

REAR AXLE

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27109000277

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GENERAL INFORMATION

27100010248

- The rear axle is a banjo-type semi-floating type. As the axle shaft bearings, double taper roller bearings are used. ABS rotor is press-fitted to the axle shaft.
- A hybrid type LSD has a high performance against driving on unstable surfaces such as muddy roads.

REAR AXLE

Item	Specifications	
Axle housing type	Banjo type	
Axle shaft	Support method	Semi-floating type
	Shaft O.D. (Bearing part x Centre x Length) mm	40.0 x 34.5 x 744.5
	Bearing type	Double taper
	Bearing (O.D. x I.D.) mm	80.0 x 40.0

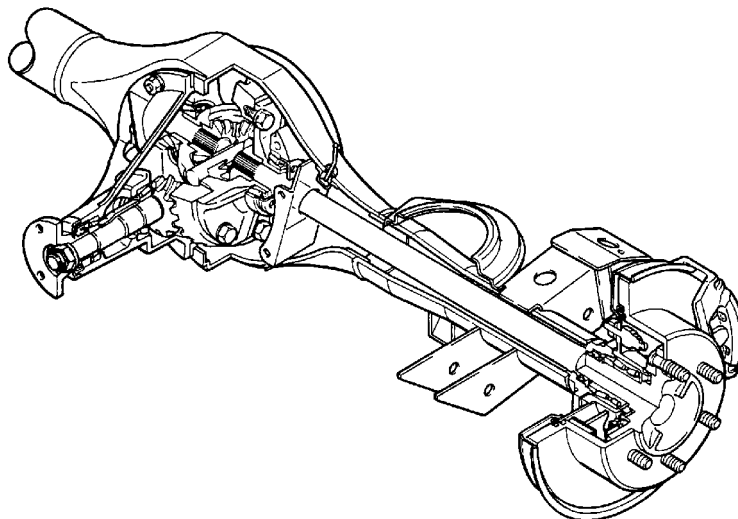
DIFFERENTIAL

Item	6G7, 4D5 <Vehicles with-out wide fender>	4D5 <Vehicles with wide fender>	
Drive gear type	Hypoid gear		
Reduction ratio	4.636	4.900	
Limited slip differential type	Torque sensitivity type and rpm sensitivity type		
Differential gear type (type x quantity)	Side gear	Straight bevel gear x 2 Helical bevel gear x 2*	
	Pinion gear	Straight bevel gear x 2 Helical bevel gear (short), helical bevel gear (long) x 4*	
Number of teeth	Drive gear	51	49
	Drive pinion	11	10
	Side gear	19, 22*	
	Pinion gear	10, 7*	
Bearing (O.D. x I.D.) mm	Side	80 x 45	
	Front	68 x 30	
	Rear	79 x 37	

NOTE

*: Vehicles with hybrid type LSD

CONSTRUCTION DIAGRAM



SERVICE SPECIFICATIONS

27100030350

Item			Standard value	Limit
Rear axle total backlash mm			–	5
Axle shaft axial play mm			0 – 0.25	–
Protruding length of stabilizer bar mounting bolt mm			15 – 17	–
Axle shaft retainer press-fitting force N	Initial press-fitting force 49,000 or more			–
	Final press-fitting force 9,800 – 108,000			–
Clearance between axle shaft retainer and snap ring mm			0 – 0.166	–
Distance between bearing case and ABS rotor mm			19.4 – 20.0	–
Drive gear backlash mm			0.13 – 0.18	–
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 anti-rust agent)	0.59 – 0.88	–
		When replacing or reusing (with gear oil applied)	0.39 – 0.49	–
	With oil seal	When replacing (with anti-rust agent)	0.83 – 1.13	–
		When replacing or reusing (with gear oil applied)	0.64 – 0.74	–

LUBRICANTS

27100040148

Item	Specified lubricants	Quantity
Rear differential gear oil	<ul style="list-style-type: none"> ● Conventional differential: Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80 W ● Limited slip differential: Hypoid gear oil MITSUBISHI Genuine Gear Oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W-90) or equivalent 	2.6 L

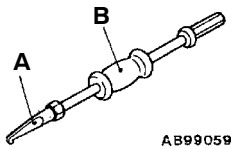
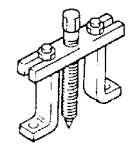
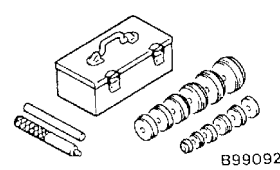
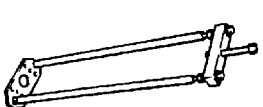
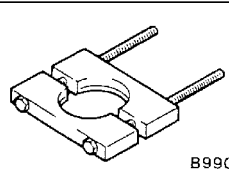
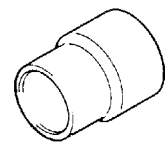
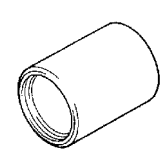
SEALANTS

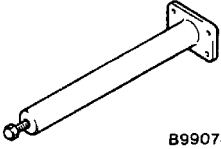
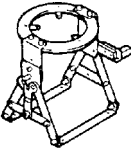
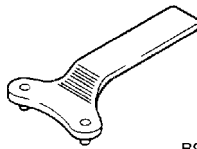

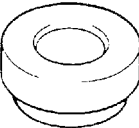
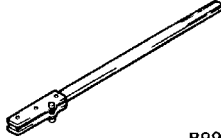
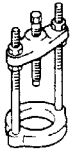

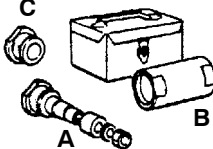
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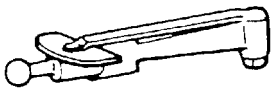
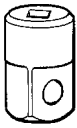
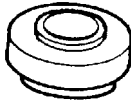

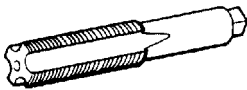

Items	Specified sealants	Remarks
Bearing case	3M ATD Part No. 8663 or equivalent	Semi-drying sealant
Axle housing (differential carrier mounting part)		
Drive gear and differential case mounting part	3M Stud Locking 4170 or equivalent	Anaerobic sealant

SPECIAL TOOLS

27100060298

Tool	Number	Name	Use
 <p>MB990590</p>	MB990590 A: MB990212 B: MB990211	Rear axle shaft oil seal remover A: Adapter B: Sliding hammer	<ul style="list-style-type: none"> Removal of axle shaft (Use together with MB990241, MB990211) Removal of axle housing oil seal
 <p>B990241</p>	MB990241	Rear axle shaft puller	Removal of axle shaft (Use together with MB990211)
 <p>B990925</p>	MB990925	Bearing and oil seal installer set	<ul style="list-style-type: none"> Press-fitting of oil seal Inspection of drive gear tooth contact Removal of bearing outer race For details of each installer, refer to GROUP 26 – Special Tools.
	MB991552	Axle shaft bearing and case remover	Removal of the axle shaft bearing and bearing case
 <p>B990560</p>	MB990560	Bearing remover	Removal of bearing inner race
 <p>B990799</p>	MB990799	Bearing inner race installer	<ul style="list-style-type: none"> Removal of axle shaft bearing inner race Press-fitting of the axle shaft bearing inner race Press-fitting of the axle shaft retainer
 <p>B990890</p>	MB990890 or MB990891	Rear suspension bushing base	Press-fitting of bearing outer race

Tool	Number	Name	Use
 <p>B990787</p>	MB990787	Axle shaft bearing remover	Installation of ABS rotor
 <p>B990909</p>	MB990909	Working base	Supporting of the differential carrier
 <p>B990201</p>	MB990201	Side bearing adjusting special spanner	Removal and adjustment of the side bearing nut
 <p>B990810</p>	MB990810	Side bearing puller	Removal of the side bearing inner race
 <p>B990811</p>	MB990811	Side bearing cup	
 <p>B990850</p>	MB990850	End yoke holder	Removal of the companion flange
 <p>B990339</p>	MB990339	Bearing puller	Removal of the drive pinion rear bearing inner race
	MB990648	Bearing remover	
	MB991171 A: MB990819 B: MB991170 C: MB991169	Pinion height gauge set A: Drive pinion gauge B: Cylinder gauge C: Drive pinion gauge attachment	Measurement of the pinion height

Tool	Number	Name	Use
	MB990685	Torque wrench	Measurement of the starting torque of drive pinion
	MB990326	Preload socket	
	MB990728	Bearing installer	Press-fitting of the drive pinion rear bearing inner race
	MB990727	Drive pinion oil seal installer	Press-fitting of the drive pinion oil seal
	MB990813	Tap	Removal of adhesive
	MB990802	Bearing installer	Press-fitting of the side bearing inner race

ON-VEHICLE SERVICE

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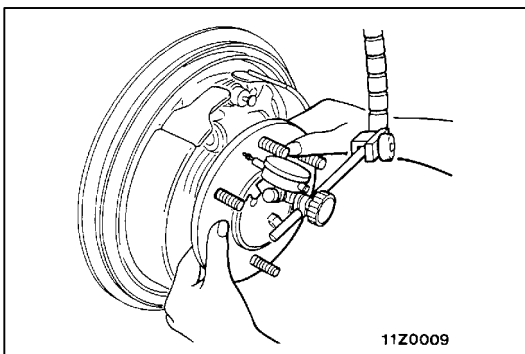
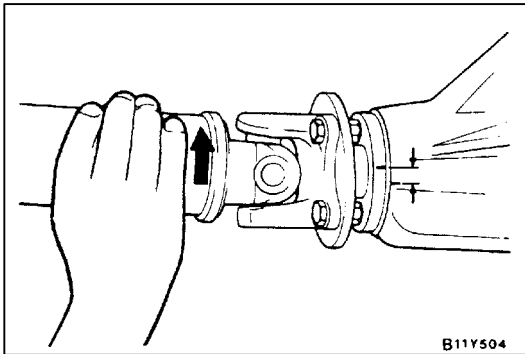
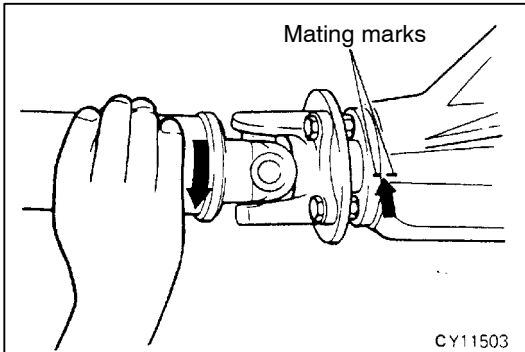
REAR AXLE TOTAL BACKLASH CHECK

1. Park the vehicle on a flat, level surface.
2. Move the transmission control lever to the neutral position. Move the transfer control lever to the neutral position. Apply the parking brake. Raise the vehicle on a jack.

3. Turn the companion flange clockwise as far as it will go. Make the mating mark on the dust cover of the companion flange and on the differential carrier.
4. Turn the companion flange anti-clockwise as far as it will go, and measure the amount of distance the mating marks moved.

Limit: 5 mm

5. If the backlash exceeds the limit value, remove the differential carrier assembly and check the following.
 - Final drive gear backlash (Refer to P.27-19.)
 - Differential gear backlash (Refer to P.27-20.)



AXLE SHAFT AXIAL PLAY CHECK

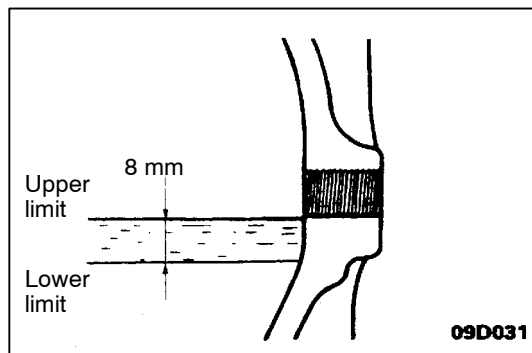
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1. Measure the axle shaft axial play by using a dial indicator.
Standard value: 0 – 0.25 mm
2. If within specifications, return vehicles to original condition.

AXLE SHAFT AXIAL PLAY ADJUSTMENT

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The axle shaft axial play is preset at factory. It can not be adjusted.



GEAR OIL LEVEL CHECK

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Check that gear oil level is not 8 mm below the bottom of filler plug hole.

Specified gear oil:

<Conventional differential>

Hypoid gear oil API classification GL-5 or higher
SAE viscosity Number 90, 80W

<Limited slip differential>

Hypoid gear oil MITSUBISHI Genuine Gear oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE90), SHELL-LSD (GL-5, SAE 80W-90) or equivalent [Quantity: 2.6 L]

AXLE ASSEMBLY

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REMOVAL AND INSTALLATION

Caution

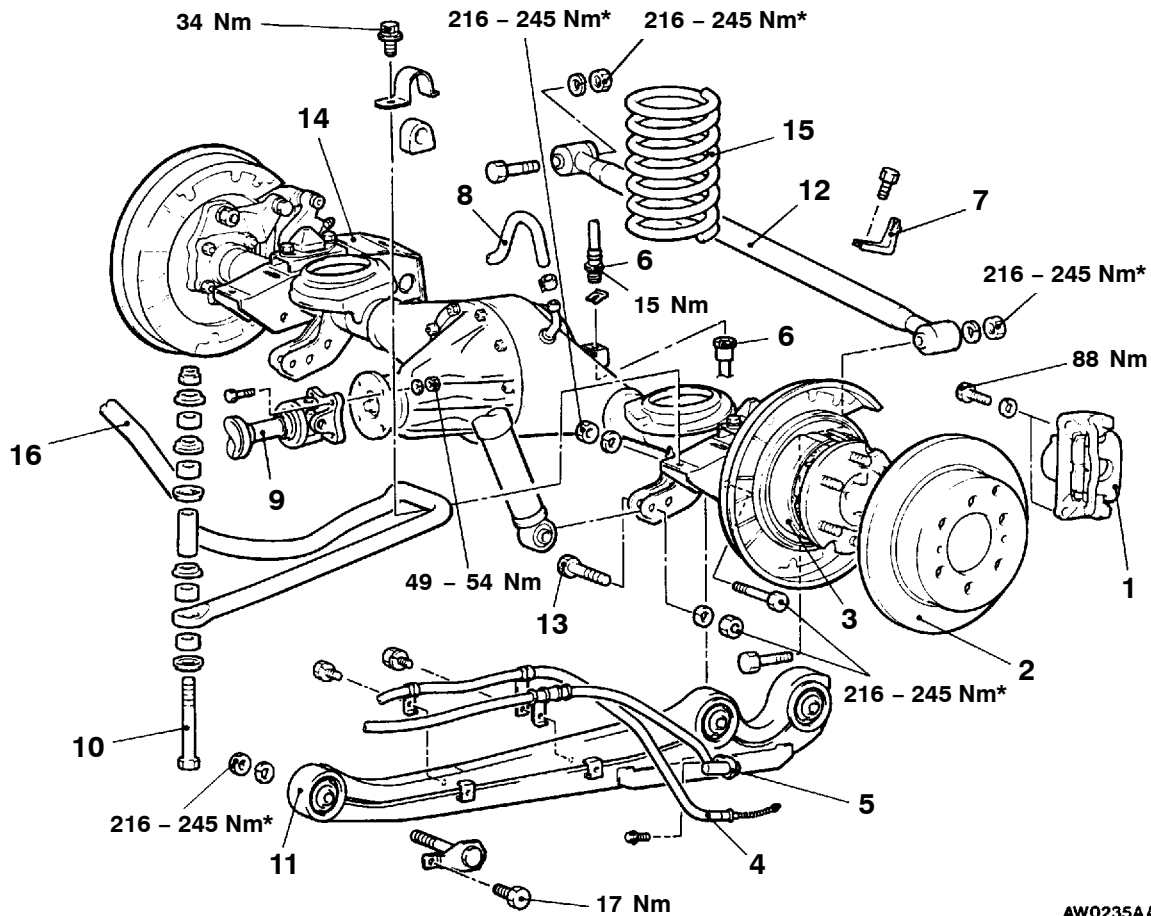
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in an unladen condition.

Pre-removal Operation

- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Filling and Air Bleeding (Refer to GROUP 35A – On-vehicle Service.)
- Parking Brake Lever Stroke Adjustment (Refer to GROUP 36 – On-vehicle Service.)



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Removal steps

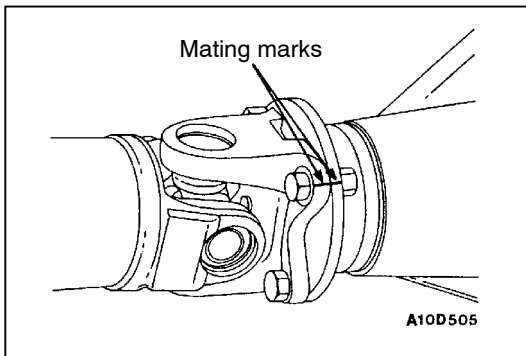


1. Caliper assembly
2. Break disc
3. Parking brake shoe assembly
(Refer to GROUP 36 – Parking Brake Drum)
4. Parking brake cable connection
5. Speed sensor connection
<Vehicles with ABS>
6. Brake hose and tube connection
7. Spring support
8. Breather hose



9. Propeller shaft
10. Stabilizer bar mounting bolt
• Support the axle assembly by a transmission jack.
11. Lower arm
12. Lateral rod
13. Shock absorber mounting bolt
(lower side only)
14. Axle assembly
15. Coil spring
16. Stabilizer bar





REMOVAL SERVICE POINTS

◀A▶ CALIPER ASSEMBLY REMOVAL

Secure the removed caliper assembly with wire to prevent it from falling off.

◀B▶ PROPELLER SHAFT REMOVAL

Place mating marks on the companion flange and flange yoke. Disconnect the propeller shaft from the companion flange.

Caution

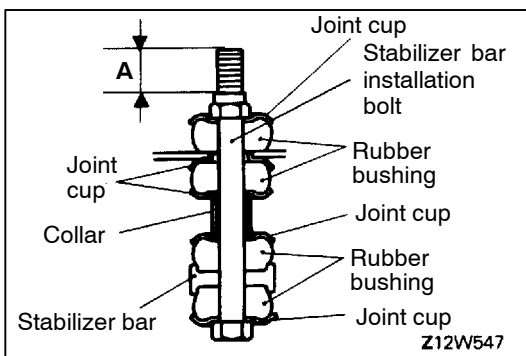
Suspend the propeller shaft from the body with wire, etc. to prevent it from falling.

◀C▶ AXLE ASSEMBLY REMOVAL

Take out the axle assembly from the rear of the vehicle.

Caution

Secure the axle assembly to the jack or equivalent. The axle assembly is heavy and unstable and may fall causing damage to the assembly, surrounding equipment, or injuring the installer.



INSTALLATION SERVICE POINTS

▶A◀ STABILIZER BAR MOUNTING BOLT INSTALLATION

When installing the stabilizer bar to the stabilizer bar bracket, check that the amount of projection of the stabilizer bar installation bolt is within the standard value range.

Standard value (A): 15–17 mm

▶B◀ PROPELLER SHAFT INSTALLATION

Align the mating marks on the flange yoke and the companion flange to install the propeller shaft.

AXLE SHAFT

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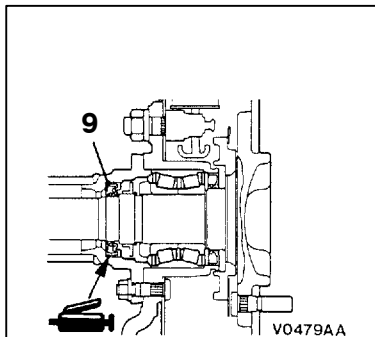
REMOVAL AND INSTALLATION

Pre-removal Operation

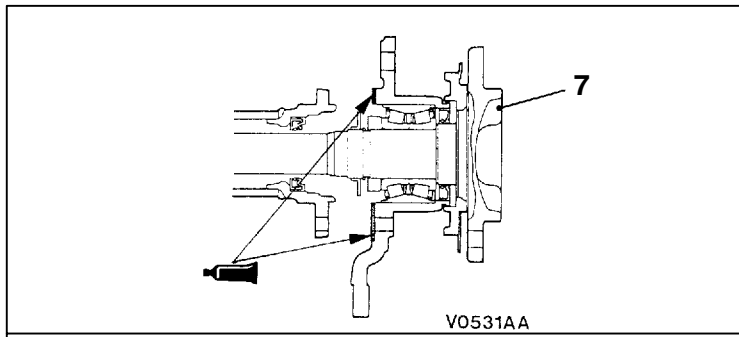
- Brake Fluid Draining

Post-installation Operation

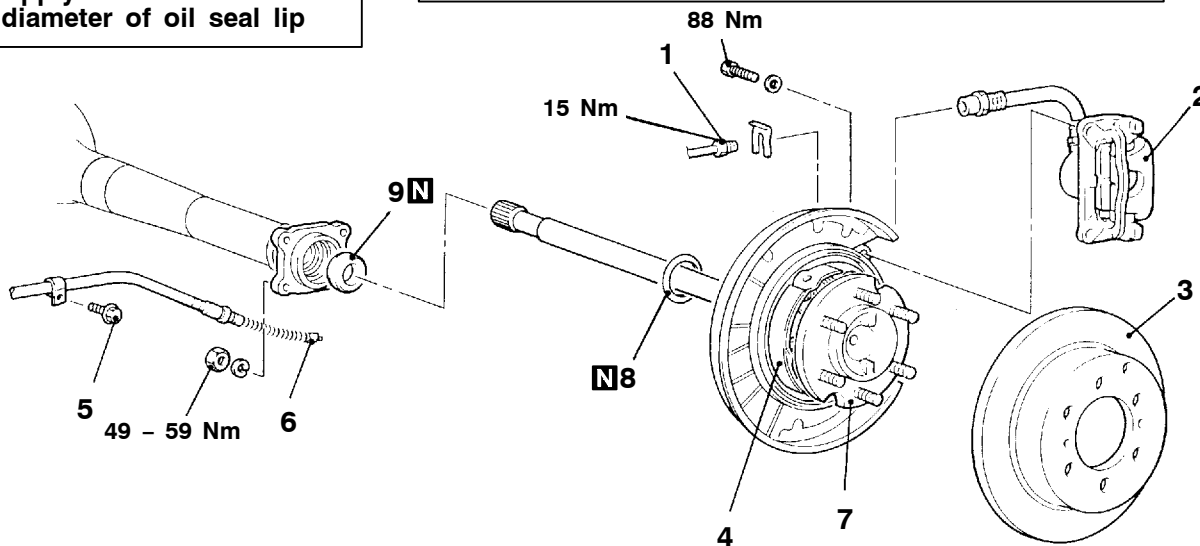
- Brake Fluid Supplying and Air Bleeding (Refer to GROUP 35A – On-vehicle Service.)
- Parking Brake Lever Stroke Adjustment (Refer to GROUP 36 – On-vehicle Service.)



Apply to entire inside diameter of oil seal lip



Sealant: 3M ATD Part No. 8663 or equivalent



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Removal steps



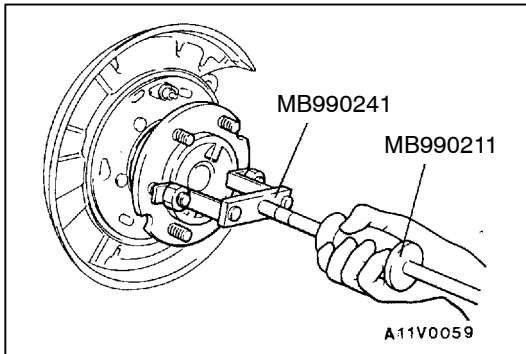
1. Brake tube
2. Caliper assembly
3. Brake disc
4. Parking brake shoe (Refer to Group 36 – Parking brake drum.)
5. Parking brake cable and speed sensor <vehicles with ABS> attaching bolt



6. Parking brake cable
7. Axle shaft assembly



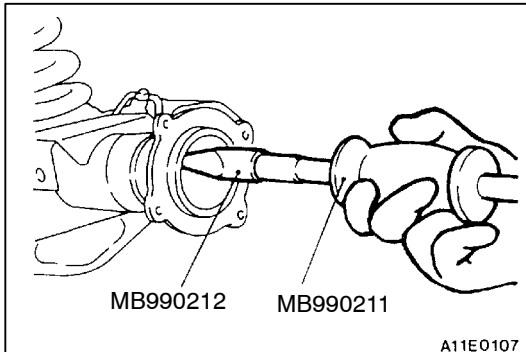
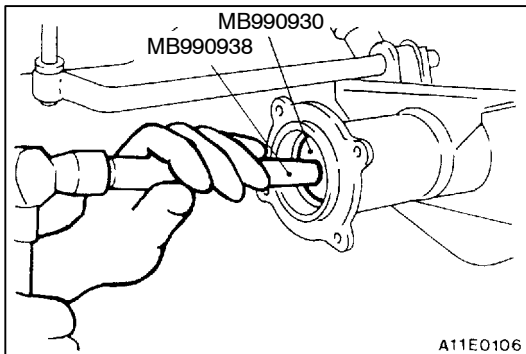
8. O-ring
9. Oil seal

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

Secure the removed caliper assembly with wire to prevent it from falling off.

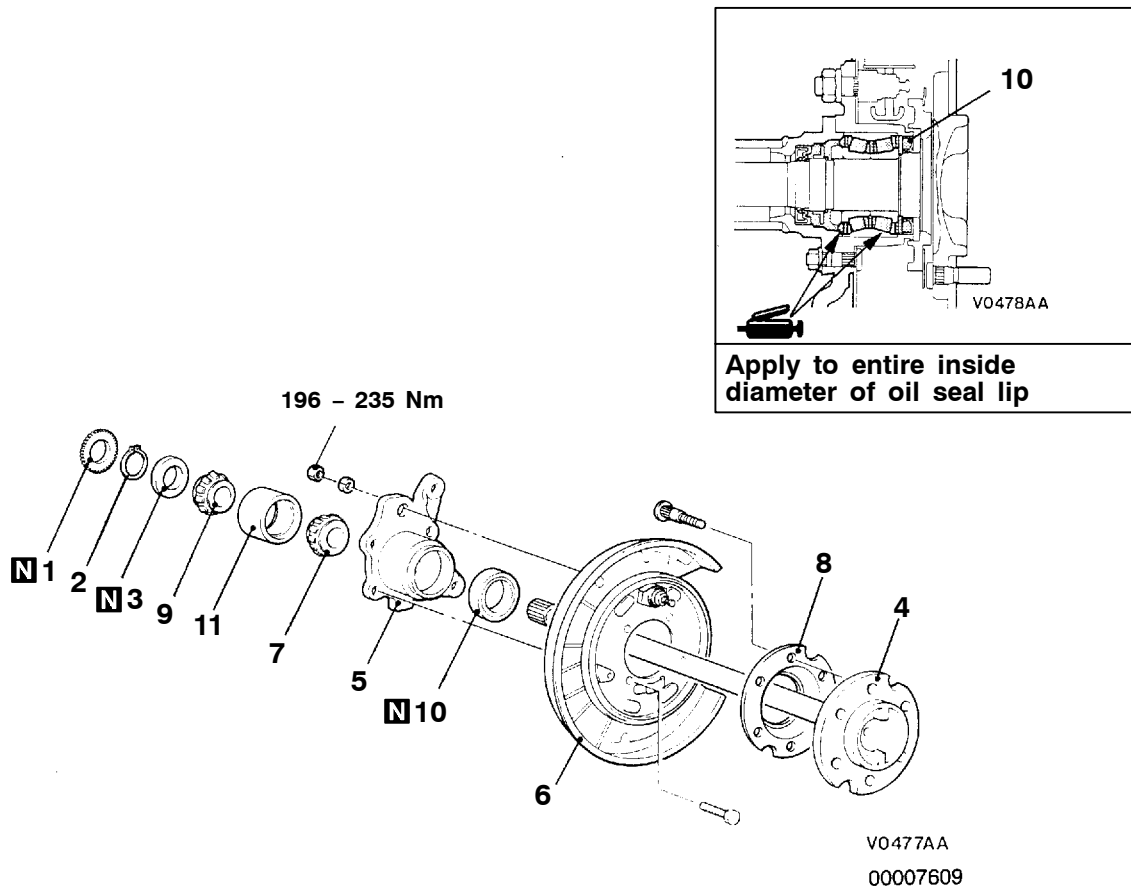
◀B▶ AXLE SHAFT ASSEMBLY REMOVAL**Caution**

Be careful not to damage the oil seal when pulling axle shaft.

**◀C▶ OIL SEAL REMOVAL****INSTALLATION SERVICE POINT****▶A◀ OIL SEAL INSTALLATION**

DISASSEMBLY AND REASSEMBLY

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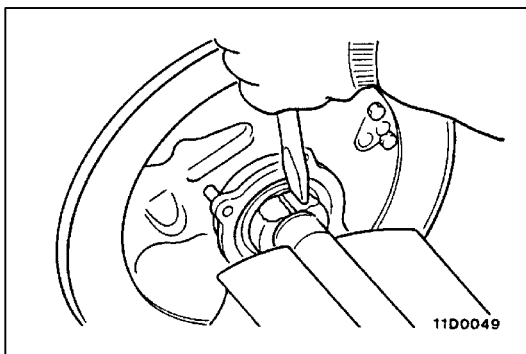
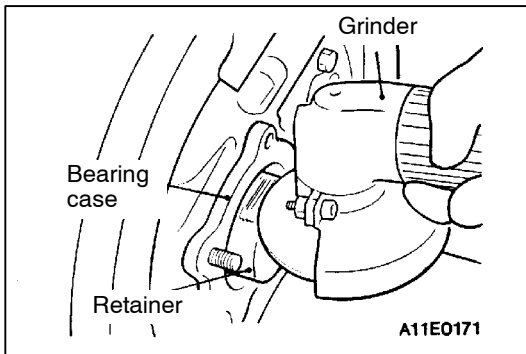
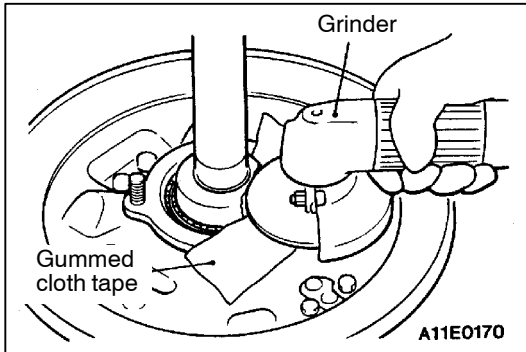
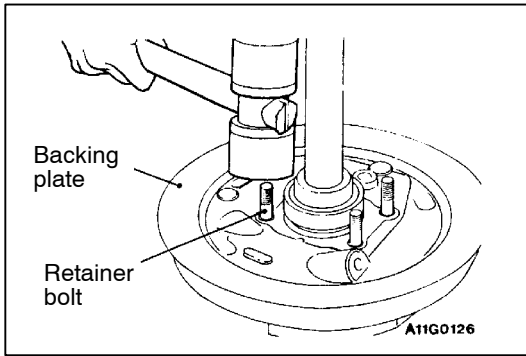
Disassembly steps

1. ABS rotor <vehicles with ABS>
2. Snap ring
3. Retainer ring
4. Axle shaft
5. Bearing case
6. Backing plate
7. Outer bearing inner race
8. Dust cover
9. Inner bearing inner race
10. Oil seal
11. Bearing outer race



Reassembly steps

- ▶▶ A ◀◀ 11. Bearing outer race
- ▶▶ B ◀◀ 9. Inner bearing inner race
- ▶▶ B ◀◀ 7. Outer bearing inner race
- ▶▶ C ◀◀ 10. Oil seal
8. Dust cover
6. Backing plate
5. Bearing case
4. Axle shaft
- ▶▶ D ◀◀ 3. Retainer ring
- ▶▶ E ◀◀ 2. Snap ring
- ▶▶ F ◀◀ 1. ABS rotor <vehicles with ABS>



DISASSEMBLY SERVICE POINTS

◀A▶ RETAINER RING REMOVAL

1. Remove one retainer bolt from the backing plate.

2. Apply gummed cloth tape around the edge of the bearing case for protection.

3. As shown in the figure, hold the axle shaft. Using a grinder, shave off a point of its circumference locally until the wall thickness becomes as follows:

- 1.0 – 1.5 mm for axle shaft side
- 2.0 mm for bearing side

Caution

Be careful not to damage the bearing case and the axle shaft.

4. Fix the axle shaft and shave off the remaining 2.0 mm on the side of the retainer bearing.

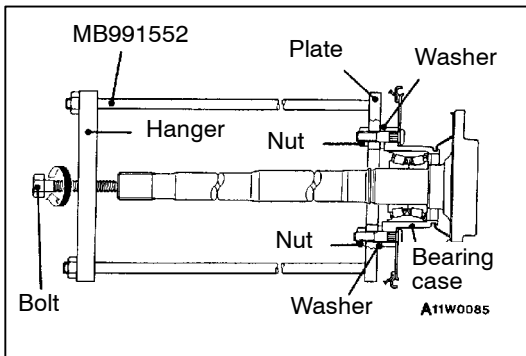
Caution

Be careful not to damage the bearing case and the axle shaft.

5. Cut in with a chisel the place where the retainer ring has been shaven and remove the retainer ring.

Caution

Be careful not to damage the axle shaft.



◀B▶ AXLE SHAFT REMOVAL

1. Secure special tool to the bearing case bolts with the nuts and adjust the height of the hanger. Then install the washers, plate and nuts in that order.

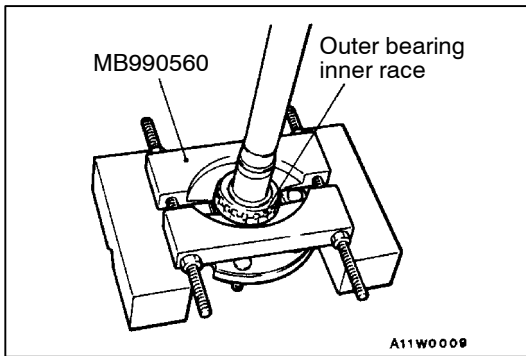
NOTE

The washers are used to eliminate the difference in height of the bearing case so that the plate and the bearing case are parallel.

2. Place the end of the bolt against the center of the axle shaft, and then tighten the nut to remove the axle shaft from the bearing case assembly.

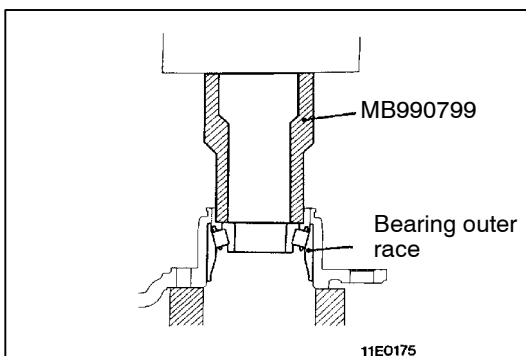
Caution

The hanger and plate should be placed so that they are parallel.



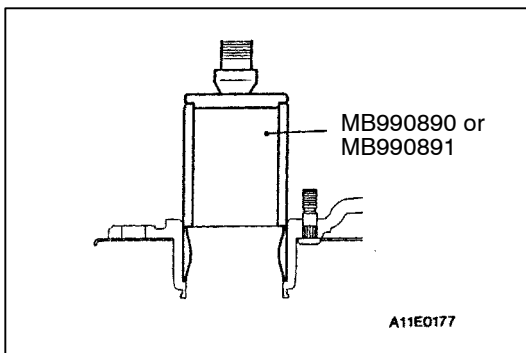
◀C▶ OUTER BEARING INNER RACE REMOVAL

Install special tool as shown in the illustration, and then use a press to remove the outer bearing inner race from the axle shaft.



◀D▶ BEARING OUTER RACE REMOVAL

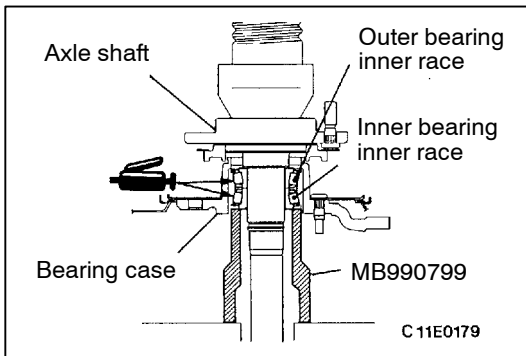
Reinstall the outer bearing inner race that was removed previously, and then use special tool and a press to remove the outer bearing outer race.



REASSEMBLY SERVICE POINTS

▶A▶ BEARING OUTER RACE INSTALLATION

Use special tool to press-fit the bearing outer race to the bearing case.

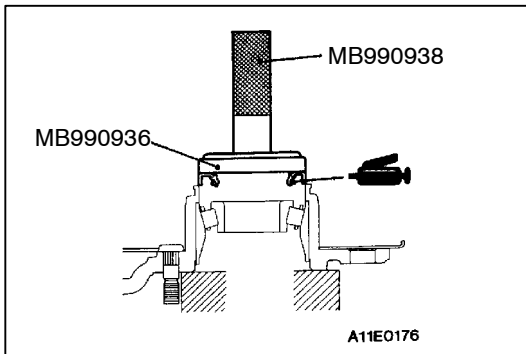


►B◄ INNER BEARING INNER RACE/OUTER BEARING INNER RACE INSTALLATION

1. Apply multipurpose grease to the roller surface and ends of the bearing.
2. Pass the axle shaft through the bearing case and the inner bearing inner race and outer bearing inner race.
3. Use special tool to press-fit the inner bearing inner race and outer bearing inner race to the axle shaft.

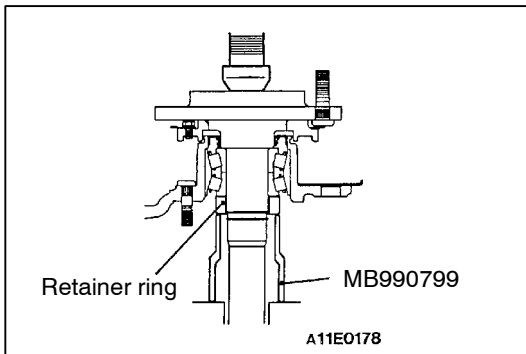
Caution

Both bearing inner race, outer race sets should be press-fitted together.



►C◄ OIL SEAL INSTALLATION

1. Apply multipurpose grease to the outside of the oil seal.
2. Use special tools to press-fit the oil seal into the bearing case until it is flush with the face of the bearing case.
3. Apply multipurpose grease to the lips of the oil seal.

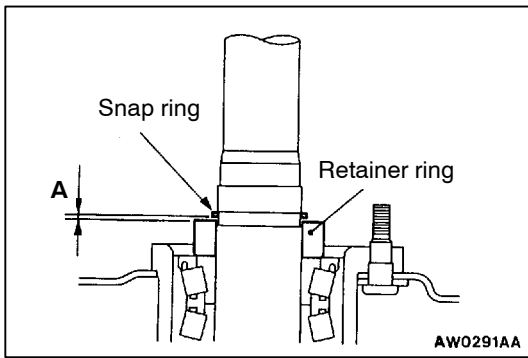


►D◄ RETAINER RING INSTALLATION

Use special tool to press-fit the retainer ring to the axle shaft. Check that the press-fitting force is at the standard value. If the initial press-fitting force is less than the standard value, replace the axle shaft.

Standard value:

Initial press-fitting force N	49,000 or more
Final press-fitting force N	98,000 – 108,000



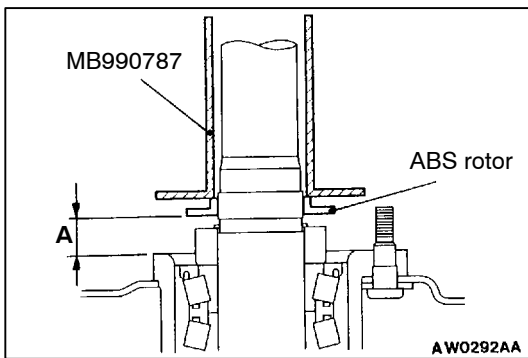
►E◄ SNAP RING INSTALLATION

1. After installing the snap ring, measure clearance (A) between the snap ring and the retainer ring with a thickness gauge, and check that it is within the standard value.

Standard value (A): 0 – 0.166 mm

2. If the clearance exceeds the standard value, change the snap ring so that the clearance is at the standard value.

Thickness of snap ring mm	Identification color
2.17	–
2.01	Yellow
1.85	Blue
1.69	Purple
1.53	Red



►F◄ ABS ROTOR INSTALLATION

Use special tool to press-fit the ABS rotor so that the distance (A) to the bearing case is at the standard value.

Standard value (A): 19.4 – 20.0 mm

INSPECTION

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- Check the dust cover for deformation and damage.
- Check the inner and outer bearings for seizure, discoloration and rough raceway surface.
- Check the axle shaft for cracks, wear and damage.

DIFFERENTIAL CARRIER

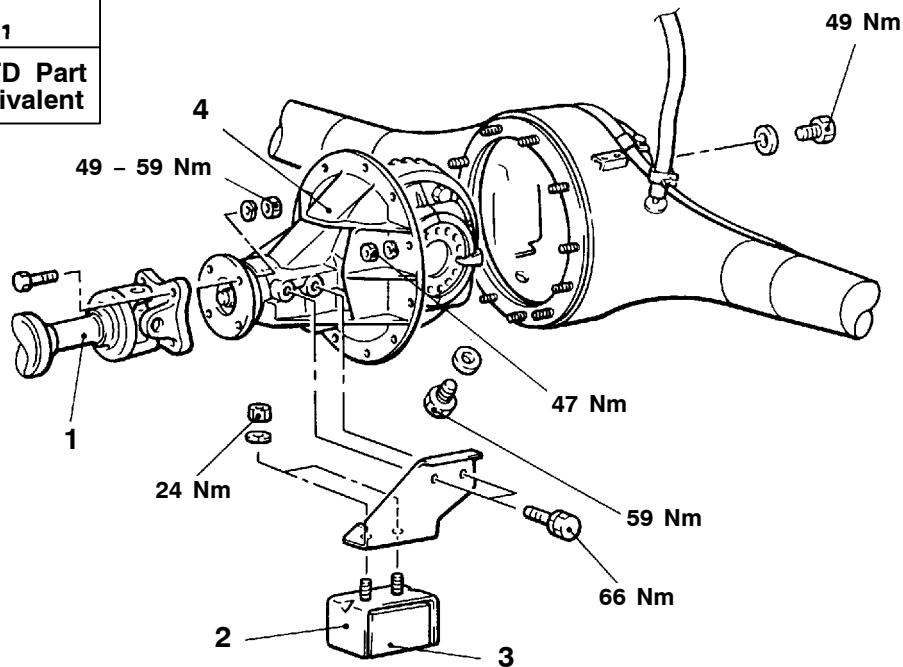
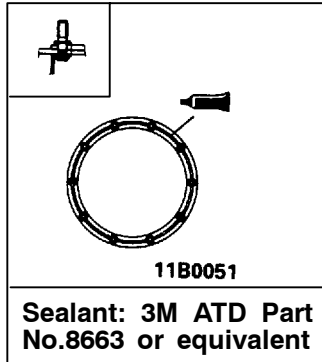
REMOVAL AND INSTALLATION

Pre-removal Operation

- Differential Gear Oil Draining
- Axle Shaft Assembly Removal (Refer to P.27-11.)

Post-installation Operation

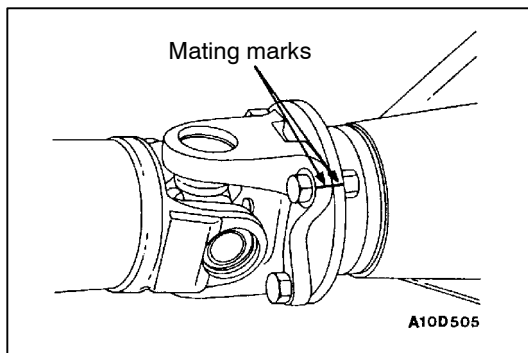
- Axle Shaft Assembly Installation (Refer to P.27-11.)
- Differential Gear Oil Filling (Refer to P.27-8.)



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Removal steps

- ◀A▶ ▶A◀ 1. Propeller shaft connection
- 2. Bracket <4D5>
- 3. Dynamic damper <4D5>
- ◀B▶ 4. Differential carrier assembly



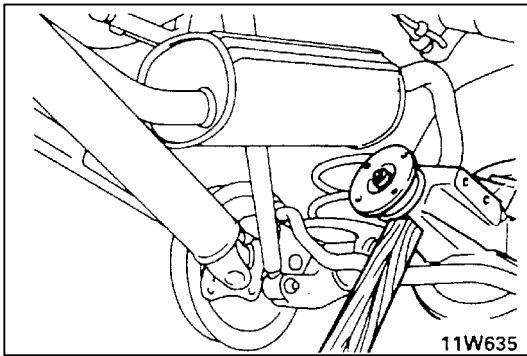
REMOVAL SERVICE POINTS

◀A▶ PROPELLER SHAFT REMOVAL

Make the mating marks on the flange yoke of the propeller shaft and the companion flange of the differential case.

Caution

Suspend the propeller shaft from the body with wire, etc.



◀B▶ DIFFERENTIAL CARRIER REMOVAL

Remove the attaching nuts and strike the lower part of differential carrier assembly with a piece of timber several times to loosen, then remove the assembly.

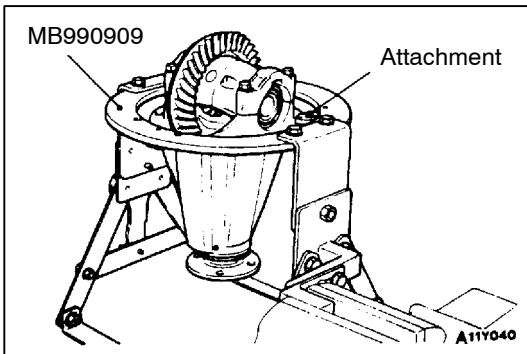
Caution

Use care not to strike the companion flange.

INSTALLATION SERVICE POINT

▶A◀ PROPELLER SHAFT INSTALLATION

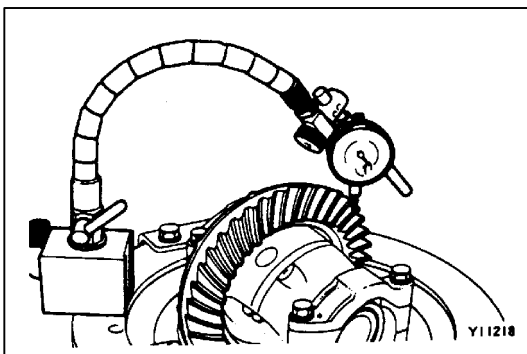
Align the mating marks on the flange yoke and the companion flange to install the propeller shaft.



INSPECTION BEFORE DISASSEMBLY

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Secure the special tool with a vice and install the differential carrier assembly with the attachment. Then carry out the following inspection.

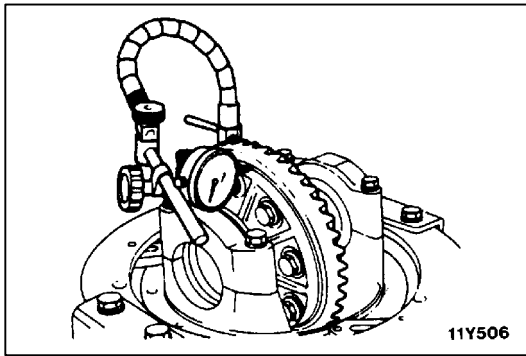


DRIVE GEAR BACKLASH

1. Place a dial gauge against the end of a drive gear tooth and secure the drive pinion. Then turn the drive gear and take measurements at four places or more to check the backlash.

Standard value: 0.13 – 0.18 mm

2. If the backlash is not within the standard value, replace the side bearing spacer, and then check the drive gear tooth contact.

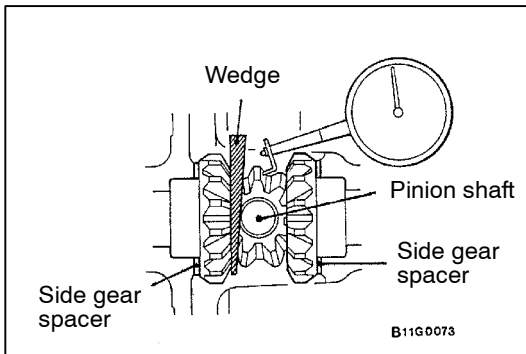


DRIVE GEAR RUNOUT

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

Limit: 0.05 mm

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



DIFFERENTIAL GEAR BACKLASH

1. Tap in a wooden wedge between the side gear and the pinion shaft and secure one side gear. Then place a dial gauge (with the measuring probe extended) against the pinion gear and measure the backlash.

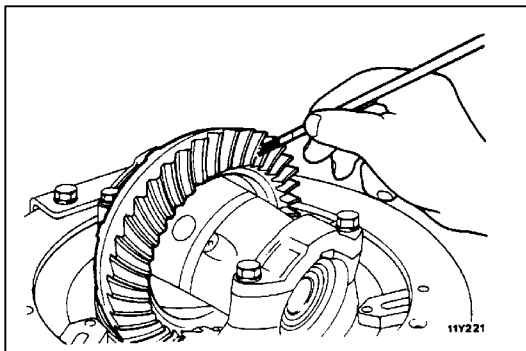
Standard value: 0 – 0.076 mm

NOTE

Check the other pinion gear by the same procedure.

Limit: 0.2 mm

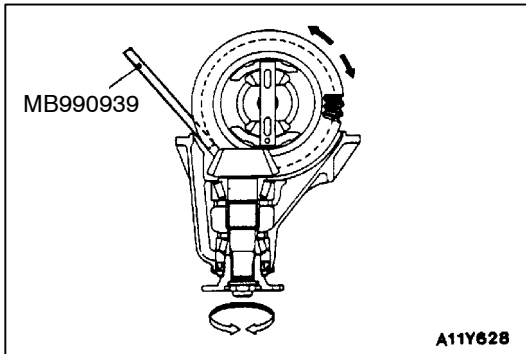
2. If the backlash exceeds the limit, replace the side gear spacers. (Refer to P.27-30.)
3. If adjustment is not possible, replace the side gears and pinion gears as a set.



DRIVE GEAR TOOTH CONTACT

Check the drive gear tooth contact by the following steps.

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

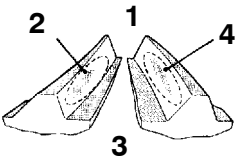
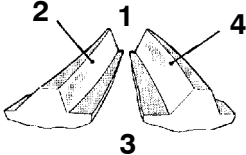
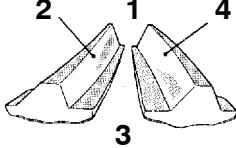
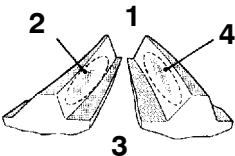
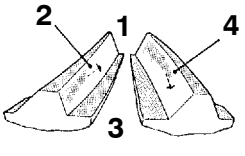
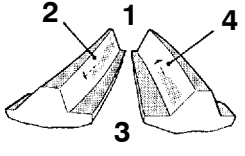


2. Insert a brass rod between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear, so that the revolution torque (approximately 2.5 – 3.0 Nm) is 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 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 pinion height adjusting 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>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 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 pinion height adjusting 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

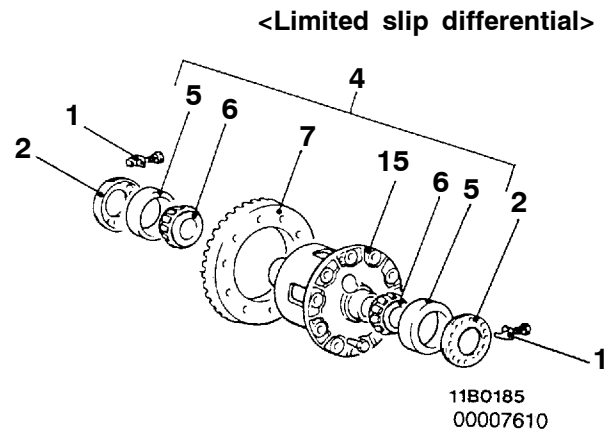
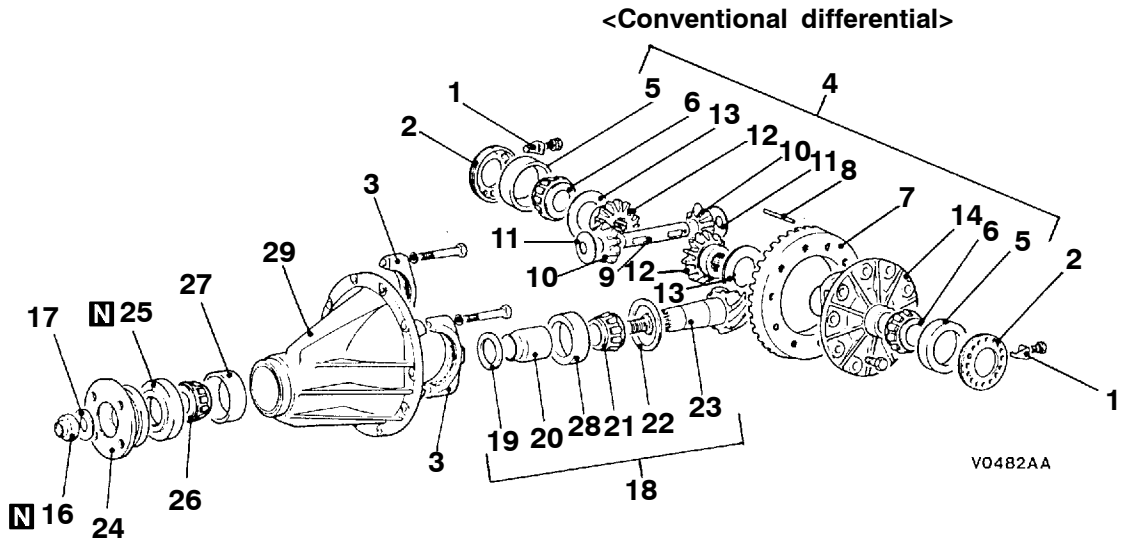
Checking the tooth contact pattern is the way to confirm that the adjustments of the pinion height and backlash have been done properly. Continue to adjust the pinion height and backlash until the tooth contact pattern resembles the standard pattern.

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.

DISASSEMBLY

Caution

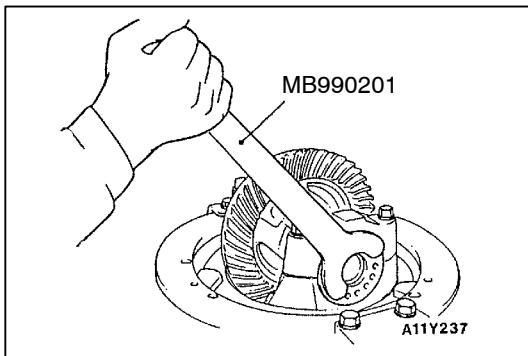
*: Do not disassemble the limited slip differential case assembly.



Disassembly steps

- Inspection before disassembly (P.27-20.)

- | | | | |
|--|--|--|--|
| <p>◀A▶</p> <p>◀B▶</p> <p>◀C▶</p> <p>◀D▶</p> <p>◀E▶</p> | <p>1. Lock plate</p> <p>2. Side bearing nut</p> <p>3. Bearing cap</p> <p>4. Differential case assembly</p> <p>5. Side bearing outer race</p> <p>6. Side bearing inner race</p> <p>7. Drive gear</p> <p>8. Lock pin</p> <p>9. Pinion shaft</p> <p>10. Pinion gear</p> <p>11. Pinion washer</p> <p>12. Side gear</p> <p>13. Side gear thrust spacer</p> <p>14. Differential case</p> <p>15. Limited slip differential case assembly*</p> | <p>◀F▶</p> <p>◀G▶</p> <p>◀H▶</p> <p>◀I▶</p> <p>◀J▶</p> | <p>16. Self-locking nut</p> <p>17. Washer</p> <p>18. Drive pinion assembly</p> <p>19. Drive pinion front shim (For adjusting preload of drive pinion)</p> <p>20. Drive pinion spacer</p> <p>21. Drive pinion rear bearing inner race</p> <p>22. Drive pinion rear shim (For adjusting drive pinion height)</p> <p>23. Drive pinion</p> <p>24. Companion flange</p> <p>25. Oil seal</p> <p>26. Drive pinion front bearing inner race</p> <p>27. Drive pinion front bearing outer race</p> <p>28. Drive pinion rear bearing outer race</p> <p>29. Differential carrier</p> |
|--|--|--|--|



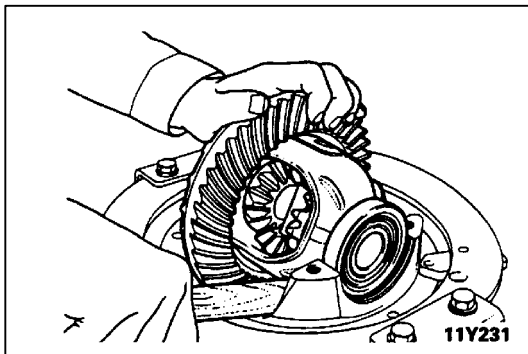
DISASSEMBLY SERVICE POINTS

◀A▶ SIDE BEARING NUT REMOVAL

Use special tool to remove the side bearing nut.

NOTE

Keep the right and left side bearings and side bearing nuts separate, so that they do not become mixed at the time of assembly.



◀B▶ DIFFERENTIAL CASE ASSEMBLY REMOVAL

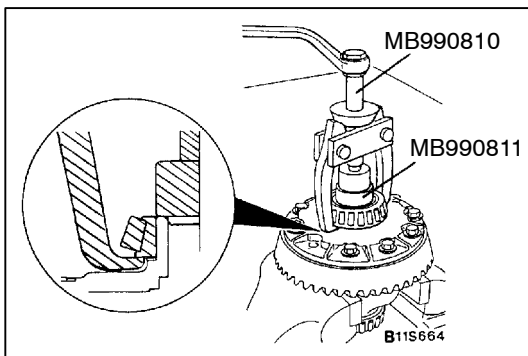
Use the handle of a hammer to remove the differential case assembly.

Caution

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

NOTE

Keep the right and left side bearings and side bearing outer race separate, so that they do not become mixed at the time of assembly.

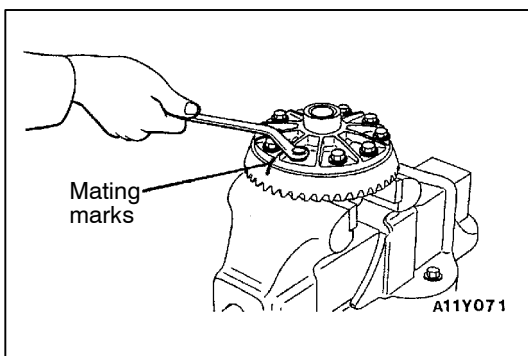


◀C▶ SIDE BEARING INNER RACE REMOVAL

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

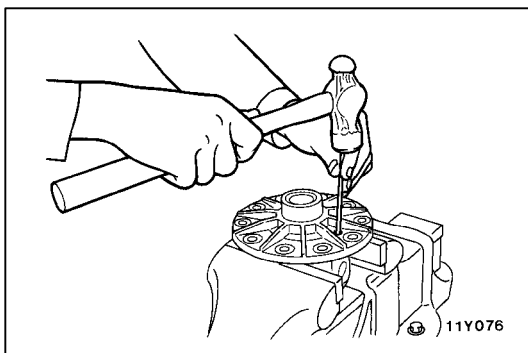
NOTE

Attach the prongs of special tools to the inner race of the side bearing through the openings in the differential case.



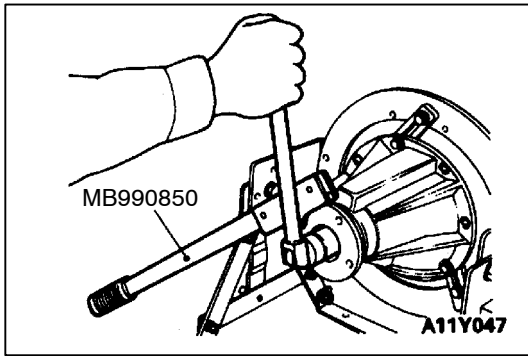
◀D▶ DRIVE GEAR REMOVAL

1. Make 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.



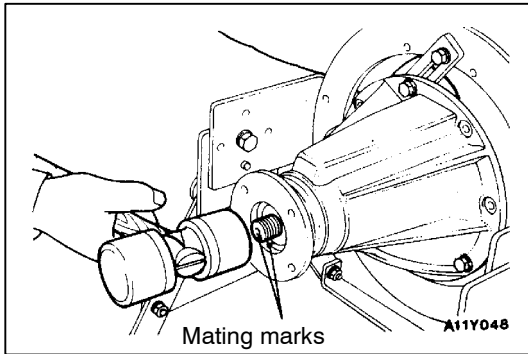
◀E▶ LOCK PIN REMOVAL

Drive out the lock pin with a punch.



◀F▶ SELF-LOCKING NUT REMOVAL

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



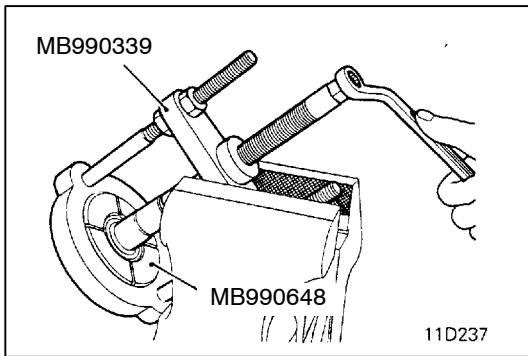
◀G▶ DRIVE PINION ASSEMBLY REMOVAL

1. Make the mating marks to the drive pinion and companion flange.

Caution

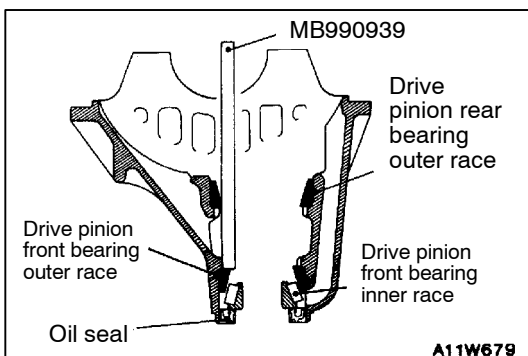
Do not make mating marks on the contact surfaces of the companion flange and propeller shaft.

2. Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.



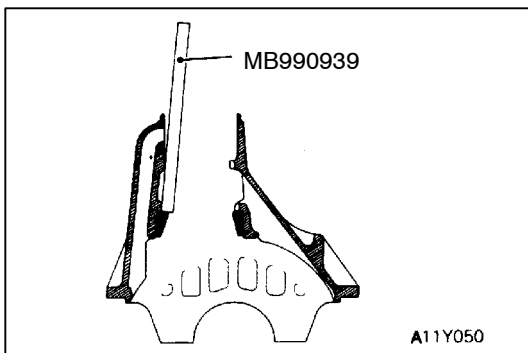
◀H▶ DRIVE PINION REAR BEARING INNER RACE REMOVAL

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



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

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

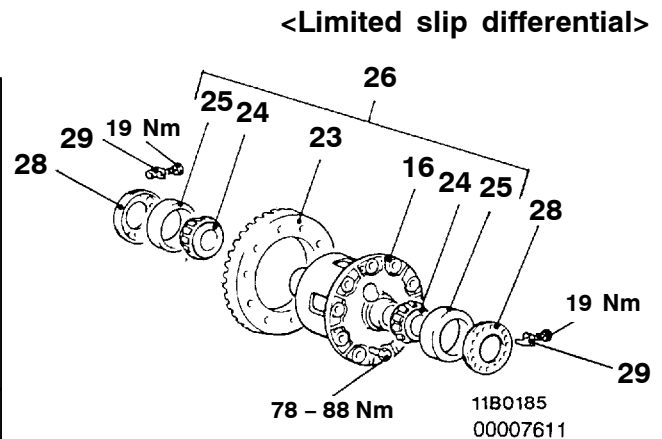
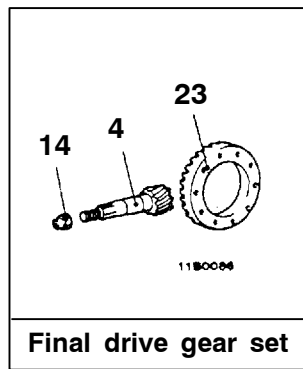
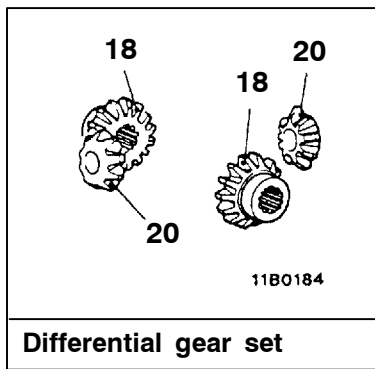
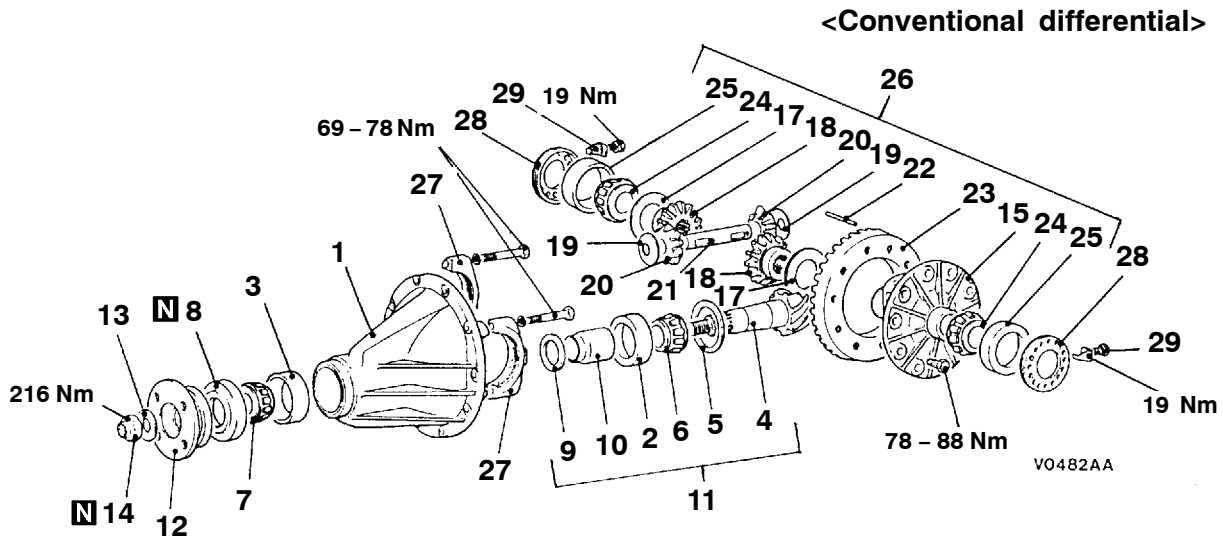


◀J▶ DRIVE PINION REAR BEARING OUTER RACE REMOVAL

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

REASSEMBLY

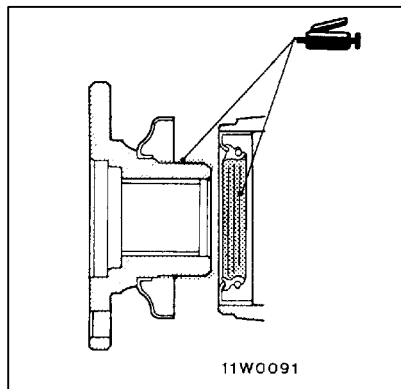
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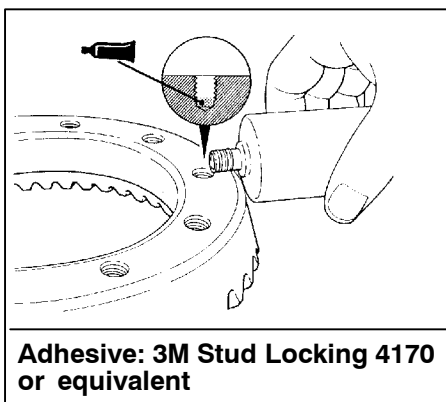
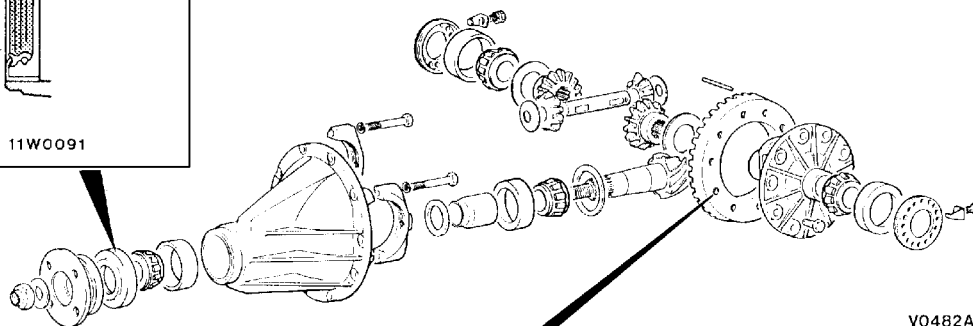
Reassembly steps

- ▶A◀ 1. Differential carrier
- ▶B◀ 2. Drive pinion rear bearing outer race
- ▶B◀ 3. Drive pinion front bearing outer race
- ▶C◀
 - Drive pinion height adjustment
- 4. Drive pinion
- 5. Drive pinion rear shim (For adjusting drive pinion height)
- ▶D◀ 6. Drive pinion rear bearing inner race
- ▶D◀
 - Drive pinion turning torque adjustment
- 7. Drive pinion front bearing inner race
- 8. Oil seal
- 9. Drive pinion front shim (For adjusting drive pinion preload)
- 10. Drive pinion spacer
- 11. Drive pinion assembly
- 12. Companion flange
- 13. Washer
- 14. Self-locking nut
- 15. Differential case
- 16. Limited slip differential case assembly
- 17. Side gear thrust spacer
- 18. Side gear
- 19. Pinion washer
- 20. Pinion gear
- ▶E◀
 - Differential gear backlash adjustment
- 21. Pinion shaft
- ▶F◀ 22. Lock pin
- ▶G◀ 23. Drive gear
- ▶H◀ 24. Side bearing inner race
- ▶H◀ 25. Side bearing outer race
- 26. Differential case assembly
- ▶I◀ 27. Bearing cap
- ▶J◀
 - Final drive gear backlash adjustment
- 28. Side bearing nut
- 29. Lock plate

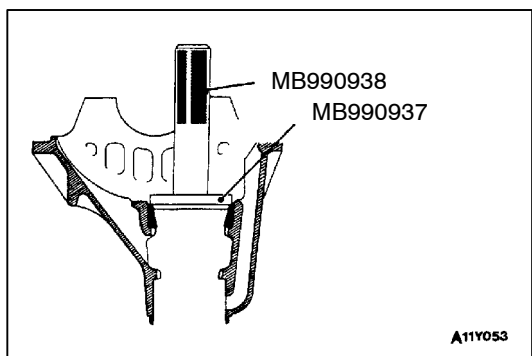
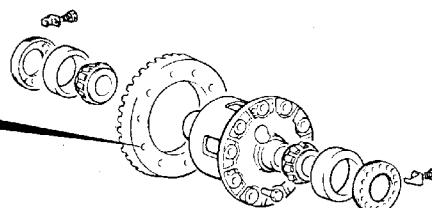
Lubrication and Adhesive Points



<Conventional differential>

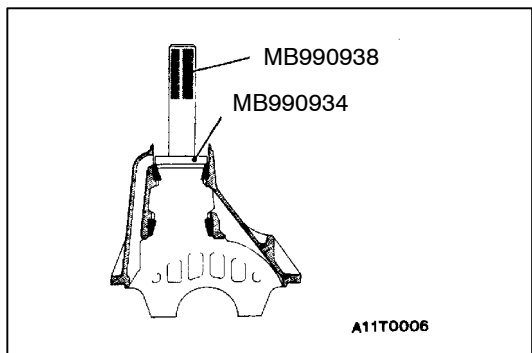


<Limited slip differential>

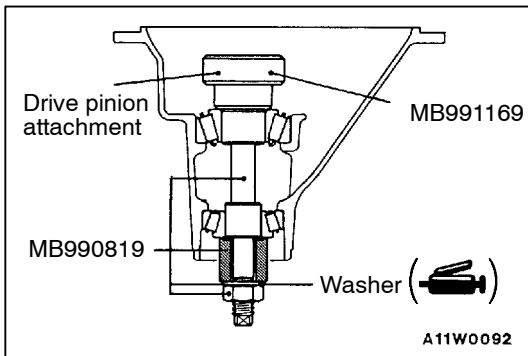


REASSEMBLY SERVICE POINTS

▶A◀ DRIVE PINION REAR BEARING OUTER RACE PRESS-FITTING



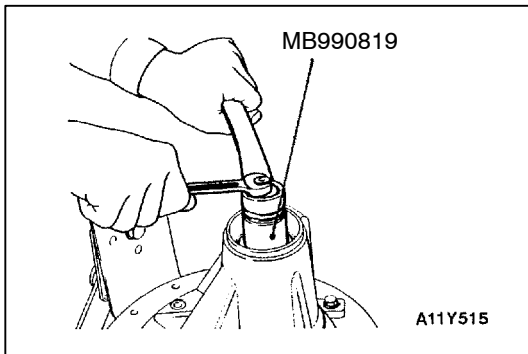
▶B◀ DRIVE PINION FRONT BEARING OUTER RACE PRESS-FITTING



►C◄ DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedures:

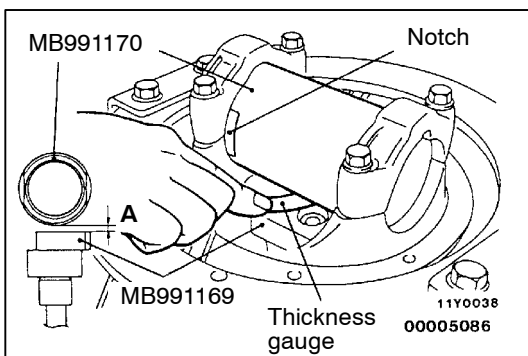
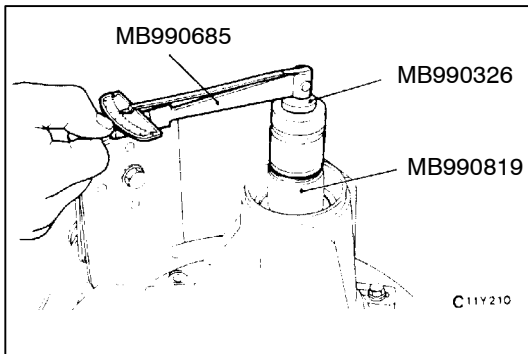
1. Apply multipurpose grease to the washer of special tool.
2. Install special tool and drive pinion front and rear bearing inner races to the gear carrier in the sequence shown in the illustration.



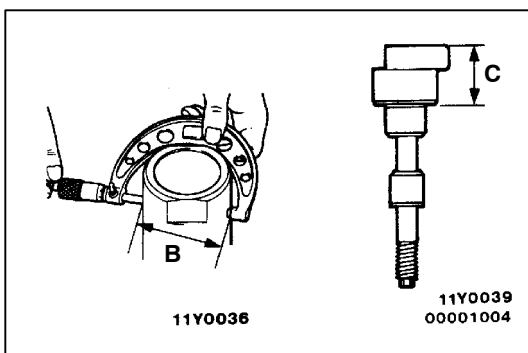
3. Tighten the nut of special tool a little at a time while measuring the turning torque of the drive pinion. Then confirm the turning torque is at the standard value.

Standard value:

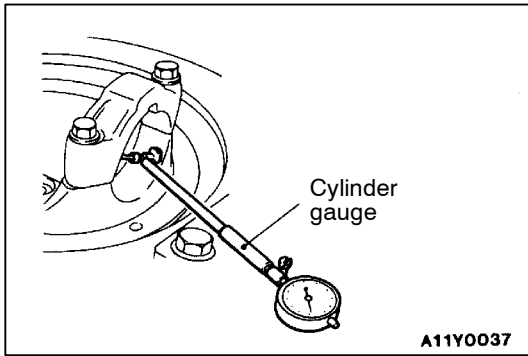
Bearing type	Bearing lubrication	Turning torque
New	None (with anti-rust agent)	0.59 – 0.88 Nm
New or reuse	Gear oil applied	0.39 – 0.49 Nm



4. Clean the side bearing hub.
5. Place 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 special tools.



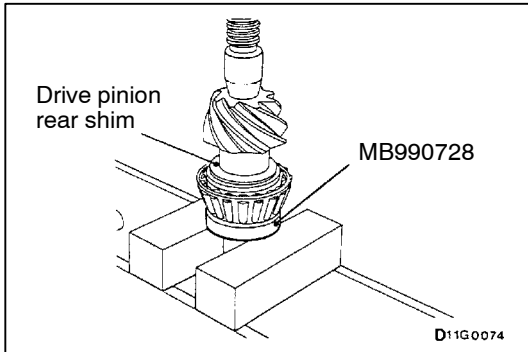
7. Remove special tools (MB991170, MB991169).
8. Use a micrometer to measure the shown dimensions (B, C) of special tools.



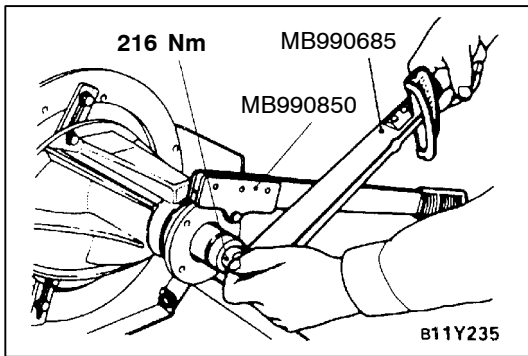
9. Install the bearing cap, and then use a cylinder gauge to measure inside diameter (D) of the bearing cap.
10. Calculate thickness (F) of the required drive pinion rear shim twice by the following formula. Select a shim which most closely matches this thickness.

$$F = A + B + C - 1/2D - E$$

E: 115.00 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 special tool.



►D◄ DRIVE PINION TURNING TORQUE ADJUSTMENT

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.

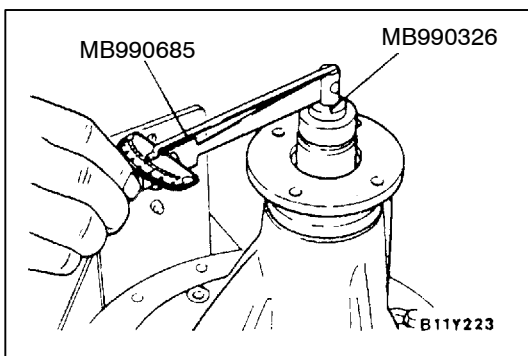
2. Tighten the companion flange to the specified torque by using special tool.

Tightening torque: 216 Nm

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

Standard value:

Bearing division	Bearing lubrication	Turning torque
New	None (with anti-rust agent)	0.59 – 0.88 Nm
New or reuse	Gear oil applied	0.39 – 0.49 Nm

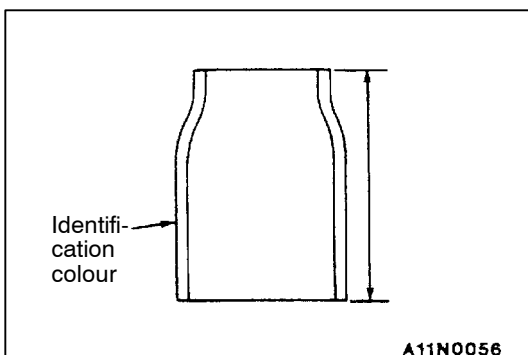


4. If the drive pinion turning torque is not within the standard value, adjust the turning torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

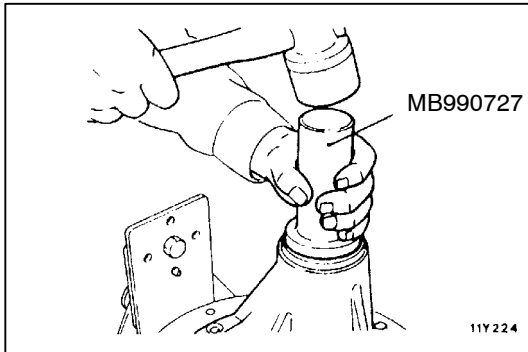
NOTE

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.

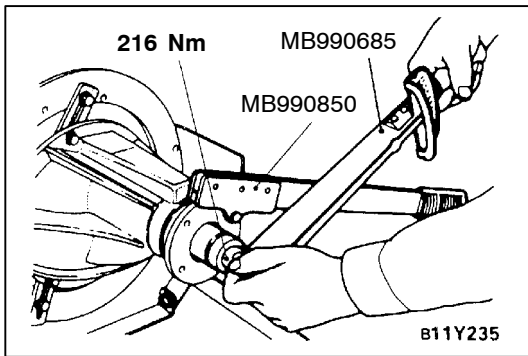
Also, select the drive pinion spacer from the following two types.



Height of drive pinion spacer mm	Identification colour
56.67	–
57.01	White

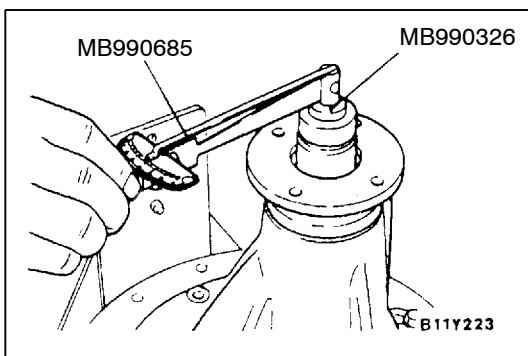


- Remove the companion flange and drive pinion again. Then insert the drive pinion front bearing inner race into the gear carrier. Use special tool to press-fit the oil seal.



- 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 special tool.

Tightening torque: 216 Nm

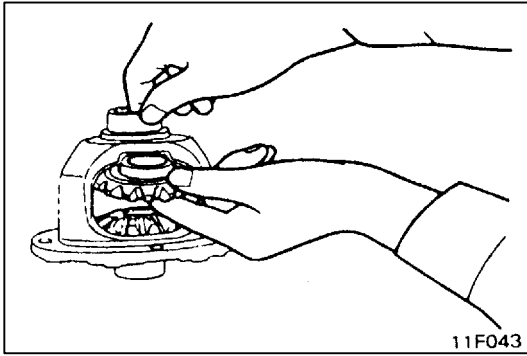


- Measure the drive pinion turning torque (with oil seal) to verify that the drive pinion turning torque complies with the standard value.

Standard value:

Bearing division	Bearing lubrication	Turning torque
New	None (with anti-rust agent)	0.83 – 1.13 Nm
New or reusing	Gear oil applied	0.64 – 0.74 Nm

- 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.



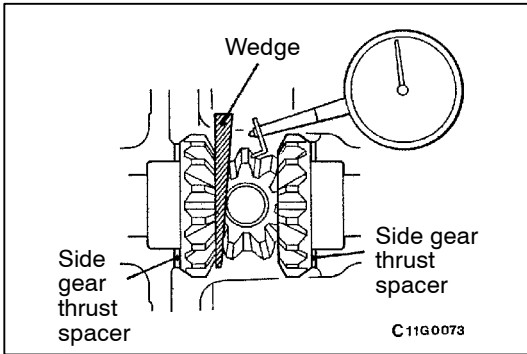
►E◄ DIFFERENTIAL GEAR BACKLASH ADJUSTMENT

Adjust the differential gear backlash by the following procedure.

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

NOTE

Do not assemble the thrust block and lock pin yet.



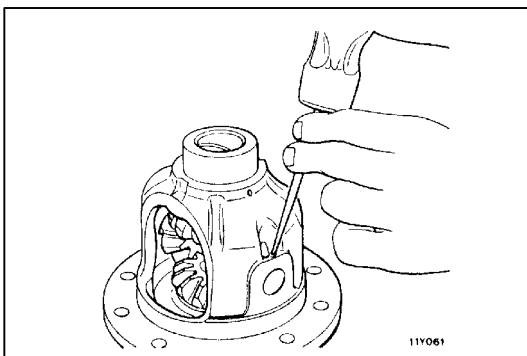
3. Insert a wedge between the side gear and the pinion shaft to lock the side gear.
4. While locking the side gear with the wedge, measure the differential gear backlash with a dial indicator on the pinion gear.

Standard value: 0 – 0.076 mm

Measure by the same procedure for the other pinion gear.

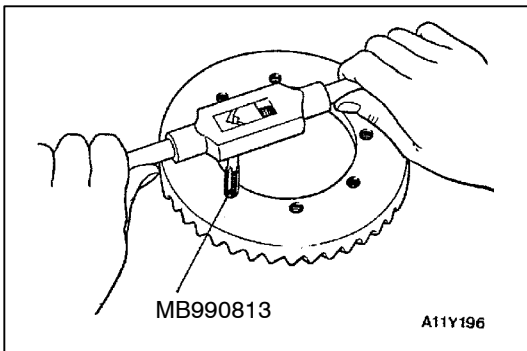
Limit: 0.2 mm

5. If the backlash exceeds the limit value, replace side bearing adjustment spacers.
6. If adjustment is not possible, replace the side gears and pinion gears as a set.
7. Check that the backlash is within the limit value and that the differential gear turns smoothly.



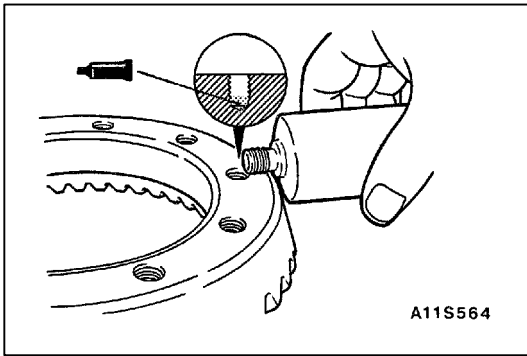
►F◄ LOCK PIN INSTALLATION

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 on both sides.



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

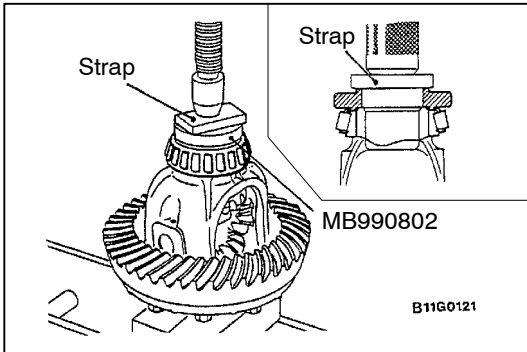


3. Apply the specified adhesive to the threaded holes of the drive gear.

Specified adhesive:
3M Stud Locking 4170 or equivalent

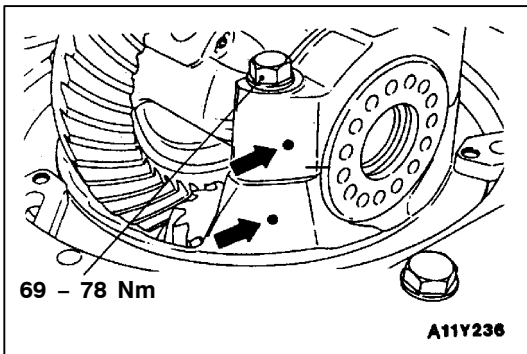
4. Install the drive gear onto the differential case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.

Tightening torque: 78 – 88 Nm



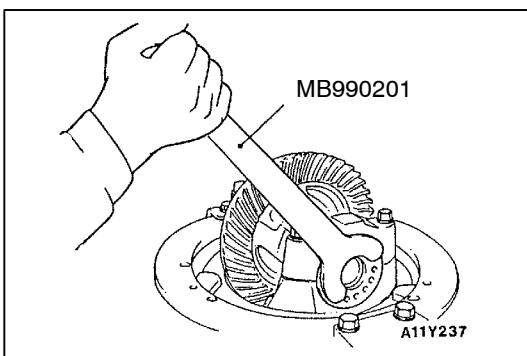
►H◄ SIDE BEARING INNER RACE INSTALLATION

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



►I◄ BEARING CAP INSTALLATION

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



►J◄ FINAL DRIVE GEAR BACKLASH ADJUSTMENT

Adjust drive gear backlash as follows:

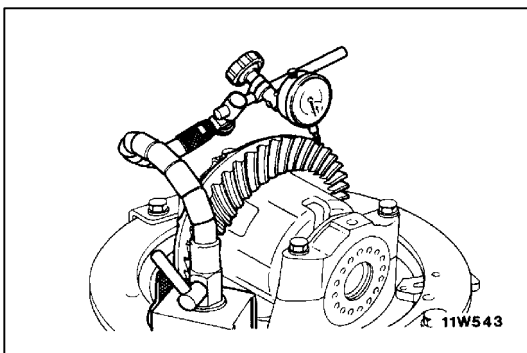
1. Using special tool, temporarily tighten the side bearing nut to just before preloading of the side bearing.

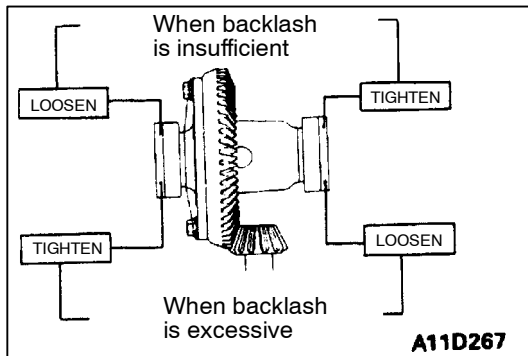
2. Measure the drive gear backlash.

NOTE

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

Standard value: 0.13 – 0.18 mm

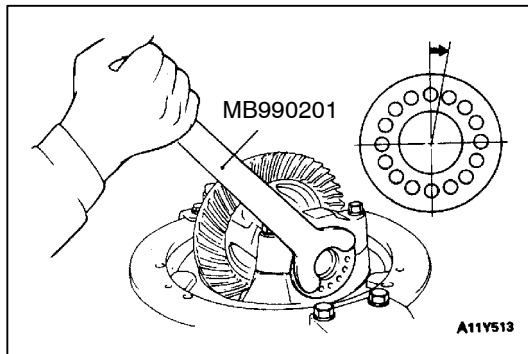




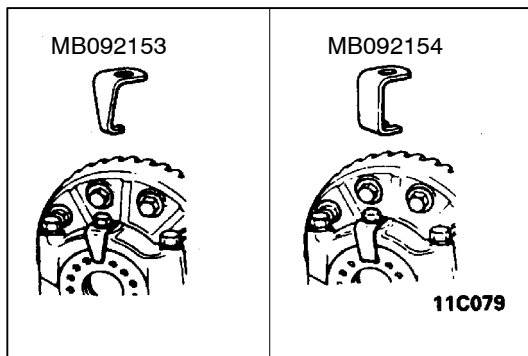
- Using special tool (MB990201), adjust the backlash to standard value by moving the side bearing nut as shown.

NOTE

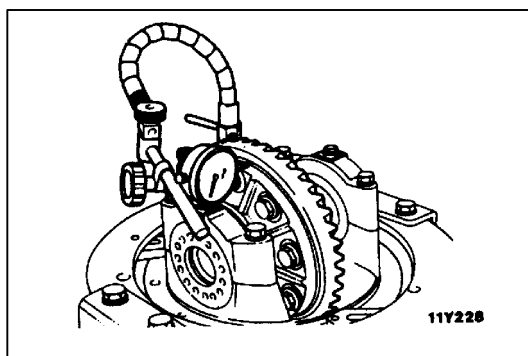
First loosen the side bearing nut then tighten the side bearing nut the same amount as when it was loosened.



- Using special tool, to apply the preload, turn down both right and left side bearing nuts on half the distance between centers of two neighboring holes.



- Choose and install the lock plate (two kinds).
- Check the final drive gear tooth contact. If poor contact is evident, make adjustment. (Refer to P.27-20.)



- Measure the drive gear runout.
Limit: 0.05 mm
- When drive gear runout exceeds the limit, remove the differential case and then the drive gears, moving them to different positions and reinstall them.
- If adjustment is not possible, replace the differential case or drive gear and drive pinion as a set.