

## GROUP 26

## FRONT AXLE

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## GENERAL DESCRIPTION

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The front axle consists of the front hubs, knuckles, drive shaft, wheel bearings, ball joints, front differential, and free wheeling clutch. The features are:

- The structural method of press fitting unit bearing into front hub is applied.
- The wheel bearing uses a taper roller unit bearing. A rotor for detecting the wheel speed is press-fitted to the UJ outer wheel.

*NOTE: DOJ: Double Offset Joint. UJ: Under cut Joint.*

- Drive shafts incorporate UJ-DOJ-type constant velocity ball joint has high power transmission efficiency and reduces vibration and noise.
- A vacuum-type free wheeling clutch has been adopted in the freewheel mechanism. Its solenoid valve and actuator Switch powertrain between RWD and 4WD.
- The differential support method is a four-point elastic support method which reduce vibration and noise.

## FRONT AXLE DIAGNOSIS

### INTRODUCTION TO FRONT AXLE DIAGNOSIS

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The 4WD vehicle incorporates a free wheeling clutch as the free-wheeling mechanism. The free wheeling clutch is configured of the mainshaft, shift fork and clutch gears, etc., and is electrically controlled.

If the clutch does not lock or locks but does not become free, there may be electrical trouble or the component may be faulty. Noise from the driveshaft, inner shaft or differential can be caused by a component defect.

### FRONT AXLE DIAGNOSTIC TROUBLESHOOTING STRATEGY

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Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a front axle fault.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify malfunction is eliminated.

### SYMPTOM CHART

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SYMPTOMS		INSPECTION PROCEDURE	REFERENCE PAGE
Free wheeling Clutch	Does not lock	1	P.26-3
	Locks but does not become free	2	P.26-3
Driveshaft, inner shaft	Noise during wheel rotation	3	P.26-4
	Noise due to excessive wheel play in turning direction	4	P.26-4
Differential	Constant noise	5	P.26-4
	Gear noise while driving	6	P.26-6
	Gear noise while coasting	7	P.26-7
	Bearing noise while driving or coasting	8	P.26-7
	Noise while turning	9	P.26-7
	Heat	10	P.26-8
	Oil leakage	11	P.26-8

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## SYMPTOM PROCEDURES

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### INSPECTION PROCEDURE 1: Does not Lock

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#### DIAGNOSIS

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**STEP 1. Check for looseness in the actuator assembly installation bolt.**

**Q: Is the actuator assembly installation bolt loosened?**

**YES :** Tighten to  $17 \pm 3$  N·m ( $13 \pm 2$  ft-lb). Then go to Step 7.

**NO :** Go to Step 2.

---

**STEP 2. Check the vacuum tank for damage.**

**Q: Is the vacuum tank damaged?**

**YES :** Replace the tank. Then go to Step 7.

**NO :** Go to Step 3.

---

**STEP 3. Check the check valve for damage.**

**Q: Is the check valve damaged?**

**YES :** Replace the valve. Then go to Step 7.

**NO :** Go to Step 4.

---

**STEP 4. Check the actuator assembly for damage.**

**Q: Is the actuator assembly damaged?**

**YES :** Replace the actuator assembly. Then go to Step 7.

**NO :** Go to Step 5.

---

**STEP 5. Check the solenoid valve operation.**

Refer to [P.26-17](#).

**Q: Is the solenoid valve operation in good condition?**

**YES :** Go to Step 6.

**NO :** Replace the valve. Then go to Step 7.

---

**STEP 6. Check the shift fork, mainshaft and clutch gear for damage.**

**Q: Is the shift fork, mainshaft or clutch gear damaged?**

**YES :** Replace the damaged part. Then go to Step 7.

**NO :** Go to Step 7.

---

**STEP 7. Retest the system.**

**Q: Does clutch locks?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

---

### INSPECTION PROCEDURE 2: Locks but does not Become Free

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#### DIAGNOSIS

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**STEP 1. Check whether foreign material has entered the mainshaft and clutch gear or clutch sleeve and clutch gear teeth.**

**Q: Has foreign material entered the mainshaft and clutch gear or clutch sleeve and clutch gear teeth?**

**YES :** Clean the teeth or replace the part. Then go to Step 2.

**NO :** There is no action to be taken.

---

**STEP 2. Retest the system.**

**Q: Does clutch become free?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

**INSPECTION PROCEDURE 3: Noise during Wheel Rotation****DIAGNOSIS**

**STEP 1. Check the housing tube and inner shaft for bending.**

**Q: Is the housing tube and inner shaft bent?**

**YES :** Replace the part. Then go to Step 4.

**NO :** Go to step 2.

**STEP 2. Check the inner shaft bearing for wear.**

**Q: Is the inner shaft bearing worn?**

**YES :** Replace the bearings. Then go to Step 4.

**NO :** Go to Step 3.

**STEP 3. Check the driveshaft assembly for wear, damage or bending.**

**Q: Is the driveshaft assembly worn, damaged or bent?**

**YES :** Replace the driveshaft assembly. Then go to Step 4.

**NO :** There is no action to be taken.

**STEP 4. Retest the system.**

**Q: Is the abnormal noise eliminated?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

**INSPECTION PROCEDURE 4: Noise Due to Excessive Wheel Play in Turning Direction****DIAGNOSIS**

**STEP 1. Check for play in the inner shaft and side gear serration, the driveshaft and side gear, or the driveshaft and drive flange.**

**Q: Is play found?**

**YES :** Adjust or replace the part. Then go to Step 2.

**NO :** The procedure is complete.

**STEP 2. Retest the system.**

**Q: Is the abnormal noise eliminated?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

**INSPECTION PROCEDURE 5: Constant Noise****DIAGNOSIS**

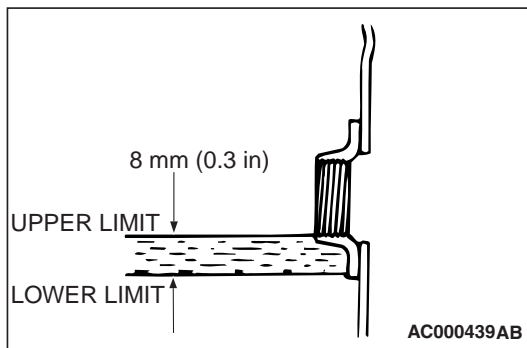
**STEP 1. Check the oil level.**

Remove the filler plug and check the gear oil level.

**Q: Is the gear oil level more than 8 mm (0.3 inch) below the bottom of the filler plug hole?**

**YES :** Check the oil leakage from differential carrier, and repair if necessary. Then, refill Hypoid gear oil API classification GL-5 or higher; Above  $-23^{\circ}\text{C}$  ( $-10^{\circ}\text{F}$ ): SAE 90, 85W-90, 80W-90, From  $-34$  to  $-23^{\circ}\text{C}$  ( $-30$  to  $-10^{\circ}\text{F}$ ): SAE 80W, 80W-90, Below  $-34^{\circ}\text{C}$  ( $-30^{\circ}\text{F}$ ): SAE 75W. Then go to Step 9.

**NO :** Go to Step 2.



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**STEP 2. Check the tooth contact (engagement) of the drive gear and drive pinion. Refer to P.26-43.**

**Q: Is the tooth contact (engagement) of the drive gear and drive pinion correct?**

**YES :** Go to Step 3.

**NO :** Adjust or replace the part. Then go to Step 9.

---

**STEP 3. Check the side bearing for looseness, wear or damage.**

**Q: Is the side bearing loosened, worn or damaged?**

**YES :** Adjust or replace the part. Then go to Step 9.

**NO :** Go to Step 4.

---

**STEP 4. Check the drive pinion bearing for wear or damage.**

**Q: Is the drive pinion bearing worn or damaged?**

**YES :** Adjust or replace the part. Then go to Step 9.

**NO :** Go to Step 5.

---

**STEP 5. Check the drive gear and drive pinion for wear.**

**Q: Is the drive gear or drive pinion worn?**

**YES :** Replace the part. Then go to Step 9.

**NO :** Go to Step 6.

---

**STEP 6. Check the side gear thrust washer or pinion shaft for wear.**

**Q: Is the side gear thrust washer or pinion shaft worn?**

**YES :** Replace the part. Then go to Step 9.

**NO :** Go to Step 7.

---

**STEP 7. Check the drive gear and differential case for strain, and the gear for damage.**

**Q: Is the drive gear or differential case strained or damaged?**

**YES :** Replace the part. Then go to Step 9.

**NO :** Go to Step 8.

---

**STEP 8. Check for the engagement of foreign material.**

**Q: Is foreign material found?**

**YES :** Remove the foreign material and then inspect. If necessary, replace the part. Then go to Step 9.

**NO :** Go to Step 9.

---

**STEP 9. Retest the system.**

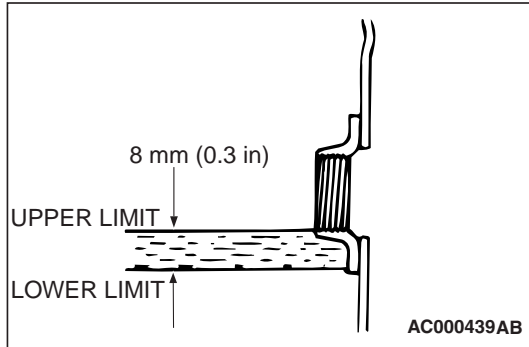
**Q: Is the abnormal noise eliminated?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

## INSPECTION PROCEDURE 6: Gear Noise while Driving

## DIAGNOSIS

**STEP 1. Check the oil level.**

Remove the filler plug and check the gear oil level.

**Q: Is the gear oil level more than 8 mm (0.3 inch) below the bottom of the filler plug hole?**

**YES :** Check the oil leakage from differential carrier, and repair if necessary. Then, refill Hypoid gear oil API classification GL-5 or higher; Above  $-23^{\circ}\text{C}(-10^{\circ}\text{F})$ : SAE 90, 85W-90, 80W-90, From  $-34$  to  $-23^{\circ}\text{C}(-30$  to  $-10^{\circ}\text{F})$ : SAE 80W, 80W-90, Below  $-34^{\circ}\text{C}(-30^{\circ}\text{F})$ : SAE 75W. Then go to Step 7.

**NO :** Go to Step 2.

**STEP 2. Check the gear engagement.**

**Q: Is the gear engagement in good condition?**

**YES :** Go to Step 3.

**NO :** Adjust the drive gear and drive pinion. Then go to Step 6.

**STEP 3. Check the drive pinion turning torque. Refer to P.26-50.**

**Q: Is the drive pinion turning torque correct?**

**YES :** Go to Step 4.

**NO :** Adjust the turning torque. Then go to Step 7.

**STEP 4. Check the gear for damage.**

**Q: Is the gear damaged?**

**YES :** Replace the gear. Then go to Step 7.

**NO :** Go to Step 5.

**STEP 5. Check for the engagement of foreign material.**

**Q: Is the foreign material found?**

**YES :** Remove the foreign material and then inspect. If necessary, replace the part. Then go to Step 7.

**NO :** Go to Step 6.

**STEP 6. Retest the system.**

**Q: Is the abnormal noise eliminated?**

**YES :** Replace the drive gear and drive pinion. Then go to Step 7.

**NO :** The procedure is complete.

**STEP 7. Retest the system.**

**Q: Is the abnormal noise eliminated?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

---

**INSPECTION PROCEDURE 7: Gear Noise while Coasting**

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**DIAGNOSIS**

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**STEP 1. Check the drive pinion turning torque.**  
Refer to **P.26-50**.

**Q: Is the drive pinion turning torque correct?**  
**YES :** Go to Step 2.  
**NO :** Adjust the turning torque. Then go to Step 3.

---

**STEP 2. Check the gear for damage.**

**Q: Is the gear damaged?**  
**YES :** Replace the gear. Then go to Step 3.  
**NO :** There is no action to be taken.

---

**STEP 3. Retest the system.**

**Q: Is the abnormal noise eliminated?**  
**YES :** The procedure is complete.  
**NO :** Repeat from Step 1.

---

**INSPECTION PROCEDURE 8: Bearing Noise while Driving or Coasting**

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**DIAGNOSIS**

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**STEP 1. Check the drive pinion rear bearing for cracks or damage.**

**Q: Is the drive pinion rear bearing cracked or damaged?**  
**YES :** Replace the part. Then go to Step 2.  
**NO :** There is no action to be taken.

---

**STEP 2. Retest the system.**

**Q: Is the abnormal noise eliminated?**  
**YES :** The procedure is complete.  
**NO :** Repeat from Step 1.

---

**INSPECTION PROCEDURE 9: Noise while Turning**

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**DIAGNOSIS**

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**STEP 1. Check the side bearing for wear or damage.**

**Q: Is the side bearing worn or damaged?**  
**YES :** Replace the part. Then go to Step 3.  
**NO :** Go to step 2.

---

**STEP 2. Check the side gear, pinion gear or pinion shaft for damage.**

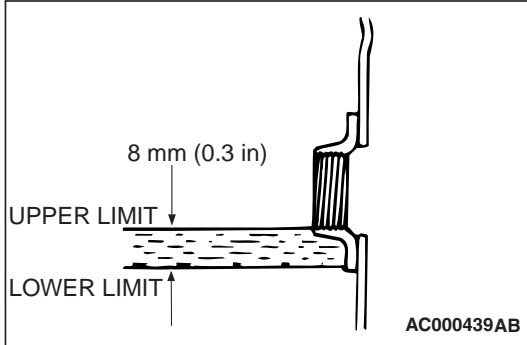
**Q: Is the side gear, pinion gear or pinion shaft damaged?**  
**YES :** Replace the part. Then go to Step 3.  
**NO :** There is no action to be taken.

---

**STEP 3. Retest the system.**

**Q: Is the abnormal noise eliminated?**  
**YES :** The procedure is complete.  
**NO :** Repeat from Step 1.

## INSPECTION PROCEDURE 10: Heat



## DIAGNOSIS

**STEP 1. Check the oil level.**

Remove the filler plug and check the gear oil level.

**Q: Is the gear oil level more than 8 mm (0.3 inch) below the bottom of the filler plug hole?**

**YES :** Check the oil leakage from differential carrier, and repair if necessary. Then, refill Hypoid gear oil API classification GL-5 or higher; Above  $-23^{\circ}\text{C}(-10^{\circ}\text{F})$ : SAE 90, 85W-90, 80W-90, From  $-34$  to  $-23^{\circ}\text{C}(-30$  to  $-10^{\circ}\text{F})$ : SAE 80W, 80W-90, Below  $-34^{\circ}\text{C}(-30^{\circ}\text{F})$ : SAE 75W. Then go to Step 3.

**NO :** Go to Step 2.

**STEP 2. Check the gear backlash (excessive) Refer to P.26-50.**

**Q: Is the gear backlash correct?**

**YES :** Go to Step 3.

**NO :** Adjust the backlash. Then go to step 3.

**STEP 3. Retest the system.**

**Q: Is the heat eliminated?**

**YES :** The procedure is complete.

**NO :** Repeat from Step 1.

## INSPECTION PROCEDURE 11: Oil Leakage

## DIAGNOSIS

**STEP 1. Check the vent plug for clogging.**

**Q: Is the vent plug clogged?**

**YES :** Clean or replace the part. Then go to Step 5.

**NO :** Go to step 2.

**STEP 2. Check the cover installation.**

**Q: Is the cover installed properly?**

**YES :** Go to Step 3.

**NO :** Repair. Then go to Step 5.

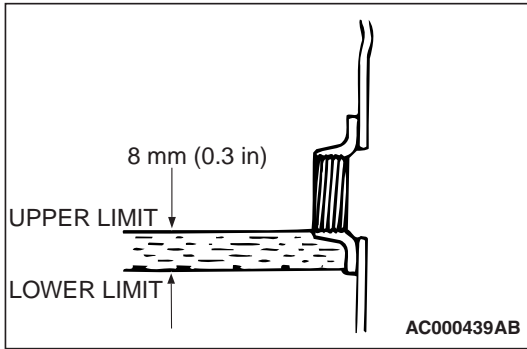
**STEP 3. Check the oil seal for wear or damaged.**

**Q: Is the oil seal worn or damaged?**

**YES :** Replace the seal. Then go to Step 5.

**NO :** Go to Step 4.





**STEP 4. Check the oil level.**

Remove the filler plug and check the gear oil level.

**Q: Is the gear oil level more than 8 mm (0.3 inch) below the bottom of the filler plug hole?**

**YES :** Check the oil leakage from differential carrier, and repair if necessary. Then, refill Hypoid gear oil API classification GL-5 or higher; Above  $-23^{\circ}\text{C}(-10^{\circ}\text{F})$ : SAE 90, 85W-90, 80W-90, From  $-34$  to  $-23^{\circ}\text{C}(-30$  to  $-10^{\circ}\text{F})$ : SAE 80W, 80W-90, Below  $-34^{\circ}\text{C}(-30^{\circ}\text{F})$ : SAE 75W. Then go to Step 5.

**NO :** There is no action to be taken.

**STEP 5. Retest the system.**

**Q: Is there oil leakage?**

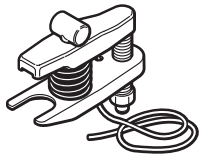
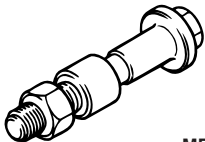
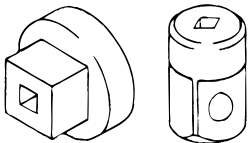
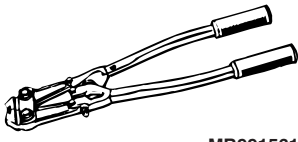

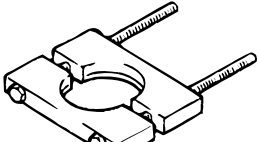

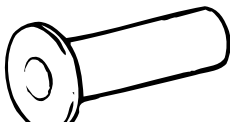
**YES :** Repeat from Step 1.


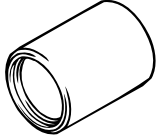
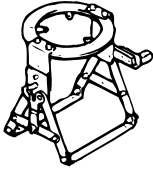
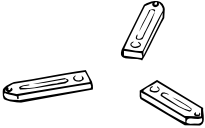


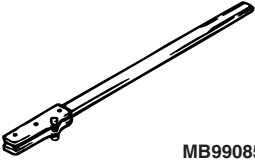
**NO :** The procedure is complete.

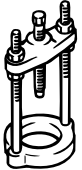
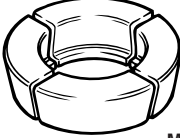

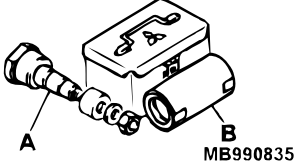
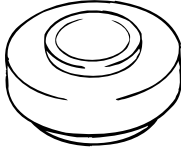
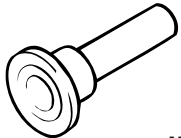

## SPECIAL TOOLS

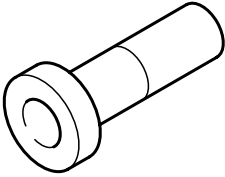
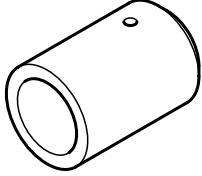
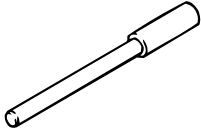
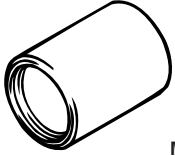
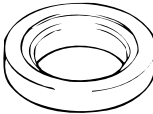
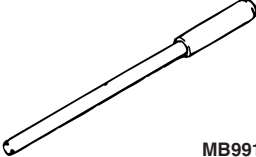


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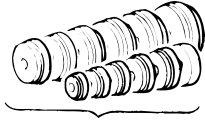

TOOLS	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
<p>MB990925</p>	<p>MB990925 Bearing and oil seal installer set</p>	<p>MB990925-01 or General service tool</p>	<ul style="list-style-type: none"> <li>• Press-fitting of wheel bearing outer race MB990935 MB990938</li> <li>• Press-fitting of oil seal (differential carrier)</li> <li>• Press-fitting of drive pinion rear bearing outer race MB990934 MB990938</li> <li>• Press-fitting of drive pinion front bearing outer race MB990936 MB990938</li> <li>• Oil seal installation (free wheel clutch) MB990926 MB990938</li> </ul>
<p>MB990590</p>	<p>MB990590 Rear axle shaft oil seal remover A: MB990212 Adapter B: MB990211 Sliding hammer</p>	<p>–</p>	<ul style="list-style-type: none"> <li>• Removal of differential carrier oil seal</li> <li>• Removal and installation of inner shaft (Used together with MB990906)</li> </ul>
<p>B990767</p>	<p>MB990767 Front hub and flange yoke holder</p>	<p>MB990767-01</p>	<p>Hub fixing</p>

TOOLS	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
 <p>AC106827</p>	MB991897 Ball joint remover	MB990635-01, MB991113-01 or General service tool	Knuckle and tie rod end ball joint disconnection <i>NOTE: Steering linkage puller (MB990635 or MB991113) is also used to disconnect knuckle and tie rod end ball joint.</i>
 <p>MB990998</p>	MB990998 Front hub remover and installer	MB990998-01 or General service tool	Inspection of hub rotation starting torque
 <p>MB990326</p>	MB990326 Preload socket	General service tool	<ul style="list-style-type: none"> <li>Inspection of hub rotation starting torque</li> <li>Measurement of wheel bearing turning torque</li> </ul>
 <p>MB991561</p>	MB991561 Boot band crimping tool	MB991561	Resin boot band installation
 <p>MB990906</p>	MB990906 Driveshaft attachment	MB990241-01	Removal and installation of inner shaft (Used together with MB990211)
 <p>MB990560</p>	MB990560 Bearing remover	MD998348-01	<ul style="list-style-type: none"> <li>Removal and press-fitting of inner shaft bearing</li> <li>Removal of freewheel clutch bearing</li> </ul>
 <p>MB990955</p>	MB990955 Oil seal installer	MB990955-01	Press-fitting of housing tube dust seal (Used together with MB990938)
 <p>MB991168</p>	MB991168 Differential oil seal installer	-	Installation of freewheel clutch oil seal

TOOLS	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
 <p>MB990799</p>	<p>MB990799 Ball joint Remover and installer</p>	<p>MB990799-01</p>	<p>Installation of freewheel clutch bearing</p>
 <p>MB990890</p>	<p>MB990890 or MB990891 Rear suspension bushing base</p>	<p>MB990890-01</p>	
 <p>MB990909</p>	<p>MB990909 Working base</p>	<p>–</p>	<p>Supporting of front differential carrier assembly</p>
	<p>MB991116 Adapter</p>	<p>–</p>	<p>Supporting of front differential carrier assembly</p>
 <p>MB990810</p>	<p>MB990810 Side bearing puller</p>	<p>MB990810-01</p>	<ul style="list-style-type: none"> <li>• Remove of side bearing inner race</li> <li>• Remove of companion flange</li> </ul>
 <p>MB990811</p>	<p>MB990811 Differential side bearing cap</p>	<p>MB990811-01</p>	
 <p>MB990850</p>	<p>MB990850 End yoke holder</p>	<p>MB990850-01</p>	<p>Removal and installation of companion flange</p>

TOOLS	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
 <p>MB990339</p>	MB990339 Bearing puller	MB990339-01	Removal of drive pinion front bearing inner race
 <p>MB990648</p>	MB990648 Bearing remover	MB990648-01	
	MB990685 Torque wrench	–	<ul style="list-style-type: none"> <li>• Inspection of hub rotation starting torque</li> <li>• Measurement of wheel bearing turning torque</li> </ul>
 <p>A B MB990835</p>	MB991171 Pinion height gauge set A: MB990819 Drive pinion gauge assembly B: MB991170 Cylinder gauge	–	<ul style="list-style-type: none"> <li>• Inspection of drive pinion rotation starting torque</li> <li>• Measurement of drive pinion height</li> </ul>
 <p>MB990802</p>	MB990802 Bearing installer	MB990802-01	<ul style="list-style-type: none"> <li>• Press-fitting of drive pinion front bearing inner race</li> <li>• Press-fitting of side bearing inner race</li> </ul>
 <p>MB990031</p>	MB990031 or MB990699 Drive pinion oil seal installer	MB990031-01	Press-fitting of drive pinion oil seal
	MB990813 Tap	–	Removal of adhesive

TOOLS	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
	MD999547 Oil seal installer	–	Removal of front differential mount insulator <Front side, Rear side (LH)>
	MD999570 Crankshaft front oil seal insulator	–	Removal of front differential mount insulator <Rear side (RH)>
 <p>MB990947</p>	MB990947 Lower arm bushing arbor	MB990947	Press fitting of front differential mount insulator <Front side, Rear side (LH)>
 <p>MB990847</p>	MB990847 Rear suspension bushing remover and installer base	MB990847	
 <p>MB990981</p>	MB990981 Mount bushing remover and installer	–	
 <p>MB991318</p>	MB991318 Lower arm bushing arbor	–	Press fitting of front differential mount insulator <Rear side (RH)>
 <p>MB991183</p>	MB991183 Bushing arbor	–	
 <p>MB990843</p>	MB990843 Draglink bushing remover and installer	–	

TOOL	TYPE	TOOL NUMBER	O D mm (in)
<p>MB990925</p>  <p>A INSTALL ADAPTER</p> <p>C BRASS BAR</p> <p>B BAR (SNAP-IN TYPE)</p>  <p>TOOL BOX</p> <p>ACX02372 AB</p>	A	MB990926	39.0 (1.54)
		MB990927	45.0 (1.77)
		MB990928	49.5 (1.95)
		MB990929	51.0 (2.00)
		MB990930	54.0 (2.13)
		MB990931	57.0 (2.24)
		MB990932	61.0 (2.40)
		MB990933	63.5 (2.50)
		MB990934	67.5 (2.66)
		MB990935	71.5 (2.81)
		MB990936	75.5 (2.97)
		MB990937	79.0 (3.11)
			B
	C	MB990939	-

## ON-VEHICLE SERVICE

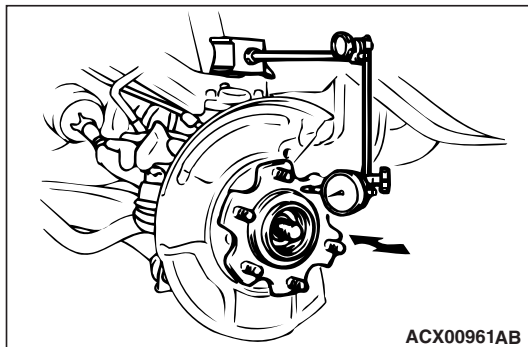
### WHEEL BEARING PLAY CHECK

M1261001100094

1. Remove caliper assembly and suspend it with wire to prevent it from falling.
2. Remove brake disc from hub.
3. Set dial gauge as shown in the diagram and move hub in the axis to measure backlash.

**Limit: 0 mm (0 inch)**

4. If the play exceeds the limit value, disassemble hub knuckle to check each component. If the front hub assembly bearing is faulty, replace the front hub assembly.



### FRONT AXLE TOTAL BACKLASH CHECK

M1261001300087

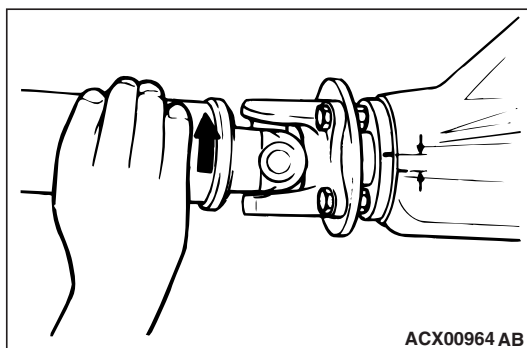
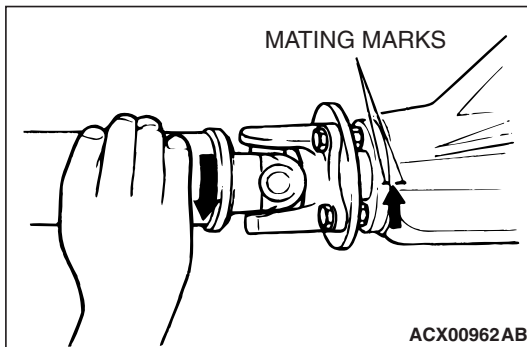
When the ignition switch is in "LOCK" (OFF) position, the front wheel comes to a stop after turning the propeller shaft by hand due to the force applied to front wheel actuator. Inspect the vehicle as follows:

1. Turn the ignition switch to "LOCK" (OFF) position, and then put the transfer shift lever to the "2H" position.

**⚠ CAUTION**

**Do not jack up the vehicle.**

2. Turn the propeller shaft until a click is heard.
3. Turn the companion flange clockwise until all play is eliminated, and then align the mating mark on the dust cover with the mating mark on the differential carrier.



4. Turn the companion flange counterclockwise until all play is eliminated and measure the distance through which the mating marks moved.

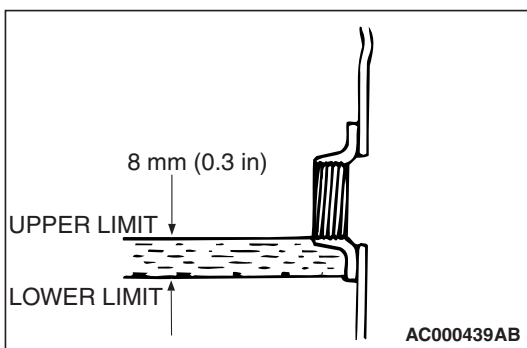
**Limit: 11 mm (0.4 inch)**

5. If the amount of movement exceeds the limit value, check the following.
  - Final drive gear backlash
  - Differential gear backlash
  - Play in the serrations and splines of the side gears, drive shaft, and drive flange

### FRONT AXLE GEAR OIL LEVEL CHECK

M1262000900108

1. Remove the filler plug and check the gear oil level.
2. Check that the gear oil level is not more than 8 mm (0.3 inch) below the bottom of the filler plug hole.



**GEAR OIL REPLACEMENT**

M1262005100011

1. Remove the filler plug.
2. Remove the drain plug and drain oil.
3. Tighten the drain plug to the specified torque.  
**Tightening torque: 65 ± 5 N·m (48 ± 4 ft-lb)**
4. Add the oil until the level comes to the lower portion of the filler plug hole.

**Specified gear oil: Hypoid gear oil API classification GL-5 or higher**

**Above -23°C(-10°F): SAE90, 85W-90, 80W-90**

**From -34 to -23°C(-30 to -10°F): SAE80W, 80W-90**

**Below -34°C(-30°F): SAE75W**

5. Tighten the filler plug to the specified torque.  
**Tightening torque: 50 ± 10 N·m (37 ± 7 ft-lb)**

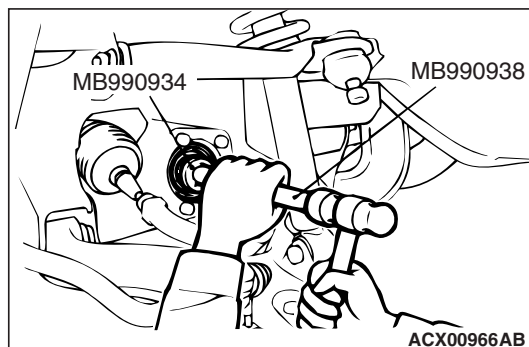
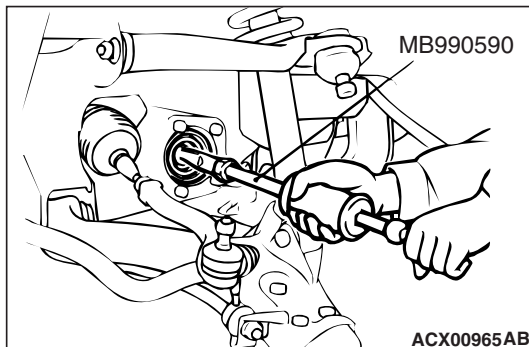
**DIFFERENTIAL CARRIER OIL SEAL REPLACEMENT**

M1262001000056

**Required Special Tools:**

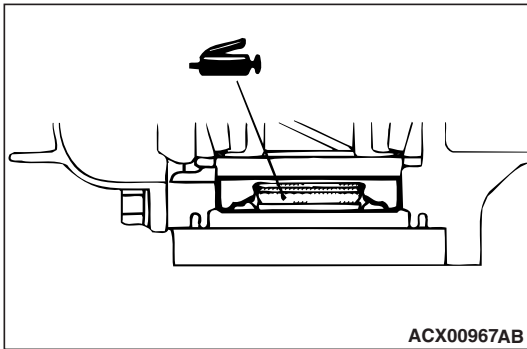
- MB990590: Rear Axle Shaft Oil Seal Remover
- MB990934: Bearing and Oil Seal Installer Set
- MB990938: Bearing and Oil Seal Installer Set

1. Remove the drive shaft <LH> (Refer to [P.26-24](#)).
2. Remove the oil seal with special tool MB990590.



3. Install new oil seal with special tools MB990934 and MB990938.

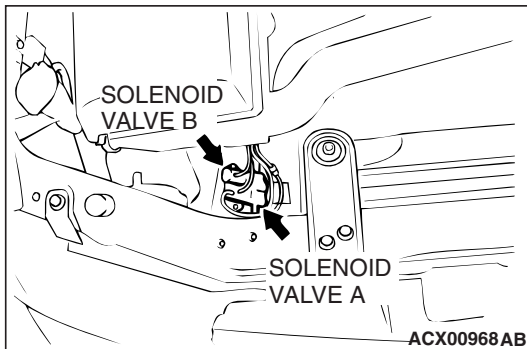




4. Apply multipurpose grease to the oil seal to lip before installing the drive shaft <LH> (Refer to P.26-24).

**CAUTION**

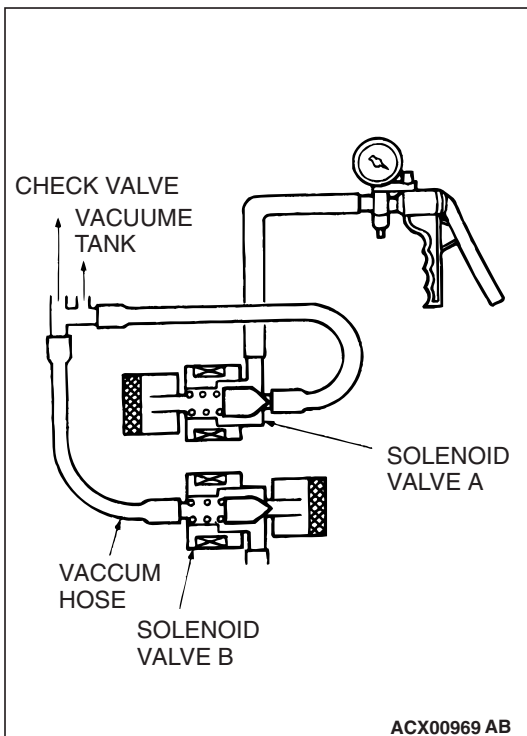
- Be careful not damage the lip of oil seal.
- Replace the circlip attached to the spline of <LH> DOJ side of driveshaft with a new one.



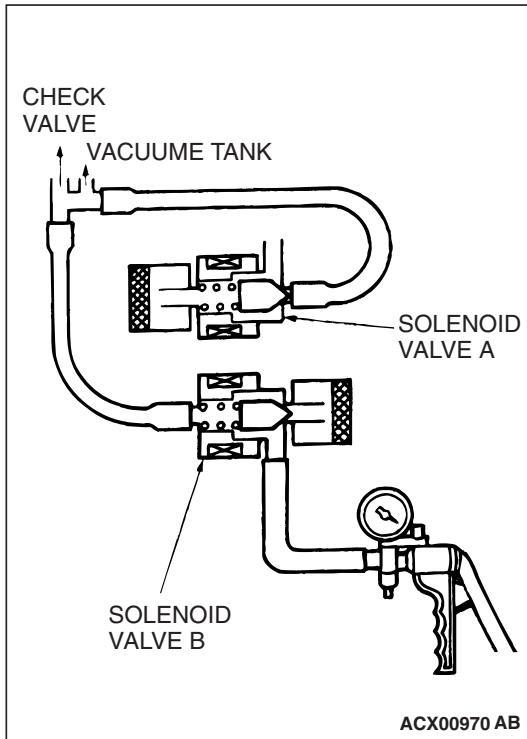
**SOLENOID VALVE OPERATION CHECK**

M1261001500070

1. Remove the vacuum hoses (blue stripe, yellow stripe) from the solenoid valves.
2. Disconnect the harness connectors.



3. Connect a hand vacuum pump to solenoid valve A and carry out the following inspections.
  - (1) Even if the hand pump is operated with no other operation, no negative pressure develops.
  - (2) Negative pressure does not develop when battery voltage is applied to solenoid valve A. Negative pressure is maintained when the vacuum hose of solenoid valve B is blocked by bending.
  - (3) When battery voltage is applied to solenoids A and B, negative pressure is maintained.



4. Connect the hand vacuum pump to solenoid valve B. Apply negative pressure and carry out the following inspections.
  - (1) With no change, negative pressure is maintained.
  - (2) When battery voltage is applied to solenoid valve B, the vacuum shuts off.
  - (3) When battery voltage is applied to solenoid valve A, the vacuum shuts off.
5. Measure the resistance of the solenoid valves.

**Standard value: 36 – 46  $\Omega$  [at 20°C (68°F)]**

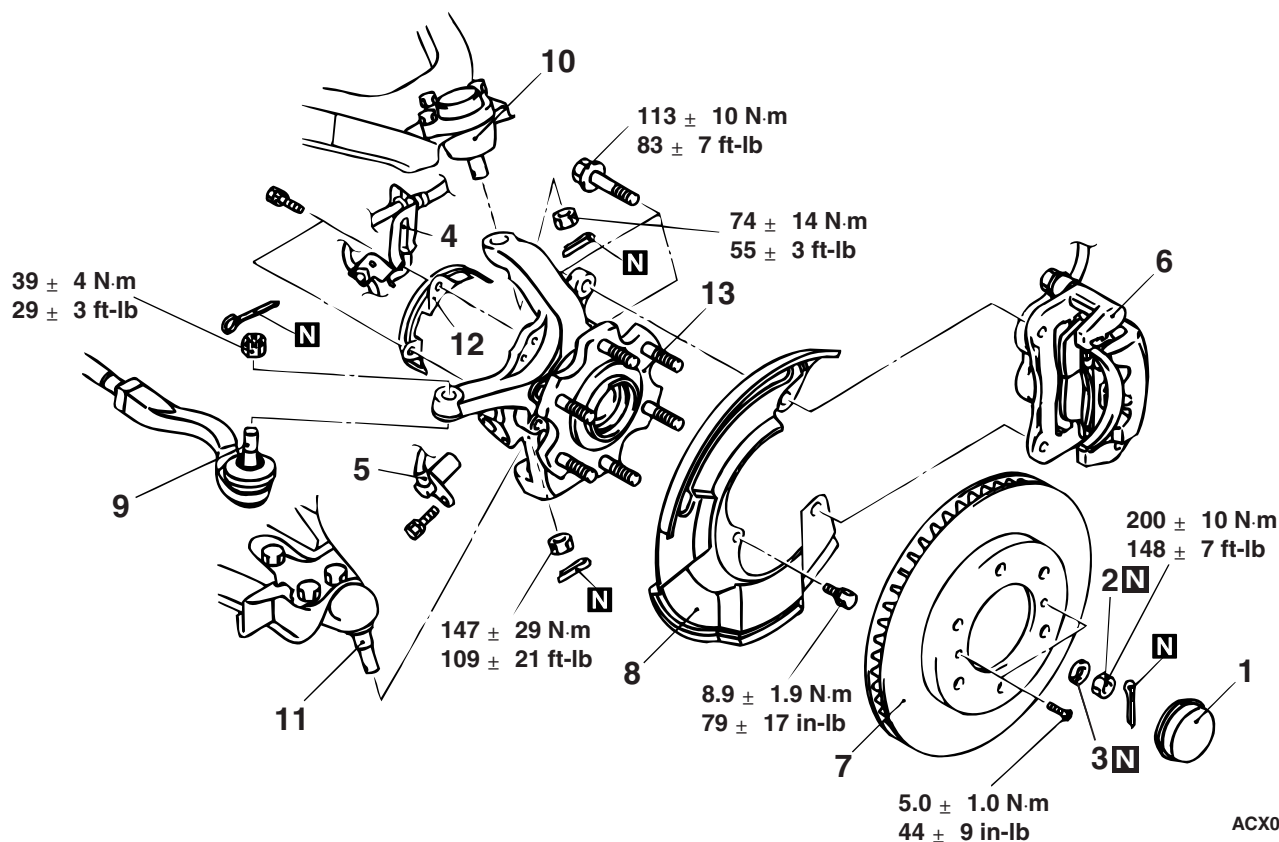
# HUB AND KNUCKLE ASSEMBLY

## REMOVAL AND INSTALLATION

M1261003000093

### Post-installation Operation

Check the dust cover for crack or damage by pushing it with your finger.



### REMOVAL STEPS

- 1. HUB CAP
- <<A>> >>C<< 2. CASTLE NUT
- >>C<< 3. WASHER
- 4. BRAKE HOSE AND VEHICLE SPEED SENSOR CLAMP BRACKET
- 5. WHEEL SPEED SENSOR
- 6. DISC BRAKE ASSEMBLY
- 7. BRAKE DISC
- 8. DUST COVER
- <<B>> >>B<< 9. TIE ROD END, HUB AND KNUCKLE ASSEMBLY CONNECTION

### REMOVAL STEPS (Continued)

- <<B>> >>A<< 10. UPPER ARM, HUB AND KNUCKLE ASSEMBLY CONNECTION
- <<B>> 11. LOWER ARM, HUB AND KNUCKLE ASSEMBLY CONNECTION
- 12. ROTOR PROTECTOR
- 13. HUB AND KNUCKLE ASSEMBLY

### Required Special Tools:

- MB990326: Preload Socket
- MB990767: Front Hub and Flange Yoke Holder
- MB990998: Front Hub Remover and Installer
- MB991897: Ball Joint Remover

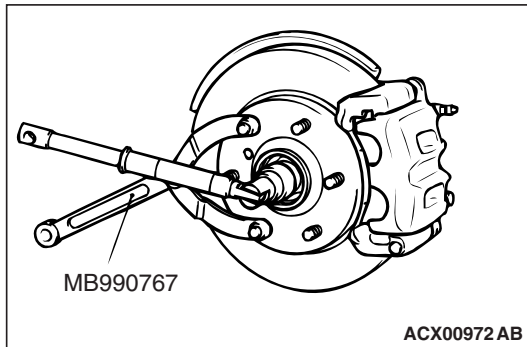
## REMOVAL SERVICE POINTS

## &lt;&lt;A&gt;&gt; CASTLE NUT REMOVAL

**⚠ CAUTION**

Do not apply pressure to the wheel bearing by the vehicle weight to avoid possible damage when the castle nut is loosened.

Use special tool MB990767 to fix hub and remove the castle nut.

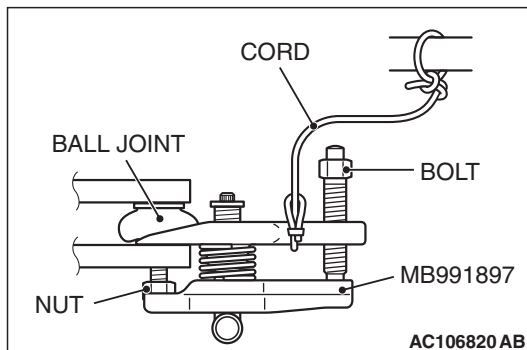


## &lt;&lt;B&gt;&gt; TIE ROD END/UPPER ARM/LOWER ARM DISCONNECTION

**⚠ CAUTION**

- Do not remove the nut from ball joint. Loosen it and use special tool to avoid possible damage to ball joint threads.
- Hang special tool with cord to prevent it from falling.

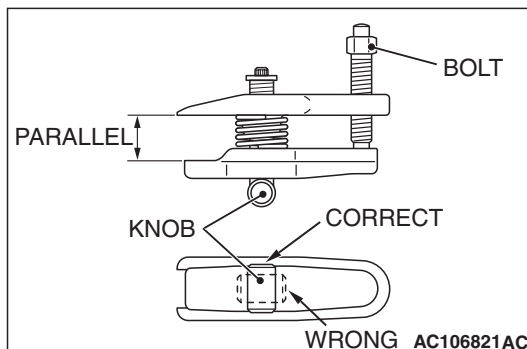
1. Install special tool MB991897 as shown in the figure.



2. Turn the bolt and knob as necessary to make the jaws of special tool MB991897 parallel, tighten the bolt by hand and confirm that the jaws are still parallel.

*NOTE: When adjusting the jaws in parallel, make sure the knob is in the position shown in the figure.*

3. Tighten the bolt with a wrench to disconnect the tie rod end.



## INSTALLATION SERVICE POINTS

### >>A<< UPPER ARM, HUB AND KNUCKLE ASSEMBLY CONNECTION

If the upper arm ball joint is disengaged from the knuckle, always renew the upper arm ball joint dust cover and retainer. (Refer to GROUP 33A-Upper Arm P.33-8.)

### >>B<< TIE ROD END, HUB AND KNUCKLE ASSEMBLY CONNECTION

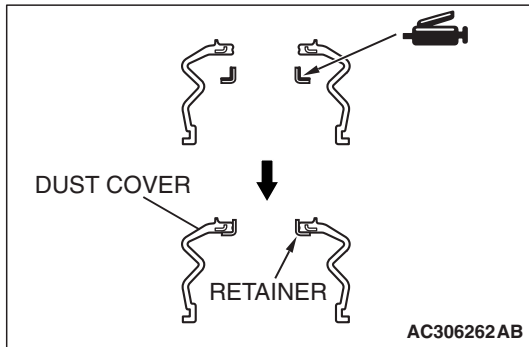
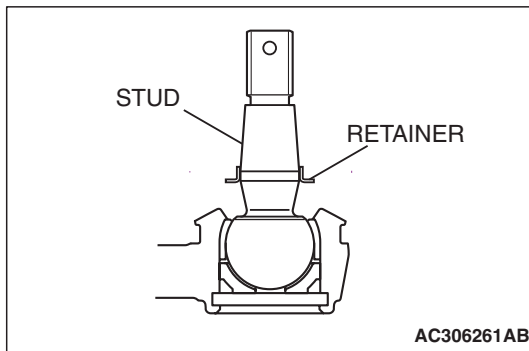
If the tie rod end ball joint is disengaged from the knuckle, always renew the tie rod end ball joint dust cover and retainer by following the procedure below.

1. Unclip the spring ring to removed the dust cover.

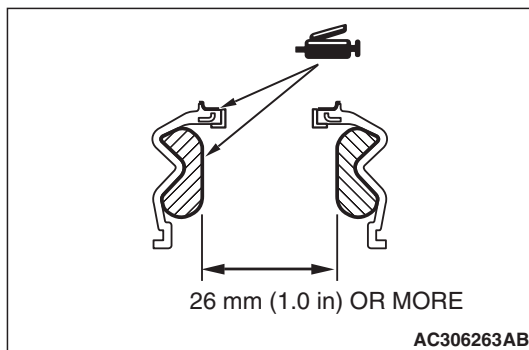
**⚠ CAUTION**

**Be careful not to damage the ball joint stud.**

2. Use a flat-tipped screwdriver to remove the retainer.



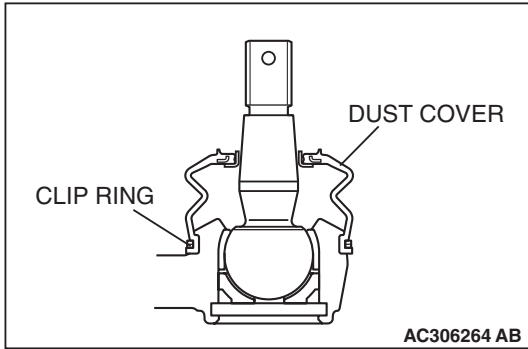
3. Apply multi-purpose grease to the new retainer, and assemble it to the new dust cover.



4. Fill multi-purpose grease inside the dust cover as shown.

**Amount to use:  $4 \pm 1$  g ( $0.14 \pm 0.04$  oz)**

5. Apply multi-purpose grease to the dust cover lip.
6. Tape the stud threads to avoid damage.

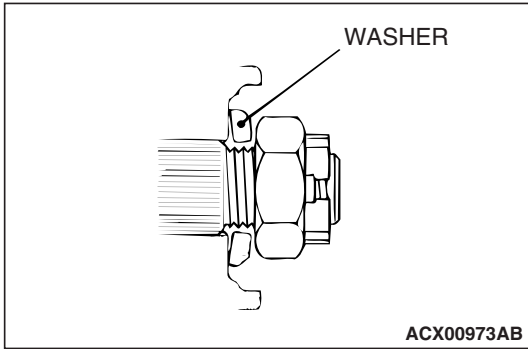


**⚠ CAUTION**

Ensure grease does not come into contact with the ball joint threads and tapers. Wipe off the grease if contaminated.

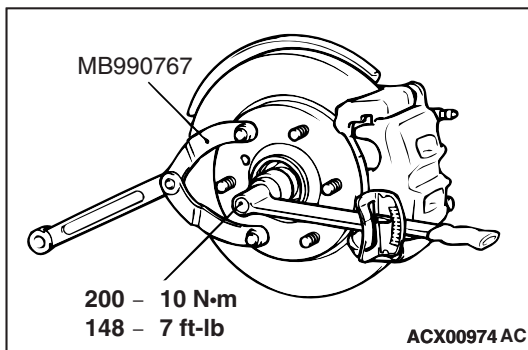
7. Install the ball joint to the dust cover.
8. Secure the dust cover with the clip ring.
9. Engage the tie rod end ball joint with the knuckle.

*NOTE: The retainer is secured in a predetermined position by tightening the ball joint nut to the specified torque.*



**>>C<< WASHER/CASTLE NUT INSTALLATION**

1. Face the flat side of a washer to a castle nut to install.



2. Tighten castle nut fully, using special tool MB990767.

**⚠ CAUTION**

Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage when castle nut is loosened.

3. If the pin holes do not align with one another, tighten the castle nut to find the mating hole within 30 degree angle and then bend the split pin to fit in.

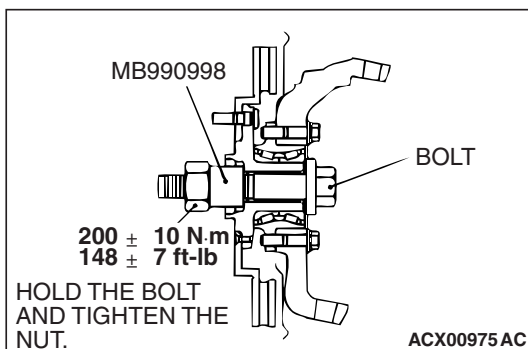
**INSPECTION**

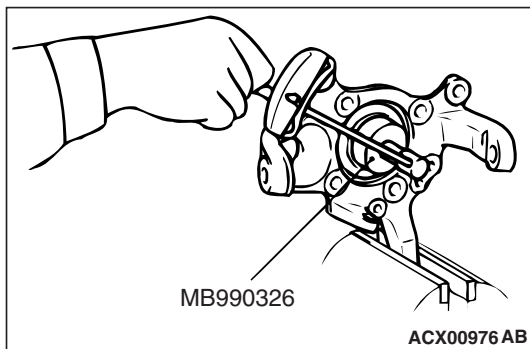
M1261003100056

**INSPECTION OF HUB ROTATION STARTING TORQUE**

1. Tighten special tool MB990998 in hub and knuckle assembly to the specified torque.

**Tightening torque: 200 ± 10 N·m (148 ± 7 ft-lb)**

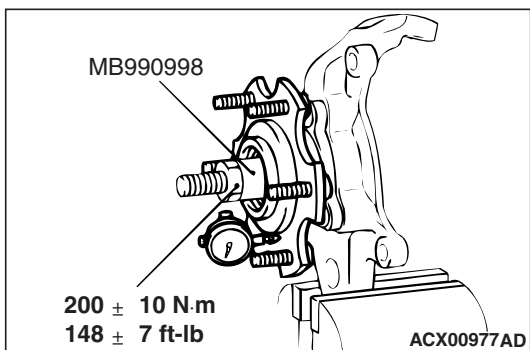




2. Measure the hub rotation starting torque with special tool MB990326.

**Limit: 1.75 N·m (15.48 in-lb)**

3. Hub rotation starting torque must be under the limit value and there should be no roughness when rotating the hub.



### WHEEL BEARING BACKLASH CHECK

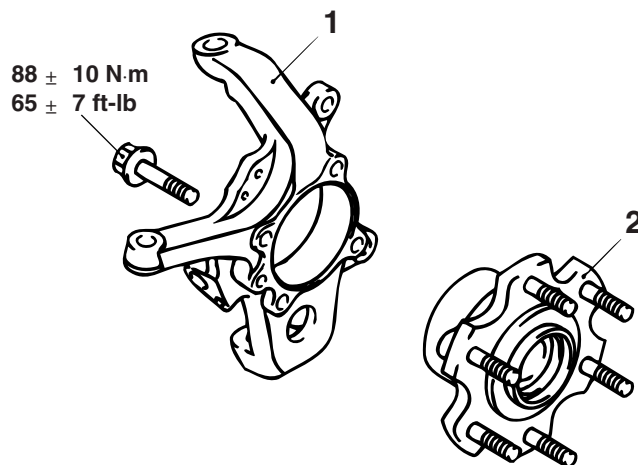
1. Secure the knuckle while holding the hub and knuckle assembly with special tool MB990998, in a vice to measure backlash in the wheel bearing.

**Limit: 0 mm (0 inch)**

2. If the value of backlash in hub axis cannot be obtained when tightened to the specified torque  $200 \pm 10$  N·m ( $148 \pm 7$  ft-lb), check mounting bolt for hub and knuckle assembly. If no defects are found, replace hub assembly.

## DISASSEMBLY AND ASSEMBLY

M1261006000036



### DISASSEMBLY STEPS

1. KNUCKLE
2. FRONT HUB ASSEMBLY

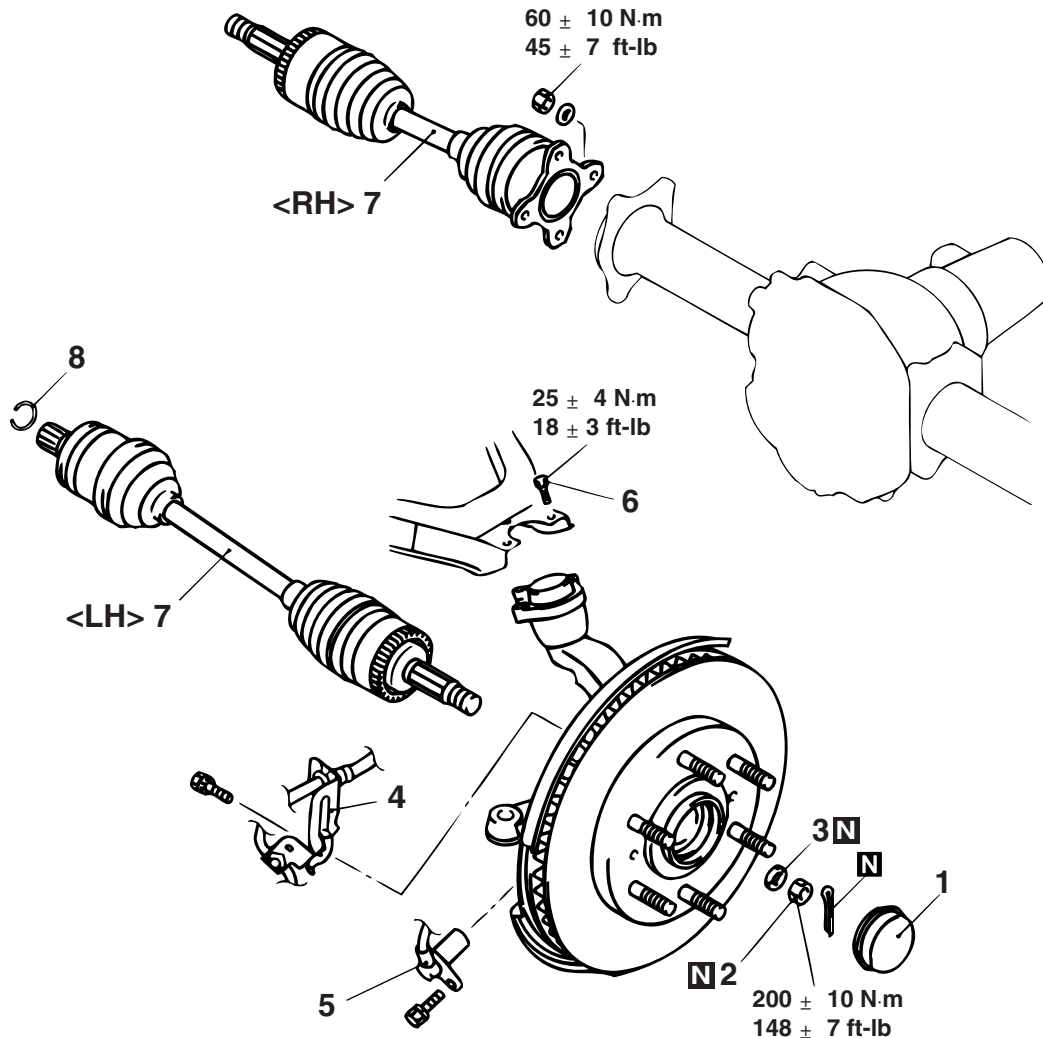
# DRIVESHAFT ASSEMBLY

## REMOVAL AND INSTALLATION

M1261003500441

### Pre-removal and Post-installation Operation

- Removal and Installation of Under Cover.
- Removal and Installation of Skid Plate (Refer to GROUP 51, Front Bumper P.51-3).
- Connection and Disconnection of Shock Absorber and Stabilizer Link in the Lower Arm Side (Refer to GROUP 33, Lower Arm P.33-15).
- Removal and Installation of Front Brake Assembly (Refer to GROUP 35A P.35A-142).
- Connection and Disconnection of Knuckle and Tie Rod End (Refer to GROUP 37, Steering Gear Box Assembly P.37-27).



ACX00979AC

### REMOVAL STEPS

1. HUB CAP
- <<A>> >>B<< 2. CASTLE NUT
- >>B<< 3. WASHER
4. BRAKE HOSE AND VEHICLE SPEED SENSOR CLAMP BRACKET

### REMOVAL STEPS (Continued)

5. WHEEL SPEED SENSOR
6. UPPER ARM AND UPPER ARM BALL JOINT CONNECTION
- <<B>> >>A<< 7. DRIVE SHAFT
8. CIRCLIP <LH>

### Required Special Tool:

- MB990767: Front Hub and Flange Yoke Holder



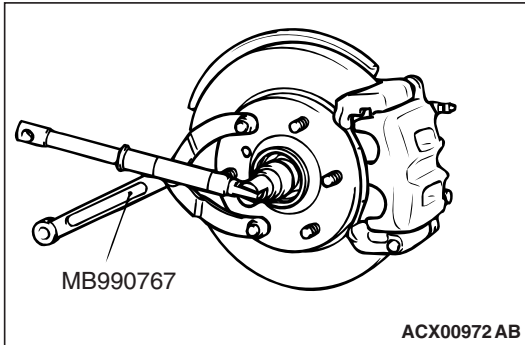
## REMOVAL SERVICE POINTS

### <<A>> CASTLE NUT REMOVAL

**⚠ CAUTION**

Do not apply pressure to the wheel bearing by the vehicle weight to avoid possible damage when castle nut is loosened.

Use special tool MB990767 to fix hub and remove the castle nut.



### <<B>> DRIVE SHAFT REMOVAL

**⚠ CAUTION**

When pulling the drive shaft out from the differential carrier, be careful that the spline part of the drive shaft does not damage the oil seal.

## INSTALLATION SERVICE POINTS

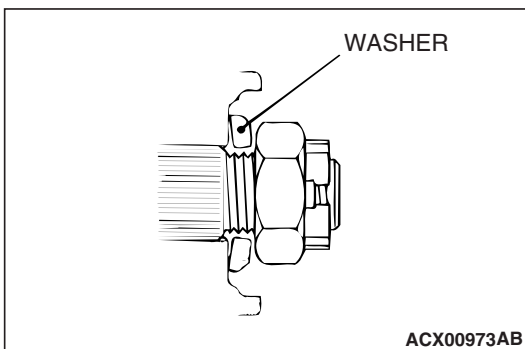
### >>A<< DRIVE SHAFT INSTALLATION

**⚠ CAUTION**

Do not damage the oil seal of the differential carrier by the drive shaft splines.

### >>B<< WASHER/CASTLE NUT INSTALLATION

1. Install washer with castle nut with its smaller side facing the castle nut.

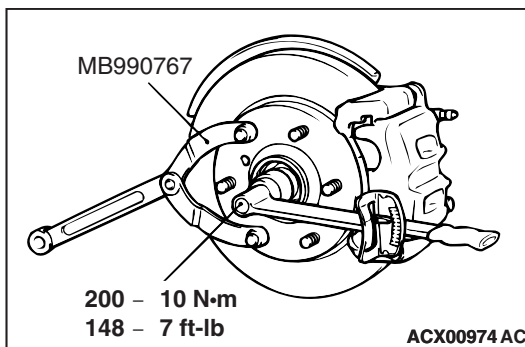


2. Tighten castle nut fully, using special tool MB990767.

**⚠ CAUTION**

Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage when castle nut is loosened.

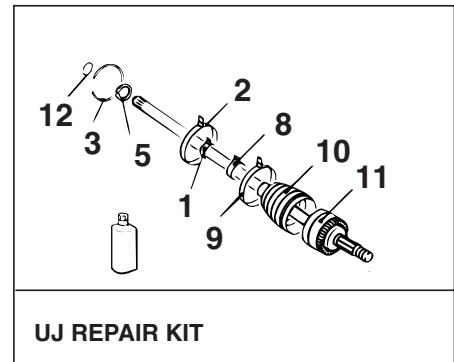
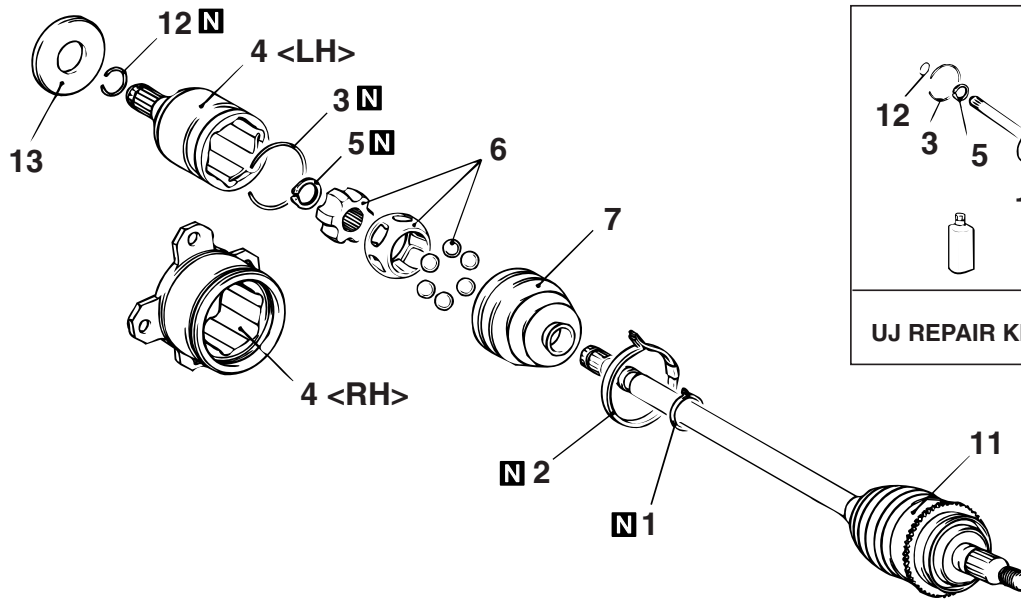
3. If the pin holes do not match with one another, tighten the castle nut to find the mating hole within 30 degree angle and then bend the split pin to fit in.



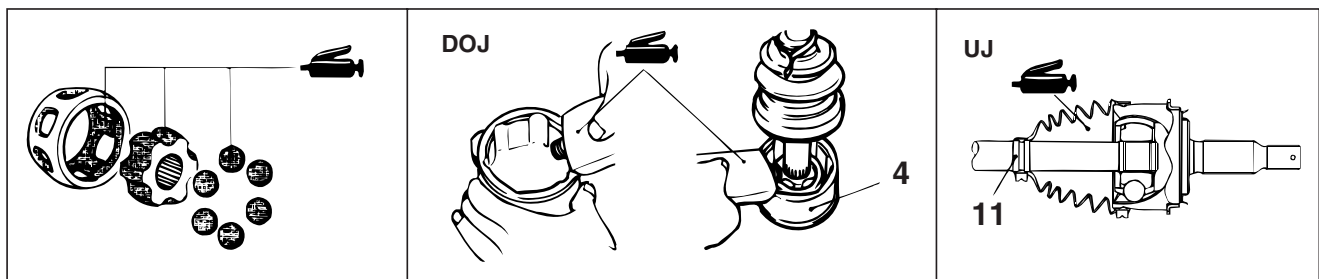
DISASSEMBLY AND ASSEMBLY

**CAUTION**

Never disassemble the UJ assembly except when replacing the UJ boot.



<p>UJ BOOT REPAIR KIT</p>	<p>DOJ BOOT REPAIR KIT</p>	<p>DOJ REPAIR KIT</p>



<p>GREASE: REPAIR KIT GREASE</p>	<p>GREASE: REPAIR KIT GREASE AMOUNT USED: &lt;UJ&gt; 135 – 10 g (4.8 – 0.3 oz) &lt;DOJ&gt; 100 – 10 g (3.5 – 0.3 oz)</p>
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**CAUTION**

THE DRIVE SHAFT JOINT USES SPECIAL GREASE. DO NOT MIX OLD AND NEW OR DIFFERENT TYPES OF GREASE.

ACX00980 AF

- DISASSEMBLY STEPS**
1. DOJ BOOT BAND (SMALL)
  2. DOJ BOOT BAND (LARGE)
  3. CIRCLIP
  4. DOJ OUTER RACE
  5. SNAP RING

<<A>>

- DISASSEMBLY STEPS**
6. INNER RACE, CAGE AND BALL ASSEMBLY
  7. DOJ BOOT
  8. UJ BOOT BAND (SMALL)
  9. UJ BOOT BAND (LARGE)

TSB Revision

**DISASSEMBLY STEPS**

10. UJ BOOT
11. UJ ASSEMBLY
12. CIRCLIP <LH>
13. DUST COVER

**ASSEMBLY STEPS**

13. DUST COVER
12. CIRCLIP <LH>
11. UJ ASSEMBLY
10. UJ BOOT
9. UJ BOOT BAND (LARGE)
8. UJ BOOT BAND (SMALL)

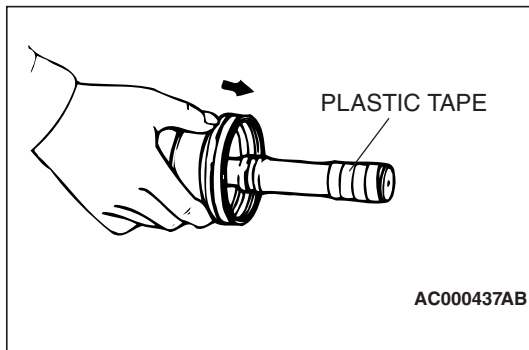
**ASSEMBLY STEPS (Continued)**

6. INNER RACE, CAGE AND BALL ASSEMBLY
5. SNAP RING
4. DOJ OUTER RACE
3. CIRCLIP
- >>A<< 7. DOJ BOOT
- >>B<< 2. DOJ BOOT BAND (LARGE)
- >>B<< 1. DOJ BOOT BAND (SMALL)

*NOTE: DOJ: Double Offset Joint, UJ: Under cut Joint*

**Required Special Tool:**

- MB991561: Boot Band Crimping Tool



**DISASSEMBLY SERVICE POINT**

**<<A>> DOJ BOOT REMOVAL**

Wrap plastic tape around the spline part on the UJ assembly so that the DOJ boot is not damaged when they are removed.

**ASSEMBLY SERVICE POINTS**

**>>A<< DOJ BOOT INSTALLATION**

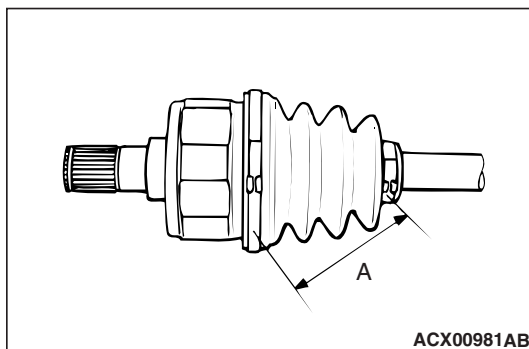
Install boot after wrapping plastic tape around the spline part on the UJ assembly.

**>>B<< DOJ BOOT BAND INSTALLATION**

1. Position the DOJ outer race so that the distance between the boot bands is at the standard value.

**Standard value (A): 80 ± 5 mm (3.2 ± 0.1 inch)**

2. Remove part of the DOJ outer race to release the air pressure inside the boot.



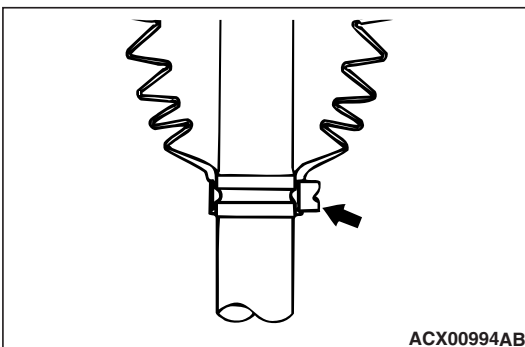
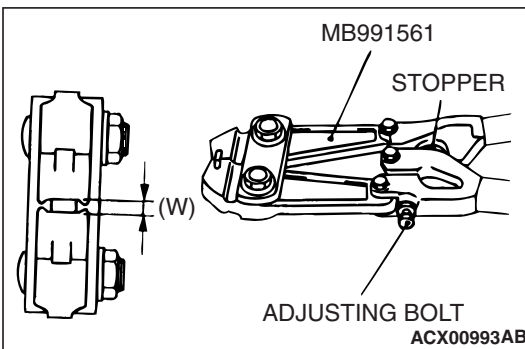
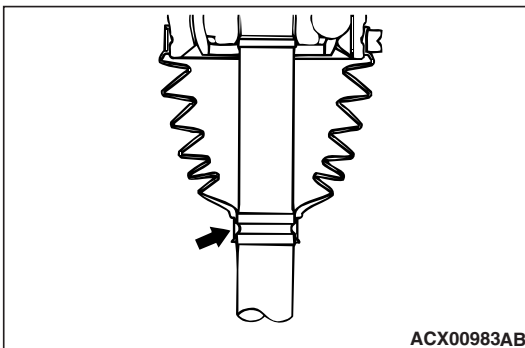
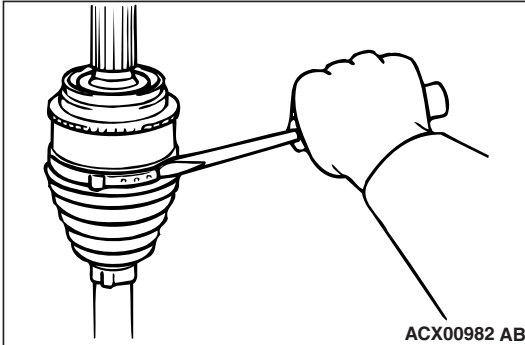
**INSPECTION**

M1261003600125

- Check the boot for damage or deterioration.
- Check the ball joint for operating condition and excessive looseness.
- Check the splines for wear or damage.
- Check the differential carrier oil seal (LH) for damage.

**UJ BOOT (RESIN BOOT) REPLACEMENT**

M1261005900069



1. Remove the boot bands (large and small).

*NOTE: The BJ boot bands cannot be re-used.*

2. Remove the BJ boot.

3. Install the small part on the plastic boot aligning the groove of the shaft.

4. Turn the adjusting bolt on special tool MB991561 so that the size of the opening (W) is at the standard value.

**Standard value (W): 2.9 mm (0.11 inch)**

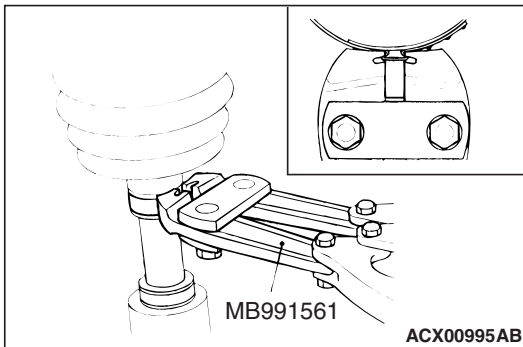
**<If it is smaller than 2.9 mm (0.11 inch)> loosen the adjusting bolt.**

**<If it is larger than 2.9 mm (0.11 inch)> tighten the adjusting bolt.**

*NOTE: The value of W will change by approximately 0.7 mm (0.03 inch) for each turn of the adjusting bolt.*

*NOTE: The adjusting bolt should not be turned more than once.*

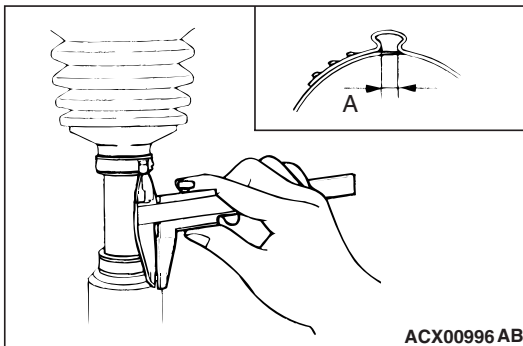
5. Install the UJ boot band (small) to the UJ boot.



6. Use special tool MB991561 to crimp the UJ boot band (small).

**CAUTION**

- Secure the drive shaft in an upright position and clamp the part of the UJ boot band to be crimped securely in the jaws of special tool MB991561.
- Crimp the UJ boot band until the special tool touches the stopper.



7. Check that crimping amount (A) of the UJ boot band is at the standard value.

**Standard value (A): 2.4 – 2.8 mm (0.09 – 0.11 inch)**

<If the crimping amount is larger than 2.8 mm (0.11 inch)>

Readjust the value of (W) in step 4 according to the following formula, and then repeat the operation in step 6.

$$W = 5.5 \text{ mm (0.22 inch)} - A$$

Example: If A = 2.9 mm (0.11 inch), then W = 2.6 mm (0.10 inch).

<If the crimping amount is smaller than 2.4 mm (0.09 inch)>

Remove the UJ boot band, readjust the value of (W) in step 4 according to the following formula, and then repeat the operations in steps 5 and 6 using a new BJ boot band.

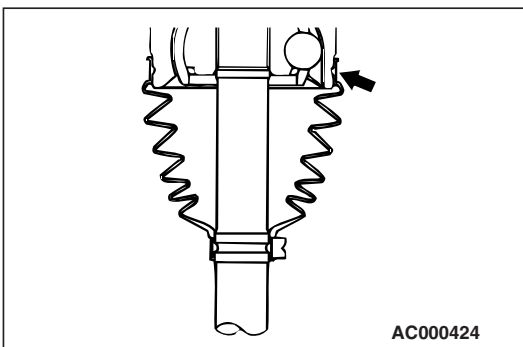
$$W = 5.5 \text{ mm (0.22 inch)} - A$$

Example: If A = 2.3 mm (0.09 inch) then W = 3.2 mm (0.13 inch).

8. Check that the UJ boot band is not sticking out past the place where it has been installed. If the UJ boot band is sticking out, remove it and then repeat the operations in steps 4 to 7 using a new UJ boot band.
9. Fill the inside of the UJ boot with the specified amount of the specified grease.

**Specified grease: Repair kit grease**

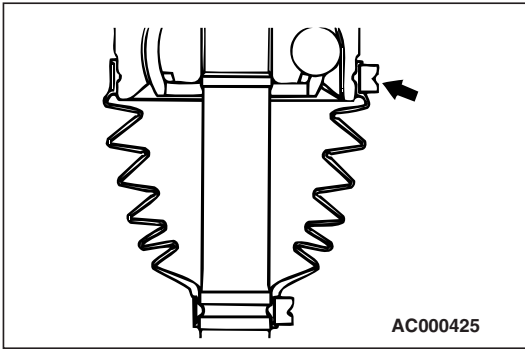
**Amount to use: 135 ± 10 g (4.8 ± 0.3 ounces)**



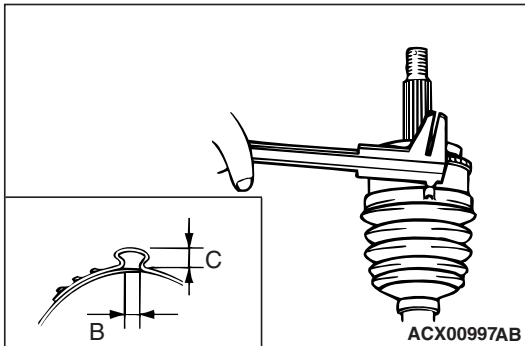
10. Install the large diameter part on the plastic boot aligning the groove of the shaft.

11. Follow the same procedure as in step 4 to adjust the size of the opening (W) on special tool MB991561 so that it is at the standard value.

**Standard value (W): 3.2 mm (0.13 inch)**



12. Install the UJ boot band (large) to the UJ boot.
13. Use special tool MB991561 to crimp the UJ boot band (large) in the same way as in step 6.



14. Check that the crimping amount (B) of the UJ boot band is at the standard value and that the crimping amount (C) of the UJ boot band is at the limited value.

**Standard value (B): 2.4 – 2.8 mm (0.09 – 0.11 inch)**

**Limited value (C): 9.5 mm (0.37 inch)**

**<If the crimping amount is larger than 2.8 mm (0.11 inch)>**

**Readjust the value of (W) in step 11 according to the following formula, and then repeat the operation in step 13.**

**$W = 5.8 \text{ mm (0.23 inch)} - B$**

**Example: If B = 2.9 mm (0.11 inch), then W = 2.9 mm (0.11 inch).**

**<If the crimping amount is smaller than 2.4 mm (0.09 inch)>**

**Remove the UJ boot band, readjust the value of (W) in step 11 according to the following formula, and then repeat the operations in steps 12 and 13 using a new UJ boot band.**

**$W = 5.8 \text{ mm (0.23 inch)} - B$**

**Example: If B = 2.3 mm (0.09 inch) then W = 3.5 mm (0.14 inch).**

15. Check that the UJ boot band is not sticking out past the place where it has been installed. If the UJ boot band is sticking out, remove it and then repeat the operations in steps 12 to 14 using a new UJ boot band.

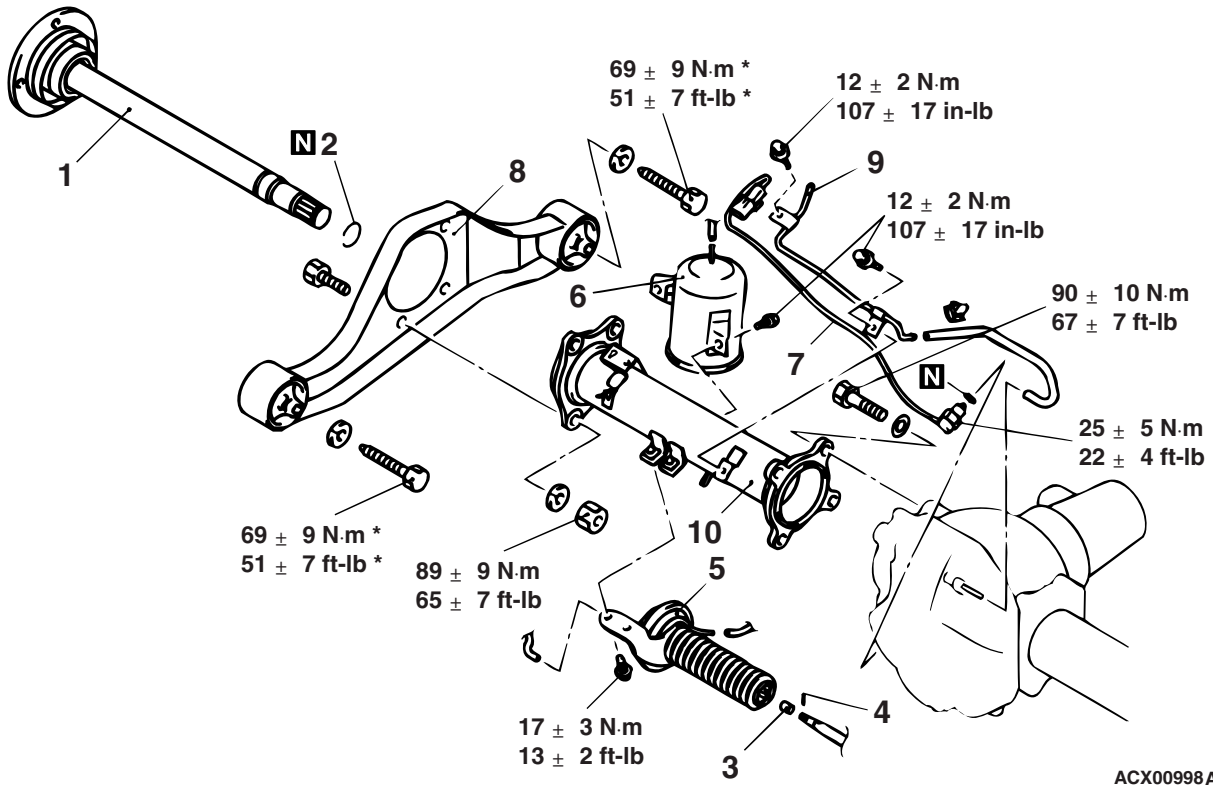
# INNER SHAFT ASSEMBLY

## REMOVAL AND INSTALLATION

M1261004000104

### Pre-removal and Post-installation Operation

- Removal and Installation of Under Cover.
- Removal and Installation of Skid Plate (Refer to GROUP 51, Front Bumper P.51-3).
- Drive Shaft <RH> Removal and Installation (Refer to P.26-24).



ACX00998AC

### REMOVAL STEPS

- <<A>> >>B<<
1. INNER SHAFT
  2. CLIP
  3. COLLAR
  4. PIN
  5. ACTUATOR ASSEMBLY
  6. VACUUM TANK ASSEMBLY
  7. FREE WHEEL ENGAGE SWITCH ASSEMBLY
- <<B>> >>A<<
- LOOSENING AND TIGHTENING OF DIFFERENTIAL MOUNTING INSULATOR BOLT

### REMOVAL STEPS (Continued)

- SUPPORT THE DIFFERENTIAL WITH A TRANSMISSION JACK.
- 8. DIFFERENTIAL MOUNTING BRACKET <RH>
- 9. BREATHER PIPE
- 10. HOUSING TUBE

### Required Special Tools:

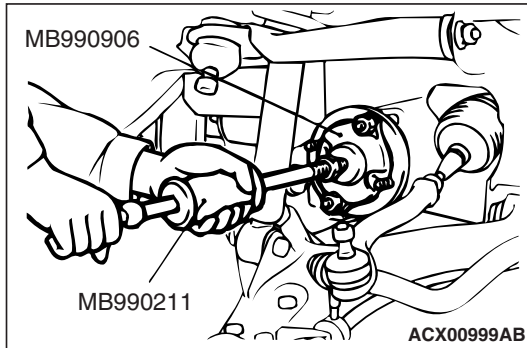
- MB990211: Sliding Hammer
- MB990906: Driveshaft Attachment

## REMOVAL SERVICE POINTS

## &lt;&lt;A&gt;&gt; INNER SHAFT REMOVAL

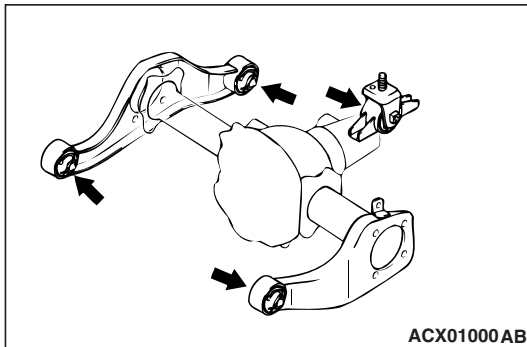
**⚠ CAUTION**

When pulling the inner shaft out from the front differential carrier with special tools MB990906 and MB990211, be careful that the spline part of the inner shaft does not damage the oil seal.



## &lt;&lt;B&gt;&gt; LOOSENING DIFFERENTIAL MOUNTING INSULATOR BOLT

Loosen the bolt shown in the diagram.



## INSTALLATION SERVICE POINTS

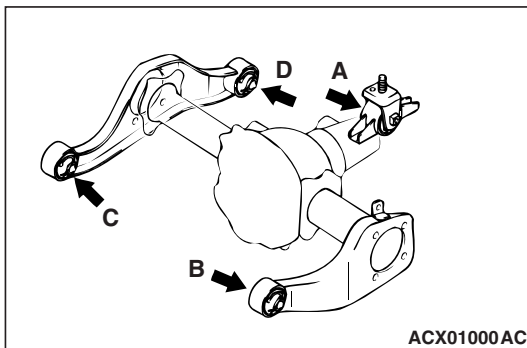
## &gt;&gt;A&lt;&lt; DIFFERENTIAL MOUNTING INSULATOR BOLT TIGHTENING

**⚠ CAUTION**

Place the vehicle on the ground after temporarily tightening bolts to prevent bushing from twisting, then fully tighten the bolts in the unladen condition.

Tighten the bolts shown in the diagram to the specified torque in the order of A, B, C, D or A, C, B, D.

**Tightening torque:  $69 \pm 9$  N·m ( $51 \pm 7$  ft·lb)**





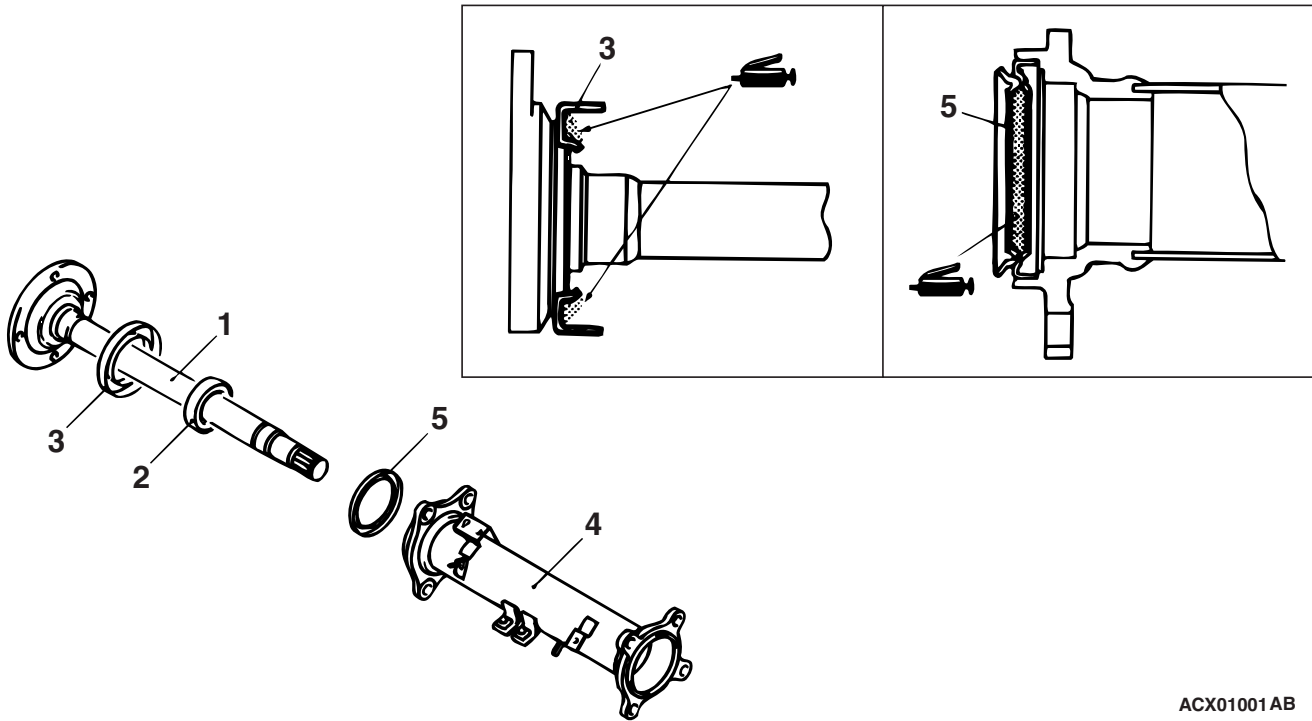
>>B<< INNER SHAFT INSTALLATION

**CAUTION**

Be careful not to damage the lip of the dust seal and oil seal.

DISASSEMBLY AND ASSEMBLY

M1261004200090



ACX01001AB

**DISASSEMBLY STEPS**

- 1. INNER SHAFT
- <<A>> >>C<< 2. BEARING
- >>B<< 3. DUST COVER

**DISASSEMBLY STEPS (Continued)**

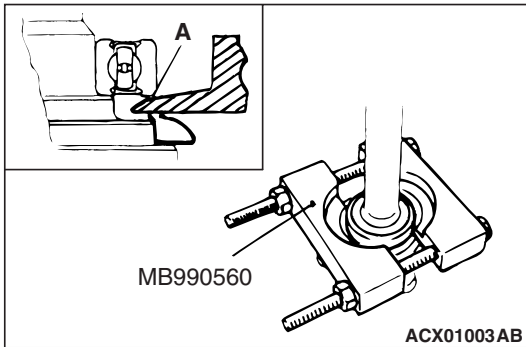
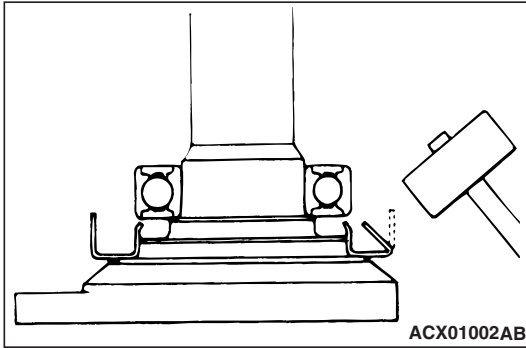
- 4. HOUSING TUBE
- >>A<< 5. DUST SEAL

**Required Special Tools:**

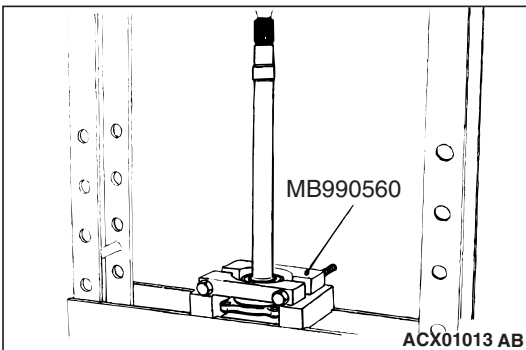
- MB990560: Bearing Remover
- MB990938: Bearing and Oil Seal Installer Set
- MB990955: Oil Seal Installer

**DISASSEMBLY SERVICE POINT****<<A>> BEARING REMOVAL**

1. Bend the outside periphery of dust cover inward with a wooden hammer.



2. After special tool MB990560 has been installed as shown, tighten the nut of the special tool MB990560 until the portion of special tool MB990560 touches the bearing outer race.

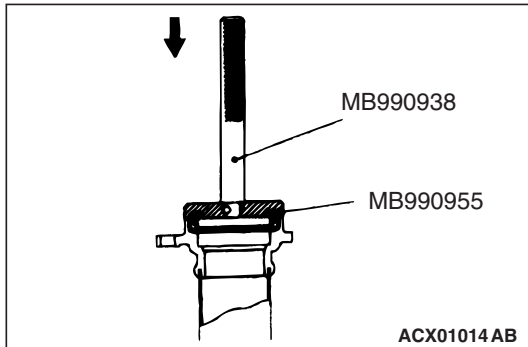


3. Press out the inner shaft from the bearing.

**ASSEMBLY SERVICE POINTS**

**>>A<< DUST SEAL INSTALLATION**

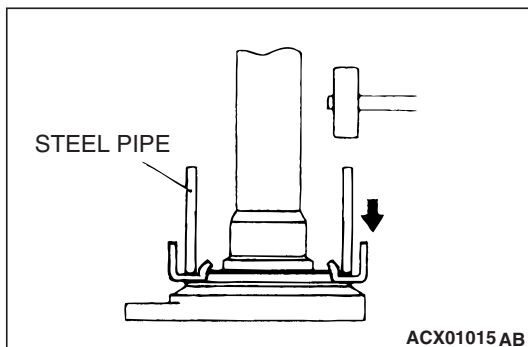
Press-fit the new dust seal into the housing tube by using special tools MB990938 and MB990955, until it is flush with the housing tube end face.



**>>B<< DUST COVER INSTALLATION**

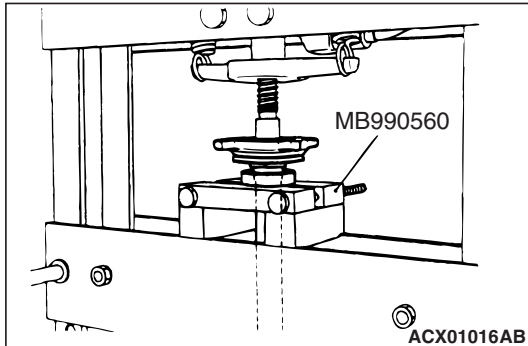
Using a steel pipe, install a new dust cover onto the inner shaft.

STEEL PIPE	mm (in)
Overall length	50 (2.0)
Outside diameter	75 (3.0)
Wall thickness	4 (0.16)



**>>C<< BEARING INSTALLATION**

Use special tool MB990560 to press-fit the bearing onto the inner shaft.

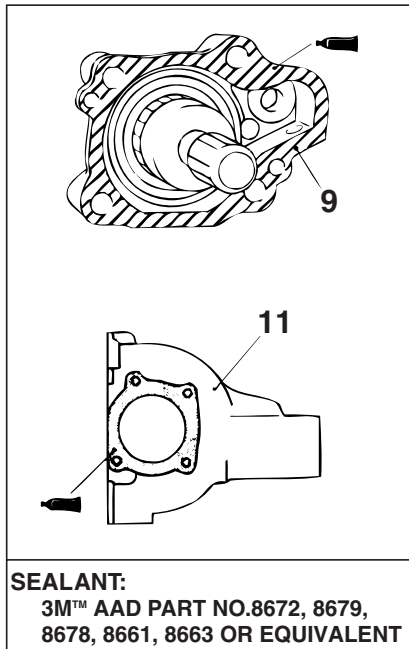
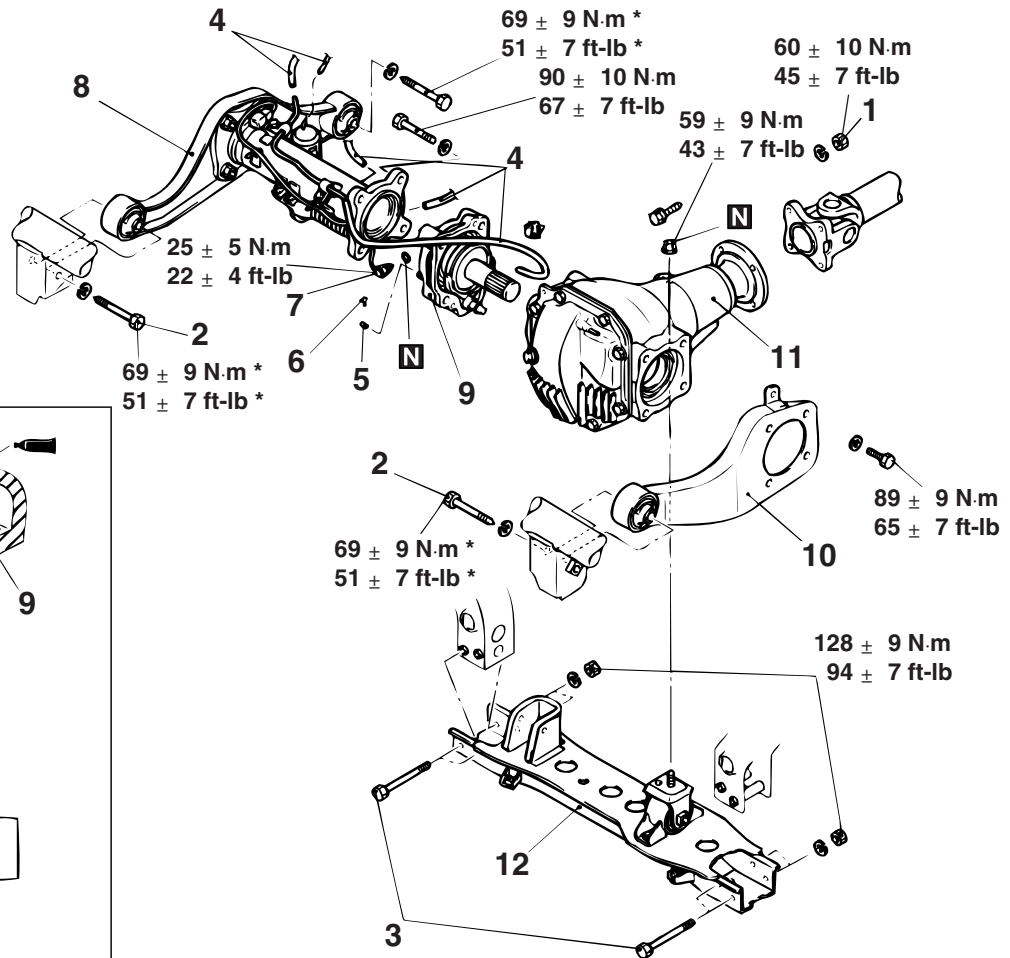


# DIFFERENTIAL CARRIER AND FREE WHEELING CLUTCH REMOVAL AND INSTALLATION

M1262001800085

**Pre-removal and Post-installation Operation**

- Under Cover Removal and Installation
- Skid Plate Removal and Installation (Refer to GROUP 51-Front Bumper P.51-3).
- Gear Oil Draining and Refill (Refer to P.26-16).
- Driveshaft Removal and Installation (Refer to P.26-24).
- Inner Shaft Removal and Installation (Refer to P.26-31).



**SEALANT:**  
3M™ AAD PART NO.8672, 8679,  
8678, 8661, 8663 OR EQUIVALENT

AC309396AB

- <<A>> >>B<<
- REMOVAL STEPS**
1. FRONT PROPELLER SHAFT CONNECTION
  2. FRONT FRAME AND DIFFERENTIAL MOUNTING BRACKET CONNECTION
  3. FRONT FRAME AND NO.2 CROSSMEMBER ASSEMBLY CONNECTION
  4. VACUUM HOSE
  5. COLLAR
  6. PIN
- <<B>>

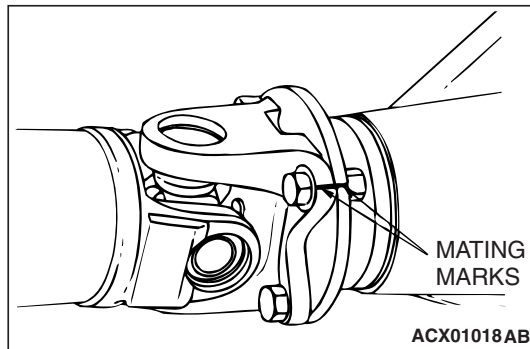
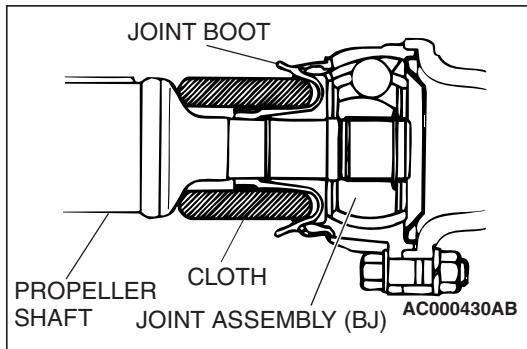
- REMOVAL STEPS (Continued)**
7. FREEWHEEL ENGAGE SWITCH CONNECTION
  - >>A<< 8. DIFFERENTIAL MOUNTING BRACKET <RH> AND HOUSING TUBE ASSEMBLY
  9. FREEWHEEL CLUTCH ASSEMBLY
  - >>A<< 10. DIFFERENTIAL MOUNTING BRACKET <LH>
  11. DIFFERENTIAL CARRIER
  12. NO.2 CROSSMEMBER ASSEMBLY

## REMOVAL SERVICE POINTS

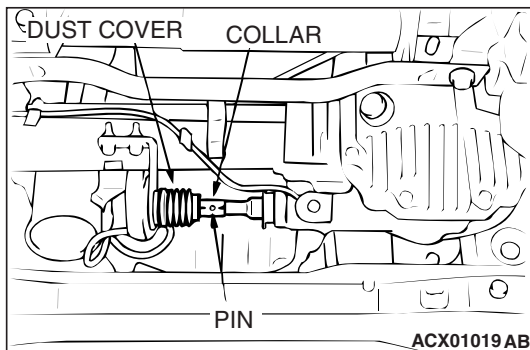
### <<A>> FRONT PROPELLER SHAFT REMOVAL

#### CAUTION

- Be careful not to damage joint boot by crimping with the bent propeller shaft joint.
- Hang propeller shaft with wires to prevent it from falling.



Make mating marks on the flange yoke and the differential carrier companion flange. Remove the front propeller shaft.



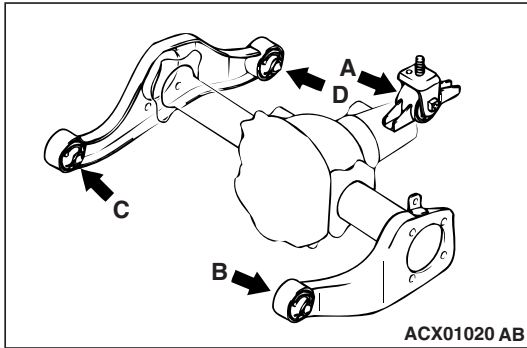
### <<B>> PIN REMOVAL

1. Remove one side of dust cover mounting part on the vacuum actuator assembly.
2. Match a pin with a pin hole and remove the pin with a punch.

**INSTALLATION SERVICE POINTS**

**>>A<< DIFFERENTIAL MOUNTING BRACKET ASSEMBLY**

Tighten differential mounting insulator in the order of A, B, C, D or A, C, B, D as shown, in the left diagram.



**>>B<< FRONT PROPELLER SHAFT INSTALLATION**

**⚠ CAUTION**

Remove grease from fastener threads before tightening. Fastener threads covered with oily products could become loose.

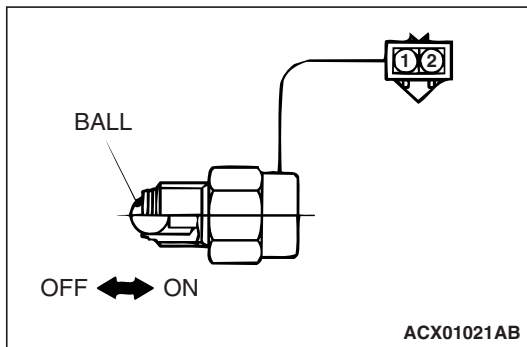
Install the front propeller shaft so that the mating marks of the flange yoke and the differential carrier companion flange are aligned.

**DIFFERENTIAL CARRIER AND FREE WHEELING CLUTCH INSPECTION**

**INSPECTION**

M1262001900048

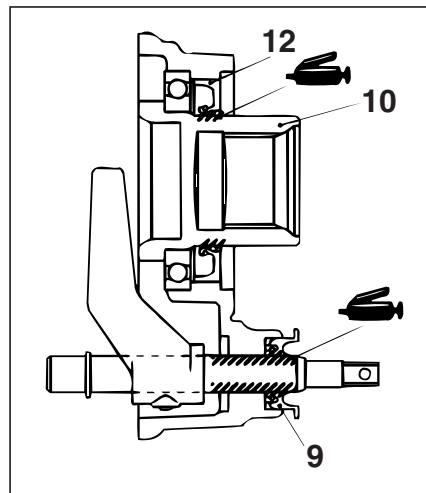
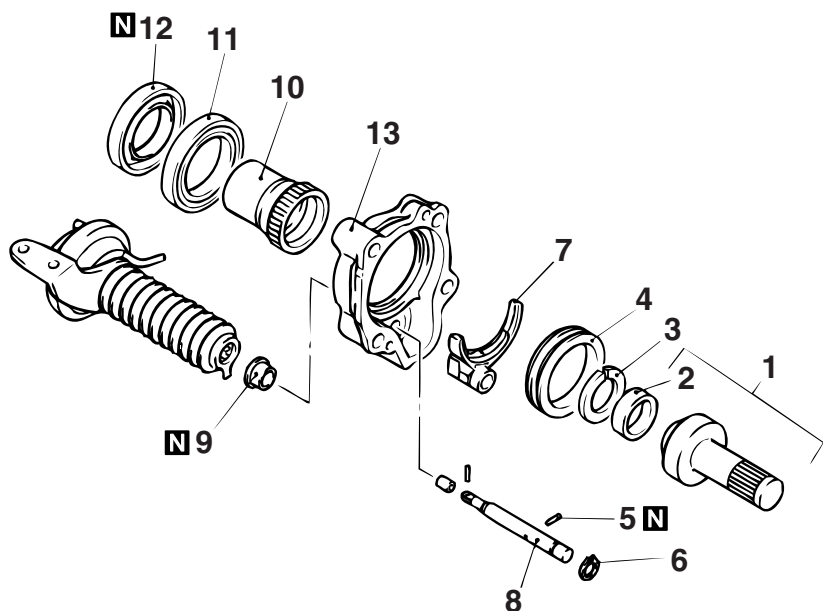
**FREEWHEEL ENGAGE SWITCH CHECK**



SHAFT(SWITCH) POSITION	TESTER CONNECTION	SPECIFIED CONDITION
PRESSED(ON)	1-2	Less than 2 ohms
RELEASED(OFF)	-	Open circuit

FREE WHEELING CLUTCH DISASSEMBLY AND ASSEMBLY

M1262002900074



AC101907AB

**FREE WHEELING CLUTCH  
DISASSEMBLY STEPS**

- <<A>> 1. MAIN SHAFT ASSEMBLY
- <<A>> >>F<< 2. BEARING
- >>E<< 3. SPACER
- 4. CLUTCH SLEEVE
- >>D<< 5. SPRING PIN
- 6. SNAP RING
- 7. SHIFT FORK

**FREE WHEELING CLUTCH  
DISASSEMBLY STEPS**

- 8. SHIFT ROD
- >>C<< 9. OIL SEAL
- <<B>> >>B<< 10. CLUTCH GEAR
- <<B>> >>B<< 11. BEARING
- >>A<< 12. OIL SEAL
- 13. CLUTCH HOUSING

**Required Special Tools:**

- MB990560: Bearing Remover
- MB990799: Ball Joint Remover and Installer
- MB990890 or MB990891: Rear Suspension Bushing Base
- MB990926: Bearing and Oil Seal Installer Set
- MB990938: Bearing and Oil Seal Installer Set
- MB991168: Differential Oil Seal Installer

### DISASSEMBLY SERVICE POINTS

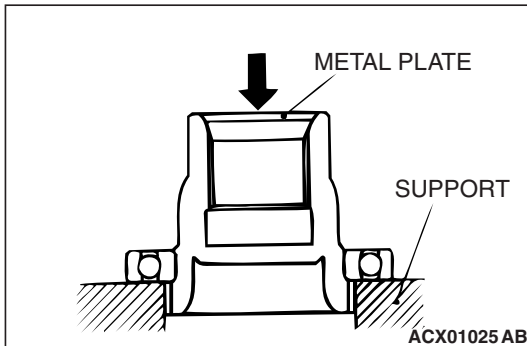
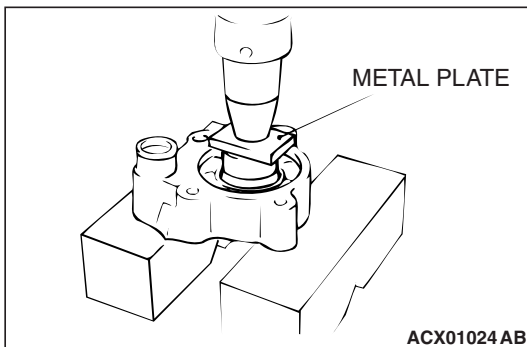
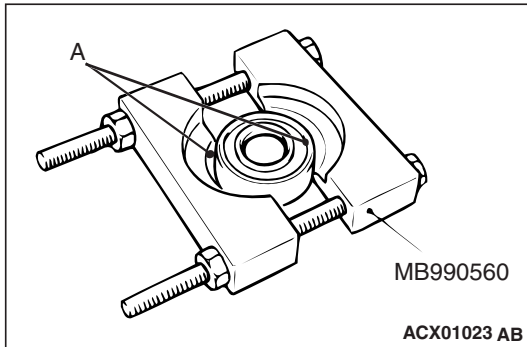
#### <<A>> MAIN SHAFT ASSEMBLY/BEARING REMOVAL

1. After special tool MB990560 has been installed as shown, tighten the nut of special tool MB990560 until portion "A" of special tool MB990560 touches the bearing outer race.

#### **⚠ CAUTION**

**Do not allow the mainshaft to drop.**

2. Press out the mainshaft from the bearing.



#### <<B>> CLUTCH GEAR/BEARING REMOVAL

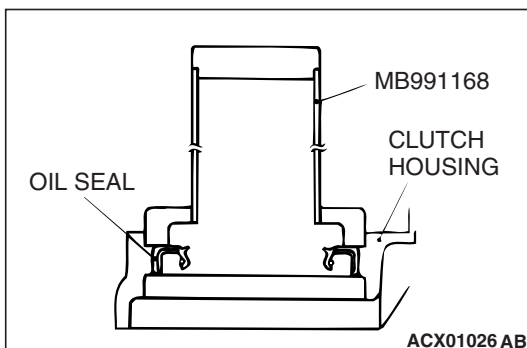
1. Use a press and steel plate to remove the clutch gear and bearing together.

2. Using a press, hold the supports against the bearing inner race, and separate the clutch gear and bearing.

### ASSEMBLY SERVICE POINTS

#### >>A<< OIL SEAL INSTALLATION

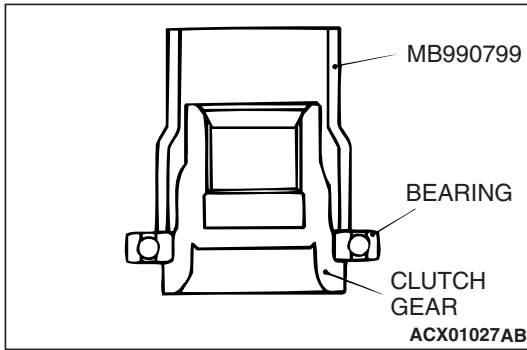
Use special tool MB991168 to tap the oil seal until it is flush with the clutch housing.





**>>B<< BEARING/CLUTCH GEAR INSTALLATION**

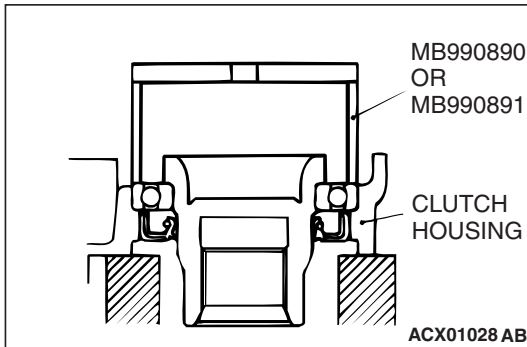
1. Use special tool MB990799 to press-fit the bearing to the shoulder of the clutch gear.



**⚠ CAUTION**

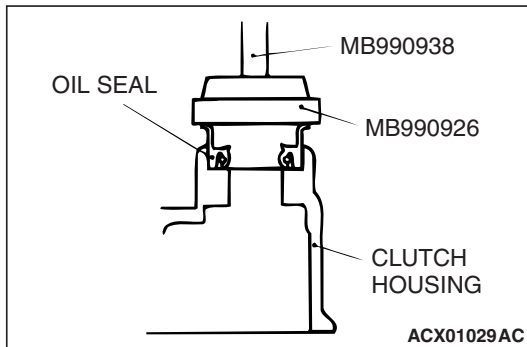
Place special tool MB990890 or MB990891 against the outer race of the bearing.

2. Use special tool MB990890 or MB990891 to press-fit the bearing to the side of the clutch housing.



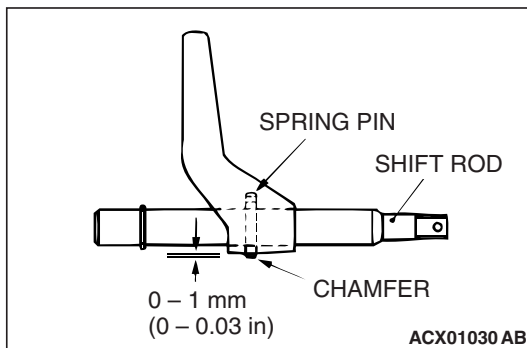
**>>C<< OIL SEAL INSTALLATION**

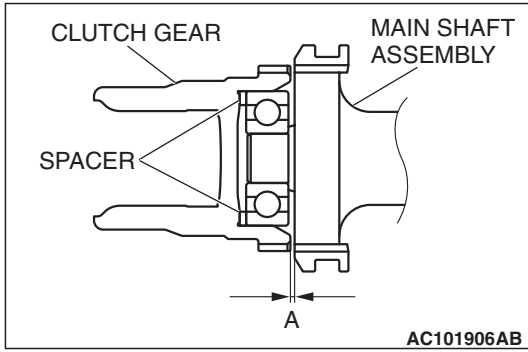
Use special tools MB990926 and MB990938 To press-fit the oil seal to the clutch housing.



**>>D<< SPRING PIN INSTALLATION**

Tap the spring pin from the chamfered side of the shaft rod until the projection length becomes the length shown in the illustration.





**>>E<< SPACER INSTALLATION**

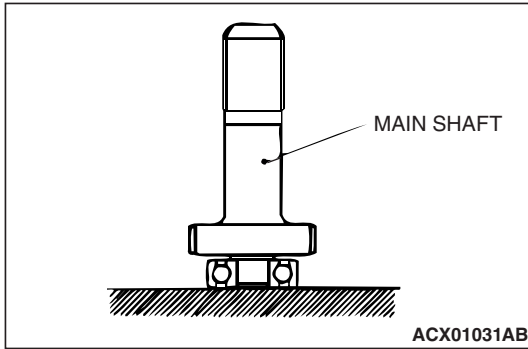
1. Place the current spacer in the area shown in the illustration to check that the dimensions shown in the illustration are within the standard values.

**Standard Value (A): 0.05 – 0.3 mm (0.002 – 0.012 inch)**

2. If the dimensions are outside of the standard values, select the correct spacer type to fit in the standard values.

Spacer type

Part Number	Thickness mm (in)	Part Number	Thickness mm (in)
MR111526	1.1 (0.04)	MR111530	2.1 (0.08)
MR111527	1.35 (0.05)	MR111531	2.35 (0.09)
MR111528	1.6 (0.06)	MR111532	2.6 (0.10)
MR111529	1.85 (0.07)	MR111533	2.85 (0.11)

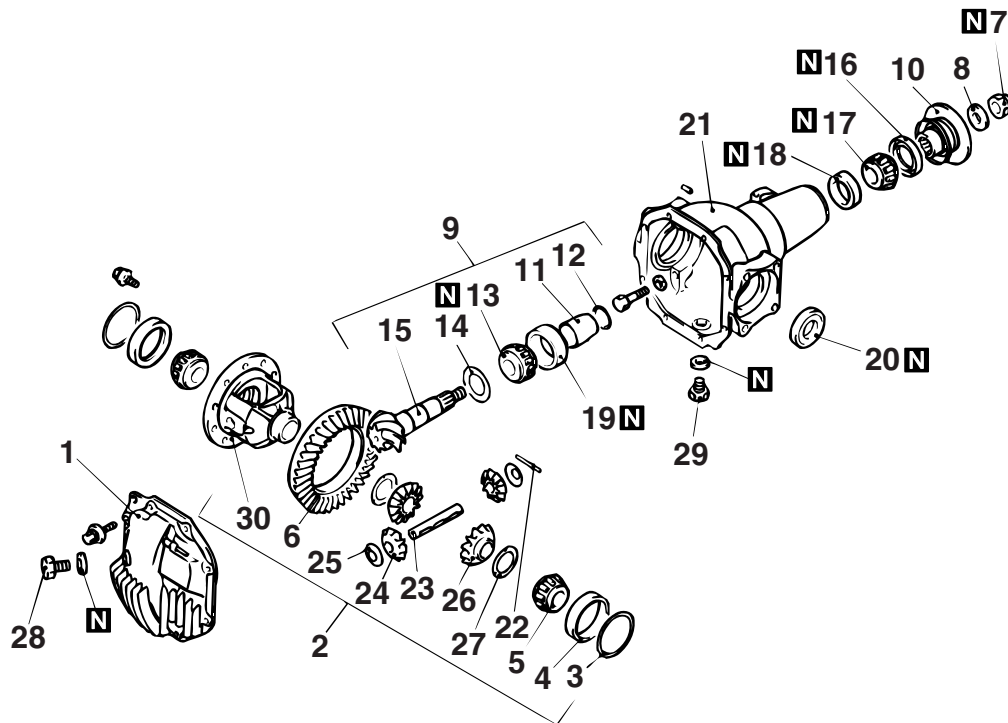


**>>F<< BEARING INSTALLATION**

Press-fit the bearing to the shoulder of the mainshaft.

**DIFFERENTIAL CARRIER DISASSEMBLY**

M1262002300124



ACX01032 AB

**DISASSEMBLY STEPS**

- |       |  |       |
|-------|--|-------|
| <<A>> | • INSPECTION BEFORE DISASSEMBLY                            | <<H>> |
| <<B>> | 1. COVER   | <<H>> |
| <<B>> | 2. DIFFERENTIAL CASE ASSEMBLY                              | <<H>> |
| <<C>> | 3. SIDE BEARING SPACER                                     | <<I>> |
| <<D>> | 4. SIDE BEARING OUTER RACE                                 | <<I>> |
| <<E>> | 5. SIDE BEARING INNER RACE                                 | <<J>> |
| <<F>> | 6. DRIVE GEAR  |       |
|       | 7. SELF-LOCKING NUT  |       |
|       | 8. WASHER  |       |
|       | 9. DRIVE PINION ASSEMBLY                                   |       |
|       | 10. COMPANION FLANGE                                       |       |
|       | 11. DRIVE PINION SPACER                                    |       |
|       | 12. DRIVE PINION REAR SHIM (FOR TURNING TORQUE ADJUSTMENT) |       |
| <<G>> | 13. DRIVE PINION FRONT BEARING INNER RACE                  |       |
|       | 14. DRIVE PINION REAR SHIM (FOR PINION HEIGHT ADJUSTMENT)  |       |
|       | 15. DRIVE PINION   |       |

**DISASSEMBLY STEPS (Continued)**

- |   |
|---|
| 16. OIL SEAL                              |
| 17. DRIVE PINION REAR BEARING INNER RACE  |
| 18. DRIVE PINION REAR BEARING OUTER RACE  |
| 19. DRIVE PINION FRONT BEARING OUTER RACE |
| 20. OIL SEAL                              |
| 21. DIFFERENTIAL CARRIER                  |
| 22. LOCK PIN                              |
| 23. PINION SHAFT                          |
| 24. PINION GEAR                           |
| 25. PINION WASHER                         |
| 26. SIDE GEAR                             |
| 27. SIDE GEAR SPACER                      |
| 28. FILLER PLUG                           |
| 29. DRAIN PLUG                            |
| 30. DIFFERENTIAL CASE                     |

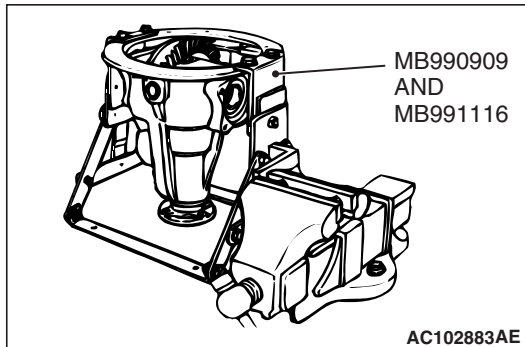
**Required Special Tools:**

- |   |  |
|---|--|
| • MB990810: Side Bearing Puller           | • MB990648: Bearing Remover                    |
| • MB990811: Differential Side Bearing Cap | • MB990939: Bearing and Oil Seal Installer Set |
| • MB990850: End Yoke Holder               | • MB990909: Working Base                       |
| • MB990339: Bearing Puller                | • MB991116: Adapter                            |

## DISASSEMBLY SERVICE POINTS

### <<A>> INSPECTION BEFORE DISASSEMBLY

1. Remove the cover and gasket.
2. Hold the special tools MB990909 and MB991116 in a vise, and install the differential carrier assembly to the special tool.

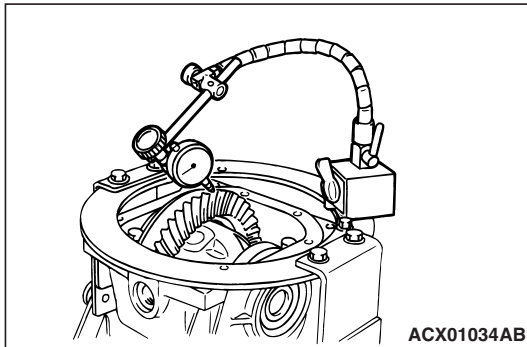


### DRIVE GEAR BACKLASH

1. With the drive pinion locked in place, use a dial gauge to measure the drive gear backlash in four or more places on the drive gear.

**Standard value: 0.11 – 0.16 mm (0.004 – 0.006 inch)**

2. If the backlash is not within the standard value, adjust the drive gear backlash (Refer to P.26-50).
3. After the adjustment, inspect the drive gear tooth contact.

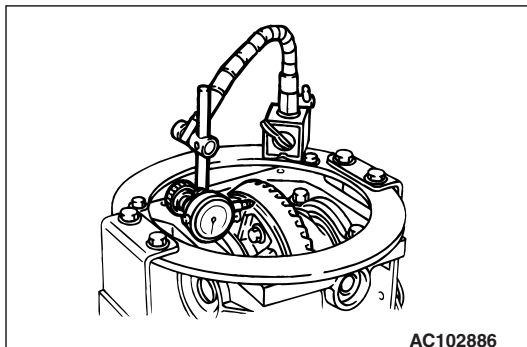


### DRIVE GEAR RUNOUT

1. Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

**Limit: 0.05 mm (0.002 inch)**

2. When runout exceeds the limit value, check for foreign material between drive gear rear side and differential case, or for loose drive gear installation bolts.
3. When step (2) gives normal results, reposition the drive gear and differential case and remeasure.
4. If adjustment is impossible, replace the differential case, or replace the drive gear and pinion as a set.



### DIFFERENTIAL GEAR BACKLASH

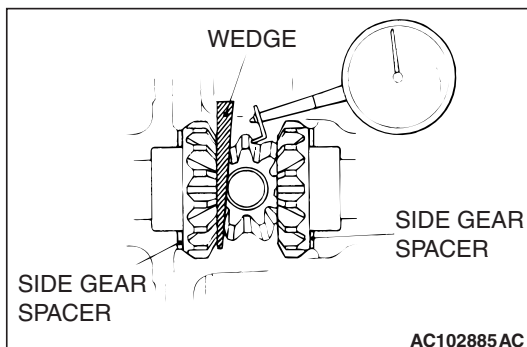
1. While locking the side gear with the wedge, measure the differential gear backlash with a dial indicator on the pinion gear.

**Standard value: 0 – 0.076 mm (0 – 0.0030 inch)**

**Limit: 0.2 mm (0.007 inch)**

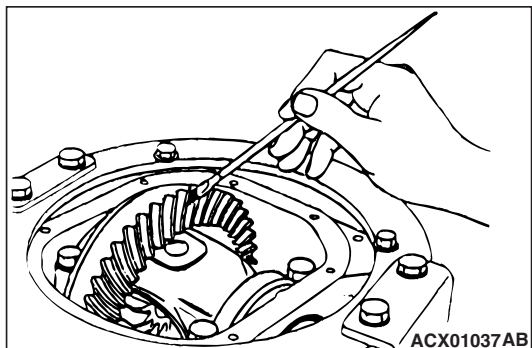
Use the measurement procedure for both pinion gears.

2. If the backlash exceeds the limit, adjust by using the side gear thrust spacers.
3. If adjustment is impossible, replace the side gear and pinion gear as a set.

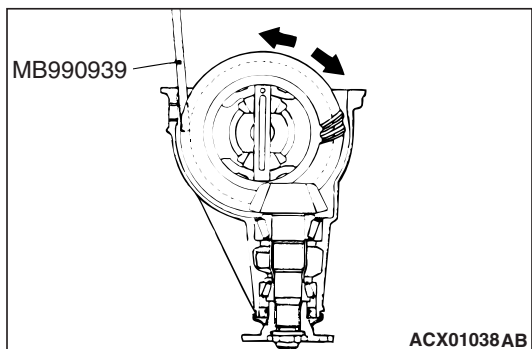


### DRIVE GEAR TOOTH CONTACT

Check the tooth contact of drive gear by following the steps below.



1. Apply a thin, uniform coat of machine blue to both surfaces of the drive gear teeth.

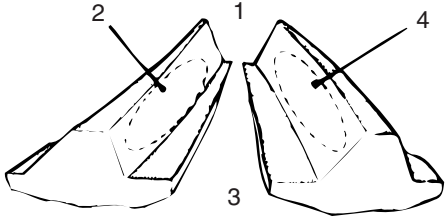
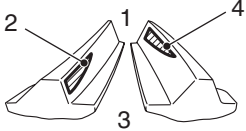
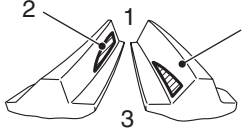
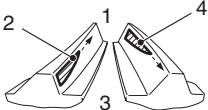
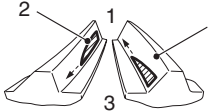


2. Insert special tool MB990939 between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear so that the revolution torque [approximately 2.5 – 3.0 N·m (22.1 – 26.6 in-lb)] is applied to the drive pinion.

**⚠ CAUTION**

**If the drive gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.**

3. Check the tooth contact condition of the drive gear and drive pinion.

STANDARD TOOTH CONTACT PATTERN	PROBLEM	SOLUTION
<p>1. Narrow tooth side 2. Drive-side tooth surface (the side applying power during forward movement) 3. Wide tooth side 4. Coast-side tooth surface (the side applying power during reverse movement)</p>  <p style="text-align: right;">ACX01039 AF</p>	<p>Tooth contact pattern resulting from excessive pinion height</p>  <p style="text-align: right;">AC107260 AB</p> <p>The drive pinion is positioned too far from the center of the drive gear.</p> <p>Tooth contact pattern resulting from insufficient pinion height.</p>  <p style="text-align: right;">AC107262 AB</p> <p>The drive pinion is positioned too close to the center of the drive gear.</p>	 <p style="text-align: right;">AC107261 AB</p> <p>Increase the thickness of the drive pinion rear shim, and position the drive pinion closer to the center of the drive gear. Also, for backlash adjustment, position the drive gear farther from the drive pinion.</p>  <p style="text-align: right;">AC107263 AB</p> <p>Decrease the thickness of the drive pinion rear shim, and position the drive pinion farther from the center of the drive gear. Also, for backlash adjustment, position the drive gear closer to the drive pinion.</p>

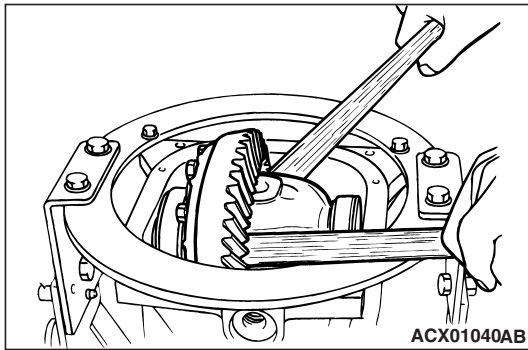
*NOTE: Check the tooth contact pattern to confirm that the adjustments of the pinion height and backlash have been done properly. Continue to adjust the pinion height and backlash until the tooth contact pattern resembles the standard pattern. If, even after adjustments have been made, the correct tooth contact pattern cannot be obtained, it means that the drive gear and the drive pinion have become worn beyond the allowable limit. Replace the gear set.*

<<B>> DIFFERENTIAL CASE ASSEMBLY REMOVAL

**CAUTION**

When taking out the differential case assembly, be careful not to drop and damage the bearing outer races.

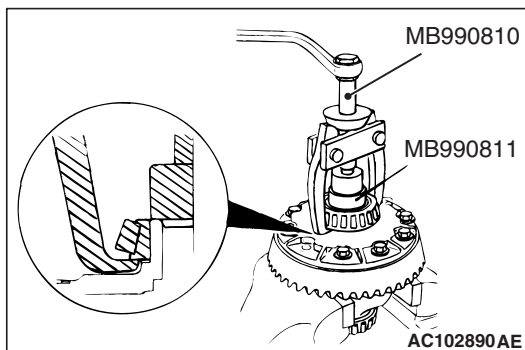
*NOTE: Keep the right and left side bearings and side bearing adjusting spacers separate, so that they do not become mixed during reassembly.*



<<C>> SIDE BEARING INNER RACE REMOVAL

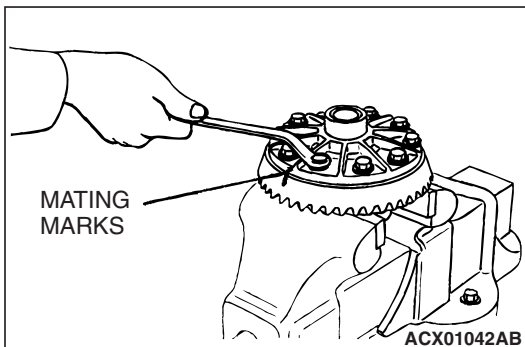
Use special tools MB990810 and MB990811 to pull out the side bearing inner races.

*NOTE: There are two notches provided (at the differential case side) for the claw part of the special tools MB990810 and MB990811 at that position.*



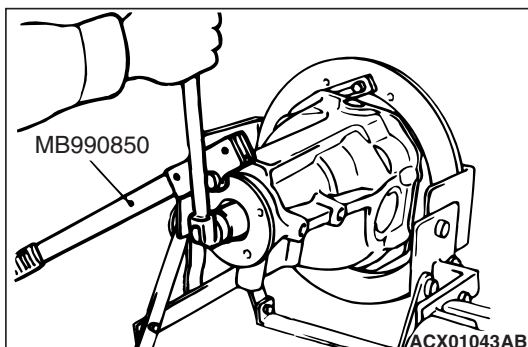
<<D>> DRIVE GEAR REMOVAL

1. Make the mating marks to the differential case and the drive gear.
2. Loosen the drive gear attaching bolts in a diagonal sequence to remove the drive gear.



<<E>> SELF-LOCKING NUT REMOVAL

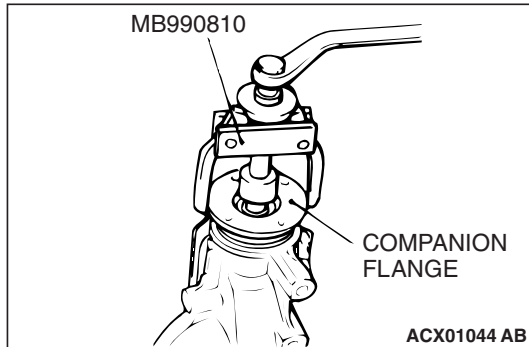
Use special tool MB990850 to hold the companion flange, and then remove the companion flange self-locking nut.



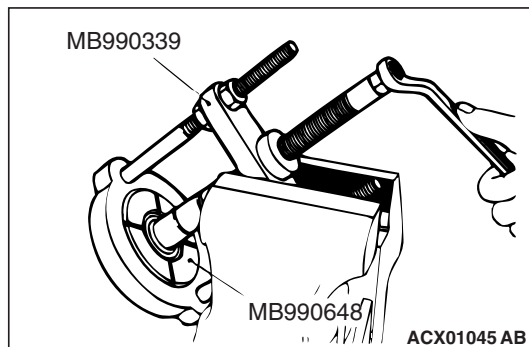
**<<F>> DRIVE PINION ASSEMBLY REMOVAL****⚠ CAUTION**

The mating mark made on the companion flange must not be on the coupling surface of the flange yoke and the front propeller shaft.

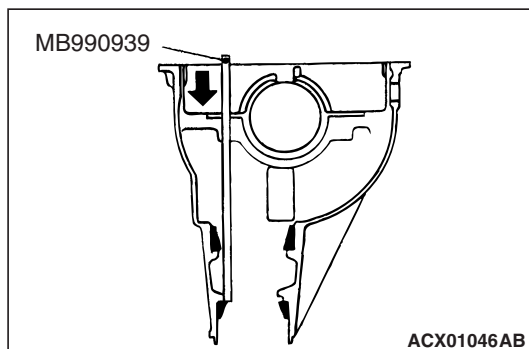
1. Make mating marks on the drive pinion and companion flange.
2. Pull out the drive pinion together with special tool MB990810.

**<<G>> DRIVE PINION FRONT BEARING INNER RACE REMOVAL**

Use special tools MB990339 and MB990648 to pull out the front bearing inner race.

**<<H>> OIL SEAL/DRIVE PINION REAR BEARING INNER RACE/DRIVE PINION REAR OUTER RACE REMOVAL**

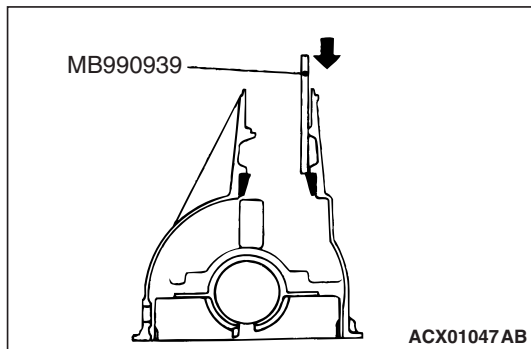
Use special tool MB990939 to remove the drive pinion rear bearing outer race.





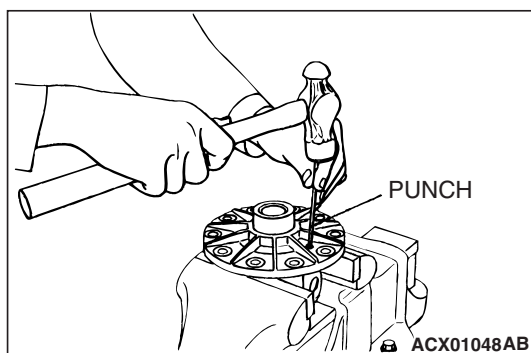
**<<I>> DRIVE PINION FRONT BEARING OUTER RACE  
REMOVAL**

Use special tool MB990939 to remove the drive pinion front bearing outer race.



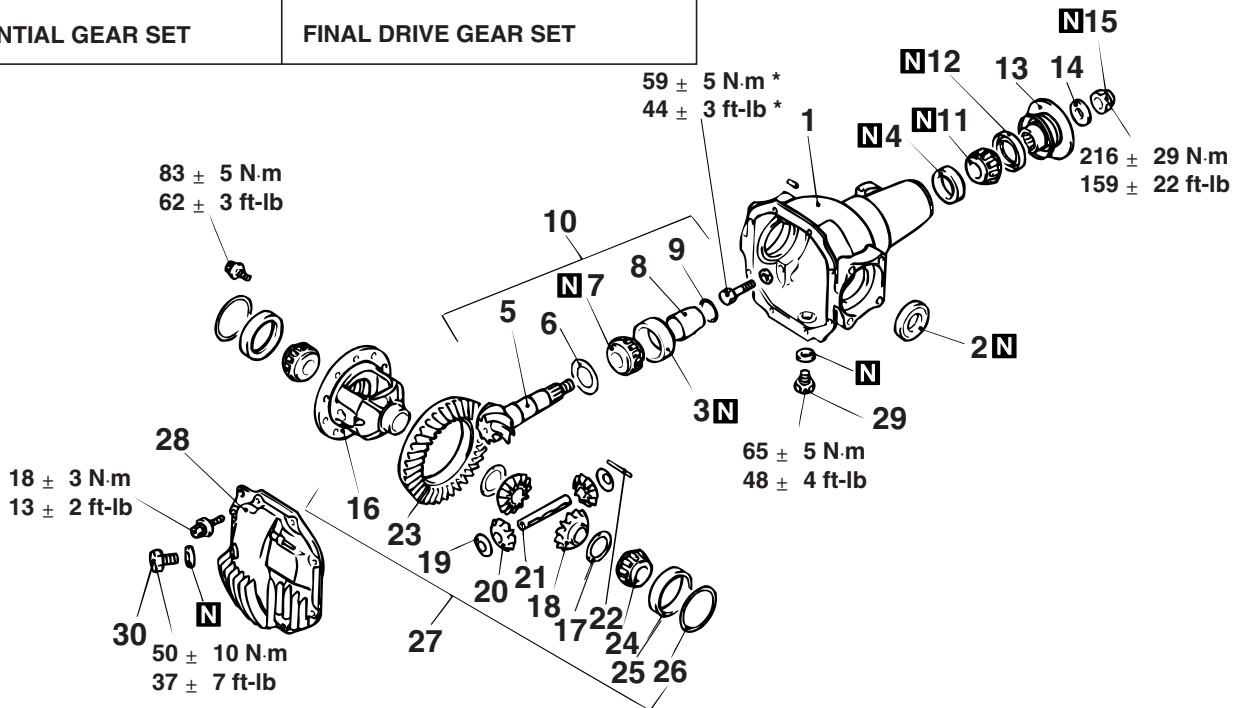
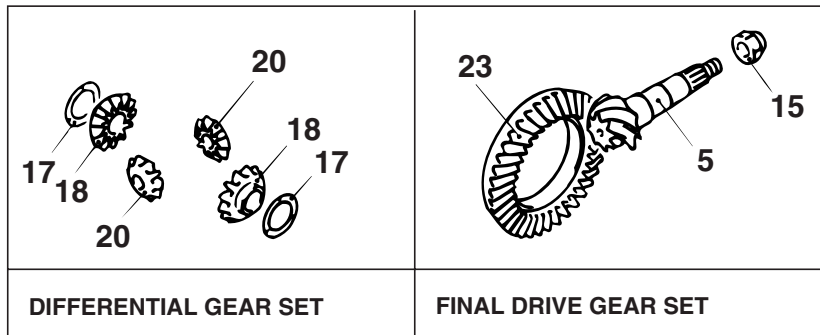
**<<J>> LOCK PIN REMOVAL**

Drive out the lock pin with a punch.



ASSEMBLY

M1262002500151



AC204225AB

**ASSEMBLY STEPS**

1. DIFFERENTIAL CARRIER
- >>A<< 2. OIL SEAL
- >>B<< 3. DRIVE PINION FRONT BEARING OUTER RACE
- >>C<< 4. DRIVE PINION REAR BEARING OUTER RACE
- >>D<< • PINION HEIGHT ADJUSTMENT
5. DRIVE PINION
6. DRIVE PINION FRONT SHIM (FOR PINION HEIGHT ADJUSTMENT)
7. DRIVE PINION FRONT BEARING INNER RACE
8. DRIVE PINION SPACER
- >>E<< • DRIVE PINION TURNING TORQUE ADJUSTMENT
9. DRIVE PINION REAR SHIM (FOR TURNING TORQUE ADJUSTMENT)
10. DRIVE PINION ASSEMBLY
11. DRIVE PINION REAR BEARING INNER RACE
12. OIL SEAL
13. COMPANION FLANGE
14. WASHER

**ASSEMBLY STEPS (Continued)**

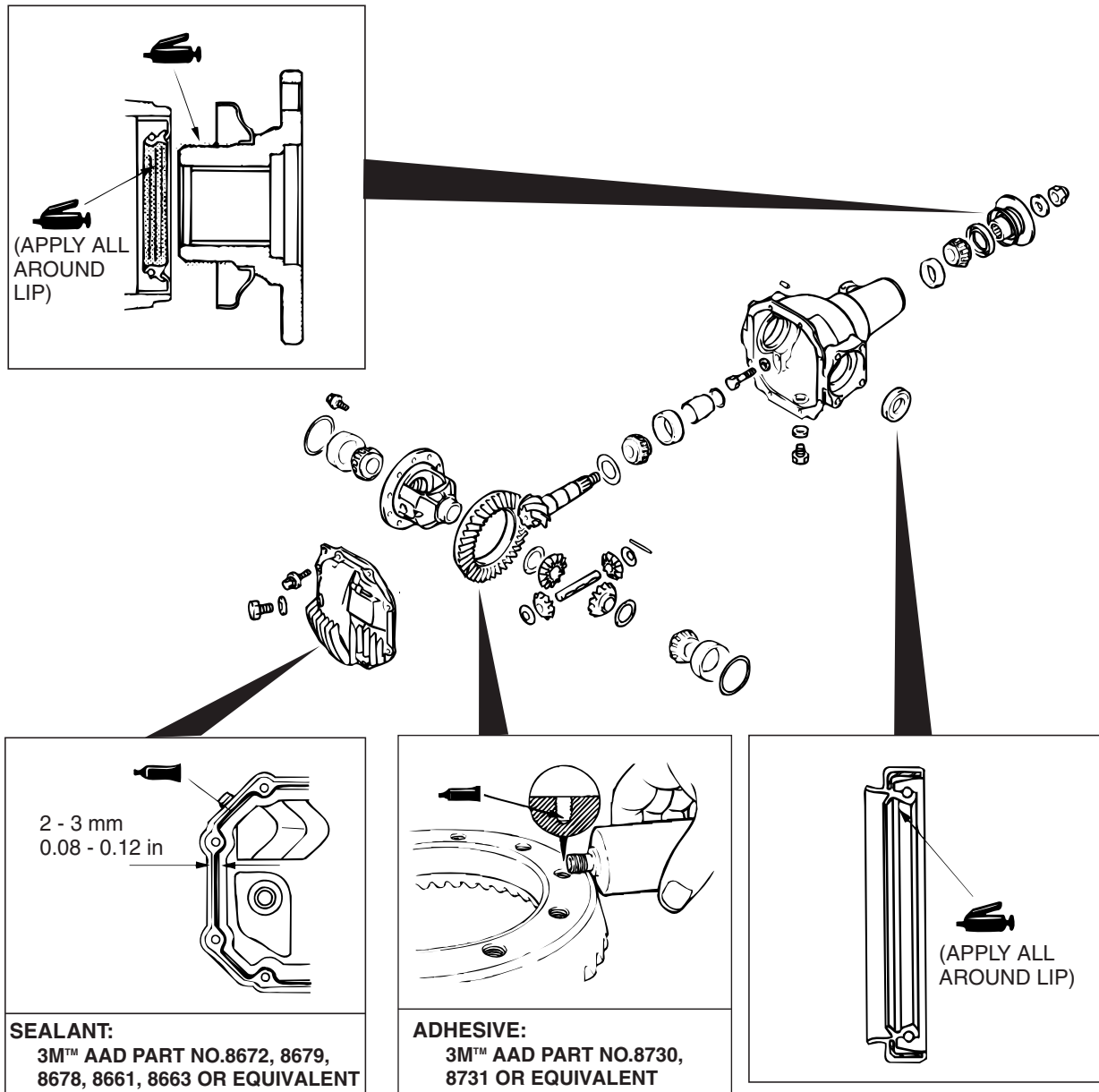
15. SELF-LOCKING NUT
16. DIFFERENTIAL CASE
- >>F<< • DIFFERENTIAL GEAR BACKLASH ADJUSTMENT
17. SIDE GEAR SPACER
18. SIDE GEAR
19. PINION WASHER
20. PINION GEAR
21. PINION SHAFT
- >>G<< 22. LOCK PIN
- >>H<< 23. DRIVE GEAR
- >>I<< 24. SIDE BEARING INNER RACE
25. SIDE BEARING OUTER RACE
- >>J<< • DRIVE GEAR BACKLASH ADJUSTMENT
26. SIDE BEARING SPACER
27. DIFFERENTIAL CASE ASSEMBLY
28. COVER
29. DRAIN PLUG
30. FILLER PLUG

*NOTE: Specified torque with asterisks means that it is covered with oil.*

**Required Special Tools:**

- MB990031 or MB990699: Drive Pinion Oil Seal Installer
- MB990326: Preload Socket
- MB990685: Torque Wrench
- MB990802: Bearing Installer
- MB990819: Drive Pinion Gauge Assembly
- MB990934: Installation Adapter
- MB990936: Installation Adapter
- MB990938: Bar
- MB990939: Brass Bar
- MB991170: Cylinder Gauge
- MB990850: End Yoke Holder
- MB990813: Tap

**LUBRICATION, SEALING AND ADHESIVE POINTS**

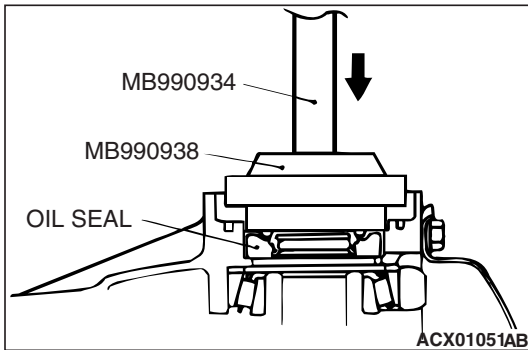


AC102455 AB

### ASSEMBLY SERVICE POINTS

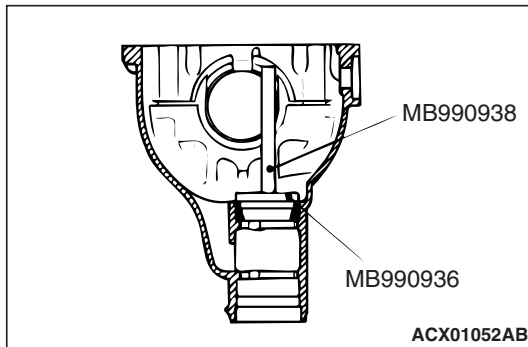
#### >>A<< OIL SEAL INSTALLATION

Use special tools MB990938 and MB990934 to insert the oil seal, and then apply a thin coat of multipurpose grease to the lip of the oil seal.



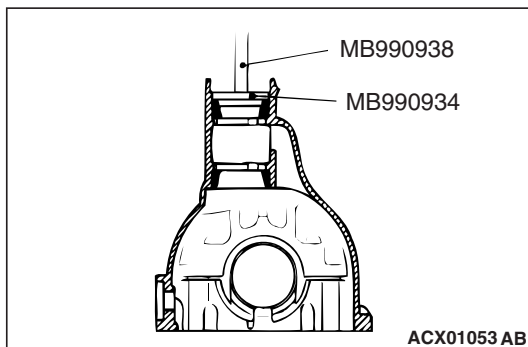
#### >>B<< DRIVE PINION FRONT BEARING OUTER RACE INSTALLATION

Use special tools MB990938 and MB990936 to press-fit the drive pinion front bearing outer races into the gear carrier.



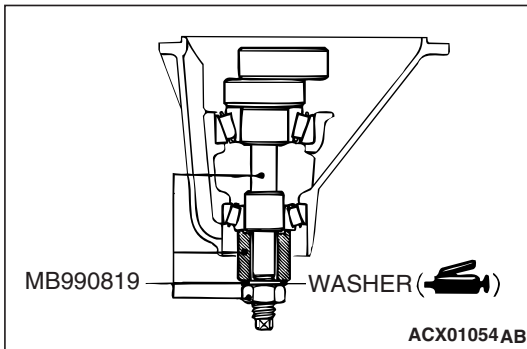
#### >>C<< DRIVE PINION REAR BEARING OUTER RACE INSTALLATION

Use special tools MB990938 and MB990934 to press-fit the drive pinion rear bearing outer races into the gear carrier.

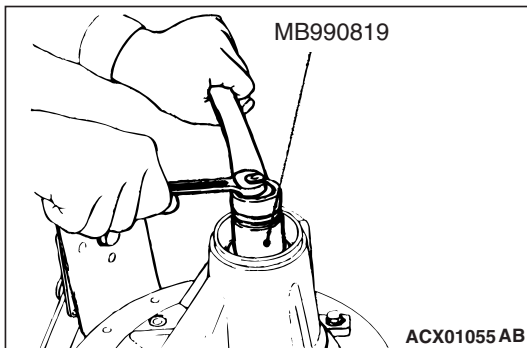


#### >>D<< PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedure.



1. Apply multipurpose grease to the washer of the special tool MB990819.
2. Install the special tool, drive pinion front and rear bearing inner races to the gear carrier.

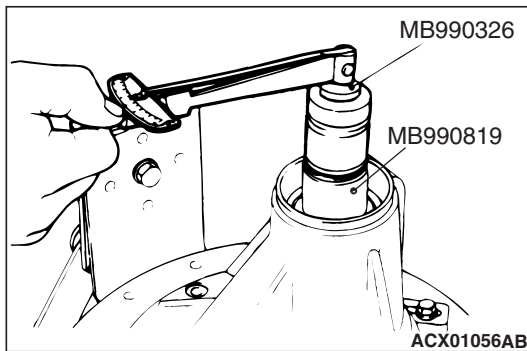


3. Tighten the nut of special tool MB990819 while measuring the turning torque of the drive pinion. Gradually keep tightening the nut of special tool MB990819 until the turning torque of the drive pinion (without oil seal) is at the standard value.

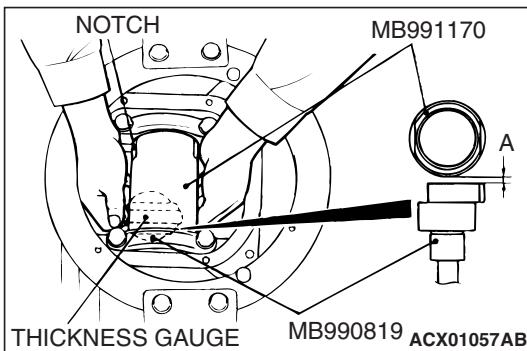
**Standard value: (Without oil seal)**

BEARING DIVISION	BEARING LUBRICATION	TURNING TORQUE
New	None (with anti-rust agent)	0.83 – 1.19 N·m (7.35 – 10.53 in·lb)

*NOTE: The special tool MB990326 cannot be turned a full revolution, so turn it several times within the range of movement to run in the bearing, and then measure the turning torque.*



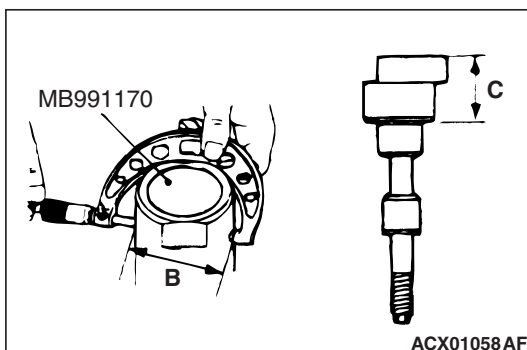
4. Clean the side bearing hub.



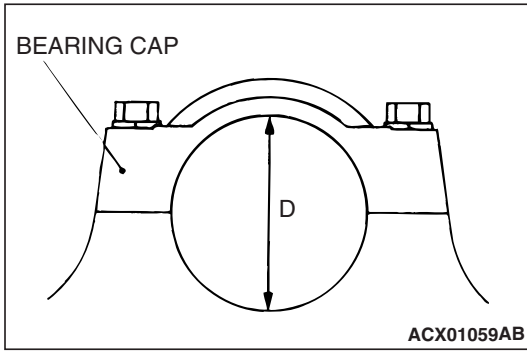
5. Install special tools MB991170 and MB990819 to the side bearing hub of the gear carrier, and then install the bearing cap.

*NOTE: Always check that the notch is in the shown position and that special tools are touching firmly against the side bearing hub.*

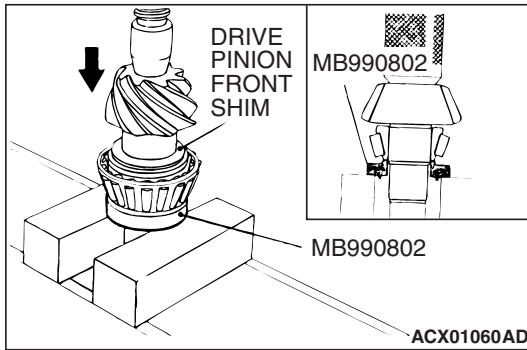
6. Use a thickness gauge to measure the clearance (A) between special tools MB991170 and MB990819.
7. Remove special tools (MB991170, MB990819).



8. Use a micrometer to measure the special tool in the places (B, C) shown in the illustration.



9. Install the bearing cap, and then use a cylinder gauge and micrometer to measure the inside diameter (D) of the bearing cap as shown in the illustration.
10. Calculate the thickness (E) of the required drive pinion front shim by the following formula, and then select a shim which most closely matches this thickness.  $E = A + B + C - 1/2D - 100.0 \text{ mm (3.94 inches)}$



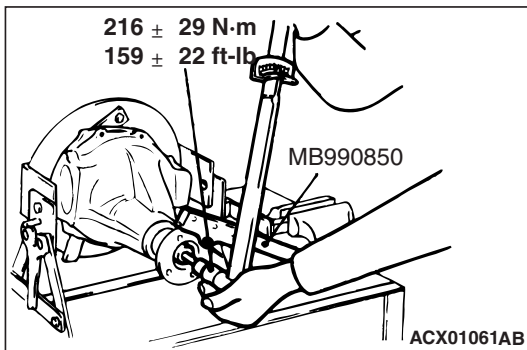
11. Fit the selected drive pinion front shim(s) to the drive pinion, and press-fit the drive pinion front bearing inner race by using special tool MB990802.

**>>E<< DRIVE PINION TURNING TORQUE ADJUSTMENT**

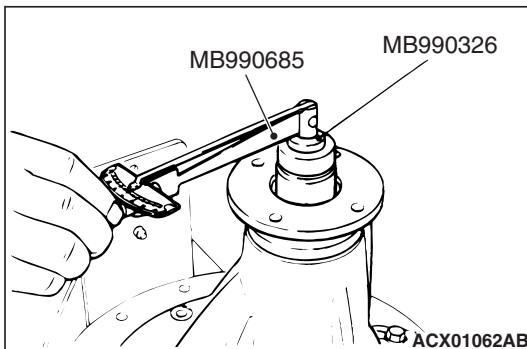
Adjust the drive pinion rotation torque by using the following procedure:

1. Insert the drive pinion into the gear carrier, and then install the drive pinion spacer, the drive pinion rear shim, the drive pinion rear bearing inner race, and the companion flange in that order.

*NOTE: Do not install the oil seal.*



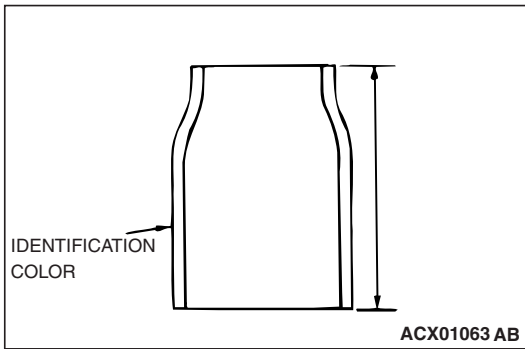
2. Tighten the companion flange to the specified torque by using special tool MB990850.



3. Measure the drive pinion turning torque (without the oil seal) by using special tools MB990685 and MB990326.

**Standard value: (Without oil seal)**

BEARING DIVISION	BEARING LUBRICATION	TURNING TORQUE
New	None (with anti-rust agent)	0.83 – 1.19 N·m (7.35 – 10.53 in-lb)

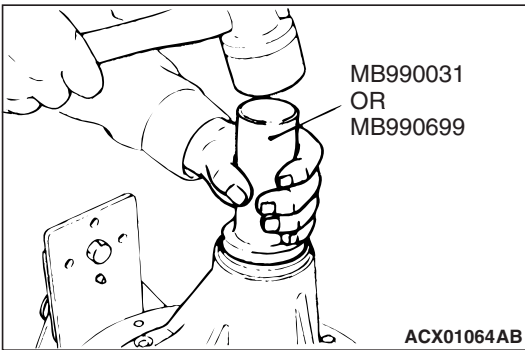


4. If the drive pinion turning torque is not within the range of the standard value, adjust the preload by replacing the drive pinion rear shim(s) or the drive pinion spacer.

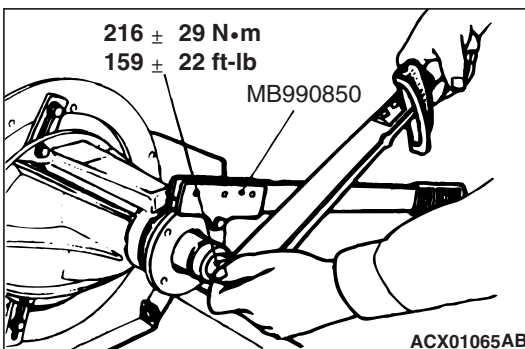
*NOTE: When selecting the drive pinion rear shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers. Also, select the drive pinion spacer from the following two types.*

DRIVE PINION SPACER HEIGHT mm (in)	IDENTIFICATION COLOR
56.67 (2.231)	White
57.01 (2.244)	—

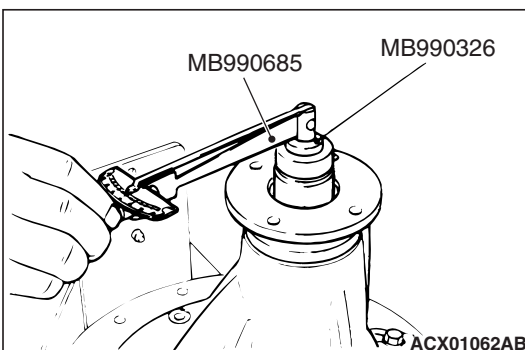
*NOTE: Apply gear oil around the circumference of companion flange (and the mating surface of oil seal) when press fitting oil seal into companion flange.*



5. Remove the companion flange and drive pinion again. Then, after inserting the drive pinion rear bearing inner race into the gear carrier, use special tool MB990031 or MB990699 to press-fit the oil seal.



6. Install the drive pinion assembly and companion flange with the mating marks properly aligned, and tighten the companion flange self-locking nut to the specified torque by using special tool MB990850.



7. Measure the drive pinion turning torque (with the oil seal) by using special tools MB990685 and MB990326.

**Standard value: (With oil seal)**

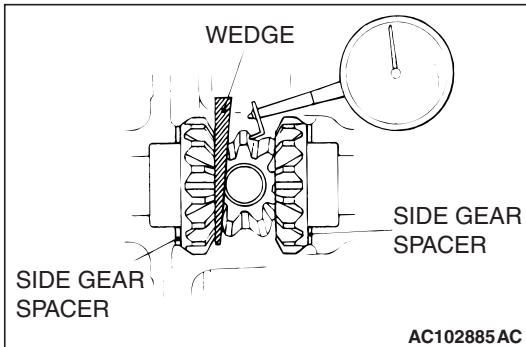
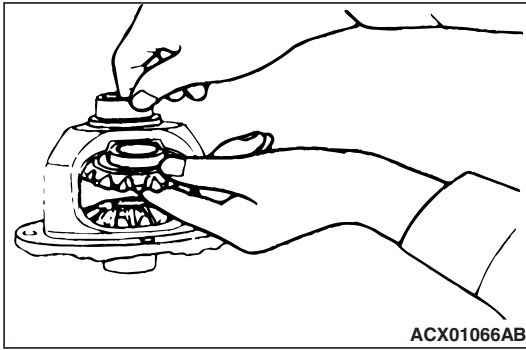
BEARING DIVISION	BEARING LUBRICATION	TURNING TORQUE
New	None (with anti-rust agent)	0.93 – 1.28 N·m (8.24 – 11.32 in-lb)
	Gear oil applied	0.97 – 1.32 N·m (8.59 – 11.68 in-lb)

8. If the drive pinion turning torque is not within the standard value, check the tightening torque of the companion flange self-locking nut and the oil seal.

**>>F<< DIFFERENTIAL GEAR BACKLASH ADJUSTMENT**

1. Assemble the side gears, side gear spacers, pinion gears and pinion washers into the differential case.
2. Temporarily install the pinion shaft.

*NOTE: Do not drive in the lock pin yet.*



3. Insert a wedge between the side gear and the pinion shaft to lock the side gear.
4. Measure the differential gear backlash with a dial indicator on the pinion gear.

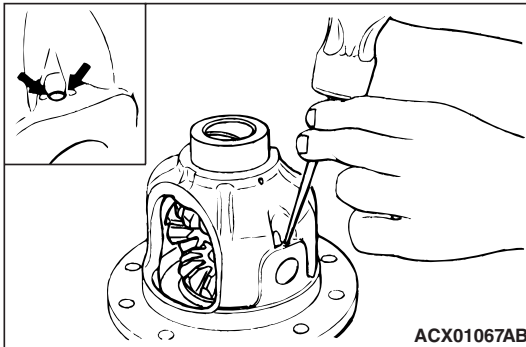
**Standard value: 0 – 0.076 mm (0 – 0.0030 inch)**

**Limit: 0.2 mm (0.007 inch)**

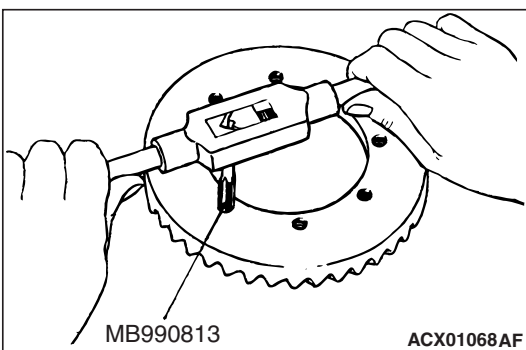
5. If the differential gear backlash exceeds the limit, adjust the backlash by installing thicker side gear spacers.
6. If adjustment is not possible, replace the side gears and pinion gears as a set.
7. Measure the differential gear backlash once again, and confirm that it is within the limit.

**>>G<< LOCK PIN INSTALLATION**

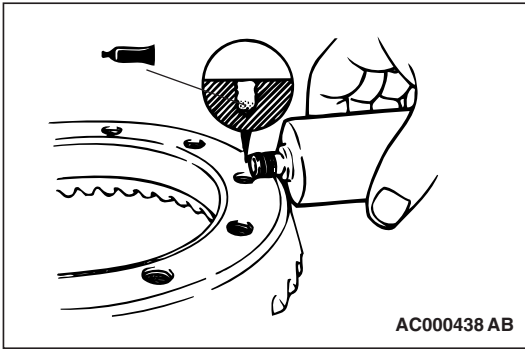
1. Align the pinion shaft lock pin hole with the differential case lock pin hole, and drive in the lock pin.
2. Stake the lock pin with a punch at two points.

**>>H<< DRIVE GEAR INSTALLATION**

1. Clean the drive gear attaching bolts.
2. Remove the adhesive adhered to the threaded holes of the drive gear by turning the special tool MB990813 (tap M10 x 1.25), and then clean the threaded holes by applying compressed air.





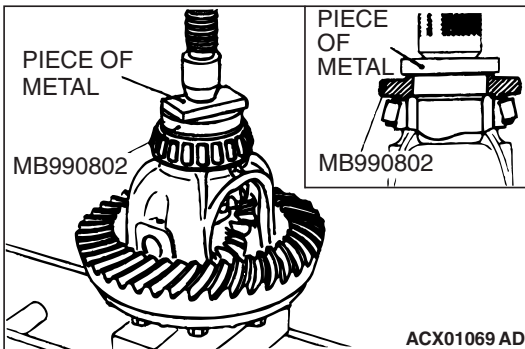


3. Apply the specified adhesive to the threaded holes of the drive gear.

**Specified adhesive: 3M™ AAD Part number 8730, 8731 or equivalent**

4. Install the drive gear onto the differential case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.

**Tightening torque:  $83 \pm 5$  N·m ( $62 \pm 3$  ft-lb)**



### >>I<< SIDE BEARING INNER RACE INSTALLATION

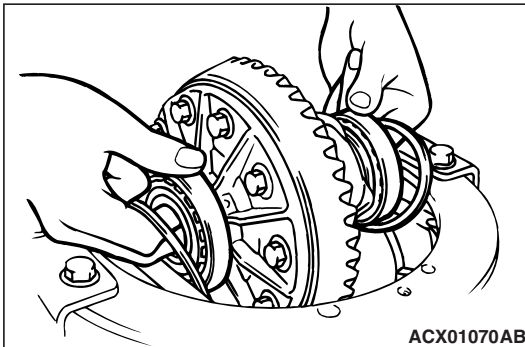
Use special tool MB990802 to press-fit the side bearing inner races into the differential case.

### >>J<< DRIVE GEAR BACKLASH ADJUSTMENT

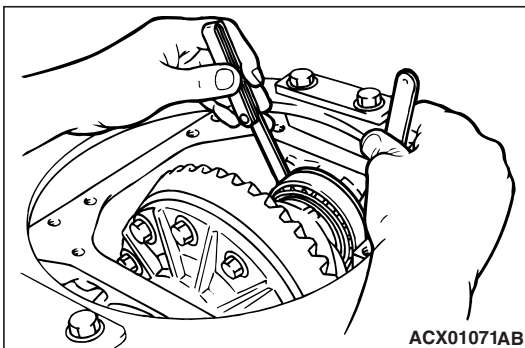
Adjust the drive gear backlash by the following procedures:

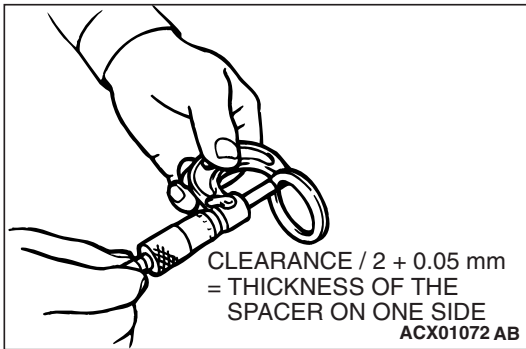
1. Install the side bearing spacers, which are thinner than those removed, to the side bearing outer races, and then mount the differential case assembly into the gear carrier.

*NOTE: Select side bearing spacers with the same thickness for both the drive pinion side and the drive gear side.*

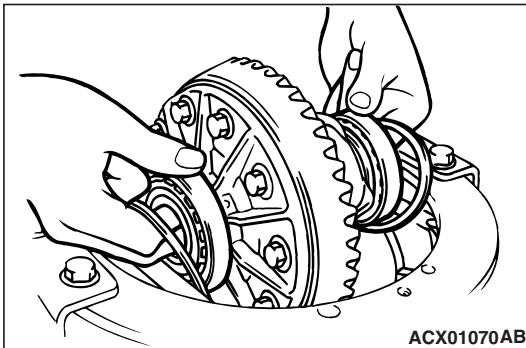


2. Push the differential case assembly to one side, and measure the clearance between the gear carrier and the side bearing adjusting spacer with a feeler gauge.

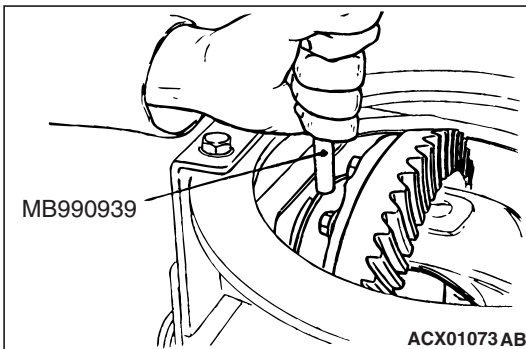




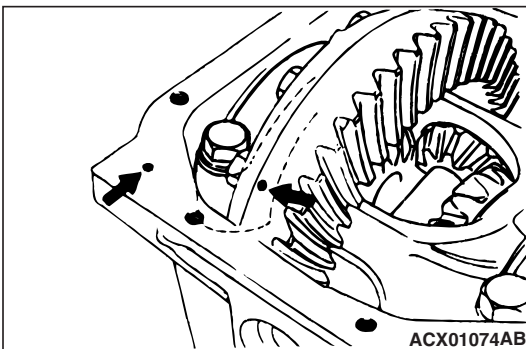
3. Measure the thickness of the side bearing adjusting spacers on one side, select two pairs of spacers which correspond to that thickness plus one half of the clearance plus 0.05 mm (0.002 inch), and then install one pair each to the drive pinion side and the drive gear side.



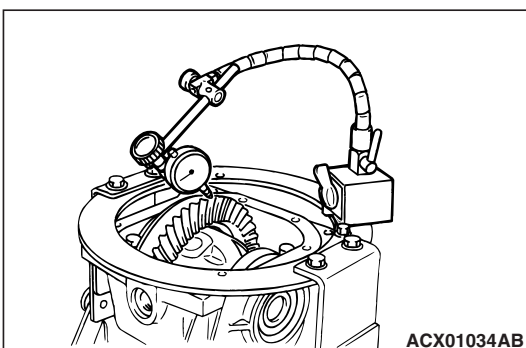
4. Install the side bearing adjusting spacers and differential case assembly, as shown in the illustration, to the gear carrier.



5. Tap the side bearing adjusting spacers with the special tool MB990939 to fit them to the side bearing outer race.



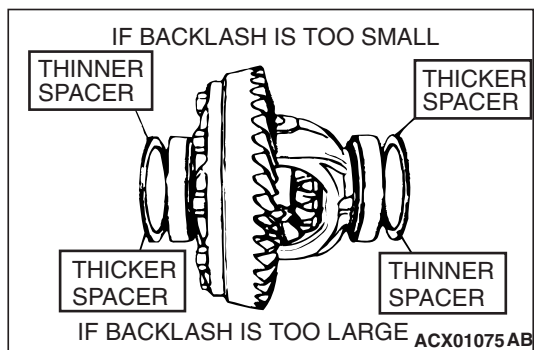
6. Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap.



7. With the drive pinion locked in place, measure the drive gear backlash with a dial indicator on the drive gear.

*NOTE: Measure at four points or more on the circumference of the drive gear.*

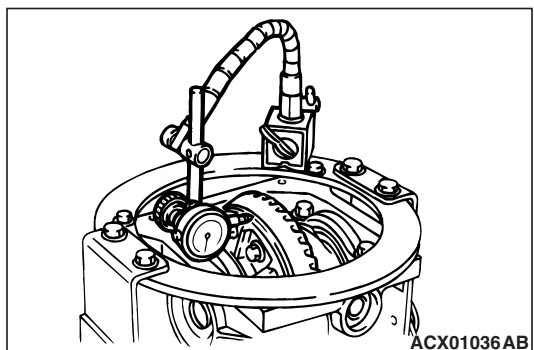
**Standard value: 0.11 – 0.16 mm (0.004 – 0.006 inch)**



8. Change the side bearing adjusting spacers as illustrated, and then adjust the drive gear backlash between the drive gear and the drive pinion.

*NOTE: When increasing the number of side bearing adjusting spacers, use the same number for each, and as few as possible.*

9. Check the drive gear and drive pinion for tooth contact. If poor contact is evident, make adjustment. (Refer to [P.26-43](#)).



10. Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

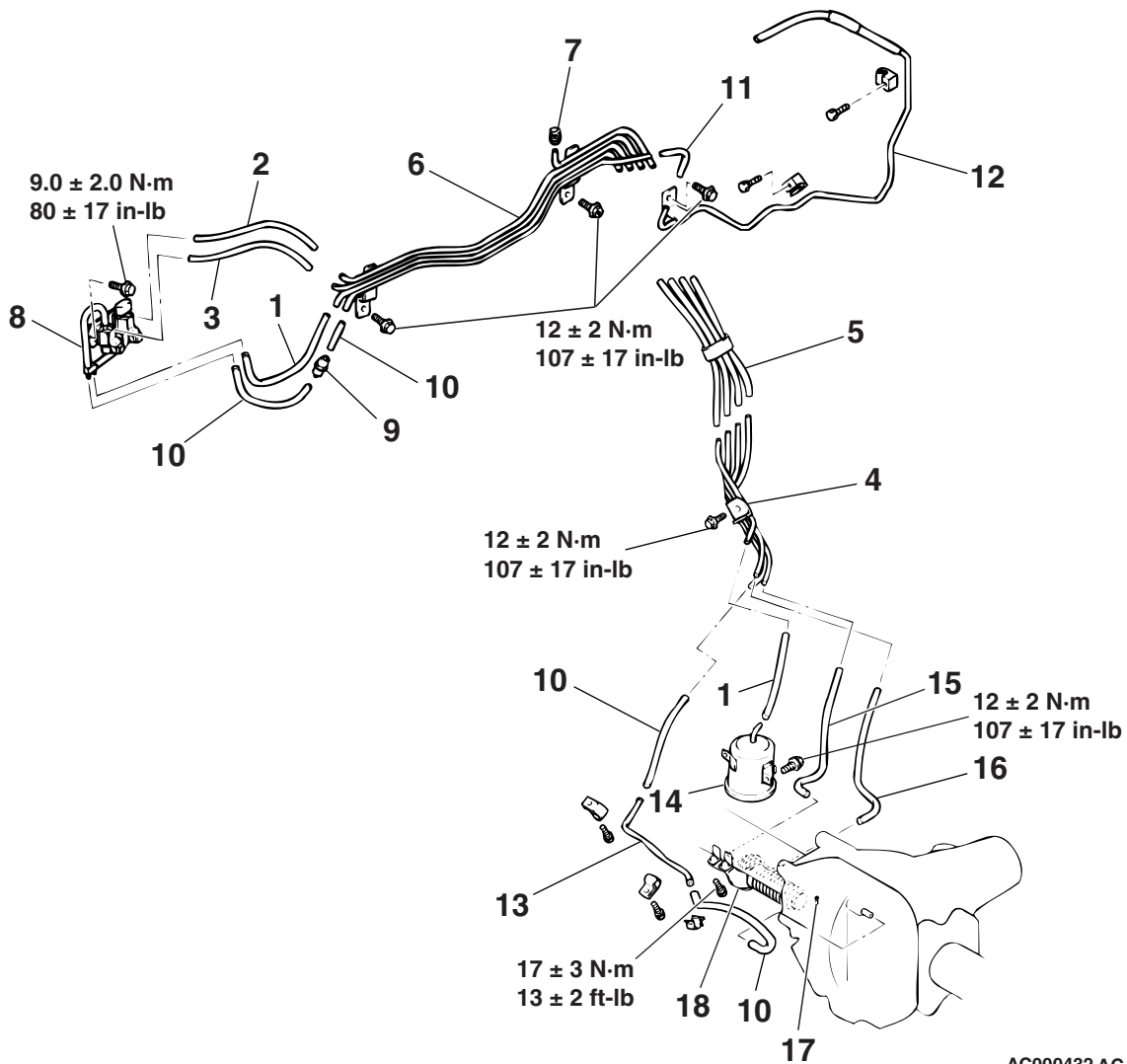
**Limit: 0.05 mm (0.002 inch)**

11. If the drive gear runout exceeds the limit, reinstall by changing the phase of the drive gear and differential case, and remeasure.
12. If adjustment is not possible, replace the differential case or replace the drive gear and drive pinion as a set.

# SOLENOID VALVE AND VACUUM HOSE

## REMOVAL AND INSTALLATION

M1262004500050



AC000432 AC

### SOLENOID VALVE ASSEMBLY, VACUUM TANK ASSEMBLY REMOVAL STEPS

- >>A<< 1. VACUUM HOSE (WHITE STRIPE).
- >>A<< 2. VACUUM HOSE (BLUE STRIPE).
- >>A<< 3. VACUUM HOSE (YELLOW STRIPE).
- 4. VACUUM PIPE ASSEMBLY
- 5. VACUUM HOSE ASSEMBLY
- 6. VACUUM PIPE ASSEMBLY
- 7. BREATHER CAP
- 8. SOLENOID VALVE ASSEMBLY
- >>B<< 9. CHECK VALVE
- 10. VACUUM HOSE
- 11. VACUUM HOSE

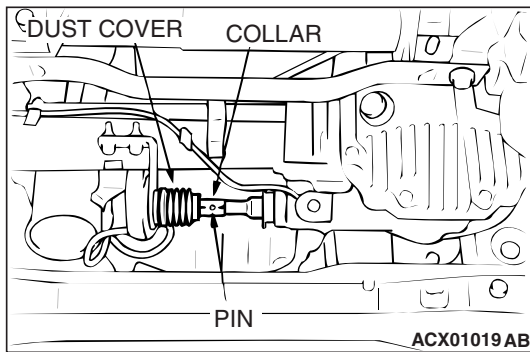
### SOLENOID VALVE ASSEMBLY, VACUUM TANK ASSEMBLY REMOVAL STEPS (Continued)

- 12. VACUUM PIPE ASSEMBLY
- 13. BREATHER PIPE
- 14. VACUUM TANK ASSEMBLY
- VACUUM ACTUATOR ASSEMBLY  
REMOVAL STEPS**
- >>A<< 15. VACUUM HOSE (BLUE STRIPE)  
CONNECTION
- >>A<< 16. VACUUM HOSE (YELLOW STRIPE)  
CONNECTION
- <<A>> 17. PIN
- 18. VACUUM ACTUATOR ASSEMBLY

### REMOVAL SERVICE POINT

#### <<A>> PIN REMOVAL

1. Remove one side of dust cover mounting part on vacuum actuator assembly.
2. Match color of pin hole with that of another pin hole to remove a pin with a punch.



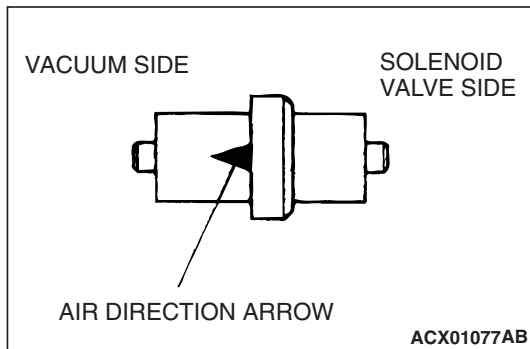
### INSTALLATION SERVICE POINTS

#### >>A<< VACUUM HOSE INSTALLATION

Match the color of each vacuum hose and solenoid valve and vacuum pipe during assembly.

#### >>B<< CHECK VALVE INSTALLATION

Install so that the air direction arrow points to the vacuum side.



## FRONT DIFFERENTIAL MOUNT

## REMOVAL AND INSTALLATION

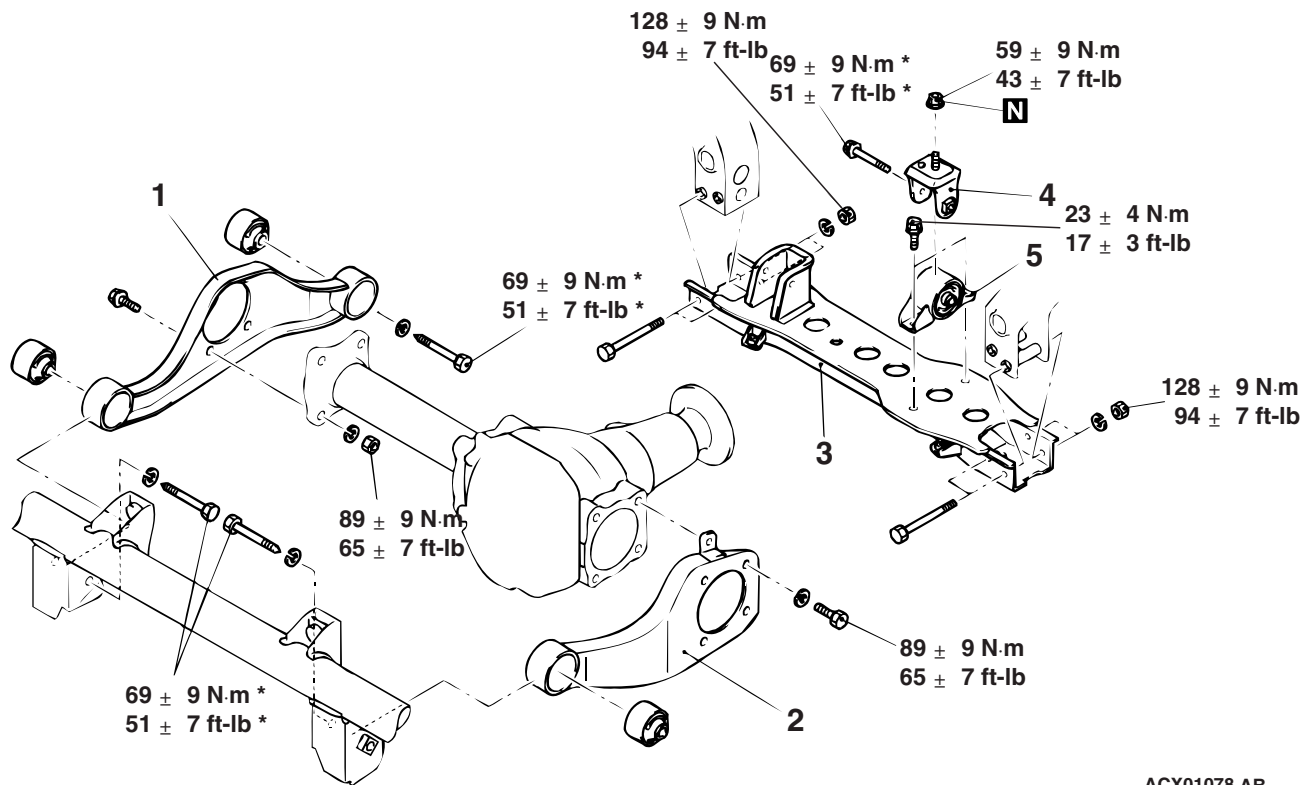
M1262001500062

**CAUTION**

\*:Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

**Pre-removal and Post-installation Operation**

- Under Cover Removal and Installation
- Skid Plate Removal and Installation (Refer to GROUP 51-Front Bumper P.51-3.)
- Gear Oil Draining and Refill (Refer to P.26-16.)
- Drive Shaft Removal and Installation (Refer to P.26-24.)
- Inner Shaft Removal and Installation (Refer to P.26-31.)



ACX01078 AB

**DIFFERENTIAL MOUNT  
BRACKET ASSEMBLY (LH/RH)  
REMOVAL STEPS**

- >>A<< 1. DIFFERENTIAL MOUNT  
BRACKET ASSEMBLY (RH)
- >>A<< 2. DIFFERENTIAL MOUNT  
BRACKET ASSEMBLY (LH)

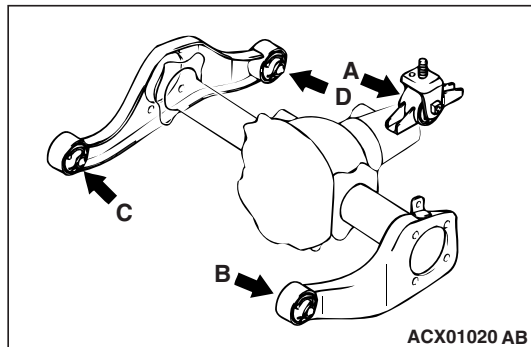
**DIFFERENTIAL MOUNT  
BRACKET ASSEMBLY (REAR)  
REMOVAL STEPS**

3. NO.2 CROSSMEMBER
4. DIFFERENTIAL SUPPORT  
BRACKET
- DIFFERENTIAL CARRIER AND  
HOUSING ASSEMBLY
- >>A<< 5. DIFFERENTIAL MOUNT  
BRACKET ASSEMBLY (REAR)

### INSTALLATION SERVICE POINT

#### >>A<< DIFFERENTIAL MOUNT BRACKET ASSEMBLY INSTALLATION

Tighten the bolts shown in the diagram with the specified torque in the order of A, B, C, D or A, C, B, D.



### DIFFERENTIAL MOUNTING INSULATOR REPLACEMENT

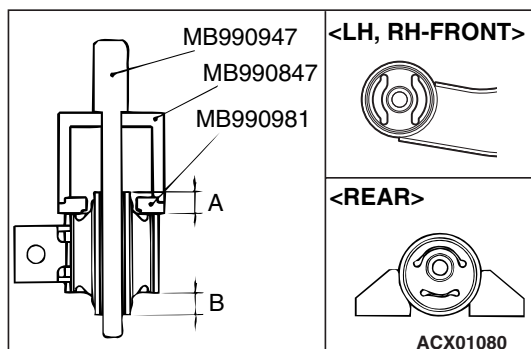
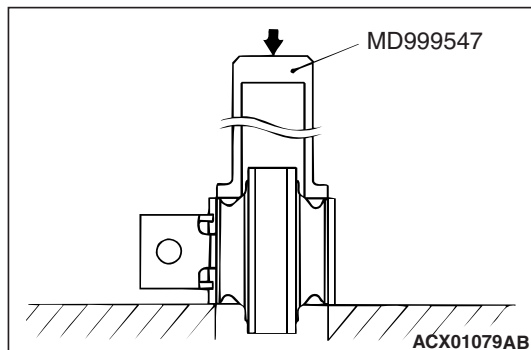
M1262004900047

#### DIFFERENTIAL MOUNTING BRACKET <LH, RH-FRONT, REAR>

##### Required Special Tools:

- MB990947: Lower Arm Bushing Arbor
- MB990847: Rear Suspension Bushing Remover and Installer Base
- MB990981: Mount Bushing Remover and Installer

1. Remove insulator with special tool MD999547.



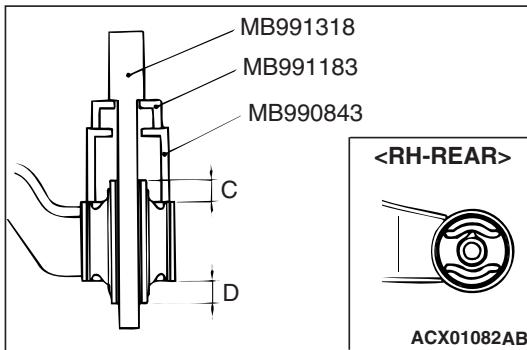
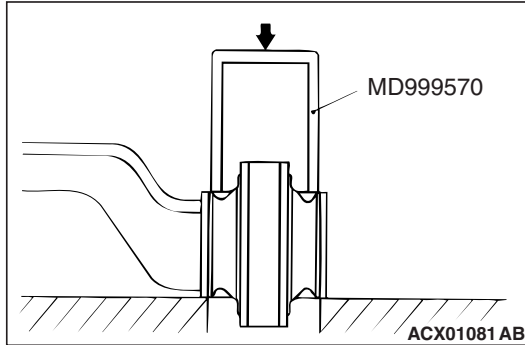
2. Using special tools MB990947, MB990847 and MB990981 with a hydraulic press, press fit each insulator to adjust until the hollow part faces as shown and the difference between A and B is 0.7 mm (0.03 inch).

## DIFFERENTIAL MOUNTING BRACKET &lt;RH-REAR&gt;

**Required Special Tools:**

- MB991318: Lower Arm Bushing Arbor
- MB991183: Bushing Arbor
- MB990843: Draglink Bushing Remover and Installer

1. Remove insulator with special tool MD999570.



2. Using special tools MB991318, MB991183 and MB990843 with a hydraulic press, press fit each insulator to adjust until the hollow part faces as shown and the difference between C and D is 0.7 mm (0.03 inch).



## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

M1261005400268

ITEM	SPECIFICATION
<b>Drive shaft</b>	
Castle nut	200 ± 10 N·m (148 ± 7 ft-lb)
Drive shaft and inner shaft connection nut	60 ± 10 N·m (45 ± 7 ft-lb)
Upper arm and upper arm ball joint connection nut	25 ± 4 N·m (18 ± 3 ft-lb)
<b>Differential carrier and Free wheeling clutch assembly</b>	
Bearing cap bolt	59 ± 5 N·m (44 ± 3 ft-lb)
Cover bolt	18 ± 3 N·m (13 ± 2 ft-lb)
Differential case bolt	83 ± 5 N·m (62 ± 3 ft-lb)
Differential carrier and propeller shaft connection bolt	60 ± 10 N·m (45 ± 7 ft-lb)
Differential mount bracket bolt	69 ± 9 N·m (51 ± 7 ft-lb)
Differential mount bracket <LH> and differential carrier connection bolt	89 ± 9 N·m (65 ± 7 ft-lb)
Differential support bracket and differential carrier connection nut	59 ± 9 N·m (43 ± 7 ft-lb)
Drain plug	65 ± 5 N·m (48 ± 4 ft-lb)
Drive pinion self-locking nut	216 ± 29 N·m (159 ± 22 ft-lb)
Filler plug	50 ± 10 N·m (37 ± 7 ft-lb)
Freewheel engage switch assembly	25 ± 5 N·m (22 ± 4 ft-lb)
Housing tube and freewheel clutch assembly connection bolt	90 ± 10 N·m (67 ± 7 ft-lb)
No.2 crossmember and front frame assembly connection nut	128 ± 9 N·m (94 ± 7 ft-lb)
<b>Front differential mount</b>	
Differential mount bracket bolt	69 ± 9 N·m (51 ± 7 ft-lb)
Differential mount bracket <REAR> bolt	23 ± 4 N·m (17 ± 3 ft-lb)
Differential mount bracket <RH> and housing tube connection nut	89 ± 9 N·m (65 ± 7 ft-lb)
Differential mount bracket <LH> and differential carrier connection bolt	89 ± 9 N·m (65 ± 7 ft-lb)
Differential support bracket and differential carrier connection nut	59 ± 9 N·m (43 ± 7 ft-lb)
Differential support bracket bolt	69 ± 9 N·m (51 ± 7 ft-lb)
No.2 crossmember and front frame assembly connection nut	128 ± 9 N·m (94 ± 7 ft-lb)
<b>Hub and knuckle assembly</b>	
Brake disc and front hub assembly connection bolt	5.0 ± 1.0 N·m (44 ± 9 in-lb)
Castle nut	200 ± 10 N·m (148 ± 7 ft-lb)
Disc brake assembly bolt	113 ± 10 N·m (83 ± 7 ft-lb)
Dust cover and front hub assembly connection bolt	8.9 ± 1.9 N·m (79 ± 17 in-lb)
Knuckle and front hub assembly connection bolt	88 ± 10 N·m (65 ± 7 ft-lb)
Lower arm ball joint and knuckle connection nut	147 ± 29 N·m (109 ± 21 ft-lb)
Tie rod end connection nut	39 ± 4 N·m (29 ± 3 ft-lb)
Upper arm ball joint and knuckle connection nut	74 ± 14 N·m (55 ± 3 ft-lb)

ITEM		SPECIFICATION
<b>Inner shaft, Housing tube</b>		
Actuator bolt		17 ± 3 N·m (13 ± 2 ft-lb)
Breather pipe bolt		12 ± 2 N·m (107 ± 17 in-lb)
Differential mount bracket <RH> and housing tube connection nut		89 ± 9 N·m (65 ± 7 ft-lb)
Differential mount bracket bolt		69 ± 9 N·m (51 ± 7 ft-lb)
Free wheel engage switch assembly		25 ± 5 N·m (22 ± 4 ft-lb)
Housing tube and differential carrier connection bolt		90 ± 10 N·m (67 ± 7 ft-lb)
Vacuum tank bolt		12 ± 2 N·m (107 ± 17 in-lb)
<b>Solenoid valve, Vacuum pipe</b>		
Actuator bolt		17 ± 3 N·m (13 ± 2 ft-lb)
Solenoid valve assembly bolt		9.0 ± 2.0 N·m (80 ± 17 in-lb)
Vacuum pipe bolt		12 ± 2 N·m (107 ± 17 in-lb)
Vacuum tank bolt		12 ± 2 N·m (107 ± 17 in-lb)

**GENERAL SPECIFICATIONS**

M1261000200344

ITEM		SPECIFICATION	
Front axle hub bearing	Type	Taper roller type nut bearing	
Driveshaft	Joint type	Outer	Under cut joint
		Inner	Double-offset joint
Differential	Final drive gear type	Hypoid gear	
	Reduction ratio	4.300	
	Pinion gear type	2 pinion	

**SERVICE SPECIFICATIONS**

M1261000300299

ITEM		STANDARD VALUE	LIMIT
Wheel bearing axis backlash mm (in)		-	0 (0)
Front axle total backlash mm (in)		-	11 (0.4)
Solenoid valve resistance [at 20°C (68°F)] Ω		36 – 46	-
Hub rotation starting torque N·m (in-lb)		-	1.75 (15.48)
Setting of DOJ boot length mm (in)		80 ± 5 (3.2 ± 0.1)	-
Opening dimension of the special tool (MB991561) mm (in)	When the BJ boot band (small) is crimped	2.9 (0.11)	-
	When the BJ boot band (large) is crimped	3.2 (0.13)	-
Crimped width of the BJ boot band mm (in)		2.4 – 2.8 (0.09 – 0.11)	-
Crimped height of BJ boot band (larger) mm (in)		-	9.5 (0.37)
Final drive gear backlash mm (in)		0.11 – 0.16 (0.004 – 0.006)	-
Drive gear runout mm (in)		-	0.05 (0.002)
Differential gear backlash mm (in)		0 – 0.076 (0 – 0.0030)	0.2 (0.007)
Drive pinion turning torque N·m (in-lb)	Without oil seal	0.83 – 1.19 (7.35 – 10.53)	-
	With oil seal	With anti-rust agent	0.93 – 1.28 (8.24 – 11.32)
		With gear oil applied	0.97 – 1.32 (8.59 – 11.68)
Main shaft assembly and clutch gear clearance mm (in)		0.05 – 0.3 (0.002 – 0.012)	-

**LUBRICANTS**

M1261000400564

ITEM	SPECIFIED LUBRICANT	QUANTITY
Front axle gear oil	Hypoid gear oil API classification GL-5 or higher <ul style="list-style-type: none"> <li>• Above -23°C(-10°F): SAE 90, 85W-90, 80W-90</li> <li>• From -34 to -23°C(-30 to -10°F): SAE 80W, 80W-90</li> <li>• Below -34°C(-30°F): SAE 75W</li> </ul>	1.15 dm <sup>3</sup> (1.21 qt)
DOJ boot grease	Repair kit grease	100 ± 10 g (3.5 ± 0.3 oz)
UJ boot grease	Repair kit grease	135 ± 10 g (4.8 ± 0.3 oz)

**SEALANTS AND ADHESIVES**

M1261000500107

ITEM	SPECIFIED SEALANTS AND ADHESIVES
Contact surface of differential mounting bracket and differential carrier	3M™ AAD Part No.8672, 8679, 8678, 8661, 8663 or equivalent
Vent plug	
Free-wheeling clutch assembly	
Drive gear threaded hole	3M™ AAD Part No.8730, 8731 or equivalent

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## NOTES