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## SPECIAL SERVICE TOOLS

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV38108300</td>
<td>Companion flange wrench</td>
<td>Removing and installing propeller shaft lock nut, and drive pinion lock nut</td>
</tr>
<tr>
<td>ST3090S000</td>
<td>Drive pinion rear inner race puller set</td>
<td>Removing center bearing</td>
</tr>
<tr>
<td>1 ST30031000</td>
<td>Puller</td>
<td>a: 79 mm (3.11 in) dia.</td>
</tr>
<tr>
<td>2 ST30901000</td>
<td>Base</td>
<td>b: 45 mm (1.77 in) dia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c: 35 mm (1.38 in) dia.</td>
</tr>
</tbody>
</table>
**Noise, Vibration and Harshness (NVH) Troubleshooting**

**NVH TROUBLESHOOTING CHART**

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

| Reference page | Uneven rotation torque | Center bearing improper installation | Excessive center bearing axial end play | Excessive center bearing mounting (insulator) cracks, damage or deterioration | Rotation imbalance | Excessive runout | Rough gear tooth | Improper gear contact | Tooth surface worn | Incorrect backlash | Improper gear oil | PROPELLER SHAFT | DIFFERENTIAL | DRIVE SHAFT | AXLE | SUSPENSION | TIRES | ROAD WHEEL | BRAKES | STEERING |
|----------------|------------------------|--------------------------------------|----------------------------------------|-----------------------------------------------|-------------------|----------------|----------------|-------------------|----------------|----------------|----------------|-----------------|---------------|-------------|---------|---------|---------|---------|---------|---------|---------|
| Symptom PROPELLER SHAFT | Noise | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × |
| Shake | × | × | × | × | × | × | × | × | × | × | × |
| Vibration | × | × | × | × | × | × | × | × | × | × | × |
| DIF-TER-ENTAL | Noise | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × |

×: Applicable
Components

SEC. 370
3S71A

M/T model

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.

A/T model

1. Propeller shaft 2nd tube
2. Center bearing upper mounting bracket
3. Clip
4. Center bearing
5. Center bearing lower mounting bracket
6. Washer
7. Companion flange
8. Lock nut
9. Propeller shaft 1st tube
10. Floor tunnel stay

On-vehicle Service

CHECKING PROPELLER SHAFT

Check propeller shaft and center bearing for damage, looseness or grease leakage. If greasing points are provided, supply grease as necessary.

NMPD0053

PD-4
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 indicated points by rotating final drive companion flange with hands.
   Runout limit: 0.6 mm (0.024 in)

Propeller shaft runout measuring points:

Distance:
   “A” 192 mm (7.56 in)
   “B” 172 mm (6.77 in)
   “C” 162 mm (6.38 in)

3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange. Then rotate companion flange 90, 180 or 270 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 it.

Removal and Installation

- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.
When installing the center bearing, use caution and pay attention to the following procedures.

- Install by aligning both matching marks on propeller shaft (put on during removal) and on final drive companion flange.
- Rotate bearing and make sure center bearing’s bearing cushion connection part is always UP as shown in left figure. And install it to vehicle by adjusting mounting bracket back-forth position for not to give deflection of vehicle front to rear direction to insulator.

**CAUTION:**
Align the arrow of the upper mounting bracket face the front of the vehicle as shown in left figure.

If companion flange has been removed, put new alignment marks B and C on it. Then reassemble using the following procedure. Perform step 4 when final drive and propeller shaft are separated from each other. Also perform step 4 when either of these parts is replaced with a new one.

1. Erase original marks B and C from companion flange with suitable solvent.
2. Mark (B)
   A. Measure companion flange vertical runout.
   B. Determine the position where maximum runout is read on dial gauge. Put mark (shown by B in figure at left) on flange perimeter corresponding to maximum runout position.

3. Mark (C)
   A. Measure companion flange surface runout.
   B. Determine the position where maximum runout is read on dial gauge. Put mark (shown by C in figure at left) on flange perimeter corresponding to maximum runout position.
4. Position companion flange and propeller shaft using alignment marks A and B. Set the marks A and B as close to each other as possible. Temporarily attach bolts and nuts.
5. Press down propeller shaft with alignment mark C facing upward. Then tighten the lower nut to specified torque.
6. Tighten remaining nuts to specified torque.

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

- If the play exceeds specifications, replace propeller shaft assembly.
  
  **Journal axial play:**
  
  0 mm (0 in) or less

**Disassembly**

**CENTER BEARING**
1. Put matchmarks on flanges, and separate 2nd tube from 1st tube.
2. Put matchmarks on the flange and shaft.
3. Remove locking nut with suitable tool.
4. Remove companion flange with puller.
   
   **Tool number:** HT72400000
5. Remove center bearing with Tool and press.
   Tool number: ST30031000

Assembly

CENTER BEARING

- When installing center bearing, position the “F” mark on center bearing toward rear of vehicle.
- Apply a coat of grease to the end face of center bearing and both sides of washer. Use multi-purpose lithium grease that contains molybdenum disulfide.

- Stake the nut. Always use new one.
- Align matchmarks when assembling tubes.
## GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Applied model</th>
<th>M/T</th>
<th>A/T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft model</td>
<td></td>
<td>3S71A</td>
</tr>
<tr>
<td>Number of joints</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Coupling method with transmission</td>
<td></td>
<td>Sleeve type</td>
</tr>
<tr>
<td>Type of journal bearings</td>
<td></td>
<td>Shell type (Non-disassembly type)</td>
</tr>
<tr>
<td>Distance between yokes</td>
<td></td>
<td>63.0 (2.480)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shaft length (Spider to spider)</th>
<th>1st</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>416 (16.38)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>633 (24.92)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shaft outer diameter</th>
<th>1st</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>75.0 (2.953)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>57 (2.24)</td>
</tr>
</tbody>
</table>

## SERVICE DATA

<table>
<thead>
<tr>
<th>Propeller shaft runout limit</th>
<th>0.6 (0.024)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal axial play</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
### SPECIAL SERVICE TOOLS

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV38108300</td>
<td>Companion flange</td>
<td>Removing and installing propeller shaft lock nut, and drive pinion lock nut</td>
</tr>
</tbody>
</table>
| KV38100800    | Differential attachment | Mounting final drive  
(To use, make a new hole.)  
a: 152 mm (5.98 in) |
| ST3090S000    | Drive pinion rear inner race puller set  
1 ST30031000 Puller  
2 ST30901000 Base | Removing and installing drive pinion rear cone  
a: 79 mm (3.11 in) dia.  
b: 45 mm (1.77 in) dia.  
c: 35 mm (1.38 in) dia. |
| ST3306S001    | Differential side bearing puller set  
1 ST3305S001 Body  
2 ST33061000 Adapter | Removing and installing differential side bearing inner cone  
a: 28.5 mm (1.122 in) dia.  
b: 38 mm (1.50 in) dia. |
| ST30611000    | Drift               | Installing pinion rear bearing outer race                                   |
| ST30613000    | Drift               | Installing pinion front bearing outer race  
a: 72 mm (2.83 in) dia.  
b: 48 mm (1.89 in) dia. |
| ST30621000    | Drift               | Installing pinion rear bearing outer race  
a: 79 mm (3.11 in) dia.  
b: 59 mm (2.32 in) dia. |
<table>
<thead>
<tr>
<th>Tool number</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST23800000</td>
<td>Drift</td>
<td>Installing side oil seal a: 44 mm (1.73 in) dia.</td>
</tr>
<tr>
<td>KV38100200</td>
<td>Gear carrier side oil seal drift</td>
<td>Installing side oil seal a: 65 mm (2.56 in) dia.</td>
</tr>
<tr>
<td>KV38100500</td>
<td>Gear carrier front oil seal drift</td>
<td>Installing front oil seal a: 85 mm (3.35 in) dia.</td>
</tr>
<tr>
<td>KV38100300</td>
<td>Differential side bearing inner cone</td>
<td>Installing side bearing inner cone a: 54 mm (2.13 in) dia.</td>
</tr>
<tr>
<td>KV38100600</td>
<td>Side bearing spacer drift</td>
<td>Installing side bearing spacer a: 8 mm (0.31 in)</td>
</tr>
<tr>
<td>ST3127S000</td>
<td>Preload gauge</td>
<td>Measuring pinion bearing preload and total preload</td>
</tr>
<tr>
<td>HT72400000</td>
<td>Slide hammer</td>
<td>Removing differential case assembly</td>
</tr>
<tr>
<td>KV381039S0</td>
<td>Drive pinion height setting gauge</td>
<td>Selecting pinion height adjusting washer</td>
</tr>
</tbody>
</table>
Noise, Vibration and Harshness (NVH) Troubleshooting
Refer to “NVH TROUBLESHOOTING CHART”, PD-3

On-vehicle Service
CHECKING DIFFERENTIAL GEAR OIL
- Check oil level and for oil leakage.
  
  Filler plug:
  ⛔️ 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

CHANGING DIFFERENTIAL GEAR OIL
1. Drain oil from drain plug and refill with new gear oil.
2. Check oil level.
  
  Oil grade: API GL-5
  Viscosity:
  - See “RECOMMENDED FLUIDS AND LUBRICANTS”.
  Capacity:
  1.2 - 1.4ℓ (2-1/2 - 3 US pt, 2-1/8 - 2-1/2 Imp pt)
  Drain plug:
  ⛔️ 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

FRONT OIL SEAL REPLACEMENT
1. Remove ABS sensor.
2. Remove propeller shaft.
3. Loosen drive pinion nut with tool.
  Tool number: KV38108300
4. Remove companion flange.

5. Remove front oil seal.

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

   **Tool number: ST30720000**

7. Install companion flange and drive pinion nut.

8. Install propeller shaft.

---

**SIDE OIL SEAL REPLACEMENT**

1. Disconnect final drive side flange and drive shaft flange and suspend drive shaft flange with wire.

2. Remove final drive side flange.

3. Remove oil seal.
4. Apply multi-purpose grease to sealing lips of oil seal. Press-fit oil seal into carrier with Tool.
   Tool number:
   KV38100200
   ST23800000
   Length “L”: Less than 0.5 mm (0.020 in)

5. Install final drive side flange RH.

6. Install final drive side flange LH.
   Use Tool to prevent side oil seal from being damaged by spline portion of side flange.
   Tool number: KV38107900

7. Install drive shaft.

8. After installing final drive side flange, measure length A.
   Length A:
   Approx. 316 - 318 mm (12.44 - 12.52 in)
Components
R200V, R200H

1. Gear carrier
2. Companion flange
3. Front oil seal
4. Pinion front bearing
5. Pinion bearing adjusting washer
6. Pinion bearing adjusting spacer
7. Pinion rear bearing
8. Pinion height adjusting washer
9. Drive pinion
10. Bearing cap
11. Side oil seal
12. Side bearing spacer
13. Side bearing adjusting washer
14. Side bearing
15. Differential case B
16. Side gear thrust washer
17. Side gear (RH)
18. Pinion mate shaft
19. Pinion mate gear
20. Pinion mate thrust washer
21. Side gear (LH)
22. Ring gear
23. Hypoid gear set
24. Differential case A
25. Gasket
26. Rear cover
27. Filler plug
28. Drain plug
29. Breather
30. ABS sensor
31. Ring gear
32. Differential assembly
33. Insulator
34. Upper stopper
Removal and Installation

REMOVAL

CAUTION:
Before removing the final drive assembly, disconnect the ABS sensor from the assembly. Then move it away from the final drive assembly. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.

- Remove propeller shaft.
- Plug up rear end of transmission rear extension housing.
- Remove drive shafts.
- Remove nuts securing final drive rear cove to suspension member.
- Support weight of final drive using jack.
- Remove final drive mounting member from front of final drive.
- Move final drive forward together with jack. Remove rear cover stud bolts from suspension member.
- Lower final drive using jack. Remove jack from rear of vehicle.

CAUTION:
- Be careful not to damage spline, sleeve yoke and front oil seal, when removing propeller shaft.
- After removal, support suspension member on a stand to prevent its insulators from being twisted or damaged.

INSTALLATION

- Fill final drive with recommended gear oil.

Disassembly

PRE-INSPECTION
Before disassembling final drive, perform the following inspection.

- Total preload
  a) Turn drive pinion in both directions several times to set bearing rollers.
  b) Check total preload with Tool.

  Tool number: ST3127S000
  Total preload:
  1.4 - 3.1 N·m (14 - 32 kg-cm, 12 - 28 in-lb)
- Ring gear to drive pinion backlash
  Check ring gear-to-drive pinion backlash with a dial indicator at several points.
  
  **Ring gear-to-drive pinion backlash:**
  0.10 - 0.15 mm (0.0039 - 0.0059 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-26).

**DIFFERENTIAL CARRIER**

1. Using two 45 mm (1.77 in) spacers, mount carrier on Tool.
   
   Tool number: KV38100800

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

3. Remove side bearing caps.
4. Lift differential case assembly out with Tool.  
   **Tool number: HT72400000**

   Keep the side bearing outer races together with inner cone — do not mix them up.  
   Also, keep side bearing spacer and adjusting shims together with bearings.

5. Loosen drive pinion nut and pull off companion flange.

6. Take out drive pinion (together with rear bearing inner race, bearing spacer and adjusting washer).

7. Remove oil seal.

8. Remove front bearing inner race.

9. Remove side oil seal.

10. Remove pinion bearing outer races with a brass drift.
11. Remove pinion rear bearing inner race and drive pinion height adjusting washer with suitable tool.

**DIFFERENTIAL CASE**

1. Remove side bearing inner cones.

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

   **Tool number:**
   - A ST3305S001
   - B ST33061000

   Be careful not to confuse left- and right-hand parts. Keep bearing and bearing race for each side together.

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. Loosen screws on differential cases A and B.
5. Separate differential cases A and B.

**Inspection**

**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.
- Check viscous coupling for oil leakage. If necessary, replace it with new one.
**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.

**Adjustment**

To avoid confusion while calculating bearing shims, it is absolutely necessary to stay with the metric system. If you measure anything in inches, **the results must be converted to the metric system.**
1. First prepare Tools for pinion height adjustment.
   1 Dummy shaft (KV38103910)
   2 Height gauge (KV38100120)
   3 Stopper (KV38100140)

2. To simplify the job, make a chart, like the one below, to organize your calculations.

<table>
<thead>
<tr>
<th>LETTERS</th>
<th>HUNDREDS OF A MILLIMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>H: Head number</td>
<td></td>
</tr>
<tr>
<td>N: Measuring clearance</td>
<td></td>
</tr>
</tbody>
</table>

3. Write the following numbers down the chart.
   H: Head number

4. Set Tool (Dummy shaft) as shown below and tighten drive pinion nut carefully to correct preload of 1.0 to 1.3 N·m (10 to 13 kg-cm, 8.7 to 11.3 in-lb).
   Tool number: KV38103910

5. Attach Tool (Height gauge) to gear carrier, and measure the clearance between the height gauge and the dummy shaft face.
6. Substitute these values into the equation to calculate the thickness of the washer.
7. Select the proper pinion height washer.

**Drive pinion height adjusting washer:**

Refer to SDS (PD-32).

If you cannot find the desired thickness of washer, use washer with thickness closest to the calculated value.

Example:

Calculated value ... \( T = 3.22 \) mm

Used washer ... \( T = 3.21 \) mm

---

**Washer selection when replacing hypoid gear set** —

Drive pinions may be different in height due to the manufacturing process. Use a washer of proper thickness to adjust the height of new drive pinion. Select the washer as follows:
Drive pinion height adjusting washer:
Refer to SDS (PD-33).

SIDE BEARING PRELOAD

1. To simplify the job, make a chart like the one below to organize your calculations.

<table>
<thead>
<tr>
<th>LETTERS</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Left housing</td>
<td></td>
</tr>
<tr>
<td>B: Right housing</td>
<td></td>
</tr>
<tr>
<td>C: Differential case</td>
<td></td>
</tr>
<tr>
<td>D: Differential case</td>
<td></td>
</tr>
<tr>
<td>H: (+) or (−): ring gear</td>
<td></td>
</tr>
<tr>
<td>E: Left side bearing (= 21 − Measured height)</td>
<td></td>
</tr>
<tr>
<td>F: Right side bearing (= 21 − Measured height)</td>
<td></td>
</tr>
<tr>
<td>G: Side bearing spacer (= 8.1 − Measured thickness)</td>
<td></td>
</tr>
<tr>
<td>X:</td>
<td>1.97</td>
</tr>
<tr>
<td>Y:</td>
<td>2.07</td>
</tr>
</tbody>
</table>

Example:

\[ T = (t_1 - t_2) \times 0.01 + T_0 \]
where \( T \): thickness of the washer to select
\( T_0 \): thickness of the washer used
\( t_1 \): old drive pinion head number
\( t_2 \): new drive pinion head number

\[ T_0 = 3.21, \ t_1 = +2, \ t_2 = -1 \]
\[ T = (2 - (-1)) \times 0.01 + 3.21 \]
\[ = 3 \times 0.01 + 3.21 \]
\[ = 0.03 + 3.21 \]
\[ = 3.24 \]
\[ T = 3.24 \text{ mm} \]

2. Write the following numbers down in the chart.
If numbers for A, B, C, D and H are not given, regard them as zero.
A & B: Figures marked on gear carrier

C & D: Figures marked on differential case
3. Calculate “E” and “F” as follows:
   \[ E \& F = 21 \text{ mm (0.83 in)} - \text{Measured bearing height} \]
   Bearing height can be measured as follows:
   a. Measure height of bearing race which will be used as a base for the opposite side of a side bearing assembly.
   b. Set bearing assembly to be measured on the base race and measure the total height.
   **Lubricate bearing assembly and turn it several times to settle it on the base for accurate measurement.**
   c. Subtract base race height from total height.

4. Calculate “G”.
   \[ G = 8.10 \text{ mm (0.3189 in)} - \text{Measured thickness} \]

<table>
<thead>
<tr>
<th>LETTERS</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>Left housing</td>
</tr>
<tr>
<td>B:</td>
<td>Right housing</td>
</tr>
<tr>
<td>C:</td>
<td>Differential case</td>
</tr>
<tr>
<td>D:</td>
<td>Differential case</td>
</tr>
<tr>
<td>H: (+) or (−):</td>
<td>ring gear</td>
</tr>
<tr>
<td>E:</td>
<td>Left side bearing (21 − Measured height)</td>
</tr>
</tbody>
</table>
5. Select the proper shims. Refer to SDS (PD-33).
If you cannot find the desired thickness of shims, use shims with the total thickness closest to the calculated value.
TOOTH CONTACT

Checking gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion. Hypoid gears which are not positioned in proper arrangement may be noisy and/or have a short life. Check gear tooth contact pattern to obtain the best contact for low noise and long life.

1. Thoroughly clean ring gear and drive pinion teeth.
2. Lightly apply a mixture of powdered titanium oxide and oil or the equivalent. Apply it to 3 or 4 teeth of ring gear drive side.
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

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

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

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

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

DIFFERENTIAL CASE
Whenever side gears or pinion mate gears are replaced, selection of thrust washers should be carried out. Before selecting thrust washers, make sure all parts are clean and well lubricated with hypoid gear oil.

Thrust Washer Selection
1. Install the previously removed thrust washer on right side gear. On left side gear, install a suitable thrust washer. Temporarily tighten differential cases using two screws.

2. Position differential assembly so that right side gear is on the upper side. Place two feeler gauges of 0.03 mm (0.0012 in) thickness between right side gear and thrust washer as shown. Do not insert feeler gauge in oil groove portion of differential case.

3. Rotate right side gear with a suitable tool attached to splines. If hard to rotate, replace thrust washer on left side gear with a thinner one.

4. Replace both 0.03 mm (0.0012 in) feeler gauges with 0.10 mm (0.0039 in) gauges. At this point, make sure right side gear does not rotate. If it rotates, replace thrust washer on left side gear with a thicker one to prevent rotation.

Assembly
1. Install differential case A and B.

2. Place differential case on ring gear.
3. Apply locking sealant to ring gear bolts, and install them. Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.
4. Press-fit side bearing inner cones on differential case with Tool.
   Tool number:
   A KV38100300
   B ST33061000

DIFFERENTIAL CARRIER

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

2. Select pinion bearing adjusting washer and drive pinion bearing spacer. Refer to ADJUSTMENT (PD-20).

   Tool number: ST30901000

4. Place pinion front bearing inner cone in final drive housing.
5. Set drive pinion assembly (as shown in figure at left) in differential carrier and install drive pinion, with press and suitable tool.

Stop when drive pinion touches bearing.
Apply multi-purpose grease to pinion rear bearing inner race, pinion front bearing inner race.

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

   Tool number: KV38100500

7. Install companion flange, and tighten pinion nut to specified torque with suitable tool.

   Make sure that threaded portion of drive pinion and pinion nut are free from oil or grease.

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

   Pinion bearing preload:
   1.1 - 1.4 N·m (11 - 14 kg-cm, 9.5 - 12.2 in-lb)

   When pinion bearing preload is outside specifications, replacement is required for pinion bearing adjusting washer and spacer. Replace with those of different thickness.
10. Install differential case assembly with side bearing outer races into gear carrier.

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

12. Drive in side bearing spacer with Tool.
   Tool number: KV38100600
   Spacer location: Right side

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

14. Check runout of ring gear with a dial indicator.
   Runout limit: 0.05 mm (0.0020 in)
15. Measure ring gear to drive pinion backlash with a dial indicator.

**Ring gear to drive pinion backlash:**

0.10 - 0.15 mm (0.0039 - 0.0059 in)

- If backlash is too small, adjustment of shim thickness is required. 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.**

16. Check total preload with Tool.

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

**Total preload:**

1.4 - 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. Difference in number of shims will change ring gear to drive pinion backlash.**

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

- Check whether the backlash varies excessively in different places. Foreign matter may be caught between the ring gear and the differential case causing the trouble.
- The backlash can vary greatly even when the ring gear runout is within a specified range. In that case, replace the hypoid gear set or differential case.

18. Check tooth contact.

Refer to ADJUSTMENT (PD-26).

19. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install side oil seal.

**Tool number:** KV38100200

20. Install rear cover and gasket.
### General Specifications

<table>
<thead>
<tr>
<th>Applied model</th>
<th>M/T</th>
<th>A/T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final drive model</td>
<td>R200H</td>
<td>R200V</td>
</tr>
<tr>
<td>Gear ratio</td>
<td>3.692</td>
<td>3.916</td>
</tr>
<tr>
<td>Number of teeth (Ring gear/drive pinion)</td>
<td>48/13</td>
<td>47/12</td>
</tr>
<tr>
<td>Oil capacity (Approx.)</td>
<td>1.2 - 1.4 (2-1/2 - 3, 2-1/8 - 2-1/2)</td>
<td></td>
</tr>
<tr>
<td>Number of pinion gears</td>
<td>—</td>
<td>4</td>
</tr>
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</table>

### Ring Gear Runout

<table>
<thead>
<tr>
<th>Ring gear runout limit</th>
<th>mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05 (0.0020)</td>
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</table>

### Side Gear Adjustment

<table>
<thead>
<tr>
<th>Side gear backlash (Clearance between side gear and differential case)</th>
<th>mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness mm (in)</td>
<td>Part number*</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>0.80 (0.0315)</td>
<td>38424-40F60</td>
</tr>
<tr>
<td>0.83 (0.0327)</td>
<td>38424-40F61</td>
</tr>
<tr>
<td>0.86 (0.0339)</td>
<td>38424-40F62</td>
</tr>
<tr>
<td>0.89 (0.0350)</td>
<td>38424-40F63</td>
</tr>
<tr>
<td>0.92 (0.0362)</td>
<td>38424-40F64</td>
</tr>
<tr>
<td>0.95 (0.0374)</td>
<td>38424-40F65</td>
</tr>
<tr>
<td>0.98 (0.0386)</td>
<td>38424-40F66</td>
</tr>
<tr>
<td>1.01 (0.0398)</td>
<td>38424-40F67</td>
</tr>
<tr>
<td>1.04 (0.0409)</td>
<td>38424-40F68</td>
</tr>
<tr>
<td>1.07 (0.0421)</td>
<td>38424-40F69</td>
</tr>
<tr>
<td>1.10 (0.0433)</td>
<td>38424-40F70</td>
</tr>
<tr>
<td>1.13 (0.0445)</td>
<td>38424-40F71</td>
</tr>
<tr>
<td>1.16 (0.0457)</td>
<td>38424-40F72</td>
</tr>
<tr>
<td>1.19 (0.0469)</td>
<td>38424-40F73</td>
</tr>
<tr>
<td>1.22 (0.0480)</td>
<td>38424-40F74</td>
</tr>
<tr>
<td>1.25 (0.0492)</td>
<td>38424-40F75</td>
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<tr>
<td>1.28 (0.0504)</td>
<td>38424-40F76</td>
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<tr>
<td>1.31 (0.0516)</td>
<td>38424-40F77</td>
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<tr>
<td>1.34 (0.0528)</td>
<td>38424-40F78</td>
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<tr>
<td>1.37 (0.0539)</td>
<td>38424-40F79</td>
</tr>
<tr>
<td>1.40 (0.0551)</td>
<td>38424-40F80</td>
</tr>
<tr>
<td>1.43 (0.0563)</td>
<td>38424-40F81</td>
</tr>
<tr>
<td>1.46 (0.0575)</td>
<td>38424-40F82</td>
</tr>
<tr>
<td>1.49 (0.0587)</td>
<td>38424-40F83</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Available side gear thrust washers</th>
<th></th>
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</thead>
</table>

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

### Total Preload Adjustment

<table>
<thead>
<tr>
<th>Drive pinion to ring gear backlash</th>
<th>mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10 - 0.15 (0.0039 - 0.0059)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total preload</th>
<th>N-m (kg-cm, in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4 - 3.1 (14 - 32, 12 - 28)</td>
<td></td>
</tr>
</tbody>
</table>

| Side bearing adjusting method | Adjusting washer |
## Available Side Bearing Adjusting Washers

<table>
<thead>
<tr>
<th>Thickness mm (in)</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00 (0.0787)</td>
<td>38453-N3100</td>
</tr>
<tr>
<td>2.05 (0.0807)</td>
<td>38453-N3101</td>
</tr>
<tr>
<td>2.10 (0.0827)</td>
<td>38453-N3102</td>
</tr>
<tr>
<td>2.15 (0.0846)</td>
<td>38453-N3103</td>
</tr>
<tr>
<td>2.20 (0.0866)</td>
<td>38453-N3104</td>
</tr>
<tr>
<td>2.25 (0.0886)</td>
<td>38453-N3105</td>
</tr>
<tr>
<td>2.30 (0.0906)</td>
<td>38453-N3106</td>
</tr>
<tr>
<td>2.35 (0.0925)</td>
<td>38453-N3107</td>
</tr>
<tr>
<td>2.40 (0.0945)</td>
<td>38453-N3108</td>
</tr>
<tr>
<td>2.45 (0.0965)</td>
<td>38453-N3109</td>
</tr>
<tr>
<td>2.50 (0.0984)</td>
<td>38453-N3110</td>
</tr>
<tr>
<td>2.55 (0.1004)</td>
<td>38453-N3111</td>
</tr>
<tr>
<td>2.60 (0.1024)</td>
<td>38453-N3112</td>
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<tr>
<td>2.65 (0.1043)</td>
<td>38453-N3113</td>
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</table>

## Drive Pinion Height Adjustment

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

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### Drive Pinion Preload Adjustment

<table>
<thead>
<tr>
<th>Drive pinion bearing preload adjusting method</th>
<th>Adjusting washer and spacer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive pinion preload without front oil seal</td>
<td>N·m (kg-cm, in-lb) 1.1 - 1.4 (11 - 14, 9.5 - 12.2)</td>
</tr>
</tbody>
</table>

#### Available front drive pinion bearing adjusting washer

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

#### Available drive pinion bearing adjusting spacers

<table>
<thead>
<tr>
<th>Length mm (in)</th>
<th>Part number*</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.5 (1.831)</td>
<td>38165-10V00</td>
</tr>
<tr>
<td>46.8 (1.843)</td>
<td>38165-10V01</td>
</tr>
<tr>
<td>45.6 (1.795)</td>
<td>38165-10V05</td>
</tr>
<tr>
<td>46.2 (1.819)</td>
<td>38165-10V06</td>
</tr>
<tr>
<td></td>
<td>38165-10V07</td>
</tr>
</tbody>
</table>

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