

REAR AXLE

CONTENTS

27109000246

REAR AXLE <2WD> 27A

REAR AXLE <4WD> 27B



REAR AXLE

<2WD>

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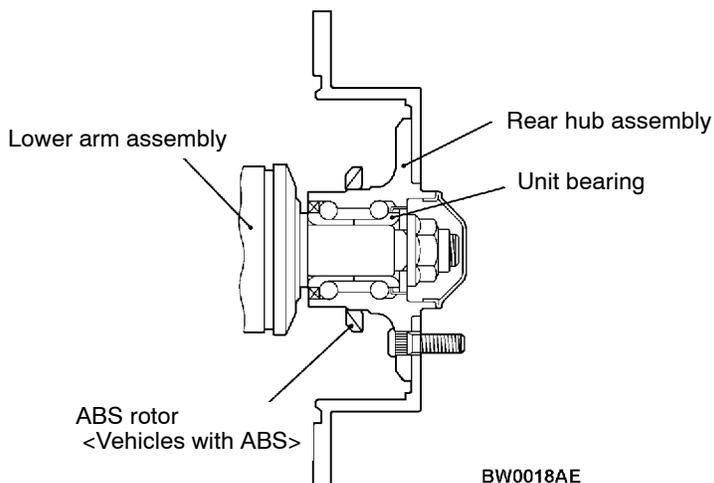


GENERAL INFORMATION

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A unit bearing (double-row angular contact ball bearing) is used as the wheel bearing.

For the vehicles with ABS, the hub has a ABS rotor for detecting the wheel rotation speed.



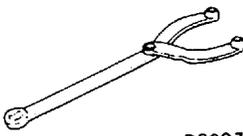
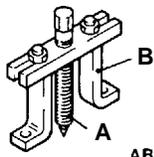
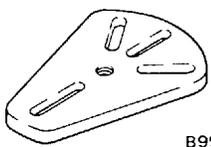
SERVICE SPECIFICATIONS

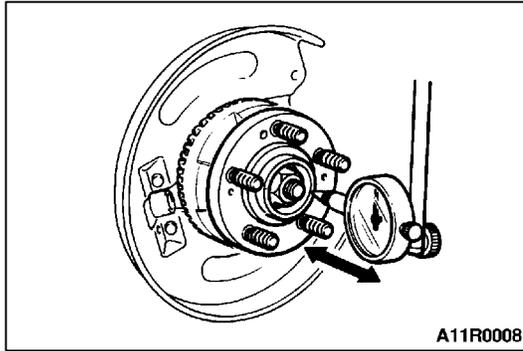
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Items	Limit
Wheel bearing axial play mm	0.05
Wheel bearing rotary-sliding resistance N	18 or less

SPECIAL TOOLS

27100060274

Tool	Number	Name	Use
 <p>B990767</p>	MB990767	End yoke holder	Hub fixing
 <p>AB990241</p>	MB990241 A: MB990242 B: MB990244	Axle shaft puller A: Puller shaft B: Puller bar	Rear hub assembly removal
 <p>B991354</p>	MB991354	Puller body	



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ON-VEHICLE SERVICE

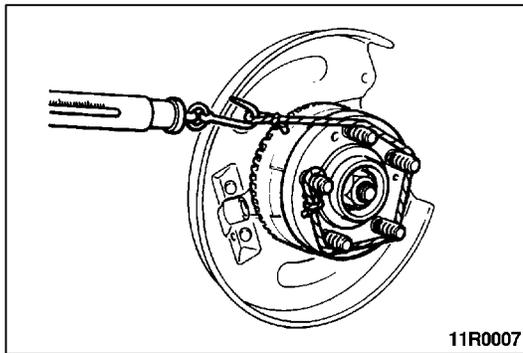
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WHEEL BEARING AXIAL PLAY CHECK

1. Remove the caliper assembly and secure it with wire so that it does not fall, and then remove the brake disc.
2. Remove the hub cap.
3. Check the bearing's axial play.
Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is axial play.

Limit: 0.05 mm

4. If the axial play exceeds the limit, the flange nut should be tightened to the specified torque 255 Nm and check the axial play again.
5. Replace the rear hub assembly if an adjustment cannot be made to within the limit.



11R0007

WHEEL BEARING ROTARY-SLIDING RESISTANCE CHECK

27100110184

1. Remove the caliper assembly and secure it with wire so that it does not fall, and then remove the brake disc.
2. After turning the hub a few times to seat the bearing, wind a rope around the hub bolt and turn the hub by pulling at a 90° angle with a spring balance. Measure to determine whether or not the rotary-sliding resistance of the rear hub is at the limit value.

Limit: 18 N or less

3. If the limit value is exceeded, loosen the flange nut and then tighten it to the specified torque 196 - 255 Nm and check the rear hub rotary sliding resistance again.
4. Replace the rear hub assembly if an adjustment cannot be made to within the limit.

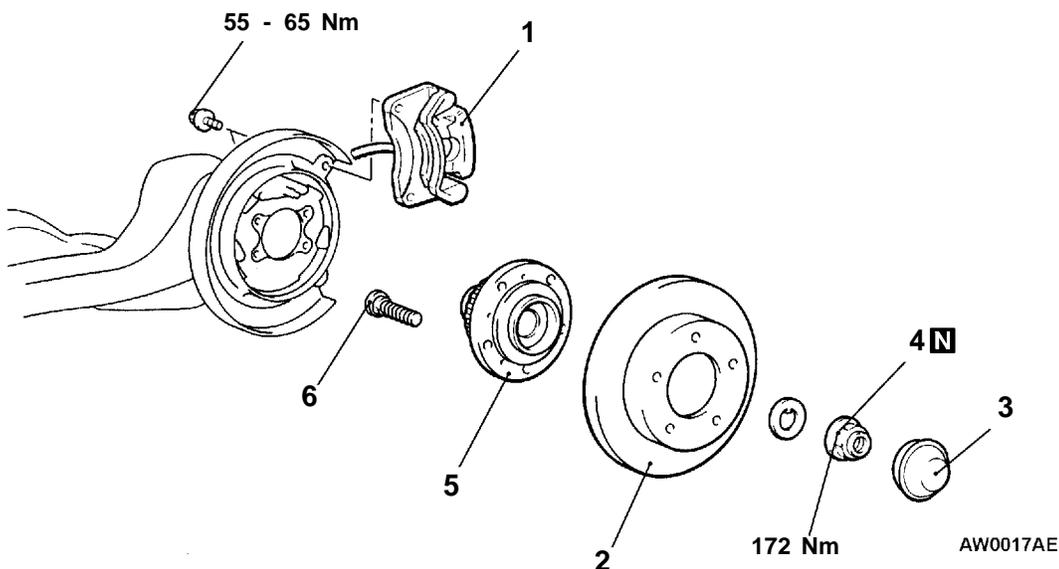
REAR HUB ASSEMBLY

27100200294

REMOVAL AND INSTALLATION

Caution

1. For the vehicles with ABS, care must be taken not to scratch or damage the teeth of the ABS rotor. The ABS rotor must never be dropped. If the teeth of the ABS rotor are chipped, resulting in a deformation of the ABS rotor, it will not be able to accurately detect the wheel rotation speed, and the system will not function normally.
2. The rear hub assembly should not be dismantled. When removing the rear hub assembly, the wheel bearing inner race may be left at the spindle side. In this case, always replace the rear hub assembly, otherwise the hub will damage the oil seal, causing oil leaks or excessive play.



Removal steps



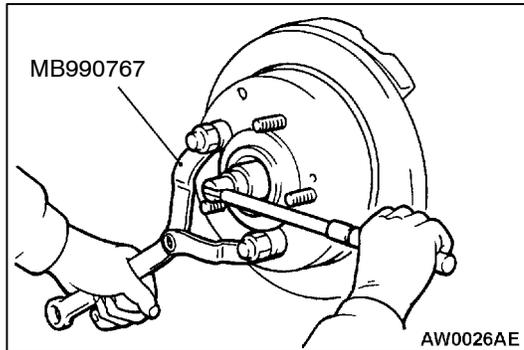
1. Caliper assembly
2. Brake disc
3. Hub cap



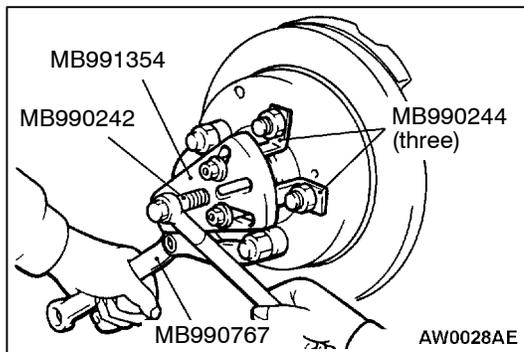
4. Flange nut
5. Rear hub assembly
6. Hub bolt

REMOVAL SERVICE POINTS**◀A▶ CALIPER ASSEMBLY REMOVAL**

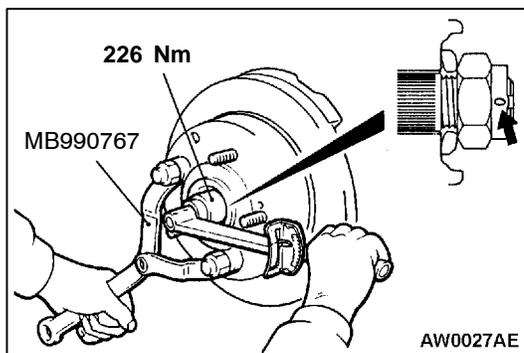
Secure the removed caliper assembly with wire, so that it does not fall.

**◀B▶ FLANGE NUT REMOVAL****Caution**

Do not apply the vehicle weight to the wheel bearing while loosening the flange nut, or the wheel bearing will be damaged.

**◀C▶ REAR HUB ASSEMBLY REMOVAL**

Use the special tools to remove the hub from the lower arm assembly.

**INSTALLATION SERVICE POINT****▶A▶ FLANGE NUT INSTALLATION**

1. Using the special tool, tighten the flange nut.

Caution

Before securely tightening the flange nuts, make sure there is no load on the wheel bearings. Otherwise the wheel bearing will be damaged.

2. After tightening the flange nut, crimp the nut to meet the concave portion of the spindle.

INSPECTION

27100210167

- Check the oil seal for crack or damage.
- Check the rear hub unit bearing for wear or damage.
- Check the rear ABS rotor for chipped teeth.

REAR AXLE

<4WD>

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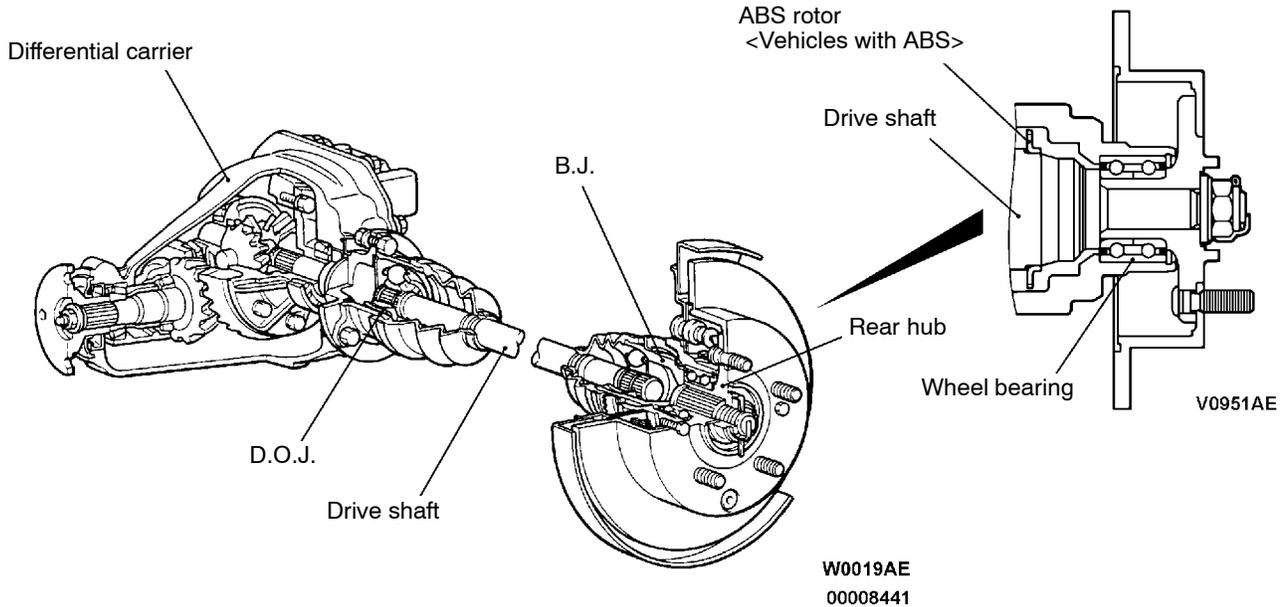
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GENERAL INFORMATION

27100010231

The drive shaft has two joints (D.O.J. and B.J.) at each side. The D.O.J. joint at the differential side can slide smoothly in the axial direction. The B.J. type constant velocity joint is used at the hub side.

In addition, for vehicles with ABS, an ABS rotor for detecting vehicle wheel speed is mounted in the drive shaft. The wheel bearing used is an angular ball bearing, which is resistant against lateral load.



SERVICE SPECIFICATIONS

27100030343

Items		Standard value	Limit	
Rear axle total backlash mm		-	5	
Wheel bearing axial play mm		-	0.05	
Setting of D.O.J. boot length mm		80	-	
Drive gear backlash mm		0.11 - 0.16	-	
Drive gear runout mm		-	0.05	
Differential gear backlash mm		0 - 0.076	0.2	
Drive pinion turning torque Nm	Without oil seal	When replacing with a new bearing (with rust-prevention oil)	0.9 - 1.2	-
		When using a new bearing or when reusing (gear oil application)	0.4 - 0.5	-
	With oil seal	When replacing with a new bearing (with rust-prevention oil)	1.0 - 1.3	-
		When using a new bearing or when reusing (gear oil application)	0.5 - 0.6	-

LUBRICANTS

27100040131

Items		Specified lubricant	Quantity
Gear oil		Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	0.55 L
B.J.	Vehicles without ABS	Repair kit grease	75 g
	Vehicles with ABS	Repair kit grease	145 g
D.O.J.		Repair kit grease	100 g

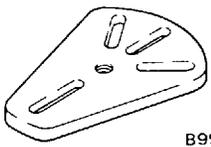
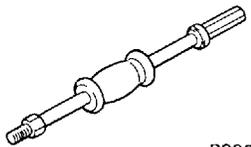
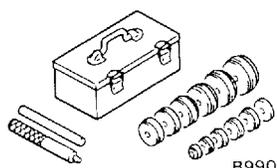
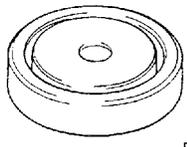
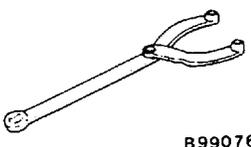
SEALANTS AND ADHESIVES

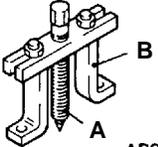
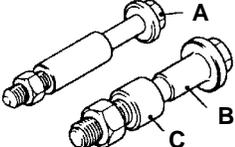
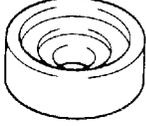
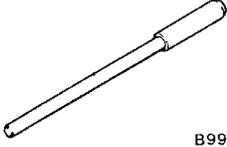
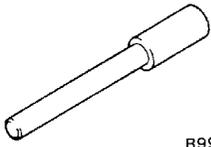
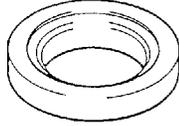
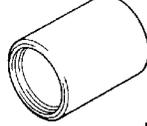
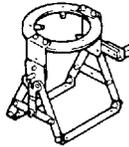
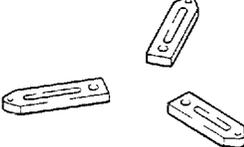
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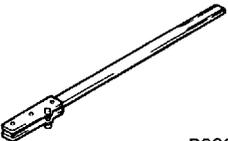
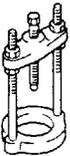
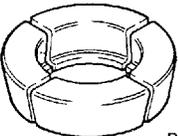
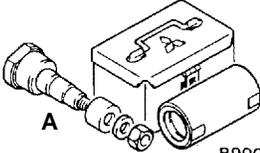
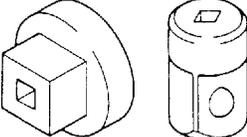
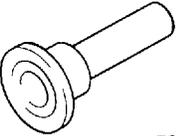
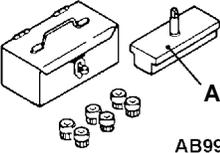
Items	Specified sealants and adhesives
Vent plug	Semi-drying sealant : 3M ATD Part No. 8661 or equivalent
Differential cover installation surface	
Drive gear threaded holes	Anaerobic sealant : 3M Stud Locking 4170 or equivalent

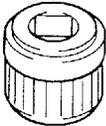
SPECIAL TOOLS

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Tool	Number	Name	Use
	MB991354	Puller body	<ul style="list-style-type: none"> • Companion shaft removal • Drive shaft removal • Rear hub assembly removal
	MB990211	Slide hammer	Companion shaft removal
	MB990925	Bearing and oil seal installer set	<ul style="list-style-type: none"> • Oil seal press-fitting • Bearing outer race press-fitting • Tooth contact of drive gear measurement (Refer to GROUP 26 - Special Tools.)
	MB991115	Oil seal installer	Oil seal press-fitting (Use in conjunction with MB990938)
	MB990767	End yoke holder	Hub fixing

Tool	Number	Name	Use
 <p>AB990241</p>	MB990241 A: MB990242 B: MB990244	Axle shaft puller A: Puller shaft B: Puller bar	<ul style="list-style-type: none"> • Drive shaft removal • Rear hub assembly removal
 <p>00005697</p>	A: MB991017 B: MB990998 C: MB991000	A, B: Front hub remover and installer C: Spacer	Wheel bearing provisional holding MB991000, which belongs to MB990998, should be used as a spacer.
 <p>B991407</p>	MB991407	Differential support arbor	Driving out and press-fitting of differential support member bushing
 <p>B991318</p>	MB991318	Lower arm bushing arbor	
 <p>B990651</p>	MB990651	Bar	
 <p>B990884</p>	MB990884	Rear suspension bushing ring	
 <p>B990890</p>	MB990890	Rear suspension bushing base	
 <p>B990909</p>	MB990909	Working base	Differential carrier assembly disassembly and reassembly
 <p>B991116</p>	MB991116	Working base adapter	

Tool	Number	Name	Use
 <p>B990810</p>	MB990810	Bearing puller	<ul style="list-style-type: none"> • Side bearing inner race removal • Companion flange removal
 <p>B990850</p>	MB990850	End yoke holder	Companion flange removal and installation
 <p>B990339</p>	MB990339	Bearing puller	Drive pinion rear bearing inner race removal
 <p>B990374</p>	MB990374	Pinion bearing remover	
 <p>B990835</p>	MB990835 A: MB990836 B: MB990392	Drive pinion setting gauge set A: Drive pinion gauge assembly B: Cylinder gauge	Drive pinion height measurement
 <p>B990326</p>	MB990326	Preload socket	Breakaway torque of the drive pinion measurement
 <p>B990728</p>	MB990728	Bearing installer	<ul style="list-style-type: none"> • Drive pinion rear bearing inner race press-fitting • Side bearing inner race press-fitting
 <p>B990031</p>	MB990031 or MB990699	Oil seal installer	Drive pinion oil seal press-fitting
 <p>AB990988</p>	MB990988 A: MB990989	Side gear holding tool set A: Base	Differential case installation

Tool	Number	Name	Use
 B991051	MB991357	Side gear holding tool	Limited slip differential gear backlash inspection

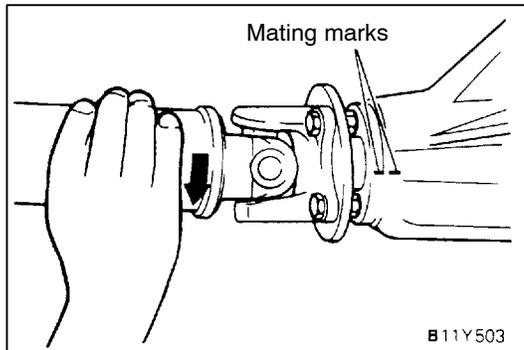
ON-VEHICLE SERVICE

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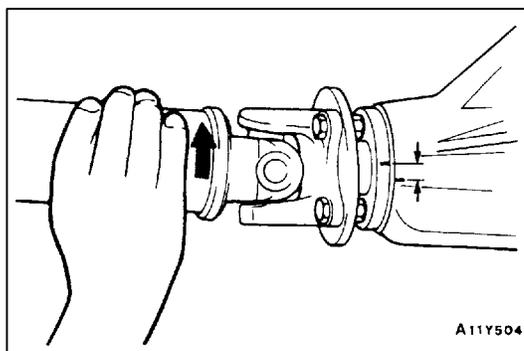
REAR AXLE TOTAL BACKLASH CHECK

If the vehicle vibrates and produces a booming sound due to an imbalance of the driving system, measure the rear axle total backlash by the following procedures to see if the differential carrier assembly requires removal.

1. Place the gearshift lever in the neutral position, apply the parking brake and jack up the vehicle.



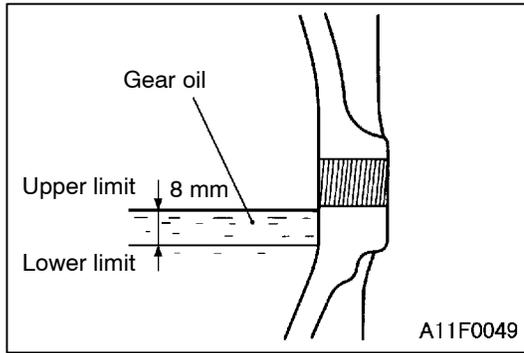
2. Manually turn the propeller shaft clockwise as far as it will go and make mating marks on the companion flange dust cover and the differential carrier.



3. Manually turn the propeller shaft anti-clockwise as far as it will go and measure the movement of the mating marks.

Limit: 5 mm

4. If the backlash exceeds the limit, remove the differential carrier assembly (Refer to P.27B-20.) and adjust the backlash (Refer to P.27B-23.).

**GEAR OIL LEVEL CHECK**

27200120135

1. Remove the filler plug.
2. Check that the gear oil level is between the upper limit (the bottom of a filler plug) and the lower limit.
3. If the gear oil level is not between the upper limit and the lower limit, add the specified gear oil until the gear oil level reaches the bottom of the filler plug.

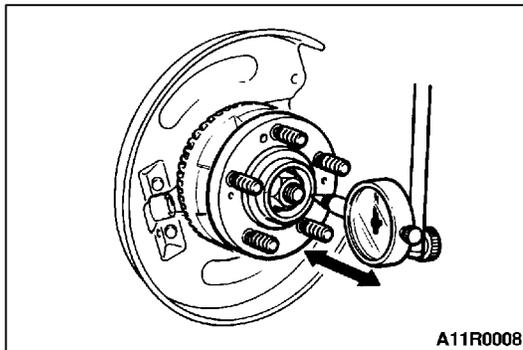
Specified gear oil:

**Hypoid gear oil API classification GL-5 or higher
SAE viscosity No. 90, 80W**

NOTE

When outside air temperature is 10°C or more: SAE90
When outside air temperature is 10°C or less: SAE80W

4. Install the filler plug, and then tighten it to 49 Nm.

**WHEEL BEARING AXIAL PLAY CHECK** 27100090181

1. Remove the caliper assembly and secure it with wire so that it does not fall, and then remove the brake disc.
2. Check the bearing's axial play.
Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is axial play.

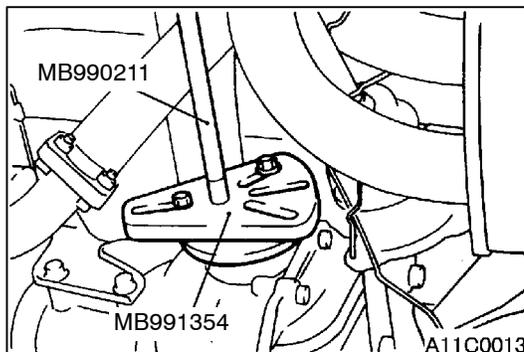
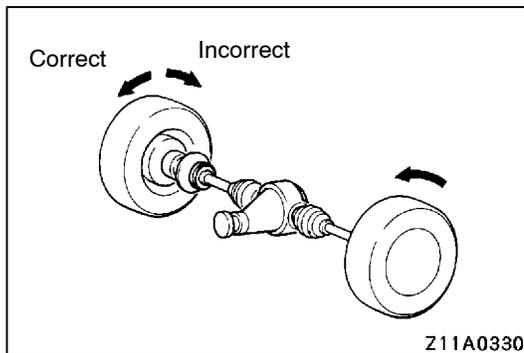
Limit: 0.05 mm

3. If the axial play exceeds the limit, replace the wheel bearing. (Refer to GROUP 34 - Lower Arm Assembly.)

LIMITED SLIP DIFFERENTIAL CONDITION CHECK (VCU TYPE)

27300100033

1. Place the shift lever in the neutral position and block the front wheels with chocks.
2. Release the parking brake lever fully.
3. Jack up the rear wheels and apply rigid racks to the specified positions of the side sills.
4. Disconnect the propeller shaft from the differential.
5. While turning one wheel slowly and make sure that the opposite wheel turns in the same direction.
6. If the opposite wheel turns in reverse, disassemble the limited slip differential with VCU and replace the VCU.



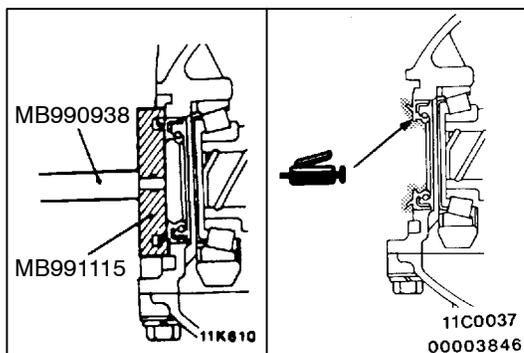
DIFFERENTIAL CARRIER OIL SEAL REPLACEMENT

27200130077

1. Disconnect the drive shaft from the companion flange, and then support it to a nearby part with a wire.
2. Use the special tool to withdraw the companion flange from the differential carrier.

Caution

Be careful not to damage the differential carrier oil seal by the companion flange spline.



3. Remove the oil seal of the differential carrier.
4. Use the special tool to set a new oil seal in position.
5. Apply multipurpose grease to the lip section of the oil seal and to the oil seal contact surface of the drive shaft.
6. Replace the circlip on the companion shaft with a new one, and then install the companion shaft onto the differential carrier.

Caution

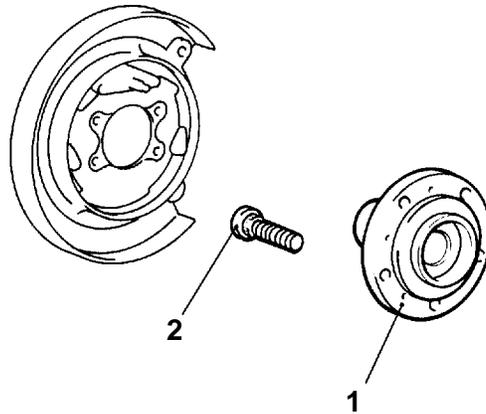
Be careful not to damage the differential carrier oil seal by the companion flange spline.

7. Install the drive shaft to the companion flange, and then tighten the retaining nuts to 54 - 64 Nm.

REAR HUB ASSEMBLY

REMOVAL AND INSTALLATION

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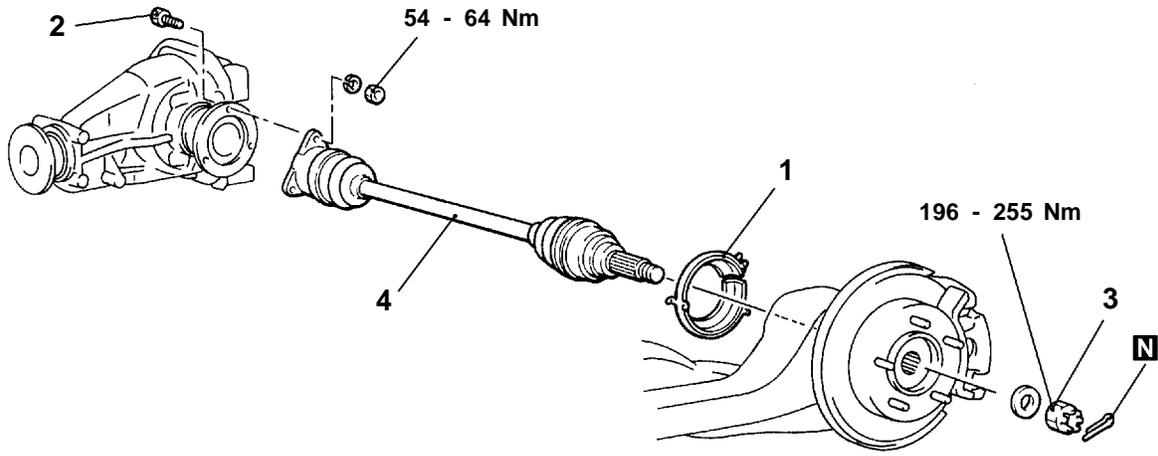
Removal steps

1. Rear hub assembly
(Refer to GROUP 34 - Lower Arm Assembly.)
2. Hub bolt

DRIVE SHAFT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
 Main Muffler Assembly Removal and Installation
 <Right drive shaft only> (Refer to GROUP 15.)



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Removal steps

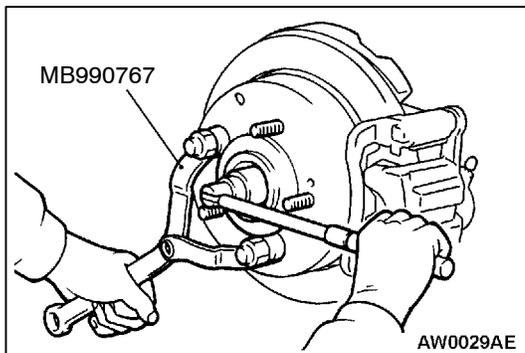
1. Cover
2. Bolt

- | | | |
|-----|-----|--------------------|
| ◀A▶ | ▶B▶ | 3. Drive shaft nut |
| ◀B▶ | ▶A▶ | 4. Drive shaft |

◀A▶ DRIVE SHAFT NUT REMOVAL

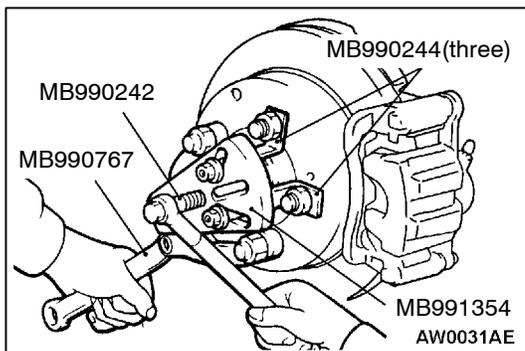
Caution

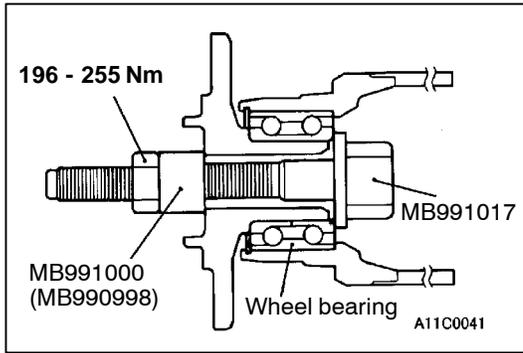
Do not apply the vehicle weight to the wheel bearing while loosening the drive shaft nut, or the wheel bearing will be damaged.



◀B▶ DRIVE SHAFT REMOVAL

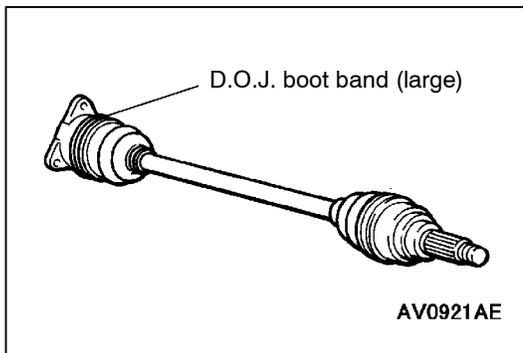
Use the special tools to push out the drive shafts from the hub.





Caution

Do not apply the vehicle weight to the wheel bearing as possible while loosening the drive shaft nut. Otherwise the wheel bearing may be damaged. If, however, the vehicle weight must be applied to the bearing (because of moving the vehicle), temporarily secure the wheel bearing by using the special tool.



INSTALLATION SERVICE POINTS

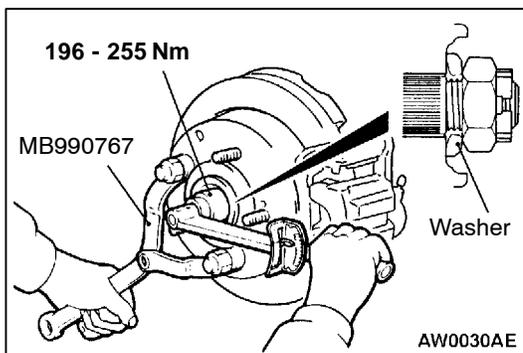
►A◄ DRIVE SHAFT INSTALLATION

NOTE

The left and right drive shafts can also be distinguished from each other by the identification colour of D.O.J. boot band (large).

Identification colours of D.O.J. boot band (large)

Item	Vehicles without ABS	Vehicles with ABS
Left drive shaft	Yellow	Violet
Right drive shaft	Blue	Brown



►B◄ DRIVE SHAFT NUT INSTALLATION

1. Install the washer and drive shaft nut in specified direction.
2. Using the special tool, tighten the drive shaft nut.

Caution

Before securely tightening the drive shaft nuts, make sure there is no load on the wheel bearings. Otherwise, the wheel bearing will be damaged.

3. If the position of the split pin holes does not match, tighten the nut up to 255 Nm in maximum.
4. Install the split pin in the first matching holes and bend it securely.

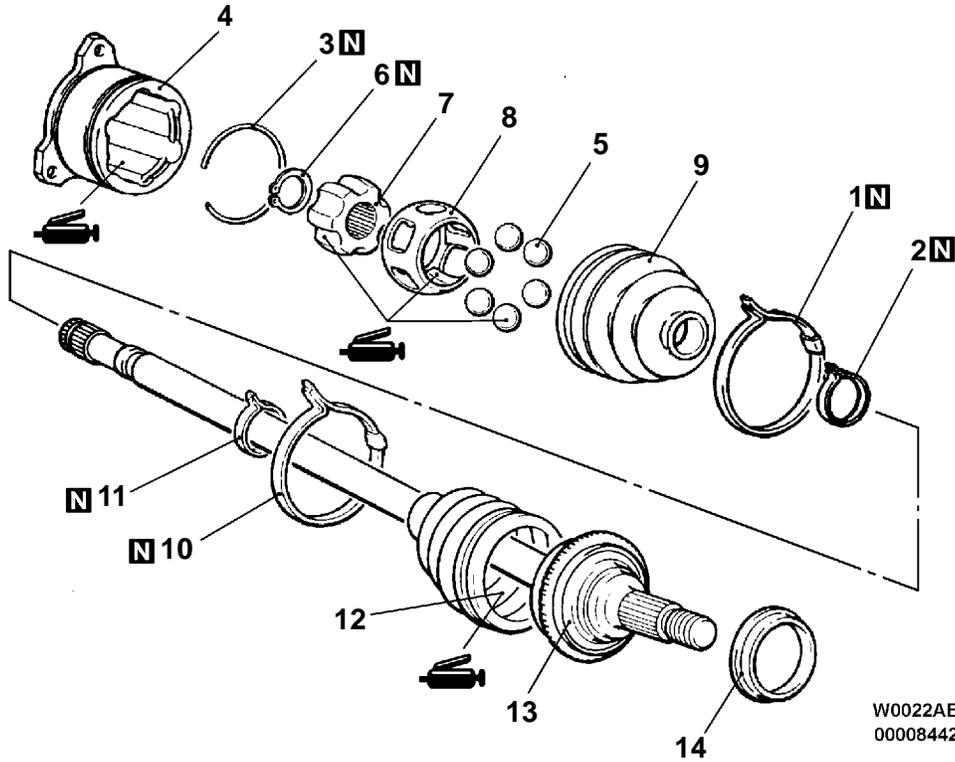
INSPECTION

27100340040

- Check the drive shaft boots for damage or deterioration.
- Check the ball joints (B.J. and D.O.J.) for excessive play or check operation.
- Check the drive shaft spline for wear or damage.

DISASSEMBLY AND REASSEMBLY

27100350067



W0022AE
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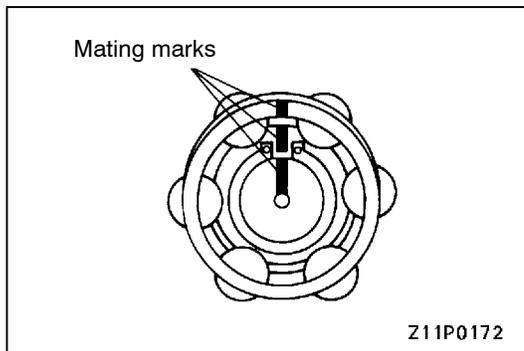
<p>W0023AE</p>	<p>11C0030</p>
<p>B.J. repair kit</p>	<p>D.O.J. repair kit</p>
<p>11C0028</p>	<p>11C0029</p>
<p>B.J. boot repair kit</p>	<p>D.O.J. boot repair kit</p>

Disassembly steps

- | | | | |
|--------|-----------------------------|--------|----------------------------|
| ▶D◀ | 1. D.O.J. boot band (large) | ▶B▶B◀ | 8. D.O.J. cage |
| ▶D◀ | 2. D.O.J. boot band (small) | ▶C▶A◀ | 9. D.O.J. boot |
| | 3. Circlip | | 10. B.J. boot band (large) |
| ▶A▶▶C◀ | 4. D.O.J. outer race | | 11. B.J. boot band (small) |
| ▶B▶▶C◀ | 5. Ball | | 12. B.J. boot |
| ▶B▶▶B◀ | 6. Snap ring | ▶C▶▶A◀ | 13. B.J. assembly |
| ▶B▶▶B◀ | 7. D.O.J. inner race | | 14. Dust cover |

DISASSEMBLY SERVICE POINTS**◀A▶ D.O.J. OUTER RACE REMOVAL**

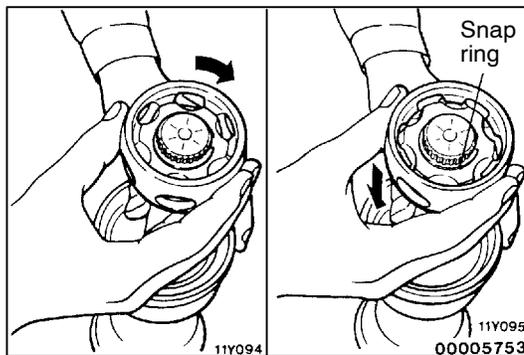
Withdraw the D.O.J. outer race from the B.J. assembly, and then clean wipe grease from the D.O.J. outer race.

**◀B▶ BALL/SNAP RING/D.O.J. INNER RACE/D.O.J. CAGE REMOVAL**

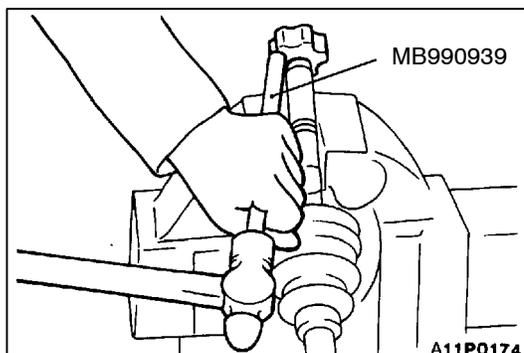
1. Matchmark the drive shaft, D.O.J. inner race and D.O.J. cage.
2. Remove the balls from the D.O.J. cage.

Caution

Do not use a flat-tipped screwdriver, as it will damage the balls.



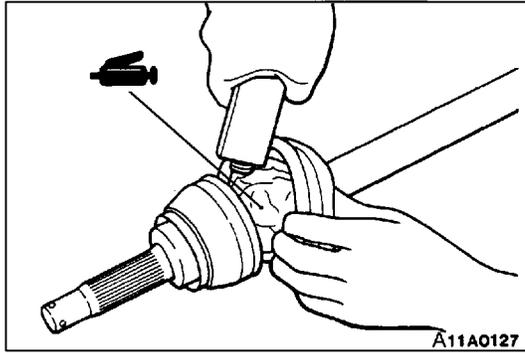
3. Slide the D.O.J. cage from the D.O.J. inner race to the B.J. side, and then remove the snap ring.



4. Use the special tool to tap the D.O.J. inner race evenly and gently, and then remove it from the shaft.

◀C▶ D.O.J. BOOT/B.J. BOOT REMOVAL

1. Wipe off grease from the shaft spline.
2. If the D.O.J. boot / B.J. boot is reused, wrap a plastic tape around the spline of the drive shaft to prevent damage during removal.



REASSEMBLY SERVICE POINTS

►A◄ B.J. BOOT/D.O.J. BOOT INSTALLATION

1. Wrap a plastic tape around the spline of the drive shaft, and then remove the B.J. boot and D.O.J. boot in that order.
2. Fill the specified grease inside the B.J. and B.J. boot.

Specified grease: Repair kit grease

Amount to use:

<Vehicles without ABS> 75 g

<Vehicles with ABS> 145 g

NOTE

The grease in the repair kit should be used once at a time. One-half of the grease should be filled in the joint, the remaining one-half filled inside the boot.

Caution

The drive shaft joint uses special grease. Do not mix old and new grease or different types of grease.

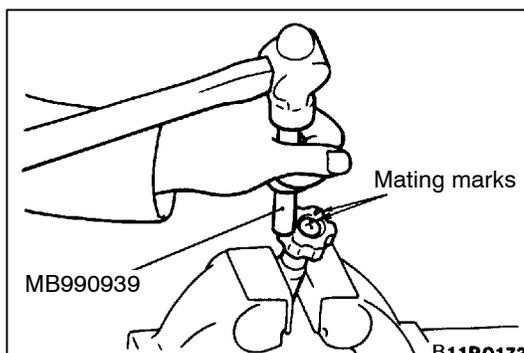
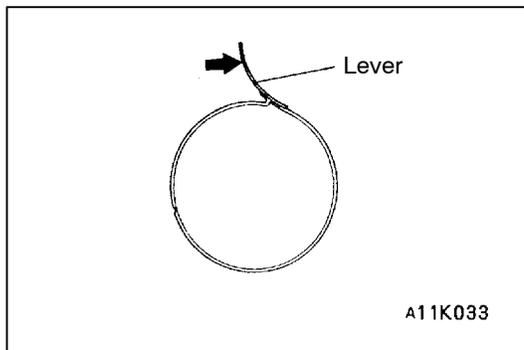
3. Tighten the boot band.

Caution

- (1) In order to maintain air inside the B.J. boot properly, the drive shaft should be maintained at 0 degree joint angle while the band is tightened.
- (2) Before tightening the B.J. boot band or D.O.J. boot band, make sure that the boot band is correct by identification number stamped on the lever.

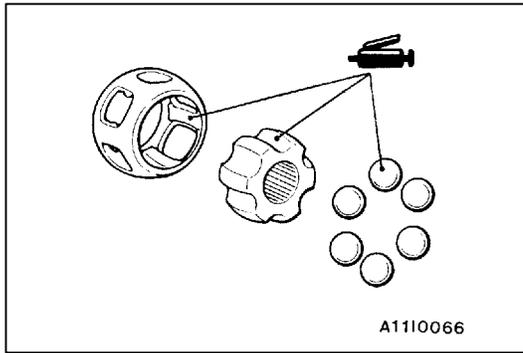
Identification numbers of the boot bands

Item		Vehicles without ABS	Vehicles with ABS
B.J. boot band	large	20-110#BJ87	20-75#BJ95
	small	20-83#BJ82	20-111#BJ87
D.O.J. bootband	large	20-82#BJ82	20-82#BJ82
	small	20-83#BJ82	20-83#BJ82



►B◄ D.O.J. CAGE/D.O.J. INNER RACE INSTALLATION

1. Assemble the D.O.J. cage in the drive shaft, and slide it to the B.J. assembly side.
2. Align the mating marks on the D.O.J. inner race and the shaft.
3. Use the special tool to press in the inner race to the shaft projection evenly and gently.



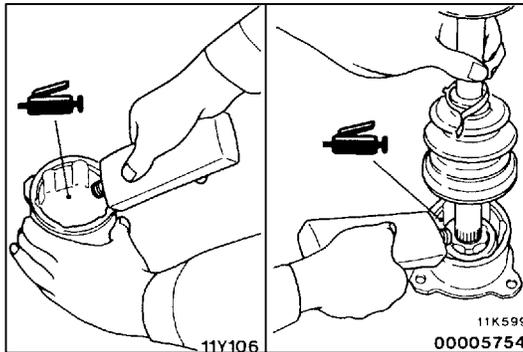
►C◄ BALL/D.O.J. OUTER RACE INSTALLATION

1. Apply the specified grease to the balls, D.O.J cage and D.O.J. inner race, and then align the mating marks on the D.O.J. cage and D.O.J. inner race to assemble the balls.

Specified grease: Repair kit grease

Caution

The drive shaft joint uses special grease. Do not mix old and new grease or different types of grease.



2. Fill the specified grease in the D.O.J. outer race, and then insert the drive shaft. Finally, fill the grease again.

Specified grease: Repair kit grease

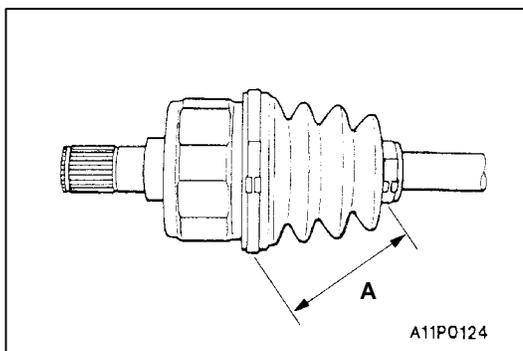
Amount to use: 100 g

NOTE

The grease in the repair kit should be used once at a time. One-half of the grease should be filled in the joint, the remaining one-half filled inside the boot.

Caution

The drive shaft joint uses special grease. Do not mix old and new grease or different types of grease.



►D◄ D.O.J. BOOT BAND (SMALL)/D.O.J. BOOT BAND (LARGE) INSTALLATION

Set the D.O.J. boot bands at the specified distance in order to adjust the amount of air inside the D.O.J. boot, and then tighten the D.O.J. boot bands securely.

Standard value (A): 80 mm

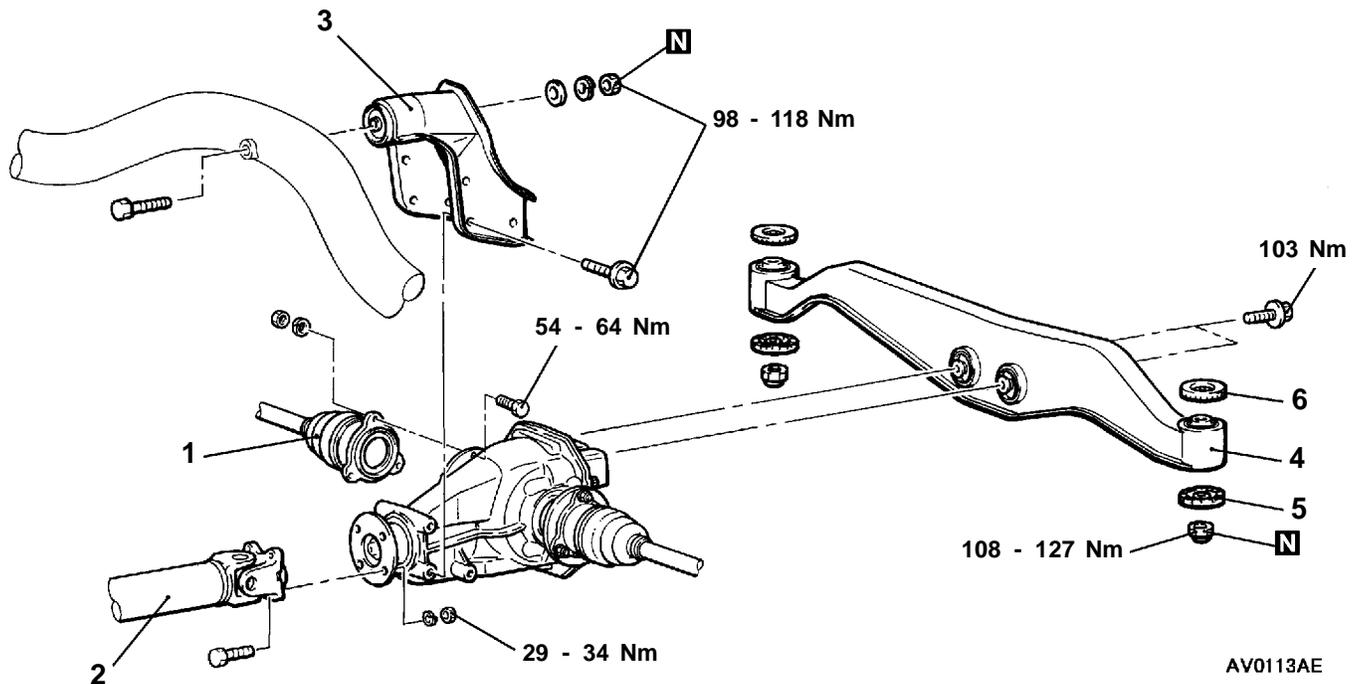
INSPECTION

27100360046

- Check the drive shaft for bending or wear.
- Check the B.J. for entry of water, foreign materials or rust.
- Check the D.O.J. cage, D.O.J. inner race and balls for rust, wear or damage.
- Check the circlip for damage or deformation.
- Check the D.O.J. outer race for wear or damage.

DIFFERENTIAL MOUNT

REMOVAL AND INSTALLATION



AV0113AE

Bracket assembly removal steps

- ◀A▶
 ▶B▶
 ▶C▶ ▶C▶
1. Disconnection of right drive shaft
 2. Propeller shaft connection
 3. Bracket assembly

Differential support member removal steps

- ▶D▶ ▶B▶
 ▶A▶ ▶A▶
- Main muffler assembly (Refer to GROUP 15.)
 - 4. Differential support member
 - 5. Lower stopper
 - 6. Upper stopper

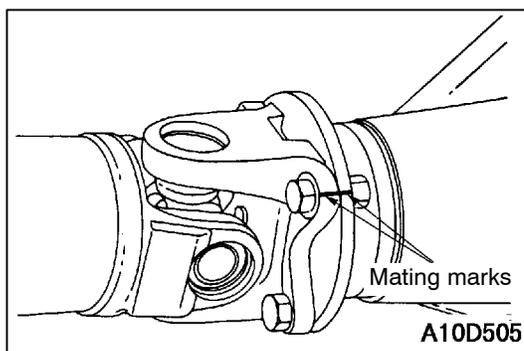
REMOVAL SERVICE POINTS

◀A▶ DISCONNECTION OF RIGHT DRIVE SHAFT

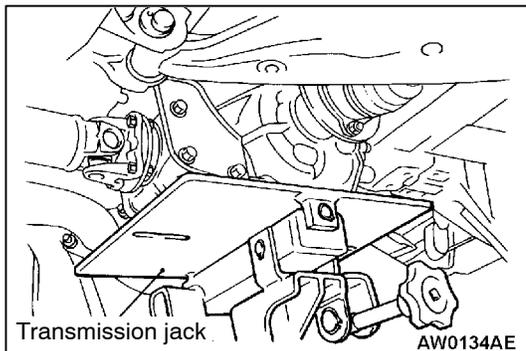
Disconnect the drive shaft from the companion flange, and then support it to a nearby part with a wire.

◀B▶ PROPELLER SHAFT DISCONNECTION

1. Make mating marks on the differential companion flange and flange yoke, and then separate the differential carrier assembly and the propeller shaft.
2. Suspend the propeller shaft from the body with wire, etc, so that there are no sharp bends.



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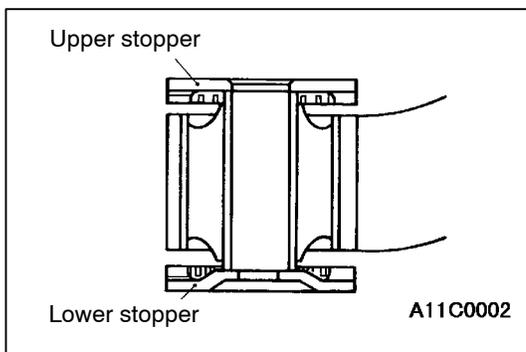


◀C▶ BRACKET ASSEMBLY REMOVAL

1. Support the bottom of the differential carrier with a transmission jack, and then remove the bracket assembly retaining bolts.
2. Lower the front of the differential carrier, and then remove the bracket assembly.

◀D▶ DIFFERENTIAL SUPPORT MEMBER REMOVAL

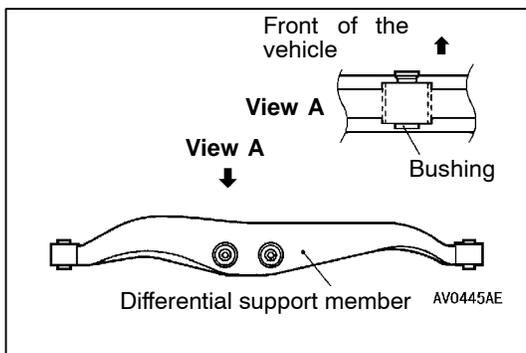
Support the bottom of the differential carrier with a transmission jack, and then remove the bolts securing the differential carrier to the differential support member.



INSTALLATION SERVICE POINTS

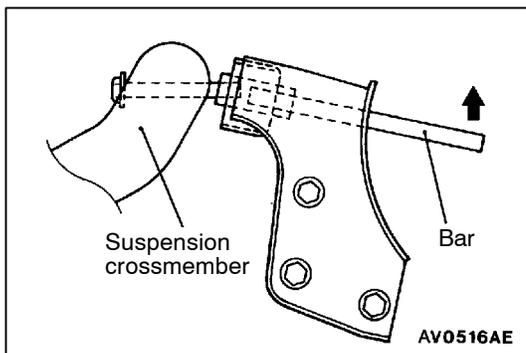
▶A▶ UPPER STOPPER/LOWER STOPPER INSTALLATION

Install the upper and lower stoppers as shown in the illustration.



▶B▶ DIFFERENTIAL SUPPORT MEMBER INSTALLATION

Install the differential support member so that a longer projection of its bushing faces towards the front of the vehicle.



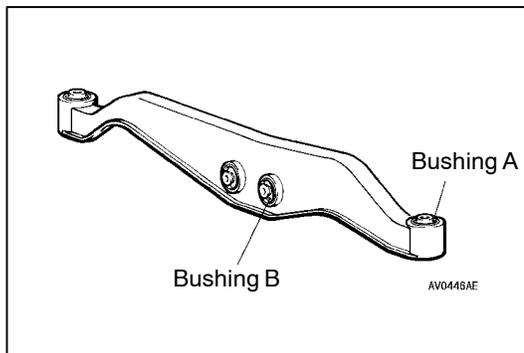
▶C▶ BRACKET ASSEMBLY INSTALLATION

Insert a bar into the bushing inner pipe, and then push up the inner pipe until it is parallel to the suspension crossmember bolt. While the inner pipe is maintained at this position, install the bracket assembly.

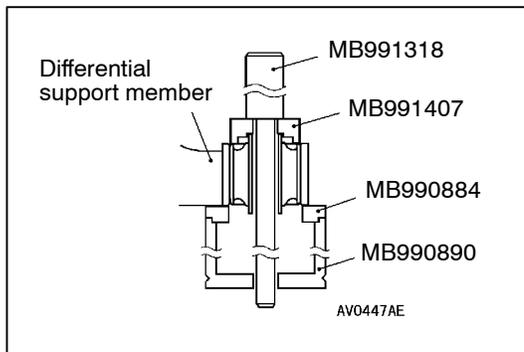
INSPECTION

2720660019

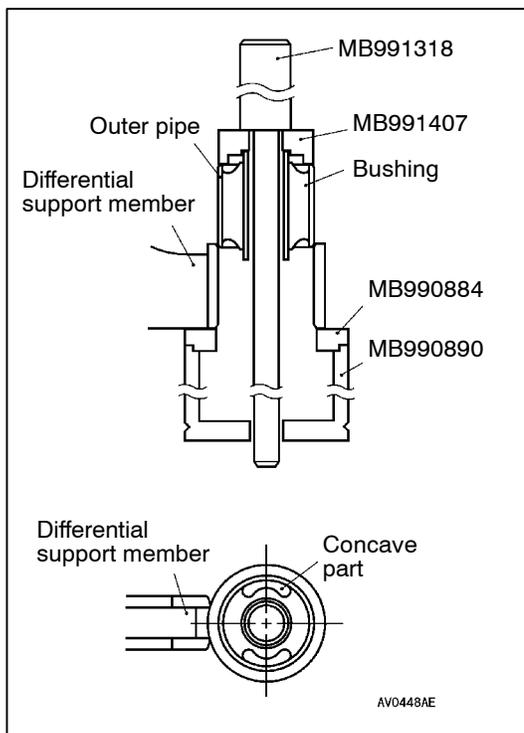
- Check the bracket assembly for cracks or deformation.
- Check the differential support member for cracks or deformation.
- Check the bushings for cracks or deterioration.

**BUSHING REPLACEMENT**

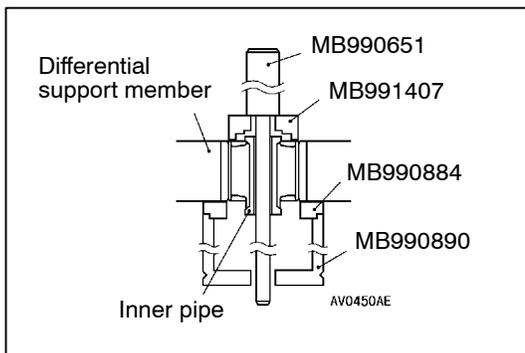
27200670012

**BUSHING A**

1. Use the special tool to press out the bushing.

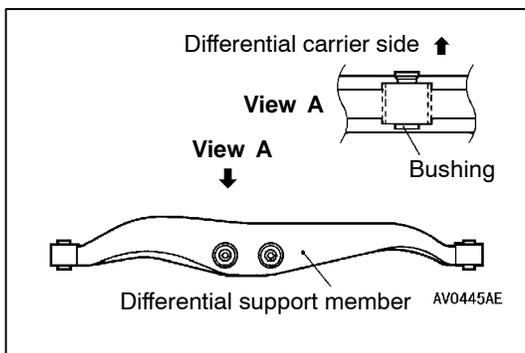


2. Use the special tool to press in the bushing.
3. Align the concave part of the bushing as shown.
4. Press in the bushing until its outer pipe end is aligned with the differential support member.

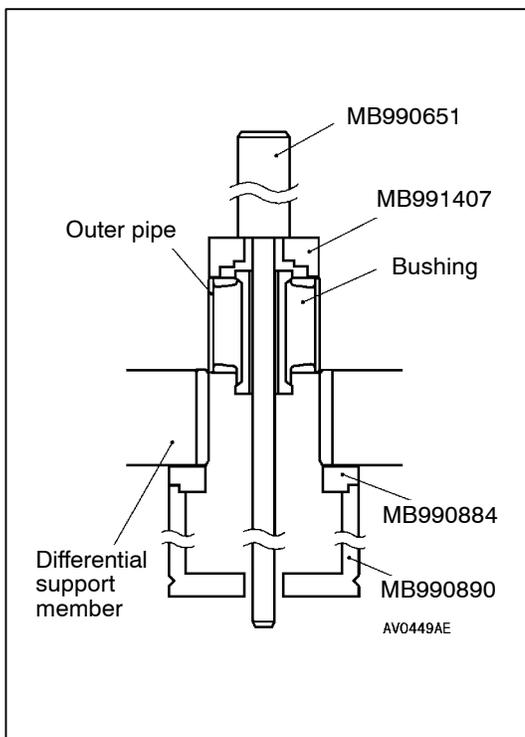


BUSHING B

1. Position special tool MB991407 on the shorter projection of the bushing inner pipe, and then press out the bushing.



2. Press in the bushing so that the longer projection of the bushing inner pipe is at the differential carrier side.

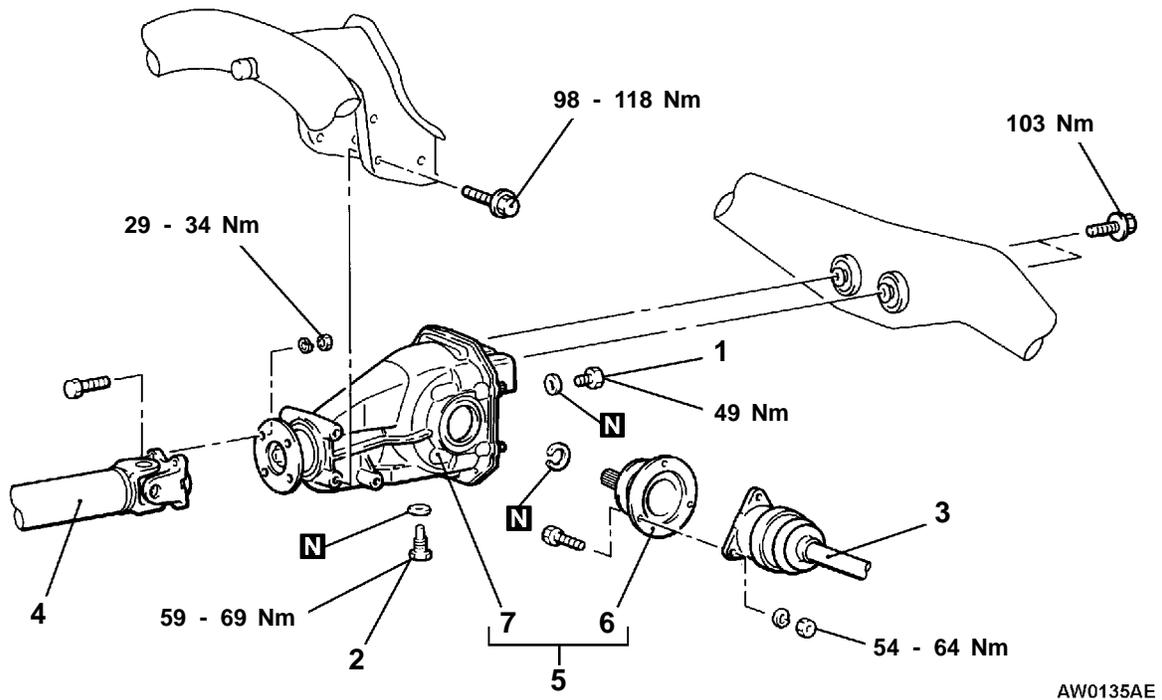


3. Set the special tools as described in step 1, and press in the bushing.

4. Press in the bushing until its outer pipe end is aligned with the differential support member.

DIFFERENTIAL CARRIER

REMOVAL AND INSTALLATION



Removal steps

- ▶C◀ 1. Filler plug
- ▶B◀ 2. Drain plug
- ▶A◀ 3. Drive shaft connection
- ▶B◀ 4. Propeller shaft connection

- ▶C◀ 5. Differential carrier assembly
- ▶D◀ ▶A◀ 6. Companion shaft
- ▶D◀ ▶A◀ 7. Differential carrier

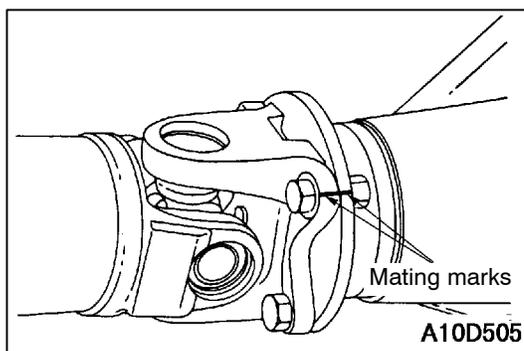
REMOVAL SERVICE POINTS

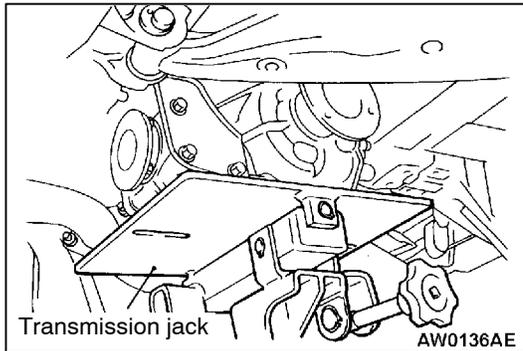
▶A▶ DRIVE SHAFT DISCONNECTION

Disconnect the drive shaft from the companion flange, and then support it to a nearby part with a wire.

▶B▶ PROPELLER SHAFT DISCONNECTION

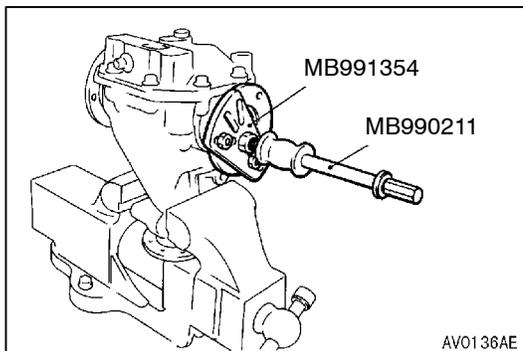
1. Make mating marks on the differential companion flange and flange yoke, and then separate the differential carrier assembly and the propeller shaft.
2. Suspend the propeller shaft from the body with wire, etc, so that there are no sharp bends.





◀C▶ DIFFERENTIAL CARRIER ASSEMBLY REMOVAL

Support the bottom of the differential carrier with a transmission jack, and then remove the differential support member bolts and the bracket assembly retaining bolts.



◀D▶ COMPANION SHAFT REMOVAL

Secure the differential carrier in a vise, and then use the special tool to withdraw the companion shaft.

Caution

Be careful not to damage the differential carrier oil seal by the companion shaft spline.

INSTALLATION SERVICE POINTS

▶A▶ COMPANION SHAFT INSTALLATION

Caution

Be careful not to damage the differential carrier oil seal by the companion shaft spline.

▶B▶ PROPELLER SHAFT CONNECTION

Connect the propeller shaft so that the mating marks on the differential companion flange and the flange yoke are aligned.

▶C▶ FILLER PLUG INSTALLATION

Fill the specified gear oil until the oil level reaches the bottom of the filler plug.

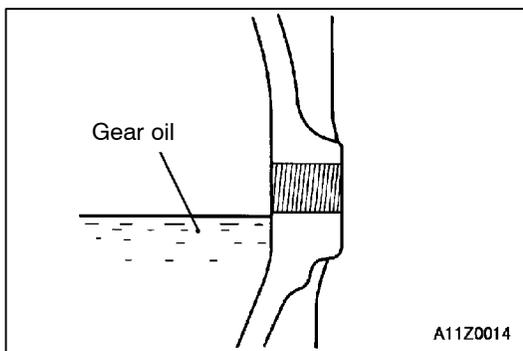
Specified gear oil:

Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W

Amount to use: 0.55 L

NOTE

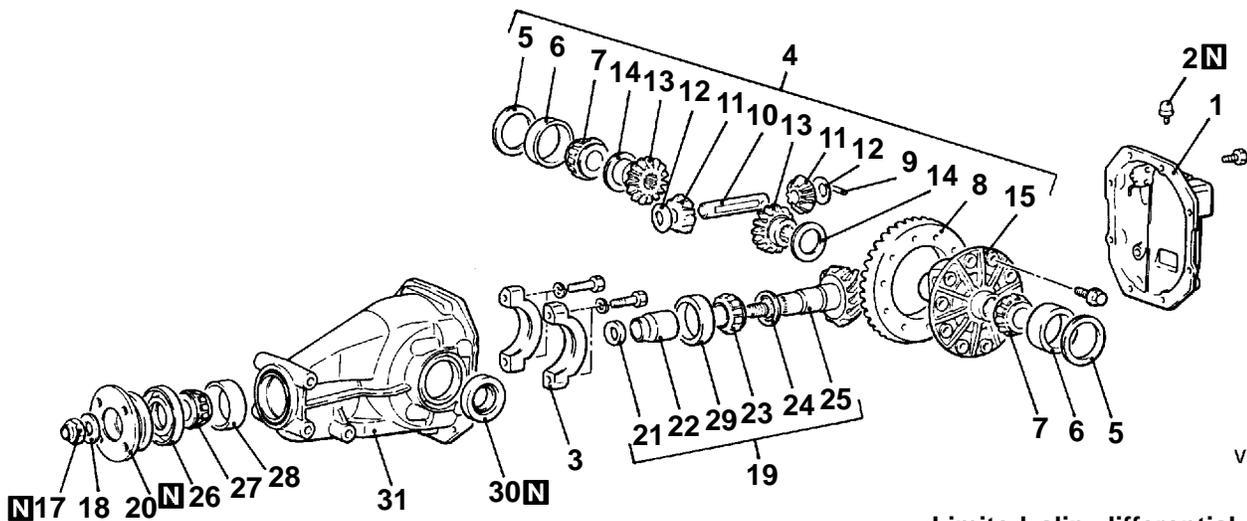
When outside air temperature is 10°C or more: SAE90
When outside air temperature is 10°C or less: SAE80W



DISASSEMBLY

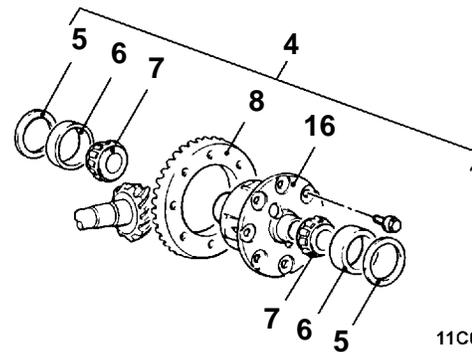
27200220170

<Conventional differential>



V0137AE

<Limited slip differential>

11C0004
00008443

Disassembly steps

◀A▶

- Inspection before disassembly

1. Differential cover assembly

2. Vent plug

3. Bearing cap

◀B▶

4. Differential case assembly

5. Side bearing spacer

6. Side bearing outer race

7. Side bearing inner race

◀C▶

8. Drive gear

◀D▶

9. Lock pin

◀E▶

<Conventional differential>

10. Pinion shaft

<Conventional differential>

11. Pinion gear

<Conventional differential>

12. Pinion washer

<Conventional differential>

13. Side gear

<Conventional differential>

14. Side gear spacer

<Conventional differential>

15. Differential case

<Conventional differential>

◀F▶

16. Limited slip differential case assembly (Refer to P.27-37.)

17. Self-locking nut

18. Washer

◀G▶

19. Drive pinion assembly

20. Companion flange

21. Drive pinion front shim (for preload adjustment)

22. Drive pinion spacer

23. Drive pinion rear bearing inner race

24. Drive pinion rear shim (for pinion height adjustment)

25. Drive pinion

26. Oil seal

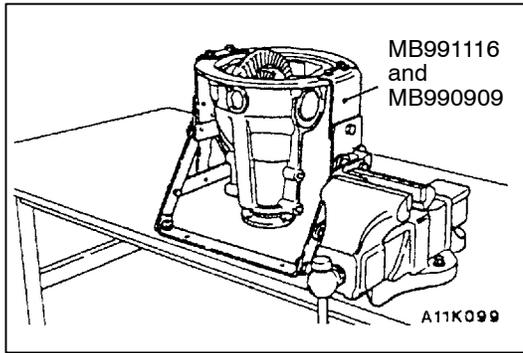
27. Drive pinion front bearing inner race

28. Drive pinion front bearing outer race

29. Drive pinion rear bearing outer race

30. Oil seal

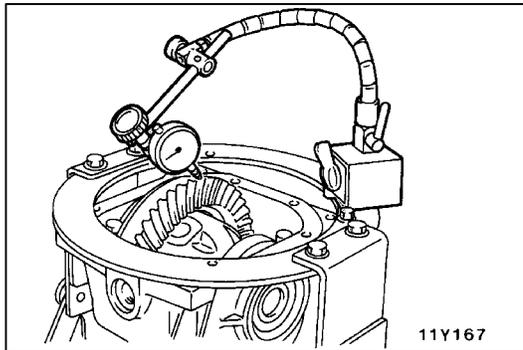
31. Gear carrier



DISASSEMBLY SERVICE POINTS

◀A▶ INSPECTION BEFORE DISASSEMBLY

Hold the special tool in a vice, and attach the differential carrier to the special tool.



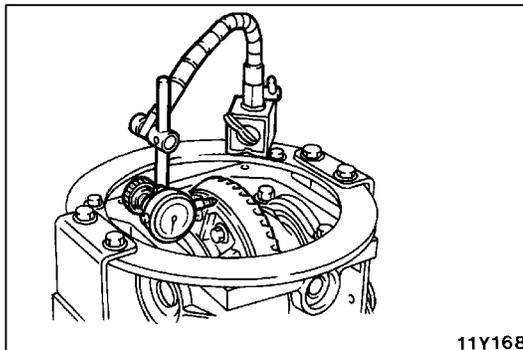
DRIVE GEAR BACKLASH CHECK

Check the drive gear backlash by the following procedure:

1. Place a dial gauge on the drive gear teeth. With the drive pinion locked in place, check if the backlash is within the standard value range at four points or more by turning the drive gear.

Standard value: 0.11 - 0.16 mm

2. If the backlash is outside the standard value, adjust using the side bearing spacer.
3. After adjustment, inspect the contact of the drive gear.



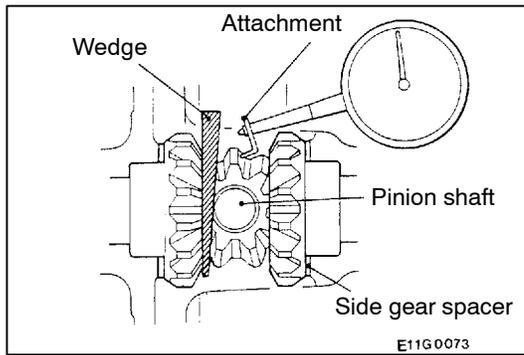
DRIVE GEAR RUNOUT CHECK

Check the drive gear runout by the following procedure:

1. Place a dial gauge on the back of the drive gear, and check if the runout does not exceed the limit by turning the drive gear.

Limit: 0.05 mm

2. If the runout exceeds the limit value, check that there is no foreign material between the reverse side of the drive gear and the differential case, or that there is no looseness in the drive gear mounting bolt.
3. If step (2) is normal, change the assembly position of the drive gear and differential case, and then take another measurement. If adjustment is impossible, replace the differential case or the drive gear and drive pinion as a set.



DIFFERENTIAL GEAR BACKLASH CHECK

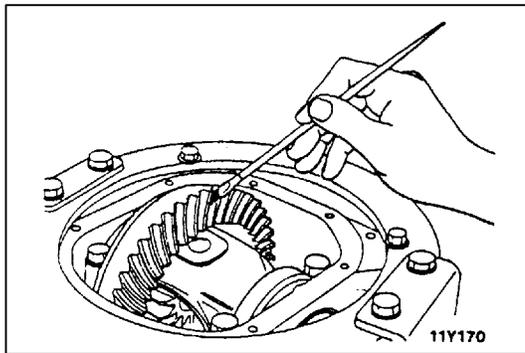
Check the differential gear backlash by the following procedure:

1. Lock a piece of wood between the side gear and the pinion shaft to hold one of the side gears in place. Then place a dial gauge (through a suitable extension) on one of the pinion gears, and check if the backlash is within the standard value range. Repeat this check for the other pinion gear.

Standard value: 0 - 0.076 mm

Limit: 0.2 mm

2. If the differential gear backlash exceeds the limit, adjust the backlash by installing thicker side gear spacers. If adjustment is impossible, replace the side gear and pinion gear as a set.



DRIVE GEAR TOOTH CONTACT CHECK

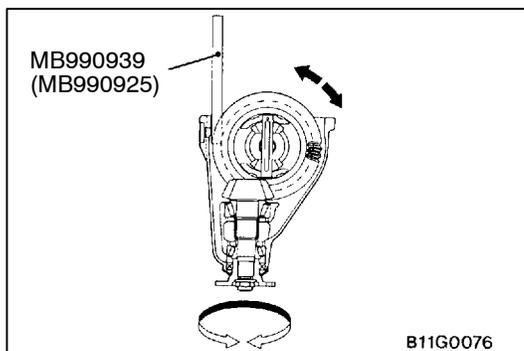
Check the drive gear tooth contact by the following procedure:

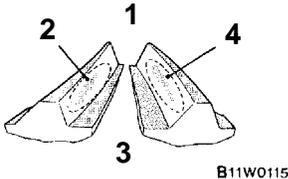
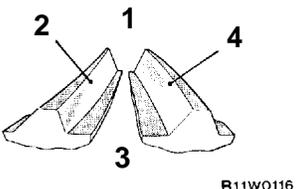
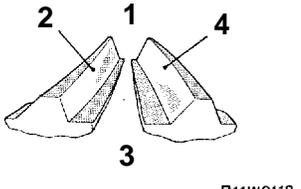
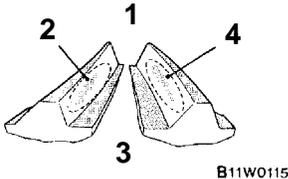
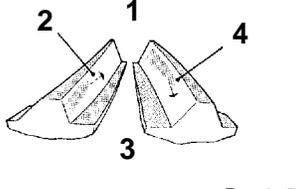
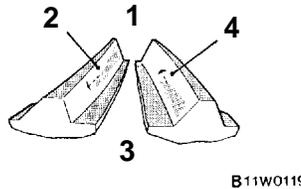
1. Apply a thin, uniform coat of machine blue to both surfaces of the drive gear teeth.
2. Insert a special tool between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear, so that the revolution torque [approximately 2.5 - 3.0 Nm] 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.



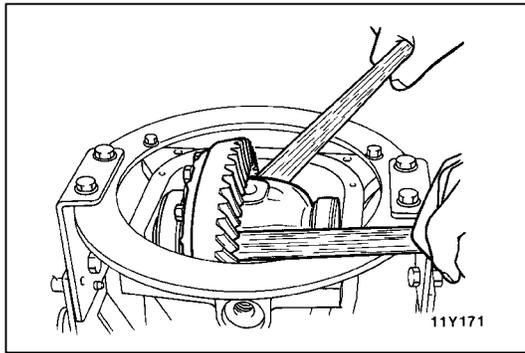
Standard tooth contact pattern	Problem	Solution
<p>1 Narrow tooth side 2 Drive-side tooth surface (the side applying power during forward movement) 3 Wide tooth side 4 Coast-side tooth surface (the side applying power during reverse movement)</p>  <p>B11W0115</p>	<p>Tooth contact pattern resulting from excessive pinion height</p>  <p>B11W0116</p> <p>The drive pinion is positioned too far from the center of the drive gear.</p>	 <p>B11W0118</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>B11W0115</p>	<p>Tooth contact pattern resulting from insufficient pinion height.</p>  <p>B11W0117</p> <p>The drive pinion is positioned too close to the center of the drive gear.</p>	 <p>B11W0119</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

Confirm that the pinion height and backlash adjustments have been done properly by inspecting the tooth contact pattern. Continue to adjust the pinion height and backlash until the tooth contact pattern resembles the standard pattern.

After adjustments, if the correct tooth contact pattern cannot be obtained, the drive gear and the drive pinion are worn beyond the allowable limit.

Replace the gear set.



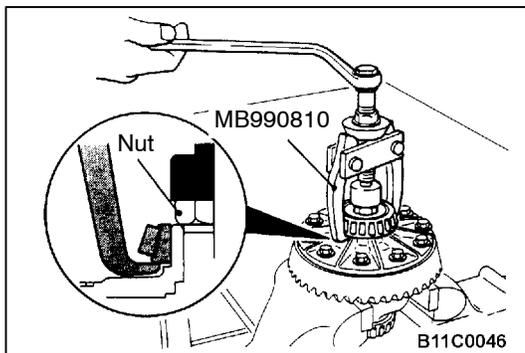
◀B▶ DIFFERENTIAL CASE ASSEMBLY REMOVAL

Caution

Remove the differential case assembly, slowly and carefully so that the side bearing outer race is not dropped.

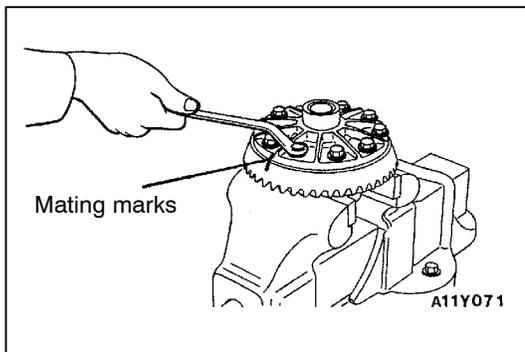
NOTE

Be sure to keep the side bearing spacers and outer races in order so that they may be reinstalled in their original positions.



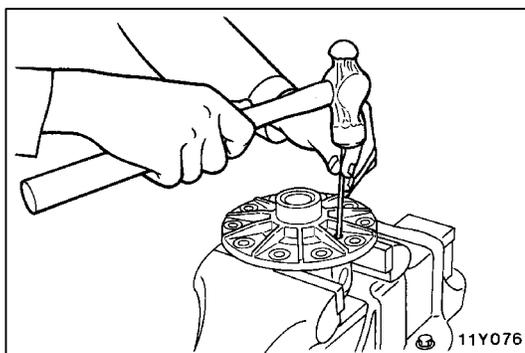
◀C▶ SIDE BEARING INNER RACE REMOVAL

Engage the two jaws of the special tool under the bottom of the side bearing inner race by using the differential case notches, and then remove the side bearing inner race.

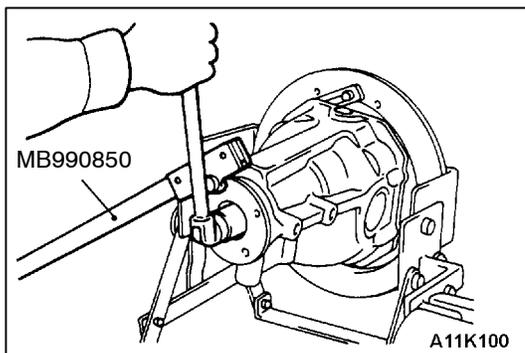


◀D▶ DRIVE GEAR REMOVAL

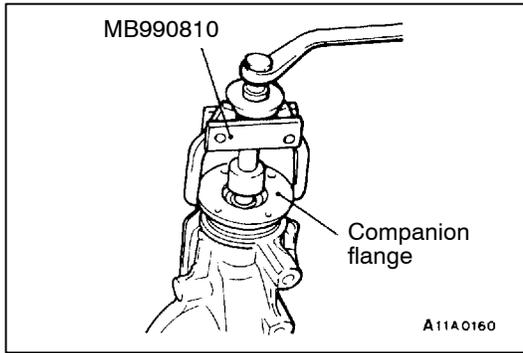
1. Make the mating marks to the differential case and the drive gear.
2. Loosen the drive gear attaching bolts in diagonal sequence to remove the drive gear.



◀E▶ LOCK PIN REMOVAL <Conventional differential>



◀F▶ SELF-LOCKING NUT REMOVAL



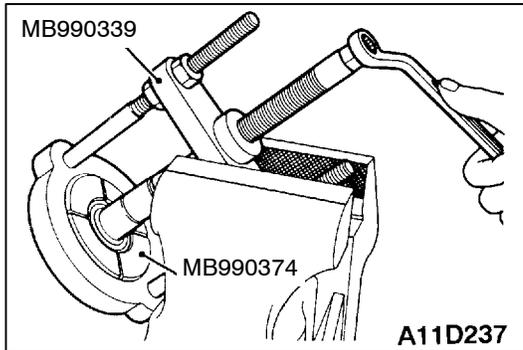
◀G▶ DRIVE PINION ASSEMBLY REMOVAL

1. Make mating marks on the drive pinion and the companion flange for reassembly purpose.

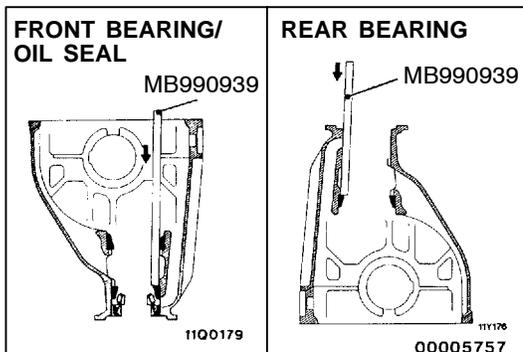
Caution

Mating marks should not be made to the contact surfaces of companion flange and propeller shaft.

2. Use the special tool to withdraw the companion flange.



◀H▶ DRIVE PINION REAR BEARING INNER RACE REMOVAL



◀I▶ OIL SEAL/DRIVE PINION FRONT BEARING INNER RACE/DRIVE PINION FRONT BEARING OUTER RACE/DRIVE PINION REAR BEARING OUTER RACE REMOVAL

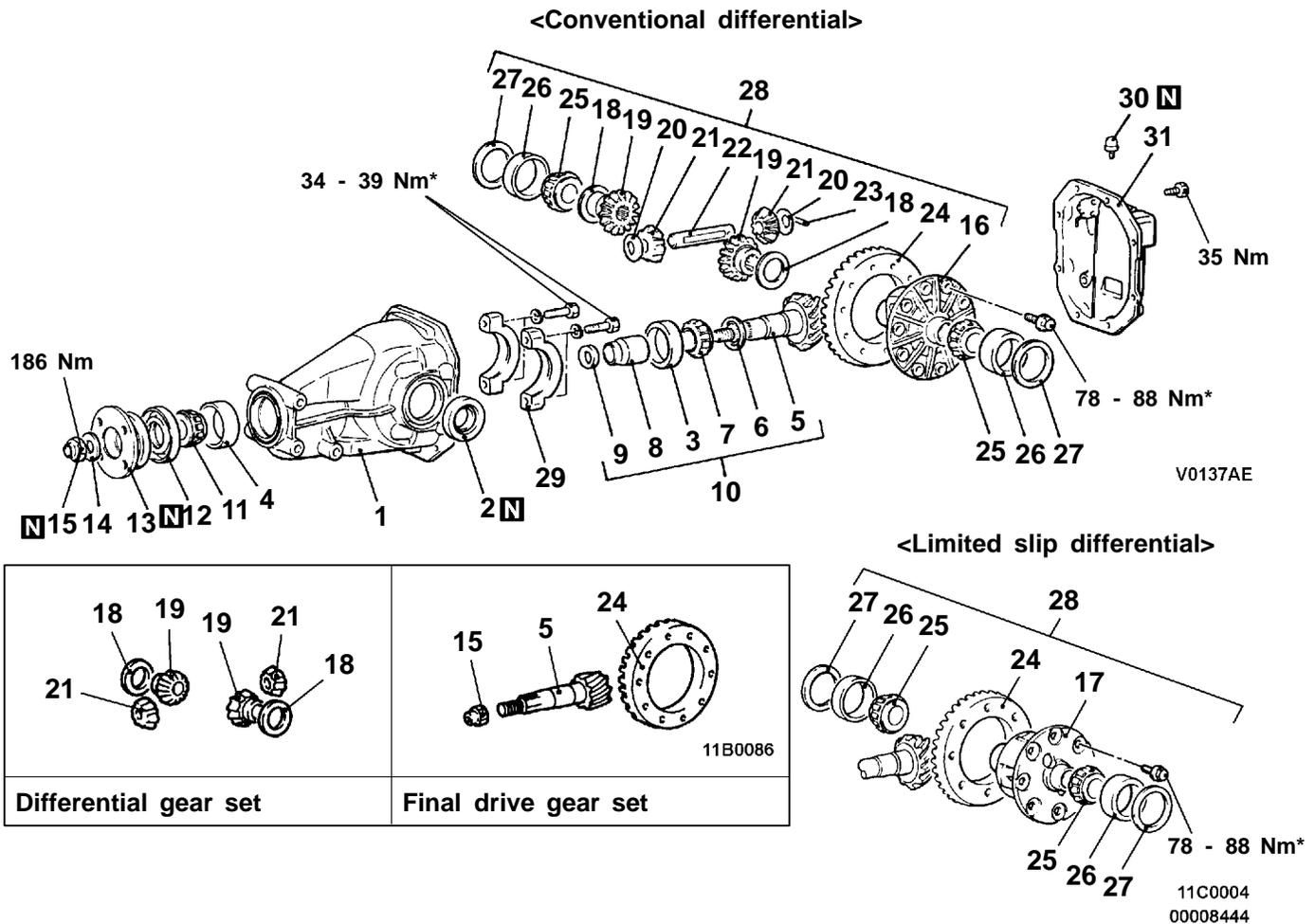
INSPECTION

27200250087

- Check the companion flange for wear or damage.
- Check the bearings for wear or discoloration.
- Check the gear carrier for cracks.
- Check the drive pinion and drive gear for wear or cracks.
- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.

REASSEMBLY

27200230159



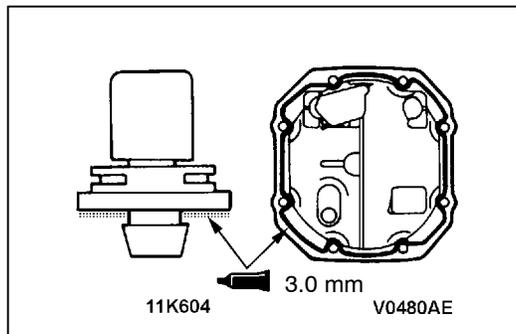
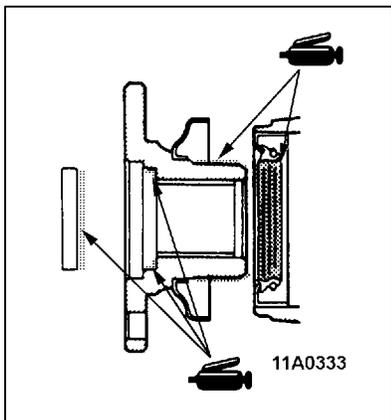
Reassembly steps

- | | |
|---|---|
| <p>▶A◀ 1. Gear carrier</p> <p>▶B◀ 2. Oil seal</p> <p>▶B◀ 3. Drive pinion rear bearing outer race</p> <p>▶B◀ 4. Drive pinion front bearing outer race</p> <p>▶C◀ ● Drive pinion height adjustment</p> <p>5. Drive pinion</p> <p>6. Drive pinion rear shim (for pinion height adjustment)</p> <p>7. Drive pinion rear bearing inner race</p> <p>8. Drive pinion spacer</p> <p>▶D◀ ● Drive pinion preload adjustment</p> <p>9. Drive pinion front shim (for turning torque adjustment)</p> <p>10. Drive pinion assembly</p> <p>11. Drive pinion front bearing inner race</p> <p>12. Oil seal</p> <p>13. Companion flange</p> <p>14. Washer</p> <p>15. Self-locking nut</p> <p>16. Differential case</p> <p>17. Limited slip differential case assembly (Refer to P.27-37.)</p> | <p>▶E◀ ● Differential gear backlash adjustment <Conventional differential></p> <p>18. Side gear spacer <Conventional differential></p> <p>19. Side gear <Conventional differential></p> <p>20. Pinion washer <Conventional differential></p> <p>21. Pinion gear <Conventional differential></p> <p>22. Pinion shaft <Conventional differential></p> <p>▶F◀ 23. Lock pin <Conventional differential></p> <p>▶G◀ 24. Drive gear</p> <p>▶H◀ 25. Side bearing inner race</p> <p>▶H◀ 26. Side bearing outer race</p> <p>▶I◀ ● Drive gear backlash adjustment</p> <p>27. Side bearing spacer</p> <p>28. Differential case assembly</p> <p>29. Bearing cap</p> <p>30. Vent plug</p> <p>31. Differential cover assembly</p> |
|---|---|

NOTE

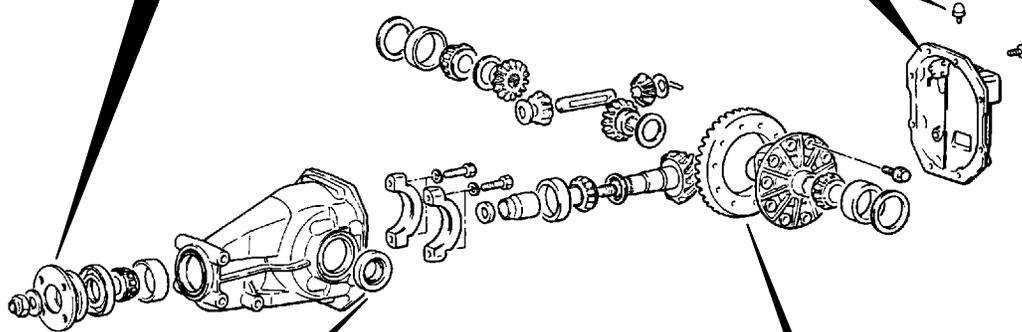
*: Tightening torque with gear oil applied

LUBRICATION, SEALING AND ADHESIVE POINTS

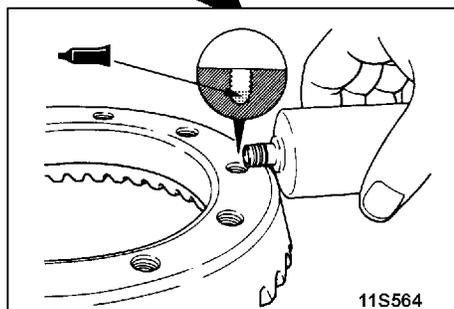
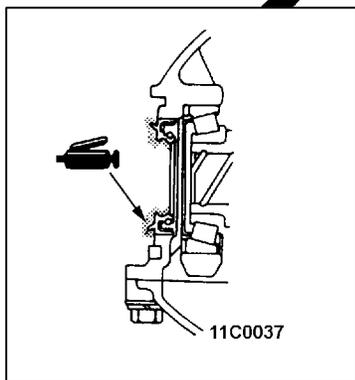
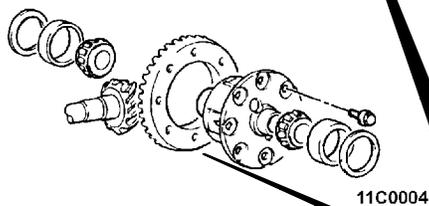


Sealant:
3M ATD Part No. 8663 or equivalent

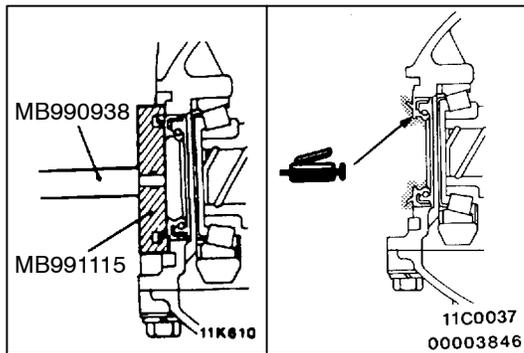
<Conventional differential>



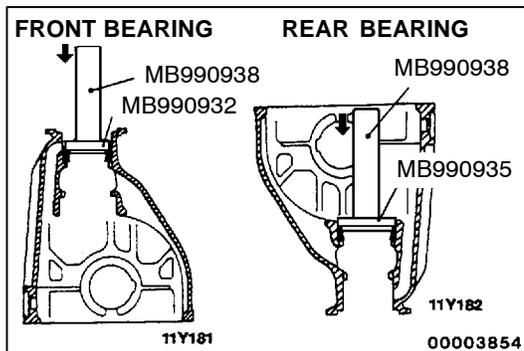
<Limited slip differential>



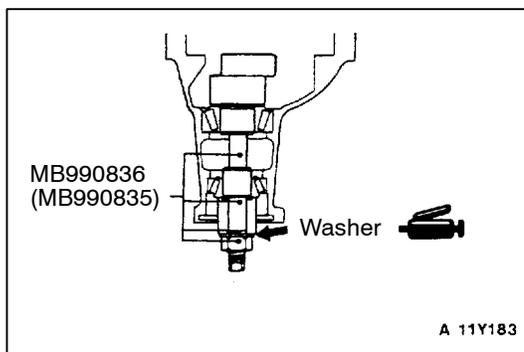
Adhesive:
3M Stud Locking Part No. 4170
or equivalent

**REASSEMBLY SERVICE POINTS****▶A◀ OIL SEAL INSTALLATION**

1. Use the special tool to press in the new oil seal fully.
2. Lightly apply multipurpose grease to the oil seal lip.

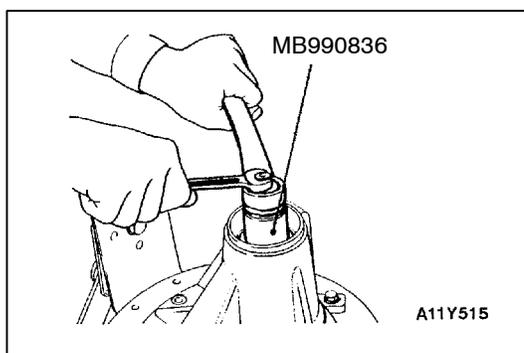
**▶B◀ DRIVE PINION REAR BEARING OUTER RACE/DRIVE PINION FRONT BEARING OUTER RACE INSTALLATION****Caution**

Be careful to press in the outer race straight, otherwise the outer race will be damaged.

**▶C◀ DRIVE PINION HEIGHT ADJUSTMENT**

Adjust the drive pinion height by the following procedures:

1. Apply a thin coat of the multipurpose grease to the mating face of the washer of the special tool.
2. Install special tools and drive pinion front and rear bearing inner races on the gear carrier in the sequence shown in the illustration.



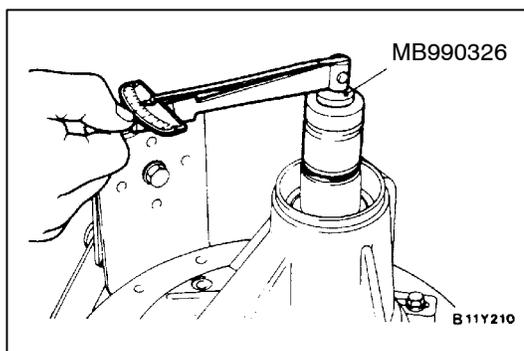
3. Gradually tighten the nut of the special tool while checking to drive pinion turning torque until the standard value of drive pinion turning torque is obtained.

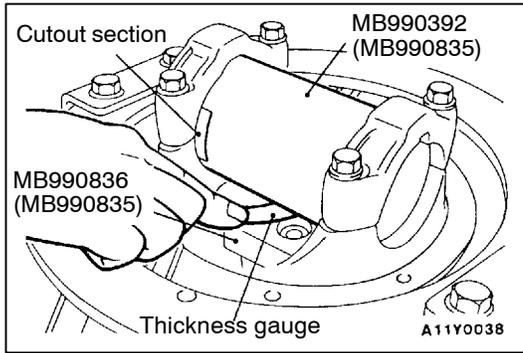
Standard value:

Bearing division	Bearing lubrication	Turning torque Nm
New	None (with anti-rust agent)	0.9 - 1.2 Nm
New or reusing	Gear oil applied	0.4 - 0.5 Nm

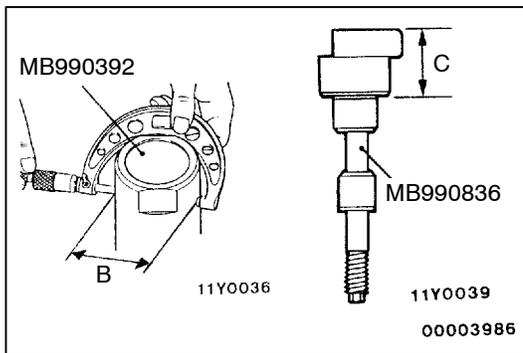
NOTE

Because the special tool cannot be turned one turn, turn it several times within the range that it can be turned; then, after fitting to the bearing, measure the rotation torque.

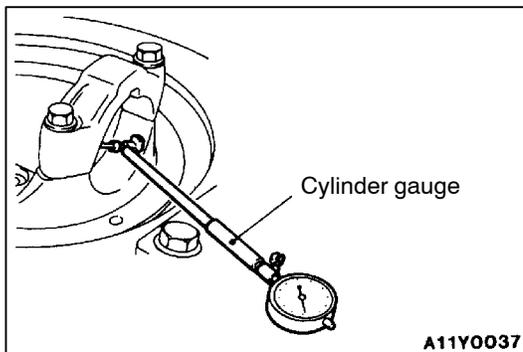




4. Clean the side bearing seat thoroughly.
5. Set the special tools in place of the side bearings, and align the cutout section as shown. Then make sure that the special tools are secured.
6. Use a thickness gauge to measure the clearance (A) between the special tools.

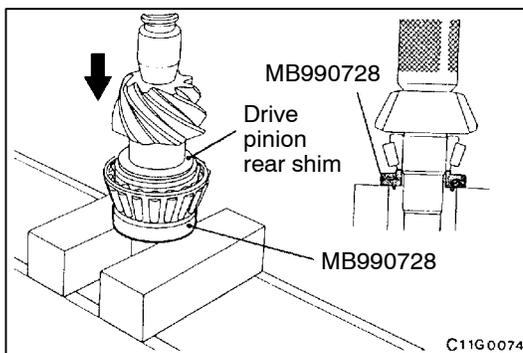


7. Remove the special tools (MB990392 and MB990836).
8. Use a micrometer to measure the dimensions (B) and (C) of the special tools.



9. Install the bearing cap, and then use a cylinder gauge and the micrometer to measure the inside diameter D of the bearing cap as shown in the illustration.
10. Calculate the thickness (E) of the drive pinion rear shim from the following equation, and select the shim that is closest in thickness to this value.

$$E = A + B + C - 1/2 D - 86.00 \text{ mm}$$



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

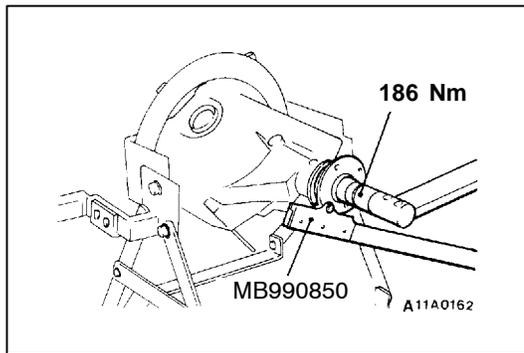
►D◄ DRIVE PINION TURNING TORQUE ADJUSTMENT

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

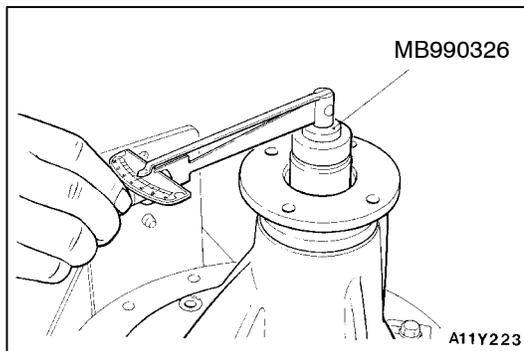
1. Insert the drive pinion into the gear carrier, and then install the drive pinion spacer, the drive pinion front shim, the drive pinion front bearing inner race, and the companion flange in that order.

NOTE

Do not install the oil seal.



- Tighten the companion flange to the specified torque by using special tools.



- Measure the drive pinion turning torque (without the oil seal) by using the special tools.

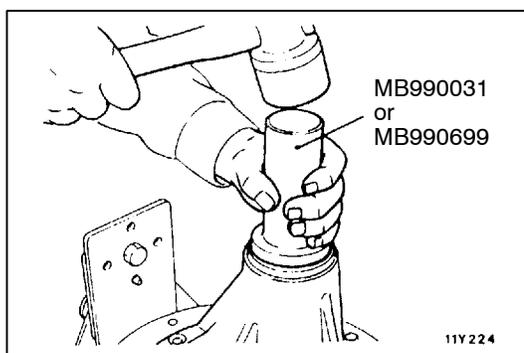
Standard value:

Bearing division	Bearing lubrication	Turning torque Nm
New	None (with anti-rust agent)	0.9 - 1.2 Nm
New or reusing	Gear oil applied	0.4 - 0.5 Nm

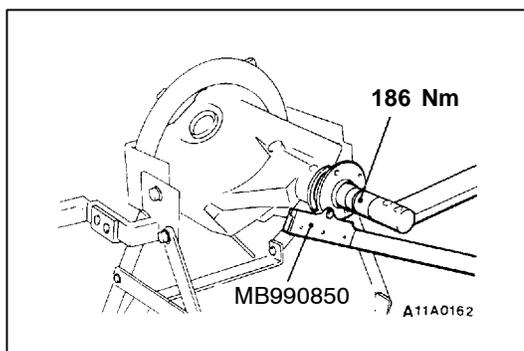
- If the drive pinion turning torque is not within the range of the standard value, adjust the turning torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

NOTE

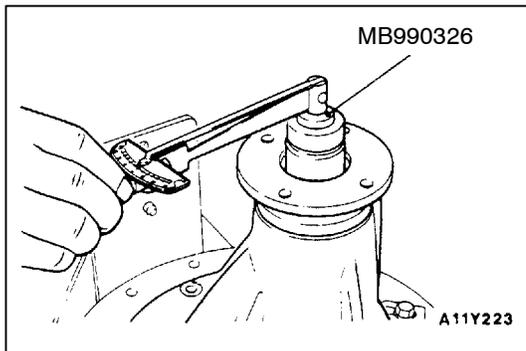
When selecting the drive pinion front shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers.



- Remove the companion flange and drive pinion once again. Drive the oil seal into the gear carrier front lip by using the special tool.
- Apply a thin coat of multipurpose grease to the companion flange contacting surface of the washer and oil seal contacting surface before installing drive pinion assembly.



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

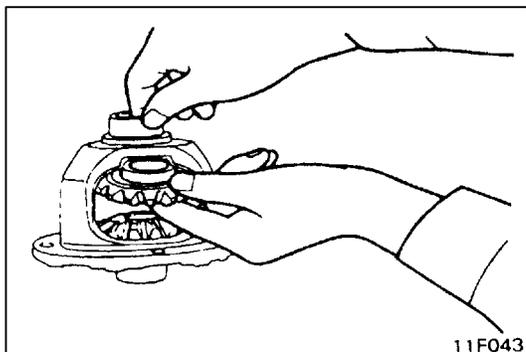


8. Measure the drive pinion turning torque (with the oil seal) by using the special tools to verify that the drive pinion turning torque complies with the standard value.

Standard value:

Bearing division	Bearing lubrication	Turning torque Nm
New	None (with anti-rust agent)	1.0 - 1.3 Nm
New or reusing	Gear oil applied	0.5 - 0.6 Nm

9. 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.



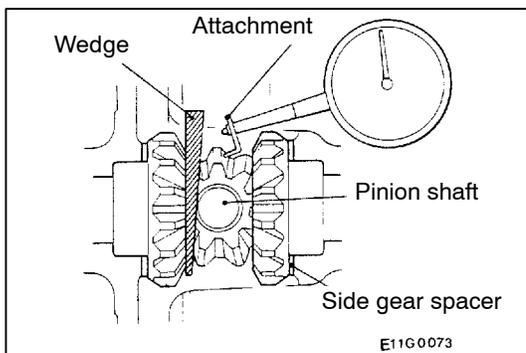
►E◀ DIFFERENTIAL GEAR BACKLASH ADJUSTMENT <Conventional differential>

Adjust the differential gear backlash by the following procedures:

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.

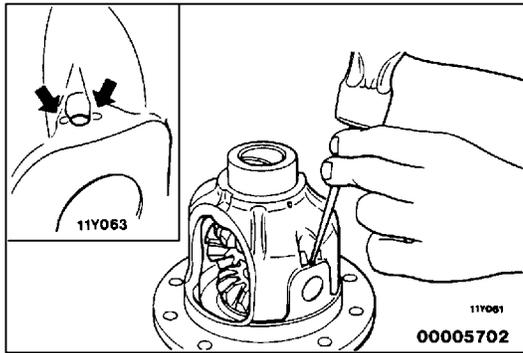
NOTE

- (1) The measurement should be made for both pinion gears individually.
- (2) Refer to P.27-37 for measurement of the limited slip differential gear backlash.

Standard value: 0 - 0.076 mm

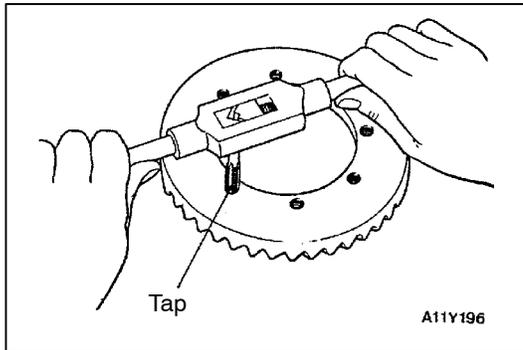
Limit: 0.2 mm

5. If the differential gear backlash exceeds the limit, adjust the backlash by installing thicker side gear spacers. If adjustment is not possible, replace the side gears and pinion gears as a set.
6. After adjustment, check that the backlash does not exceed the limit value and the differential gear turns smoothly.



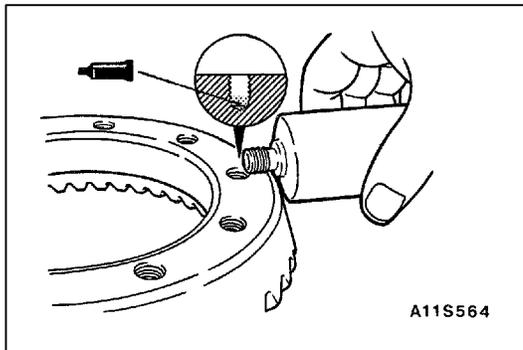
►F◄ LOCK PIN INSTALLATION

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.



►G◄ 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 (tap M10 x 1.25), and then clean the threaded holes by applying compressed air.



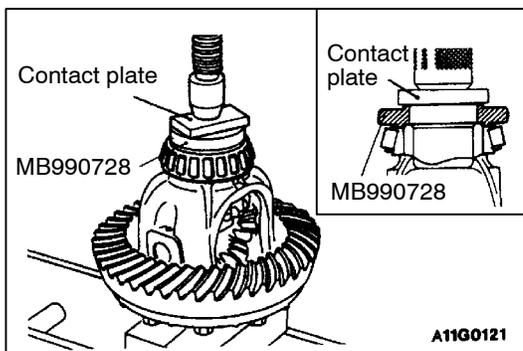
3. Apply the specified adhesive to the threaded holes of the drive gear.

Specified adhesive:

3M Stud Locking Part No. 4170 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: 78 - 88 Nm



►H◄ SIDE BEARING INNER RACE INSTALLATION

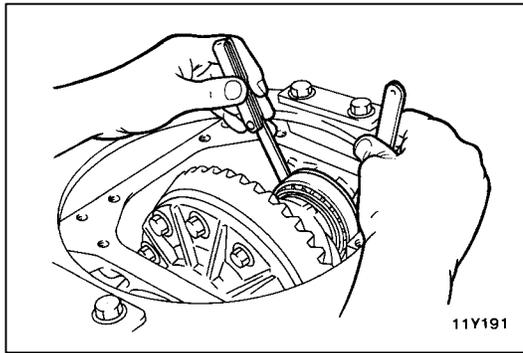
►I◄ DRIVE GEAR BACKLASH ADJUSTMENT

Adjust the drive gear backlash by the following procedures:

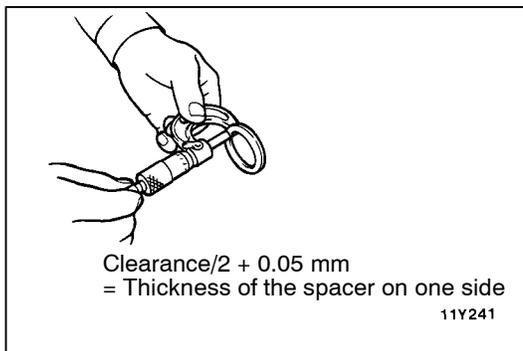
1. Install the side bearing spacers, which are thinner than those removed, to the side bearing outer races, and then mount the differential case assembly into the gear carrier.

NOTE

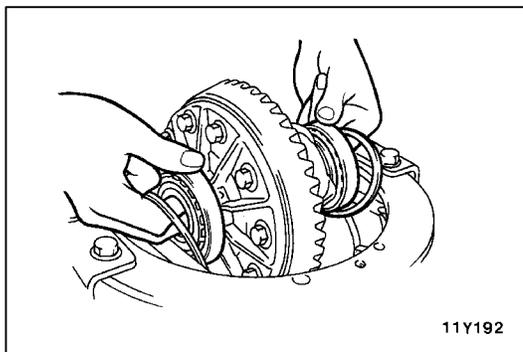
Select side bearing spacers with the same thickness for both the drive pinion side and the drive gear side.



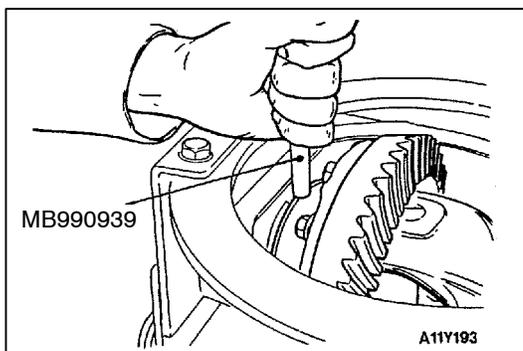
2. Push the differential case to one side, and measure the clearance between the gear carrier and the side bearing adjusting spacer with a thickness gauge.



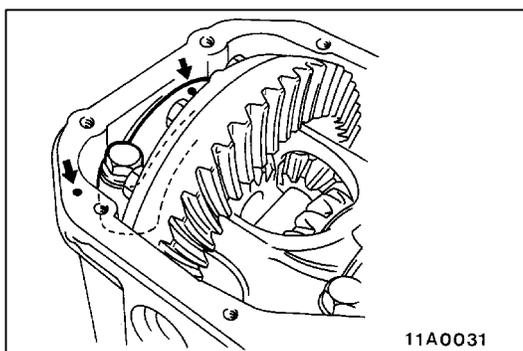
3. Measure the thickness of the side bearing spacers on one side, select two pairs of spacers which correspond to that thickness plus one half of the clearance plus 0.05 mm, and then install one pair each to the drive pinion side and the drive gear side.



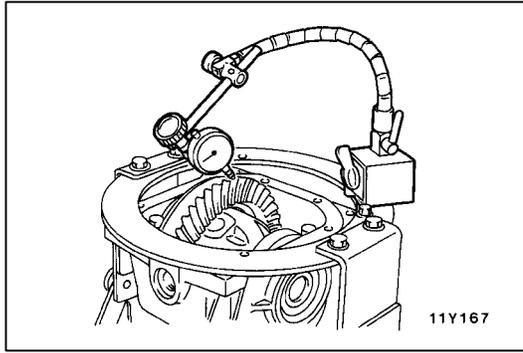
4. Install the side bearing spacers and differential case assembly, as shown in the illustration, to the gear carrier.



5. Tap the side bearing adjusting spacers with special tool 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.

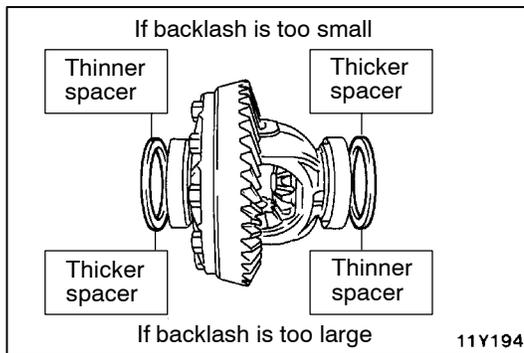


7. With the drive pinion locked in place, measure the drive gear backlash with a dial indicator on the drive gear.

NOTE

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

Standard value: 0.11 - 0.16 mm

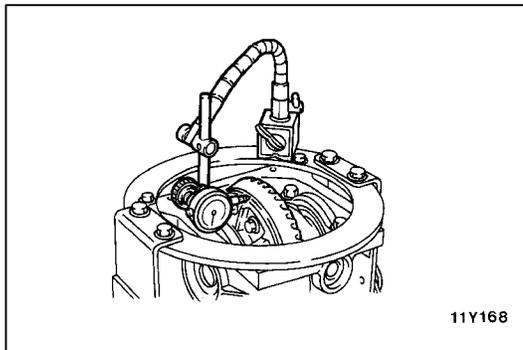


8. Change the side bearing spacers as illustrated, and then adjust the drive gear backlash between the drive gear and the drive pinion.

NOTE

When increasing the number of side bearing 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.27-24.)



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

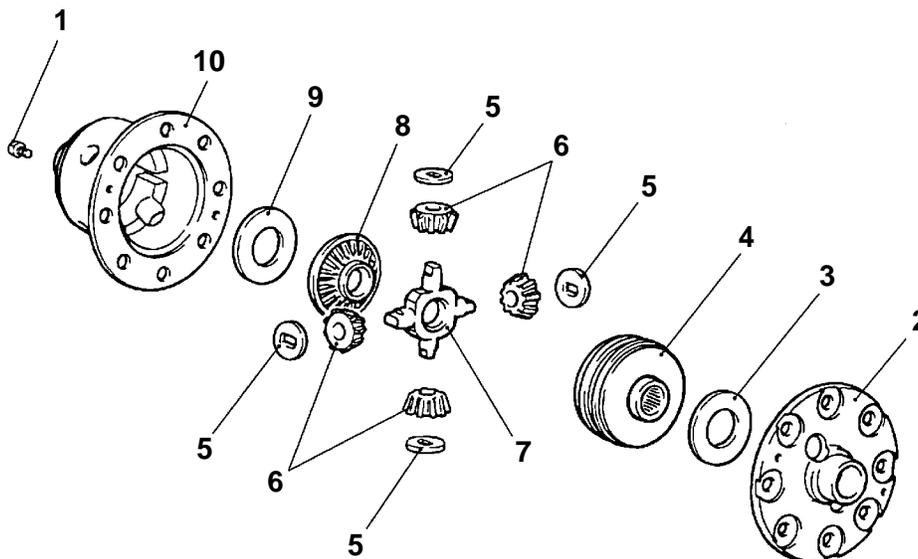
Limit: 0.05 mm

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.

LSD CASE ASSEMBLY

27300140066

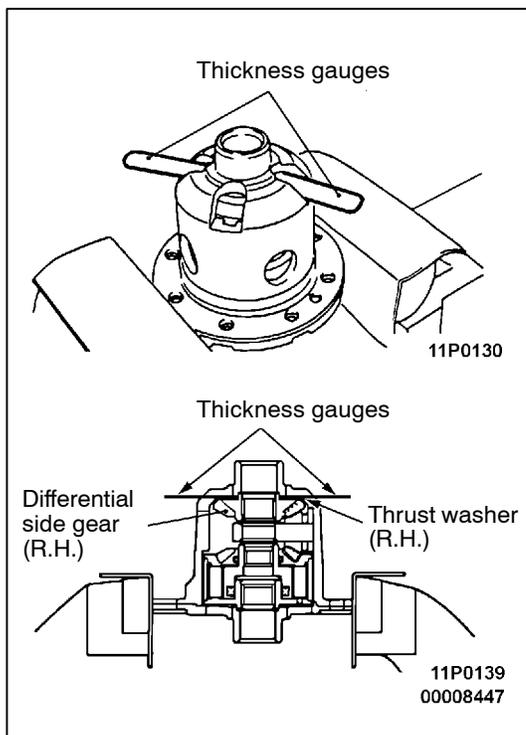
DISASSEMBLY AND REASSEMBLY



A11P0127

Disassembly steps

- ◀A▶ • Inspection before disassembly
- 1. Screw
- ▶A▶ 2. Differential case (A)
- ▶B▶ ▶C▶ 3. Thrust washer (L.H.)
- 4. Viscous coupling (with differential side gear: L.H.)
- ▶B▶ ▶B▶ 5. Pinion mate washer
- ▶B▶ 6. Differential pinion mate
- 7. Differential pinion shaft
- 8. Differential side gear (R.H.)
- 9. Thrust washer (R.H.)
- ▶B▶ ▶A▶ 10. Differential case (B)



DISASSEMBLY SERVICE POINTS

◀A▶ INSPECTION BEFORE DISASSEMBLY
DIFFERENTIAL GEAR BACKLASH CHECK

1. Hold the limited slip differential case assembly in a vice with the differential side gear (R.H.) up.

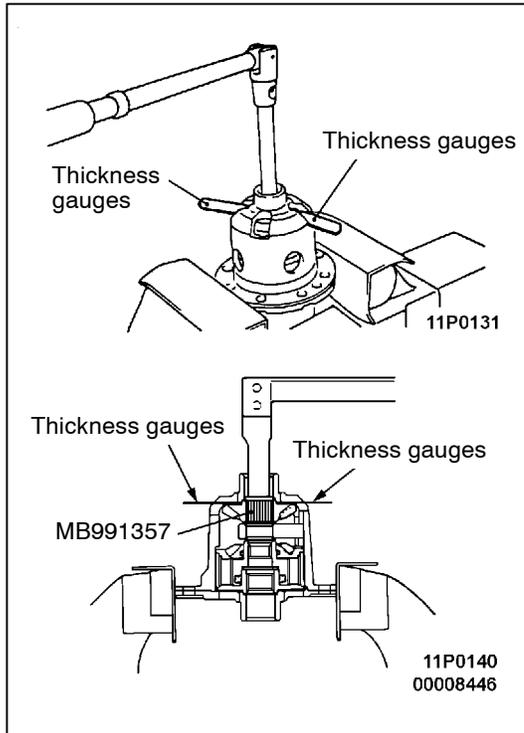
Caution

Be careful not to tighten the vice too strongly to avoid damage to the limited slip differential case assembly.

2. Install two 0.03 mm thickness gauge blades diagonally between the differential case (B) and the thrust washer (R.H.).

Caution

Do not insert the thickness gauge in the oil groove provided in the differential case (B).



3. Insert the special tool in the splined portion of the differential side gear (R.H.) and make sure that the side gear (R.H.) turns.
4. Replace the thickness gauges with 0.09 mm thickness gauges.
5. Insert the special tool in the splined portion of the differential side gear (R.H.) and make sure that the side gear (R.H.) does not turn.

Standard value: Differential gear backlash
0.03 - 0.09 mm

NOTE

The differential gear backlash is normal if the side gear clearance in the direction of thrust is within the standard value.

6. If the side gear clearance in the direction of thrust is not within the standard value, remove the differential case (A) and adjust by means of thrust washer (L.H.).

Thrust washer	Part No.	Thickness mm
L.H.	MB569243	0.8, 0.9, 1.0, 1.1, 1.15, 1.2, 1.25, 1.3, 1.35, 1.4, 1.5
R.H. [Reference]	MB569528	0.8

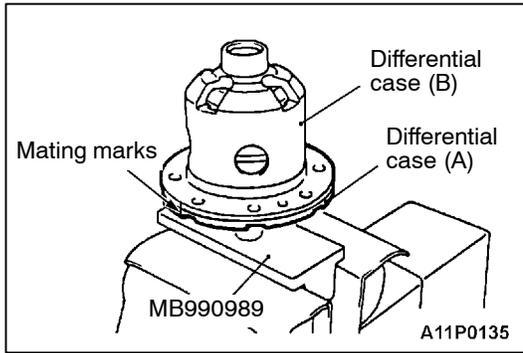
NOTE

The thrust washers (L.H.) are available in a kit. Select one appropriate thrust washer from among 11 washers.

◀B▶ THRUST WASHER (L.H.)/THRUST WASHER (R.H.) REMOVAL

The thrust washer (L.H.) differs from the thrust washer (R.H.) in thickness.

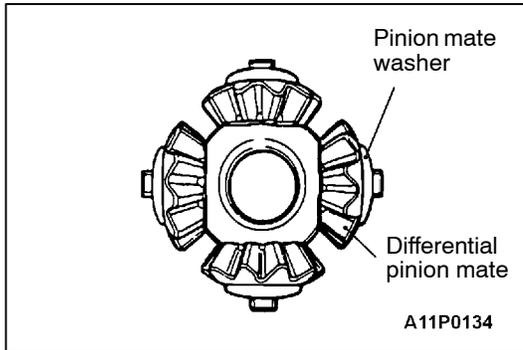
Keep them separately from each other for reference in assembly.



REASSEMBLY SERVICE POINTS

►A◄ DIFFERENTIAL CASE (B)/DIFFERENTIAL CASE (A) INSTALLATION

Install the differential cases (A) and (B) with their mating marks in alignment.



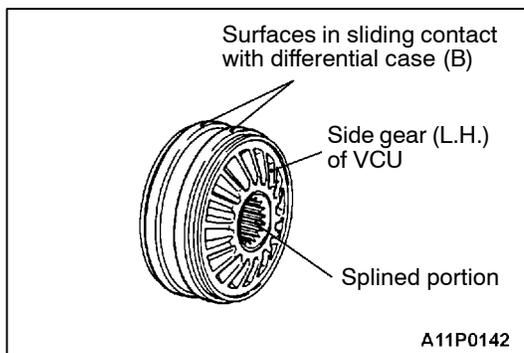
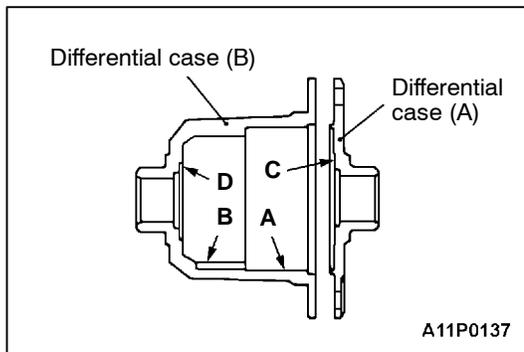
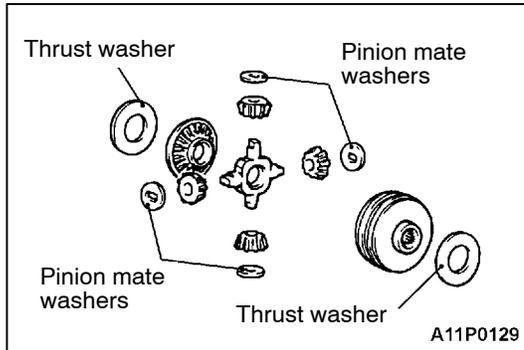
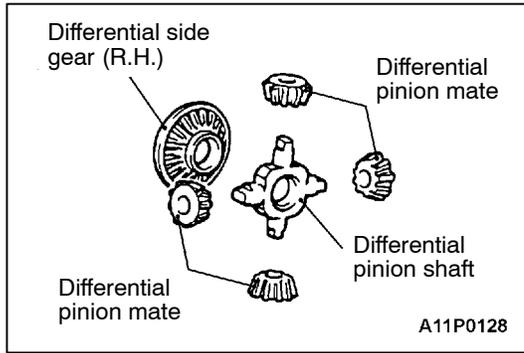
►B◄ DIFFERENTIAL PINION MATE/PINION MATE WASHER INSTALLATION

Attach the differential pinion mate to the pinion shaft with the pinion washers directed as shown, then assemble them into the differential case (B).

►C◄ THRUST WASHER (L.H.) SELECTION

When the differential side gear and pinion mate gear have been replaced, select the thrust washer (L.H.) by the following procedure.

1. Wash the differential side gear and pinion mate gear with unleaded gasoline and degrease.
2. Assemble the thrust washers so far used, without confusing the R.H. part with the L.H. part and together with each gear, VCU, pinion mate washer and pinion shaft, to the differential cases (A) and (B), and loosely tighten the screws.
3. Check the differential backlash, and select a thrust washer (L.H.) to obtain its standard value. (Refer to P.27-38.)



INSPECTION

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1. Check each gear and the differential pinion shaft for wear and damage.
2. Check the splined portion of the differential side gear (R.H.) for damage and shoulder.
3. Check the sliding surfaces of the thrust washer and pinion mate washer for wear, seizure and damage.
4. Check the sliding surfaces of the differential cases (A) and (B) for wear, seizure and damage.
 - A. Surface in sliding contact with VCU
 - B. Surface in sliding contact with pinion mate washer
 - C. Surface in sliding contact with thrust washer
 - D. Surface in sliding contact with thrust washer
5. Check the spline of VCU for damage and shoulder and check the surface in sliding contact with the differential case (B).
6. Check the side gear (L.H.) of VCU for wear and damage.