – 33 in lb)
Drive gear to drive pinion backlash	0.10 – 0.15 mm (0.0039 – 0.0059 in)

# SERVICE DATA AND SPECIFICATIONS (SDS)

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