

REAR AXLE AWD

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Rear axle total backlash mm			–	5
Wheel bearing axial play mm			–	0.05
Rear wheel bearing turning starting torque Nm			1.0	–
TJ boot assembly dimension mm			0.11 – 0.16	–
Differential gear backlash (VCU LSD) mm			0.03 – 0.09	0.2
Drive pinion turning torque	Without seal	When replacing with new part (with rust prevention oil)	0.9 – 1.2	–
		New or re-used (oil applied)	0.4 – 0.5	–
	With oil seal	Replacing with new part (with rust prevention oil)	1.0 – 1.3	–
		New or re-used (oil applied)	0.5 – 0.6	–
Rear differential ratio			3.312	

LUBRICANTS

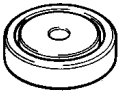
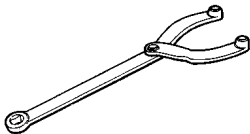
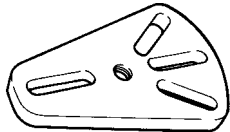
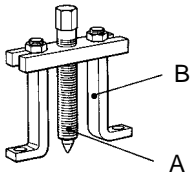
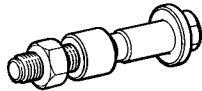

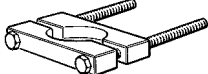
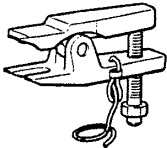
Item	Brand	Volume
Gear oil VCU LSD	Hypoid gear oil API classification GL-5 or higher. Above 10°C SAE 90W. Below 10°C SAE 80W.	0.55 litres
BJ Joint	Repair kit grease (NTN LJ grease)	85g
TJ Joint	Repair kit grease (NTN LJ grease)	105g

SEALANT AND ADHESIVES

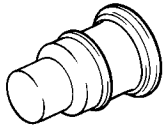
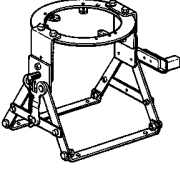
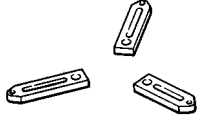
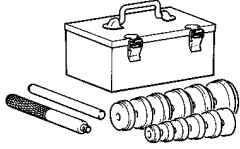
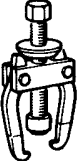

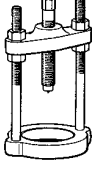

Application	Brand
Bent plug	Three bond 1104 semi dry sealant
Differential cover assembly	
Drive gear and differential case	

SPECIAL TOOLS

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Tool	Tool number and name	Supersession	Application
	MB991115 Oil seal installer		Press fitting of differential side oil seal Use together with MB990938
	MB990767 End yoke holder		Hub fixing
	MB991354 Puller body		Removal of drive shaft Removal of rear hub assembly
	MB 990241 Rear axle shaft puller A: MB990242 Puller shaft B: MB990244 Puller bar		
	MB990998 Front hub remover and installer		Measurement of hub turning starting torque Temporary fix of wheel alignment
	MB990326 Pre-load socket		Measurement of hub turning starting torque Measurement of drive pinion pre-load
	MB990560 Bearing remover		Rotor removal, press fitting
	MB991406, MB991113 , or MB990635 Steering linkage puller	13-006	Toe control arm ball joint and knuckle removal

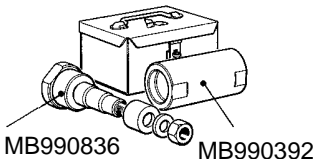

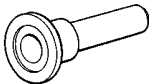

27C REAR AXLE <AWD> – Special Tools

Tool	Tool number and name	Supersession	Application
	MB991460 Plug	–	Prevention of differential oil from running out and the entry of foreign material
	MB990909 Working base		Differential carrier assembly disassembly and reassembly
	MB991116 Working base adaptor		
	MB990925 Bearing and oil seal installer set		Removal and press fitting of oil seal and bearing outer race Differential final gear tooth contact
	MB990810 Bearing puller		Removal of side bearing inner race Removal of companion flange
	MB990850 End yoke holder		Removal and fitting of companion flange
	MB990339 Bearing puller		Removal of drive pinion rear bearing inner race
	MB990374 Pinion bearing removal		

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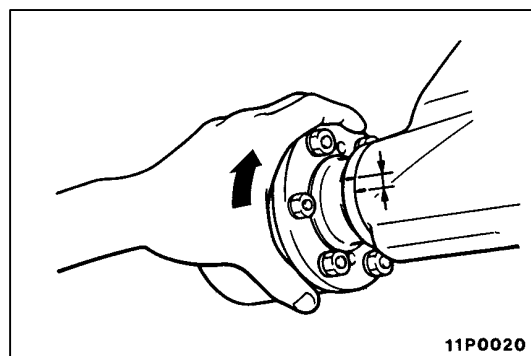
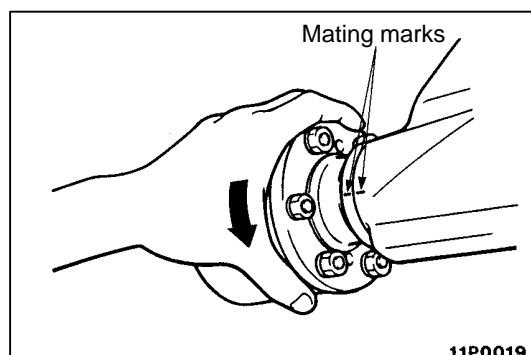
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Tool	Tool number and name	Supersession	Application
	MB990835 Drive pinion setting gauge set		Measurement of drive pinion height
	MB990728 Bearing installer		Press fitting of drive pinion rear bearing inner race Press fitting of side bearing inner race
	MB990031 or MB990699 Oil seal installer		Press fitting of drive pinion oil seal
	MB991357 Side gear holding tool		Inspection for differential gear backlash

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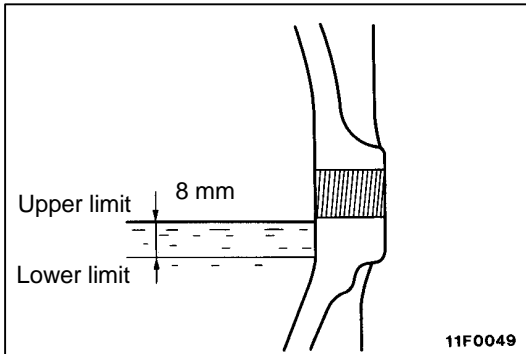


ON-VEHICLE SERVICE

REAR AXIAL TOTAL BACKLASH CHECK

If the drive system booms or the vehicle vibrates, measure the rear axle total backlash by the following procedure. Then judge if the differential carrier assembly removal is necessary from the result.

- Place the shift lever in the neutral position and apply the park brake.
- Turn the propeller shaft clockwise as far as it goes. Make mating marks on the dust cover of the companion flange and the gear carrier.
- Turn the propeller shaft counterclockwise as far as it goes, and measure the distance between the mating marks.
Limit: 5 mm
- If the backlash exceeds the limit value, remove the differential carrier assembly and check the following points.
 - Final drive gear backlash
 - Differential gear backlash

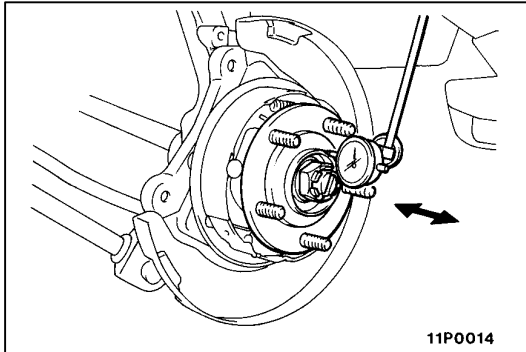


GEAR OIL LEVEL CHECK

If the gear oil level is not within the upper and lower limits, add the specified gear oil to the upper limit level, (the bottom of the plug hole).

Specified gear oil: Hypoid gear oil API classification GL-5 or higher. Above 10°C SAE 90W. Below 10°C SAE 80W

Amount used: 0.55l

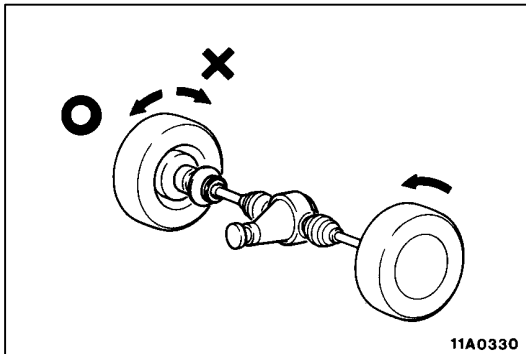


WHEEL BEARING CHECK FOR FREE PLAY IN AXIAL DIRECTION

1. Remove the caliper assembly and brake disc.
2. Fit dial gauge as shown in diagram and move the rear hub in the axial direction to measure the free play.

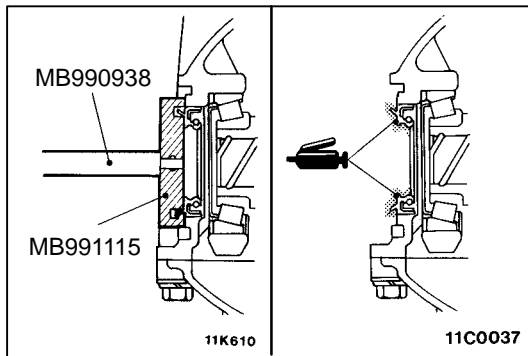
Limit: 0.05 mm

3. If the free play exceeds the limit, replace the rear hub assembly.



VCU LSD CHECK

1. Place the shift lever in the neutral position, and chock front wheels.
2. Release the parking brake.
3. Jack up the rear wheels, and apply rigid rack to the specified place.
4. Separate the joint on the differential carrier and propeller shaft.
5. Confirm that if one wheel is turned slowly (approx. 29 Nm of turning torque) the other wheel turns in the same direction.
6. If the other wheel turns in the opposite direction replace the VCU.



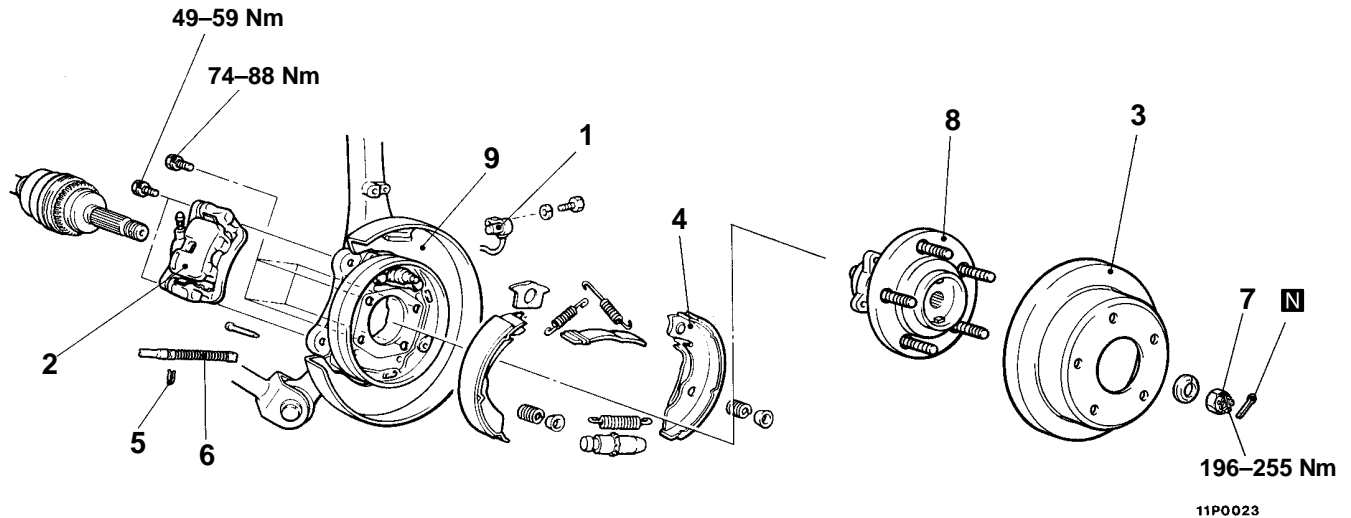
DIFFERENTIAL CARRIER OIL SEAL REPLACEMENT

1. Remove the drive shaft.
2. Remove the differential carrier oil seal.
3. Use the special tools to drive a new oil seal to the side face of the differential carrier.
4. Apply multi-purpose grease to the seal lip and drive shaft oil seating area.
5. Install a new drive shaft circlip, and install the drive shaft to the differential carrier.
6. Check wheel alignment. (Refer to Group 34 – [On-vehicle Service](#)).

HUB BOLT REPLACEMENT

Refer to [Group 27](#)

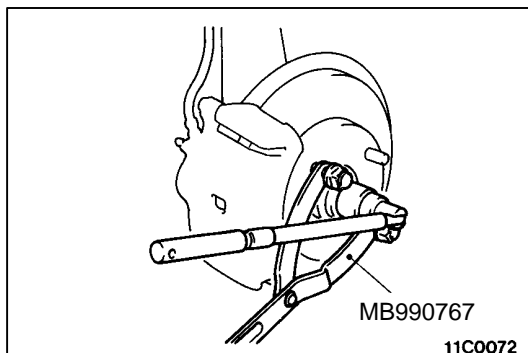
REAR HUB ASSEMBLY REMOVAL AND INSTALLATION



Removal steps

1. Rear speed sensor (Refer [Group 35B Wheel speed sensor](#).)
2. Calliper assembly
3. Brake disc
4. Shoe and lining Refer to Group 36 – Parking Brake

5. Clip
6. Connection of parking brake cable
7. Drive shaft nut
8. Rear hub nut
9. Dust shield

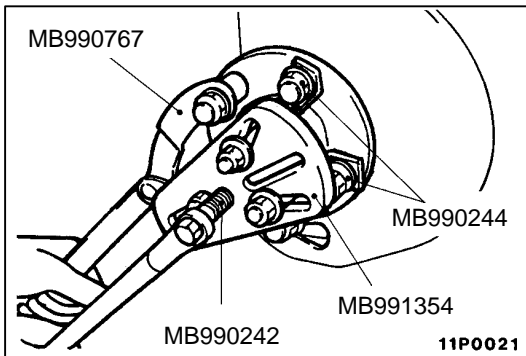


REMOVAL SERVICE POINTS

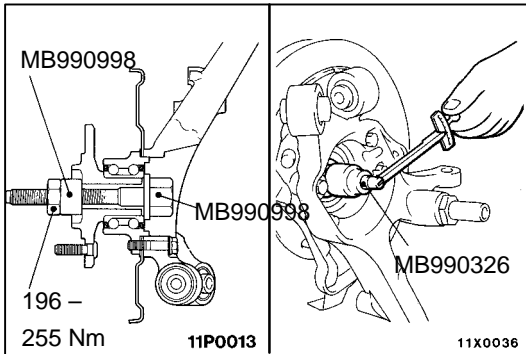
◀A▶ CALLIPER ASSEMBLY REMOVAL

Remove the calliper assembly and suspend it with wire to an adjacent part to ensure no load is placed on the brake hose.

◀B▶ DRIVE SHAFT NUT REMOVAL



◀C▶ REAR HUB ASSEMBLY REMOVAL



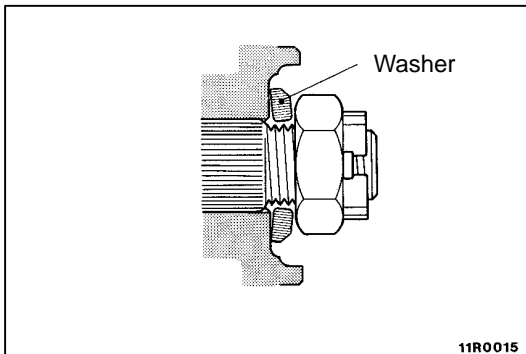
INSPECTION

REAR WHEEL BEARING TURN STARTING TORQUE CHECK

1. Use the special tool (MB990998) to tighten to the specified torque.
2. Use the special tool (MB990326) to measure the turn starting torque of the rear wheel bearing.

Limit: 1.0 Nm

3. Turn starting torque should be within the specified limit, and it should not be notchy or crunchy when the hub is turning.



INSTALLATION SERVICE POINT

▶A◀ DRIVE SHAFT NUT INSTALLATION

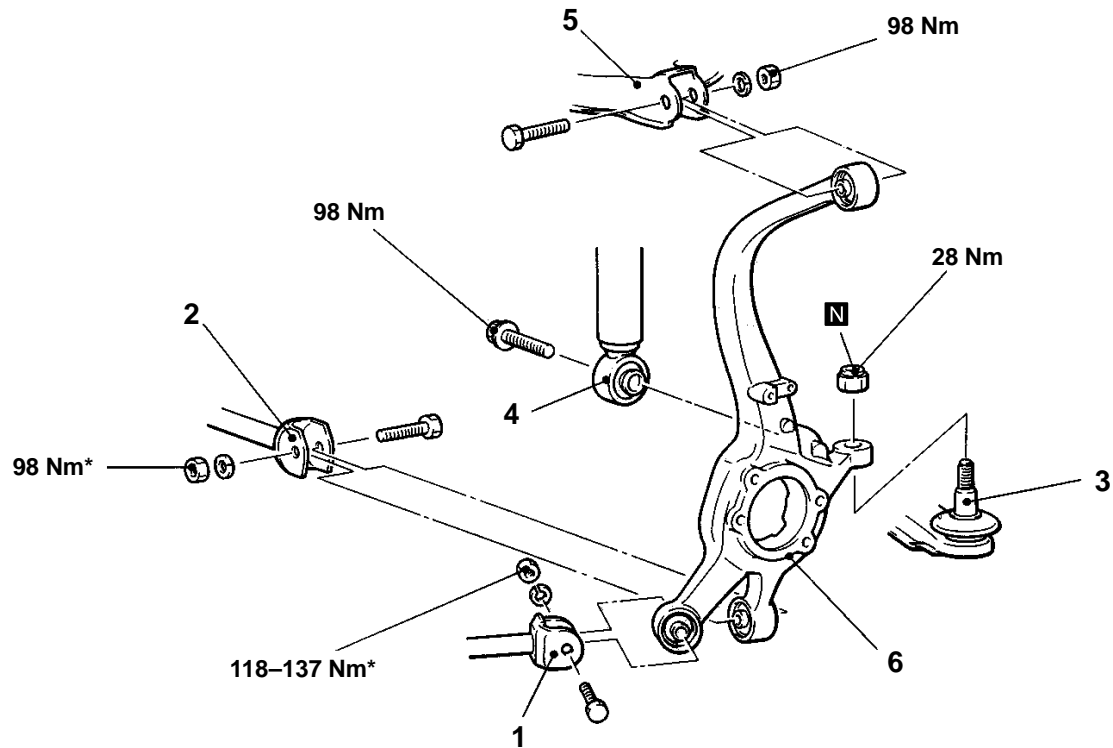
1. Assemble the drive shaft washer in the direction shown in the illustration.
2. Use the special tools as used for the removal to tighten the drive shaft nut to the specified torque.

KNUCKLE

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- (1) Rear Speed sensor Removal and Installation
(Refer [GROUP 35B Wheel speed sensor.](#))
- (2) Rear Hub Assembly [Removal and Installation](#)



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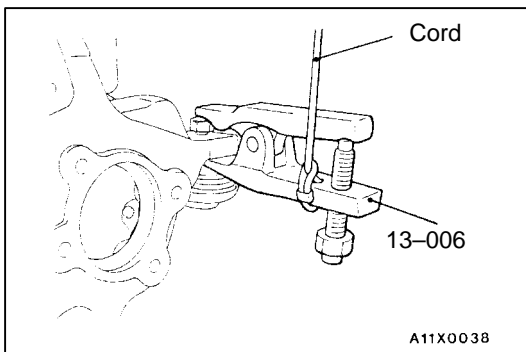
Removal steps

1. Connection for trailing arm
2. Connection for lower arm
3. Connection for toe control arm
4. Connection for shock absorber
5. Connection for upper arm

6. Knuckle

Caution

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



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REMOVAL SERVICE POINT

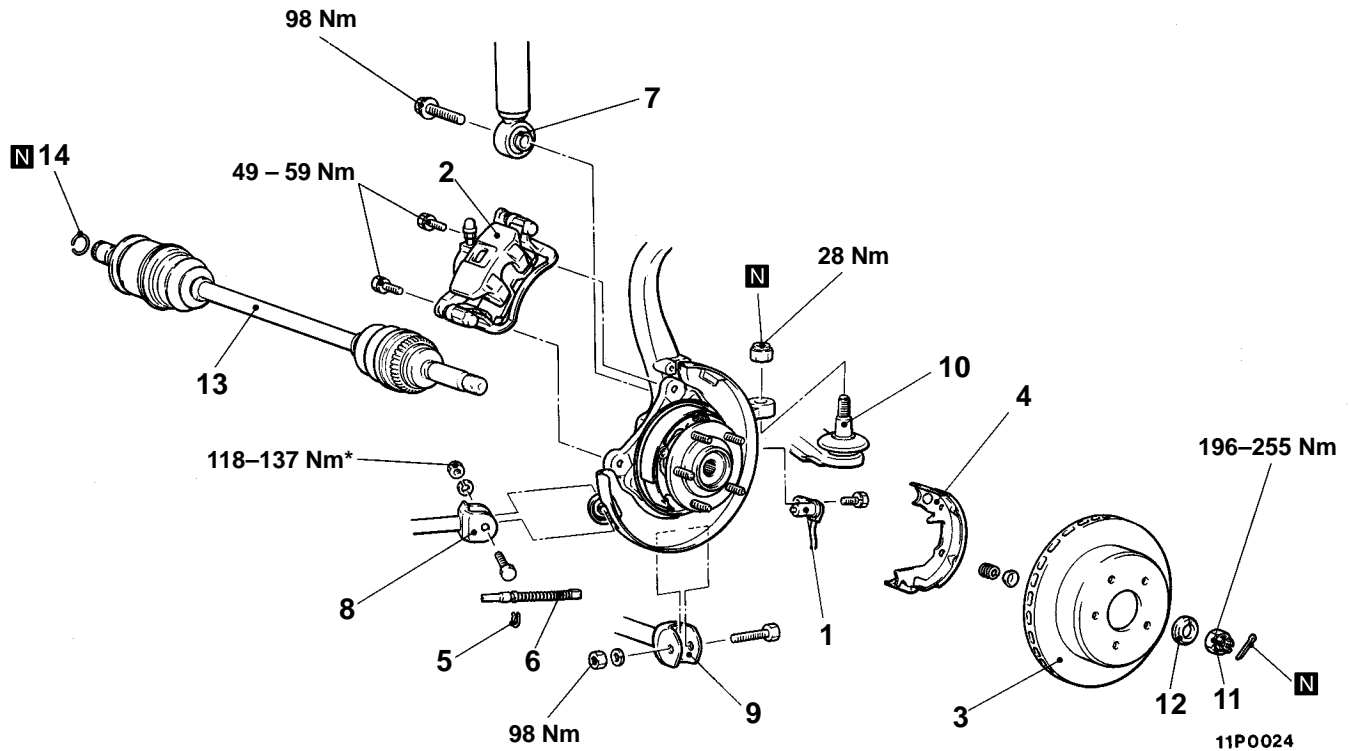
TOE CONTROL ARM REMOVAL

Caution

1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

DRIVE SHAFT

REMOVAL AND INSTALLATION



Removal steps

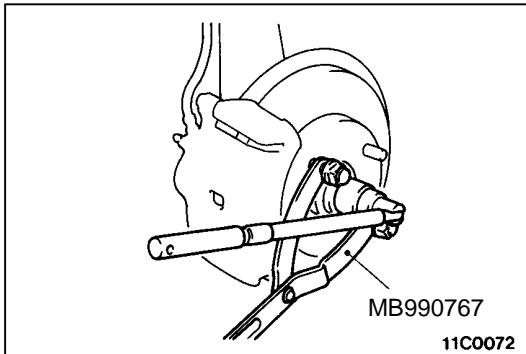
1. Rear speed sensor (Refer to Group 35B)
2. Caliper assembly
3. Brake disc
4. Shoe and lining assembly (Refer to Group 36)
5. Clip
6. Parking brake cable
7. Connection for shock absorber
8. Connection for trailing arm



9. Connection for lower arm
10. Connection for toe control arm
11. Drive shaft nut
12. Washer
13. Drive shaft
14. Circlip

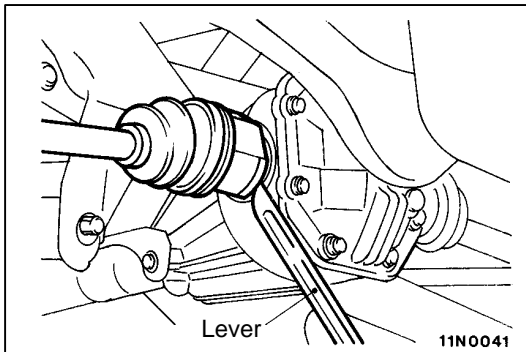
Caution

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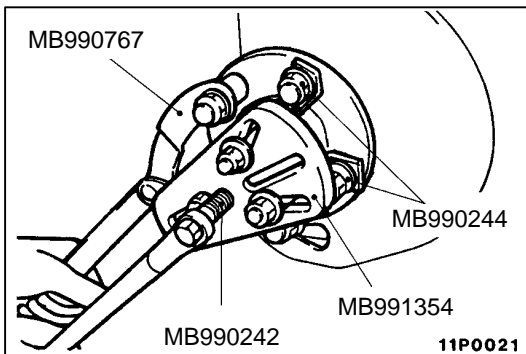
REMOVAL SERVICE POINTS

◀A▶ DRIVE SHAFT NUT REMOVAL

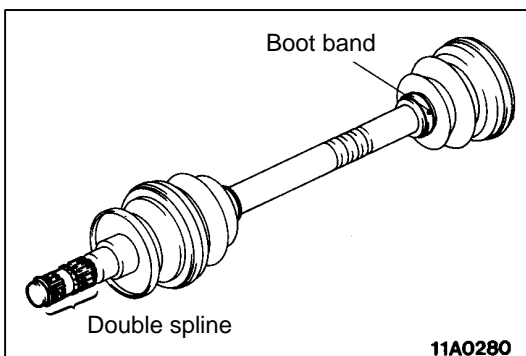


◀B▶ DRIVE SHAFT REMOVAL

1. Push the knuckle bottom toward the outer side of the vehicle and separate the drive shaft from the differential carrier using a lever.



2. Use the special tool to remove the drive shaft from the rear hub.



INSTALLATION SERVICE POINTS

▶A▶ DRIVE SHAFT INSTALLATION

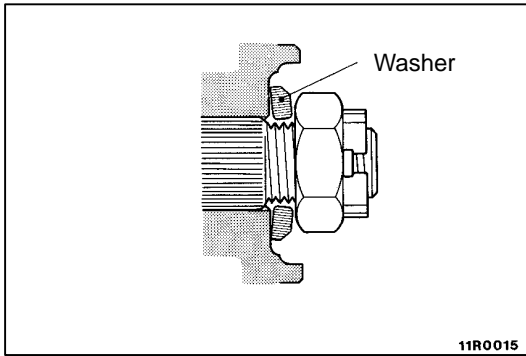
Caution

1. Be careful that the spline part of the drive shaft does not damage the oil seal of the differential carrier.
2. Ensure the drive shaft with the double splines is installed into the right hand side of the differential.

NOTE

Identify the drive shaft for the right and left by the colour of the TJ boot band (Small).

Left drive shaft	Right drive shaft
Yellowish green	Brown



►B◄ DRIVE SHAFT NUT INSTALLATION

1. Assemble the drive shaft washer in the direction shown in the illustration.
2. Use the special tools as used for the removal to tighten the drive shaft nut to the specified torque.

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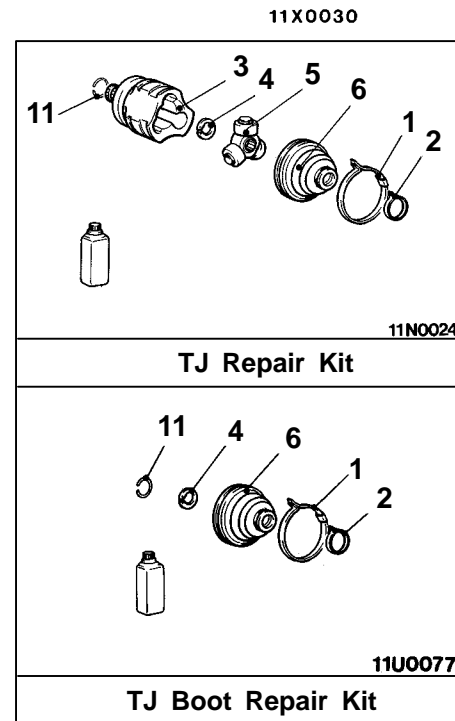
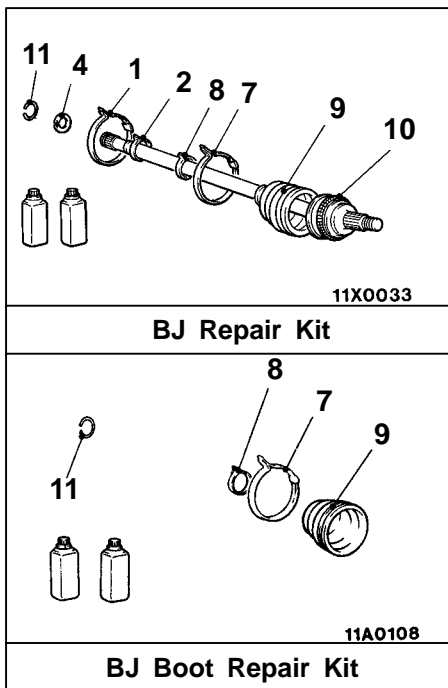
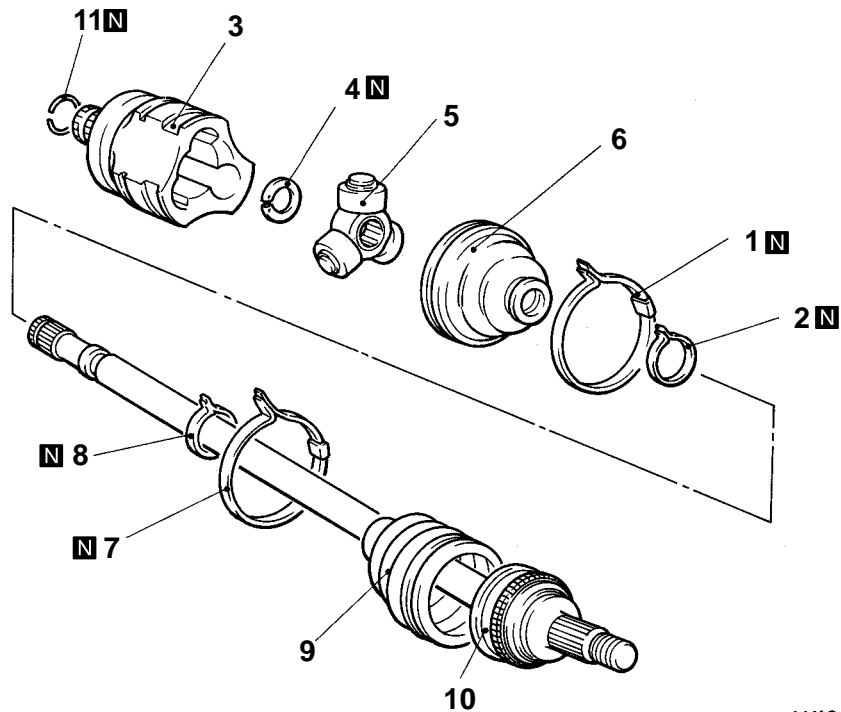
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DRIVE SHAFT

DISASSEMBLY AND REASSEMBLY

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Removal steps

- 1. TJ boot band
- 2. Boot band (small)
- 3. TJ case
- 4. Snap ring
- 5. Spider assembly
- 6. TJ boot
- 7. BJ boot band

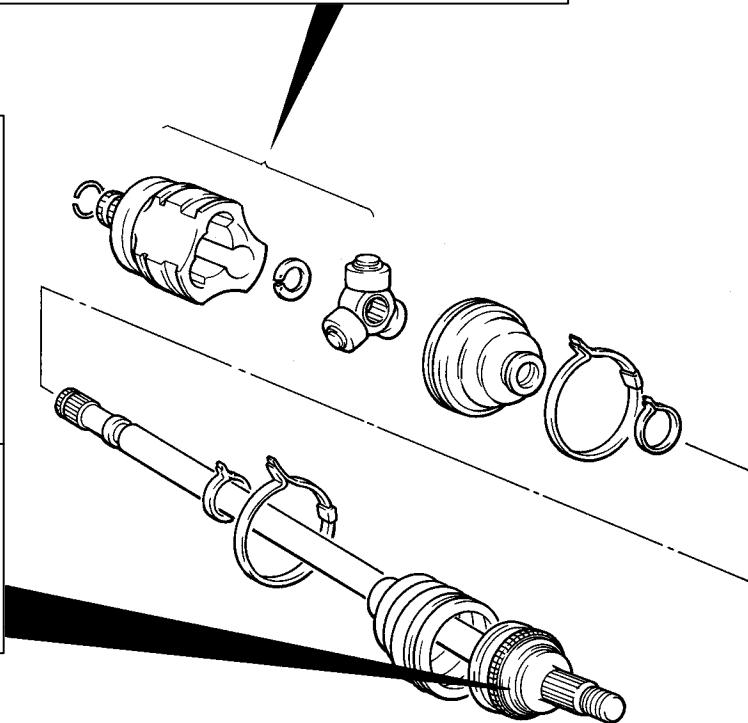
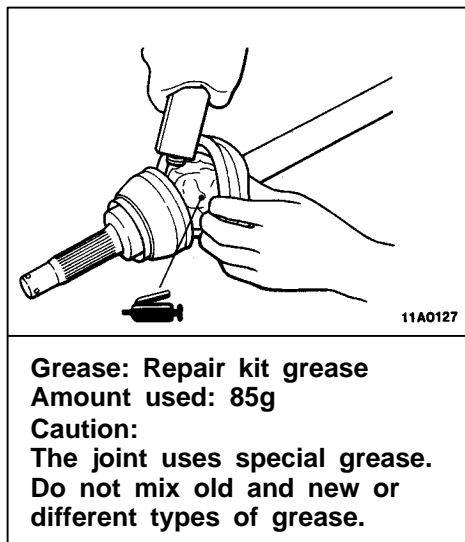
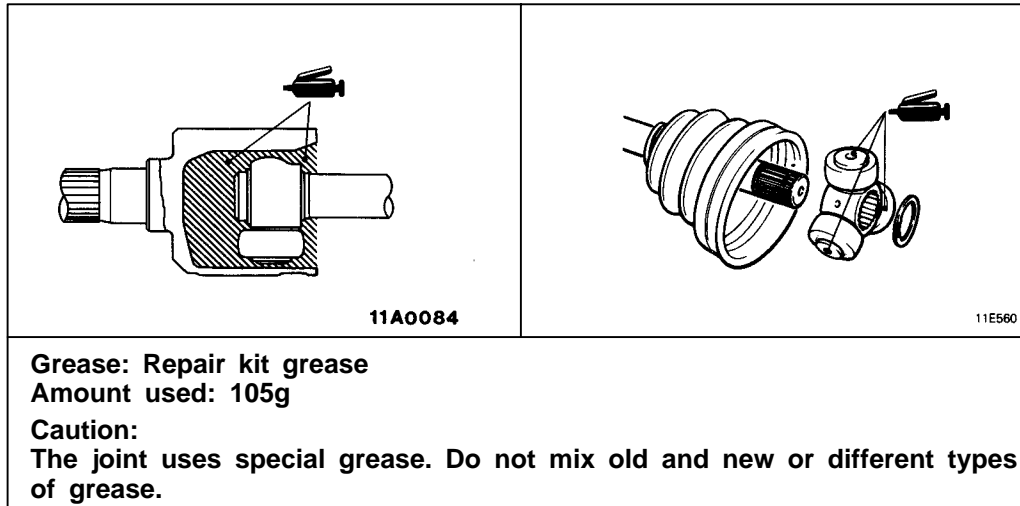
- 8. Boot band (small)
- 9. BJ boot
- 10. BJ assembly
- 11. Circlip

Caution

Be aware that right and left TJ cases are different.

DRIVE SHAFT

LUBRICATION POINTS



23TJ015A

DISASSEMBLY SERVICE POINTS

◀A▶ TJ CASE/SPIDER ASSEMBLY REMOVAL

1. Wipe off grease from the inside of the TJ case and spider assembly.
2. If there is water or foreign material in the wiped grease, be sure to clean the spider assembly.

Caution

Do not disassemble the spider assembly.

◀B▶ JT BOOT/BJ BOOT REMOVAL

1. Wipe off the grease from the shaft spline.
2. If the TJ boot and the BJ boot are re-used, wrap tape around the shaft spline so that they are not damaged when removed.

ASSEMBLY SERVICE POINTS**▶A◀ BJ BOOT/TJ BOOT INSTALLATION**

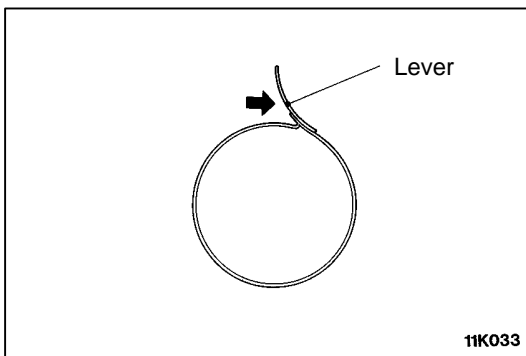
1. Wrap tape around the shaft spline, then install the BJ boot followed by the TJ boot.
2. Fill the BJ and TJ boot with the specified grease.

Specified grease:**Repair kit grease: Amount used 85g****NOTE**

When using the repair kit grease, use the whole amount, aiming at filling the inside of the joint and the inside of the boot with about half each.

Caution

1. In order to control the amount of air in the BJ boot as specified, the bending angle of the drive shaft should be 0°.
2. BJ boot band and TJ boot band should be identified by the identification number marked on the lever.



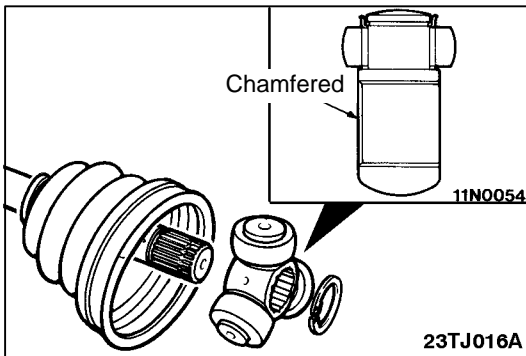
Item	Identification number
BJ boot band	20-113#BJ87L
TJ boot band	20-125#BJ87
BJ, TJ boot band (small)	20-146#BJ87

▶B◀ SPIDER ASSEMBLY/TJ CASE INSTALLATION

1. Apply the specified grease sufficiently between the spider axle and the roller.

Specified grease:**Repair kit grease****Caution**

1. The drive shaft joint uses special grease. Do not mix old and new or different types of grease.
2. If the spider assembly has been cleaned, take special care to apply the specified grease.



2. Fit the spider assembly to the shaft on the chamfered side of spline.
3. After applying the specified grease to the TJ case, insert the drive shaft and apply grease once more.

Specified grease:

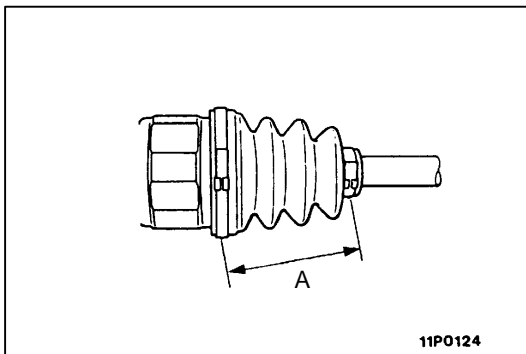
Repair kit grease: Amount 105g

NOTE

When using the repair kit grease, use the whole amount, aiming at filling the inside of the joint and the inside of the boot with about half each.

Caution

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



►C◄ BOOT BAND (SMALL)/TJ BOOT BAND INSTALLATION

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

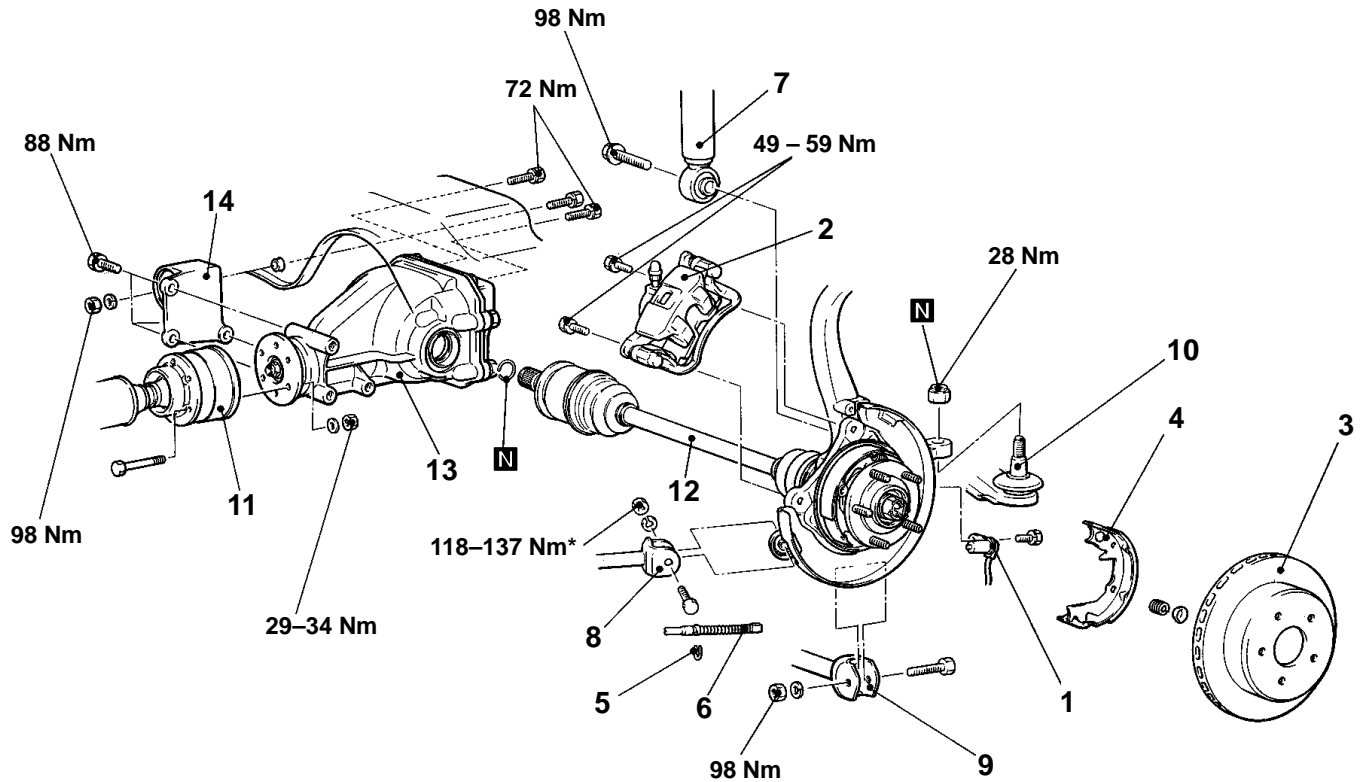
Standard value (A): 85mm

DIFFERENTIAL CARRIER

REMOVAL AND INSTALLATION

Post-installation Operation

- Adjustment of Parking Brake (Refer [Group 36.](#))



Removal steps

1. Rear speed sensor (Refer to [Group 35B](#))
2. Caliper assembly
3. Brake disc
4. Shoe and lining assembly (Refer to [Group 36](#))
5. Clip
6. Parking brake cable
7. Connection for shock absorber
8. Connection for trailing arm



9. Connection for lower arm
10. Connection for toe control arm
11. Connection for propeller shaft
12. Connection for drive shaft
13. Differential carrier
14. Differential mount bracket

Caution

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

REMOVAL SERVICE POINTS

◀A▶ PROPELLER SHAFT REMOVAL

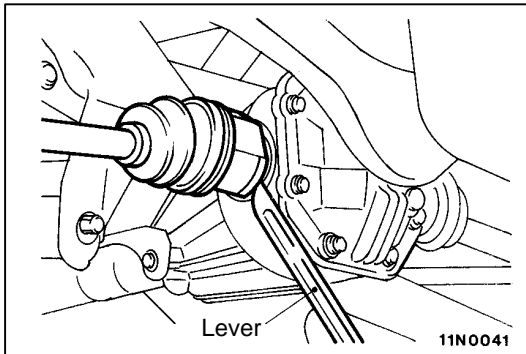
1. Make mating marks on the differential companion flange yoke, and disconnect the differential carrier assembly and propeller shaft.
2. Suspend the removed propeller shaft from the body with a wire to prevent bending.

Caution

If propeller shaft bends sharply, cross groove universal joint can be damaged.

◀B▶ DRIVE SHAFT REMOVAL

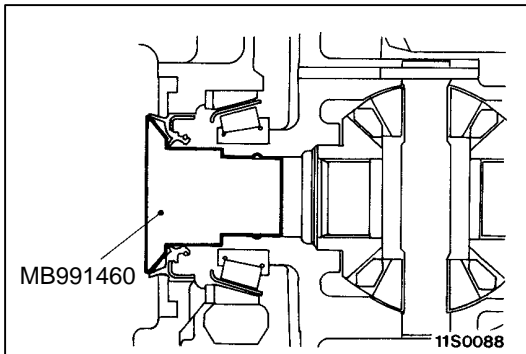
1. Push the knuckle bottom toward the outer side of the vehicle and separate the drive shaft from the differential carrier using a lever.
2. Suspend the drive shaft with wire, so the joint is not damaged.



3. Use the special tool to cover the differential to prevent the entry of foreign material.

◀C▶ DIFFERENTIAL CARRIER REMOVAL

Supporting the bottom of the differential carrier with a jack, remove the bolt from the joint with rear crossmember, and remove the differential carrier.



INSTALLATION SERVICE POINTS

▶A▶ DRIVE SHAFT INSTALLATION

Caution

Do not damage the oil seal of the differential carrier

INSPECTION BEFORE DISASSEMBLY

Remove the cover, fix the special tool to the vise, and install the differential carrier assembly to check the following items.

FINAL DRIVE GEAR BACKLASH

Check the final drive gear for backlash in the following procedure.

1. Setting a dial gauge on the side face of the drive gear tooth with the drive pinion.

NOTE

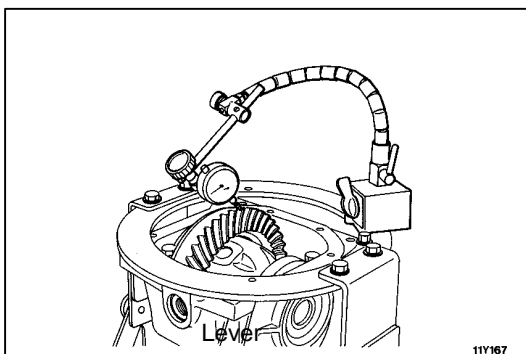
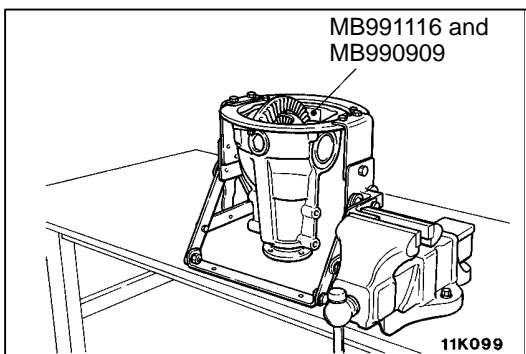
Measure the backlash on 4 or more points on the circumference of the drive gear.

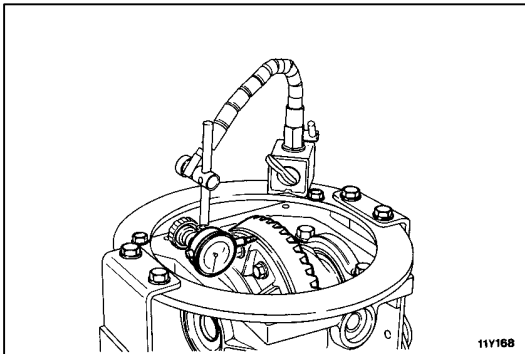
Standard value: 0.11 – 0.16mm

2. If the backlash is not within the standard value, adjust it by the side bearing spacer.

NOTE

After the adjustment, inspect the final drive gear tooth contact.





DRIVE GEAR BACK RUNOUT

Check the drive gear for runout by the following procedure.

1. With a dial gauge on the back of the drive gear, turn the drive gear and measure runout.

Limit: 0.05mm

2. If runout exceeds the limit value, check if there is foreign material between the back of the drive gear and the differential case or the installation bolts of the drive gear are loose.
3. If the results in step 2 are normal, reposition the drive gear and the differential case and measure it again.

NOTE

If adjustment is impossible, replace the differential case, or the drive gear and pinion as a set.

DIFFERENTIAL GEAR BACKLASH

Check the differential gear for backlash by the following procedure.

1. Insert a wedge (made of wood) between the side gear and the pinion shaft to lock one of the side gears, and measure the backlash with a dial gauge on the pinion gear.

NOTE

Measure the backlash of 2 pinion gears.

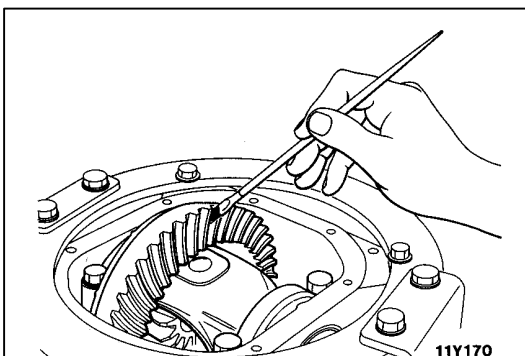
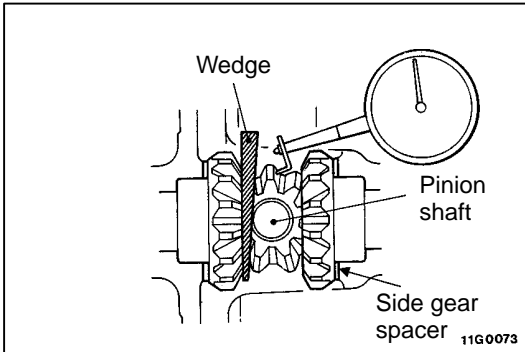
Standard value: 0 – 0.076mm

Limit: 0.2mm

2. If the backlash exceeds the limit, adjust it by the side gear spacer.

NOTE

If the adjustment is not possible, replace the side gear and pinion gear as a set.



FINAL DRIVE GEAR TOOTH CONTACT

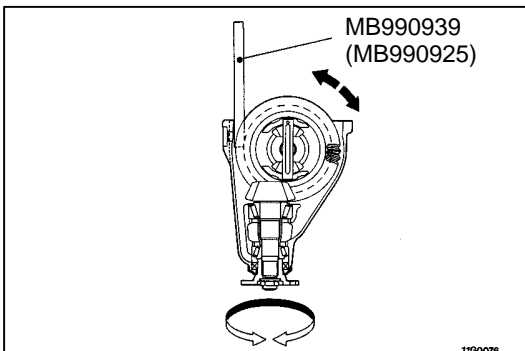
Check final drive gear tooth contact by the following procedure.

1. Apply a thin, uniform coat of machine blue, to both sides, of the drive gear teeth.
2. Insert the special tool between the gear carrier and the side face of the drive gear fitting part of the differential case. Rotate the companion flange by hand, once in the normal direction and once in the reverse direction, while applying a load to the drive gear so that a turning torque of approximately 2.5 – 3.0Nm is applied to the drive pinion.

Caution

Do not rotate the drive gear repeatedly, as the tooth contact pattern will look unclear.

3. Check the tooth contact condition of the final drive gear.

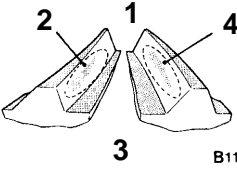
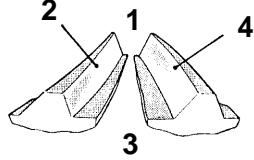
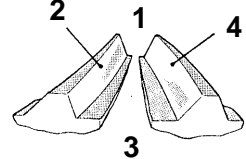
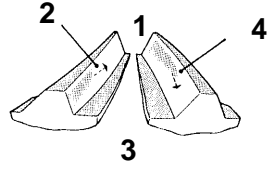
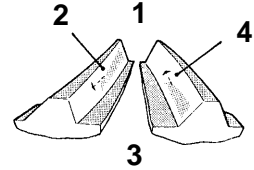


27C REAR AXLE <AWD> – Differential Carrier

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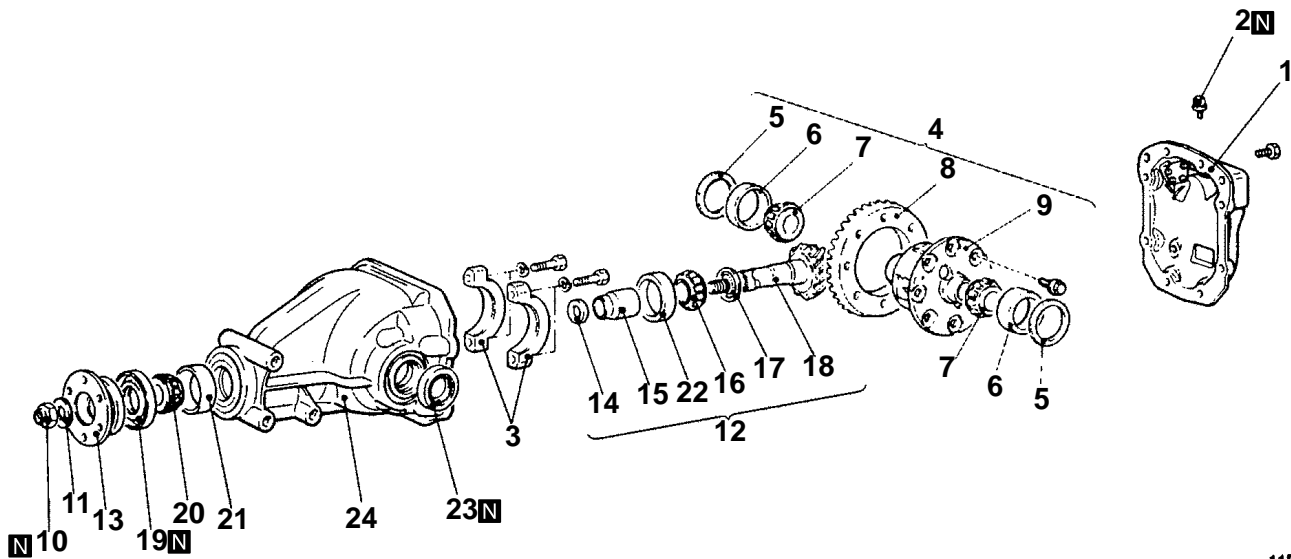
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Standard tooth contact pattern	Problem	Solution
<p>1 Narrow tooth side 2 Drive-side tooth surface (the side applying power during forward movement) 3 Wide tooth side 4 Coast-side tooth surface (the side applying power during reverse movement)</p>  <p style="text-align: right;">B11W0115</p>	<p>Tooth contact pattern resulting from excessive pinion height</p>  <p style="text-align: right;">B11W0116</p> <p>The drive pinion is positioned too far from the centre of the drive gear.</p>	 <p style="text-align: right;">B11W0118</p> <p>Increase the thickness of the drive pinion rear shim, and position the drive pinion closer to the centre of the drive gear. Also, for backlash adjustment, position the drive gear farther from the drive pinion.</p>
	<p>Tooth contact pattern resulting from insufficient pinion height</p>  <p style="text-align: right;">B11W0117</p> <p>The drive pinion is positioned too close to the centre of the drive gear.</p>	 <p style="text-align: right;">B11W0119</p> <p>Decrease the thickness of the drive pinion rear shim, and position the drive pinion farther from the centre of the drive gear. Also, for backlash adjustment, position the drive gear closer to the drive pinion.</p>

NOTE

Checking the tooth contact pattern is the way 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.

DIFFERENTIAL**DISASSEMBLY****Main
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Disassembly steps**A**

1. Differential cover assembly
2. Bent plug
3. Bearing cap
4. Differential case assembly
5. Side bearing spacer
6. Side bearing outer race
7. Side bearing inner race
8. Drive gear
9. LSD case assembly
10. Self-locking nut
11. Washer
12. Drive pinion assembly
13. Companion flange

**B
C****D****E****F****G****G****G****G**

14. Drive pinion front shim (for adjusting drive pinion turning torque)
15. Drive pinion spacer
16. Drive pinion rear bearing inner race
17. Drive pinion rear shim (for adjusting drive pinion height)
18. Drive pinion
19. Oil seal
20. Drive pinion front bearing inner race
21. Drive pinion front bearing outer race
22. Drive pinion rear bearing outer race
23. Oil seal
24. Gear carrier

DISASSEMBLY SERVICE POINTS

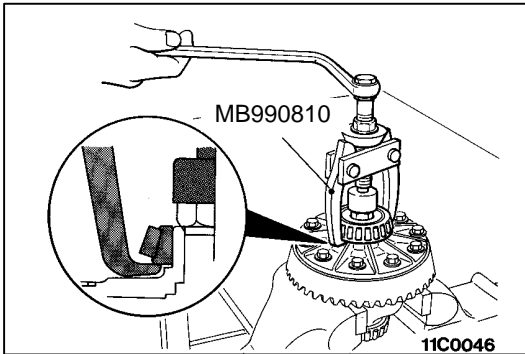
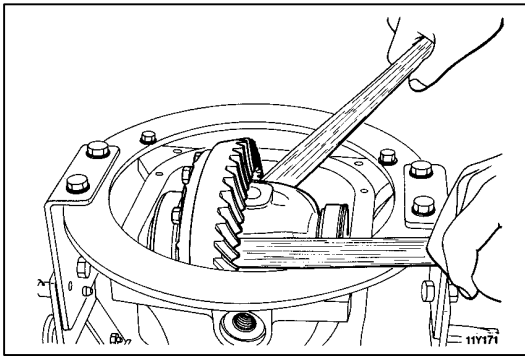
◀A▶ DIFFERENTIAL CASE ASSEMBLY REMOVAL

Caution

Remove the differential case assembly slowly, and be careful not to drop the side bearing outer race.

NOTE

Keep the right and left side bearing shims and side bearing outer races separate to avoid confusion during assembly.



◀B▶ SIDE BEARING INNER RACE REMOVAL

Use the special tool to remove side bearing inner race.

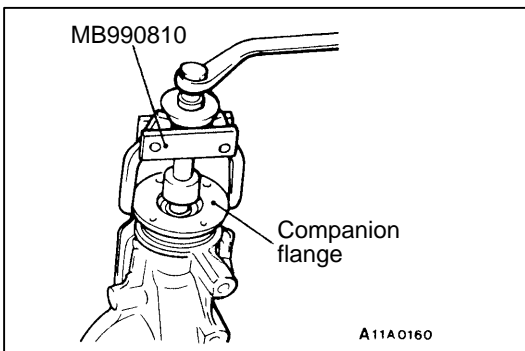
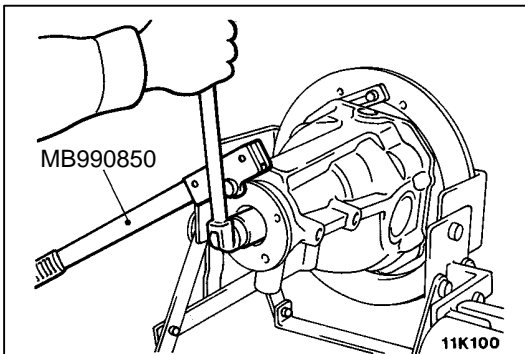
NOTE

Hitch the claws of the special tool on the 2 notches of the side bearing inner race on the differential case side.

◀C▶ DRIVE GEAR REMOVAL

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

◀D▶ SELF LOCKING NUT REMOVAL



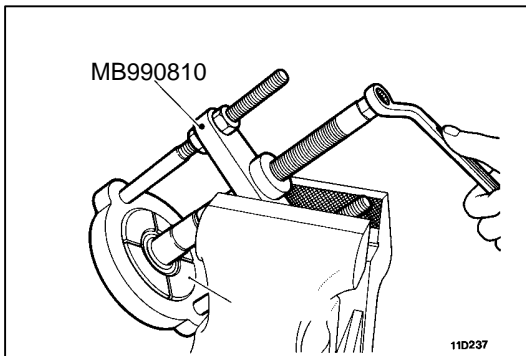
◀E▶ DRIVE PINION ASSEMBLY REMOVAL

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

Caution

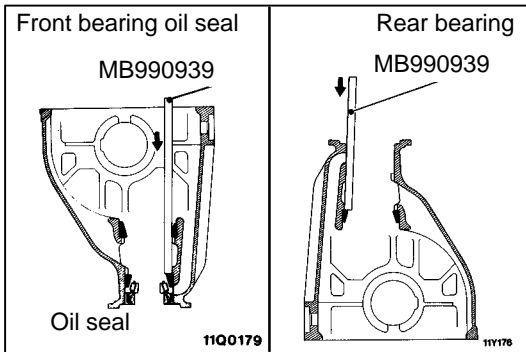
Do not make mating marks on the contact surface of the companion flange and propeller shaft.

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



◀F▶ DRIVE PINION REAR BEARING INNER RACE REMOVAL

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

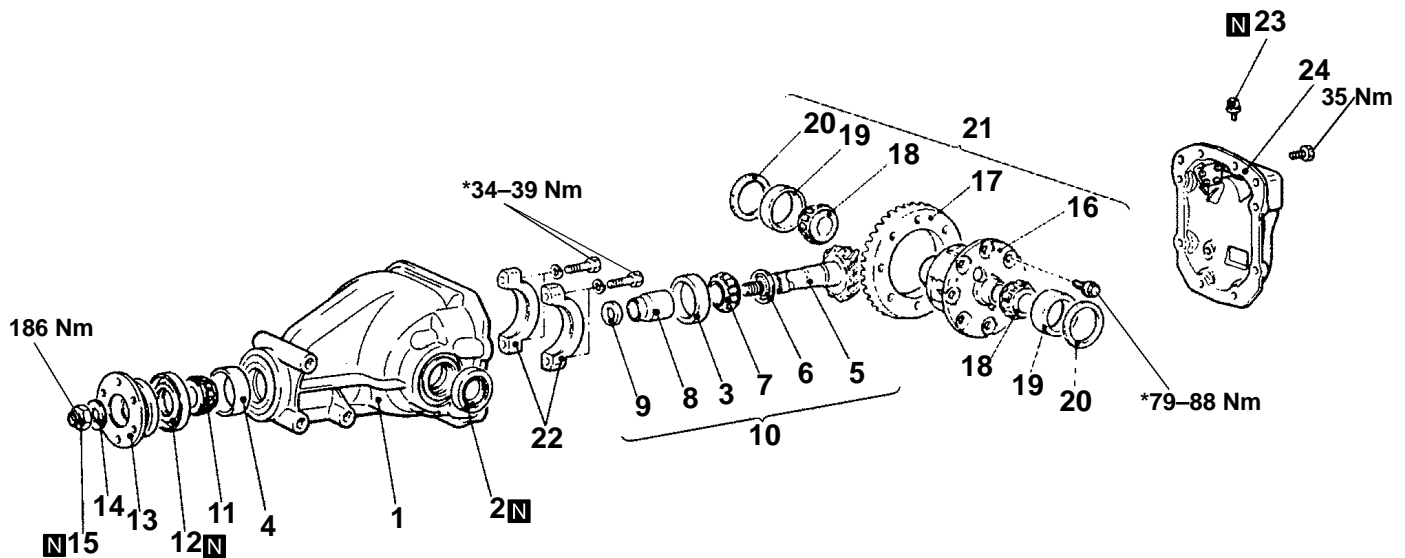
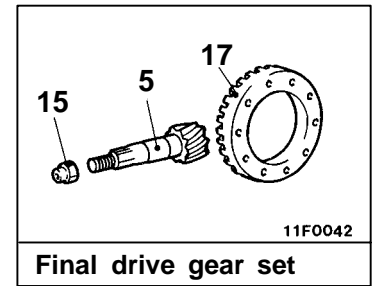


◀G▶ OIL SEAL/DRIVE DRIVE PINION FRONT BEARING INNER RACE, DRIVE PINION FRONT BEARING OUTER RACE, AND DRIVE PINION REAR BEARING OUTER RACE REMOVAL

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

DIFFERENTIAL

REASSEMBLY

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Disassembly steps

- 1. Gear carrier
- ▶A▶ 2. Oil seal
- ▶B▶ 3. Drive pinion rear bearing outer race
- ▶B▶ 4. Drive pinion front bearing outer race
- ▶C▶ • Adjustment of drive pinion height
- 5. Drive pinion
- 6. Drive pinion rear shim (for adjusting drive pinion)
- 7. Drive pinion rear bearing inner race
- 8. Drive pinion spacer
- ▶D▶ • Adjustment of drive pinion turning torque
- 9. Drive pinion front shim (for adjusting drive pinion turning torque)
- 10. Drive pinion assembly
- 11. Drive pinion front bearing inner race
- 12. Oil seal
- 13. Companion flange

- 14. Washer
- 15. Self-locking nut
- 16. LSD case assembly
- ▶E▶ 17. Drive gear
- ▶F▶ 18. Side bearing inner race
- ▶G▶ 19. Side bearing outer race
- ▶G▶ • Adjustment of final gear backlash
- 20. Side bearing spacer
- 21. Differential case assembly
- 22. Bearing cap
- 23. Bent plug
- 24. Differential cover assembly

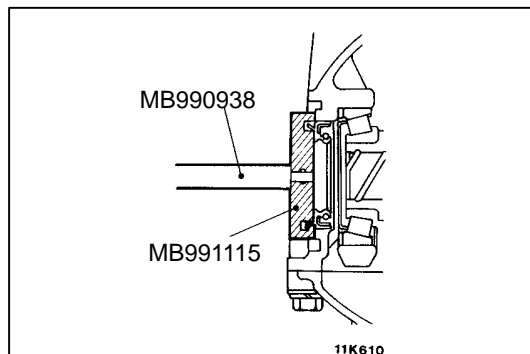
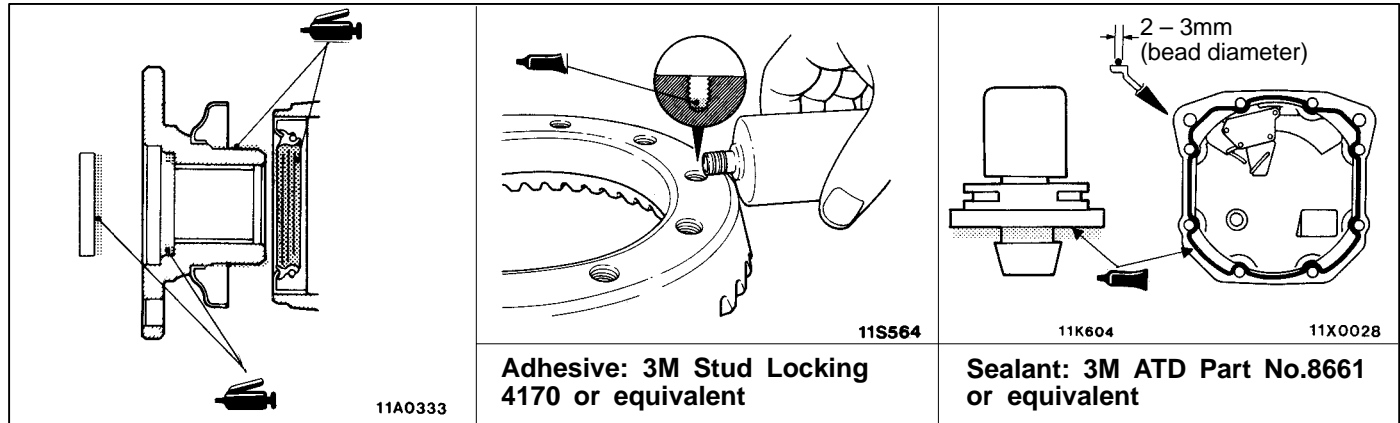
Caution

Tightening torque marked with * is that with oil coated.

LUBRICATION AND ADHESIVE POINTS

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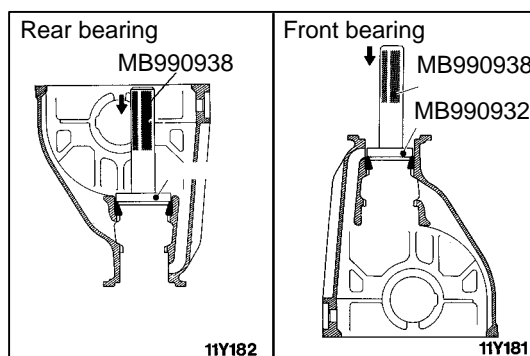
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REASSEMBLY SERVICE POINTS

►A◄ OIL SEAL FITTING

1. Use the special tools to press-fit the oil seal to the side face of the differential carrier.
2. Apply a thin amount of multi purpose grease to the oil seal lip.



►B◄ DRIVE PINION REAR BEARING OUTER RACE, DRIVE PINION FRONT BEARING OUTER RACE FITTING

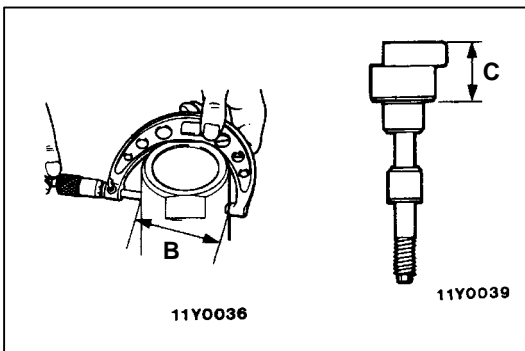
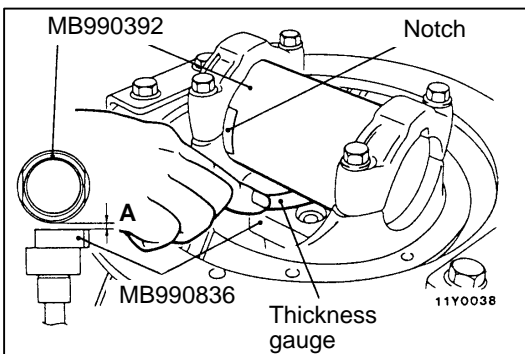
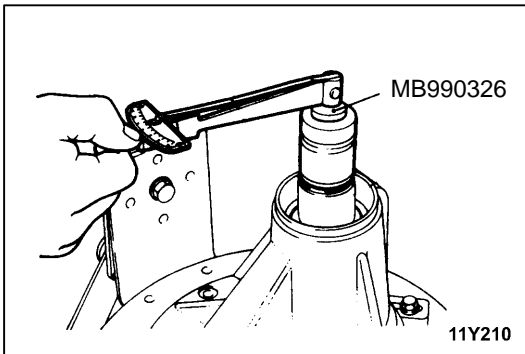
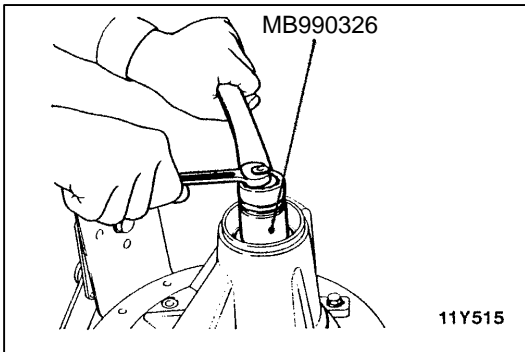
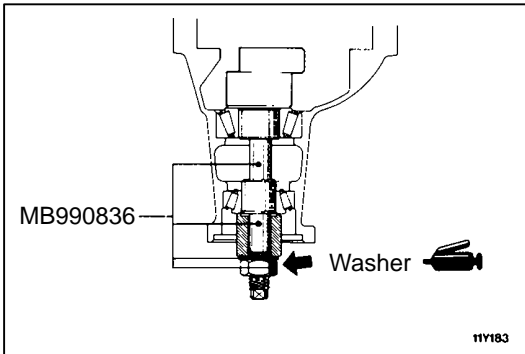
Caution

Do not lean outer race to press-fit

►C◄ DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedures:

1. Apply multipurpose grease to the washer of the special tool.
2. Install the special tool and drive pinion front and rear bearing inner races to the gear carrier in the sequence shown in the illustration.

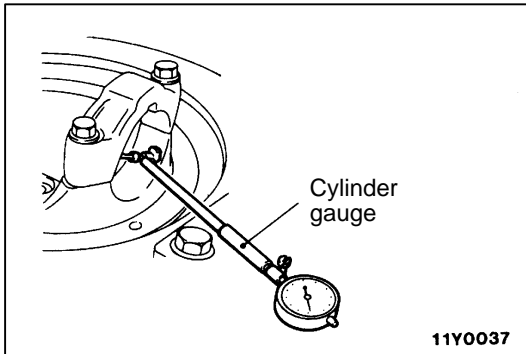


3. Tighten the nut of the special tool a little at a time while measuring the turning torque of the drive pinion. Then confirm the turning torque (without the oil seal) is at the standard value.

Standard value:

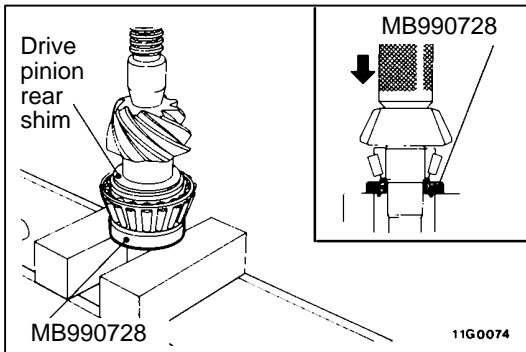
Bearing type	Turning torque
New	0.4 – 0.5 N·m

4. Clean the side bearing hub.
5. Place the special tool between the side bearing hub of the gear carrier, and position the notch as shown in the illustration. Then tighten side bearing mounting bolt.
6. Use a thickness gauge to measure the clearance (A) between the special tools.
7. Remove special tools (MB990836).
8. Use a micrometer to measure the shown dimensions (B, C) of special tools.

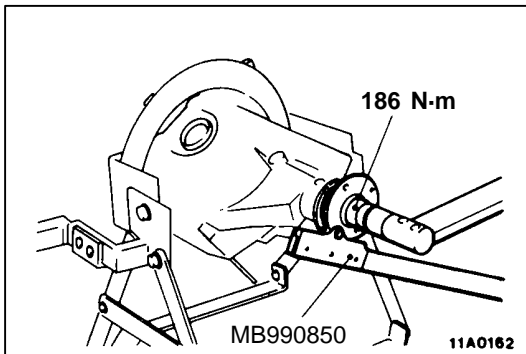


9. Install the bearing cap, and then use a cylinder gauge to measure inside diameter (D) of the bearing cap.
10. Calculate thickness (F) of the required drive pinion rear shim twice by the following formula. Select a shim which most closely matches this thickness.

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



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 /OIL SEAL INSTALLATION

1. Insert the drive pinion into the gear carrier, and then install the following parts in sequence from the carrier rear side. Drive pinion spacer, drive pinion front shim and drive pinion front bearing inner race, companion flange.

NOTE

Do not install the oil seal.

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

3. Measure the drive pinion turning torque (without the oil seal).

Standard value:

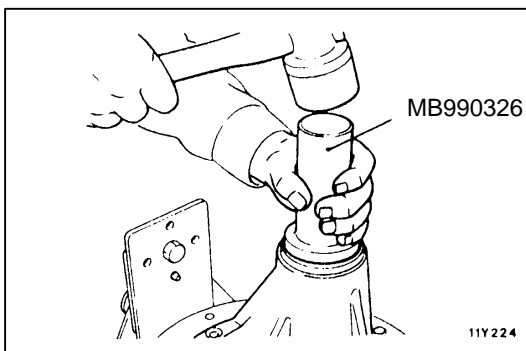
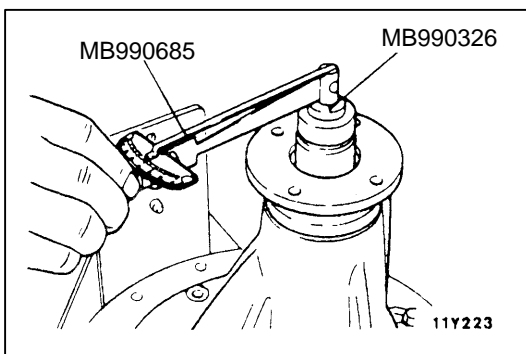
Bearing division	Turning torque
New	0.9 – 1.2 N·m

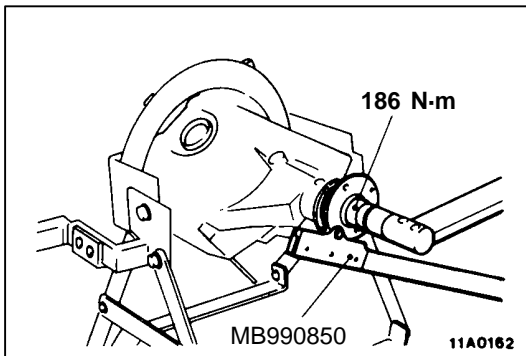
4. If the drive pinion turning torque is not within the standard value, adjust the turning torque by replacing the drive pinion front shim(s).

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.

5. Remove the companion flange and drive pinion again. Then insert the drive pinion front bearing inner race into the gear carrier. Use the special tool to press-fit the oil seal.
6. Apply multi-purpose grease to the working face and washer of the companion flange.



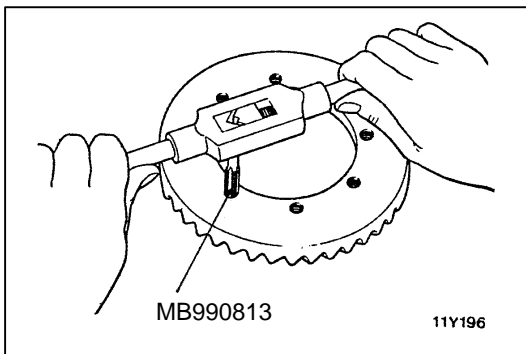
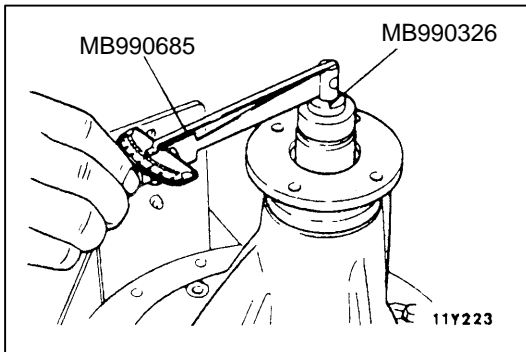


7. Install the drive pinion assembly and companion flange with mating marks properly aligned. Tighten the companion flange self-locking nut to the specified torque using the special tool.
8. Measure the drive pinion turning torque (with oil seal) to verify that the drive pinion turning torque complies with the standard value.

Standard value:

Bearing division	Companion flange lubrication	Turning torque
New	None (With anti-rust agent)	1.0 – 1.3 N·m
	Gear oil applied	0.5 – 0.6 N·m

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



►E◄ 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 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 N·m

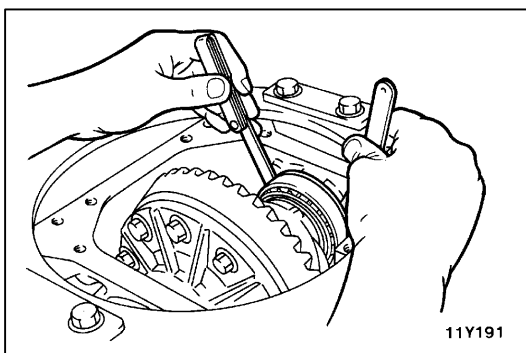
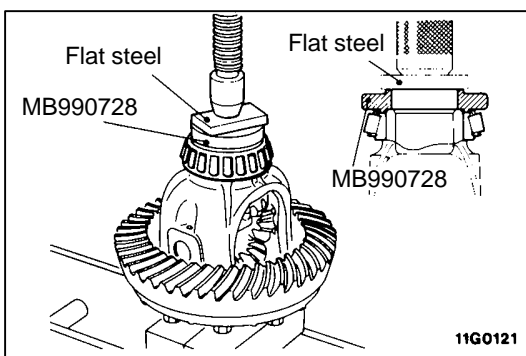
►F◄ SIDE BEARING INNER RACE INSTALLATION

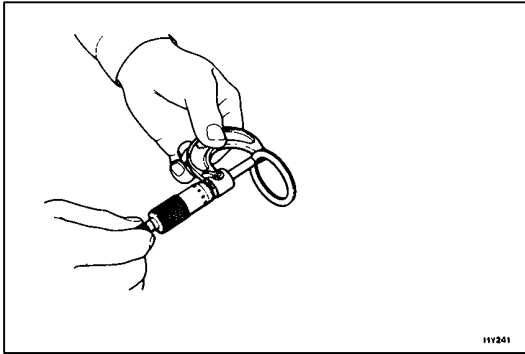
Use the special tool to press-fit the side bearing inner races into the differential case.

►G◄ BEARING CAP INSTALLATION/FINAL DRIVE GEAR BACKLASH ADJUSTMENT

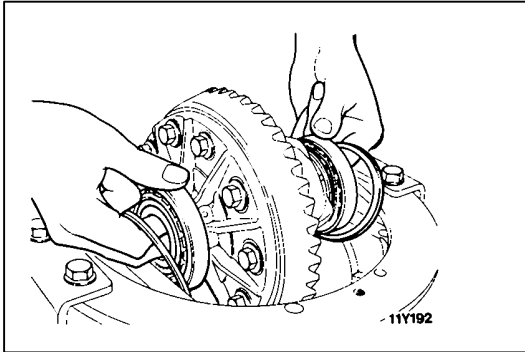
Adjust drive gear backlash as follows:

1. Assemble the differential case with the side bearing outer race to the gear carrier.
2. Press the differential case to one side to measure the clearance of the side bearing outer race and the gear carrier.

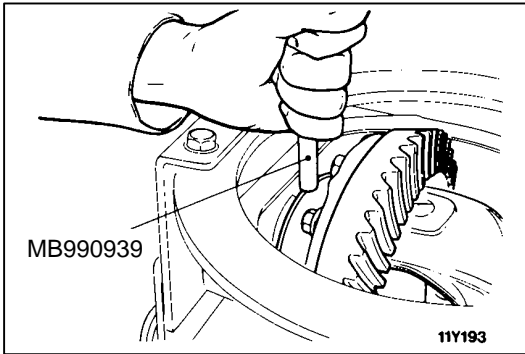




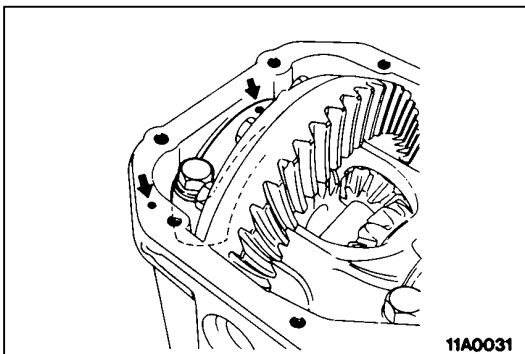
3. Remove the differential case, and measure the thickness of the installed side bearing spacer on one side. The measured value + 1/2 of clearance + 0.05mm pre-load should be the thickness of the side bearing spacer to choose. Select two bearing spacers.



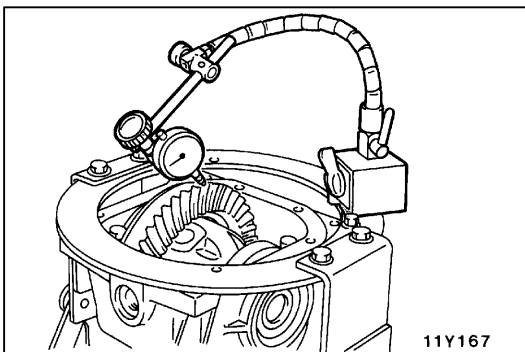
4. Install the side bearing spacer chosen above into the differential carrier with the side bearing outer race as shown in the diagram.



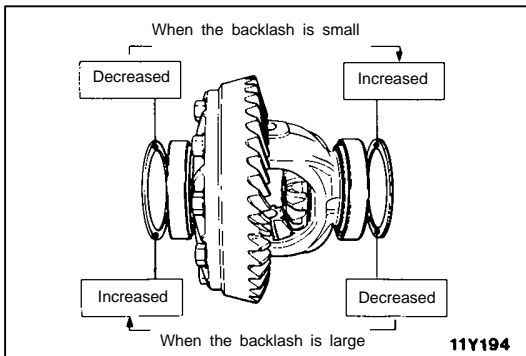
5. Use the special tool to drive the side bearing outer race.



6. Align the mating marks on the gear carrier and bearing cap and install the bearing cap.



7. Use a dial gauge, touching the side of the drive gear teeth to check if the backlash is the standard value by fixing the drive pinion and moving the drive gear.

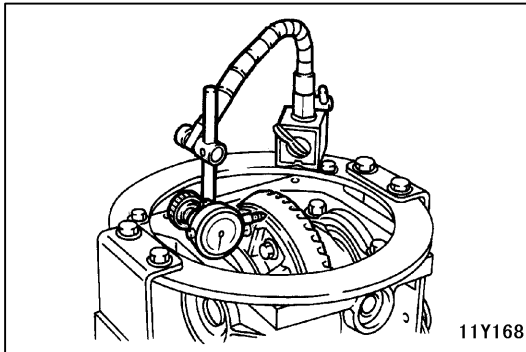


8. If the backlash is not within the standard value, move the side bearing spacer as shown in the illustration to adjust the backlash.

NOTE

The increment of side bearing spacer must be coincided with the decreased amount.

9. Inspect the tooth condition at the final drive gear and make an adjustment if required. (Refer to GROUP 27 – Pre-removal Inspection.)



10. Measure the drive gear runout.

Limit: 0.05 mm

11. When drive gear runout exceeds the limit, remove the differential case and then the drive gears, moving them to different positions and reinstall them.

NOTE:

If adjustment is not possible, replace the differential case or drive gear and drive pinion as a set.

LSD CASE ASSEMBLY

INSPECTION BEFORE DISASSEMBLY

DIFFERENTIAL GEAR BACKLASH CHECK

1. Fix the LSD case assembly to a vise with the differential side gear (RH) up.

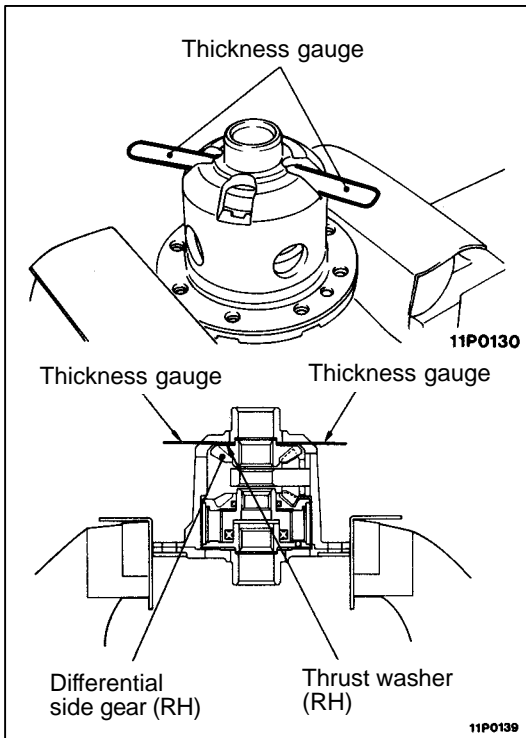
Caution

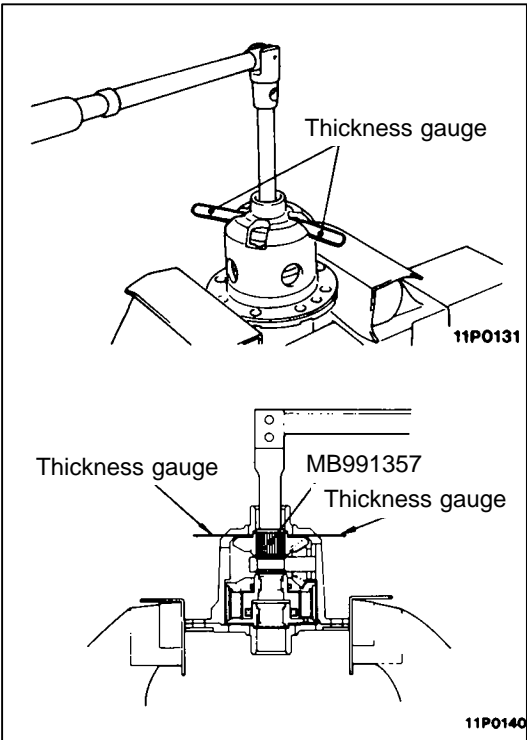
Do not tighten the LSD case assembly too much

2. Insert 2 thickness gauges of 0.03mm in thickness, in diagonal positions between the differential case B and the thrust washer (RH).

Caution

Do not insert the thickness gauge at the oil groove of the differential case B.





3. Insert the special tool into the spline part of the differential side gear (RH), and make sure that the side gear (RH) rotates.
4. Replace with the thickness gauge of 0.09mm.
5. Insert the special tool into the spline part of the differential side gear (RH), and make sure the side gear (RH) does not rotate.

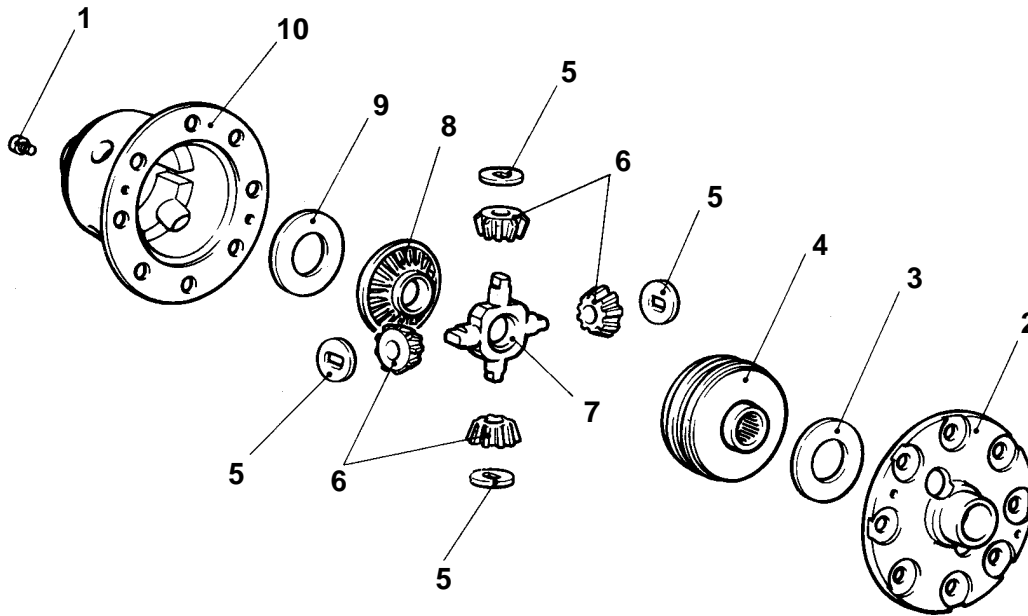
Differential gear backlash

Standard value (Clearance from side gear on the thrust side): 0.03 – 0.09mm

6. If the clearance is beyond the standard value, remove the differential case A, and adjust it by the thickness of thrust washer (LH).

Thrust washer thickness	
LH	RH (Reference)
0.8	0.8
0.9	
1.0	
1.1	
1.15	
1.2	
1.25	
1.3	
1.35	
1.4	
1.5	

DISASSEMBLY AND REASSEMBLY



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Disassembly steps

- Pre-disassembly inspection (Refer to Group 27)



1. Screw
2. Differential case A
3. Thrust washer (LH)
4. VCU (differential side gear)



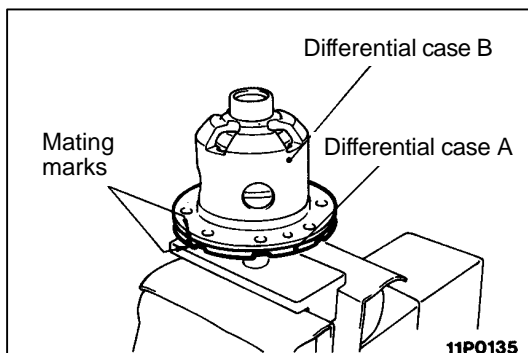
5. Pinion mate washer
6. Differential pinion mate
7. Differential pinion shaft
8. Differential side gear
9. Thrust washer (RH)
10. Differential case B

**DISASSEMBLY SERVICE POINT****◀A▶ THRUST WASHER (LH)/THRUST WASHER (RH) REMOVAL**

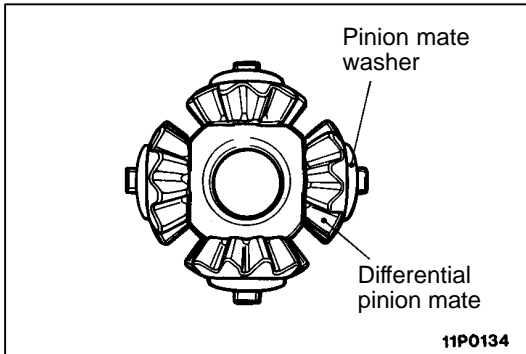
Thrust washer thickness is different between LH and RH.

REASSEMBLY SERVICE POINTS**▶A◀ DIFFERENTIAL CASE B/DIFFERENTIAL CASE A INSTALLATION**

Align the mating marks on the differential case B and A, and assemble the case.



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►B◄ DIFFERENTIAL PINION MATE/PINION MATE WASHER INSTALLATION

Install the washer into the differential pinion shaft in the direction shown in the diagram, then install them into the differential case B.

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►C◄ THRUST WASHER (LH) INSTALLATION

When replacing the differential side gear and pinion mate gear, choose thrust washer (LH) by the following procedure.

1. Clean the differential side gear and the pinion mate gear with solvent to remove grease.
2. Install the thrust washers, which have been used, with RH and LH in the correct positions into the differential case A and B as well as gears, VCU, pinion mate washers and pinion shaft, and tighten temporarily with screws.
3. Check the differential gear for backlash. Choose thrust washer (LH) to control the backlash to the standard value. (Refer to Group 27)