SECTION DLN
DRIVELINE

CONTENTS

REAR FINAL DRIVE: R200V

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000005234955

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

		Reference	DLN-6, "Inspection"	—	—	—	—	DLN-6, "Inspection"	DLN-6, "Inspection"	DLN-12, "NVH Troubleshooting Chart" (R200) DLN-53, "NVH Troubleshooting Chart" (R200V)	NVH in FAX, RAX, FSU and RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in ST section.
		Possible cause and SUSPECTED PARTS	Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
Symptom	Noise		×	×	×	×	×	×	×	×	×	×	×	×	×	×
	Shake			×			×				×	×	×	×	×	×
	Vibration		×	×	×	×	×	×	×		×	×		×		×

×: Applicable

PRECAUTION

PRECAUTIONS

Service notice or Precautions for Rear Propeller Shaft

INFOID:0000000005234956

- If the propeller shaft is dropped, replace the propeller shaft assembly.
- Never tap the tube. Avoid impacts and scratching.
- Replace the propeller shaft assembly if there are cracks or deflection on the tube.
- Protect the propeller shaft tube from damage with a tube protector during repair service.

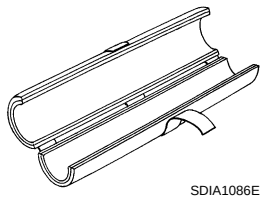
PREPARATION

PREPARATION

Special Service Tool

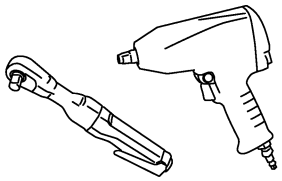
INFOID:0000000005234957

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
— (J-46208) Propeller shaft protector  SDIA1086E	Removing and installing propeller shaft

Commercial Service Tools

INFOID:0000000005234958

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

PERIODIC MAINTENANCE

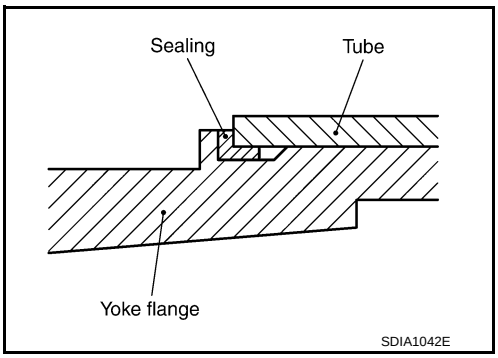
REAR PROPELLER SHAFT

Inspection

INFOID:0000000005234959

NOISE

- Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- Check that there is clearance between the tube end and yoke flange. If no clearance is found, replace the propeller shaft.
- If there are cracks, peeling, or any other breakage on the seal (yoke and tube joint) replace the propeller shaft assembly.



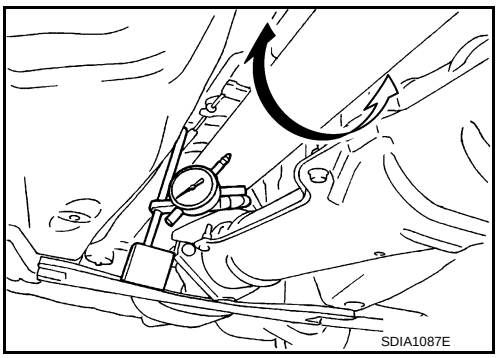
VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.

Limit

Propeller shaft runout **: Refer to DLN-10, "Propeller Shaft Runout".**

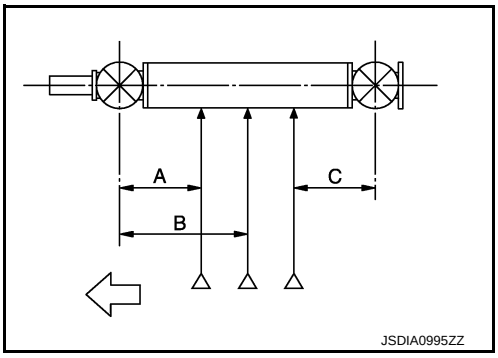


2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then rotate companion flange 90, 180, 270 degrees and install propeller shaft.
3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
4. Check the vibration by driving vehicle.

RUNOUT MEASURING POINT

Propeller shaft runout measuring point (Point "△").

⇦: Vehicle front



Standard

M/T

A	**: 340 mm (13.39 in)**
B	**: 610 mm (24.02 in)**
C	**: 340 mm (13.39 in)**

A/T

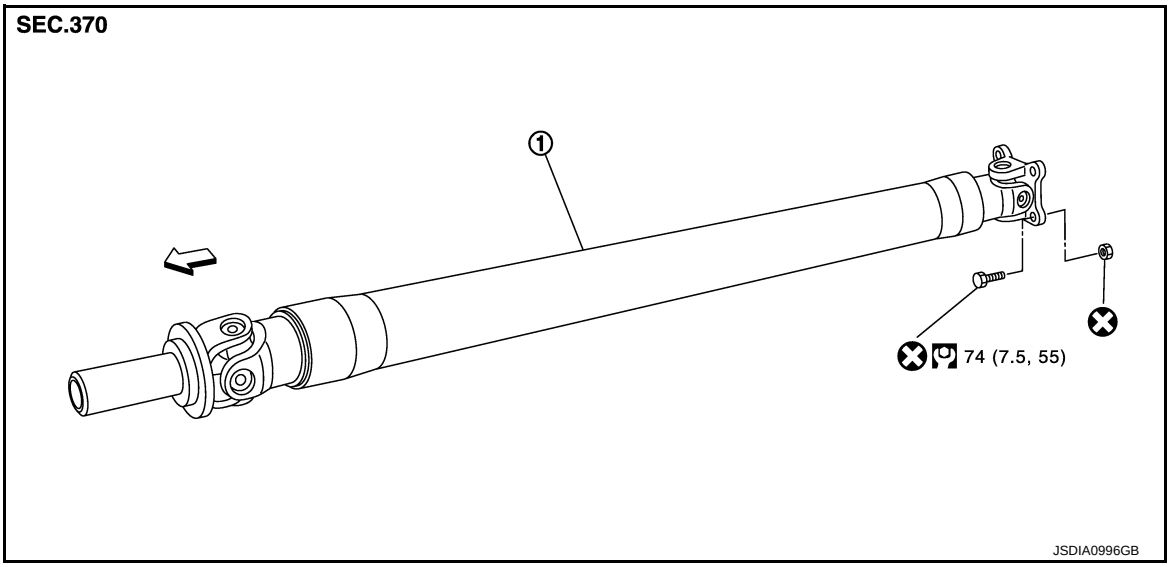
A	**: 340 mm (13.39 in)**
B	**: 580 mm (22.83 in)**
C	**: 340 mm (13.39 in)**

REMOVAL AND INSTALLATION

REAR PROPELLER SHAFT

Exploded View

INFOID:0000000005234960



1. Propeller shaft assembly

⇦: Vehicle front

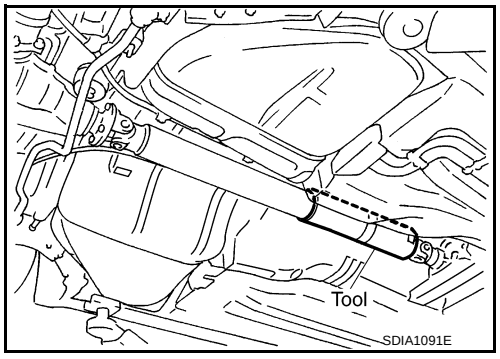
Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

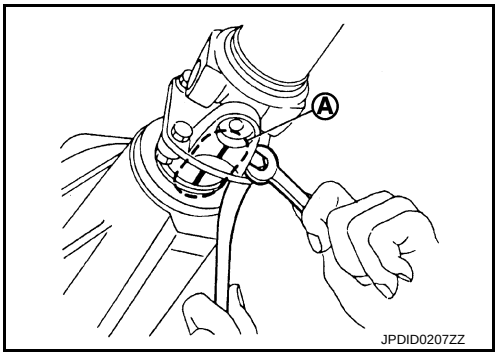
INFOID:0000000005234961

REMOVAL

1. Shift the transmission to the neutral position, and then release the parking brake.
2. Remove the center muffler and exhaust front tube with power tool. Refer to EX-5, "Exploded View".
3. Remove the heat insulator.
4. Attach propeller shaft protector [SST: — (J-46208)] to propeller shaft.



5. Put matching marks (A) on propeller shaft companion flange and final drive companion flange.
CAUTION:
For matching marks, use paint. Never damage propeller shaft companion flange and final drive companion flange.
6. Remove propeller shaft fixing bolts and nuts, and then remove propeller shaft from the vehicle.
CAUTION:
Never damage the rear oil seal of transmission.

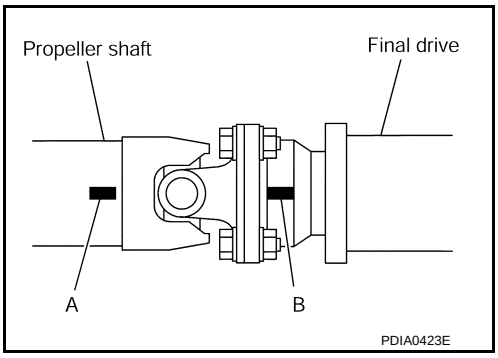


INSTALLATION

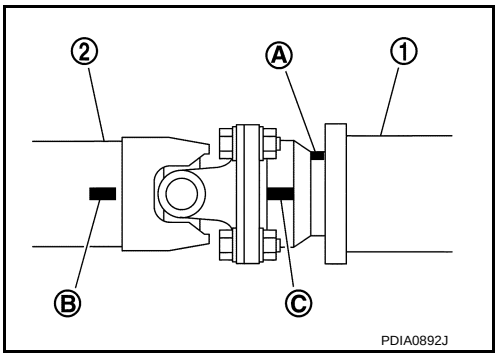
Note the following, and install in the reverse order of removal.

CAUTION:
After the installation, remove the propellershaft protector from the propeller shaft.

- When installing propeller shaft, attach propeller shaft protector to propeller shaft.
- Aligning the matching of propeller shaft (A) companion flange with that of final drive companion flange (B).



- If propeller shaft assembly or final drive assembly has been replaced, connect them as follows:
- Face the companion flange mark (A) of the final drive (1) upward. With the mark (A) faced upward, couple the propeller shaft and the final drive so that the matching mark (B) of propeller shaft (2) can be positioned as closest as possible with the matching mark (C) of the final drive companion flange.
- Tighten mounting bolts and nuts of propeller shaft and final drive to the specified torque.
- After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive. Reinstall companion flange after rotating it by 90, 180, 270 degrees. Then perform driving test and check propeller shaft vibration again at each point.



Inspection

INFOID:0000000005234962

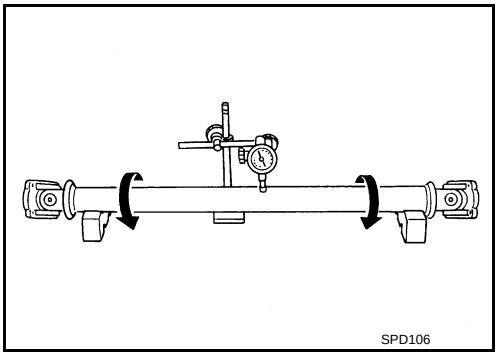
APPEARANCE

Check propeller shaft for bend and damage. If damage is detected, replace propeller shaft assembly.

PROPELLER SHAFT RUNOUT

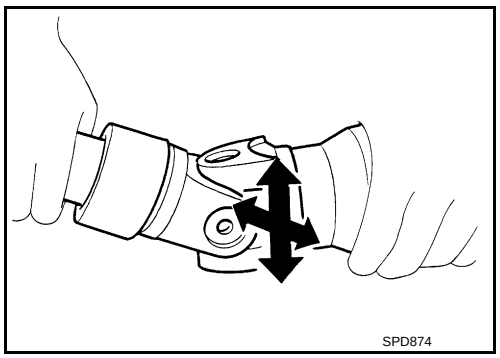
Check propeller shaft runout at measuring points with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly. For measuring point, refer to DLN-6, "Inspection".

Limit	
Propeller shaft runout	**: Refer to DLN-10, "Propeller Shaft Runout".**



JOURNAL AXIAL PLAY

As shown in the figure, while fixing yoke on one side, check axial play of joint. If it is outside the standard, replace propeller shaft assembly.



Standard

Journal axial play : **Refer to** DLN-10, "Journal Axial Play".

CAUTION:
Never disassemble joints.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:0000000005234963

Applied model		2WD	
		VQ37VHR	
		M/T	A/T
Propeller shaft model		2S80A, CFRP	
Number of joints		2	
Type of journal bearings (Non-disassembly type)	1st joint	Shell type	
	2nd joint	Shell type	
Coupling method with transmission		Sleeve type	
Coupling method with rear final drive		Flange type	
Shaft length (Spider to spider)		1221 mm (48.07 in)	1160 mm (45.67 in)
Shaft outer diameter		85 mm (3.35 in)	

Propeller Shaft Runout

INFOID:0000000005234964

Unit: mm (in)

Item	Limit
Propeller shaft runout	1.5 (0.059)

Journal Axial Play

INFOID:0000000005234965

Unit: mm (in)

Item	Standard
Journal axial play	0 (0)

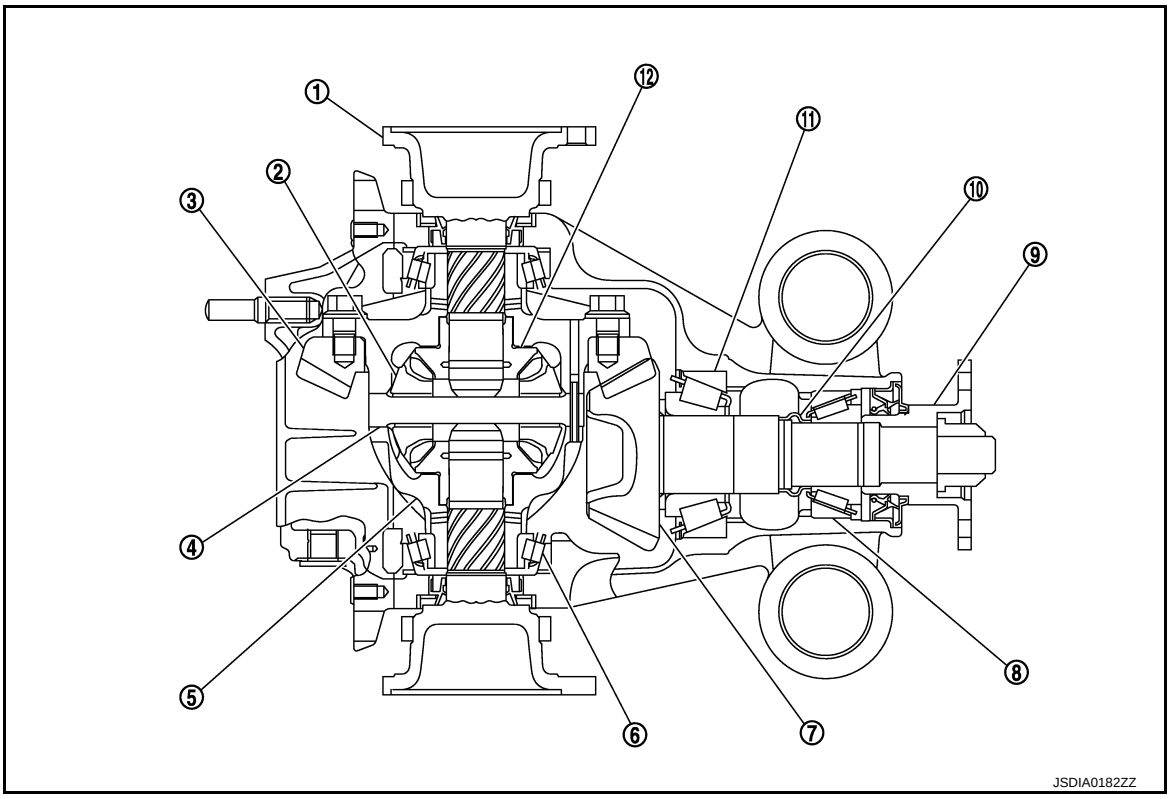
SYSTEM DESCRIPTION

REAR FINAL DRIVE ASSEMBLY

System Diagram

INFOID:0000000005234966

CROSS-SECTIONAL VIEW



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

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000005234967

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

		Reference	DLN-40, "Inspection After Disassembly"	DLN-36, "Adjustment"	DLN-40, "Inspection After Disassembly"	DLN-36, "Adjustment"	DLN-36, "Adjustment"	DLN-18, "Inspection"	DLN-6, "Inspection"	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in ST 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	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
Symptom	Noise		×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Rear Final Drive

INFOID:0000000005234968

- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they never interfere with the function of the parts when applied.
- Overhaul should be done in a clean work area, it is preferable to work in dustproof area.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with new ones, if necessary.
- Gaskets, seals and O-rings should be replaced any time when the unit is disassembled.
- 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-dry them.
- 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.
- Always use shop paper for cleaning the inside of components.
- Never use cotton gloves or shop rags to prevent entering of lint.
- During assembly, observe the specified tightening torque, and apply new gear oil, petroleum jelly, or multi-purpose grease as specified for each vehicle, if necessary.

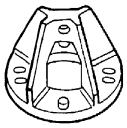
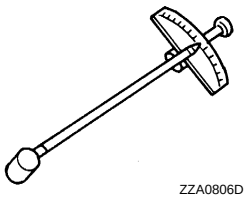
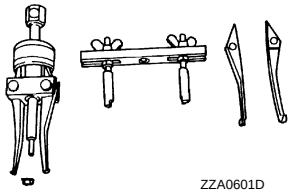
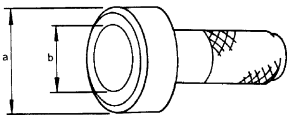
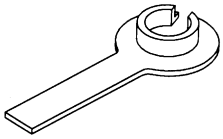
PREPARATION

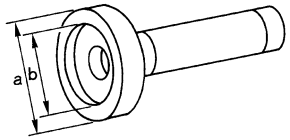
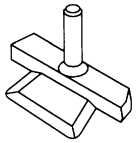
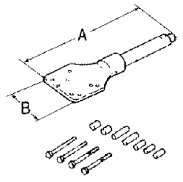
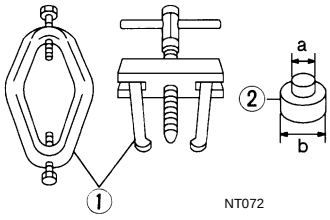
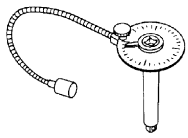
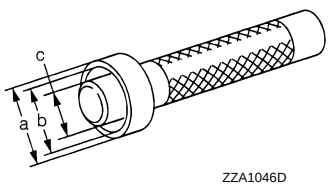
PREPARATION

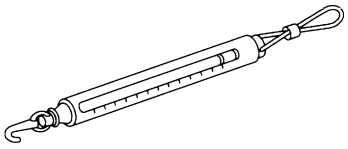
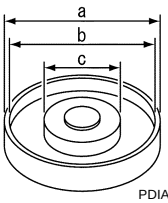
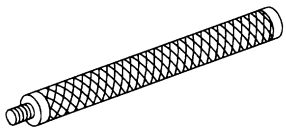
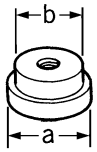
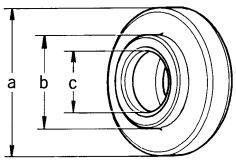
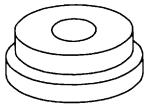
Special Service Tools

INFOID:0000000005234969

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

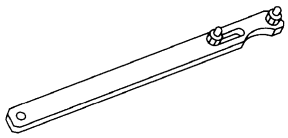
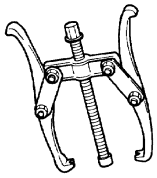
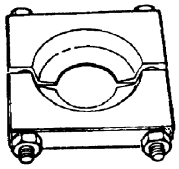
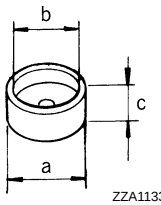
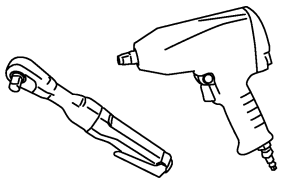
Tool number (Kent-Moore No.) Tool name	Description
KV40104100 (—) Attachment  ZZA0804D	Removing side flange
ST36230000 (J-25840-A) Sliding hammer  ZZA0803D	Removing side flange
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	Measuring pinion bearing preload and total preload
KV381054S0 (J-34286) Puller  ZZA0601D	Removing front oil seal
ST30720000 (J-25405) Drift a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.  ZZA0811D	• Installing front oil seal • Installing pinion rear bearing outer race
KV38107900 (J-39352) Protector  S-NT129	Installing side flange

Tool number (Kent-Moore No.) Tool name	Description
KV38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.  ZZA1143D	Installing side oil seal
KV10111100 (J-37228) Seal cutter  S-NT046	Removing rear cover
KV38100800 (J-25604-01) Attachment A: 541 mm (21.30 in) B: 200 mm (7.87 in)  SDIA0267E	Fixing unit assembly
ST3306S001 (J-22888-D) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.  NT072	Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench  ZZA0120D	Tightening the drive gear mounting bolt
KV38100300 (J-25523) Drift a: 54 mm (2.13 in) dia. b: 46 mm (1.81 in) dia. c: 32 mm (1.26 in) dia.  ZZA1046D	Installing side bearing inner race

Tool number (Kent-Moore No.) Tool name	Description
— (J-8129) Spring gauge  NT127	Measuring turning torque
KV40105230 (—) Drift a: 92 mm (3.62 in) dia. b: 86 mm (3.39 in) dia. c: 45 mm (1.77 in) dia.  PDIA0591E	Installing pinion rear bearing outer race
ST30611000 (J-25742-1) Drift bar  S-NT090	Installing pinion front bearing outer race (Use with ST30613000)
ST30613000 (J-25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.  ZZA1000D	Installing pinion front bearing outer race
ST30901000 (J-26010-01) Drift a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35.2 mm (1.386 in) dia.  ZZA0978D	Installing pinion rear bearing inner race
— (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

INFOID:0000000005234970

Tool name	Description
Flange wrench  NT035	Removing and installing drive pinion lock nut
Puller  ZZA0119D	Removing companion flange
Sliding hammer  NT125	Removing differencial case assembly
Replacer  ZZA0700D	Removing pinion rear bearing inner race
Spacer a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia. c: 30 mm (1.18 in)  ZZA1133D	Installing pinion front bearing inner race
Power tool  PBIC0190E	Loosening bolts and nuts

PERIODIC MAINTENANCE

REAR DIFFERENTIAL GEAR OIL

Inspection

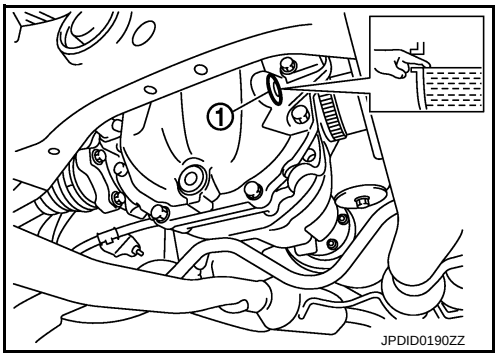
INFOID:0000000005234971

OIL LEAKAGE

Make sure that oil is not leaking from final drive assembly or around it.

OIL LEVEL

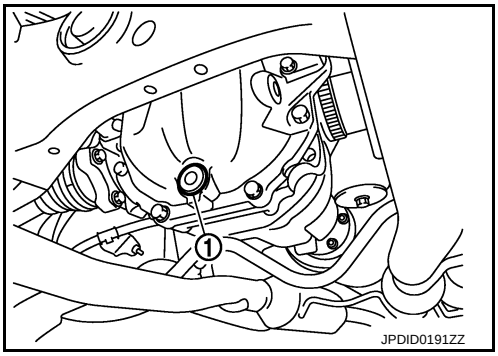
- Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug (1) and install it on final drive assembly. Refer to DLN-28, "Exploded View".
  CAUTION:
  Never reuse gasket.



Draining

INFOID:0000000005234972

1. Stop the engine.
2. Remove drain plug (1) and drain gear oil.
3. Set a gasket on drain plug (1) and install it to final drive assembly and tighten to the specified torque. Refer to DLN-28, "Exploded View".
   CAUTION:
   Never reuse gasket.

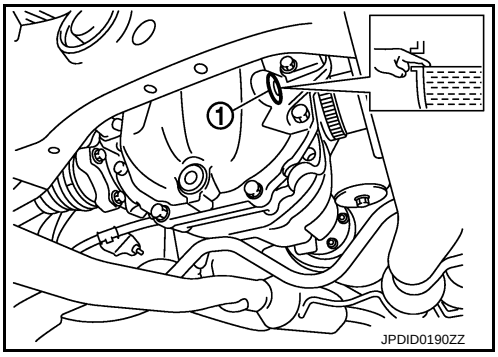


Refilling

INFOID:0000000005234973

1. Remove filler plug (1). Fill with new gear oil until oil level reaches the specified level near filler plug mounting hole.

Oil grade and viscosity	**: Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-15, "FOR MEXICO : Fluids and Lubricants" (except for NORTH AMERICA).**
Oil capacity	**: Refer to DLN-51, "General Specification".**



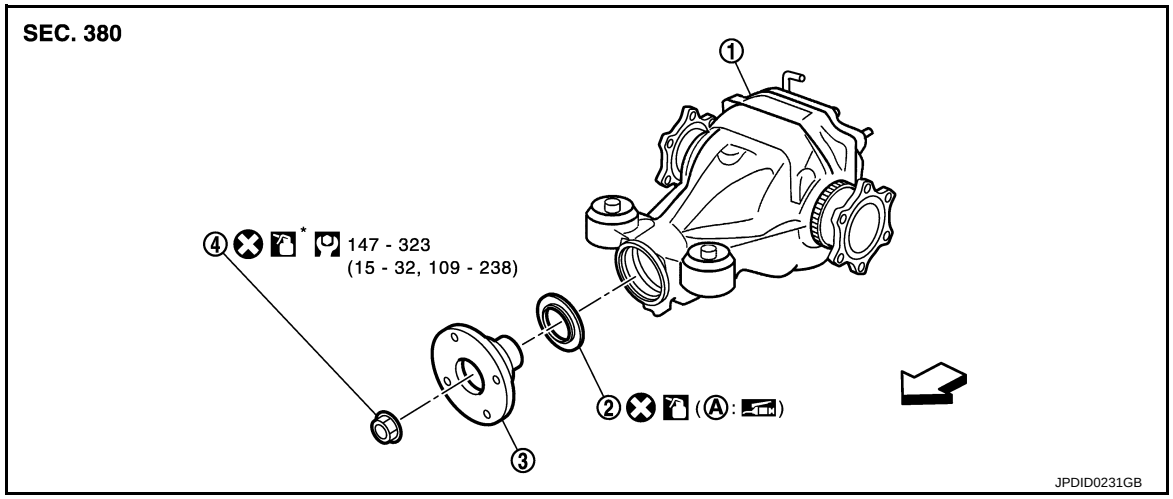
2. After refilling oil, check oil level. Set a gasket to filler plug (1), then install it to final drive assembly. Refer to DLN-28, "Exploded View".
   CAUTION:
   Never reuse gasket.

REMOVAL AND INSTALLATION

FRONT OIL SEAL

Exploded View

INFOID:0000000005234974



1. Final drive assembly
2. Front oil seal
3. Companion flange
4. Drive pinion lock nut

A. Oil seal lip

⇦: Vehicle front

: Apply gear oil.

*: Apply anti-corrosion oil.

Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000005234975

REMOVAL

CAUTION:

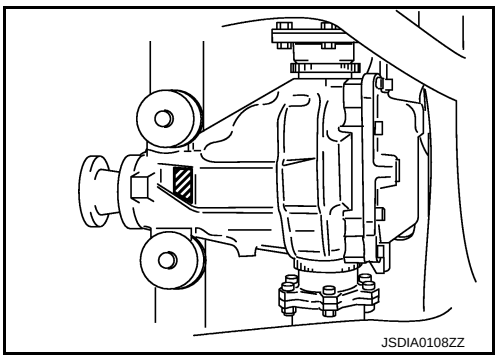
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to DLN-26, "Removal and Installation" and DLN-29, "Disassembly".

NOTE:

The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

Identification stamp of replacement frequency of front oil seal

- The diagonally shaded area in the figure shows stamping point for replacement frequency of front oil seal.
- The following table shows if collapsible spacer replacement is needed before replacing front oil seal.
  When collapsible spacer replacement is required, disassemble final drive assembly to replace collapsible spacer and front oil seal. Refer to DLN-29, "Disassembly".



Stamp	collapsible spacer replacement
No stamp	Not required

Stamp	collapsible spacer replacement
“0” or “0” on the far right of stamp	Required
“01” or “1” on the far right of stamp	Not required

CAUTION:
Make a stamping after replacing front oil seal.

- After replacing front oil seal, make a stamping on the stamping point in accordance with the table below in order to identify replacement frequency.

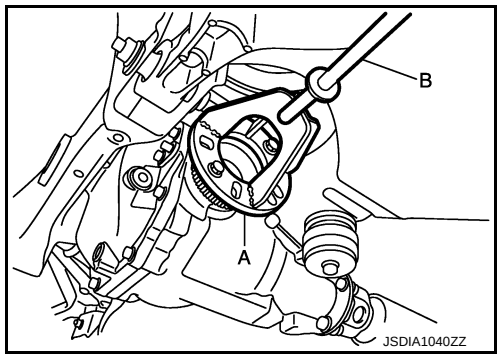
CAUTION:
Make a stamping from left to right.

Stamp before stamping	Stamping on the far right	Stamping
No stamp	0	0
“0” (Front oil seal was replaced once.)	1	01
“01” (Collapsible spacer and front oil seal were replaced last time.)	0	010
“0” is on the far right. (Only front oil seal was replaced last time.)	1	...01
“1” is on the far right. (Collapsible spacer and front oil seal were replaced last time.)	0	...010

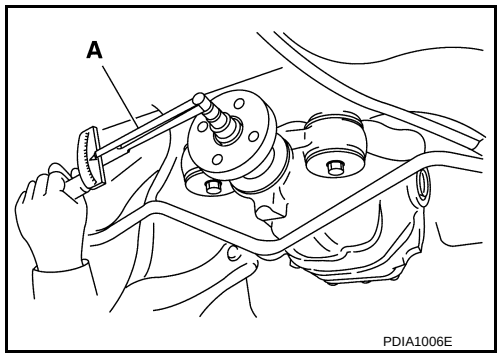
1. Drain gear oil. Refer to DLN-18, "Draining".
2. Make a judgment if a collapsible spacer replacement is required.
3. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
4. Remove rear wheel sensors. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
5. Remove drive shafts from final drive. Refer to RAX-10, "Exploded View".
6. Remove the side flanges as follows.
   1. Install attachment to side flange.

      A : Attachment [SST: KV40104100 (—)]
      B : Sliding hammer [SST: ST36230000 (J-25840-A)]

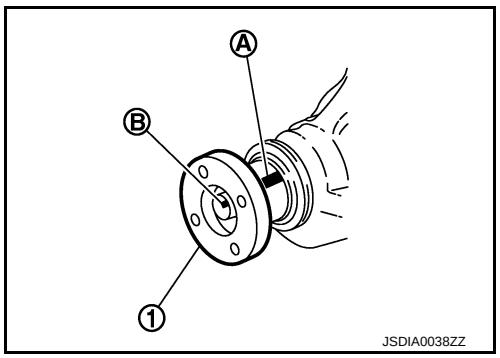
   2. Pull out the side flange with the sliding hammer.
7. Remove rear propeller shaft. Refer to DLN-7, "Exploded View".



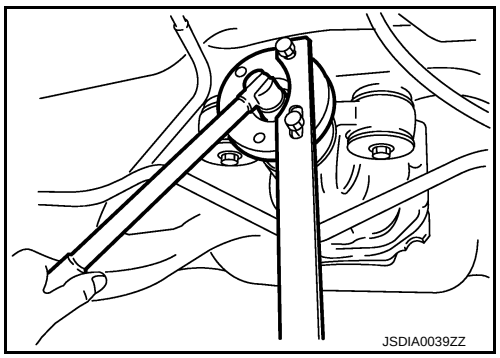
8. Measure the total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].
   NOTE:
   Record the preload measurement.



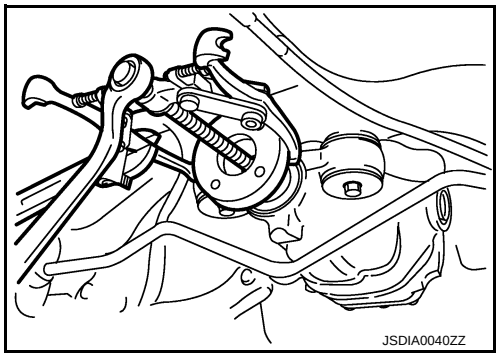
9. Put matching mark (B) on the end of the drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.
NOTE:
The matching mark on the final drive companion flange indicates the maximum vertical runout position.



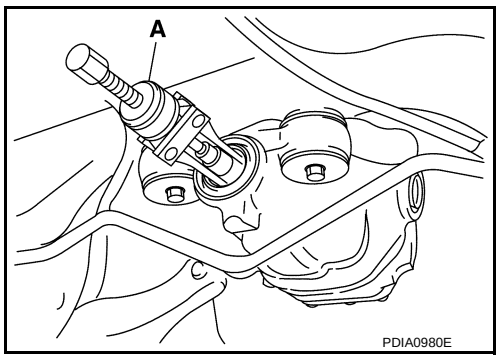
10. Remove drive pinion lock nut using the flange wrench (commercial service tool).



11. Remove companion flange using pullers.



12. Remove front oil seal using the puller (A) [SST: KV381054S0 (J-34286)].

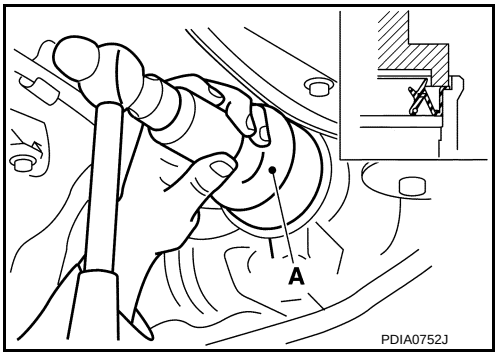


INSTALLATION

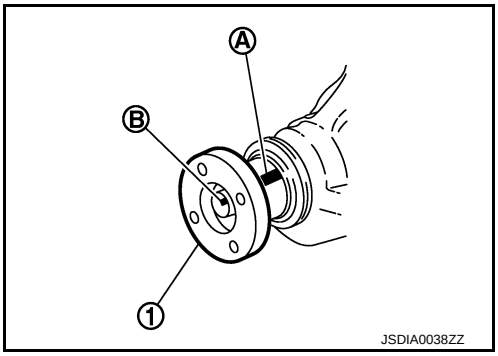
1. Apply multi-purpose grease to front oil seal lip.

2. Install front oil seal using the drift (A) [SST: ST30720000 (J-25405)] as shown in figure.

CAUTION:
- **Never reuse oil seal.**
- **Never incline oil seal when installing.**



3. Align the matching mark (B) of drive pinion with the matching mark (A) of companion flange (1), and then install the companion flange.



4. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion.

CAUTION:
Never reuse drive pinion lock nut.

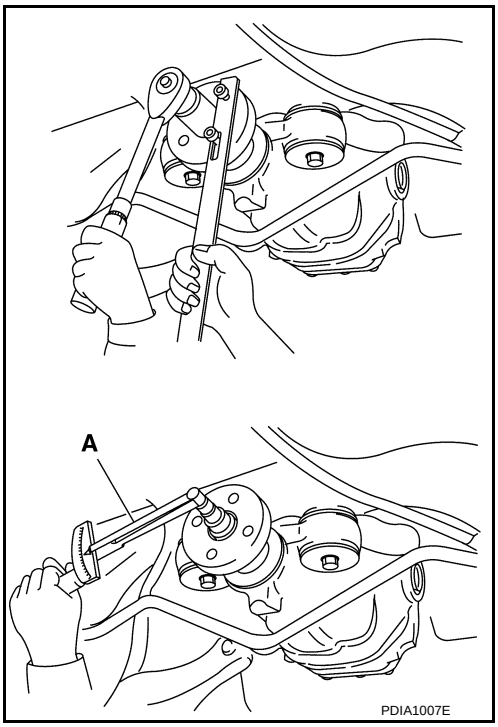
5. Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values.

A : Preload gauge [SST: ST3127S000 (J-25765-A)]

Standard

Total preload torque	**: A value that add 0.1 – 0.4 N·m (0.01 – 0.04 kg-m, 0.9 – 3.5 in-lb) to the measured value before removing.**

CAUTION:
- **Adjust to the lower limit of the drive pinion lock nut tightening torque first.**
- **If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.**

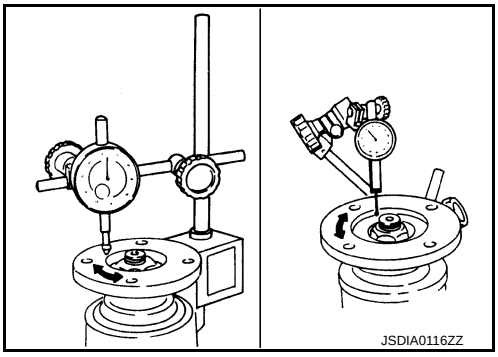


6. Fit a dial indicator onto the companion flange face (inner side of the propeller shaft mounting bolt holes).
7. Rotate companion flange to check for runout.

Limit

Companion flange runout	**: Refer to DLN-51, "Companion Flange Runout".**

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



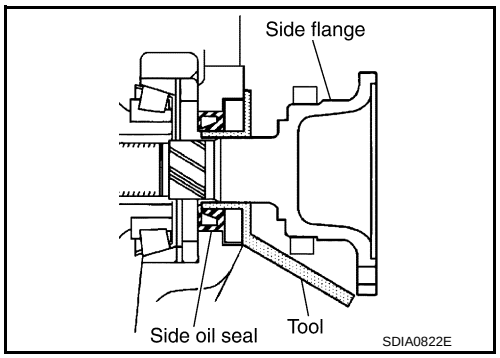
Limit

Companion flange runout : Refer to DLN-51, "Companion Flange Runout".

- If the runout value is outside the runout limit, follow the procedure below to adjust.
- Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
- If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
- If the runout value is still outside of the limit after the check and repair, replace companion flange.

10. Make a stamping for identification of front oil seal replacement frequency. Refer to “Identification stamp of replacement frequency of front oil seal”.
CAUTION:
Make a stamping after replacing front oil seal.
11. Install rear propeller shaft. Refer to DLN-7, "Exploded View".
12. Install side flanges with the following procedure.

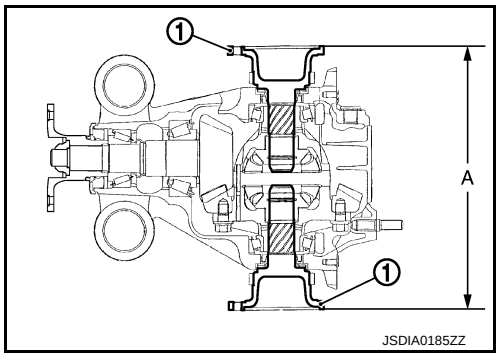
a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
c. Put a suitable drift on the center of side flange, then drive it until sound changes.
NOTE:
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.



d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

Standard

A : 326 – 328 mm (12.83 – 12.91 in)

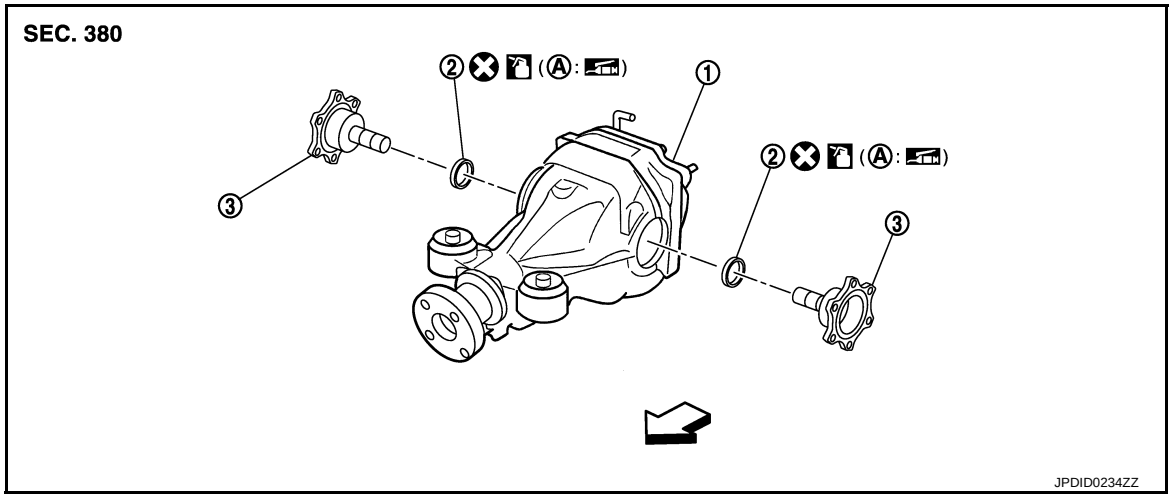


13. Install drive shafts. Refer to RAX-10, "Exploded View".
14. Install rear wheel sensors. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
15. Install center muffler. Refer to EX-5, "Exploded View".
16. Refill gear oil to the final drive and check oil level. Refer to DLN-18, "Refilling".
17. Check the final drive for oil leakage. Refer to DLN-18, "Inspection".

SIDE OIL SEAL

Exploded View

INFOID:0000000005234976



1. Final drive assembly
2. Side oil seal
3. Side flange

A. Oil seal lip

⇦: Vehicle front

: Apply gear oil.

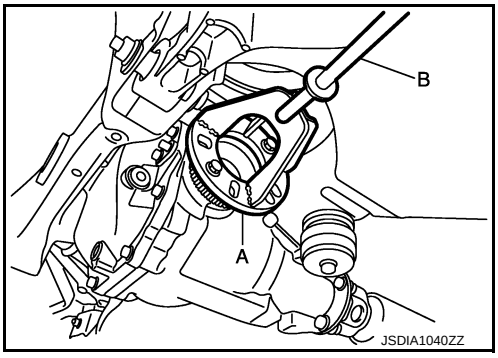
Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000005234977

REMOVAL

1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
2. Remove rear wheel sensor. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
3. Remove drive shaft from final drive with a power tool. Refer to RAX-10, "Exploded View".
4. Install attachment to side flange, and then pull out the side flange with the sliding hammer.



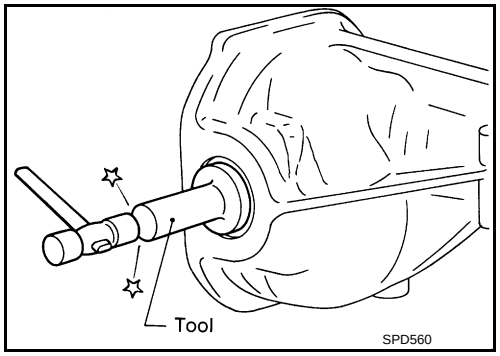
A : Attachment [SST: KV40104100 (—)]
B : Sliding hammer [SST: ST36230000 (J-25840-A)]

5. Remove side oil seal, using a suitable tool.
CAUTION:
Never damage gear carrier.

INSTALLATION

1. Apply multi-purpose grease to side oil seal lip.

2. Install side oil seal until it becomes flush with the case end, using the drift [SST: KV38100200 (J-26233)].
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**

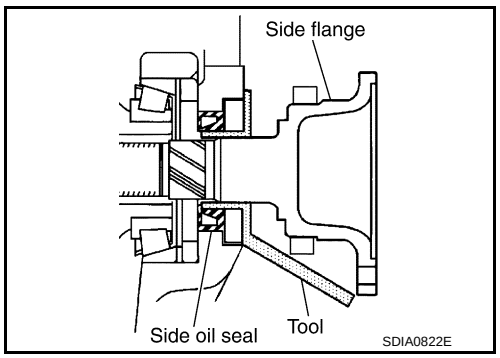


3. Install side flange with the following procedure.

a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.

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

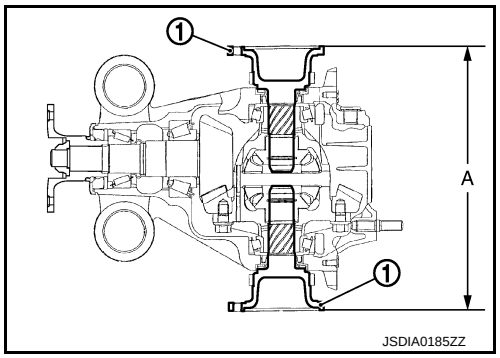
c. Put a suitable drift on the center of side flange, then drive it until sound changes.
NOTE:
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.



d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

Standard

A : 326 – 328 mm (12.83 – 12.91 in)



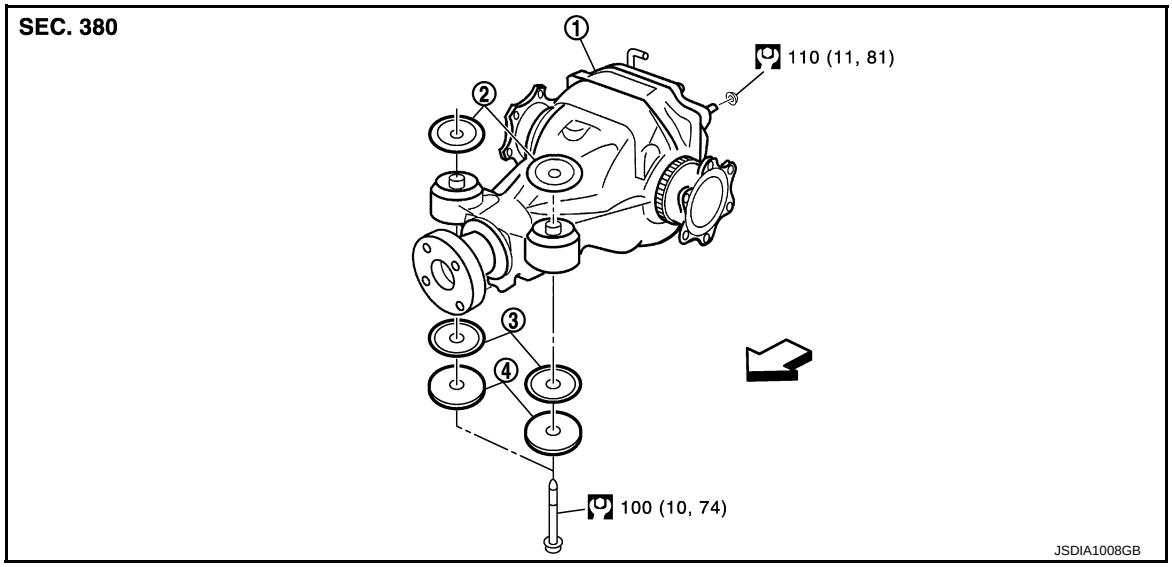
4. Install drive shaft. Refer to RAX-10, "Exploded View".
5. Install rear wheel sensor. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
6. Install center muffler. Refer to EX-5, "Exploded View".
7. When oil leaks while removing, check oil level after the installation. Refer to DLN-18, "Inspection".

UNIT REMOVAL AND INSTALLATION

REAR FINAL DRIVE ASSEMBLY

Exploded View

INFOID:0000000005234978



1. Rear final drive assembly
2. Upper stopper
3. Lower stopper
4. Washer

⇦: Vehicle front

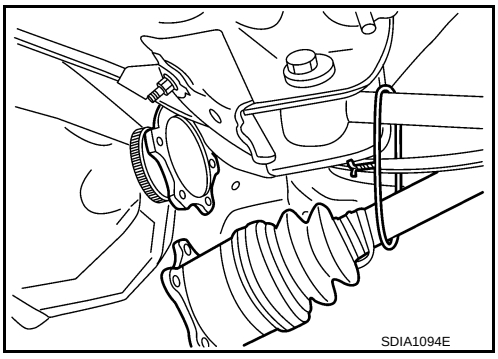
Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

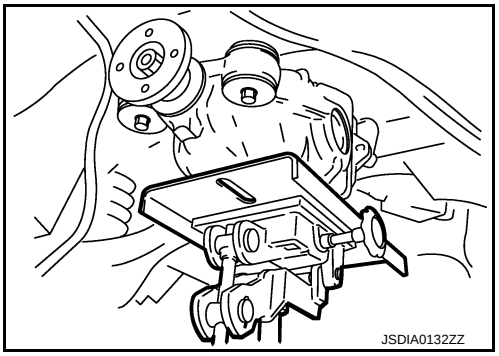
INFOID:0000000005234979

REMOVAL

1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
2. Remove diag brace with power tool. Refer to RSU-17, "Exploded View".
3. Remove stabilizer bar with a power tool. Refer to RSU-16, "Exploded View".
4. Remove rear propeller shaft from the final drive. Refer to DLN-7, "Exploded View".
5. Remove drive shafts from final drive with a power tool. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
6. Remove breather hose from the final drive.
7. Remove rear wheel sensors. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".



8. Set a suitable jack to rear final drive assembly.
CAUTION:
Never place a jack on the rear cover (aluminum case).
9. Remove the mounting bolts and nuts connecting to the suspension member, and remove rear final drive assembly with a power tool.
CAUTION:
Secure rear final drive assembly to a suitable jack while removing it.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INSTALLATION

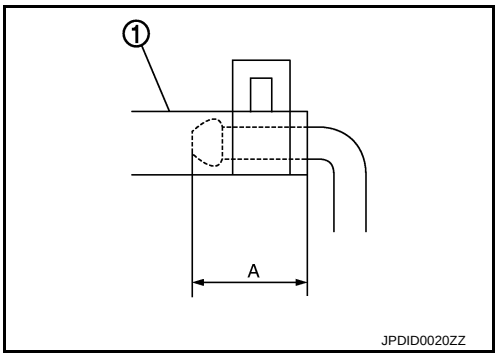
Note the following, and installation is in the reverse order of removal.

CAUTION:
Make sure there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.

- Install the breather hose (1) to breather connector until dimension (A) shown as follows.

A:

Final drive side	**: 20 mm (0.79 in)**
Suspension member side	**: 20.5 mm (0.807 in)**



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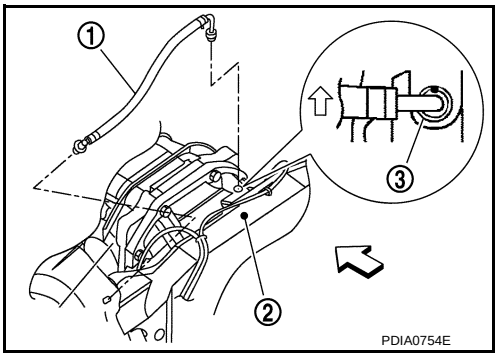
CAUTION:
- **Never reuse hose clamp.**
- **Install the hose clamp at the final drive side, with the tab facing downward.**
- **Install the hose clamp at the suspension member side, with the tab facing downward.**

- If remove breather connector, install breather hose (1) as shown in the figure.
- For installation, insert the breather connector to suspension member (2). Install metal connector (3) to rear cover with aiming painted marking to the front of vehicle.

⇦: Vehicle front



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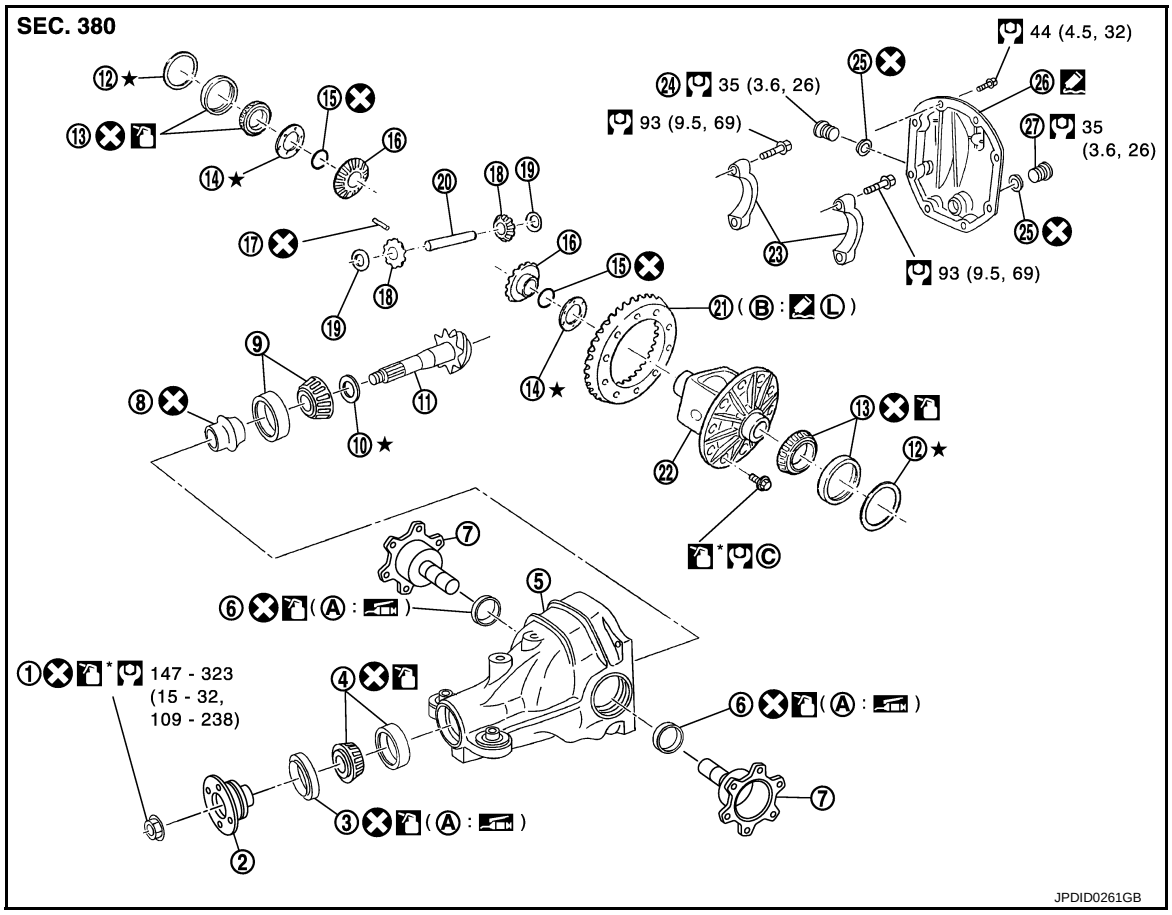
CAUTION:
Never reuse breather connector and metal connector.
- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-18, "Inspection".

UNIT DISASSEMBLY AND ASSEMBLY

DIFFERENTIAL ASSEMBLY

Exploded View

INFOID:0000000005234980



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
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. Circular clip
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
A. Oil seal lip
B. Screw hole
C. Comply with the assembly procedure when tightening. Refer to DLN-31, "Assembly".

: Apply gear oil.

*: Apply anti-corrosion oil.

: Apply Genuine Silicone RTV or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

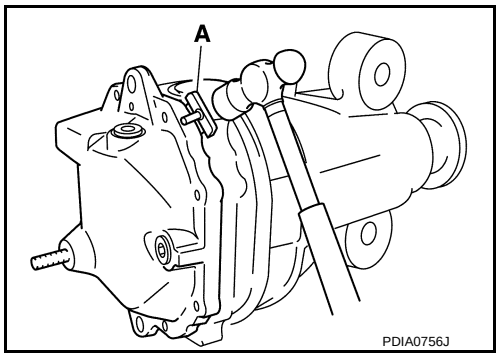
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

Refer to GI-4, "Components" for symbols not described on the above.

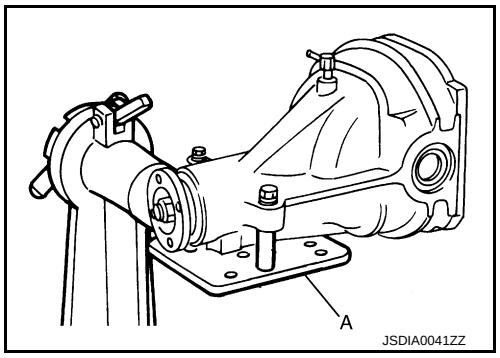
Disassembly

INFOID:0000000005234981

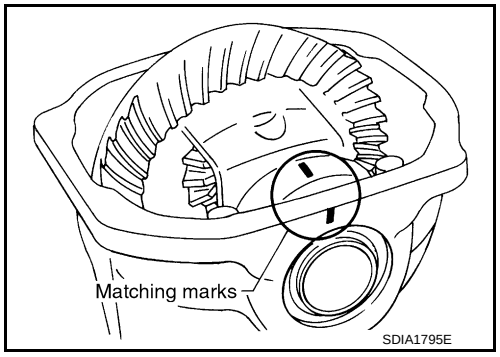
1. Drain gear oil, if necessary.
2. Remove side flanges.
3. Remove rear cover mounting bolts.
4. Remove rear cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and rear cover.
   CAUTION:
   - **Never damage the mating surface.**
   - **Never insert flat-bladed screwdriver, this may damage the mating surface.**



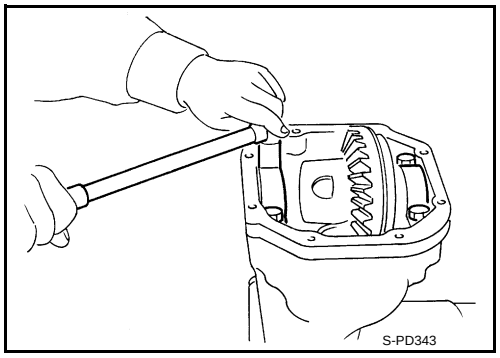
5. Using two spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].



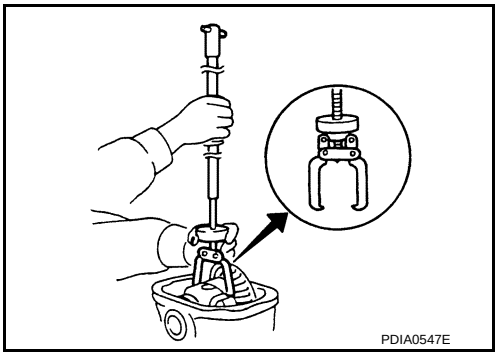
6. For proper reinstallation, paint matching marks on one side of the bearing cap.
   CAUTION:
   - **For matching marks, use paint. Never damage bearing caps and gear carrier.**
   - **Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.**



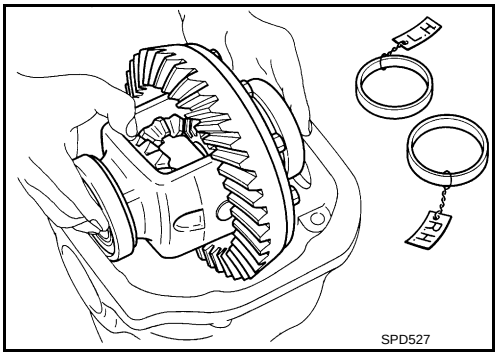
7. Remove bearing caps.



8. Lift differential case assembly out with a suitable tool.



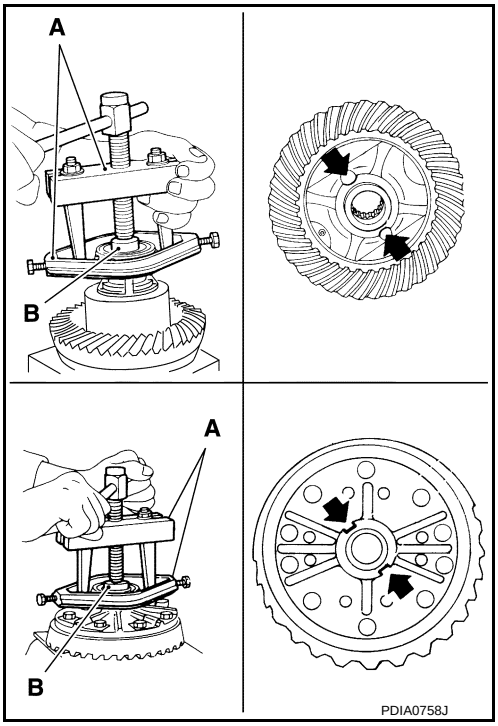
- Keep side bearing outer races together with inner race. Never mix them up.
  Also, keep side bearing adjusting washers together with bearings.



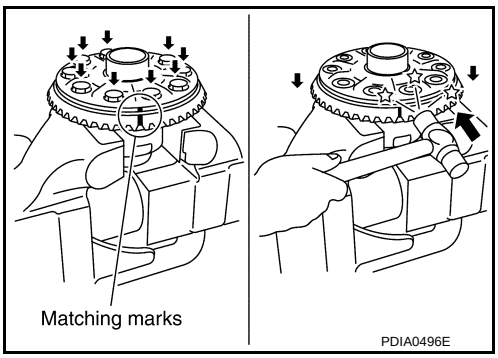
9. Remove side bearing inner race.
   To prevent damage to bearing, engage puller jaws in groove (⬅).

   A : Puller [SST: ST33051001 (J-22888-20)]
   B : Base [SST: ST33061000 (J-8107-2)]

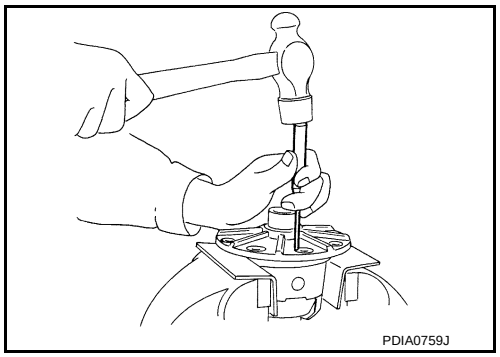
   CAUTION:
   - **To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.**
   - **It is not necessary to remove side bearing inner race except when it is replaced.**



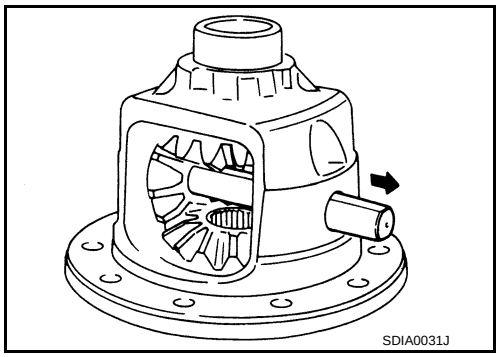
10. For proper reinstallation, paint matching marks on one differential case assembly.
    CAUTION:
    For matching marks, use paint. Never damage differential case and drive gear.
11. Remove drive gear mounting bolts.
12. Tap drive gear off differential case assembly with a soft hammer.
    CAUTION:
    Tap evenly all around to keep drive gear from bending.



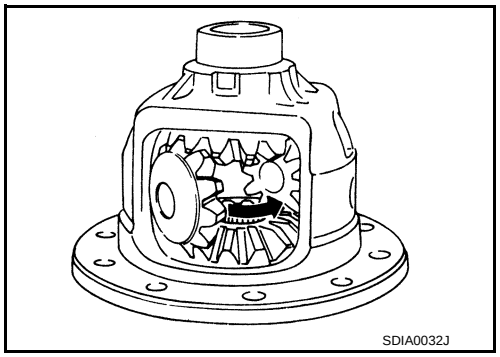
13. Remove lock pin of pinion mate shaft with a punch from drive gear side.


PDIA0759J

14. Remove pinion mate shaft.


SDIA0031J

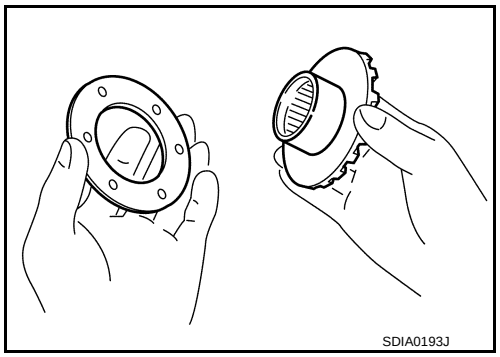
15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
16. Remove circular clip from side gear.
CAUTION:
Never damage side gear.
17. Remove side oil seal, using a suitable tool.
CAUTION:
Never damage gear carrier.


SDIA0032J

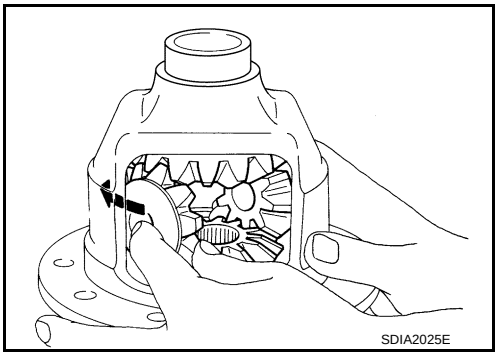
Assembly

INFOID:0000000005234982

1. Install circular clip to side gear.
CAUTION:
Never damage side gear.
2. 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.

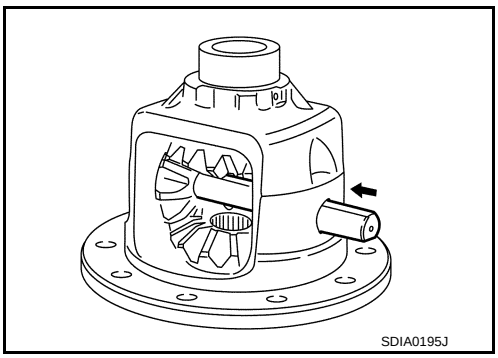

SDIA0193J

3. Install side gears and thrust washers into differential case.
CAUTION:
Make sure that the circular clip is installed to side gears.


SDIA2025E

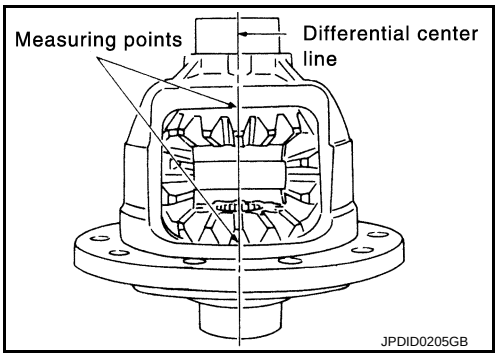
4. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.

5. Align the lock pin holes on differential case with shaft, and install pinion mate shaft.


SDIA0195J

6. Measure side gear end play. If necessary, select the appropriate side gear thrust washers.

a. Place differential case straight up so that side gear to be measured comes upward.



JPDID0205GB

b. Using feeler gauge, measure the clearance between side gear back and differential case at 3 different points, while rotating side gear. Average the 3 readings, and then measure the clearance of the other side as well.

Standard

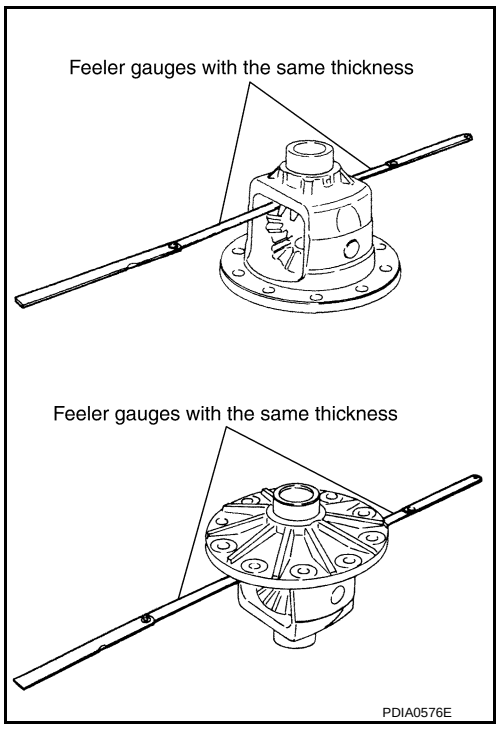
Side gear back clearance **: Refer to DLN-51, "Differential Side Gear Clearance".**

CAUTION:
To prevent side gear from tilting, insert feeler gauges with the same thickness from both sides.

c. If the back clearance is outside the specification, use a thicker/thinner side gear thrust washer to adjust.

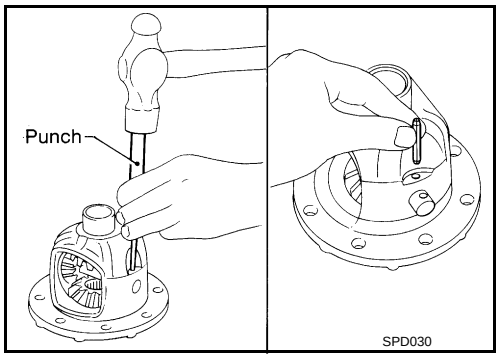
When the back clearance is large:	**Use a thicker thrust washer.**
When the back clearance is small:	**Use a thinner thrust washer.**

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



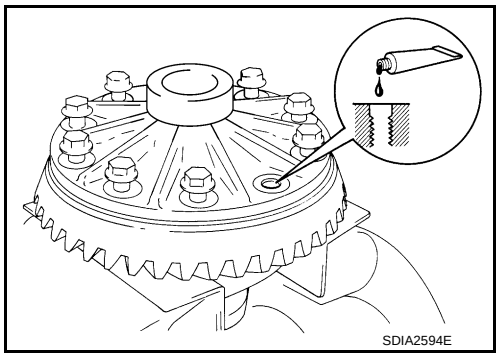
7. Drive a lock pin into pinion mate shaft, using a punch. Make sure lock pin is flush with differential case.

CAUTION:
Never reuse lock pin.



8. Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

CAUTION:
Clean and degrease drive gear back and threaded holes sufficiently.



9. Install the drive gear to differential case.

CAUTION:
Align the matching marks of differential case and drive gear.

10. Tighten the mounting bolts with the following procedure.

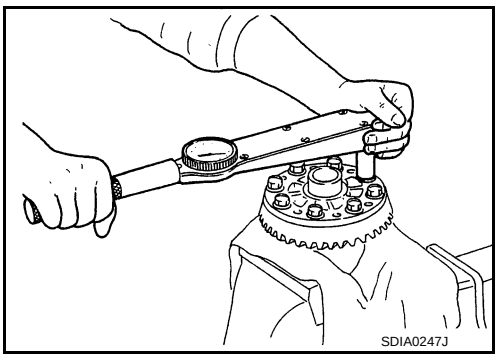
CAUTION:
Apply anti-corrosin oil to the thread and seat of mounting bolts.

a. Tighten the bolts in a crisscross fashion to the specified torque.

Drive gear mounting bolts tightening torque : 78.5 N•m (8.0 kg-m, 58 ft-lb)

b. Tighten the bolts additionally to the specified angle.

Drive gear mounting bolts tightening angle : 31 to 36 degree

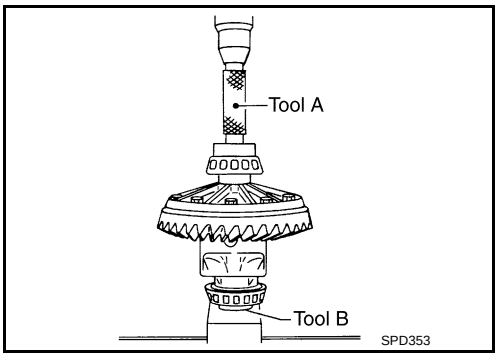


CAUTION:
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

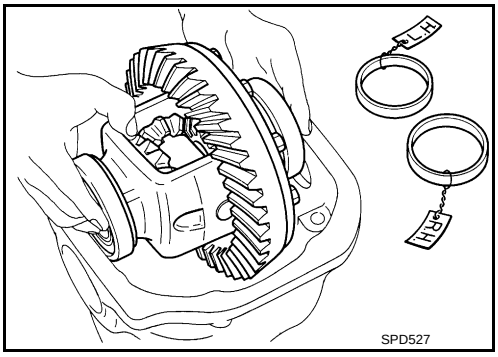
11. Press side bearing inner races to differential case, using the drift and the base.

A : Drift [SST: KV38100300 (J-25523)]
B : Base [SST: ST33061000 (J-8107-2)]

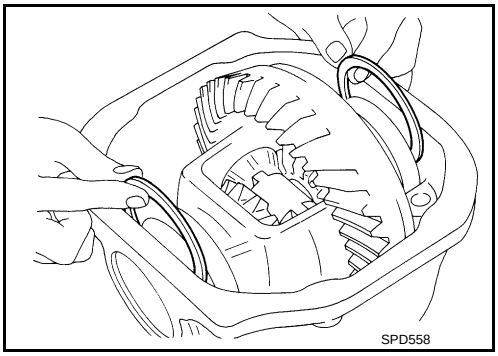
CAUTION:
Never reuse side bearing inner race.



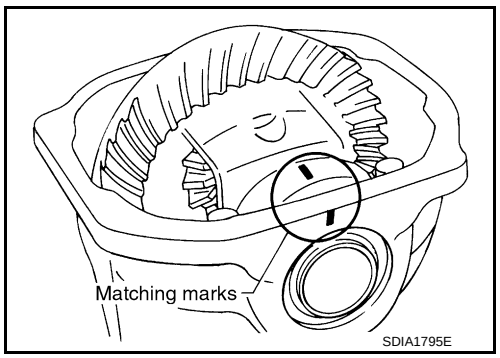
12. Install differential case assembly with side bearing outer races into gear carrier.
13. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to DLN-36, "Adjustment".



14. Insert selected left and right side bearing adjusting washers in place between side bearings and gear carrier. Refer to DLN-36, "Adjustment".

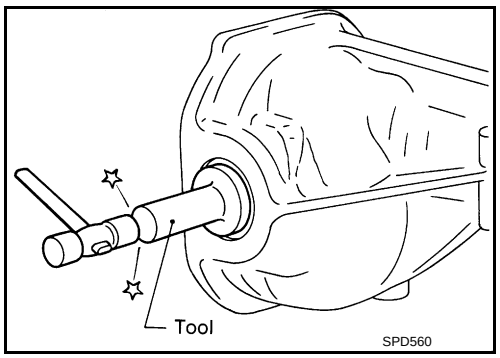


15. Align matching marks on bearing cap with that on gear carrier.
16. Install bearing caps and tighten bearing cap mounting bolts.

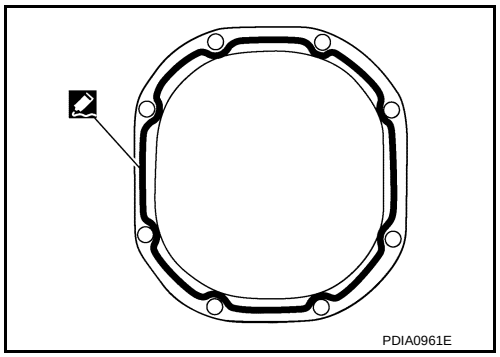


17. Using the drift [SST: KV38100200 (J-26233)], drive side oil seals until it becomes flush with the case end.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

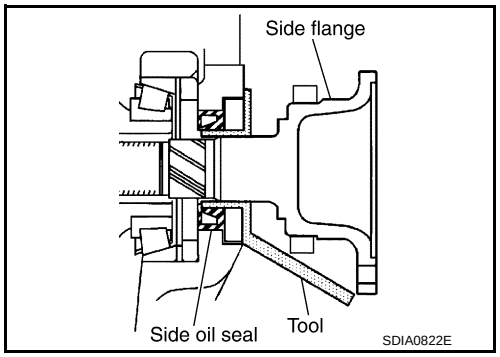
18. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to DLN-36, "Adjustment".
Recheck above items. Readjust the above description, if necessary.



19. Apply sealant to mating surface of rear cover.
Use Genuine Silicone RTV or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".
CAUTION:
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.
20. Install rear cover on gear carrier and tighten mounting bolts.

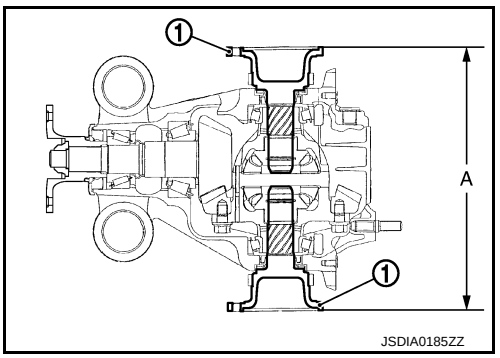


21. Install side flanges with the following procedure.
a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.



c. Put a 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 that seems to affect the whole final drive.

d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.



Standard

A : 326 – 328 mm (12.83 – 12.91 in)

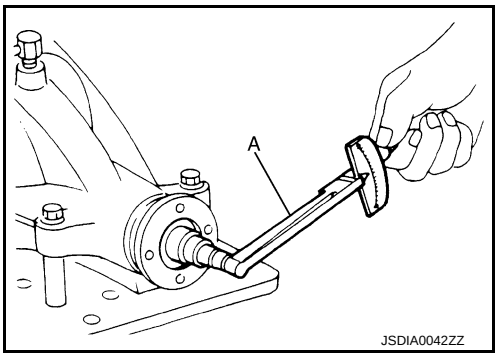
Adjustment

INFOID:0000000005234983

TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

1. Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
2. Remove side flanges.
3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
4. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
5. Measure total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].



Standard

Total preload torque : Refer to DLN-51, "Preload Torque".

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

- If 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 large

On pinion bearings: Replace the collapsible spacer.

On side bearings: Use thinner side bearing adjusting washers by the same amount to each side.

When the preload is small

On pinion bearings: Tighten the drive pinion lock nut.

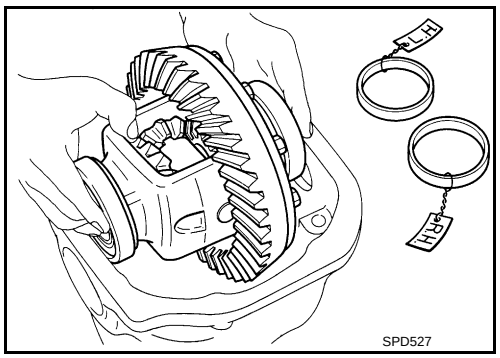
On side bearings: Use thicker side bearing adjusting washers by the same amount to each side.

SIDE BEARING PRELOAD

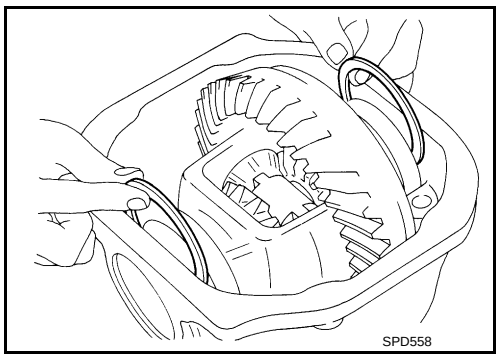
Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-29, "Disassembly".

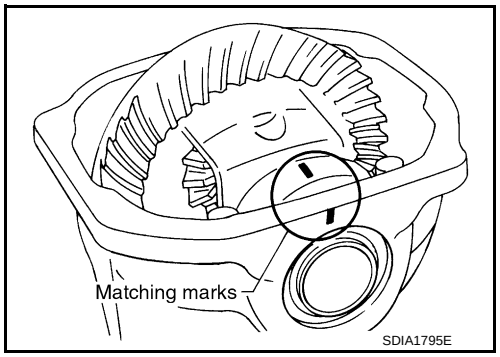
2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
3. Place the differential case, with side bearings and bearing races installed, into gear carrier.



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



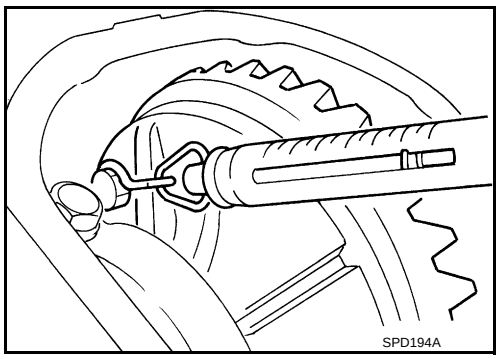
5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.
6. Turn the carrier several times to seat the bearings.



7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

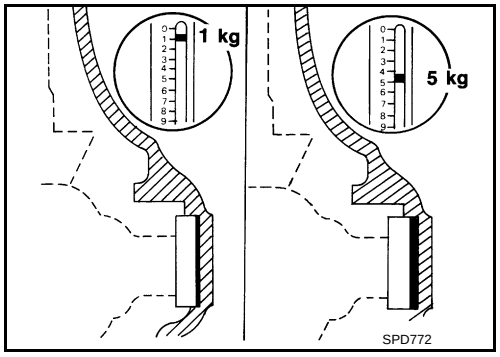
Standard

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



8. If the turning torque is outside the specification, use a thicker/thinner side bearing adjusting washer to adjust.

If the turning torque is less than the specified range:	**Use a thicker thrust washer.**
If the turning torque is greater than the specification:	**Use a thinner thrust washer.**

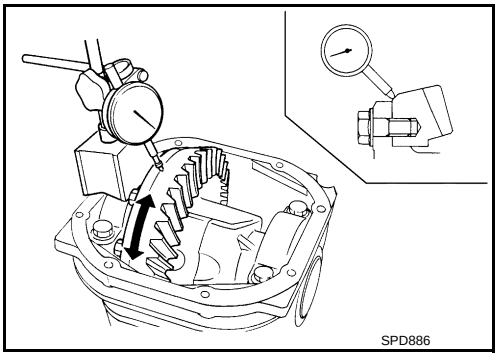


CAUTION:
Select a side bearing adjusting washer for right and left individually.

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

DRIVE GEAR RUNOUT

1. Remove rear cover. Refer to DLN-29, "Disassembly".
2. Fit a dial indicator to the drive gear back face.
3. Rotate the drive gear to measure runout.



Limit

Drive gear runout	**: Refer to DLN-51, "Drive Gear Runout".**

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

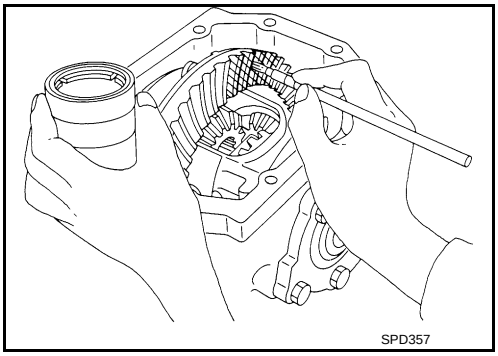
CAUTION:
Replace drive gear and drive pinion gear as a set.

TOOTH CONTACT

Before inspection and adjustment, drain gear oil.

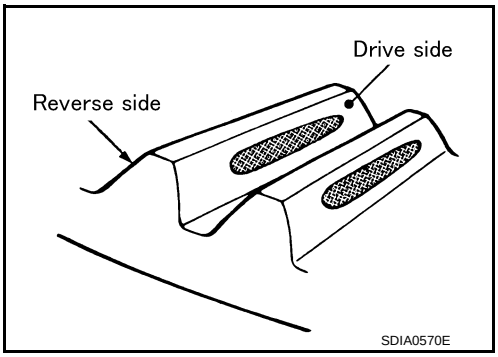
1. Remove rear cover. Refer to DLN-29, "Disassembly".
2. Apply red lead to drive gear.

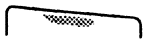
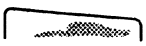
CAUTION:
Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.



3. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.

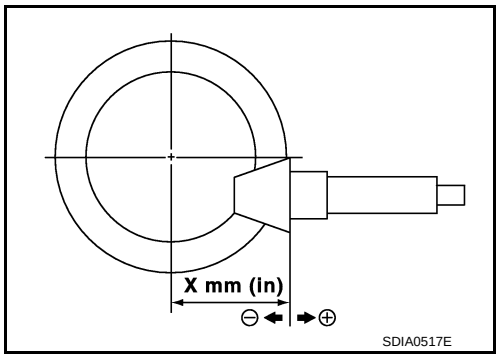
CAUTION:
Check tooth contact on drive side and reverse side.



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 		+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
		Thicker ↑	+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.

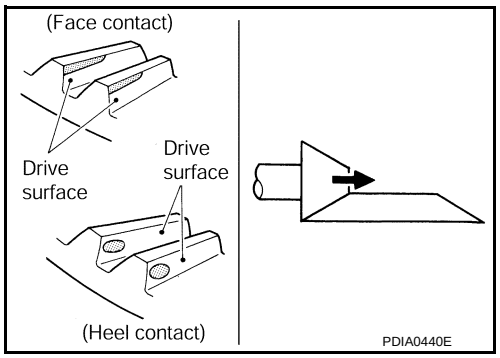
SDIA0207E

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



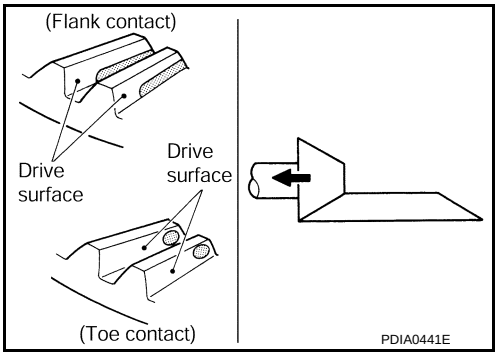
SDIA0517E

- If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.



PDIA0440E

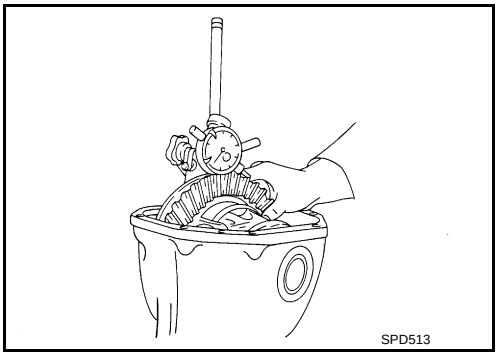
- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin pinion height adjusting washers to move drive pinion farther from drive gear.



BACKLASH

Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-29, "Disassembly".
2. Fit a dial indicator to the drive gear face to measure the backlash.



Standard

Backlash **: Refer to DLN-51, "Backlash".**

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

When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount.

When the backlash is small:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount.

CAUTION:

Never change the total amount of washers as it changes the bearing preload.

Inspection After Disassembly

INFOID:0000000005234984

DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never 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

- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

SIDE GEAR AND PINION MATE GEAR

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

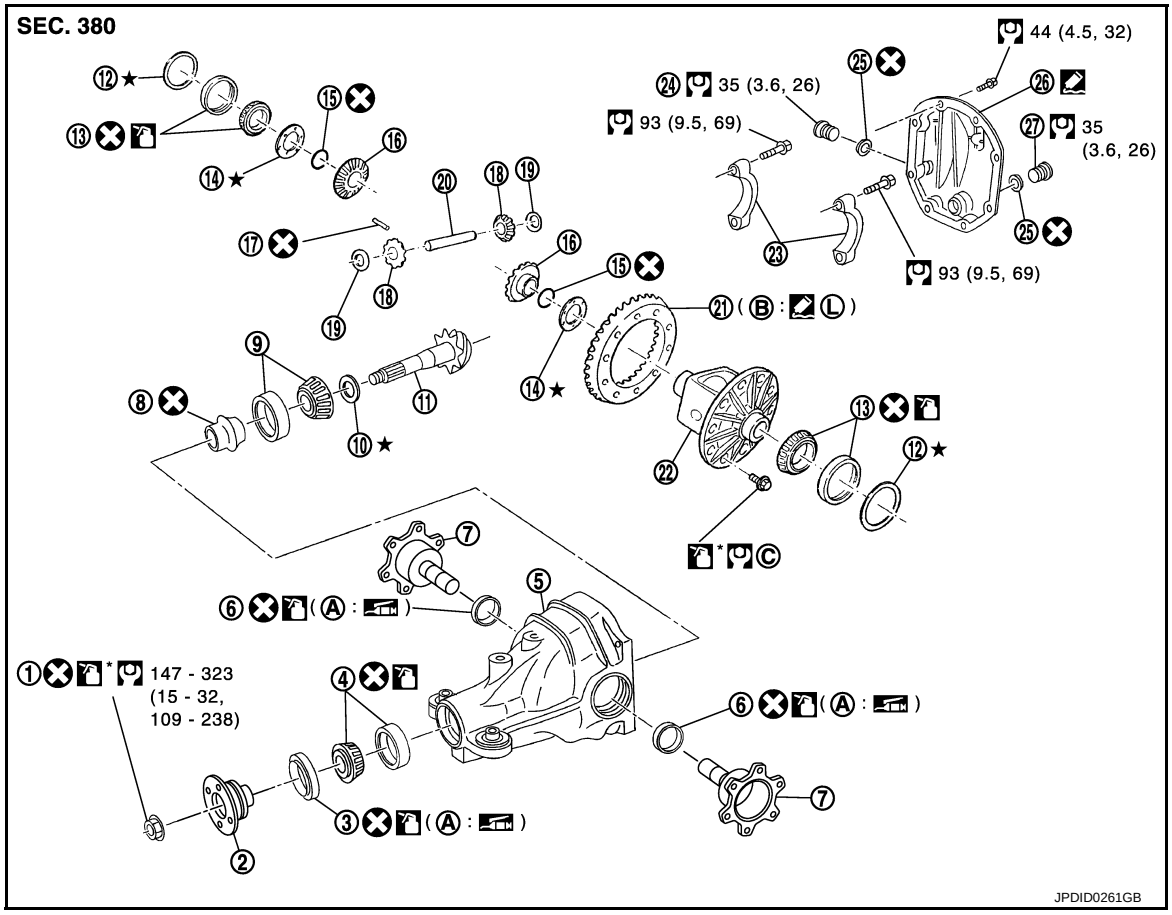
COMPANION FLANGE

- Clean up the disassembled parts.
- 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.

DRIVE PINION

Exploded View

INFOID:0000000005474070



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
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. Circular clip
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
A. Oil seal lip
B. Screw hole
C. Comply with the assembly procedure when tightening. Refer to DLN-31, "Assembly".

: Apply gear oil.

*: Apply anti-corrosion oil.

: Apply Genuine Silicone RTV or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

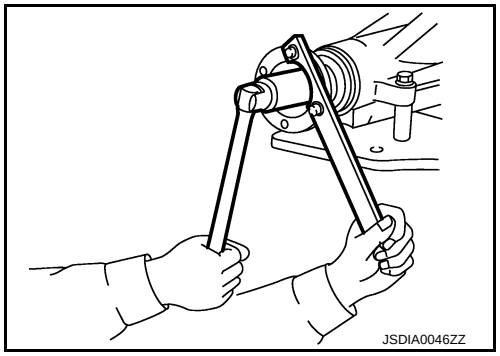
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

Refer to GI-4, "Components" for symbols not described on the above.

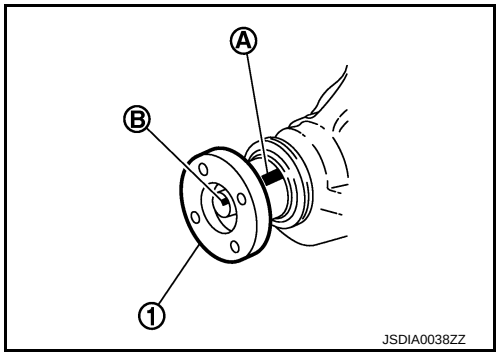
Disassembly

INFOID:0000000005234986

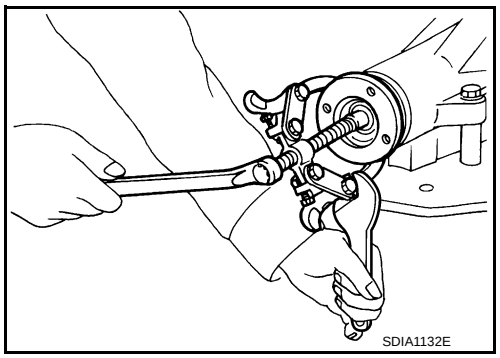
1. Remove differential case assembly. Refer to DLN-29, "Disassembly".
2. Remove drive pinion lock nut with the flange wrench (commercial service tool).



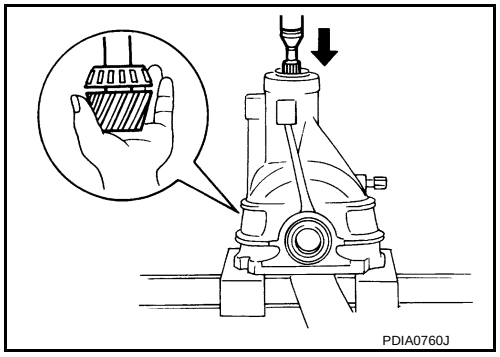
3. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.
NOTE:
The matching mark on the final drive companion flange indicates the maximum vertical runout position.
When replacing companion flange, matching mark is not necessary.



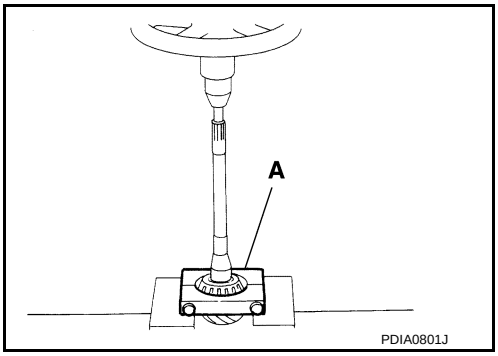
4. Remove companion flange using the suitable pullers.



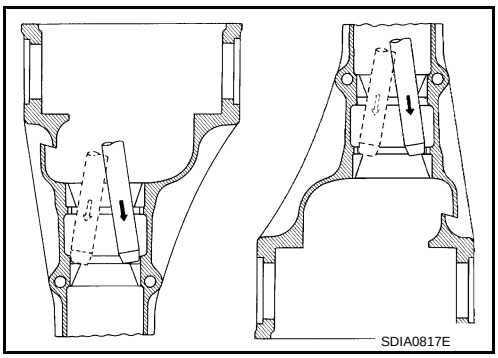
5. Press drive pinion assembly out of gear carrier.
CAUTION:
Never drop drive pinion assembly.
6. Remove front oil seal.
7. Remove side oil seal.
8. Remove pinion front bearing inner race.
9. Remove collapsible spacer.



10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).



11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.
CAUTION:
Never damage gear carrier.



Assembly

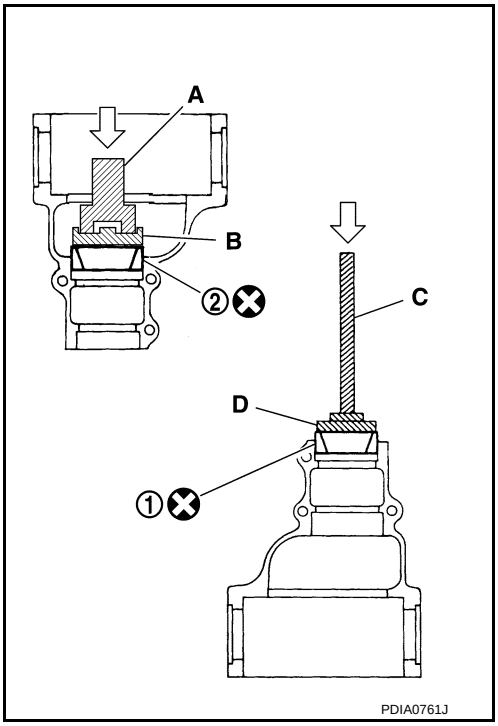
INFOID:0000000005234987

1. Install front bearing outer race (1) and rear bearing outer race (2) using drifts.

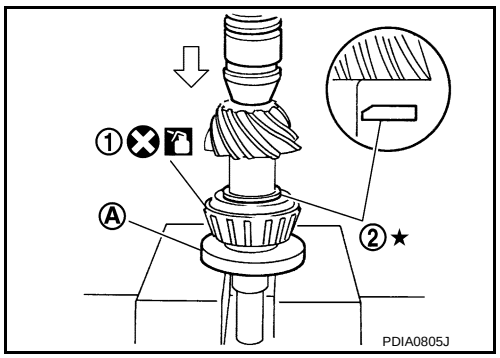
A : Drift [SST: ST30720000 (J-25405)]
B : Drift [SST: KV40105230 (—)]
C : Drift bar [SST: ST30611000 (J-25742-1)]
D : Drift [SST: ST30613000 (J-25742-3)]

CAUTION:
- **At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.**
- **Never reuse pinion front and rear bearing outer race.**

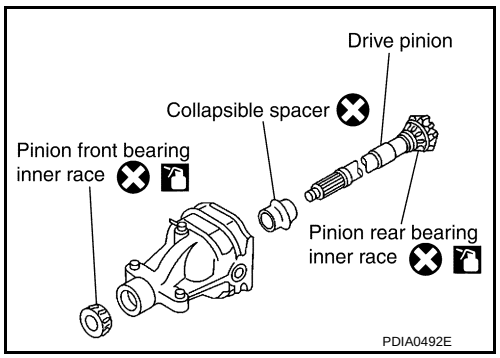
2. Select drive pinion height adjusting washer. Refer to DLN-46, "Adjustment".



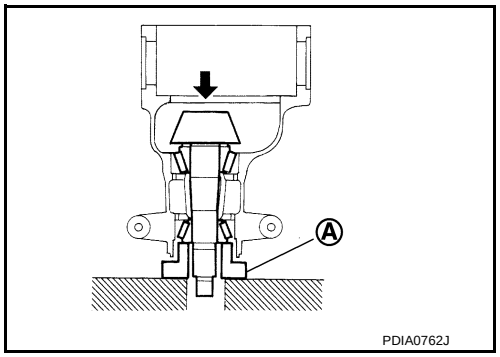
3. Install selected drive pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30901000 (J-26010-01)].
CAUTION:
- **Be careful of the direction of pinion height adjusting washer. (Assemble as shown in the figure.)**
- **Never reuse pinion rear bearing inner race.**



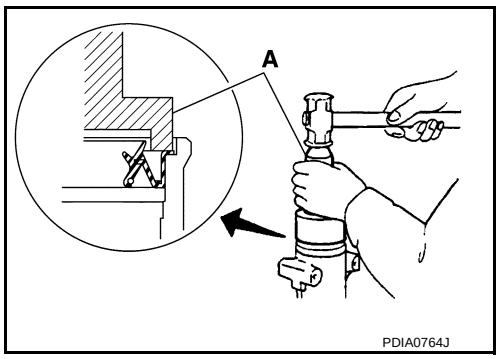
4. Assemble collapsible spacer to drive pinion.
CAUTION:
Never reuse collapsible spacer.
5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.
6. Apply gear oil to pinion front bearing, and assemble pinion front bearing inner race to drive pinion assembly.
CAUTION:
Never reuse pinion front bearing inner race.



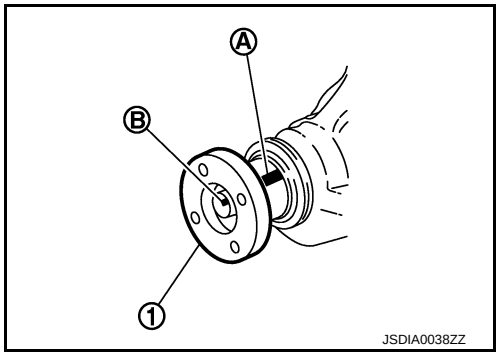
7. Using suitable spacer (A), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



8. Using the drift (A) [SST: ST30720000 (J-25405)], install front oil seal as shown in figure.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



9. Install companion flange (1).
NOTE:
When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange.



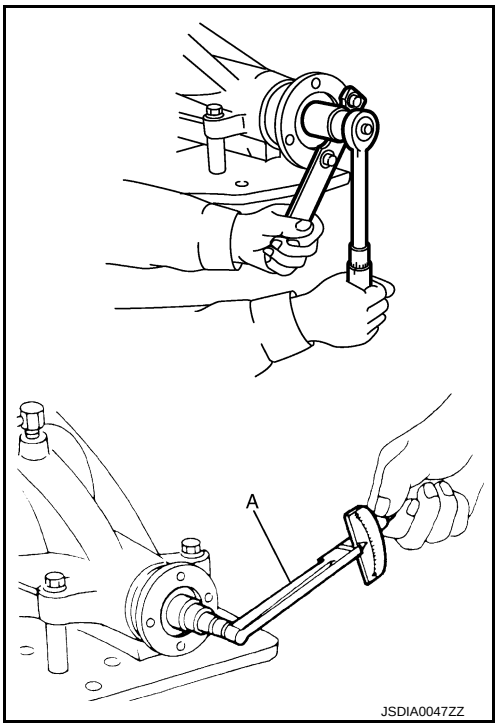
10. Apply anti-corrosion oil to the thread and seat of drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion.
    CAUTION:
    Never reuse drive pinion lock nut.
11. Adjust to the drive pinion lock nut tightening torque and pinion bearing preload torque.

    A : Preload gauge [SST: ST3127S000 (J-25765-A)]

    Standard

    Pinion bearing preload : Refer to DLN-51, "Preload Torque".

    CAUTION:
    - **Adjust to the lower limit of the drive pinion lock nut tightening torque first.**
    - **If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.**
    - **After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.**



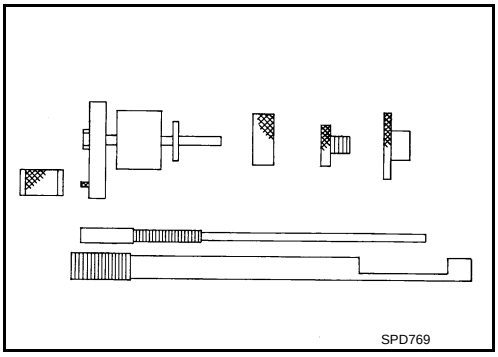
12. Install differential case assembly. Refer to DLN-31, "Assembly".
    CAUTION:
    Never install rear cover at this timing.
13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to DLN-36, "Adjustment" and DLN-46, "Adjustment".
    Recheck above items. Readjust the above description, if necessary.
14. Check total preload torque. Refer to DLN-36, "Adjustment".
15. Install rear cover. Refer to DLN-31, "Assembly".

Adjustment

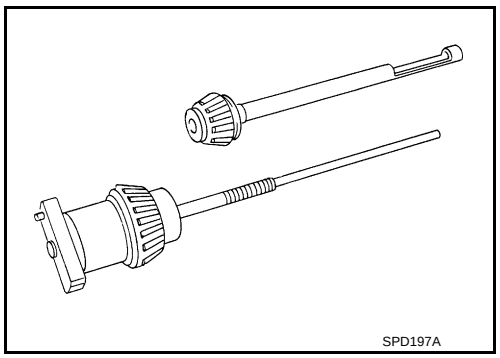
INFOID:0000000005234988

PINION GEAR HEIGHT

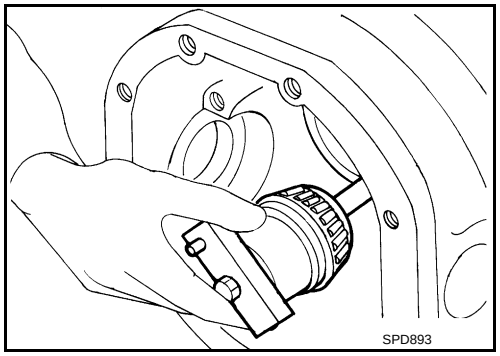
1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the differential shim selector tool [SST: — (J-34309)].



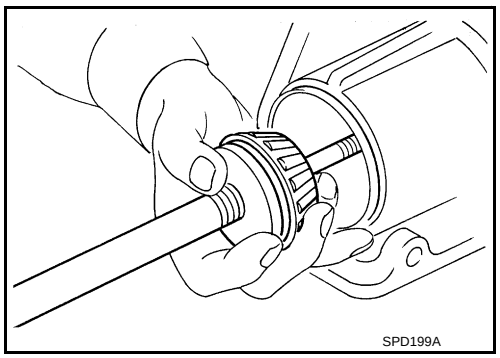
- **Pinion front bearing;** make sure the J-34309-3 pinion front bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the pinion front bearing pilot, J-34309-5, to secure the bearing in its proper position.
- **Pinion rear bearing;** the pinion rear bearing pilot, J-34309-8, is 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).


SPD197A

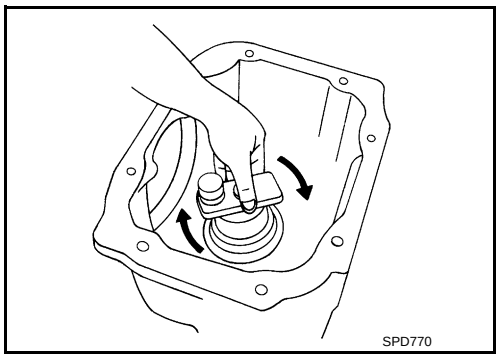
3. Install the pinion rear bearing inner race into gear carrier. Then place the pinion preload shim selector tool, J-34309-1, gauge screw assembly.


SPD893

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 gear carrier. Make sure that the pinion height gauge plate, J-34309-16, turns a full 360 degrees. Tighten the two sections together by hand.


SPD199A

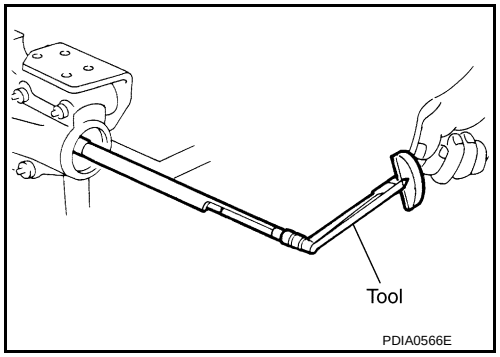
5. Turn the assembly several times to seat the bearings.


SPD770

6. Measure the turning torque at the end of the J-34309-2 gauge anvil using preload gauge [SST: ST3127S000 (J-25765-A)].

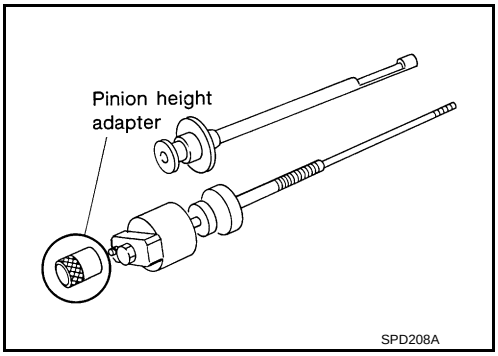
Standard

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

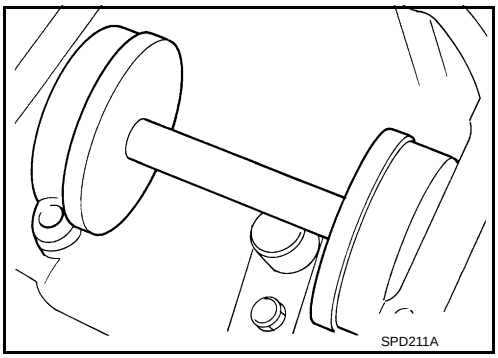


PDIA0566E

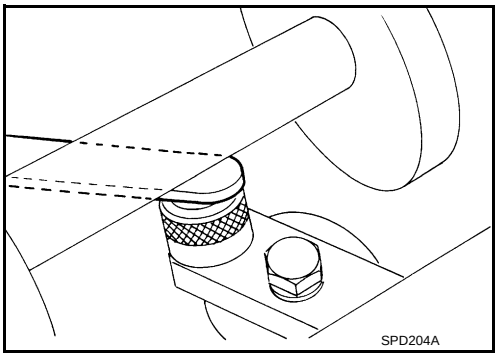
7. Place the J-34309-11 “R200A” pinion height adapter onto the gauge plate and tighten it by hand.
CAUTION:
Make sure all machined surfaces are clean.



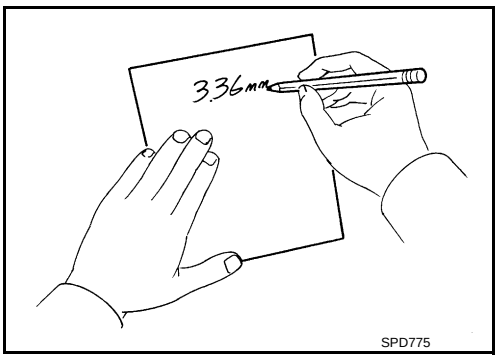
8. Position the side bearing discs, J-25269-4, and arbor firmly into the side bearing bores. Install the bearing caps and tighten bearing cap mounting bolts to the specified torque. Refer to DLN-42, "Exploded View".



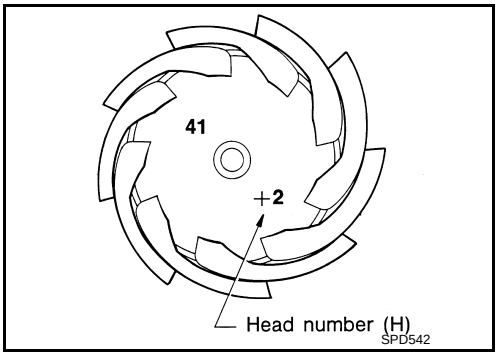
9. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and J-34309-101 feeler gauge. Measure the distance between the J-34309-11 pinion height adapter including the standard gauge and the arbor.



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

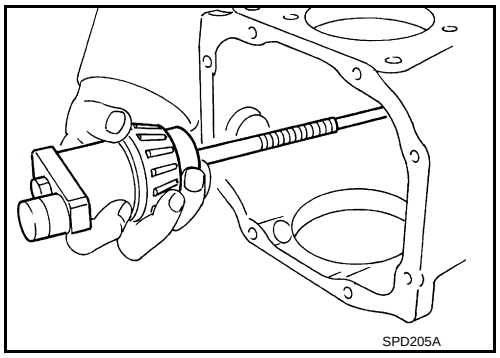


11. Correct the pinion height washer size by referring to the “pinion head number”.
There are two numbers painted on the drive pinion. The first one refers to the drive pinion and drive gear as a matched set. This number should be the same as the number on the drive gear. The second number is the “pinion 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.
13. Remove the J-34309 differential shim selector tool from the final drive housing. Then disassemble to retrieve the pinion bearings.

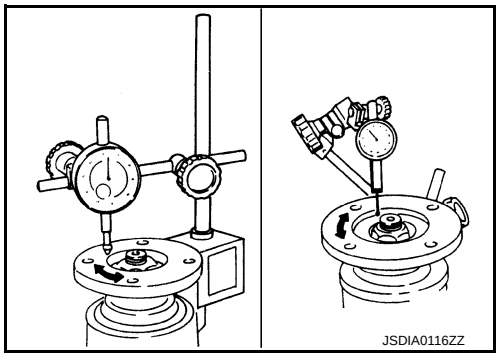

SPD205A

COMPANION FLANGE RUNOUT

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

Limit

Companion flange runout **: Refer to DLN-51, "Companion Flange Runout".**


JSDIA0116ZZ

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

Limit

Inner side of companion flange runout **: Refer to DLN-51, "Companion Flange Runout".**

5. If the runout value is outside the runout limit, follow the procedure below to adjust.

a. Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.

b. If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.

c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

Inspection After Disassembly

INFOID:0000000005234989

DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never 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

- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

SIDE GEAR AND PINION MATE GEAR

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

COMPANION FLANGE

- Clean up the disassembled parts.
- 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.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000005234990

Applied model	2WD	
	VQ37VHR	
	M/T	A/T
Final drive model	R200	
Gear ratio	3.692	3.357
Number of teeth (Drive gear/Drive pinion)	48/13	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	

Drive Gear Runout

INFOID:0000000005234991

Unit: mm (in)

Item	Limit
Drive gear back face runout	0.05 (0.0020)

Differential Side Gear Clearance

INFOID:0000000005234992

Unit: mm (in)

Item	Standard
Side gear backlash (Clearance between side gear and differential case)	0.20 (0.0079) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)

Preload Torque

INFOID:0000000005234993

Unit: N·m (kg-m, in-lb)

Item	Standard
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)	2.85 – 3.75 (0.29 – 0.38, 26 – 33)

Backlash

INFOID:0000000005234994

Unit: mm (in)

Item	Standard
Drive gear to drive pinion gear	0.10 – 0.15 (0.0039 – 0.0059)

Companion Flange Runout

INFOID:0000000005234995

Unit: mm (in)

Item	Limit
Companion flange face runout	0.08 (0.0031)
Inner side of the companion flange runout	0.08 (0.0031)

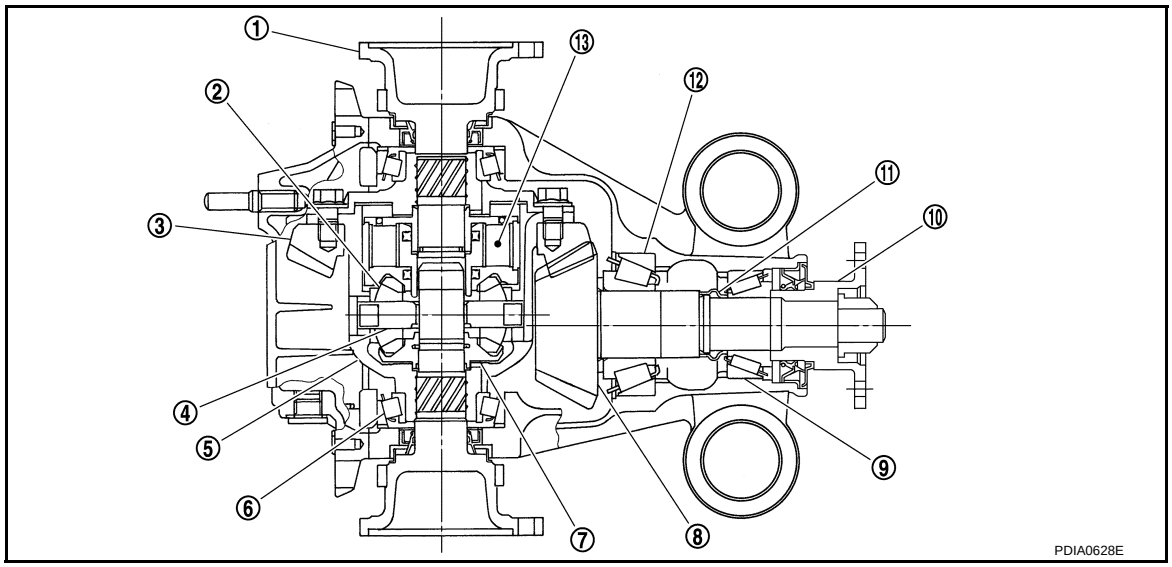
SYSTEM DESCRIPTION

REAR FINAL DRIVE ASSEMBLY

System Diagram

INFOID:0000000005234996

CROSS-SECTIONAL VIEW



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

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000005234997

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

Reference		DLN-80, "Inspection After Disassembly"	DLN-76, "Adjustment"	DLN-80, "Inspection After Disassembly"	DLN-76, "Adjustment"	DLN-76, "Adjustment"	DLN-59, "Inspection"	DLN-6, "Inspection"	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH RAX section.	NVH in BR section.	NVH in ST 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	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Rear Final Drive

INFOID:0000000005234998

- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they never interfere with the function of the parts when applied.
- Overhaul should be done in a clean work area, it is preferable to work in dustproof area.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with a new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time when the unit is disassembled.
- 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-dry them.
- Be careful not to damage sliding surfaces and mating surfaces.
- Always use shop paper for cleaning the inside of components.
- 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.
- Never use cotton gloves or shop rags to prevent entering of lint.
- During assembly, observe the specified tightening torque, and apply new gear oil, petroleum jelly, or multipurpose grease as specified for each vehicle, if necessary.

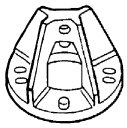
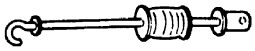
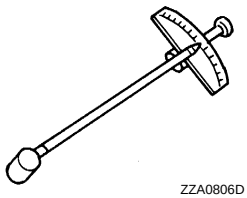
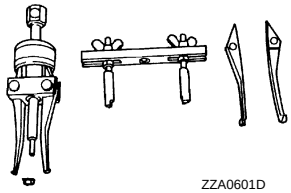
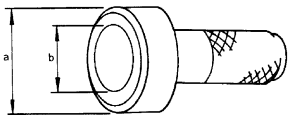
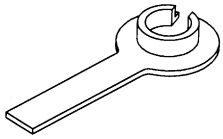
PREPARATION

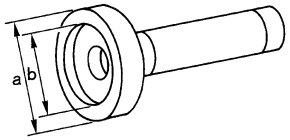
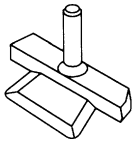
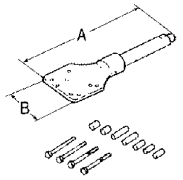
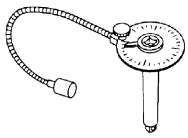
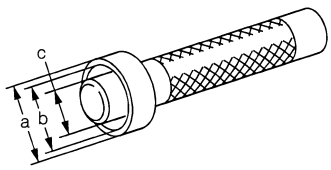
PREPARATION

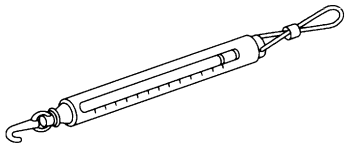
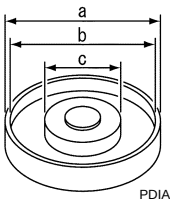
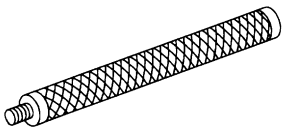
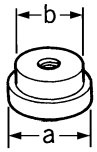
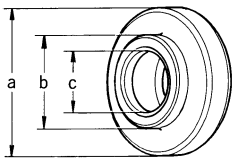
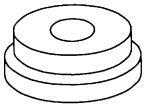
Special Service Tools

INFOID:0000000005234999

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

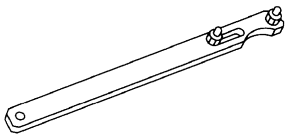
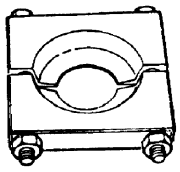
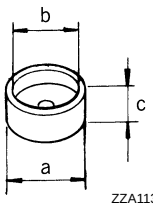
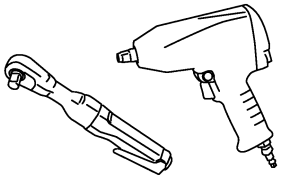
Tool number (Kent-Moore No.) Tool name	Description
KV40104100 (—) Attachment  ZZA0804D	Removing side flange
ST36230000 (J-25840-A) Sliding hammer  ZZA0803D	Removing side flange
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	Measuring pinion bearing preload and total preload
KV381054S0 (J-34286) Puller  ZZA0601D	Removing front oil seal
ST30720000 (J-25405) Drift a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.  ZZA0811D	• Installing front oil seal • Installing pinion rear bearing outer race
KV38107900 (J-39352) Protector  S-NT129	Installing side flange

Tool number (Kent-Moore No.) Tool name	Description
KV38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.  ZZA1143D	Installing side oil seal
KV10111100 (J-37228) Seal cutter  S-NT046	Removing rear cover
KV38100800 (J-25604-01) Attachment A: 541 mm (21.30 in) B: 200 mm (7.87 in)  SDIA0267E	Fixing unit assembly
ST3306S001 (J-22888-D) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.	Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench  ZZA0120D	Tightening the drive gear mounting bolt
KV38100300 (J-25523) Drift a: 54 mm (2.13 in) dia. b: 46 mm (1.81 in) dia. c: 32 mm (1.26 in) dia.  ZZA1046D	Installing side bearing inner race

Tool number (Kent-Moore No.) Tool name		Description
— (J-8129) Spring gauge	 NT127	Measuring turning torque
KV40105230 (—) Drift a: 92 mm (3.62 in) dia. b: 86 mm (3.39 in) dia. c: 45 mm (1.77 in) dia.	 PDIA0591E	Installing pinion rear bearing outer race
ST30611000 (J-25742-1) Drift bar	 S-NT090	Installing pinion front bearing outer race (Use with ST30613000)
ST30613000 (J-25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.	 ZZA1000D	Installing pinion front bearing outer race
ST30901000 (J-26010-01) Drift a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35.2 mm (1.386 in) dia.	 ZZA0978D	Installing pinion rear bearing inner race
— (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

INFOID:0000000005235000

Tool name	Description
Flange wrench  NT035	Removing and installing drive pinion lock nut
Replacer  ZZA0700D	Removing pinion rear bearing inner race
Spacer a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia. c: 30 mm (1.18 in)  ZZA1133D	Installing pinion front bearing inner race
Power tool  PBIC0190E	Loosening bolts and nuts

PERIODIC MAINTENANCE

REAR DIFFERENTIAL GEAR OIL

Inspection

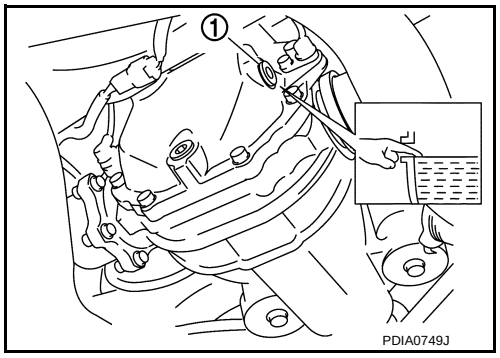
INFOID:0000000005235001

OIL LEAKAGE

Make sure that oil is not leaking from final drive assembly or around it.

OIL LEVEL

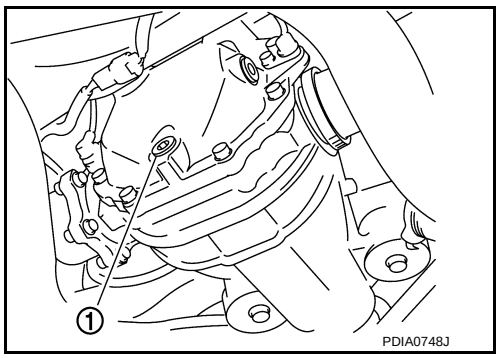
- Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug (1) and install it on final drive assembly. Refer to DLN-69, "Exploded View".
  CAUTION:
  Never reuse gasket.



Draining

INFOID:0000000005235002

1. Stop the engine.
2. Remove drain plug (1) and drain gear oil.
3. Set a gasket on drain plug (1) and install it to final drive assembly and tighten to the specified torque. Refer to DLN-69, "Exploded View".
   CAUTION:
   Never reuse gasket.

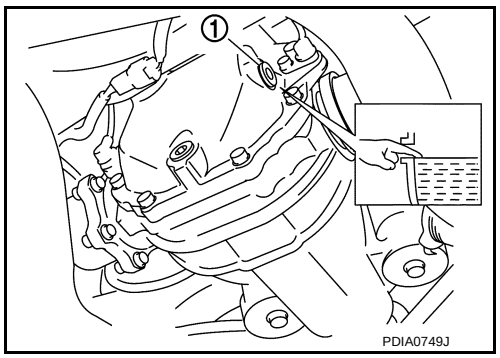


Refilling

INFOID:0000000005235003

1. Remove filler plug (1). Fill with new gear oil until oil level reaches the specified level near filler plug mounting hole.

Oil grade and viscosity	**: Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-15, "FOR MEXICO : Fluids and Lubricants" (except for NORTH AMERICA).**
Oil capacity	**: Refer to DLN-91, "General Specification".**



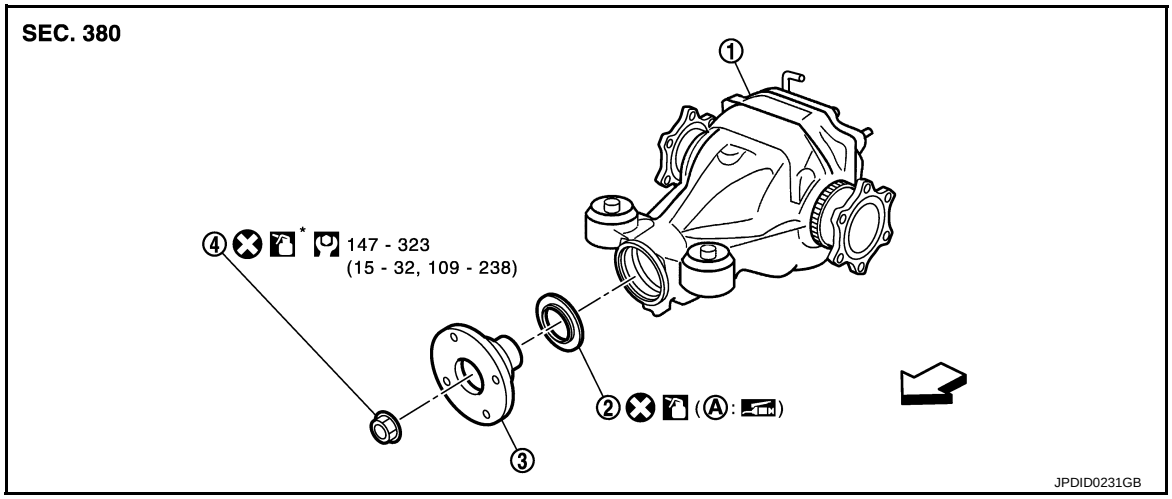
2. After refilling oil, check oil level. Set a gasket to filler plug (1), then install it to final drive assembly. Refer to DLN-69, "Exploded View".
   CAUTION:
   Never reuse gasket.

REMOVAL AND INSTALLATION

FRONT OIL SEAL

Exploded View

INFOID:0000000005235004



1. Final drive assembly
2. Front oil seal
3. Companion flange
4. Drive pinion lock nut

A. Oil seal lip

⇦: Vehicle front

: Apply gear oil.

*: Apply unti-corrosion oil.

Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000005235005

REMOVAL

CAUTION:

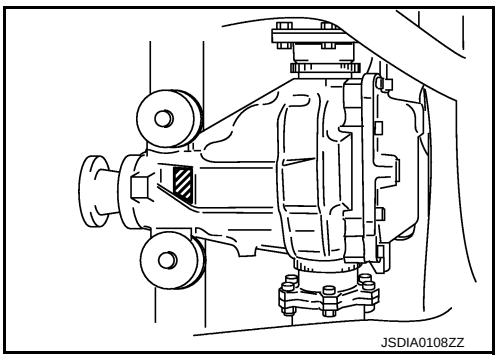
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to DLN-67, "Removal and Installation" and DLN-70, "Disassembly".

NOTE:

The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

Identification stamp of replacement frequency of front oil seal.

- The diagonally shaded area in the figure shows stamping point for replacement frequency of front oil seal.
- The following table shows if collapsible spacer replacement is needed before replacing front oil seal.
  When collapsible spacer replacement is required, disassemble final drive assembly to replace collapsible spacer and front oil seal. Refer to DLN-70, "Disassembly".



Stamp	collapsible spacer replacement
No stamp	Not required

Stamp	collapsible spacer replacement
“0” or “0” on the far right of stamp	Required
“01” or “1” on the far right of stamp	Not required

CAUTION:
Make a stamping after replacing front oil seal.

- After replacing front oil seal, make a stamping on the stamping point in accordance with the table below in order to identify replacement frequency.

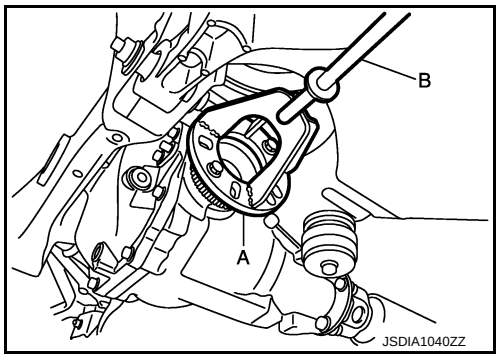
CAUTION:
Make a stamping made from left to right.

Stamp before stamping	Stamping on the far right	Stamping
No stamp	0	0
“0” (Front oil seal was replaced once.)	1	01
“01” (Collapsible spacer and front oil seal were replaced last time.)	0	010
“0” is on the far right. (Only front oil seal was replaced last time.)	1	...01
“1” is on the far right. (Collapsible spacer and front oil seal were replaced last time.)	0	...010

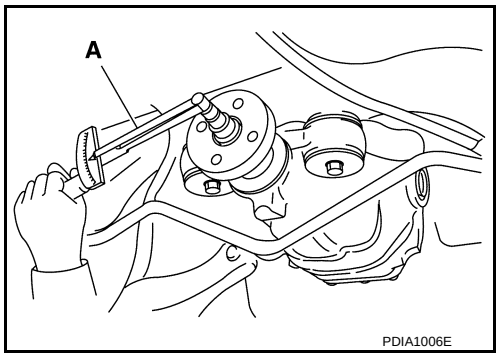
1. Drain gear oil. Refer to DLN-59, "Draining".
2. Make a judgment if a collapsible spacer replacement is required.
3. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
4. Remove rear wheel sensors. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
5. Remove drive shafts from final drive. Refer to RAX-10, "Exploded View".
6. Remove the side flanges as follows.
   1. Install attachment to side flange.

      A : Attachment [SST: KV40104100 (—)]
      B : Sliding hammer [SST: ST36230000 (J-25840-A)]

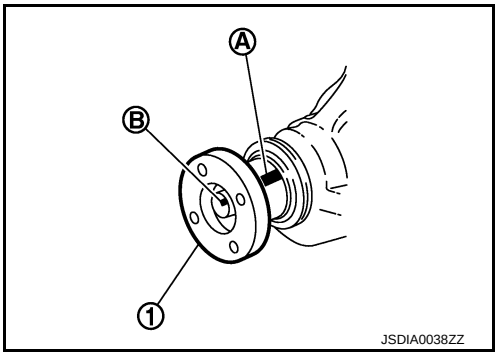
   2. Pull out the side flange with the sliding hammer.
7. Remove propeller shaft. Refer to DLN-7, "Exploded View".



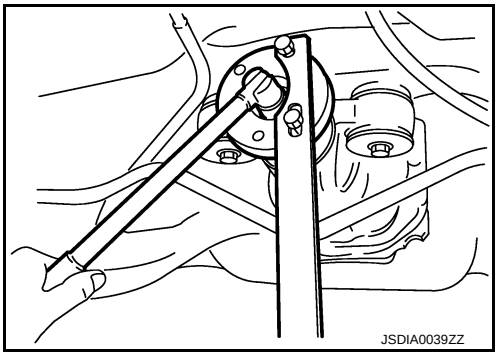
8. Measure the total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].
   NOTE:
   Record the preload measurement.



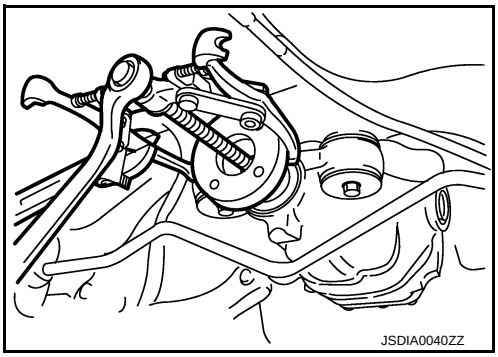
9. Put matching mark (B) on the end of the drive pinion. The matching mark (B) should be in line with the matching mark (A) on companion flange (1).
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.
NOTE:
The matching mark (A) on the final drive companion flange (1) indicates the maximum vertical runout position.



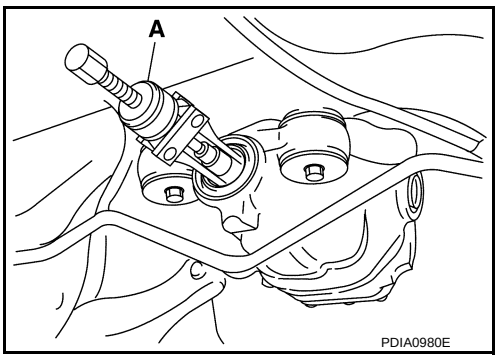
10. Remove drive pinion lock nut using the flange wrench (commercial service tool).



11. Remove companion flange using a puller.



12. Remove front oil seal using the puller (A) [SST: KV381054S0 (J-34286)].

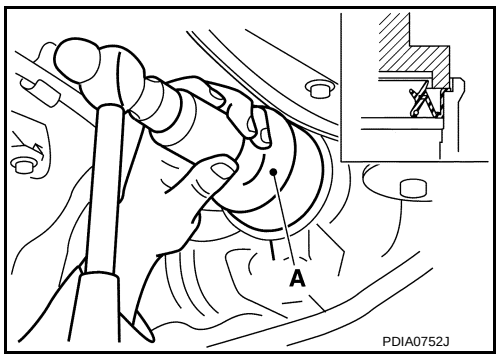


INSTALLATION

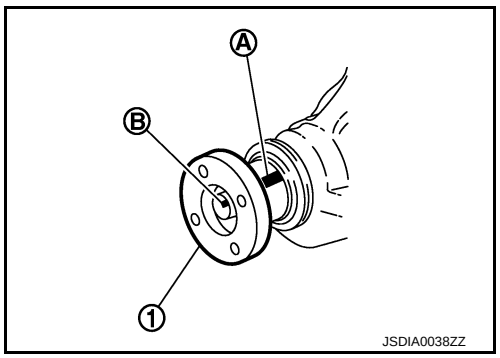
1. Apply multi-purpose grease to front oil seal lip.

2. Install front oil seal using the drift (A) [SST: ST30720000 (J-25405)] as shown in figure.

CAUTION:
- **Never reuse oil seal.**
- **Never incline oil seal when installing.**



3. Align the matching mark (B) of drive pinion with the matching mark (A) of companion flange (1), and then install the companion flange (1).



4. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion.

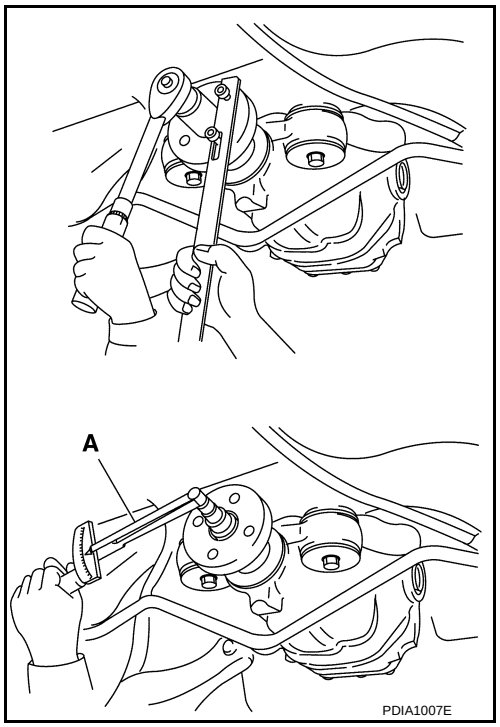
CAUTION:
Never reuse drive pinion lock nut.

5. Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values.

A: Preload gauge [SST: ST3127S000 (J-25765-A)]

Total preload torque	**: A value that add 0.1– 0.4 N·m (0.01 – 0.04 kg-m) to the measured value when removing.**

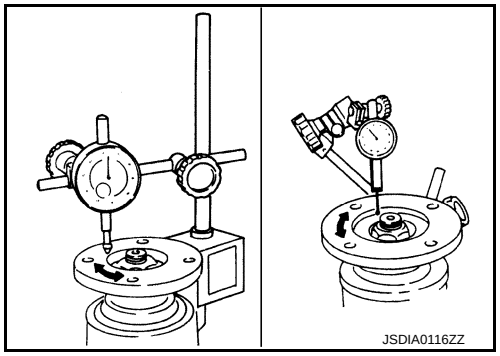
CAUTION:
- **Adjust to the lower limit of the drive pinion lock nut tightening torque first.**
- **If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.**



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

Limit	
Companion flange runout	**: Refer to DLN-91, "Companion flange Runout".**

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



Limit

Companion flange runout : Refer to DLN-91, "Companion flange Runout".

10. 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 position where the runout is the minimum.

b. If the runout value is still outside of the limit after the phase has been changed, possible causes are be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.

c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

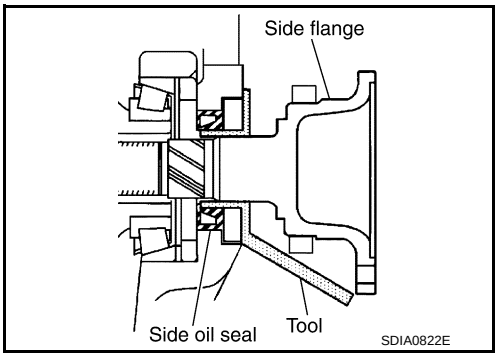
11. Make a stamping for identification of front oil seal replacement frequency. Refer to “Identification stamp of replacement frequency of front oil seal”.
CAUTION:
Make a stamping after replacing front oil seal.

12. Install propeller shaft. Refer to DLN-7, "Exploded View".

13. Install side flanges with the following procedure.

a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.

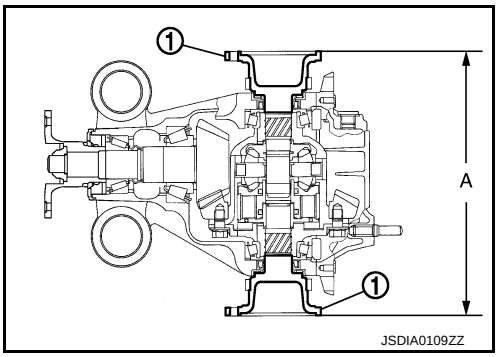
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.



c. Put a 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 that seems to affect the whole final drive.

d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

A : 326 – 328 mm (12.83 – 12.91 in)



14. Install drive shafts. Refer to RAX-10, "Exploded View".

15. Install rear wheel sensors. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".

16. Install center muffler. Refer to EX-5, "Exploded View".

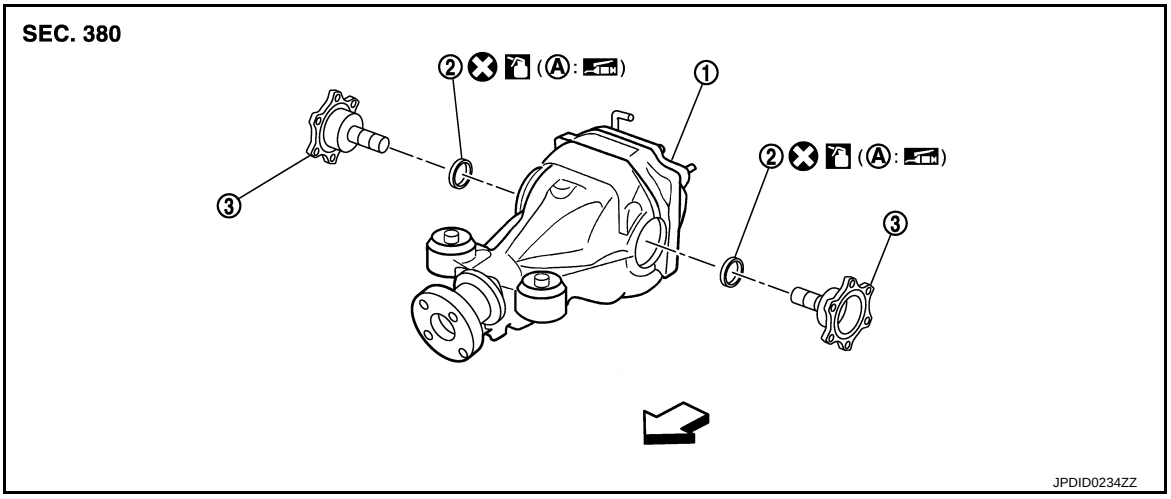
17. Refill gear oil to the final drive and check oil level. Refer to DLN-59, "Refilling".

18. Check the final drive for oil leakage. Refer to DLN-59, "Inspection".

SIDE OIL SEAL

Exploded View

INFOID:0000000005235006



1. Final drive assembly
2. Side oil seal
3. Side flange

A. Oil seal lip

⇦: Vehicle front

: Apply gear oil.

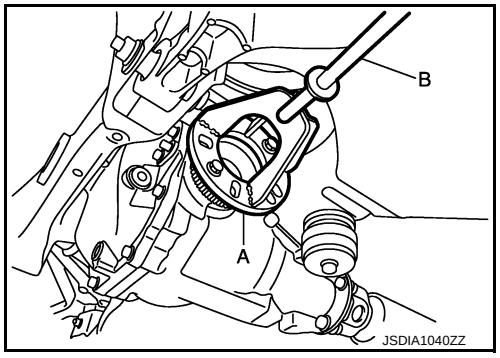
Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000005235007

REMOVAL

1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
2. Remove rear wheel sensor. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
3. Remove drive shaft from final drive with a power tool. Refer to RAX-10, "Exploded View".
4. Install attachment to side flange, and then pull out the side flange with the sliding hammer.



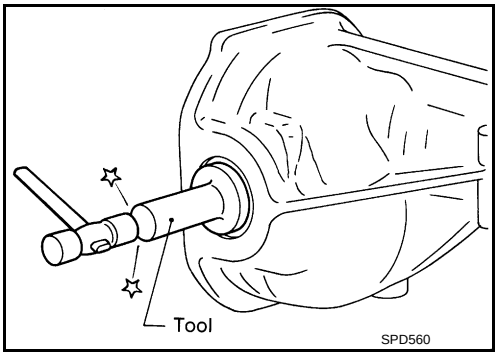
A : Attachment [SST: KV40104100 (—)]
B : Sliding hammer [SST: ST36230000 (J-25840-A)]

5. Remove side oil seal, using a suitable tool.
CAUTION:
Never damage gear carrier.

INSTALLATION

1. Apply multi-purpose grease to side oil seal lip.

2. Install side oil seal until it becomes flush with the case end, using the drift [SST: KV38100200 (J-26233)].
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**

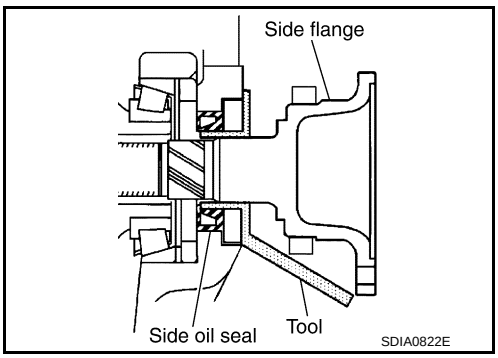


3. Install side flange with the following procedure.

a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.

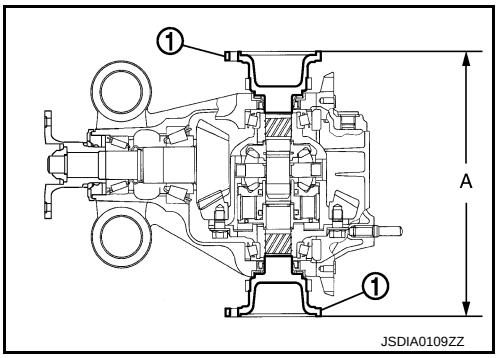
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.

c. Put a 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 that seems to affect the whole final drive.



d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

A : 326 – 328 mm (12.83 – 12.91 in)



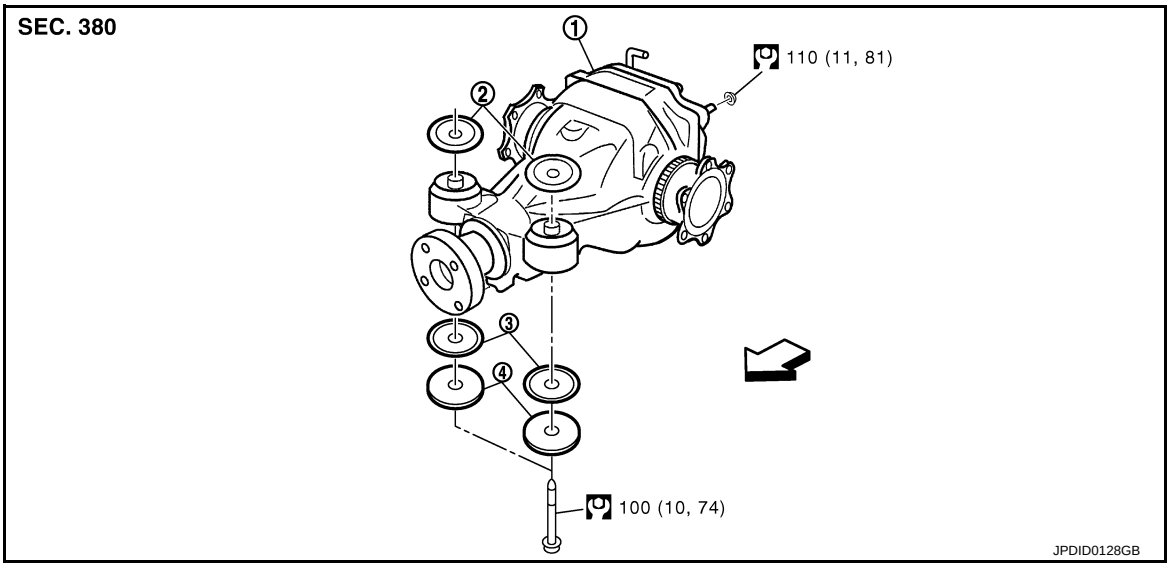
4. Install drive shaft. Refer to RAX-10, "Exploded View".
5. Install rear wheel sensor. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".
6. Install center muffler. Refer to EX-5, "Exploded View".
7. When oil leaks while removing, check oil level after the installation. Refer to DLN-59, "Inspection".

UNIT REMOVAL AND INSTALLATION

REAR FINAL DRIVE ASSEMBLY

Exploded View

INFOID:0000000005235008



1. Rear final drive assembly
2. Upper stopper
3. Lower stopper
4. Washer

⇦: Vehicle front

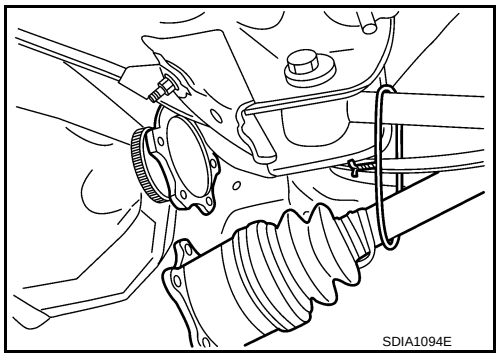
Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

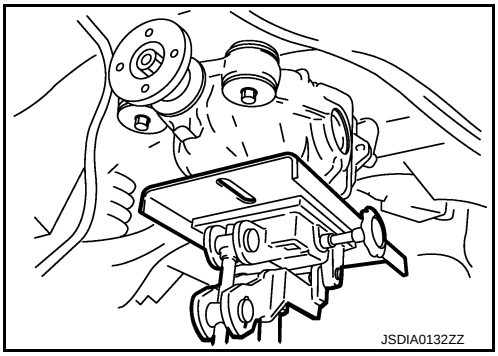
INFOID:0000000005235009

REMOVAL

1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
2. Remove diag brace with power tool. Refer to RSU-17, "Exploded View".
3. Remove rear stabilizer bar with a power tool. Refer to RSU-16, "Exploded View".
4. Remove propeller shaft from the final drive. Refer to DLN-7, "Exploded View".
5. Remove drive shafts from final drive with a power tool. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
6. Remove breather hose from the final drive.
7. Remove rear wheel sensors. Refer to BRC-98, "REAR WHEEL SENSOR : Exploded View".



8. Set a suitable jack to rear final drive assembly.
CAUTION:
Never place a jack on the rear cover (aluminum case).
9. Remove the mounting bolts and nuts connecting to the suspension member, and remove rear final drive assembly with a power tool.
CAUTION:
Secure rear final drive assembly to a suitable jack while removing it.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INSTALLATION

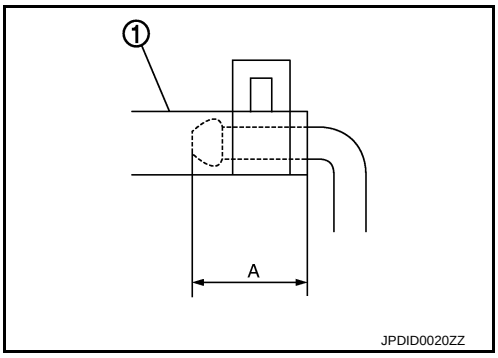
Note the following, and installation is in the reverse order of removal.

CAUTION:
Make sure there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.

- Install the breather hose (1) to breather connector until dimension (A) shown as follows.

A:

Final drive side	**: 20 mm (0.79 in)**
Suspension member side	**: 20.5 mm (0.807 in)**



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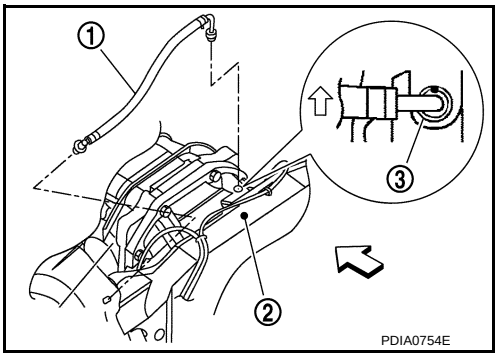
CAUTION:
- **Never reuse hose clamp.**
- **Install the hose clamp at the final drive side, with the tab facing downward.**
- **Install the hose clamp at the suspension member side, with the tab facing downward.**

- If remove breather connector, install breather hose (1) as shown in the figure.
- For installation, insert the breather connector to suspension member (2). Install metal connector (3) to rear cover with aiming painted marking to the front of vehicle.

⇦: Vehicle front



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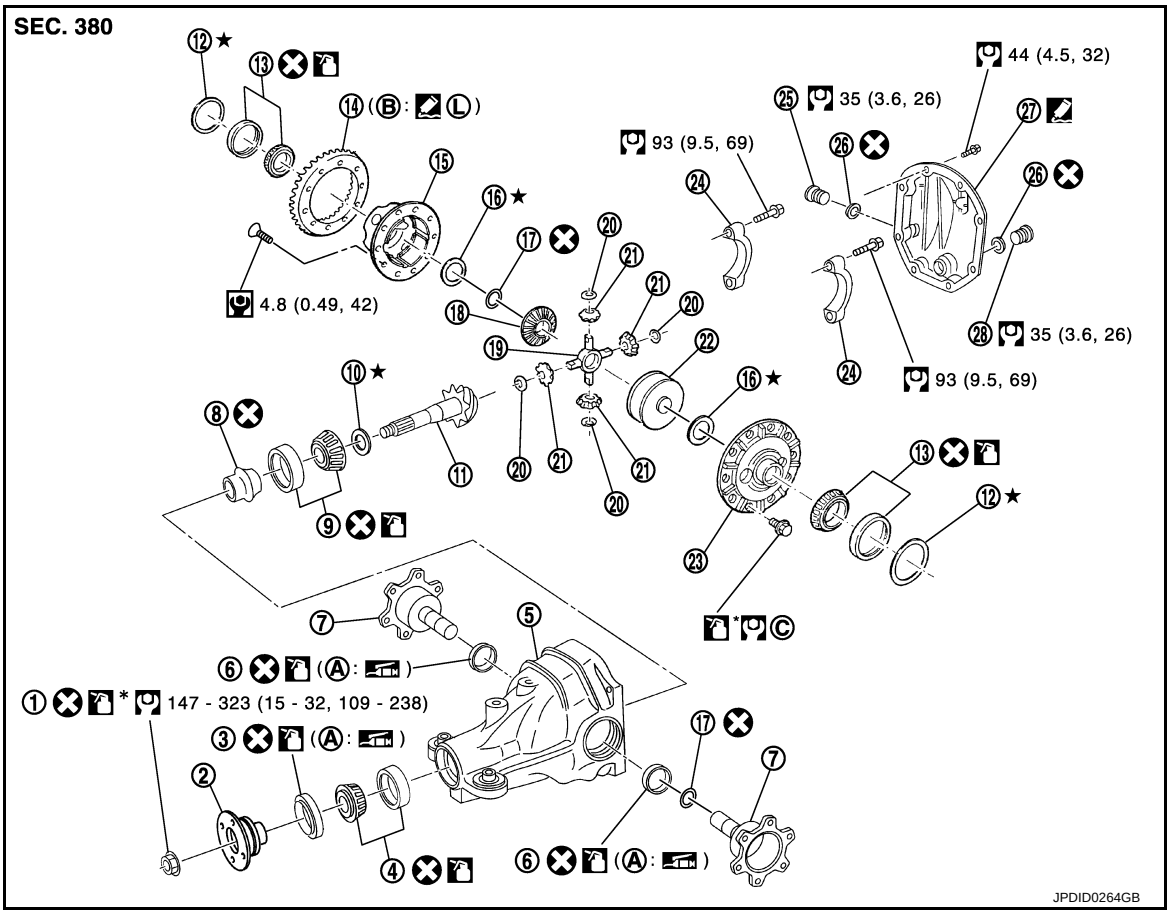
CAUTION:
Never reuse breather connector and metal connector.
- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-59, "Inspection".

UNIT DISASSEMBLY AND ASSEMBLY

DIFFERENTIAL ASSEMBLY

Exploded View

INFOID:0000000005235010



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	8. Collapsible spacer	9. Pinion rear bearing
10. Pinion height adjusting washer	11. Drive pinion	12. Side bearing adjusting washer
13. Side bearing	14. Drive gear	15. Differential case B
16. Side gear thrust washer	17. Circular clip	18. Side gear
19. Pinion mate shaft	20. Pinion mate thrust washer	21. Pinion mate gear
22. Viscous coupling	23. Differential case A	24. Bearing cap
25. Filler plug	26. Gasket	27. Rear cover
28. Drain plug		
A. Oil seal lip	B. Screw hole	C. Comply with the assembly procedure when tightening. Refer to DLN-72, "Assembly".

: Apply gear oil.

*: Apply anti-corrosion oil.

: Apply Genuine Silicone RTV or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

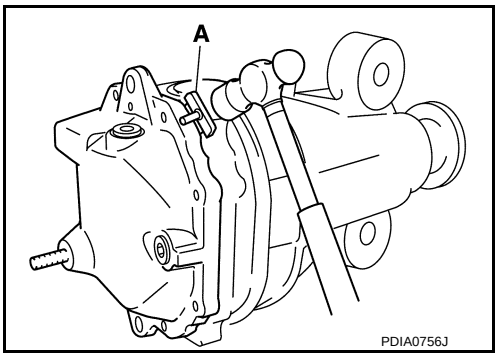
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

Refer to GI-4, "Components" for symbols not described on the above.

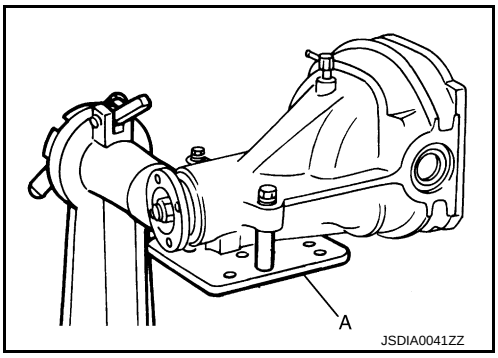
Disassembly

INFOID:0000000005235011

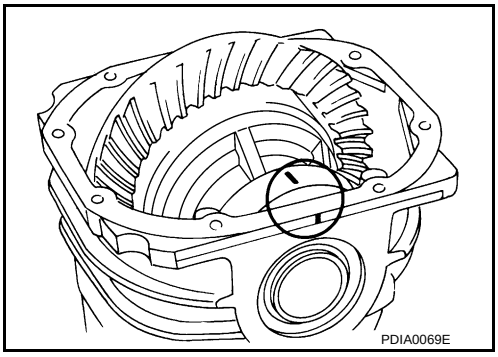
1. Drain gear oil, if necessary.
2. Remove side flanges.
3. Remove rear cover mounting bolts.
4. Remove rear cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and rear cover.
   CAUTION:
   - **Never damage the mating surface.**
   - **Never insert flat-bladed screwdriver, this may damage the mating surface.**



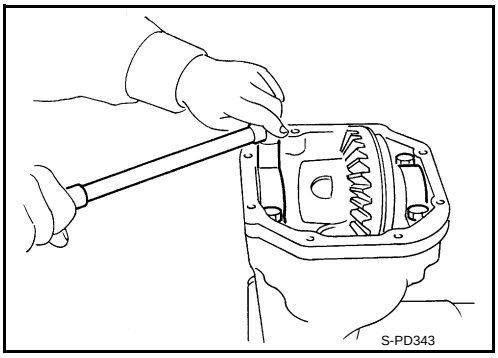
5. Using two spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].



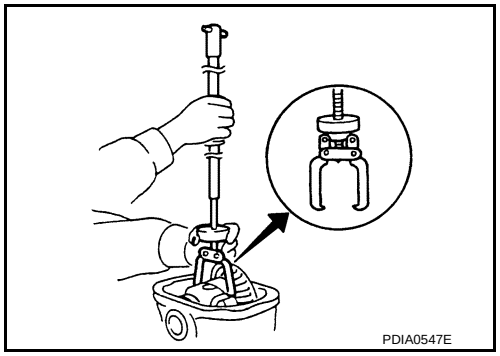
6. For proper reinstallation, paint matching marks on one side of the bearing cap.
   CAUTION:
   - **For matching marks, use paint. Never damage bearing caps and gear carrier.**
   - **Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.**



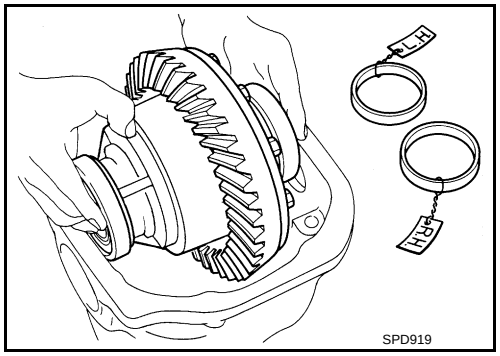
7. Remove bearing caps.



8. Lift differential case assembly out with a suitable tool.



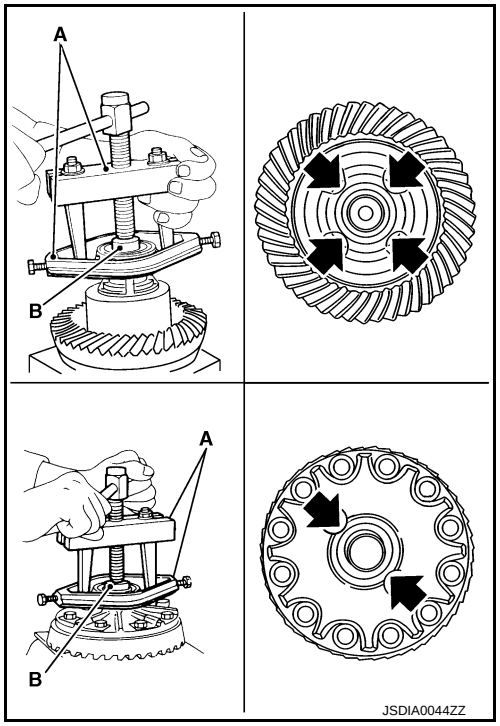
- Keep side bearing outer races together with inner race. Never mix them up.
  Also, keep side bearing adjusting washers together with bearings.



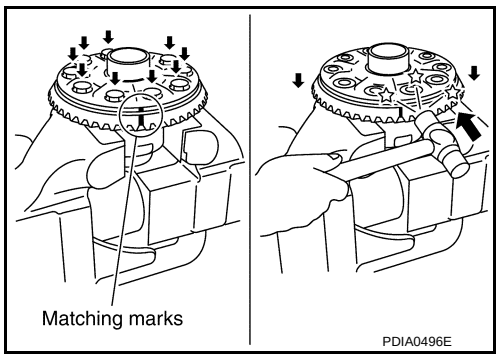
9. Remove side bearing inner race.
   To prevent damage to bearing, engage puller jaws in groove (⬅).

   A: Puller [SST: ST33051001 (J-22888-20)]
   B: Base [SST: ST33061000 (J-8107-2)]

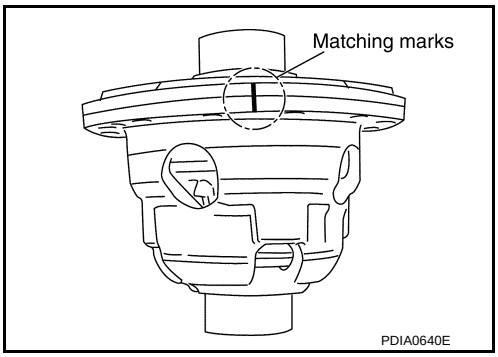
   CAUTION:
   - **To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.**
   - **It is not necessary to remove side bearing inner race except when it is replaced.**



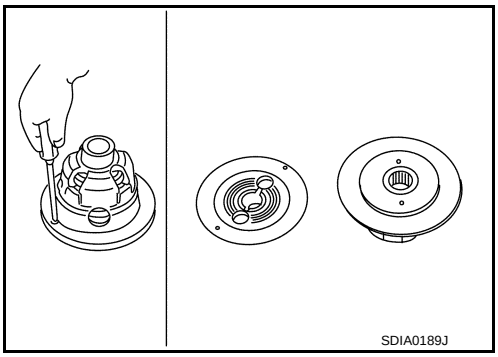
10. For proper reinstallation, paint matching marks on one differential case assembly.
    CAUTION:
    For matching marks, use paint. Never damage differential case and drive gear.
11. Remove drive gear mounting bolts.
12. Tap drive gear off differential case assembly with a soft hammer.
    CAUTION:
    Tap evenly all around to keep drive gear from bending.



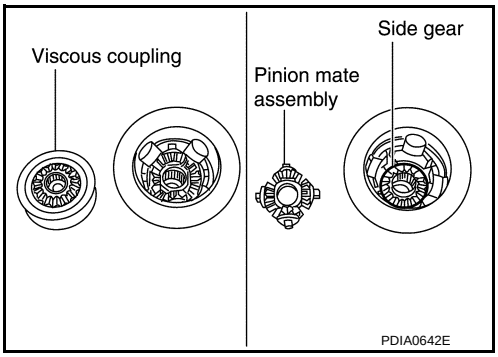
13. Put matching marks with paint.



14. Loosen screws on differential cases A and B.



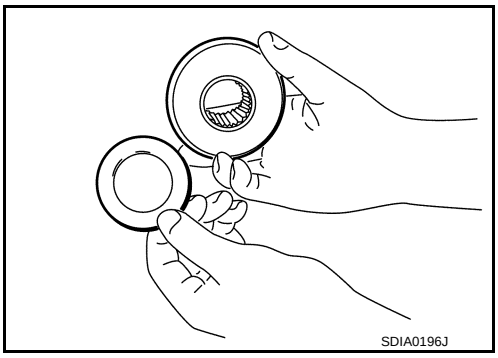
15. Separate differential case A and B, then remove viscous coupling, pinion mate gear, pinion mate thrust washer, side gear, pinion mate shaft, circular clip and side gear thrust washer from differential cases.
16. Remove side oil seal, using a suitable tool.
CAUTION:
Never damage gear carrier.



Assembly

INFOID:0000000005235012

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



2. Install side gear and thrust washer into differential case B.

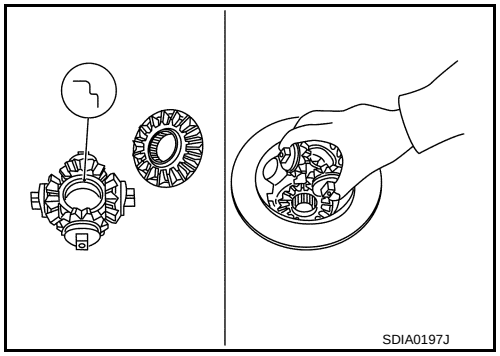
CAUTION:

Make sure that the circular clip is installed to side gear.

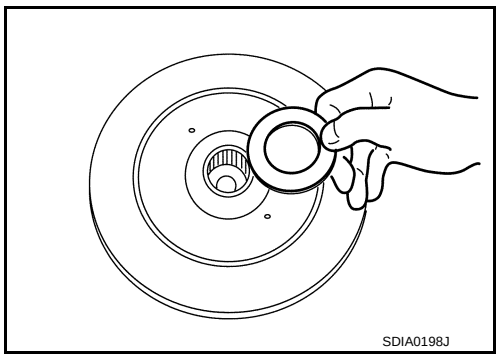
3. Install pinion mate assembly (pinion mate shaft, pinion mate gears and pinion mate thrust washers) into differential case B.

CAUTION:

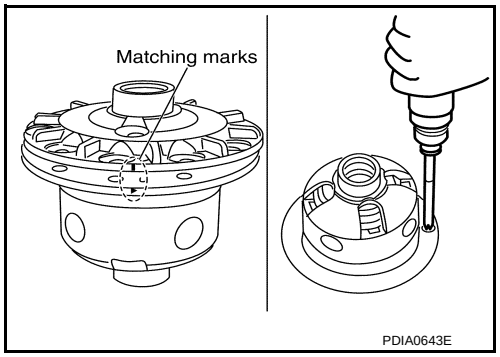
Install the pinion mate shaft groove side to side gear.



4. Install viscous coupling into differential case B.
5. Install side gear thrust washer with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the viscous coupling.



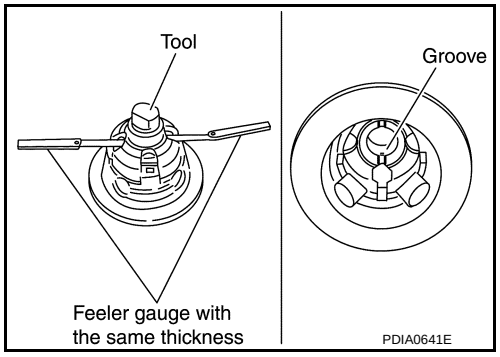
6. Align the matching marks and install differential case A into differential case B.



7. Measure side gear end play. If necessary, select the appropriate side gear thrust washer.

a. Place differential assembly so that right side gear is on the upper side.

b. Measure the clearance between right side gear back and differential case using feeler gauge, while rotating right side gear with a suitable tool attached to splines.



Standard

Side gear back clearance **: Refer to DLN-91, "Differential Side Gear Clearance".**

CAUTION:

- **Never place feeler gauge at groove side of differential case.**
- **To prevent side gear from tilting, insert feeler gauges with the same thickness from both sides.**

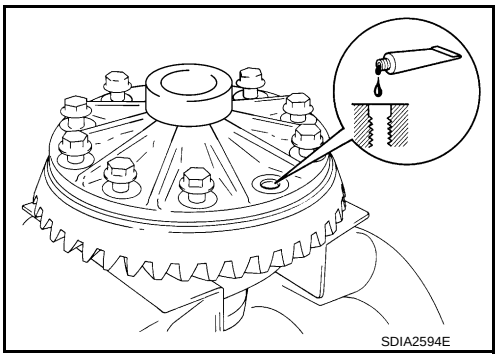
c. If the back clearance is outside the specification, use a thicker/thinner side gear thrust washer to adjust.

When the back clearance is large:	**Use a thicker thrust washer.**
When the back clearance is small:	**Use a thinner thrust washer.**

CAUTION:

- **Adjust the clearance with the left side gear thrust washer only.**
- **Only one side gear thrust washer can be selected.**

8. Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".



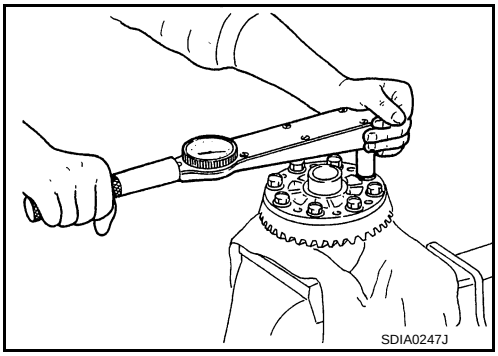
CAUTION:
Clean and degrease drive gear back and threaded holes sufficiently.

9. Install the drive gear to differential case.

CAUTION:
Align the matching marks of differential case and drive gear.

10. Tighten the mounting bolts with the following procedure.

CAUTION:
Apply anti-corrosin oil to the thread and seat of mounting bolts.



a. Tighten the bolts in a crisscross fashion to the specified torque.

Drive gear mounting bolts tightening torque	**: 78.5 N•m (8.0 kg-m, 58 ft-lb)**

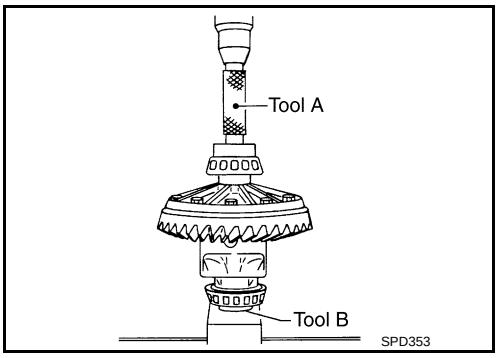
b. Tighten the bolts additionally to the specified angle.

Drive gear mounting bolts tightening angle	**: 31 to 36 degree**

CAUTION:
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

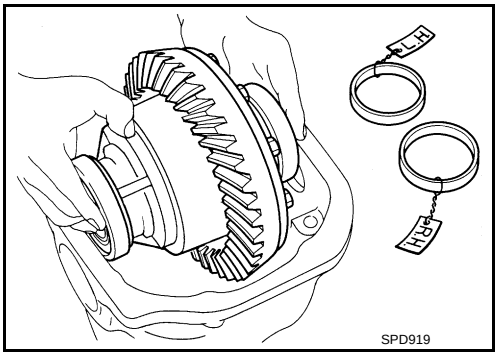
11. Press side bearing inner races to differential case, using the drift and the base.

A : Drift [SST: KV38100300 (J-25523)]
B : Base [SST: ST33061000 (J-8107-2)]

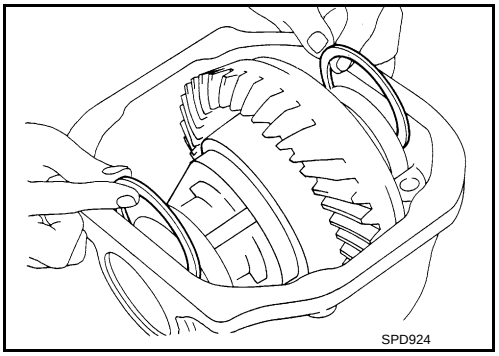


CAUTION:
Never reuse side bearing inner race.

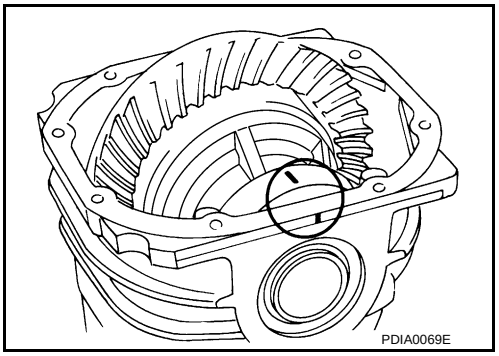
12. Install differential case assembly with side bearing outer races into gear carrier.
13. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to DLN-76, "Adjustment".



14. Insert selected left and right side bearing adjusting washers in place between side bearings and gear carrier. Refer to DLN-76, "Adjustment".

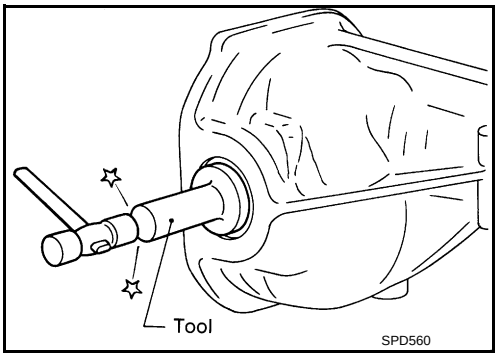


15. Align matching marks on bearing cap with that on gear carrier.
16. Install bearing caps and tighten bearing cap mounting bolts.

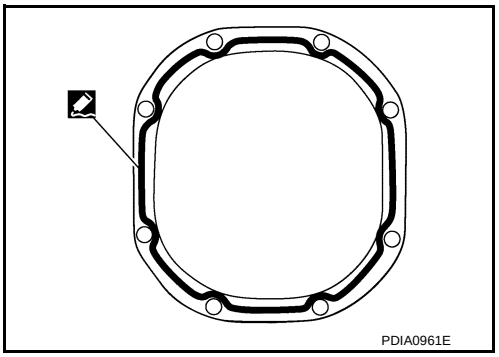


17. Using the drift [SST: KV38100200 (J-26233)], drive side oil seals until it becomes flush with the case end.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

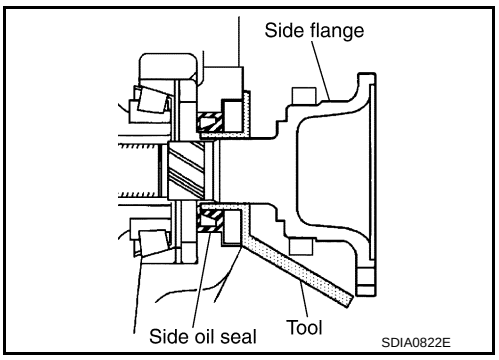
18. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to DLN-76, "Adjustment".
Recheck above items. Readjust the above description, if necessary.



19. Apply sealant to mating surface of rear cover.
Use Genuine Silicone RTV or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".
CAUTION:
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.
20. Install rear cover on gear carrier and tighten mounting bolts.



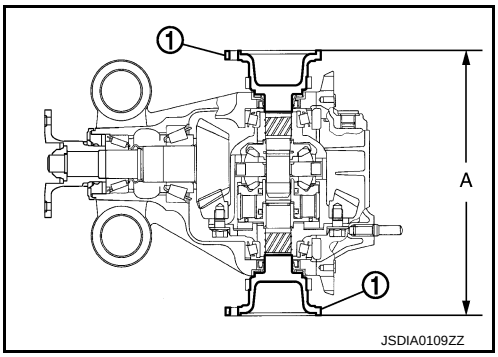
21. Install side flanges with the following procedure.
a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.



c. Put a 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 that seems to affect the whole final drive.

d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

A : 326 – 328 mm (12.83 – 12.91 in)



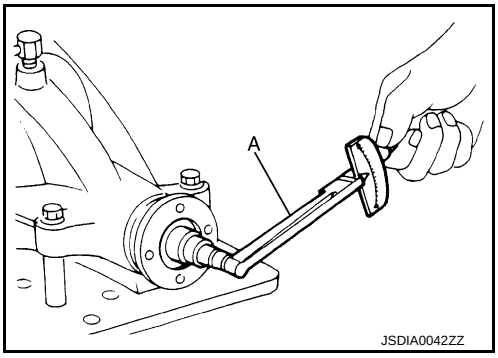
Adjustment

INFOID:0000000005235013

TOTAL PRELOAD TORQUE

- Before inspection and adjustment, drain gear oil.

1. Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
2. Remove side flanges.
3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
4. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
5. Measure total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].



Standard

Total preload torque : Refer to DLN-91, "Preload Torque".

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

- If 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 large

On pinion bearings: Replace the collapsible spacer.

On side bearings: Use thinner side bearing adjusting washers by the same amount to each side.

When the preload is small

On pinion bearings: Tighten the drive pinion lock nut.

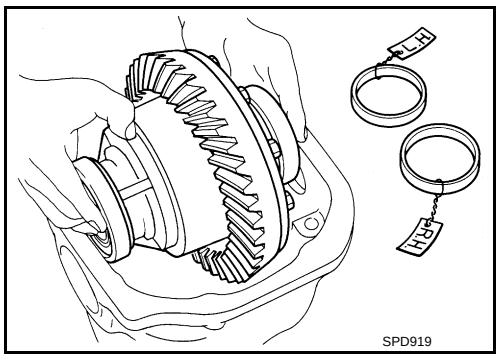
On side bearings: Use thicker side bearing adjusting washers by the same amount to each side.

SIDE BEARING PRELOAD

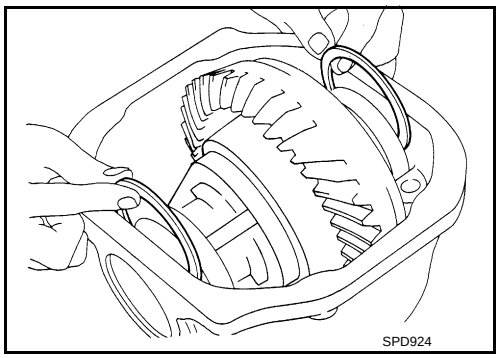
- Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-70, "Disassembly".

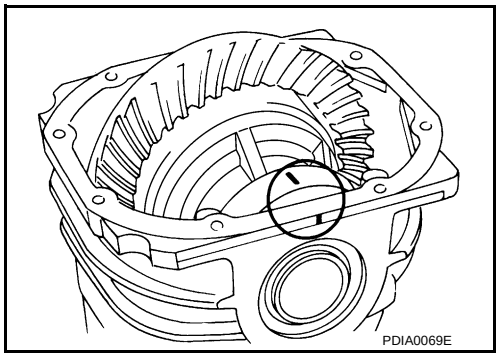
2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
3. Place the differential case, with side bearings and bearing races installed, into gear carrier.



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

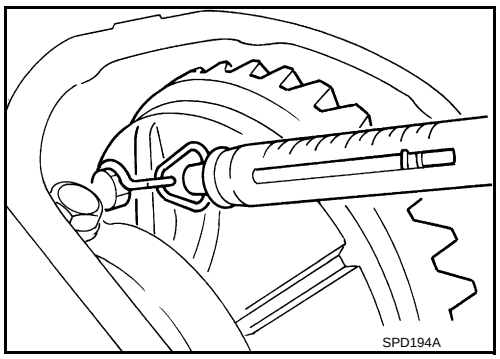


5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.
6. Turn the carrier several times to seat the bearings.



7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (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**



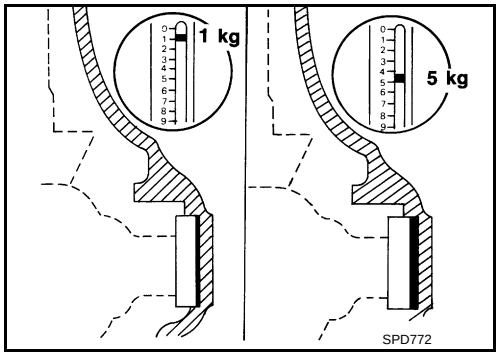
8. If the turning torque is outside the specification, use a thicker/ thinner side bearing adjusting washer to adjust.

If the turning torque is less than the specified range:

Use a thicker thrust washer.

If the turning torque is greater than the specification:

Use a thinner thrust washer.



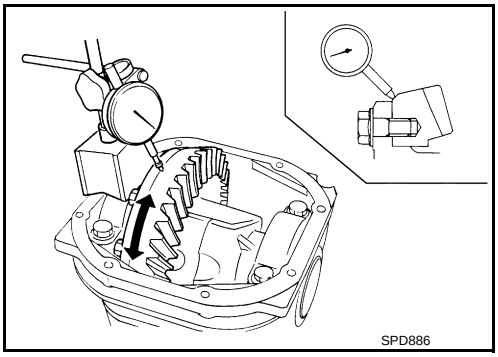
CAUTION:

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

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

DRIVE GEAR RUNOUT

1. Remove rear cover. Refer to DLN-70, "Disassembly".
2. Fit a dial indicator to the drive gear back face.
3. Rotate the drive gear to measure runout.



Limit

Drive gear runout	**: Refer to DLN-91, "Drive Gear Runout".**

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

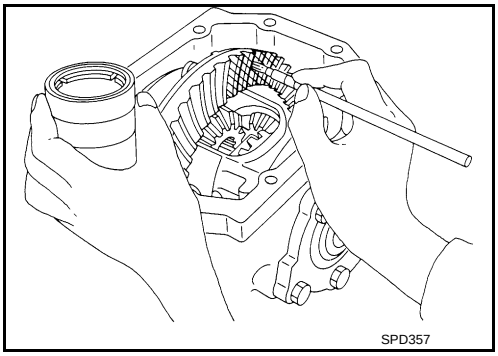
CAUTION:
Replace drive gear and drive pinion gear as a set.

TOOTH CONTACT

- Before inspection and adjustment, drain gear oil.

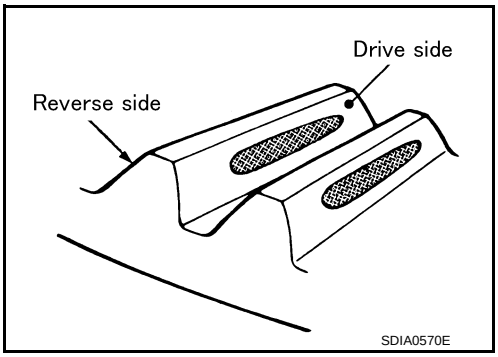
1. Remove rear cover. Refer to DLN-70, "Disassembly".
2. Apply red lead to drive gear.

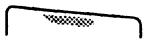
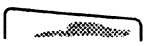
CAUTION:
Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.



3. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.

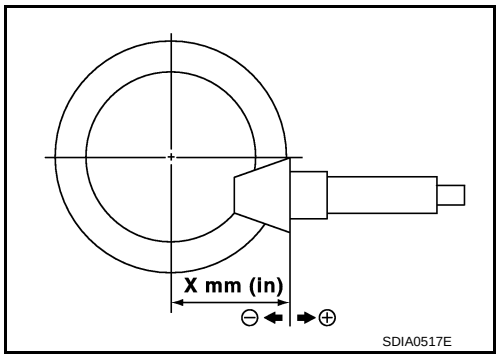
CAUTION:
Check tooth contact on drive side and reverse side.



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 		+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
		Thicker ↑	+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.

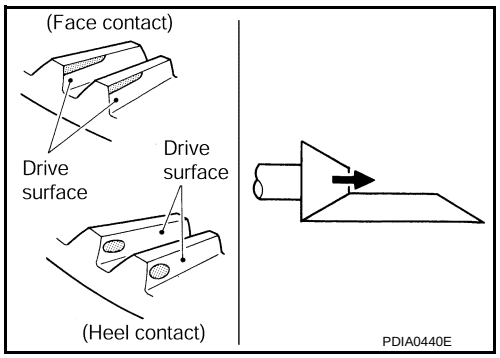
SDIA0207E

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



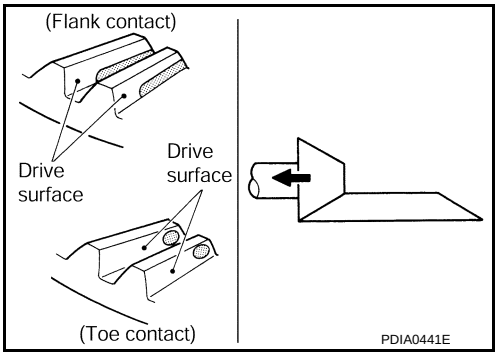
SDIA0517E

- If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.



PDIA0440E

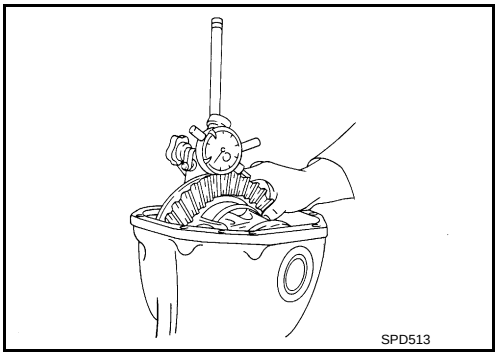
- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin pinion height adjusting washers to move drive pinion farther from drive gear.



BACKLASH

- Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-70, "Disassembly".
2. Fit a dial indicator to the drive gear face to measure the backlash.



Standard

Backlash **: Refer to DLN-91, "Backlash".**

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

When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount.

When the backlash is small:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount.

CAUTION:

Never change the total amount of washers as it changes the bearing preload.

Inspection After Disassembly

INFOID:0000000005235014

DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never 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

- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

SIDE GEAR AND PINION MATE GEAR

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

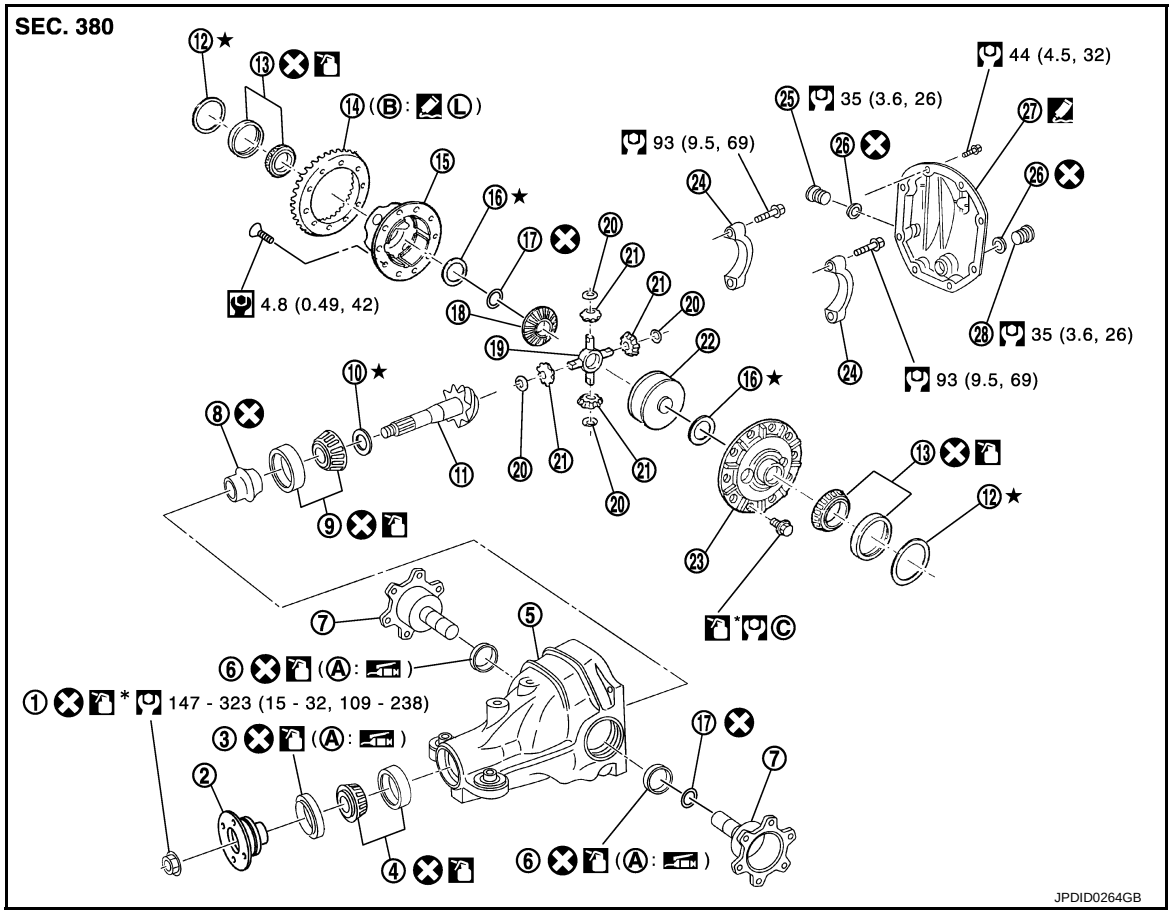
COMPANION FLANGE

- Clean up the disassembled parts.
- 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.

DRIVE PINION

Exploded View

INFOID:0000000005474072



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	8.	Collapsible spacer	9.	Pinion rear bearing
10.	Pinion height adjusting washer	11.	Drive pinion	12.	Side bearing adjusting washer
13.	Side bearing	14.	Drive gear	15.	Differential case B
16.	Side gear thrust washer	17.	Circular clip	18.	Side gear
19.	Pinion mate shaft	20.	Pinion mate thrust washer	21.	Pinion mate gear
22.	Viscous coupling	23.	Differential case A	24.	Bearing cap
25.	Filler plug	26.	Gasket	27.	Rear cover
28.	Drain plug				
A.	Oil seal lip	B.	Screw hole	C.	Comply with the assembly procedure when tightening. Refer to DLN-72, "Assembly".

: Apply gear oil.

*: Apply anti-corrosion oil.

: Apply Genuine Silicone RTV or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

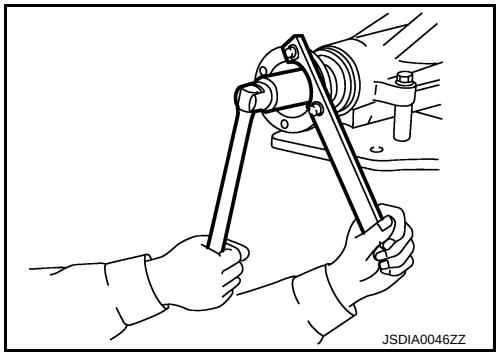
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-18, "Recommended Chemical Products and Sealants".

Refer to GI-4, "Components" for symbols not described on the above.

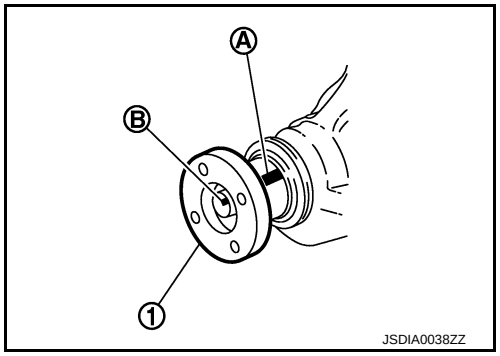
Disassembly

INFOID:0000000005235016

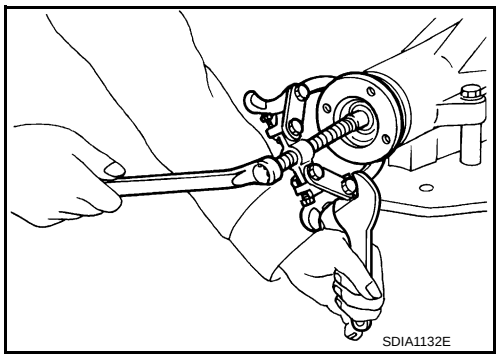
1. Remove differential case assembly. Refer to DLN-70, "Disassembly".
2. Remove drive pinion lock nut with the flange wrench.



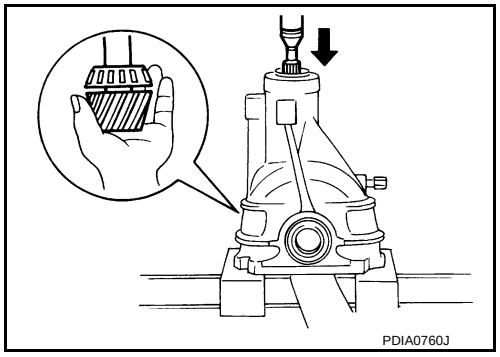
3. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.
NOTE:
The matching mark (A) on the final drive companion flange (1) indicates the maximum vertical runout position.
When replacing companion flange, matching mark is not necessary.



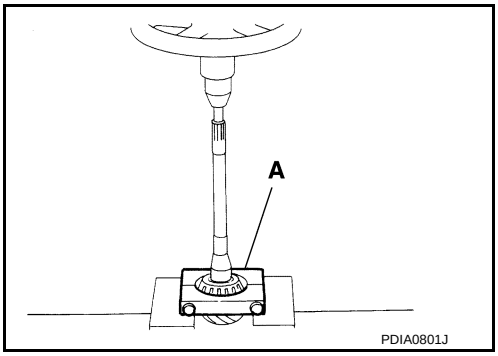
4. Remove companion flange using the suitable pullers.



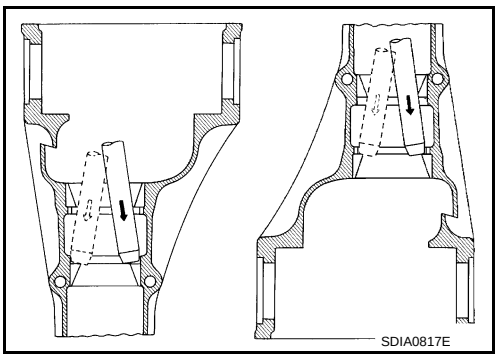
5. Press drive pinion assembly out of gear carrier.
CAUTION:
Never drop drive pinion assembly.
6. Remove front oil seal.
7. Remove side oil seal.
8. Remove pinion front bearing inner race.
9. Remove collapsible spacer.



10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).



11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.
CAUTION:
Never damage gear carrier.



Assembly

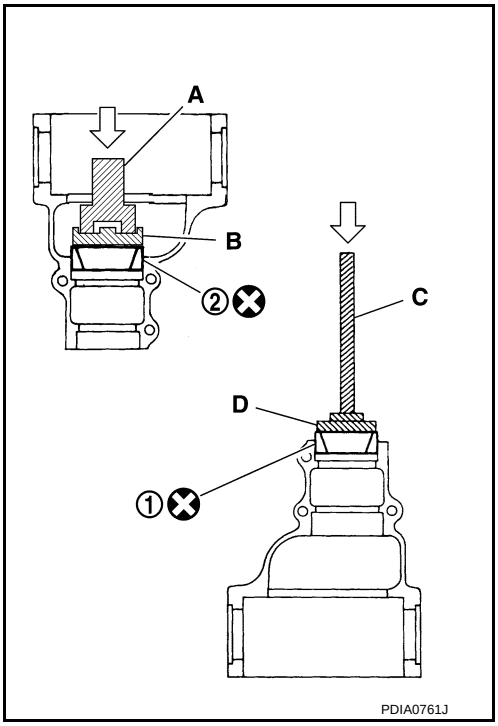
INFOID:0000000005235017

1. Install front bearing outer race (1) and rear bearing outer race (2) using drifts.

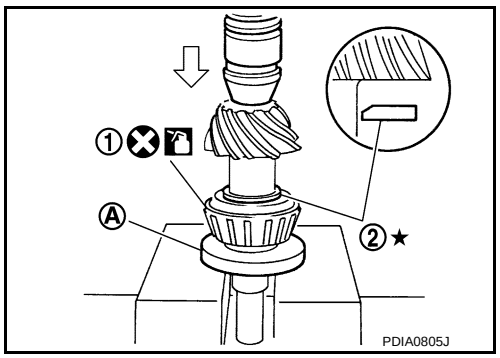
A: Drift [SST: ST30720000 (J-25405)]
B: Drift [SST: KV40105230 (—)]
C: Drift bar [SST: ST30611000 (J-25742-1)]
D: Drift [SST: ST30613000 (J-25742-3)]

CAUTION:
- **At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.**
- **Never reuse pinion front and rear bearing outer race.**

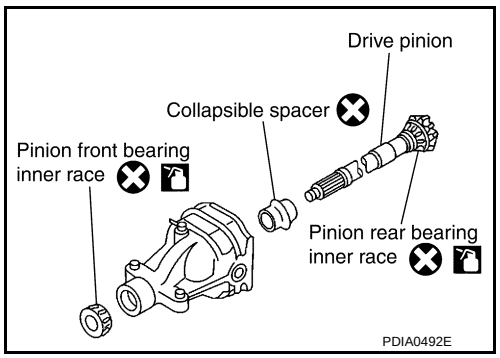
2. Select drive pinion height adjusting washer. Refer to DLN-86, "Adjustment".



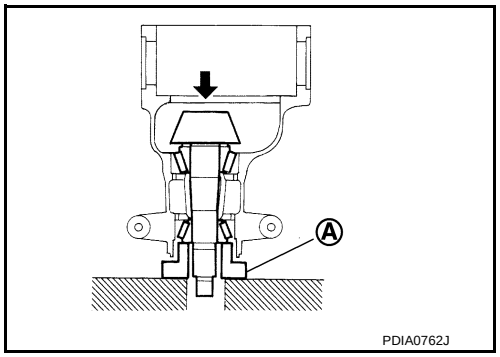
3. Install selected drive pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30901000 (J-26010-01)].
CAUTION:
- **Be careful of the direction of pinion height adjusting washer. (Assemble as shown in the figure.)**
- **Never reuse pinion rear bearing inner race.**



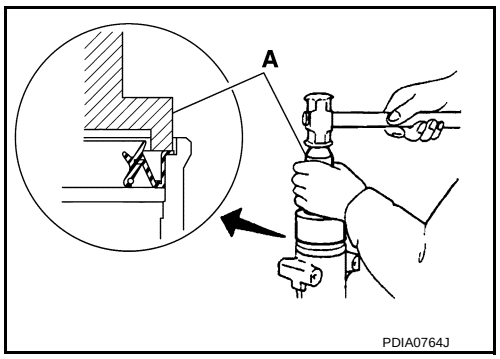
4. Assemble collapsible spacer to drive pinion.
CAUTION:
Never reuse collapsible spacer.
5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.
6. Apply gear oil to pinion front bearing, and assemble pinion front bearing inner race to drive pinion assembly.
CAUTION:
Never reuse pinion front bearing inner race.



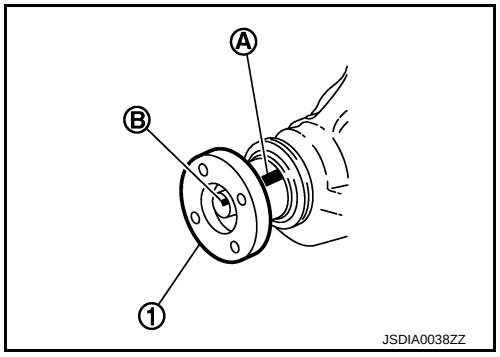
7. Using a spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



8. Using the drift (A) [SST: ST30720000 (J-25405)], install front oil seal as shown in figure.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



9. Install companion flange (1).
NOTE:
When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).



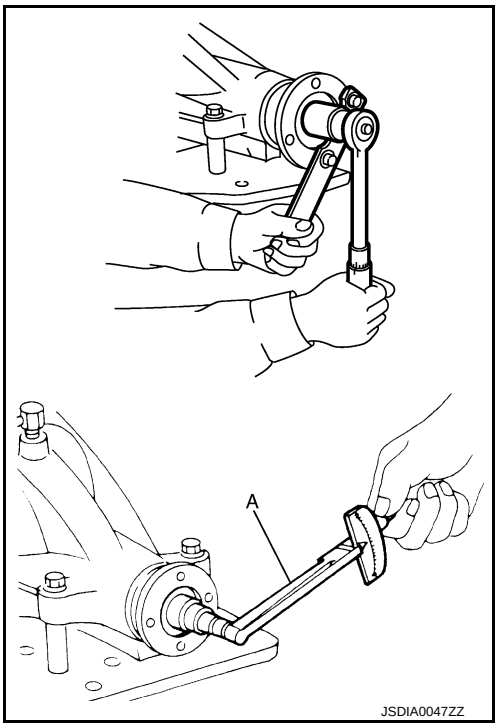
10. Apply anti-corrosion oil to the thread and seat of drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion.
    CAUTION:
    Never reuse drive pinion lock nut.
11. Adjust to the drive pinion lock nut tightening torque and pinion bearing preload torque.

    A: Preload gauge [SST: ST3127S000 (J-25765-A)]

    Standard

    Pinion bearing preload : **Refer to DLN-91, "Preload Torque".**

    CAUTION:
    - **Adjust to the lower limit of the drive pinion lock nut tightening torque first.**
    - **If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.**
    - **After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.**



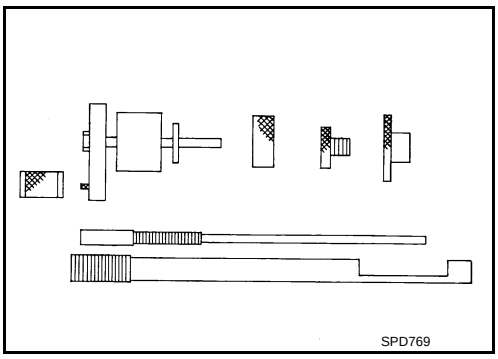
12. Install differential case assembly. Refer to DLN-84, "Assembly".
    CAUTION:
    Never install rear cover at the timing.
13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to DLN-76, "Adjustment" and DLN-86, "Adjustment".
    Recheck above items. Readjust the above description, if necessary.
14. Check total preload torque. Refer to DLN-86, "Adjustment".
15. Install rear cover. Refer to DLN-84, "Assembly".

Adjustment

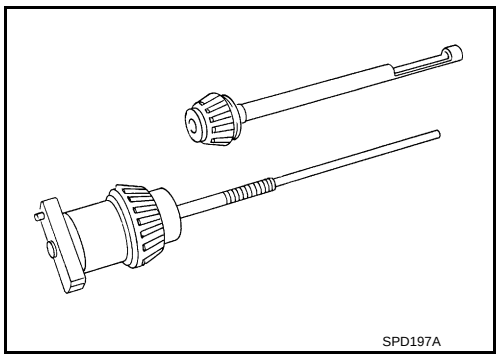
INFOID:0000000005235018

PINION GEAR HEIGHT

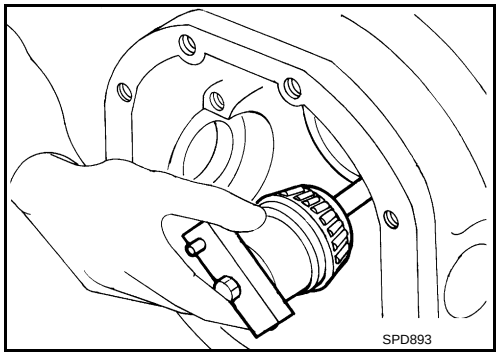
1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the differential shim selector tool [SST: — (J-34309)].



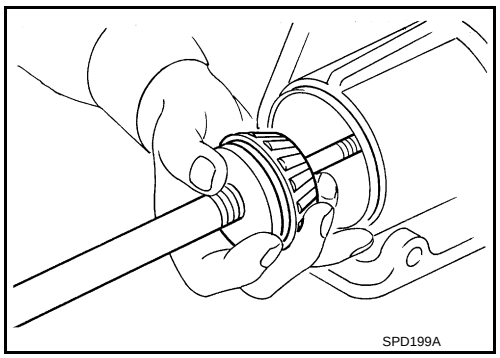
- **Pinion front bearing;** make sure the J-34309-3 pinion front bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the pinion front bearing pilot, J-34309-5, to secure the bearing in its proper position.
- **Pinion rear bearing;** the pinion rear bearing pilot, J-34309-8, is 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).


SPD197A

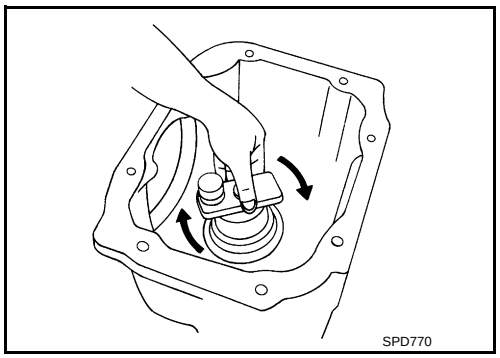
3. Install the pinion rear bearing inner race into gear carrier. Then place the pinion preload shim selector tool, J-34309-1, gauge screw assembly.


SPD893

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 gear carrier. Make sure that the pinion height gauge plate, J-34309-16, turns a full 360 degrees. Tighten the two sections together by hand.

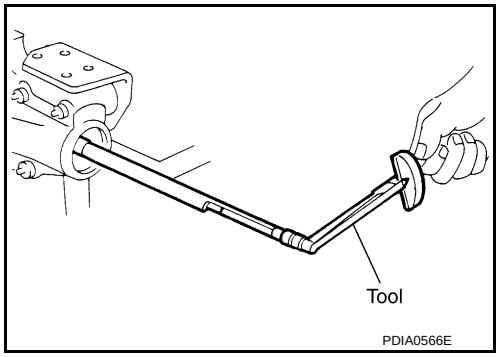

SPD199A

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


SPD770

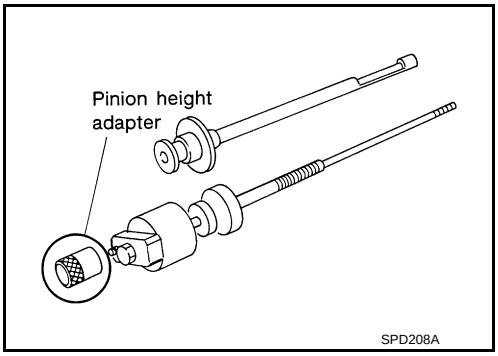
6. Measure the turning torque at the end of the J-34309-2 gauge anvil using preload gauge [SST: ST3127S000 (J-25765-A)].

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

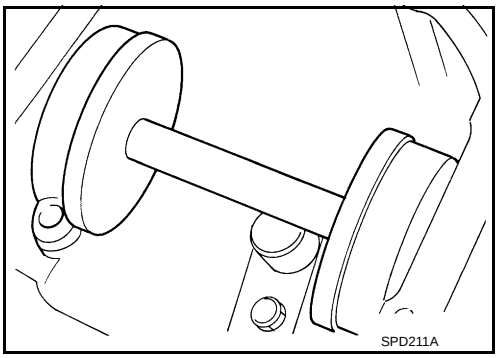


PDIA0566E

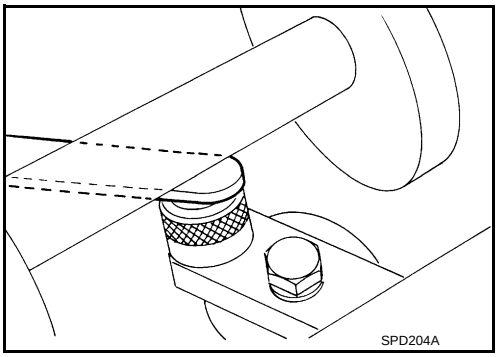
7. Place the J-34309-11 “R200A” pinion height adapter onto the gauge plate and tighten it by hand.
CAUTION:
Make sure all machined surfaces are clean.



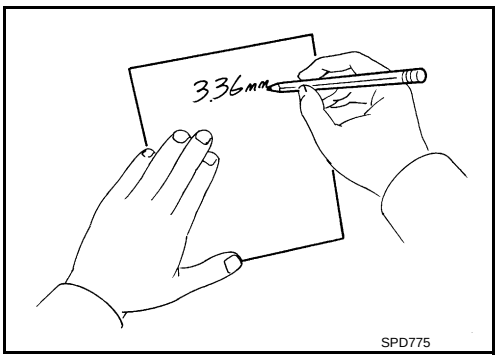
8. Position the side bearing discs, J-25269-4, and arbor firmly into the side bearing bores. Install the bearing caps and tighten bearing cap mounting bolts to the specified torque. Refer to DLN-69, "Exploded View".



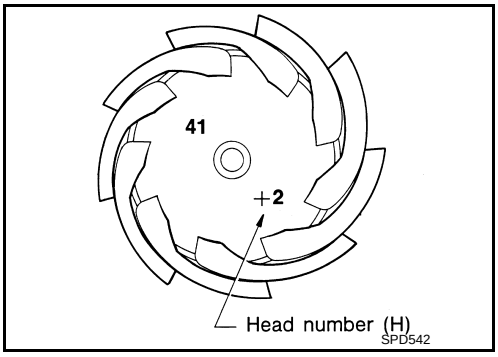
9. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and J-34309-101 feeler gauge. Measure the distance between the J-34309-11 pinion height adapter including the standard gauge and the arbor.



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

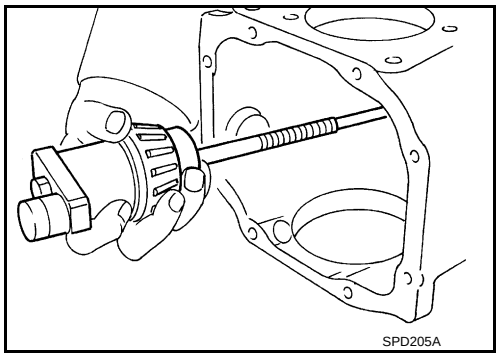


11. Correct the pinion height washer size by referring to the “pinion head number”.
There are two numbers painted on the drive pinion. The first one refers to the drive pinion and drive gear as a matched set. This number should be the same as the number on the drive gear. The second number is the “pinion 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.
13. Remove the J-34309 differential shim selector tool from the final drive housing. Then disassemble to retrieve the pinion bearings.

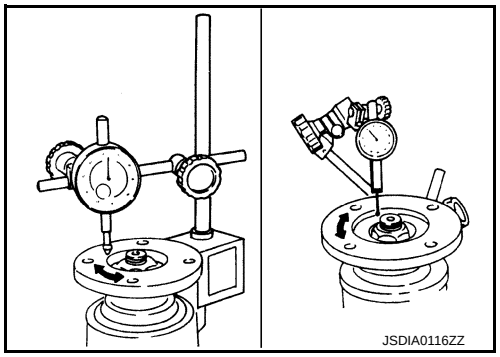

SPD205A

COMPANION FLANGE RUNOUT

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

Limit

Companion flange runout **: Refer to DLN-91, "Companion flange Runout".**


JSDIA0116ZZ

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

Limit

Companion flange runout **: Refer to DLN-91, "Companion flange Runout".**

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 position where the runout is the minimum.

b. If the runout value is still outside of the limit after the phase has been changed, possible causes are an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.

c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

Inspection After Disassembly

INFOID:0000000005235019

DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never 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

- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

SIDE GEAR AND PINION MATE GEAR

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- 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

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

COMPANION FLANGE

- Clean up the disassembled parts.
- 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.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000005235020

Applied model	2WD	
	VQ37VHR	
	M/T	A/T
Final drive model	R200V (With LSD)	
Gear ratio	3.692	3.357
Number of teeth (Drive gear/Drive pinion)	48/13	47/14
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.4 (3, 2-1/2)	
Number of pinion gears	4	
Drive pinion adjustment spacer type	Collapsible	

Drive Gear Runout

INFOID:0000000005235021

Unit: mm (in)

Item	limit
Drive gear back face runout	0.05 (0.0020)

Differential Side Gear Clearance

INFOID:0000000005235022

Unit: mm (in)

Item	Standard
Side gear backlash (Clearance between side gear and differential case)	0.15 (0.0059 in) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)

Preload Torque

INFOID:0000000005235023

Unit: N·m (kg-m, in-lb)

Item	Standard
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)	2.85 – 3.75 (0.29 – 0.38, 26 – 33)

Backlash

INFOID:0000000005235024

Unit: mm (in)

Item	Standard
Drive gear to drive pinion gear	0.10 – 0.15 (0.0039 – 0.0059)

Companion flange Runout

INFOID:0000000005235025

Unit: mm (in)

Item	Limit
Companion flange face runout	0.08 (0.0031)
Inner side of the companion flange runout	0.08 (0.0031)