SECTION RFD
REAR FINAL DRIVE

CONTENTS

PRECAUTIONS

PFP:00001

Precautions

ADS000W5

CAUTION:

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

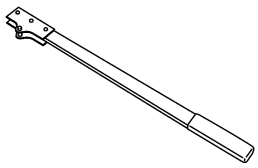
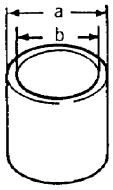
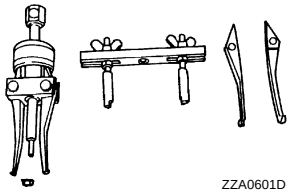
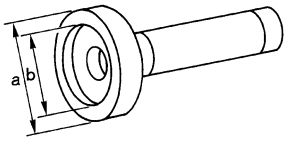
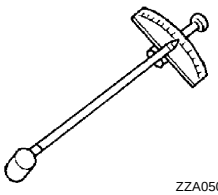
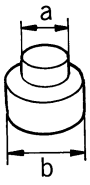
PREPARATION

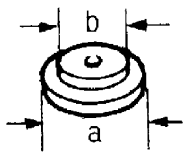
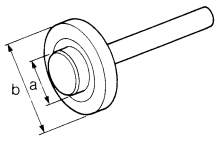
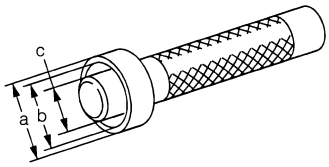
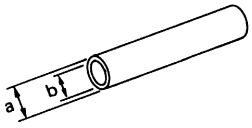
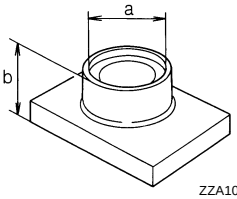
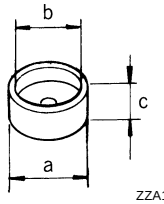
PFP:00002

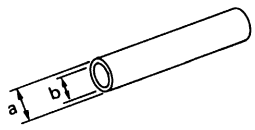
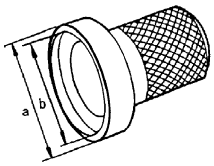
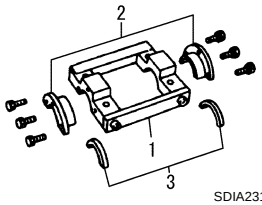
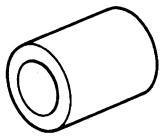
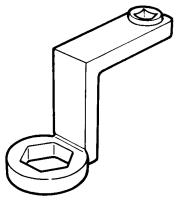
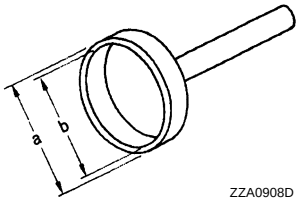
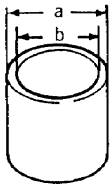
Special Service Tools

ADS000EE

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

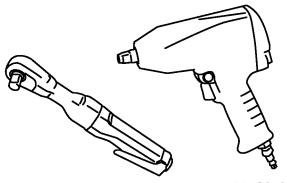
Tool number (Kent-Moore No.) Tool name		Description
KV38108300 (–) Drive pinion flange wrench	 PDIA0045E	Removing and installing companion flange lock nut
ST27861000 (–) Drift a: 62 mm (2.44 in) dia. b: 52 mm (2.05 in) dia.	 ZZA0832D	● Installing final drive front oil seal ● Installing final drive side oil seal
ST33290001 (J34286) Side bearing outer race puller	 ZZA0601D	Removing front oil seal
KV38100200 (J26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.	 ZZA1143D	● Installing final drive front oil seal ● Installing final drive side oil seal
ST3127S000 (J25765-A) Preload gauge	 ZZA0503D	Measuring preload torque
ST33052000 (–) Drift a: 22 mm (0.87 in) dia. b: 28 mm (1.10 in) dia.	 ZZA1023D	Removing side bearing inner race

Tool number (Kent-Moore No.) Tool name		Description
KV40100610 (J26089) Drift a: 63 mm (2.48 in) dia. b: 54.3 mm (2.138 in) dia.	 ZZA0810D	● Removing and installing gear carrier and rear cover (2 pieces are used) ● Installing pinion front bearing inner race
ST23550000 (–) Tip diameter: 4.5 mm (0.177 in) dia. Pin punch	 ZZA0815D	Removing and installing lock pin
ST17130000 (–) Drift a: 31.8 mm (1.252 in) dia. b: 58 mm (2.28 in) dia.	 ZZA0836D	Installing pinion rear bearing outer race
ST33230000 (J25805-01) Drift a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28.5 mm (1.122 in) dia.	 ZZA1046D	Installing pinion front bearing outer race
ST23860000 (–) Drift a: 38 mm (1.50 in) dia. b: 33 mm (1.30 in) dia.	 ZZA0534D	● Installing pinion rear bearing inner race ● Installing pinion front bearing inner race
ST38220000 (–) Press stand a: 63 mm (2.48 in) dia. b: 65 mm (2.56 in)	 ZZA1058D	Installing pinion front bearing inner race
KV40105020 (–) Drift a: 39.7 mm (1.563 in) dia. b: 35 mm (1.38 in) dia. c: 15 mm (0.59 in)	 ZZA1133D	Installing side bearing inner race

Tool number (Kent-Moore No.) Tool name		Description
ST22350000 (J25678-01) Drift a: 34 mm (1.34 in) dia. b: 28 mm (1.10 in) dia.	 ZZA0534D	Installing coupling front bearing
ST33400001 (J26082) Drift a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.	 ZZA0814D	Installing front oil seal
KV381086S1 (–) Dummy cover set 1. KV38108610 (–) Dummy cover 2. KV38108621 (–) Dummy cap spacer 3. KV38108630 (–) Dummy cap shim	 SDIA2313E	● Checking backlash ● Checking drive gear runout ● Checking tooth contact
KV38108500 (–) Drive pinion gear socket	 ZZA1205D	● Measuring preload ● Removing and installing drive pinion nut
KV38108400 (–) Pinion nut wrench	 ZZA1206D	Measuring preload
ST15310000 (J25640-B) Oil seal drift a: 96 mm (3.78 in) dia. b: 84 mm (3.31 in) dia.	 ZZA0908D	Center oil seal installation
KV40104710 (–) Support ring a: 76.3 mm (3.004 in) dia. b: 67.9 mm (2.673 in) dia.	 ZZA0832D	Center oil seal installation

Commercial Service Tools

ADS000F1

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ADS000K4

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

Reference page			—	Refer to RFD-16, "TOOTH CONTACT"	—	Refer to RFD-14, "Pre-Inspection"	—	Refer to MA-22, "CHASSIS AND BODY MAINTENANCE"	NVH in PR section.	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 PS section.
Possible cause and SUSPECTED PARTS			Rough gear tooth	Improper gear contact	Tooth surfaces worn	Incorrect backlash	Companion flange excessive runout	Improper gear oil	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Symptom	DIFFERENTIAL	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

FRONT OIL SEAL

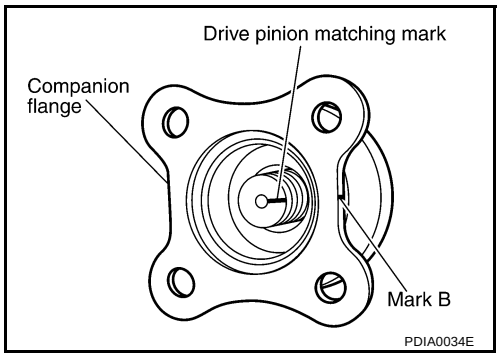
PFP:38189

Removal and Installation

ADS000K5

REMOVAL

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

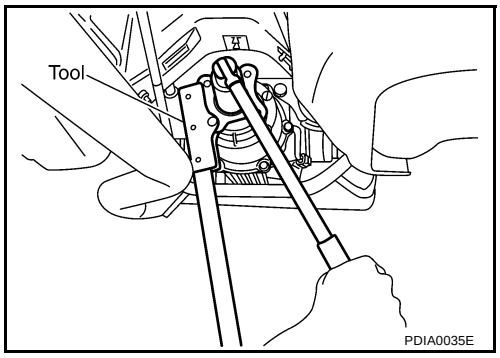


CAUTION:

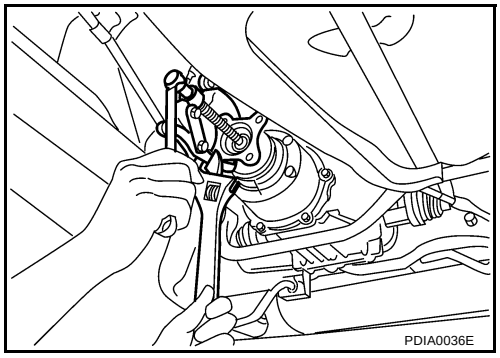
- **For matching mark, use paint. Never damage drive pinion.**
- **The mark on the final drive companion flange indicates the maximum vertical runout position.**

3. Using the drive pinion flange wrench, Remove companion flange lock nut.

Tool number : KV38108300 (–)

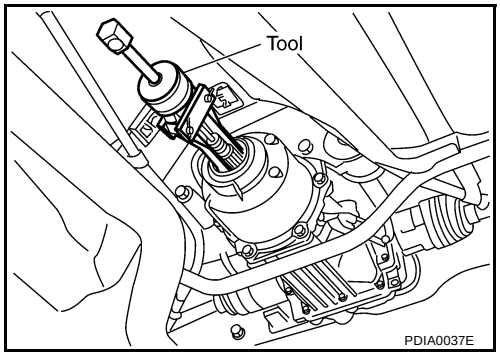


4. Using the puller, remove the companion flange.



5. Using the side bearing outer race puller, remove front oil seal.

Tool number : ST33290001 (J34286)

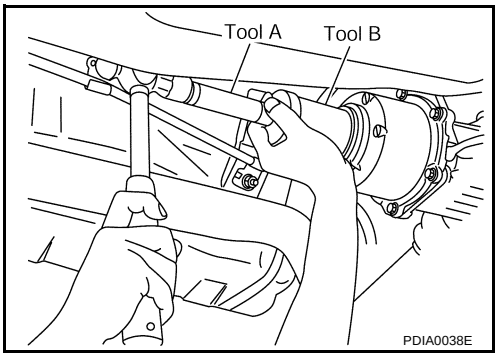


INSTALLATION

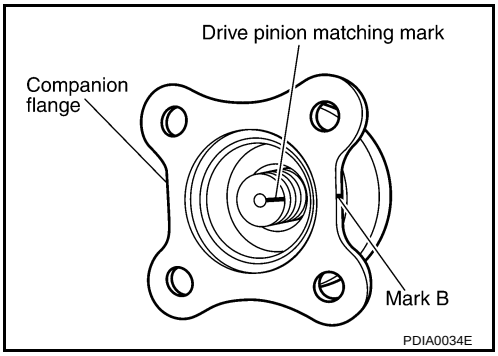
1. Apply multi-purpose grease to sealing lips of oil seal. Press front oil seal into carrier with tool.

   Tool number **A: KV38100200 (J26233)**
   B: ST27861000 (–)

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



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



3. Apply oil or grease on the screw part of drive pinion and the seating surface of companion flange lock nut.
4. Install companion flange lock nut with tool, tighten the nut to the specified torque. Refer to RFD-13, "Components" .

   Tool number : KV38108300 (–)

   CAUTION:
   The companion flange lock nut is not reusable. Never reuse companion flange lock nut.
5. Install propeller shaft. Refer to PR-4, "REAR PROPELLER SHAFT" .

SIDE OIL SEAL

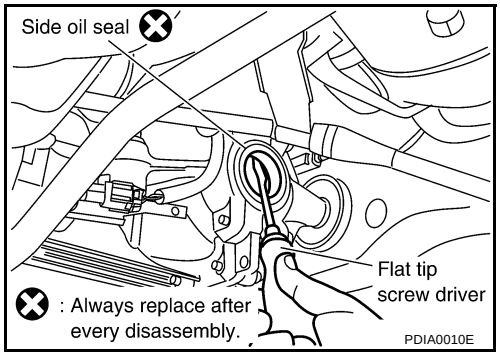
PFP:38343

Removal and Installation

ADS000EI

REMOVAL

1. Remove rear wheel sensor.Refer to BRC-42, "WHEEL SENSORS" .
2. Remove rear axle assembly. Refer to RAX-5, "WHEEL HUB"
3. Remove rear drive shaft. Refer to RAX-7, "REAR DRIVE SHAFT" .
4. Using flat tip screwdriver as shown in the figure, remove side oil seal.

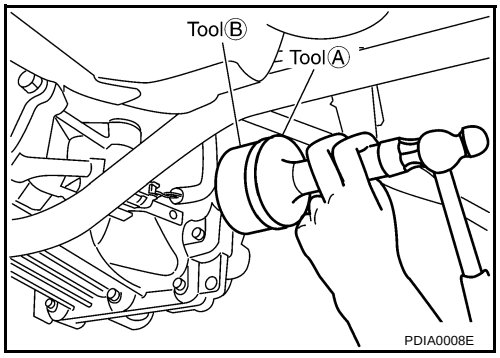


INSTALLATION

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

   Tool number **A: KV38100200 (J26233)**
   B: ST27861000 (–)

   CAUTION:
   - **When installing the oil seal be careful not to get it inclined.**
   - **Discard the old oil seal. Always replace with new one.**
3. Install rear drive shaft. Refer to RAX-7, "REAR DRIVE SHAFT" .
4. Install rear axle assembly. Refer to RAX-5, "WHEEL HUB" .

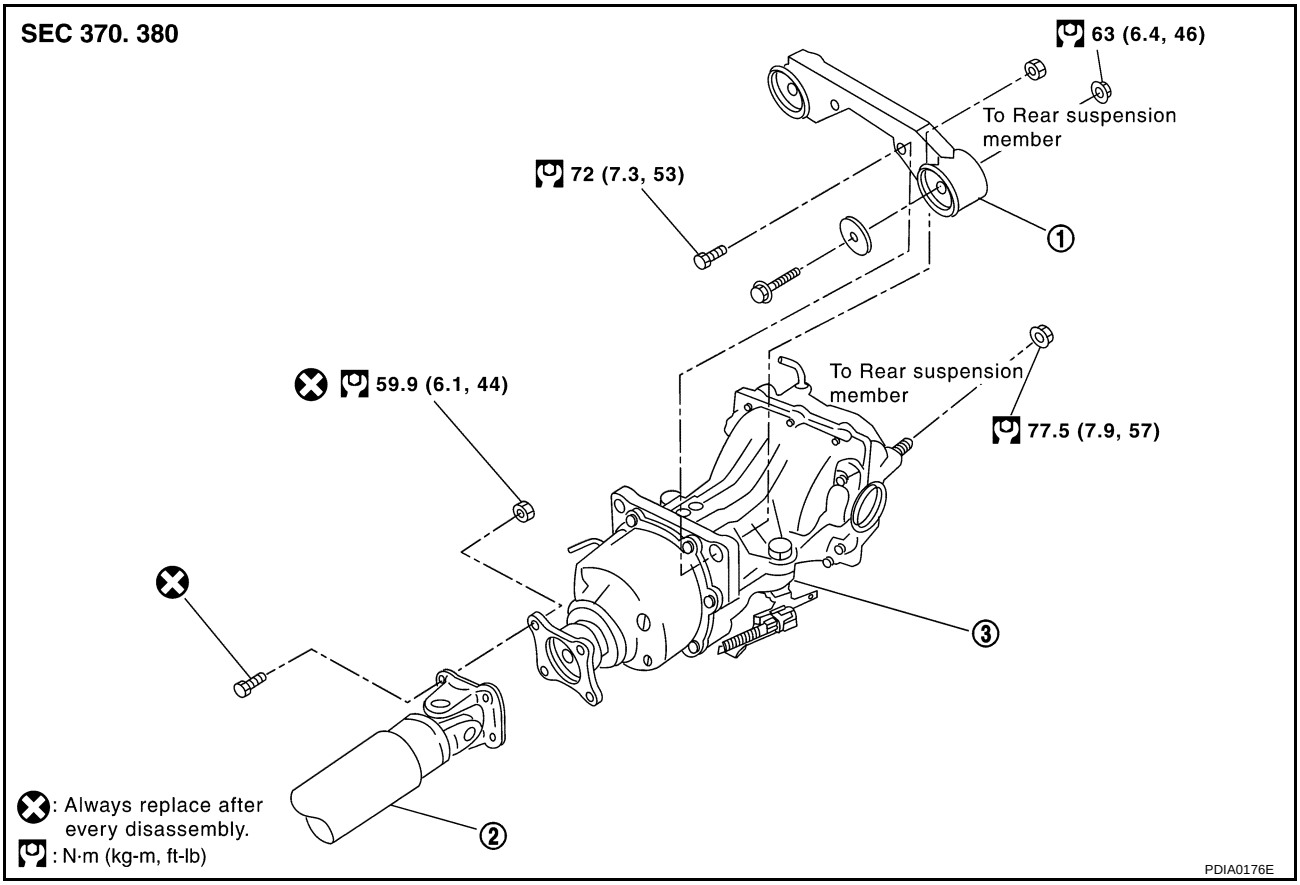


REAR FINAL DRIVE ASSEMBLY

PFP:38300

Removal and Installation

ADS000EK

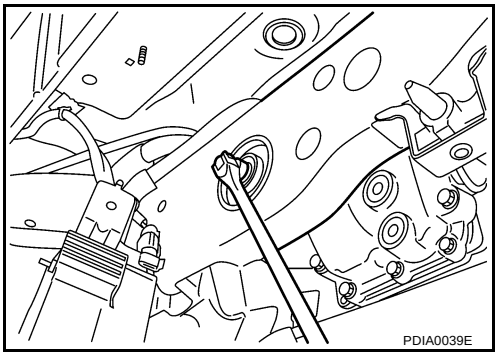


1. Final drive mount bracket
2. Rear propeller shaft
3. Rear final drive assembly

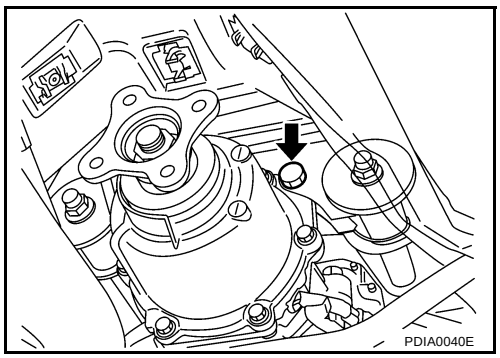
REMOVAL

1. Remove rear propeller shaft. Refer to PR-5, "REMOVAL" .
2. Remove rear stabilizer mounting bracket with power tool. Refer to RSU-16, "STABILIZER BAR" .
3. Remove wheel sensor. Refer to BRC-42, "WHEEL SENSORS" .
4. Remove rear drive shaft. Refer to RAX-7, "REAR DRIVE SHAFT" .
5. Remove electric controlled coupling connector.
6. Remove electric controlled coupling breather hose and rear final drive breather hose.
7. Remove canister. Refer toEC-651, "EVAPORATIVE EMISSION SYSTEM" .
8. Set Transmission Jack to rear final drive assembly, and then remove nuts from rear suspension member with power tool.

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



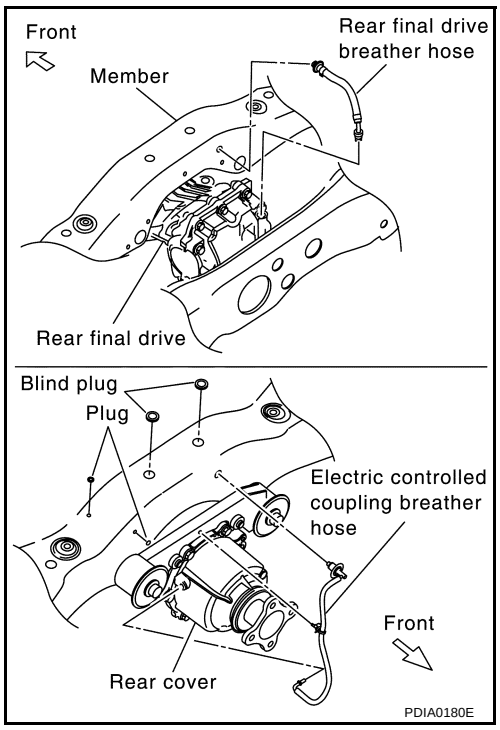
9. Remove bolt and nut of final drive mount bracket, and then remove rear final drive assembly from vehicle with power tool.



INSTALLATION

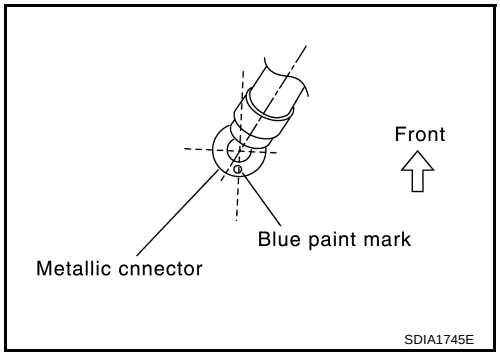
Refer to RFD-13, "Components" about each tightening torque, and perform installation by reversing the removal procedure with paying attention to the following matters.

- Install air breather hose at the position as the figure indicates.
- For installation of air breather hose, vehicle body side should be properly inserted to member, and cup ring cover side should be installed by aiming tip of tube to the front of the vehicle, then metal connector should be properly force-fitted.



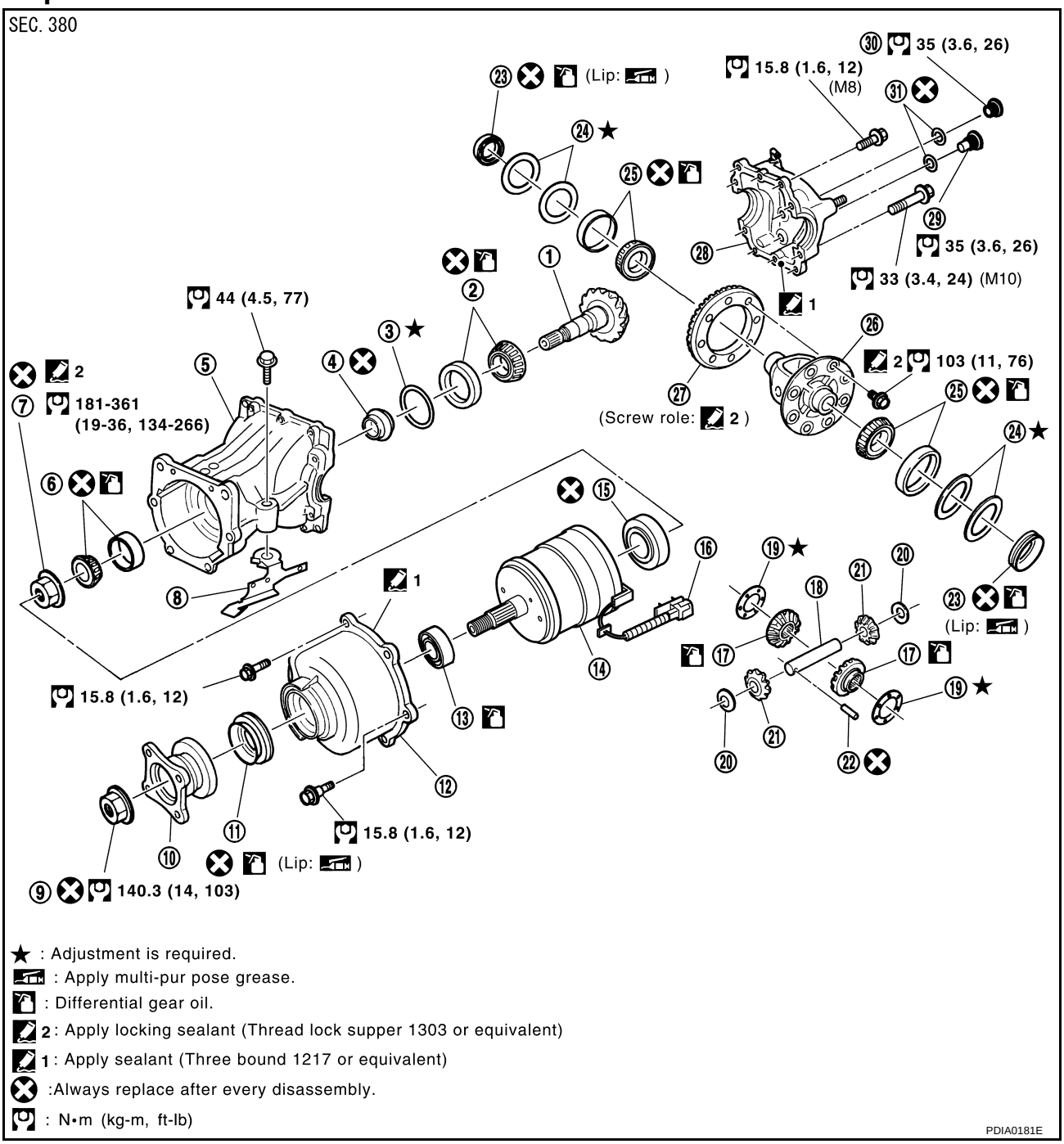
- Install metal connector of rear cover by inserting it with aiming blue painted marking to the rear of the vehicle.

  CAUTION:
  Crushing cause by bending, curved and so forth should be avoided when installing air breather hose.
- When removing final drive assembly, check quantity of oil after the removal if oil leaks.



Components

ADS000EN



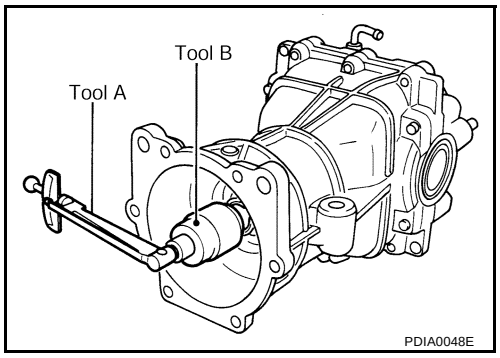
1.	Drive pinion	2.	Pinion rear bearing	3.	Drive pinion adjusting shim
4.	Collapsible spacer	5.	Gear carrier	6.	Pinion front bearing
7.	Drive pinion nut	8.	Electric controlled coupling connector bracket	9.	Companion flange lock nut
10.	Companion flange	11.	Front oil seal	12.	Coupling cover
13.	Coupling front bearing	14.	Electric controlled coupling	15.	Center oil seal
16.	Electric controlled coupling connector	17.	Side gear	18.	Pinion mate shaft
19.	Side gear thrust washer	20.	Pinion mate thrust washer	21.	Pinion mate gear
22.	Lock pin	23.	Side oil seal	24.	Side bearing adjusting shim
25.	Side bearing	26.	Differential case	27.	Drive gear
28.	Rear cover	29.	Drain plug	30.	Filler plug
31.	Gasket				

Pre-Inspection

ADS000EO

TOTAL PRELOAD

1. Drain the oil.
2. Remove electric controlled coupling assembly. Refer to RFD-19, "Removal of Electric Controlled Coupling Assembly" .
3. Rotate the drive pinion back and forth in 2 to 3 times to check for unusual noise and rotation malfunction.
4. Rotate the drive pinion at least 20 times to check for smooth operation of the bearing.
5. Fit the drive pinion socket onto the drive pinion spline. Using a preload gauge, measure the total preload.



Tool number **A: ST3127S000 (J25765-A)**
B: KV38108500 (–)

Total preload
:1.33 - 2.15 N·m (0.14 - 0.21 kg-m, 12 - 19 in-lb)

- If outside the standard, disassemble, check, and adjust each part. Adjust the pinion bearing and side bearing preload.
  Adjust the pinion bearing preload first, then adjust the side bearing preload.

Side bearing preload
: 0.64-0.98 N·m (0.07 - 0.09 kg-m, 6 - 8 in-lb)

When the preload torque is large
On pinion bearings : Replace the collapsible spacer.
On side bearings : Use thinner side bearing adjusting shims.

When the preload is small
On pinion bearings : Tighten the pinion nut.
On side bearings : Use thicker side bearing adjusting shims.

Side bearing adjusting shims

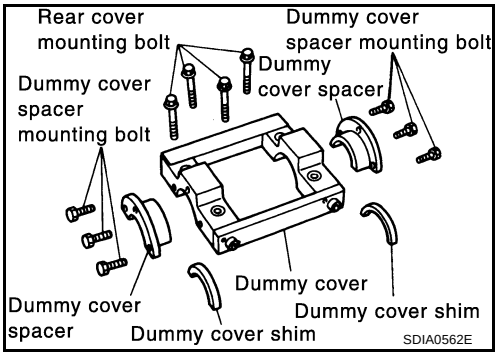
Thickness	Part No.	Thickness	Part No.	Thickness	Part No.
1.85 mm (0.0728 in)	38453 4N200	2.05 mm (0.0807 in)	38453 4N204	2.25 mm (0.0886 in)	38453 4N208
1.90 mm (0.0748 in)	38453 4N201	2.10 mm (0.0827 in)	38453 4N205	2.30 mm (0.0906 in)	38453 4N209
1.95 mm (0.0768 in)	38453 4N202	2.15 mm (0.0854 in)	38453 4N206	2.35 mm (0.0925 in)	38453 4N210
2.00 mm (0.0787 in)	38453 4N203	2.20 mm (0.0866 in)	38453 4N207		

DRIVE GEAR TO DRIVE PINION BACKLASH

1. Drain the oil.
2. Remove the rear cover. Refer to RFD-19, "Removal of Differential Assembly" .
3. Following the procedure below, install a dummy cover set to the gear carrier.

Tool Number : KV381086S1 (–)

a. Fit dummy cover shims to the right and left side bearing adjusting shims.



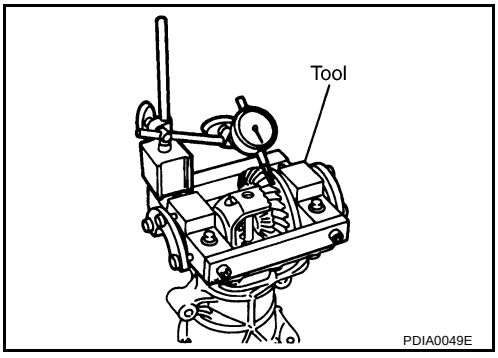
b. Temporarily tighten a dummy cover to the gear carrier.
c. Position a dummy cover spacer to the dummy cover.
d. Tighten rear cover mounting bolts to the specified torque. Refer to RFD-13, "Components" .
e. Tighten dummy cover spacer mounting bolts evenly to the specified torque.

: 5.9 N·m (0.6 kg-m, 52 in-lb)

4. Fit a dial gauge to the drive gear face to measure the backlash.

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

- If outside the standard, change the thickness of the side bearing adjusting shims.



When the backlash is large:

Make the drive gear back adjusting shims thicker, and the drive gear front adjusting shims thinner.

When the backlash is small:

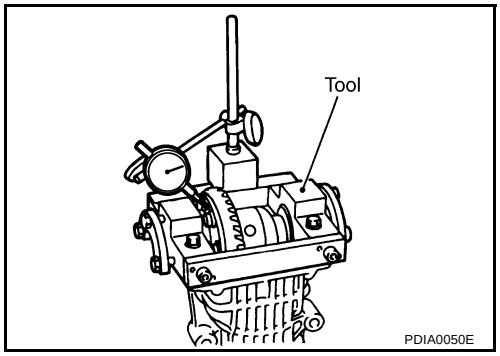
Make the drive gear back adjusting shims thinner, and the drive gear front adjusting shims thicker.

Side bearing adjusting shims

Thickness	Part No.	Thickness	Part No.	Thickness	Part No.
1.85 mm (0.0728 in)	38453 4N200	2.05 mm (0.0807 in)	38453 4N204	2.25 mm (0.0886 in)	38453 4N208
1.90 mm (0.0748 in)	38453 4N201	2.10 mm (0.0827 in)	38453 4N205	2.30 mm (0.0906 in)	38453 4N209
1.95 mm (0.0768 in)	38453 4N202	2.15 mm (0.0854 in)	38453 4N206	2.35 mm (0.0925 in)	38453 4N210
2.00 mm (0.0787 in)	38453 4N203	2.20 mm (0.0866 in)	38453 4N207		

DRIVE GEAR RUNOUT

1. Drain the oil.
2. Remove the rear cover.Refer to RFD-19, "Removal of Differential Assembly" .
3. Attach dummy cover set. Refer to RFD-15, "DRIVE GEAR TO DRIVE PINION BACKLASH" .



Tool Number : KV381086S1 (–)

4. Fit a dial gauge to the drive gear back face.
5. Rotate the drive gear to measure runout.

Runout limit : 0.05 mm (0.0020 in) or less

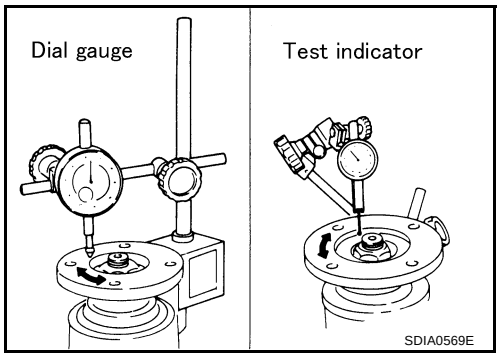
- If outside the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc.

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

COMPANION FLANGE RUNOUT

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

Runout limit : 0.13 mm (0.0051 in)



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

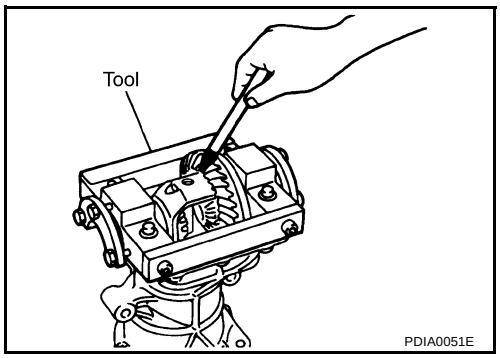
Runout limit : 0.13 mm (0.0051 in)

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

a. Check for runout while changing the phase between companion flange and drive pinion gear by 90° step, and search for the point where the runout is the minimum.
b. If the runout value is still outside of the limit after the phase has been changed, replace the companion flange.
c. If the runout value is still outside of the limit after the companion flange has been replaced, possible cause will be an assembly malfunction of the drive pinion gear and the electronically controlled coupling, malfunctioning coupling bearing, or malfunctioning electronically controlled coupling.

TOOTH CONTACT

1. Drain the oil.
2. Remove the rear cover. Refer to RFD-19, "Removal of Differential Assembly" .
3. Attach dummy cover set. Refer to RFD-15, "DRIVE GEAR TO DRIVE PINION BACKLASH" .

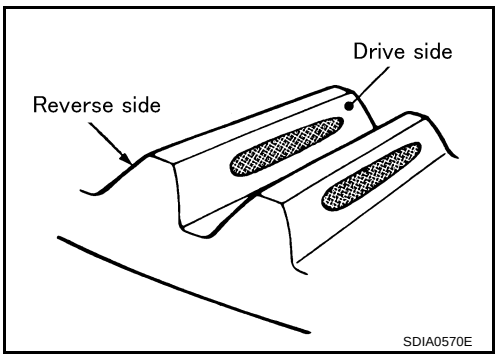


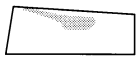
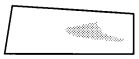
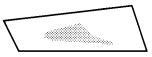
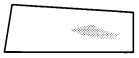
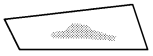
Tool Number : KV381086S1 (–)

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

6. Rotate the drive gear back and forth in several times, check drive pinion gear to drive gear tooth contact.

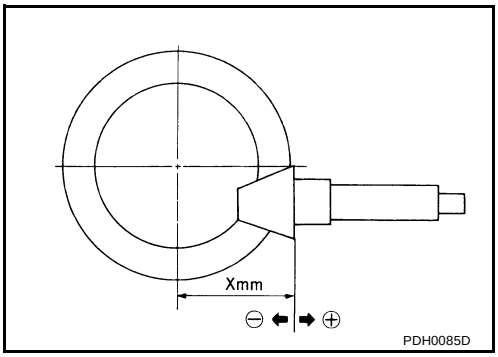
CAUTION:
Check tooth contact on drive side and reverse side.



Tooth contact condition		Drive pinion adjusting shim selection value (mm)		Adjustment (Yes/No)	Possible cause
Drive side	Back side				
Heel side Toe side 	Toe side Heel side 		+0.09	Yes	Occurrence of noise and scoring sound in all speed ranges.
		Thicker ↑	+0.06		Occurrence of noise when accelerating.
			+0.03	No	–
			0		
		Thinner ↓	−0.03		
			−0.06	Yes	Occurrence of noise at constant speed and decreasing speed.
			−0.09		Occurrence of noise and scoring sound in all speed ranges.

SDIA0563E

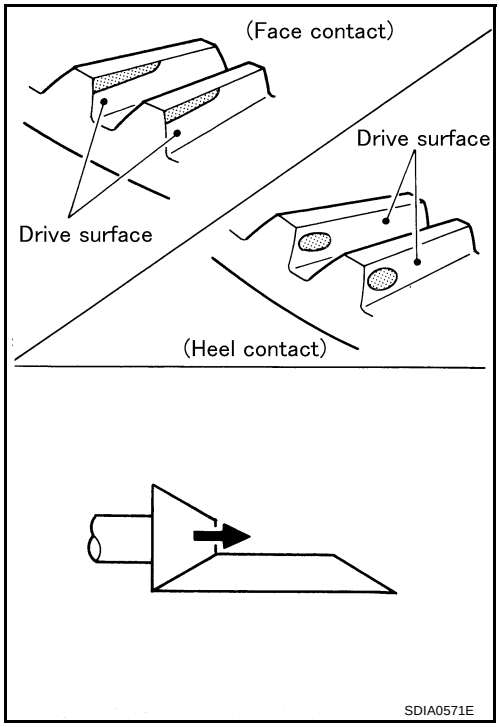
7. If the tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height (dimension X in the figure).



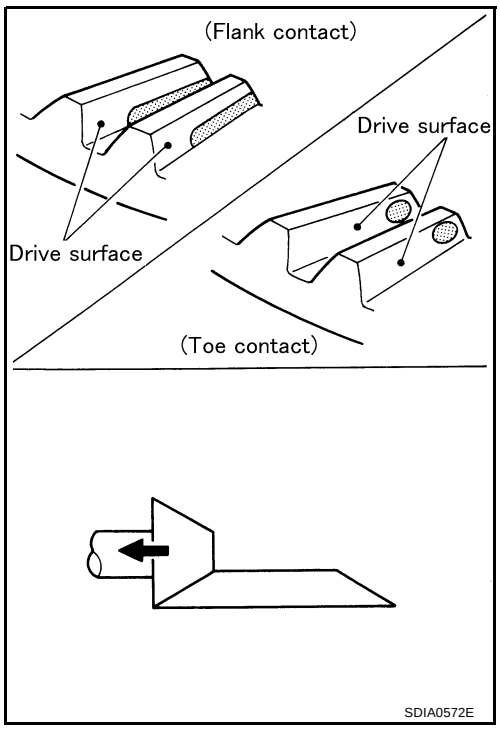
Drive pinion adjusting shim

Thickness	Part No.	Thickness	Part No.
1.70 mm (0.0669 in)	38154 4N200	2.00 mm (0.0787 in)	38154 4N210
1.73 mm (0.0681 in)	38154 4N201	2.03 mm (0.0799 in)	38154 4N211
1.76 mm (0.0693 in)	38154 4N202	2.06 mm (0.0811 in)	38154 4N212
1.79 mm (0.0705 in)	38154 4N203	2.09 mm (0.0823 in)	38154 4N213
1.82 mm (0.0717 in)	38154 4N204	2.12 mm (0.0835 in)	38154 4N214
1.85 mm (0.0728 in)	38154 4N205	2.15 mm (0.0846 in)	38154 4N215
1.88 mm (0.0740 in)	38154 4N206	2.18 mm (0.0858 in)	38154 4N216
1.91 mm (0.0752 in)	38154 4N207	2.21 mm (0.0870 in)	38154 4N217
1.94 mm (0.0764 in)	38154 4N208	2.24 mm (0.0882 in)	38154 4N218
1.97 mm (0.0776 in)	38154 4N209		

- In case of face contact or heel contact, thicken the drive pinion gear adjusting shims to move the drive pinion gear closer to the drive gear.



- In case of flank contact or toe contact, thin the drive pinion gear adjusting shims to move the drive pinion gear farther from the drive gear.



Disassembly and Assembly

ADS000EP

DISASSEMBLY

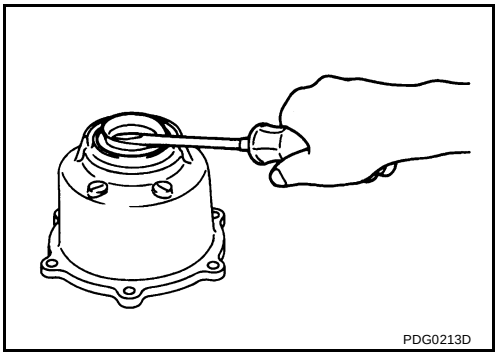
Removal of Electric Controlled Coupling Assembly

1. Using the drive pinion flange wrench, Remove companion flange lock nut.

   Tool number : KV38108300 (–)

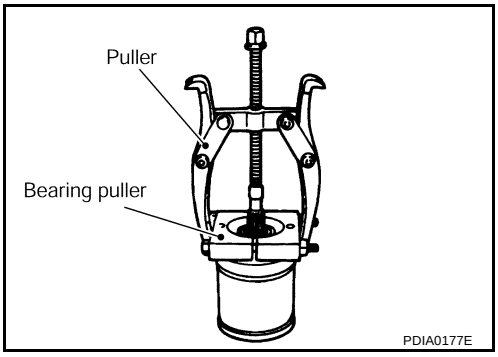
2. Using the puller, remove the companion flange.
3. Remove coupling cover.
4. Using flat tip screwdriver, remove Front oil seal from the coupling cover.

   CAUTION:
   Be careful not to damage the coupling cover.


PDG0213D

5. Remove electric controlled coupling assembly from the gear carrier.
6. Using a puller, remove coupling front bearing from the electronically controlled coupling.

   CAUTION:
   When the bearing is replaced with new one, reassemble the shim between bearing and the coupling.

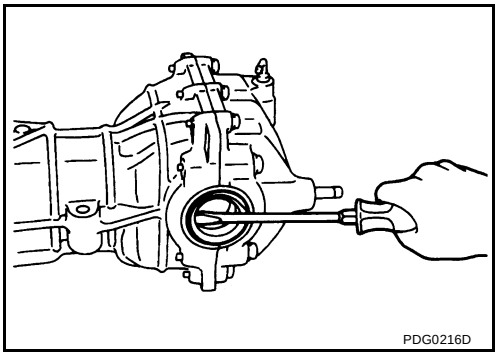


PDIA0177E

Removal of Differential Assembly

1. Using flat tip screwdriver, remove side oil seal from the gear carrier assembly.

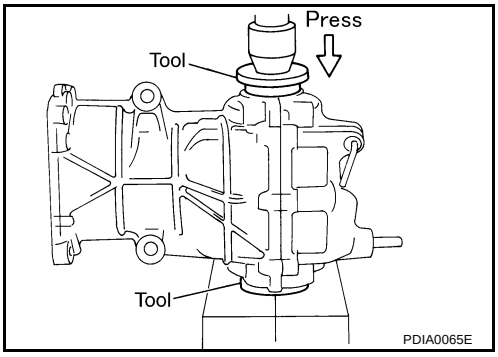
   CAUTION:
   Be careful not to damage the gear carrier and rear cover.
2. Remove rear cover mounting bolts.


PDG0216D

3. Fit a drift to the right and left side bearing adjusting shims individually. Compress differential case assembly and side bearing to remove gear carrier assembly and rear cover.

   Tool number : KV40100610 (J26089)

   CAUTION:
   The pressure shall be as low as possible to remove gear carrier assembly and rear cover. The maximum pressure shall be 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



PDIA0065E

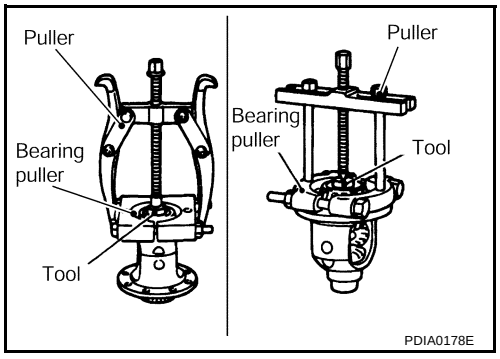
NOTE:
The differential case assembly, side bearings, and adjusting shims are compressed and integrated in the gear carrier and rear cover.

4. Remove side bearing adjusting shims and side bearing outer race.

CAUTION:
Mark the side bearing adjusting shims so that the original mounting positions (right/left) can be identified later.

5. Remove drive gear mounting bolts, and remove drive gear from the differential case.
6. Using a puller and a drift, remove side bearing inner race.

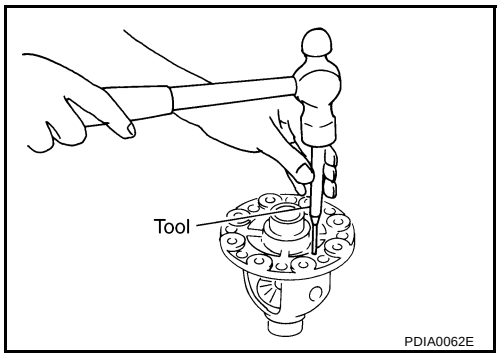
Tool number : ST33052000 (–)



7. Using a pin punch, pull the lock pin out of the pinion mate shaft.

Tool number : ST23550000 (–)

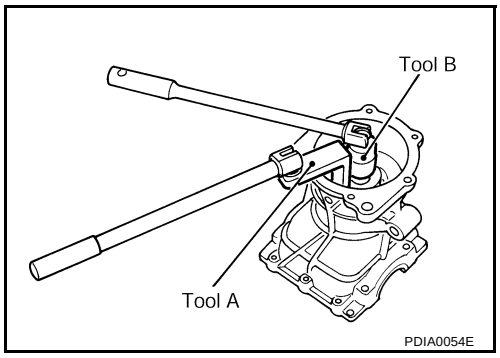
8. Remove pinion mate shaft, pinion mate gears, pinion mate thrust washers, side gears, side gear thrust washers from the differential case.



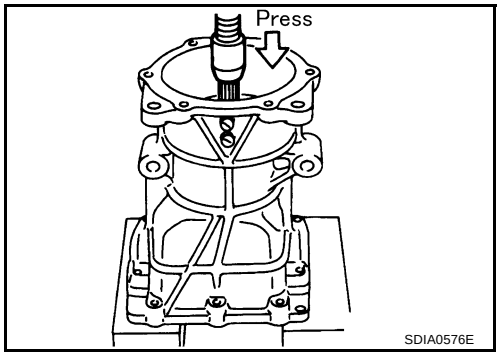
Removing Drive Pinion Assembly

1. Remove Electric controlled coupling assembly. Refer to RFD-19, "Removal of Electric Controlled Coupling Assembly" .
2. Remove differential case assembly. Refer to RFD-19, "Removal of Differential Assembly" .
3. Fit a drive pinion socket onto the drive pinion spline. Using a pinion nut wrench, remove drive pinion nut.

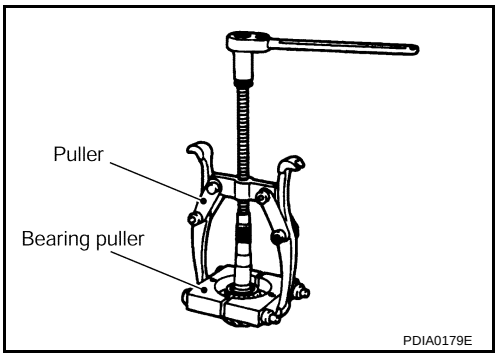
Tool number A: KV38108400 (–)
B: KV38108500 (–)



4. Remove center oil seal.
5. Press the drive pinion gear assembly out of the gear carrier.
6. Remove pinion front bearing inner race.
7. Remove collapsible spacer.



8. Using a puller, remove pinion rear bearing inner race from the drive pinion.

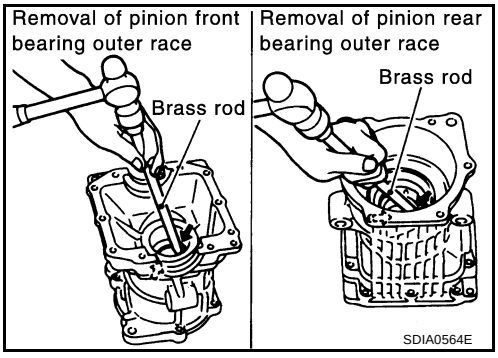


9. Using a brass rod, tap the pinion front bearing outer race evenly from the 2 cutouts on the gear carrier and remove pinion front bearing outer race.

CAUTION:
Be careful not to damage the gear carrier.

10. Using a brass rod, tap the drive pinion adjusting shim evenly from the 2 cutouts on the gear carrier and remove drive pinion adjusting shims and pinion rear bearing outer race.

CAUTION:
Be careful not to damage the gear carrier.



Inspection

- Clean up the disassembled parts. Then, inspect if the parts are wear or damaged. If so, follow the measures below.

Content	Measures
Hypoid gear	● If the gear teeth do not mesh or line-up correctly, determine the cause and adjust, repair, or replace as necessary. ● If the gear are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with a new gears.
Bearing	● If found any chipped (by friction), pitted, worn, rusted, scratched mark, or unusual noise from the bearing, replace with a new bearing ASSY (as new set).
Side gear thrust washer and Pinion mate thrust washer	● Replace with a new one if found any cracks or damage on the surface of the tooth. ● Replace with a new one if found any worn or chipped mark on the contact sides of the thrust washer.
Side gear and Pinion mate thrust washer	● Replace with a new one if found that it chipped (by friction), damaged, or unusual worn.
Oil seal	● Oil seals must be replaced with a new one whenever disassembled.
Differential case	● Replace with a new one if found any wear or cracks on the contact sides of the Differential case.
Companion flange	● Replace with a new one if found any chipped marks (about 0.10mm, 0.0039in) or other damage on the contact sides of the lips of the companion flange.

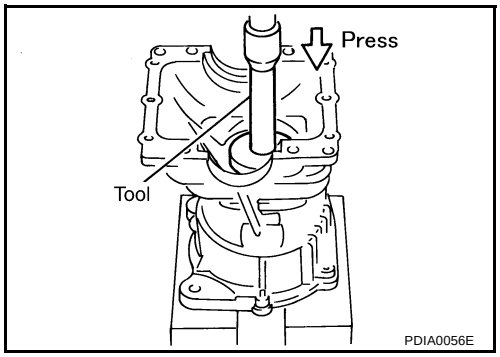
ASSEMBLY

Assembly of Drive Pinion Assembly

1. Assemble with a drive pinion adjusting shim of the same thickness as was installed prior to disassembly. Using a drift, press a pinion rear bearing outer race into the gear carrier.

   Tool number : ST17130000 (–)

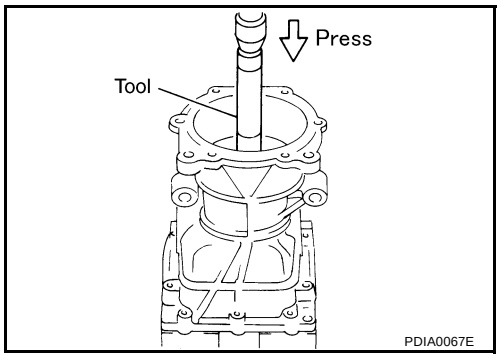
   CAUTION:
   - **At first, using a hammer, tap the bearing outer race until it becomes square to the gear carrier.**
   - **Do not reuse the pinion rear bearing outer race.**



2. Using a drift, press a pinion front bearing outer race into the gear carrier.

   Tool number : ST33230000 (J25805-01)

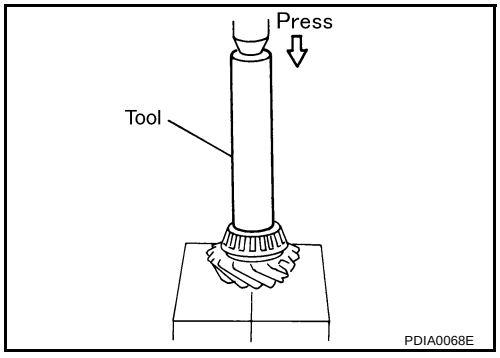
   CAUTION:
   - **At first, using a hammer, tap the bearing outer race until it becomes square to the gear carrier.**
   - **Do not reuse the pinion front bearing outer race.**



3. Using a drift, press a pinion rear bearing inner race into the drive pinion.

   Tool number : ST23860000 (–)

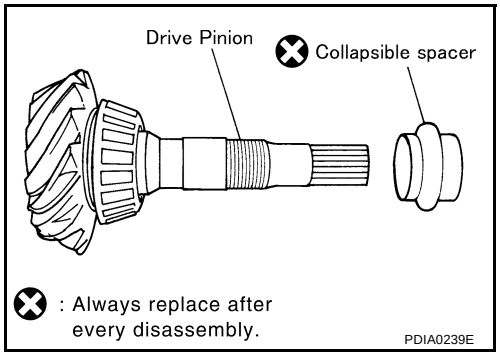
   CAUTION:
   Do not reuse the pinion rear bearing inner race.



4. After checking and adjusting the tooth contact and backlash of the hypoid gear following the procedure below, assemble a collapsible spacer to the drive pinion.

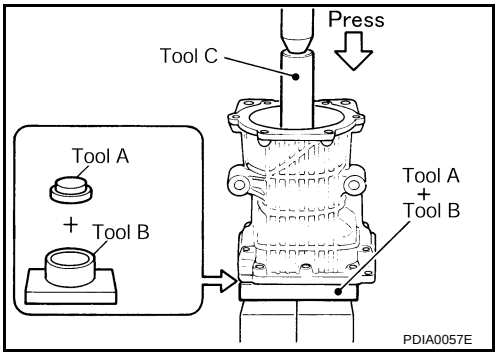
   CAUTION:
   - **Be careful of the mounting orientation of the collapsible spacer.**
   - **Do not reuse the collapsible spacer.**

a. Apply differential oil to the pinion rear bearing, and assemble the drive pinion to the gear carrier.



b. Assemble a pinion front bearing inner race to the drive pinion. Using a drift and press stand, press the pinion nut as far as it can be tightened.

Tool number **A: KV40100610 (J26089)**
B: ST38220000 (–)
C: ST23860000 (–)

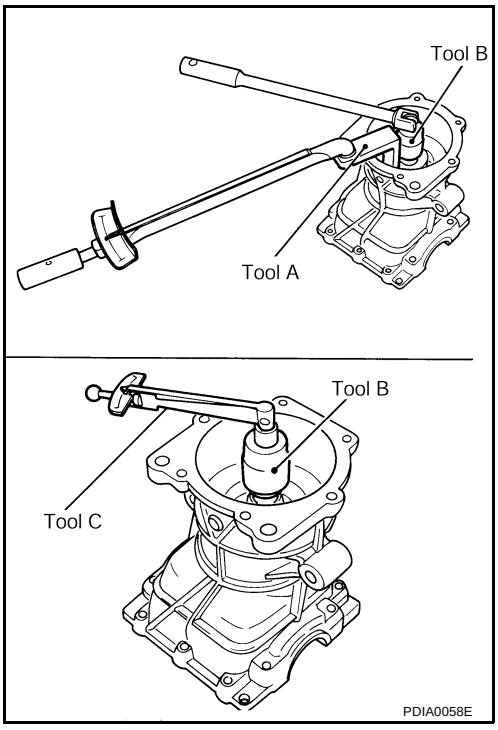


c. Temporarily tighten the removed pinion nut to the drive pinion.

NOTE:
Use the removed pinion nut only for the preload measurement.

d. Fit the drive pinion socket onto the drive pinion spline. Using a pinion nut wrench, tighten the pinion nut to the specified preload torque.

Tool number **A: KV38108400 (–)**
B: KV38108500 (–)
C: ST3127S000 (J25765-A)



CAUTION:
The pinion nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten it by 5° to 10°.

e. Apply differential oil to the side bearings, and install new side bearing adjusting shims with the same thickness or re-install the old ones to the same mounting position they were in prior to disassembly. Install the differential case assembly to the gear carrier. Refer to RFD-25, "Installation of Differential Assembly" .

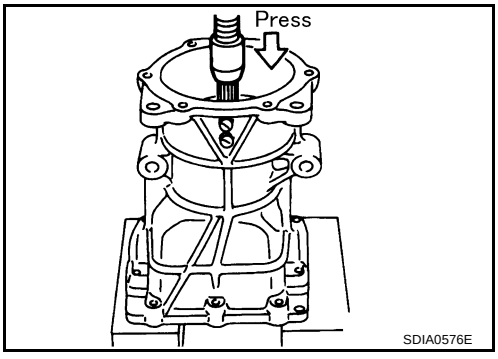
f. Install a dummy cover set to check and adjust the tooth contact. Refer to RFD-16, "TOOTH CONTACT" .

g. Check and adjust the backlash. Refer to RFD-15, "DRIVE GEAR TO DRIVE PINION BACKLASH" .

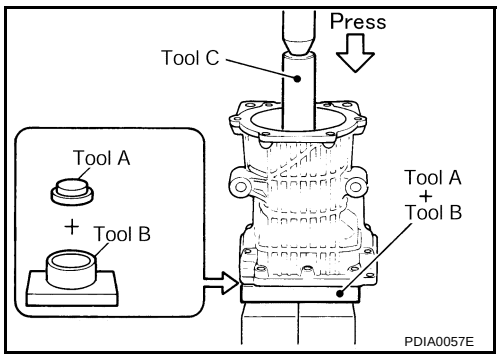
h. Remove dummy cover set, and remove differential case assembly.

i. Remove pinion nut, pinion front bearing inner race, and remove drive pinion gear.

5. Install the drive pinion gear with a collapsible spacer to the gear carrier.



6. Using a drift and press stand, press the pinion front bearing inner race to the drive pinion as far as a pinion nut can be tightened.

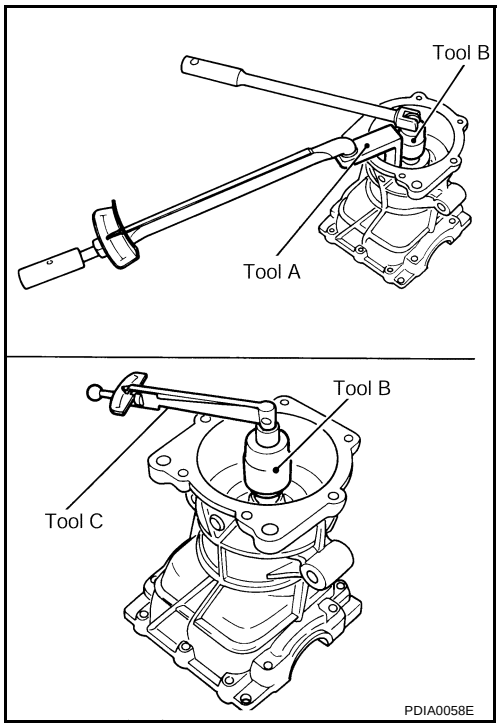


Tool number **A: KV40100610 (J26089)**
B: ST38220000 (–)
C: ST23860000 (–)

7. Apply anti-corrosive oil to the thread and seat of the pinion nut, and temporarily tighten the pinion nut to the drive pinion.

CAUTION:
Do not reuse the pinion nut.

8. Fit a drive pinion socket onto the drive pinion gear spline. Using a pinion nut wrench, adjust the pinion nut tightening torque and pinion bearing preload torque.



Tool number **A: KV38108400 (–)**
B: KV38108500 (–)
C: ST3127S000 (J25765-A)

Pinion nut tightening torque

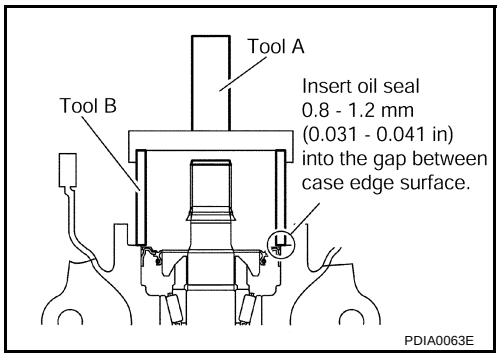
: 181- 361 N·m (19 - 36 Kg-m, 134 - 266 ft-lb)

Pinion bearing preload

: 0.69 - 1.17 N·m (0.07 - 0.11 kg-m, 7 - 10 in-lb)

CAUTION:
- **Do not reuse the pinion nut.**
- **Adjust the lower limit of the pinion nut tightening torque first.**
- **If the preload torque exceeds the specified value, replace the collapsible spacer and tighten it again to adjust. Never loosen the pinion nut to adjust the preload torque.**
- **After adjustment, rotate the drive pinion gear back and forth 2 to 3 times to check for abnormal noise, rotation malfunction, and other malfunctions.**

9. Install center oil seal refer to illustration.



Tool number **A: ST15310000 (J25640-B)**
B: KV40104710 (–)

10. Install the differential case assembly. Refer to RFD-25, "Installation of Differential Assembly" .

CAUTION:
Do not install the rear cover.

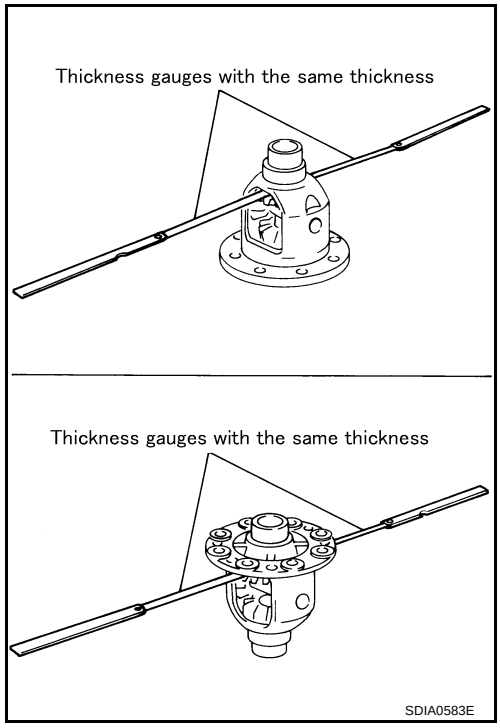
11. Install a dummy cover set, and check backlash, drive gear back runout, and tooth contact. Refer to RFD-16, "TOOTH CONTACT" .
12. Remove dummy cover, then install the rear cover, and drive in the oil seal. Refer to RFD-25, "Installation of Differential Assembly" .
13. Check overall preload torque. Refer to RFD-14, "TOTAL PRELOAD" .
14. Connect electric controlled coupling assembly. Refer to RFD-27, "Installation of Electric Controlled Coupling Assembly" .
15. Check companion flange runout. Refer to RFD-16, "COMPANION FLANGE RUNOUT" .

Installation of Differential Assembly

1. Assemble new side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.
2. Assemble the side gears, side gear thrust washers, pinion mate gears, and pinion mate thrust washers to the differential case, and temporarily assemble the pinion mate shaft.
3. Measure the side gear end play following the procedure below, and select the appropriate side gear thrust washers.
   - Using a thickness gauge, measure the clearance between side gear back and the differential case at 3 different points, while rotating the side gear. Average the 3 readings, and select the appropriate side gear thrust washer so that the mean value is within specifications below. (Measure the clearance of the other side as well.)

   Side gear end play standard:

   0.2 mm (0.008 in) or less. Every gear shall rotate smoothly with no abnormal feeling of drag.



Thickness	Part No.	Thickness	Part No.
0.74 mm (0.0291 in)	38424 4N200	0.83 mm (0.0327 in)	38424 4N203
0.77 mm (0.0303 in)	38424 4N201	0.86 mm (0.0339 in)	38424 4N204
0.80 mm (0.0315 in)	38424 4N202		

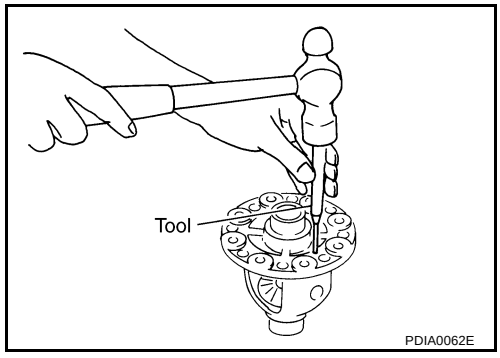
CAUTION:

- **Before measurement, place differential case straight up so that side gear to be measured comes upward. To prevent the side gear from tilting, insert thickness gauges with the same thickness from both sides.**
- **Select a side gear thrust washer for right and left individually.**

4. Assemble the selected side gear thrust washer to the differential case.
5. Using a pin punch, drive a lock pin into the pinion mating shaft.

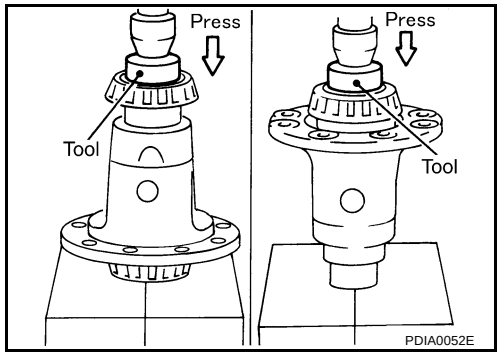
   Tool number : ST23550000 (–)

   CAUTION:
   Do not reuse the lock pin.



6. Using a drift, press a side bearing inner race into the differential case.

   Tool number : KV40105020 (–)

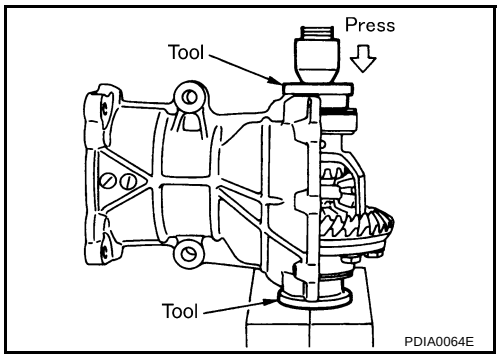


7. Apply locking sealant onto the thread of the drive gear.

CAUTION:
The drive gear back, threaded holes, and drive gear bolts shall be cleaned and decreased sufficiently.

8. Assemble the drive gear to the differential case, and tighten it with drive gear bolt. Refer to RFD-13, "Components" .
9. Apply differential oil to the side bearings, and assemble new side bearing adjusting shims (2 pieces for one side) with the same thickness as the ones installed prior to disassembly or re-install the old ones, with a side bearing outer race to the differential case.
   If the side bearing adjusting shims have been already selected, use them.
10. Fit a drift to the right and left side bearing adjusting shims individually. Compress differential case assembly and side bearing to install the gear carrier assembly to differential case assembly.

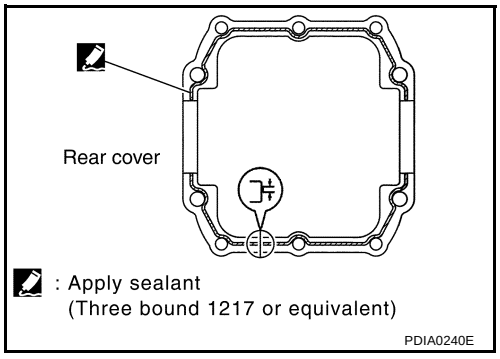
Tool number : KV40100610 (J26089)



CAUTION:
- **A drift shall be placed on the center of the adjusting shims.**
- **The pressure shall be as low as possible to install the gear carrier assembly into the differential assembly. The maximum pressure shall be 1 ton.**
- **If the adjusting shims are installed by tapping, the gear carrier may be damaged. Avoid tapping.**

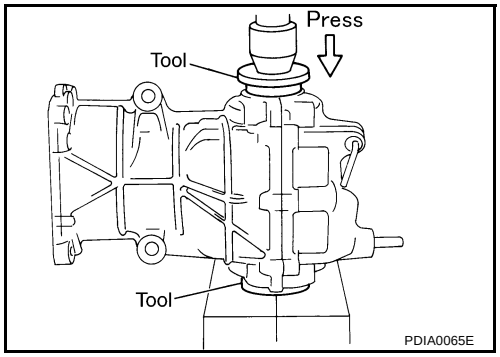
11. Install a dummy cover set, check and adjust the backlash, drive gear back runout, tooth contact, and overall preload torque. Refer to RFD-14, "Pre-Inspection" .
12. Remove dummy cover set.
13. Apply a continuos bead of sealant around the gear carrier mating surface on the rear cover as shown in the figure. Overlap both ends of the bead for at least 3 mm (0.12 in).

CAUTION:
Remove old sealant on the mounting surface, then remove any moisture, oil, and foreign material on the application and mounting surfaces.



14. Fit a drift to the right and left side bearing adjusting shims individually. Compress differential case assembly and side bearing to install the rear cover.

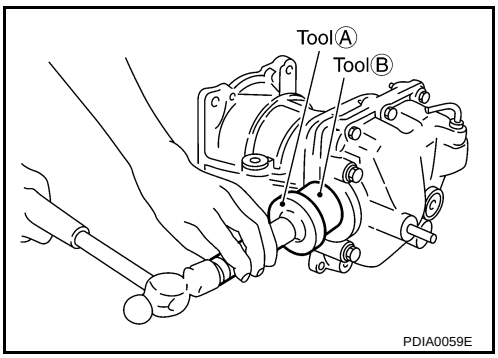
Tool number : KV40100610 (J26089)



CAUTION:
- **A drift shall be placed on the center of the adjusting shims.**
- **The pressure shall be as low as possible to install the rear cover. The maximum pressure shall be 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)**
- **If the rear cover is forced in by tapping, the rear cover may be damaged by the adjusting shims. Avoid tapping.**

15. Tighten rear cover mounting bolts to the specified torque. Refer to RFD-13, "Components" .

16. Using a drift, drive the oil seal until it becomes flush with the case end.



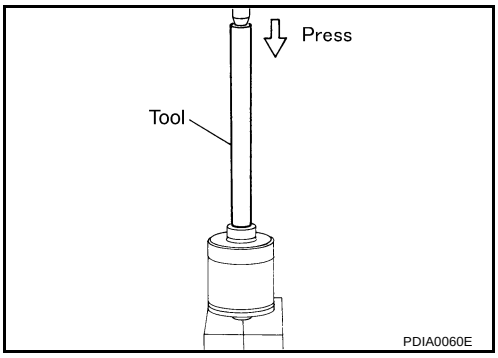
Tool number **A: KV38100200 (J26233)**
B: ST27861000 (–)

CAUTION:
- **Do not reuse oil seals.**
- **Apply multi-purpose grease onto the oil seal lips, and differential oil onto the circumference of the oil seal.**

17. Check overall preload torque. Refer to RFD-14, "TOTAL PRELOAD" .

Installation of Electric Controlled Coupling Assembly

1. Using a drift, install the coupling front bearing to the electric controlled coupling.

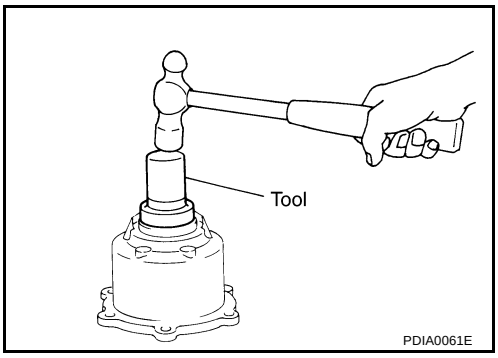


Tool number **: ST22350000 (J25678-01)**

CAUTION:
At disassembly, be sure to install shim between electric controlled coupling and bearing. Chamfering side of shim should be coupled to install.

2. Assemble the electric controlled coupling assembly to the drive pinion gear.

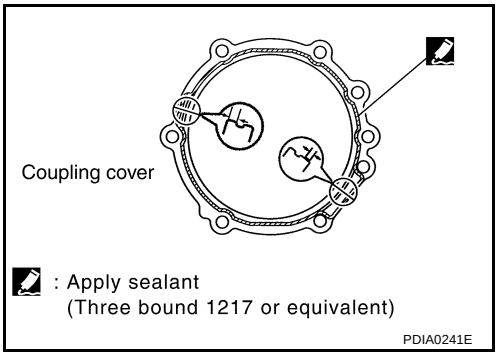
3. Using a drift, drive an oil seal until it becomes flush with the case end.



Tool number **: ST33400001 (J26082)**

CAUTION:
- **Do not reuse oil seals.**
- **Apply multi-purpose grease onto the oil seal lips, and differential oil onto the circumference of the oil seal.**

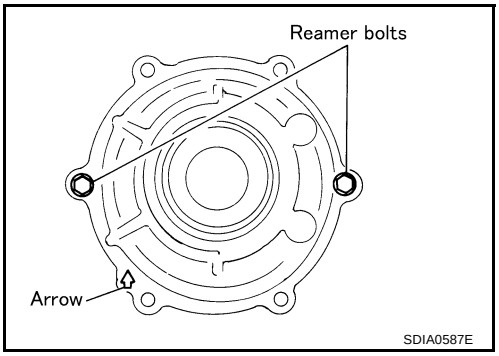
4. Apply a continuous bead sealant around the gear carrier mating surface on the coupling cover as shown in the figure. Overlap both ends of the bead for at least 3 mm (0.12 in).



CAUTION:
Remove old sealant on the mounting surface, then remove any moisture, oil, and foreign material from the application and mounting surfaces.

5. Assemble the coupling cover to the gear carrier assembly with the arrow facing upward, temporarily tighten reamer bolts to the positions shown in the figure.
6. Tighten the reamer bolts and coupling cover mounting bolts to the specified torque.
7. Assemble the companion flange.
8. Using a flange wrench, tighten the companion flange nut to the specified torque.

   CAUTION:
   Do not reuse the companion flange nut.
9. Check companion flange runout. Refer to RFD-16, "COMPANION FLANGE RUNOUT" .



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specification

ADS000EQ

Applied model	VQ35DE
	CVT
Final drive model	R145
Drive gear pitch diameter	145
Gear ratio	2.466
Number of teeth (Drive gear/Drive pinion)	37/15
Oil capacity (approx.)	0.55 ℓ (1 - 1/8 US pt, 1 Imp pt.)
Number of pinion gears	2
Drive pinion adjustment spacer type	collapsible

Drive Gear Runout

ADS000ER

Type	R145
Drive gear runout limit	0.05 mm (0.0020 in) or less

Side Gear Adjustment

ADS000ES

Type	R145
Clearance limit between side gear differential case	0.2 mm (0.008 in) or less. Every gear shall rotate smoothly with no abnormal feeling of drag.

AVAILABLE SIDE GEAR THRUST WASHERS

	Thickness	Part No.	Thickness	Part No.
Thrust washer	0.74 mm (0.0291 in) 0.77 mm (0.0303 in) 0.80 mm (0.0315 in)	38424 4N200 38424 4N201 38424 4N202	0.83 mm (0.0327 in) 0.86 mm (0.0339 in)	38424 4N203 38424 4N204

Drive Pinion Adjustment

ADS000ET

Adjustment of drive pinion gear	Collapsible spacer
Drive pinion gear preload	0.69 - 1.17 N·m (0.07 - 0.11 kg-m, 7 - 10 in-lb)

AVAILABLE DRIVE PINION ADJUSTING SHIM

	Thickness	Part No.	Thickness	Part No.
Adjusting shim	1.70 mm (0.0669 in) 1.73 mm (0.0681 in) 1.76 mm (0.0693 in) 1.79 mm (0.0705 in) 1.82 mm (0.0717 in) 1.85 mm (0.0728 in) 1.88 mm (0.0740 in) 1.91 mm (0.0752 in) 1.94 mm (0.0764 in) 1.97 mm (0.0776 in)	38154 4N200 38154 4N201 38154 4N202 38154 4N203 38154 4N204 38154 4N205 38154 4N206 38154 4N207 38154 4N208 38154 4N209	2.00 mm (0.0787 in) 2.03 mm (0.0799 in) 2.06 mm (0.0811 in) 2.09 mm (0.0823 in) 2.12 mm (0.0835 in) 2.15 mm (0.0846 in) 2.18 mm (0.0858 in) 2.21 mm (0.0870 in) 2.24 mm (0.0882 in)	38154 4N210 38154 4N211 38154 4N212 38154 4N213 38154 4N214 38154 4N215 38154 4N216 38154 4N217 38154 4N218

Side Bearing Preload Adjustment

ADS000EU

Adjustment of side bearing	Adjusting shim
Side bearing preload	0.64 - 0.98 N·m (0.07 - 0.09 kg-m, 6 - 8 in-lb)

AVAILABLE SIDE BEARING ADJUSTING SHIM

	Thickness	Part No.	Thickness	Part No.
Adjusting shim	1.85 mm (0.0728 in) 1.90 mm (0.0748 in) 1.95 mm (0.0768 in) 2.00 mm (0.0787 in) 2.05 mm (0.0807 in) 2.10 mm (0.0827 in)	38453 4N200 38453 4N201 38453 4N202 38453 4N203 38453 4N204 38453 4N205	2.15 mm (0.0854 in) 2.20 mm (0.0866 in) 2.25 mm (0.0886 in) 2.30 mm (0.0906 in) 2.35 mm (0.0925 in)	38453 4N206 38453 4N207 38453 4N208 38453 4N209 38453 4N210

Total Preload

ADS000EV

Total preload with oil seal installed	1.33 - 2.15 N·m (0.14 - 0.21 kg-m,12 - 19 in-lb)
Drive gear backlash to drive pinion	0.10 - 0.15 mm (0.0039 - 0.0059 in)