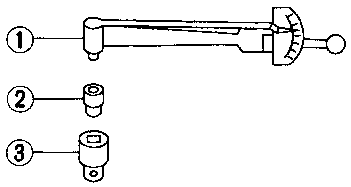
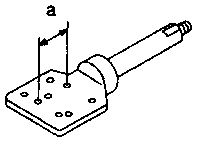
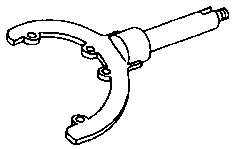
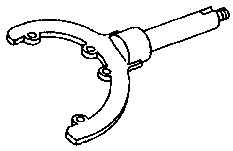
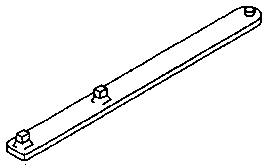
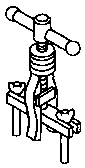
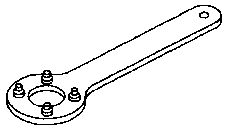
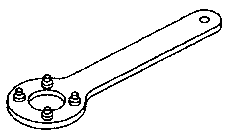
PROPELLER SHAFT & DIFFERENTIAL CARRIER

SECTION PD

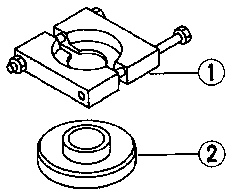
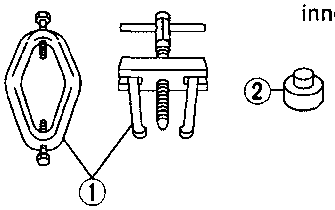
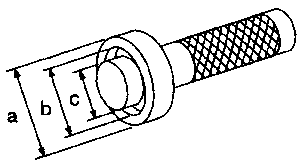
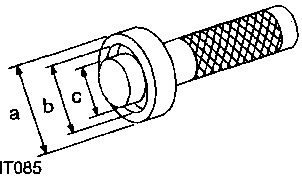
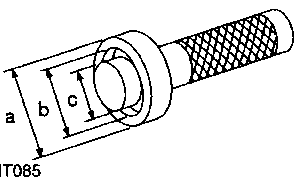
CONTENTS

CONTENTS (Cont'd.)

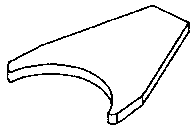
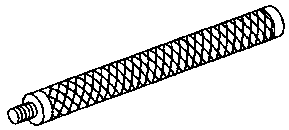
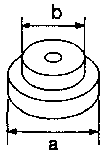
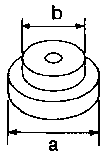
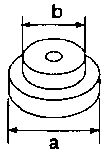
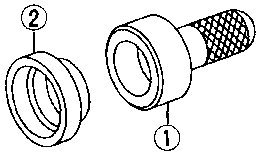
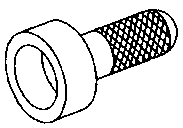
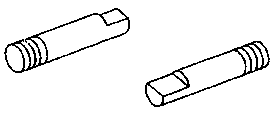
Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	Unit application			
		R180A	R200A	H190A	H233B
ST3217S000 (See J25765-A) Preload gauge ① GG91030000 (J25765) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter	Measuring pinion bearing preload and total preload  NT124	X	X	X	X
KV38100800 (—) Differential attachment Equivalent tool (J25604-01)	Mounting final drive (To use, make a new hole.) **a: 152 mm (5.98 in)**  NT119	X	X	—	—
ST06310000 (—) Differential attachment Equivalent tool (J25602-01)	Mounting final drive  NT140	—	—	X	—
ST06340000 (—) Differential attachment Equivalent tool (J24310)	Mounting final drive  NT140	—	—	—	X
ST32580000 (J34312) Differential side bearing adjusting nut wrench	Adjusting side bearing preload and backlash (ring gear-drive pinion)  NT141	—	—	—	X
ST33290001 (J25810-A) Side bearing outer race puller	Removing side bearing outer race and side oil seal  NT076	X	—	—	—
ST38060002 (J34311) Drive pinion flange wrench	Removing and installing propeller shaft lock nut, and drive pinion lock nut  NT113	X	X	X	—
KV38104700 (J34311) Drive pinion flange wrench	Removing and installing propeller shaft lock nut, and drive pinion lock nut  NT113	—	—	—	X

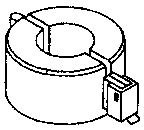
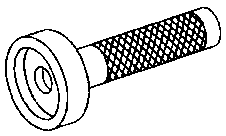
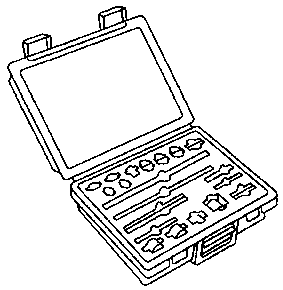
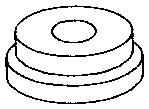
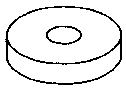
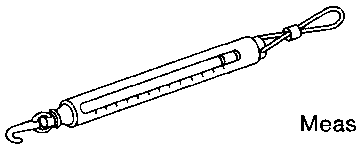
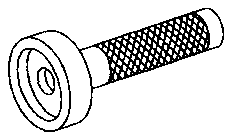
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description		Unit application			
			R180A	R200A	H190A	H233B
ST3090S000 (—) Drive pinion rear inner race puller set ① ST30031000 (J22912-01) Puller ② ST30901000 (—) Base Equivalent tool (J26010-01)	 NT132	Removing and installing drive pinion rear inner cone	X	X	X	X
ST3306S001 Differential side bearing puller set ① ST33051001 (—) Body Equivalent tool (J22888) ② ST33061000 (J8107-2) Adapter	 NT133	Removing and installing differential side bearing inner cone	X	X	X	X
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.**	X	—	X	—
KV38100300 (J25523) Differential side bearing drift	 NT085	Installing side bearing inner cone **a: 54 mm (2.13 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 32 mm (1.26 in) dia.**	—	X	—	—
ST33190000 (—) Differential side bearing drift Equivalent tool (J25523)	 NT085	Installing side bearing inner cone **a: 52 mm (2.05 in) dia.** **b: 45.5 mm (1.791 in) dia.** **c: 34 mm (1.34 in) dia.**	—	—	—	X
ST33081000 (—) Side bearing puller adapter	 NT137	Installing side bearing inner cone	—	—	—	X

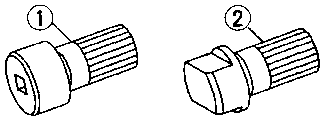
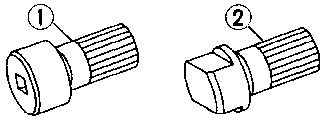
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	Unit application			
		R180A	R200A	H190A	H233B
KV38100600 (J25267) Side bearing spacer drift	 NT123 — Installing side bearing spacer	—	X	—	—
ST30611000 (J25742-1) Drift	 NT090 — Installing pinion rear bearing outer race	X	X	X	X
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.**	X	X	X	X
ST30701000 (J25742-2) Drift	 NT073 — Installing pinion front bearing outer race **a: 61.5 mm (2.421 in) dia.** **b: 41 mm (1.61 in) dia.**	X	—	—	—
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.**	—	X	X	X
KV381025S0 (—) Oil seal fitting tool ① ST30720000 (—) Drift bar Equivalent tool (J25405) ② KV38102510 (—) Drift	 NT122 — Installing front oil seal	X	—	X	X
KV38100500 (—) Gear carrier front oil seal drift Equivalent tool (J25273)	 NT121 — Installing front oil seal	—	X	—	—
ST33720000 (J25817) Differential side retainer guide	 NT138 — Installing side retainer	X	—	—	—

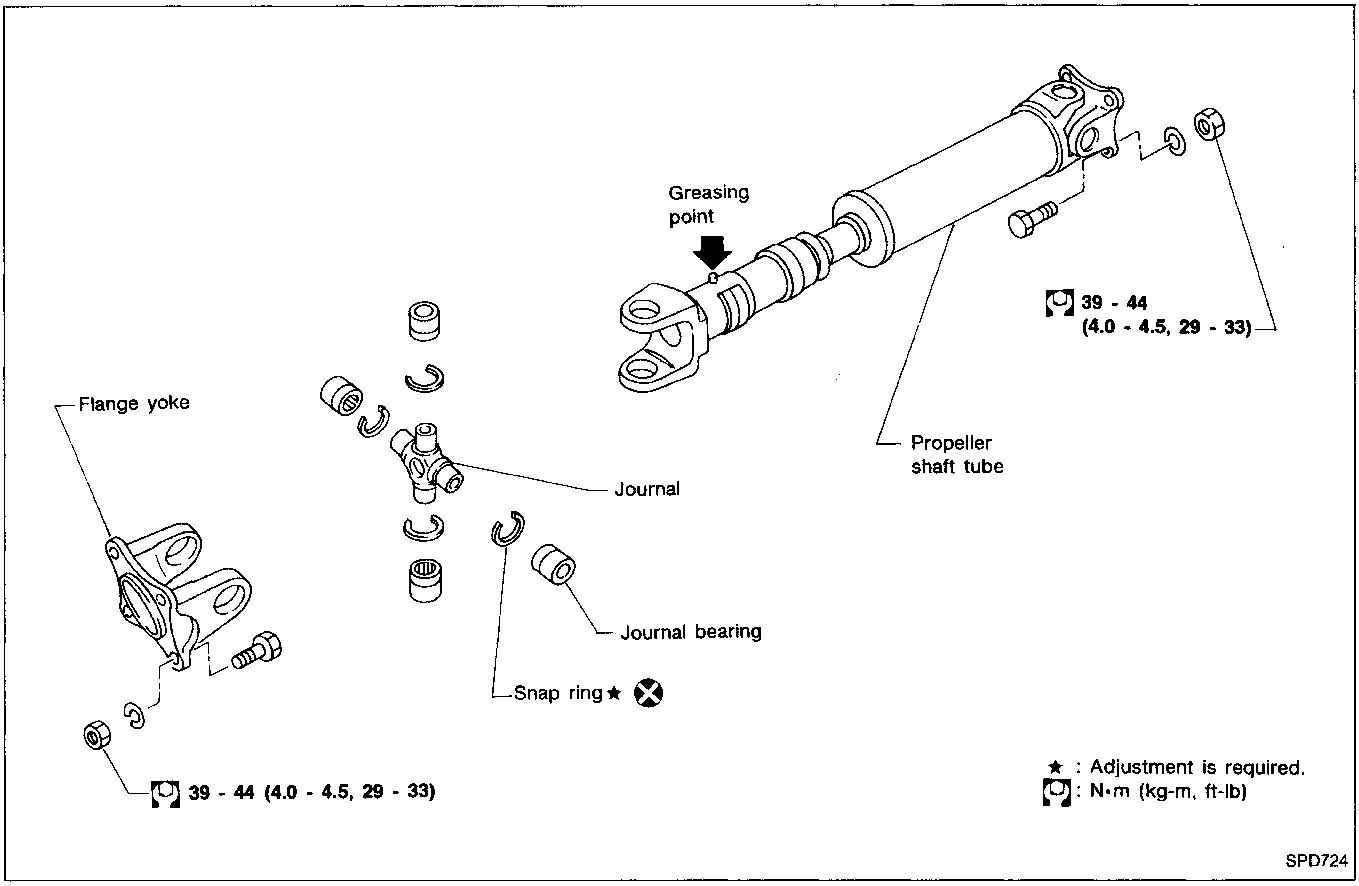
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	Unit application			
		R180A	R200A	H190A	H233B
ST33270000 (J25809) Side oil seal drift	 NT139 Installing side oil seal	X	—	—	—
KV38100200 (J26233) Gear carrier side oil seal drift	 NT120 Installing side oil seal	—	X	—	—
(J34309) Differential shim selector	 NT134 Adjusting bearing pre-load and gear height	X	X	X	X
(J25269-4) Side bearing discs (2 Req'd)	 NT136 Selecting pinion height adjusting washer	X	X	—	—
(J25269-18) Side bearing discs (2 Req'd)	 NT135 Selecting pinion height adjusting washer	—	—	X	X
(J8129) Spring gauge	 NT127 Measuring carrier turning torque	X	X	X	X
(J35764) Gear carrier side oil seal drift	 NT120 Installing side oil seal	X	—	—	—

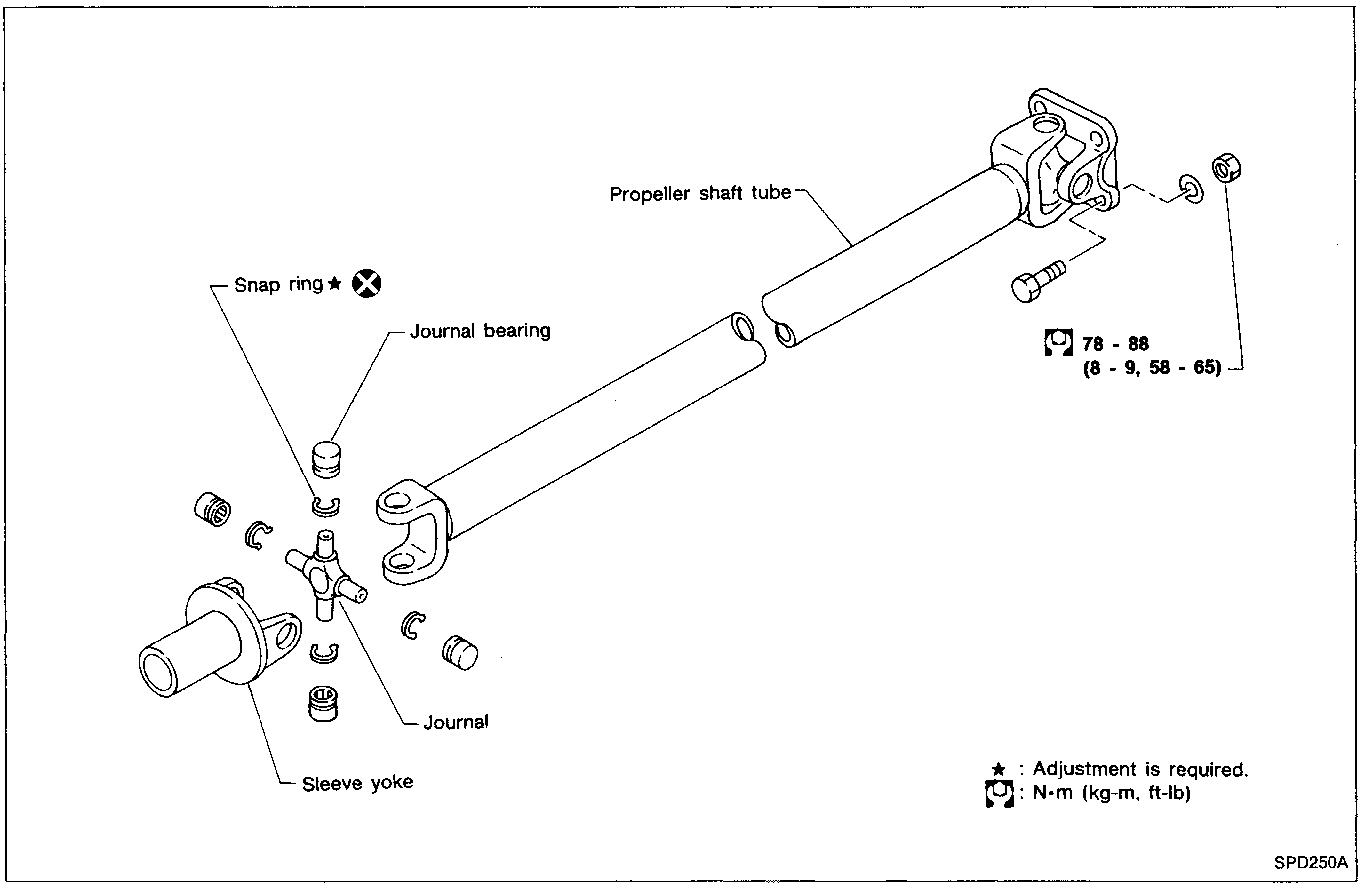
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	Unit application			
		R180A	R200A	H190A	H233B
KV381051S0 (—) Rear axle shaft dummy ① KV38105110 (—) Torque wrench side ② KV38105120 (—) Vice side	Checking differential torque on limited slip differential  NT142	—	—	X	—
KV381052S0 (—) Rear axle shaft dummy ① KV38105210 (—) Torque wrench side ② KV38105220 (—) Vice side	Checking differential torque on limited slip differential  NT142	—	—	—	X

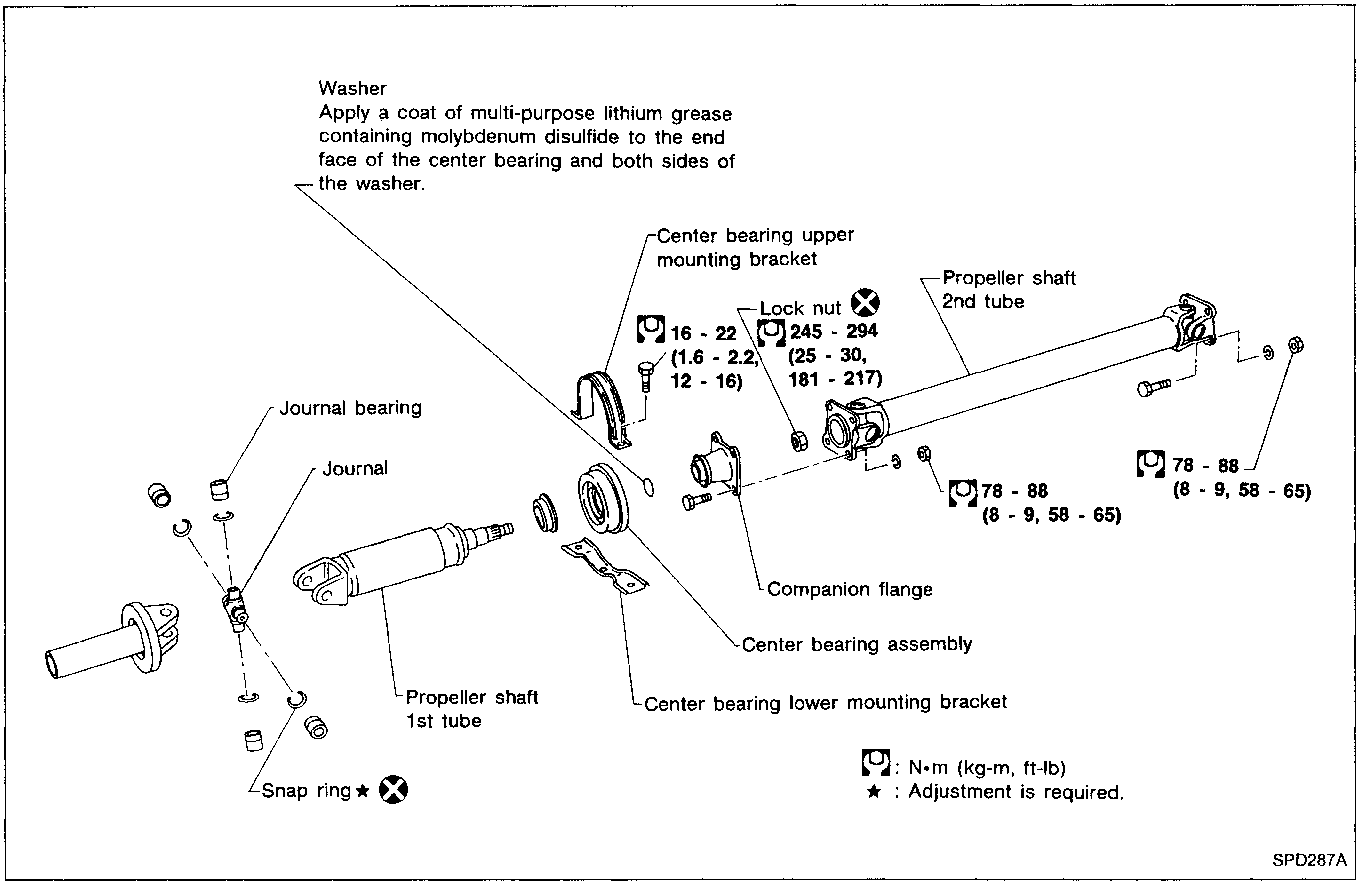
Front propeller shaft (Model 2F71H)



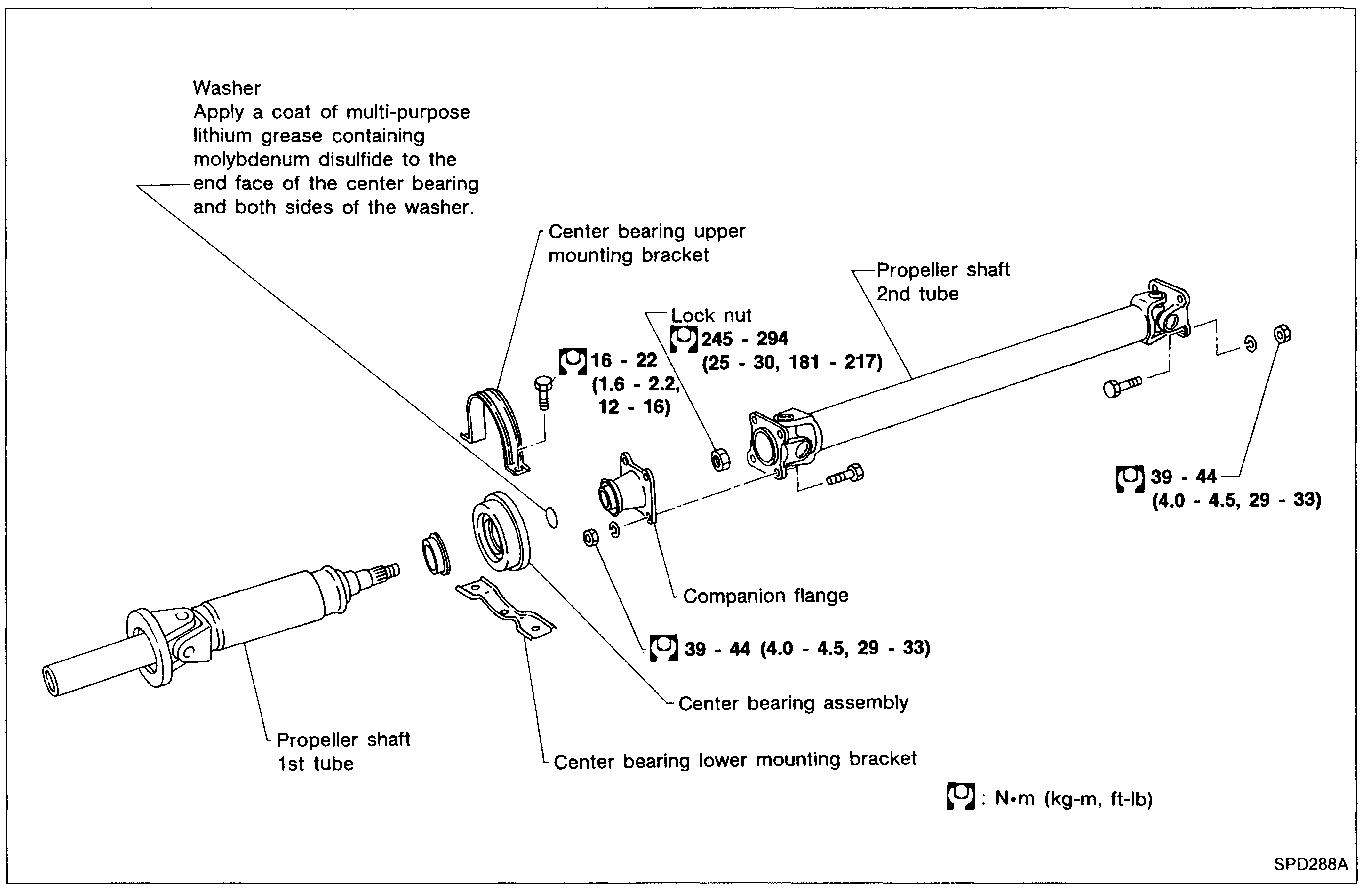
Rear propeller shaft (Model 2S80B)

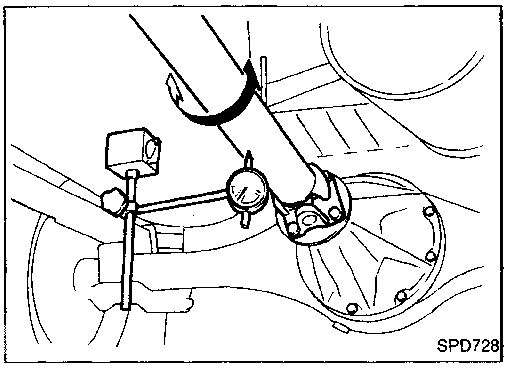


Rear propeller shaft (Model 3S80B)



Rear propeller shaft (Model 3S71A)




SPD728

On-vehicle Service

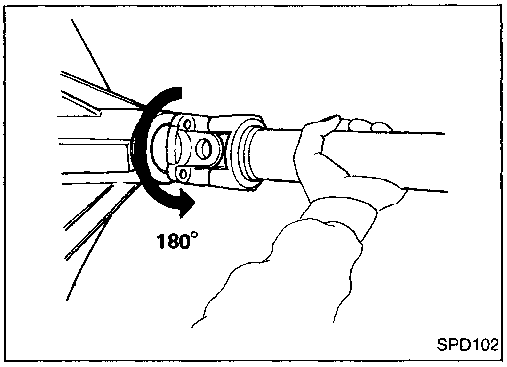
PROPELLER SHAFT VIBRATION

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

1. Raise rear wheels.
2. Measure propeller shaft runout at several points by rotating final drive companion flange with hands.
3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange; then rotate companion flange 180 degrees and reconnect propeller shaft.
   Runout limit: 0.6 mm (0.024 in)
4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
5. Perform road test.

APPEARANCE CHECKING

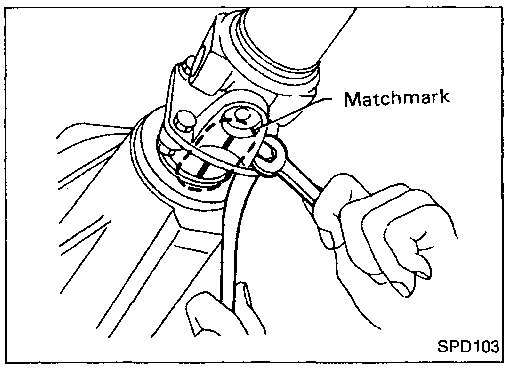
- Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace center bearing.



SPD102

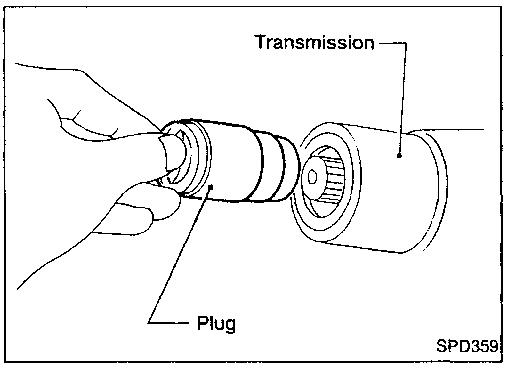
Removal and Installation

- Put match marks on flanges and separate propeller shaft from final drive.



SPD103

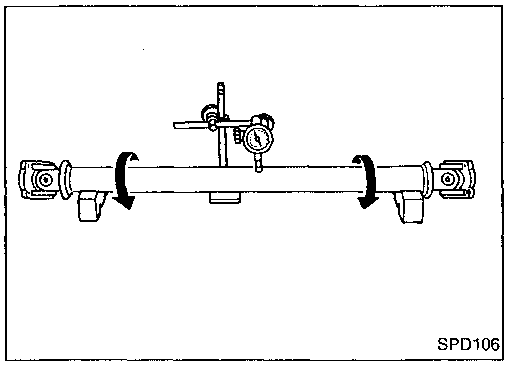
- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.



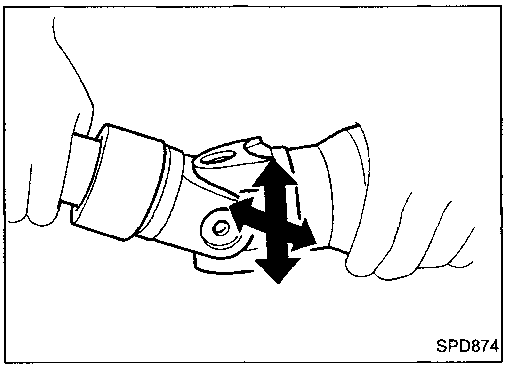
SPD359

Inspection

- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.
  Runout limit: 0.6 mm (0.024 in)


SPD106

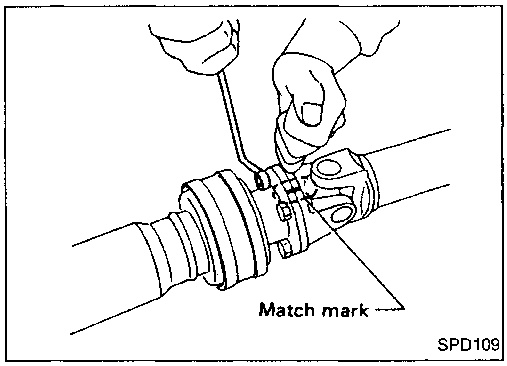
Inspection (Cont'd)



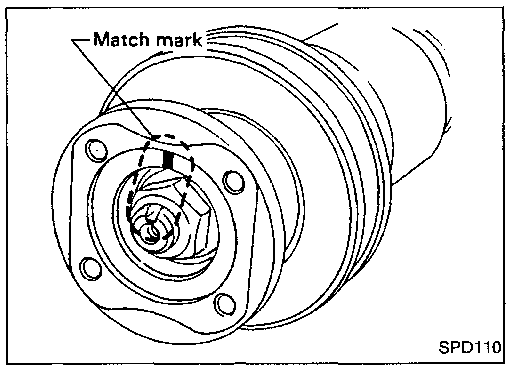
- Inspect journal axial play.
  If the play exceeds specifications, replace propeller shaft assembly.
  Journal axial play:
  0.02 mm (0.0008 in) or less

Disassembly

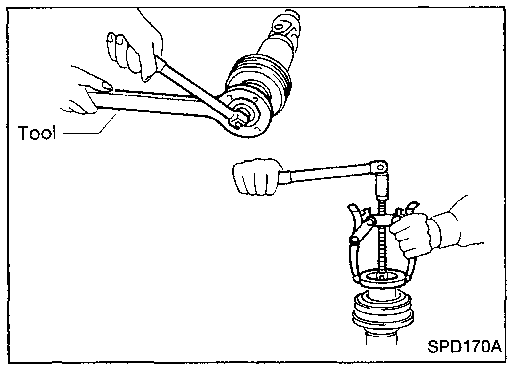
CENTER BEARING



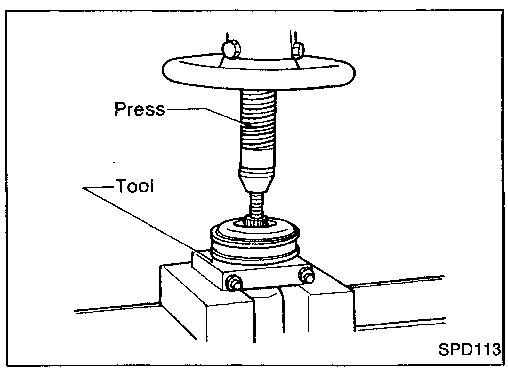
1. Put match marks on flanges, and separate 2nd tube from 1st tube.



2. Put match marks on the flange and shaft.

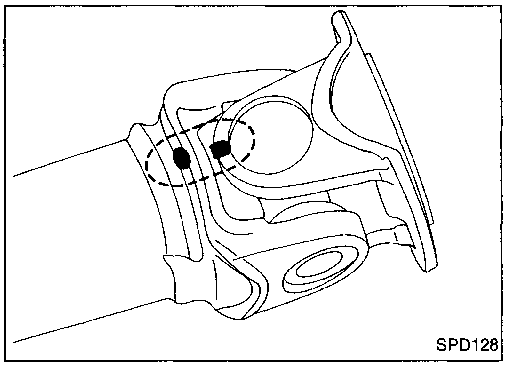


3. Remove locking nut with Tool.
   Tool number:
   R180A, R200A, H190A
   ST38060002 (J34311)
   H233B
   KV38104700 (J34311)
4. Remove companion flange with puller.



5. Remove center bearing with Tool and press.
   Tool number: ST30031000 (J22912-01)

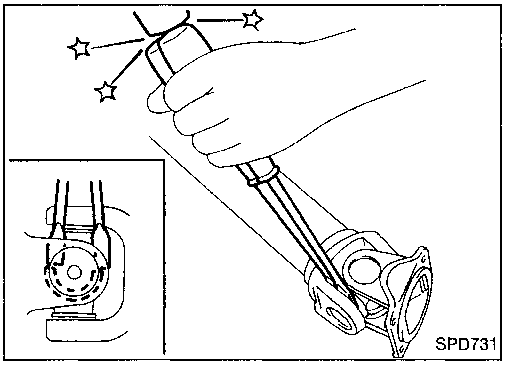
Disassembly (Cont'd)



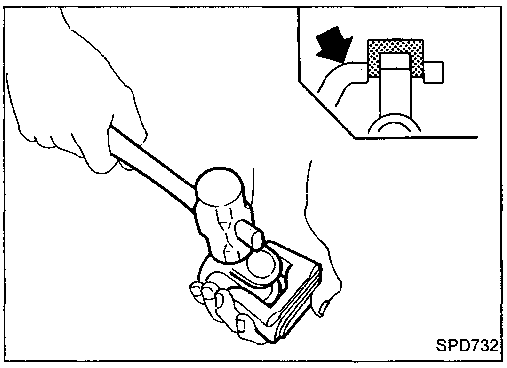
JOURNAL (71H and 80B)

71H: Do not disassemble.

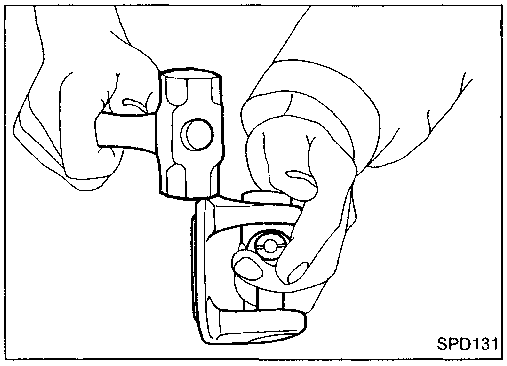
1. Put match marks on shaft and flange or yoke.



2. Remove snap ring.

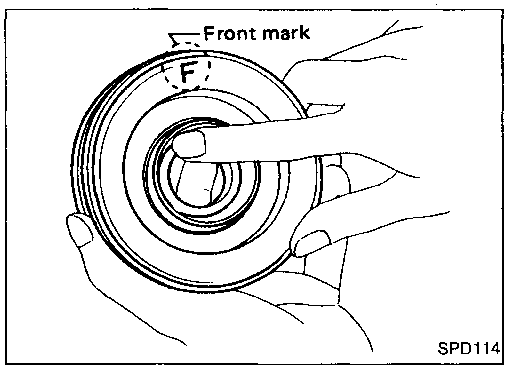


3. Remove pushed out journal bearing by lightly tapping yoke with a hammer, taking care not to damage journal and yoke hole.



4. Remove bearing at opposite side in above operation.

Put marks on disassembled parts so that they can be reinstalled in their original positions from which they were removed.

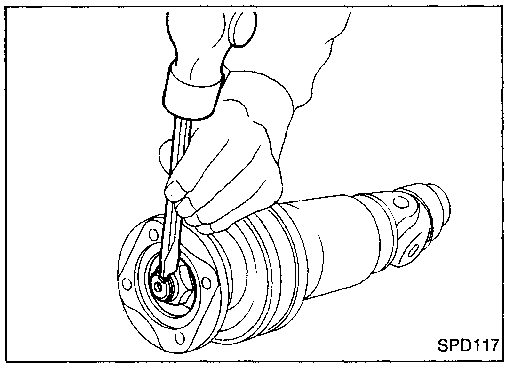


Assembly

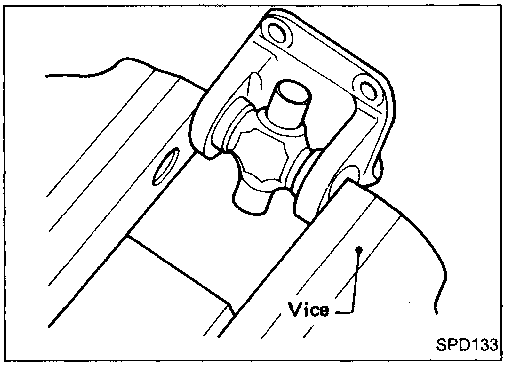
CENTER BEARING

- When installing center bearing, position the "F" mark on center bearing toward front of vehicle.
- **Apply a coat of multi-purpose lithium grease containing molybdenum disulfide to the end face of the center bearing and both sides of the washer.**

Assembly (Cont'd)



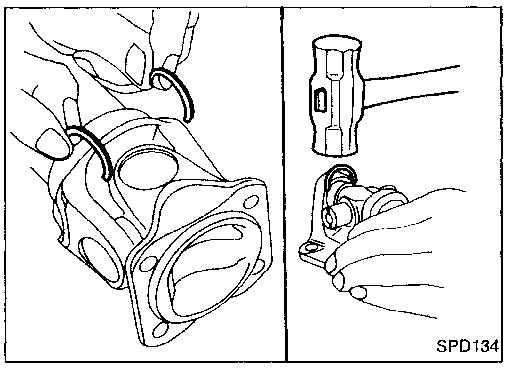
- Stake the nut. Always use new one.
- Align match marks when assembling tubes.



JOURNAL (71H and 80B)

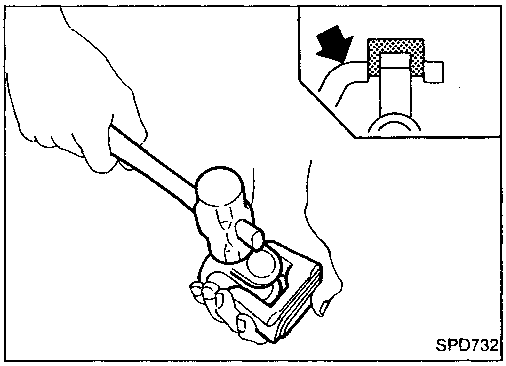
1. Assemble journal bearing. Apply recommended multi-purpose grease on bearing inner surface.

When assembling, be careful that needle bearing does not fall down.

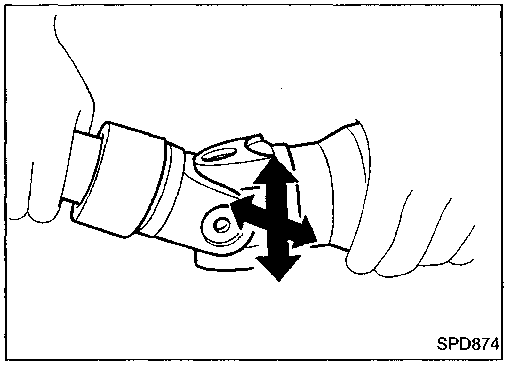


2. Select snap ring that will provide specified play in axial direction of journal, and install them.
   Refer to SDS (PD-97).

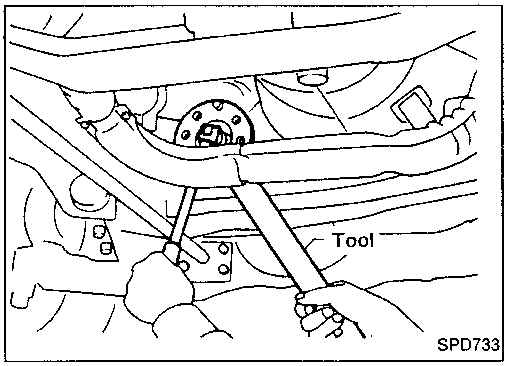
Select snap rings with a difference in thickness at both sides within 0.06 mm (0.0024 in).



3. Adjust thrust clearance between bearing and snap ring to zero by tapping yoke.

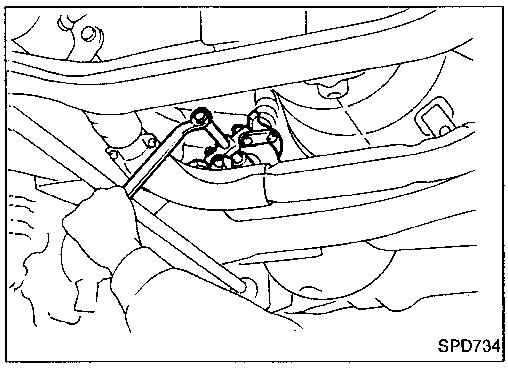


4. Check to see that journal moves smoothly and check for axial play.
   Axial play: 0.02 mm (0.0008 in) or less

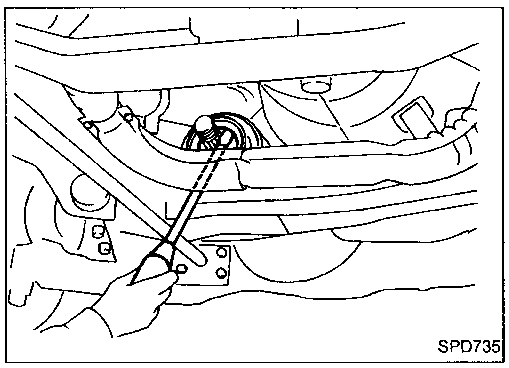


Front Oil Seal Replacement (Front final drive)

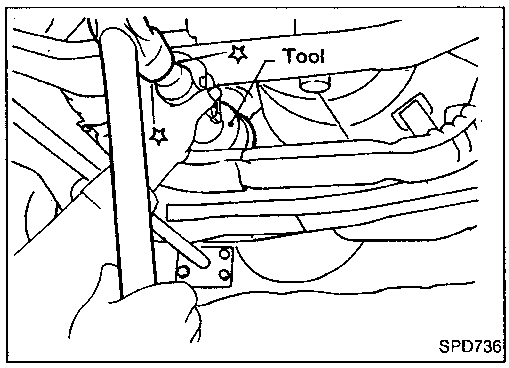
1. Remove front propeller shaft.
2. Loosen drive pinion nut.
   Tool number: ST38060002 (J34311)



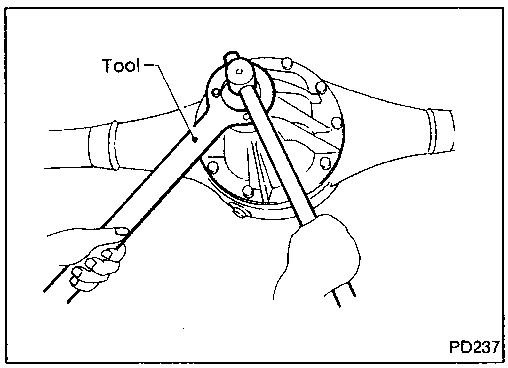
3. Remove companion flange.



4. Remove front oil seal.



5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier.
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.
   Tool number:
   R180A
   ST30720000 (—)
   Equivalent tool (J25405)
   R200A
   KV38100500 (—)
   Equivalent tool (J25273)

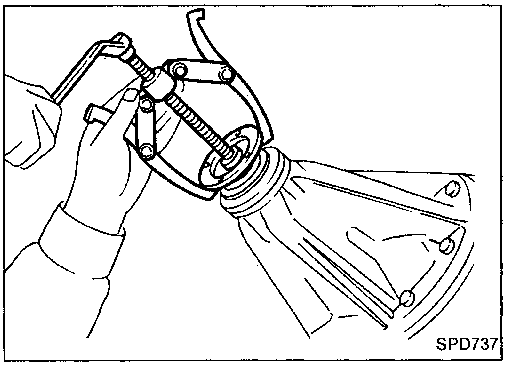


Front Oil Seal Replacement

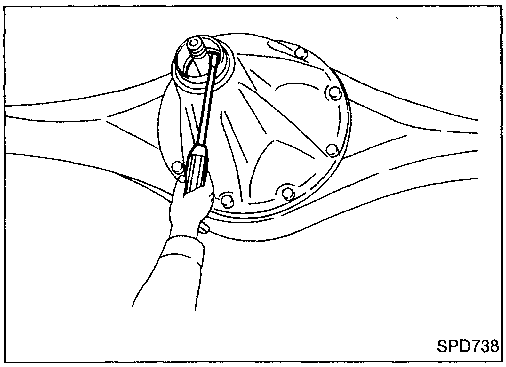
CAUTION:
For final drive models using collapsible spacer (H190A) bearing preload must be adjusted whenever companion flange is removed. Therefore, final drive overhaul is required.

1. Remove propeller shaft.
2. Loosen drive pinion nut.
   Tool number: KV38104700 (J34311)

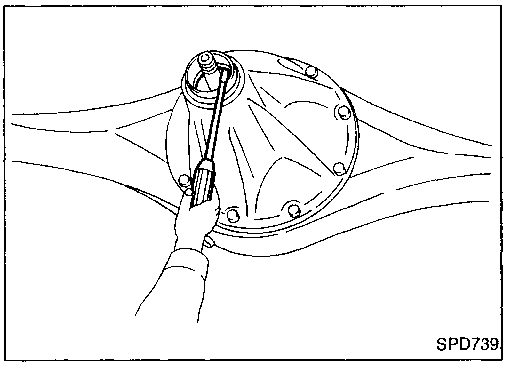
Front Oil Seal Replacement (Cont'd)


SPD737

3. Remove companion flange.

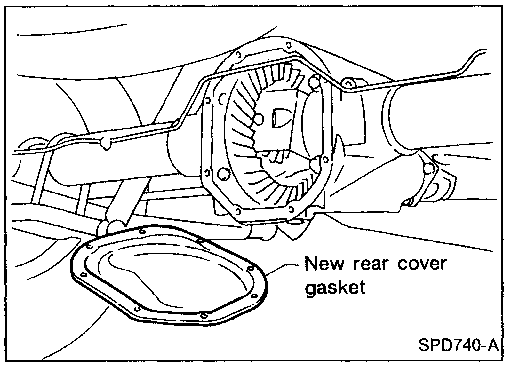

SPD738

4. Remove front oil seal.


SPD739

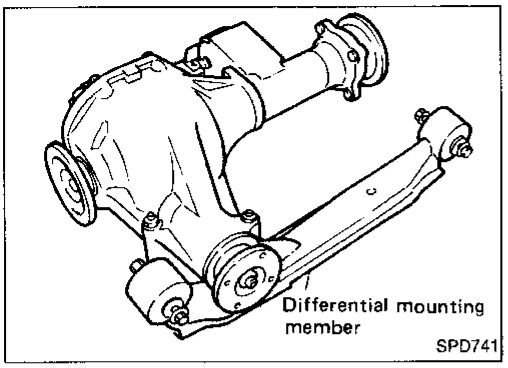
5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier.
   Tool number: (J25273)
6. Install companion flange and drive pinion nut.
7. Install rear propeller shaft.

Rear Cover Gasket Replacement



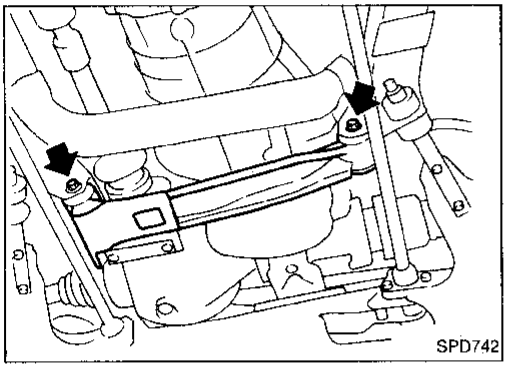
SPD740-A

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.



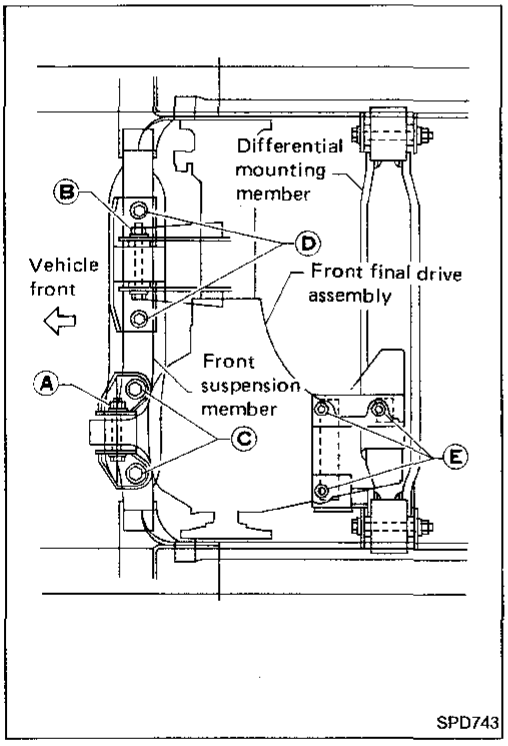
Removal

1. Remove front propeller shaft.
2. Remove drive shaft. Refer to "FRONT AXLE (4WD)" in FA section.
3. Remove engine mounting bolts and raise up engine.
4. Remove front final drive together with differential mounting member.



Installation

1. Install front final drive assembly together with differential mounting member.



2. Perform tightening front final drive securing bolts and nuts by following procedure to prevent drive train vibration.
(1) Temporarily tighten nut Ⓐ.
(2) Temporarily tighten nut Ⓑ.
(3) Tighten bolt Ⓒ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(4) Tighten bolt Ⓓ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(5) Tighten nut Ⓐ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(6) Tighten nut Ⓑ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
(7) Tighten nut Ⓔ to the torque of 68 to 87 N·m (6.9 to 8.9 kg-m, 50 to 64 ft-lb).
3. Install drive shaft. Refer to "FRONT AXLE (4WD)" in FA section.
4. Install front propeller shaft.

Removal

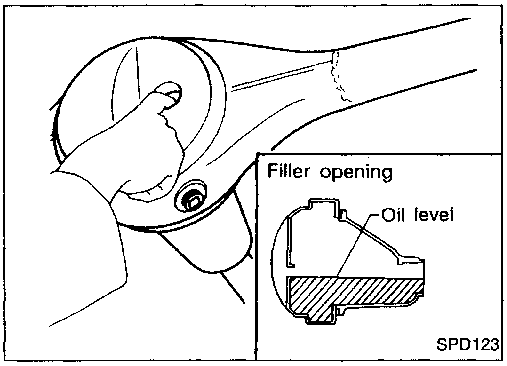
- Remove propeller shaft.

Plug front end of transfer.

- Remove axle shaft.
  Refer to "REAR AXLE" in RA section.

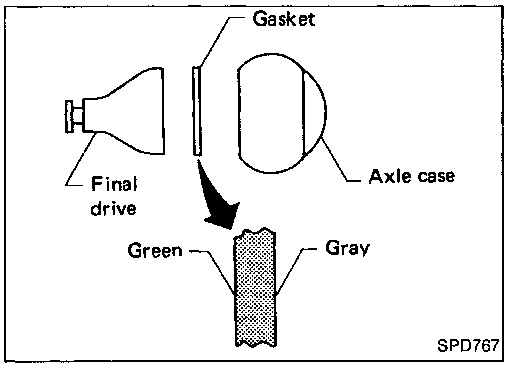
CAUTION:

- **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.**



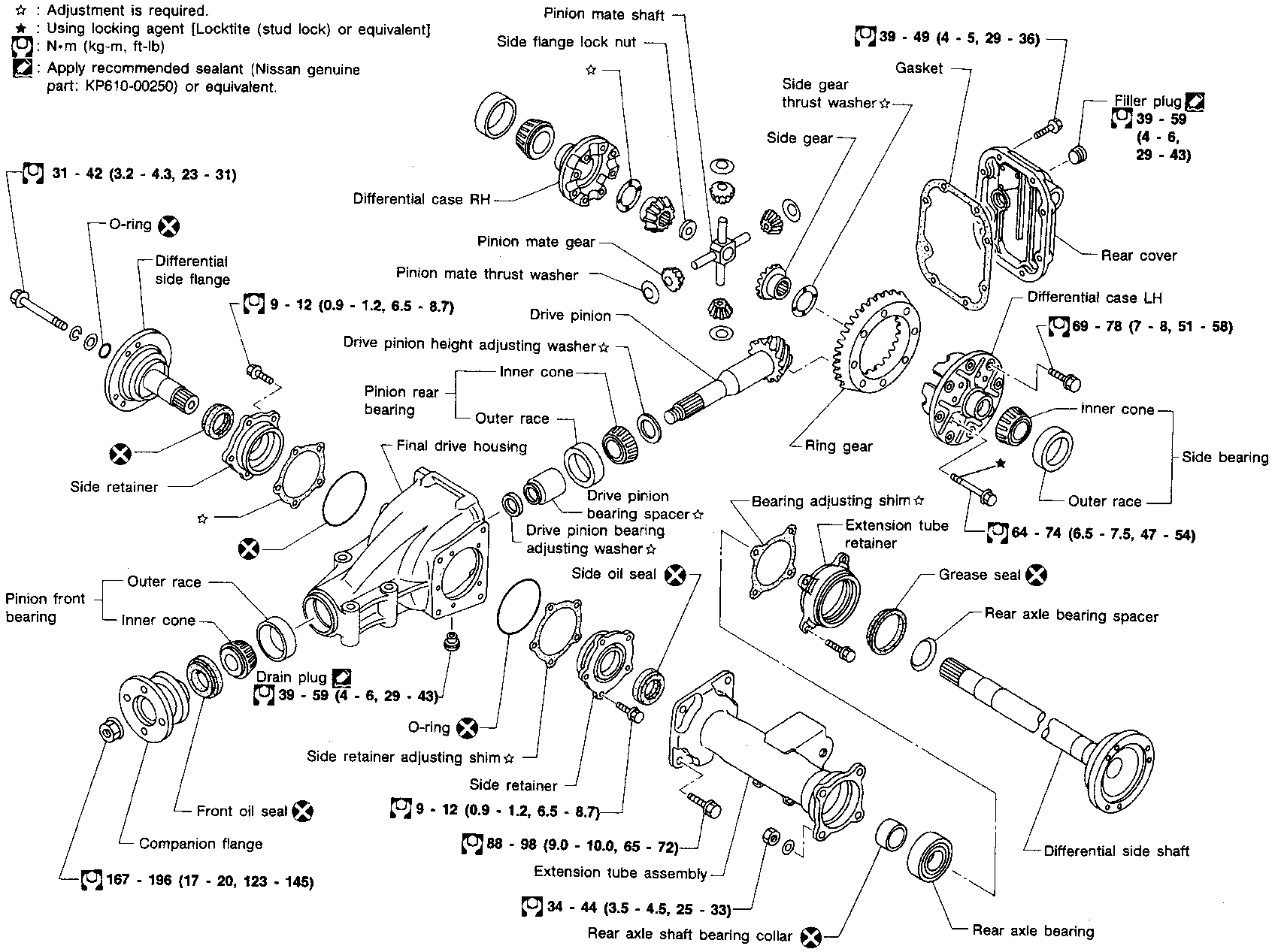
Installation

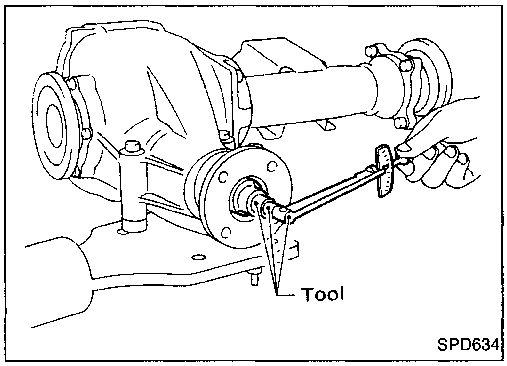
- Fill final drive with recommended gear oil.



- Pay attention to the direction of gasket (H233B only).

☆ : Adjustment is required.
★ : Using locking agent [Locktite (stud lock) or equivalent]
: N•m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.



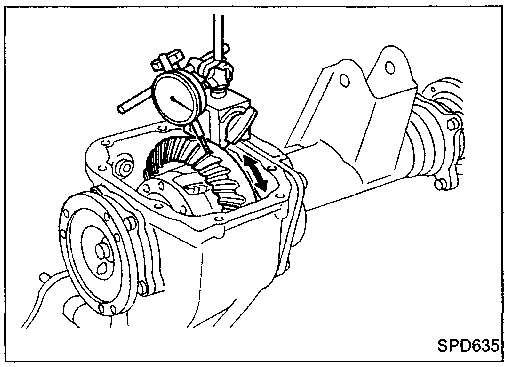


Pre-inspection

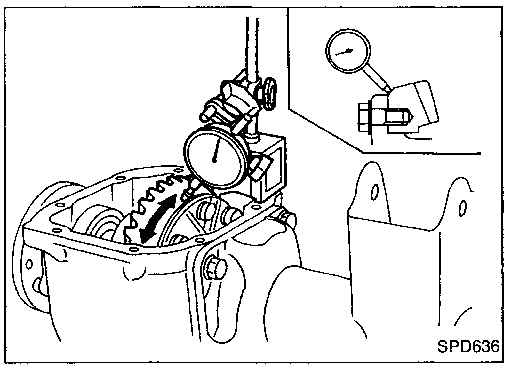
Before disassembling final drive, perform the following inspection.

- Total preload

1) Turn drive pinion in both directions several times to set bearing rollers.
2) Check total preload with Tool.
   Tool number: ST3127S000 (J25765-A)
   Total preload:
   1.2 - 2.3 N·m
   (12 - 23 kg-cm, 10 - 20 in-lb)



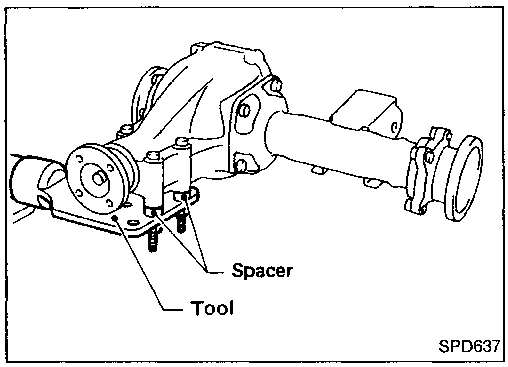
- Ring gear to drive pinion backlash
  Check backlash of ring gear with a dial indicator at several points.
  Ring gear to drive pinion backlash:
  0.13 - 0.18 mm (0.0051 - 0.0071 in)



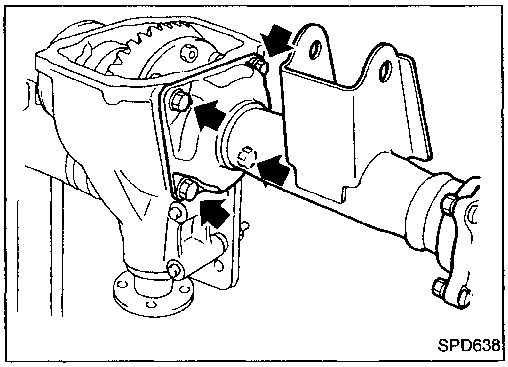
- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit:
  0.05 mm (0.0020 in)
- Tooth contact
  Check tooth contact. Refer to ADJUSTMENT (PD-30).

Final Drive Housing

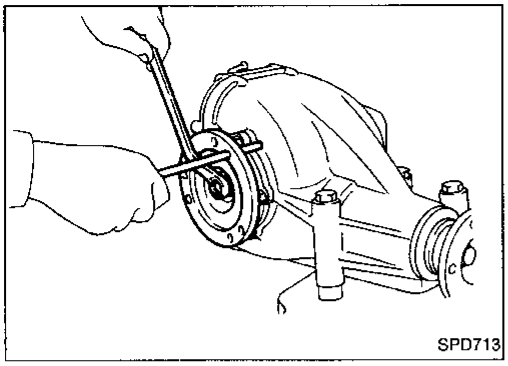
1. Using three spacers [20 mm (0.79 in)], mount final drive assembly on Tool.
   Tool number:
   KV38100800 (—)
   Equivalent tool (J34310), (J25604)



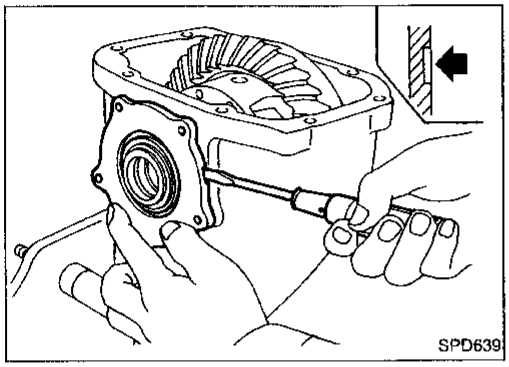
2. Remove extension tube and differential side shaft assembly.



Final Drive Housing (Cont'd)

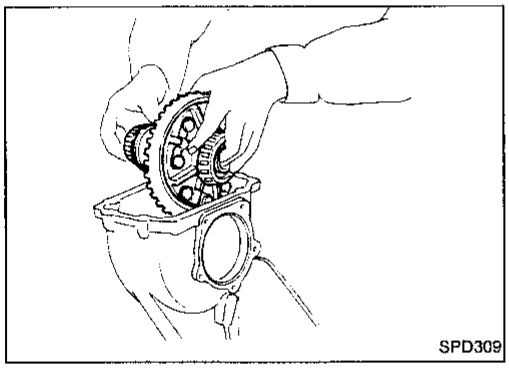

SPD713

3. Remove differential side flange.

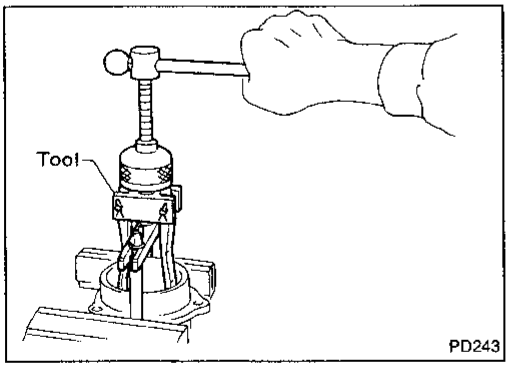

SPD639

4. Mark side retainers for identification. Remove side retainers.

Be careful not to confuse right and left side retainers and shims.


SPD309

5. Extract differential case from final drive housing.

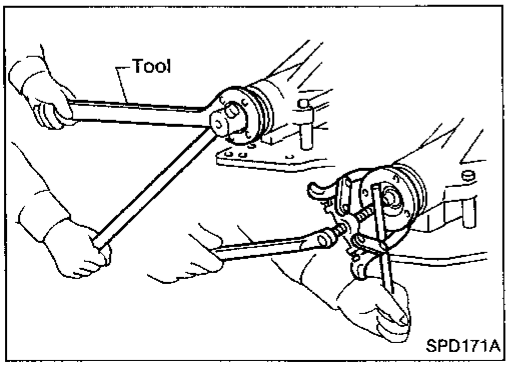


PD243

6. Remove side outer races.
   Tool number: ST33290001 (J25810-A)

Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.

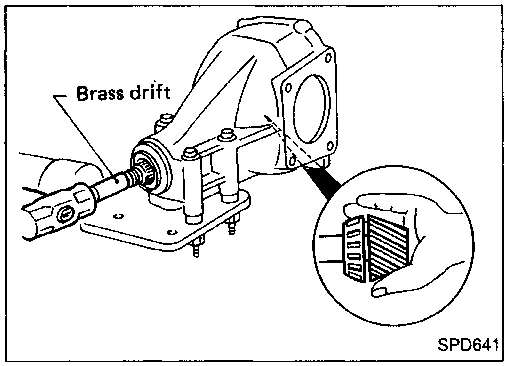
7. Remove side oil seal.



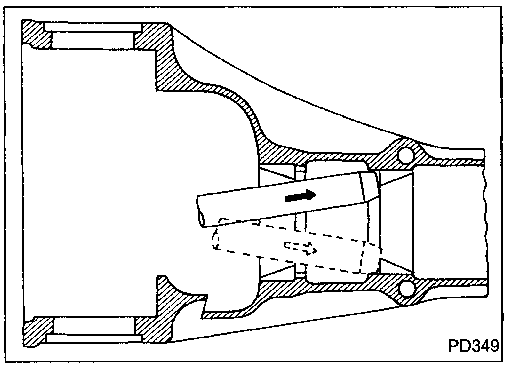
SPD171A

8. Loosen drive pinion nut.
   Tool number: ST38060002 (J34311)
9. Remove companion flange with puller.

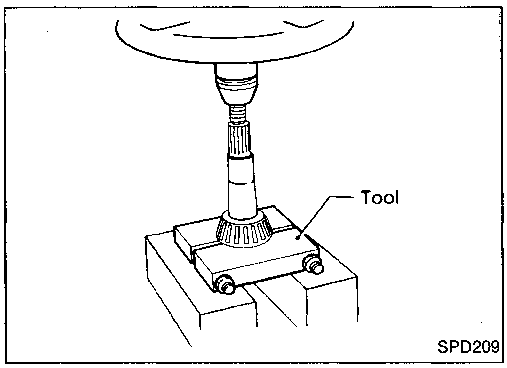
Final Drive Housing (Cont'd)



10. Take out drive pinion together with pinion rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting washer.
11. Remove front oil seal and pinion front bearing inner cone.



12. Remove pinion front and rear bearing outer races with brass drift.



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

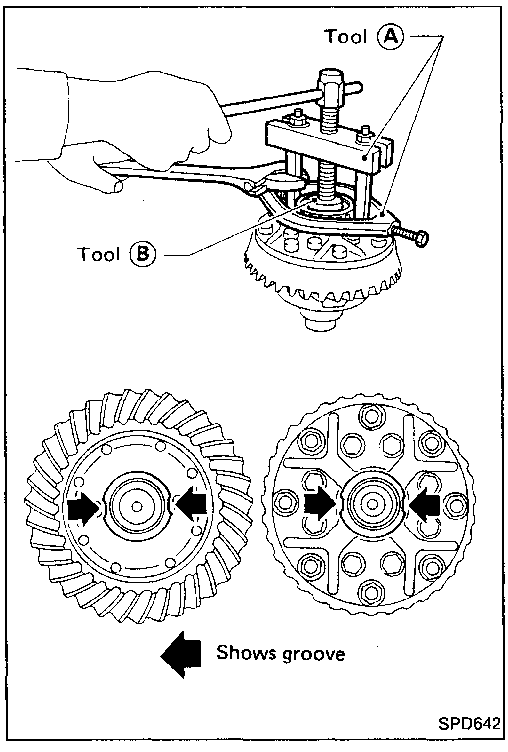
Differential Case

1. Remove side bearing inner cones.

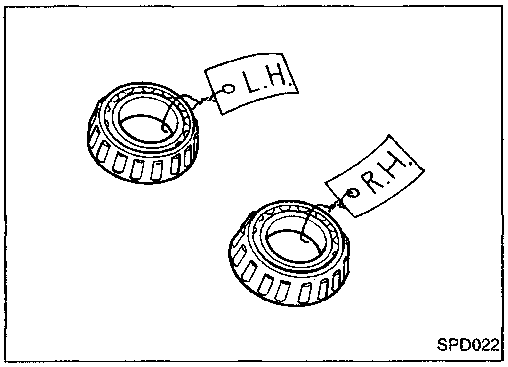
To prevent damage to bearing, engage puller jaws in grooves.

Tool number:

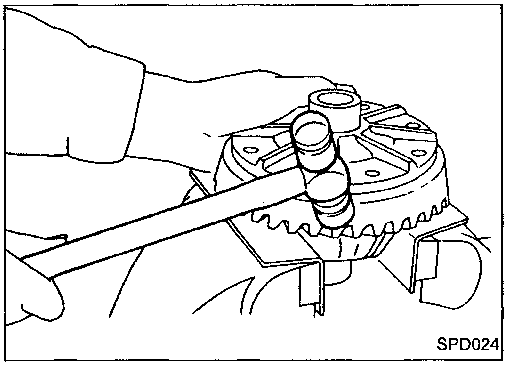
Ⓐ ST33051001 (—)
Equivalent tool (J22888)
Ⓑ ST33061000 (J8107-2)



Differential Case (Cont'd)

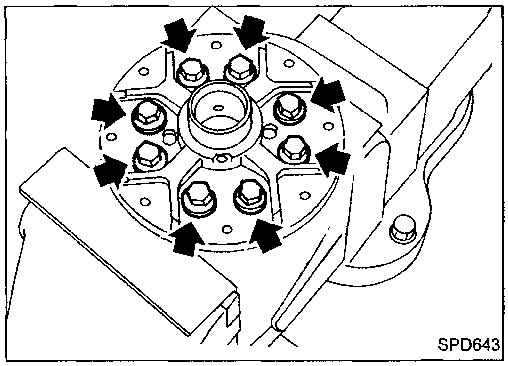


Be careful not to confuse the right and left hand parts.



2. Loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off differential case with a soft hammer.

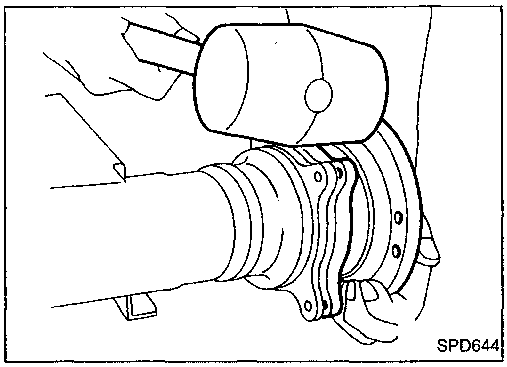
Tap evenly all around to keep ring gear from binding.



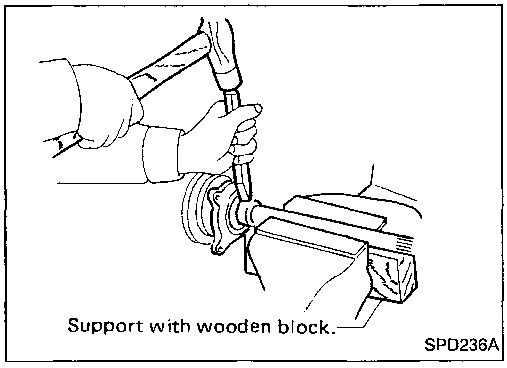
4. Separate differential case LH and RH.

Put match marks on both differential case LH and RH sides prior to separating them.

Extension Tube and Differential Side Shaft

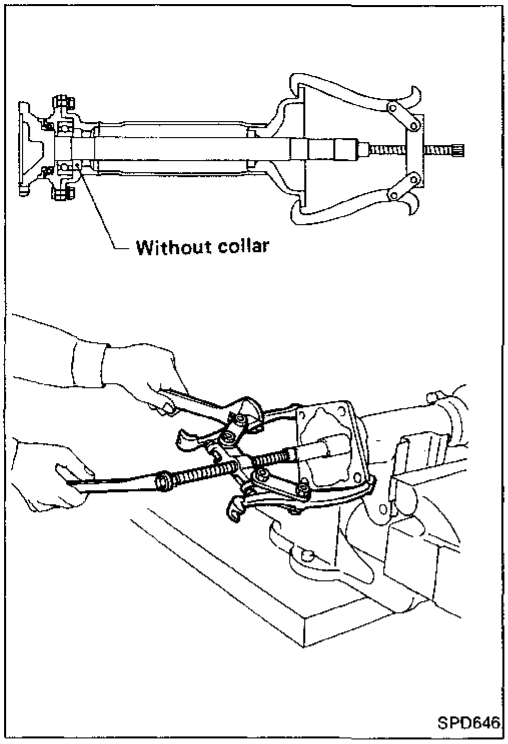


1. Remove differential side shaft assembly from extension tube.

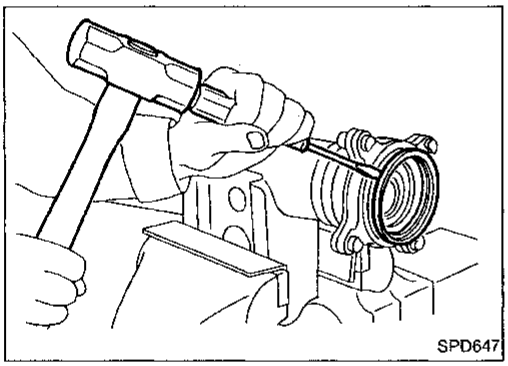


2. Cut rear axle bearing collar with cold chisel. Be careful not to damage differential side shaft.

Extension Tube and Differential Side Shaft (Cont'd)



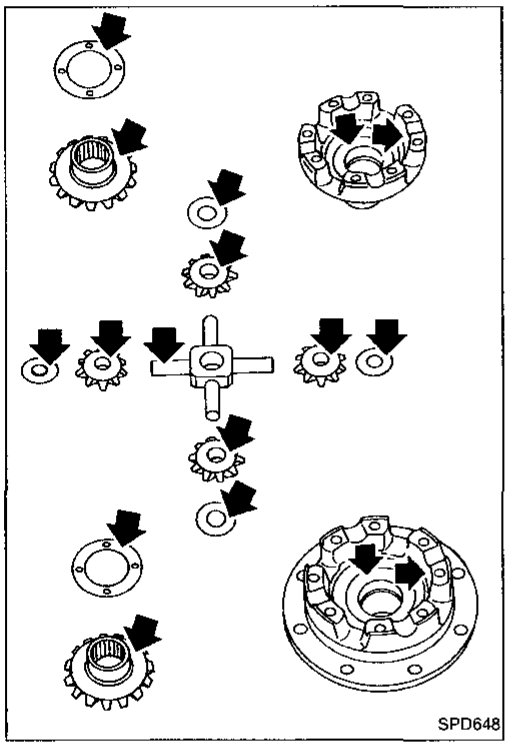
3. Reinstall differential side shaft into extension tube and secure with bolts. Remove rear axle bearing by drawing out differential side shaft from rear axle bearing with puller.



4. Remove grease seal.

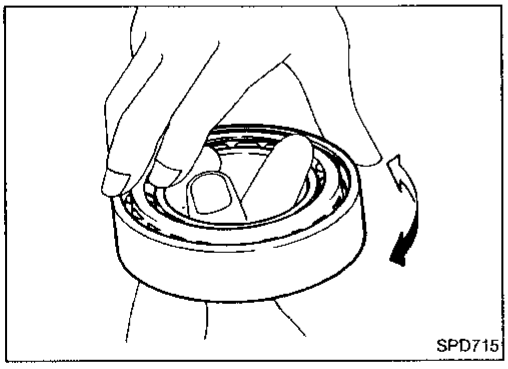
Ring Gear and Drive Pinion

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).


SPD648

Differential Case Assembly

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

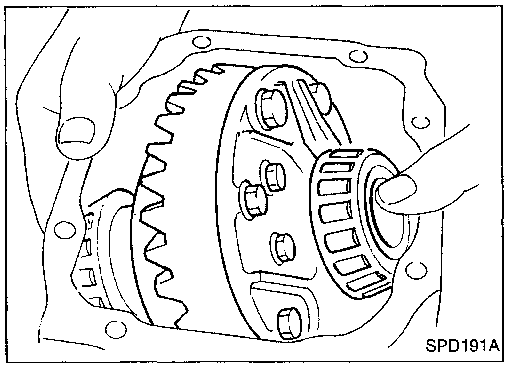

SPD715

Bearing

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

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

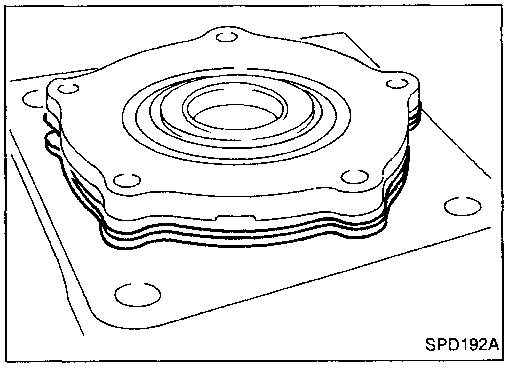
1. Side bearing preload.
2. Pinion gear height.
3. Pinion bearing preload.
4. Ring gear to pinion backlash. Refer to ASSEMBLY (PD-34).
5. Ring and pinion gear tooth contact pattern.


SPD191A

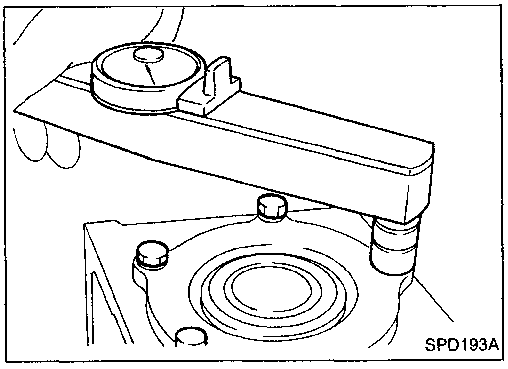
Side Bearing Preload

Note: A selection of carrier side retainer adjusting shims is required for successful completion of this procedure.

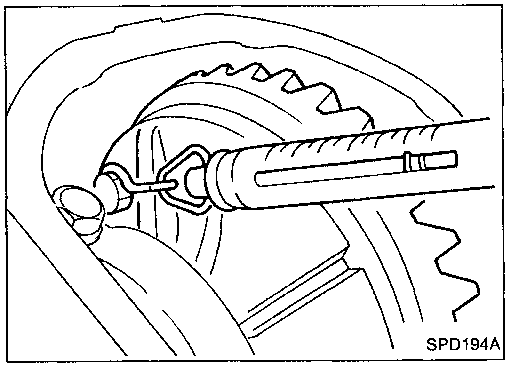
1. Make sure all parts are clean and that the bearings are well lubricated with light oil or Dexron type automatic transmission fluid.
2. Install differential carrier and side bearing assembly into the final drive housing.


SPD192A

3. Place all of the original side retainer adjusting shims onto the side bearing retainer that goes at the ring gear end of the carrier.


SPD193A

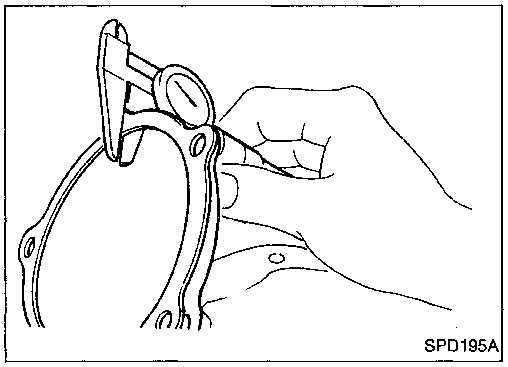
4. Install both bearing retainers onto the final drive housing and torque the retainer bolts.
   Bolt torque specification:
   9 - 12 N·m (0.9 - 1.2 kg-m, 6.5 - 8.7 ft-lb)


SPD194A

5. Turn the carrier several times to seat the bearings.
6. Measure the carrier turning torque with a spring gauge, J8129, at the ring gear retainer bolt.
   Turning torque specification:
   34.3 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb)
   of pulling force at the ring gear bolt.

Side Bearing Preload (Cont'd)

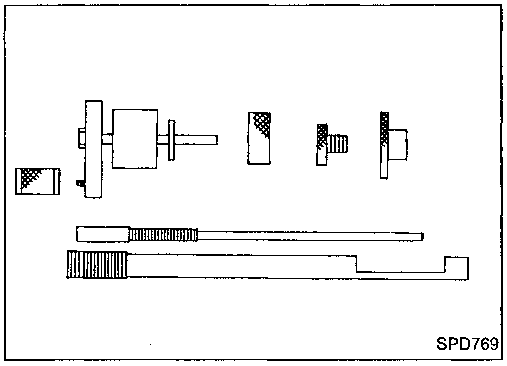
7. If the turning torque measured is incorrect, establish the correct bearing preload by adding to or subtracting from the total amount of shim thickness.
- Increase shim thickness to decrease turning torque on the carrier.
- Decrease shim thickness to increase turning torque on the carrier.

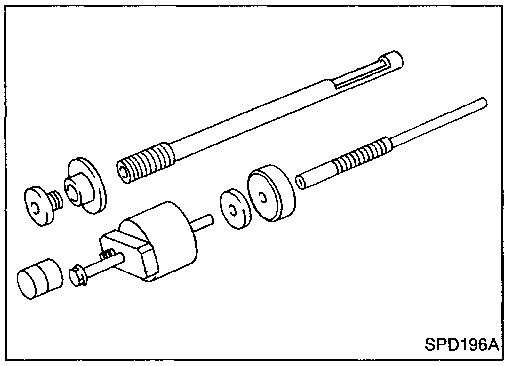

SPD195A

8. Record the correct, selected total thickness of the side retainer adjusting shims, and remove the carrier and bearings from the final drive housing. Save all shims for later re-use.

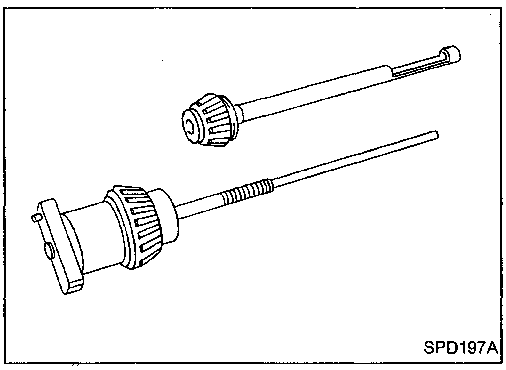
Pinion Gear Height and Pinion Bearing Preload

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion pre-load shim selector tool, J34309.
- **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, J34309-7, to secure the bearing in its proper position.

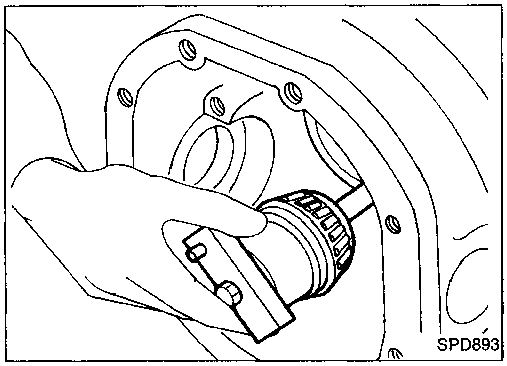

SPD769


SPD196A

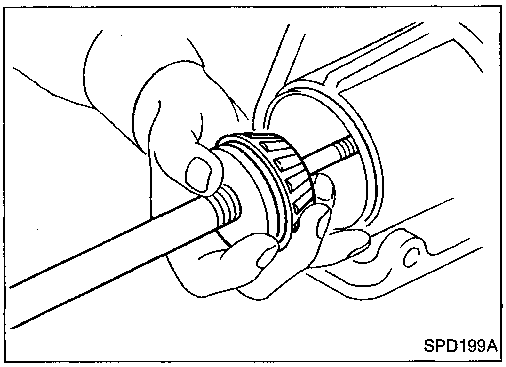
- **Rear Pinion Bearing** — the rear pinion bearing pilot, J34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J34309-4, is used to lock the bearing to the assembly.


SPD197A

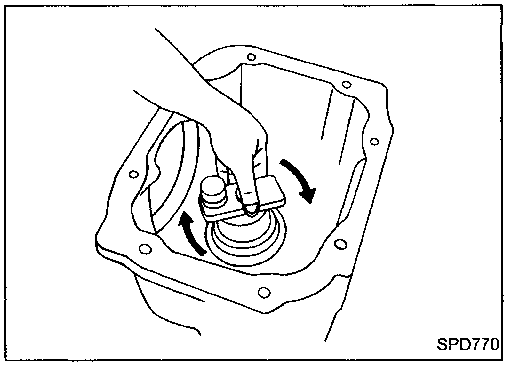
Pinion Gear Height and Pinion Bearing Preload (Cont'd)


SPD893

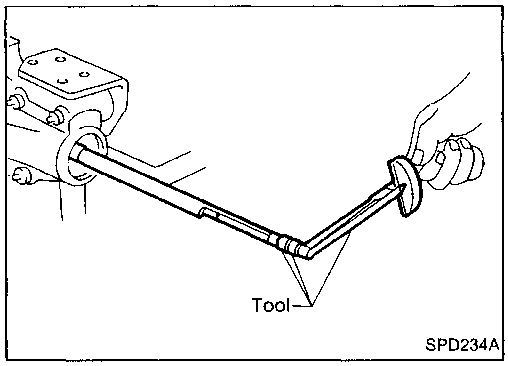
3. Place the pinion preload shim selector tool gauge screw, J34309-1, with the pinion rear bearing inner cone installed, into the final drive housing.


SPD199A

4. Install the J34309-2 gauge anvil with the front pinion bearing into the final drive housing and assemble it to the J34309-1 gauge screw. Make sure that the J34309-16 gauge plate will turn a full 360 degrees, and tighten the two sections by hand.


SPD770

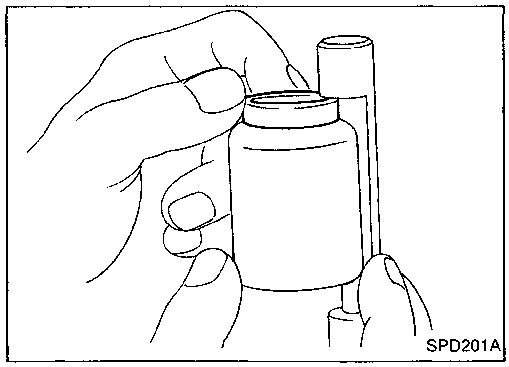
5. Turn the assembly several times to seat the bearings.



SPD234A

6. Measure the turning torque at the end of the J34309-2 shaft using torque wrench J25765-A.
   Turning torque specification:
   0.6 - 1.0 N·m (6 - 10 kg-cm, 5.2 - 8.7 in-lb)
7. Place the J34309-10 "R180A" pinion height adapter onto the gauge plate and tighten it by hand.

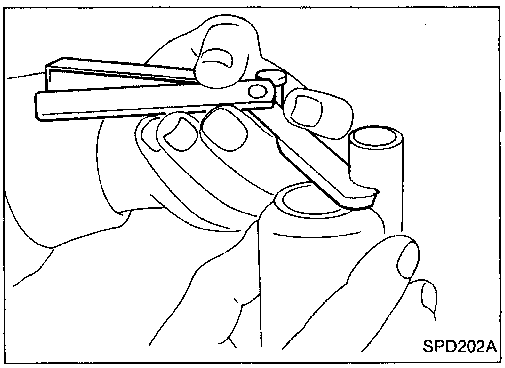
CAUTION:
Make sure all machined surfaces are clean.


SPD201A

PINION BEARING PRELOAD WASHER SELECTION

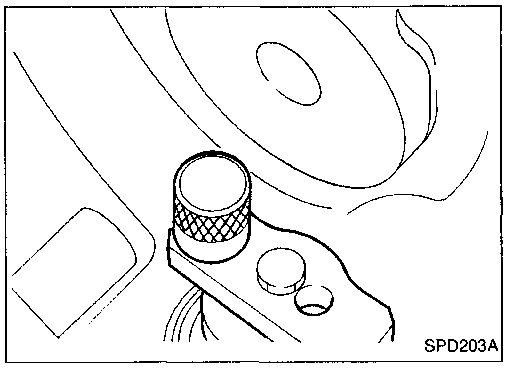
8. Place the solid pinion bearing adjusting spacer squarely into the recessed portion of the J34309-2 gauge anvil.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

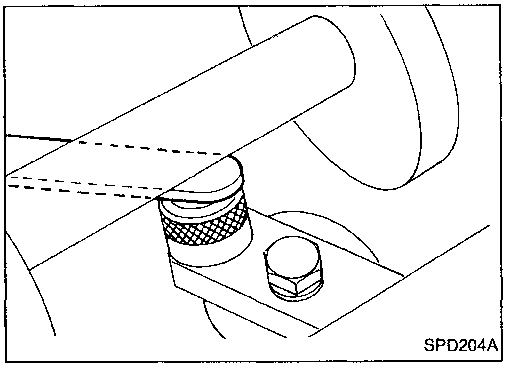

SPD202A

9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 6 mm (0.24 in) and your J34309-101 feeler gauge. The exact total measure you get with the gauges is the thickness of the adjusting washer required. Select the correct washer.
   Drive pinion bearing adjusting washer:
   Refer to SDS (PD-99).
10. Set your selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion and bearings into the final drive housing.

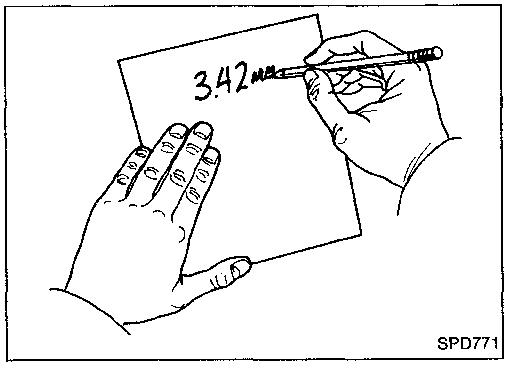
PINION HEIGHT ADJUSTING WASHER SELECTION


SPD203A

11. Position the side bearing discs, J25269-4, and arbor firmly into the side bearing bores.


SPD204A

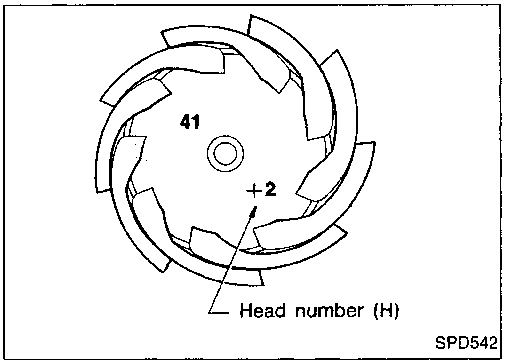
12. Select the correct standard pinion height adjusting washer thickness using a standard gauge of 3 mm (0.12 in) and your J34309-101 feeler gauge. Measure the distance between the J34309-10 "R180A" pinion height adapter and the arbor.



SPD771

13. Write down your exact total measurement.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

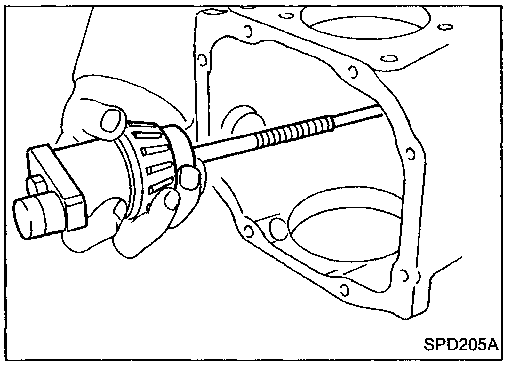


14. Correct the pinion height washer size by referring to the "pinion head number".

Note: There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number", and it refers to the ideal pinion height from standard for quietest operation. Use the following chart to determine the correct pinion height washer.

Pinion Head Height Number	Add or Remove from the Standard Pinion Height Washer Thickness Measurement
−6	Add 0.06 mm (0.0024 in)
−5	Add 0.05 mm (0.0020 in)
−4	Add 0.04 mm (0.0016 in)
−3	Add 0.03 mm (0.0012 in)
−2	Add 0.02 mm (0.0008 in)
−1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+1	Subtract 0.01 mm (0.0004 in)
+2	Subtract 0.02 mm (0.0008 in)
+3	Subtract 0.03 mm (0.0012 in)
+4	Subtract 0.04 mm (0.0016 in)
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

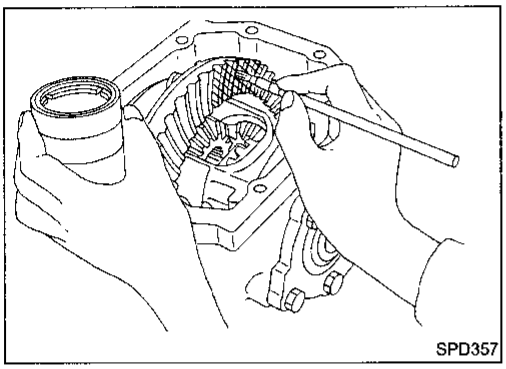
15. Select the correct pinion height washer.
Drive pinion height adjusting washer:
Refer to SDS (PD-99).



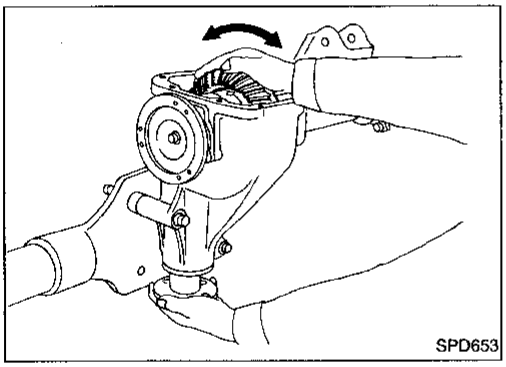
16. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.

Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life, or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

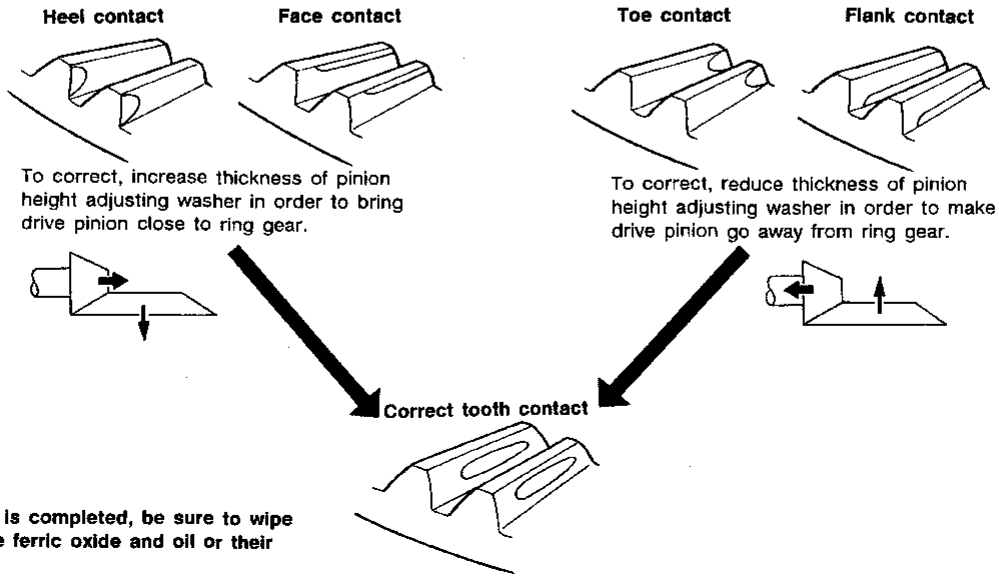

SPD357

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.


SPD653

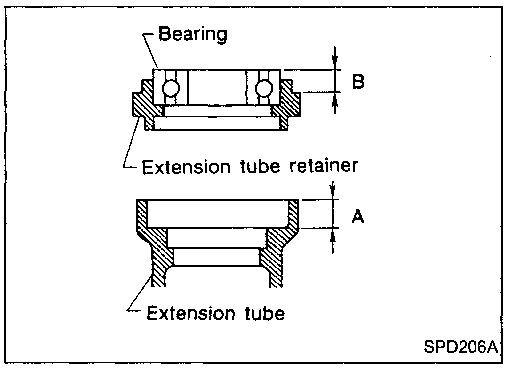
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
The tooth pattern is the best indication of how well a differential has been set up.



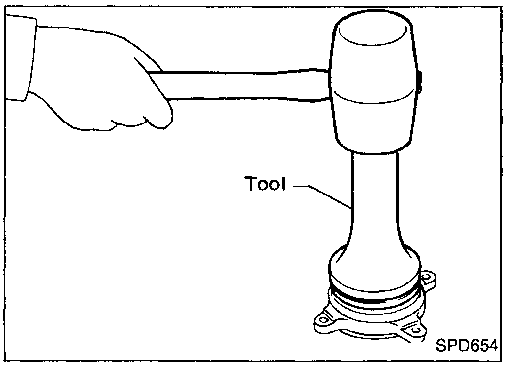
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007

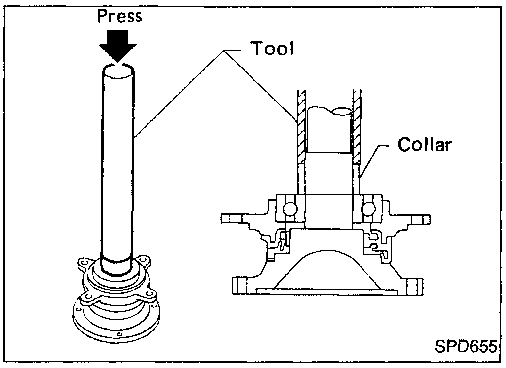


Extension Tube and Differential Side Shaft

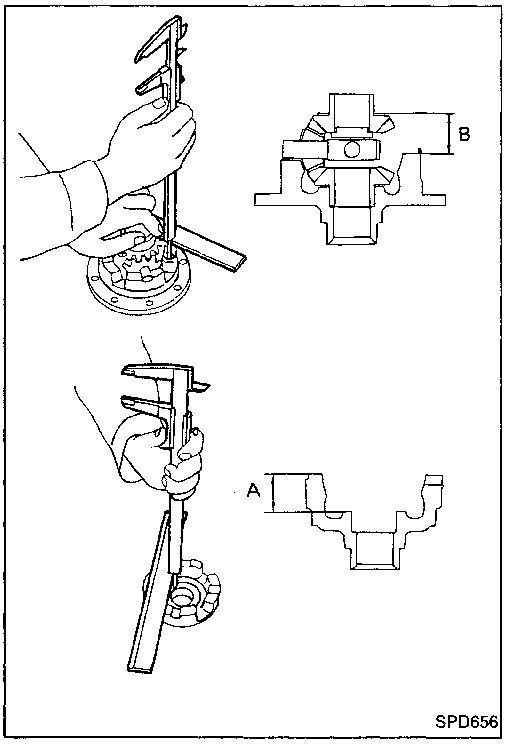
1. Measure rear axle bearing end play.
   Rear axle bearing end play (A - B):
   0.1 mm (0.0039 in) or less
   The end play can be adjusted with bearing adjusting shim.
   Available bearing adjusting shims:
   Refer to SDS (PD-99).



2. Install grease seal.
   Tool number: (J35764)



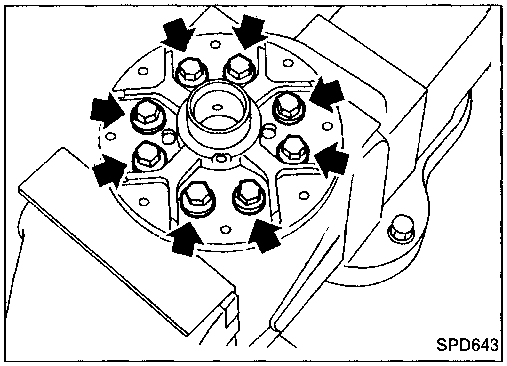
3. Install extension tube retainer, rear axle bearing and rear axle shaft bearing collar on differential side shaft.
4. Install differential side shaft assembly into extension tube.



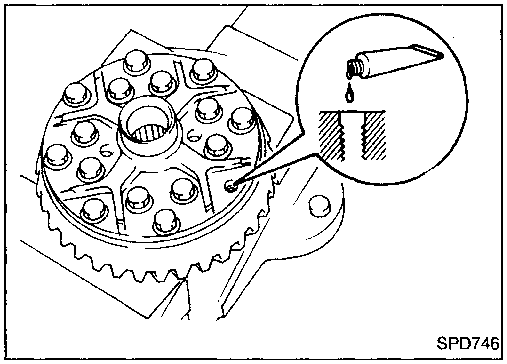
Differential Case

1. Measure clearance between side gear thrust washer and differential case.
   Clearance between side gear thrust washer and differential case (A - B):
   0.10 - 0.20 mm (0.0039 - 0.0079 in)
   The clearance can be adjusted with side gear thrust washer.
   Available side gear thrust washers:
   Refer to SDS (PD-99).
2. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.

Differential Case (Cont'd)

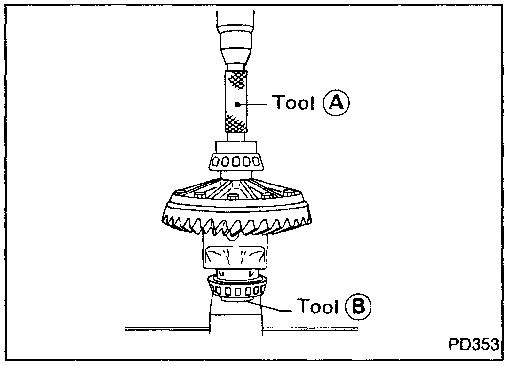

SPD643

3. Install differential case LH and RH.


SPD746

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 criss-cross fashion, lightly tapping bolt head with a hammer.



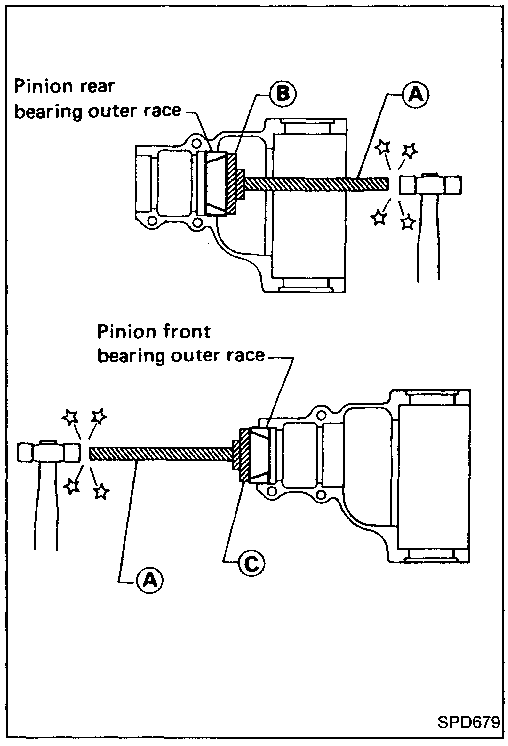
PD353

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

Tool number:

Ⓐ ST33230000 (J25805-01)
Ⓑ ST33061000 (J8107-2)

Final Drive Housing



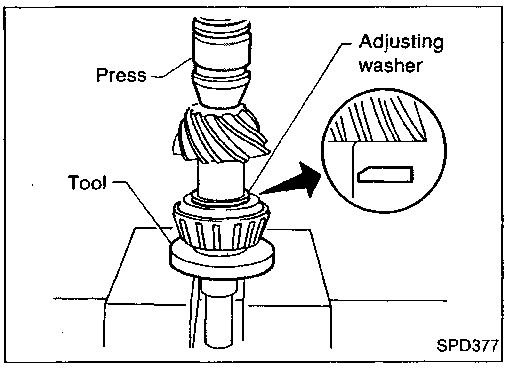
SPD679

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

Tool number:

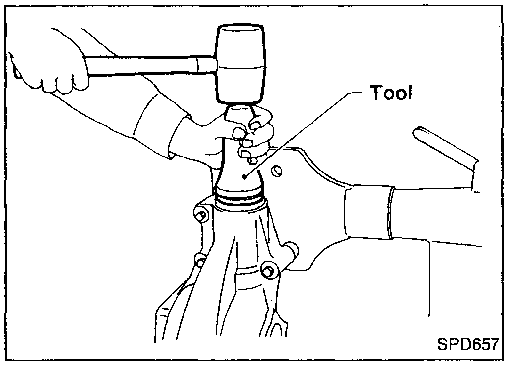
Ⓐ ST30611000 (J25742-1)
Ⓑ ST30621000 (J25742-5)
Ⓒ ST30701000 (J25742-2)

Final Drive Housing (Cont'd)



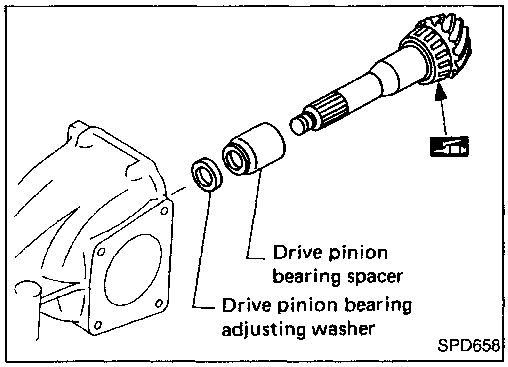
2. Select pinion bearing adjusting washer and drive pinion bearing spacer. Refer to ADJUSTMENT (PD-26).
3. Install drive pinion height adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, using press and Tool.

Tool number: ST30901000 (—)
Equivalent tool (J26010-01)

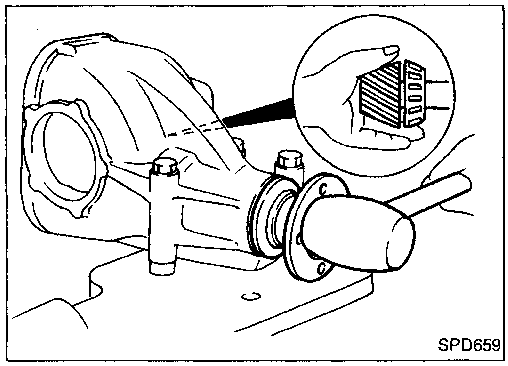


4. Place pinion front bearing inner cone in final drive housing.
5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

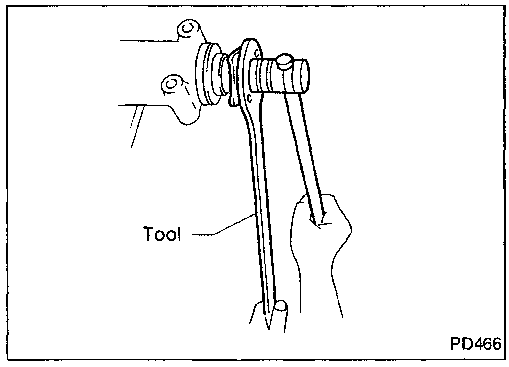
Tool number: ST30720000 (—)
Equivalent tool (J25405)



6. Place drive pinion bearing spacer, pinion bearing adjusting washer and drive pinion in final drive housing.



7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.

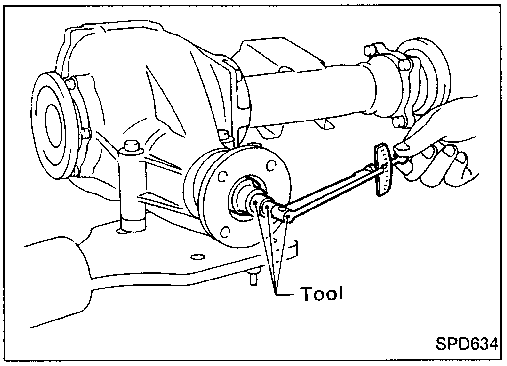


8. Tighten pinion nut to the specified torque.

The threaded portion of drive pinion and pinion nut should be free from oil or grease.

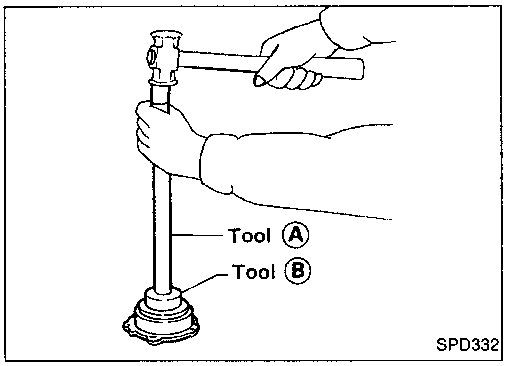
Tool number: ST38060002 (J34311)

Final Drive Housing (Cont'd)

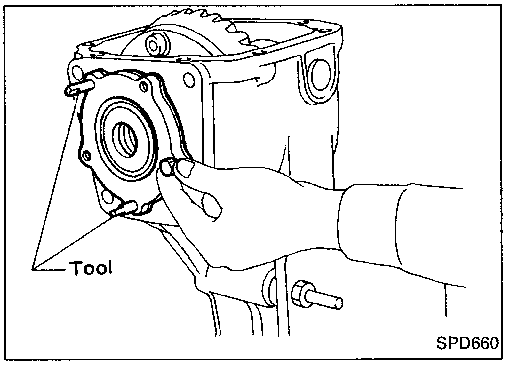


9. Turn drive pinion in both directions several revolutions, and measure pinion bearing preload.
   Tool number: ST3127S000 (J25765-A)
   Pinion bearing preload:
   1.1 - 1.7 N·m (11 - 17 kg-cm, 9.5 - 14.8 in-lb)

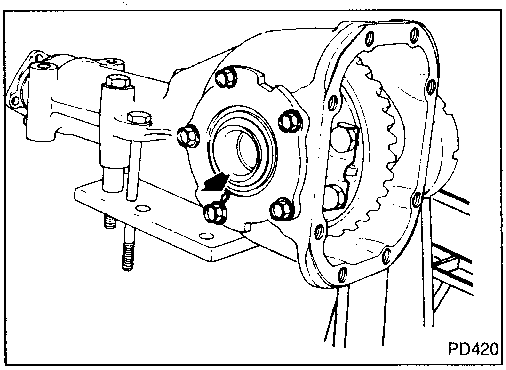
When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.



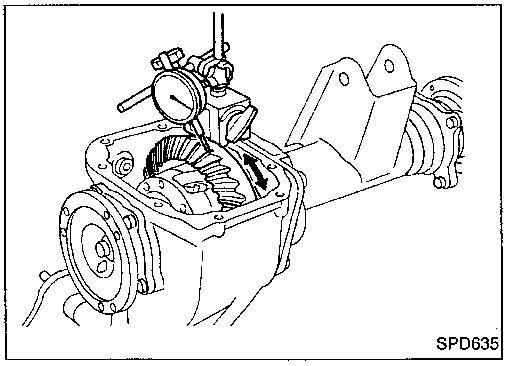
10. Select side retainer adjusting shim.
    Refer to ADJUSTMENT (PD-25).
11. Press-fit side bearing outer race into side retainer.
    Tool number:
    Ⓐ ST30611000 (J25742-1)
    Ⓑ ST30621000 (J25742-5)



12. Install side oil seal.
13. Install differential case assembly.
14. Place side retainer adjusting shims (Refer to ADJUSTMENT, PD-25.), and O-ring on side retainer, and install them in final drive housing.
    Tool number: ST33720000 (J25817)



- Align arrows stamped on side retainer and final drive housing.

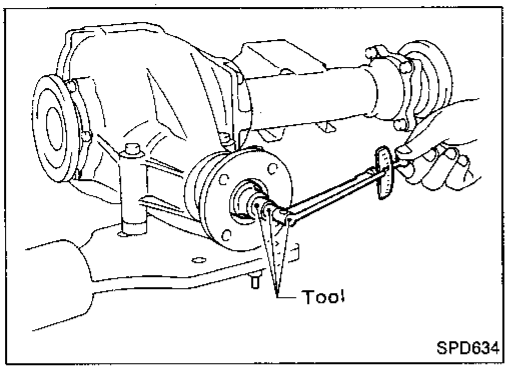


15. Measure ring gear to drive pinion backlash with a dial indicator.
    Ring gear to drive pinion backlash:
    0.13 - 0.18 mm (0.0051 - 0.0071 in)

- 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.

Final Drive Housing (Cont'd)



16. Check total preload with Tool.

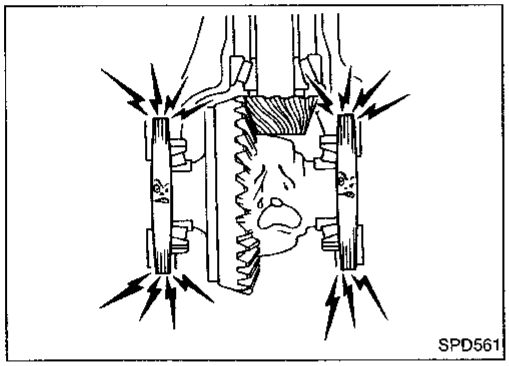
When checking preload, turn drive pinion in both directions several times to set bearing rollers.

Tool number: ST3127S000 (J25765-A)

Total preload:

1.2 - 2.3 N·m

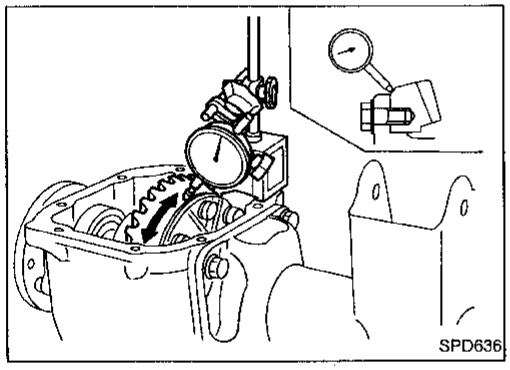
(12 - 23 kg-cm, 10 - 20 in-lb)



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



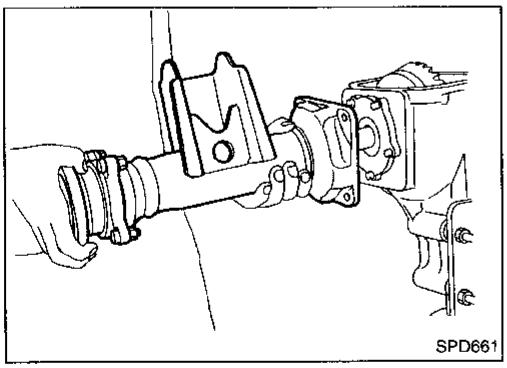
18. Check runout of ring gear with a dial indicator.

Runout limit:

0.05 mm (0.0020 in)

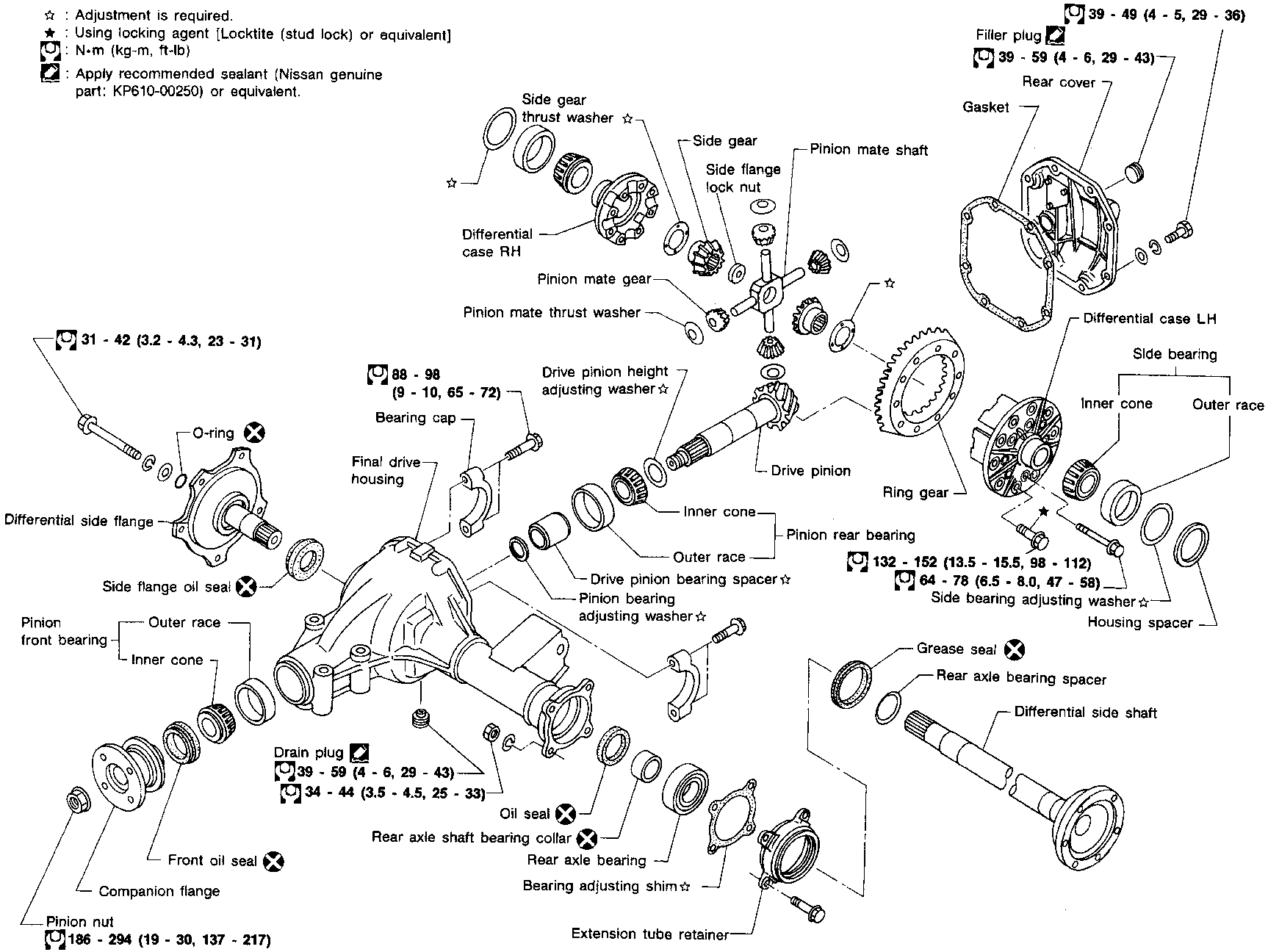
- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

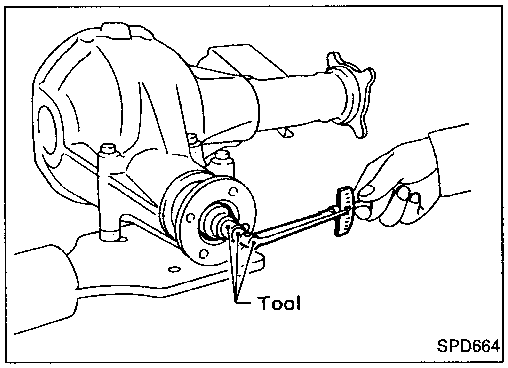
19. Check tooth contact. Refer to ADJUSTMENT (PD-30).
20. Install rear cover and gasket.



21. Install extension tube and differential side shaft assembly.

☆ : Adjustment is required.
★ : Using locking agent [Locktite (stud lock) or equivalent]
: N·m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.



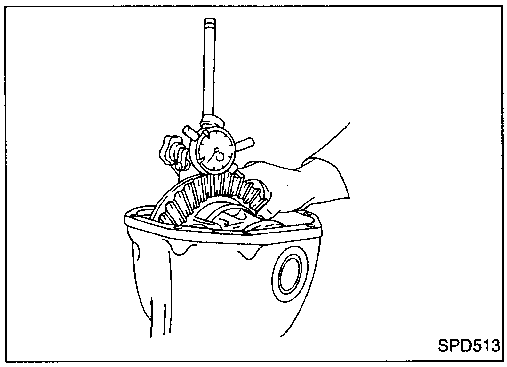


Pre-inspection

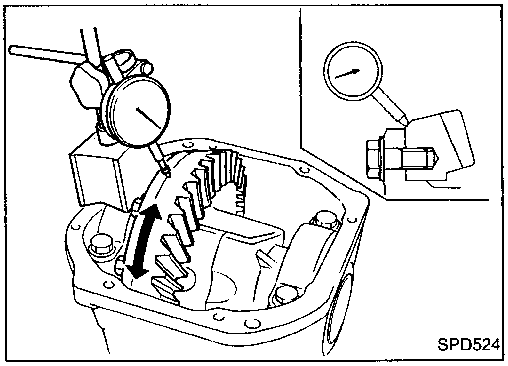
Before disassembling final drive, perform the following inspection.

- Total preload

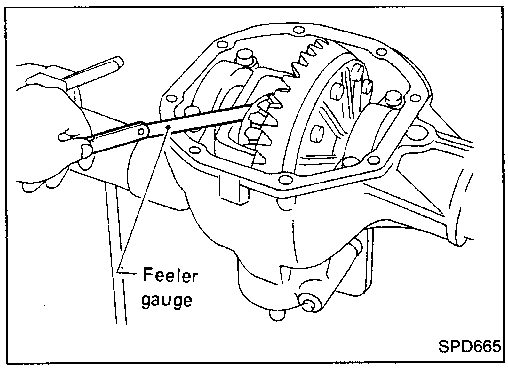
1) Turn drive pinion in both directions several times to set bearing rollers.
2) Check total preload with Tool.
   Tool number: ST3127S000 (J25765-A)
   Total preload:
   1.4 - 3.1 N·m (14 - 32 kg-cm, 12 - 28 in-lb)



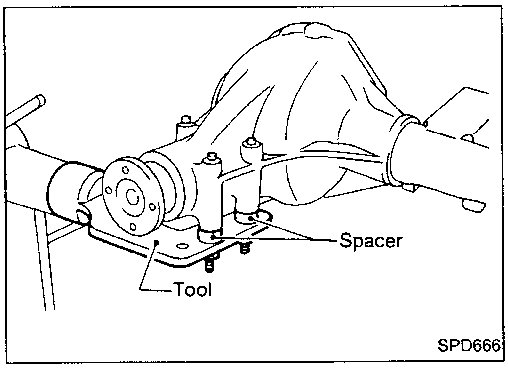
- Ring gear to drive pinion backlash
  Check backlash of ring gear with a dial indicator at several points.
  Ring gear to drive pinion backlash:
  0.13 - 0.18 mm (0.0051 - 0.0071 in)



- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit:
  0.05 mm (0.0020 in)
- Tooth contact
  Check tooth contact. Refer to ADJUSTMENT (PD-49).



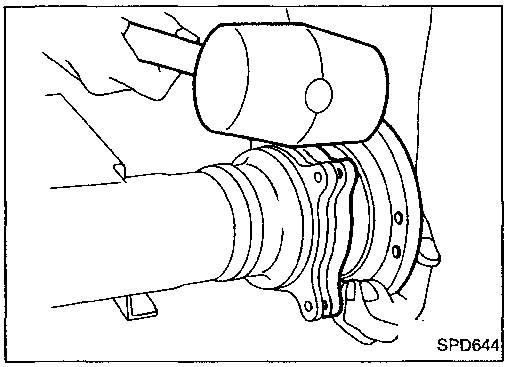
- Side gear to pinion mate gear backlash
  Using a feeler gauge, measure clearance between side gear thrust washer and differential case.
  Clearance between side gear thrust washer and differential case:
  0.10 - 0.20 mm (0.0039 - 0.0079 in)



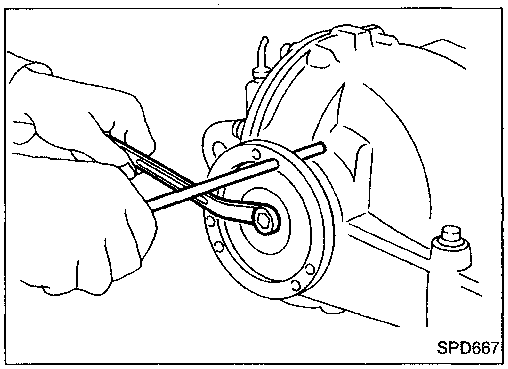
Final Drive Housing

1. Using three spacers [20 mm (0.79 in)], mount final drive assembly on Tool.
   Tool number:
   KV38100800 (—)
   Equivalent tool (J34310), (J25604)

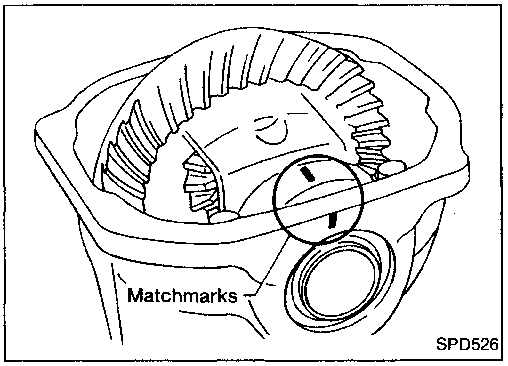
Final Drive Housing (Cont'd)



2. Remove differential side shaft assembly.

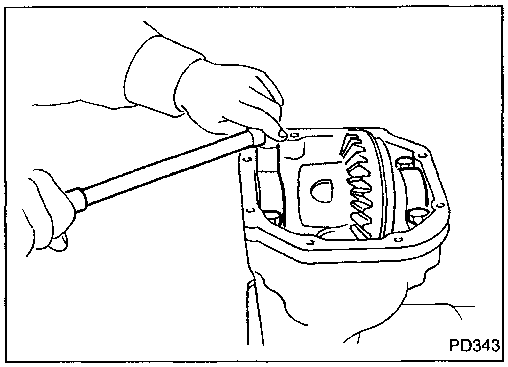


3. Remove differential side flange.

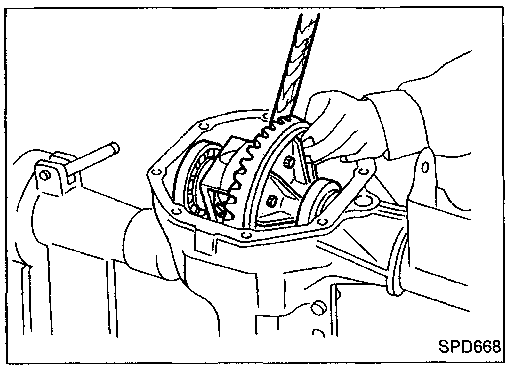


4. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

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

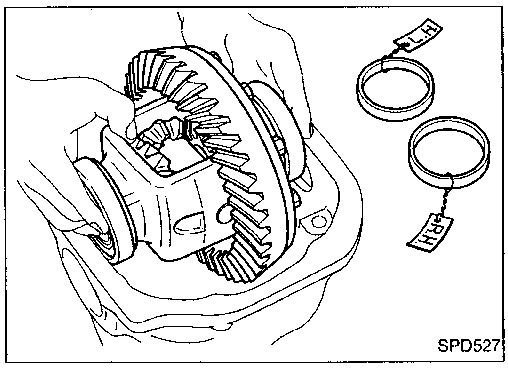


5. Remove side bearing caps.



6. Remove differential case assembly with a pry bar.

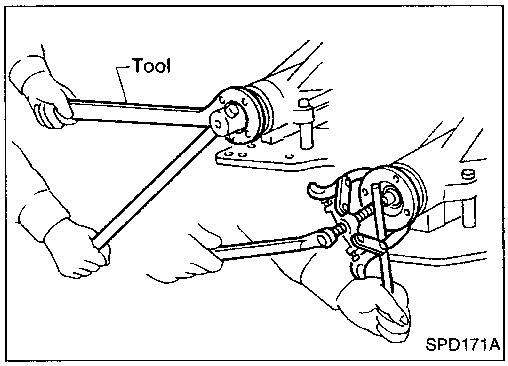
Final Drive Housing (Cont'd)



SPD527

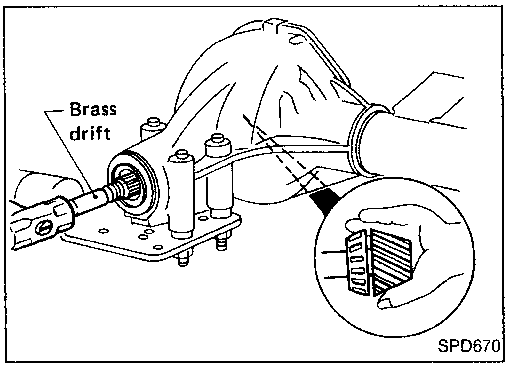
Be careful to keep the side bearing outer races together with their respective inner cones — don't mix them up.

CAUTION:
Side bearing spacer is placed on either the left or right depending upon final drive gear ratio. It should be labeled so that it may be replaced correctly.



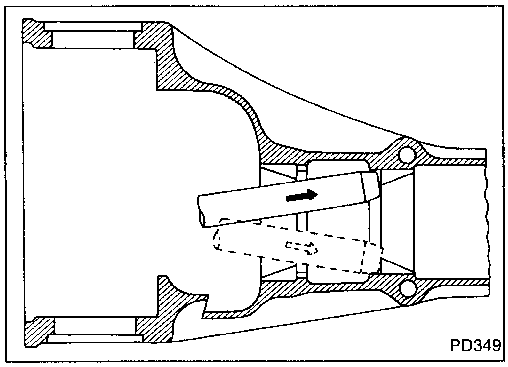
SPD171A

7. Loosen drive pinion nut.
   Tool number: ST38060002 (J34311)
8. Remove companion flange with puller.

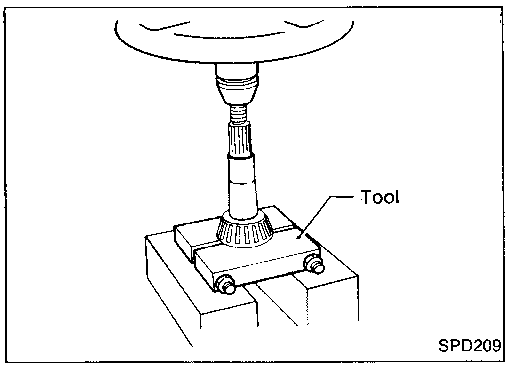


SPD670

9. Take out drive pinion together with rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting washer.
10. Remove front oil seal and pinion front bearing inner cone.

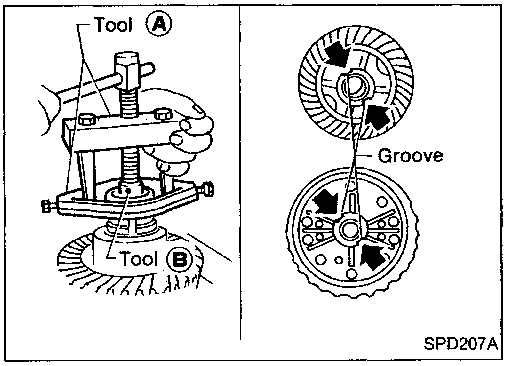

PD349

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



SPD209

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



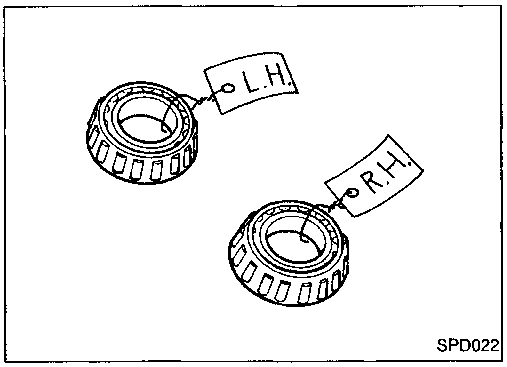
Differential Case

1. Remove side bearing inner cones.

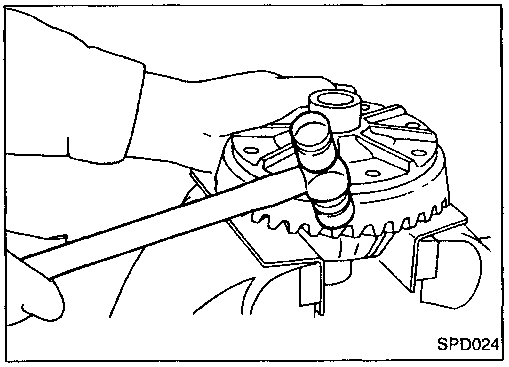
To prevent damage to bearing, engage puller jaws in grooves.

Tool number:

Ⓐ ST33051001 (—)
Equivalent tool (J22888)
Ⓑ ST33061000 (J8107-2)

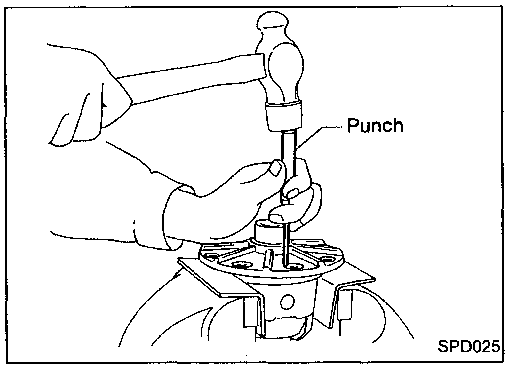


Be careful not to confuse the right and left hand parts.



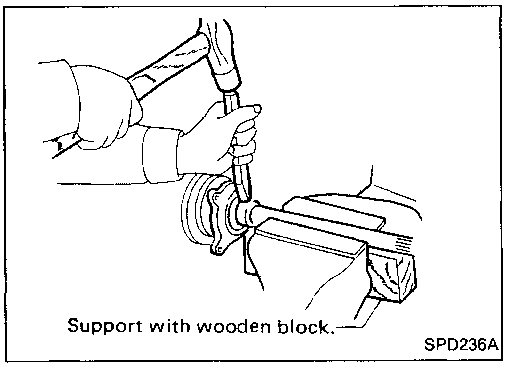
2. Loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off the differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.



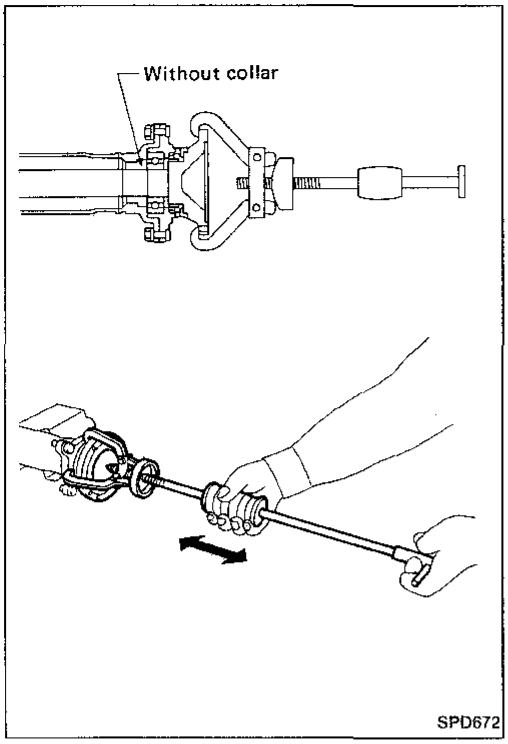
4. Punch off pinion mate shaft lock pin from ring gear side.

Differential Side Shaft

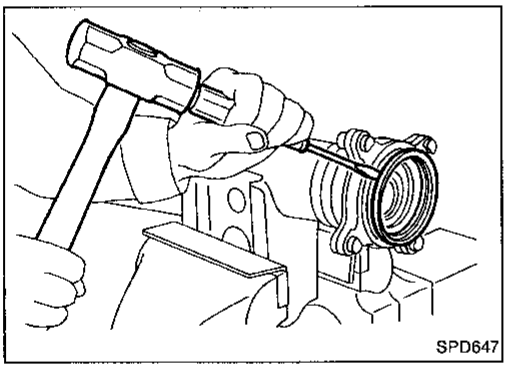


1. Cut collar with cold chisel. Be careful not to damage differential side shaft.

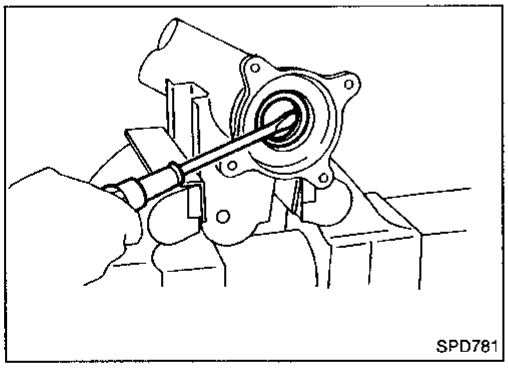
Differential Side Shaft (Cont'd)



2. Reinstall differential side shaft into extension tube and secure with bolts. Remove rear axle bearing by drawing out differential side shaft from rear axle bearing with puller.

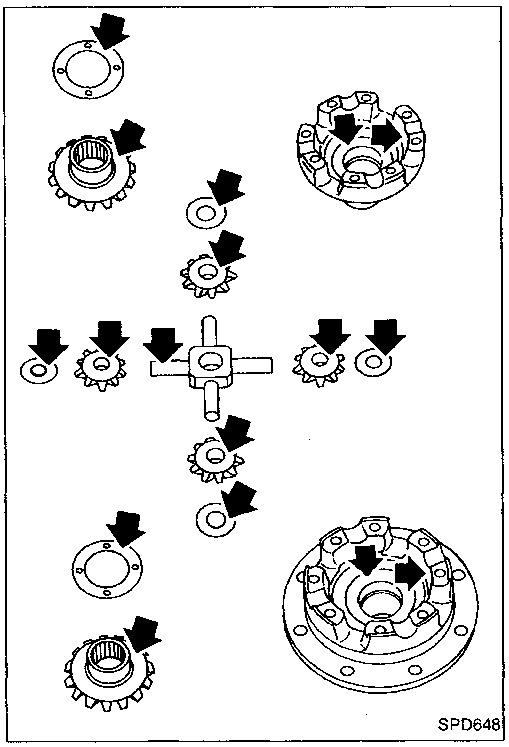


3. Remove grease seal and oil seal.



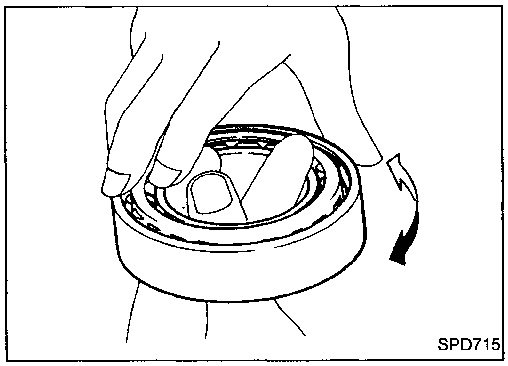
Ring Gear and Drive Pinion

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).


SPD648

Differential Case Assembly

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


SPD715

Bearing

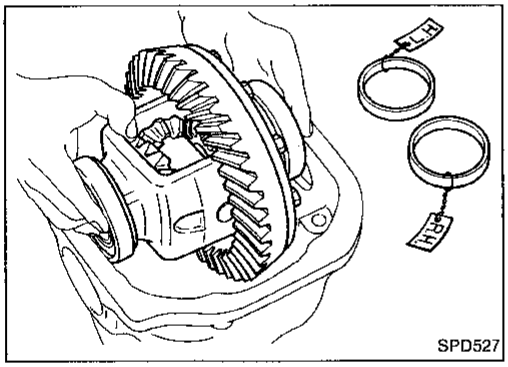
1. Thoroughly clean bearing.
2. Check bearing for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.

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

1. Side Bearing Preload.
2. Pinion Gear Height.
3. Pinion Bearing Preload.
4. Ring Gear to pinion Backlash. Refer to ASSEMBLY (PD-54).
5. Ring and Pinion Gear Tooth Contact Pattern.

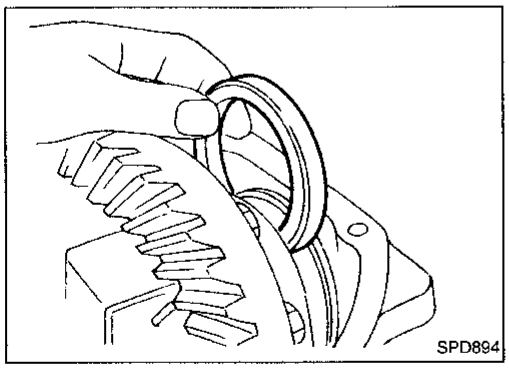
Side Bearing Preload

Note: A selection of carrier side bearing adjusting washer is required for successful completion of this procedure.



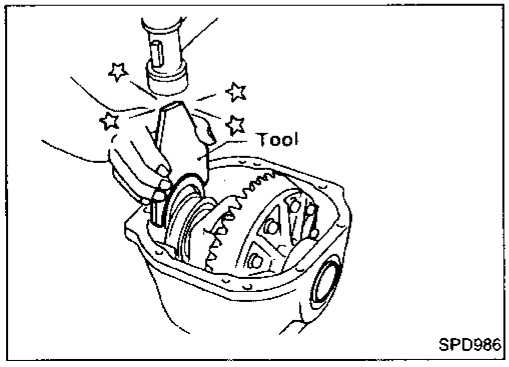
SPD527

1. Make sure all parts are clean and that the bearings are well lubricated with light oil or Dexron type 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.

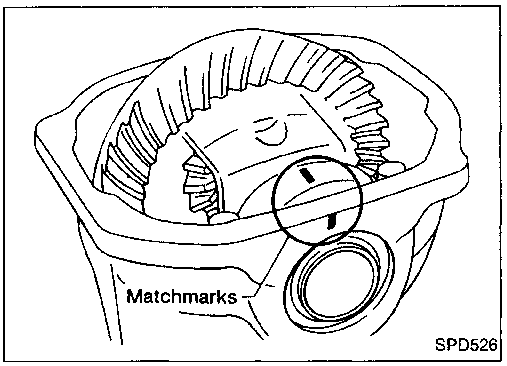
CAUTION:
Side bearing spacer is placed on either the right or left depending upon final drive gear ratio. Be sure to replace it on the correct side.



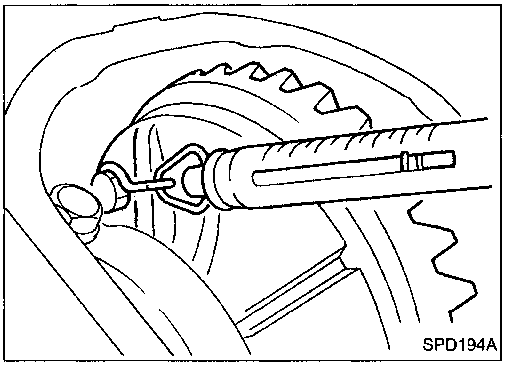
SPD986

4. Using the J25267 side bearing shim installer, place both of the original carrier side bearing preload shims on the carrier end, opposite the ring gear.

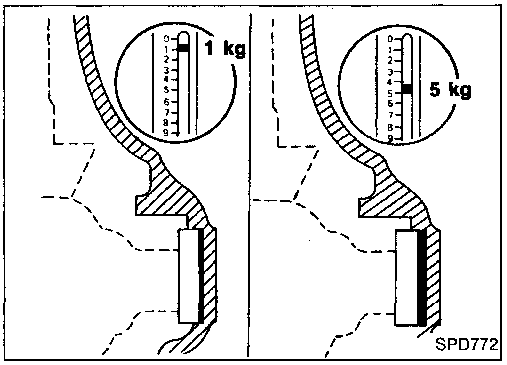
Side Bearing Preload (Cont'd)



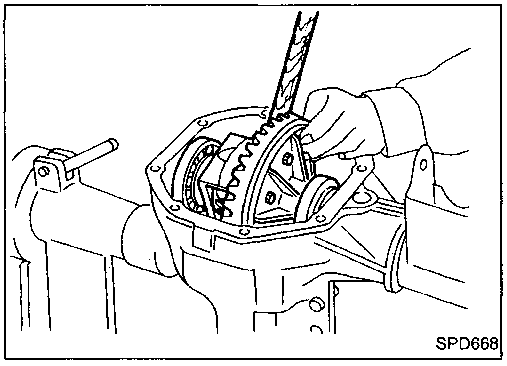
5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.
   Specification:
   88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)
6. Turn the carrier several times to seat the bearings.



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 kg, 7.7 - 8.8 lb)
   of pulling force at the ring gear bolt.

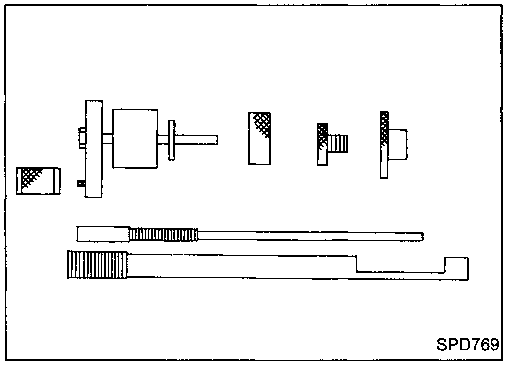


8. If the carrier turning torque is not within the specification range, increase or decrease the total thickness of the side bearing adjusting washers until the turning torque is correct. If the turning torque is less than the specified range, install washers of greater thickness; if the turning torque is greater than the specification, install thinner washers. See the SDS section for washer dimensions and part numbers.
9. Record the total amount of washer thickness required for the correct carrier side bearing preload.



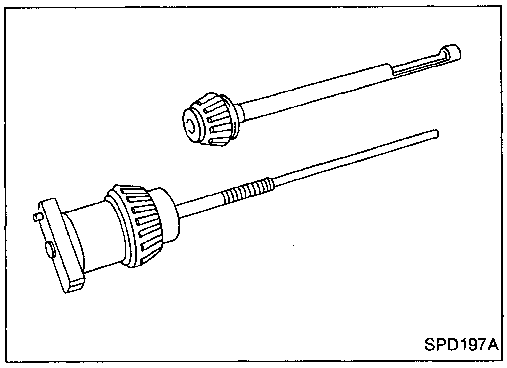
10. Remove the carrier from the final drive housing, saving the selected preload washers for later use during the assembly of the final drive unit.

Pinion Gear Height and Pinion Bearing Preload

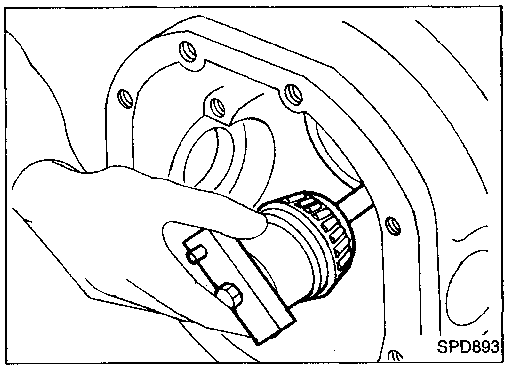


1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion pre-load shim selector Tool, J34309.

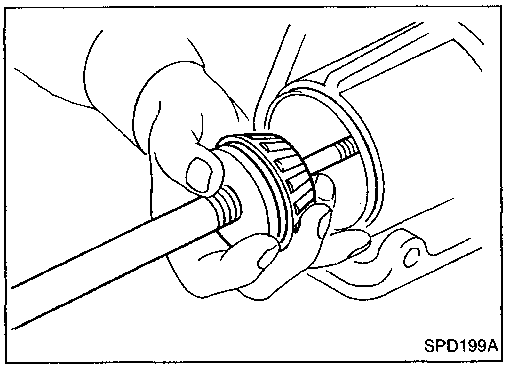
Pinion Gear Height and Pinion Bearing Preload (Cont'd)


SPD197A

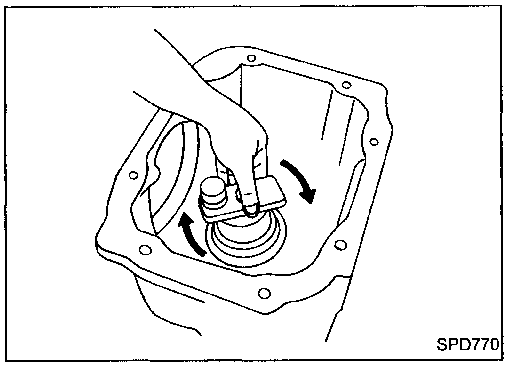
- **Front Pinion Bearing** — make sure the J34309-3 front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.
- **Rear Pinion Bearing** — the rear pinion bearing pilot, J34309-15, is 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

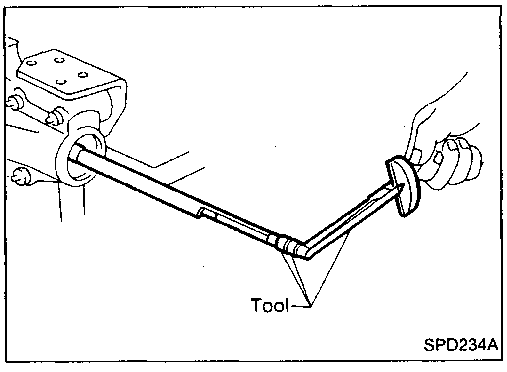
3. Place the pinion preload shim selector Tool, J34309-1, gauge screw assembly with the pinion rear bearing inner cone installed into the final drive housing.


SPD199A

4. Assemble the front pinion bearing inner cone and the J34309-2 gauge anvil 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, and tighten the two sections together by hand.


SPD770

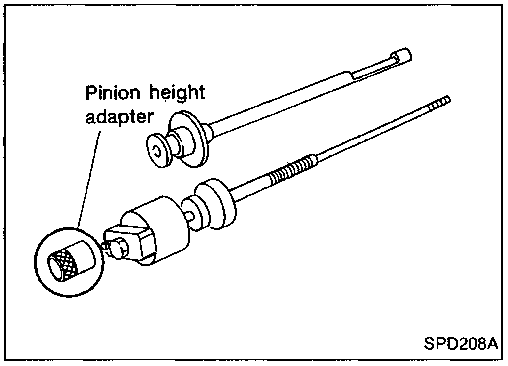
5. Turn the assembly several times to seat the bearings.



SPD234A

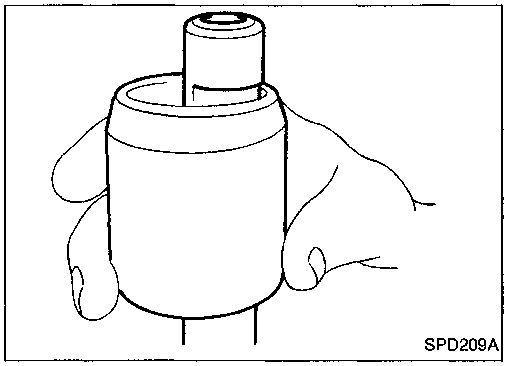
6. Measure the turning torque at the end of the J34309-2 gauge anvil using torque wrench J25765A.
   Turning torque specification:
   1.0 - 1.3 N·m (10 - 13 kg-cm, 8.7 - 11.3 in-lb)

Pinion Gear Height and Pinion Bearing Preload (Cont'd)



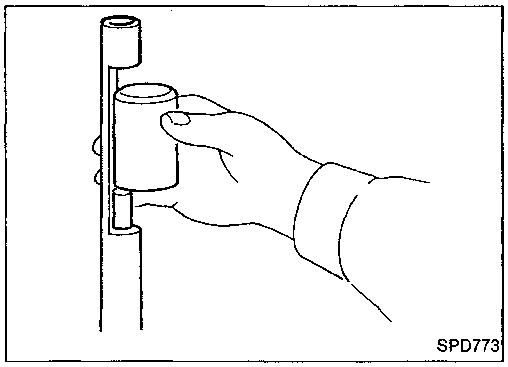
7. Place the J34309-1 "R200A" pinion height adapter onto the gauge plate and tighten it by hand.

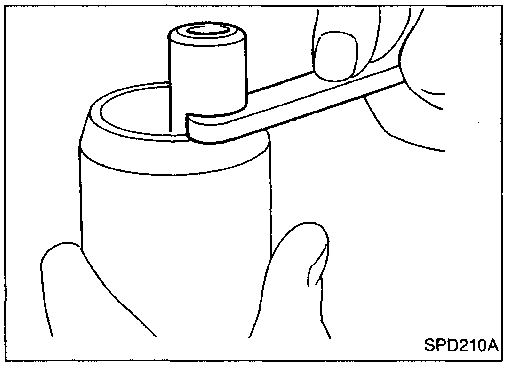
CAUTION:
Make sure all machined surfaces are clean.



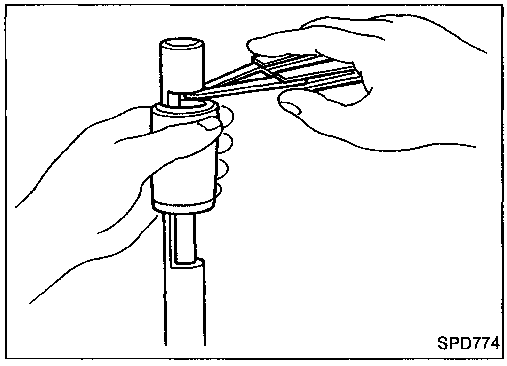
PINION BEARING PRELOAD WASHER SELECTION

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.

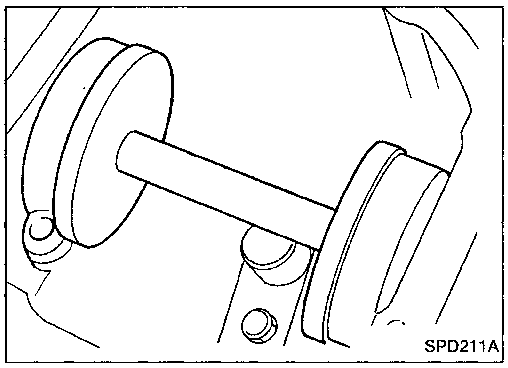




9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 3.5 mm (0.138 in) and your J34309-101 feeler gauge. The exact measure you get with your gauges is the thickness of the adjusting washer required. Select the correct washer.
   Drive pinion bearing preload adjusting washer:
   Refer to SDS (PD-100).
10. Set your selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion gear and bearings into the final drive.

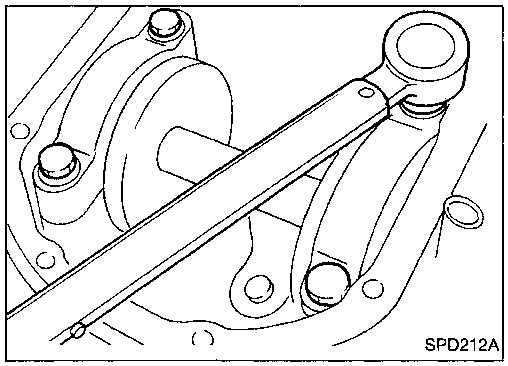


Pinion Gear Height and Pinion Bearing Preload (Cont'd)

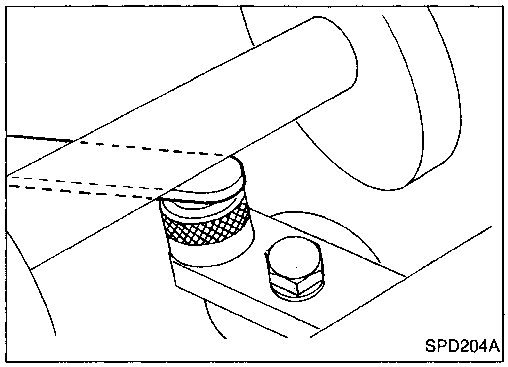

SPD211A

PINION HEIGHT ADJUSTING WASHER SELECTION

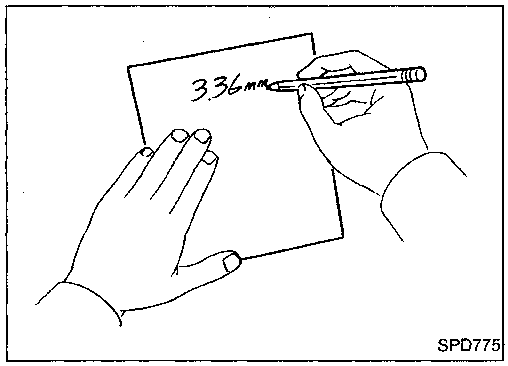
11. Now, position the side bearing discs, J25269-4, and arbor firmly into the side bearing bores.


SPD212A

12. Install the side bearing caps and tighten the cap bolts.
    Specification:
    88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)

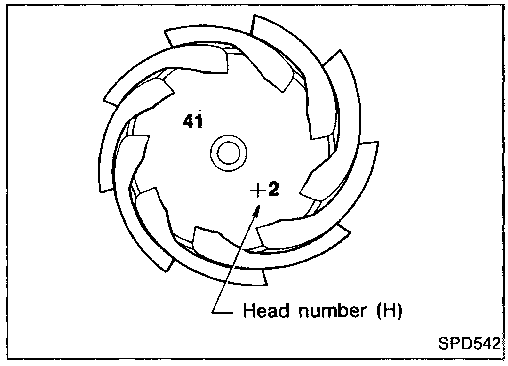

SPD204A

13. Select the correct standard pinion height adjusting washer thickness by using a standard gauge of 3.0 mm (0.118 in) and your J34309-101 feeler gauge. Measure the gap between the J34309-11 "R200A" pinion height adapter and the arbor.



SPD775

14. Write down your exact total measurement.



SPD542

15. Correct the pinion height washer size by referring to the "pinion head number".

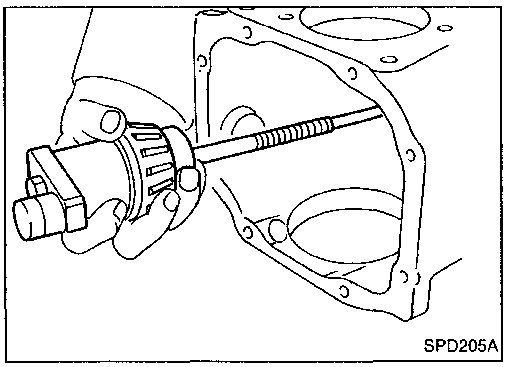
Note: There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number," and it refers to the ideal pinion height from standard for quietest operation.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

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)

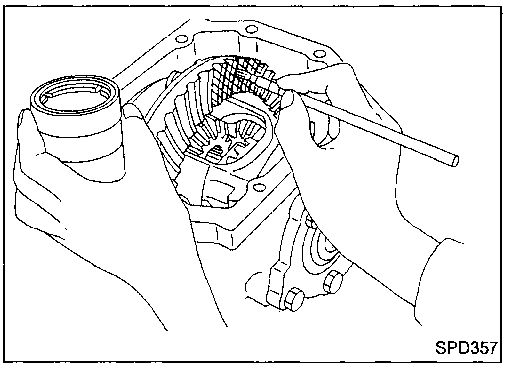
16. Select the correct drive pinion height washer.
    Drive pinion height adjusting washer:
    Refer to SDS (PD-100).


SPD205A

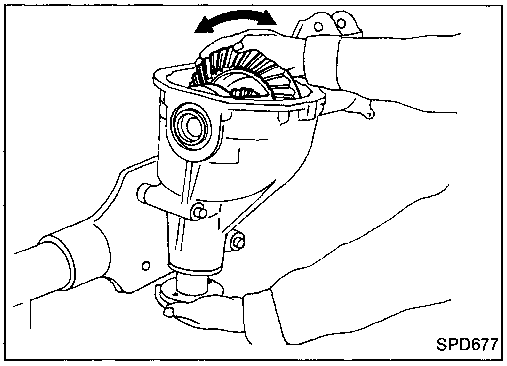
17. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.

Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life, or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

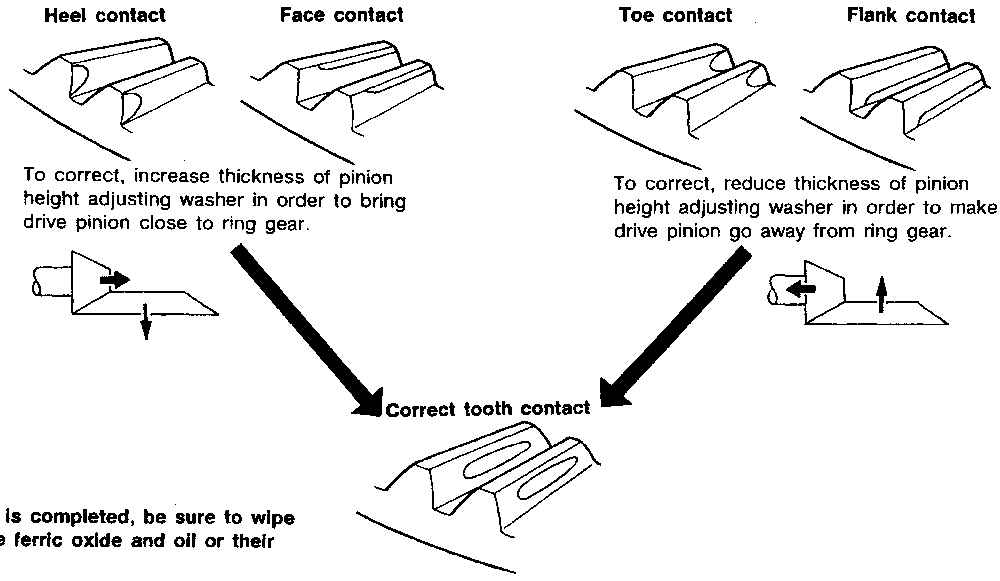

SPD357

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.


SPD677

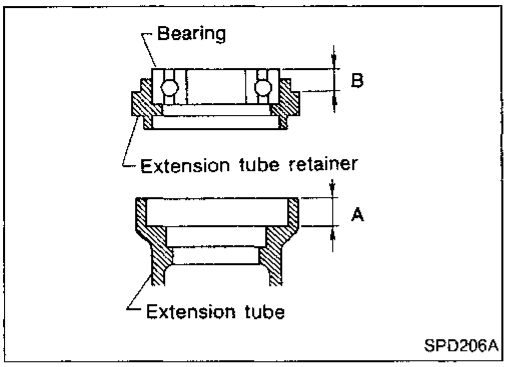
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
The tooth pattern is the best indication of how well a differential has been set up.



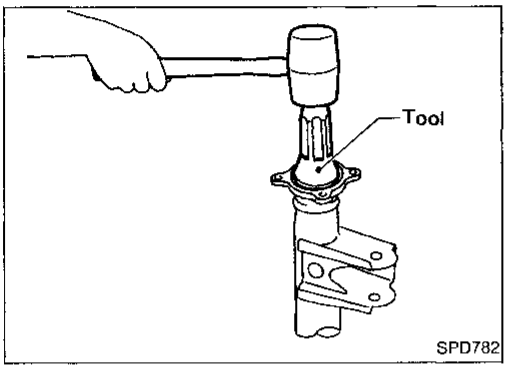
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007

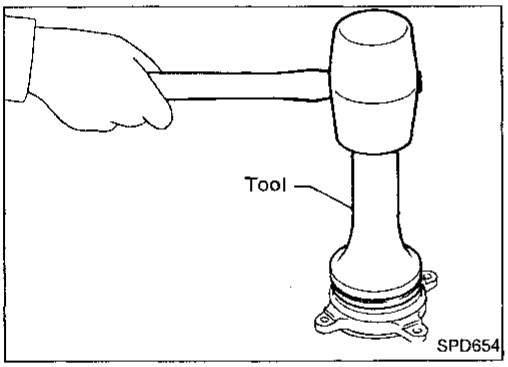


Differential Side Shaft

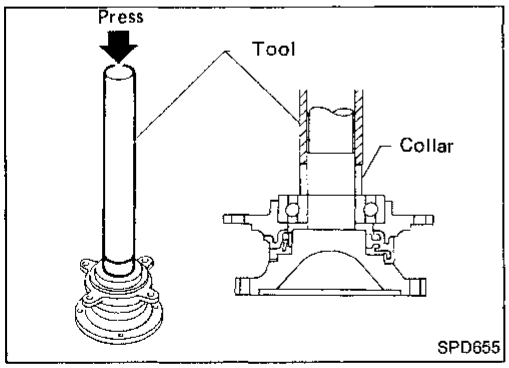
1. Measure rear axle bearing end play.
   Rear axle bearing end play (A - B):
   0.1 mm (0.0039 in) or less
   The end play can be adjusted with bearing adjusting shim. Refer to SDS (PD-100).



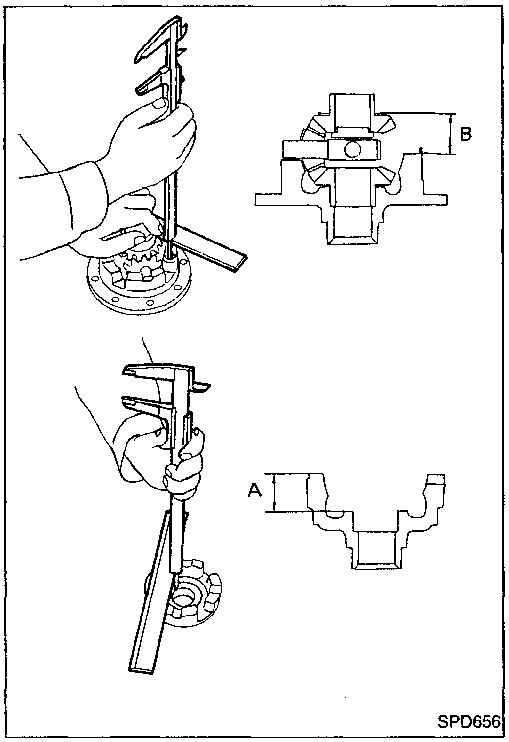
2. Install oil seal and grease seal.
   Tool number: ST33190000 (—)
   Equivalent tool (J26233)



Tool number: (J26233)

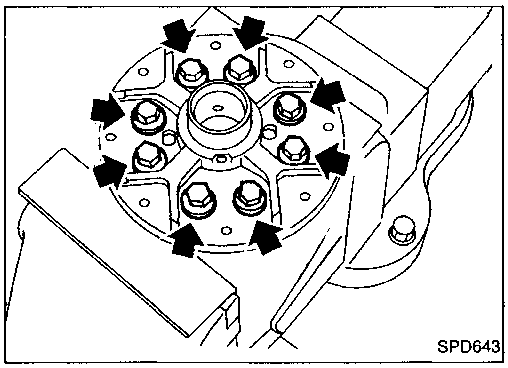


3. Install extension tube retainer, rear axle bearing and rear axle shaft bearing collar on differential side shaft.

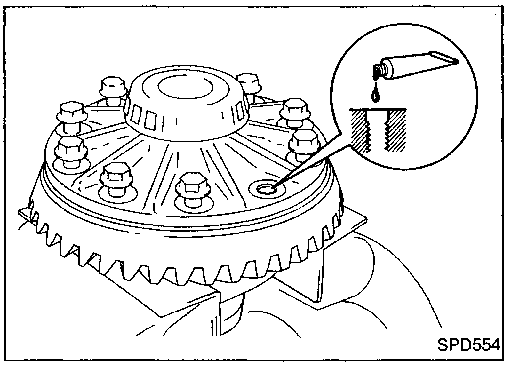


Differential Case

1. Measure clearance between side gear thrust washer and differential case.
   Clearance between side gear thrust washer and differential case (A - B):
   0.10 - 0.20 mm (0.0039 - 0.0079 in)
   The clearance can be adjusted with side gear thrust washer.
   Available side gear thrust washers:
   Refer to SDS (PD-100).
2. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.

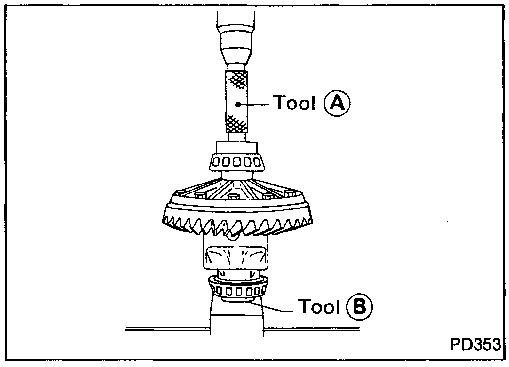


3. Install differential case LH and RH.

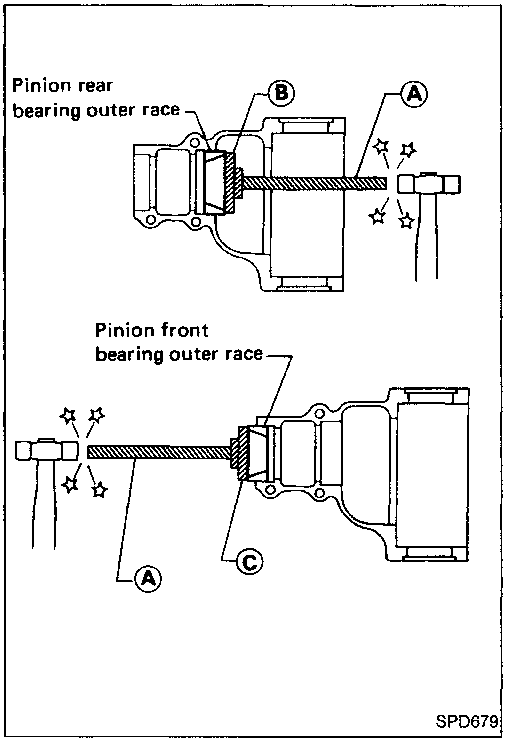


4. Place differential case on ring gear.
5. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.

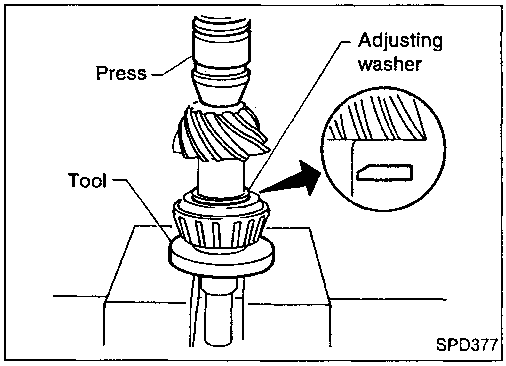


6. Press-fit side bearing inner cones on differential case with Tool.
   Tool number:
   Ⓐ KV38100300 (J25523)
   Ⓑ ST33061000 (J8107-2)

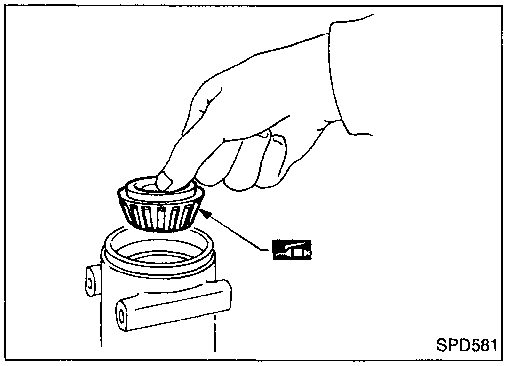


Final Drive Housing

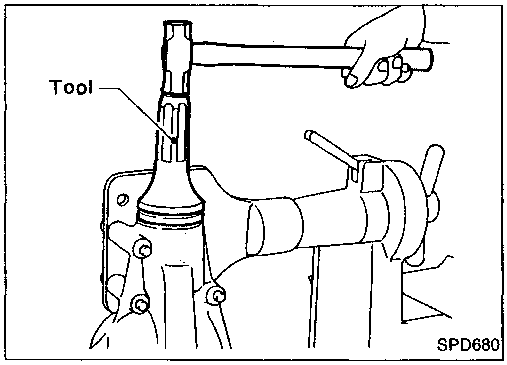
1. Press-fit front and rear bearing outer races with Tools.
   Tool number:
   - **Ⓐ ST30611000 (J25742-1)**
   - **Ⓑ ST30621000 (J25742-5)**
   - **Ⓒ ST30613000 (J25742-3)**



2. Select drive pinion height adjusting washer and pinion bearing adjusting washer. Refer to ADJUSTMENT (PD-44).
3. Install drive pinion height adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, using press and Tool.
   Tool number: ST30901000 (—)
   Equivalent tool (J26010-01)

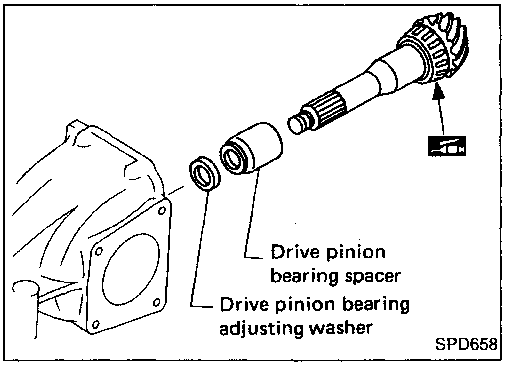


4. Place pinion front bearing inner cone in final drive housing.

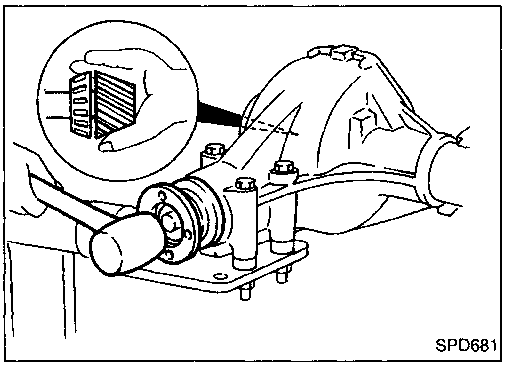


5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.
   Tool number: KV38100500 (—)
   Equivalent tool (J25273)

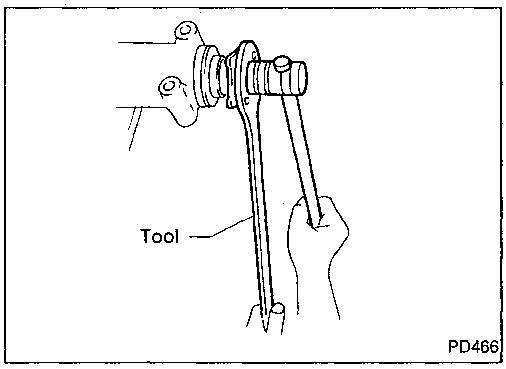
Final Drive Housing (Cont'd)



6. Place drive pinion bearing spacer, drive pinion bearing adjusting washer and drive pinion in final drive housing.



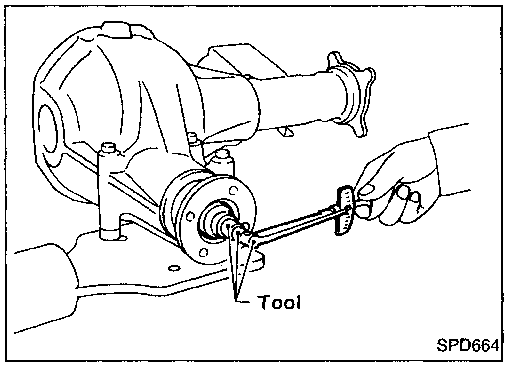
7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.



8. Tighten pinion nut to the specified torque.

The threaded portion of drive pinion and pinion nut should be free from oil or grease.

Tool number: ST38060002 (J34311)



9. Turn drive pinion in both directions several revolutions, and measure pinion bearing preload.

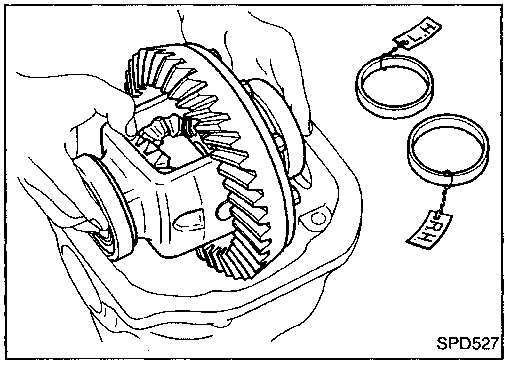
Tool number: ST3127S000 (J25765-A)

Pinion bearing preload:

1.1 - 1.7 N·m

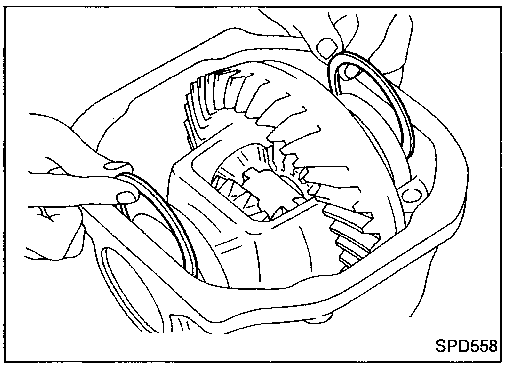
(11 - 17 kg-cm, 9.5 - 14.8 in-lb)

When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.

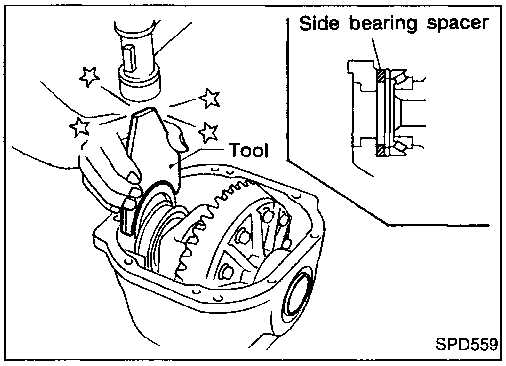


10. Select side bearing adjusting washer.
    Refer to ADJUSTMENT (PD-43).
11. Install differential case assembly with side bearing outer races into final drive housing.

Final Drive Housing (Cont'd)

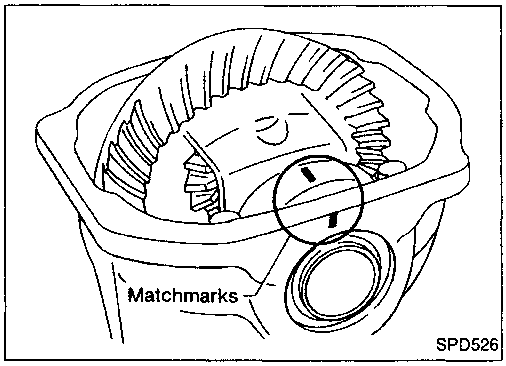

SPD558

12. Insert left and right side bearing adjusting washers in place between side bearings and final drive housing.



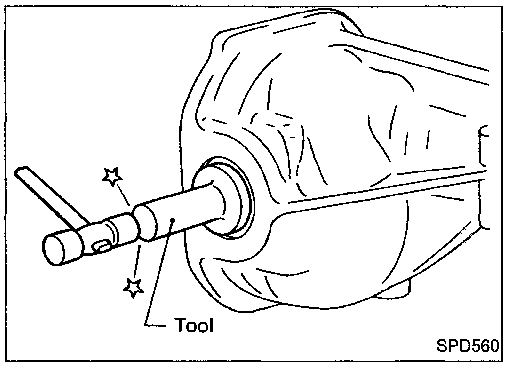
SPD559

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



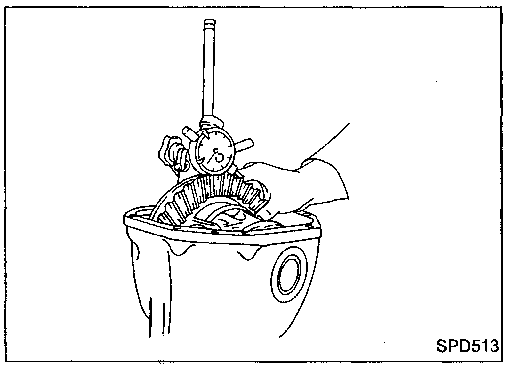
SPD526

14. Align mark on bearing cap with that on final drive housing and install bearing cap on final drive housing.



SPD560

15. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install side oil seal.
    Tool number: KV38100200 (J26233)

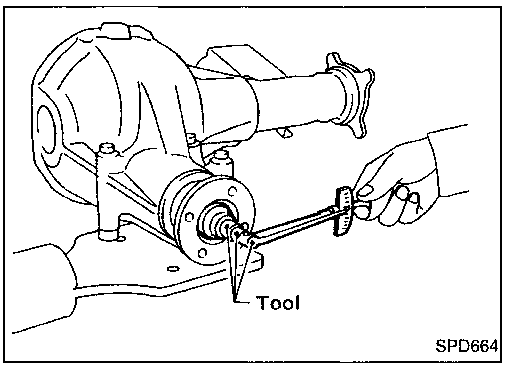

SPD513

16. 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.

Final Drive Housing (Cont'd)



17. Check total preload with Tool.

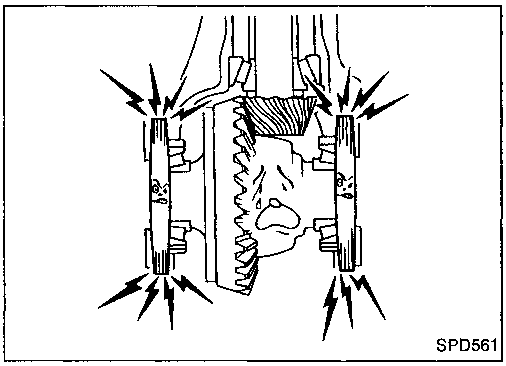
When checking preload, turn drive pinion in both directions several times to set bearing rollers.

Tool number: ST3127S000 (J25765-A)

Total preload:

1.4 - 3.1 N·m

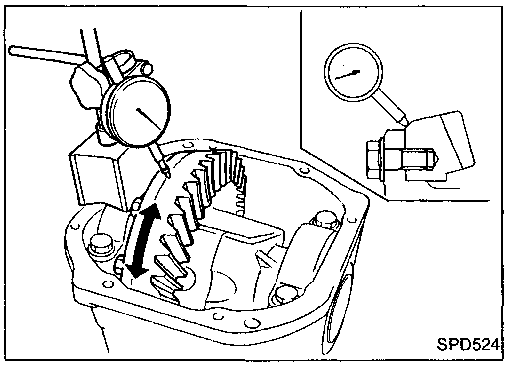
(14 - 32 kg-cm, 12 - 28 in-lb)



- 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.

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



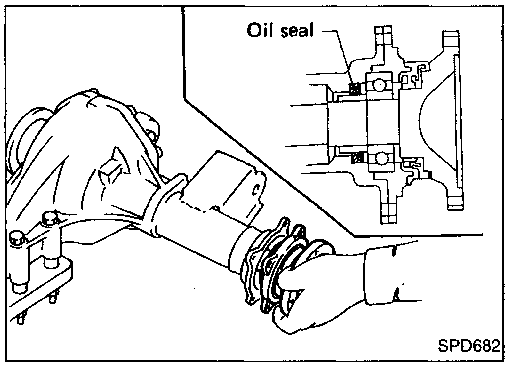
19. Check runout of ring gear with a dial indicator.

Runout limit:

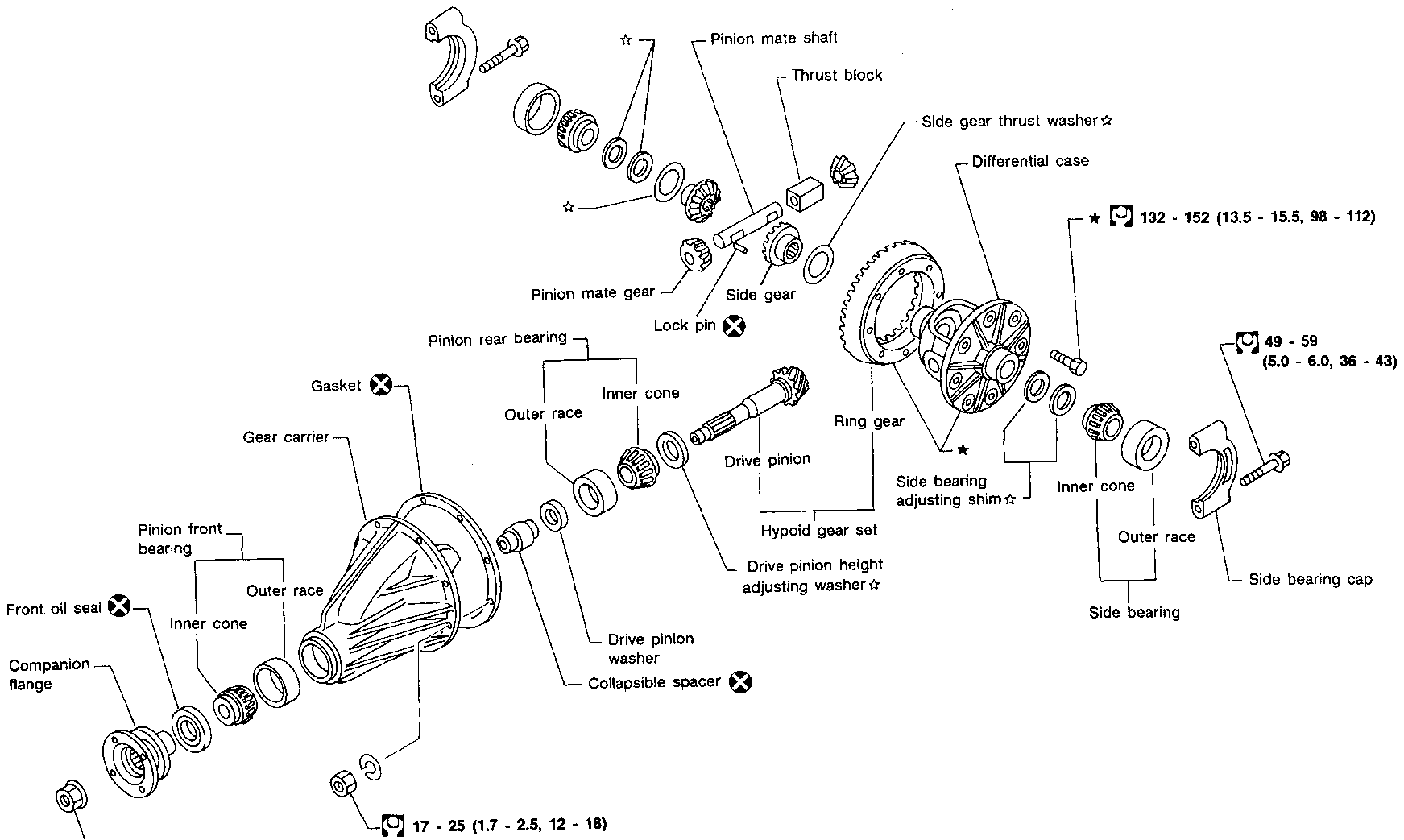
0.05 mm (0.0020 in)

- 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.

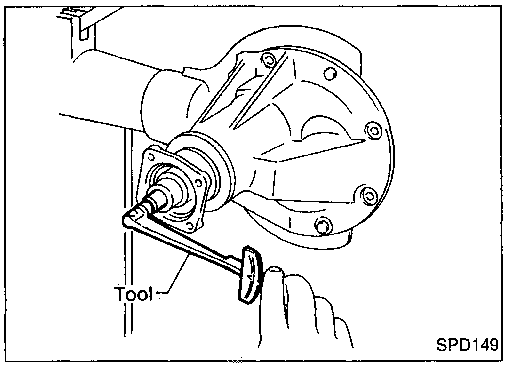
20. Check tooth contact. Refer to ADJUSTMENT (PD-49).
21. Install rear cover and gasket.



22. Install differential side shaft assembly.



: N·m (kg-m, ft-lb)
☆ : Adjustment is required.
★ : Using locking agent [Locktite (stud lock) or equivalent]



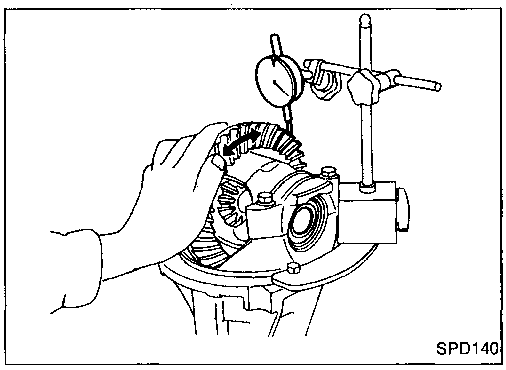
Pre-inspection

Before disassembling final drive, perform the following inspection.

- Total preload

1) Turn drive pinion in both directions several revolutions to seat bearing rollers correctly.
2) Check total preload with Tool.

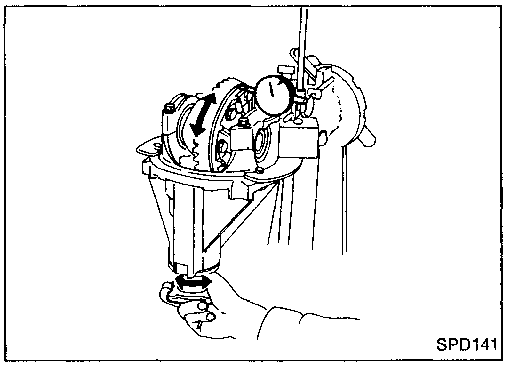
Tool number: ST3127S000 (J25765-A)
Total preload:
1.2 - 2.2 N·m
(12 - 22 kg-cm, 10 - 19 in-lb)



- Ring gear to drive pinion backlash

Check backlash of ring gear with a dial indicator at several points.

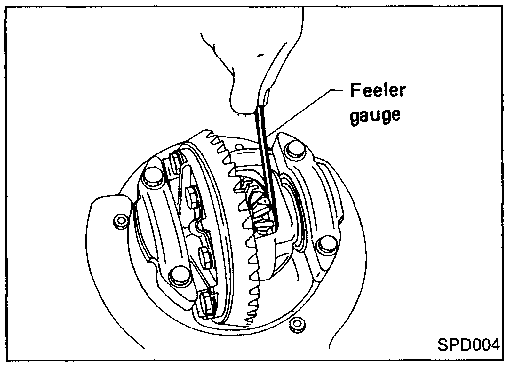
Ring gear to drive pinion backlash:
0.13 - 0.18 mm (0.0051 - 0.0071 in)



- Ring gear runout

Check runout of ring gear with a dial indicator.

Runout limit:
0.05 mm (0.0020 in)



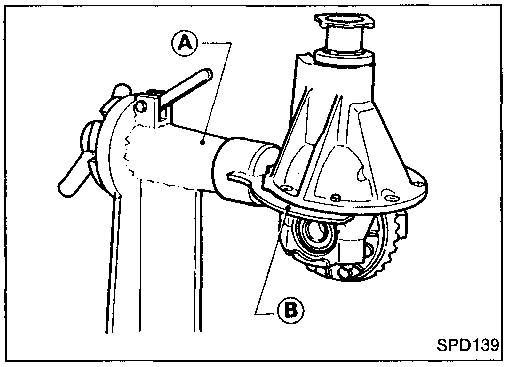
- Tooth contact

Check tooth contact. Refer to ADJUSTMENT (PD-67).

- 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:
0.10 - 0.20 mm (0.0039 - 0.0079 in)

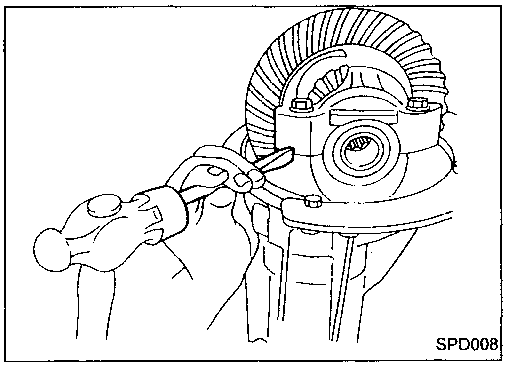


Differential Carrier

1. Mount differential carrier on Tools.

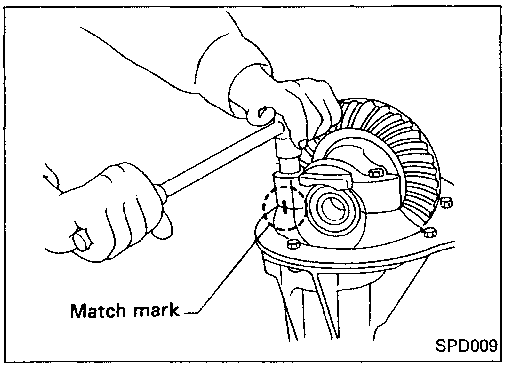
Tool number:
Ⓐ ST0501S000 (—)
Ⓑ ST06310000 (J25602-01)

Differential Carrier (Cont'd)


SPD008

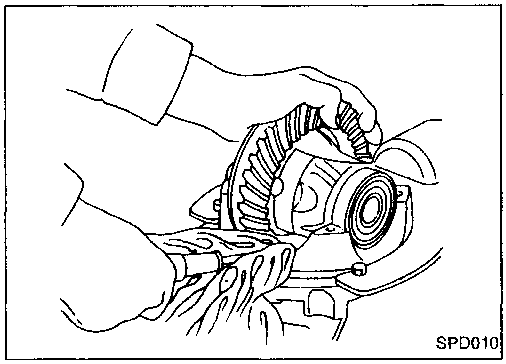
2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

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

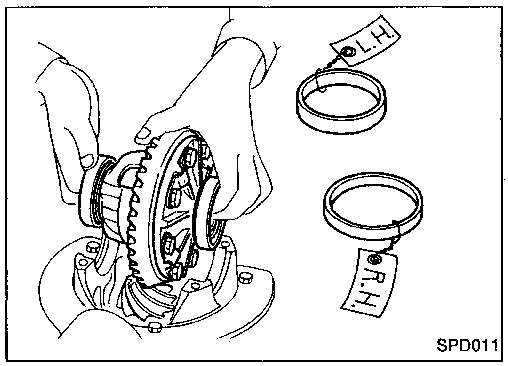


SPD009

3. Remove side bearing caps.

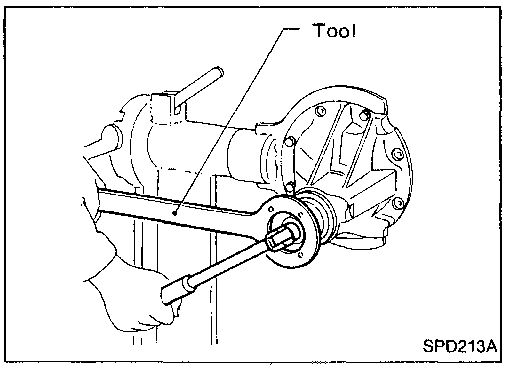

SPD010

4. Remove differential case assembly with a pry bar.



SPD011

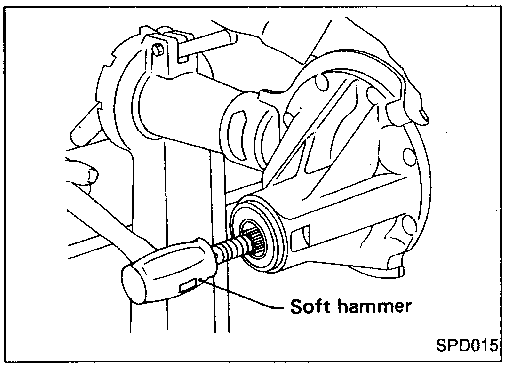
Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.



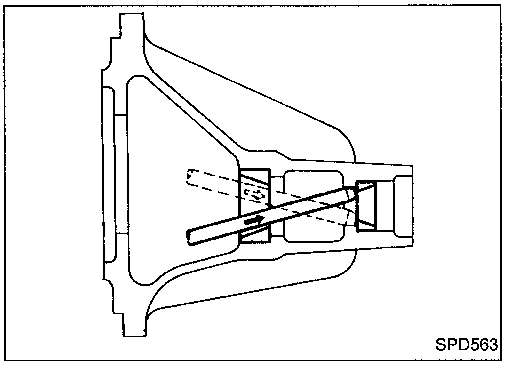
SPD213A

5. Remove drive pinion nut with Tool.
   Tool number: ST38060002 (J34311)
6. Remove companion flange with puller.

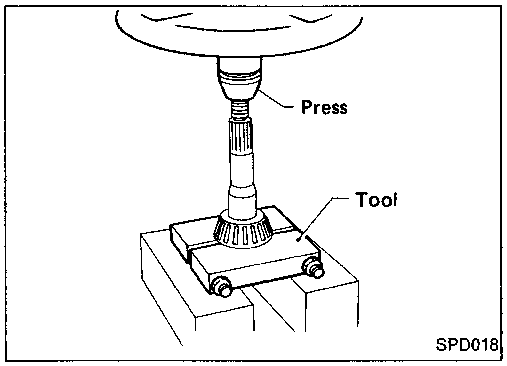
Differential Carrier (Cont'd)



7. Remove drive pinion with soft hammer.
8. Remove oil seal.

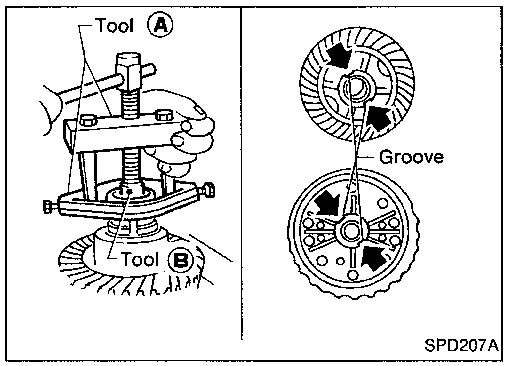


9. Remove pinion bearing outer races with a brass drift.



10. Pull out rear bearing inner cone with a press and Tool.
    Tool number: ST30031000 (J22912-01)

Differential Case

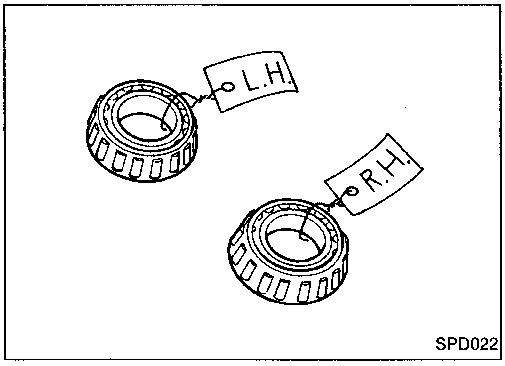


1. Remove side bearing inner cones.

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

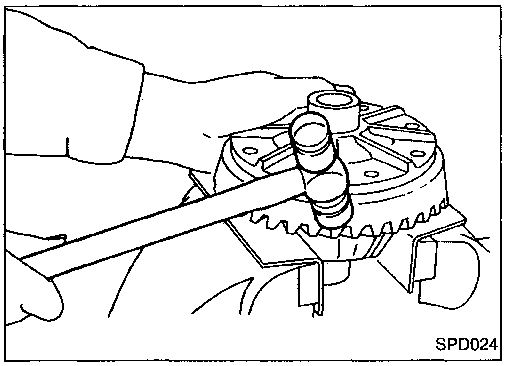
Tool number:

Ⓐ ST33051001 (—)
Equivalent tool (J22888)
Ⓑ ST33061000 (J8107-2)



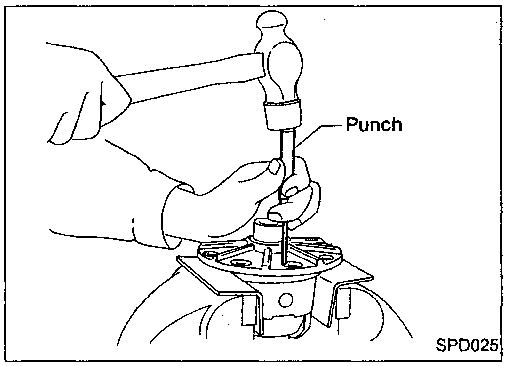
Be careful not to confuse the left and right hand parts.

Differential Case (Cont'd)



2. Spread out lock straps and loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.

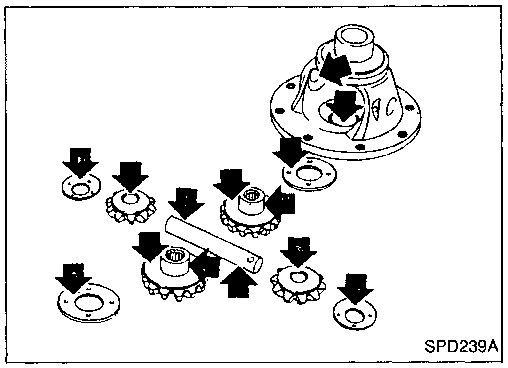


4. Drive out pinion mate shaft lock pin, with Tool from ring gear side.

Lock pin is calked at pin hole mouth on differential case.

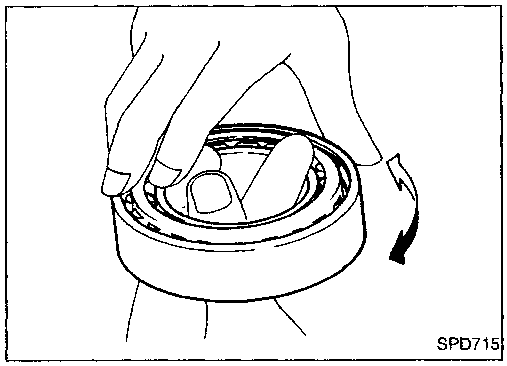
Ring Gear and Drive Pinion

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).


SPD239A

Differential Case Assembly

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


SPD715

Bearing

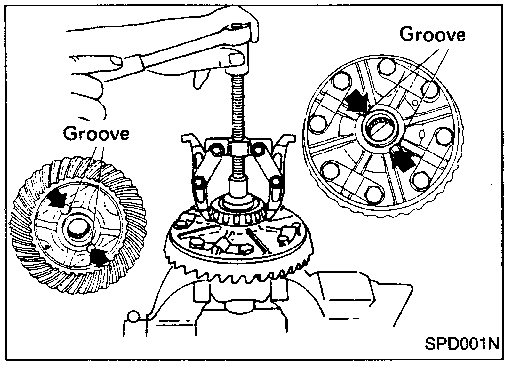
1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.

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

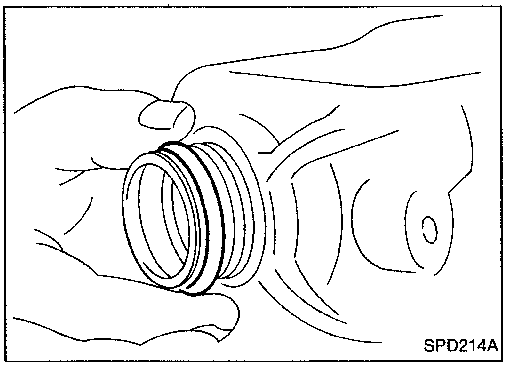
1. Side Bearing Preload.
2. Pinion Gear Height.
3. Pinion Bearing Preload. Refer to ASSEMBLY (PD-71).
4. Ring Gear-to-pinion Backlash. Refer to ASSEMBLY (PD-71).
5. Ring and Pinion Gear Tooth Contact Pattern.

Side Bearing Preload

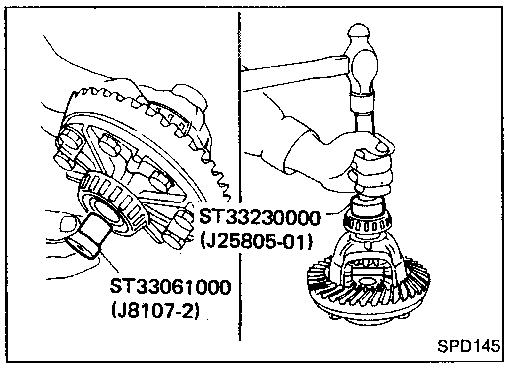
Note:
A selection of carrier side bearing preload shims is required for successful completion of this procedure.



1. Make sure all parts are clean and that the bearings are well lubricated with light oil or Dexron type automatic transmission fluid.
2. Attach side bearing puller Tools J22888 and J8107-2 to the carrier side bearing and remove the bearings.

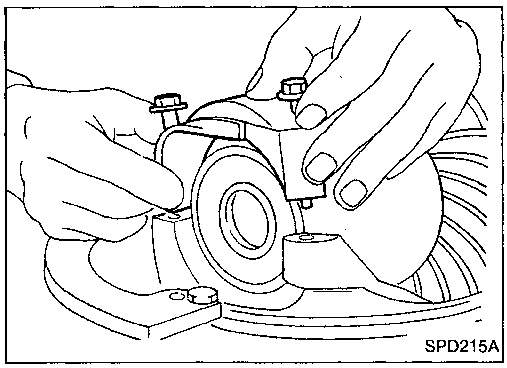


3. Reinstall all of the original side bearing adjusting shims on the carrier side, away from the ring gear.



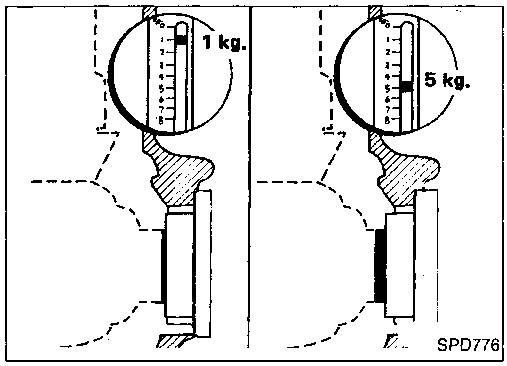
4. Reinstall the carrier side bearing using Tools J25805-01 and J8107-2. Press on the bearings.

Side Bearing Preload (Cont'd)


SPD215A

5. Install carrier and bearings into the final drive housing. Install side bearing caps. Torque the bolts and tap on the caps with a soft hammer to seat the bearings.
   Side bearing cap bolt torque:
   Specification 49 - 59 N·m (5 - 6 kg-m, 36 - 43 ft-lb)

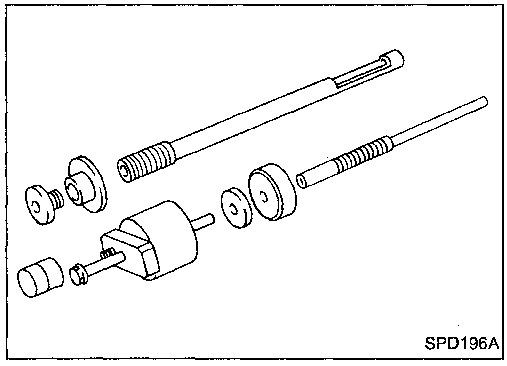
6. After turning the carrier several times to seat the bearings, measure carrier turning force with spring gauge J8129.
   Turning force specification:
   34.3 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb)
   of pulling force at the ring gear bolt.



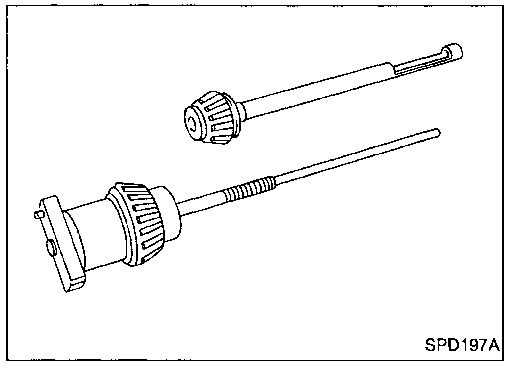
SPD776

7. If necessary, correct the carrier bearing preload by adding to or subtracting from the total amount of shim thickness. Add shim thickness to increase turning force on the carrier. Subtract shim thickness to decrease turning force on the carrier.

Pinion Gear Height

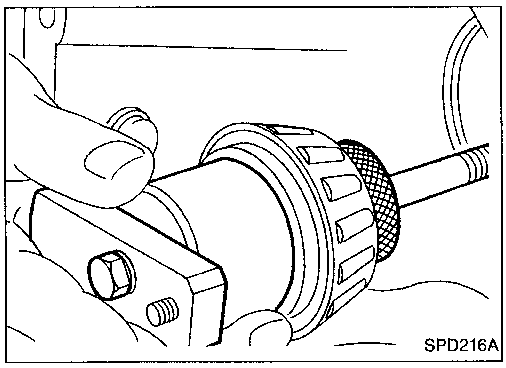

SPD196A

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion pre-load shim selector tool, J34309.

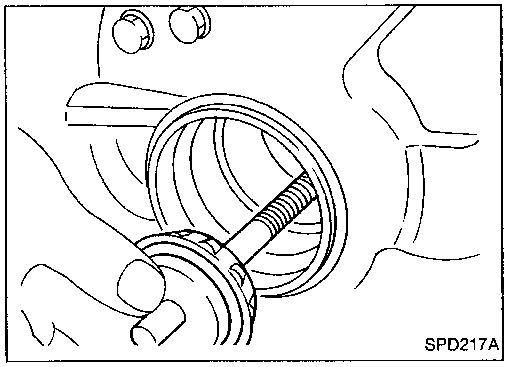

SPD197A

- **Front Pinion Bearing** — make sure the J34309-3 front pinion bearing is secured tightly against the J34309 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, J34309-15, 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.

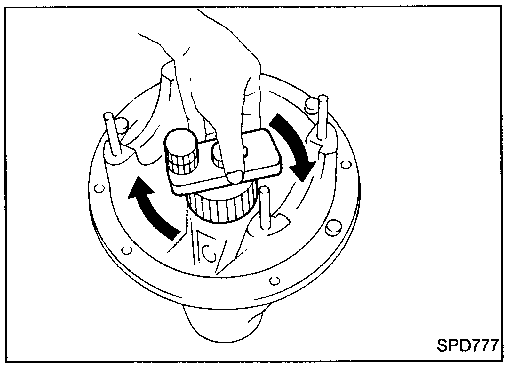
Pinion Gear Height (Cont'd)


SPD216A

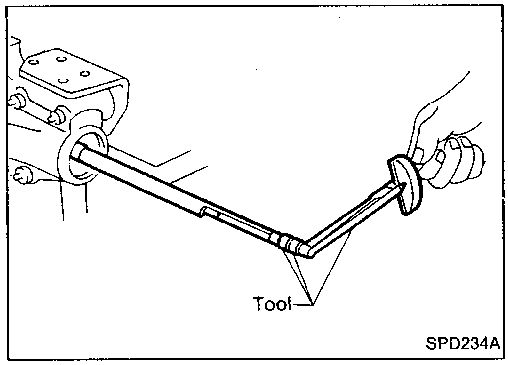
3. Place the pinion pre-load shim selector Tool J34309-1 gauge screw assembly with the pinion rear bearing inner cone installed into the final drive housing.


SPD217A

4. Assemble the front pinion bearing inner cone and the J34309-2 gauge anvil 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, and tighten the two sections together by hand.

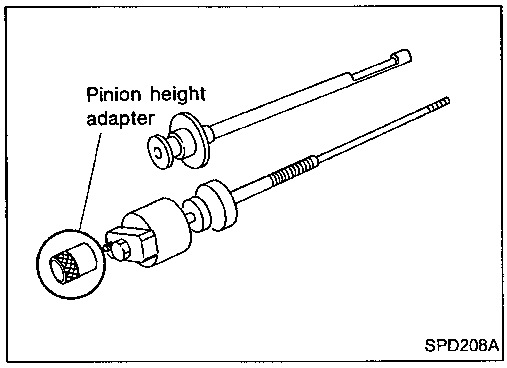

SPD777

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 torque wrench J25765A.
   Turning torque specification:
   1.0 - 1.3 N·m
   (10 - 13 kg-cm, 8.7 - 11.3 in-lb)



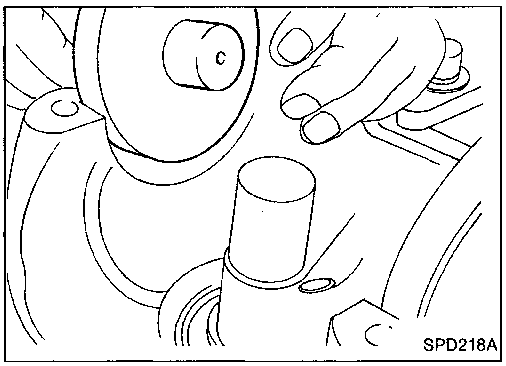
SPD208A

7. Place the J34309-14 pinion height adapter onto the gauge plate and tighten it by hand.

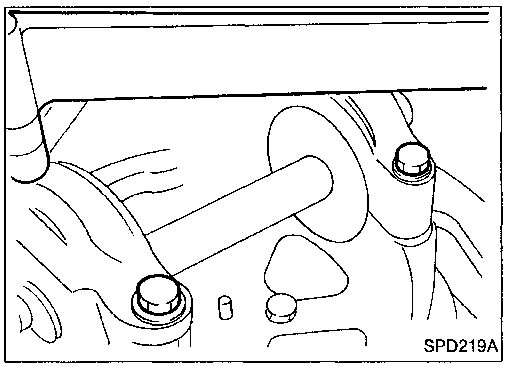
CAUTION:
Make sure all machined surfaces are clean.

Pinion Gear Height (Cont'd)

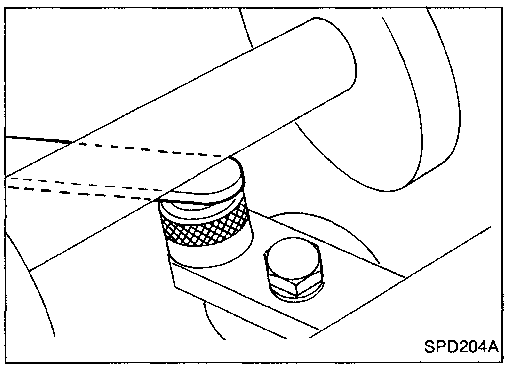
PINION HEIGHT ADJUSTING WASHER SELECTION



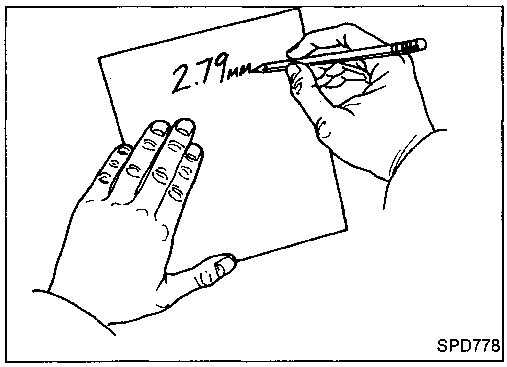
8. Now, position the side bearing discs, J25269-18, and arbor firmly into the side bearing bores.



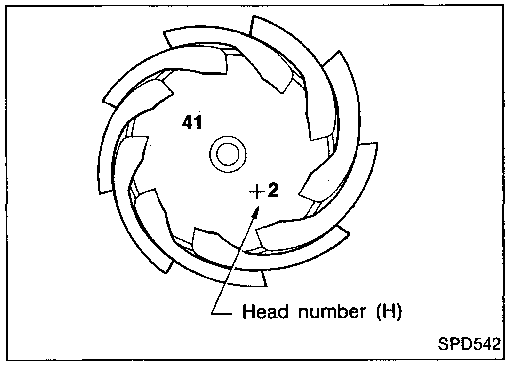
9. Install the side bearing caps and torque the cap bolts.
   Specification:
   49 - 59 N·m (5 - 6 kg-m, 36 - 43 ft-lb)



10. Select the correct standard pinion height adjusting washer thickness by using J34309-101 feeler gauge. Measure the gap between the J34309-14 pinion height adapter and the arbor.



11. Write down your exact total measurement.



12. Correct the pinion height washer size by referring to the "pinion head number".

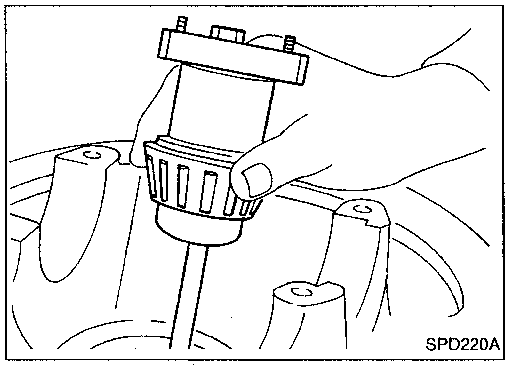
Note:
There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number," and it refers to the ideal pinion height from standard for quietest operation.

Pinion Gear Height (Cont'd)

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)

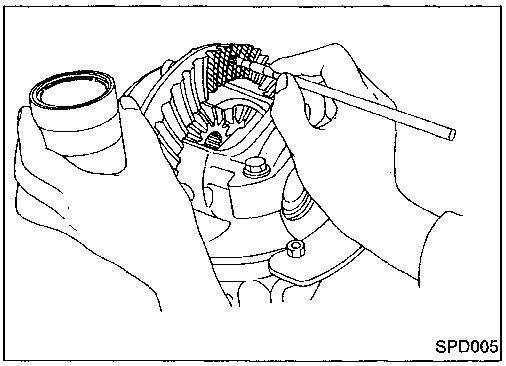
13. Select the correct pinion height washer.
    Drive pinion height adjusting washer:
    Refer to SDS (PD-101).



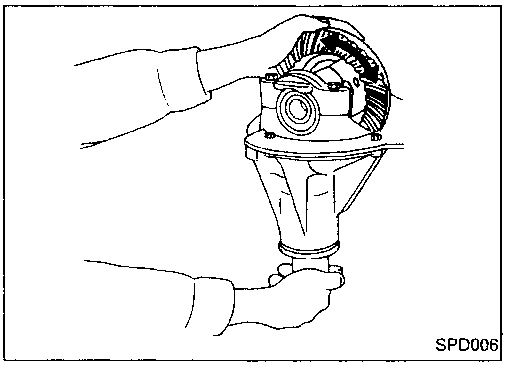
14. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.

Tooth Contact

Checking of gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life, or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

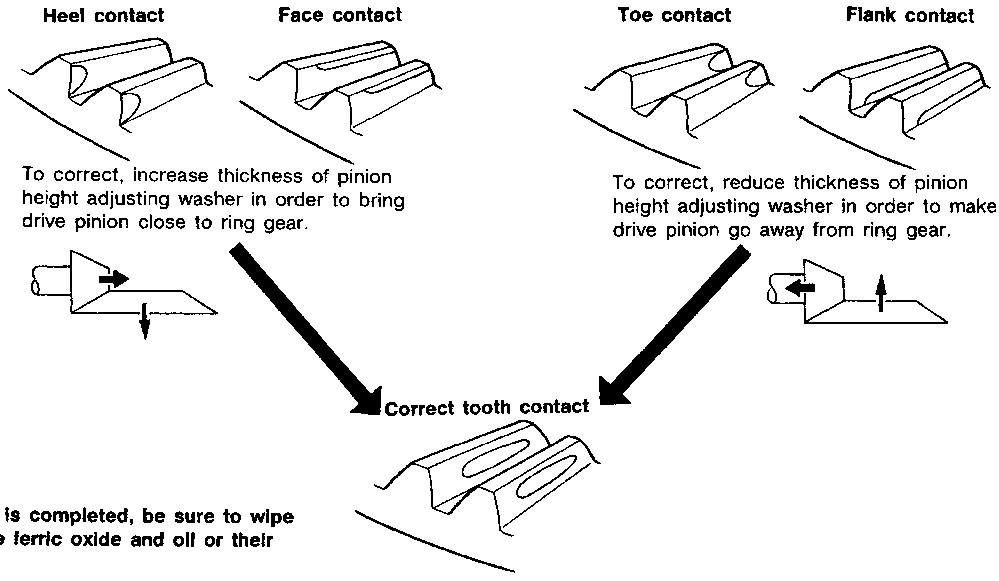

SPD005

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.


SPD006

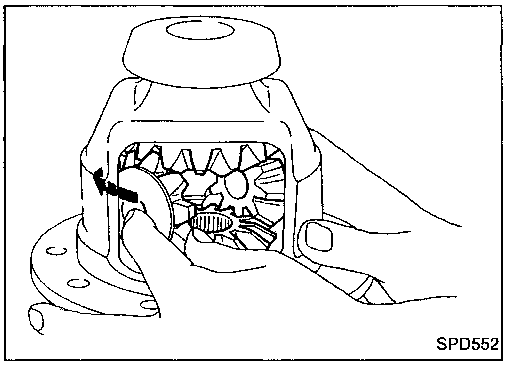
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
The tooth pattern is the best indication of how well a differential has been set up.



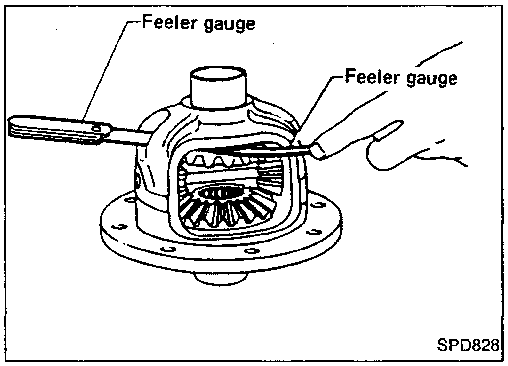
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007


SPD552

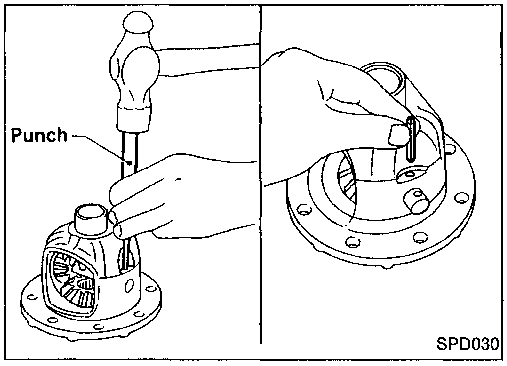
Differential Case

1. Install side gears, pinion mate gears and thrust washers into differential case.



SPD828

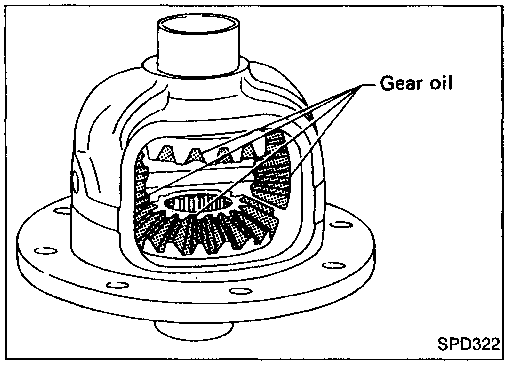
2. Fit pinion mate shaft to differential case so that it meets lock pin holes.
3. Adjust backlash between side gear and pinion mate gear by selecting side gear thrust washer. Refer to SDS (PD-101).
   Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case):
   0.10 - 0.20 mm (0.0039 - 0.0079 in)



SPD030

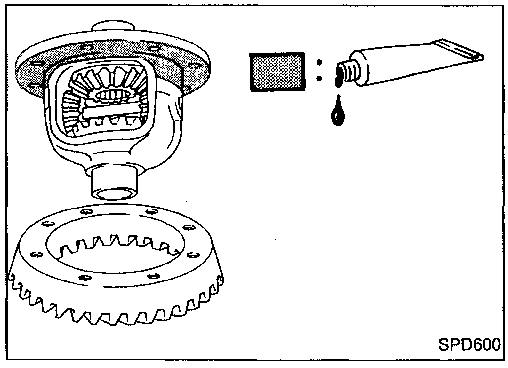
4. Install pinion mate shaft lock pin with a punch.

Make sure lock pin is flush with case.



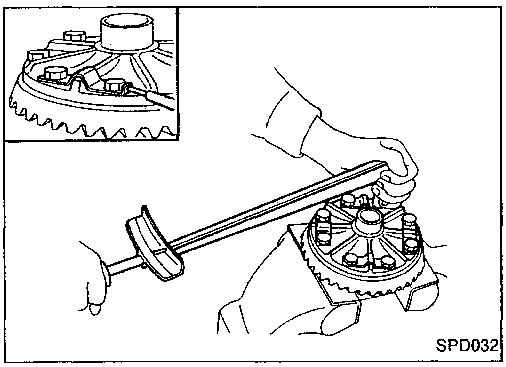
SPD322

5. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.

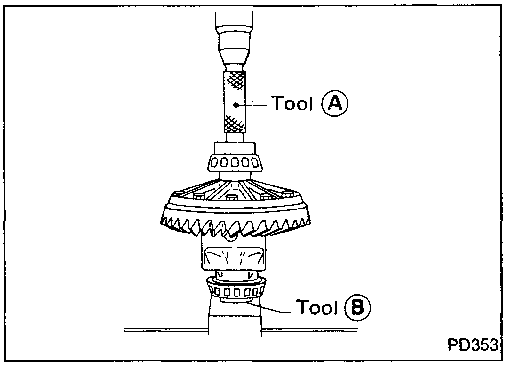

SPD600

6. Apply locking agent [Locktite (stud lock) or equivalent] to contacting surfaces of ring gear and differential case, then place differential case on ring gear.

Differential Case (Cont'd)

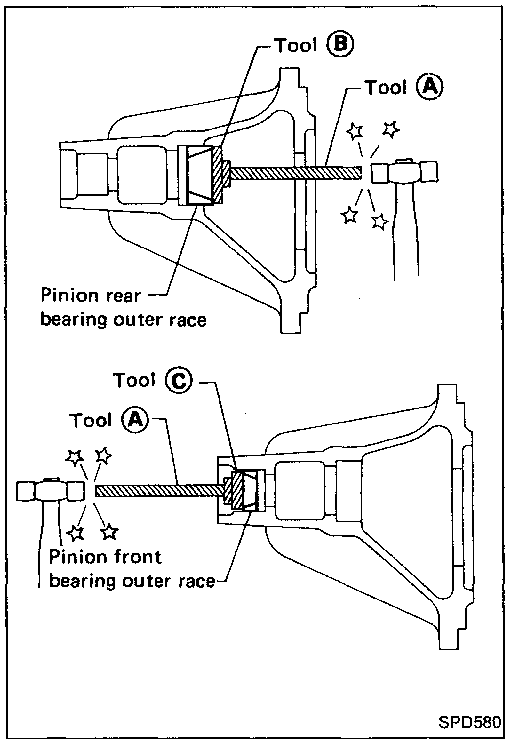


7. Apply a small amount of locking agent (described on previous page) to ring gear bolts.
8. Install new lock straps and ring gear bolts.
   - **Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.**
   - **Then bend up lock straps to lock the bolts in place.**

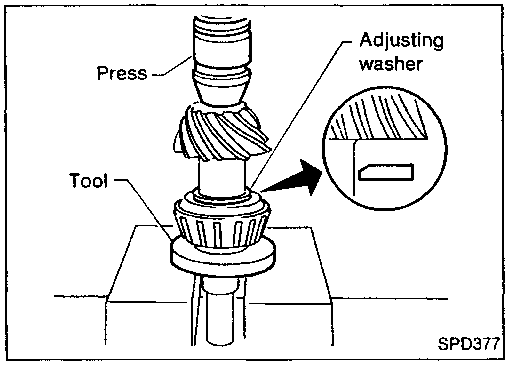


9. Select side bearing adjusting shims.
   Refer to ADJUSTMENT (PD-62).
10. Install the shims behind each bearing and press on side bearing inner cones with Tool.
    Tool number:
    Ⓐ ST33230000 (J25805-01)
    Ⓑ ST33061000 (J8107-2)

Differential Carrier

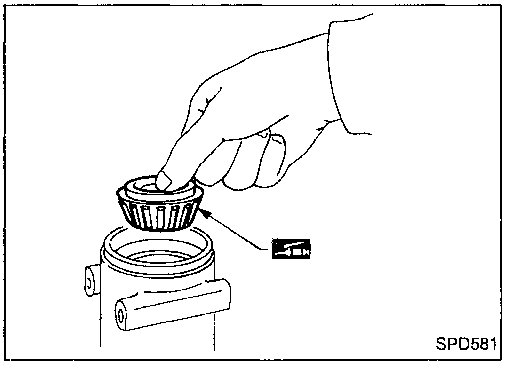


1. Press fit front and rear bearing outer races with Tools.
   Tool number:
   Ⓐ ST30611000 (J25742-1)
   Ⓑ ST30621000 (—)
   Ⓒ ST30613000 (J25742-3)

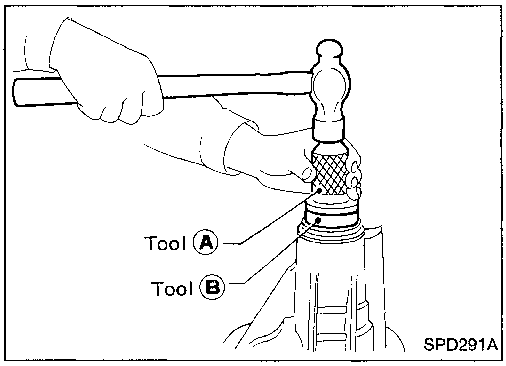


2. Select pinion height adjusting washer. Refer to ADJUSTMENT (PD-63).
3. Install pinion height adjusting washer in drive pinion, and press fit rear bearing inner cone in it with press and Tool.
   Tool number: ST30901000 (—)
   Equivalent tool (J26010-01)

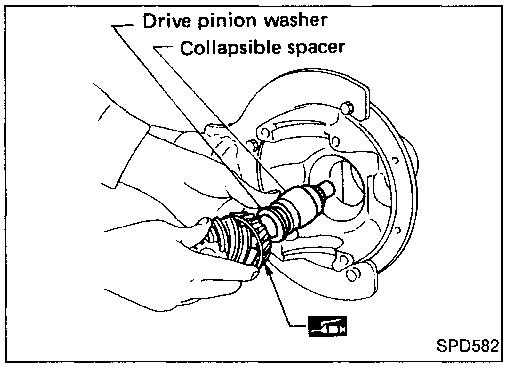
Differential Carrier (Cont'd)



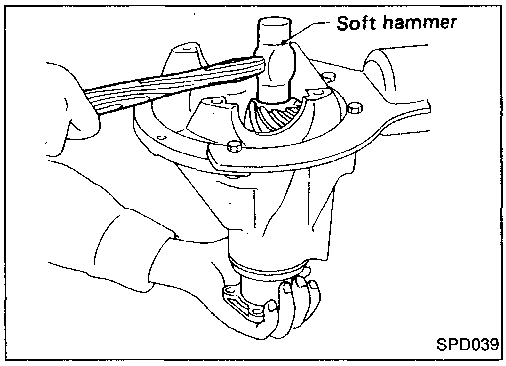
4. Place pinion front bearing inner cone in gear carrier.



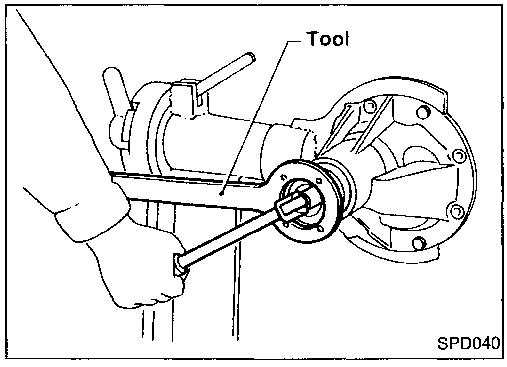
5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.
   Tool number:
   (A) ST30720000 (—)
   Equivalent tool (J25405)
   (B) KV38102510 (—)



6. Install drive pinion washer, collapsible spacer and drive pinion in gear carrier.

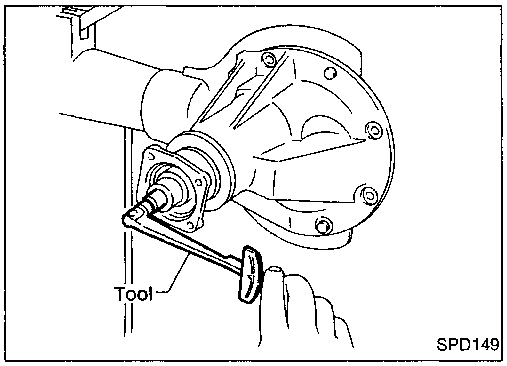


7. Install companion flange and hold it firmly.
   Insert pinion into companion flange by tapping its head with a soft hammer.



8. Temporarily tighten pinion nut until there is no axial play.
   The threaded portion of drive pinion and pinion nut should be free from oil or grease.
   Tool number: ST38060002 (J34311)

Differential Carrier (Cont'd)

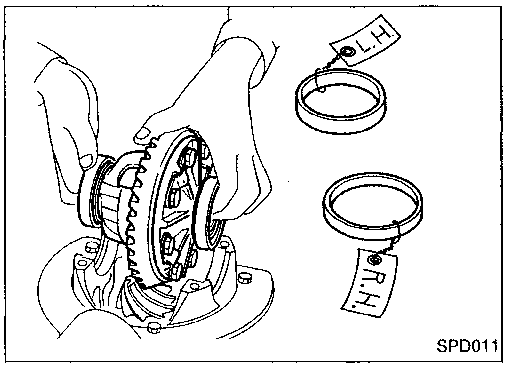


9. Tighten pinion nut by degrees to the specified preload while checking the preload with Tools.

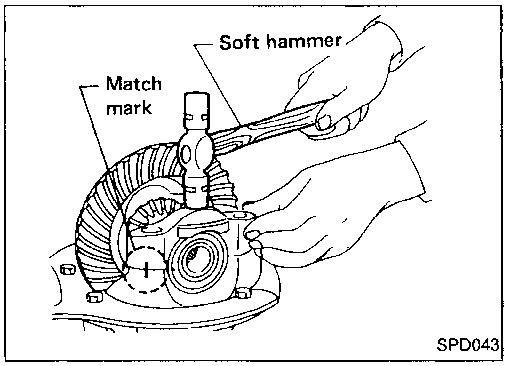
When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.

Pinion bearing preload:
1.1 - 1.6 N·m (11 - 16 kg-cm, 9.5 - 13.9 in-lb)
Tool number: ST3127S000 (J25765-A)

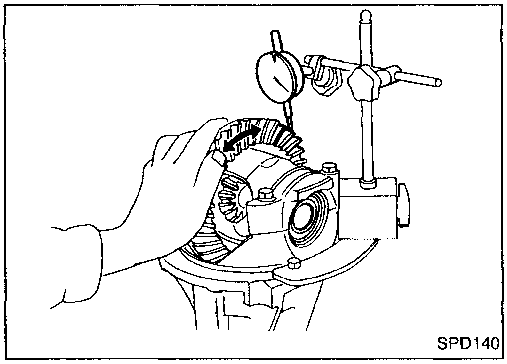
CAUTION:
The preload is achieved by using the permanent set of collapsible spacer. So here, if an overpreload results from excessive turning of the pinion nut, the spacer should be replaced by new one.



10. Install differential case assembly with side bearing outer races into gear carrier.



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

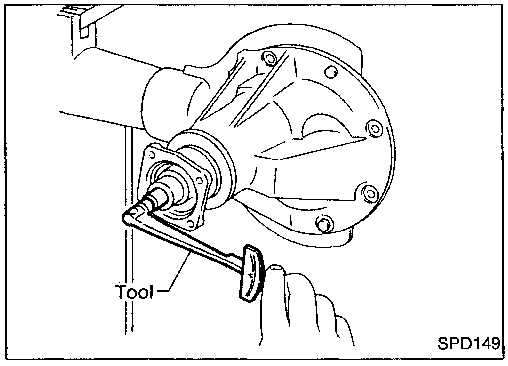


12. Measure ring gear to drive pinion backlash with a dial indicator.

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

- If backlash is too small, decrease thickness of left shim and increase thickness of right 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.

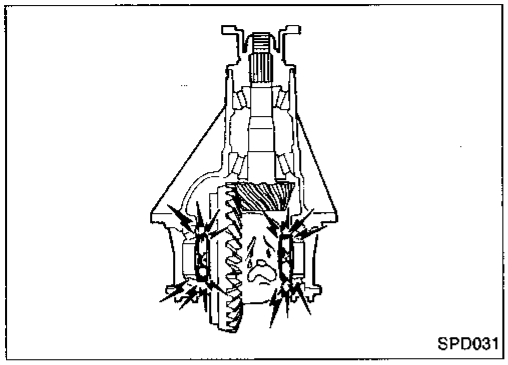


13. Check total preload with Tool.

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

Tool number: ST3127S000 (J25765-A)
Total preload:
1.2 - 2.2 N·m (12 - 22 kg-cm, 10 - 19 in-lb)

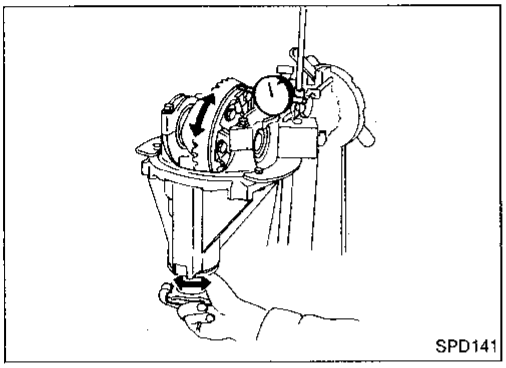
Differential Carrier (Cont'd)


SPD031

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

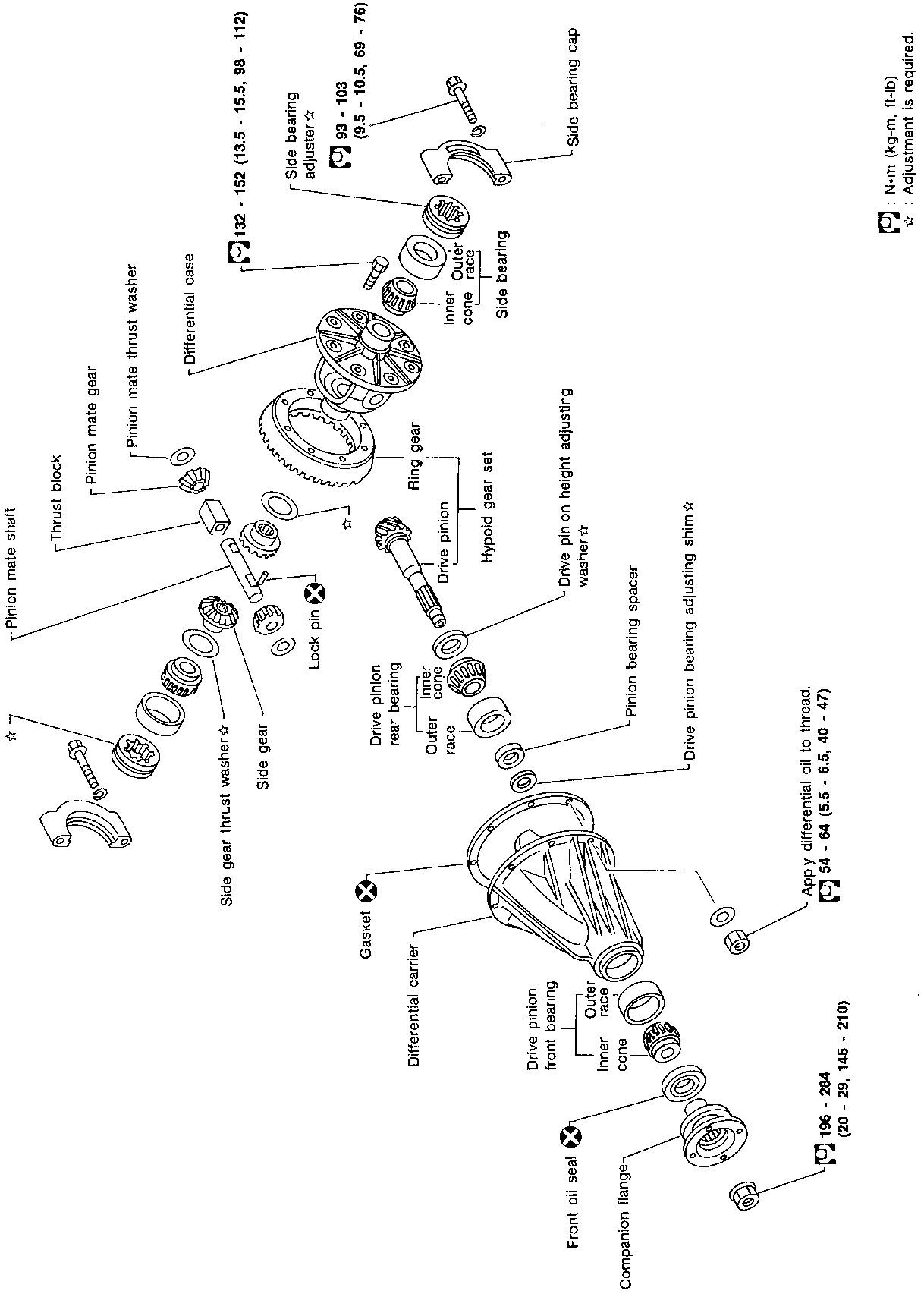
14. Recheck ring gear-to-drive pinion backlash because an increase or decrease in thickness of shims will cause change of ring gear-to-pinion backlash.


SPD141

15. 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.

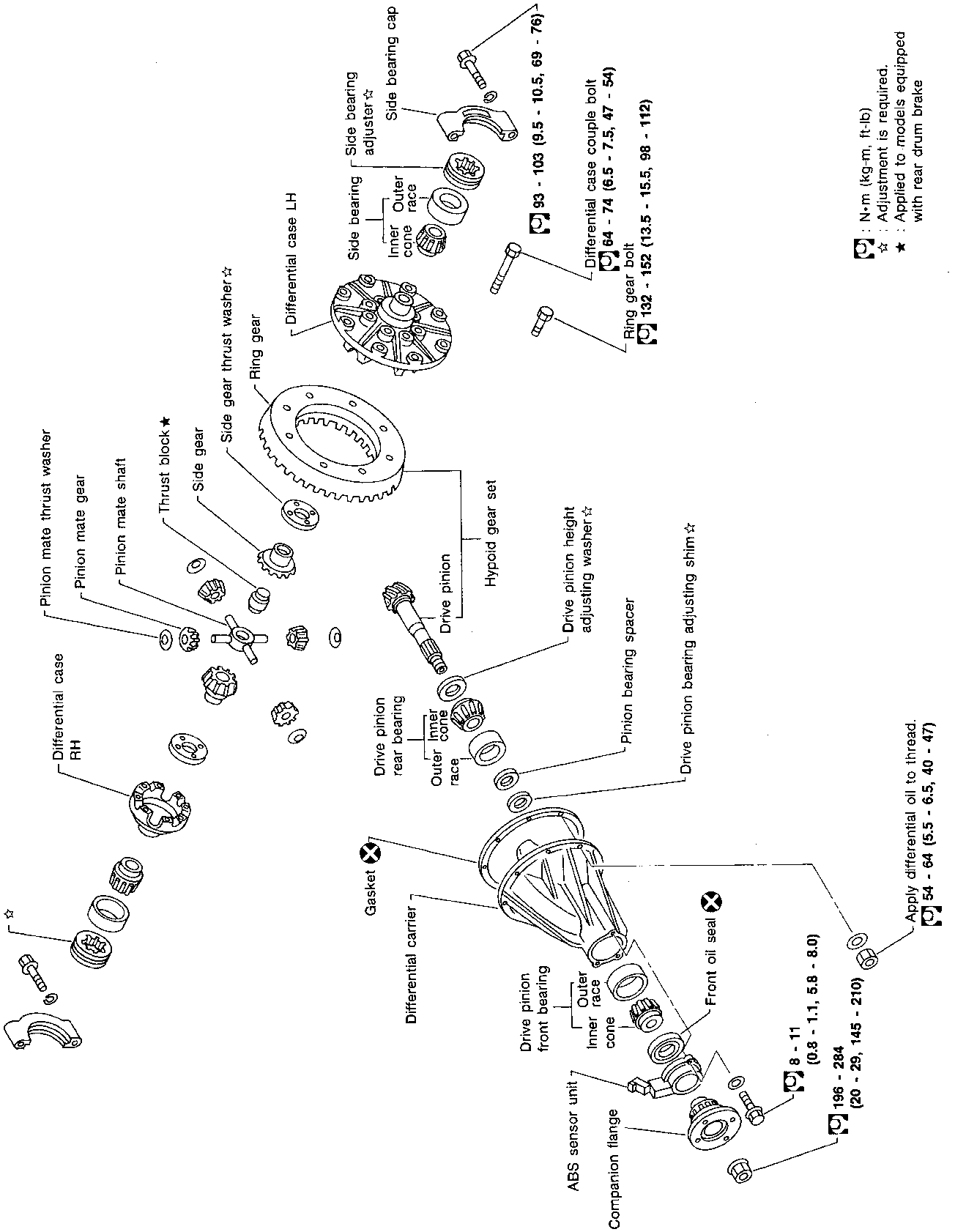
16. Check tooth contact.
    Refer to ADJUSTMENT (PD-67).

2-pinion type

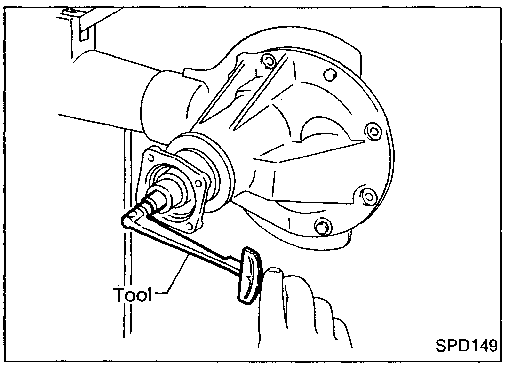


SPD289A

4-pinion type



SPD290A



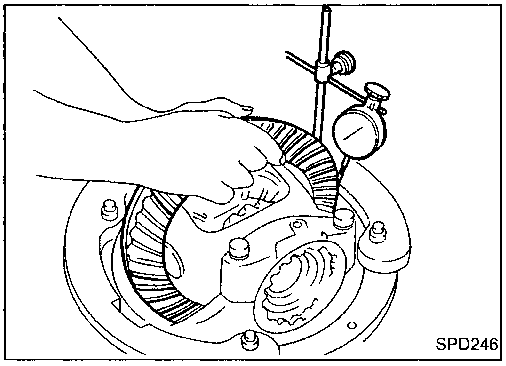
Pre-inspection

Before disassembling final drive, perform the following inspection.

- Total preload

1) Turn drive pinion in both directions several times to seat bearing rollers correctly.
2) Check total preload with Tool.

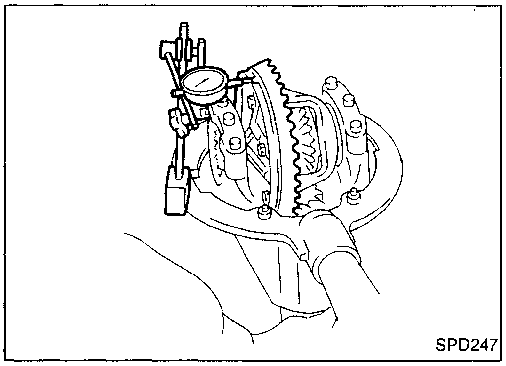
Total preload:
1.7 - 2.5 N·m
(17 - 25 kg-cm, 15 - 22 in-lb)
Tool number: ST3127S000 (J25765-A)



- Ring gear to drive pinion backlash

Check backlash of ring gear with a dial indicator at several points.

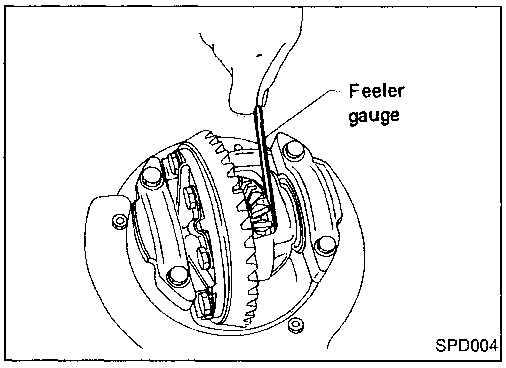
Ring gear-to-drive pinion backlash:
0.15 - 0.20 mm (0.0059 - 0.0079 in)



- Ring gear runout

Check runout of ring gear with a dial indicator.

Runout limit:
0.08 mm (0.0031 in)



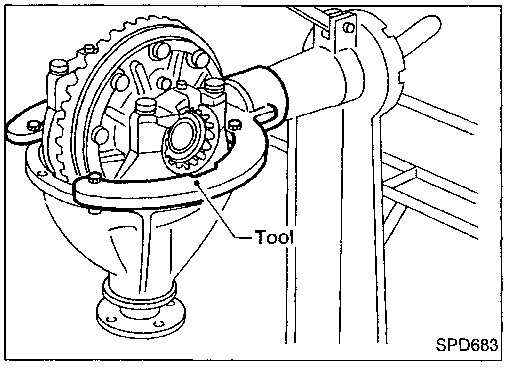
- Tooth contact

Check tooth contact, referring to ADJUSTMENT (PD-90).

- 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:
0.10 - 0.20 mm (0.0039 - 0.0079 in)

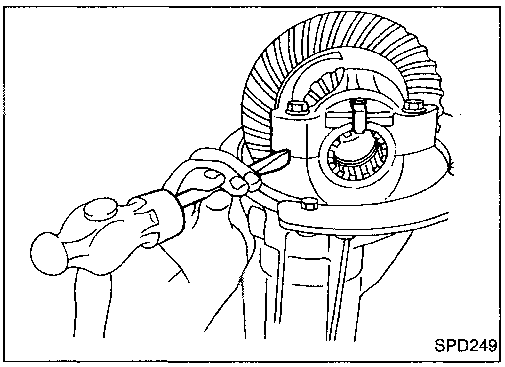


Differential Carrier

1. Mount final drive assembly on Tool.

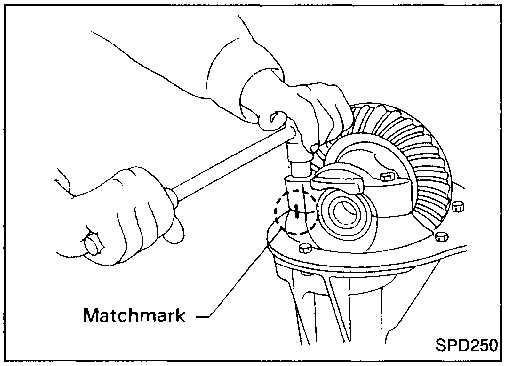
Tool number: ST06340000 (—)
Equivalent tool (J25602-3), (J34310)

Differential Carrier (Cont'd)


SPD249

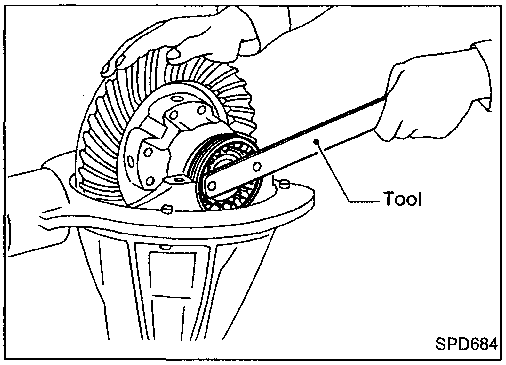
2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

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



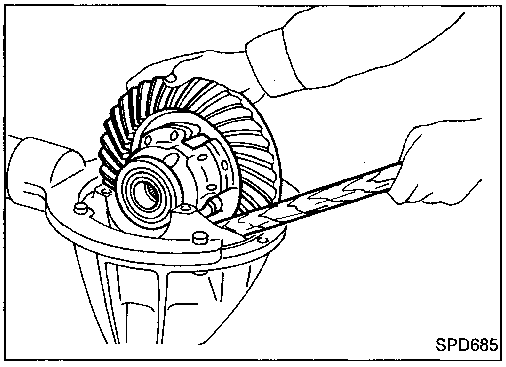
SPD250

3. Remove side lock fingers and side bearing caps.

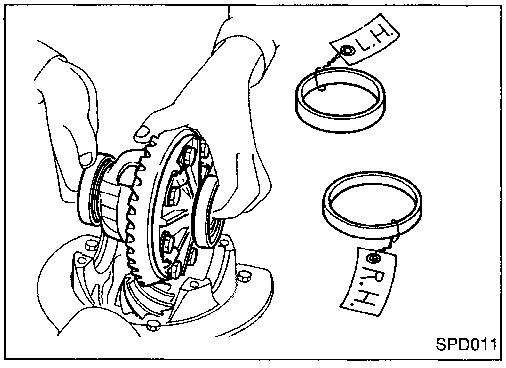


SPD684

4. Remove side bearing adjuster with Tool.
   Tool number: ST32580000 (J34312)


SPD685

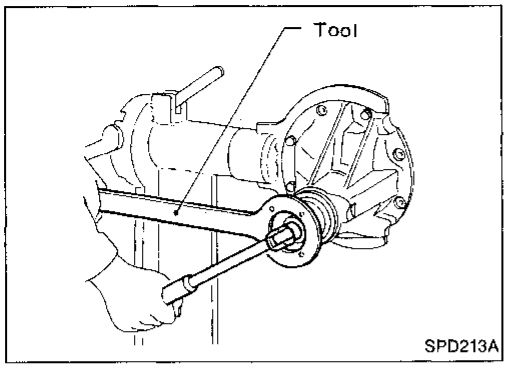
5. Remove differential case assembly with a pry bar.



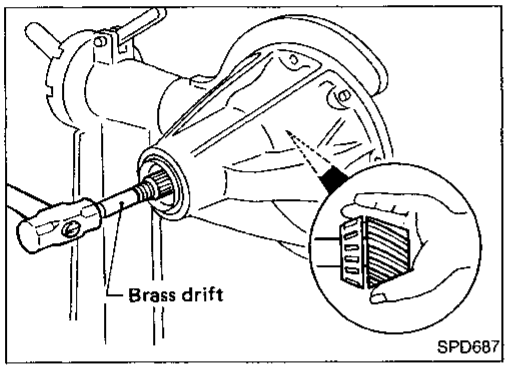
SPD011

Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.

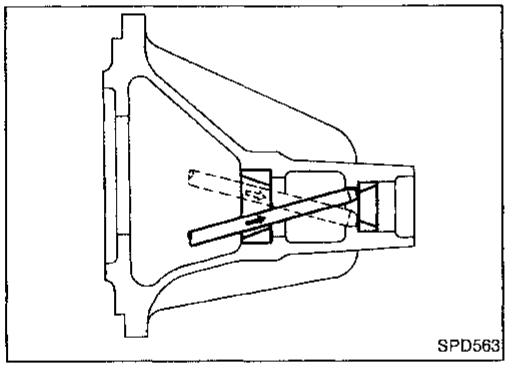
Differential Carrier (Cont'd)



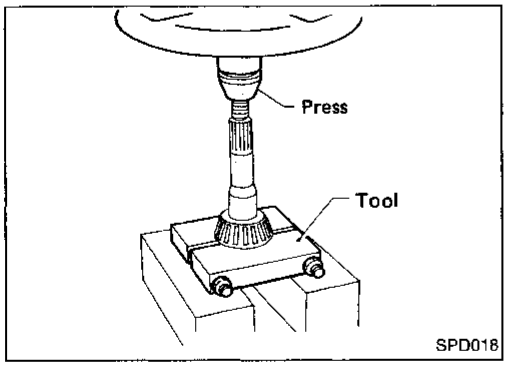
6. Remove drive pinion nut with Tool.
   Tool number: KV38104700 (J34311)
7. Remove companion flange with puller.
8. Remove ABS sensor. (Models with ABS)



9. Take out drive pinion together with pinion rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting shim.

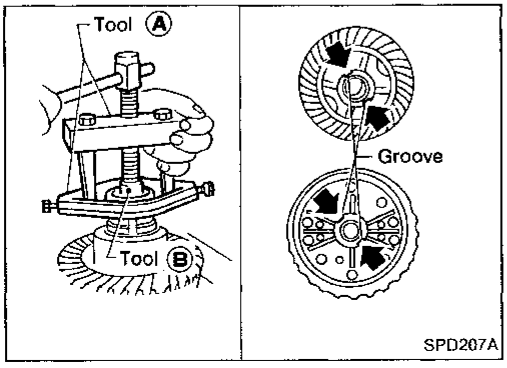


10. Remove front oil seal and pinion front bearing inner cone.
11. Remove pinion bearing outer races with a brass drift.



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

Differential Case



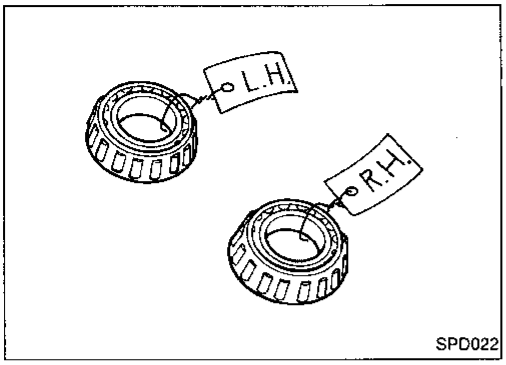
1. Remove side bearing inner cones.

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

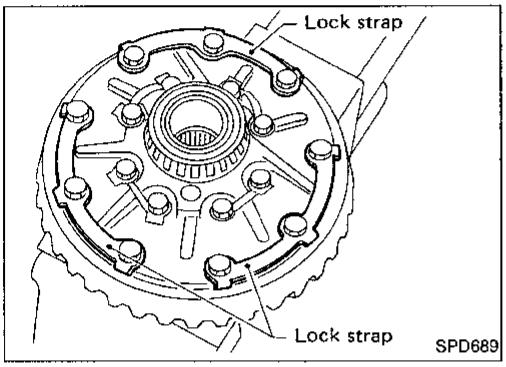
Tool number:

Ⓐ ST33051001 (—)
Equivalent tool (J22888)
Ⓑ ST33061000 (J8107-2)

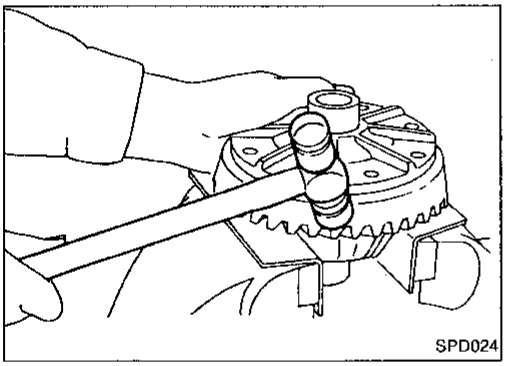
Differential Case (Cont'd)



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

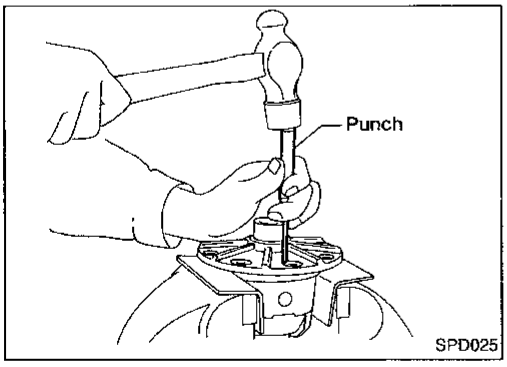


2. Spread out lock straps and loosen ring gear bolts in a criss-cross fashion.



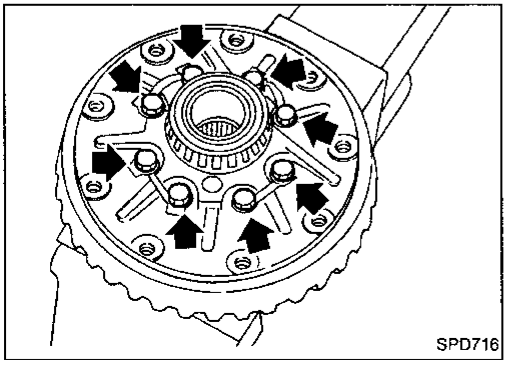
3. Tap ring gear off differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.



4. Drive out pinion mate shaft lock pin, with punch from ring gear side (2-pinion type differential case).

Lock pin is calked at pin hole mouth on differential case.

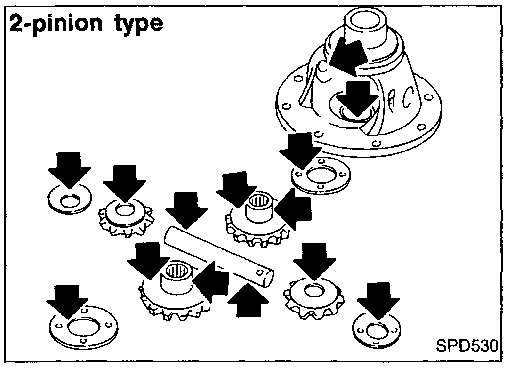


5. Separate differential case LH and RH (4-pinion type differential case).

Put match marks on both differential case LH and RH sides prior to separating them.

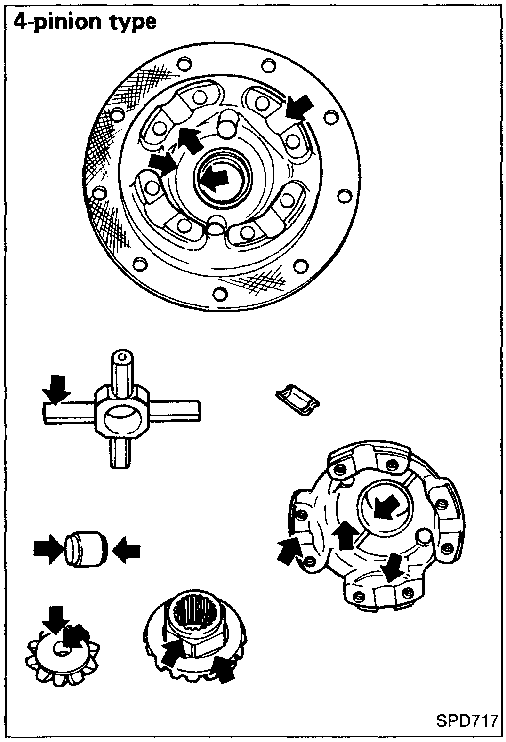
Ring Gear and Drive Pinion

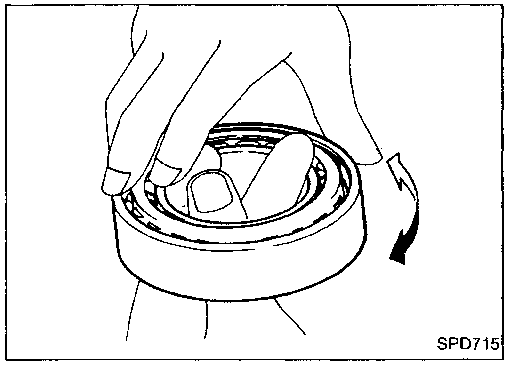
Check gear teeth for scoring, cracking or chipping.
If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).



Differential Case Assembly

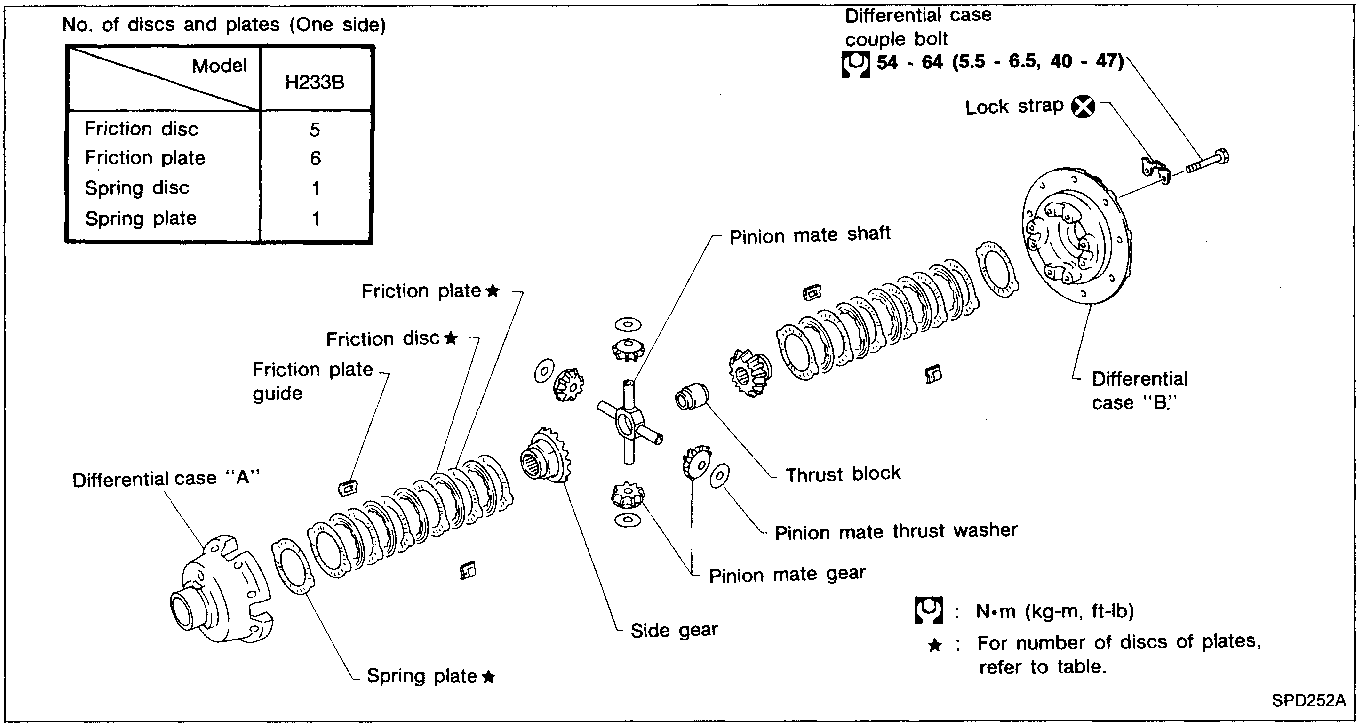
Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, and thrust washers.

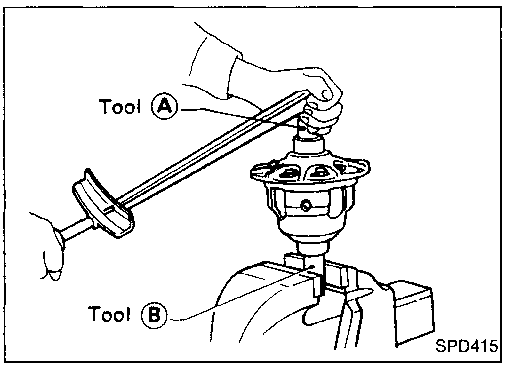




Bearing

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.





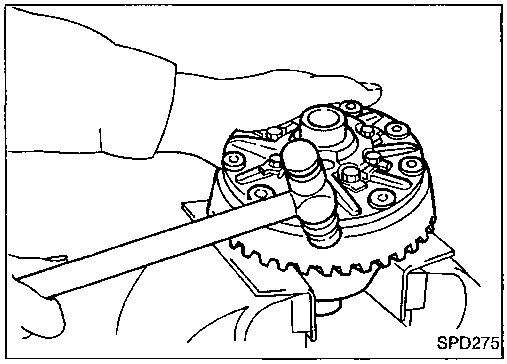
CAUTION:
Do not run engine when one wheel (rear) is off the ground.

Preparation for Disassembly

CHECKING DIFFERENTIAL TORQUE

Measure differential torque with Tool.
If it is not within the specifications, inspect components of limited slip differential.

Differential torque:
353 - 392 N·m
(36 - 40 kg-m, 260 - 289 ft-lb)
Tool number:
Ⓐ KV38105210 (—)
Ⓑ KV38105220 (—)

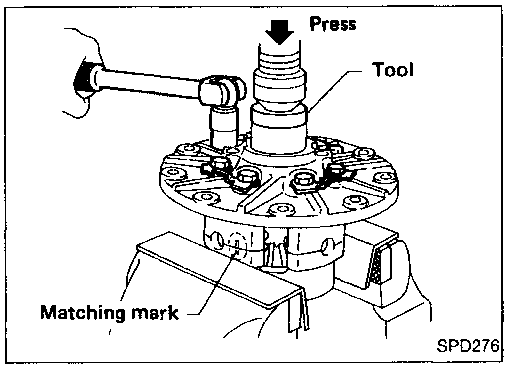


Disassembly

1. Remove side bearing inner cone with Tool.
2. Remove ring gear by spreading out lock straps.
3. Loosen ring gear bolts in a criss-cross fashion.
4. Tap ring gear off gear case with a soft hammer.

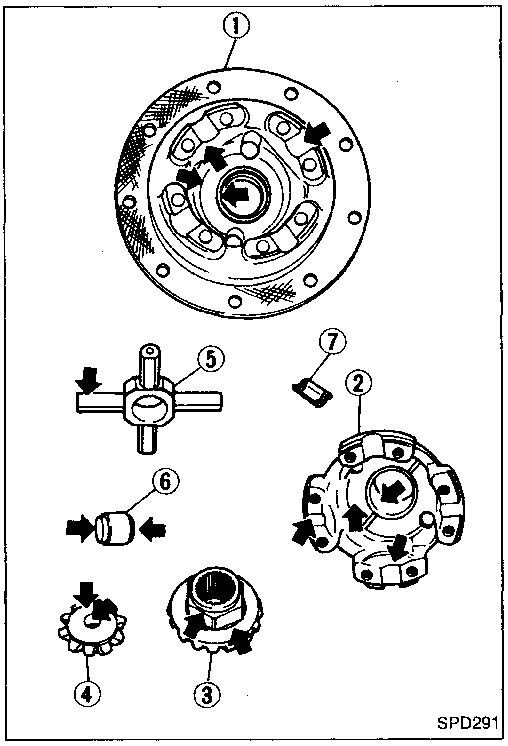
Tap evenly all around to keep ring gear from binding.

Disassembly (Cont'd)



5. Remove differential case by spreading out lock straps.
6. Remove couple bolts on differential cases A and B with a press.
   Tool number: ST33081000 (—)
7. Separate differential case A and B.
   Draw out component parts (discs and plates, etc.).

Put marks on gears and pressure rings so that they can be reinstalled in their original positions from which they were removed.



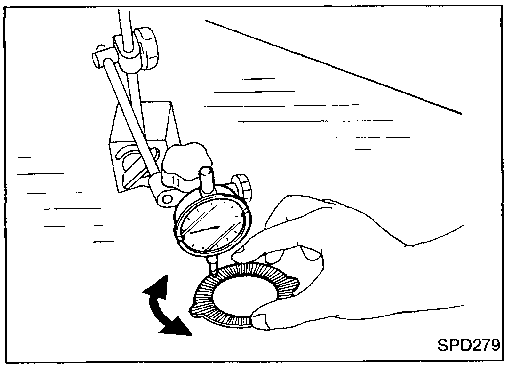
Inspection

CONTACT SURFACES

1. Clean the disassembled parts in suitable solvent and blow dry with compressed air.
2. If following surfaces are found with burrs or scratches, smooth with oil stone.
   - ① Differential case A
   - ② Differential case B
   - ③ Side gear
   - ④ Pinion mate gear
   - ⑤ Pinion mate shaft
   - ⑥ Thrust block
   - ⑦ Friction plate guide

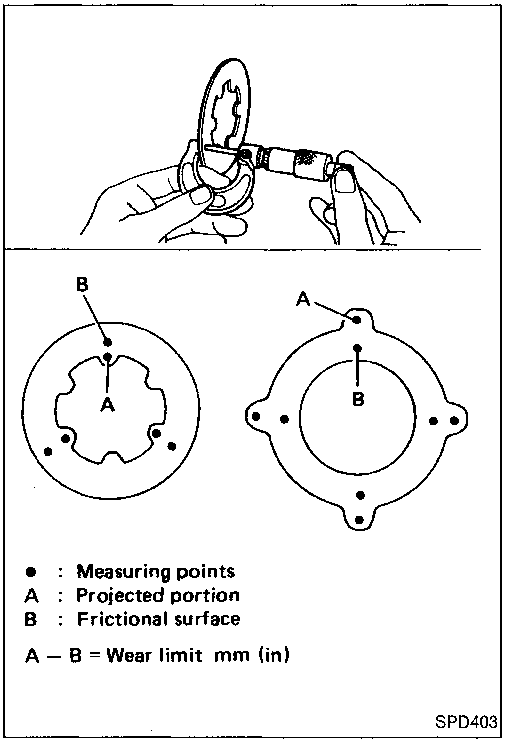
DISC AND PLATE

1. Clean the discs and plates in suitable solvent and blow dry with compressed air.
2. Inspect discs and plates for wear, nicks and burrs.



3. To test if friction disc or plate is not distorted, place it on a surface plate and rotate it by hand with indicating finger of dial gauge resting against disc or plate surface.
   Allowable warpage:
   0.05 - 0.15 mm (0.0020 - 0.0059 in)
   If it exceeds limits, replace with a new plate to eliminate possibility of clutch slippage or sticking.

Inspection (Cont'd)

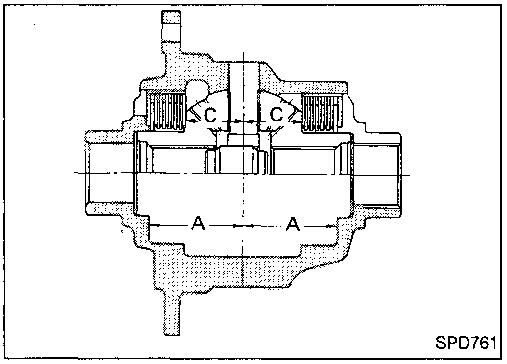


4. Measure frictional surfaces and projected portions of friction disc, friction plate, spring plate, and determine each part's differences to see if the specified wear limit has been exceeded.
5. Measure frictional surfaces and projected portions of friction disc, friction plate; spring plate and spring disc (H233B only).

If any part has worn beyond the wear limit, replace it with a new one that is the same thickness as the projected portion.

Wear limit:

0.1 mm (0.004 in) or less



Adjustment

FRICTION DISC AND FRICTION PLATE END PLAY

End play of friction disc and friction plate can be calculated by using following equation and should be adjusted within following range.

Adjustment can be made by selecting friction disc having two different thicknesses.

End play E:

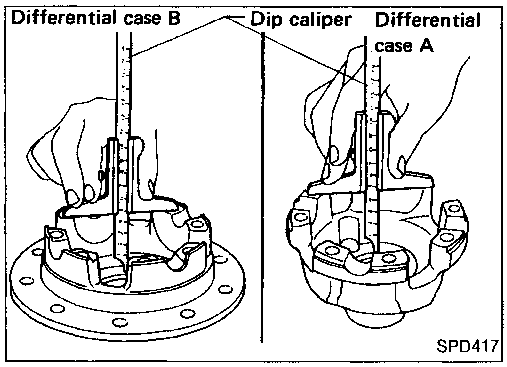
0.05 - 0.15 mm (0.0020 - 0.0059 in)

E = A – (B + C)

A: Length of differential case contact surface to differential case inner bottom.

B: Total thickness of friction discs, friction plates, spring disc and spring plate in differential case on one side.

C: Length of differential case contact surface to back side of side gear.

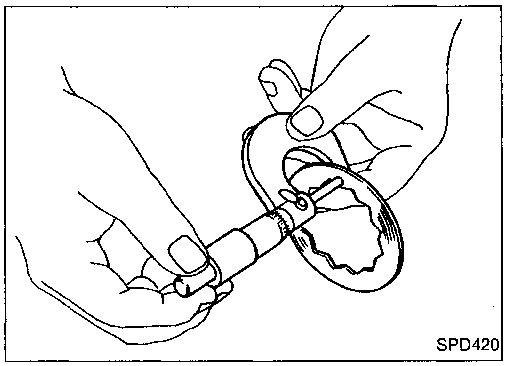


1. Measure values of "A".

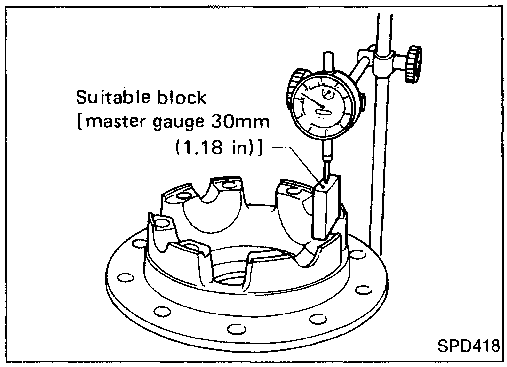
Standard length A:

49.50 - 49.55 mm (1.9488 - 1.9508 in)

Adjustment (Cont'd)


SPD420

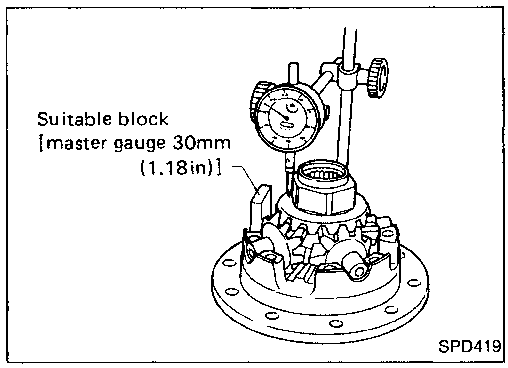
2. Measure thickness of each disc and plate.
   Total thickness "B":
   19.24 - 20.26 mm (0.7575 - 0.7976 in)



SPD418

3. Measure values of "C".
(1) Attach a dial indicator to the base plate.
(2) Place differential case B on the base plate, and install a master gauge on case B.

Then adjust the dial indicator scale to zero with its tip on the master gauge.



SPD419

(3) Install pinion mate gears, side gears and pinion mate shaft in differential case B.
(4) Set dial indicator's tip on the side gear, and read the indication.

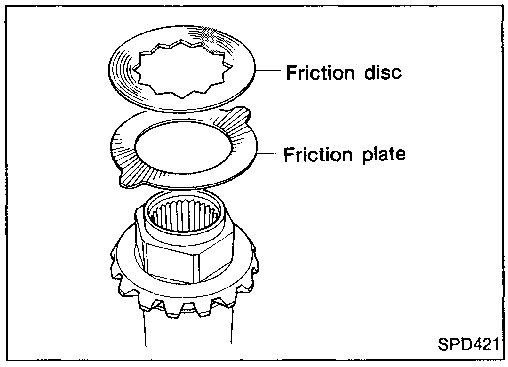
Example:

E = A – D = A – (B + C) = 0.05 to 0.15 mm
A = 49.52 mm
B = 19.45 mm
C = 29.7 mm
D = B + C

B ... 19.45	A ... 49.52
+C ... 29.7	–D ... 49.15
49.15	0.37

E = A – D

From the above equation, end play of 0.37 mm exceeds the specified range of 0.05 to 0.15 mm.
Select suitable discs and plates to adjust correctly.



SPD421

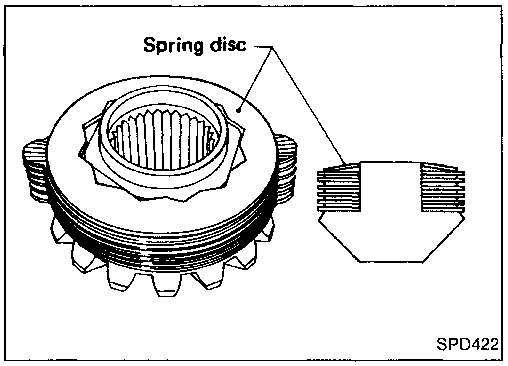
Assembly

Prior to assembling discs and plates, properly lubricate them by dipping them in limited slip differential oil.

1. Alternately position specified number of friction plates and friction discs on rear of side gear.

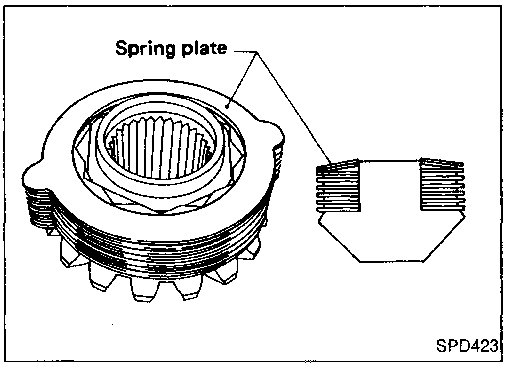
Always position a friction plate first on rear of side gear.

Assembly (Cont'd)

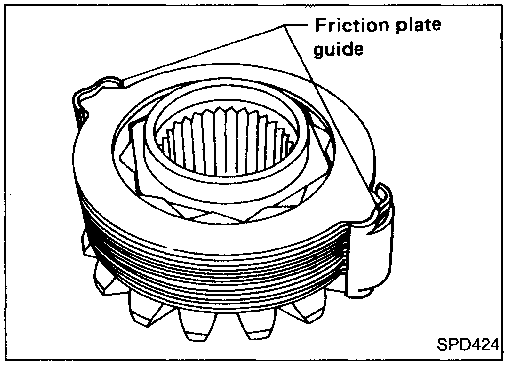


2. Install spring disc.

Align the twelve angular holes in spring disc with the hexagonal area of the side gear.

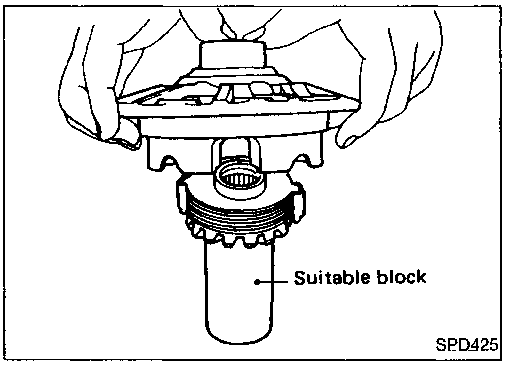


3. Install spring plate.



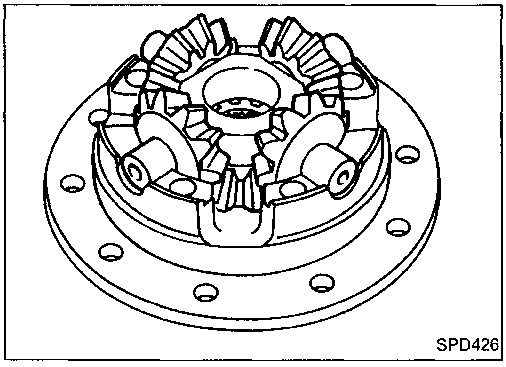
4. Install friction plate guides.

Correctly align the raised portions of friction plates, and apply grease to inner surfaces of friction plate guides to prevent them from falling.



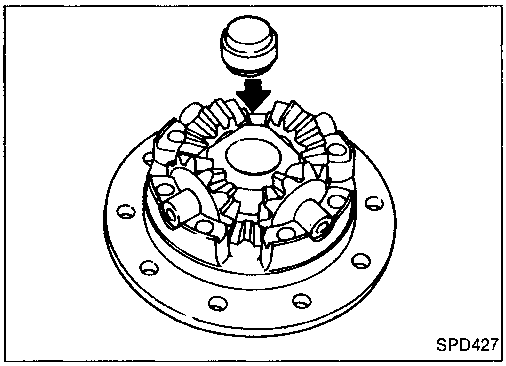
5. Install differential case B over side gear, discs, plates and friction plate guide assembly.

- **Install differential case B while supporting friction plate guides with your middle finger inserted through oil hole in differential case.**
- **Be careful not to detach spring disc from the hexagonal part of the side gear.**

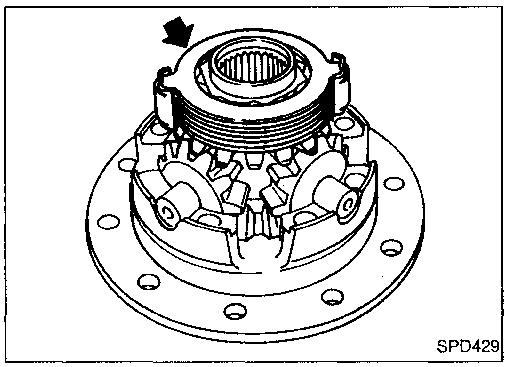


6. Install pinion mate gears and pinion shaft to differential case B.

Assembly (Cont'd)

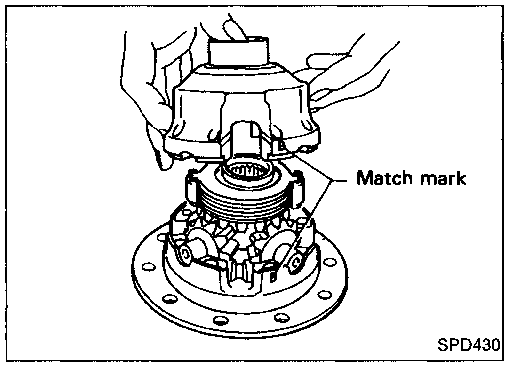

SPD427

7. Install thrust block.


SPD429

8. Install side gear to pinion mate gears.
9. Install each disc and plate.

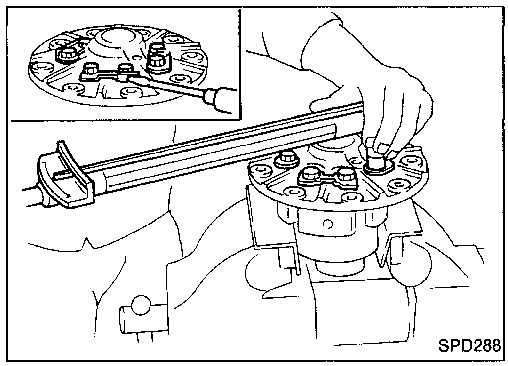
Use same procedures as outlined in steps 1. through 4. above.



SPD430

10. Install differential case A.

Position differential cases A and B by correctly aligning marks stamped on cases.


SPD288

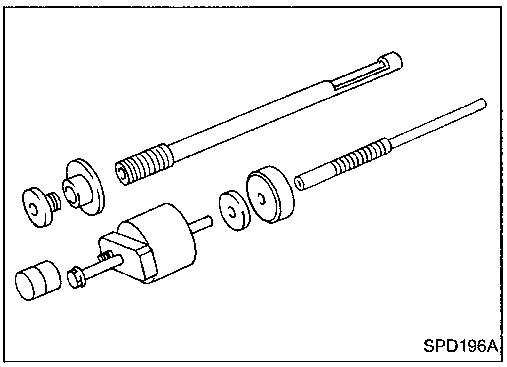
11. Tighten differential case bolts.
12. Place ring gear on differential case and install new lock straps and bolts.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.
Then bend up lock straps to lock the bolts in place.

13. Install side bearing inner cone.
14. Check differential torque.

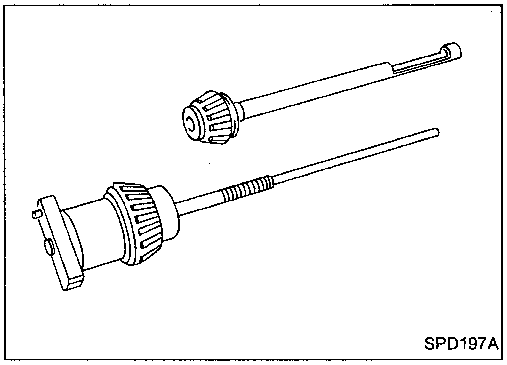
For quiet and reliable final drive operation, the following five adjustments must be made correctly:

1. Side Bearing Preload.
2. Pinion Gear Height.
3. Side Bearing Preload.
4. Ring Gear to pinion Backlash. Refer to ASSEMBLY (PD-95).
5. Ring and Pinion Gear Tooth Contact Pattern.

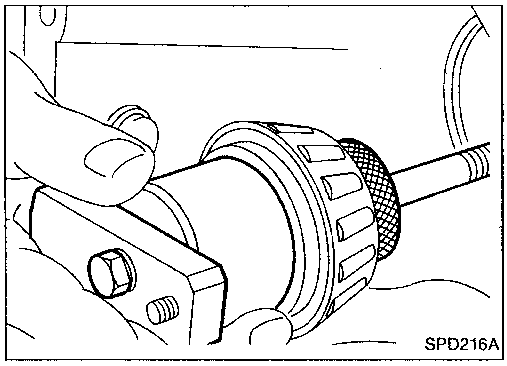

SPD196A

Pinion Bearing Preload and Pinion Gear Height

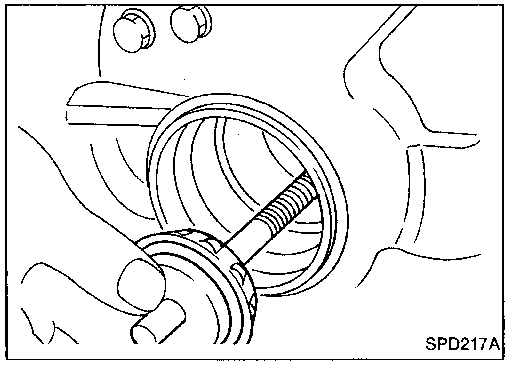
1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion pre-load shim selector tool, J34309.


SPD197A

- **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.
- **Front Pinion Bearing** — make sure he 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.

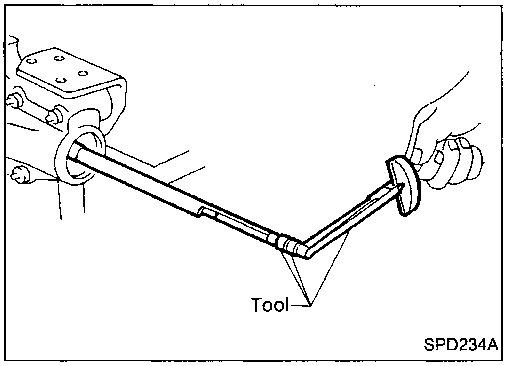

SPD216A

3. Place the pinion preload shim selector tool gauge screw assembly, J34309-1, with the pinion rear bearing inner cone installed, into the final drive housing.

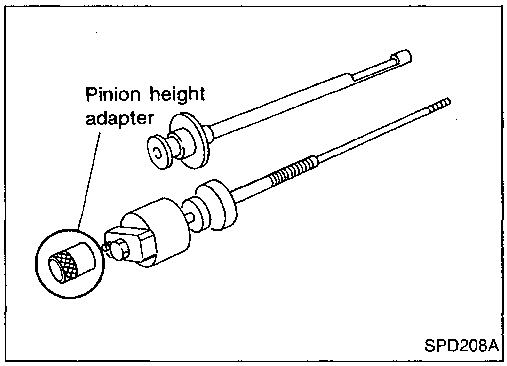

SPD217A

4. Install the J34309-2 gauge anvil with the front pinion bearing into the final drive housing and assemble it to the J34309-1 gauge screw. Make sure that the J34309-16 gauge plate will turn a full 360 degrees, and tighten the two sections by hand to set bearing pre-load.
5. Turn the assembly several times to seat the bearings.

Pinion Bearing Preload and Pinion Gear Height (Cont'd)



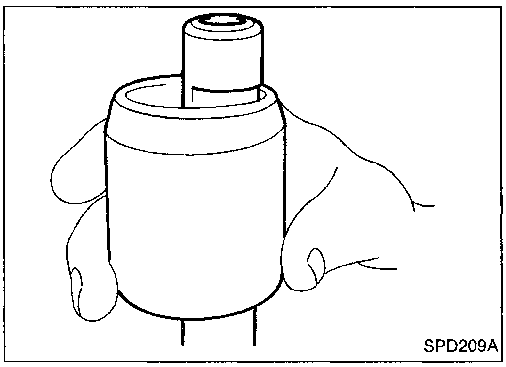
6. Measure the turning torque at the end of the J34309-2 gauge anvil using torque wrench J25765A.
   Turning torque specification:
   0.4 - 0.9 N·m (4 - 9 kg-cm, 3.5 - 7.8 in-lb)



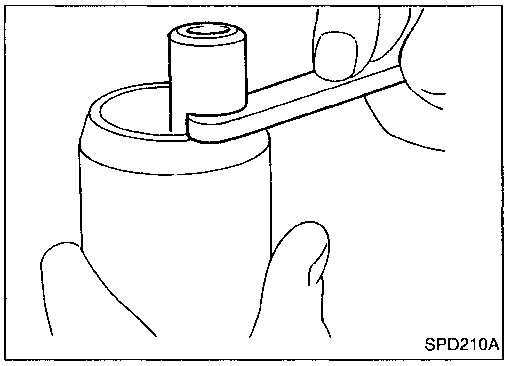
7. Place the J34309-12 "H233B" pinion height adapter onto the gauge plate and tighten it by hand.

CAUTION:
Make sure all machined surfaces are clean.

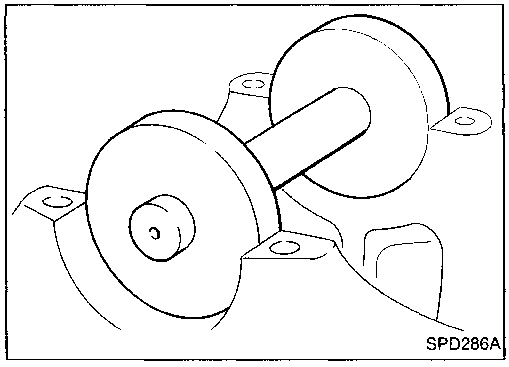
PINION BEARING PRELOAD WASHER SELECTION



8. Place the solid pinion bearing adjusting spacer squarely into the recessed portion of the J34309-2 gauge anvil. Rest its end on the J34309-1 gauge screw.



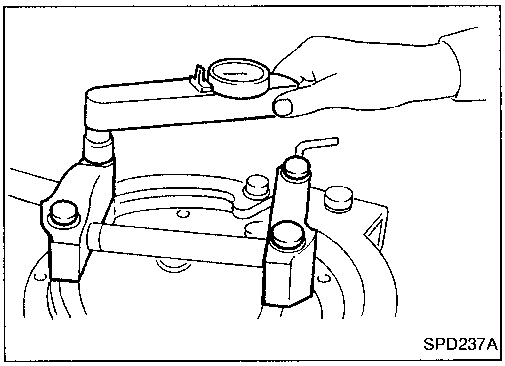
9. Select the correct thickness of pinion bearing preload adjusting washer using your J34309-101 feeler gauge. The exact measurement you get with your feeler gauge is the thickness of the adjusting shim required. Select the correct shim.
   Drive pinion bearing preload adjusting shim:
   Refer to SDS (PD-103).
10. Set correct pinion bearing preload adjusting shim aside for use when assembling the pinion and bearings into the final drive housing.



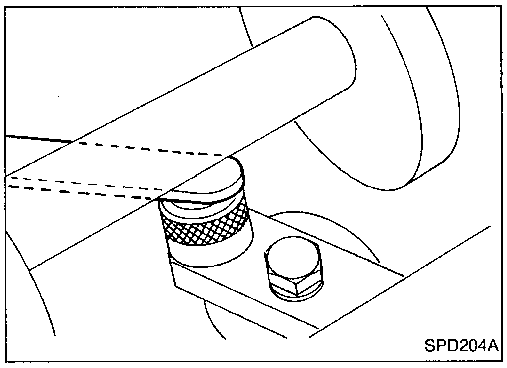
PINION HEIGHT ADJUSTING WASHER SELECTION

11. Position the J25269-18 side bearing discs and the arbor into the side bearing bores.

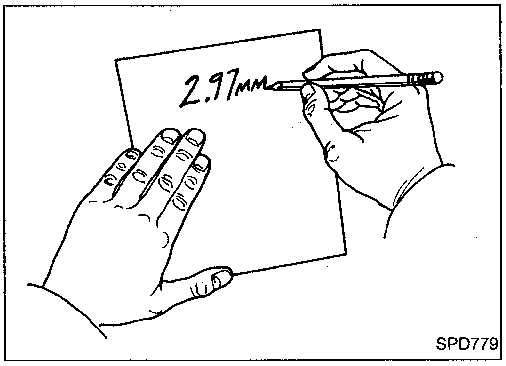
Pinion Bearing Preload and Pinion Gear Height (Cont'd)


SPD237A

12. Install the bearing caps and torque the bolts.
    Specification:
    93 - 103 N·m (9.5 - 10.5 kg-m, 69 - 76 ft-lb)

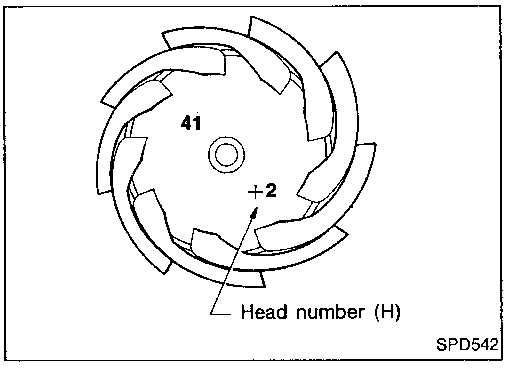

SPD204A

13. Select the correct standard pinion height adjusting washer thickness using a standard gauge of 2.5, 3.0, or 3.5 mm (0.098, 0.118, or 0.138 in) and your J34309-101 feeler gauge. Measure the distance between the J34309-12 "H233B" pinion height adapter and the arbor.



SPD779

14. Write down your exact total measurement.



SPD542

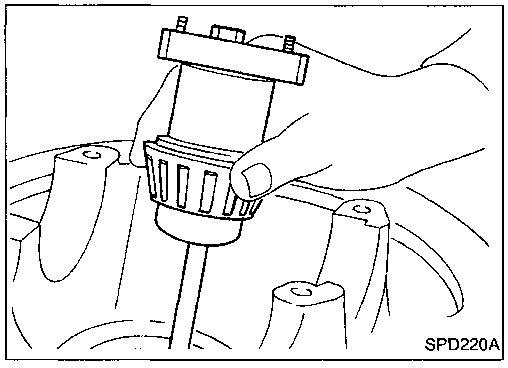
15. Correct the pinion height washer size by referring to the "pinion head height number".

Note: There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number," and it refers to the ideal pinion height from standard for the quietest operation. Use the following chart to determine the correct pinion height washer.

Pinion Bearing Preload and Pinion Gear Height (Cont'd)

Pinion Head Height Number	Add or Remove from the Selected 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)

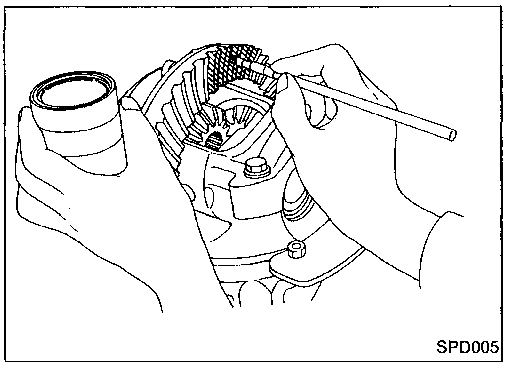
16. Select the correct pinion height washer.
    Drive pinion height adjusting washer:
    Refer to SDS (PD-102).



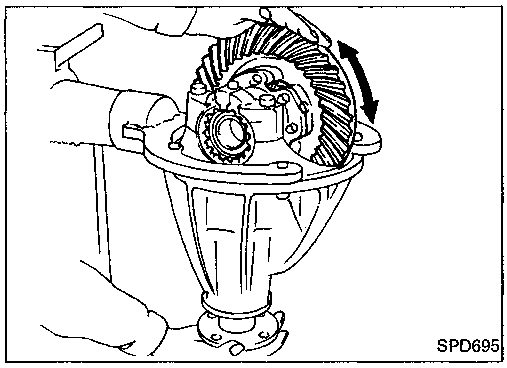
17. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.

Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

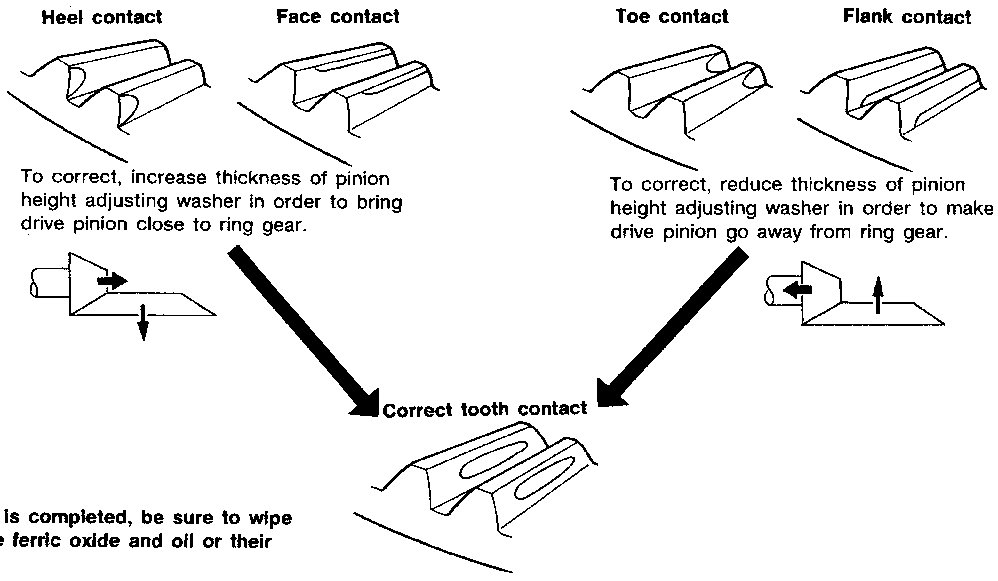

SPD005

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.


SPD695

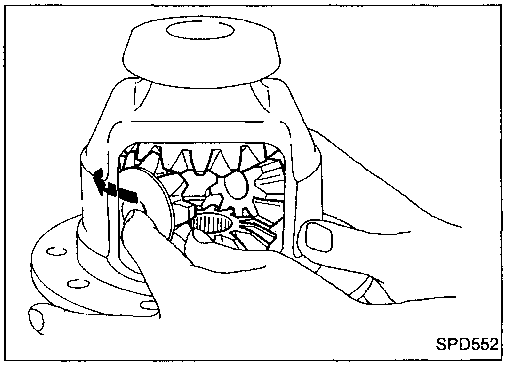
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
The tooth pattern is the best indication of how well a differential has been set up.



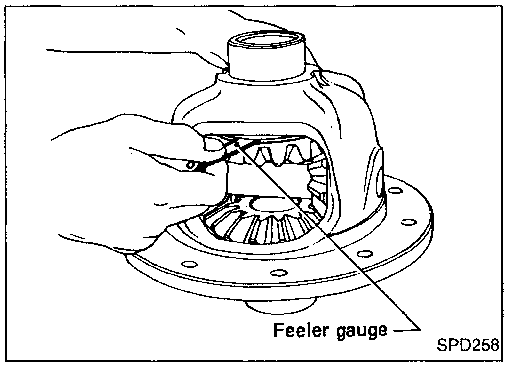
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007


SPD552

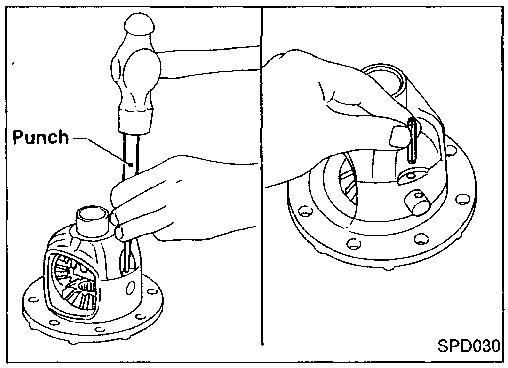
Differential Case — 2-pinion type —

1. Install side gears, pinion mate gears and thrust washers into differential case.



SPD258

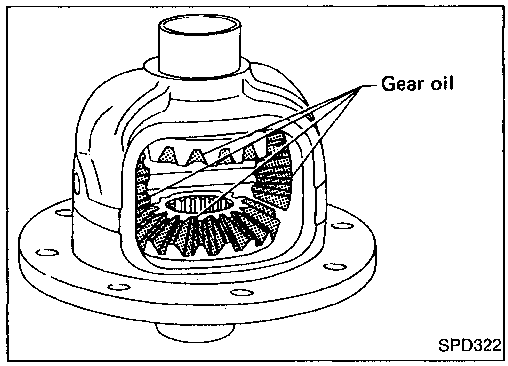
2. Fit pinion mate shaft to differential case so that it meets lock pin holes.
3. Adjust backlash between side gear and pinion mate gear by selecting side gear thrust washer.
   Refer to SDS (PD-102).
   Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case):
   0.10 - 0.20 mm (0.0039 - 0.0079 in)



SPD030

4. Install pinion mate shaft lock pin with a punch.

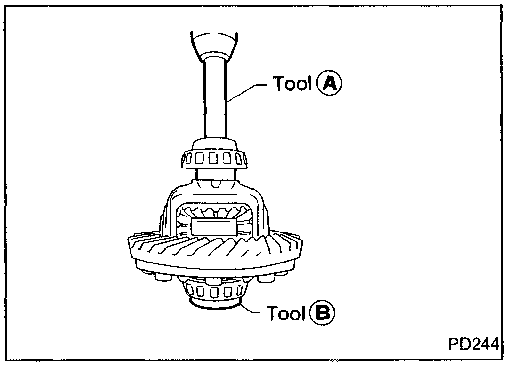
Make sure lock pin is flush with case.



SPD322

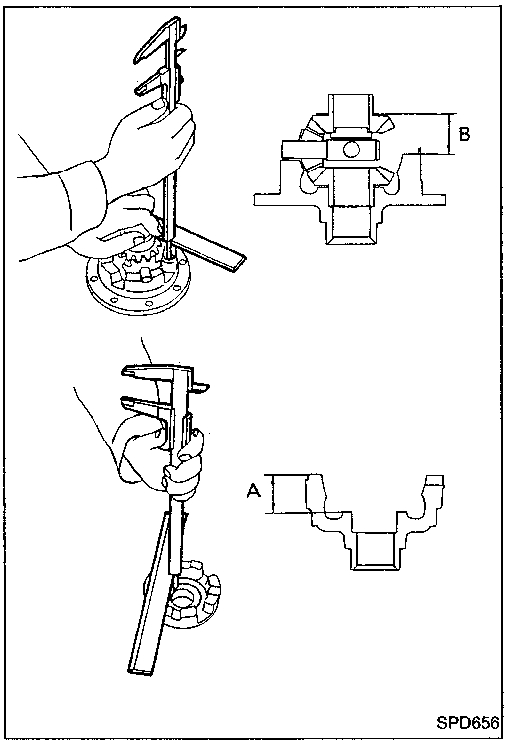
5. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.
6. Install differential case assembly on ring gear.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.



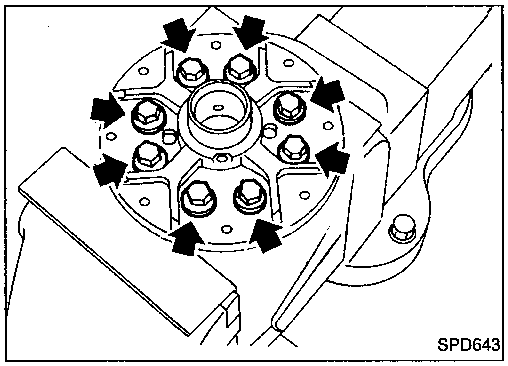
PD244

7. Press-fit side bearing inner cones on differential case with Tool.
   Tool number:
   Ⓐ ST33190000 (—)
   Equivalent tool (J25523)
   Ⓑ ST33081000 (—)

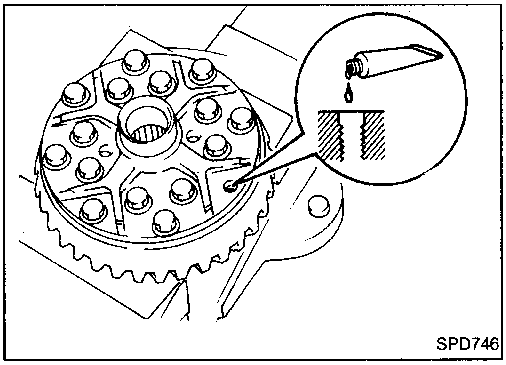


Differential Case — 4-pinion type —

1. Measure clearance between side gear thrust washer and differential case.
   Clearance between side gear thrust washer and differential case (A — B):
   0.10 - 0.20 mm (0.0039 - 0.0079 in)
   The clearance can be adjusted with side gear thrust washer. Refer to SDS (PD-102).
2. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.

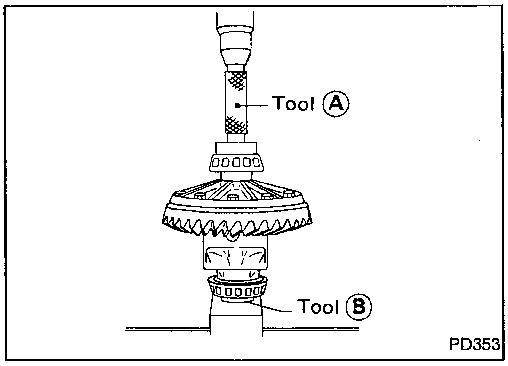


3. Install differential case LH and RH.
4. Install differential case on ring gear.

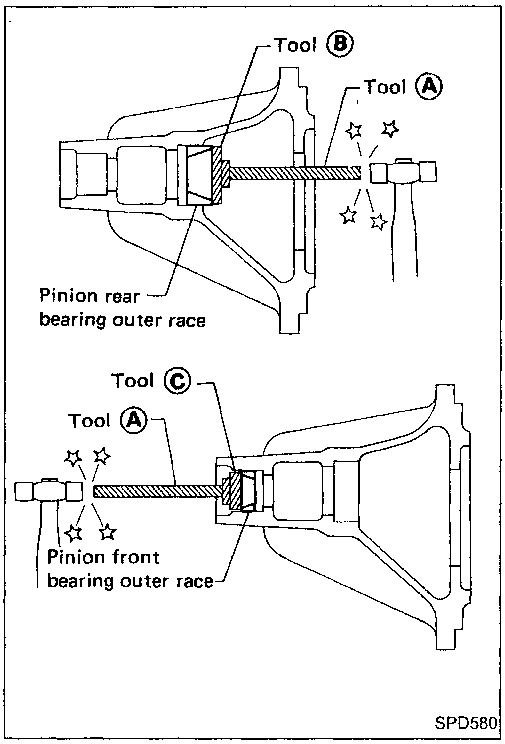


5. Place differential case on ring gear.
6. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.

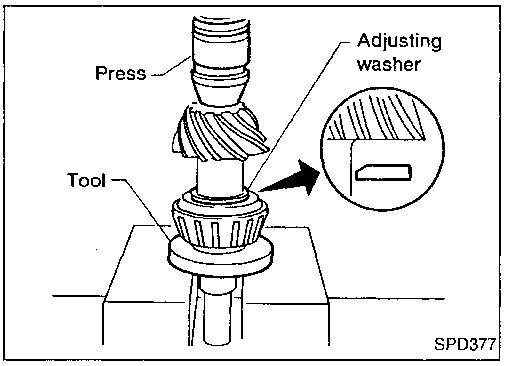


7. Press-fit side bearing inner cones on differential case with Tool.
   Tool number:
   Ⓐ ST33190000 (—)
   Equivalent tool (J25523)
   Ⓑ ST33081000 (—)

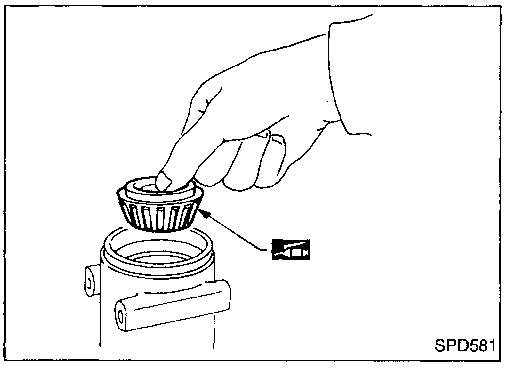


Differential Carrier

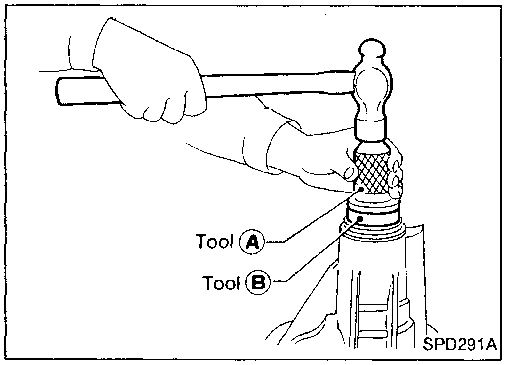
1. Press-fit front and rear bearing outer races with Tools.
   Tool number:
   Ⓐ ST30611000 (J25742-1)
   Ⓑ ST30621000 (J25742-5)
   Ⓒ ST30613000 (J25742-3)



2. Select drive pinion adjusting washer. Refer to ADJUSTMENT (PD-86).
3. Install drive pinion adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, with press and Tool.
   Tool number: ST30901000 (—)
   Equivalent tool (J26010-01)

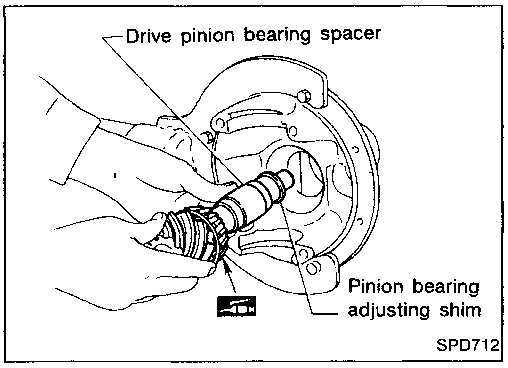


4. Place pinion front bearing inner cone in gear carrier.

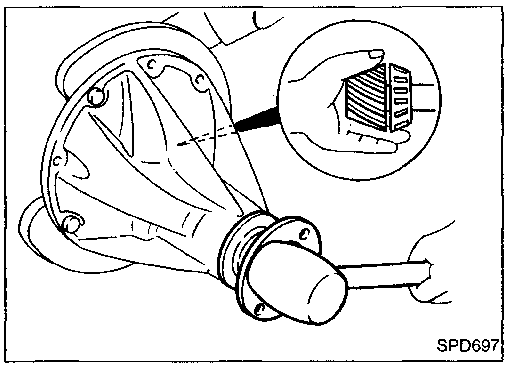


5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.
   Tool number:
   Ⓐ ST30720000 (—)
   Equivalent tool (J25405)
   Ⓑ KV38102510 (—)

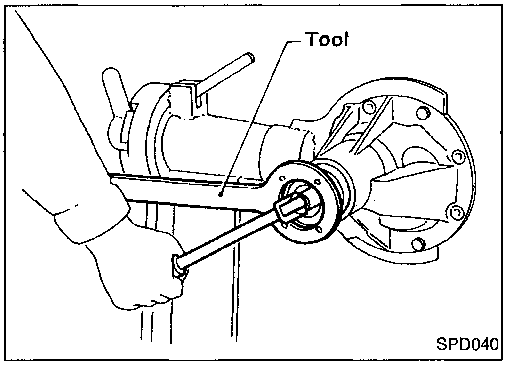
Differential Carrier (Cont'd)



6. Install drive pinion bearing spacer, pinion bearing adjusting shim and drive pinion in gear carrier.



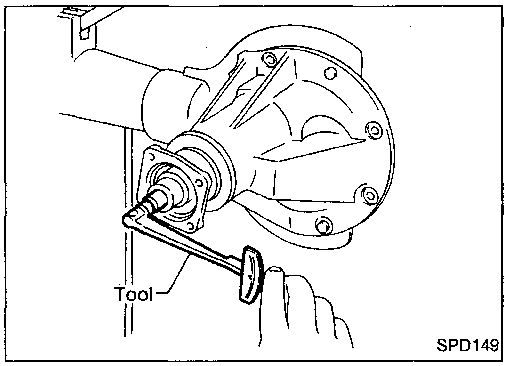
7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.



8. Tighten pinion nut to the specified torque.

The threaded portion of drive pinion and pinion nut should be free from oil or grease.

Tool number: KV38104700 (J34311)

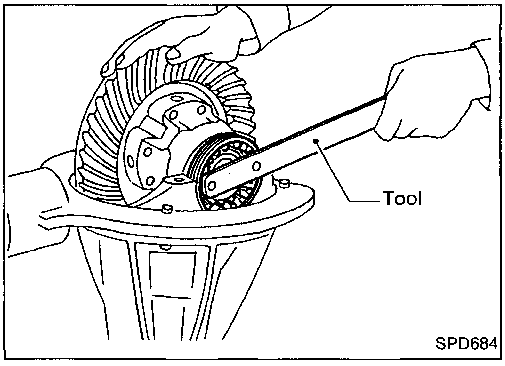


9. Turn drive pinion in both directions several times, and measure pinion bearing preload.

Tool number: ST3127S000 (J25765-A)

Pinion bearing preload (Without front oil seal):

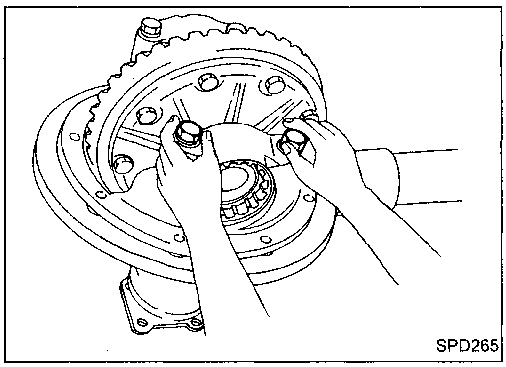
1.2 - 1.5 N·m (12 - 15 kg-cm, 10 - 13 in-lb)



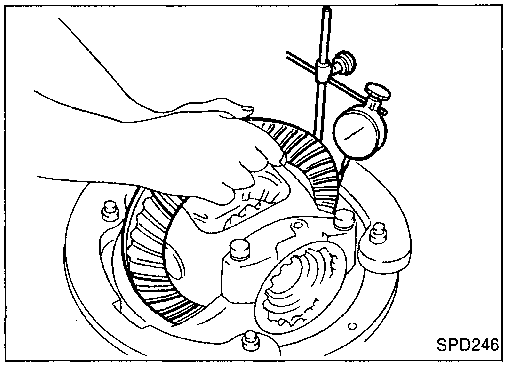
10. Install differential case assembly with side bearing outer races into gear carrier.
11. Position side bearing adjusters on gear carrier with threads properly engaged; screw in adjusters lightly at this stage of assembly.

Tool number: ST32580000 (J34312)

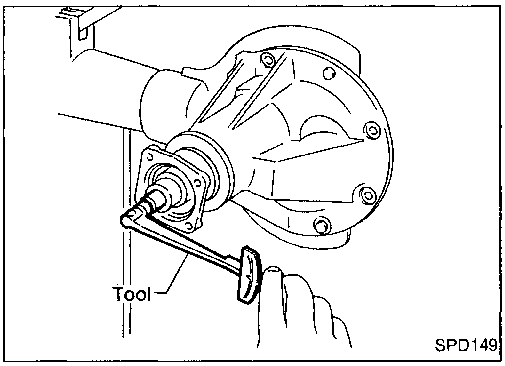
Differential Carrier (Cont'd)


SPD265

12. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.
- Do not tighten at this point to allow further tightening of side bearing adjusters.

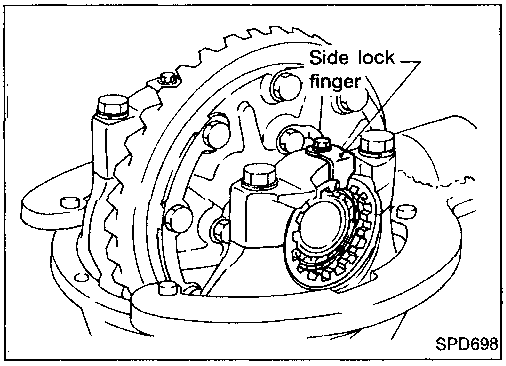

SPD246

13. Tighten both right and left side bearing adjusters alternately and measure ring gear backlash and total preload at the same time. Adjust right and left side bearing adjusters by tightening them alternately so that proper ring gear backlash and total preload can be obtained.
Ring gear-to-drive pinion backlash:
0.15 - 0.20 mm (0.0059 - 0.0079 in)



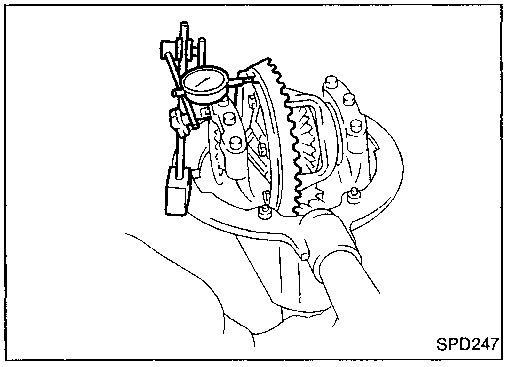
SPD149

- **When checking preload, turn drive pinion in both directions several times to set bearing rollers.**
Tool number: ST3127S000 (J25765-A)
Total preload:
1.7 - 2.5 N·m (17 - 25 kg-cm, 15 - 22 in-lb)



SPD698

14. Tighten side bearing cap bolts.
15. Install side lock finger in place to prevent rotation during operation.


SPD247

16. Check runout of ring gear with a dial indicator.
Runout limit: 0.08 mm (0.0031 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.
17. Check tooth contact. Refer to ADJUSTMENT (PD-90).

Propeller Shaft

GENERAL SPECIFICATIONS

2WD models

Engine	KA24E				VG30E			
Wheelbase	Standard		Long		Standard		Long	
Transmission	M/T	A/T	M/T	A/T	M/T	A/T	M/T	A/T
Propeller shaft model	3S71A				3S80B			
Number of joints	3							
Coupling method with transmission	Sleeve type							
Type of journal bearings	Shell type (non-disassembly type)				Solid type (disassembly type)			
Distance between yokes mm (in)	71 (2.80)				80 (3.15)			
Shaft length mm (in) (Spider to spider)								
1st	665 (26.18)	565 (22.24)	665 (26.18)	565 (22.24)	690 (27.17)	590 (23.23)	690 (27.17)	590 (23.23)
2nd	680 (26.77)		980 (38.58)		650 (25.59)		960 (37.80)	
Shaft outer diameter mm (in)								
1st	75 (2.95)							
2nd	65 (2.56)							

4WD models

Location	Front		Rear			
Wheelbase	—		Standard		Long	
Engine	—		KA24E	VG30E	KA24E	VG30E
Transmission	M/T	A/T	—			
Propeller shaft model	2F71H		2S80B		3S80B	
Number of joints	2				3	
Coupling method with transmission	Flange type		Sleeve type			
Type of journal bearings	Solid type (disassembly type)					
Distance between yokes mm (in)	71 (2.80)		80 (3.15)			
Shaft length mm (in) (Spider to spider)						
1st	542 (21.34)	540 (21.26)	940 (37.01)		430 (16.93)	
2nd	—				810 (31.89)	
Shaft outer diameter mm (in)						
1st	65 (2.56)	50.8 (2.000)	65 (2.56)	75 (2.95)	65 (2.56)	75 (2.95)
2nd	—				65 (2.56)	75 (2.95)

Propeller Shaft (Cont'd)

SERVICE DATA

Unit: mm (in)

Propeller shaft runout limit	0.6 (0.024)
Journal axial play	0.02 (0.0008) or less

Snap ring (80B)

Unit: mm (in)

Thickness	Color	Part number
1.99 (0.0783)	White	37146-C9400
2.02 (0.0795)	Yellow	37147-C9400
2.05 (0.0807)	Red	37148-C9400
2.08 (0.0819)	Green	37149-C9400
2.11 (0.0831)	Blue	37150-C9400
2.14 (0.0843)	Light brown	37151-C9400
2.17 (0.0854)	Black	37152-C9400
2.20 (0.0866)	No paint	37153-C9400

Snap ring (71H)

Unit: mm (in)

Thickness	Color	Part number
1.99 (0.0783)	White	37146-01G00
2.02 (0.0795)	Yellow	37147-01G00
2.05 (0.0807)	Red	37148-01G00
2.08 (0.0819)	Green	37149-01G00
2.11 (0.0831)	Blue	37150-01G00
2.14 (0.0843)	Light brown	37151-01G00
2.17 (0.0854)	Pink	37152-01G00
2.20 (0.0866)	No paint	37153-01G00

Final Drive

GENERAL SPECIFICATIONS

2WD models

Engine	KA24E		VG30E				
Vehicle type	—		Truck				Wagon
Transmission	M/T	A/T	M/T	A/T	M/T	A/T	—
Body type	—		Except Heavy duty		Heavy duty		—
Final drive model Rear	H190A		H233B				
Number of pinions	2				4		
Gear ratio	3.545	3.700		3.900	4.625	4.375	4.375 4.625*1
Number of teeth (Ring gear/drive pinion)	39/11	37/10		39/10	37/8	35/8	35/8 37/8*1
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.5 (3-1/8, 2-5/8)		2.8 (5-7/8, 4-7/8)				

*1: Optional tire (P235/75) equipped models

4WD models

Engine		KA24E	VG30E		
Vehicle type		—	—	Truck	Wagon
Transmission		—	M/T	A/T	
Vehicle grade		—	—	SE	Except SE
Final drive model	Front	R180A	R200A		
	Rear	H233B			
Gear ratio		4.375	4.625		4.375 4.625*1
Number of pinions					
	Front	4			
	Rear	4			
Number of teeth (Ring gear/drive pinion)		35/8	37/8		35/8 37/8*1
Oil capacity (Approx.) ℓ (US pt, Imp pt)					
	Front	1.3 (2-3/4, 2-1/4)	1.5 (3-1/8, 2-5/8)		
	Rear	2.8 (5-7/8, 4-7/8)			

*1: Optional tire (31 x 10.5R15LT and P235/75) equipped models.

Final Drive (Cont'd)

INSPECTION AND ADJUSTMENT (R180A)

Ring gear runout

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

Axle bearing adjustment

Axle bearing end play mm (in)	0 - 0.1 (0 - 0.004)

Available axle bearing adjusting shims

Thickness mm (in)	Part number
0.10 (0.0039)	38233-01G11
0.20 (0.0079)	38233-01G12
0.30 (0.0118)	38233-01G13
0.40 (0.0157)	38233-01G14
0.50 (0.0197)	38233-01G10

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)

Available side gear thrust washers

Thickness mm (in)	Part number
0.75 - 0.78 (0.0295 - 0.0307)	38424-W2010
0.78 - 0.81 (0.0307 - 0.0319)	38424-W2011
0.81 - 0.84 (0.0319 - 0.0331)	38424-W2012
0.84 - 0.87 (0.0331 - 0.0343)	38424-W2013
0.87 - 0.90 (0.0343 - 0.0354)	38424-W2014
0.90 - 0.93 (0.0354 - 0.0366)	38424-W2015
0.93 - 0.96 (0.0366 - 0.0378)	38424-W2016
0.96 - 0.99 (0.0378 - 0.0390)	38424-W2017

Side bearing adjustment

Differential carrier assembly turning resistance N (kg, lb)	34.3 - 39.2 (3.5 - 4.0, 7.7 - 8.8)

Available side retainer shims

Thickness mm (in)	Part number
0.20 (0.0079)	38453-01G00
0.25 (0.0098)	38453-01G01
0.30 (0.0118)	38453-01G02
0.40 (0.0157)	38453-01G03
0.50 (0.0197)	38453-01G04

Total preload adjustment

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

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
3.09 (0.1217)	38154-B4017
3.12 (0.1228)	38154-B4018
3.15 (0.1240)	38154-B4019
3.18 (0.1252)	38154-B4020
3.21 (0.1264)	38154-E4600
3.24 (0.1276)	38154-E4601
3.27 (0.1287)	38154-E4602
3.30 (0.1299)	38154-E4603
3.33 (0.1311)	38154-E4604
3.36 (0.1323)	38154-E4605
3.39 (0.1335)	38154-E4606
3.42 (0.1346)	38154-E4607
3.45 (0.1358)	38154-E4608
3.48 (0.1370)	38154-E4609
3.51 (0.1382)	38154-E4610
3.54 (0.1394)	38154-E4611
3.57 (0.1406)	38154-E4612
3.60 (0.1417)	38154-E4613
3.63 (0.1429)	38154-E4614
3.66 (0.1441)	38154-E4615

Drive pinion preload adjustment

Drive pinion preload N·m (kg-cm, in-lb)	
With front oil seal	1.1 - 1.7 (11 - 17, 9.5 - 14.8)

Available drive pinion bearing preload adjusting washers

Thickness mm (in)	Part number
6.59 (0.2594)	38127-01G00
6.57 (0.2587)	38127-01G01
6.55 (0.2579)	38127-01G02
6.53 (0.2571)	38127-01G03
6.51 (0.2563)	38127-01G04
6.49 (0.2555)	38127-01G05
6.47 (0.2547)	38127-01G06
6.45 (0.2539)	38127-01G07
6.43 (0.2531)	38127-01G08
6.41 (0.2524)	38127-01G09
6.39 (0.2516)	38127-01G10
6.37 (0.2508)	38127-01G11
6.35 (0.2500)	38127-01G12
6.33 (0.2492)	38127-01G13
6.31 (0.2484)	38127-01G14

Available drive pinion bearing preload adjusting spacers

Length mm (in)	Part number
52.20 (2.0551)	38130-78500
52.40 (2.0630)	38131-78500
52.60 (2.0709)	38132-78500
52.80 (2.0787)	38133-78500
53.00 (2.0866)	38134-78500
53.20 (2.0945)	38135-78500

Final Drive (Cont'd)

INSPECTION AND ADJUSTMENT (R200A)

Ring gear runout

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

Axle bearing adjustment

Axle bearing end play mm (in)	0 - 0.1 (0 - 0.004)

Available axle bearing adjusting shims

Thickness mm (in)	Part number
0.10 (0.0039)	38233-01G11
0.20 (0.0079)	38233-01G12
0.30 (0.0118)	38233-01G13
0.40 (0.0157)	38233-01G14
0.50 (0.0197)	38233-01G10

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)

Available side gear thrust washers

Thickness mm (in)	Part number
0.775 (0.0305)	38424-E3000
0.825 (0.0325)	38424-E3001
0.875 (0.0344)	38424-E3002
0.925 (0.0364)	38424-E3003

Side bearing adjustment

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

Total preload adjustment

Total preload N·m (kg-cm, in-lb)	1.4 - 3.1 (14 - 32, 12 - 28)
Ring gear backlash mm (in)	0.13 - 0.18 (0.0051 - 0.0071)

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
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

Drive pinion preload adjustment

Drive pinion preload N·m (kg-cm, in-lb)	
With front oil seal	1.1 - 1.7 (11 - 17, 9.5 - 14.8)

Available drive pinion bearing preload adjusting washers

Thickness mm (in)	Part number
3.80 - 3.82 (0.1496 - 0.1504)	38125-61001
3.82 - 3.84 (0.1504 - 0.1512)	38126-61001
3.84 - 3.86 (0.1512 - 0.1520)	38127-61001
3.86 - 3.88 (0.1520 - 0.1528)	38128-61001
3.88 - 3.90 (0.1528 - 0.1535)	38129-61001
3.90 - 3.92 (0.1535 - 0.1543)	38130-61001
3.92 - 3.94 (0.1543 - 0.1551)	38131-61001
3.94 - 3.96 (0.1551 - 0.1559)	38132-61001
3.96 - 3.98 (0.1559 - 0.1567)	38133-61001
3.98 - 4.00 (0.1567 - 0.1575)	38134-61001
4.00 - 4.02 (0.1575 - 0.1583)	38135-61001
4.02 - 4.04 (0.1583 - 0.1591)	38136-61001
4.04 - 4.06 (0.1591 - 0.1598)	38137-61001
4.06 - 4.08 (0.1598 - 0.1606)	38138-61001
4.08 - 4.10 (0.1606 - 0.1614)	38139-61001

Available drive pinion bearing preload adjusting spacers

Length mm (in)	Part number
54.50 (2.1457)	38165-B4000
54.80 (2.1575)	38165-B4001
55.10 (2.1693)	38165-B4002
55.40 (2.1811)	38165-B4003
55.70 (2.1929)	38165-B4004
56.00 (2.2047)	38165-61001

Final Drive (Cont'd)

INSPECTION AND ADJUSTMENT (H190A)

Ring gear runout

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

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)

Available side gear thrust washers

Conventional models

Thickness mm (in)	Part number
0.775 (0.0305)	38424-E3000
0.825 (0.0325)	38424-E3001
0.875 (0.0344)	38424-E3002
0.925 (0.0364)	38424-E3003

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
2.58 (0.1016)	38154-P6000
2.61 (0.1028)	38154-P6001
2.64 (0.1039)	38154-P6002
2.67 (0.1051)	38154-P6003
2.70 (0.1063)	38154-P6004
2.73 (0.1075)	38154-P6005
2.76 (0.1087)	38154-P6006
2.79 (0.1098)	38154-P6007
2.82 (0.1110)	38154-P6008
2.85 (0.1122)	38154-P6009
2.88 (0.1134)	38154-P6010
2.91 (0.1146)	38154-P6011
2.94 (0.1157)	38154-P6012
2.97 (0.1169)	38154-P6013
3.00 (0.1181)	38154-P6014
3.03 (0.1193)	38154-P6015
3.06 (0.1205)	38154-P6016
3.09 (0.1217)	38154-P6017
3.12 (0.1228)	38154-P6018
3.15 (0.1240)	38154-P6019
3.18 (0.1252)	38154-P6020

Drive pinion preload adjustment

Drive pinion preload N·m (kg-cm, in-lb)	
With front oil seal	1.1 - 1.6 (11 - 16, 9.5 - 13.9)

Side bearing adjustment

Differential carrier assembly turning resistance N (kg, lb)	34.3 - 39.2 (3.5 - 4.0, 7.7 - 8.8)

Available side bearing adjusting shims

Thickness mm (in)	Part number
0.12 (0.0047)	38453-61201
0.15 (0.0059)	38453-61202
0.17 (0.0067)	38453-61203
0.25 (0.0098)	38453-61204
0.30 (0.0118)	38453-61205
0.40 (0.0157)	38453-61206

Total preload adjustment

Total preload N·m (kg-cm, in-lb)	1.2 - 2.2 (12 - 22, 10 - 19)
Ring gear backlash mm (in)	0.13 - 0.18 (0.0051 - 0.0071)

Final Drive (Cont'd)

INSPECTION AND ADJUSTMENT (H233B)

Ring gear runout

Ring gear runout limit mm (in)	0.08 (0.0031)

Side gear adjustment

Side gear backlash (Clearance between side gear and differential case) mm (in)	0.10 - 0.20 (0.0039 - 0.0079)

Available side gear thrust washers

Thickness mm (in)	Part number
1.75 (0.0689)	38424-T5000
1.80 (0.0709)	38424-T5001
1.85 (0.0728)	38424-T5002

— Additional service for limited slip differential model —

Differential torque adjustment

Differential torque N·m (kg-m, ft-lb)	353 - 392 (36 - 40, 260 - 289)
Number of discs and plates (One side)	
Friction disc	5
Friction plate	6
Spring disc	1
Spring plate	1
Wear limit of plate and disc mm (in)	0.1 (0.004)
Allowable warpage of friction disc and plate mm (in)	0.05 - 0.15 (0.0020 - 0.0059)

Available discs and plates

Plate name	Thickness mm (in)	Part number
Friction disc	1.48 - 1.52 (0.0583 - 0.0598) 1.58 - 1.62 (0.0622 - 0.0638)	38433-C6000 (Standard type) 38433-C6001 (Adjusting type)
Friction plate	1.48 - 1.52 (0.0583 - 0.0598)	38432-C6000
Spring disc	1.48 - 1.52 (0.0583 - 0.0598)	38436-C6000
Spring plate	1.48 - 1.52 (0.0583 - 0.0598)	38435-C6010

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
2.58 (0.1016)	38151-01J00
2.61 (0.1028)	38151-01J01
2.64 (0.1039)	38151-01J02
2.67 (0.1051)	38151-01J03
2.70 (0.1063)	38151-01J04
2.73 (0.1075)	38151-01J05
2.76 (0.1087)	38151-01J06
2.79 (0.1098)	38151-01J07
2.82 (0.1110)	38151-01J08
2.85 (0.1122)	38151-01J09
2.88 (0.1134)	38151-01J10
2.91 (0.1146)	38151-01J11
2.94 (0.1157)	38151-01J12
2.97 (0.1169)	38151-01J13
3.00 (0.1181)	38151-01J14
3.03 (0.1193)	38151-01J15
3.06 (0.1205)	38151-01J16
3.09 (0.1217)	38151-01J17
3.12 (0.1228)	38151-01J18
3.15 (0.1240)	38151-01J19
3.18 (0.1252)	38151-01J60
3.21 (0.1264)	38151-01J61
3.24 (0.1276)	38151-01J62
3.27 (0.1287)	38151-01J63
3.30 (0.1299)	38151-01J64
3.33 (0.1311)	38151-01J65
3.36 (0.1323)	38151-01J66
3.39 (0.1335)	38151-01J67
3.42 (0.1346)	38151-01J68
3.45 (0.1358)	38151-01J69
3.48 (0.1370)	38151-01J70
3.51 (0.1382)	38151-01J71
3.54 (0.1394)	38151-01J72
3.57 (0.1406)	38151-01J73
3.60 (0.1417)	38151-01J74
3.63 (0.1429)	38151-01J75
3.66 (0.1441)	38151-01J76

Final Drive (Cont'd)

Drive pinion preload adjustment

Drive pinion preload N·m (kg-cm, in-lb)	
Without front oil seal	1.2 - 1.5 (12 - 15, 10 - 13)

Available front drive pinion bearing adjusting shims

Thickness mm (in)	Part number
2.31 (0.0909)	38125-82100
2.33 (0.0917)	38126-82100
2.35 (0.0925)	38127-82100
2.37 (0.0933)	38128-82100
2.39 (0.0941)	38129-82100
2.41 (0.0949)	38130-82100
2.43 (0.0957)	38131-82100
2.45 (0.0965)	38132-82100
2.47 (0.0972)	38133-82100
2.49 (0.0980)	38134-82100
2.51 (0.0988)	38135-82100
2.53 (0.0996)	38136-82100
2.55 (0.1004)	38137-82100
2.57 (0.1012)	38138-82100
2.59 (0.1020)	38139-82100

Available drive pinion bearing adjusting spacers

Thickness mm (in)	Part number
4.50 (0.1772)	38165-76000
4.75 (0.1870)	38166-76000
5.00 (0.1969)	38167-76000
5.25 (0.2067)	38166-01J00
5.50 (0.2165)	38166-01J10

Total preload adjustment

Total preload N·m (kg-cm, in-lb)	1.7 - 2.5 (17 - 25, 15 - 22)
Ring gear backlash mm (in)	0.15 - 0.20 (0.0059 - 0.0079)