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# STEERING

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

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# STEERING

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**WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES**  
**WARNING!**

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

**NOTE**

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (\*).

## GENERAL INFORMATION

A 4-spoke type steering wheel has been mounted. All models have been equipped with the SRS as standard.

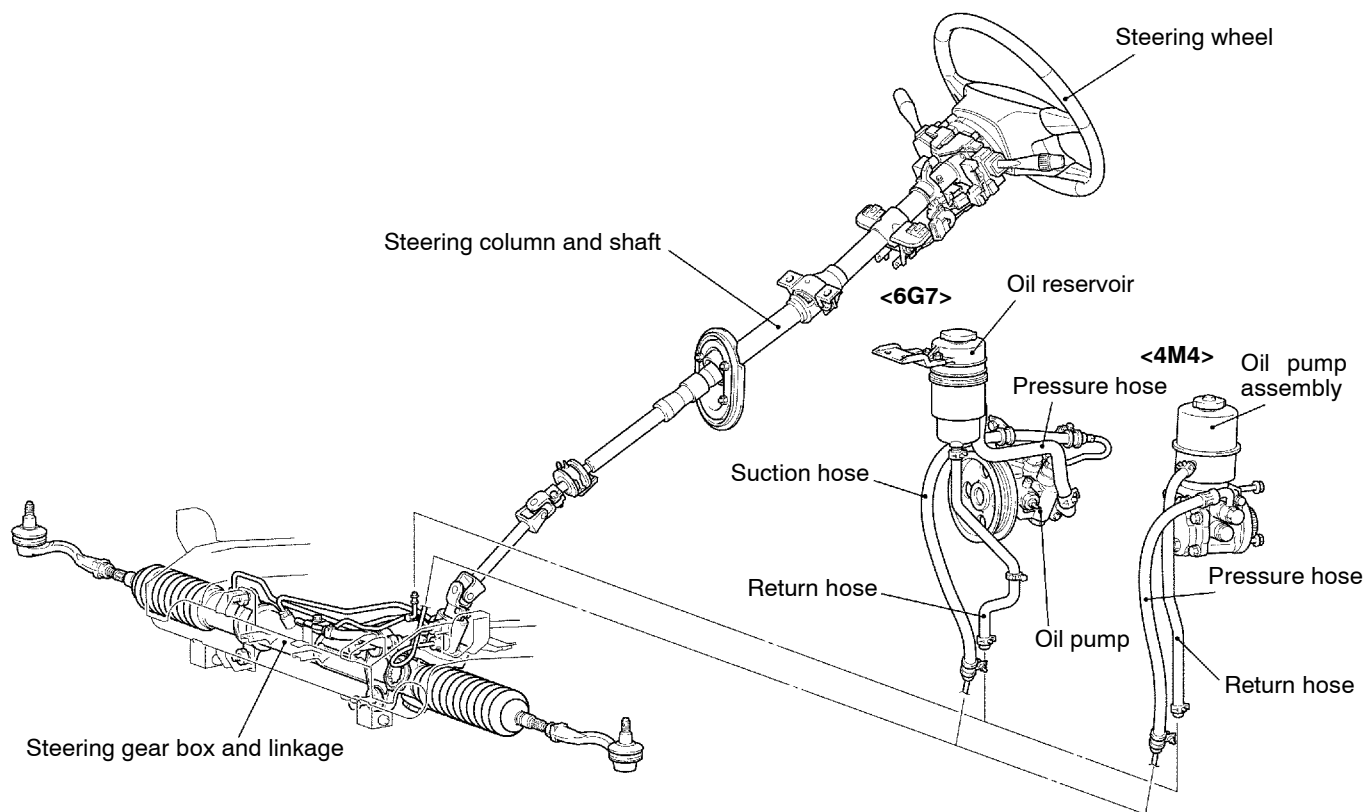
The power steering is an integral rack and pinion type that combines the steering gear and linkage

into one light-weight and compact assembly. The steering system uses a vane oil pump with a fluid flow control system, so that steering effort varies with engine speed.

Item		Specifications
Steering gear and linkage	Type	Integral type
	Gear type	Rack and pinion
Oil pump	Type	Vane type
	Displacement ml/rev.	10.0
	Relief set pressure MPa	8.8

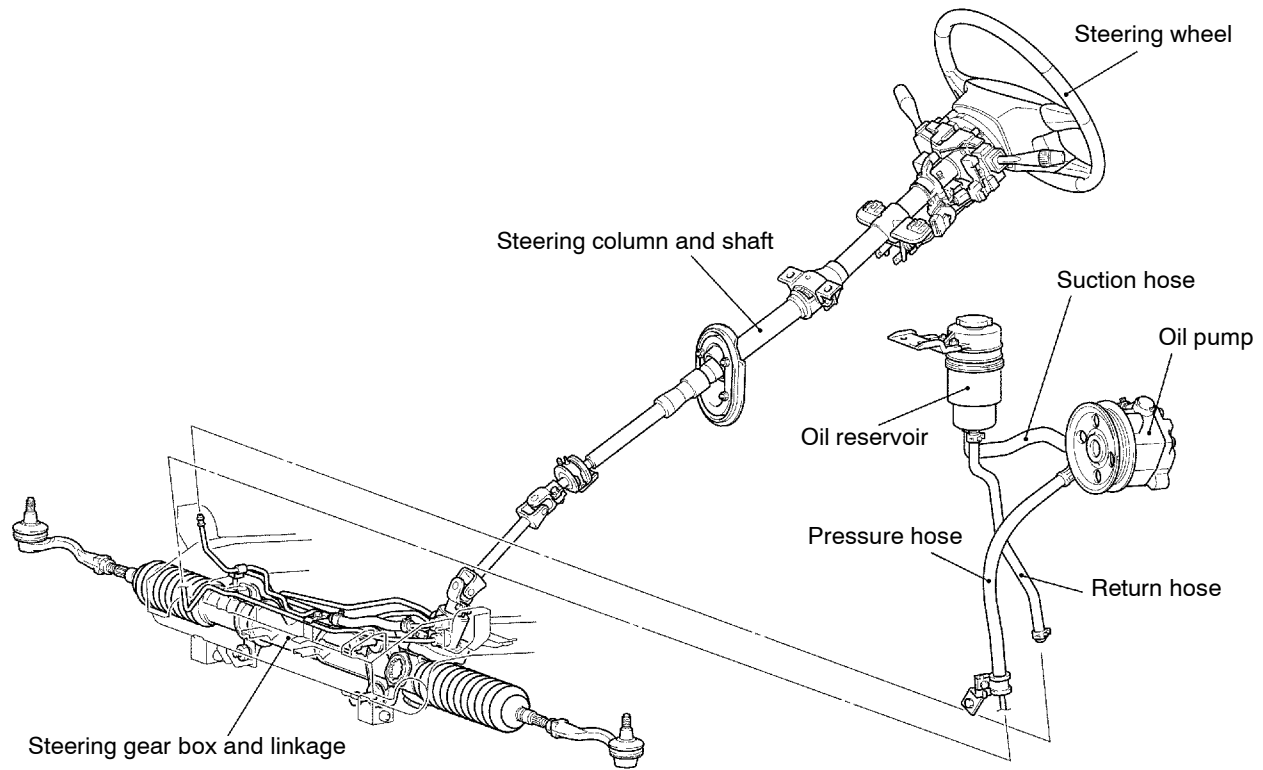
## CONSTRUCTION DIAGRAM

<L.H. drive vehicles–6G7, 4M4>



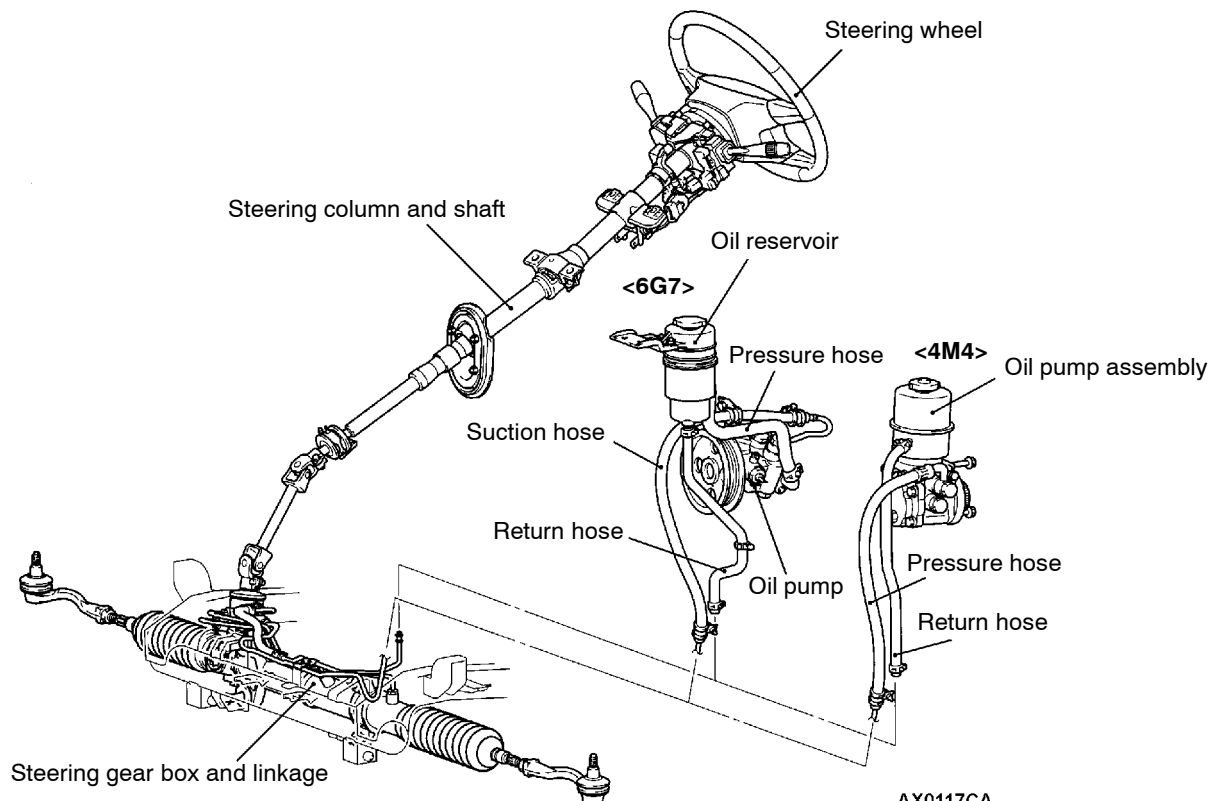
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## &lt;L.H. drive vehicles-4D5&gt;



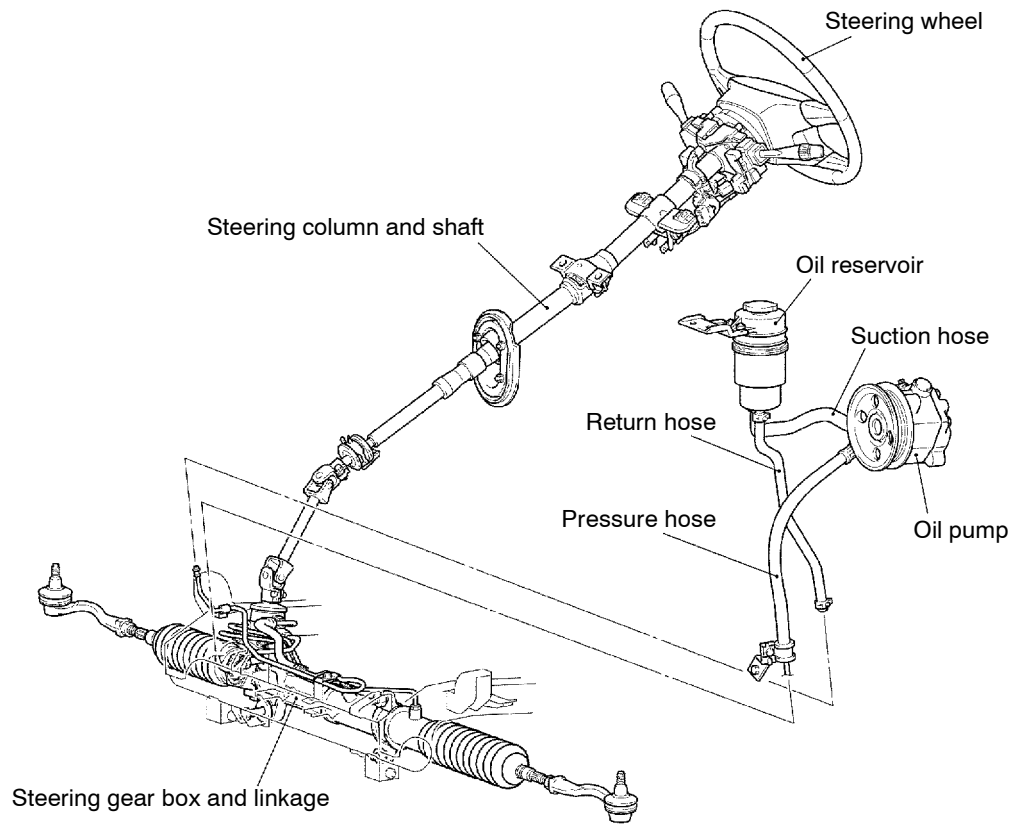
AX1645CA

## &lt;R.H. drive vehicles-6G7, 4M4&gt;



AX0117CA

&lt;R.H. drive vehicles-4D5&gt;



AX1646CA

## SERVICE SPECIFICATIONS

Item		Standard value	Limit
Steering wheel free play mm	with engine running	-	30 or less
	with engine stopped	0 – 10	-
Steering angle	Inner wheel	36°30' ± 1°30'	-
	Outer wheel <For reference>	31°40'	-
Ball joint turning torque N·m		0.49 - 2.45	-
Stationary steering effort N	Steering effort	39.2 or less	-
	Fluctuation allowance	5.9 or less	-
Oil pump relief pressure MPa		8.3 - 9.0	-
Pressure under no-load condition MPa	<6G7, 4D5>	0.34	-
	<4M4>	0.29	-
Steering gear retention hydraulic pressure MPa		8.3 - 9.0	-
Oil pressure switch operating pressure MPa <6G7, 4M4>	OFF→ON	1.5 - 2.0	-
	ON→OFF	1.5 - 2.0	-
Pinion total rotation torque N·m	Total rotation torque	0.6 - 1.7	-
	Torque variation	0.4 or less	-
Tie rod joint swing resistance N (Tie rod joint swing torque N·m)		11 - 35 (1.4 - 4.9)	-
Special tool aperture dimension (MB991561) mm		2.9	-
Band crimped width mm		2.4 - 2.8	-

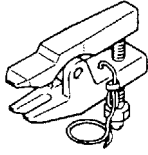
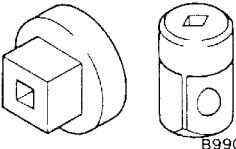
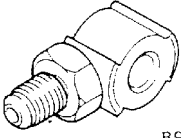
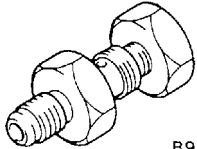
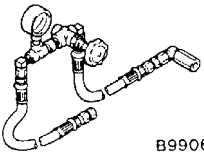
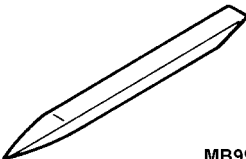
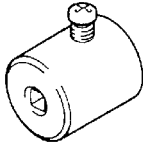
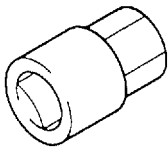
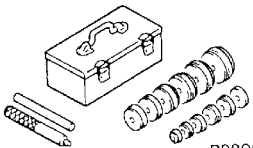
## LUBRICANTS

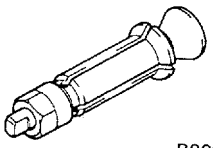
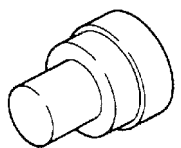
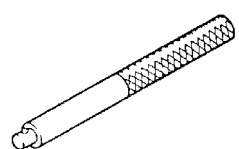
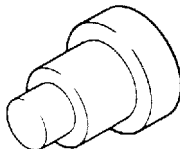
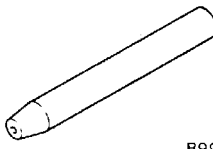
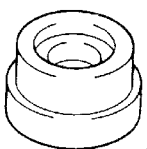
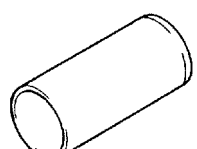
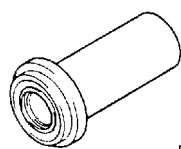
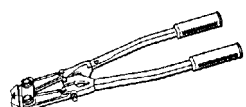
Item	Specified lubricant	Quantity
Power steering	Automatic transmission fluid DEXRON II	About 0.6 l
Tie rod bellows	Silicone grease	As required
Pinion and valve assembly	Repair kit grease	As required
Rack assembly	Repair kit grease	As required

## SEALANT AND ADHESIVE

Item	Specified sealant	Remarks
Rack support cover end plug	3M ATD Part No. 8663 or equivalent	Semi-drying sealant

## SPECIAL TOOLS

Tool	Number	Name	Use
 B991113	MB990635, MB991113 or MB991406	Steering linkage puller	Tie rod end disconnection
 B990326	MB990326	Preload socket	Ball joint turning torque measurement
 B990993	MB991548	Power steering oil pressure gauge adapter (pump side)	Oil pressure measurement
 B990994	MB991549	Power steering oil pressure gauge adapter (hose side)	
 B990662	MB990662	Oil pressure gauge assembly	
 MB990784	MB990784	Ornament remover	Steering wheel cover removal
 B991006	MB991006	Preload socket	Total pinion torque measurement
 B991204	MB991204	Torque wrench socket	<ul style="list-style-type: none"> <li>• Rack support cover removal</li> <li>• Total pinion torque adjustment</li> </ul>
 B990925	MB990925	Bearing and oil seal installer set	Oil seal and bearing press fitting (Refer to GROUP 26 - Special Tools.)

Tool	Number	Name	Use
 B991120	MB991120	Needle bearing puller	Valve housing needle bearing pressing-out
 B991198	MB991199	Oil seal installer	Gear housing oil seal press fitting
 B991197	MB991197	Bar (long type)	
 B991202	MB991202	Oil seal and bearing installer	Valve housing needle bearing and lower bearing press fitting
 B991212	MB991213	Oil seal protector	Rack assembly installation
 B991203	MB991203	Oil seal and bearing installer	Valve housing oil seal and bearing press fitting
 B991317	MB991317	Seal ring installer	Pinion seal ring compression
 B990941	MB990941	Torque tube bearing installer	Valve housing lower oil seal press fitting
 B991561	MB991561	Boot band crimping tool	Bellows band installation

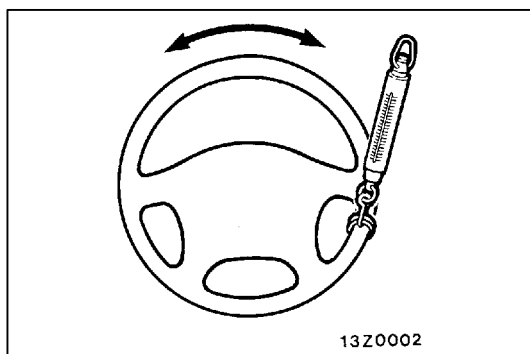


## ON-VEHICLE SERVICE

### STEERING WHEEL FREE PLAY CHECK

1. With the engine running (hydraulic pressure operating), put the front wheels in straight-ahead position.
2. Lightly turn the steering wheel left and right to measure circumferential play on the steering wheel before the wheels start to move.

**Limit: 30 mm or less**



3. When the play exceeds the limit, check steering shaft connections and steering linkage for looseness. Repair or replace if necessary.
4. If the play still exceeds the limit, put the steering wheel in straight-ahead position with the engine stopped. Then, load 5 N in the circumferential direction on the steering wheel and measure circumferential play.

**Standard value: 0 – 10 mm**

5. In case the play exceeds the standard value again, remove the steering gear box and linkage. Then, check and adjust total pinion torque. (Refer to P.37A-19.)

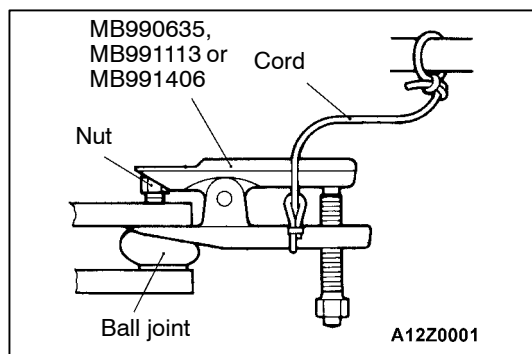
### STEERING ANGLE CHECK

1. Put the front wheels on a turning radius gauge and measure steering angle.

**Standard value:**

Inner wheels	$36^{\circ}30' \pm 1^{\circ}30'$
Outer wheels <For reference>	$31^{\circ}40'$

2. If the standard values are not met, toe-in is probably incorrect. Adjust the toe-in, seeing GROUP 33A - On-vehicle Service, and recheck the steering angle.

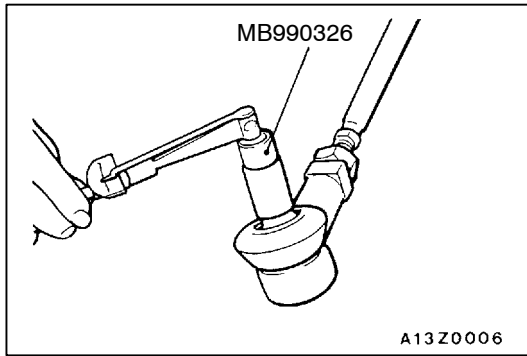


### TIE ROD END BALL JOINT STARTING TORQUE CHECK

1. Use the special tool to disconnect the tie rod and knuckle.

#### Caution

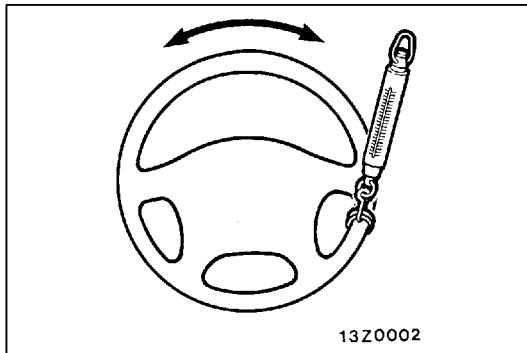
- (1) In order not to damage the ball joint thread, the tie rod end mounting nut must be only loosened but not removed from the ball joint. Also, be sure to use the special tool.
- (2) Tie the special tool with a cord so as not to fall off.



2. After swinging the ball joint stud several times, install the nut on the stud. Then, measure ball joint turning torque with the special tool.

**Standard value: 0.49 – 2.45 N·m**

3. When the torque is over the standard value, replace the tie rod end.
4. When the torque is below the standard value, check the ball joint for looseness or ratcheting. If none of these found, the ball joint is still serviceable.



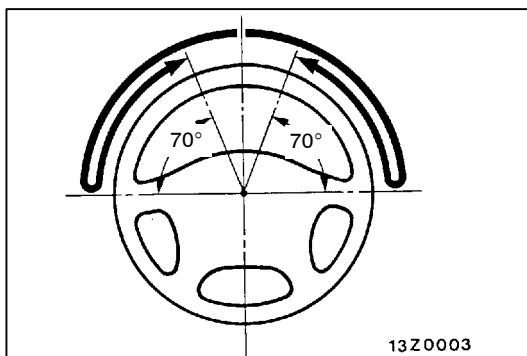
### STATIONARY STEERING EFFORT CHECK

1. With the vehicle stopped on a flat, paved surface, put the steering wheel in straight-ahead position.
2. Start the engine and keep it at  $1,000 \pm 100$  r/min.
3. Attach a spring balance to the steering wheel outer bar. Measure steering effort required to turn the steering wheel from the straight-ahead position to the left and right (within a range of 1.5 turns). Also see that no significant fluctuation is present in the steering effort.

**Standard value:**

Steering effort	39.2 N or less
Fluctuation	5.9 N or less

4. If the standard values are not met, check and adjust the related parts.



### STEERING WHEEL RETURNABILITY CHECK

Check returnability as follows on road test:

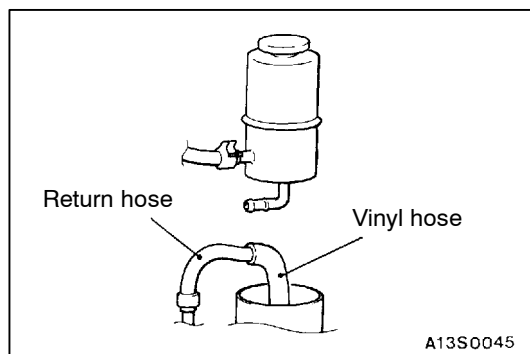
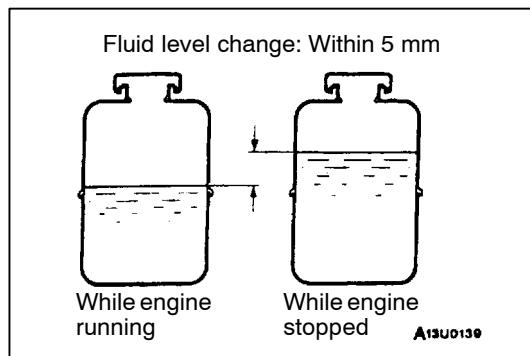
1. Make both gradual and sudden turns and see by your own feeling that the steering effort and returnability have no difference between the left and right turns.
2. At a speed of about 35 km/h, turn the steering wheel  $90^\circ$ , keep it there for 1 to 2 seconds and release. When the steering wheel returns more than  $70^\circ$ , it has a good returnability.

#### NOTE

You may have momentary increase in effort when turning the steering wheel quickly, which is normal. This happens due to insufficient job of the oil pump when the engine is running at low speed such as idling.

### OIL PUMP BELT TENSION CHECK <6G7, 4D5>

Refer to GROUP 11A/11B - On-vehicle Service.



## POWER STEERING FLUID LEVEL CHECK

1. Park the vehicle on a flat, level surface and start the engine. Without the vehicle moving, turn the steering wheel several times until the fluid reaches 50 to 60°C.
2. With the engine running, turn the wheel fully left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness.
4. Check difference in fluid level between the engine stopped and running. If the difference is 5 mm or more, bleed air.

## POWER STEERING FLUID REPLACEMENT

1. Jack up the vehicle and support the front wheels with rigid racks.
2. Disconnect the return hose.
3. Connect a vinyl hose to the return hose and drain fluid into a container.
4. Disconnect the ignition coil connectors. (Refer to GROUP16 – Ignition System.)
5. Cranking the engine several times intermittently with the starter, turn the steering wheel fully left and right to drain the fluid.
6. Connect the return hose and secure it with the clip.
7. Fill the oil reservoir with specified fluid up to between “MAX” and “MIN” marks, and then bleed air.

### Specified fluid:

**Automatic transmission fluid DEXRON II**

### Caution

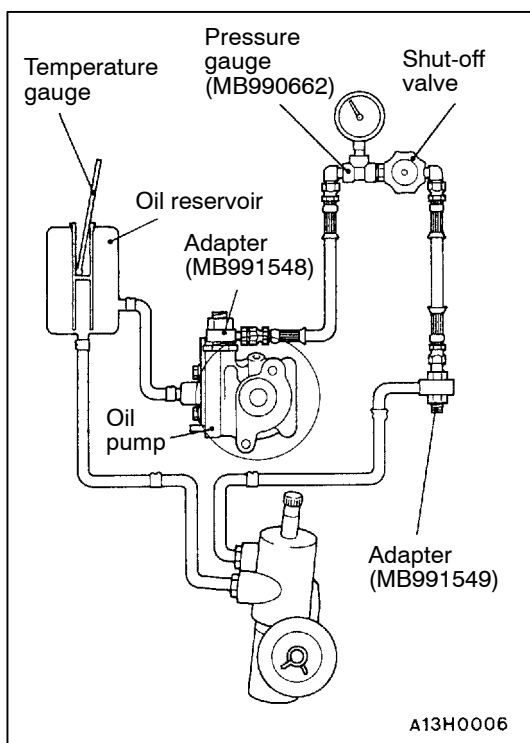
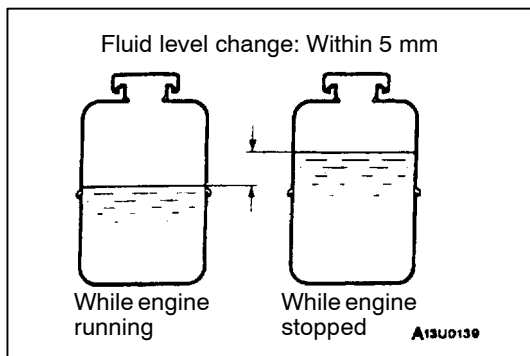
**Do not use ATF-SP II M and ATF-SP III.**

## POWER STEERING SYSTEM BLEEDING

1. Jack up the vehicle and support the front wheels with rigid racks.
2. Disconnect the ignition coil connectors. Cranking the engine with the starter several times intermittently (during 15 to 20 seconds), turn the steering wheel left and right fully five or six times.

### Caution

- (1) **During the bleeding, refill the fluid so that the level is always above “MIN” mark on the oil reservoir.**
- (2) **Be sure to bleed air only while cranking. If the bleeding is done with the engine running, the air will be broken up and absorbed into the fluid.**
3. Connect the ignition coil connectors and idle the engine.
4. Turn the steering wheel left and right fully until no bubbles comes out in the oil reservoir.
5. See that the fluid is not milky and that the fluid level is between “MAX” and “MIN” marks.
6. See that the fluid level changes little when the steering wheel is turned left and right.
7. Check difference in fluid levels between the engine stopped and running.



8. If the level changes more than 5 mm, the air is badly bled. So, bleed air again.

#### Caution

- (1) If the fluid level rises suddenly after the engine is stopped, the bleeding is incomplete.
- (2) Incomplete bleeding causes abnormal noises from the pump and the flow-control valve. This could lessen the life of the pump and the other parts.

### OIL PUMP PRESSURE TEST

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed air. Without the vehicle moving, turn the steering wheel several times to raise the fluid temperature to 50 to 60°C.
3. Start the engine and idle at 1,000±100 r/min.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure.

**Standard value: 8.3 - 9.0 MPa**

5. If the standard value is not met, disassemble and assemble the oil pump again. Then, remeasure oil pressure.
6. With the pressure gauge shut-off valve fully open, check the hydraulic pressure in unladen condition.

**Standard value:**

**<6G7,4D5> 0.34 MPa**

**<4M4> 0.29 MPa**

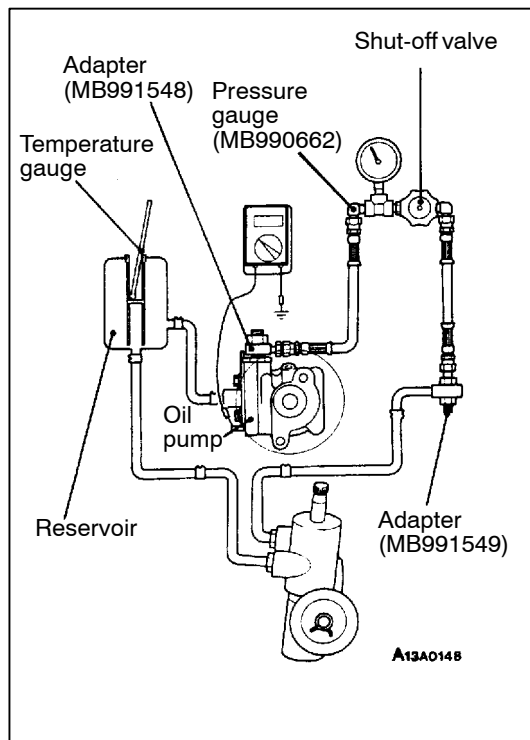
7. If the standard value is not met, the oil line or steering gear is probably defective. So, repair and measure oil pressure again.
8. Turn the steering wheel fully either left or right and check the retention hydraulic pressure.

**Standard value: 8.3 - 9.0 MPa**

9. If the pressure is below the standard value, disassemble and reassemble the steering gear. If above, disassemble and reassemble the components of the oil pump flow control valve. Then, measure oil pressure again.
10. Remove the special tools, and tighten the pressure hose to the specified torque.

**Tightening torque: 57 ± 7 N·m**

11. Bleed the system.



### POWER STEERING OIL PRESSURE SWITCH CHECK <6G7, 4M4>

1. Disconnect the pressure hose from the oil pump and connect the special tools.
2. Bleed air. Without the vehicle moving, turn the steering wheel several times to raise the fluid temperature to 50 to 60°C.
3. Idle the engine.
4. Disconnect the oil pressure switch connector and set an ohmmeter in position.
5. Gradually close the shut-off valve in the pressure gauge to increase hydraulic pressure. Check that the hydraulic pressure activating the switch meets the standard value.

**Standard value: 1.5 - 2.0 MPa**

6. Gradually open the shut-off valve and reduce the hydraulic pressure. Check that the hydraulic pressure deactivating the switch meets the standard value.

**Standard value: 1.5 - 2.0 MPa**

7. Remove the special tools and tighten the pressure hose to the specified torque.

**Tightening torque: 57 ± 7 N·m**

8. Bleed the system.

### BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the tie rod end.

#### NOTE

A cracked or damaged dust cover may damage the ball joint.

# STEERING WHEEL AND SHAFT

## REMOVAL AND INSTALLATION

### Caution:

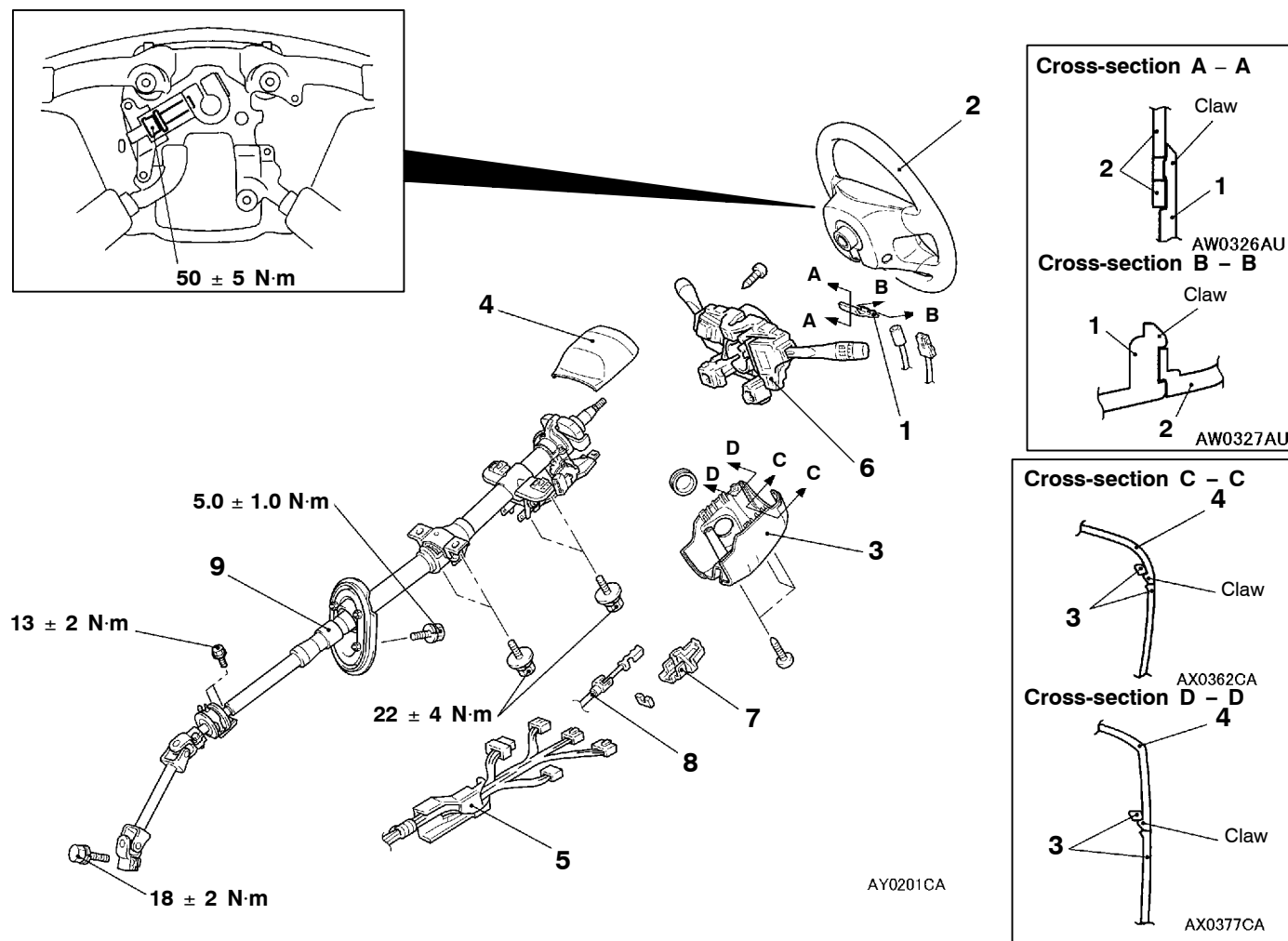
Before removing the air bag module and clock spring, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.

#### Pre-removal Operation

- Air Cleaner, Resonance Hose and Air Intake Duct Removal (Refer to GROUP 15.)
- Instrument Under Cover Removal (Refer to GROUP 52A.)

#### Post-installation Operation

- Instrument Under Cover Installation (Refer to GROUP 52A.)
- Air Cleaner, Resonance Hose and Air Intake Duct Installation (Refer to GROUP 15.)
- Checking Steering Wheel Position with Wheels Straight Ahead



### Removal steps

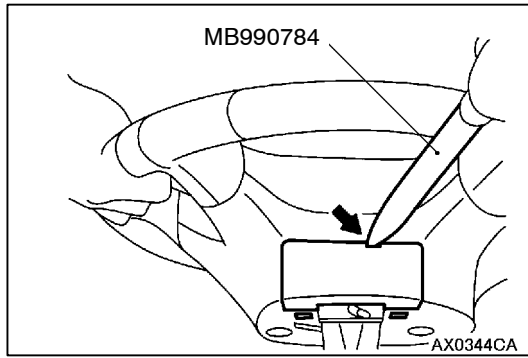


1. Cover
2. Steering wheel and air bag module assembly
3. Lower column cover
4. Upper column cover
5. Protector
6. Clock spring and column switch assembly <Refer to GROUP 52B.>
7. Cover <A/T>
8. Key interlock cable <A/T>

- Brake pedal return spring <Refer to GROUP 35A – Brake Pedal.>
- 9. Steering column shaft assembly

### NOTE

When the air bag module assembly must be removed, refer to GROUP 52B – Air Bag Modules and Clock Spring.



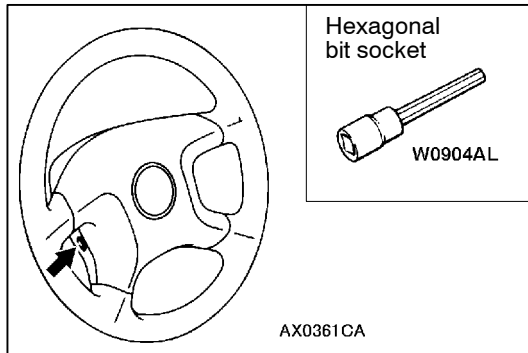
## REMOVAL SERVICE POINTS

### ◀A▶ COVER REMOVAL

Insert the special tool from the indicated position to remove the cover.

#### NOTE

The special tool can be inserted through the notch behind the position shown.



### ◀B▶ STEERING WHEEL AND AIRBAG MODULE ASSEMBLY REMOVAL

1. Disconnect the connectors of the air bag module and the horn switch through a hole made after the removal of the cover.
2. Loosen the bolt completely. Then, remove the steering wheel and airbag module assembly.

#### NOTE

Use a hexagonal bit socket or a hexagonal wrench having an effective length of 75 mm or more in the hexagonal section and the diameter of 8 mm or more.

- 
- 13E106
- 13F0052  
00005782



# POWER STEERING GEAR BOX AND LINKAGE

## REMOVAL AND INSTALLATION

### Caution: SRS

On vehicles with SRS, before removing steering gear box, refer to GROUP 52B. Also, put the front wheels in straight-ahead position and remove the ignition key. Failure to do so may damage the SRS clock spring and render the SRS air bag inoperative, which results serious driver injury.

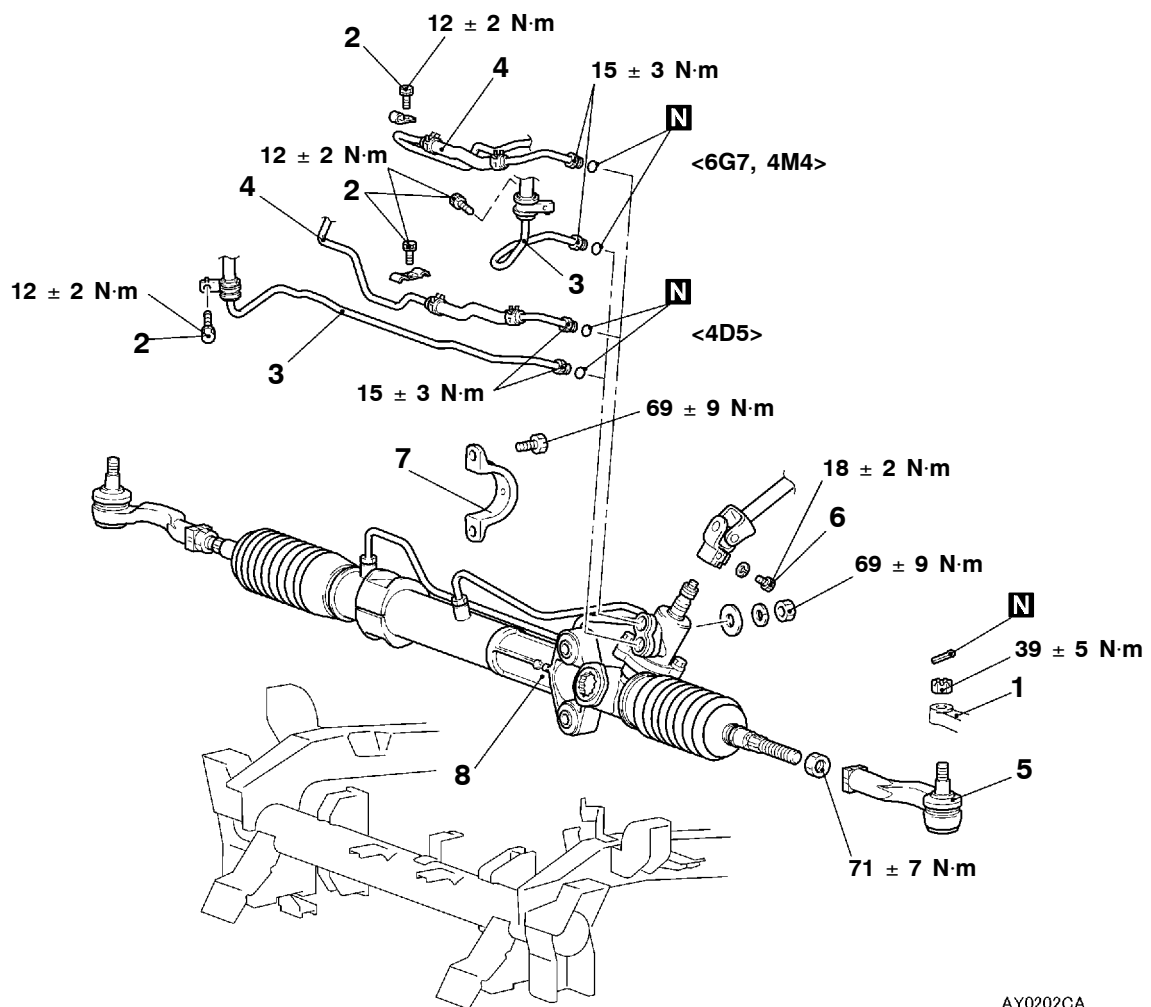
#### Pre-removal Operation

Power Steering Fluid Draining (Refer to P.37A-10.)

#### Post-installation Operation

- Power Steering Fluid Supplying and bleeding (Refer to P.37A-10.)
- Check the Dust Cover for Cracks or Damage by Pushing it with Finger.
- Checking Steering Wheel Position with Wheels Straight Ahead

<L.H. drive vehicles>



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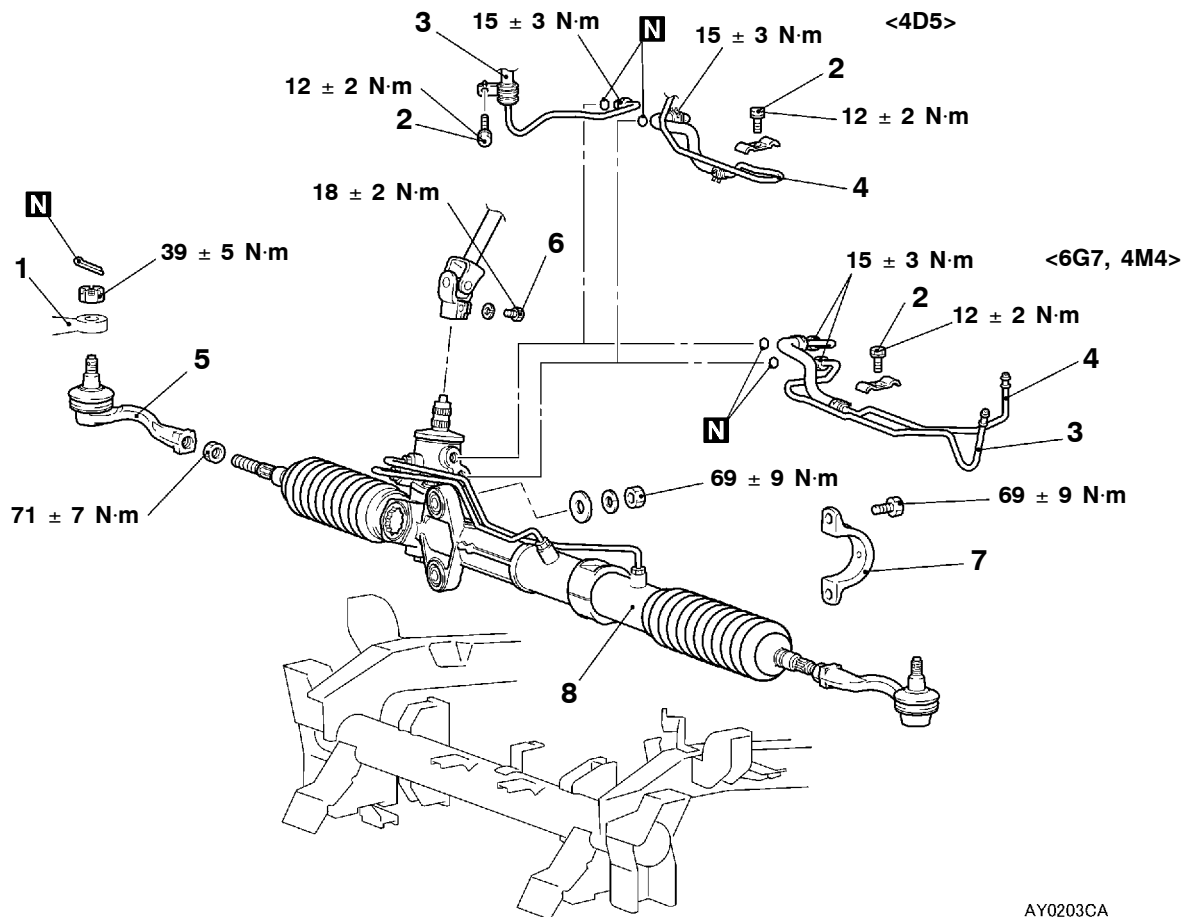
### Removal steps

- Under cover removal

1. Tie rod end and knuckle connection
2. Bolt
3. Pressure hose assembly
4. Return tube

5. Tie rod end (LH)
6. Differential mount bracket assembly (LH) separation
7. Gear box clamp
8. Steering gear and linkage

&lt;R.H. drive vehicles&gt;



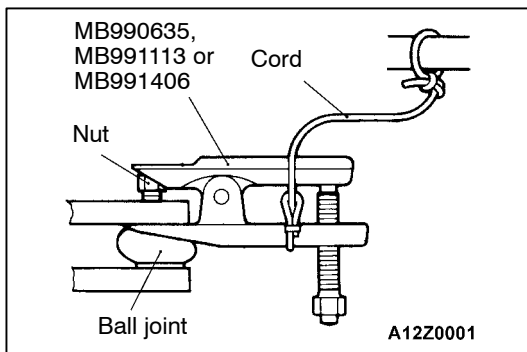
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**Removal steps**

- Under cover removal

1. Tie rod end and knuckle connection
2. Bolt
3. Pressure hose assembly
4. Return tube

5. Tie rod end (RH)
6. Differential mount bracket assembly (RH) separation
7. Gear box clamp
8. Steering gear and linkage

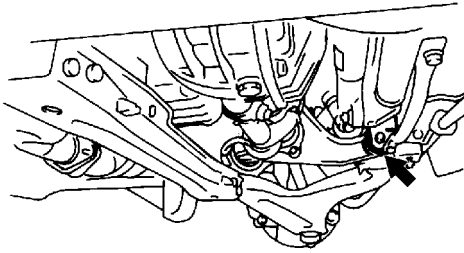


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**REMOVAL SERVICE POINTS****◀A▶ TIE ROD END AND KNUCKLE DISCONNECTION****Caution**

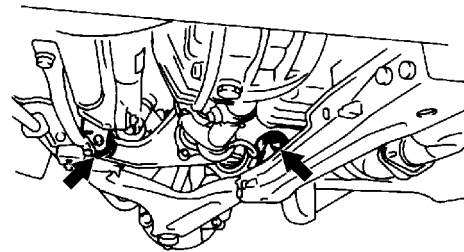
1. In order not to damage the ball joint thread, the tie rod end mounting nut must be only loosened but not removed from the ball joint. Be sure to use the special tool.
2. Tie the special tool with a cord so as not to fall off.

&lt;L.H. drive vehicles&gt;



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&lt;R.H. drive vehicles&gt;



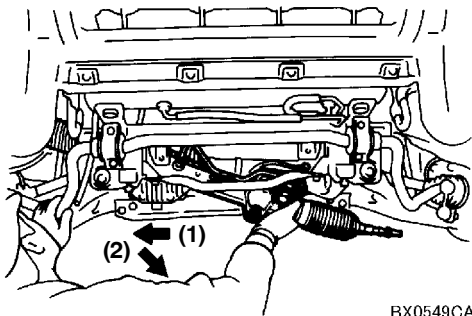
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**◀B▶ DIFFERENTIAL MOUNT BRACKET ASSEMBLY SEPARATION**

1. Remove the bolts securing the differential mount bracket assembly (LH) to the front frame assembly <L.H. drive vehicles>.

2. Remove the bolts securing the differential mount bracket assembly (RH) to the front frame assembly and the bolts securing the differential mount bracket assembly (RH) to the No.2 crossmember <R.H. drive vehicles>.

&lt;L.H. drive vehicles&gt;



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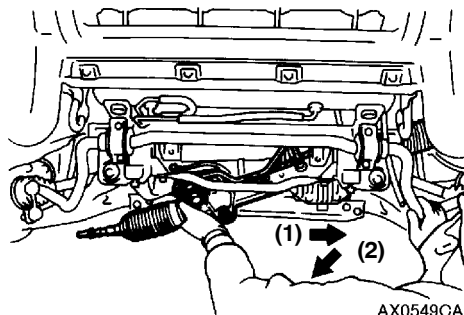
**◀C▶ STEERING GEAR AND LINKAGE REMOVAL**

1. Pull the rack to the right as far as it will go, and lower the steering gear and linkage through the space of the front frame by manipulating it <L.H. drive vehicles>.

**Caution**

**Be careful not to damage the boot when removing the steering gear and linkage.**

&lt;R.H. drive vehicles&gt;



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2. Pull the rack to the left as far as it will go, and lower the steering gear and linkage through the space of the front frame by manipulating it <R.H. drive vehicles>.

**Caution**

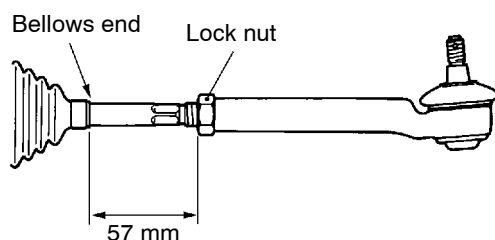
**Be careful not to damage the boot when removing the steering gear and linkage.**

**INSTALLATION SERVICE POINTS****▶A◀ TIE ROD END INSTALLATION**

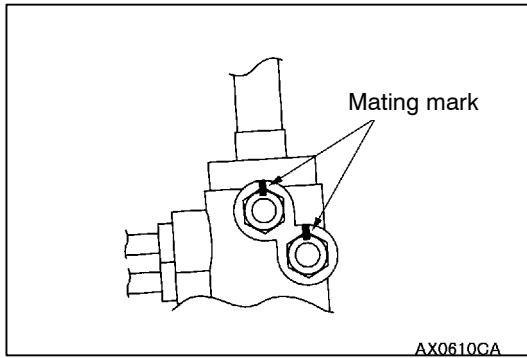
Screw in the tie-rod end by the amount shown in the illustration, and then provisionally tighten it with the lock nut.

**NOTE**

Install the steering gear and linkage to the vehicle body, and adjust the toe-in before tightening the lock nut to the specified torque.

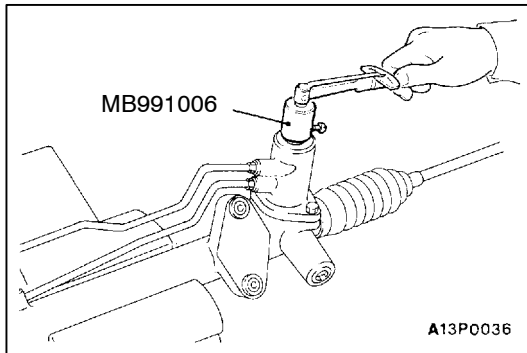


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### ►B◄ RETURN TUBE/PRESSURE HOSE ASSEMBLY INSTALLATION

Align the markings on the gearbox side and the tube side.



## INSPECTION

### GEAR BOX PINION TOTAL ROTATION TORQUE CHECK

1. Using the special tool, turn the pinion gear at a speed of one rotation per 4 to 6 seconds to measure total rotation torque.

#### Standard values:

**Total rotation torque: 0.6 – 1.7 N·m**

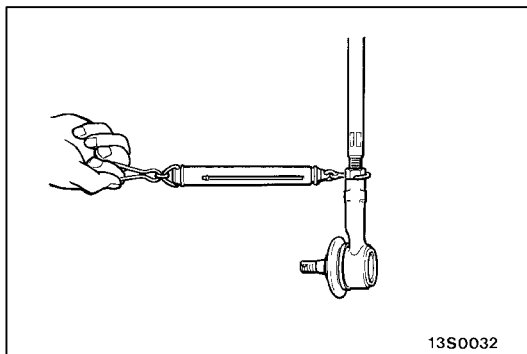
**Torque fluctuation: 0.4 N·m or less**

#### NOTE

- (1) Remove the bellows from the rack housing before measuring.
- (2) Measure the total rotation torque by turning the special tool left and right 180° from the neutral position.
2. If the standard values are not met, adjust the pinion total rotation torque. (Refer to P.37-27.)
3. In case the adjustment is impossible, disassemble and check the components, and repair if necessary.

#### Caution

**Secure the steering gear box and linkage in their mounting positions only. Otherwise, deformation or damage could result.**



### TIE ROD SWING RESISTANCE CHECK

1. Swing the tie rod 10 times hardily.
2. With the tie rod end downwards as shown, use a spring scale to measure swing resistance (swing torque).

**Standard value: 11 - 35 N (1.4 - 4.9 N·m)**

3. If the measured value is above the standard value, replace the tie rod.
4. If below, check the ball joint for looseness or ratcheting. The tie rod is still serviceable when the ball joint swings smoothly.

### TIE ROD END BALL JOINT DUST COVER CHECK

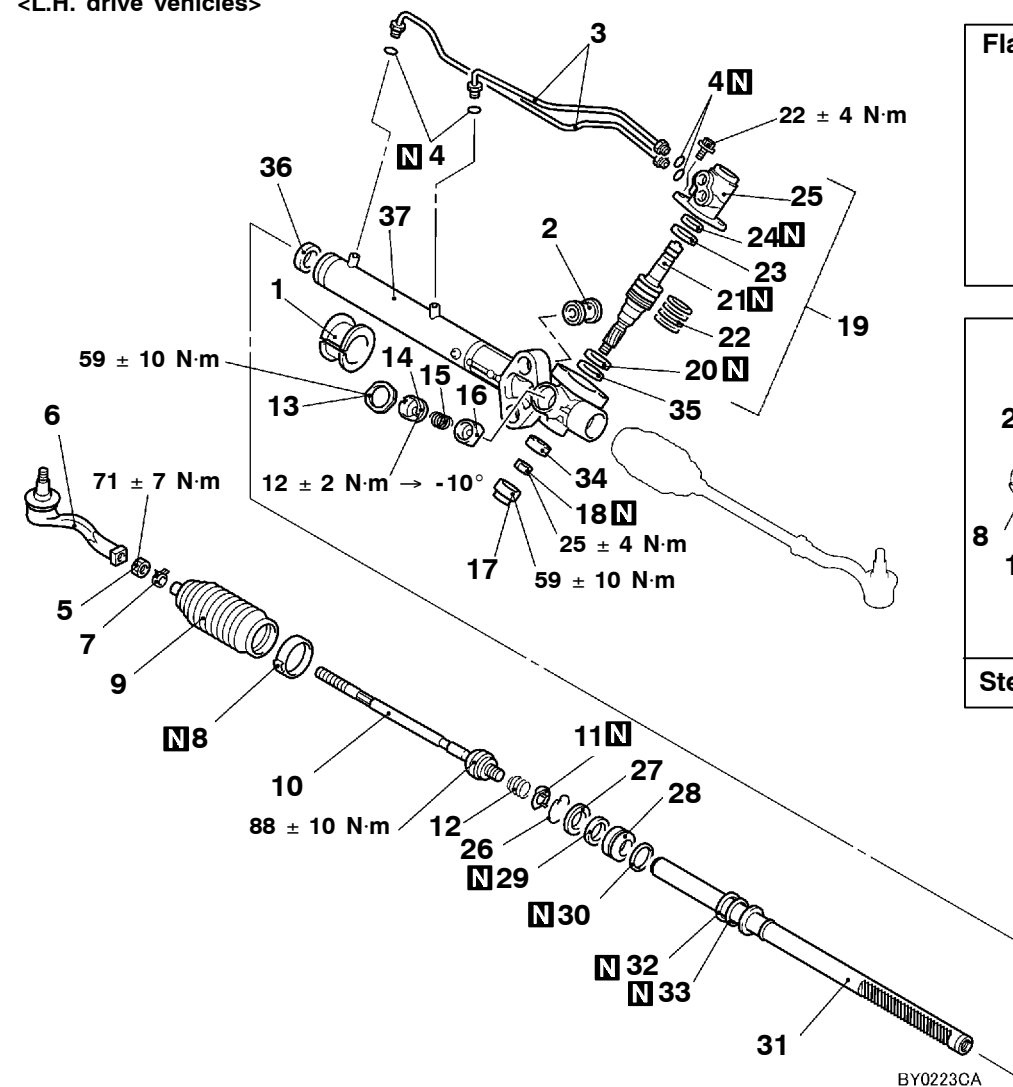
1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the tie rod end. (Refer to P.37A-20, 21.)

#### NOTE

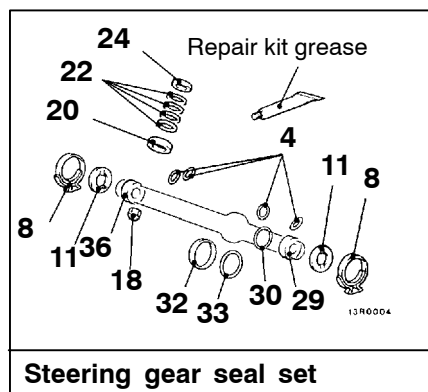
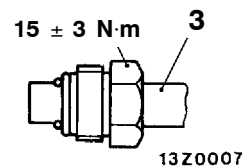
A cracked or damaged dust cover may damage the ball joint. Replace the dust cover when it is damaged during service work.

## DISASSEMBLY AND REASSEMBLY

&lt;L.H. drive vehicles&gt;



## Flare nut

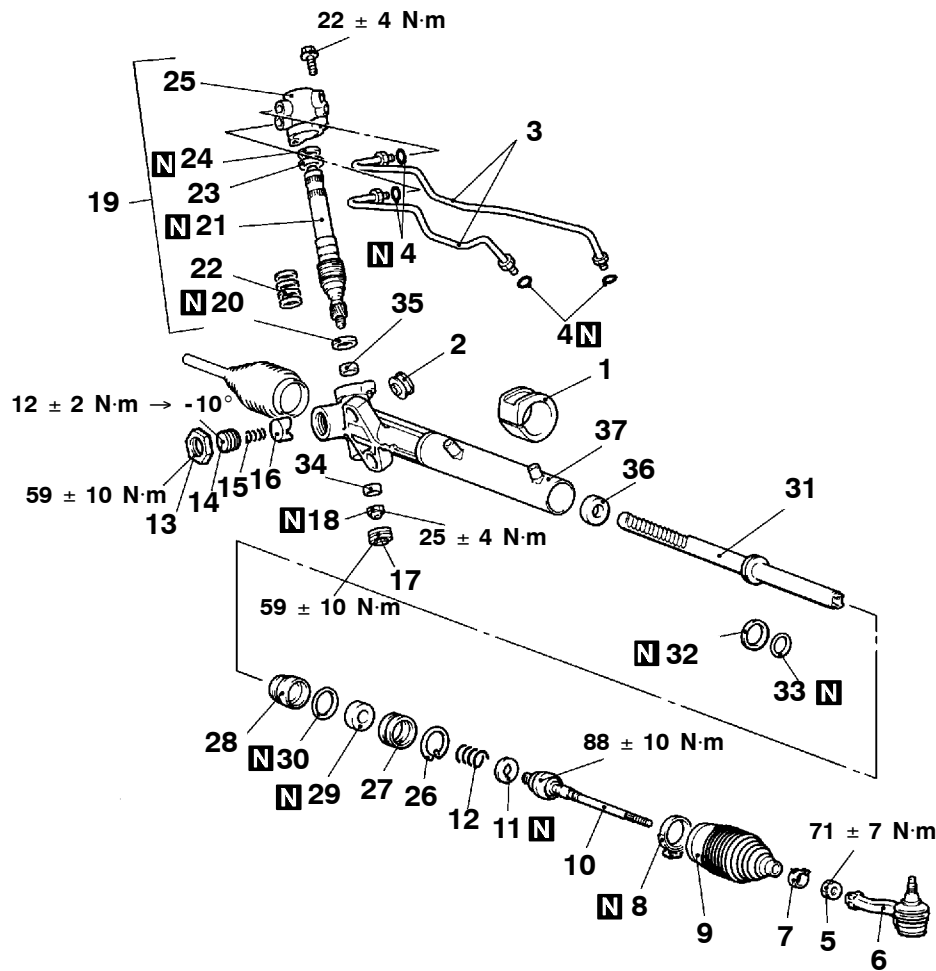


## Steering gear seal set

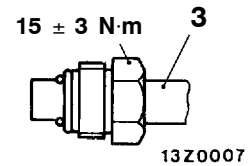
## Disassembly steps

- |     |   |        |                               |
|-----|---|--------|-------------------------------|
| ▶O◀ | 1. Gear mounting rubber cushion           | ▶B▶▶H◀ | 19. Valve housing assembly    |
| ▶N◀ | 2. Gear housing mounting bushing          | ▶B▶▶F◀ | 20. Lower oil seal            |
| ▶N◀ | 3. Feed pipe                              | ▶C▶▶G◀ | 21. Pinion and valve assembly |
| ▶M◀ | 4. O-ring                                 | ▶D▶▶F◀ | 22. Seal ring                 |
| ▶L◀ | 5. Lock nut                               | ▶D▶▶F◀ | 23. Upper bearing             |
| ▶L◀ | 6. Tie rod end                            | ▶E▶▶E◀ | 24. Upper oil seal            |
| ▶J◀ | 7. Clip                                   | ▶F▶▶D◀ | 25. Valve housing             |
| ▶J◀ | 8. Band                                   | ▶F▶▶D◀ | 26. Circlip                   |
| ▶J◀ | 9. Bellows                                | ▶F▶▶C◀ | 27. Rack stopper              |
| ▶K◀ | 10. Tie rod                               | ▶F▶▶B◀ | 28. Rack bushing              |
| ▶J◀ | 11. Tab washer                            | ▶F▶▶B◀ | 29. Oil seal                  |
| ▶J◀ | 12. Coil spring                           | ▶F▶▶A◀ | 30. O-ring                    |
| ▶J◀ | • Total pinion rotating torque adjustment |        | 31. Rack assembly             |
| ▶J◀ | 13. Lock nut                              |        | 32. Seal ring                 |
| ▶J◀ | 14. Rack support cover                    |        | 33. O-ring                    |
| ▶J◀ | 15. Support spring                        |        | 34. Lower bearing             |
| ▶J◀ | 16. Rack support                          |        | 35. Needle bearing            |
| ▶I◀ | 17. End plug                              |        | 36. Oil seal                  |
|     | 18. Lock nut                              |        | 37. Gear housing              |

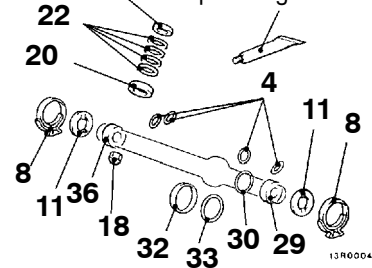
&lt;R.H. drive vehicles&gt;



## Flare nut



## Repair kit grease



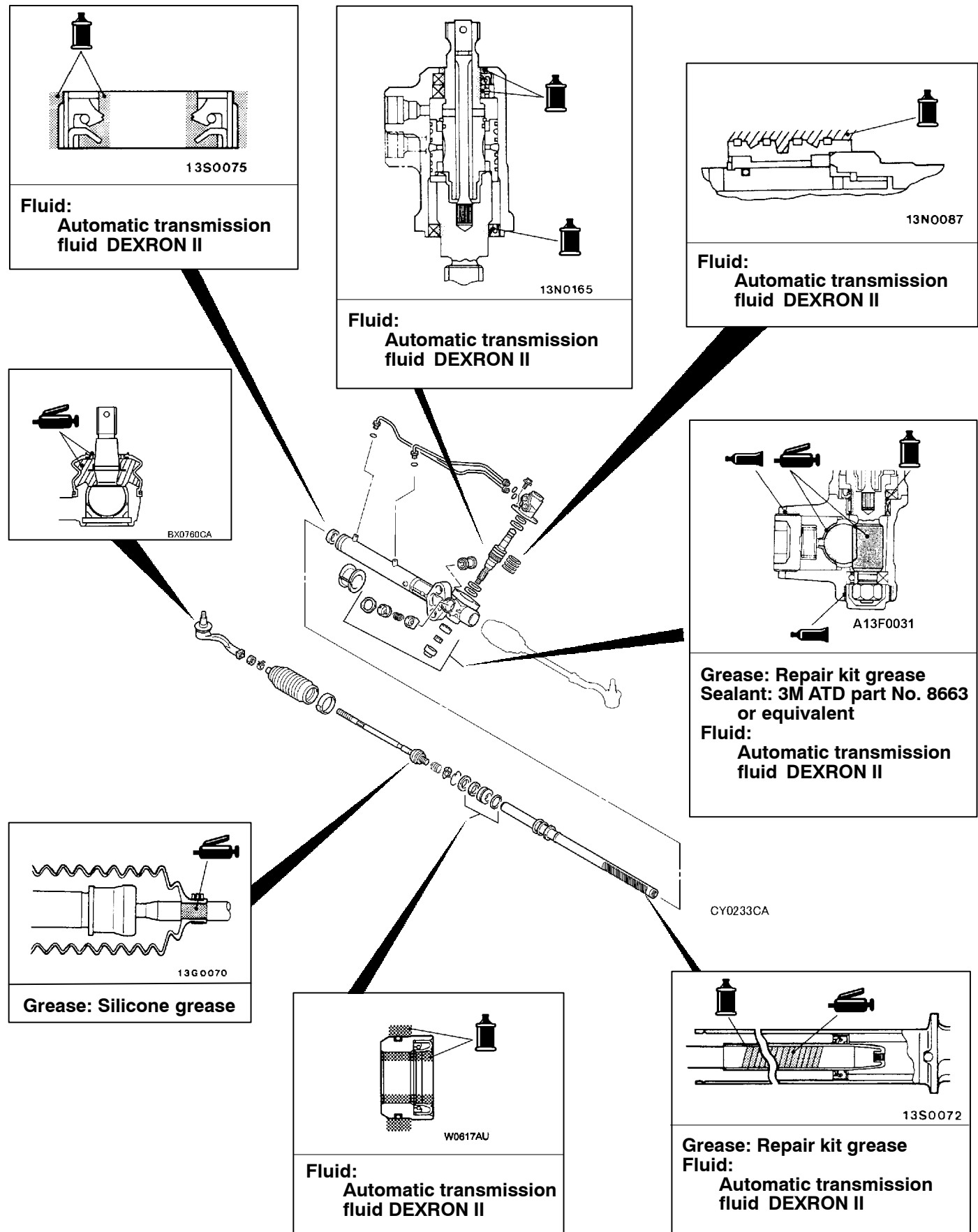
## Steering gear seal set

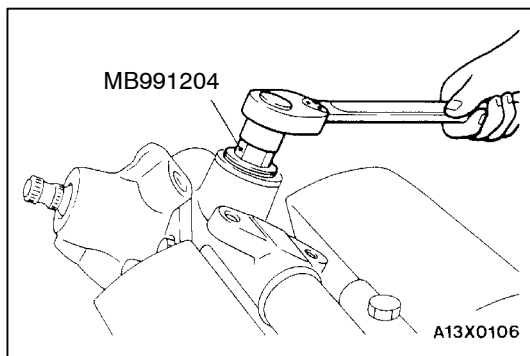
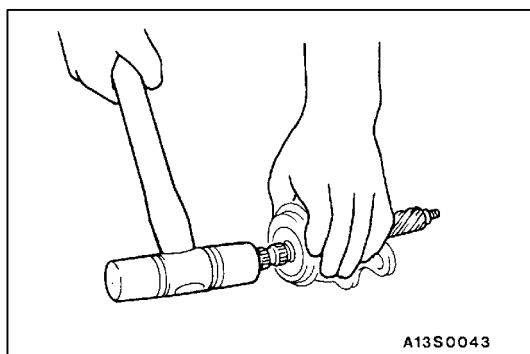
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## Disassembly steps

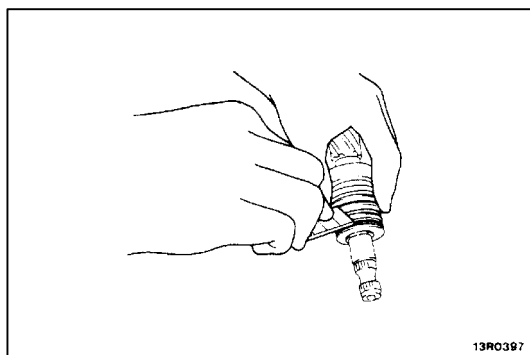
- |     |   |     |                               |
|-----|---|-----|-------------------------------|
| ▶O◀ | 1. Gear mounting rubber cushion           | ▶B▶ | 19. Valve housing assembly    |
| ▶N▶ | 2. Gear housing mounting bushing          | ▶B▶ | 20. Lower oil seal            |
| ▶N▶ | 3. Feed pipe                              | ▶G▶ | 21. Pinion and valve assembly |
| ▶N▶ | 4. O-ring                                 | ▶F▶ | 22. Seal ring                 |
| ▶M▶ | 5. Lock nut                               | ▶F▶ | 23. Upper bearing             |
| ▶L▶ | 6. Tie rod end                            | ▶E▶ | 24. Upper oil seal            |
| ▶L▶ | 7. Clip                                   | ▶E▶ | 25. Valve housing             |
| ▶K▶ | 8. Band                                   | ▶D▶ | 26. Circlip                   |
| ▶J▶ | 9. Bellows                                | ▶D▶ | 27. Rack stopper              |
| ▶J▶ | 10. Tie rod                               | ▶D▶ | 28. Rack bushing              |
| ▶J▶ | 11. Tab washer                            | ▶C▶ | 29. Oil seal                  |
| ▶J▶ | 12. Coil spring                           | ▶C▶ | 30. O-ring                    |
| ▶J▶ | • Total pinion rotating torque adjustment | ▶B▶ | 31. Rack assembly             |
| ▶J▶ | 13. Lock nut                              | ▶B▶ | 32. Seal ring                 |
| ▶J▶ | 14. Rack support cover                    | ▶A▶ | 33. O-ring                    |
| ▶J▶ | 15. Support spring                        | ▶B▶ | 34. Lower bearing             |
| ▶J▶ | 16. Rack support                          | ▶B▶ | 35. Needle bearing            |
| ▶I▶ | 17. End plug                              | ▶A▶ | 36. Oil seal                  |
| ▶I▶ | 18. Lock nut                              | ▶A▶ | 37. Gear housing              |

## Lubrication and Sealing Points



**DISASSEMBLY SERVICE POINTS****◀A▶ RACK SUPPORT COVER REMOVAL****◀B▶ LOWER OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL**

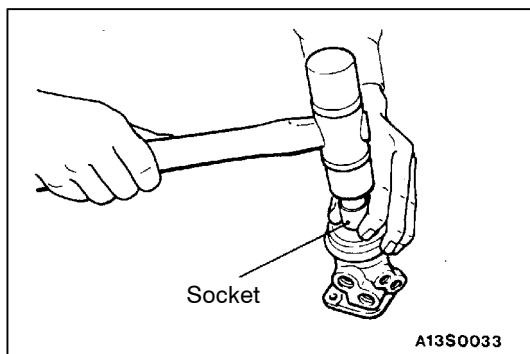
With a plastic hammer, lightly tap the pinion and valve assembly in its spline to remove the lower oil seal and pinion and valve assembly from the valve housing.

**◀C▶ SEAL RING REMOVAL**

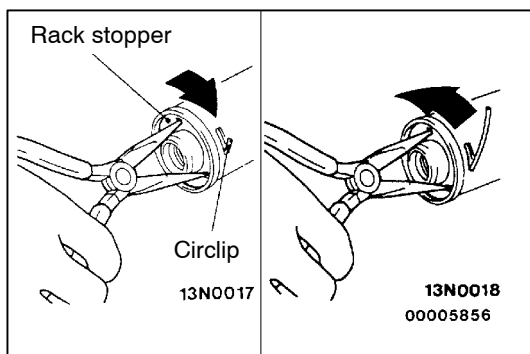
Cut the seal ring to remove from the pinion and valve assembly.

**Caution**

When cutting the seal ring, be careful not to damage the pinion and valve assembly.

**◀D▶ UPPER BEARING/UPPER OIL SEAL REMOVAL**

Using a socket, pull out the upper oil seal and bearing from the valve housing.

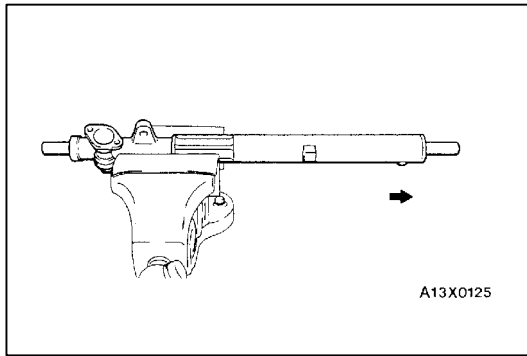
**◀E▶ CIRCLIP REMOVAL**

1. Turn the rack stopper clockwise until the circlip end comes out of the slot in the rack housing.
2. Turn the rack stopper anticlockwise to remove the circlip.

**Caution**

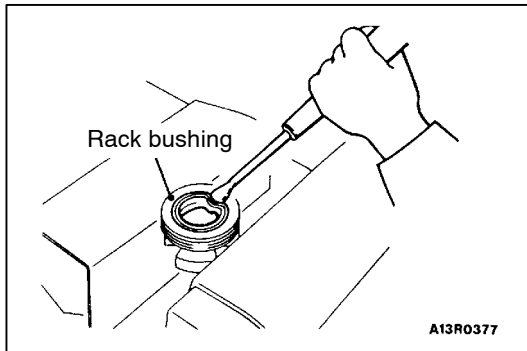
Do not turn the rack stopper anticlockwise first. Otherwise, the circlip will get caught in the slot in the housing, which makes the rack stopper unable to turn.





### ◀F▶ RACK STOPPER/RACK BUSHING/OIL SEAL/O-RING/RACK ASSEMBLY REMOVAL

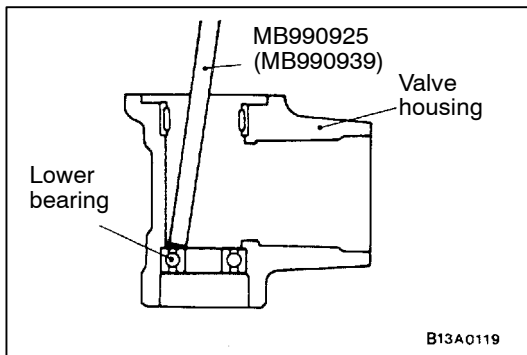
1. Remove the rack stopper, rack bushing, oil seal and O-ring together by pulling out the rack gently.



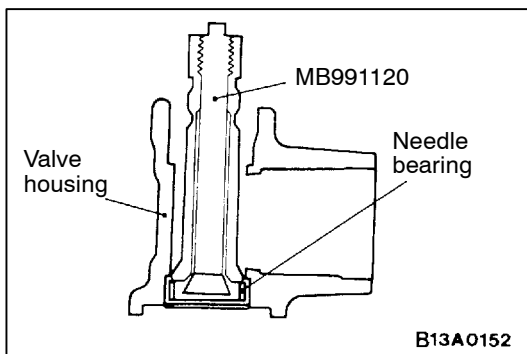
2. Partially bend the oil seal to remove from the rack bushing.

#### Caution

Use care not to damage the oil seal press-fitting surface of the rack bushing.



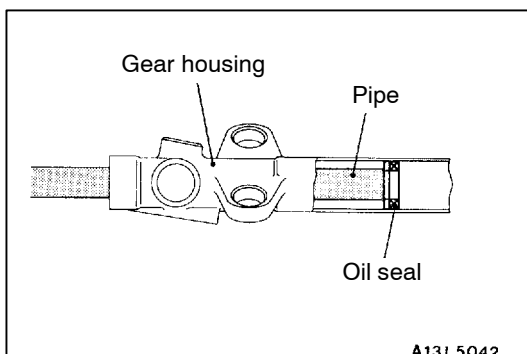
### ◀G▶ LOWER BEARING REMOVAL



### ◀H▶ NEEDLE BEARING REMOVAL

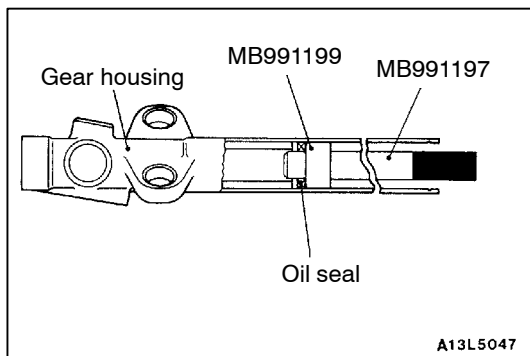
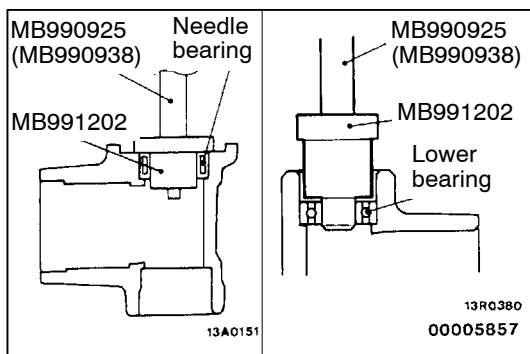
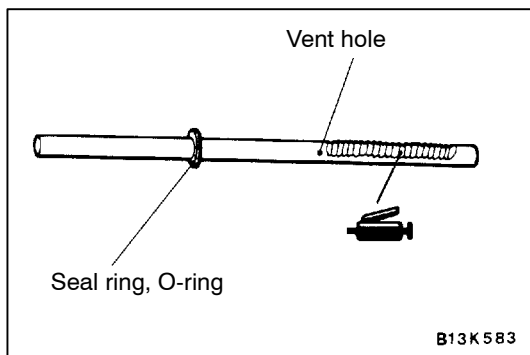
#### Caution

Do not twist the special tool too much, otherwise it may damage the inside surface of the valve housing.



### ◀I▶ OIL SEAL REMOVAL

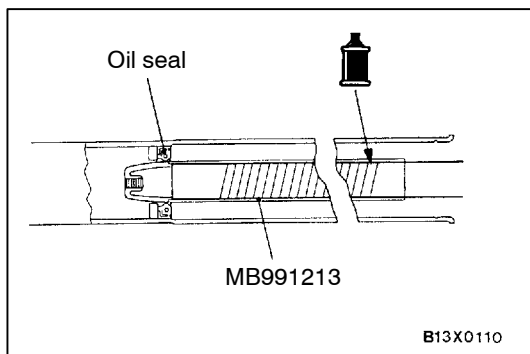
Use a pipe or the like to pull out the oil seal.

**REASSEMBLY SERVICE POINTS****►A◄ OIL SEAL INSTALLATION****►B◄ NEEDLE BEARING/LOWER BEARING INSTALLATION****►C◄ RACK ASSEMBLY INSTALLATION**

1. Apply repair kit grease to the teeth of the rack assembly.

**Caution**

Use care not to close the vent hole in the rack with grease.



2. Cover the serrations of the rack assembly with the special tool.
3. Apply specified fluid to the outer surfaces of the special tool, seal ring and O-ring.

**Specified fluid:**

**Automatic transmission fluid DEXRON II**

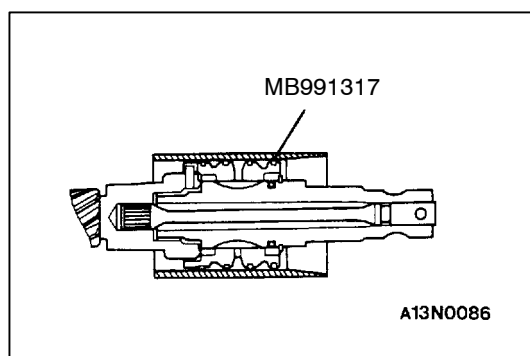
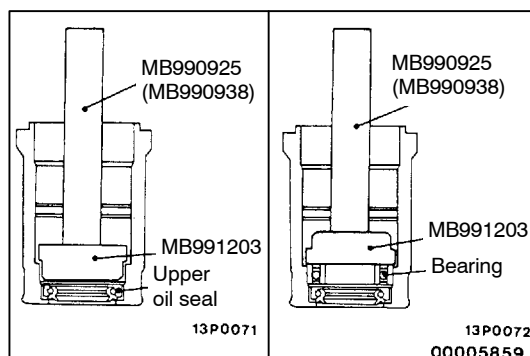
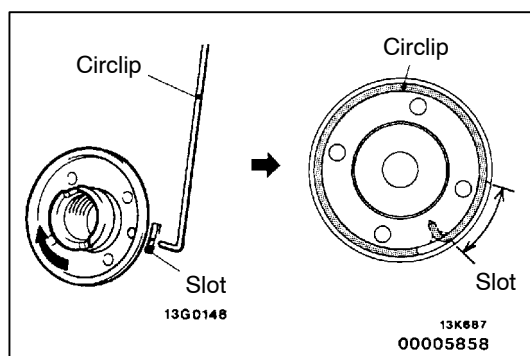
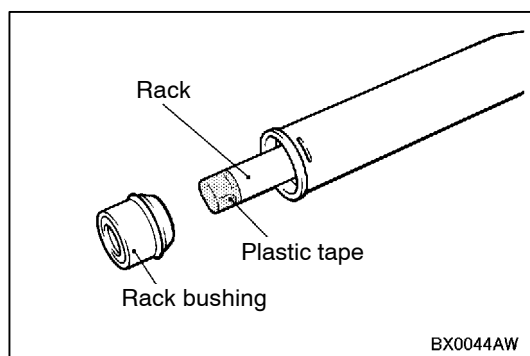
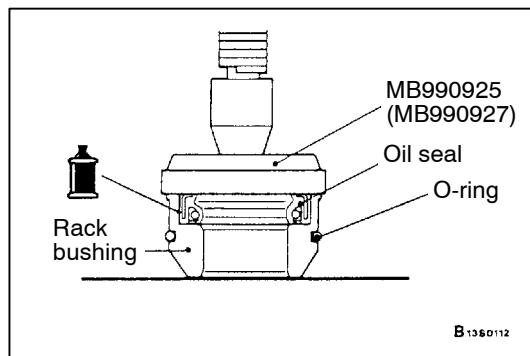
**Caution**

**Do not use ATF-SP II M and ATF-SP III.**

4. Slowly insert the rack covered with the special tool from the power cylinder side of the gear housing.

**Caution**

Carefully push in the rack with the oil seal centre and the special tool end matched. This is to avoid the retainer spring coming off.



### ►D◄ OIL SEAL/RACK BUSHING INSTALLATION

1. Apply specified fluid to the outer surface of the oil seal. Using the special tool, press in the oil seal until it is flush with the bushing end face.

#### Specified fluid:

Automatic transmission fluid DEXRON II

#### Caution

Do not use ATF-SP II M and ATF-SP III.

2. Apply the specified fluid to the oil seal inner surface and the O-ring.

#### Specified fluid:

Automatic transmission fluid DEXRON II

#### Caution

Do not use ATF-SP II M and ATF-SP III.

3. Wrap the rack end with plastic tape, and push the rack bushing onto the rack.

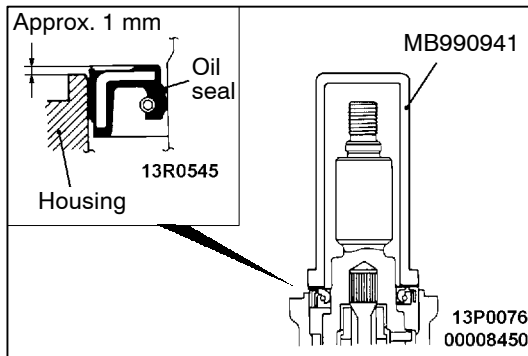
### ►E◄ CIRCLIP INSTALLATION

Align the mark on the rack stopper and the slot in the cylinder. Then, insert the circlip into the rack stopper hole through the cylinder hole. Turn the rack stopper clockwise and insert the circlip firmly.

### ►F◄ UPPER OIL SEAL/UPPER BEARING INSTALLATION

### ►G◄ SEAL RING INSTALLATION

After installation, using the special tool or by hand, compress seal rings that expand during installation.

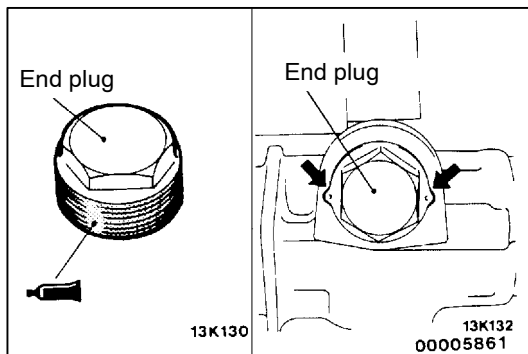


### ►H◄ LOWER OIL SEAL INSTALLATION

Using the special tool, press the oil seal into the valve housing. The upper surface of the oil seal must project outwards about 1 mm from the housing end surface.

#### Caution

When the oil seal is flush with or lower than the housing edge, reassemble the components. Otherwise, oil leaks will result.



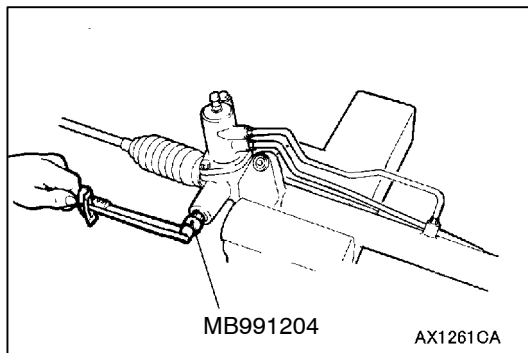
### ►I◄ END PLUG INSTALLATION

1. Apply specified sealant to the threaded section of the end plug, and then install the end plug to the gear housing.

#### Specified fluid:

**3M ATD Part No.8663 or equivalent**

2. Use a punch to bend over the two tabs on the sides of the end plug to prevent the end plug from turning.



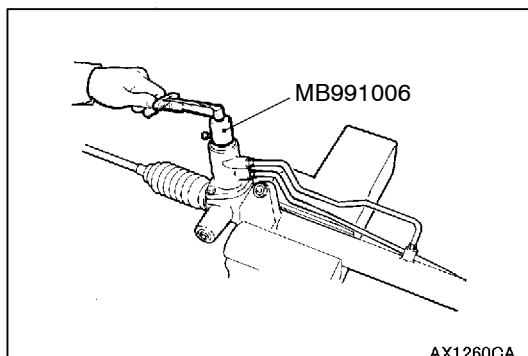
### ►J◄ RACK SUPPORT COVER/LOCKING NUT INSTALLATION

1. Apply specified sealant to the rack cover support thread.

#### Specified fluid:

**3M ATD Part No.8663 or equivalent**

2. Using the special tool, tighten the rack support cover to  $12 \pm 2$  N·m.
3. Return the rack support cover by about  $10^\circ$ .
4. Tighten the locking nut to the specified torque, using the special tool to prevent the rack support cover from spinning.



### ►K◄ PINION TOTAL ROTATION TORQUE ADJUSTMENT

1. Using the special tool, measure total rotation torque by turning the pinion gear at a speed of one rotation per 4 to 6 seconds.

#### Standard value:

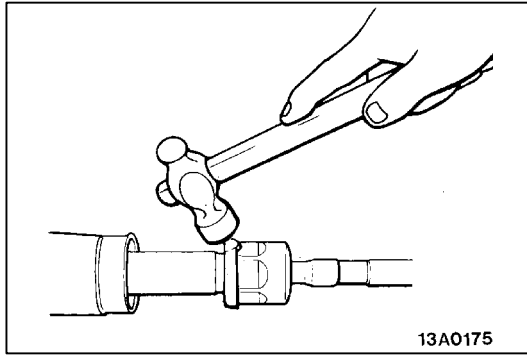
**Total rotation torque: 0.6 - 1.7 Nm**

**Torque fluctuation: 0.4 Nm or less**

2. If the total rotation torque or torque fluctuation does not meet the standard values, adjust by returning the rack support cover within a range of  $0$  to  $30^\circ$ .

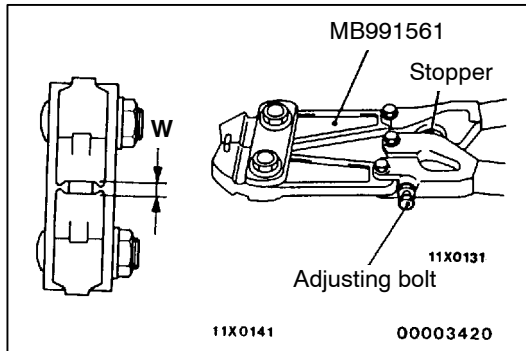
#### Caution

- (1) Adjust around the maximum limit of the standard values.
- (2) See that no ratcheting or catching are present when operating the rack towards the shaft direction.
- (3) Measure the total pinion torque through the whole stroke of the rack.
3. If the adjustment is impossible in the given range, check the components of the rack support cover, and replace if necessary.



### ►L◄ TAB WASHER/TIE ROD INSTALLATION

After installing the tie rod to the rack, fold the tab washer end (2 locations) to the tie rod notch.



### ►M◄ BELLOWS BAND INSTALLATION

1. Turn the adjusting bolt of the special tool to adjust the opening dimension (W) to the standard value.

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

**<When more than 2.9 mm>**

**Screw in the adjusting bolt.**

**<When less than 2.9 mm>**

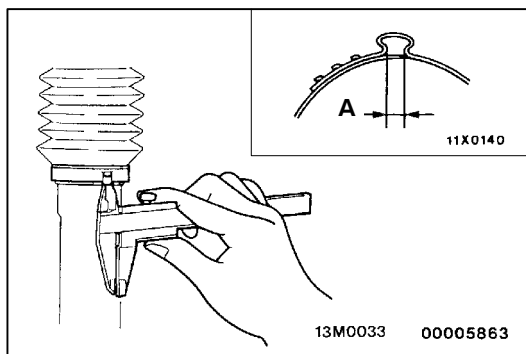
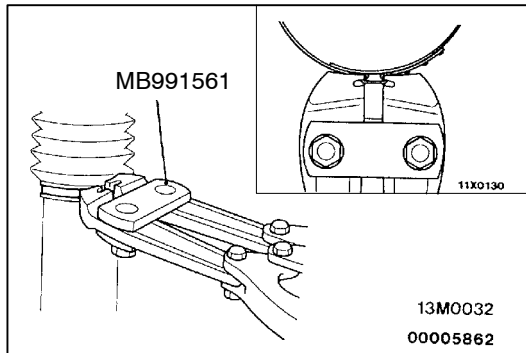
**Loosen the adjusting bolt.**

#### NOTE

- (1) The dimension (W) is adjusted by about 0.7 mm per one turn.
- (2) Do not turn the adjusting bolt more than one turn.
2. Use the special tool to crimp the bellows band.

#### Caution

- (1) **Hold the rack housing, and use the special tool to crimp the bellows band securely.**
- (2) **Crimp the bellows band until the special tool touches the stopper.**



3. See that the crimped width (A) meets the standard value.

**Standard value (A): 2.4 - 2.8 mm**

**<When more than 2.8 mm>**

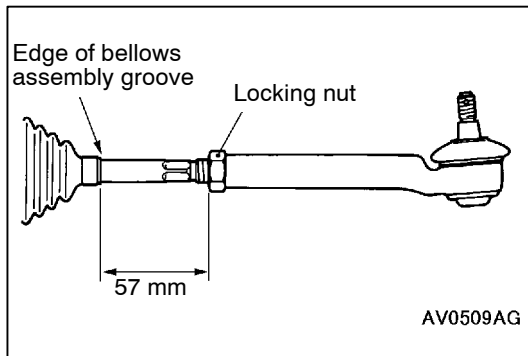
Readjust the dimension (W) of step (1) to the value calculated by the following equation, and repeat step (2).

**$W = 5.5 \text{ mm} - A$  [Example: If (A) is 2.9 mm, (W) is 2.6 mm.]**

**<When less than 2.4 mm>**

Remove the bellows band, readjust the dimension (W) of step (1) to the value calculated by the following equation, and use a new bellows band to repeat steps (2) to (3).

**$W = 5.5 \text{ mm} - A$  [Example: If (A) is 2.3 mm, (W) is 3.2 mm.]**

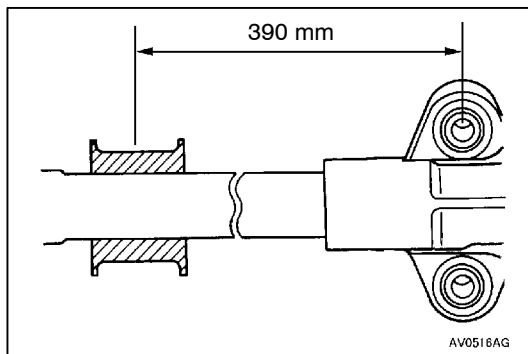


### ►N◄ TIE ROD END/LOCKING NUT INSTALLATION

Screw in the tie rod end until the dimension shown is achieved. Then, temporarily tighten with the locking nut.

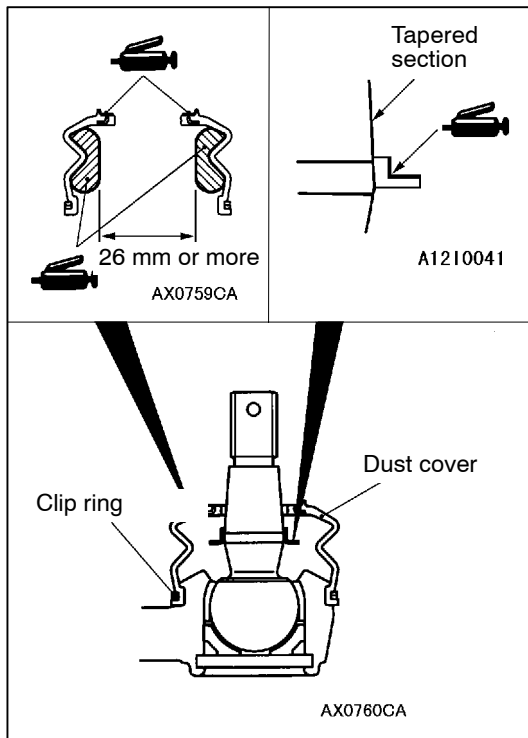
#### NOTE

The locking nut must be tightened securely only after the power steering gear box and linkage are installed to the vehicle and toe-in is adjusted.



### ►O◄ GEAR MOUNTING RUBBER INSTALLATION

Install the gear mounting rubber to the rack housing so that the distance is as shown in the illustration.



### TIE ROD END BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the clip ring, and then remove the dust cover.
2. Refill multi-purpose grease inside the dust cover as shown in the illustration.
3. Apply multi-purpose grease to the top of the dust cover and to the retainer of the ball joint stud.
4. Wrap the stud thread of the tie rod end ball joint with vinyl tape, and then install the dust cover to the tie rod end ball joint.

#### Caution

**Do not apply multi-purpose grease to the place (tapered section) where the threaded section of the ball joint connects with the knuckle. Wipe away any grease which gets on this section.**

5. Secure the dust cover in place with the clip ring.

#### Caution

**To prevent the grease to be applied on the ball joint connection (taper) with knuckle, do not compress the dust cover before installation.**

6. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.

# POWER STEERING OIL PUMP

## REMOVAL AND INSTALLATION

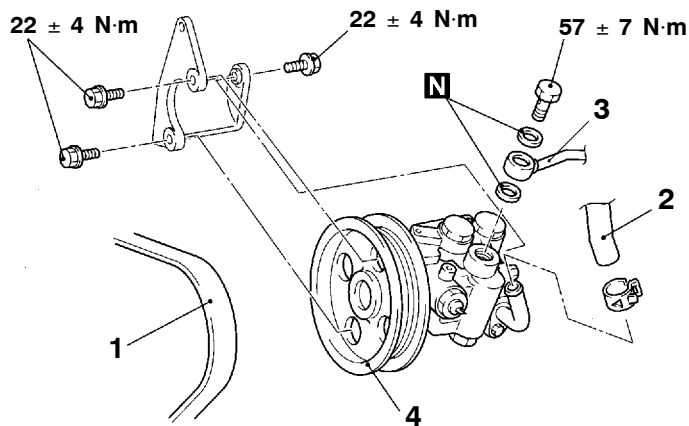
### Pre-removal Operation

- Battery and Battery Tray Removal
- Power Steering Fluid Draining (Refer to P.37A-9.)

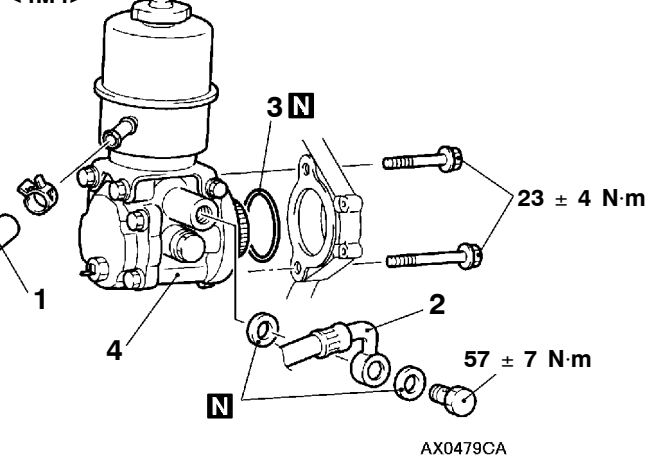
### Post-installation Operation

- Power Steering Fluid Supplying and Bleeding (Refer to P.37A-9.)
- Battery and Battery Tray Installation
- Drive Belt Tension Adjusting <6G7, 4D5> (Refer to GROUP 11A/11B – On-vehicle Service.)

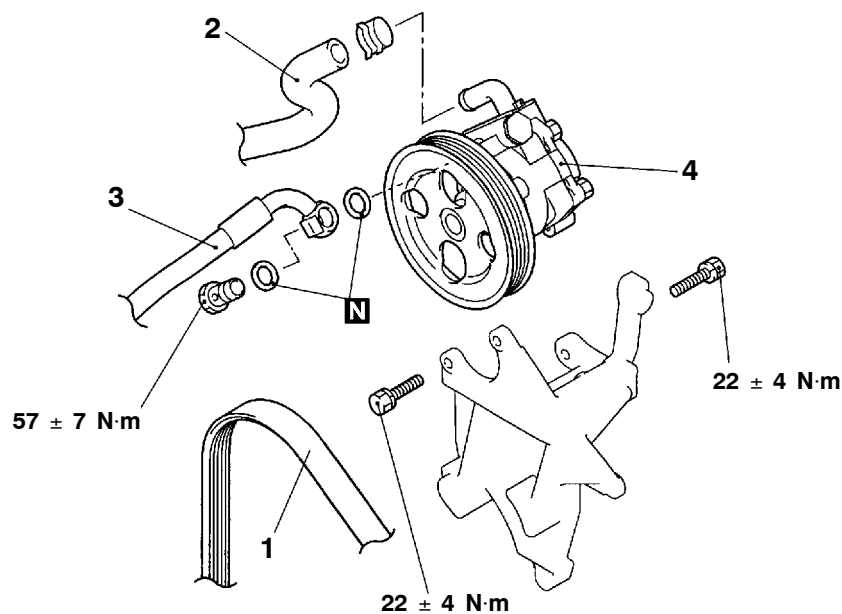
&lt;6G7&gt;



&lt;4M4&gt;



&lt;4D5&gt;



### Removal steps

&lt;6G7, 4D5&gt;

1. Drive belt (Refer to GROUP 11A, 11B.)
2. Suction hose
3. Pressure tube
4. Oil pump assembly

&lt;4M4&gt;

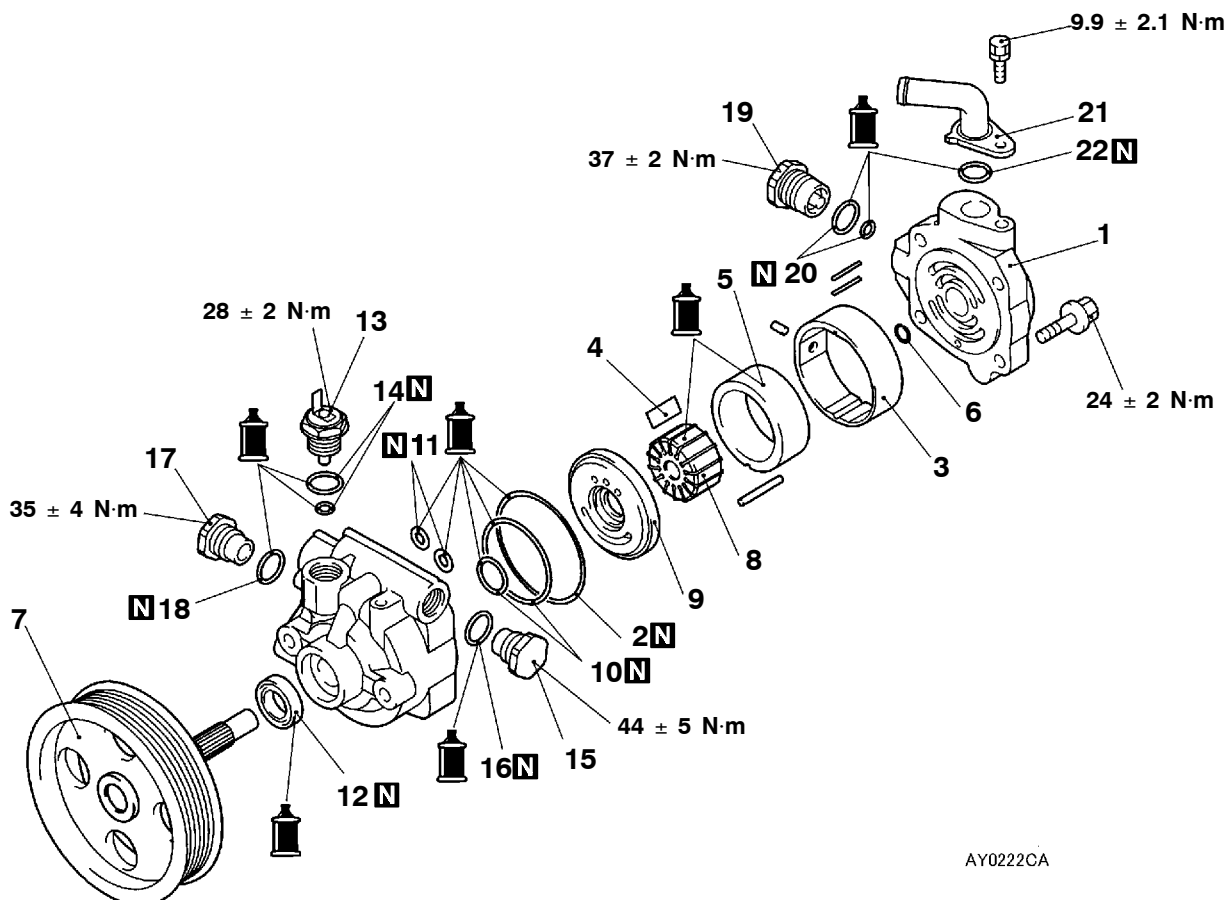
- Engine cover (Refer to GROUP 11C.)
1. Pressure hose
  2. Return hose B
  3. O-ring
  4. Oil pump assembly

## DISASSEMBLY AND REASSEMBLY

&lt;6G7, 4D5&gt;

## Caution

Never disassemble the terminal assembly unable to be reassembled.



NOTE

AY0222CA



Automatic transmission fluid DEXRON II

<p>AY0220CA</p>	<p>AY0209CA</p>	<p>AY0221CA</p>
Oil pump seal kit	Oil pump cartridge kit	Oil pump pulley and shaft kit

## Disassembly steps

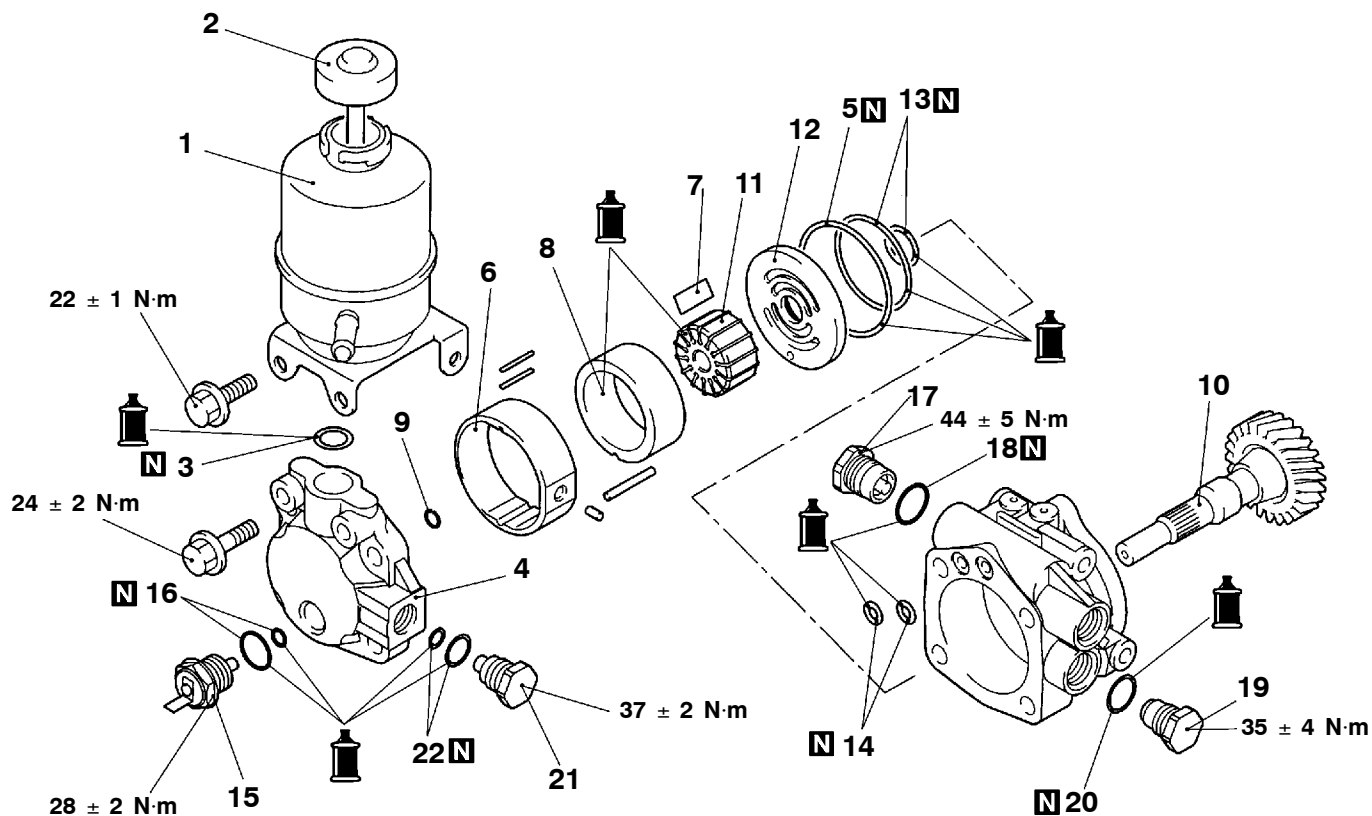
- |     |                     |                                 |
|-----|---------------------|---------------------------------|
|     | 1. Pump cover       | ▶B◀ 12. Oil seal                |
|     | 2. O-ring           | ▶A◀ 13. Terminal assembly <6G7> |
|     | 3. Adapter ring     | ▶A◀ 14. O-ring <6G7>            |
| ▶E◀ | 4. Vanes            | ▶A◀ 15. Inner plug A            |
| ▶D◀ | 5. Cam ring         | ▶A◀ 16. O-ring                  |
|     | 6. Snap ring        | ▶A◀ 17. Inner plug B            |
| ▶C◀ | 7. Pulley and shaft | ▶A◀ 18. O-ring                  |
|     | 8. Rotor            | ▶A◀ 19. Inner plug C            |
|     | 9. Side plate       | ▶A◀ 20. O-ring                  |
| ▶A◀ | 10. O-ring          | ▶A◀ 21. Suction connector       |
| ▶A◀ | 11. O-ring          | ▶A◀ 22. O-ring                  |



&lt;4M4&gt;

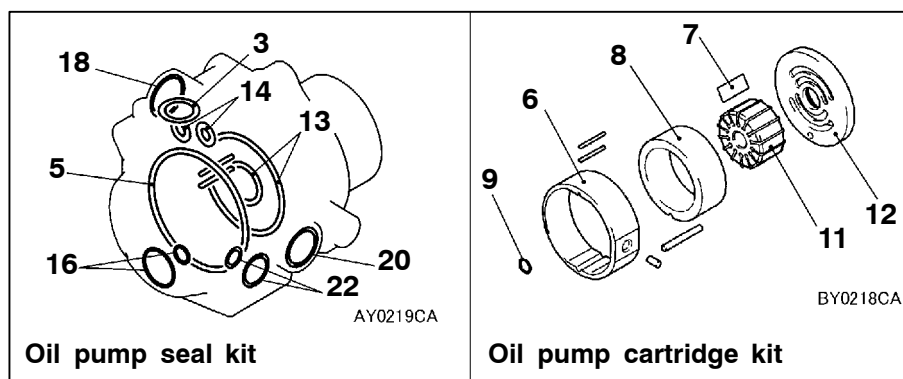
**Caution**

Never disassemble the terminal assembly unable to be reassembled.

**NOTE**

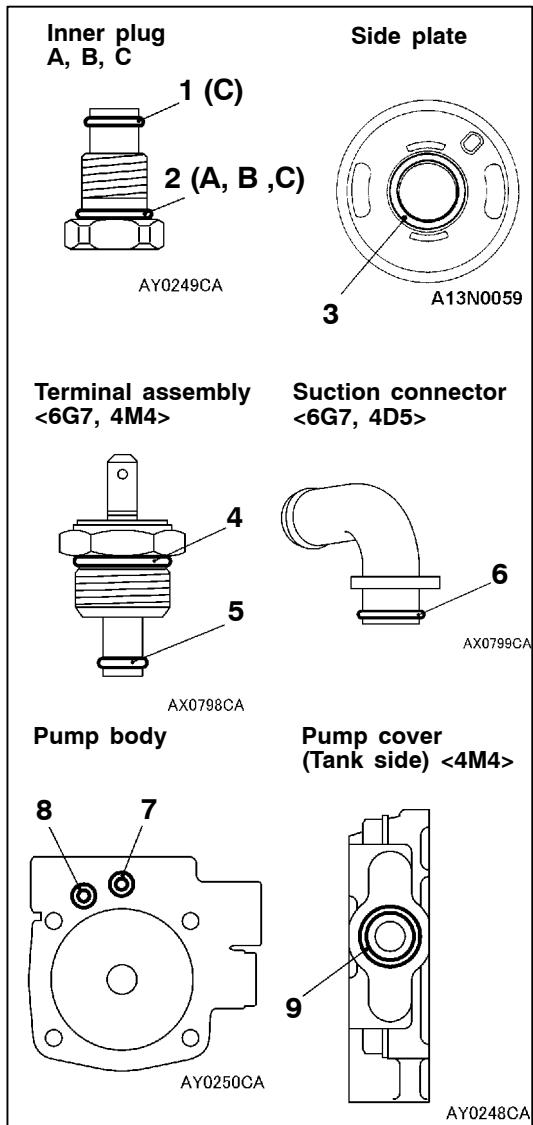
: Automatic transmission fluid DEXRON II

AY0218CA

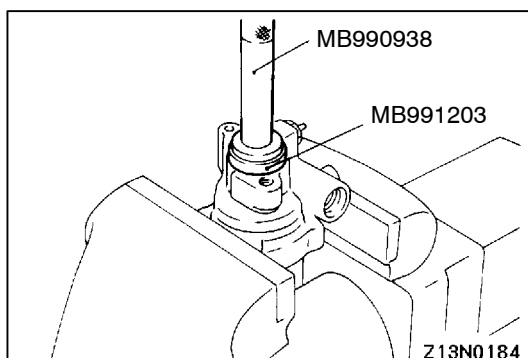
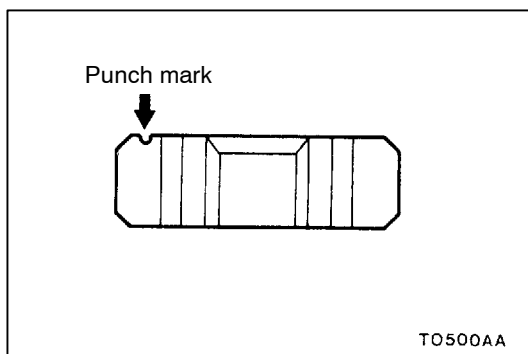
**Disassembly steps**

- 1. Tank assembly
- 2. Cap assembly
- ▶A◀ 3. O-ring
- 4. Pump cover
- 5. O-ring
- 6. Adapter ring
- ▶D◀ 7. Vanes
- ▶C◀ 8. Cam ring
- 9. Snap ring
- 10. Oil pump gear
- ▶B◀ 11. Rotor

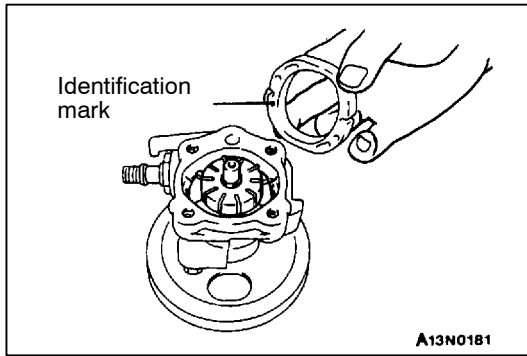
- 12. Side plate
- ▶A◀ 13. O-ring
- ▶A◀ 14. O-ring
- ▶A◀ 15. Terminal assembly
- ▶A◀ 16. O-ring
- 17. Inner plug A
- ▶A◀ 18. O-ring
- 19. Inner plug B
- ▶A◀ 20. O-ring
- 21. Inner plug C
- ▶A◀ 22. O-ring

**REASSEMBLY SERVICE POINTS****►A◄ O-RING INSTALLATION**

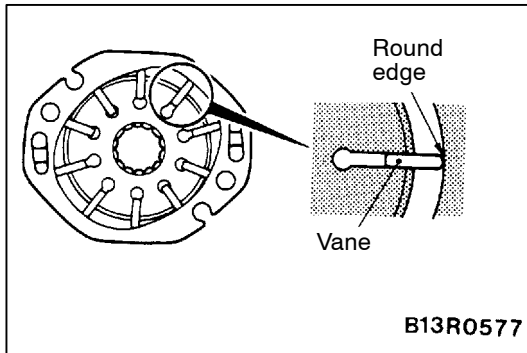
No.		ID × Width mm
1		6.8 × 1.9
2	Inner plug A, C	12.4 × 2.6
	Inner plug B	14.8 × 2.4
3		21 × 1.9
4		14.8 × 1.9
5		3.8 × 1.9
6		15.8 × 2.4
7		9.8 × 1.9
8		6.8 × 1.9
9		13.8 × 2.4

**►B◄ OIL SEAL INSTALLATION <6G7, 4D5>****►C◄ ROTOR INSTALLATION**

Install the rotor with its punch mark towards the side plate.

**►D◄ CAM RING INSTALLATION**

Install the cam ring with its identification mark towards the side plate.

**►E◄ VANE INSTALLATION**

Install the vane to the rotor with its round edge outwards (towards cam ring).

# POWER STEERING OIL HOSES

## REMOVAL AND INSTALLATION

### Pre-removal Operation

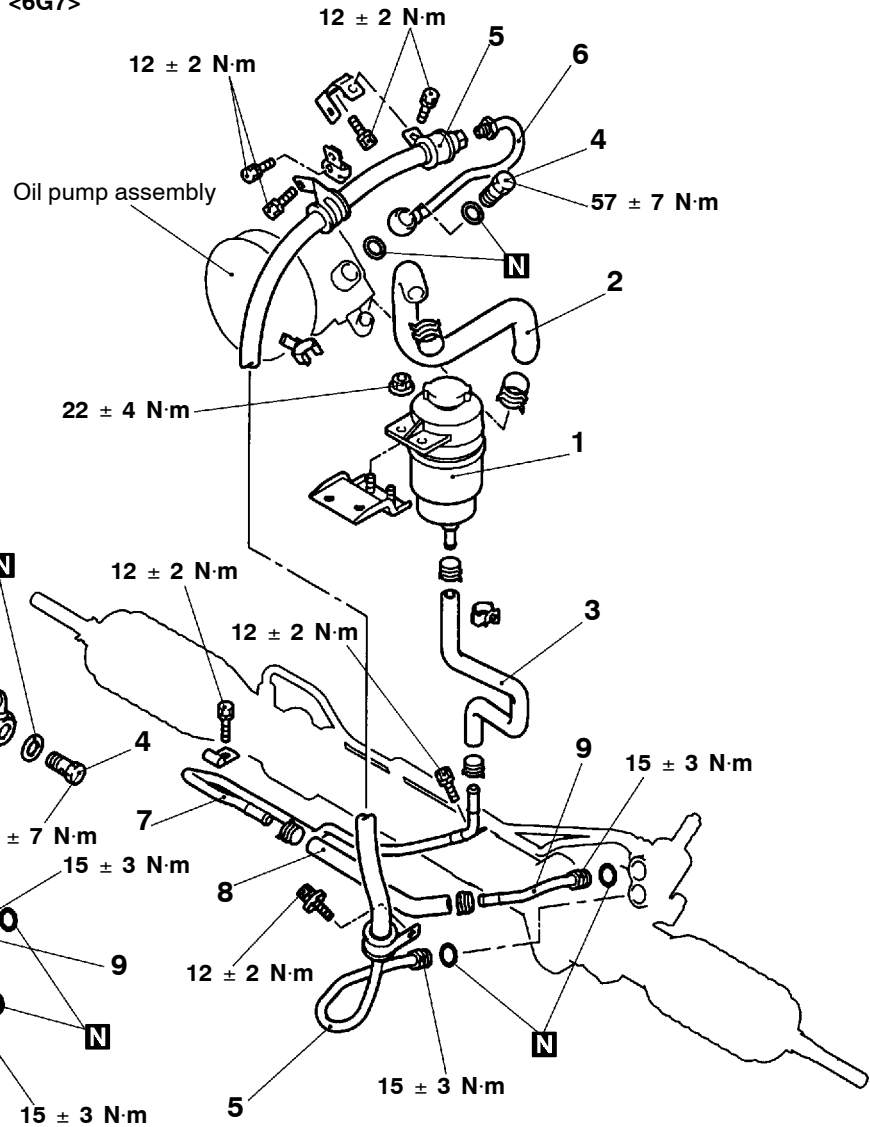
- Under Cover Removal
- Power Steering Fluid Draining (Refer to P.37A-10.)
- Battery and Battery Tray Removal
- Condense Tank Removal (Refer to GROUP 14.)

### Post-installation Operation

- Condense Tank Installation (Refer to GROUP 14.)
- Battery and Battery Tray Installation
- Power Steering Fluid Adding and Air Bleeding (Refer to P.37A-10.)
- Under Cover Installation
- Drive Belt Tension Check <6G7, 4D5> (Refer to GROUP11A/11B – On-vehicle Service.)

<L.H. drive vehicles – 6G7, 4M4>

<6G7>



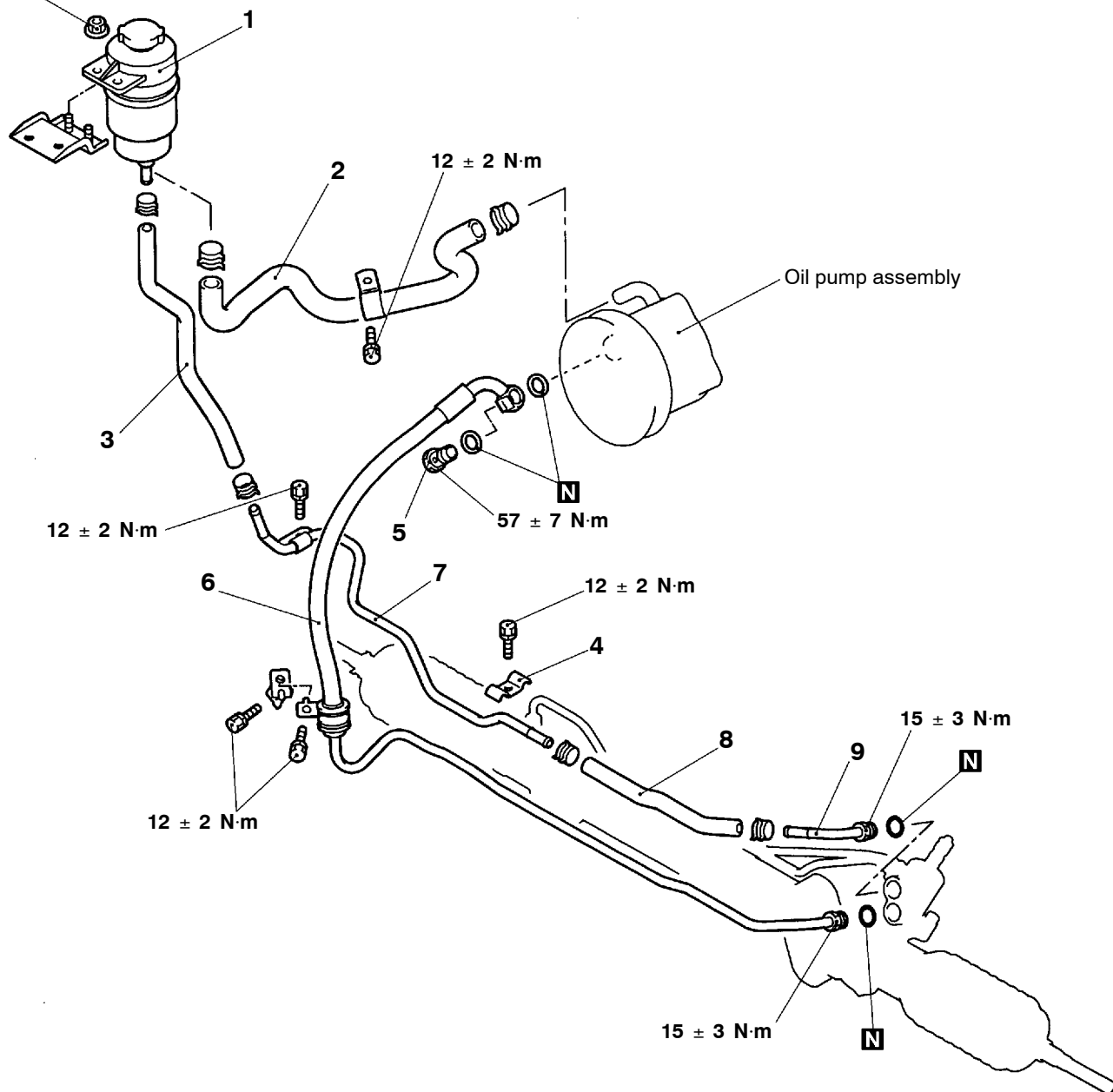
AY0205CA

### Removal steps

1. Oil reservoir <6G7>  
 2. Suction hose <6G7>  
 3. Return hose B  
 4. Eye bolt  
 5. Pressure hose assembly

6. Pressure tube <6G7>  
 7. Cooler tube  
 8. Return hose A  
 9. Return tube

&lt;L.H. drive vehicles – 4D5&gt;

 $22 \pm 4 \text{ N}\cdot\text{m}$ 

AY0210CA

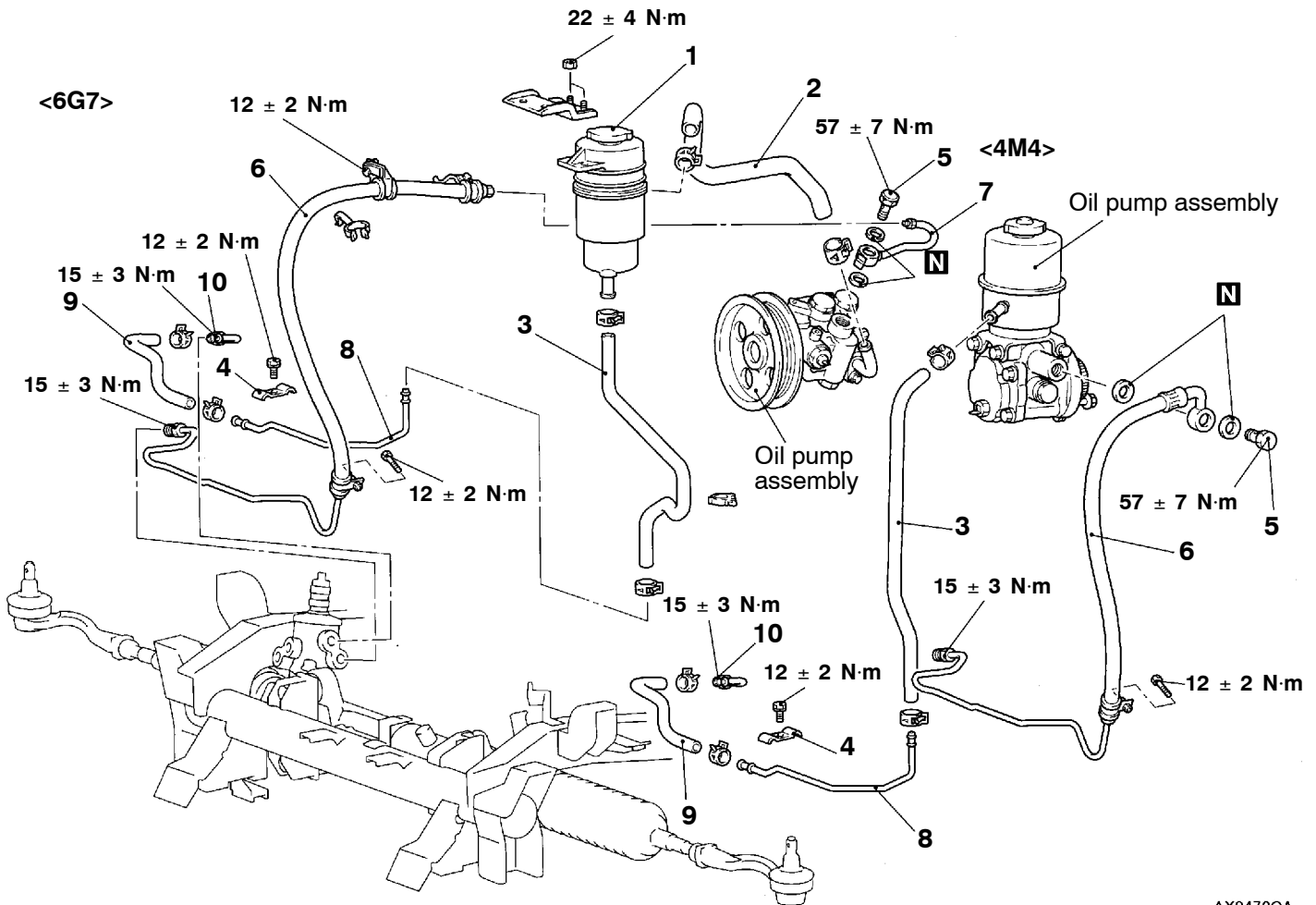
**Removal steps**

1. Oil reservoir
2. Suction hose
3. Return hose B
4. Tube clip
5. Eye bolt



6. Pressure hose assembly
7. Cooler tube
8. Return hose A
9. Return tube

&lt;R.H. drive vehicles – 6G7, 4M4&gt;



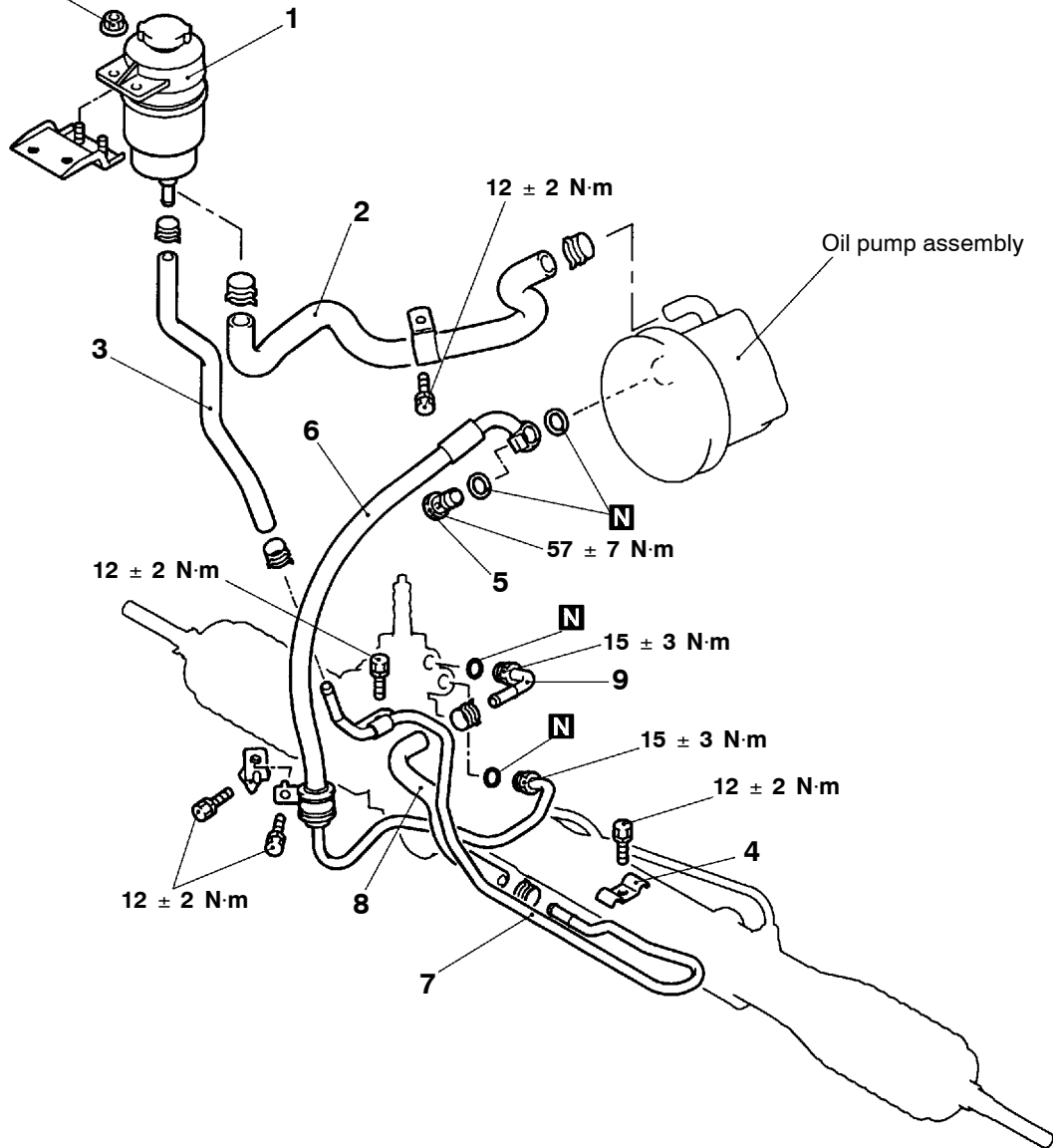
AX0472CA

**Removal steps**

1. Oil reservoir <6G7>  
 2. Suction hose <6G7>  
 3. Return hose B  
 4. Tube clip  
 5. Eye bolt

6. Pressure hose assembly  
 7. Pressure tube <6G7>  
 8. Cooler tube  
 9. Return hose A  
 10. Return tube

&lt;R.H. drive vehicles – 4D5&gt;

 $22 \pm 4 \text{ N}\cdot\text{m}$ 

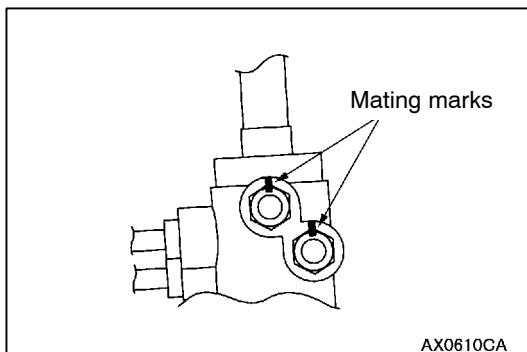
AY0217CA

**Removal steps**

1. Oil reservoir
2. Suction hose
3. Return hose B
4. Tube clip
5. Eye bolt



6. Pressure hose assembly
7. Cooler tube
8. Return hose A
9. Return tube



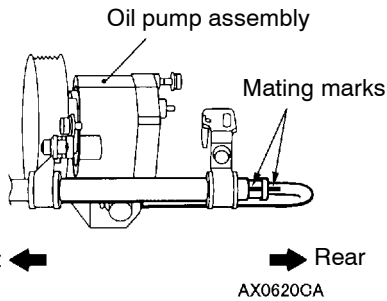
AX0610CA

**INSTALLATION SERVICE POINTS**

►A◄ **RETURN TUBE/PRESSURE TUBE <6G7>/  
PRESSURE HOSE ASSEMBLY <6G7>  
INSTALLATION**

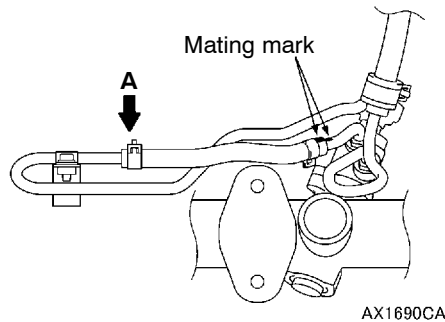
1. Align the mating marks on the gear box and return tubes when installing.

&lt;6G7&gt;

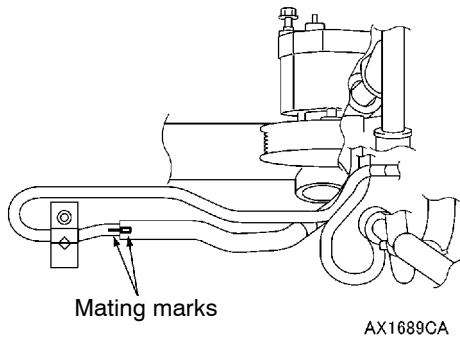


2. Install the pressure hose assembly and the pressure tubes so that the mating marks are facing upwards <6G7>.

&lt;L.H. drive vehicles – 6G7, 4M4&gt;



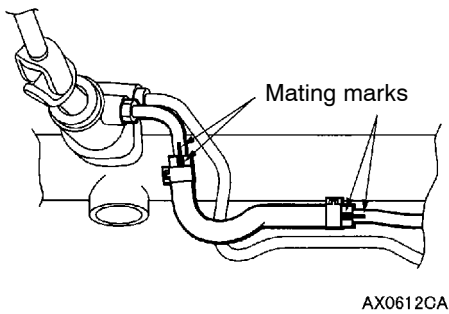
View A



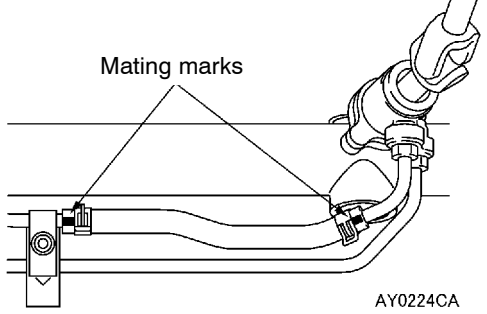
### ►B◄ RETURN HOSE A/COOLER TUBE INSTALLATION

Install so that the mating marks are facing upwards.

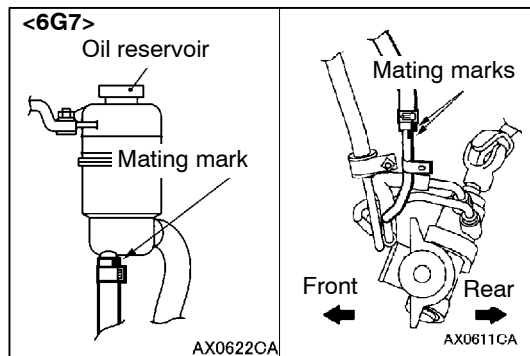
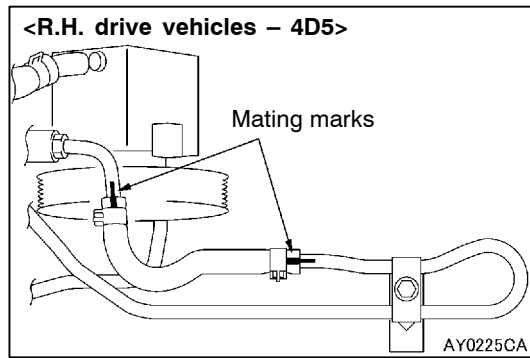
&lt;R.H. drive vehicles – 6G7, 4M4&gt;



&lt;L.H. drive vehicles – 4D5&gt;

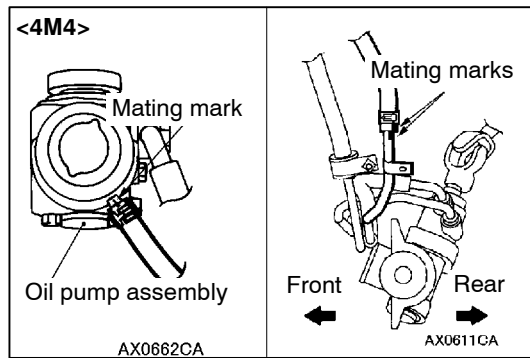




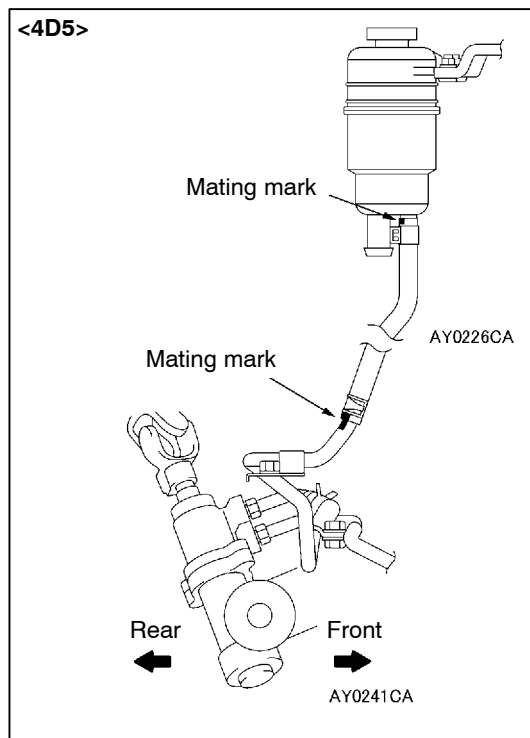


### ►C◄ RETURN HOSE B INSTALLATION

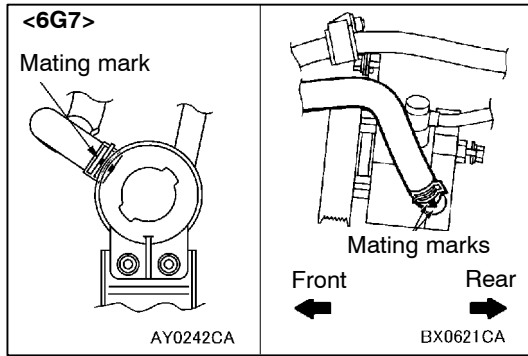
1. Install so that the mating marks are facing towards the rear <6G7>.



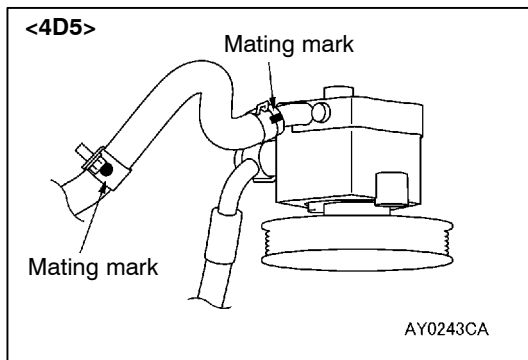
2. Install so that the pump-side mating marks are facing upwards, and the tube-side mating marks are facing towards the rear <4M4>.



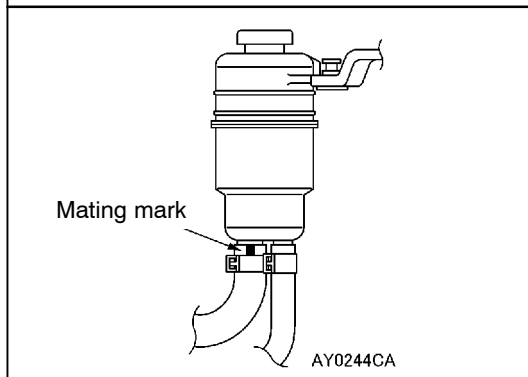
3. Install so that the mating marks are facing towards the rear <4D5>.

**►D◄ SUCTION HOSE INSTALLATION**

1. Install so that the reservoir tank-side mating marks are facing upwards, and the pump-side mating marks are facing towards the outside <6G7>.



2. Install so that the pump-side mating marks are facing upwards, and the reservoir tank-side mating marks are facing towards the outside <4D5>.



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**NOTES**