STEERING

CONTENTS

37209000217

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, side impact sensors 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 (*).

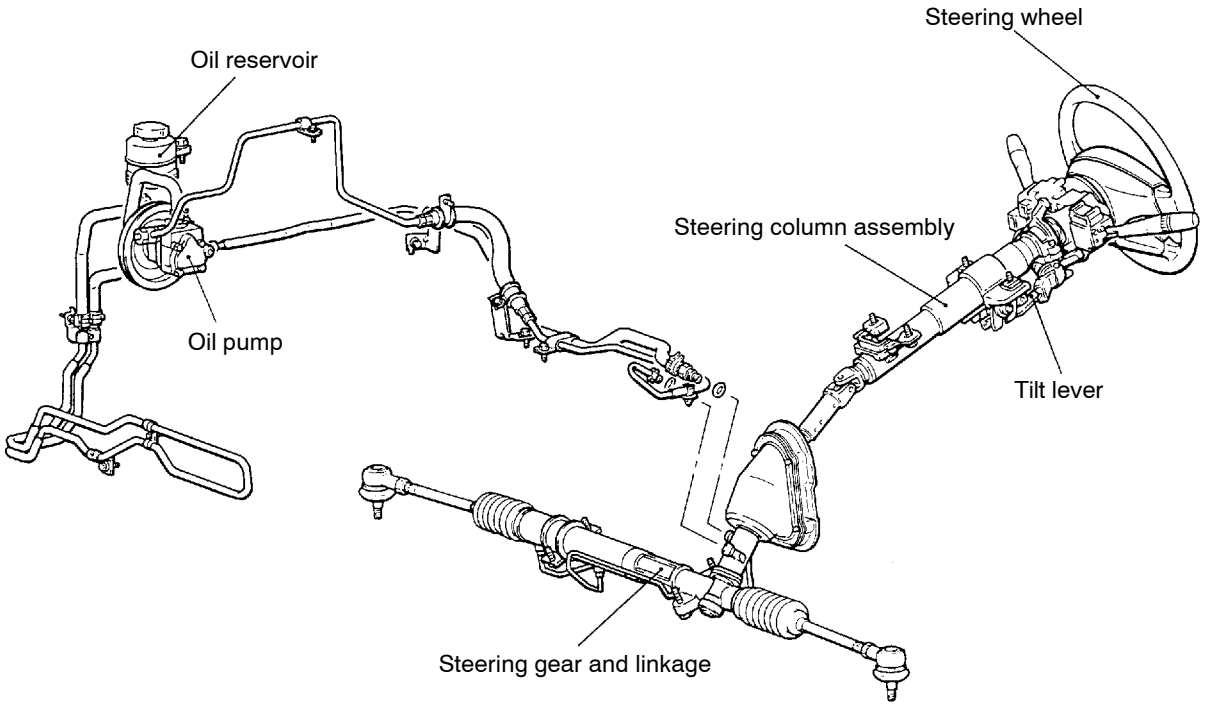
GENERAL INFORMATION

37200010172

The steering wheel is 4-spoke type.
The steering wheel including the air bag is a 3-spoke type. The steering column is equipped with both shock absorbing and tilt steering mechanisms.
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.

Items		Specifications
Steering gear and linkage	Type	Integral type
	Gear type	Rack and pinion
Oil pump	Type	Vane type
	Displacement mL	9.6
	Relief set pressure MPa	11.8

CONSTRUCTION DIAGRAM



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SERVICE SPECIFICATIONS

37200030192

Items			Standard value	Limit
Steering wheel free play mm	with engine stopped		10 or less	-
	when hydraulic operation		-	30
Steering angle	Inner wheel		38°00' ± 2° <Except 6A1 - R.H. drive vehicles> 39°00' ± 2° <6A1 - R.H. drive vehicles>	-
	Outer wheel		30°30'	-
Tie rod end ball joint starting torque Nm			0.5 - 2.5	-
Stationary steering effort N (Fluctuation allowance)			30 or less (5.9 or less)	-
Oil pump pressure MPa	Oil pump relief pressure		11.8	-
	Pressure under no-load conditions		0.8 - 1.0	-
	Steering gear retention hydraulic pressure		11.8	-
Oil pressure switch operating pressure MPa		OFF→ON	1.8 - 2.4	-
		ON→OFF	0.8 - 2.4	-
Total pinion torque Nm (Change in torque: 0.4 Nm)			0.7 - 1.4	-
Tie rod joint swing resistance N (Tie rod joint swing torque Nm)			8 - 27 (1.5 - 4.9)	-
Opening dimension of special tool (MB991561) mm			2.9	-
Band crimped width mm			2.4 - 2.8	-

LUBRICANTS

37200040140

Items	Specified lubricant	Quantity
Power steering fluid	Automatic transmission fluid DEXRON or DEXRON II	As required
Bellows	Silicone grease	As required
Pinion and valve assembly	Repair kit grease	As required
Rack assembly		
Oil seal, pinion and valve assembly, ball bearing, needle roller bearing, special tool (MB991213)	Automatic transmission fluid DEXRON or DEXRON II	As required
Flow control valve, friction surface of rotor, vanes, cam ring, pump cover, O-ring		

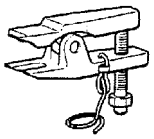
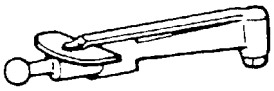
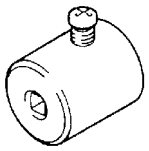
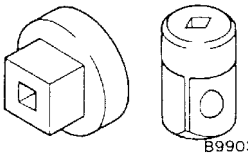
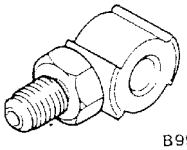
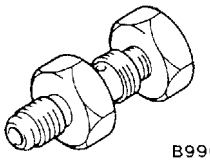
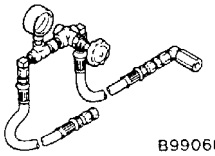
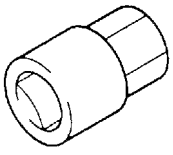
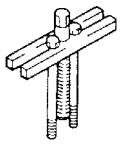
SEALANT

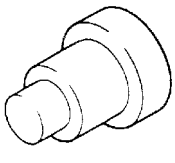
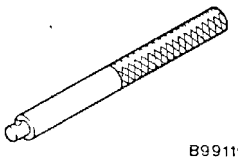
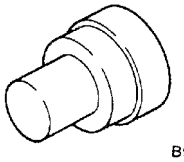
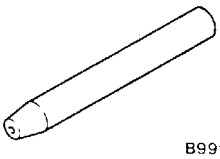
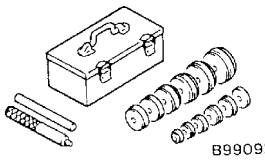
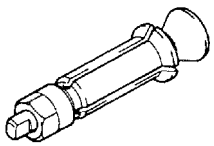
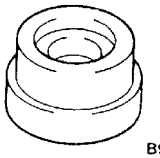
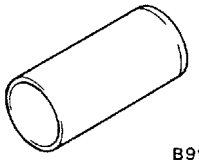
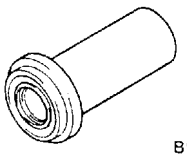
37200050136

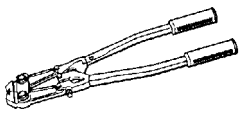
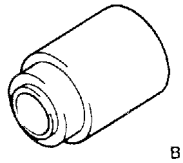
Items	Specified sealant	Remarks
End plug screw	3M ATD Part No. 8661 or equivalent	Semi-drying sealant
Power steering rack support cover screw		
Dust cover lip for tie rod end ball joint		

SPECIAL TOOLS

37200060177

Tool	Number	Name	Use
	MB990635, MB991113 or MB991406	Steering linkage puller	Disconnection of tie rod end
	MB990685	Torque wrench	• Measurement of the ball joint starting torque • Measurement of the total pinion torque
 B991006	MB991006	Preload socket	Measurement of the total pinion torque
 B990326	MB990326	Preload socket	Measurement of the ball joint starting torque
 B990993	MB990993	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
 B990994	MB990994	Power steering oil pressure gauge adapter (hose side)	Measurement of oil pressure
 B990662	MB990662	Oil pressure gauge assembly	Measurement of oil pressure
 B991204	MB991204	Torque wrench socket	• Adjustment of rack support • Removal of rack support cover
 B990803	MB990803	Steering wheel puller	Disconnection of the steering wheel

Tool	Number	Name	Use
 B991202	MB991202	Oil seal and bearing installer	Press fitting of rack housing bearing
 B991197	MB991197	Bar (long type)	To press in the oil seal for the rack
 B991198	MB991199	Oil seal installer	To press in the oil seal for the rack
 B991212	MB991213	Rack installer	Rack installation
 B990925	MB990925	Bearing and oil seal installer set	Installation of the oil seal and bearing
 B991120	MB991120	Needle bearing puller	Removal of rack housing needle bearing
 B991203	MB991203	Oil seal and bearing installer	To press in the valve housing oil seal and bearing
 B991317	MB991317	Seal ring installer	Compression of the seal rings after replacement of the pinion seal rings
 B990941	MB990941	Torque tube bearing installer	Installation of valve housing oil seal

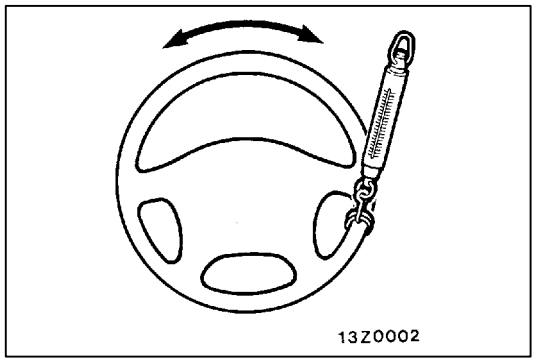
Tool	Number	Name	Use
	MB991561	Boot band crimping tool	Installation of bellows band
 B990776	MB990776	Front axle base	Installation of dust cover for tie rod end ball joint

ON-VEHICLE SERVICE

37200100138

STEERING WHEEL FREE PLAY CHECK

1. With engine running (hydraulic operation), set front wheels straight ahead.


13Z0002

2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

   Limit: 30 mm

3. When play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value, set steering wheel straight ahead with engine stopped. Load 5 N towards steering wheel circumference and check play.

   Standard value (steering wheel play with engine stopped): 10 mm or less

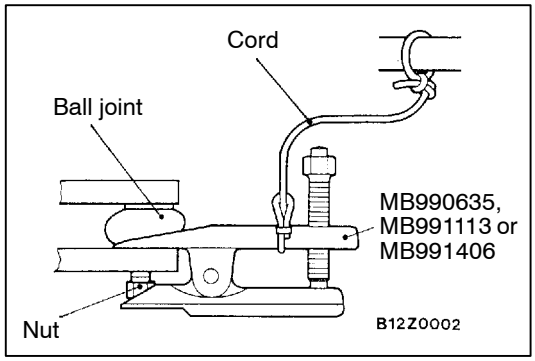
   If the play exceeds the standard value, remove steering gear box and check total pinion torque.

STEERING ANGLE CHECK

37200110179

1. Locate front wheels on turning radius gauge and measure steering angle.

   Standard value:
   Inner wheel
   38°00' ± 2° <Except 6A1-R.H. drive vehicles>
   39°00' ± 2° <6A1-R.H. drive vehicles>
   Outer wheel 30°30'
2. When the angle is not within the standard value, the toe is probably incorrect. Adjust toe (Refer to GROUP 33A - On-vehicle Service) and recheck steering angle.

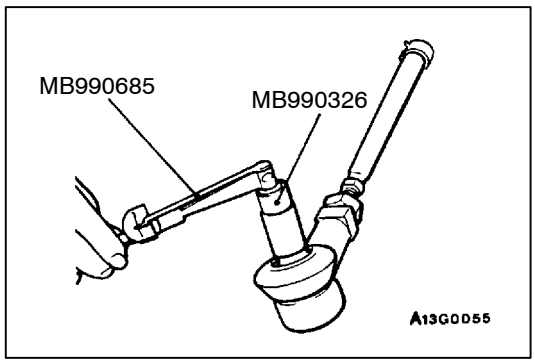


TIE ROD END BALL JOINT STARTING TORQUE CHECK

37200150140

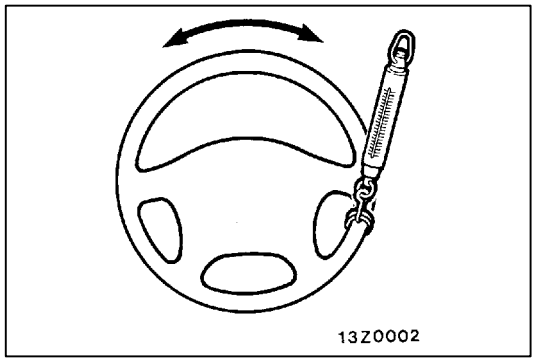
1. Disconnect tie rod and knuckle with special tool.

   Caution
   1. Using the special tool, loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.
   2. Support the special tool with a cord, etc. to prevent it from coming off.



2. Move ball joint stud several times and install nut on stud. Measure ball joint starting torque with special tools.

   Standard value: 0.5 - 2.5 Nm
3. When the starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check ball joint for end play or ratcheting. If none of these, the joint is still serviceable.



STATIONARY STEERING EFFORT CHECK

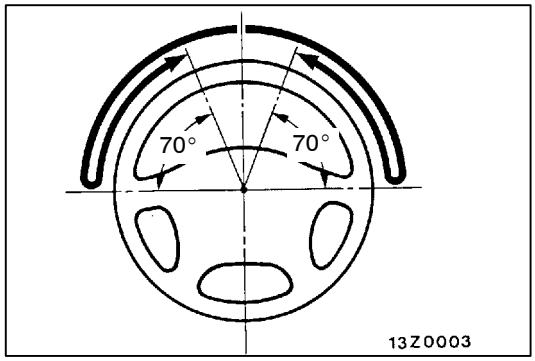
37200170160

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to 1,000±100 r/min.

   Caution
   After checking the engine r/min must return to the standard idling r/min.

3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant fluctuation of the required steering force.

   Standard value:
   Steering effort: 30N or less
   Fluctuation allowance: 5.9N or less



CHECKING STEERING WHEEL RETURN TO CENTRE

37200180156

To make this test, conduct a road test and check as follows.

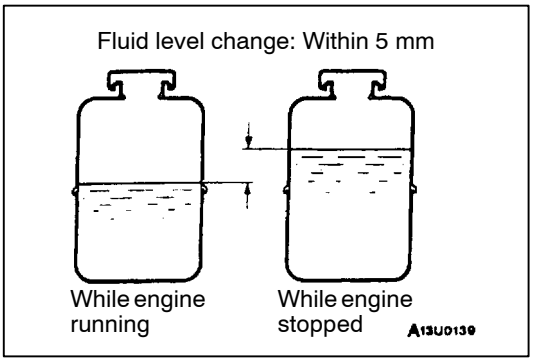
1. Make both gradual and sudden turns and check the steering “feeling” to be sure that there is not difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h, turn the steering wheel 90° and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to be satisfactory.

   NOTE
   There will be a momentary feeling or “heaviness” when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

DRIVE BELT TENSION CHECK

37200190050

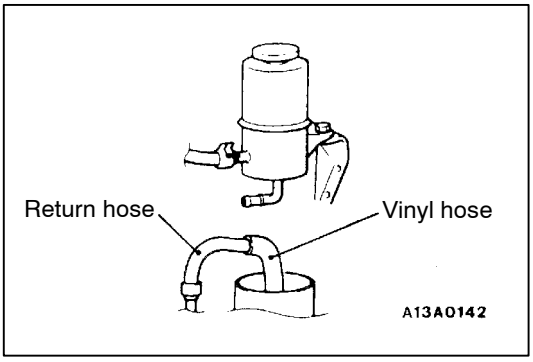
Refer to GROUP 11 - On-vehicle Service.



FLUID LEVEL CHECK

37200200043

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50 - 60°C.
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the change of the fluid level is 5 mm or more, air bleeding should be done.



FLUID REPLACEMENT

37200210046

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. Disconnect the high tension cable.

Caution
Be careful not to position the high-tension cable near the delivery pipe.

5. While operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.
6. Connect the return hoses securely, and then secure it with the clip.
7. Fill the oil reservoir with the specified fluid up to the lower position of the filter, and then bleed the air.

Specified fluid:
Automatic transmission fluid
DEXRON or DEXRON II

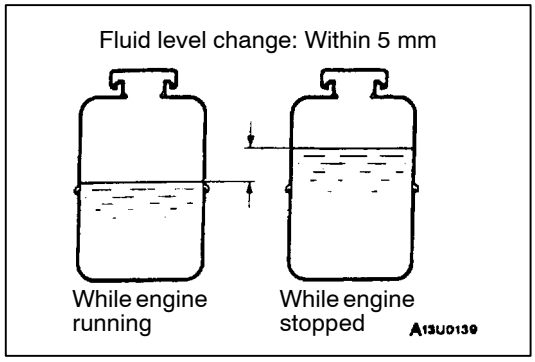
BLEEDING

37200220155

1. Jack up the front wheels and support them by using a rigid rack.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right five or six times.
4. On vehicles with a petrol engine, disconnect the high-tension cable. On vehicles with a diesel engine, remove the fuel cut valve connector attached to the injection pump.

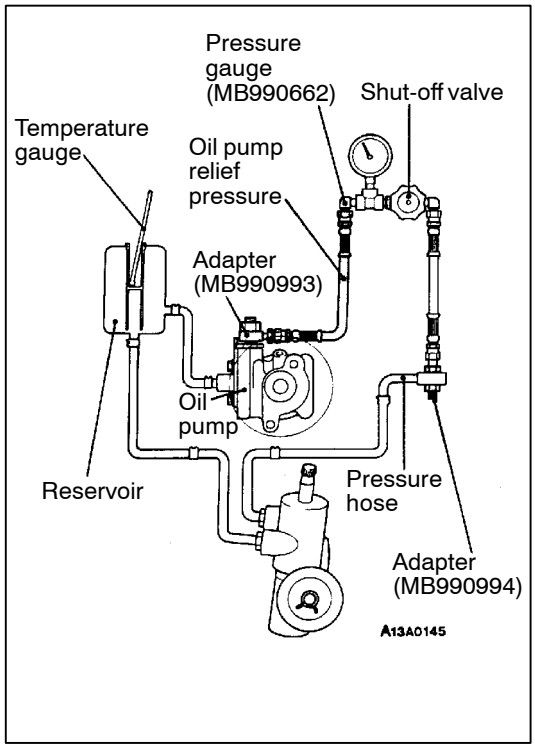
   Caution
   Be careful not to position the high-tension cable near the delivery pipe.
5. While operating the starting motor intermittently, turn the steering wheel all the way to the left and right five or six times (for 15 to 20 seconds).

   Caution
   1. During air bleeding, refill the fluid so that the level never falls below the lower position of the filter.
   2. If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.
6. On vehicles with a petrol engine, connect the high-tension cable. On vehicles with a diesel engine, connect the fuel cut valve connector attached to the injection pump. Start the engine (idling).
7. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
8. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
9. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.



10. Check whether or not the change in the fluid level is within 5 mm when the engine is stopped and when it is running.
11. If the change of the fluid level is 5 mm or more, the air has not been completely bled from the system, and thus must be bled completely.

    Caution
    1. If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.
    2. If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause a lessening of the life of the pump, etc.



OIL PUMP PRESSURE TEST

37200230189

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 - 60°C.
3. Start the engine and idle it at 1,000±100 r/min.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

   Standard value: 11.8 MPa

   Caution
   Pressure gauge shut off valve must not remain closed for more than 10 seconds.

5. If it is not within the standard value, replace the oil pump.
6. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

   Standard value: 0.8 - 1.0 MPa

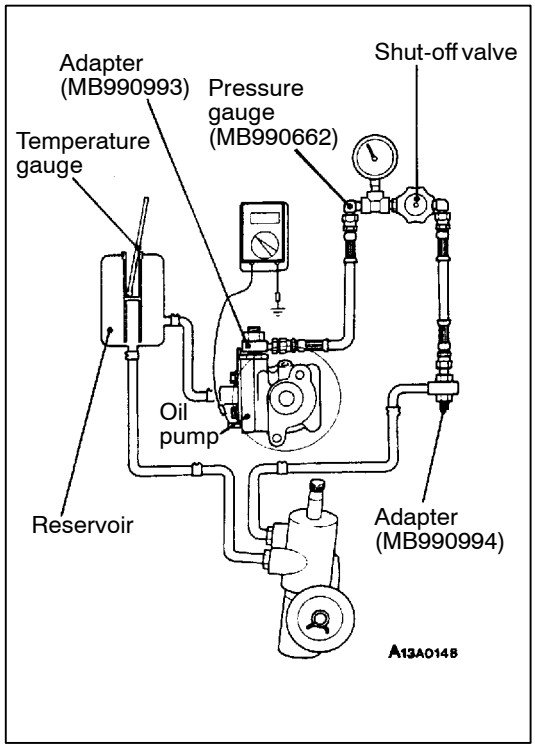
7. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
8. Fully open the shut-off valve of the pressure gauge.
9. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

   Standard value: 11.8 MPa

10. When not within the standard value, replace the power steering gear box.
    Remeasure fluid pressure.
11. Remove the special tools, and then tighten the pressure hose to the specified torque.

    Tightening torque: 18 Nm

12. Bleed the system.



POWER STEERING OIL PRESSURE SWITCH CHECK

37200720150

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 - 60°C.
3. The engine should be idling.
4. Disconnect the connection of the connector for the oil pressure switch, and place an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure, then check whether or not the hydraulic pressure that activates the switch is the standard value.

   Standard value: 1.8 - 2.4 MPa

6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether or not the hydraulic pressure that deactivates the switch is the standard value.

   Standard value: 0.8 - 2.4 MPa

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

   Tightening torque: 18 Nm

8. Bleed the system.

BALL JOINT DUST COVER CHECK

37200860012

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
   Cracks or damage of the dust cover may cause damage of the ball joint.

STEERING WHEEL AND SHAFT

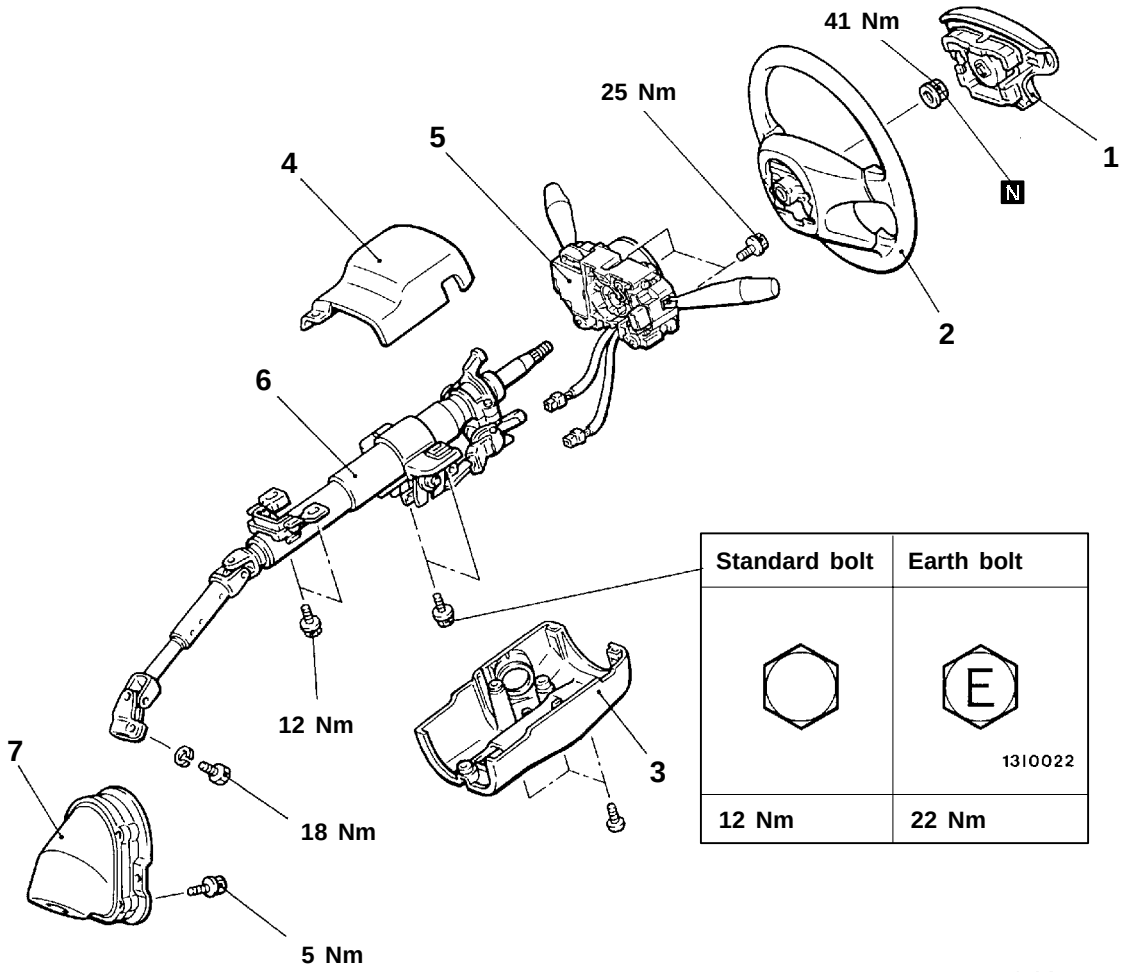
37200260218

REMOVAL AND INSTALLATION

CAUTION: SRS
For vehicles with SRS, before removal of air bag module, refer to GROUP 52B - Service Precautions and Air Bag Module and Clock Spring.

Pre-removal Operation
Instrument Lower Panel Assembly Removal (Refer to GROUP 52A - Instrument Panel.)

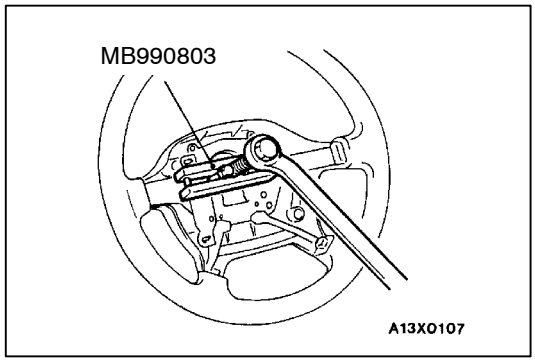
Post-installation Operation
- Instrument Lower Panel Assembly Installation (Refer to GROUP 52A - Instrument Panel.)
- Checking Steering Wheel Position with Wheels Straight Ahead



Removal steps

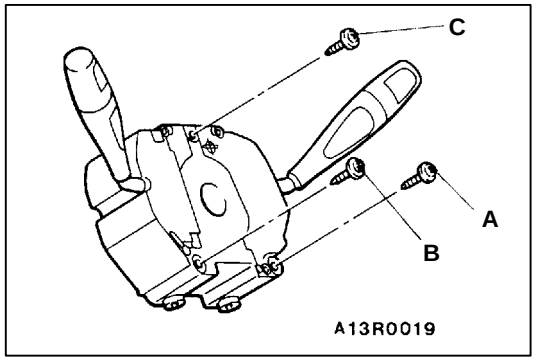
1. Air bag module (Refer to GROUP 52B - Air Bag Module and Clock Spring.)
◀A▶ 2. Steering wheel
3. Lower column cover
4. Upper column cover
▶A◀ 5. Clock spring and column switch (Refer to GROUP 52B - Air Bag Module and Clock Spring.)
6. Steering shaft assembly
7. Steering cover assembly

Caution
One of the steering shaft assembly mounting bolts must be the earth bolt. The earth bolt has a "E" mark on its head.



REMOVAL SERVICE POINT

◀A▶ STEERING WHEEL REMOVAL



INSTALLATION SERVICE POINT

▶A◀ CLOCK SPRING AND COLUMN SWITCH/COLUMN SWITCH INSTALLATION

Tighten the screws in an alphabetical order.

DISASSEMBLY AND REASSEMBLY

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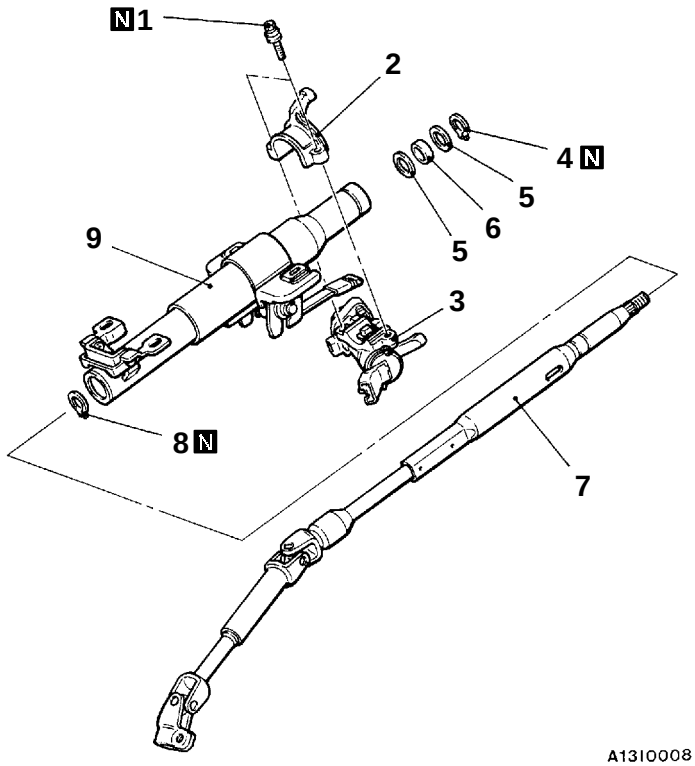
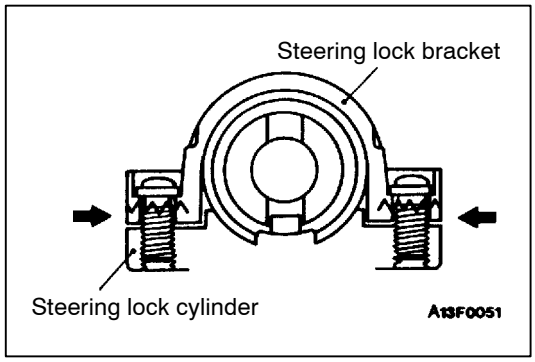


Disassembly steps

◀A▶ ▶A◀ 1. Special bolt
▶A◀ 2. Steering lock bracket
▶A◀ 3. Steering lock cylinder
4. Snap ring
5. Stopper
6. Spacer
7. Steering shaft assembly
8. Snap ring
9. Steering column assembly



DISASSEMBLY SERVICE POINT

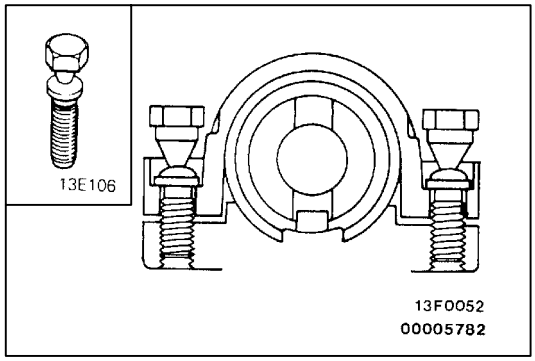
◀A▶ STEERING LOCK BRACKET/STEERING LOCK CYLINDER REMOVAL

If it is necessary to remove the steering lock cylinder, use a hacksaw to cut the special bolts at the steering lock bracket side.

REASSEMBLY SERVICE POINT

▶A◀ STEERING LOCK CYLINDER/STEERING LOCK BRACKET/SPECIAL BOLT INSTALLATION

1. When installing the steering lock cylinder and steering lock bracket to the column tube, temporarily install the steering lock in alignment with the column boss.



2. After checking that the lock works properly, tighten the special bolts until the head twists off.

Caution
The steering lock bracket and bolts must be replaced with new ones when the steering lock is installed.

POWER STEERING GEAR BOX

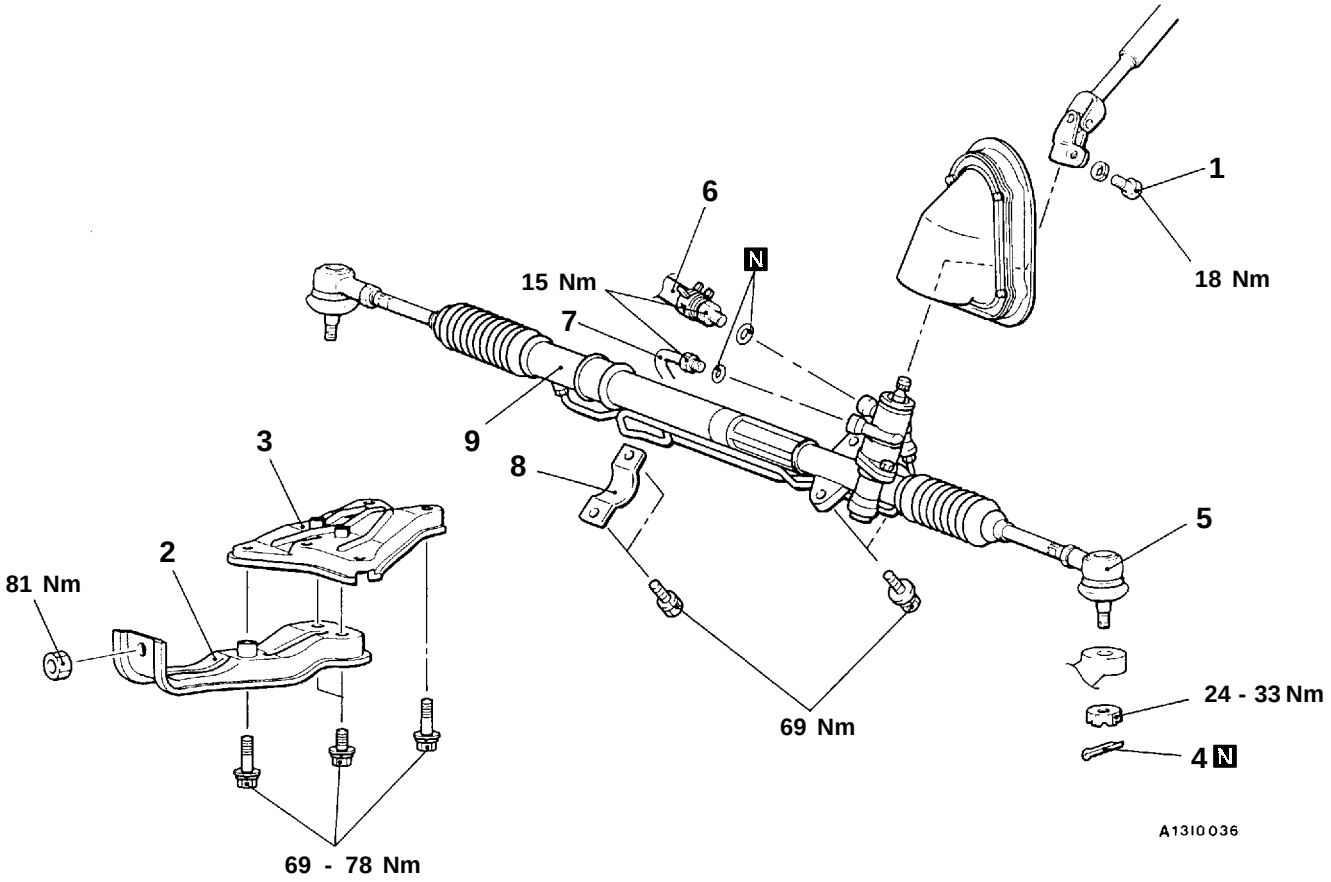
37200390207

REMOVAL AND INSTALLATION

CAUTION: SRS
For vehicles with SRS, before removal of steering gear box, refer to GROUP 52B, centre front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-9.)
- Center Member Removal (Refer to GROUP 32.)
- Front Exhaust Pipe Removal (Refer to GROUP 15.)
- Stabilizer Bar Removal (Refer to GROUP 33A.)

Post-installation Operation
- Check the Dust Cover for Cracks or Damage by Pushing it with Finger.
- Stabilizer Bar Installation (Refer to GROUP 33A.)
- Front Exhaust Pipe Installation (Refer to GROUP 15.)
- Center Member Installation (Refer to GROUP 32.)
- Power Steering Fluid Supplying (Refer to P.37A-9.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-10.)
- Checking Steering Wheel Position with Wheels Straight Ahead
- Front Wheel Alignment Adjustment (Refer to GROUP 33A.)



Removal steps

1. Steering shaft assembly and gear box connecting bolt
2. No.2 stay

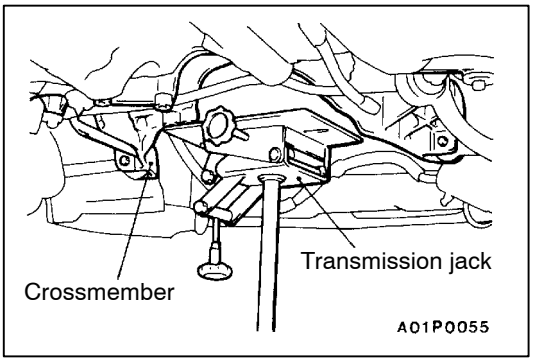
◀A▶ 3. No.3 stay

4. Split pin

◀B▶ 5. Tie rod end and knuckle connection

6. Pressure tube connection
7. Return tube connection
8. Cylinder clamp

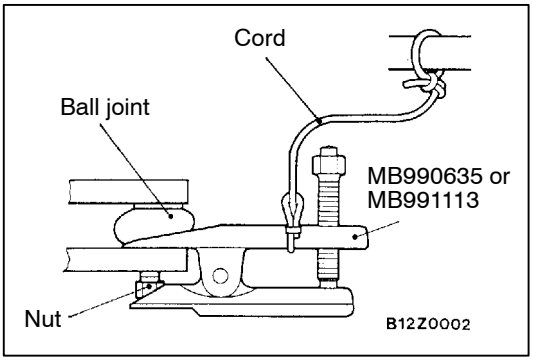
◀C▶ 9. Gear box assembly



REMOVAL SERVICE POINTS

◀A▶ NO.3 STAY REMOVAL

Hold the crossmember with a transmission jack, and remove the No.3 stay.



◀B▶ TIE ROD END DISCONNECTION

Caution

1. **Using the special tool, loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.**
2. **Support the special tool with a cord, etc. to prevent it from coming off.**

◀C▶ GEAR BOX ASSEMBLY REMOVAL

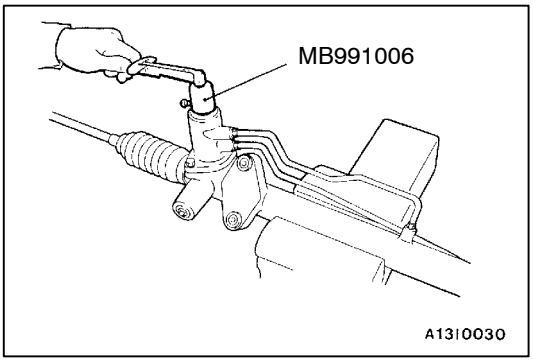
Caution

Be careful not to damage the bellows and the tie rod end dust cover when removing the gear box assembly.

INSPECTION

37200400139

- Check the rubber parts for cracks and breakage.



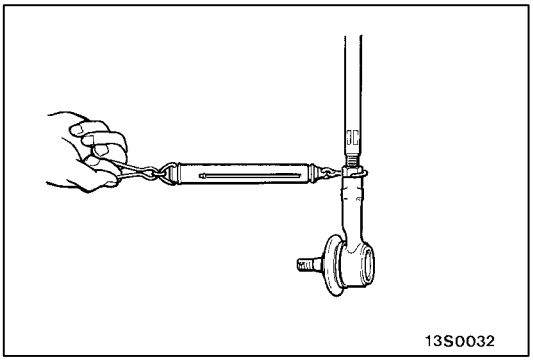
GEAR BOX TOTAL PINION TORQUE

Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion torque.

Standard value: 0.7 - 1.4 Nm
[Change in torque: 0.4 Nm]

Caution
When holding the steering gear box assembly in a vice, secure its mounting positions. If it is secured in any other places, the gear housing may become deformed or damaged.

NOTE
When measuring, remove the bellows from the rack housing. Measure the pinion torque through the whole stroke of the rack.
If the measured value is not within the standard range, first adjust the rack support cover, and then check the total pinion starting torque again.
If the total pinion starting torque cannot be adjusted to within the standard range by adjusting the rack support cover, check the rack support cover, rack support spring, rack support and replace any parts if necessary.



CHECK THE TIE ROD FOR SWING RESISTANCE

1. Give 10 hard swings to the tie rod.
2. Measure the tie rod swing resistance with a spring balance.

   Standard value: 8 - 27 N [1.5 - 4.9 Nm]

3. If the measured value exceeds the standard value, replace tie rod.
4. Even if the measured value is below the standard value, the tie rod which swings smoothly without excessive play may be used.

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-19.)

   NOTE
   Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.

DISASSEMBLY AND REASSEMBLY

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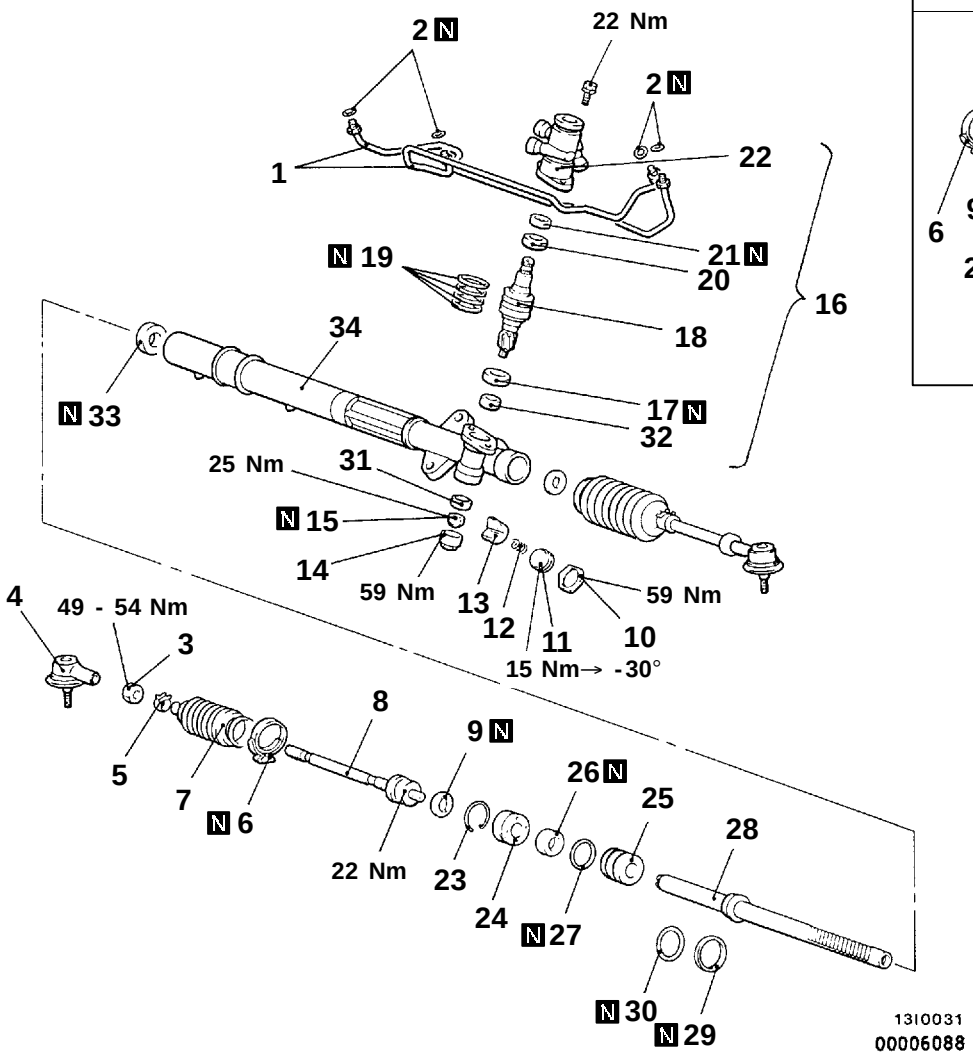
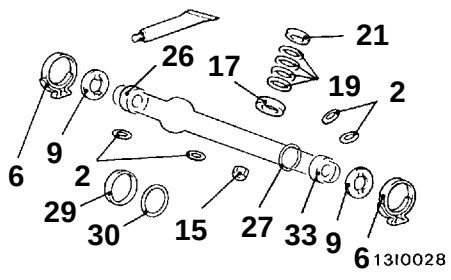
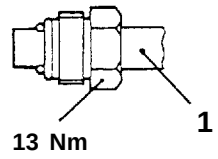


Steering gear seal kit



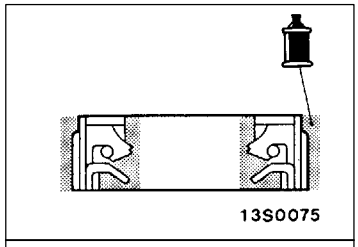
Flare nut



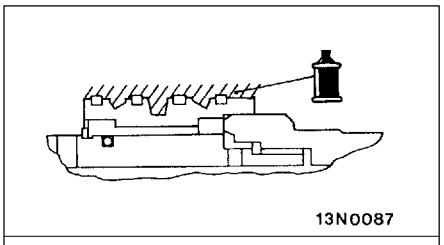
Disassembly steps

- 1. Feed pipe
- 2. O-ring
- ▶N◀ 3. Tie rod end locking nut
- ▶N◀ 4. Tie rod end
- 5. Bellows clip
- ▶M◀ 6. Bellows band
- 7. Bellows
- ▶L◀ 8. Tie rod
- ▶L◀ 9. Tab washer
- ▶K◀ • Total pinion torque adjustment
- ▶J◀ 10. Locking nut
- ◀A▶ ▶J◀ 11. Rack support cover
- 12. Rack support spring
- 13. Rack support
- ▶I◀ 14. End plug
- 15. Self-locking nut
- 16. Valve housing assembly
- ◀B▶ ▶H◀ 17. Oil seal
- ◀B▶ 18. Pinion and valve assembly
- ◀C▶ ▶G◀ 19. Seal ring
- ◀D▶ ▶F◀ 20. Ball bearing
- ◀D▶ ▶F◀ 21. Oil seal
- 22. Valve housing
- ◀E▶ ▶E◀ 23. Circlip
- ◀F▶ 24. Rack stopper
- ◀F▶ ▶D◀ 25. Rack bushing
- ◀G▶ ▶D◀ 26. Oil seal
- 27. O-ring
- ◀F▶ ▶C◀ 28. Rack
- ◀C▶ 29. Seal ring
- 30. O-ring
- ◀H▶ ▶B◀ 31. Ball bearing
- ◀I▶ ▶B◀ 32. Needle roller bearing
- ◀J▶ ▶A◀ 33. Oil seal
- 34. Rack housing

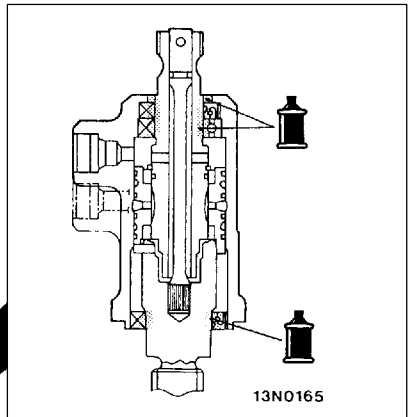
Lubrication and Sealing Points



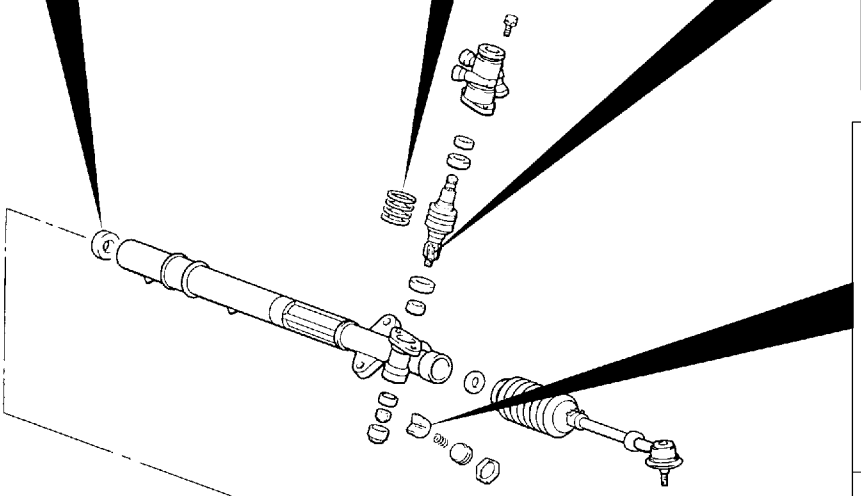
Fluid:
Automatic transmission fluid DEXRON or DEXRON II

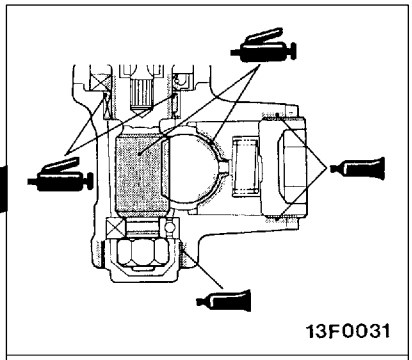


Fluid:
Automatic transmission fluid DEXRON or DEXRON II

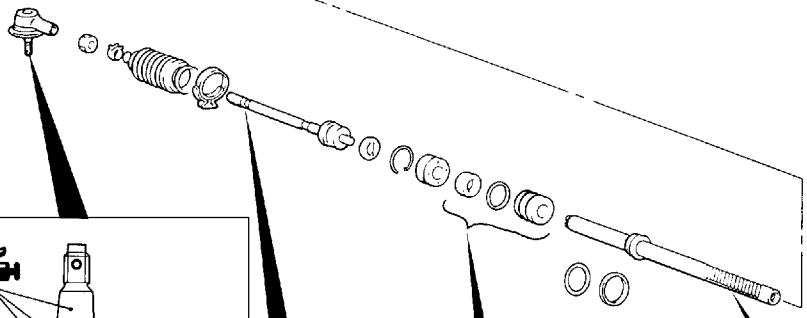


Fluid:
Automatic transmission fluid DEXRON or DEXRON II





Sealant:
3M ATD Part No. 8661 or equivalent
Grease: Repair kit grease



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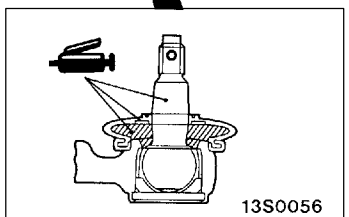
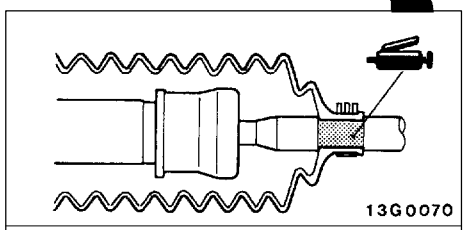
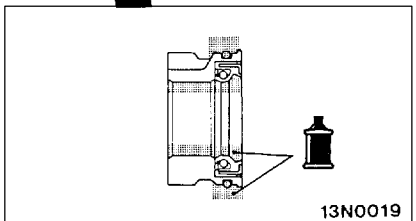


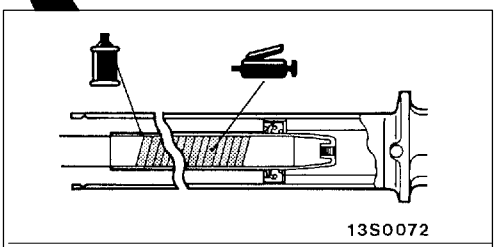
Sealant:
3M ATD Part No. 8661 or equivalent



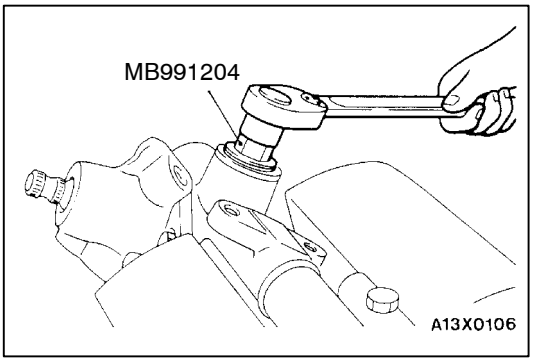
Grease: Silicone grease



Fluid: Automatic transmission fluid DEXRON or DEXRON II



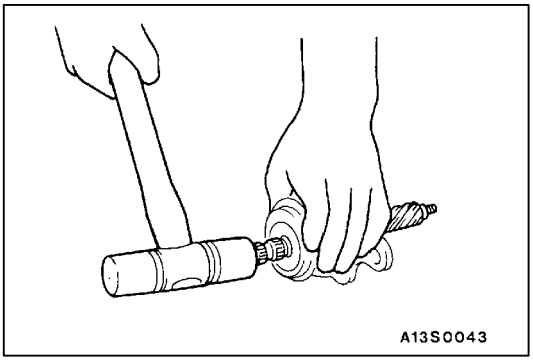
Fluid: Automatic transmission fluid DEXRON or DEXRON II
Grease: Repair kit grease



DISASSEMBLY SERVICE POINTS

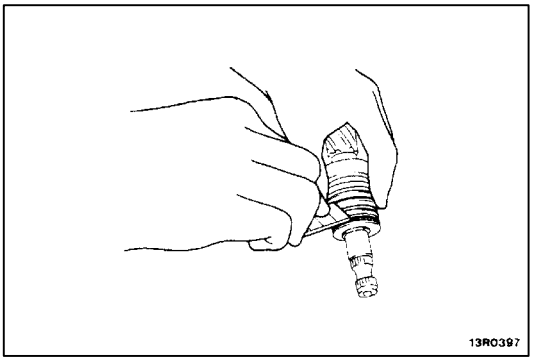
◀A▶ RACK SUPPORT COVER REMOVAL

Use the special tool to remove the rack support cover from the gear box.



◀B▶ OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL

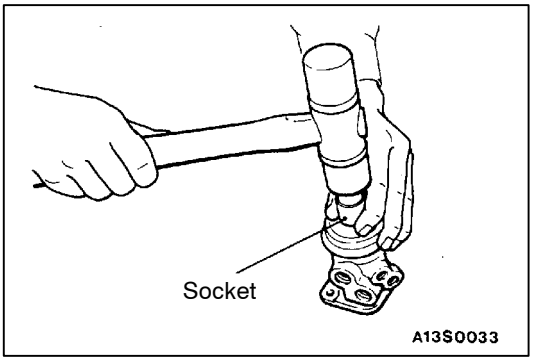
Using a plastic hammer, gently tap the pinion to remove it.



◀C▶ SEAL RING REMOVAL

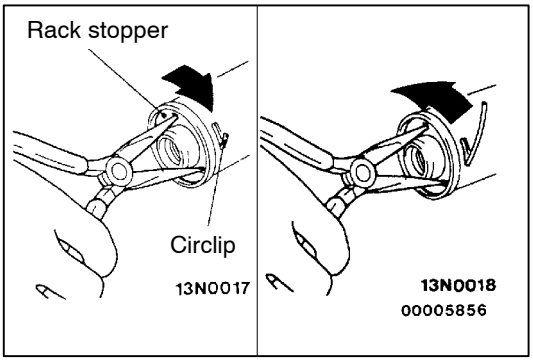
Cut the seal ring and remove it from the pinion and valve assembly and the rack.

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



◀D▶ BALL BEARING/OIL SEAL REMOVAL

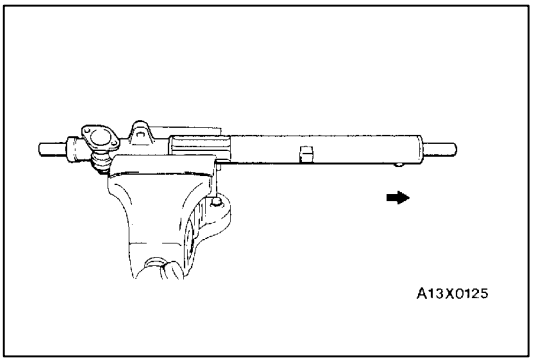
Use a socket, remove the oil seal and the ball bearing from the valve housing assembly simultaneously.



◀E▶ CIRCLIP REMOVAL

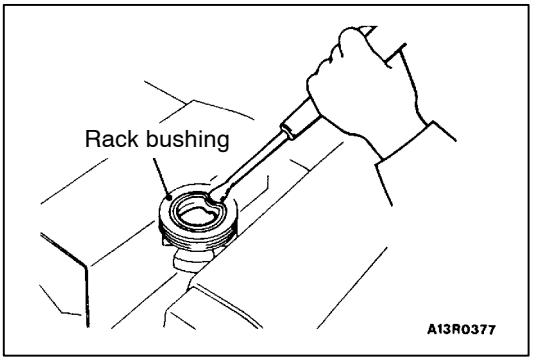
1. Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
2. Turn the rack stopper anticlockwise to remove the circlip.

Caution
Note that if the rack stopper is first turned anticlockwise, the circlip will get caught in the slot in the housing and the rack stopper will not turn.



◀F▶ RACK STOPPER/RACK BUSHING/RACK REMOVAL

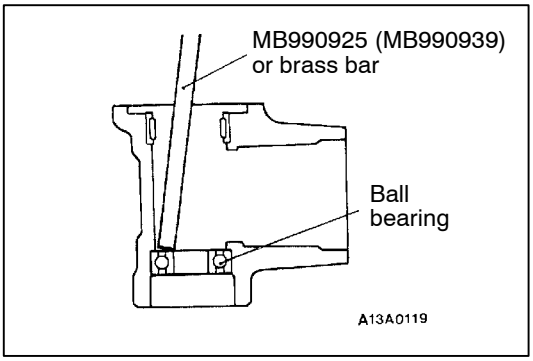
Pull out the rack assembly gently, and remove the rack stopper and rack bushing together.



◀G▶ OIL SEAL REMOVAL

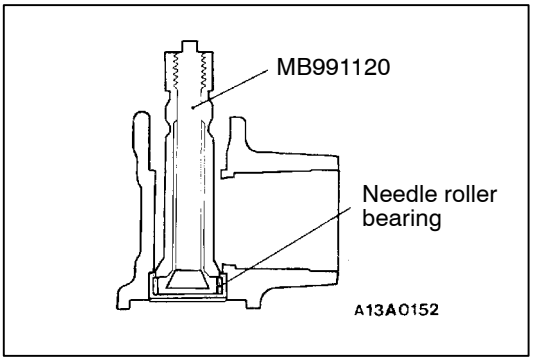
Partially bend the oil seal to remove from the rack bushing.

Caution
Do not damage the oil seal press fitting surface of the rack bushing.



◀H▶ BALL BEARING REMOVAL

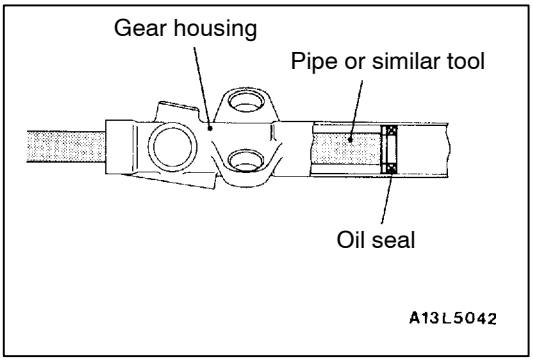
Use a brass bar or the special tool to remove the ball bearing from the gear housing.



◀I▶ NEEDLE ROLLER BEARING REMOVAL

Use the special tool to remove the needle roller bearing from the rack housing.

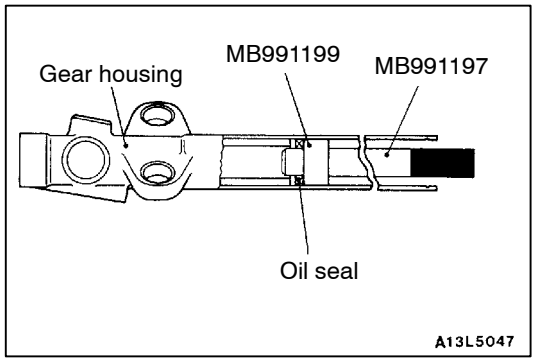
Caution
Do not open the special tool excessively to prevent damaging housing interior.



◀J▶ OIL SEAL REMOVAL

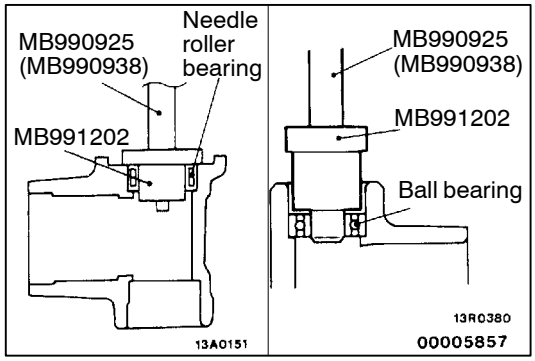
Use a piece of pipe or similar tool to remove the oil seal from the gear housing.

Caution
Be careful not to damage the inner surface of the rack cylinder of the gear housing.

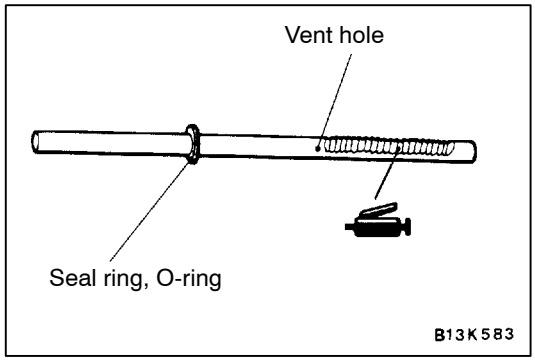


REASSEMBLY SERVICE POINTS

▶A◀ OIL SEAL INSTALLATION



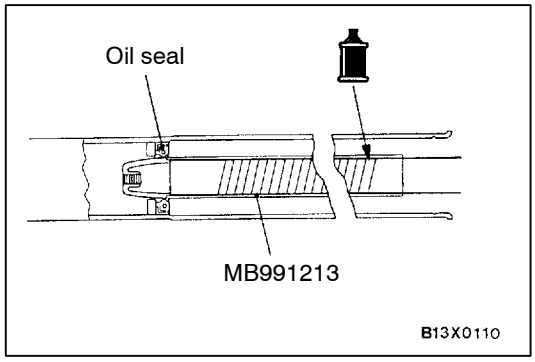
▶B◀ NEEDLE ROLLER BEARING/BALL BEARING INSTALLATION



▶C◀ RACK INSTALLATION

1. Apply a coating of repair kit grease to the rack tooth face.

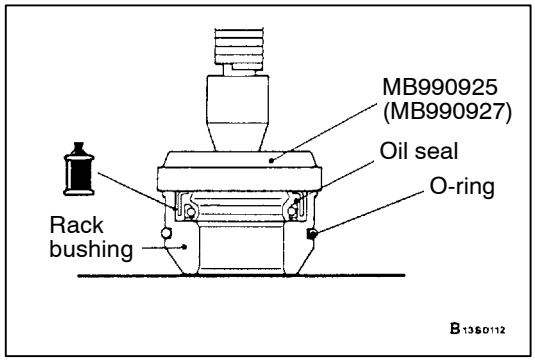
Caution
Do not close the vent hole in the rack with grease.



2. Cover rack serrations with special tool.
3. Apply the specified fluid on the special tool.

Specified fluid:
Automatic transmission fluid
DEXRON or DEXRON II

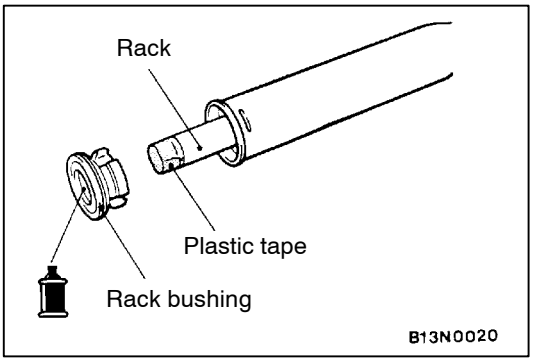
4. Match the oil seal centre with rack to prevent retainer spring from slipping and slowly insert rack from power cylinder side.



▶D◀ OIL SEAL/RACK BUSHING INSTALLATION

1. Apply the specified fluid to the outer surface of the oil seal. Press-fit the oil seal using the special tool until it is flush with the bushing end face.

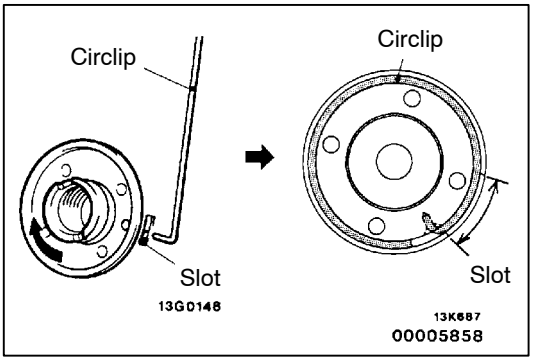
Specified fluid:
Automatic transmission fluid
DEXRON or DEXRON II



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

   Specified fluid:
   Automatic transmission fluid
   DEXRON or DEXRON II

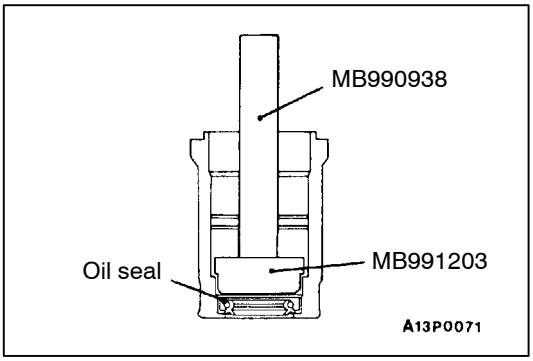
3. Wrap the rack end with plastic tape, and push the rack bushing onto the rack.



▶E◀ CIRCLIP INSTALLATION

Insert the circlip to the rack stopper hole through the cylinder hole. Turn the rack stopper clockwise and insert the circlip firmly.

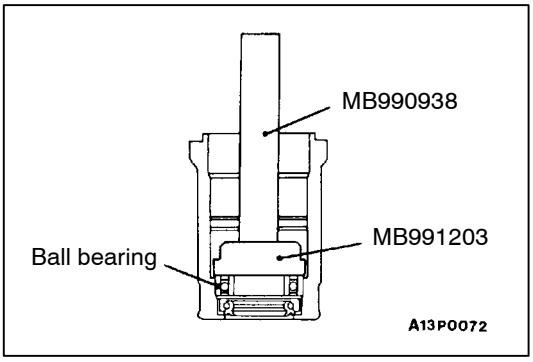
Caution
Insert the circlip to the rack stopper hole while turning the rack stopper clockwise.



▶F◀ OIL SEAL/BALL BEARING INSTALLATION

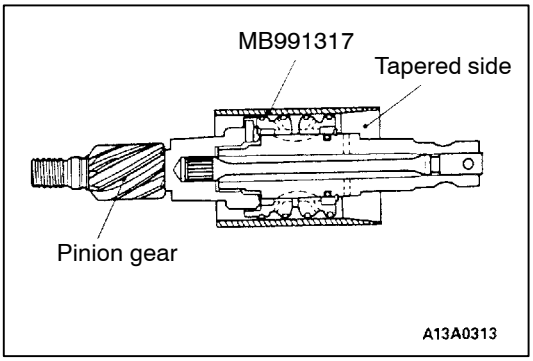
1. Apply a coating of the specified fluid to the outside of the oil seal. Using the special tools, press the oil seal into the valve housing.

   Specified fluid:
   Automatic transmission fluid
   DEXRON or DEXRON II



2. Apply a coating of the specified fluid to the outside of the ball bearing. Using the special tools, press the ball bearing into the valve housing.

   Specified fluid:
   Automatic transmission fluid
   DEXRON or DEXRON II

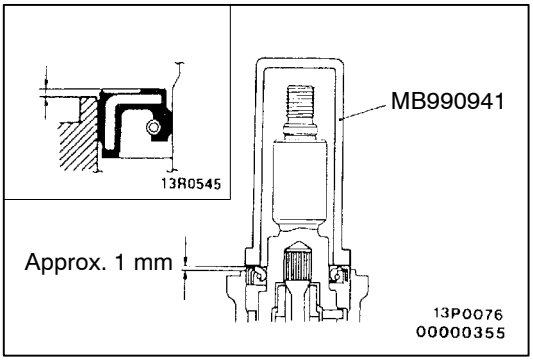


▶G◀SEAL RING INSTALLATION

1. Kneed the seal ring to soften it.
2. Apply the specified fluid to the seal ring, and install to the rack groove.

   Specified fluid:
   Automatic transmission fluid
   DEXRON or DEXRON II

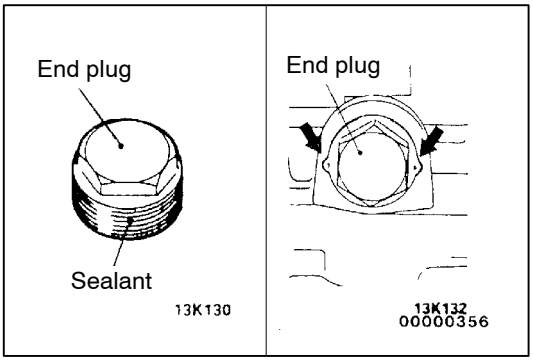
3. Insert the tapered side of the special tool from the pinion gear side, and compress the seal ring.



▶H◀ OIL SEAL INSTALLATION

Use the special tool to press the oil seal into the valve housing. The upper surface of the oil seal should project outwards approx. 1 mm from the housing edge surface.

Caution
If the oil seal is flush with or lower than the housing edge, it will cause oil leaks and require reassembly.

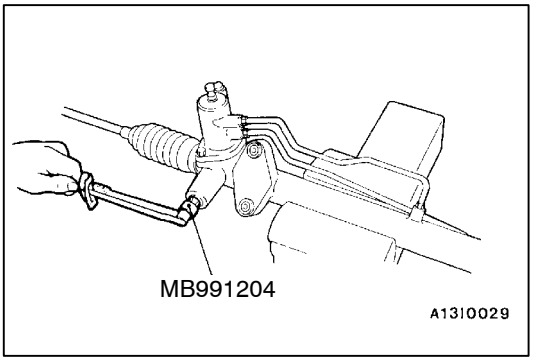


▶I◀ END PLUG INSTALLATION

1. Apply the specified sealant to the threaded part of the end plug.

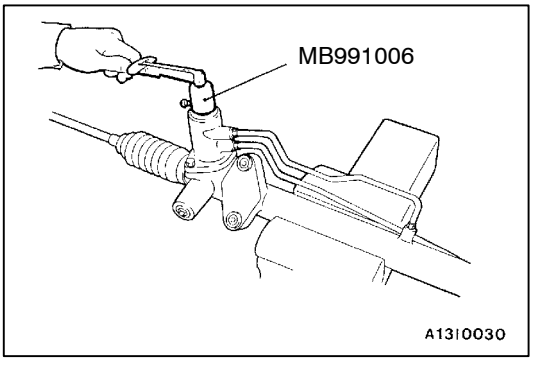
   Specified sealant:
   3M ATD Part No.8661 or equivalent

2. Secure the threaded portion of the end plug at two places by using a punch.



▶J◀ RACK SUPPORT COVER/LOCKING NUT INSTALLATION

1. Use the special tool to tighten the rack support cover to 15 Nm.
2. Return the rack support cover 30°.
3. Use the special tool to hold the rack support cover and tighten the locking nut to the specified torque.



▶K◀ TOTAL PINION TORQUE ADJUSTMENT

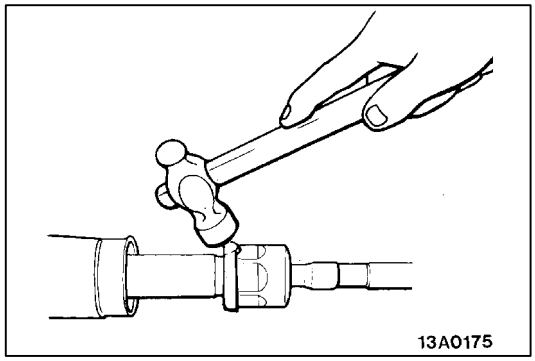
1. Using the special tool, rotate the pinion shaft at the rate of one rotation in 4 to 6 seconds to check the total pinion torque and the change in torque.

   Standard value:
   Total pinion torque: 0.7 - 1.4 Nm
   Change in torque: 0.4 Nm or less

2. If the total pinion torque or the change in torque is outside the standard value, return the rack support cover within 0 to 30°, and adjust again.

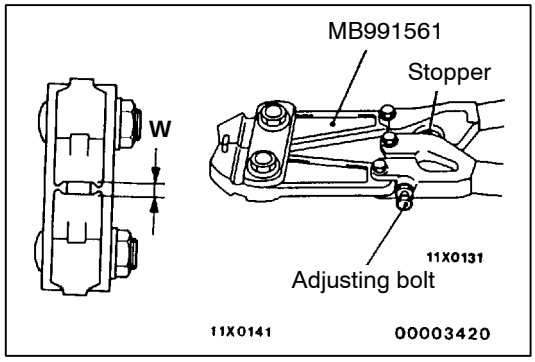
Caution
(1) When adjusting, set the standard value at its highest value.
(2) Assure no ratcheting or catching when operating the rack towards the shaft direction.
(3) Measure the total pinion torque through the whole stroke of the rack.

NOTE
If the total pinion toque cannot be adjusted to the standard value within the specified return angle, check the rack support cover components and replace any parts 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

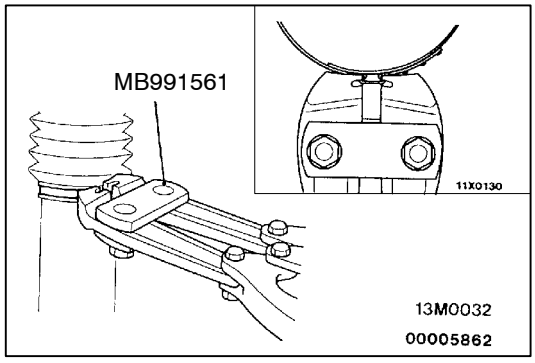
1. Turn the adjusting bolt of the special tool to adjust the opening dimension (W) to the standard value.

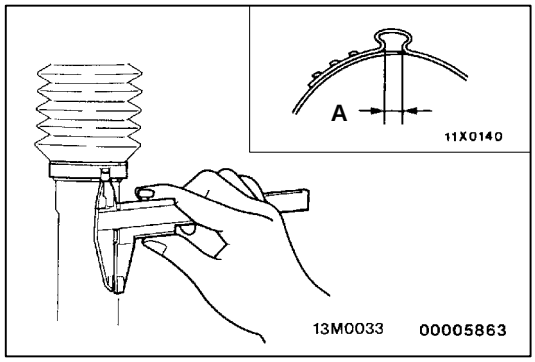
Standard value (W): 2.9 mm
<When more than 2.9 mm>
Screw in the adjusting bolt.
<When less than 2.9 mm>
Loosen the adjusting bolt.

NOTE
(1) The dimension (W) is adjusted by approx. 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.



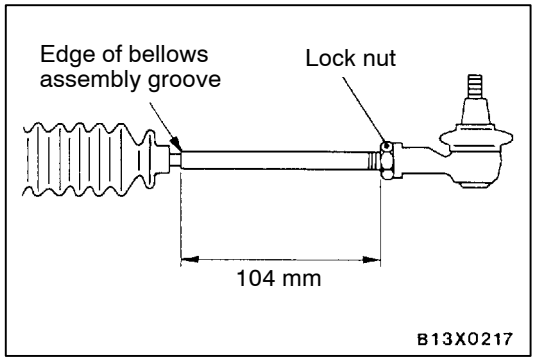


3. Check that the crimped width (A) is within the standard value.

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 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 mm - A [Example: If (A) is 2.3 mm, (W) is 3.2 mm.]



▶N◀ TIE ROD END/TIE ROD END LOCKING NUT INSTALLATION

Screw in the tie rod end to have its right and left length as illustrated. Lock with lock nut.

INSPECTION

37200440131

RACK CHECK

- Check the rack tooth surfaces for damage or wear.
- Check the oil seal contact surfaces for uneven wear.
- Check the rack for bends.

PINION AND VALVE ASSEMBLY CHECK

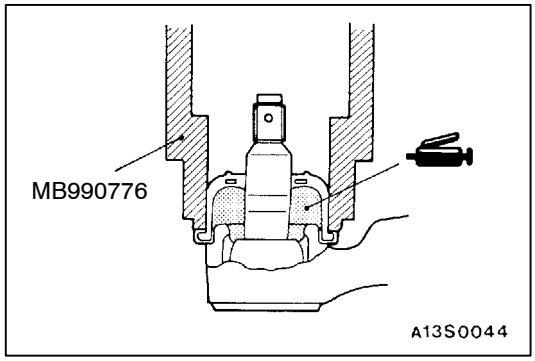
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING CHECK

- Check for roughness or abnormal noise during bearing operation.
- Check the bearing for play.
- Check the needle roller bearing for roller slip-off.

OTHER CHECK

- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.



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. Apply grease to the inside of the dust cover.
2. Apply the specified sealant to the mounting surface of the dust cover.

   Specified sealant: 3M ATD Part No.8661 or equivalent

3. Drive in the dust cover with special tool until it is fully seated.
4. Check the dust cover for cracks or damage by pushing it with finger.

POWER STEERING OIL PUMP

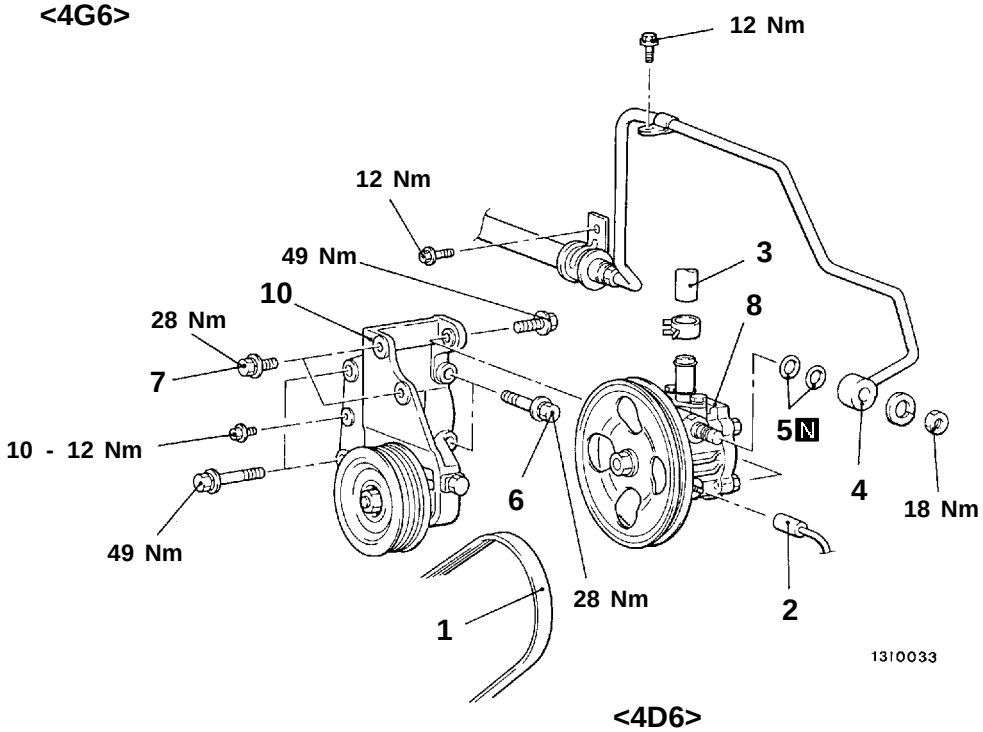
37200520262

REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-9.)
- Condenser Fan Motor Assembly Removal (Refer to GROUP 14.) <6A1>

Post-installation Operation
- Condenser Fan Motor Assembly Installation (Refer to GROUP 14.) <6A1>
- Power Steering Fluid Supplying (Refer to P.37A-9.)
- Drive Belt Tension Adjusting (Refer to GROUP 11 - On-vehicle Service.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-10.)
- Oil Pump Pressure Check (Refer to P.37A-11.)

<4G6>



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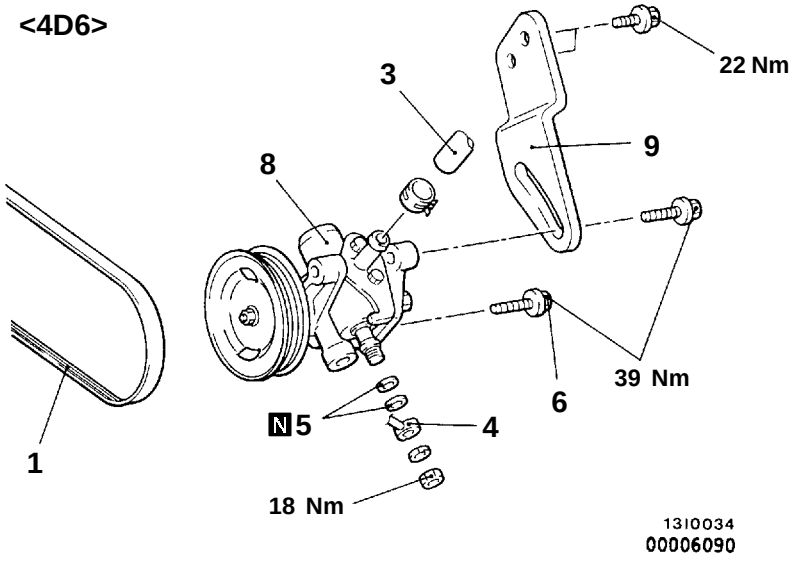
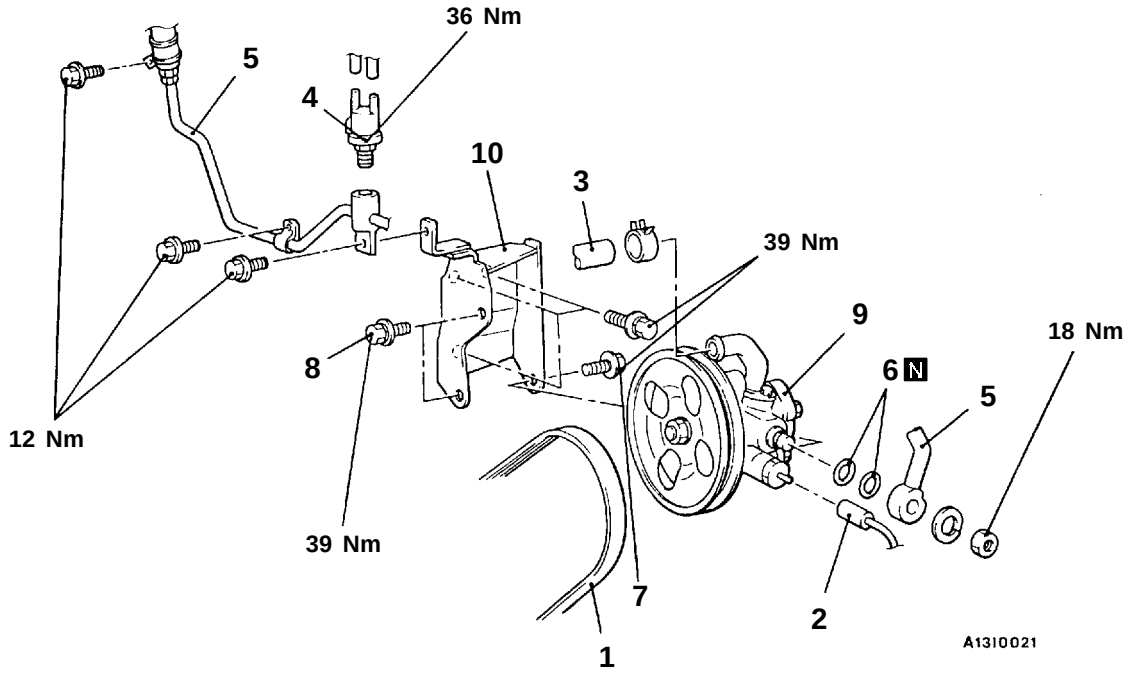


Removal steps

1. Drive belt
2. Pressure switch connector
3. Suction hose
4. Pressure hose
5. O-ring
6. Bolt
7. Bolt
8. Oil pump
9. Oil pump brace
10. Oil pump bracket

<6A1>



Removal steps

1. Drive belt
2. Pressure switch connector
3. Suction hose
4. Air control valve
5. Pressure hose
6. O-ring
7. Bolt
8. Bolts
9. Oil pump
10. Oil pump bracket

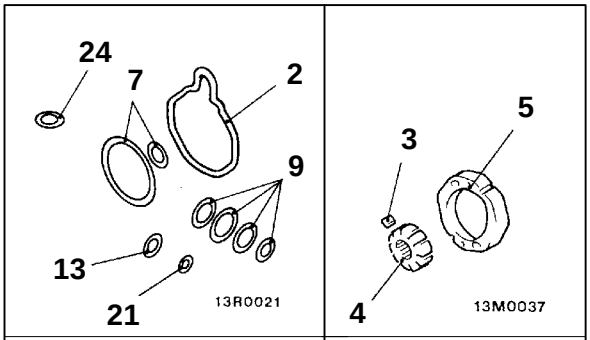
INSPECTION

37200530036

- Check the drive belt for cracks.
- Check the pulley assembly for uneven rotation.

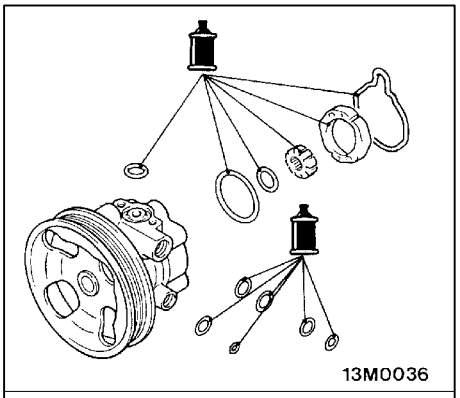
DISASSEMBLY AND REASSEMBLY

37200540220

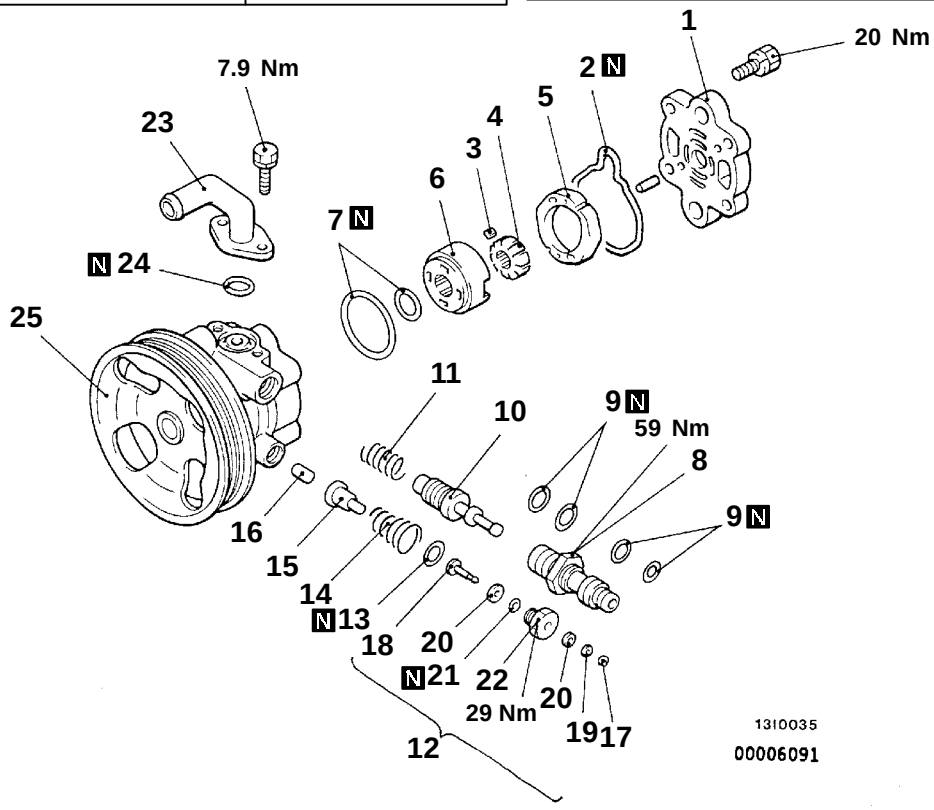


Oil pump seal kit

Oil pump cartridge kit



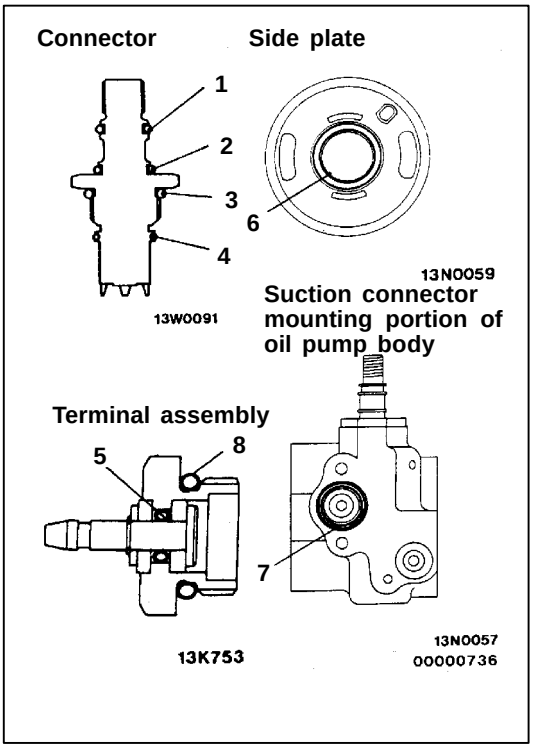
Fluid: Automatic transmission fluid DEXRON or DEXRON II



Disassembly steps

1. Pump cover
2. O-ring
▶E◀ 3. Vanes
4. Rotor
▶D◀ 5. Cam ring
▶C◀ 6. Side plate
▶A◀ 7. O-ring
8. Connector
▶A◀ 9. O-ring
10. Flow control valve
11. Flow control spring
12. Terminal assembly
▶A◀ 13. O-ring
▶B◀ 14. Spring
15. Plunger
16. Piston rod
17. Snap ring
18. Terminal
19. Washer
20. Insulator
▶A◀ 21. O-ring
22. Plug
23. Suction connector
▶A◀ 24. O-ring
25. Oil pump body and pulley assembly

Caution
Do not disassemble the flow control valve.

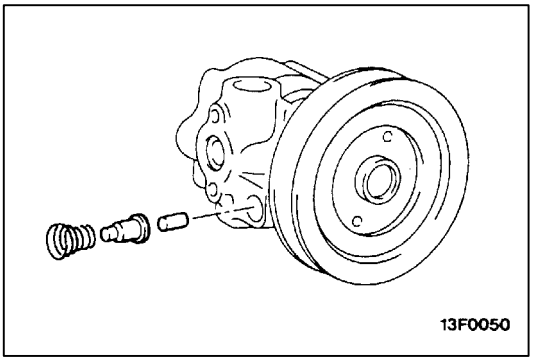


REASSEMBLY SERVICE POINTS

▶A◀ O-RINGS INSTALLATION

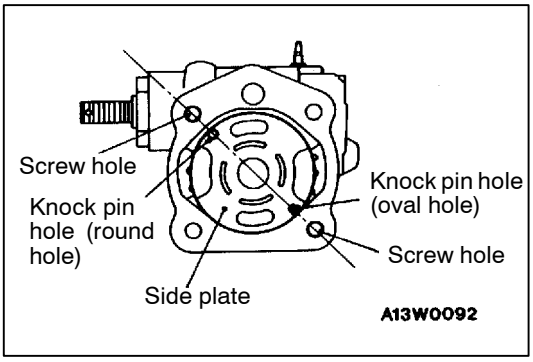
Apply the specified fluid on O-rings to install.

No.	I.D. × Width mm
1	11 × 1.9
2	13 × 1.9
3	17.8 × 2.4
4	13.5 × 1.5
5	3.8 × 1.9
6	16.8 × 2.4
7	17.8 × 2.4
8	13.0 × 1.9



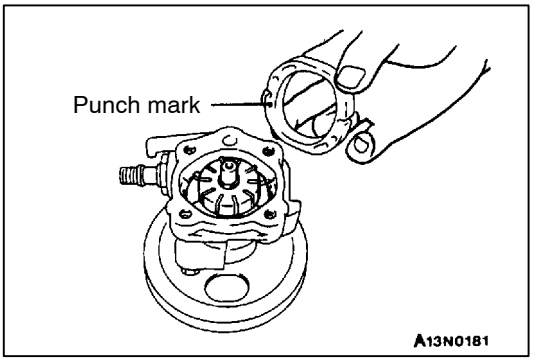
▶B◀ SPRING INSTALLATION

Fit the spring to the oil pump body with the larger diameter end at the terminal assembly side.



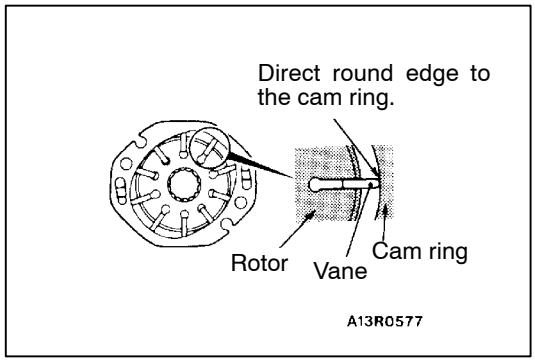
▶C◀ SIDE PLATE INSTALLATION

Install the side plate so that the screw hole in the oil pump body and the knock pin holes in the side plate are all in a straight line.



▶D◀ CAM RING INSTALLATION

Install the cam ring with the punch mark facing the side plate.



▶E◀ VANE INSTALLATION

Install the vanes on the rotor, paying close attention to the installation direction.

INSPECTION

37200550087

- Check the flow control valve for clogging.
- Check the pulley assembly for wear or damage.
- Check the groove of rotor and vanes for “stepped” wear.
- Check the contact surface of cam ring and vanes for “stepped” wear.
- Check the vanes for damage.

POWER STEERING HOSES

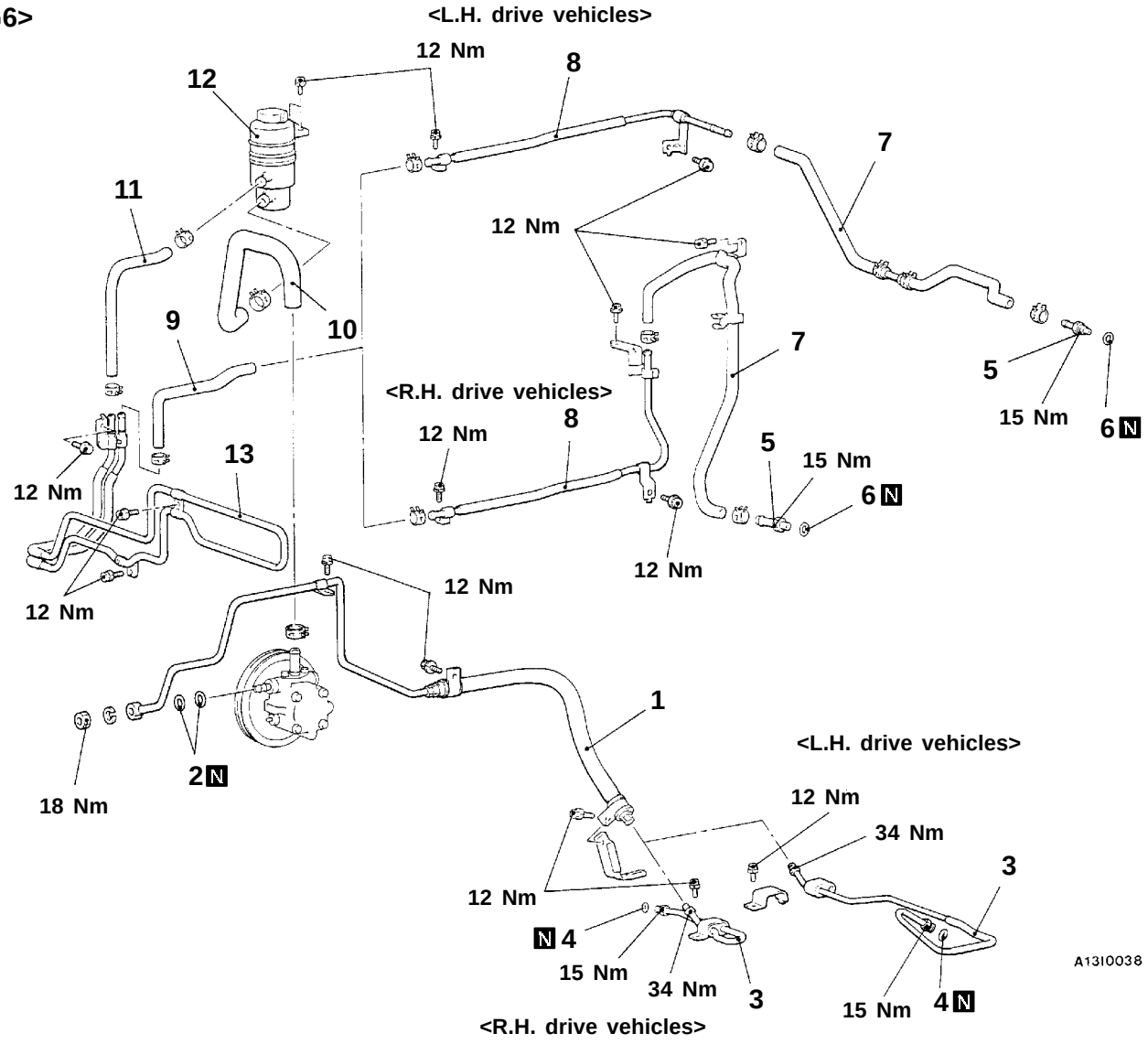
37200570267

REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-9.)
- Front Bumper Removal (Refer to GROUP 51.)

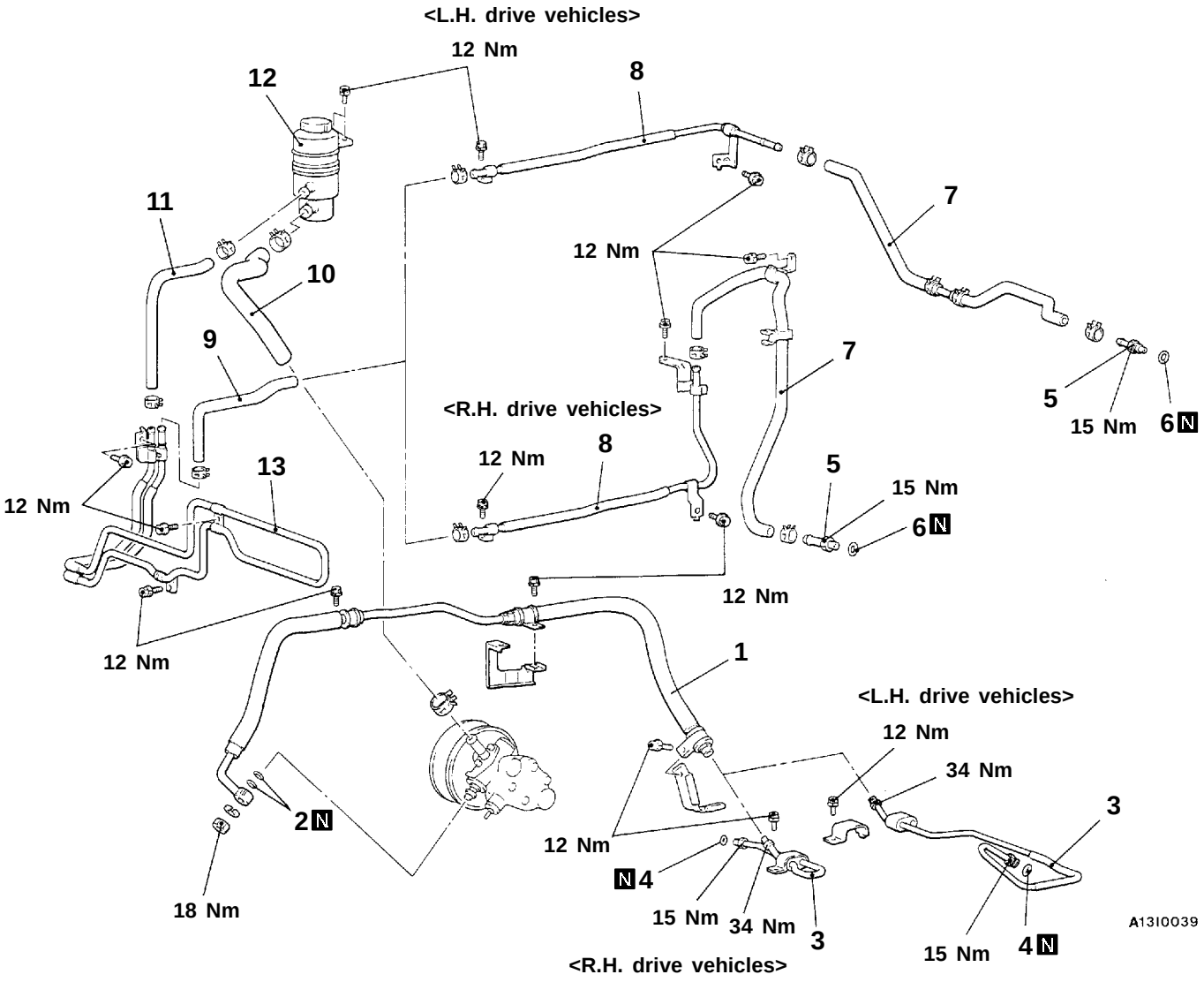
Post-installation Operation
- Front Bumper Installation (Refer to GROUP 51.)
- Power Steering Fluid Supplying (Refer to P.37A-9.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-10.)

<4G6>

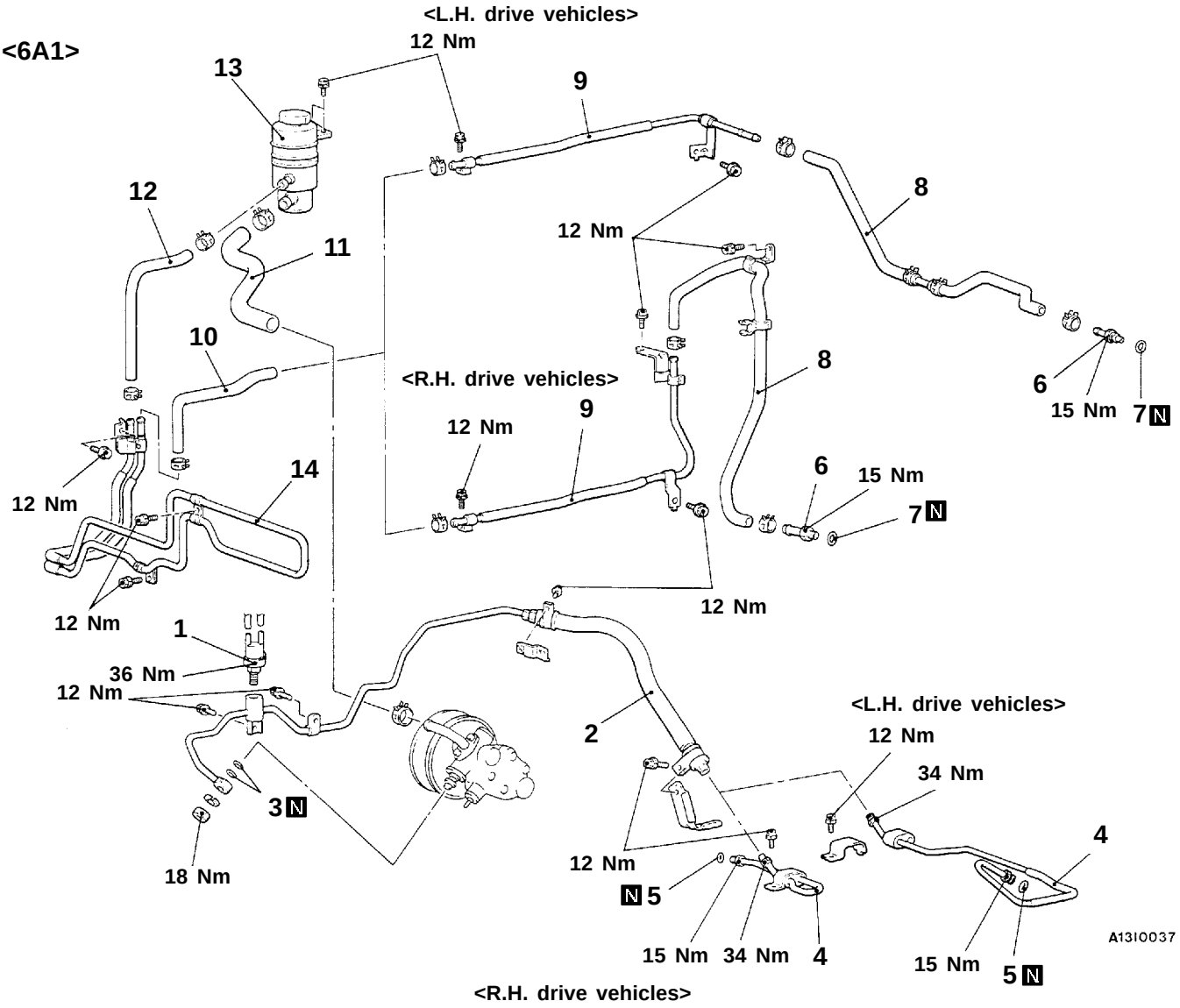


▶A◀ 1. Pressure hose
2. O-ring
3. Pressure tube
4. O-ring
5. Return tube
6. O-ring
7. Return hose
8. Return tube
9. Return hose
10. Suction hose
11. Return hose
12. Oil reservoir
13. Cooler tube

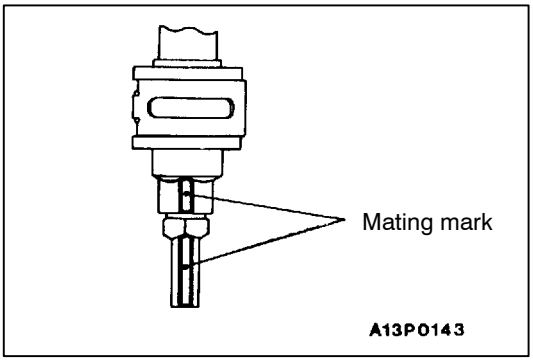
<4D6>



▶A◀ 1. Pressure hose
2. O-ring
3. Pressure tube
4. O-ring
5. Return tube
6. O-ring
7. Return hose
8. Return tube
9. Return hose
10. Suction hose
11. Return hose
12. Oil reservoir
13. Cooler tube



1. Air control valve
▶A◀ 2. Pressure hose
3. O-ring
4. Pressure tube
5. O-ring
6. Return tube
7. O-ring
8. Return hose
9. Return tube
10. Return hose
11. Suction hose
12. Return hose
13. Oil reservoir
14. Cooler tube



INSTALLATION SERVICE POINT

▶A◀ PRESSURE HOSE INSTALLATION

Align the marks on the pressure hose and pressure tube, and install the pressure hose.