REAR AXLE

Click on the applicable bookmark to selected the required model year.

REAR AXLE

CONTENTS

GENERAL INFORMATION

The rear axle has the following features.

- D.O.J.-type on the differential side and B.J.-type on the hub side constant velocity joints are featured in the drive shaft.
- Large capacity and high rigidity taper-roller type unit bearing in the wheel bearing is featured.
- The hybrid LSD and differential lock with LSD which benefit driving on muddy and rough roads are featured as an option.
- ABS rotor to detect wheel speed is press-fitted in the drive shaft.

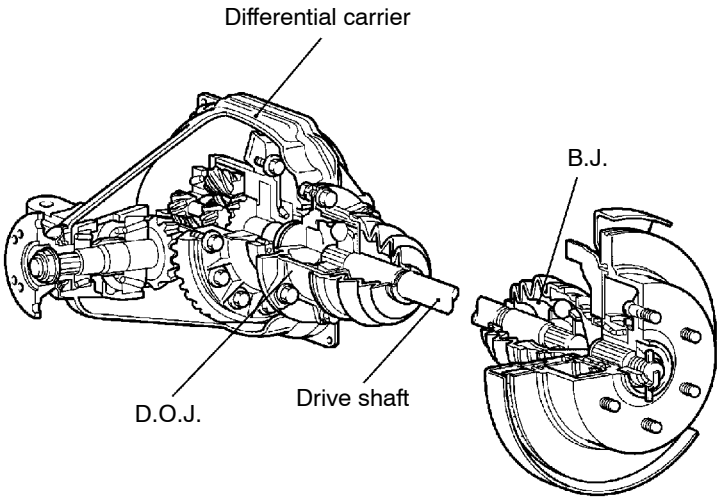
NOTE
The structure of normal differential and hybrid LSD is basically the same as featured in existing models.

SPECIFICATIONS

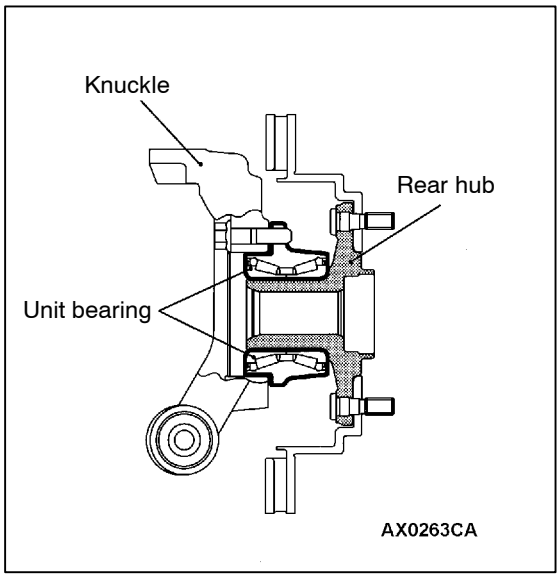
Item			Normal Differential	Hybrid LSD	Differential Lock with LSD
Reduction gear type			Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio			4.900*1, 3.917*2, 4.100*3, 4.300*4	4.900*1, 3.917*2, 4.100*3, 4.300*4	4.900*1, 3.917*2, 4.100*3, 4.300*4
LSD type			-	Torque sensing + VCU	Torque sensing
Differential gear type (Type × number of gears)		Side gear	Straight bevel gear × 2	Helical gear × 2	Helical gear × 2
		Pinion gear	Straight bevel gear × 2	Long pinion × 4, Short pinion × 4	Long pinion × 4, Short pinion × 4
Number of teeth	Drive gear		49*1, 47*2, 41*3, 43*4	49*1, 47*2, 41*3, 43*4	49*1, 47*2, 41*3, 43*4
	Drive pinion		10*1, *3, *4, 12*2	10*1, *3, *4, 12*2	10*1, *3, *4, 12*2
	Side gear		18	22	22
	Pinion gear		10	7	7
Bearings (Outside diameter × Inside diameter) mm		Side	90.0 × 55.0	90.0 × 55.0	90.0 × 55.0
		Front	68.3 × 30.2	68.3 × 30.2	68.3 × 30.2
		Rear	79.4 × 36.5	79.4 × 36.5	79.4 × 36.5

NOTE
*1: 4D56
*2: 4M41-A/T
*3: 4M41-M/T
*4: 6G74 GDI

CONSTRUCTION DIAGRAM



AX0262CA



SERVICE SPECIFICATIONS

Item			Standard value	Limit
Rear axle total backlash mm			-	5
Wheel bearing rotation starting torque N·m			-	1.76
Wheel bearing axial play mm			-	0
DOJ boot assembly dimension mm		Vehicles without 4M4-M/T	110 ± 3	-
		Vehicles with 4M4-M/T	115 ± 3	-
Rear differential lock air pump pressure kPa			25 – 40	-
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 N·m	Without oil seal		1.94 – 2.25	-
	With oil seal	Companion flange (oil seal contacting area) with anti-rust agent	2.03 – 2.34	-
		Companion flange (oil seal contacting area) with gear oil applied	2.10 – 2.40	-

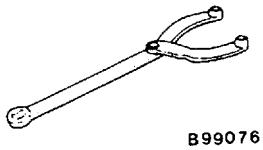
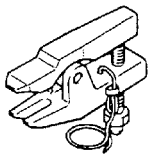
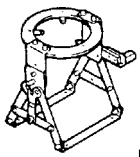
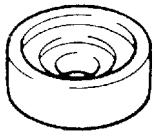
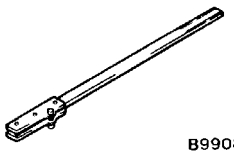
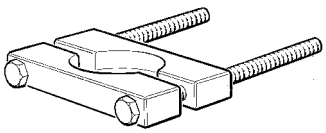
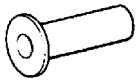
LUBRICANTS

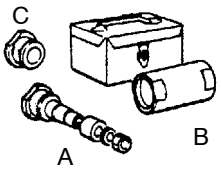
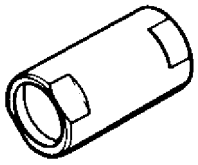
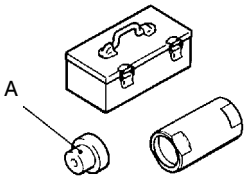
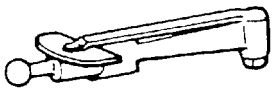
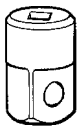
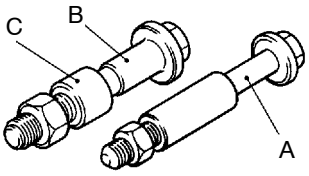
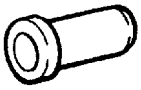
Item	Specified lubricants	Quantity
Rear differential gear oil	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80 W	Approx. 1.6 L
B.J. joint	Repair kit grease	245 ± 10 g
D.O.J. joint	Repair kit grease	295 ± 10 g

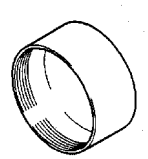
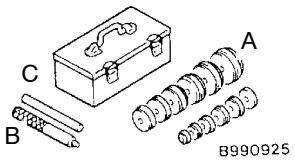
SEALANTS

Items	Specified sealants	Remarks
Differential cover	3M ATD Part No. 8661 or equivalent	Semi-drying sealant
Drive gear and differential case mounting part	3M Stud Locking 4170 or equivalent	Anaerobic sealant

SPECIAL TOOLS

Tool	Number	Name	Use
 B990767	MB990767	Front hub and flange yoke holder	Removal, installation of the drive shaft nut
 B991113	MB991113 or MB990635	Steering linkage puller	Disconnection of ball joint
 B990909	MB990909	Working base	Supporting of the differential carrier
 B990810	MB990810	Side bearing puller	• Removal of the side bearing inner race • Removal of the companion flange
	MB991407	Differential rear support arbor	Removal of the side bearing inner race
 B990850	MB990850	End yoke holder	• Removal of the self-locking nut • Adjustment of the drive pinion turning torque
	MD998801	Bearing remover	Removal of the drive pinion rear bearing inner race
	MB991168	Differential oil seal installer	Installation of drive pinion oil seal
 MB991445	MB991445	Bush remover and installer base	Installation of drive pinion rear bearing outer race

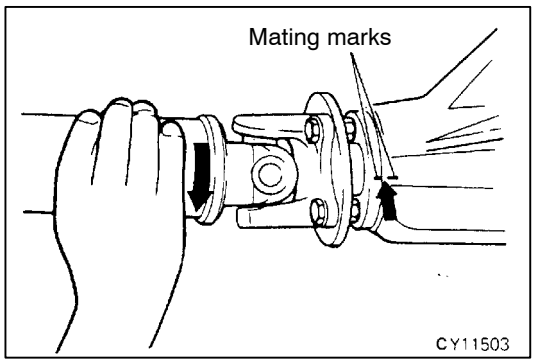
Tool	Number	Name	Use
	MB991171 A: MB990819 B: MB991170 C: MB991169	Pinion height gauge set A: Drive pinion gauge B: Cylinder gauge C: Drive pinion gauge attachment	Measurement of the pinion height
	MB991534	Cylinder gauge	
	MB991768 A: MB991770	Drive pinion gauge set A: Head	
	MB990685	Torque wrench	Measurement of the starting torque of ball bearing
	MB990326	Preload socket	
	A: MB991017 B: MB990998 C: MB991000	A, B: Front hub remover and installer C: Spacer	• Measure at the wheel bearing rotation starting torque • Wheel bearing backlash check
	MB990802	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

Tool	Number	Name	Use
	MD998812	Installer cap	Press-fitting of the side bearing inner race
	MD998829	Installer adaptor	
	MB990925 A: MB990926- MB990937 B: MB990938 C: MB990939	Bearing and oil seal installer set A: Installer adaptor B: Bar C: Brass bar	● 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.

ON-VEHICLE SERVICE

REAR AXLE TOTAL BACKLASH CHECK

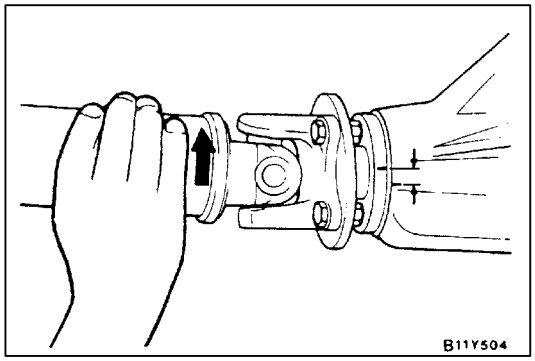
1. Park the vehicle on a flat, level surface.
2. Move the transmission control lever to the neutral position. Move the transfer control lever to the neutral position. Apply the parking brake. Raise the vehicle on a jack.



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.27-37.)
   - Differential gear backlash (Refer to P.27-36.)

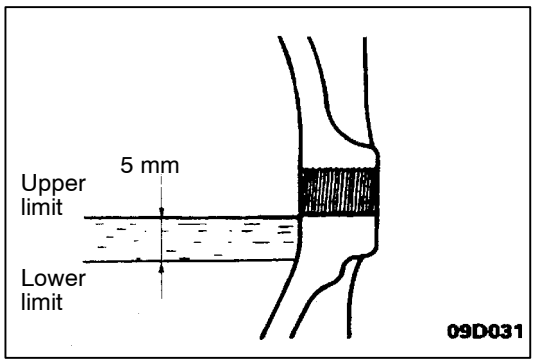


GEAR OIL LEVEL CHECK

Check that gear oil level is not 5 mm below the bottom of filler plug hole.

Specified gear oil:

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

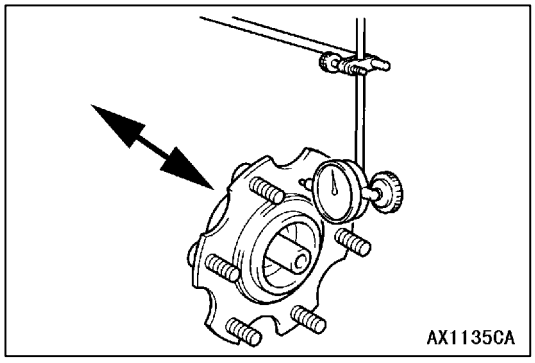


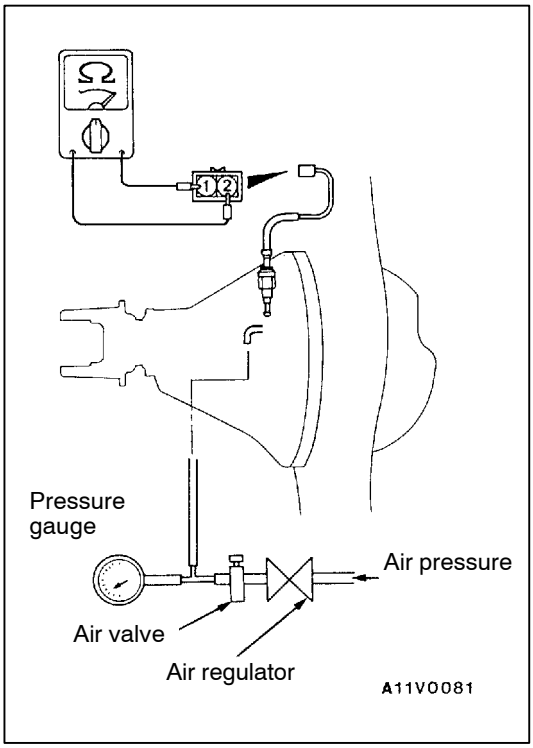
WHEEL BEARING AXIAL PLAY CHECK

1. Remove the rear brake assembly and remove the brake disc while holding it with wires to prevent it from falling.
2. Fit the dial gauge as shown in the diagram and move hub in the axial direction to measure the play.

   Limit: 0 mm

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





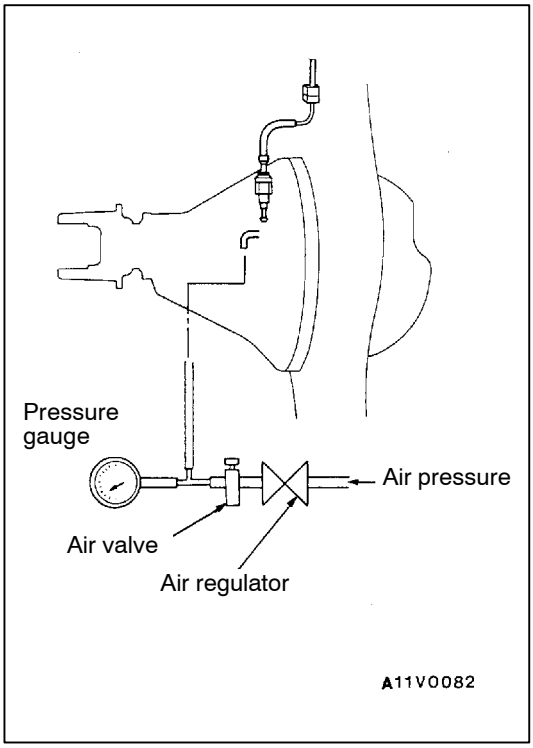
REAR DIFFERENTIAL LOCK DETECTION SWITCH CHECK

1. Raise up the vehicle.
2. Remove the air pipe and air hose connections.
3. Connect a pressure gauge and air regulator, for adjusting the compressed air pressure, to the air hose.
4. Adjust the compressed air pressure with the air regulator until the pressure gage shows a pressure of approximately 25 kPa.

   Caution
   Do not apply a higher pressure.
5. Hold the wheel on one side of the vehicle stationary, and slowly turn the wheel on the other side.
6. Check for continuity in the rear differential lock detection switch.

When air is supplied	Continuity
When air is released	No continuity

7. If the detection switch is defective, first remove the differential carrier, then remove the detection switch.



REAR DIFFERENTIAL LOCK SYSTEM AIR LEAKAGE CHECK

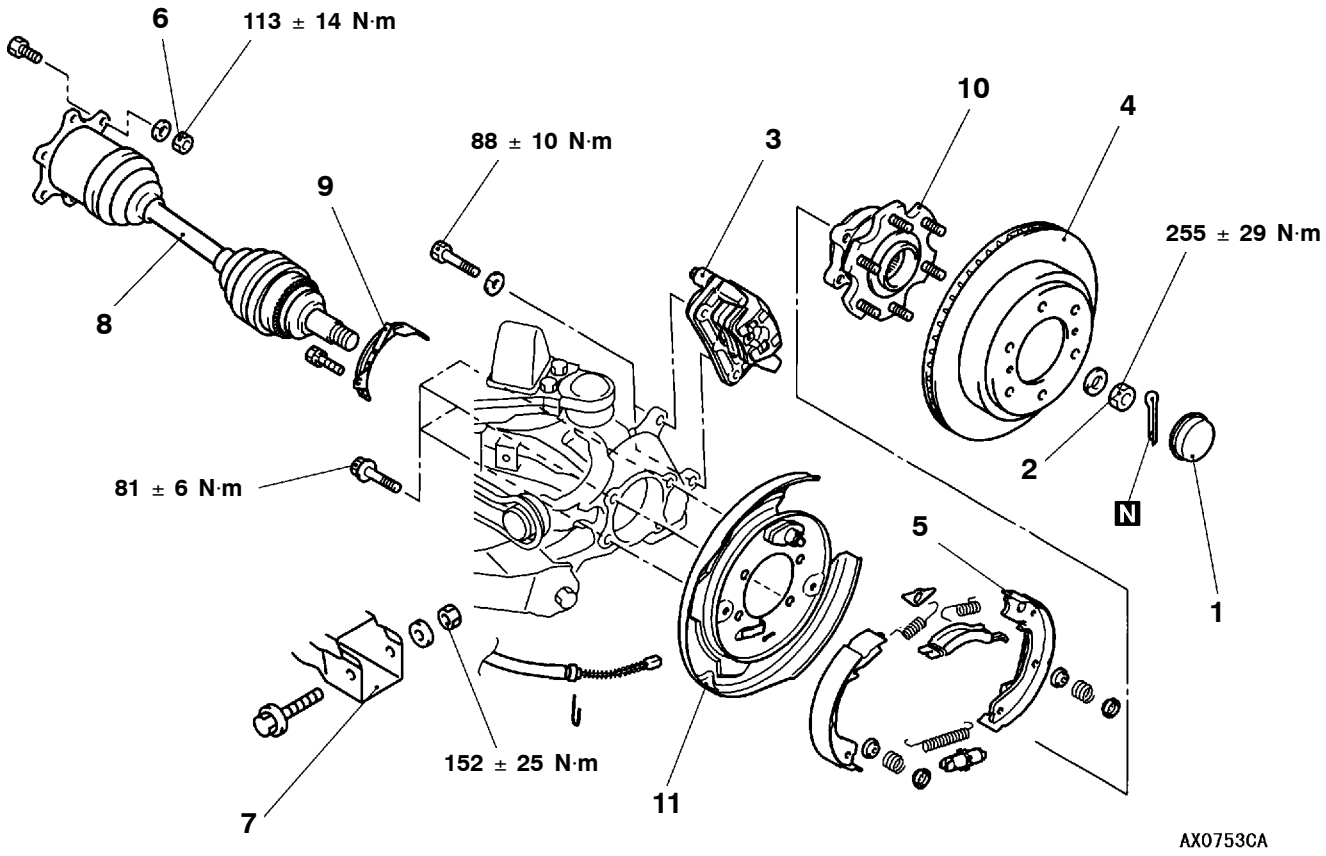
1. Remove the rear differential lock air pump and remove the air hose from the air pump. (Refer to P.27-20.)
2. Connect a pressure gage and air regulator, for adjusting the compressed air pressure to the air hose.
3. Adjust the compressed air pressure with the air regulator until the pressure gage shows a pressure of approximately 35 kPa.

   Caution
   Do not apply a higher pressure.
4. Shut off the air valve.
5. If after approximately 10 minutes have passed, the pressure has dropped, it can be concluded that there is no leaking of air from the air hose, etc.

REAR HUB ASSEMBLY

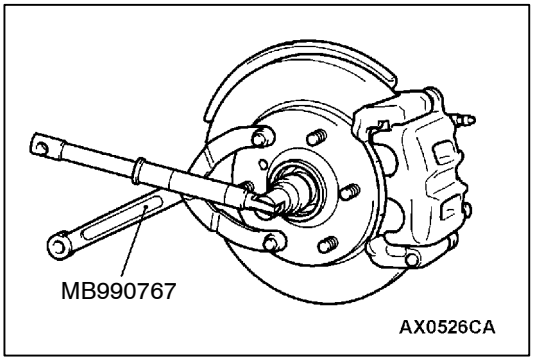
REMOVAL AND INSTALLATION

Post-installation Operation
Parking Brake Lever Stroke Adjustment (Refer to GROUP 36 – On-vehicle Service.)



Removal steps

◀A▶ ▶B◀ 1. Hub cap
2. Drive shaft nut
◀B▶ 3. Rear brake caliper
4. Rear brake disc
5. Parking brake shoe & lining assembly (Refer to GROUP 36 - Parking Brake Drum.)
6. Companion shaft and drive shaft connection
◀C▶ ▶A◀ 7. Lower arm and knuckle connection
8. Rear drive shaft assembly
9. ABS rotor protector
10. Rear hub assembly
11. Backing plate



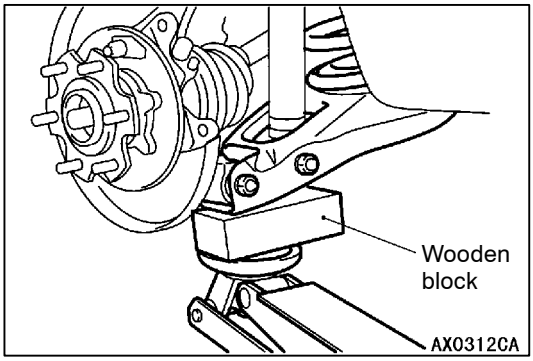
REMOVAL SERVICE POINTS

◀A▶ DRIVE SHAFT NUT REMOVAL

Caution
Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.

◀B▶ REAR BRAKE CALIPER REMOVAL

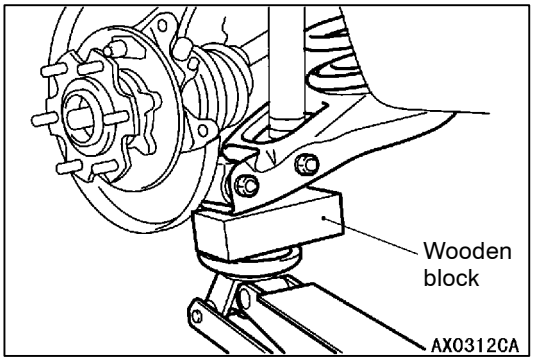
Suspend the rear brake caliper from the body with wire, etc. to prevent it from falling.



◀C▶ LOWER ARM AND KNUCKLE DISCONNECTION

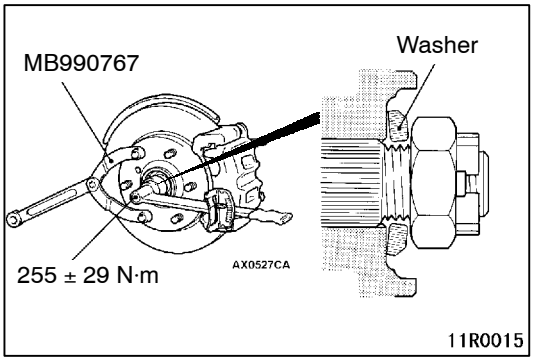
Attach wooden block to the lower arm as shown in the illustration and use the floor jack to remove the lower arm mounting bolt by compressing the coil spring.

INSTALLATION SERVICE POINTS



▶A◀ LOWER ARM AND KNUCKLE CONNECTION

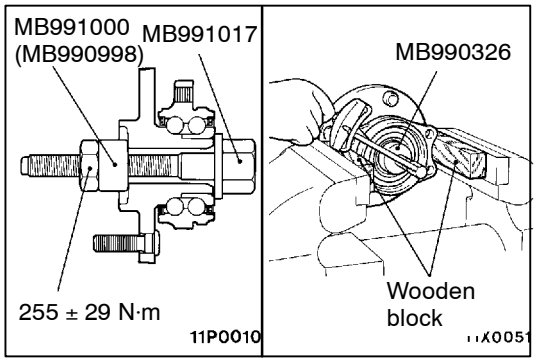
Attach wooden block to the lower arm as shown in the illustration and use the floor jack to install the lower arm mounting bolt by compressing the coil spring.



▶B◀ DRIVE SHAFT NUT INSTALLATION

1. Assemble the drive shaft washer in the illustrated direction.
2. Tighten the drive shaft nut fully with special tools.

   Caution
   Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.
3. If the pin hole does not align with another, tighten the drive shaft nut (less than 284 N·m) and find the nearest hole then bend the split pin to fit in.



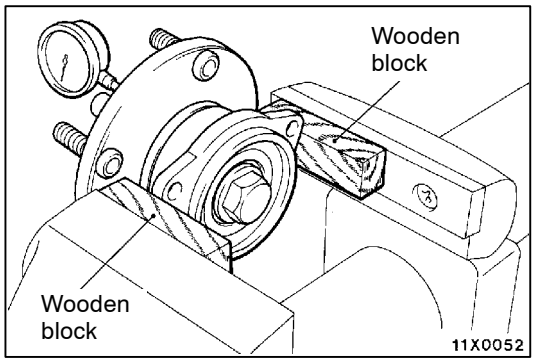
INSPECTION

WHEEL BEARING ROTATION STARTING TORQUE CHECK

1. Tighten special tools in rear hub assembly to the specified torque.
2. Hold rear hub assembly in a vice by way of wooden block.
3. Measure the wheel bearing rotation torque with special tools.

   Limit: 1.76 N·m

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



WHEEL BEARING AXIAL PLAY CHECK

1. Check the wheel bearing axial play.

   Limit: 0 mm

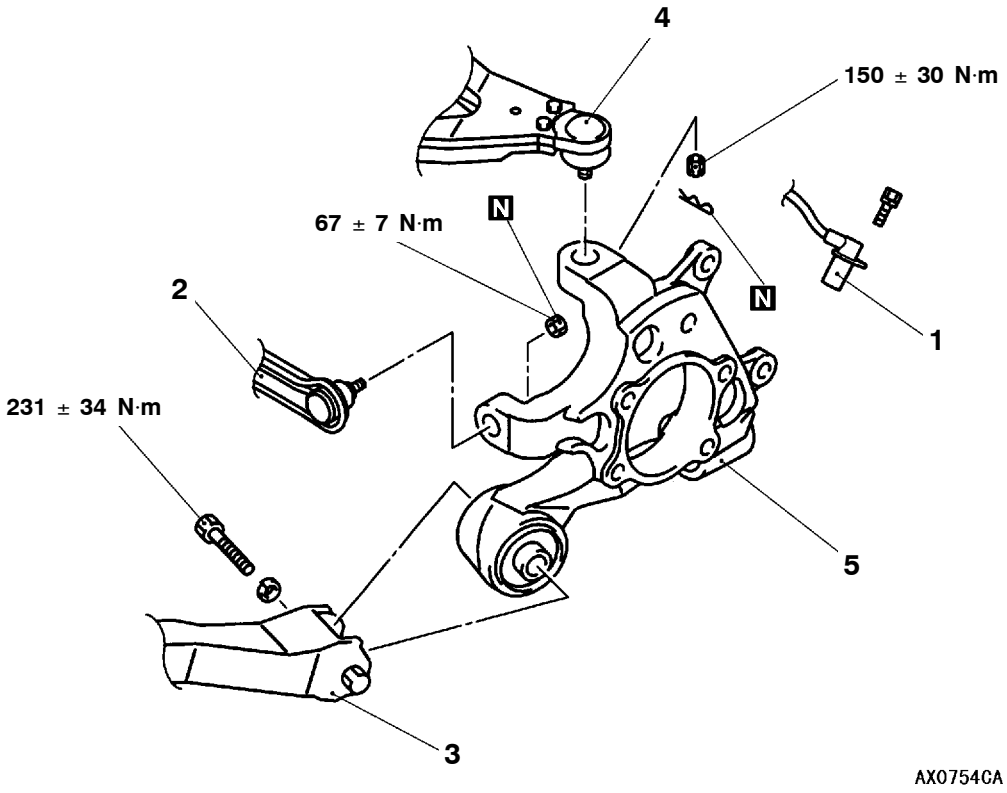
2. If the wheel bearing axial play exceeds the limit value at the specified torque of (255 ± 29 N·m), replace the rear hub assembly.

KNUCKLE

REMOVAL AND INSTALLATION

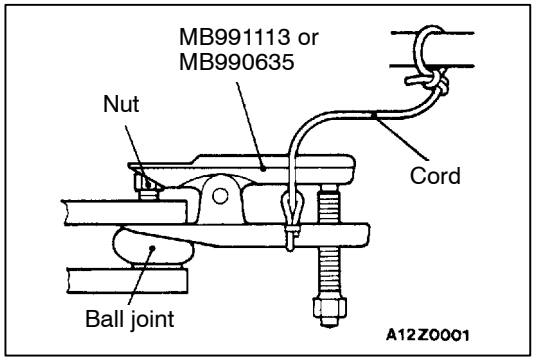
Pre-removal Operation
Rear Hub Assembly Removal (Refer to P.27-10.)

Post-installation Operation
- Press dust cover with a finger to check for crack or damage in the dust cover.
- Rear Hub Assembly Installation (Refer to P.27-10.)



Removal steps

◀A▶ 1. Vehicle speed sensor
2. Knuckle and toe-control arm connection
◀A▶ 3. Knuckle and trailing arm connection
4. Knuckle and upper arm connection
5. Knuckle assembly



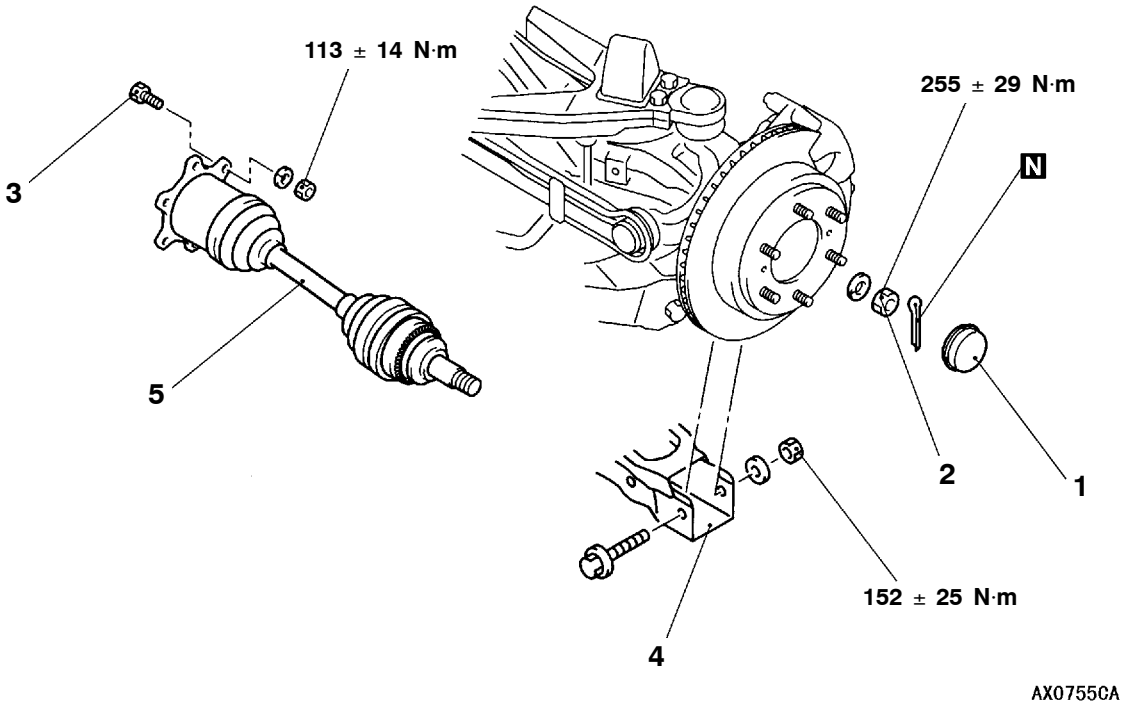
REMOVAL SERVICE POINT

◀A▶ KNUCKLE AND CONTROL ARM/UPPER ARM DISCONNECTION

Caution
1. **Use special tools to loosen the nut from the ball joint instead of removing it.**
2. **Hang special tools with ropes to prevent them from falling.**

DRIVE SHAFT

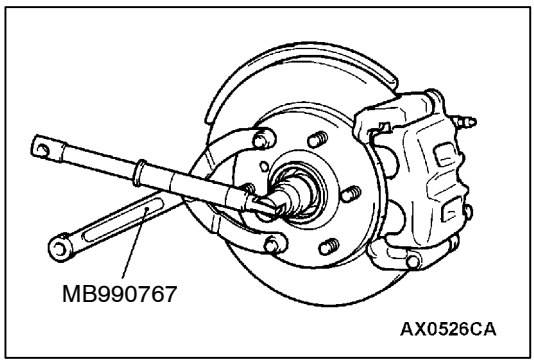
REMOVAL AND INSTALLATION



Removal steps

◀A▶ ▶B◀ 1. Cap
2. Drive shaft nut
3. Companion shaft and drive shaft connection

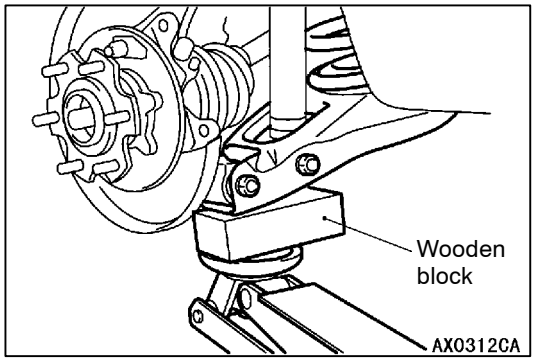
◀B▶ ▶A◀ 4. Knuckle and lower arm connection
5. Rear drive shaft assembly



REMOVAL SERVICE POINTS

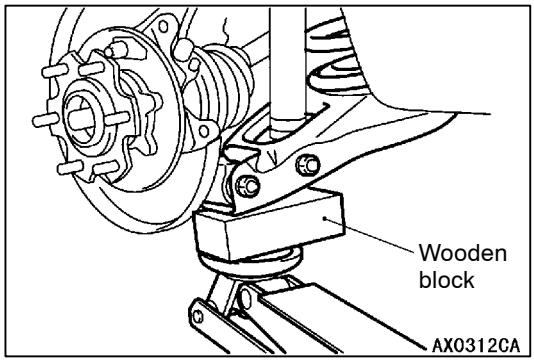
◀A▶ DRIVE SHAFT NUT REMOVAL

Caution
Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.



◀B▶ LOWER ARM AND KNUCKLE DISCONNECTION

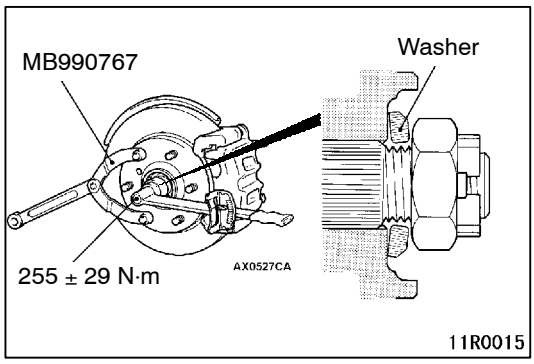
Attach wooden block to the lower arm as shown in the illustration and use the floor jack to remove the lower arm mounting bolt by compressing the coil spring.



INSTALLATION SERVICE POINTS

▶A◀ LOWER ARM AND KNUCKLE CONNECTION

Attach wooden block to the lower arm as shown in the illustration and use the floor jack to install the lower arm mounting bolt by compressing the coil spring.



▶B◀ DRIVE SHAFT NUT INSTALLATION

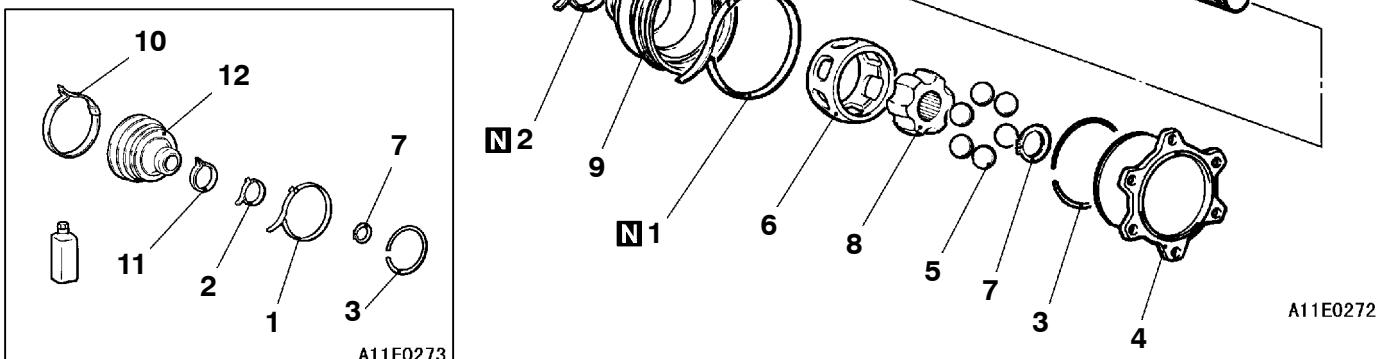
1. Assemble the drive shaft washer in the illustrated direction.
2. Tighten the drive shaft nut fully with special tools.

   Caution
   Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.

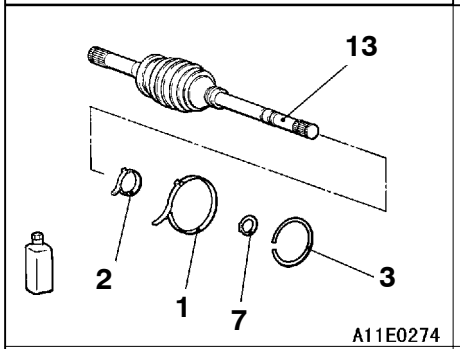
3. If the pin hole does not align with another, tighten the drive shaft nut (less than 284 N·m) and find the nearest hole then bend the split pin to fit in.

DISASSEMBLY AND REASSEMBLY

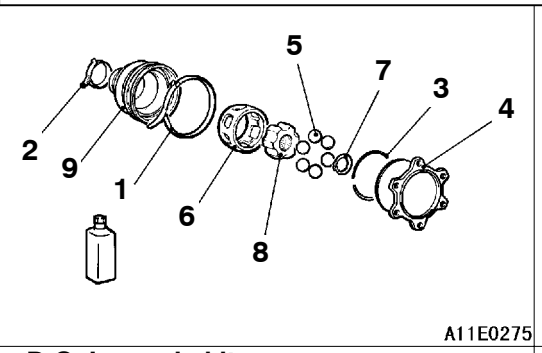
Caution
Never disassemble the B.J. assembly except when replacing the B.J. boot.



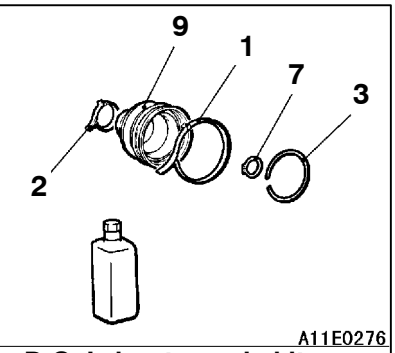
B.J. boot repair kit



B.J. repair kit



D.O.J. repair kit

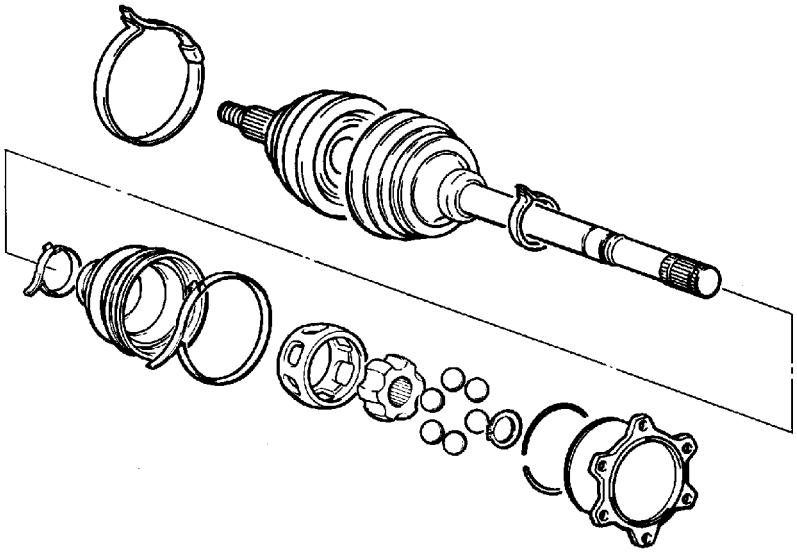


D.O.J. boot repair kit

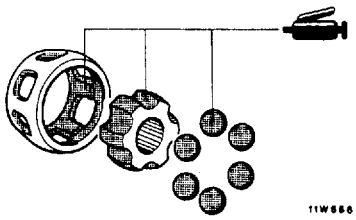
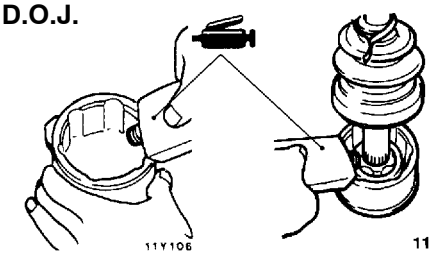
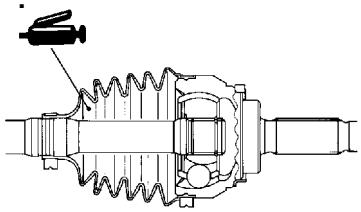
	Disassembly steps		Reassembly steps
	1. D.O.J. boot band (large)		13. B.J. assembly
	2. D.O.J. boot band (small)	▶A◀	12. B.J. boot
	3. Circlip		11. B.J. boot band (small)
	4. D.O.J. outer race		10. B.J. boot band (large)
◀A▶	5. Balls	▶A◀	9. D.O.J. boot
◀B▶	6. D.O.J. cage	▶B◀	6. D.O.J. cage
	7. Snap ring	▶B◀	8. D.O.J. inner race
	8. D.O.J. inner race		7. Snap ring
◀C▶	9. D.O.J. boot		5. Balls
	10. B.J. boot band (large)	▶C◀	4. D.O.J. outer race
	11. B.J. boot band (small)		3. Circlip
◀C▶	12. B.J. boot	▶D◀	2. D.O.J. boot band (small)
	13. B.J. assembly	▶D◀	1. D.O.J. boot band (large)

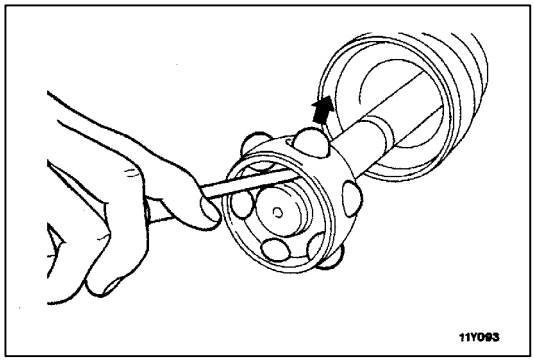
Lubrication Points

Caution
Do not mix old and new or different types of grease, as a special grease is used in the joint.



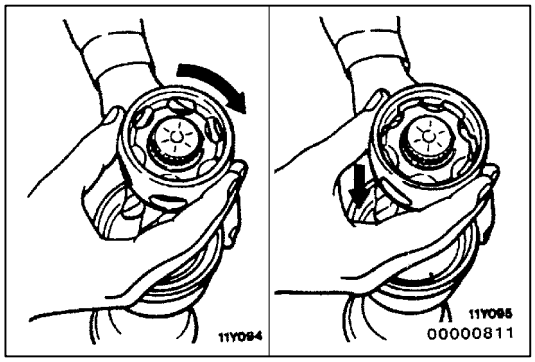
11E0272

 11W656	D.O.J.  11Y106 11H0067	B.J.  A11X0142
Grease: Repair kit grease	**Grease: Repair kit grease** **<B.J.>245 ± 10 g (135 ± 5 g inside joint, 110 ± 5 g inside boot)** **<D.O.J.>295 ± 10 g (185 ± 5 g inside joint, 110 ± 5 g inside boot)** Note The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.	



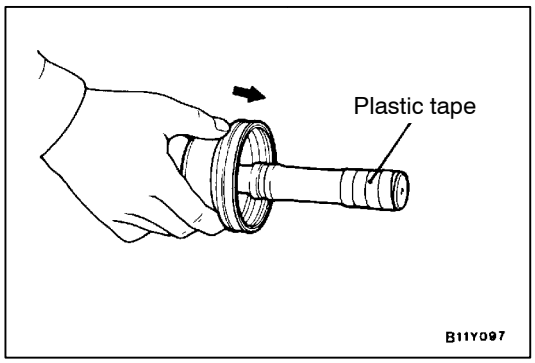
DISASSEMBLY SERVICE POINTS

◀A▶ BALLS REMOVAL



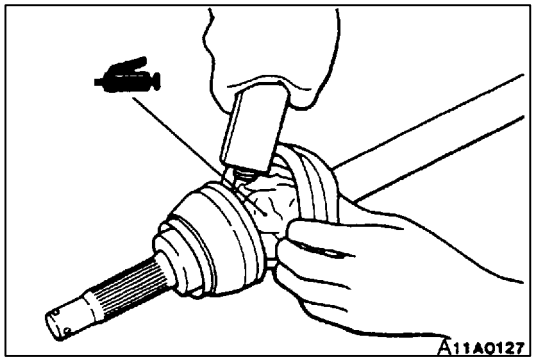
◀B▶ D.O.J. CAGE REMOVAL

Remove the D.O.J. cage from the D.O.J. inner race in the direction of the B.J.



◀C▶ D.O.J. BOOT/B.J. BOOT REMOVAL

Wrap plastic tape around the spline part on the D.O.J. side of the drive shaft so that D.O.J. boot/B.J. boot are not damaged when they are removed.



REASSEMBLY SERVICE POINTS

▶A◀ B.J. BOOT/D.O.J. BOOT INSTALLATION

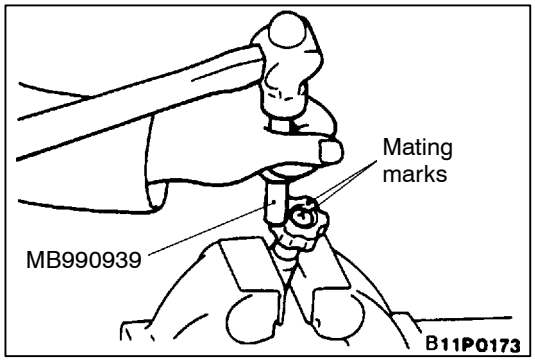
1. Wrap the tape around the spline of the shaft, then install B.J. boot and D.O.J. boot in order.
2. Fill the inside of B.J. and B.J. boot with specified grease.

   Specified grease: Repair kit grease

   Used amount: 245 ± 10 g
   (135 ± 5 g inside joint, 110 ± 5 g inside boot)

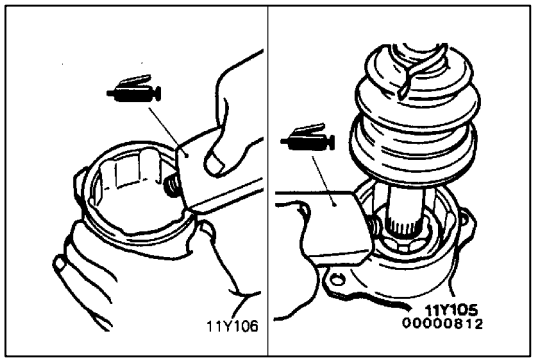
   Caution
   Do not mix old and new or different types of grease, as a special grease is used in the joint.
3. Tighten the boot band.

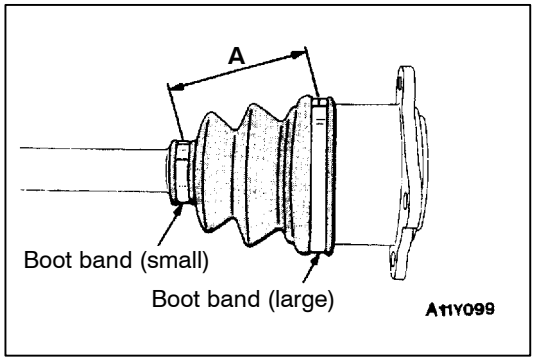
   Caution
   In order to fill the specified amount of air inside the BJ boot, keep the bent angle of the drive shaft to 0° during the operation.



▶B◀ D.O.J. CAGE/D.O.J. INNER RACE INSTALLATION

1. Install D.O.J. cage to the drive shaft and put it aside to B.J. assembly side.
2. Align the mating mark of D.O.J. inner race with that of the shaft.
3. Tap the inner race with even force to press-fit into the bump of the shaft with special tools.





▶C◀ D.O.J. OUTER RACE INSTALLATION

Fill the inside of the D.O.J. outer race and D.O.J. boot with the specified grease.

Specified grease:
Repair kit grease 295 ± 10 g (185 ± 5 g inside joint, 110 ± 5 g inside boot)

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

▶D◀ D.O.J. BOOT/D.O.J. BOOT BAND INSTALLATION

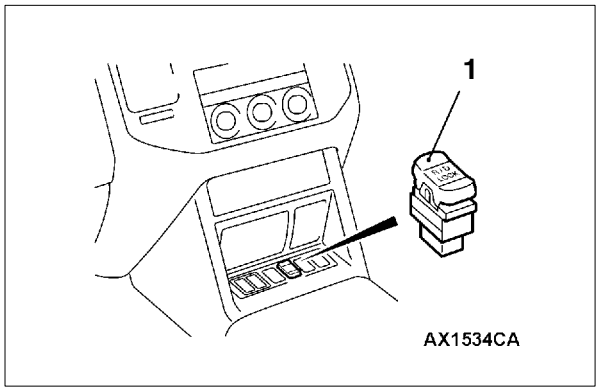
1. Position the D.O.J. outer race so that the distance between the boot bands is at the standard value.

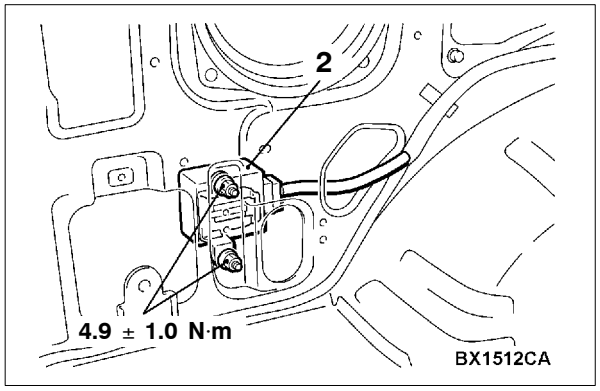
   Standard value (A): 110 ± 3 mm <4D5, 4M4-A/T, 6G7>
   115 ± 3 mm <4M4-M/T>

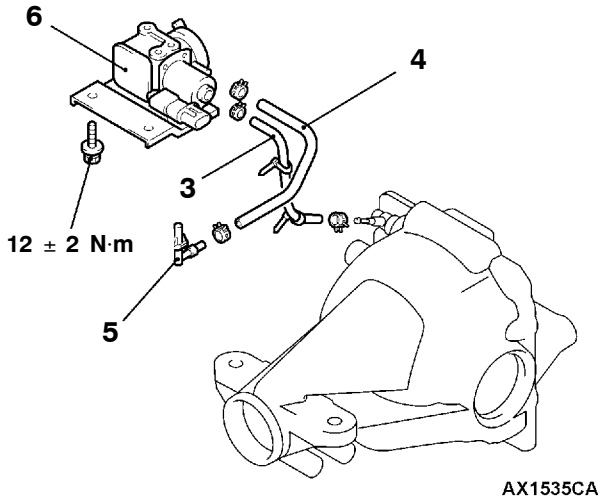
2. Remove part of the D.O.J. boot from the D.O.J. outer race to release the air pressure inside the boot.

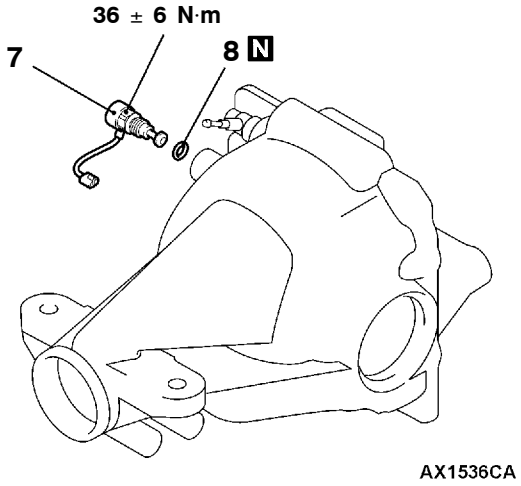
REAR DIFFERENTIAL LOCK

REMOVAL AND INSTALLATION









1. Rear differential lock switch

Rear differential lock-ECU removal steps

- Upper/Lower quarter trim (Refer to Group 52A – Trims.)

2. Rear differential lock-ECU

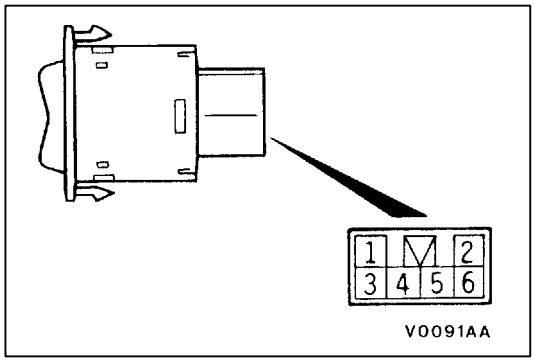
Rear differential lock air pump assembly removal steps

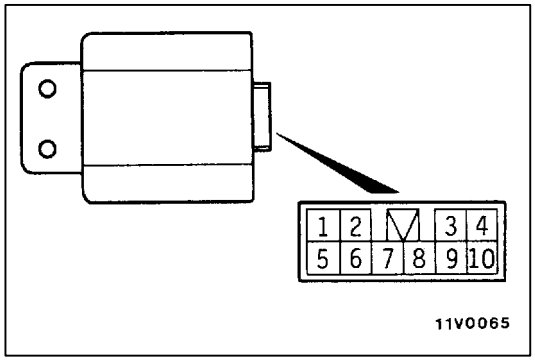
3. Hose
4. Vapor hose
5. Nipple
6. Rear differential lock air pump assembly

Rear differential lock position switch removal steps

- Differential carrier (Refer to P.27-23.)

7. Rear differential lock position switch
8. Gasket





INSPECTION

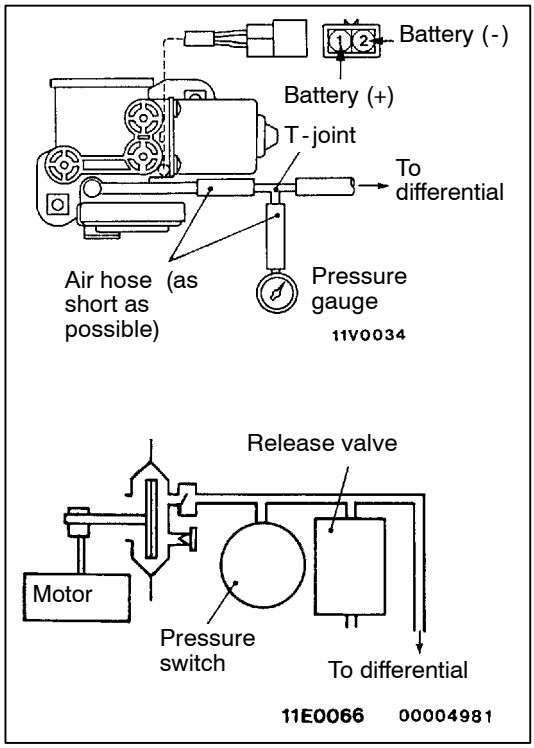
REAR DIFFERENTIAL LOCK SWITCH CHECK

Switch position	Terminal No.					
	1	ILL	2	3	5	6
OFF	○	○	○	○		○
ON	○	○	○		○	○

REAR DIFFERENTIAL LOCK-ECU CHECK

1. Measure the terminal voltage under each condition.
2. With the ECU connected to the harness and the probe inserted into rear of the harness connector, measure the voltage between terminal number 6 (earth terminal) and each terminal.

Terminal No.	Inspection item		Condition		Terminal voltage
1	Rear differential lock switch	OFF side	Ignition switch: ON	When in neutral	System voltage
2	Vehicle speed reed switch		Select “D” or “1” (1st gear) and drive forward slowly		5 V
3	Ignition switch (IG1)		Ignition switch (IG1)	OFF	0 V
				ON	Approximately 12 V (battery positive voltage)
4	Rear differential lock air pump		Ignition switch: ON	When filling or holding	System voltage
				When releasing	0 V
5	4WD detection switch		Ignition switch: ON	4WD	0 V
				2WD	System voltage
8	Rear differential lock detection switch		Ignition switch: ON	Rear differential is locked	0 V
				Rear differential is free	System voltage
9	Rear differential lock switch	ON side	Ignition switch: ON	ON side or OFF side	0 V
10	Rear differential lock indicator lamp		Ignition switch: ON	Rear differential is locked	0 V
				Rear differential is free	System voltage

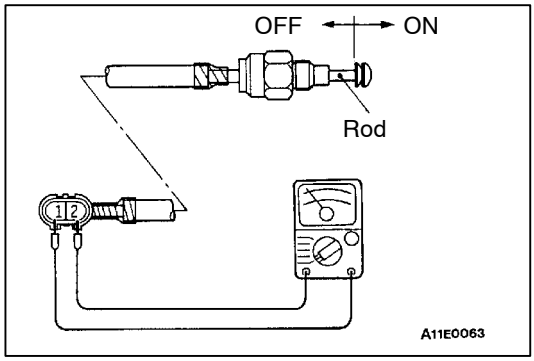


REAR DIFFERENTIAL LOCK AIR PUMP CHECK

1. Install air hose to the differential.
2. Connect a pressure gauge to the air pump discharge outlet nozzle, via the air hose and T-joint.
3. Apply battery voltage to the air pump connector.
4. Measure the time when the pump starts and stops operating, and if stops within five seconds, the pressure switch inside the pump is normal.
5. Measure the pressure 10 - 20 seconds after the pump has stopped.

   Standard value: 25 - 40 kPa

   If the pressure is within the standard value, the release valve inside the pump is normal.
6. Check that the pump does not begin operating for five minutes after it has stopped.
7. If the inspection for 4 - 6 is normal, then the pump is fully operational.



REAR DIFFERENTIAL LOCK DETECTION SWITCH CHECK

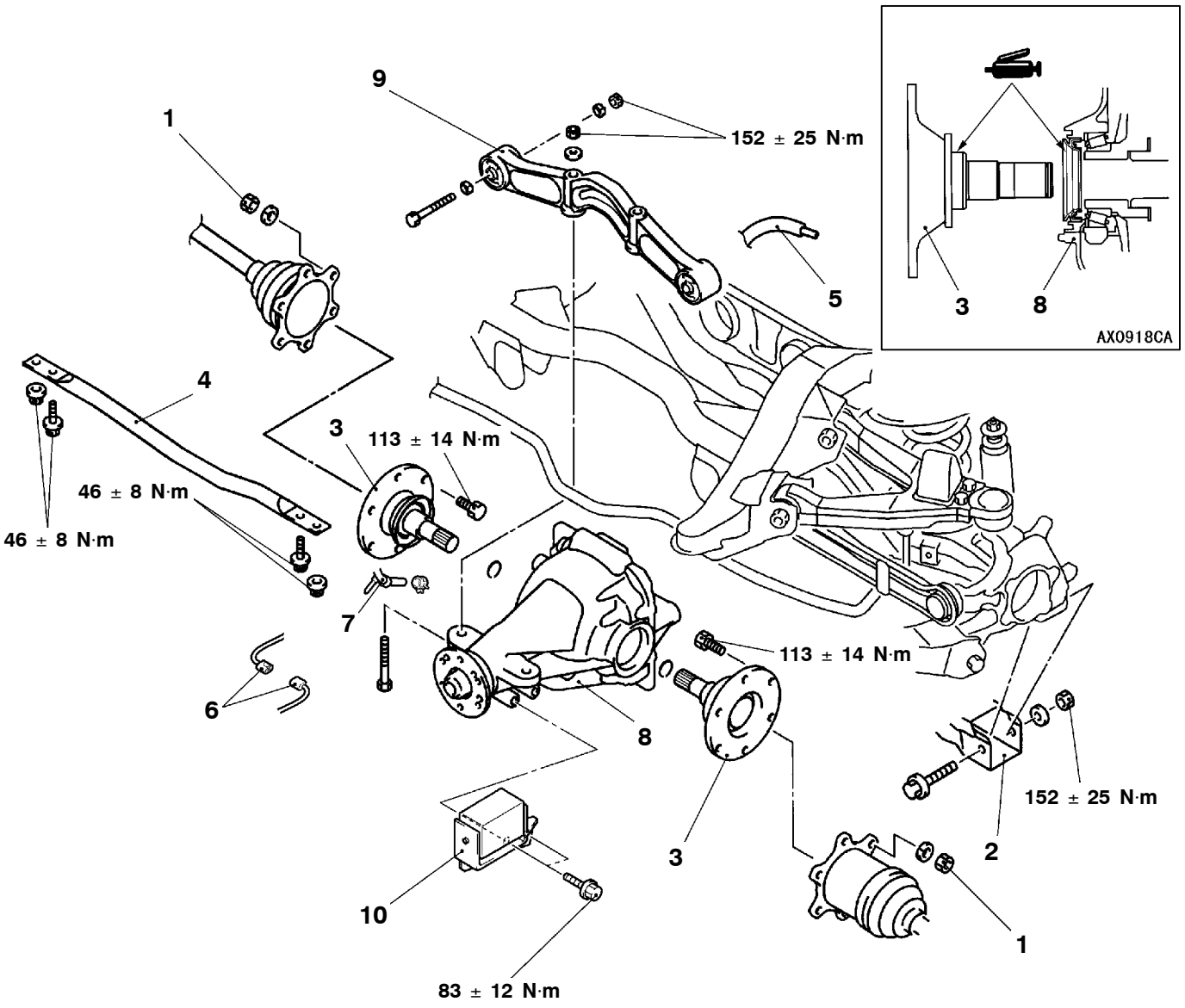
1. Connect an ohmmeter to the detection switch connector.
2. The rear differential lock switch is in good condition when the rod of the detection switch is pulled, there should be continuity, and when it returned to its normal position, no continuity.

DIFFERENTIAL CARRIER

REMOVAL AND INSTALLATION

Caution
Since a carbon fiber fortified plastic tube is used in the rear propeller shaft, make sure to refer to GROUP 25 for removal procedure.

Pre-removal and Post-installation Operation
Differential Gear Oil Draining and Refilling (Refer to P.27-8.)



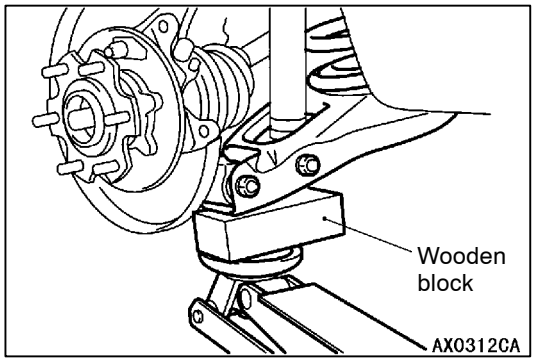
Removal steps

- Propeller shaft (Refer to GROUP 25.)

1. Drive shaft connection
◀A▶ ▶A◀ 2. Knuckle and lower arm connection
3. Companion shaft
4. Toe control tower bar
5. Breather hose connection
6. Harness connection <Vehicles with rear differential lock>
7. Hose connection <Vehicles with rear differential lock>
◀B▶ 8. Differential carrier assembly

- Fuel tank (Refer to GROUP 13B - Fuel Supply.)

9. Rear differential mount member
10. Dynamic damper



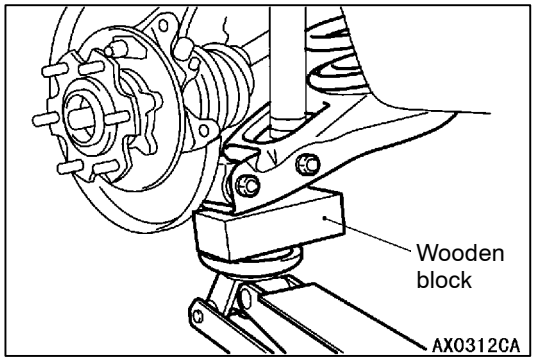
REMOVAL SERVICE POINTS

◀A▶ KNUCKLE AND LOWER ARM DISCONNECTION

Attach wooden block to the lower arm as shown in the illustration and use the floor jack to remove the lower arm mounting bolt by compressing the coil spring.

◀B▶ DIFFERENTIAL CARRIER ASSEMBLY REMOVAL

Support the differential carrier lower part by jacking to remove the joint bolt and the differential carrier assembly.



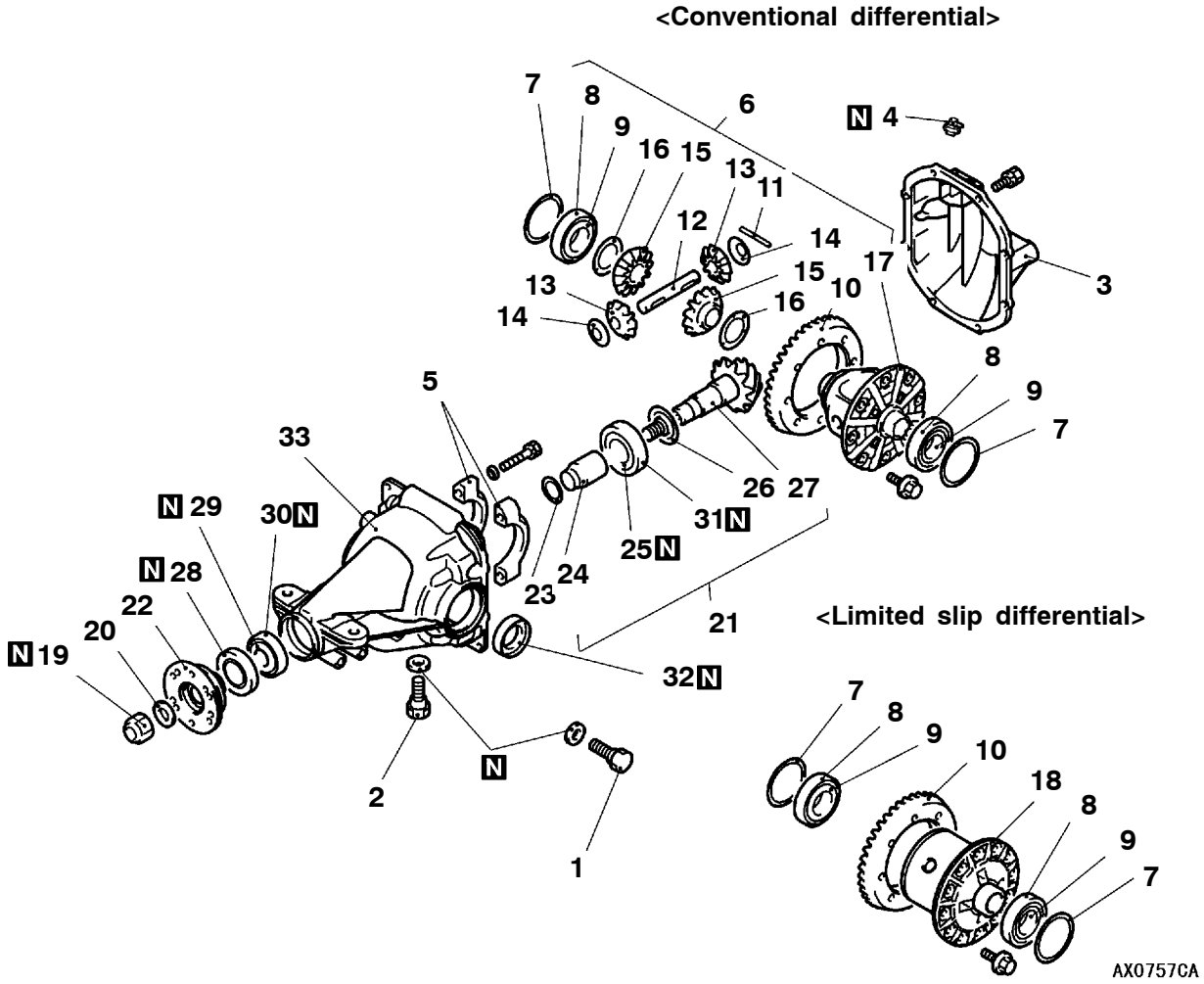
INSTALLATION SERVICE POINT

▶A◀ KNUCKLE AND LOWER ARM CONNECTION

Attach wooden block to the lower arm as shown in the illustration and use the floor jack to install the lower arm mounting bolt by compressing the coil spring.

DISASSEMBLY

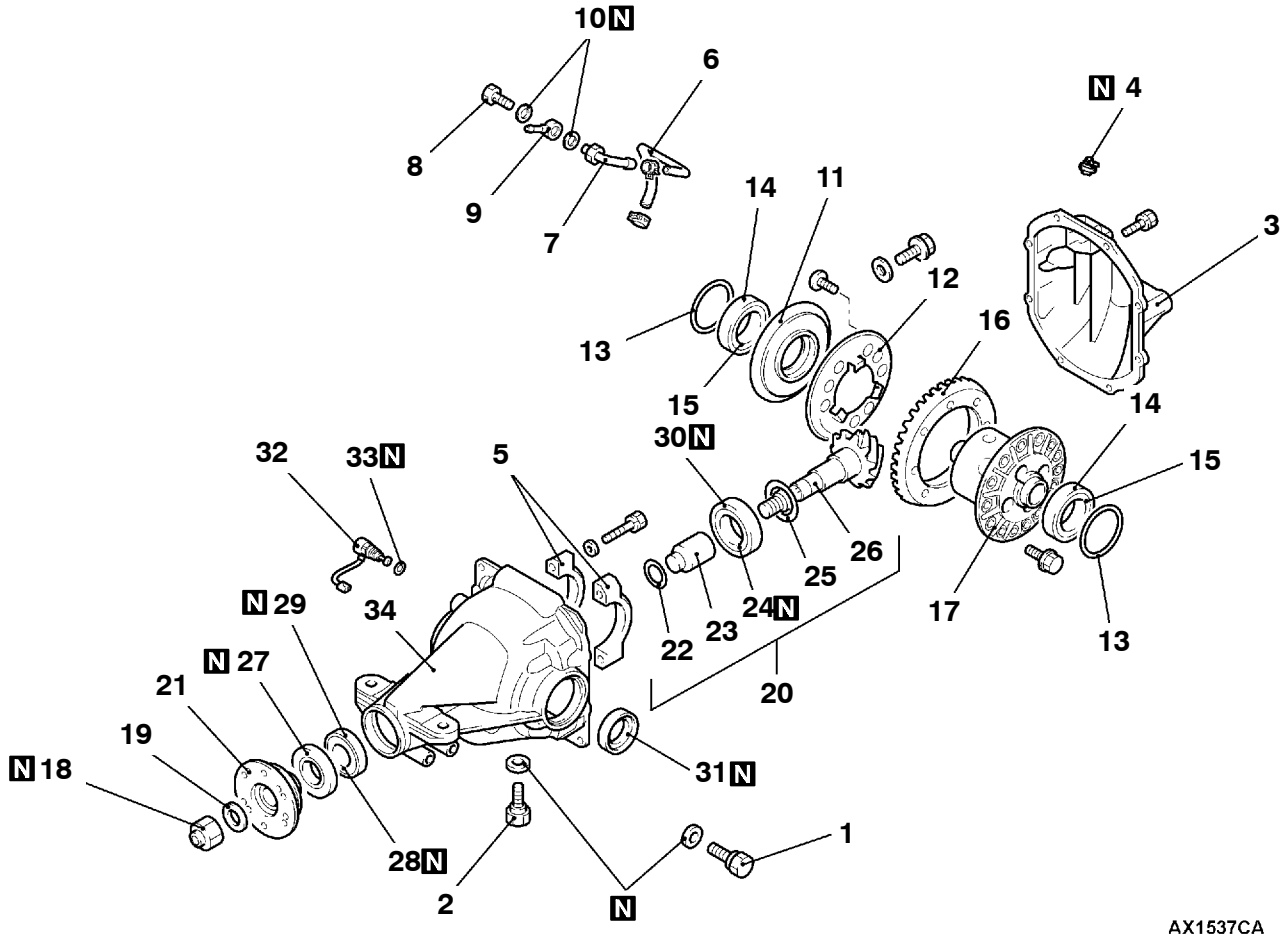
Caution
***: Do not disassemble the limited slip differential case assembly.**



Disassembly steps

◀A▶ ● Inspection before disassembly
1. Filler plug
2. Drain plug
3. Differential cover
4. Vent plug
5. Bearing cap
◀B▶ 6. Differential case assembly
◀B▶ 7. Differential side shim
◀B▶ 8. Side bearing outer race
◀C▶ 9. Side bearing inner race
◀D▶ 10. Drive gear
◀E▶ 11. Lock pin
12. Pinion shaft
13. Pinion gear
14. Pinion washer
15. Side gear
16. Side gear thrust spacer
17. Differential case
18. Limited slip differential case assembly*
◀F▶ 19. Self-locking nut
20. Washer
◀G▶ 21. Drive pinion assembly
◀G▶ 22. Companion flange
23. Drive pinion front shim (For adjusting preload of drive pinion)
24. Drive pinion spacer
◀H▶ 25. Drive pinion rear bearing inner race
26. Drive pinion rear shim (For adjusting drive pinion height)
27. Drive pinion
◀I▶ 28. Oil seal
◀I▶ 29. Drive pinion front bearing inner race
◀I▶ 30. Drive pinion front bearing outer race
◀J▶ 31. Drive pinion rear bearing outer race
32. Oil seal
33. Differential carrier

<Rear differential lock with limited slip differential>



Disassembly steps

◀A▶ ● Inspection before disassembly
1. Filler plug
2. Drain plug
3. Differential cover
4. Vent plug
5. Bearing cap
6. Hose
7. Air pipe assembly (A)
8. Eye bolt
9. Air pipe assembly (B)
10. Gasket
11. Actuator assembly
12. Pressure plate
◀B▶ 13. Differential side shim
◀B▶ 14. Side bearing outer race
◀C▶ 15. Side bearing inner race
◀D▶ 16. Drive gear
17. Limited slip differential case assembly*
◀F▶ 18. Self-locking nut
19. Washer
◀G▶ 20. Drive pinion assembly
◀G▶ 21. Companion flange
22. Drive pinion front shim (For adjusting preload of drive pinion)
23. Drive pinion spacer
◀H▶ 24. Drive pinion rear bearing inner race
25. Drive pinion rear shim (For adjusting drive pinion height)
26. Drive pinion
◀I▶ 27. Oil seal
◀I▶ 28. Drive pinion front bearing inner race
◀I▶ 29. Drive pinion front bearing outer race
◀J▶ 30. Drive pinion rear bearing outer race
31. Oil seal
32. Rear differential lock position switch
33. Gasket
34. Differential carrier

DISASSEMBLY SERVICE POINTS

◀A▶ INSPECTION BEFORE DISASSEMBLY

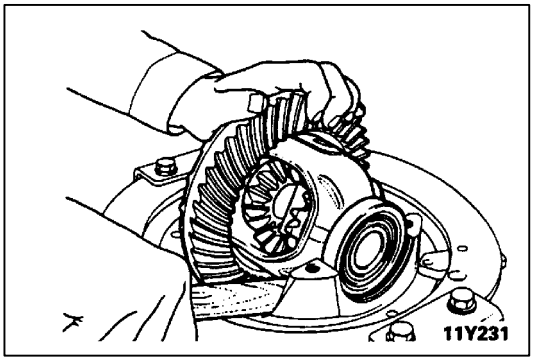
Except for the following standard values, inspection procedure is the same as GROUP 26 – Pre-removal Inspection.

DRIVE GEAR BACKLASH

Standard value: 0.13 - 0.18 mm

DIFFERENTIAL GEAR BACKLASH

Standard value: 0 - 0.076 mm

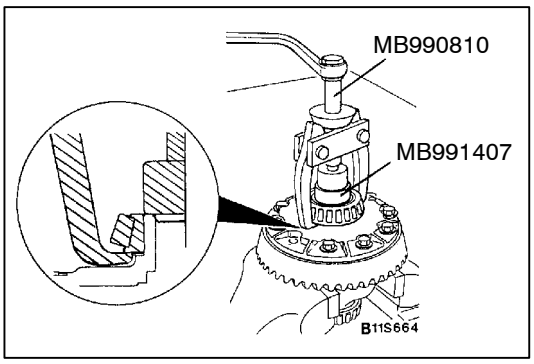


◀B▶ DIFFERENTIAL CASE ASSEMBLY/DIFFERENTIAL SIDE SHIM/SIDE BEARING OUTER RACE REMOVAL

Use the handle of a hammer to remove the differential case assembly, differential side shims and side bearings.

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

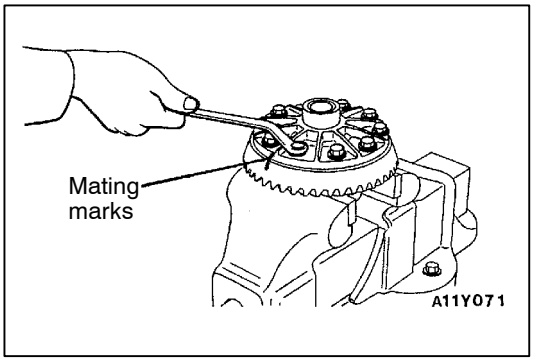
NOTE
Keep the right and left side bearings and side bearing outer race separate, so that they do not become mixed at the time of assembly.



◀C▶ SIDE BEARING INNER RACE REMOVAL

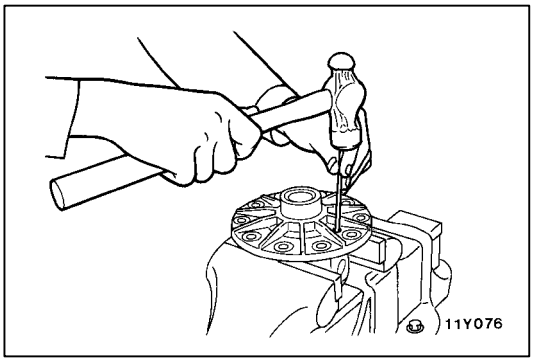
Use special tools to pull out the side bearing inner race.

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



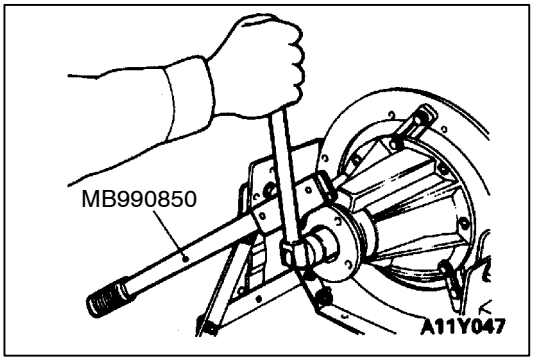
◀D▶ DRIVE GEAR REMOVAL

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.



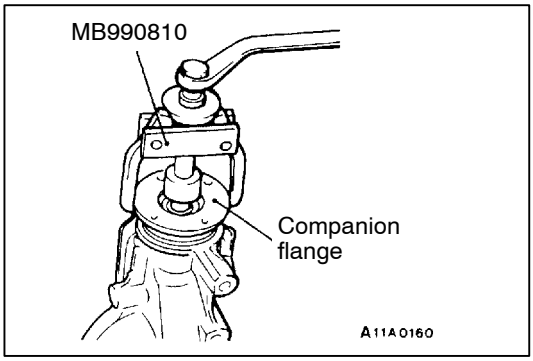
◀E▶ LOCK PIN REMOVAL

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.

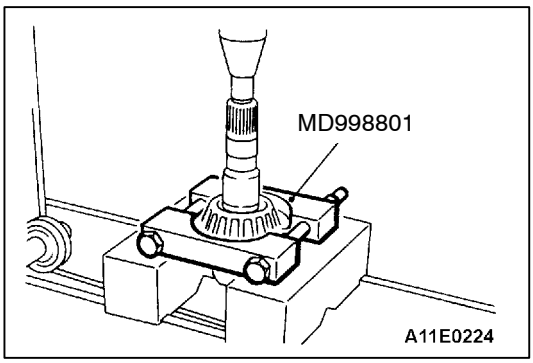


◀G▶ DRIVE PINION ASSEMBLY/COMPANION FLANGE REMOVAL

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

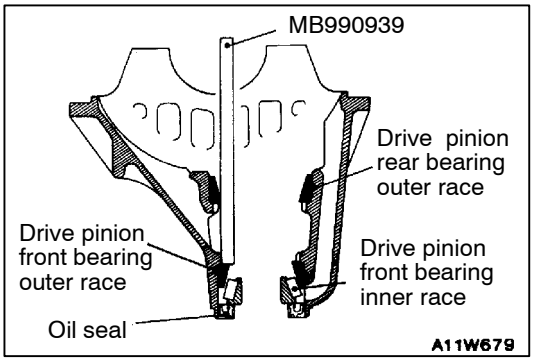
   Caution
   Do not make mating marks on the contact surfaces of the companion flange and propeller shaft.

2. Use special tools to pull out the companion flange.



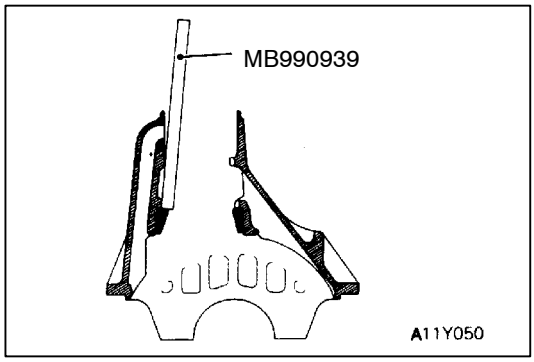
◀H▶ DRIVE PINION REAR BEARING INNER RACE REMOVAL

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.

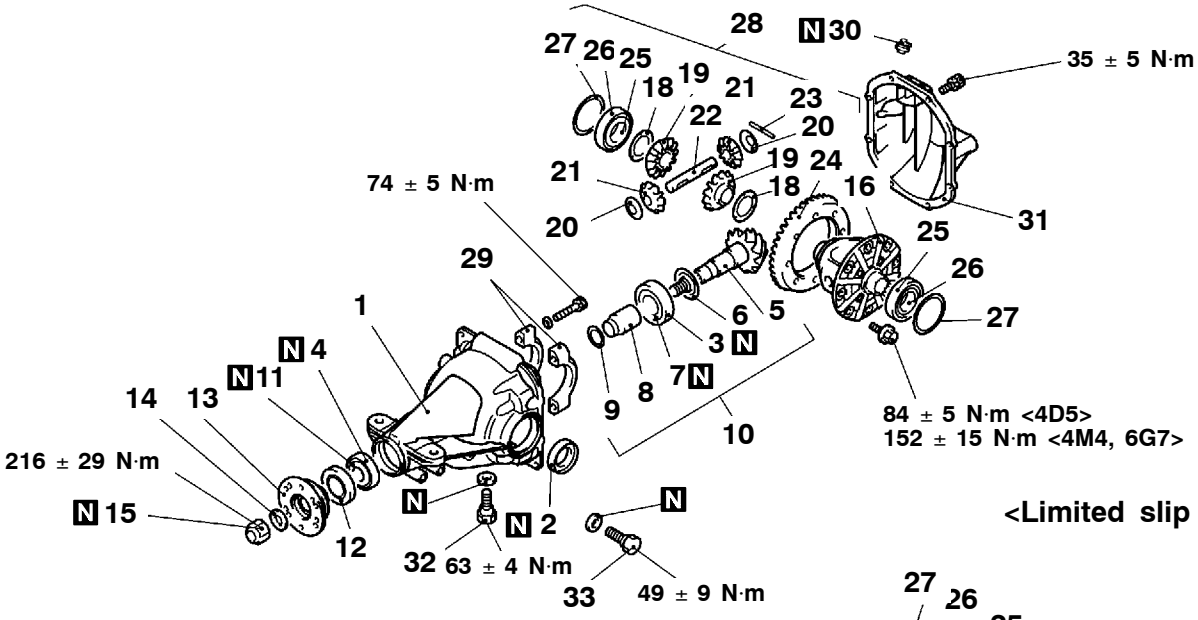


◀J▶ DRIVE PINION REAR BEARING OUTER RACE REMOVAL

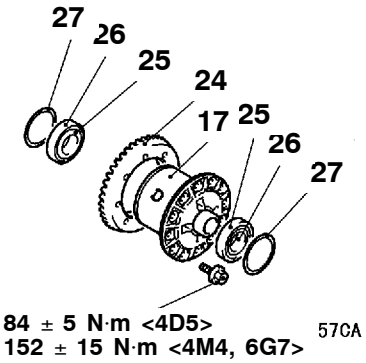
Use special tool to remove the drive pinion rear bearing outer race.

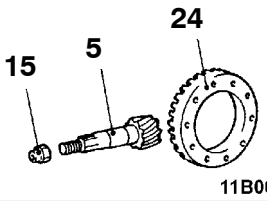
REASSEMBLY

<Conventional differential>

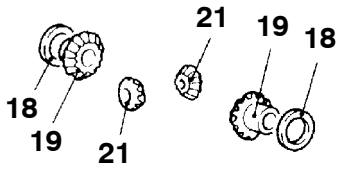


<Limited slip differential>





Differential gear set

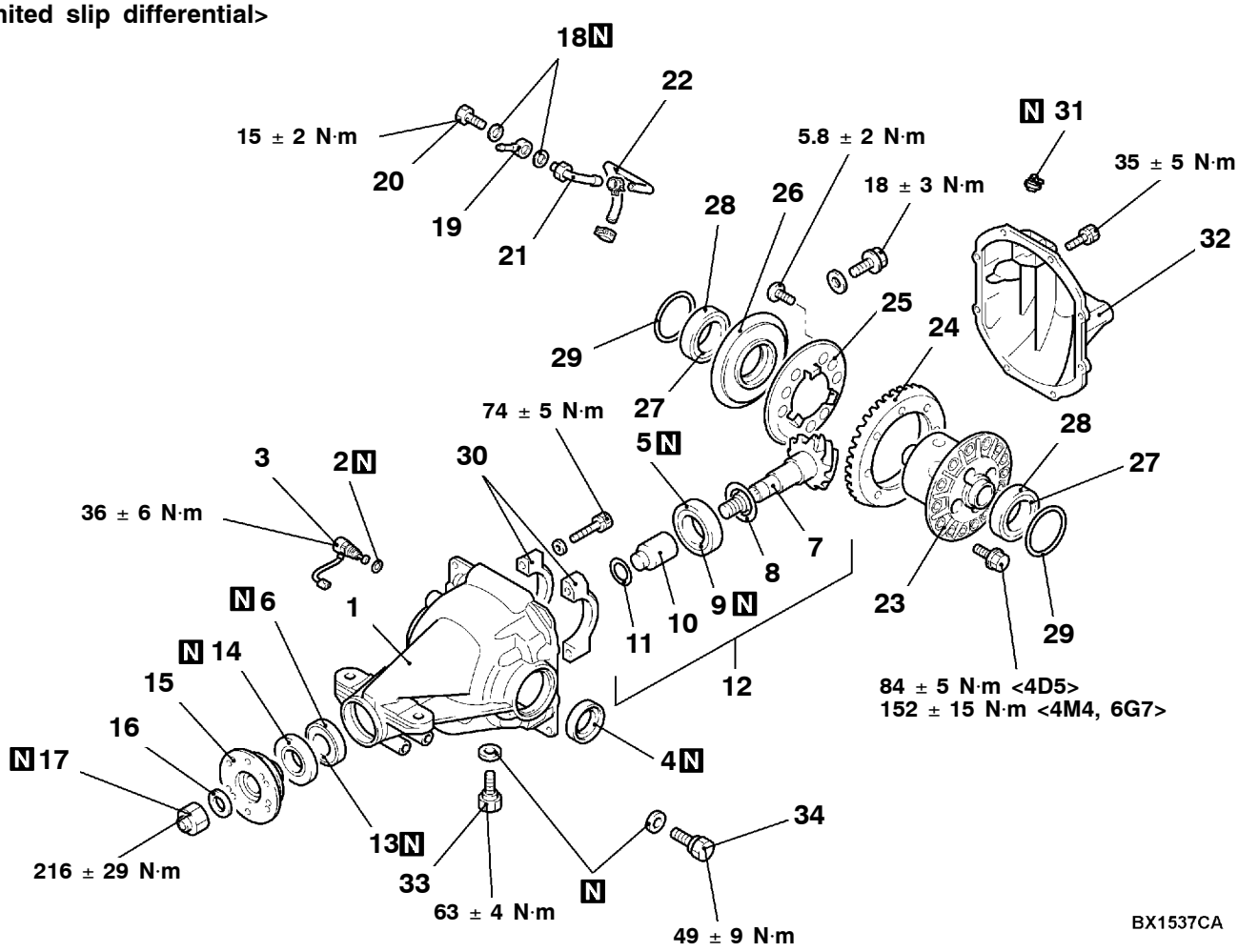


Final drive gear set

Reassembly steps

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

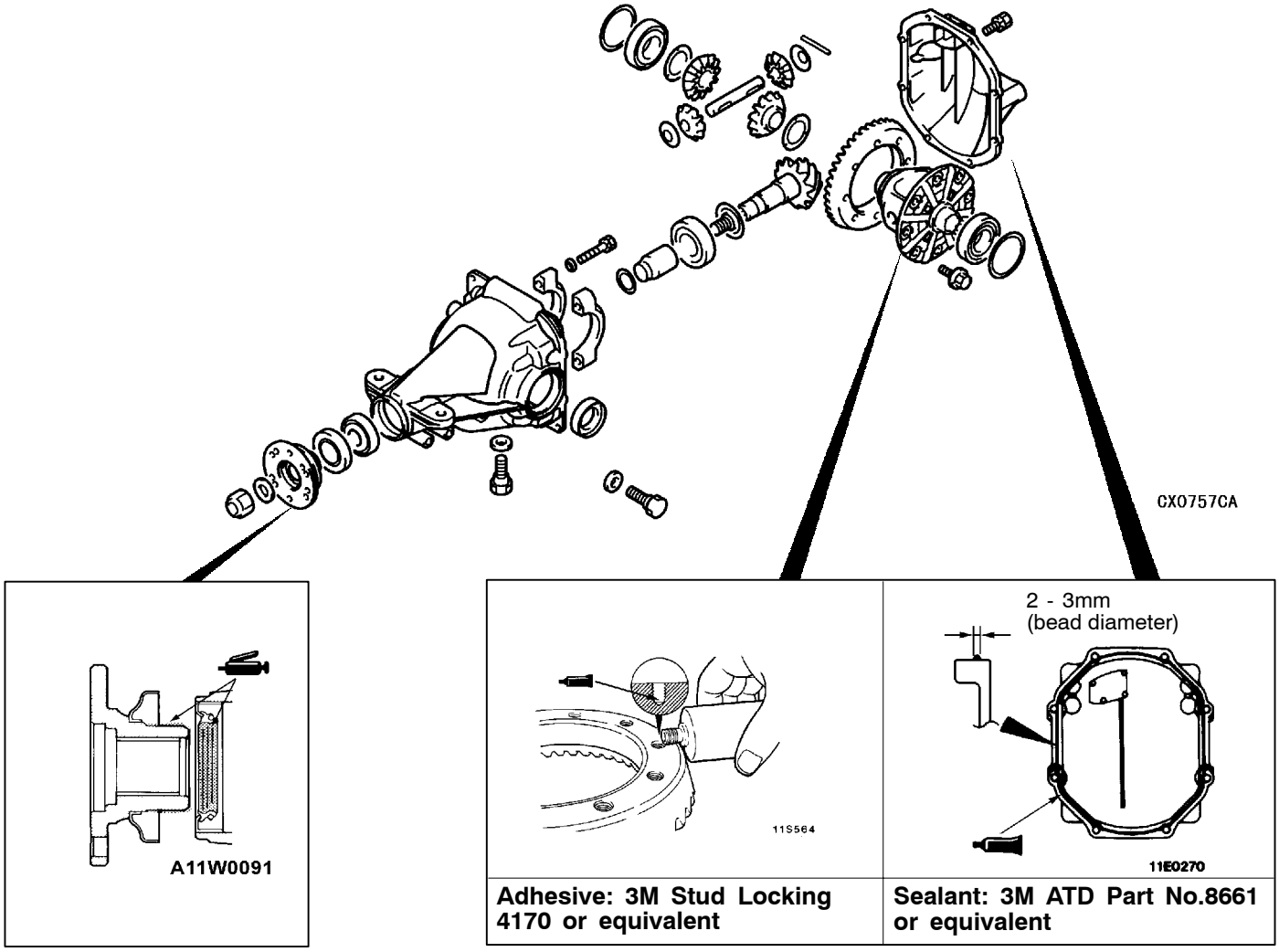
<Rear differential lock with limited slip differential>



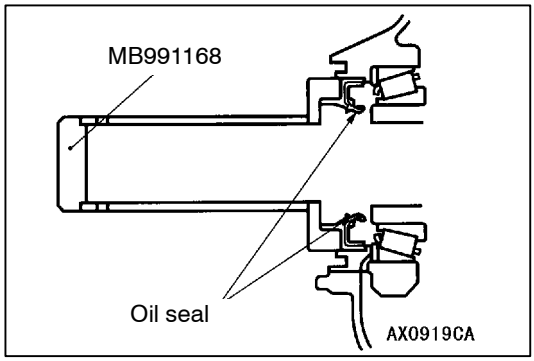
Reassembly steps

1. Differential carrier
2. Gasket
3. Rear differential lock position switch
- ▶A◀ 4. Oil seal
- ▶B◀ 5. Drive pinion rear bearing outer race
- ▶C◀ 6. Drive pinion front bearing outer race
- ▶D◀ ● Drive pinion height adjustment
7. Drive pinion
8. Drive pinion rear shim (For adjusting drive pinion height)
9. Drive pinion rear bearing inner race
10. Drive pinion spacer
- ▶E◀ ● Drive pinion turning torque adjustment
11. Drive pinion front shim (For adjusting drive pinion preload)
12. Drive pinion assembly
13. Drive pinion front bearing inner race
- ▶E◀ 14. Oil seal
15. Companion flange
16. Washer
17. Self-locking nut
18. Gasket
19. Air pipe assembly (B)
20. Eye bolt
21. Air pipe assembly (A)
22. Hose
23. Limited slip differential case assembly
- ▶H◀ 24. Drive gear
25. Pressure plate
26. Actuator assembly
- ▶I◀ 27. Side bearing inner race
28. Side bearing outer race
29. Side bearing shim
- ▶J◀ 30. Bearing cap
31. Vent plug
32. Differential cover
33. Drain plug
34. Filler plug
- ▶J◀ ● Final drive gear backlash adjustment

Lubrication and Adhesive Points

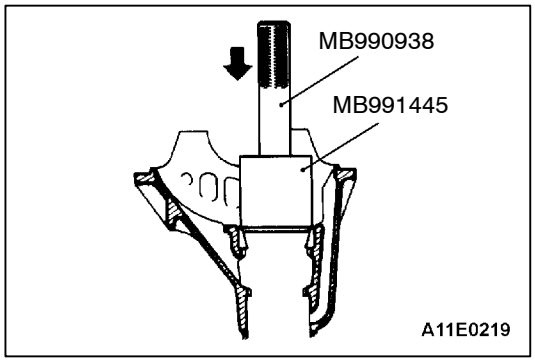


Adhesive: 3M Stud Locking 4170 or equivalent	Sealant: 3M ATD Part No.8661 or equivalent

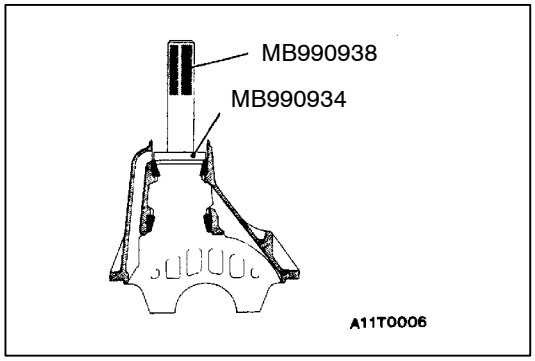


REASSEMBLY SERVICE POINTS

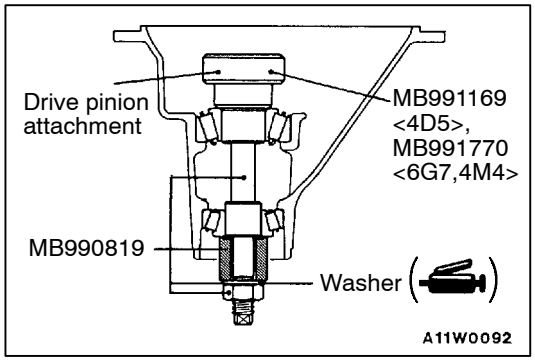
▶A◀ OIL SEAL PRESS-FITTING



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



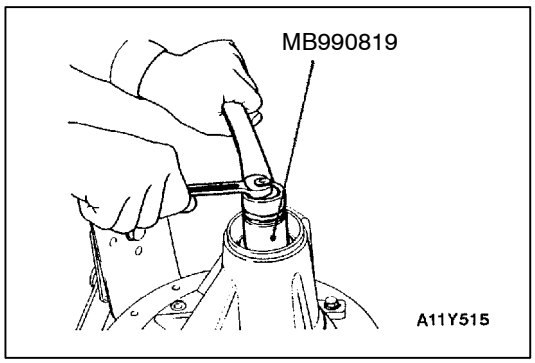
▶C◀ DRIVE PINION FRONT BEARING OUTER RACE PRESS-FITTING



▶D◀ DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedures:

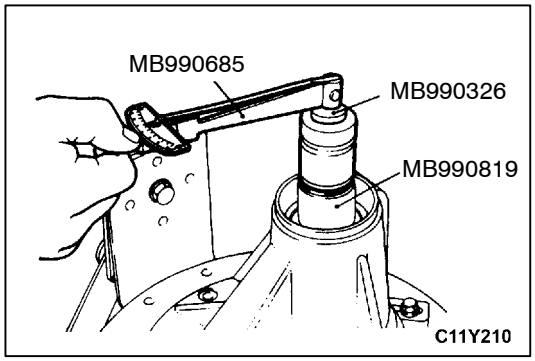
1. Apply multipurpose grease to the washer of special tool.
2. Install special tool and drive pinion front and rear bearing inner races to the gear carrier in the sequence shown in the illustration.

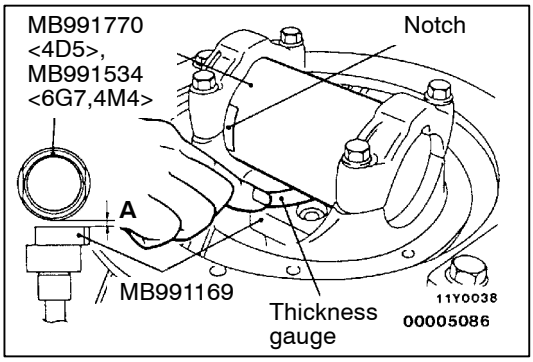


3. Tighten the nut of special tool a little at a time while measuring the turning torque of the drive pinion. Then confirm the turning torque(without the oil seal) is at the standard value.

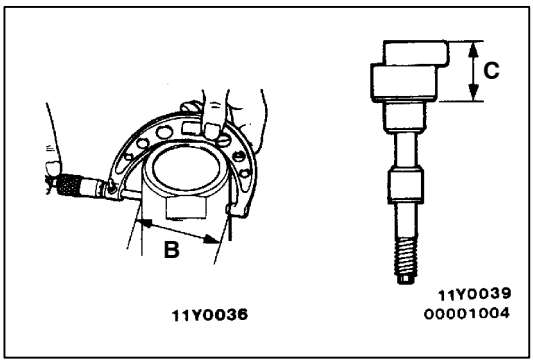
Standard value:

Bearing type	Turning torque
New	1.94 - 2.25 N·m

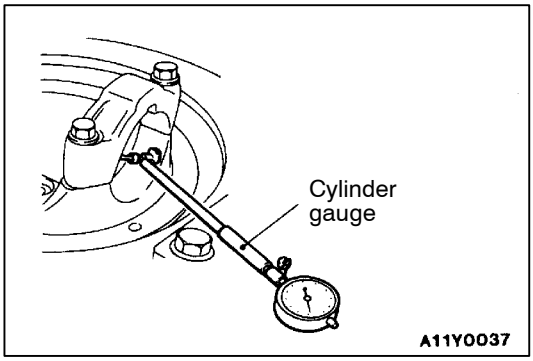




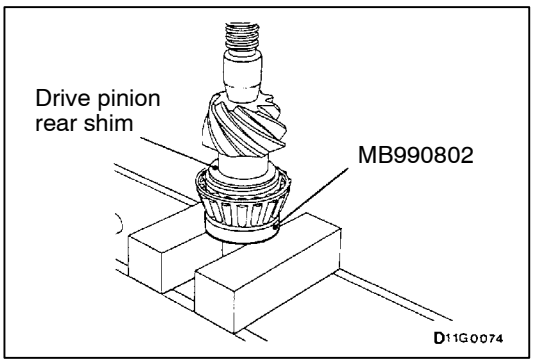
4. Clean the side bearing hub.
5. Place special tool between the side bearing hub of the gear carrier, and position the notch as shown in the illustration. Then tighten side bearing mounting bolt.
6. Use a thickness gauge to measure the clearance (A) between special tools.



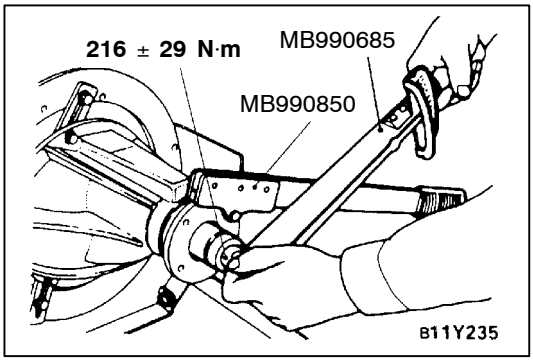
7. Remove special tools (MB991170, MB991169).
8. Use a micrometer to measure the shown dimensions (B, C) of special tools.



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 - 86.00 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.

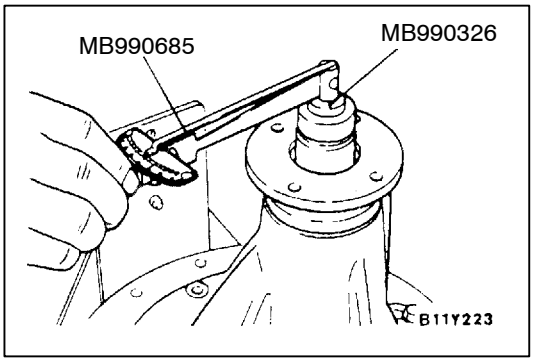


▶E◀ DRIVE PINION TURNING TORQUE ADJUSTMENT /OIL SEAL INSTALLATION

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.

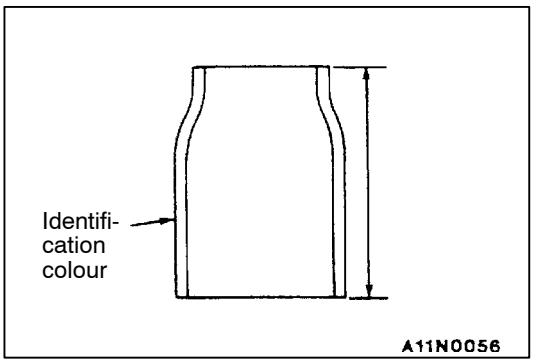
2. Tighten the companion flange to the specified torque by using special tool.



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

Standard value:

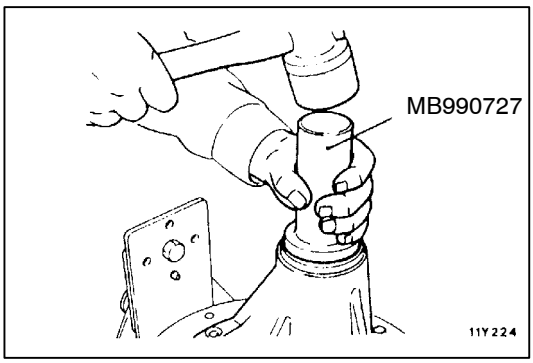
Bearing division	Turning torque
New	1.94 - 2.25 N·m



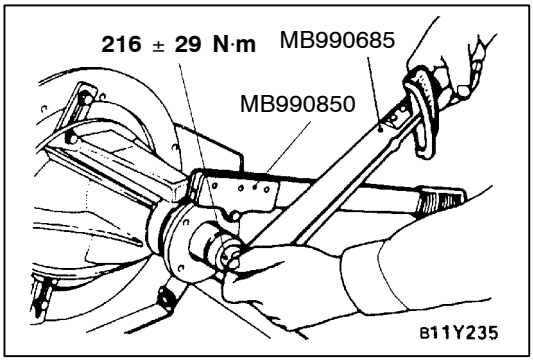
4. If the drive pinion turning torque is not within the standard value, adjust the turning torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

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.

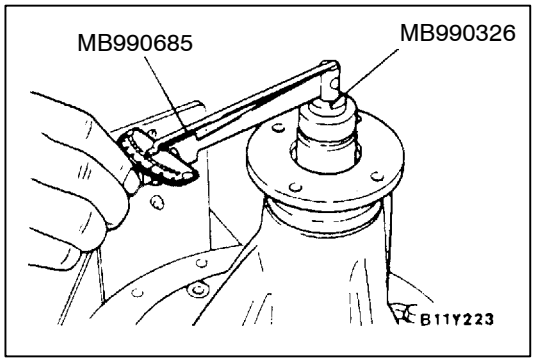
Height of drive pinion spacer mm	Identification colour
52.50	Yellow
52.84	Red



5. 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.



6. 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.

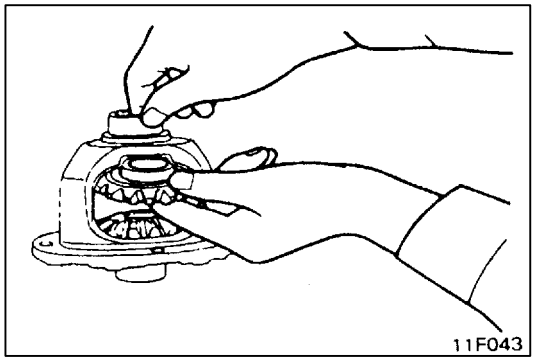


7. Measure the drive pinion turning torque (with oil seal) to verify that the drive pinion turning torque complies with the standard value.

Standard value:

Bearing division	Companion flange lubrication	Turning torque
New	None (With anti-rust agent)	2.03 - 2.34 N·m
	Gear oil applied	2.10 - 2.40 N·m

8. 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.

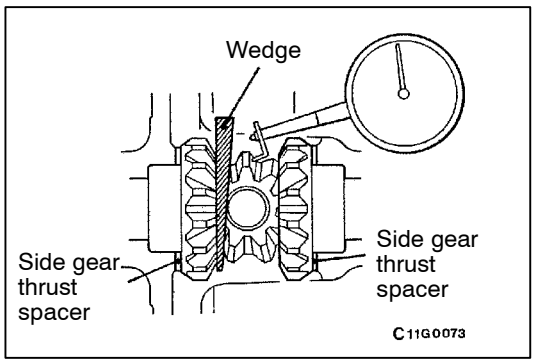


▶F◀ DIFFERENTIAL GEAR BACKLASH ADJUSTMENT

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.



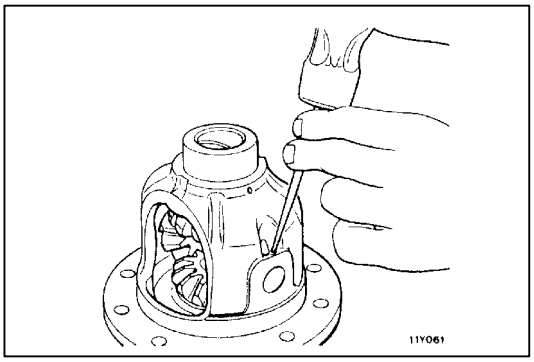
3. Insert a wedge between the side gear and the pinion shaft to lock the side gear.
4. While locking the side gear with the wedge, measure the differential gear backlash with a dial indicator on the pinion gear.

Standard value: 0 - 0.076 mm

Measure by the same procedure for the other pinion gear.

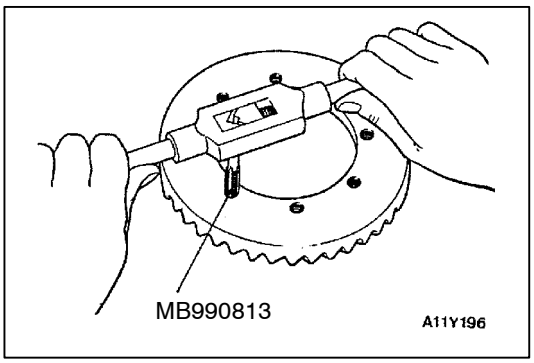
Limit: 0.2 mm

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.



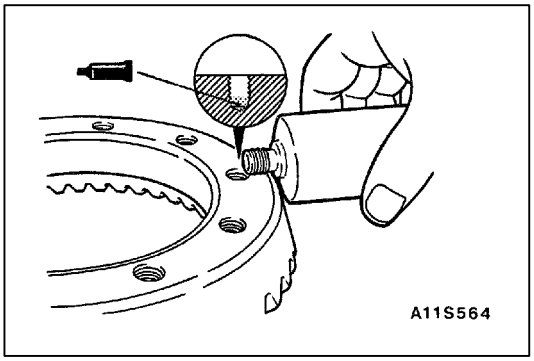
▶G◀ LOCK PIN INSTALLATION

1. Align the pinion shaft lock pin hole with the differential case lock pin hole, and drive in the lock pin.
2. Stake the lock pin with a punch on both sides.



▶H◀ DRIVE GEAR INSTALLATION

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

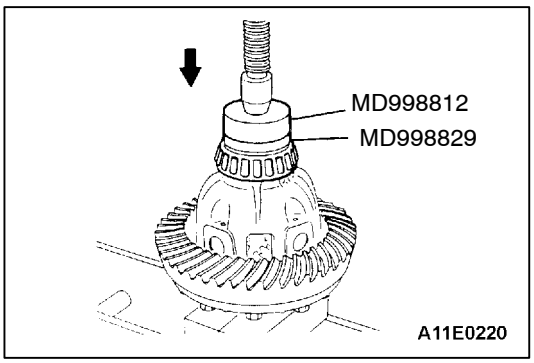


3. Apply the specified adhesive to the threaded holes of the drive gear.

   Specified adhesive:
   3M Stud Locking 4170 or equivalent

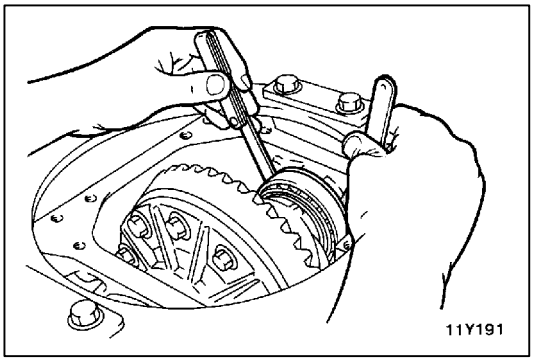
4. Install the drive gear onto the differential case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.

   Tightening torque: 84 ± 5 N·m <4D5>
   152 ± 15 N·m <4M4, 6G7>



▶I◀ SIDE BEARING INNER RACE INSTALLATION

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

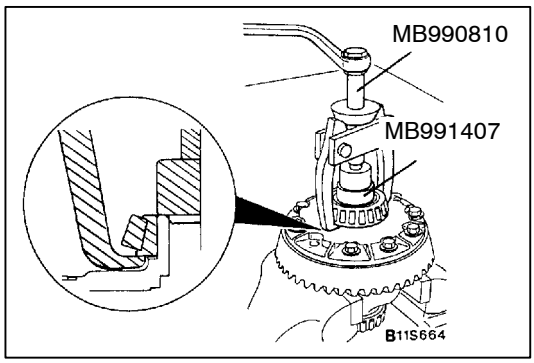


▶J◀ BEARING CAP INSTALLATION/FINAL DRIVE GEAR BACKLASH ADJUSTMENT

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.

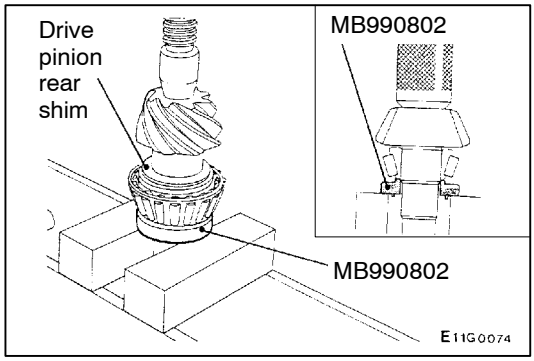
3. Select two pairs of the side bearing spacer with the thickness derived from the sum of the clearance and a half of pre-load, 0.05 mm.



4. Remove the side bearing with special tools.

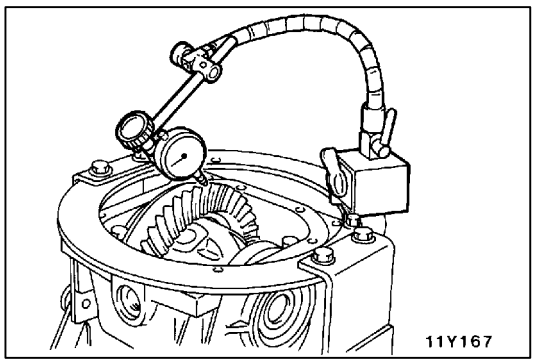
   NOTE
   Hook the claws of the special tool with the side bearing inner race by using the notches (two areas) of the differential case side.

5. Assemble the selected side bearing spacers to each side.



6. Use special tools to press-fit the side bearing inner case into the differential case. After installing the outer race, assemble the differential case to the gear carrier.
7. Align the mating marks of differential carrier and the bearing cap with each other to tighten to the specified torque.

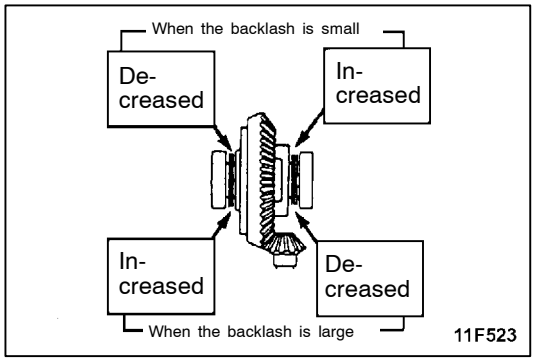
   Tightening torque: 74 ± 5 N·m



8. Measure the drive gear backlash.

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

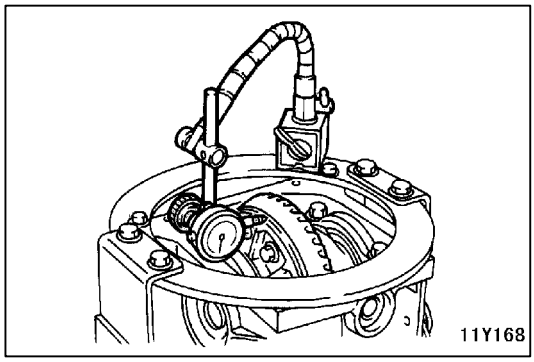
   Standard value: 0.13 - 0.18 mm



9. 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.

10. Inspect the tooth condition at the final drive gear and make an adjustment if required. (Refer to GROUP 26 – Pre-removal Inspection.)



11. Measure the drive gear runout.

    Limit: 0.05 mm

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

NOTES