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) If it is possible that the SRS components are subjected to heat over 93°C in baking or drying after painting, remove the SRS components (air bag module and SRS-ECU) beforehand.

(3) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorised MITSUBISHI dealer.

(4) 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

Section titles with the asterisk (*) in the table of contents in each group indicate operations requiring warnings.

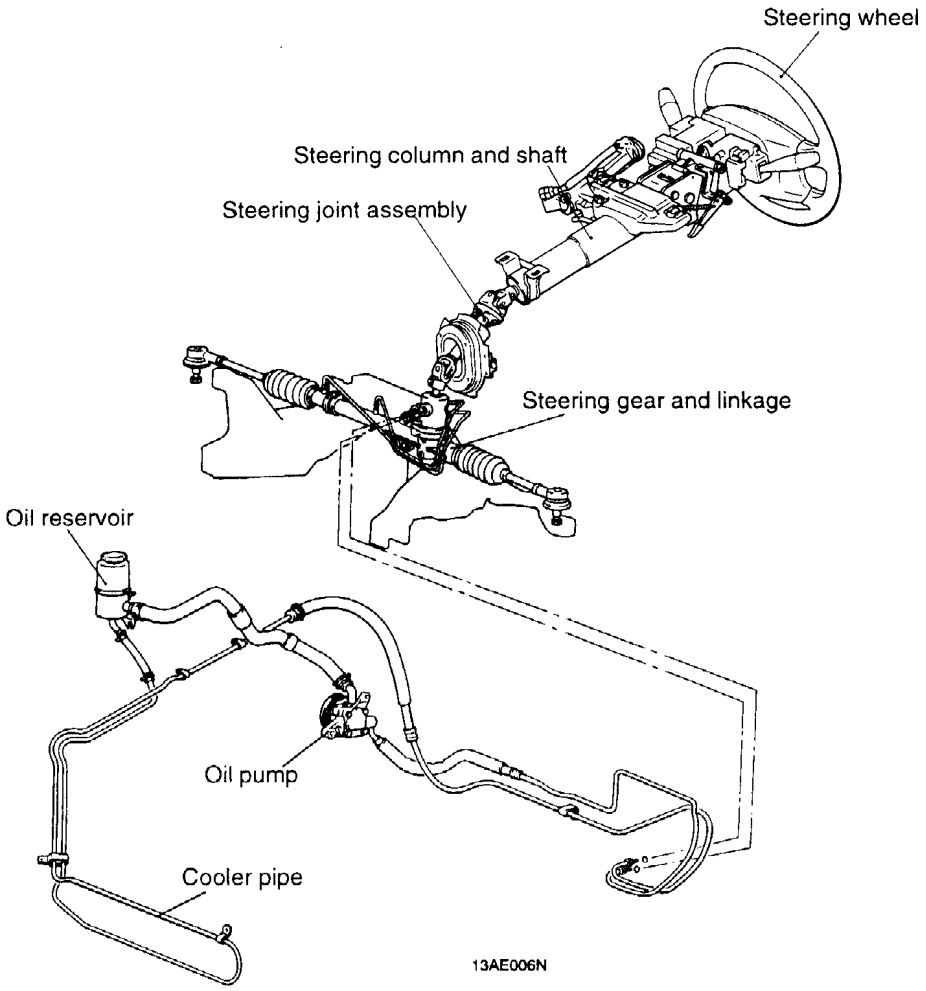
GENERAL INFORMATION

Power steering has been adopted in all models. The power steering is responsive to engine speed. The main features are as follows.
Four-spoke steering wheel has been adopted. In addition, a driver SRS airbag is provided as a standard in all vehicles.

The steering column in all vehicles has a shock absorber mechanism and a tilt steering mechanism.
A vane-type oil pump with a fluid flow control system included has been adopted.
The steering gear and linkage is an integral rack and pinion type.

Items		Specifications
Gear box	Steering gear type	Rack and pinion
Oil pump	Oil pump type	Vane type
	Displacement cm^3/rev.	9.6
	Relief set pressure MPa	11.8

CONSTRUCTION DIAGRAM



SERVICE SPECIFICATIONS

Items		Standard value	Limit
Steering wheel free play mm	with engine stopped	0–10	–
	with engine running	–	30
Steering angle	Inner wheel	36°00' ± 2°	–
	Outer wheel	30°30'	–
Tie rod end ball joint starting torque Nm		0.5–2.5	–
Stationary steering effort N		27 or less (LHD)	–
		30 or less (RHD)	–
Fluctuation allowance N		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 holding hydraulic pressure	11.8	–
Power steering pressure switch operating pressure MPa	ON → OFF	2.5–4.4	–
	OFF → ON	3.4–4.4	–
Total pinion preload Nm		0.8–1.6	–
Tie rod joint swing resistance N		6–20	–
Tie rod joint swing torque Nm		2–5	–
Oil pump pulley assembly backlash mm		–	0.1

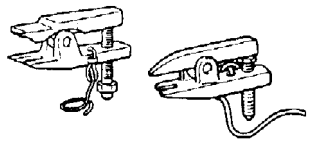
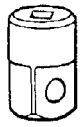
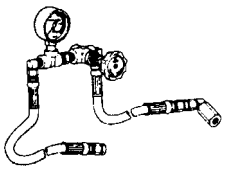
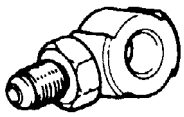
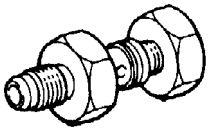
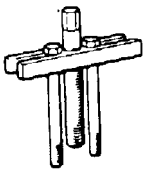
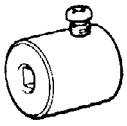
LUBRICANTS

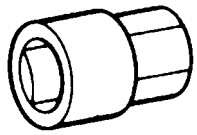
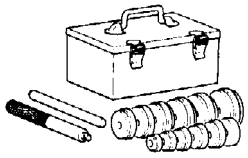
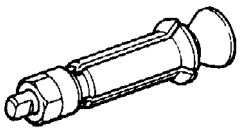
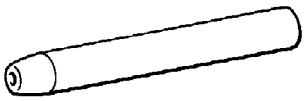
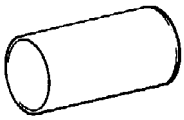
Items		Specified lubricants	Quantity
Power steering gearbox	Bearing	Automatic transmission fluid DEXRON or DEXRON II	As required
	O-ring		
	Oil seal		
	Special tool (MB991214)		
	Pinion and valve assembly seal ring part		
	Bellows	Silicone grease	As required
Oil pump	Power steering fluid	Automatic transmission fluid DEXRON or DEXRON II	0.9 ℓ
	Flow control valve	Automatic transmission fluid DEXRON or DEXRON II	As required
	Friction surface of rotor, vane, cam ring and pump cover		
	O-ring		

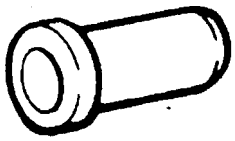
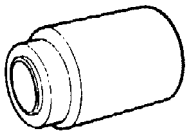
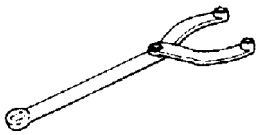
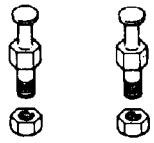
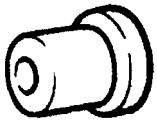
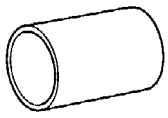
SEALANT

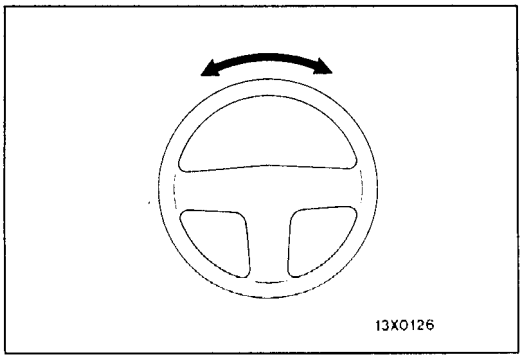
Items		Specified sealant	Remarks
Power steering gearbox	End plug screw	3M ATD Part No. 8663 or equivalent	Semi-drying sealants
	Power steering rack support cover screw		
	Dust cover lip for tie rod end ball joint		

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991113 or MB990635	Steering linkage puller	Tie-rod end disconnection
	MB990326	Preload socket	Tie rod end ball joint starting torque check
	MB990662	Oil pressure gauge assembly	Oil pump pressure test
	MB990993 or MB991217	Power steering oil pressure gauge adaptor (pump side)	Oil pump pressure test
	MB990994	Power steering oil pressure gauge adaptor (hose side)	
	MB990803	Steering wheel puller	Steering wheel removal
	MB991006	Preload socket	Pinion shaft preload measurement

Tool	Number	Name	Use
	MB991204	Torque wrench socket	Rack support adjustment Rack support cover removal
	MB990925	Bearing and oil seal installer set	Oil seal and bearing installation MB990926 MB990927 MB990938 MB990939
	MB991120	Needle bearing puller	Needle roller bearing removal
	MB991197	Bar (long type)	Oil seal installation
	MB991201	Oil seal installer	Oil seal installation
	MB991202	Oil seal & bearing installer	Needle roller bearing installation
	MB991214	Rack installer	Rack installation
	MB991203	Oil seal & bearing installer	Oil seal and bearing installation
	MB991317	Seal ring installer	Seal ring installation

Tool	Number	Name	Use
	MB990941	Dust cover installer	Oil seal installation
	MB990776	Front axle base	Dust cover installation
	MB990767	End yoke holder	Drive pulley removal and installation
	MD998719 or MD998754	Crankshaft pulley holder pin	Drive pulley removal and installation
	MB990956	Needle bearing installer	Drive shaft assembly installation
	MB991172	Adaptor	Drive shaft assembly installation



ON-VEHICLE SERVICE

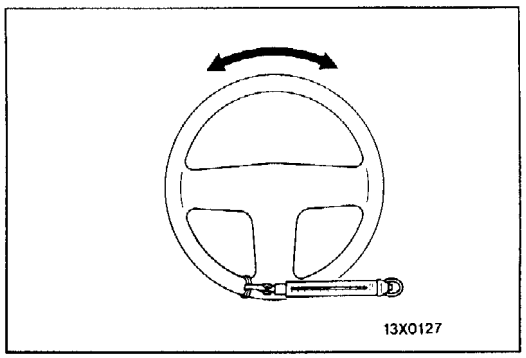
STEERING WHEEL FREE PLAY CHECK

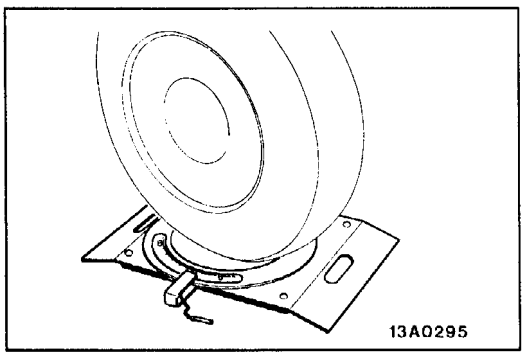
1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

   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): 0–10 mm or less

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

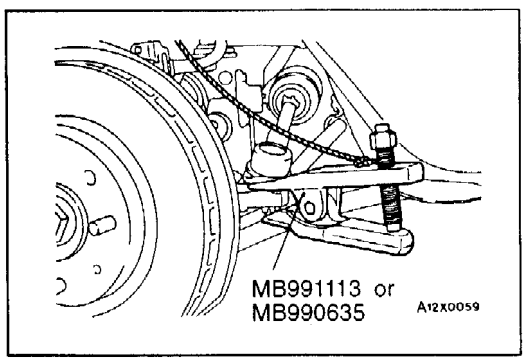




STEERING ANGLE CHECK

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

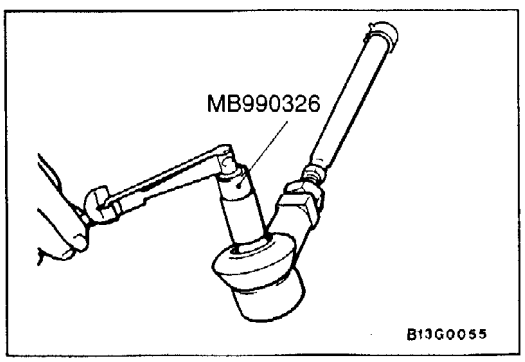
   Standard value:
   Inside wheel: 36°00' ± 2°
   Outside wheel: 30°30'
2. When the angle is not within the standard value, the toe is probably incorrect. Adjust toe (Refer to GROUP 33A – On-vehicle Service) and recheck steering angle.



TIE ROD END BALL JOINT STARTING TORQUE CHECK

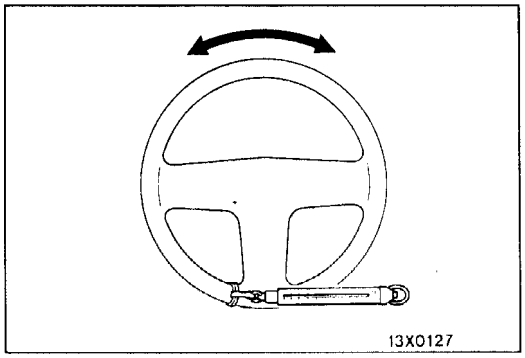
1. Disconnect tie rod and knuckle with special tool.

   Caution
   1. Be sure to tie the cord of the special tool to the nearby part.
   2. Loosen the nut but do not remove it until the tie rod end is separated from the knuckle.



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 less than the standard value, check ball joint for excessive end play or binding. If these checks are satisfactory, the joint is still serviceable.



STATIONARY STEERING EFFORT CHECK

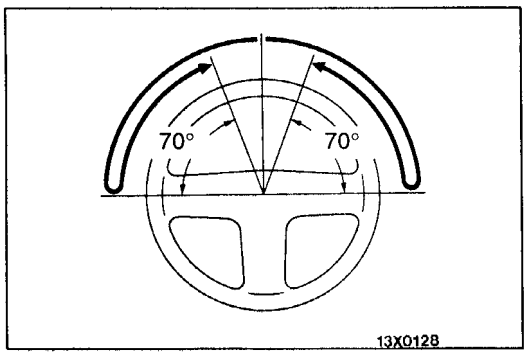
1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to 1,000 ± 100 r/min.

   Caution
   After checking, reset the idle speed to the specified idling rpm.

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: 27 N or less
   Fluctuation allowance: 5.9 N or less

4. If the measured force exceeds the standard value, refer to the troubleshooting and make the checks and adjustments described there.

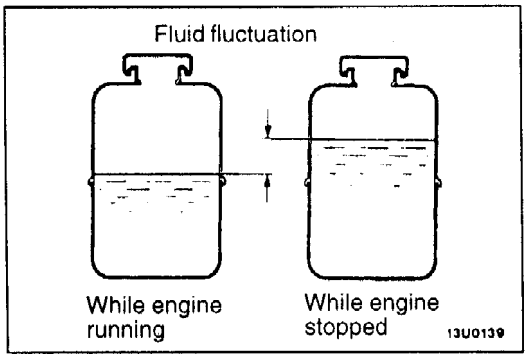


CHECKING STEERING WHEEL RETURN TO CENTRE

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

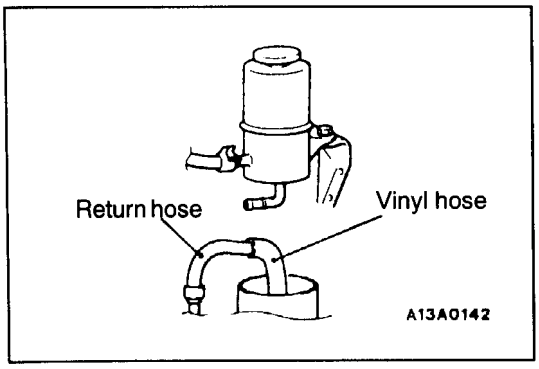
1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is no difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 20–30 km/h, turn the steering wheel 90°, and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to the 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 reduced during idling.)



FLUID LEVEL CHECK

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.
4. Check the difference of the fluid level when the engine is stopped, and while it is running. If the fluid level changes considerably, air bleeding should be done.



FLUID REPLACEMENT

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

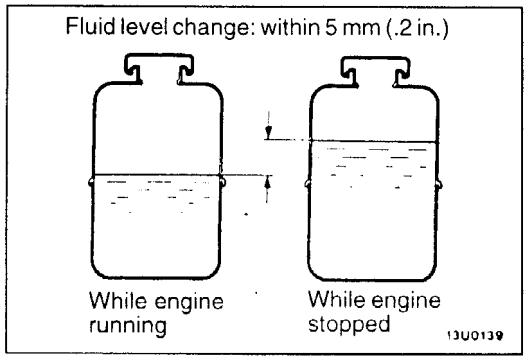
Specified fluid:
Automatic transmission fluid DEXRON or DEXRON II

BLEEDING

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 time.
4. Disconnect the connector from the crankshaft position sensor and then, 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, replenish the fluid supply 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.**

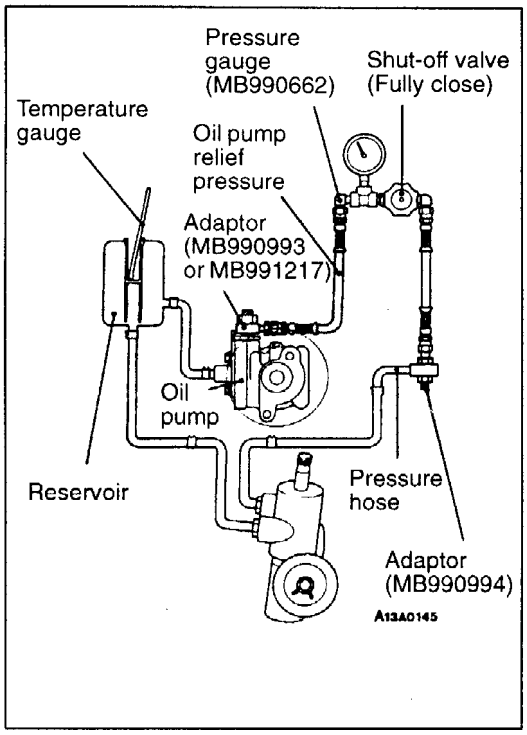
5. Connect the crankshaft angle sensor connector and then start the engine (idling).
6. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
7. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
8. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.



9. Check whether or not the change in the fluid level is within 5 mm when the engine is stopped and when it is running.

Caution

1. **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.**
2. **If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.**
3. **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

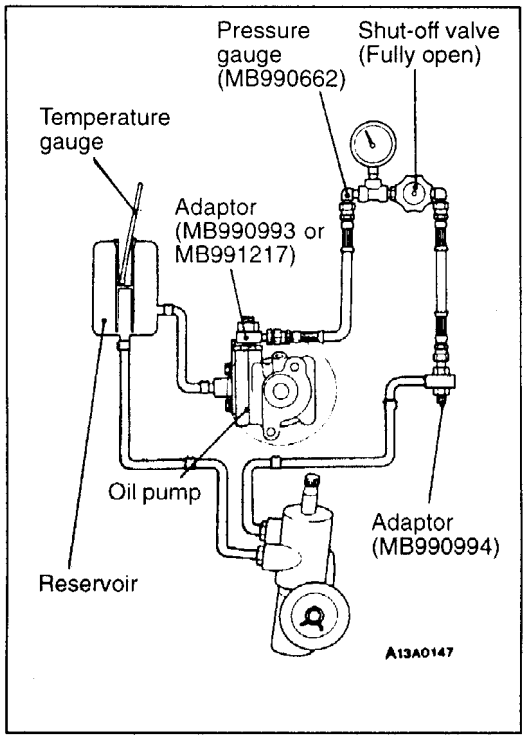
CHECKING THE OIL PUMP RELIEF PRESSURE

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, overhaul the oil pump.
6. Remove the special tools and then tighten the pressure hose to the specified torque.
7. Bleed the system.

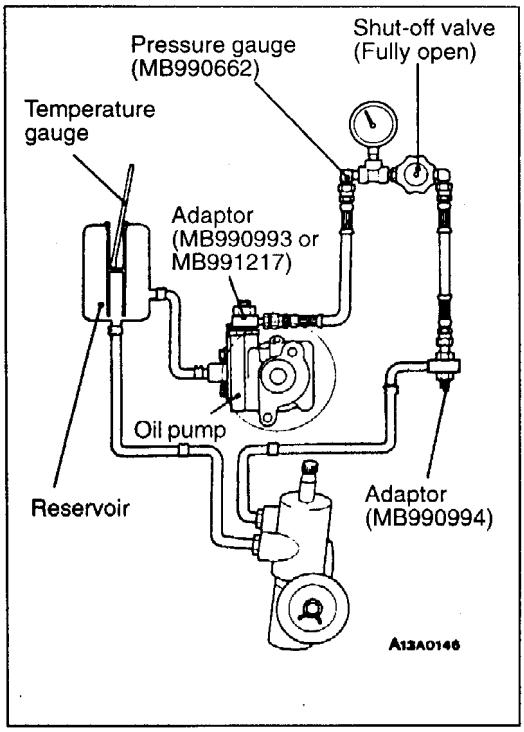


CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS

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. 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

5. 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.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.

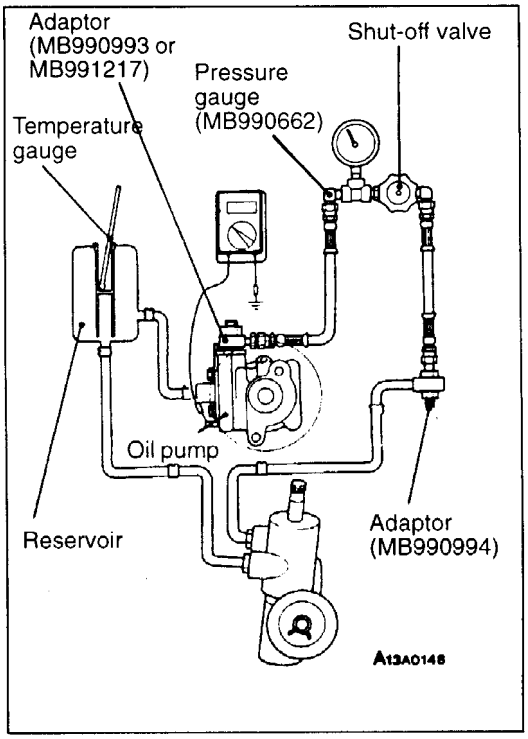


CHECKING THE STEERING GEAR HOLDING HYDRAULIC PRESSURE

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 and fully open the shut-off valve of the pressure gauge.
5. Turn the steering wheel all the way to the left or right; then check whether or not the holding hydraulic pressure is the standard value.

   Standard value: 11.8 MPa

6. When not within the standard value, overhaul the steering gear box.
   Remeasure fluid pressure.
7. Remove the special tools, and the tighten the pressure hose to the specified torque.
8. Bleed the system.



POWER STEERING PRESSURE SWITCH CHECK

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 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: 3.4–4.4 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: 2.5–4.4 MPa

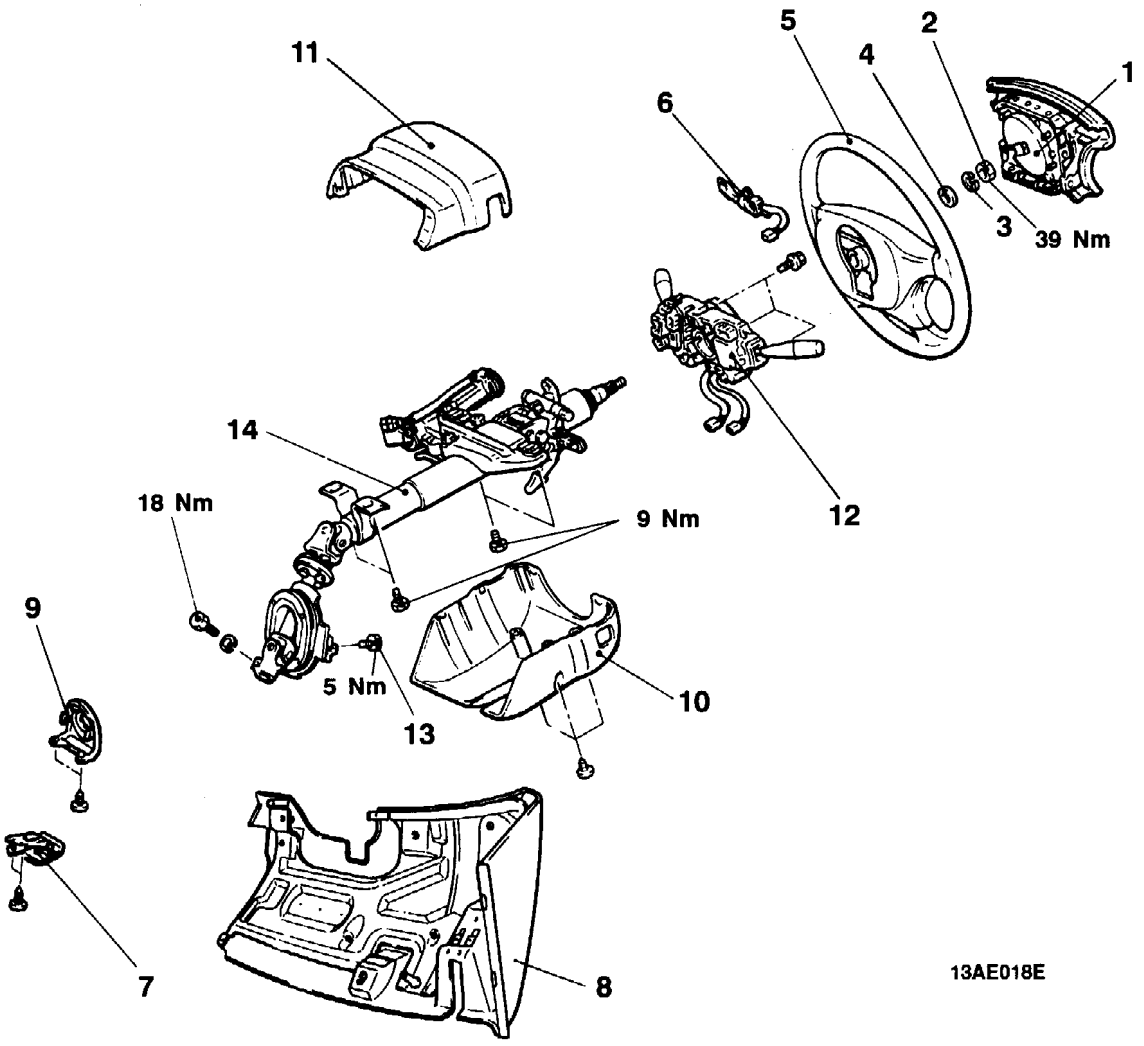
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

STEERING WHEEL AND SHAFT

REMOVAL AND INSTALLATION

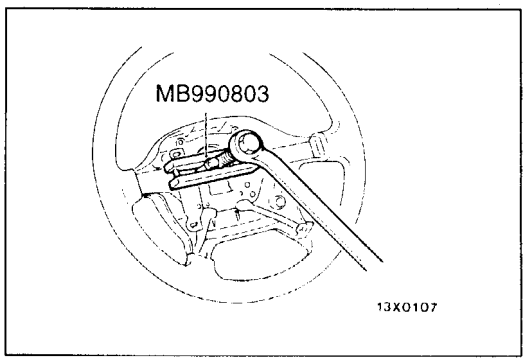
CAUTION: SRS
Before removal of air bag module, refer to:
GROUP 52B – SRS Service Precautions
GROUP 52B – Air Bag Module and Clock Spring

Post-installation Operation
- Checking Steering Wheel Position with Wheels Straight Ahead



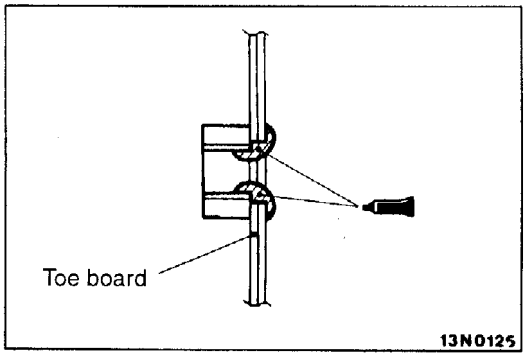
Removal steps

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
2. Steering wheel retaining nut
3. Spring washer
4. Flat washer
◀A▶ 5. Steering wheel
6. Cruise control switch
7. Lock release handle
8. Instrument panel lower cover
9. Key cylinder panel
10. Lower column cover
11. Upper column cover
12. Clock spring and column switch assembly (Refer to GROUP 52B)
▶A◀ 13. Retainer mounting bolt
14. Steering column assembly



REMOVAL SERVICE POINT

◀A▶ STEERING WHEEL REMOVAL



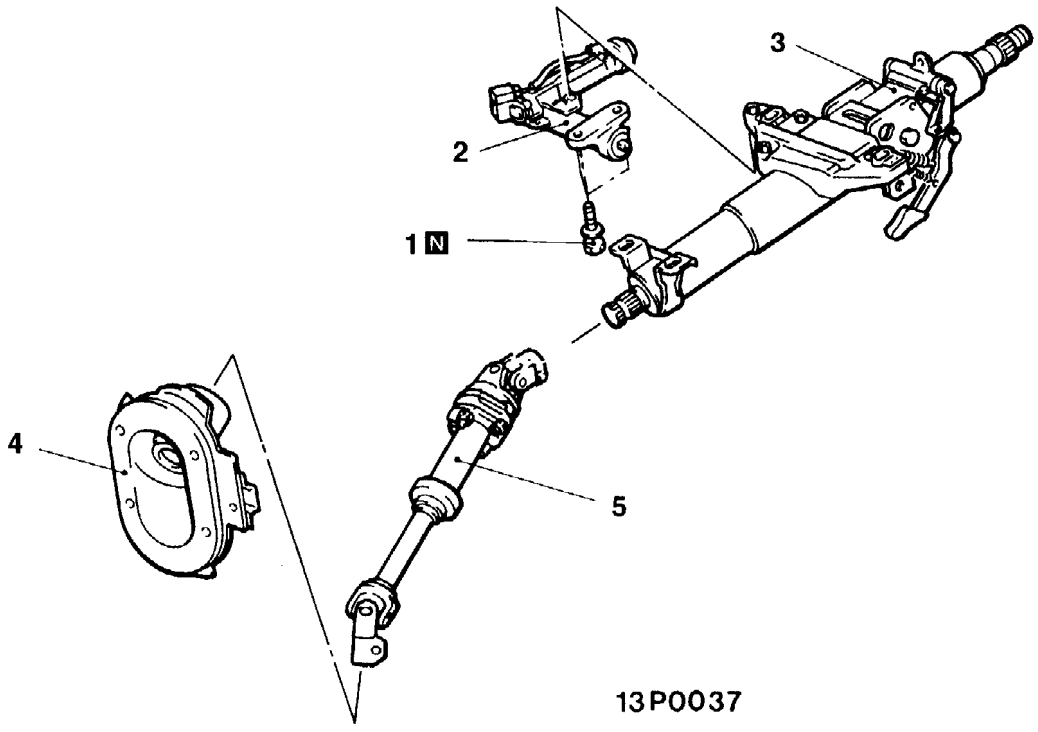
INSTALLATION SERVICE POINT

▶A◀ RETAINER MOUNTING BOLT

Before installing the bolt, coat the mounting hole on the toe board with the specified sealant.

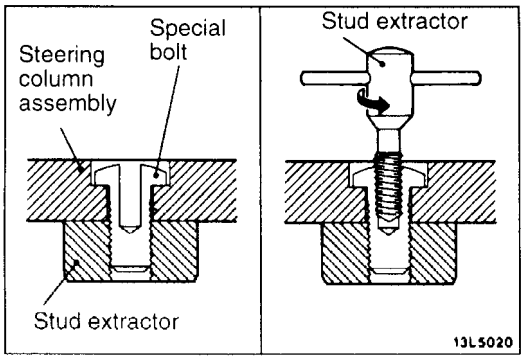
Specified Sealant: Three–bond 1104 or equivalent product.

DISASSEMBLY AND REASSEMBLY



Disassembly steps

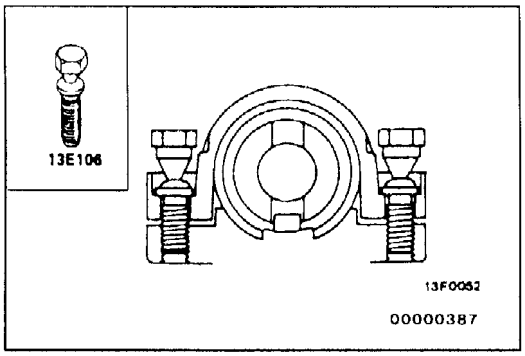
◀A▶ ▶A◀ 1. Special bolt
▶A◀ 2. Steering lock cylinder and bracket assembly
3. Steering column assembly
4. Cover assembly
5. Steering joint assembly



DISASSEMBLY SERVICE POINT

◀A▶ SPECIAL BOLT REMOVAL

1. Drill a hole in the special bolt to a depth to enable a suitable size stud extractor to stand up.
2. Using the stud extractor, remove the special bolt.



REASSEMBLY SERVICE POINT

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

1. When installing the steering lock cylinder and bracket assembly 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.

INSPECTION

- Check the steering shaft for play and rough movement.
- Check the joints for play, damage, or rough movement.
- Check the joint bearing for wear and damage.
- Check the dust shield for damage.

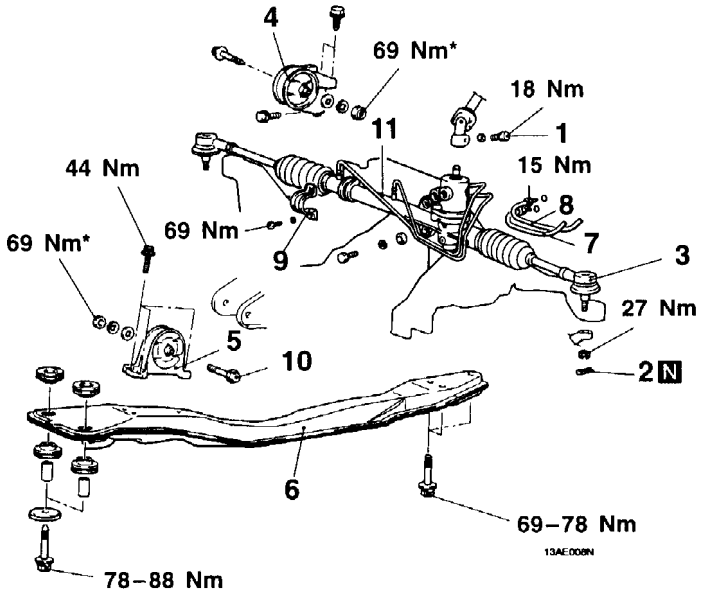
POWER STEERING GEAR BOX

REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-9.)
- Disconnect the centre member (Refer to GROUP 32 – Power Plant Mount)
- Disconnect the front exhaust pipe (Refer to GROUP 15 – Intake and Exhaust)

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

Post-installation Operation
- Fit the front exhaust pipe (Refer to GROUP 15 – Intake and Exhaust)
- Fit the centre member (Refer to GROUP 32 – Power Plant Mount)
- Power Steering Fluid Supplying (Refer to P.37A-9.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-9.)
- Steering Wheel Position with Wheels Straight Ahead Checking
- Front Wheel Alignment Adjustment (Refer to GROUP 33A – On-vehicle Service.)



Removal steps

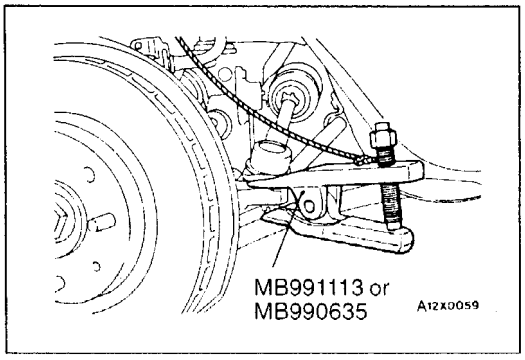
1. Joint assembly and gear box connecting bolt
2. Cotter pin

◀A▶ 3. Connection for tie rod end and knuckle

4. Rear roll stopper
5. Front roll stopper
6. Centre member assembly
7. Pressure pipe
8. Return pipe
9. Clamp
10. Bolt

◀B▶ 11. Gear box assembly

Caution
The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.



REMOVAL SERVICE POINTS

◀A▶ TIE-ROD END DISCONNECTION

Caution

1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it until the tie rod end is separated from the knuckle.**

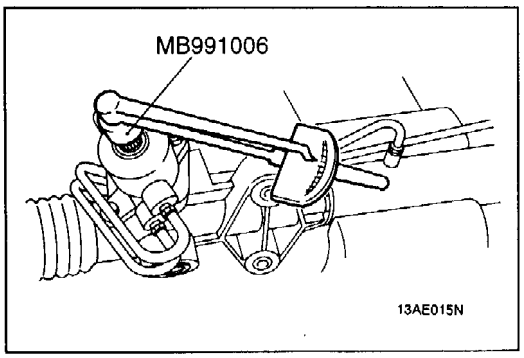
◀B▶ GEAR BOX ASSEMBLY REMOVAL

Caution

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

INSPECTION

- Check the rubber parts for cracks and breakage.

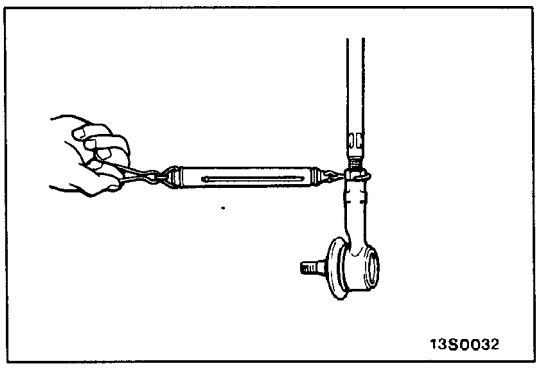


GEAR BOX TOTAL PINION TORQUE

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: 0.8–1.6 Nm
Torque variation: 0.5 Nm

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 necessary.



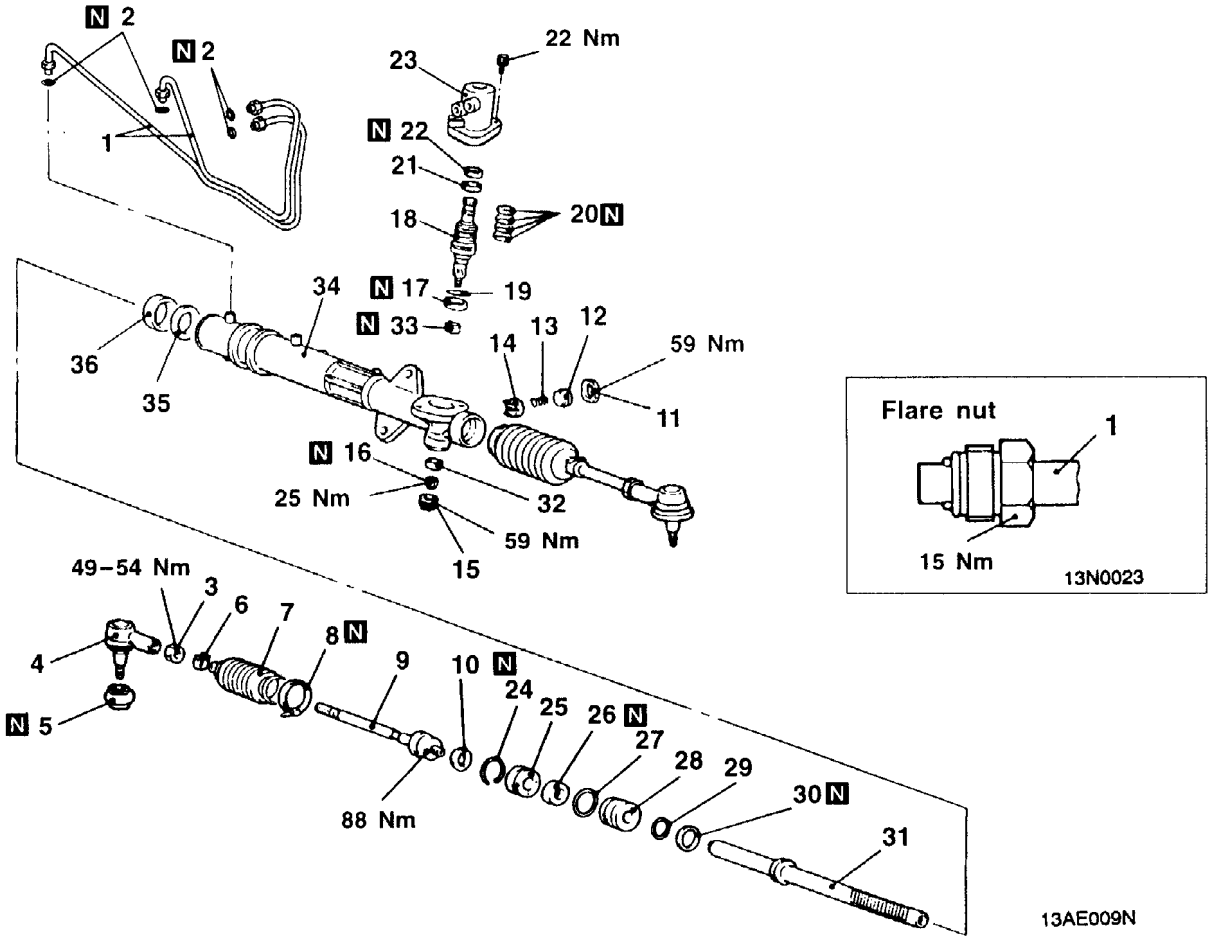
CHECK THE TIE ROD FOR SWING RESISTANCE

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

   Standard value: 6–20 N

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

DISASSEMBLY AND REASSEMBLY



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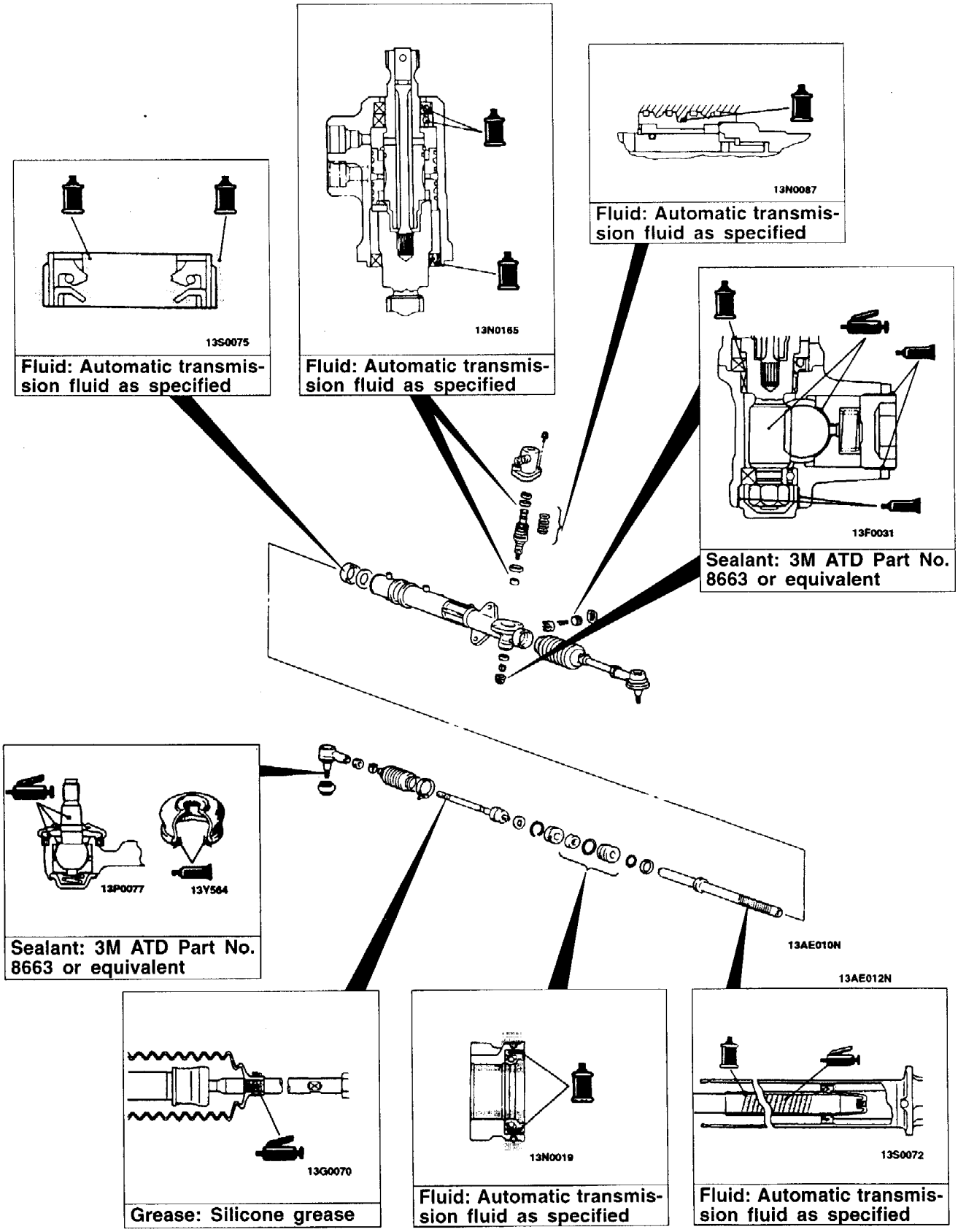
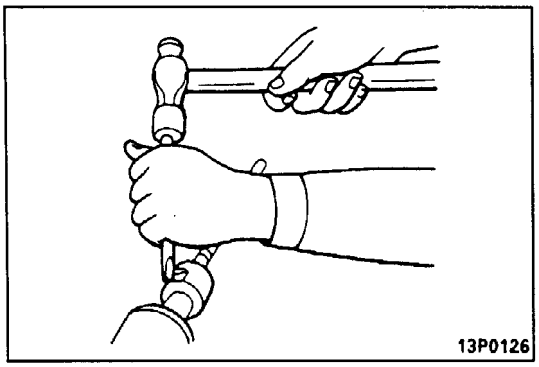
Disassembly steps

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

Lubrication and Sealing Points

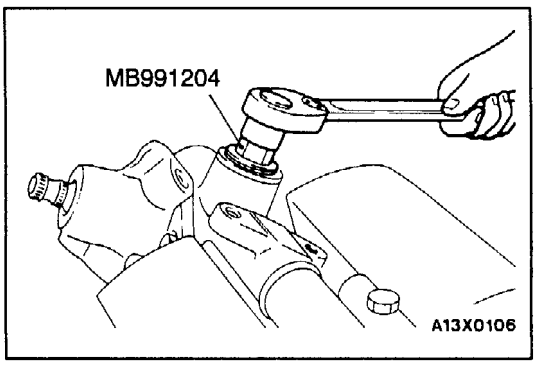




DISASSEMBLY SERVICE POINTS

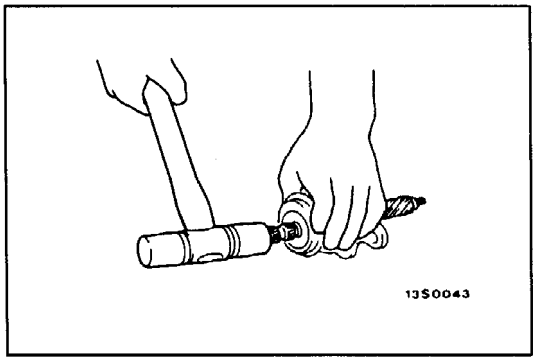
◀A▶ TIE ROD/TAB WASHER REMOVAL

Unstake the tab washer which fixes the tie rod and rack with a chisel.



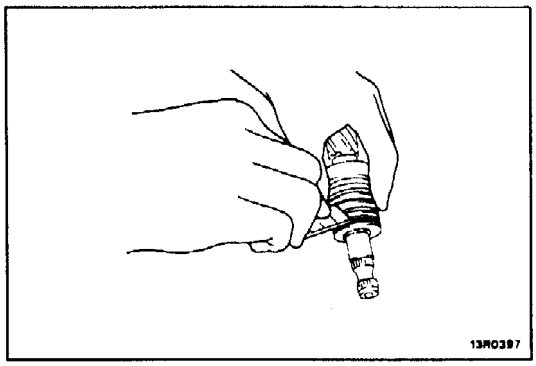
◀B▶ RACK SUPPORT COVER REMOVAL

Using the special tool, remove the rack support cover from the gear box.



◀C▶ OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL

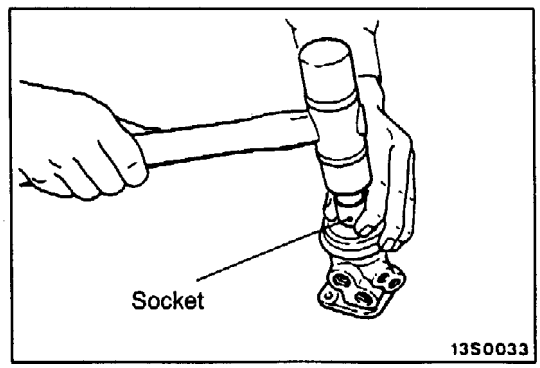
Using a plastic hammer, gently tap the pinion to remove it.



◀D▶ SEAL RING REMOVAL

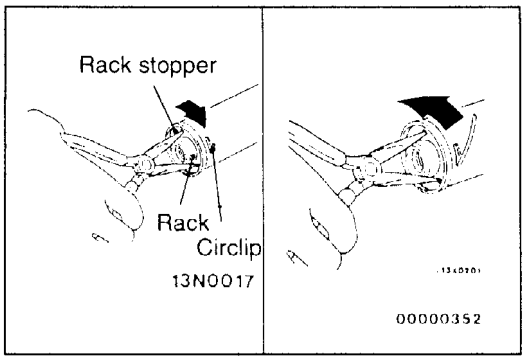
Cut the seal ring and remove it from the pinion and valve assembly and the rack.

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



◀E▶ BALL BEARING/OIL SEAL REMOVAL

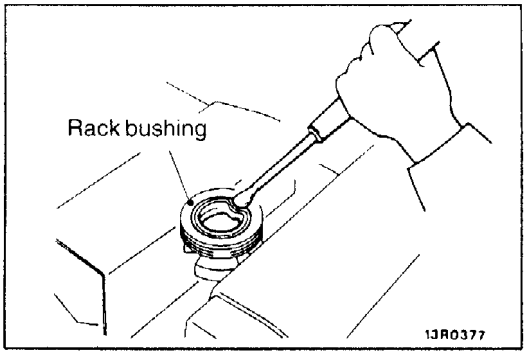
Using a socket, remove the oil seal and the ball bearing from the valve housing simultaneously.



◀F▶ 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 counterclockwise to remove the circlip.

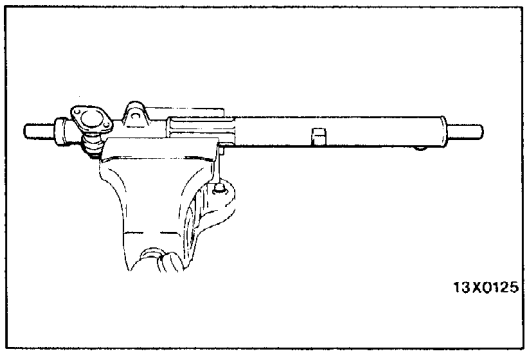
Caution
Note that if the rack stopper is first turned counterclockwise, the circlip will get caught in the slot in the housing and the rack stopper will not turn.



◀G▶ OIL SEAL REMOVAL

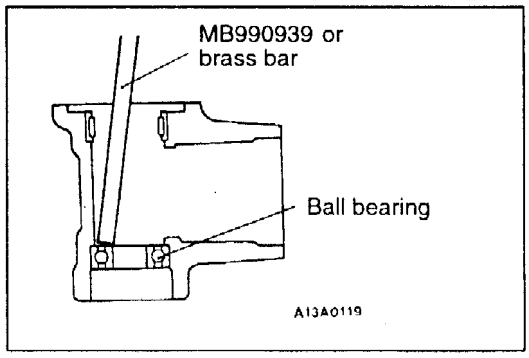
Partially bend oil seal and remove from rack bushing.

Caution
Do not damage oil seal press fitting surface.



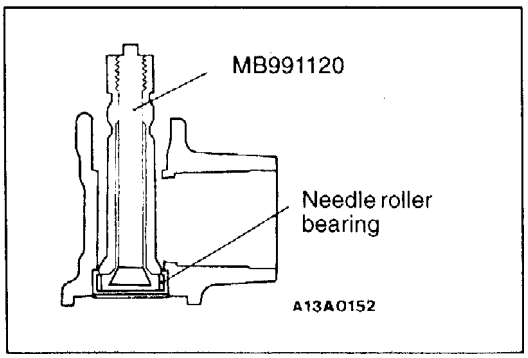
◀H▶ RACK REMOVAL

Pull out the rack slowly.
At this time also take out the rack stopper and the rack bushing simultaneously.



◀I▶ BALL BEARING REMOVAL

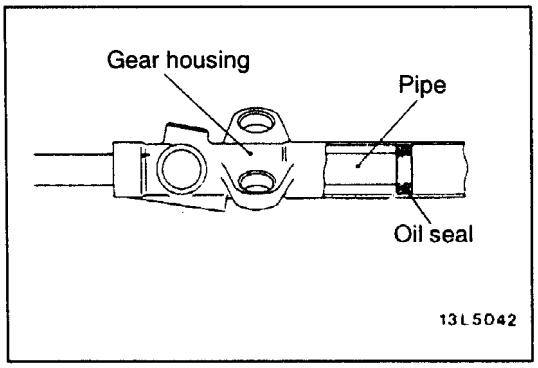
Use a brass bar or special tool to remove the ball bearing from the gear housing.



◀J▶ NEEDLE ROLLER BEARING REMOVAL

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

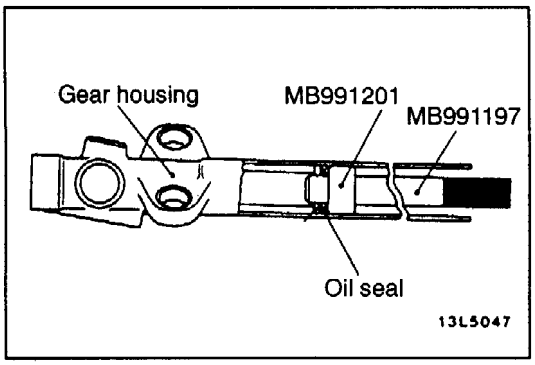
Caution
Do not open special tool excessively to prevent damaging housing interior.



◀K▶ OIL SEAL REMOVAL

Use a piece of pipe, [outside diameter 23mm] 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.



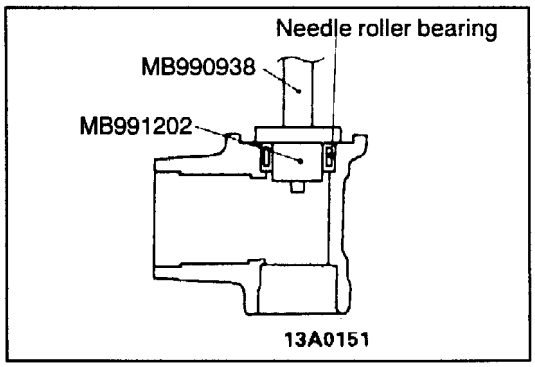
REASSEMBLY SERVICE POINTS

▶A◀ OIL SEAL INSTALLATION

1. Apply a coating of the specified fluid to the outside of the oil seal.

   Specified fluid:
   Automatic transmission fluid DEXRON or DEXRON II

2. Using the special tools, press the oil seal into the rack housing to the specified position (where the upper surface of press-in guide coincides with the stepped part of the press-in tool).



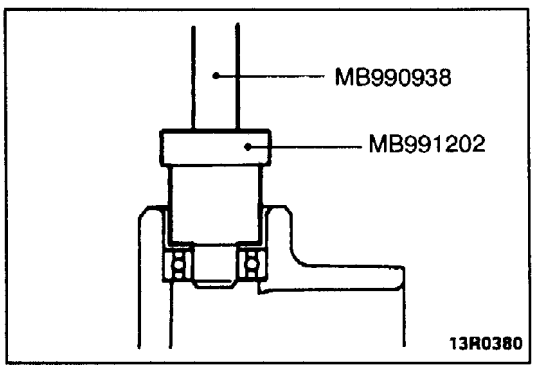
▶B◀ NEEDLE ROLLER BEARING INSTALLATION

1. Apply specified fluid to housing, bearing and oil seal press fitting surface.

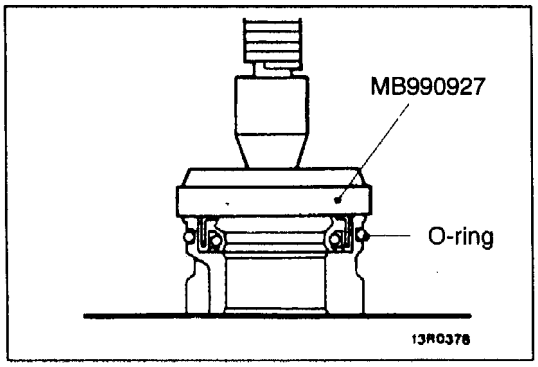
   Specified fluid:
   Automatic transmission fluid DEXRON or DEXRON II

2. Press fit needle roller bearing with special tools.

   Caution
   Press fit straight as valve housing is aluminium.



▶C◀ BALL BEARING INSTALLATION

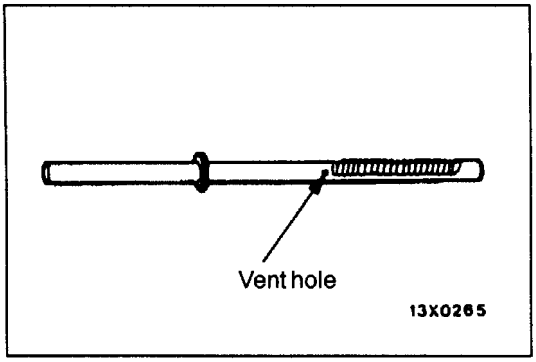


▶D◀ OIL SEAL/O-RING INSTALLATION

1. Apply a coating of the specified fluid to the outside of the oil seal and O-ring.

   Specified fluid:
   Automatic transmission fluid DEXRON or DEXRON II

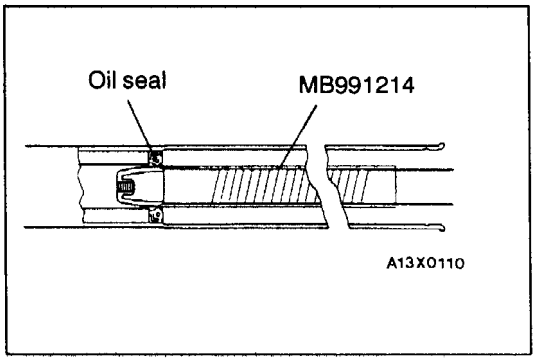
2. Use special tool to press fit oil seal until it touches the rack bush end.



▶E◀ RACK INSTALLATION

1. Apply a coating of multipurpose grease to the rack teeth face.

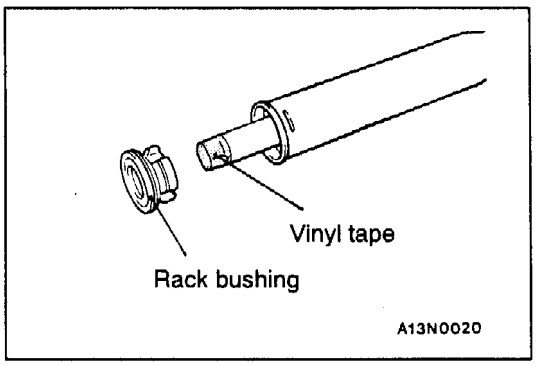
   Caution
   Do not block the vent hole in the rack with grease.



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

   Specified fluid:
   Automatic transmission fluid DEXRON or DEXRON II

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

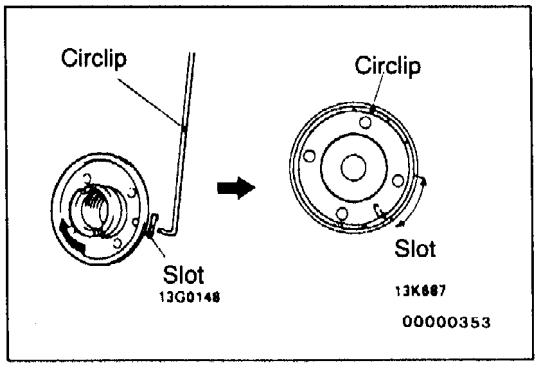


▶F◀ RACK BUSHING INSTALLATION

Wrap the rack end with vinyl tape, apply a coating of the specified fluid, and then install the rack bushing and rack stopper.

Specified fluid:
Automatic transmission fluid DEXRON or DEXRON II

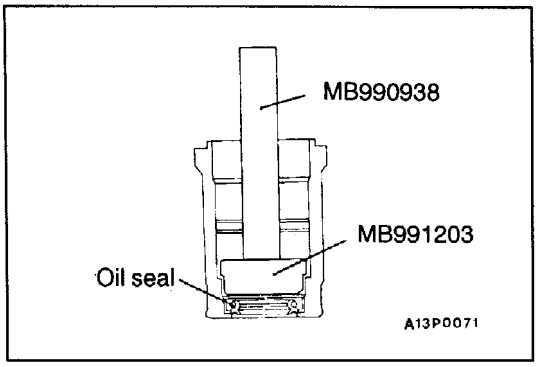
Caution
Do not allow oil seal retainer spring to slip out.



▶G◀ CIRCLIP INSTALLATION

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

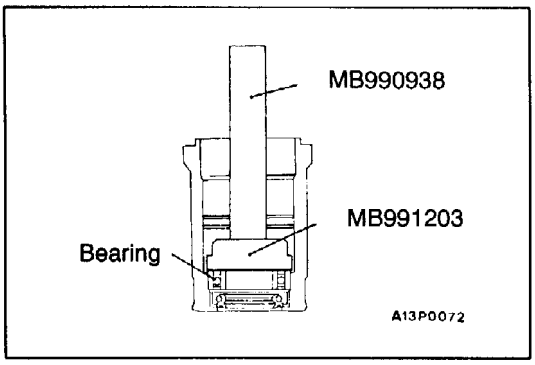
Caution
Insert circlip to rack stopper hole whilst turning rack stopper clockwise.



▶H◀ OIL SEAL INSTALLATION

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.

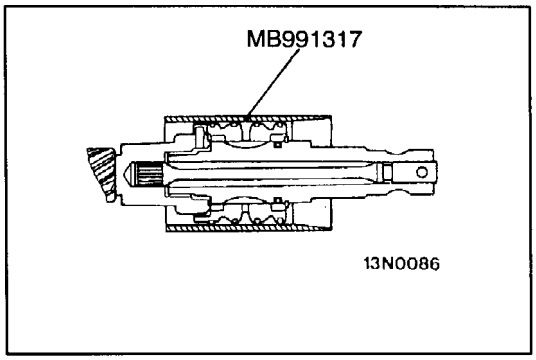
Specified fluid:
Automatic transmission fluid DEXRON or DEXRON II



▶I◀ BALL BEARING INSTALLATION

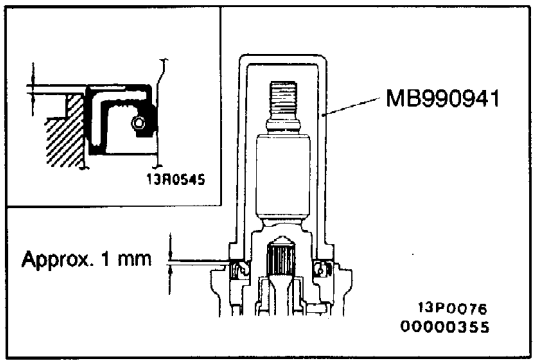
Apply a coating of the specified fluid to the outside of the ball bearing. Using the special tools, press the oil seal into the valve housing.

Specified fluid:
Automatic transmission fluid DEXRON or DEXRON II



▶J◀ SEAL RING INSTALLATION

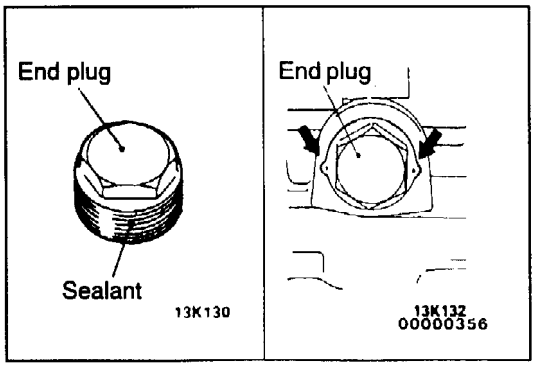
Because the seal rings expand at the time of installation, tighten after installation by using the special tool to compress the rings, or press down by hand.



▶K◀ OIL SEAL INSTALLATION

Using the special tool, press the oil seal into the valve housing.

Caution
To ensure effective sealing at the valve housing alignment surface, the upper surface of the oil seal should project outward approximately 1 mm from the housing edge surface.

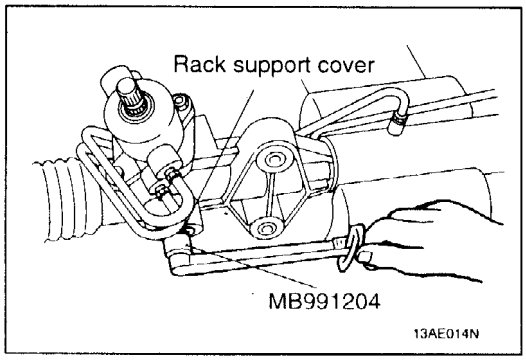


▶L◀ END PLUG INSTALLATION

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

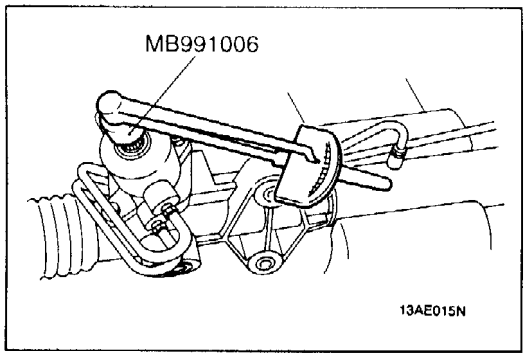
   Specified sealant:3M ATD Part No. 8663 or equivalent

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



▶M◀TOTAL PINION TORQUE ADJUSTMENT

1. Position rack at its centre. Tighten rack support cover to 15 Nm.
2. Reverse rotate the rack support cover by about 30°.



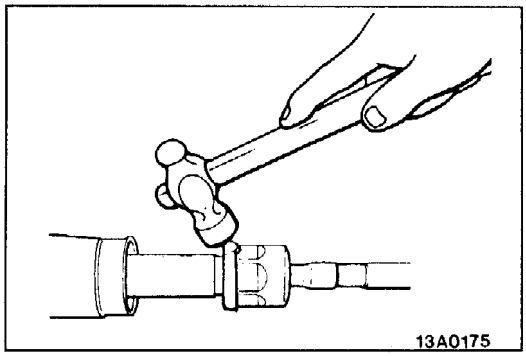
3. Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion torque.

   Standard value: 0.8–1.6 Nm

   Torque variation: 0.5 Nm or less

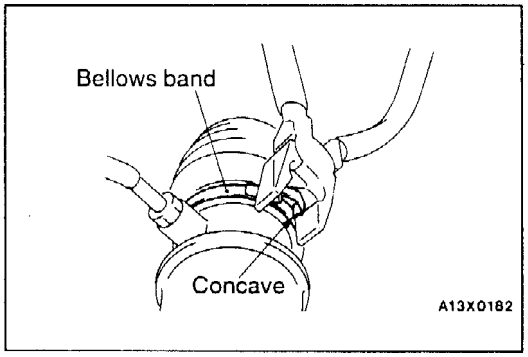
4. If the rotation torque or torque fluctuation is outside the standard value, adjust by reverse rotating the rack support cover to within a range of 0–30°.
5. After adjusting, lock rack support cover with lock nut.

   Caution
   1. **When adjusting, set the standard value at its highest value.**
   2. **When operating the rack in the axial direction,ensure there is no roughness or snagging.**
   3. **Measure the torque at all points.**
   4. **If it is impossible to adjust the rack support cover to the standard values while within the regulated reverse rotation angle, carry out an inspection of the rack support cover and replace if necessary.**



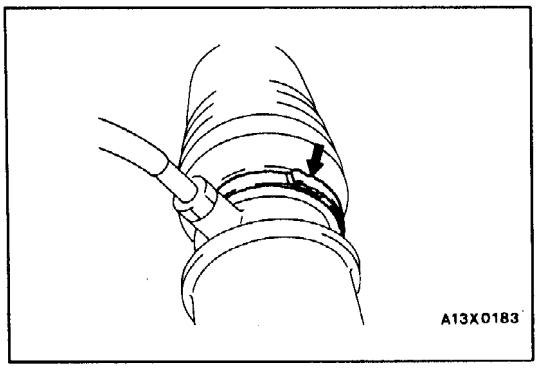
▶N◀TAB WASHER/TIE ROD INSTALLATION

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

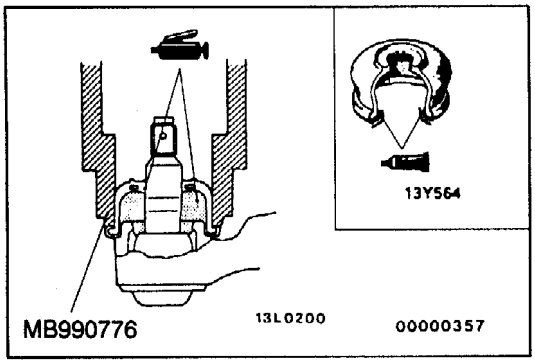


▶O◀BELLOWS BAND INSTALLATION

1. Apply pliers to the concave section of the bellows band and tighten the bellows band.



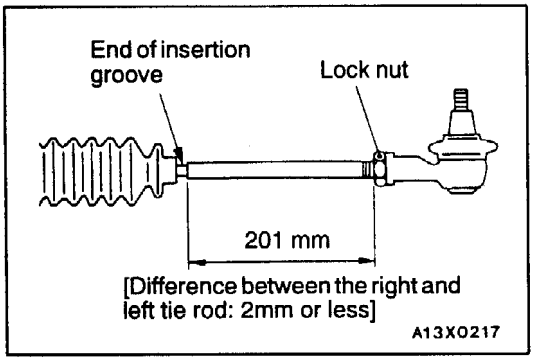
2. Use a plastic hammer or similar to bend the convex section of the bellows band as shown in the illustration.



▶P◀ DUST COVER INSTALLATION

1. Pack dust cover interior with multipurpose grease.
2. Apply specified sealant to dust cover lip.

   Specified sealant:3M ATD Part No. 8663 or equivalent
3. Using the special tool, install the dust cover to the tie rod end ball joint.



▶Q◀ TIE ROD END INSTALLATION

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

INSPECTION

RACK

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

BEARING

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

OTHERS

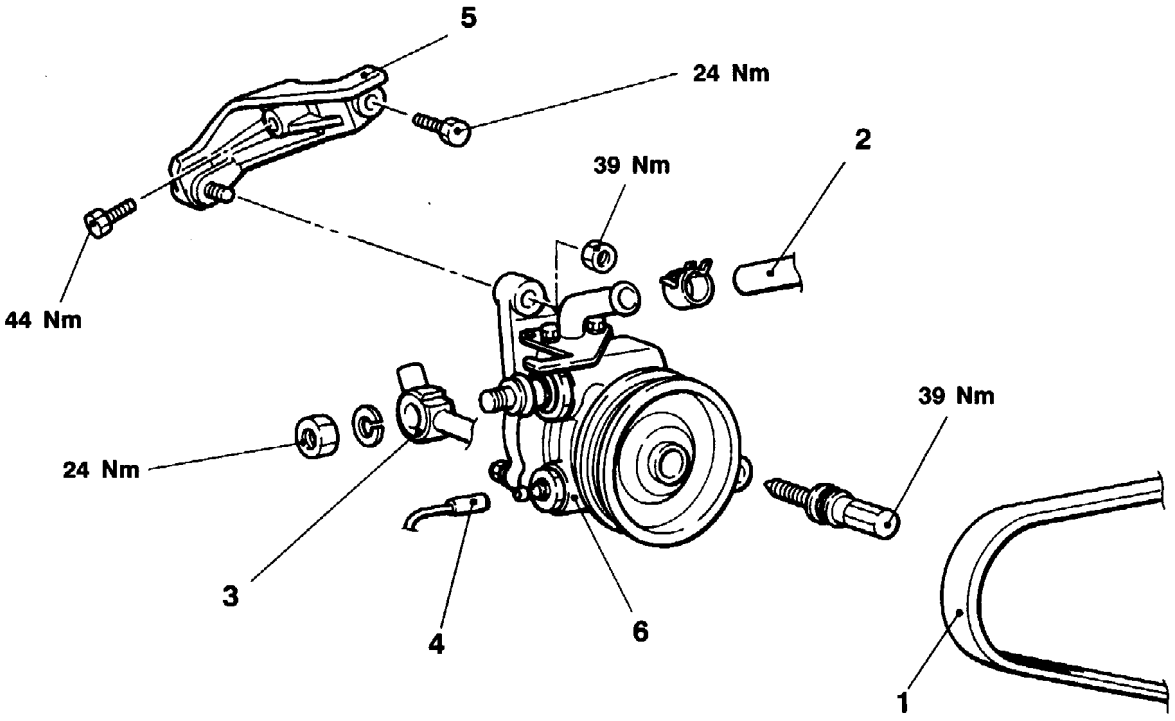
- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.

POWER STEERING OIL PUMP

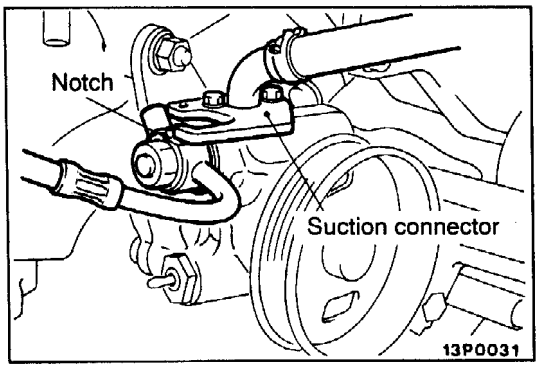
REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-9.)

Post-installation Operation
- 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-9.)
- Oil Pump Pressure Check (Refer to P.37A-10.)



Removal steps
1. Drive-belt
2. Suction hose
▶A◀ 3. Pressure hose
4. Pressure switch connector
5. Power steering pump bracket stay
6. Oil pump



INSTALLATION SERVICE POINT

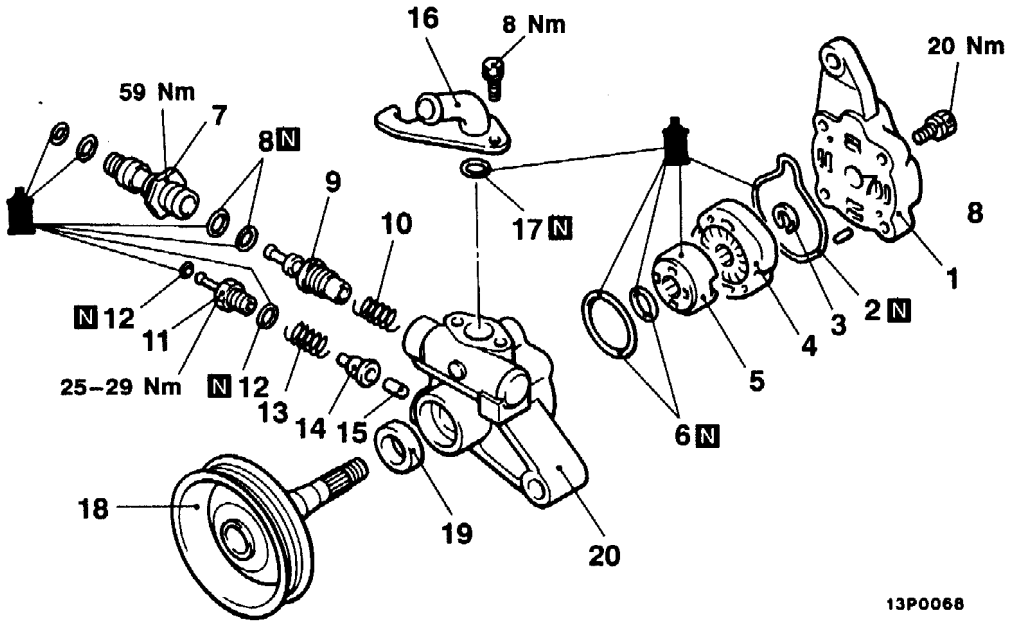
▶A◀ PRESSURE HOSE INSTALLATION

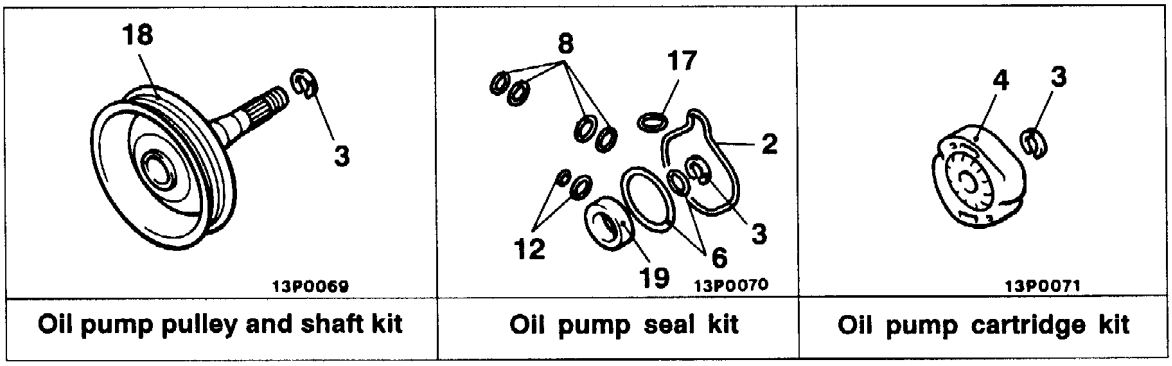
Connect the pressure hose so that its notched part contacts the suction connector.

INSPECTION

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

DISASSEMBLY AND REASSEMBLY



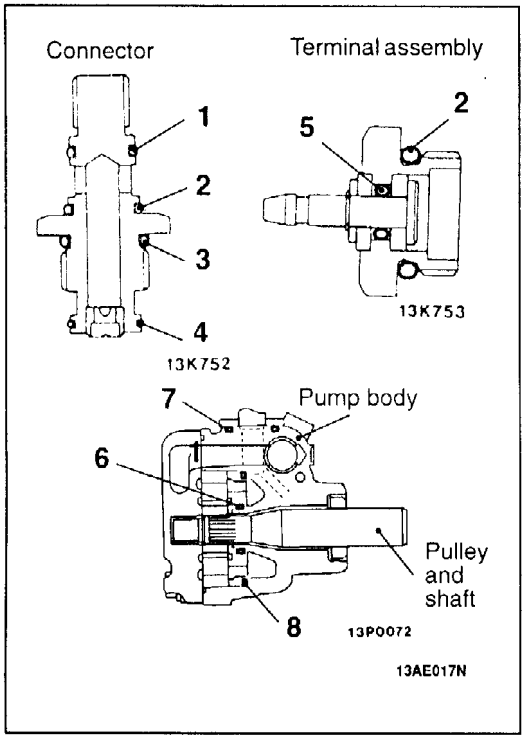


Oil pump pulley and shaft kit	Oil pump seal kit	Oil pump cartridge kit

13AE016N

Disassembly steps

1. Pump cover
2. O-ring
3. Snap ring
4. Oil pump cartridge
5. Side plate
▶A◀ 6. O-ring
7. Connector
▶A◀ 8. O-ring
9. Flow control valve
10. Flow control spring
11. Terminal assembly
▶A◀ 12. O-ring
13. Plunger spring
14. Plunger
15. Piston rod
16. Suction connector
▶A◀ 17. O-ring
18. Pulley and shaft
19. Shaft oil seal
20. Oil pump



REASSEMBLY SERVICE POINT

▶A◀ O-RINGS INSTALLATION

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	47.2×2.4

INSPECTION

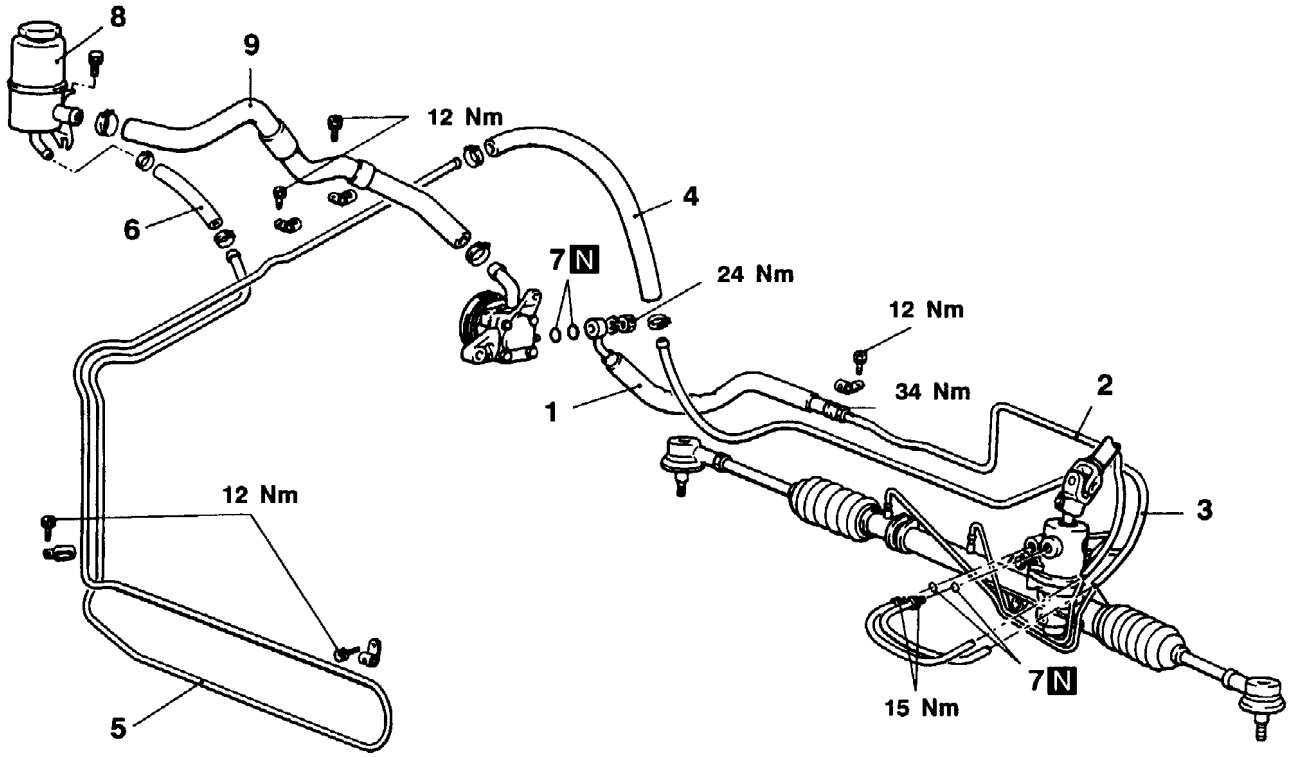
- Check the flow control valve for clogging.
- Check the pulley assembly for wear or damage.
- Check the groove of rotor and vane for "stepped" wear.
- Check the contact surface of cam ring and vanes for "stepped" wear.
- Check the vanes for damage.

POWER STEERING HOSES

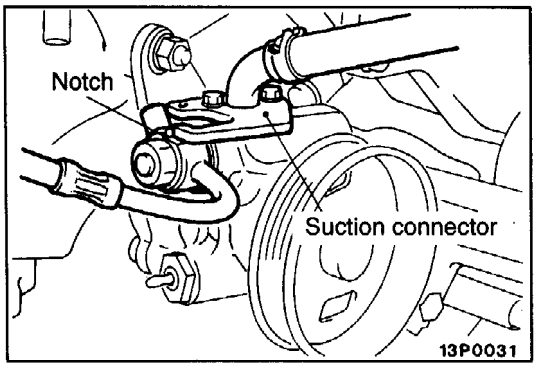
REMOVAL AND INSTALLATION

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

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



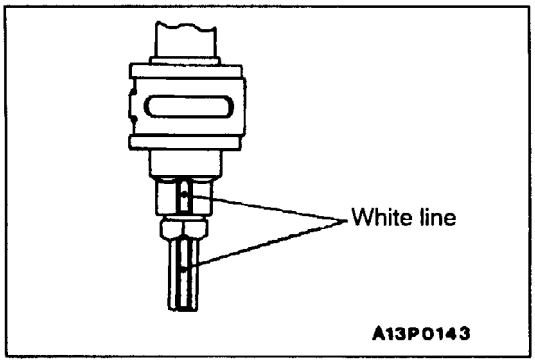
▶A◀ 1. Pressure hose
2. Pressure tube
3. Return tube
4. Return hose
5. Cooler tube
6. Hose
7. O-ring
8. Oil reservoir
9. Suction hose



INSTALLATION SERVICE POINT

▶A◀ PRESSURE HOSE INSTALLATION

1. Connect the pressure hose so that its slot section contacts the oil pump's guide bracket.



2. When the pressure hose is installed, align the white line on the pressure hose with the white line on the pressure tube so that together they form a straight line.