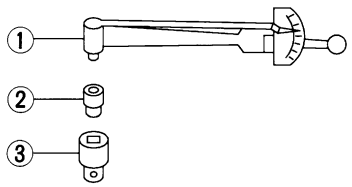
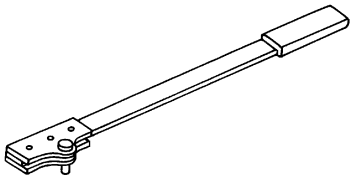
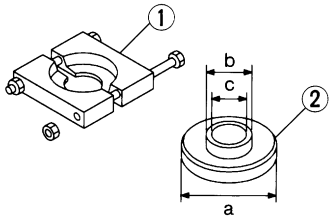
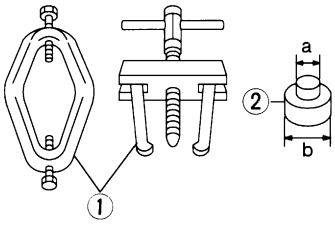
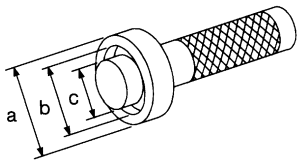
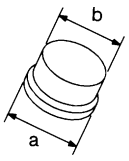
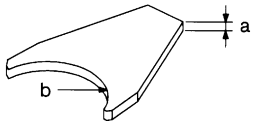
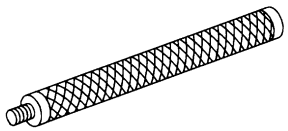
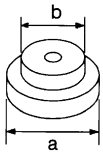
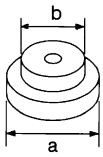
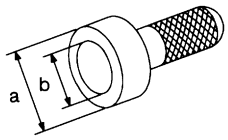
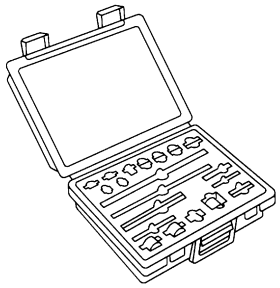
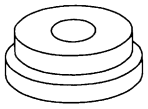
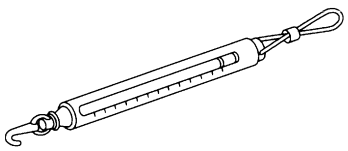
Preparation

SPECIAL SERVICE TOOLS

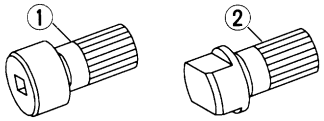
NEPD0114

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

Tool number (Kent-Moore No.) Tool name	Description	
ST3127S000 (See J25765-A) Preload gauge 1 GG91030000 (J25765) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT124	Measuring pinion bearing preload and total preload
KV38108300 (J44195) Companion flange wrench	 NT771	Removing and installing propeller shaft lock nut and drive pinion lock nut
ST3090S000 (—) Drive pinion rear inner race puller set 1 ST30031000 (J22912-01) Puller 2 ST30901000 (J26010-01) Base	 NT527	Removing and installing drive pinion rear inner cone **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35 mm (1.38 in) dia.**
ST3306S001 Differential side bearing puller set 1 ST33051001 (J22888-20) Body 2 ST33061000 (J8107-2) Adapter	 NT072	Removing and installing differential side bearing inner cone **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST33230000 (J25805-01) Differential side bearing drift	 NT085	Installing side bearing inner cone **a: 51 mm (2.01 in) dia.** **b: 41 mm (1.61 in) dia.** **c: 28.5 mm (1.122 in) dia.**
ST33081000 (—) Side bearing puller adapter	 NT431	Installing side bearing inner cone **a: 43 mm (1.69 in) dia.** **b: 33.5 mm (1.319 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description	
KV38100600 (J25267) Side bearing spacer drift	 NT528	Installing side bearing spacer **a: 8 mm (0.31 in)** **b: R42.5 mm (1.673 in)**
ST30611000 (J25742-1) Drift	 NT090	Installing pinion rear bearing outer race
ST30621000 (J25742-5) Drift	 NT073	Installing pinion rear bearing outer race **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30613000 (J25742-3) Drift	 NT073	Installing pinion front bearing outer race **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
KV38100500 (J25273) Gear carrier front oil seal drift	 NT115	Installing front oil seal **a: 85 mm (3.35 in) dia.** **b: 60 mm (2.36 in) dia.**
(J34309) Differential shim selector	 NT134	Adjusting bearing pre-load and gear height
(J25269-4) Side bearing discs (2 Req'd)	 NT136	Selecting pinion height adjusting washer
(J8129) Spring gauge	 NT127	Measuring carrier turning torque

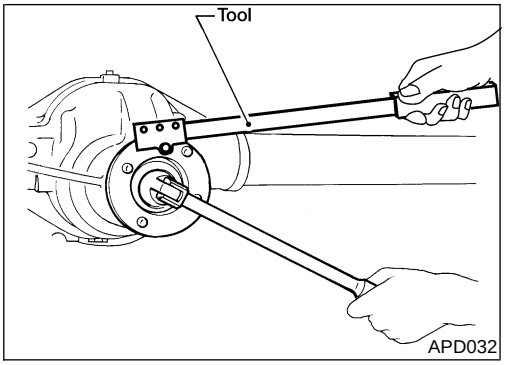
Preparation (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
KV381051S0 (—) Rear axle shaft dummy 1 KV38105110 (—) Torque wrench side 2 KV38105120 (—) Vise side	 NT142 Checking differential torque on limited slip differential

Noise, Vibration and Harshness (NVH) Troubleshooting

NEPD0115

Refer to "NVH TROUBLESHOOTING CHART", PD-4.



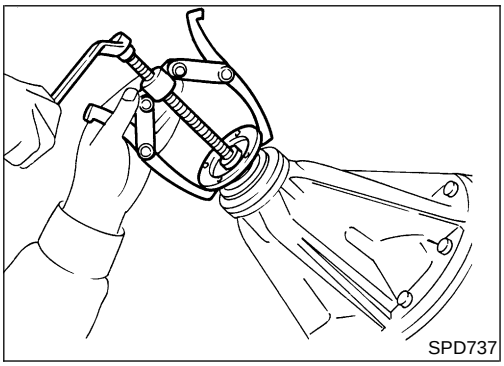
On-vehicle Service

FRONT OIL SEAL REPLACEMENT

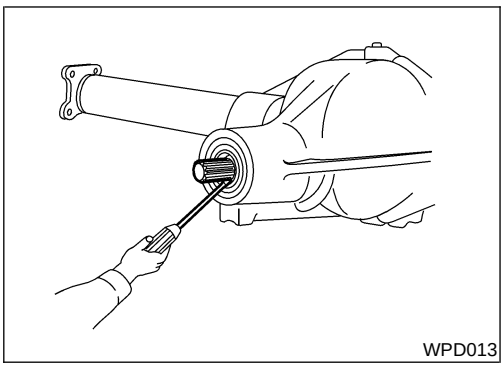
=NEPD0124

1. Remove propeller shaft. Refer to “Removal and Installation”, PD-9.
2. Loosen drive pinion nut.

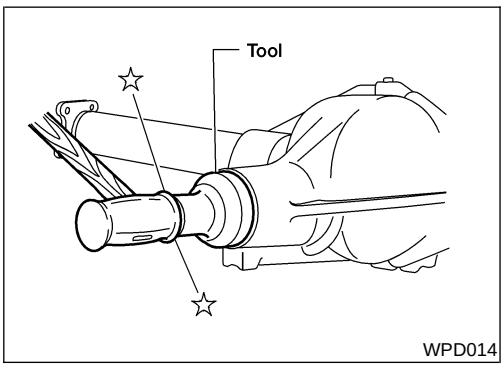
Tool number: KV38108300 (J-44195)



3. Remove companion flange.
4. Remove ABS sensor and sensor rotor.



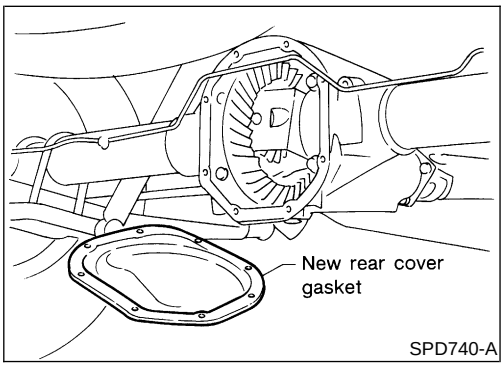
5. Remove front oil seal.



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

Tool number:
KV38100500 (J25273)

7. Install ABS sensor and sensor rotor.
8. Install companion flange and drive pinion nut.
9. Install rear propeller shaft.



REAR COVER GASKET REPLACEMENT

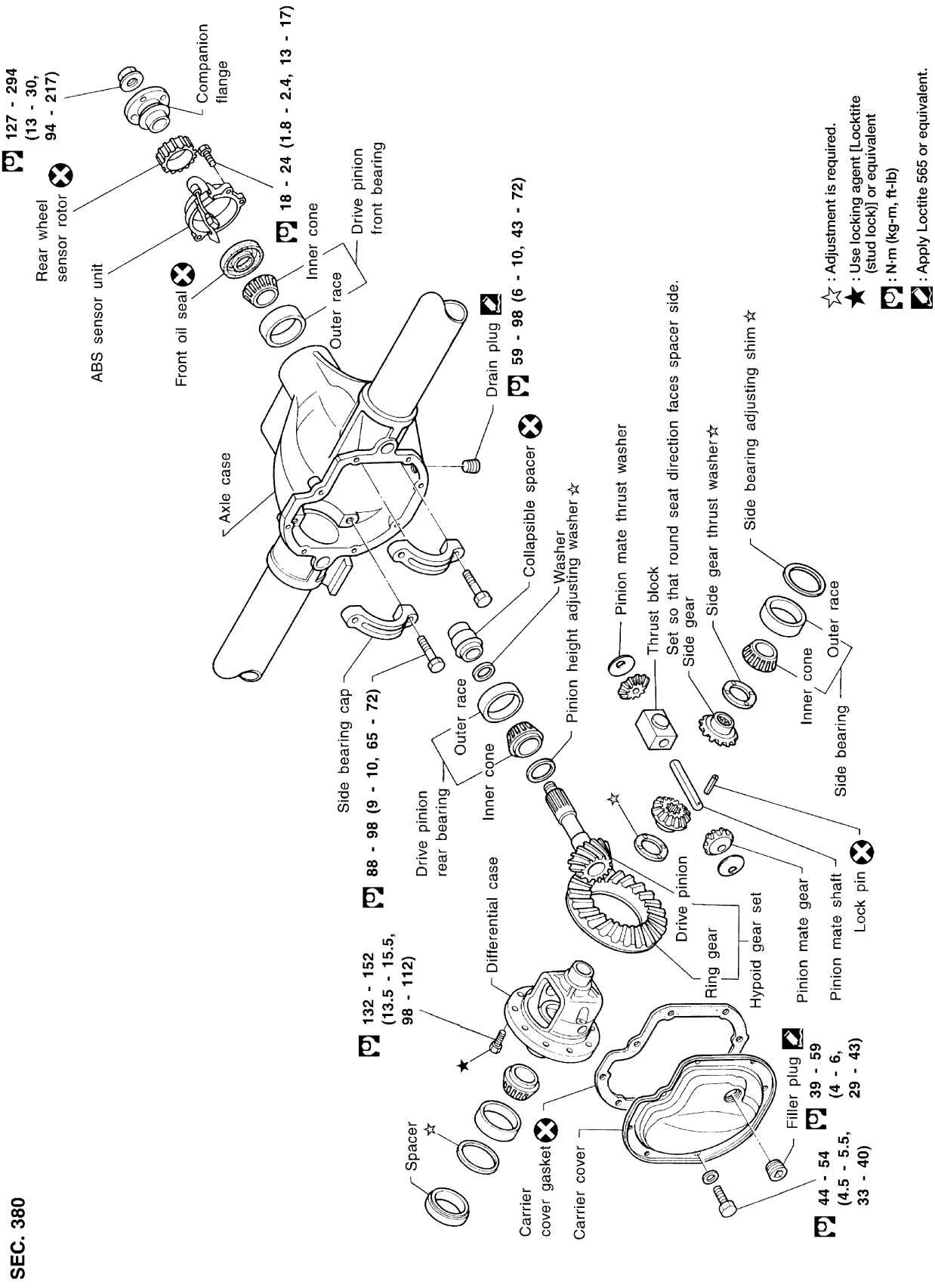
NEPD0116

(Rear final drive: Model C200)

1. Drain gear oil.
2. Remove rear cover and rear cover gasket.
3. Install new rear cover gasket and rear cover.
4. Fill final drive with recommended gear oil.

Components

NEPD0117



SEC. 380

WPD018

Removal and Installation

NEPD0118

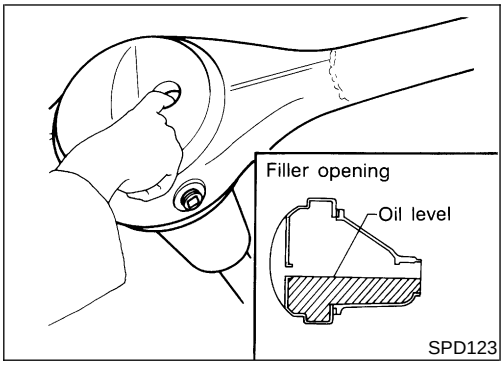
REMOVAL

NEPD0118S01

- Remove propeller shaft. Refer to “Removal and Installation”, PD-9.
  Plug front end of transfer.
- Remove axle shaft.
  Refer ***AX-30***, “REAR AXLE”.

CAUTION:

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



INSTALLATION

NEPD0118S02

- Fill final drive with recommended gear oil.

Disassembly

NEPD0119

PRE-INSPECTION

NEPD0119S01

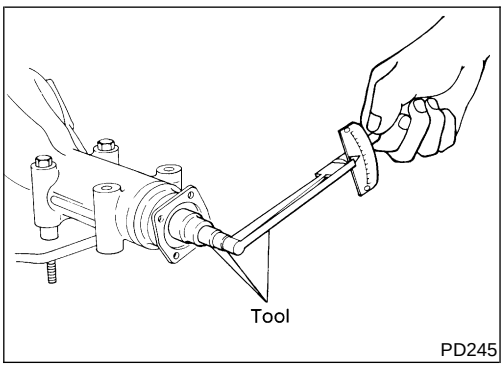
Before disassembling final drive, perform the following inspection.

- Total preload

a) Turn drive pinion in both directions several times to set bearing rollers.

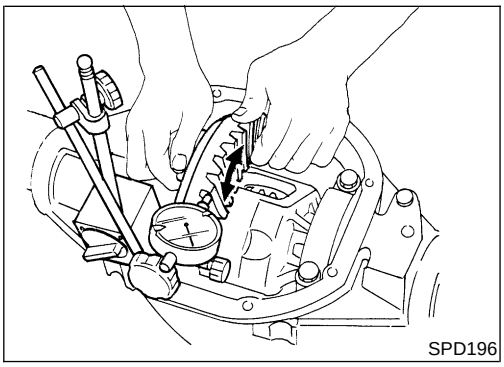
b) Check total preload with Tool.

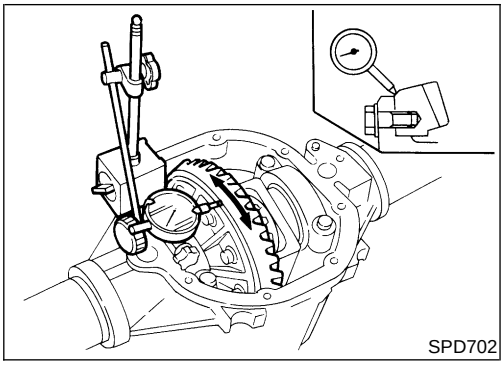
Tool number: ST3127S000 (J25765-A)
Total preload:
1.2 - 2.3 N·m (12 - 23 kg-cm, 10 - 20 in-lb)



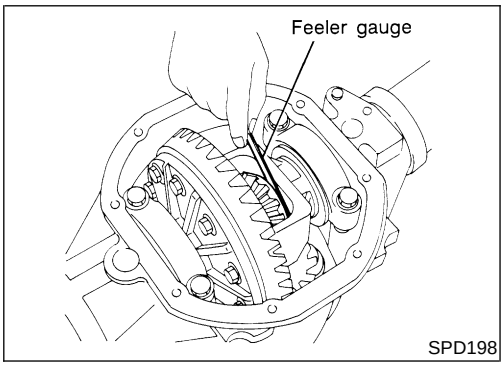
- Ring gear-to-drive pinion backlash.
  Check backlash of ring gear with a dial indicator at several points.

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




SPD702

- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit: 0.05 mm (0.0020 in)



SPD198

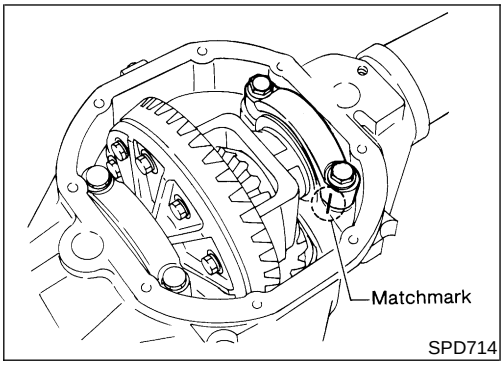
- Tooth contact
  Check tooth contact. Refer to "TOOTH CONTACT", PD-56.
- Side gear-to-pinion mate gear backlash
  Measure clearance between side gear thrust washer and differential case with a feeler gauge.
  Clearance between side gear thrust washer and differential case:
  Less than 0.15 mm (0.0059 in)

DIFFERENTIAL CARRIER

NEPD0119S02

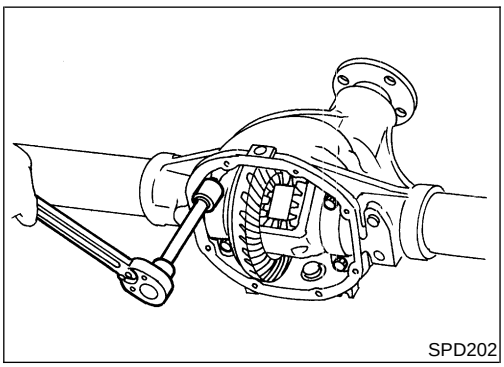
1. Remove rear cover and rear cover gasket.
2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

Bearing caps are line-bored during manufacture and should be put back in their original places.

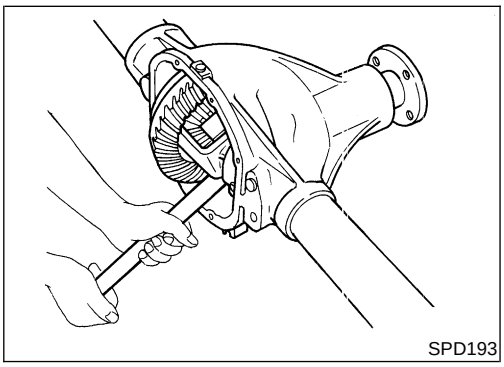


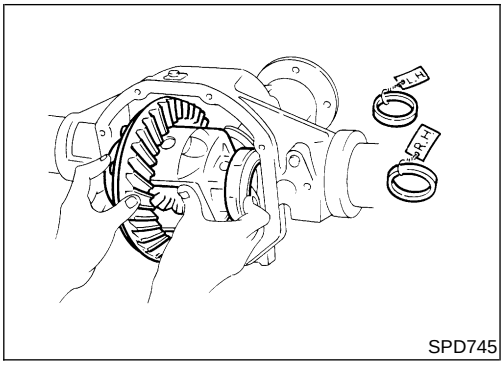
SPD714

3. Remove side bearing caps.


SPD202

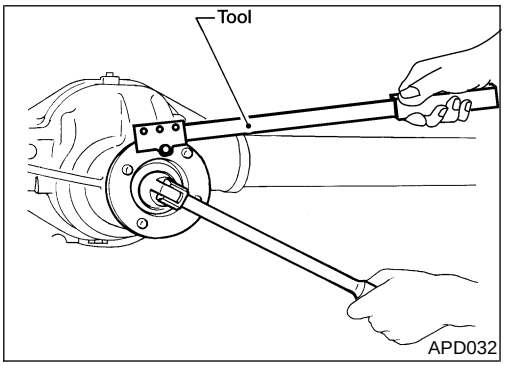
4. Remove differential case assembly with pry bar.


SPD193



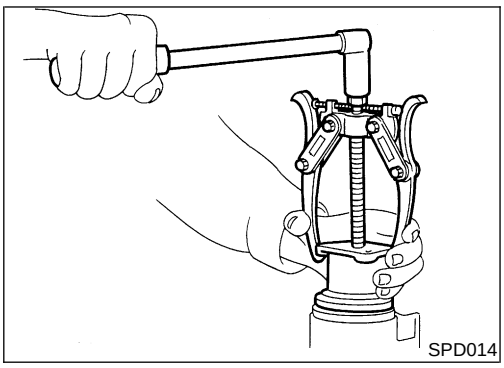
SPD745

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

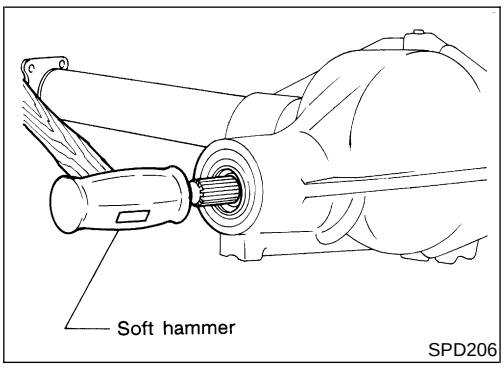


APD032

5. Remove pinion nut with Tool.
   Tool number: KV38108300 (J44195)

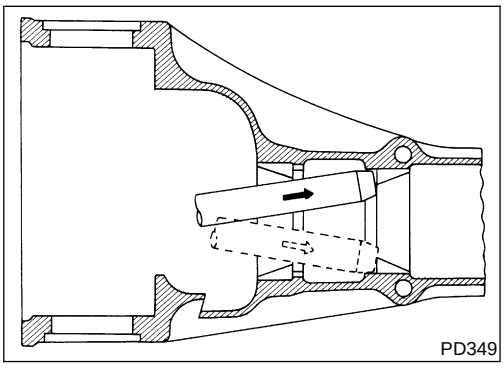

SPD014

6. Remove companion flange with puller.
7. Remove ABS sensor and sensor rotor.

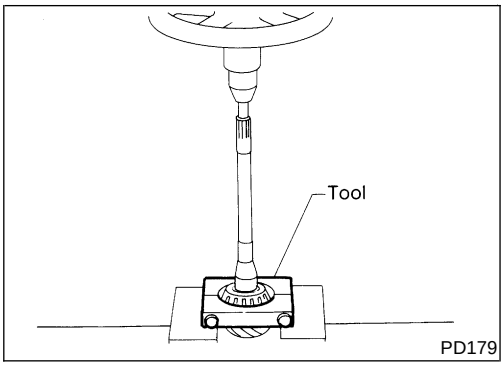


SPD206

8. Remove drive pinion with soft hammer.
9. Remove front oil seal and pinion front bearing inner cone.


PD349

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

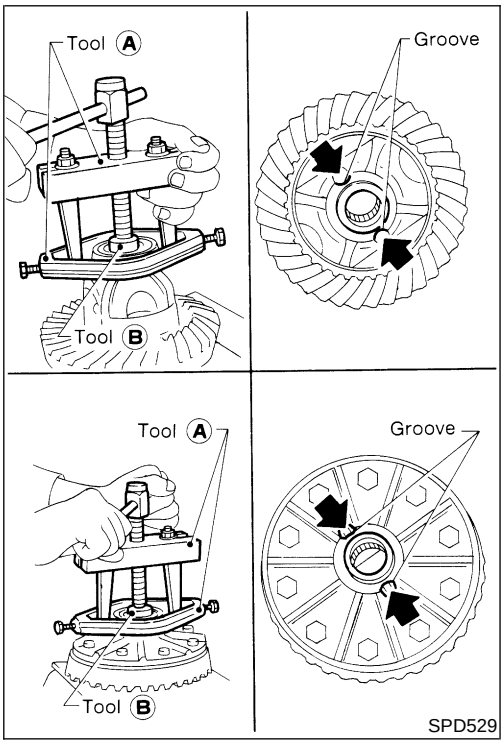


11. Remove pinion rear bearing inner cone and pinion height adjusting washer.
    Tool number: ST30031000 (J22912-01)

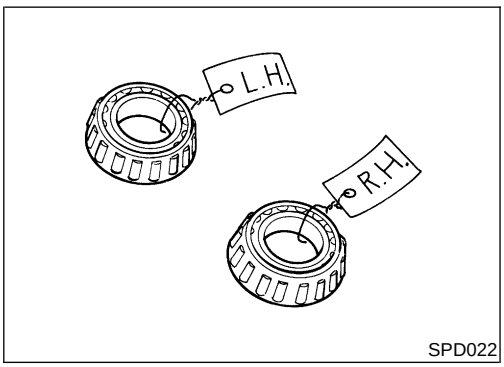
DIFFERENTIAL CASE

NEPD0119S03

1. Remove side bearing inner cones.
   To prevent damage to bearing, engage puller jaws in grooves.
   Tool numbers:
   A ST33051001 (J22888-20)
   B ST33061000 (J8107-2)

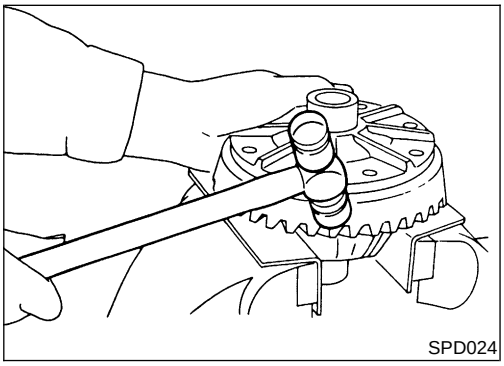


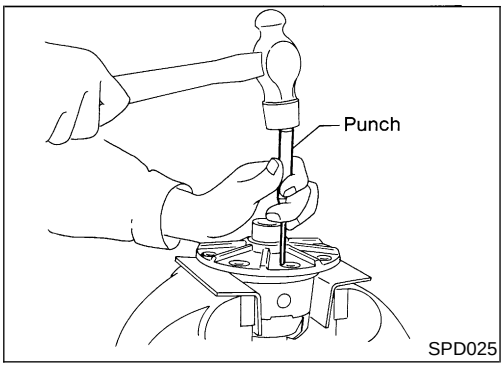
Be careful not to confuse the right-hand and left-hand parts.



2. Loosen ring gear bolts in a crisscross fashion.
3. Tap ring gear off the differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.





4. Punch off pinion mate shaft lock pin from ring gear side.

Lock pin is caulked at pinhole mouth on differential case.

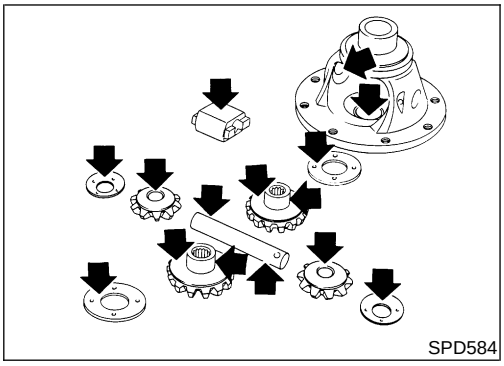
Inspection

NEPD0120

RING GEAR AND DRIVE PINION

NEPD0120S01

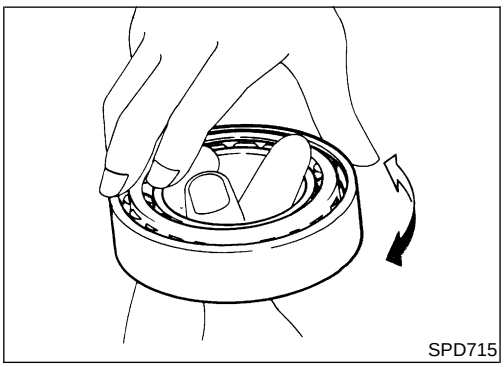
Check gear teeth for scoring, cracking or chipping. If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).



DIFFERENTIAL CASE ASSEMBLY

NEPD0120S02

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



BEARING

NEPD0120S03

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

Adjustment

NEPD0121

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

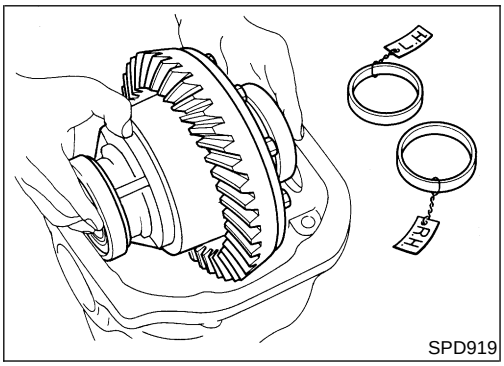
1. Side bearing preload. Refer to "SIDE BEARING PRELOAD", PD-50.
2. Pinion gear height. Refer to "PINION GEAR HEIGHT AND PINION BEARING PRELOAD", PD-51.
3. Pinion bearing preload. Refer to "PINION GEAR HEIGHT AND PINION BEARING PRELOAD", PD-51.
4. Ring gear-to-pinion backlash. Refer to "Total Preload Adjustment", PD-62.

5. Ring and pinion gear tooth contact pattern. Refer to "TOOTH CONTACT", PD-56.

SIDE BEARING PRELOAD

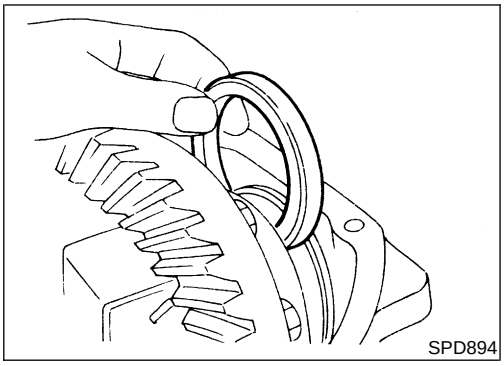
NEPD0121S01

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



SPD919

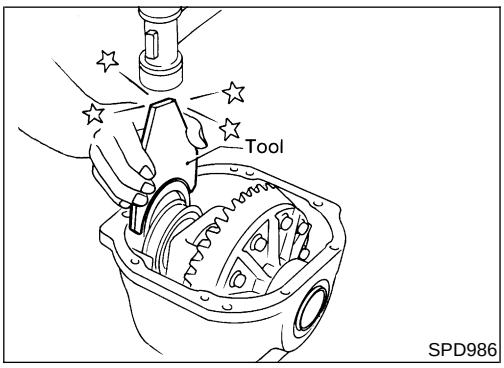
1. Make sure all parts are clean. Make sure, also, the bearings are well lubricated with light oil or type "DEXRON™" automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.


SPD894

3. Put the side bearing spacer in place.

CAUTION:

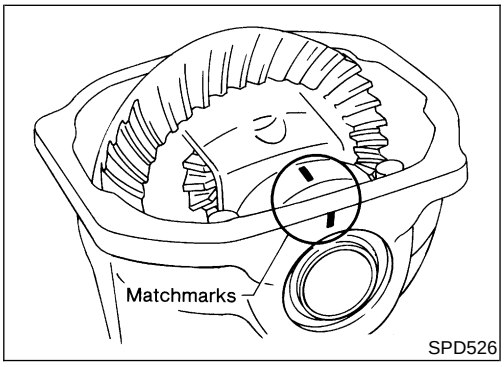
Side bearing spacer is placed on either the right or left depending upon final drive gear ratio. Be sure to replace it on the correct side.



SPD986

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

Tool number: KV38100600 (J25267)



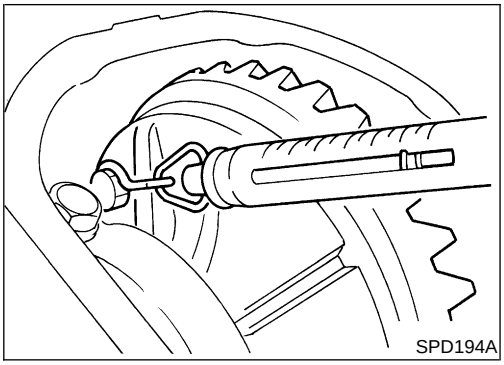
SPD526

5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.

Specification:

88 - 98 N·m (9.0 - 10.0 kg-m, 65 - 72 ft-lb)

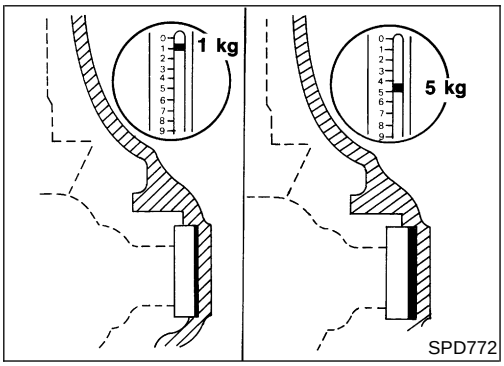
6. Turn the carrier several times to seat the bearings.


SPD194A

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

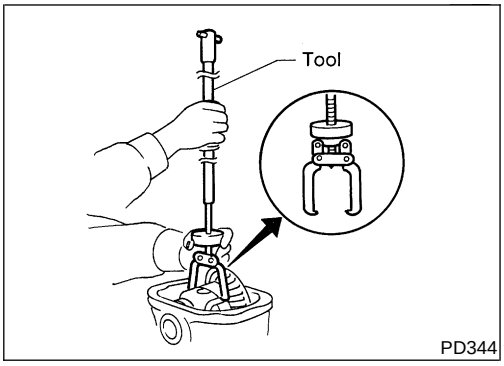
Specification:

34.3 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb) of pulling force at the ring gear bolt



SPD772

8. If the turning torque is not within the specifications, correct the torque as follows:
- If the turning torque is less than the specified range, install washers of greater thickness.
- If the turning torque is greater than the specification, install thinner washers.
- Refer to "Side Bearing Adjustment", PD-62, for washer dimensions and part numbers.
9. Record the total amount of washer thickness required for the correct carrier side bearing preload.



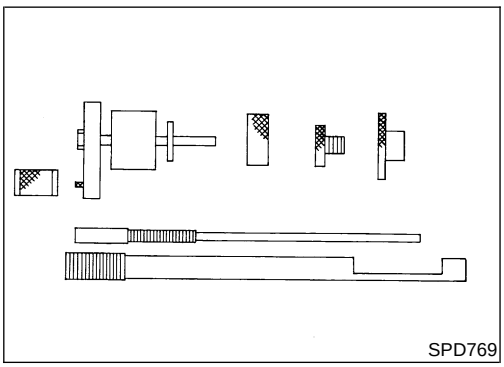
PD344

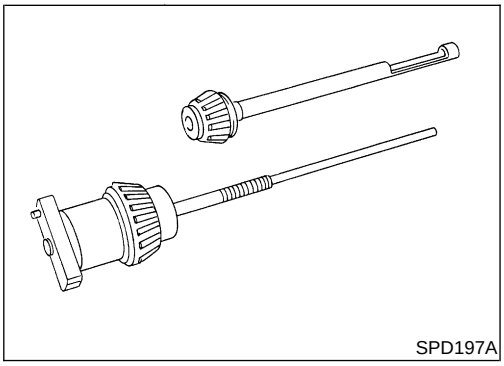
10. Remove the carrier from the final drive housing. Save the selected preload washers for later use during the assembly of the final drive unit.

PINION GEAR HEIGHT AND PINION BEARING PRELOAD

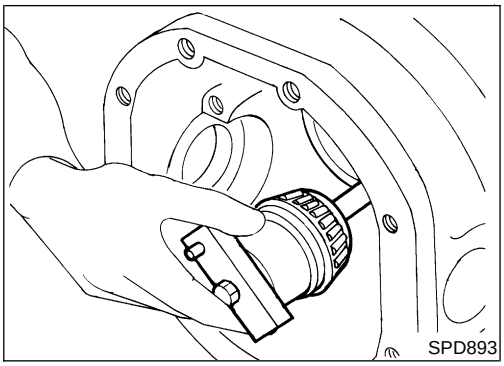
NEPD0121S02

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion preload shim selector Tool, J34309.

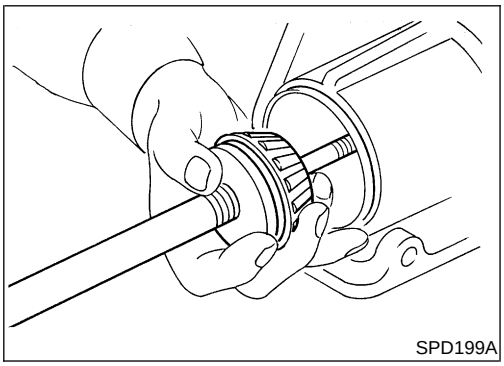

SPD769


SPD197A

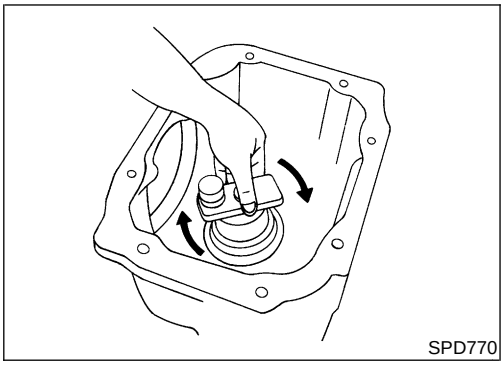
- **Front pinion bearing** — make sure the J34309-3 front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.
- **Rear pinion bearing** — the rear pinion bearing pilot, J34309-8, is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


SPD893

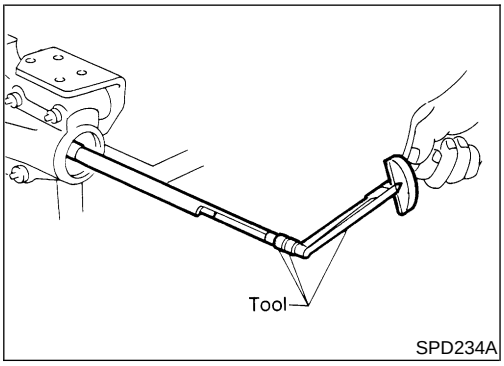
3. Install the pinion rear bearing inner cone into the final drive housing. Then place the pinion preload shim selector Tool, J34309-1, on gauge screw assembly.


SPD199A

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


SPD770

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



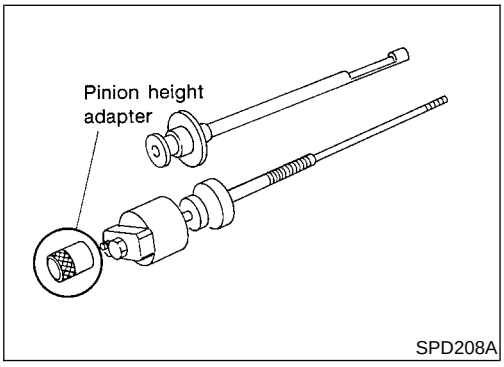
SPD234A

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

Tool number: ST3127S000 (J25765-A)

Turning torque specification:

1.0 - 1.3 N·m (10 - 13 kg-cm, 8.7 - 11.3 in-lb)

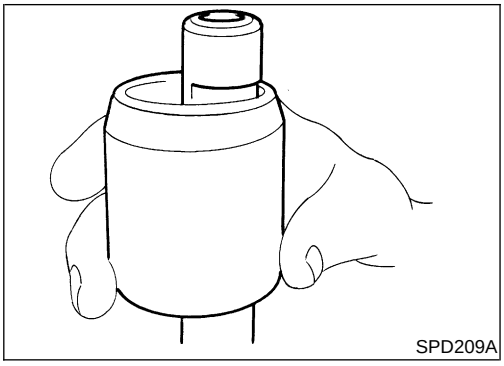


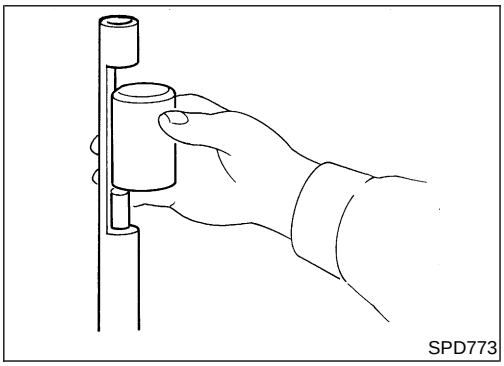
SPD208A

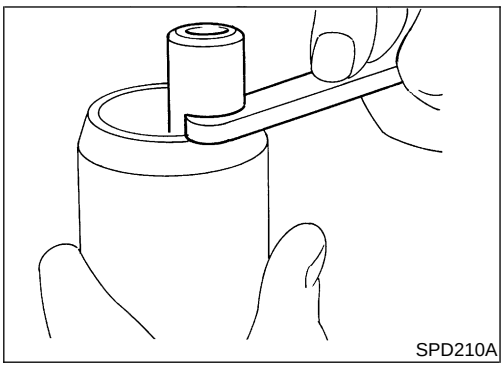
7. Place the J34309-11 pinion height adapter onto the gauge plate and tighten it by hand.

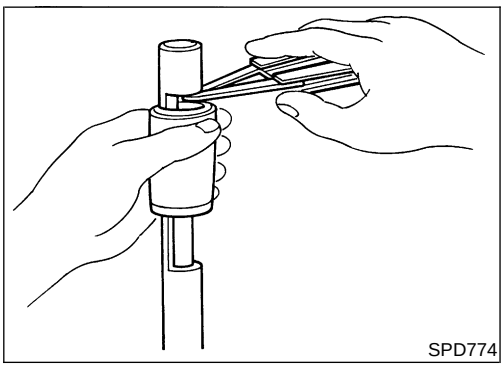
CAUTION:

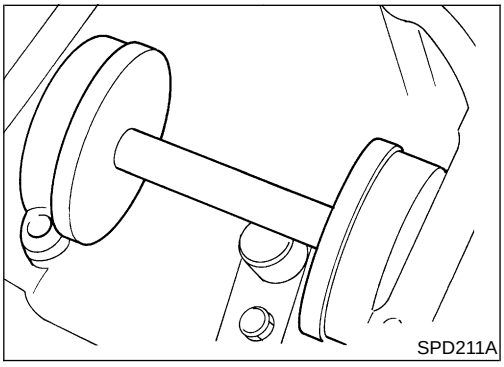
Make sure all machined surfaces are clean.


SPD209A


SPD773


SPD210A


SPD774


SPD211A

PINION BEARING PRELOAD WASHER SELECTION

8. Place the solid pinion bearing spacer, small end first, over the J34309-2 gauge anvil and seat the small end squarely against the tip of the J34309-1 gauge screw in the tool recessed portion.

9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 3.5 mm (0.138 in) and J34309-101 feeler gauge. The exact measure is the thickness of the adjusting washer required. Select the correct washer.

Drive pinion bearing preload adjusting washer:

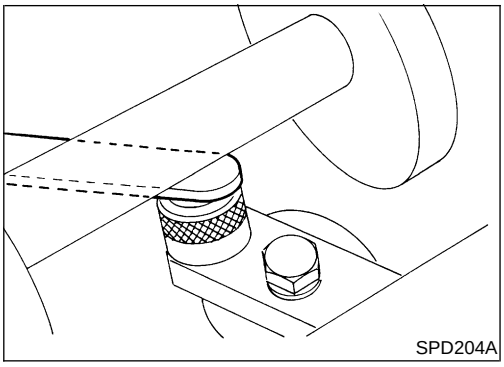
Refer to "Drive Pinion Preload Adjustment", PD-63.

10. Set the selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion gear and bearings into the final drive.

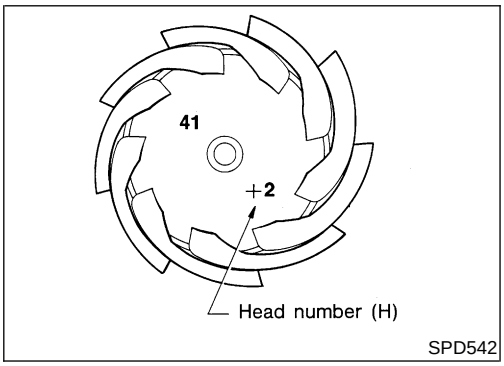
PINION HEIGHT ADJUSTING WASHER SELECTION

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

Adjustment (Cont'd)


SPD204A

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



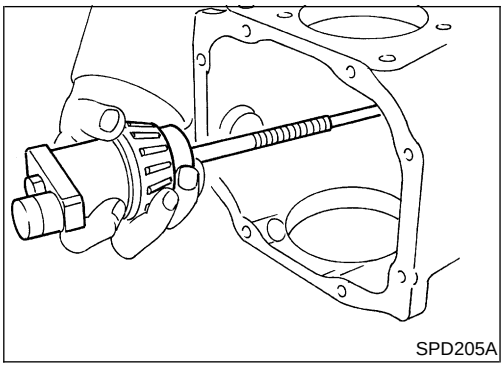
SPD542

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

Use the following chart to determine the correct pinion height washer:

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

15. Select the correct pinion height washer.
Drive pinion height adjusting washer:
Refer to "Drive Pinion Height Adjustment", PD-63.

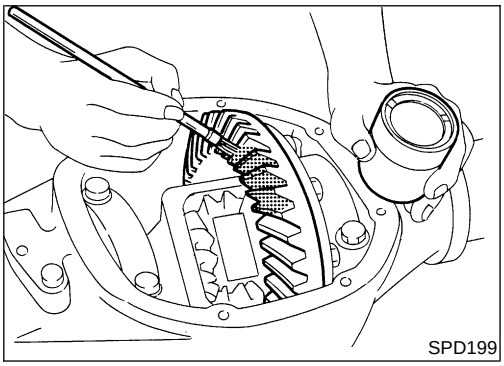

SPD205A

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

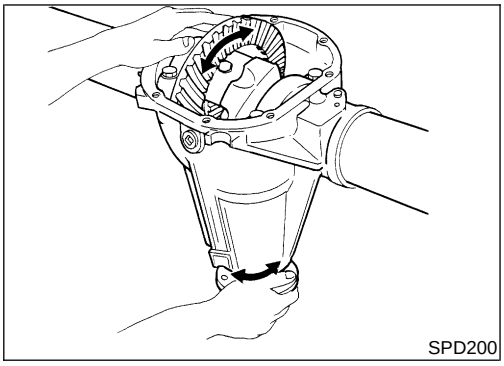
TOOTH CONTACT

=NEPD0121S03

Checking gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear set which is not positioned properly may be noisy, or have short life or both. With the checking or gear tooth contact pattern, the most desirable contact for low noise level and long life can be assured.

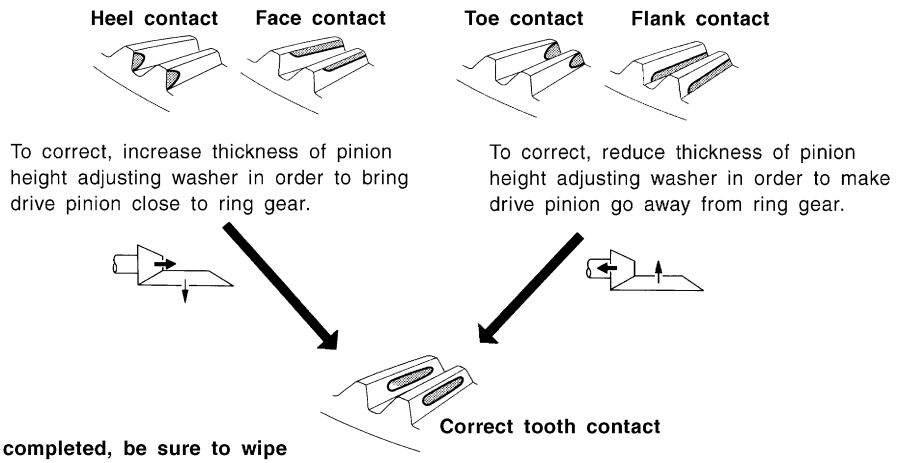

SPD199

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


SPD200

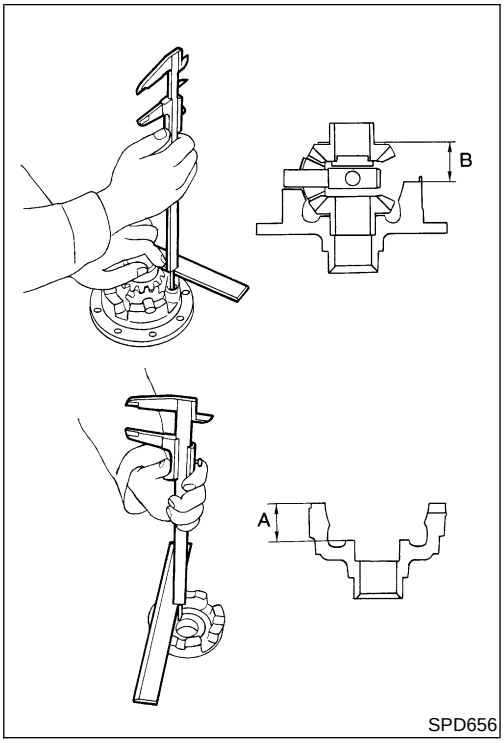
3. Hold companion flange steady and rotate the ring gear in both directions.

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



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

SPD007-B



Assembly

NEPD0122

DIFFERENTIAL CASE

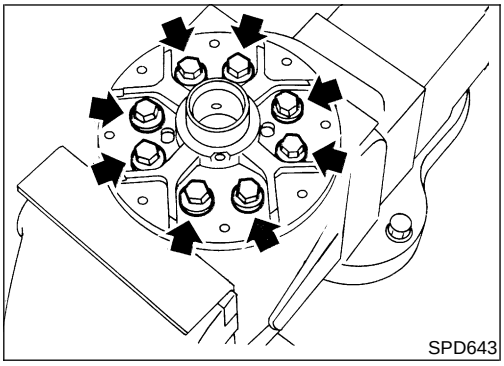
NEPD0122S01

1. Measure clearance between side gear thrust washer and differential case.

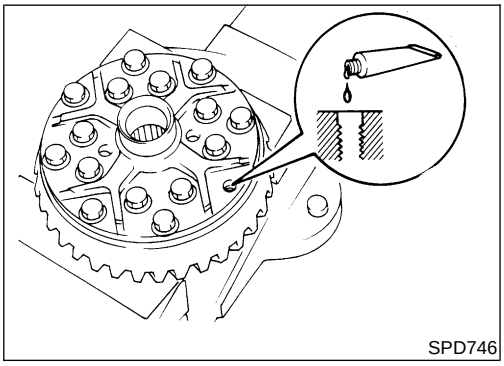
   Clearance between side gear thrust washer and differential case (A – B):

   Less than 0.15 mm (0.0059 in)

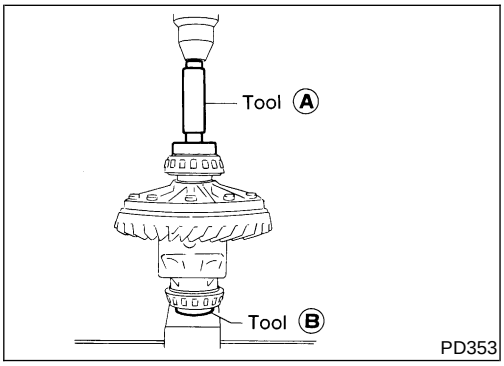
   The clearance can be adjusted with side gear thrust washer. Refer to “Side Gear Adjustment”, PD-62.
2. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see that they turn properly.



3. Install differential case LH and RH.



4. Place differential case on ring gear.
5. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.
   Tighten bolts in a crisscross pattern.



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

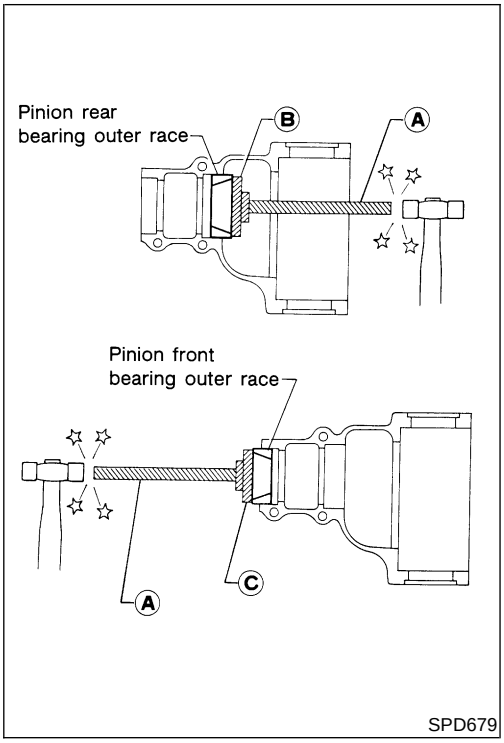
   Tool numbers:

   A ST33230000 (J25805-01)

   B ST33061000 (J8107-2)

DIFFERENTIAL CARRIER

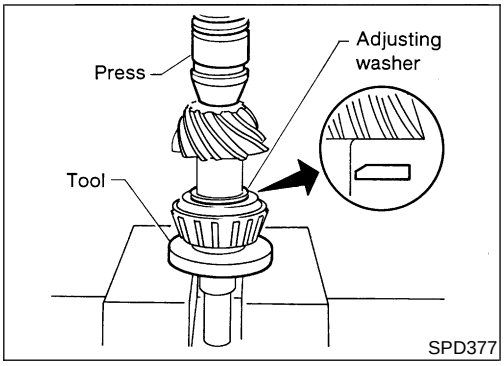
NEPD0122S02



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

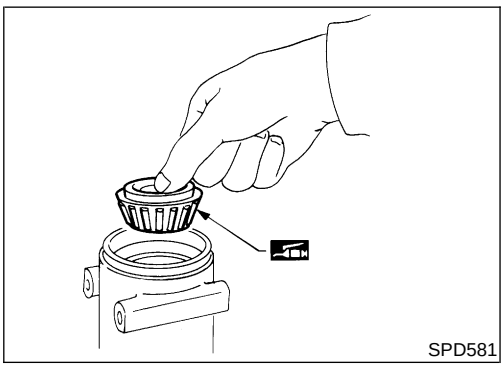
Tool numbers:

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

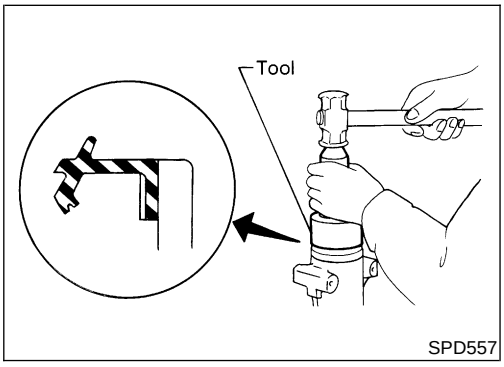


2. Select pinion height adjusting washer. Refer to "PINION GEAR HEIGHT AND PINION BEARING PRELOAD", PD-51.
3. Install pinion height adjusting washer in drive pinion, and press-fit rear bearing inner cone in it, with press and Tool.

Tool number: ST30901000 (J26010-01)

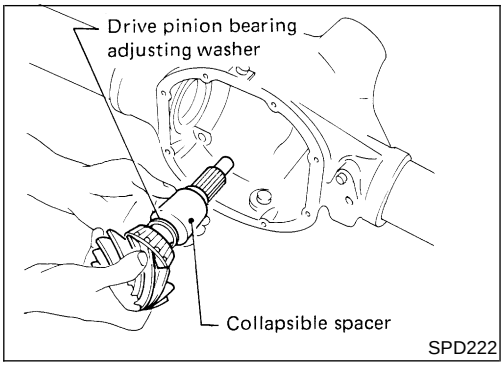


4. Place pinion front bearing inner cone in gear carrier.

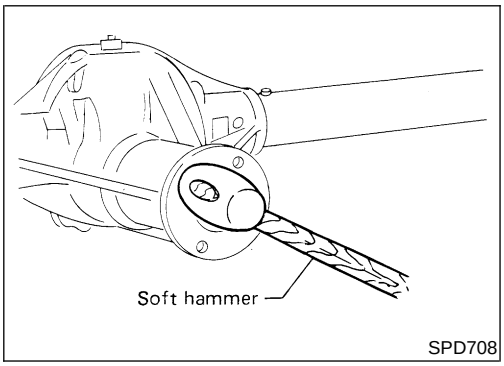


5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

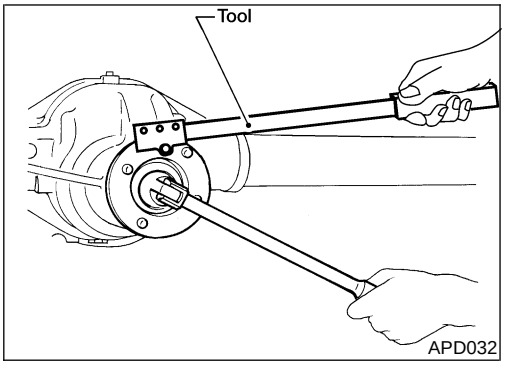
Tool number: KV38100500 (J25273)



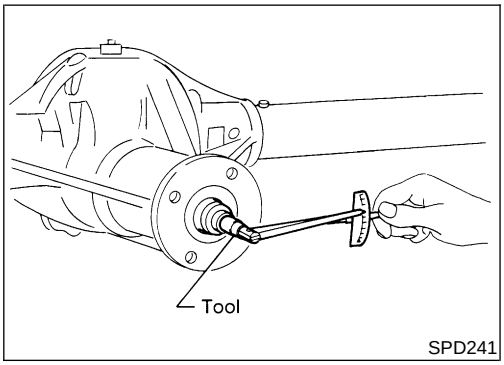
6. Place drive pinion bearing spacer, drive pinion bearing adjusting washer and drive pinion in gear carrier.



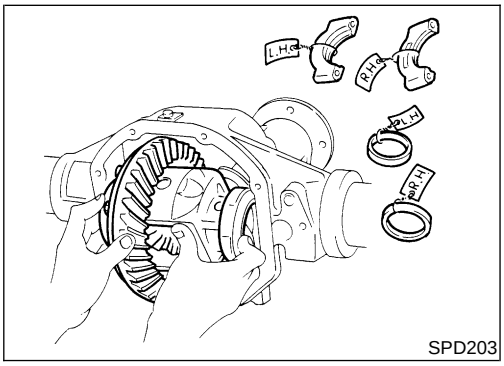
7. Install ABS sensor, sensor rotor, and companion flange onto drive pinion. Tap the companion flange with a soft hammer until fully seated.



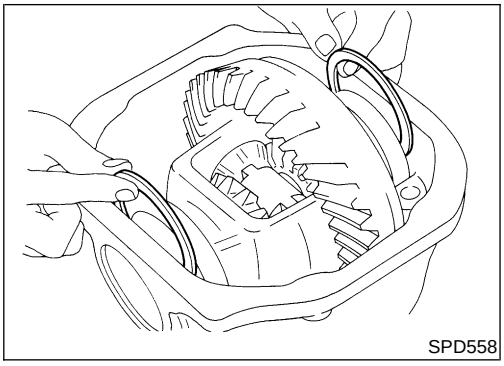
8. Tighten pinion nut to 127 N·m (13 kg-m, 94 ft-lb).
The threaded portion of drive pinion and pinion nut should be free from oil or grease.
Tool number: KV38108300 (J44195)



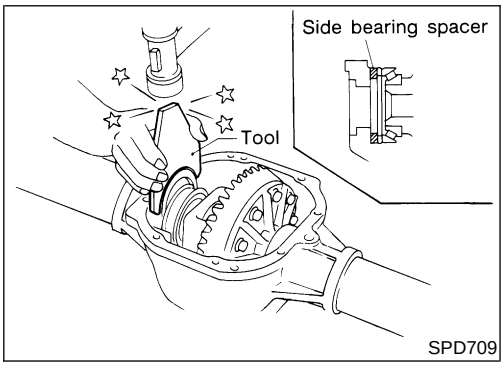
9. Tighten the pinion nut by very small degrees until the specified preload is achieved. When checking the preload, turn the drive pinion in both directions several times to set the bearing rollers.
Tool number: ST3127S000 (J25765-A)
Pinion bearing preload:
1.1 - 1.7 N·m (11 - 17 kg-cm, 9.5 - 14.8 in-lb)
This procedure will have to be repeated if:
- **Maximum preload is achieved before the minimum pinion nut torque is reached.**
- **Minimum preload is not achieved before maximum pinion nut torque is reached.**



10. Select side bearing adjusting washer.
Refer to "SIDE BEARING PRELOAD", PD-50.
11. Install differential case assembly with side bearing outer races into gear carrier.

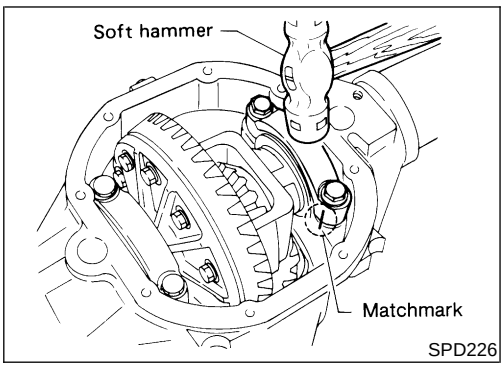

SPD558

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



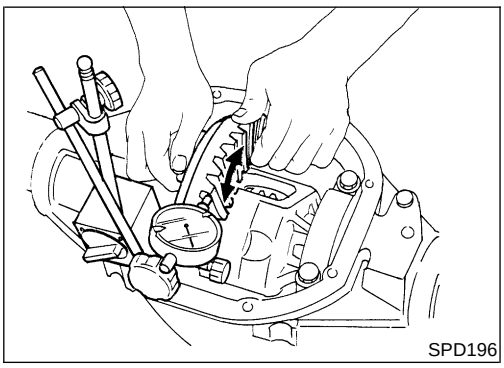
SPD709

13. Drive in side bearing spacer with Tool.
Tool number: KV38100600 (J25267)



SPD226

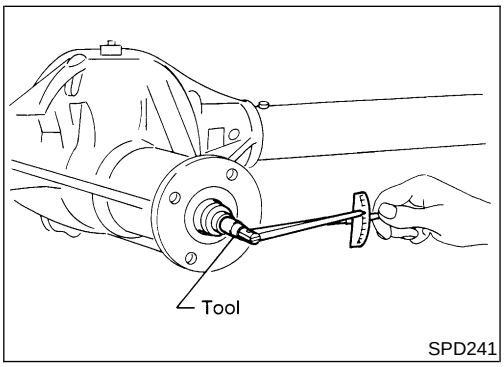
14. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.


SPD196

15. Measure ring gear-to-drive pinion backlash with a dial indicator.
Ring gear-to-drive pinion backlash:
0.13 - 0.18 mm (0.0051 - 0.0071 in)

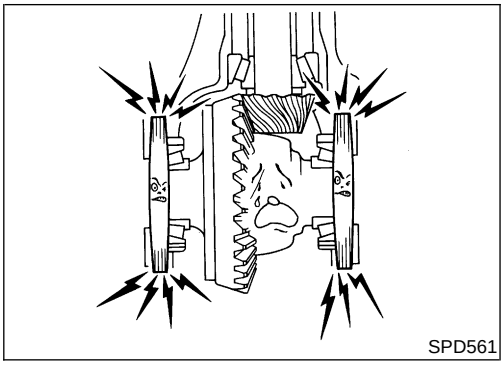
- If backlash is too small, decrease thickness of right shim and increase thickness of left shim by the same amount.
If backlash is too great, reverse the above procedure.

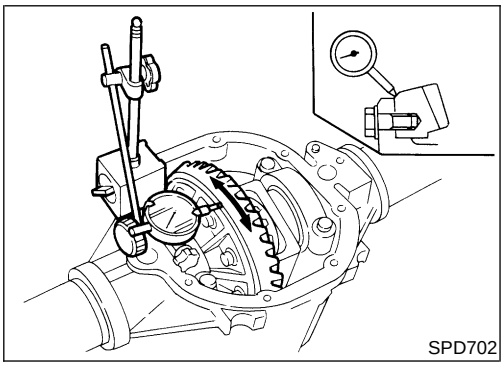
Never change the total amount of shims as it will change the bearing preload.



SPD241

16. Check total preload with Tool.
When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.
Total preload:
1.2 - 2.3 N·m (12 - 23 kg-cm, 10 - 20 in-lb)
Tool number: ST3127S000 (J25765-A)


SPD561


SPD702

- If preload is too great, remove the same amount of shim from each side.
- If preload is too small, add the same amount of shim to each side.

Never add or remove a different number of shims for each side as it will change ring gear-to-drive pinion backlash.

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

18. Check runout of ring gear with a dial indicator.
    Runout limit: 0.05 mm (0.0020 in)
- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

19. Check tooth contact.
    Refer to "TOOTH CONTACT", PD-56.
20. Install rear cover and gasket.

Service Data and Specifications (SDS)

C200

General Specifications

=NEPD0123

NEPD0123S01

Engine	KA24DE			
Body	Standard wheelbase		Long wheelbase	
Transmission	A/T	M/T	A/T	M/T
Rear final drive	Standard			
	C200			
	2-pinion			
Gear ratio	4.111	3.700	4.625	3.900
Number of teeth (Ring gear/drive pinion)	37/9	37/10	37/8	39/10
Oil capacity (Approx.) ℓ (US pt, lmp pt)	1.3 (2-3/4, 2-1/4)			

Ring Gear Runout

NEPD0123S02

Ring gear runout limit mm (in)	0.05 (0.0020)

Side Gear Adjustment

NEPD0123S03

Side gear backlash (Clearance between side gear and differential case) mm (in)		Less than 0.15 (0.0059)
Available side gear thrust washers	Thickness mm (in)	Part number*
	0.75 (0.0295)	38424-N3110
	0.78 (0.0307)	38424-N3111
	0.81 (0.0319)	38424-N3112
	0.84 (0.0331)	38424-N3113
	0.87 (0.0343)	38424-N3114
	0.90 (0.0354)	38424-N3115
	0.93 (0.0366)	38424-N3116

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

Side Bearing Adjustment

NEPD0123S04

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

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

Total Preload Adjustment

NEPD0123S05

Total preload N·m (kg-cm, in-lb)	1.2 - 2.3 (12 - 23, 10 - 20)
Ring gear-to-pinion backlash mm (in)	0.13 - 0.18 (0.0051 - 0.0071)

Drive Pinion Height Adjustment

NEPD0123S06

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

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

Drive Pinion Preload Adjustment

NEPD0123S07

Drive pinion bearing preload adjusting method	Collapsible spacer
Drive pinion preload with front oil seal N·m (kg-cm, in-lb)	1.1 - 1.7 (11 - 17, 9.5 - 15)
Drive pinion preload without front oil seal N·m (kg-cm, in-lb)	1.0 - 1.6 (10 - 16, 8.7 - 14)