

GROUP 37A

POWER STEERING

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

⚠ WARNING

- 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).
- Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- 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 air bag control unit, SRS warning light, front impact sensors, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

POWER STEERING OIL PUMP ASSEMBLY	37A-46	REMOVAL AND INSTALLATION <2.4L ENGINE>.....	37A-55
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REMOVAL AND INSTALLATION <2 000> .	37A-52	SEALANTS	37A-60

GENERAL DESCRIPTION

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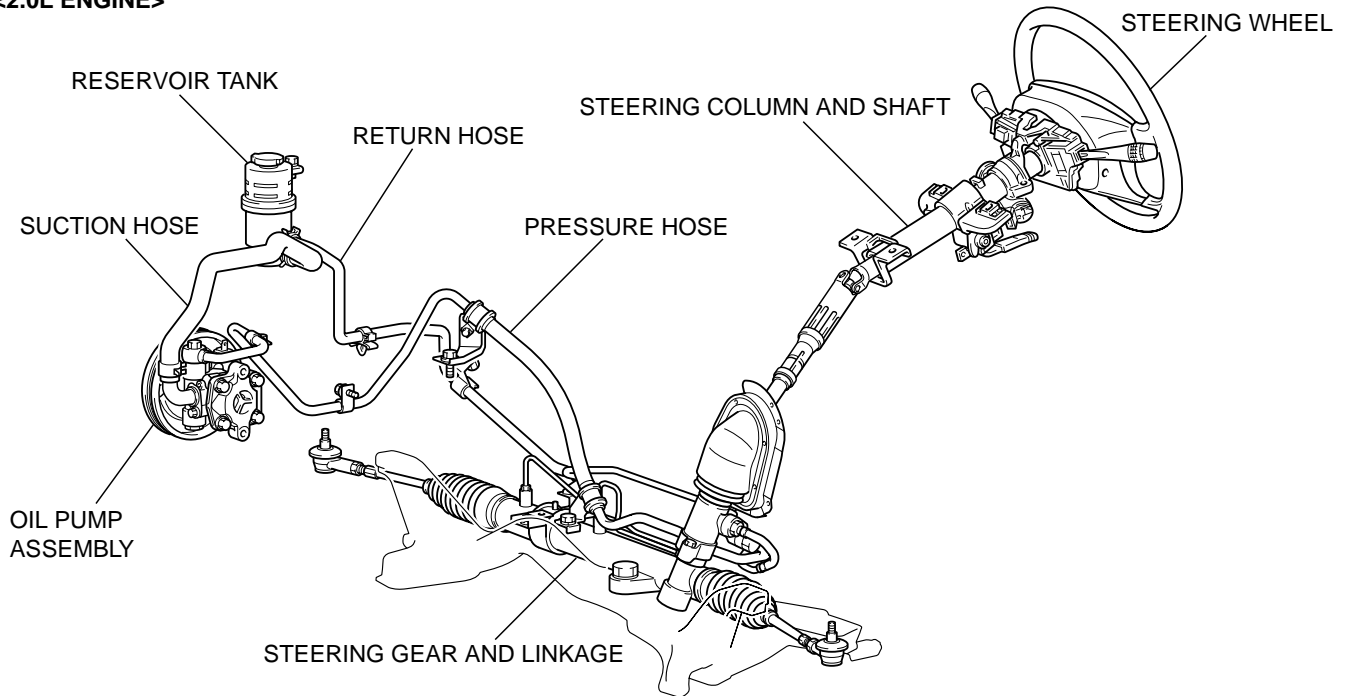
The steering wheel has four spokes. All vehicles are equipped with SRS (Supplemental Restraint System).

The steering column has a shock absorber mechanism and a tilt mechanism.

The power steering is an integral rack and pinion type that combines the steering gear and linkage into one light-weight and compact assembly.

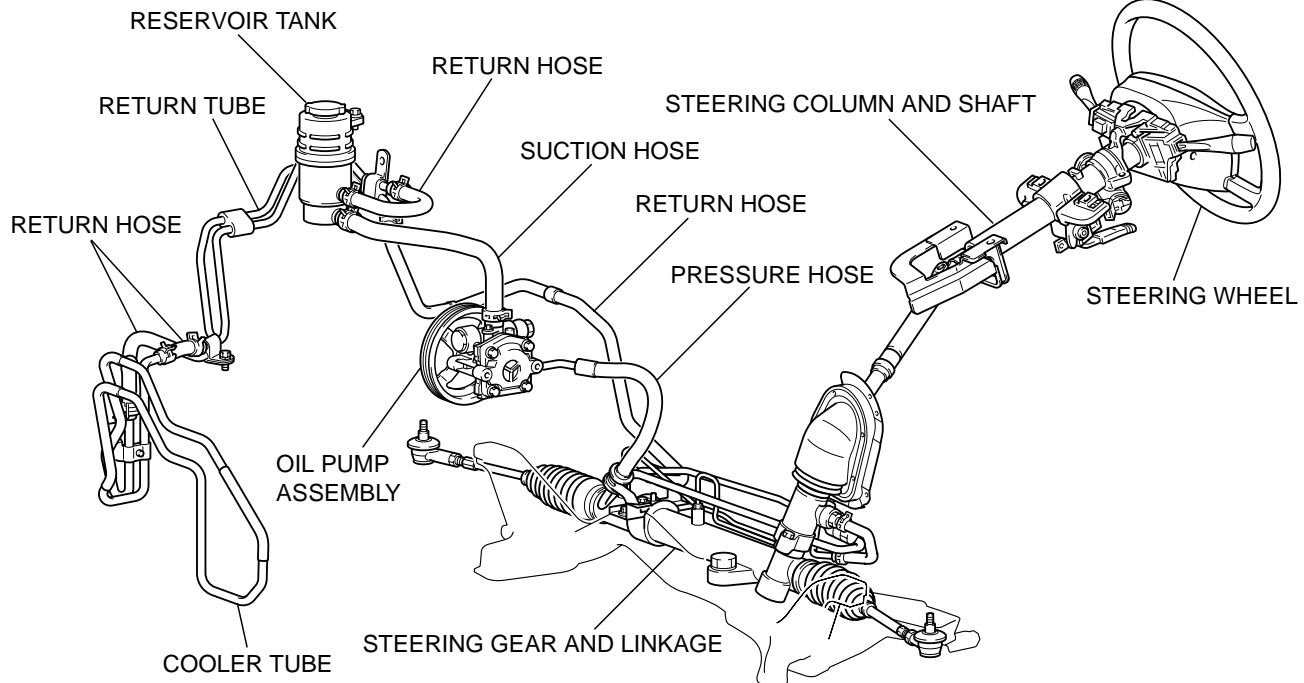
The steering system uses a vane oil pump with a fluid flow control system, so that steering effort varies with engine speed.

<2.0L ENGINE>



AC100365AC

<2.4L ENGINE>



AC305918AC

POWER STEERING DIAGNOSIS

INTRODUCTION TO POWER STEERING DIAGNOSIS

M1372008500221

Hydraulic power steering is used for all vehicles. Faults in the power steering can include excessive play of the steering wheel, difficult steering wheel operation, noise, vibration, and oil leaks, etc. Possible causes of these faults can include defects in the gear box, oil pump or steering linkage.

POWER STEERING DIAGNOSIS TROUBLESHOOTING STRATEGY

M1372007300224

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a power steering fault.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.

3. Find the malfunction by following the Symptom Chart.

4. Verify malfunction is eliminated.

SYMPTOM CHART

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SYMPTOMS	INSPECTION PROCEDURE	REFERENCE PAGE
Excessive play of steering wheel	1	P.37A-5
Difficult steering wheel operation (insufficient power assist)	2	P.37A-6
Rattling noise	3	P.37A-7
Shrill noise	4	P.37A-8
Squealing noise	5	P.37A-8
Hissing noise	6	P.37A-8
Droning noise	7	P.37A-9
Squeaking noise	8	P.37A-10
Vibration	9	P.37A-11
Oil leakage from hose connection	10	P.37A-11
Oil leakage from hose assembly	11	P.37A-11
Oil leakage from oil reservoir	12	P.37A-12
Oil leakage from oil pump	13	P.37A-12
Oil leakage from gear box	14	P.37A-12

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Excessive Play of Steering Wheel

DIAGNOSIS

STEP 1. Check for looseness at the steering shaft coupling section and at the steering wheel linkage.

Q: Is there any looseness?

YES : Repair or replace the part. Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check the steering wheel free play.

(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 the steering wheel in both directions.

Limit: 30 mm (1.2 inch)

(3) If the free play exceeds the limit value, set steering wheel straight ahead with engine stopped. Load approximately 5 N (1.1 pound) toward steering circumference and check play.

Standard value (steering wheel play with engine stopped): 10 mm (0.4 inch) or less

Q: Does the play exceed the standard value?

YES : Remove steering gear box (Refer to [P.37A-30.](#)) and check total pinion torque (Refer to [P.37A-30.](#)). Then go to Step 3.

NO : Go to Step 3.

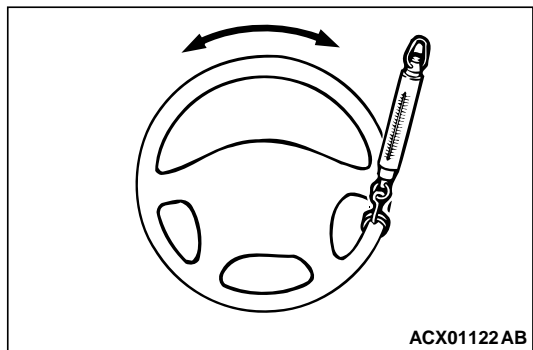
STEP 3. Check steering wheel play.

Verify that the steering wheel play is not excessive.

Q: Is the steering wheel play excessive?

YES : Repeat to Step 1.

NO : The procedure is complete.



INSPECTION PROCEDURE 2: Difficult Steering Wheel Operation (Insufficient Power Assist)

DIAGNOSIS

STEP 1. Check the power steering belt tension.

Refer to GROUP 00, Maintenance Service – Drive Belts [P.00-45](#).

Q: Is the power steering belt tension within the standard value?

YES : Go to Step 2.

NO : Adjust the tension. (Refer to GROUP 00, Maintenance Service – Drive Belts [P.00-45](#).) Then go to Step 10.

STEP 2. Check the belt for damage.

Q: Is the belt damaged?

YES : Replace the belt. Then go to Step 10.

NO : Go to Step 3.

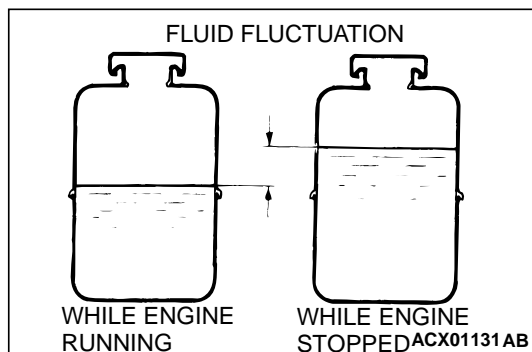
STEP 3. Check the fluid level.

- (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 (122 – 140°F).
- (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 (0.2 inch) or more, bleed air from the system. (Refer to [P.37A-20](#).)

Q: Is fluid foamy?

YES : Go to Step 4.

NO : Go to Step 10.

**STEP 4. Check for entry of air.**

Q: Has air entered?

YES : Bleed the air (Refer to [P.37A-20](#)). Then go to Step 10.

NO : Go to Step 5.

STEP 5. Check each hose for crushing or twisting.

Q: Is any hose crushed or twisted?

YES : Repair or replace the hose. Then go to Step 10.

NO : Go to Step 6.

STEP 6. Check for oil leaks.

Q: Are there oil leaks?

YES : Repair it. Then go to Step 10.

NO : Go to Step 7.

STEP 7. Check the wheel alignment (camber and caster).

Refer to GROUP 33A, On-vehicle Service – Front Wheel Alignment Check and Adjustment [P.33A-7](#).

Q: Is the alignment incorrect?

YES : Repair it. Then go to Step 10.

NO : Go to Step 8.

STEP 8. Check the gear box rack piston seal for damage.

Q: Is there damage?

YES : Replace it. Then go to Step 10.

NO : Go to Step 9.

STEP 9. Check for excessive tie rod end ball joint breakaway torque.

Refer to [P.37A-17](#).

Q: Is there fault?

YES : Replace the part. Then go to Step 10.

NO : Go to Step 10.

STEP 10. Check steering wheel operation.

Verify that steering wheel operation is not difficult.

Q: Is the steering wheel operation difficult?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 3: Rattling Noise

DIAGNOSIS

STEP 1. Check for proper oil pump and gear box installation.

Q: Is the oil pump and gear box installation correct?

YES : Go to Step 2.

NO : Repair it. Then go to Step 4.

STEP 2. Check for interference of other parts with the steering column and power steering hoses.

Q: Is there interference?

YES : Correct the interference. Then go to Step 4.

NO : Go to Step 3.

STEP 3. Check for noise from inside the oil pump or gear box.

Q: Is there noise?

YES : Replace the part. Then go to Step 4.

NO : Go to Step 4.

STEP 4. Check for rattling noise.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 4: Shrill Noise

DIAGNOSIS

STEP 1. Check for entry of air.**Q: Is the power steering fluid foamy?****YES :** Bleed the air. (Refer to [P.37A-20.](#)) Then go to Step 3 .**NO :** Go to Step 2.

STEP 2. Check for seizure in the oil pump.**Q: Is there seizure?****YES :** Replace the part. Then go to Step 3.**NO :** Go to Step 3.

STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?**YES :** Repeat from Step 1.**NO :** The procedure is complete.

INSPECTION PROCEDURE 5: Squealing Noise

DIAGNOSIS

STEP 1. Check the belt tension.Refer to GROUP 00, Maintenance Service – Drive Belts [P.00-45.](#)**Q: Is the belt tension incorrect?****YES :** Adjust the belt tension. (Refer to GROUP 00, Maintenance Service – Drive Belts [P.00-45.](#)) Then go to Step 3.**NO :** Go to Step 2.

STEP 2. Check for seizure in the oil pump.**Q: Is there seizure?****YES :** Replace the part. Then go to Step 3.**NO :** Go to Step 3.

STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?**YES :** Repeat from Step 1.**NO :** The procedure is complete.

INSPECTION PROCEDURE 6: Hissing Noise

DIAGNOSIS

STEP 1. Check for entry of air.**Q: Is the power steering fluid foamy?****YES :** Bleed the air. (Refer to [P.37A-20.](#)) Then go to Step 4 .**NO :** Go to Step 2.

STEP 3. Check the steering gear box for damage.**Q: Is there damage?****YES :** Repair or replace the part. Then go to Step 4.**NO :** Go to Step 4.

STEP 4. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?**YES :** Repeat from Step 1.**NO :** The procedure is complete.

STEP 2. Check each hose for crushing or twisting.**Q: Is any hose crushed or twisted?****YES :** Repair or replace the hose. Then go to Step 4.**NO :** Go to Step 3.

INSPECTION PROCEDURE 7: Droning Noise

DIAGNOSIS

STEP 1. Check the oil pump or oil pump bracket installation.

Q: Is the oil pump or oil pump bracket installation correct?

YES : Go to Step 2.

NO : Repair it. Then go to Step 3.

STEP 2. Check the oil pump for damage.

NOTE: If a slight "beat noise" is produced by the oil pump when the steering wheel is turned fully and held in that position, this is not a malfunction.

Q: Is there damage?

YES : Replace the oil pump. Then go to Step 3.

NO : Go to Step 3.

STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 8: Squeaking Noise

DIAGNOSIS

STEP 1. Check for interference of the wheel and vehicle body.

If interfering, adjust the steering angle.

- (1) Place the front wheel on a turning radius gauge and measure the steering angle.

Standard value:

ITEM		SPECIFICATION
Inside wheel	Vehicle with 14 inch tire	40°40' ± 1°30'
	Vehicle with 15 inch tire	39°30' ± 1°30'
	Vehicle with 16 inch tire	33°40' +1°00'/-2°00'
Outside wheel (reference)	Vehicle with 14 inch tire	33°20'
	Vehicle with 15 inch tire	32°30'
	Vehicle with 16 inch tire	28°46'

- (2) If the steering angle is not within the standard value, adjust the toe-in.

Standard value: 1 ± 2 mm (0.04 ± 0.09 inch)

- (3) Adjust the toe-in by undoing the clip and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).

NOTE: The toe will move out as the left turnbuckle is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.

Q: Is the steering angle normal?

YES : Go to Step 2.

NO : Adjust the steering angle. Then go to Step 3.

STEP 2. Check the steering gear box for damage.**Q: Is there damage?**

YES : Repair or replace the part. Then go to Step 3.

NO : Go to Step 3.

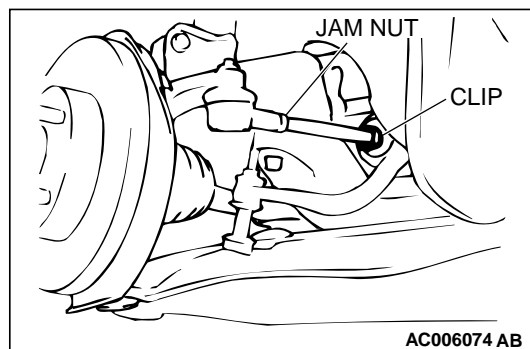
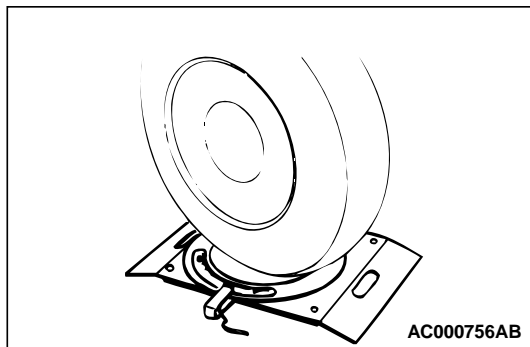
STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.



INSPECTION PROCEDURE 9: Vibration

NOTE: A slight vibration may be felt when the stationary steering effort is made due to the condition of the road surface. To check whether the vibration actually exists or not, test-drive the vehicle on a dry concrete or asphalt surface. A very slight amount of vibration is not a malfunction.

DIAGNOSIS

STEP 1. Check for entry of air.

Q: Is the power steering fluid foamy?

YES : Bleed the air. (Refer to [P.37A-20.](#)) Then go to Step 3 .

NO : Go to Step 2.

STEP 2. Check the steering gear box for damage.

Q: Is there damage?

YES : Repair or replace the part. Then go to Step 3.

NO : Go to Step 3.

STEP 3. Retest the system.

Confirm that no vibration is generated.

Q: Is there vibration?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 10: Oil Leakage from Hose Connection

DIAGNOSIS

STEP 1. Check for loosening of the flare nut.

Q: Is the flare nut loose?

YES : Tighten it to 15 ± 3 N·m (11 ± 2 ft·lb). Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check the hose connection and the clamp installation.

Q: Are they correct?

YES : Go to Step 3.

NO : Repair or replace the part. Then go to Step 3.

STEP 3. Retest the system.

Check that no oil is leaking.

Q: Is there oil leakage?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 11: Oil Leakage from Hose Assembly

DIAGNOSIS

STEP 1. Check the hose for damage or clogging.

Q: Is the hose damaged or clogged?

YES : Repair or replace it. Then go to Step 2.

NO : Go to Step 2.

STEP 2. Retest the system.

Check that no oil is leaking.

Q: Is there oil leakage?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 12: Oil Leakage from Oil Reservoir

DIAGNOSIS

STEP 1. Check the oil reservoir for damage.**Q: Is there damage?****YES :** Repair or replace it. Then go to Step 3.**NO :** Go to Step 2.

STEP 2. Check for overflowing.**Q: Is there oil overflowing from the reservoir?****YES :** Adjust fluid level. Then go to Step 3.**NO :** Go to Step 3.

STEP 3. Retest the system.**Q: Is there oil leakage?****YES :** Repeat from to Step 1.**NO :** The procedure is complete.

INSPECTION PROCEDURE 13: Oil Leakage from Oil Pump

DIAGNOSIS

STEP 1. Check the oil pump body for damage.**Q: Is there damage?****YES :** Replace the part. Then go to Step 3.**NO :** Go to Step 2.

STEP 2. Check the O-ring or oil seal for damage.**Q: Is there damage?****YES :** Replace the part. Then go to Step 3.**NO :** Go to Step 3.

STEP 3. Retest the system.

Check that no oil is leaking.

Q: Is there oil leakage?**YES :** Repeat from Step 1.**NO :** The procedure is complete.

INSPECTION PROCEDURE 14: Oil Leakage from Gear Box

DIAGNOSIS

STEP 1. Check the gear box housing for damage.**Q: Is there damage?****YES :** Replace the part. Then go to Step 3.**NO :** Go to Step 2.

STEP 2. Check the oil-ring or oil seal for damage.**Q: Is there damage?****YES :** Replace the part. Then go to Step 3.**NO :** Go to Step 3.

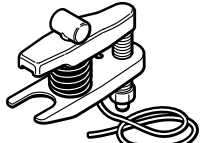
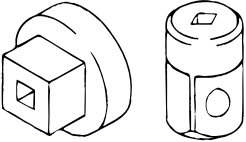
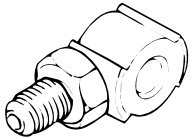
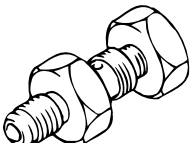
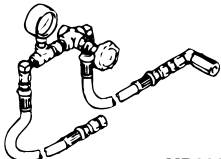
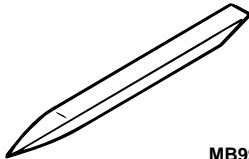
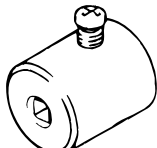
STEP 3. Retest the system.

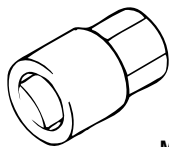

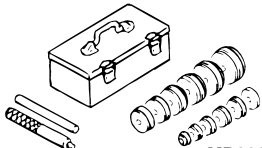
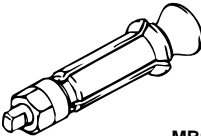


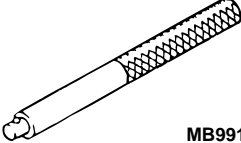
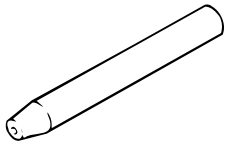
Check that no oil is leaking.

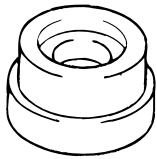
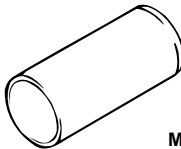
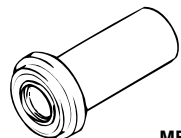
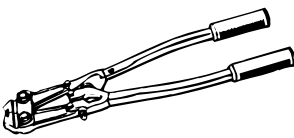
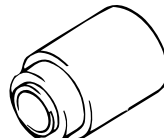
Q: Is there oil leakage?**YES :** Repeat from Step 1.**NO :** The procedure is complete.

SPECIAL TOOLS

M1372000600417

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 AC106827	MB991897 Ball joint remover	MB991113-01, MB990635-01 or general service tool	Tie rod end disconnection <i>NOTE: Steering linkage puller (MB990635 or MB991113) is also used to disconnect knuckle and tie rod end ball joint.</i>
 MB990326	MB990326 Preload socket	General service tool	Tie rod end ball joint breakaway torque check
 MB991548	MB991548 Power steering oil pressure gauge adapter (Pump side)	MB991548-01	Oil pump pressure test
 MB991549	MB991549 Power steering oil pressure gauge adapter (Hose side)	MB991549-01	
 MB990662	MB990662 Oil pressure gauge assembly	MB990662-01	
 MB990784	MB990748 Ornament remover	General service tool	Cover removal
 MB991006	MB990228 or MB991006 Preload socket	MB990228-01	Gear box total pinion torque check

TOOL	TOOL NUMBER AND NAME	SUPERSESSON	APPLICATION
 MB991204	MB991204 Torque wrench socket	General service tool	<ul style="list-style-type: none"> • Rack support adjustment <Vehicles with 14 and 15 inch tire> • Rack support cover removal <Vehicles with 14 and 15 inch tire>
 MB991621	MB991621 Piston driver	—	<ul style="list-style-type: none"> • Rack support adjustment <Vehicles with 16 inch tire> • Rack support cover removal <Vehicles with 16 inch tire>
 MB990925	MB990925 Bearing and oil seal installer set	MB990925-01 or general service tool	<ul style="list-style-type: none"> • Oil seal and bearing installation • MB990926, MB990927, MB990938, MB990939 (For details, refer to GROUP 26, Special Tools P.26-5.)
 MB991120	MB991120 Needle bearing puller	Tool not available	Needle roller bearing removal
 MB991202	MB991202 Oil seal and bearing installer	General service tool	<ul style="list-style-type: none"> • Oil seal installation <Vehicles with 14 and 15 inch tire> • Needle bearing installation • Lower bearing installation
 MB991199	MB991199 Oil seal and bearing installer	General service tool	Oil seal installation <Vehicles with 16 inch tire>
 MB991197	MB991197 Bar (long type)	General service tool	Oil seal installation
 MB991212	MB991212 Rack installer	—	Rack installation

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 <p align="center">MB991203</p>	MB991203 Oil seal and bearing installer	Tool not available	Oil seal and bearing installation
 <p align="center">MB991317</p>	MB991317 Seal ring installer	Tool not available	Seal ring installation
 <p align="center">MB990941</p>	MB990941 Torque tube bearing installer	MB990941-01 or general service tool	Valve housing oil seal installation
 <p align="center">MB991561</p>	MB991561 Boot band crimping tool	MB991561	Bellows band installation
 <p align="center">MB990776</p>	MB990776 Front axle base	MB990776-01	Dust cover installation

ON-VEHICLE SERVICE

STEERING WHEEL FREE PLAY CHECK

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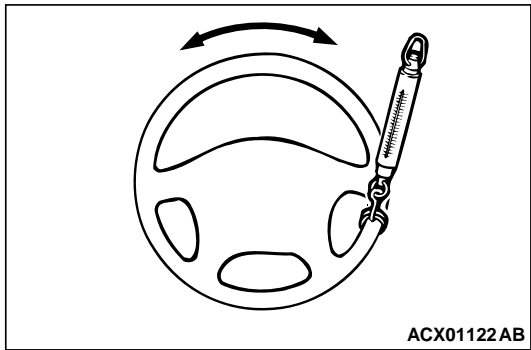
1. With the engine running (hydraulic operation), set the front wheels straight ahead.
2. Measure the play on the steering wheel circumference before the wheels start to move when slightly moving the steering wheel in both directions.

Limit: 30 mm (1.2 inch)

3. When the play exceeds the limit, check for the play on the steering shaft and steering linkage connection. Correct or replace.
4. If the free play still exceeds the limit value, set the steering wheel straight ahead with the engine stopped. Load 5 N (1.1 pound) towards the steering wheel circumference and check the play.

Standard value (steering wheel play with the engine stopped): 10 mm (0.4 inch) or less

5. If the play exceeds the standard value, remove the steering gear box (Refer to [P.37A-30.](#)) and check total pinion torque (Refer to [P.37A-30.](#)).



STEERING ANGLE CHECK

M1372001100415

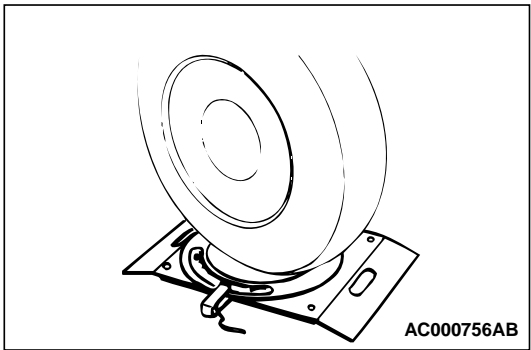
1. Place the front wheel on a turning radius gauge and measure the steering angle.

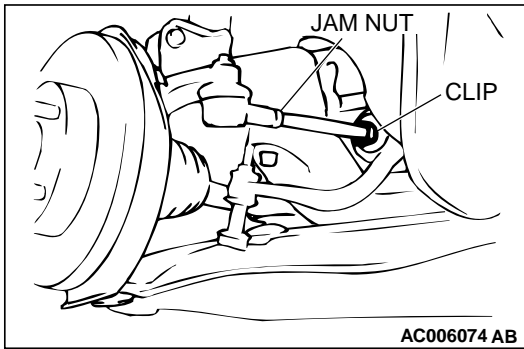
Standard value:

ITEM		SPECIFICATI ON
Inside wheel	Vehicle with 14 inch tire	40°40' ± 1°30'
	Vehicle with 15 inch tire	39°30' ± 1°30'
	Vehicle with 16 inch tire	33°40' +1°00'/-2°00'
Outside wheel (reference)	Vehicle with 14 inch tire	33°20'
	Vehicle with 15 inch tire	32°30'
	Vehicle with 16 inch tire	28°46'

2. If the steering angle is not within the standard value, adjust the toe-in.

Standard value: 1 ± 2 mm (0.04 ± 0.09 inch)





3. Loosen the jam nut, and unclip the bellows.
4. Adjust the toe-in by turning the left and right tie rod turnbuckles by the same amount (in opposite directions).
NOTE: The toe will move out as the left turnbuckle is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.
5. Tighten the jam nut to the specified torque, and tighten the bellows by the clip.

Standard torque: 40 ± 5 N·m (29 ± 4 ft-lb)

TIE ROD END BALL JOINT BREAKAWAY TORQUE CHECK

M1372001500338

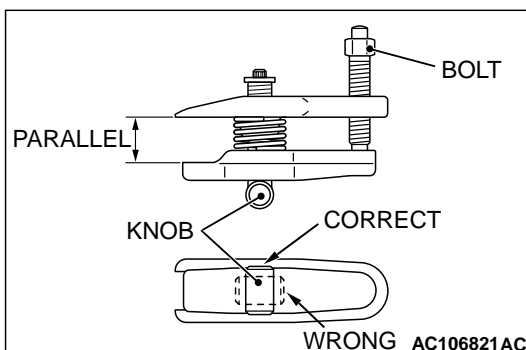
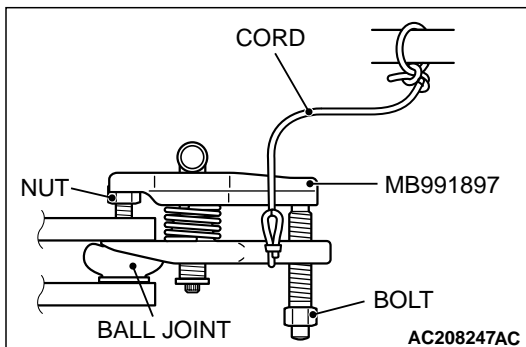
Required Special Tools:

- MB990326: Preload Socket
- MB991897: Ball Joint Remover

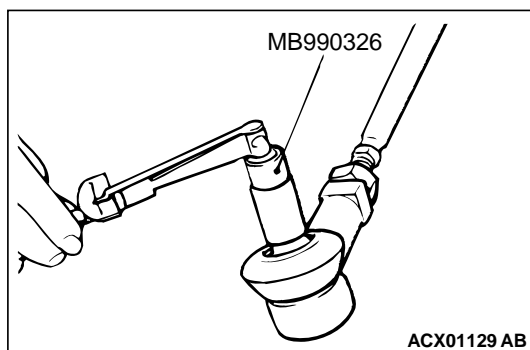
CAUTION

- **Do not remove the nut from the ball joint. Loosen it and use special tool MB991897 to avoid possible damage to the ball joint threads.**
- **Hang special tool MB991897 with rope or wire to prevent them from falling.**

1. Install the special tool MB991897 as shown in the figure.



2. Turn the bolt and knob as necessary to make the jaws of special tool MB991897 parallel, tighten the bolt by hand and confirm that the jaws are still parallel.
NOTE: When adjusting the jaws in parallel, make sure the knob is in the position shown in the figure.
3. Tighten the bolt with a wrench to disconnect the tie rod end.



4. Move the ball joint stud several times and install the nut on the stud. Measure the ball joint breakaway torque with special tool MB990326.

Standard value: 0.5 – 2.5 N·m (4.4 – 22.1 in-lb)

5. If the breakaway torque exceeds the standard value, replace the tie rod end.
6. If the breakaway torque is under the standard value, check the ball joint for end play or ratcheting. If no end play or ratcheting, the ball joint can be re-used.

⚠ CAUTION

Always use a new ball joint nut as it is a self-locking nut.

7. Tighten the nut to the specified torque.

Tightening torque: 25 ± 5 N·m (19 ± 3 ft-lb)

STATIONARY STEERING EFFORT CHECK

M1372001700376

1. With the vehicle stopped on a flat and paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set the engine idle speed.

Standard value: 700 ± 50 r/min

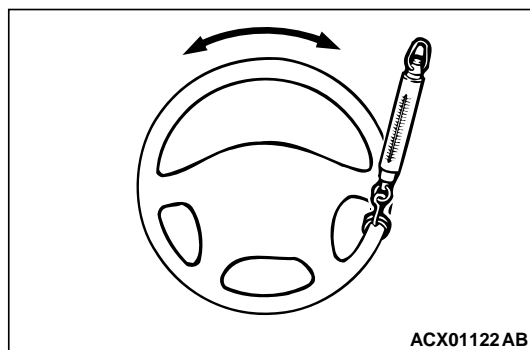
3. Attach a spring scale to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant change in the required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

Standard value:

Steering effort: 29 N (6.5 lb) or less

Fluctuation allowance: 5.9 N (1.33 lb) or less

4. If the measured value exceeds the standard value, refer to Inspection Procedure 2 "Difficult Steering Wheel Operation (Insufficient Power Assist)" [P.37A-6](#).



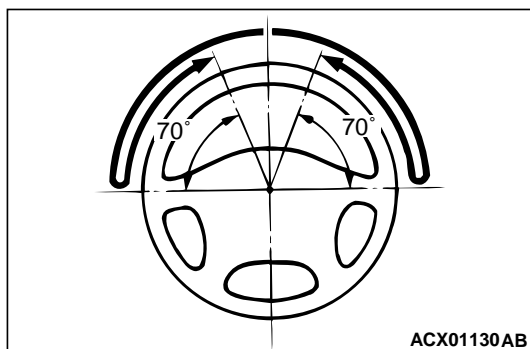
STEERING WHEEL RETURN TO CENTER CHECK

M1372001800351

Conduct a road test:

1. Make both gradual and sudden turns and check the steering wheel return.
2. At a vehicle speed of approximately 35 km/h (22 mph), turn the steering wheel 90 degrees, hold a few seconds, then release. If the steering wheel then returns 70 degrees or more, the return can be judged satisfactory.

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



DRIVE BELT TENSION CHECK

M1372001900303

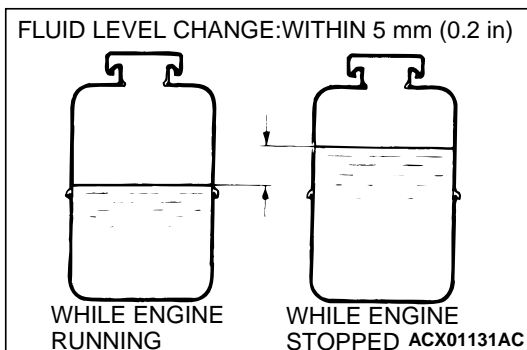
Refer to GROUP 00, Maintenance Service – Drive Belts

P.00-45.

FLUID LEVEL CHECK

M1372002000325

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 (122 – 140°F).
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 (0.2 inch) or more, air bleeding should be done.



FLUID REPLACEMENT

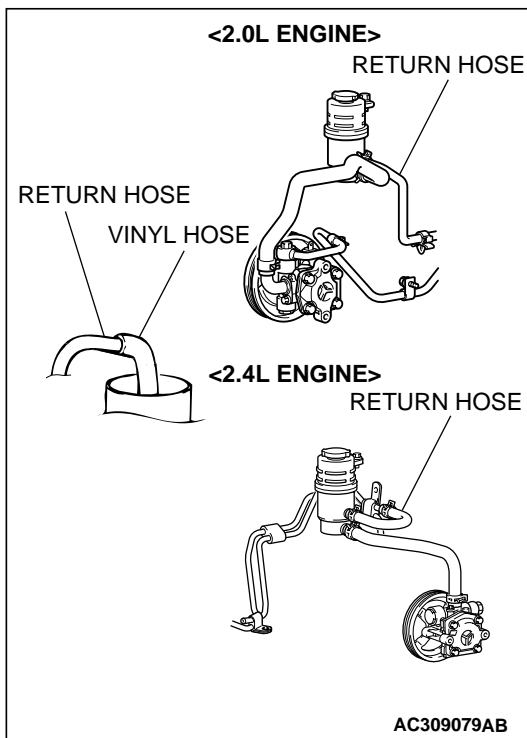
M1372002100388

1. Raise and support the front wheels.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the fluid into a container.

⚠ CAUTION

Be careful not to position the high-tension cable near the fuel rail.

4. Disconnect the high-tension cable.
5. 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.
6. Connect the return hose securely, and then secure with the clip.
7. Fill the oil reservoir with GENUINE MITSUBISHI POWER STEERING FLUID up to the lower position of the filler, and then bleed the air.



POWER STEERING SYSTEM AIR BLEEDING

M1372002200374

Perform air bleeding procedure as necessary after replacing the steering gear box or the steering fluid lines.

1. Raise and support the front wheels.
2. Disconnect the high-tension cable. Turn the steering wheel all the way to the left and right five or six times while using the starter motor to crank the engine intermittently several times (for 15 to 20 seconds).

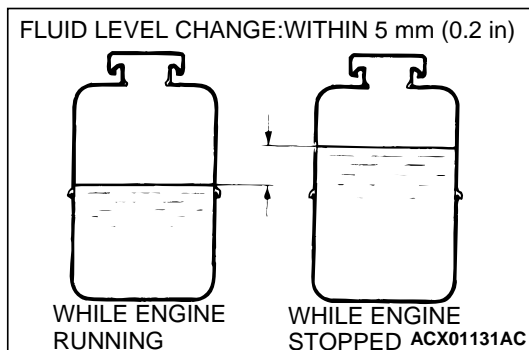
⚠ CAUTION

- Be careful not to place the high-tension cable near the fuel rail.
 - Perform air bleeding only while cranking the engine. If air bleeding is performed while the engine is running, air could enter the fluid. During air bleeding, refill the steering fluid supply so that the level never falls below the lower mark on the dipstick.
3. Connect the high-tension cable. Start the engine (idling).
 4. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
 5. Confirm that the fluid is not milky, and that the level is between the high and low dipstick marks.
 6. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.
 7. Confirm that the change in the fluid level is no more than 5 mm (0.2 inch) when the engine is stopped and when it is running.

⚠ CAUTION

If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled. If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause reduce the life of the power steering components.

8. If the change of the fluid level is 5 mm (0.2 inch) or more, the air has not been completely bled from the system. The air bleeding procedure must be repeated.



OIL PUMP PRESSURE TEST

Required Special Tools:

- MB990662: Pressure Gauge
- MB991548: Power Steering Oil Pressure Gauge Adapter (Pump Side)
- MB991549: Power Steering Oil Pressure Gauge Adapter (Hose Side)

1. Disconnect the pressure hose from the oil pump, and then connect special tools MB991548, MB990662 and MB991549.
2. Bleed air, 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 (122 – 140°F).
3. Start the engine and idle it at 700 ± 50 r/min.

CAUTION

The pressure gauge shut-off valve must not remain closed for more than 10 seconds.

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. Open it again immediately after checking the pressure.

Standard value: 8.8 – 9.5 MPa (1,276 – 1,378 psi)

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 (116 – 145 psi)

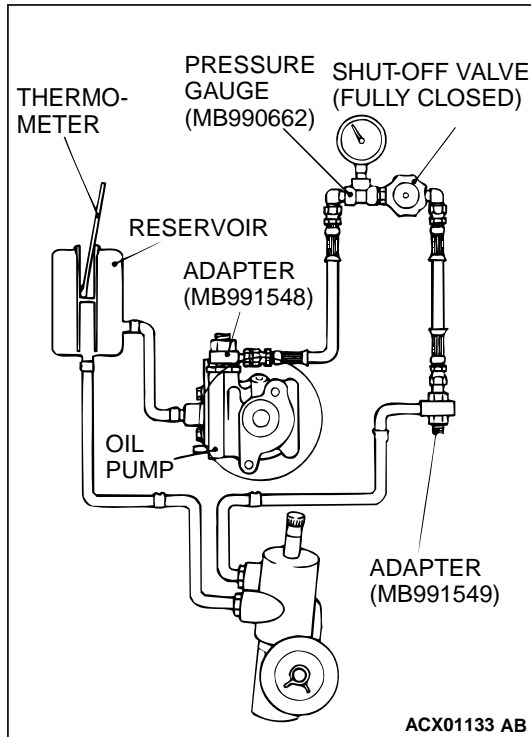
7. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
8. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

Standard value: 8.8 – 9.5 MPa (1,276 – 1,378 psi)

9. If not the standard value, overhaul the steering gear box. Remeasure fluid pressure.
10. Remove special tools MB991548, MB990662 and MB991549, and then tighten the pressure hose to the specified torque.

Tightening torque: 57 ± 7 N·m (42 ± 5 ft·lb)

11. Bleed the system. (Refer to [P.37A-20.](#))

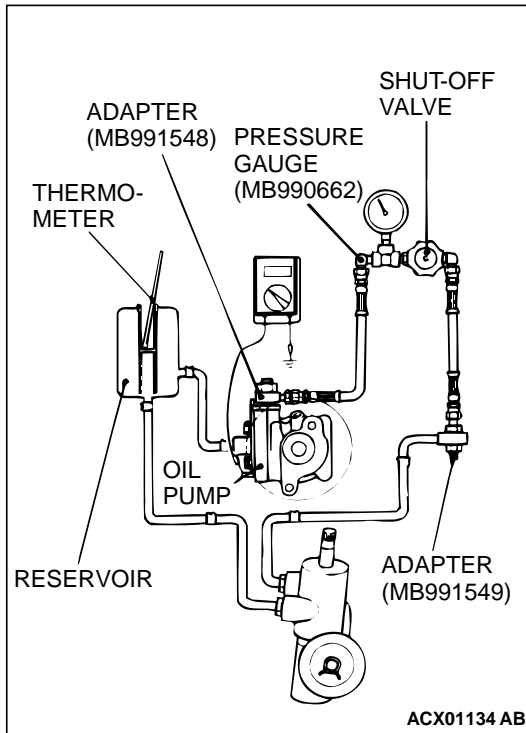


POWER STEERING PRESSURE SWITCH CHECK

M1372007200368

Required Special Tools:

- MB990662: Pressure Gauge
- MB991548: Power Steering Oil Pressure Gauge Adapter (Pump Side)
- MB991549: Power Steering Oil Pressure Gauge Adapter (Hose Side)



1. Disconnect the pressure hose from the oil pump, and then connect special tools MB991548, MB990662 and MB991549.
2. Bleed 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 (122 – 140°F).
3. The engine should be idling.
4. Disconnect the connector for the oil pressure switch, and place an ohmmeter at the switch.
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: 1.5 – 2.0 MPa (217 – 290 psi)

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: 0.7 – 2.0 MPa (102 – 290 psi)

7. Remove special tools MB991548, MB990662 and MB991549, and then tighten the pressure hose to the specified torque.

Tightening torque: 57 ± 7 N·m (42 ± 5 ft-lb)

8. Bleed the system. (Refer to [P.37A-20.](#))

BALL JOINT DUST COVER CHECK

M1372008600303

1. Press the dust cover with your finger to check whether the dust cover is cracked or damaged.
2. If the dust cover is cracked or damaged, replace the tie rod end.

NOTE: If the dust cover is cracked or damaged, the ball joint could be damaged.

**STEERING COLUMN SHAFT ASSEMBLY SHOCK
ABSORBING MECHANISM CHECK**

M1372013500153

⚠ WARNING

1. ***If the vehicle continues to be driven after the collision absorbing mechanism has operated, the steering column shaft may be damaged while it is in use.***
2. ***If there is a slack in the mounting base, do not attempt to repair it but replace the steering column shaft assembly.***

If a collision accident occurs or severe impact is applied on the steering wheel, the collision energy absorbing mechanism may have operated. Once the mechanism has operated, it will be inoperative even it has suffered no apparent damage. Determine if the steering column shaft can be reused by the following procedure. If the collision energy absorbing mechanism has already operated, replace the steering shaft assembly. If any excessive radial freeplay on the steering wheel is found with the tilt lever in the lock position, always inspect the steering shaft assembly.

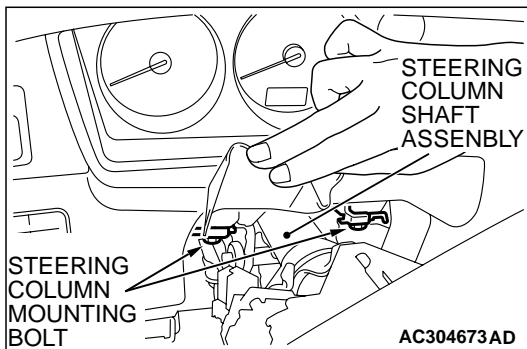
Inspection procedure

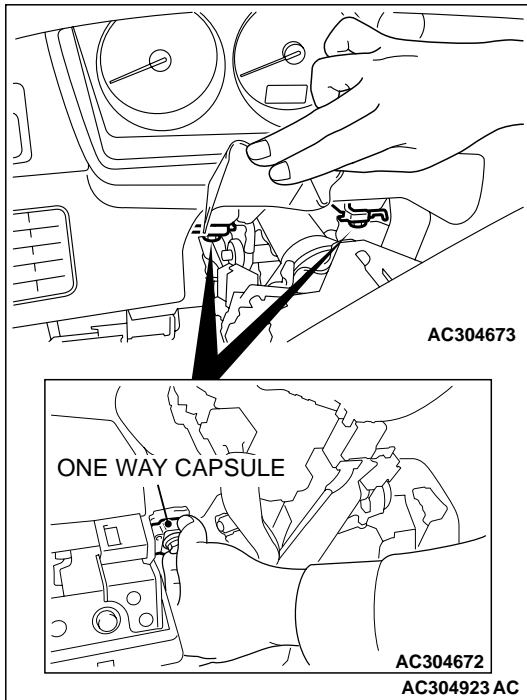
1. Remove the lower and upper column covers.

⚠ CAUTION

After inspection, do not release the tilt lever until the steering shaft assembly has been installed.

2. Ensure that the tilt lever is in the lock position.
3. Loosen the two upper steering column mounting bolts by two turns.





4. Hold the one-way capsules as shown, and then try to lock them. If there is a slack in either of the capsules, replace the steering column shaft assembly.

NOTE: When installing a new steering column shaft assembly, place the tilt lever in the lock position, if it is not in place.

⚠ CAUTION

1. Be careful that nothing is pinched between the mounting base and the body.
2. After inspection, do not release the tilt lever until the steering shaft assembly has been installed.
5. After inspection, if there is no fault, tighten the two steering column upper side mounting bolts (2 bolts) to the specified torque.

Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)

STEERING WHEEL AND SHAFT ASSEMBLY

REMOVAL AND INSTALLATION

M1372002600327

⚠ WARNING

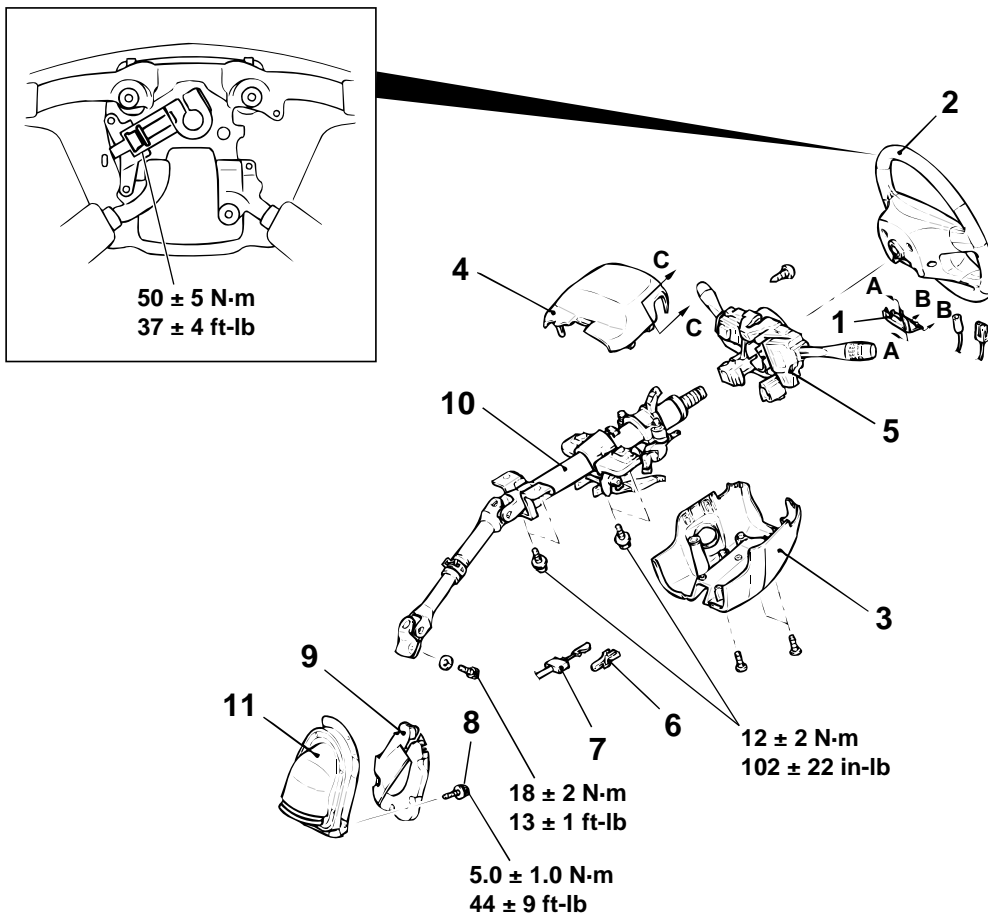
- Before removing the air bag module, refer to GROUP 52B, Service Precautions [P.52B-16](#) and Air Bag Module and Clock Spring [P.52B-205](#).
- When removing and installing the steering wheel, do not let it bump against the air bag module.

Post-removal Operation

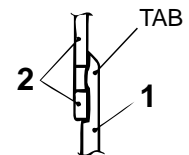
- Instrument Under Cover Removal (Refer to GROUP 52A, Instrument Panel [P.52A-3](#).)

Post-installation Operation

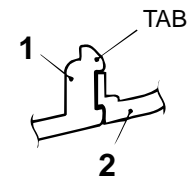
- Instrument Under Cover Removal (Refer to GROUP 52A, Instrument Panel [P.52A-3](#).)
- Checking Steering Wheel Position with Wheels Straight Ahead



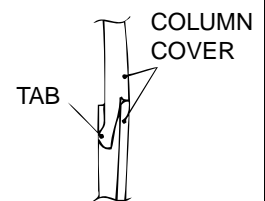
SECTION A - A



SECTION B - B



SECTION C - C



AC100370 AB

REMOVAL STEPS

<<A>>
<>

1. COVER
2. STEERING WHEEL AND AIR BAG MODULE ASSEMBLY
3. LOWER COLUMN COVER
4. UPPER COLUMN COVER
5. CLOCK SPRING AND COLUMN SWITCH ASSEMBLY (REFER TO GROUP 52B, AIR BAG MODULE AND CLOCK SPRING [P.52B-205](#).)
6. COVER <A/T>
7. KEY INTERLOCK CABLE <A/T>

REMOVAL STEPS (Continued)

- >>B<< 8. Bolt
>>A<< 9. SHAFT COVER
<<C>> 10. STEERING COLUMN SHAFT ASSEMBLY
11. COVER ASSEMBLY

Required Special Tool:

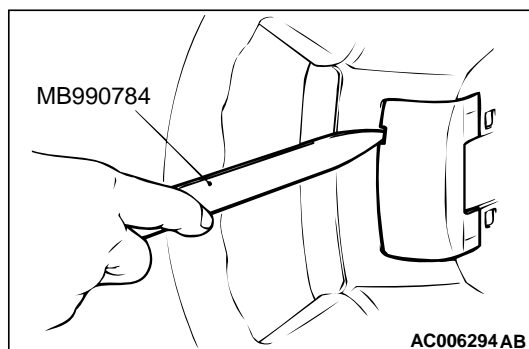
- MB990784: Ornament remover

REMOVAL SERVICE POINTS

<<A>> STEERING WHEEL REMOVAL

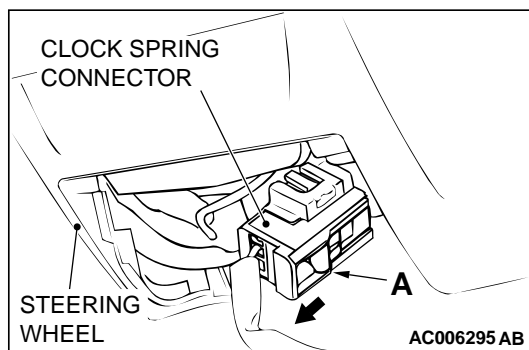
Insert the special tool MB990784 at the indicated position to remove the cover.

NOTE: The special tool MB990784 can be inserted through the notch behind the area shown.



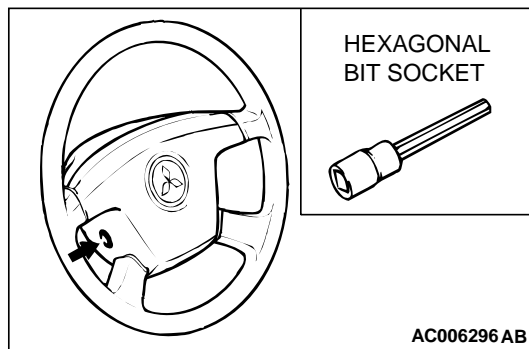
<> STEERING WHEEL AND AIRBAG MODULE ASSEMBLY REMOVAL

1. By sliding section A of the clock spring connector shown in the illustration in the arrow direction, disconnect the connector.



2. Loosen the bolt completely. Then, remove the steering wheel and airbag module assembly.

NOTE: Use a hexagonal bit socket or a hexagonal wrench having an effective length of 75 mm (3.0 inches) or more in the hexagonal section and the diameter of 8 mm (0.31 inches) or more.



<<C>> STEERING SHAFT ASSEMBLY REMOVAL

⚠ CAUTION

The tilt lever should be held in the lock position until the steering shaft assembly is installed to the vehicle. If the steering shaft assembly is removed with the tilt lever released, or the tilt lever is released after the steering shaft assembly was removed from the vehicle, the steering column can not be reinstalled correctly. If the steering column is installed incorrectly, the collision energy absorbing mechanism may be damaged.

Ensure that the tilt lever is in the lock position, and remove the steering shaft mounting bolts.

INSTALLATION SERVICE POINT

>>A<< STEERING SHAFT ASSEMBLY INSTALLATION

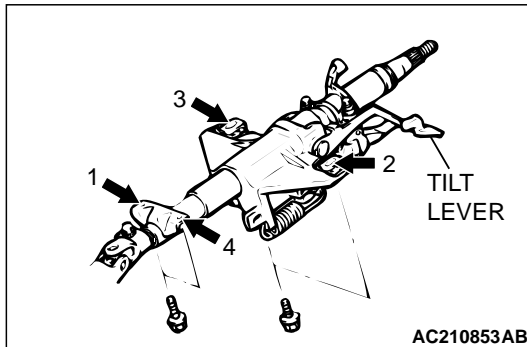
<When re-using steering shaft assembly>

CAUTION

Do not release the tilt lever until the steering column shaft assembly has been installed.

Ensure that the tilt lever is in the lock position, and install the steering shaft assembly. Tighten the four bolts in the order shown by hand, and then tighten them to the specified torque in the order shown.

Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)



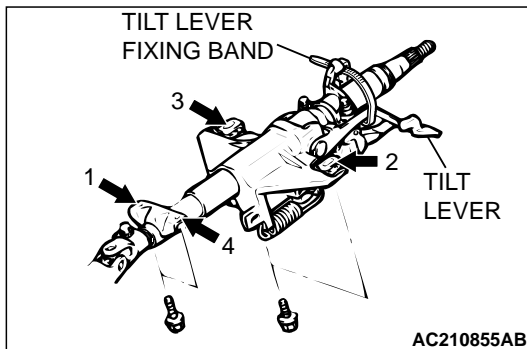
<When replacing steering shaft assembly (Replacement tilt lever with fixing band)>

CAUTION

1. **Do not release the tilt lever until the steering shaft assembly has been installed.**
2. **Remove the fixing band after the installation has been done.**

Ensure that the tilt lever is in the lock position, and install the steering shaft assembly. Tighten the four bolts in the order shown by hand, and then tighten them to the specified torque in the order shown.

Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)



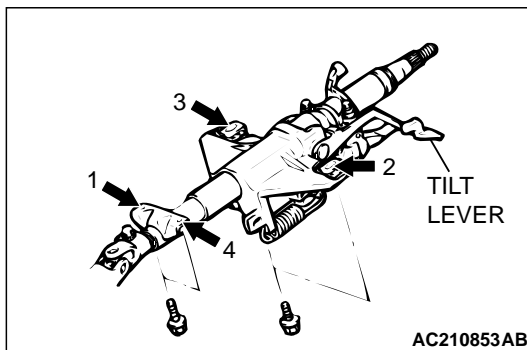
<When replacing steering shaft assembly (Replacement tilt lever without fixing band)>

CAUTION

Do not release the tilt lever until the steering shaft assembly has been installed.

Ensure that the tilt lever is in the lock position, and install the steering shaft assembly. Tighten the four bolts in the order shown by hand, and then tighten them to the specified torque in the order shown.

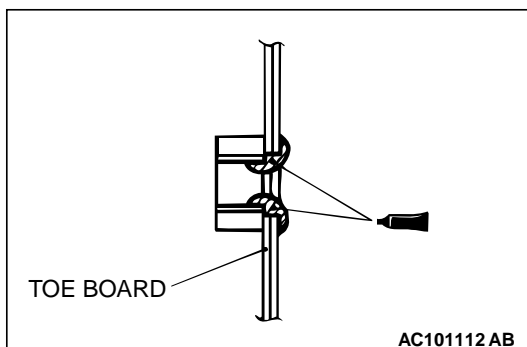
Tightening torque: 12 ± 2 N·m (102 ± 22 in-lb)



>>B<< BOLT

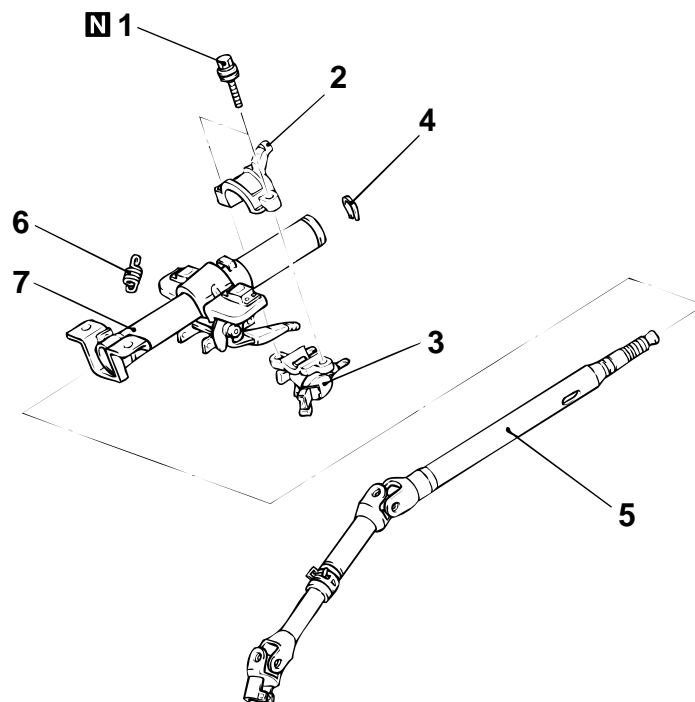
Before installing the bolt, coat the mounting hole on the toe board with the specified sealant.

**Specified Sealant: 3M™ AAD Part No. 8633
Windo-weld Resealant or equivalent**



DISASSEMBLY AND ASSEMBLY

M1372002800257



AC100394 AB

DISASSEMBLY STEPS

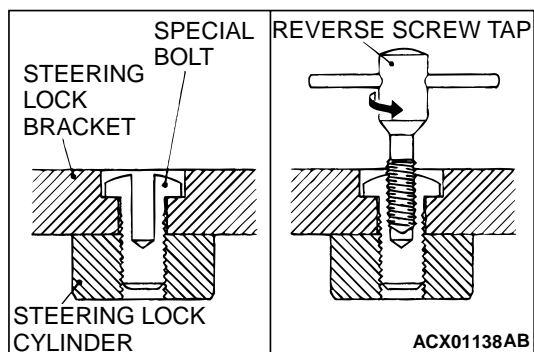
- <<A>> >>A<< 1. SPECIAL BOLT
 >>A<< 2. STEERING LOCK BRACKET
 >>A<< 3. STEERING LOCK CYLINDER
 ASSEMBLY
 4. SNAP RING

DISASSEMBLY STEPS (Continued)

5. STEERING SHAFT ASSEMBLY
 6. TILT SPRING
 7. STEERING COLUMN ASSEMBLY

DISASSEMBLY SERVICE POINT**<<A>> SPECIAL BOLT REMOVAL**

1. Drill in the special bolt a hole deep enough for the tap to stand.
2. Remove the special bolt with a left-hand tap.



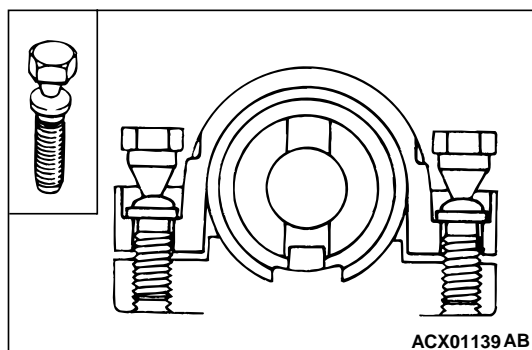
ASSEMBLY SERVICE POINT

>>A<< STEERING LOCK CYLINDER ASSEMBLY/STEERING LOCK BRACKET/SPECIAL BOLT INSTALLATION

CAUTION

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

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.



POWER STEERING GEAR BOX AND LINKAGE

REMOVAL AND INSTALLATION

M1372010900271

⚠ WARNING

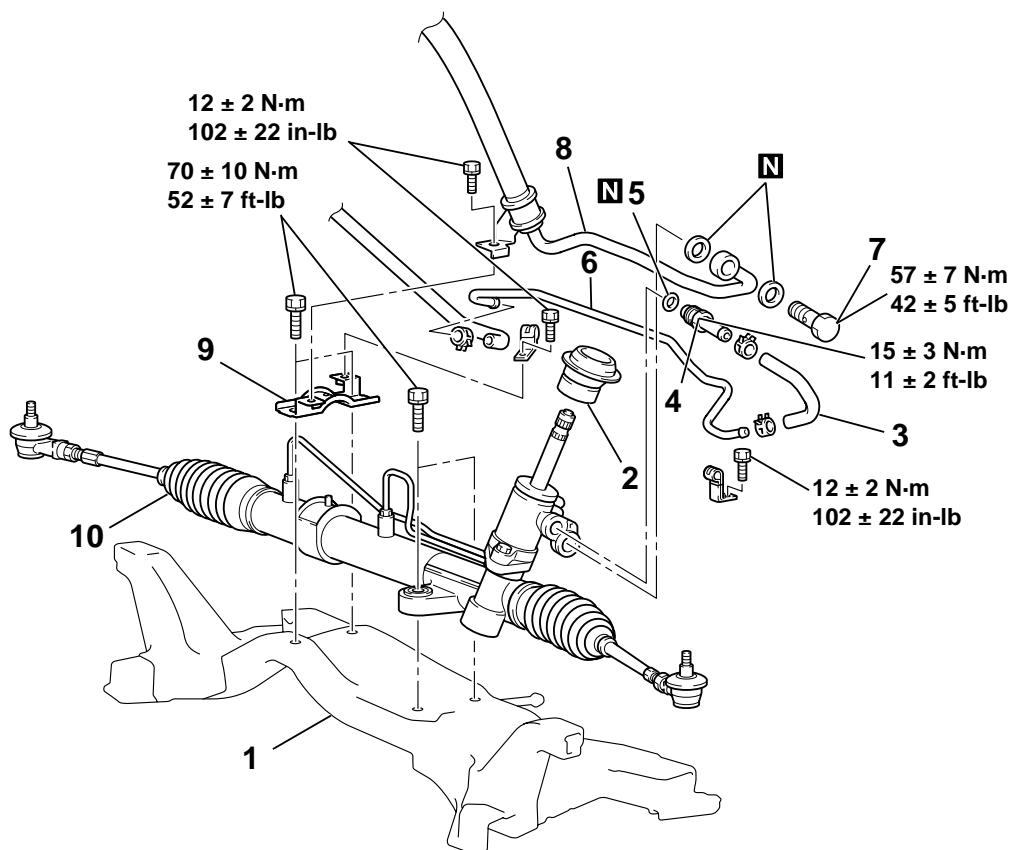
Before removing the air bag module, refer to GROUP 52B, Service Precautions [P.52B-16](#) and Air Bag Module and Clock Spring [P.52B-205](#). Center the front wheels and remove the ignition key. Failure to do so may damage the SRS clock spring and render the SRS system inoperative, risking serious injury.

Pre-removal Operation

- Power Steering Fluid Draining (Refer to [P.37A-19](#).)

Post-installation Operation

- Check the Dust Cover for Cracks or Damage by Pushing it with Your Finger.
- Power Steering Fluid Supplying (Refer to [P.37A-19](#).)
- Power Steering Fluid Line Bleeding (Refer to [P.37A-20](#).)
- Checking Steering Wheel Position with Wheels Straight Ahead.
- Front Wheel Alignment Adjustment (Refer to GROUP 33A, On-vehicle Service – Front Wheel Alignment Check and Adjustment [P.33A-7](#).)



AC304920 AC

REMOVAL STEPS

- CROSSMEMBER (REFER TO GROUP 32, CROSSMEMBER [P.32-9](#).)
- REAR ROLL STOPPER (REFER TO GROUP 32, ENGINE ROLL STOPPER AND CROSSMEMBER [P.32-7](#))

>>A<< 2. JOINT COVER GROMMET

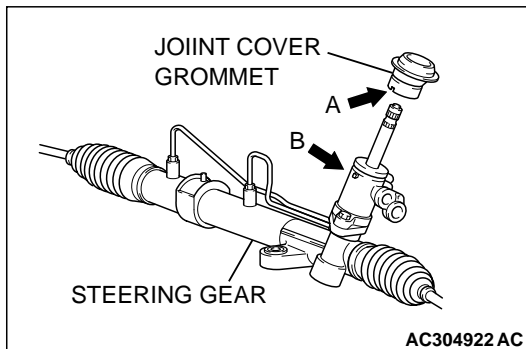
REMOVAL STEPS (Continued)

- RETURN HOSE
- RETURN TUBE
- O-RING
- RETURN TUBE
- EYE BOLT
- PRESSURE HOSE ASSEMBLY
- CLAMP
- STEERING GEAR AND LINKAGE

INSTALLATION SERVICE POINT

>>A<< JOINT COVER GROMMET INSTALLATION

Align the joint cover grommet notch (arrow A) with the steering gear lug (arrow B), and then install the steering joint cover to the steering gear.



INSPECTION

M1372011000271

GEAR BOX TOTAL PINION TORQUE CHECK

Required Special Tool:

- MB991006: Preload Socket

CAUTION

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

Using special tool MB991006, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion torque.

Standard value:

0.6 – 1.6 N·m (5.3 – 14.2 in-lb) <Vehicles with 14 and 15 inch tire>

0.7 – 2.1 N·m (6.2– 18.6 in-lb) <Vehicles with 16 inch tire>

[Change in torque:]

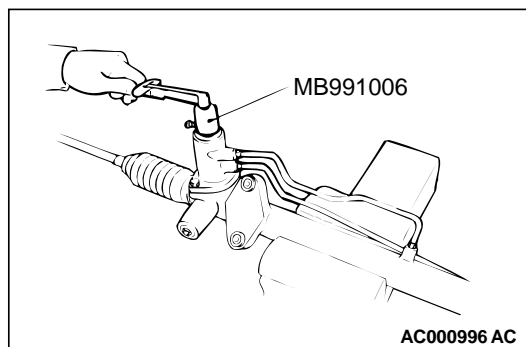
0.4 N·m (3.5 in-lb) or less <Vehicles with 14 and 15 inch tire>

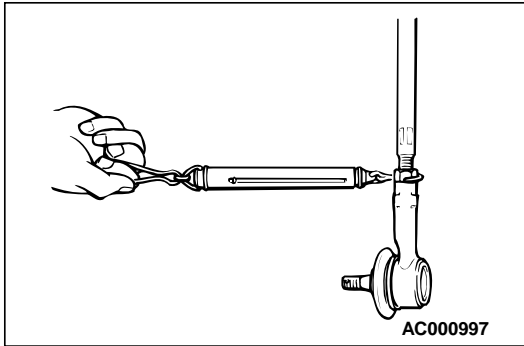
0.6 N·m (5.3 in-lb) or less <Vehicles with 16 inch tire>

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 torque again.

If the total pinion 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.



**TIE ROD SWING RESISTANCE CHECK**

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

Standard value:

6 – 19 N (26.7 – 84.5 lb) [1.5 – 4.9 N·m (13.2 – 43.4 in-lb)]

3. If the measured value exceeds the standard value, replace tie rod.
4. If the measured value is below the standard value, the tie rod can be re-used if it swings smoothly without excessive play.

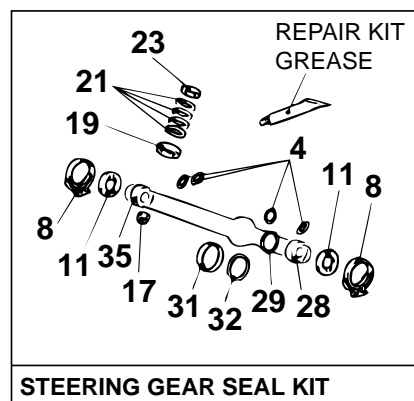
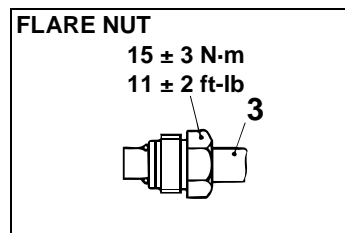
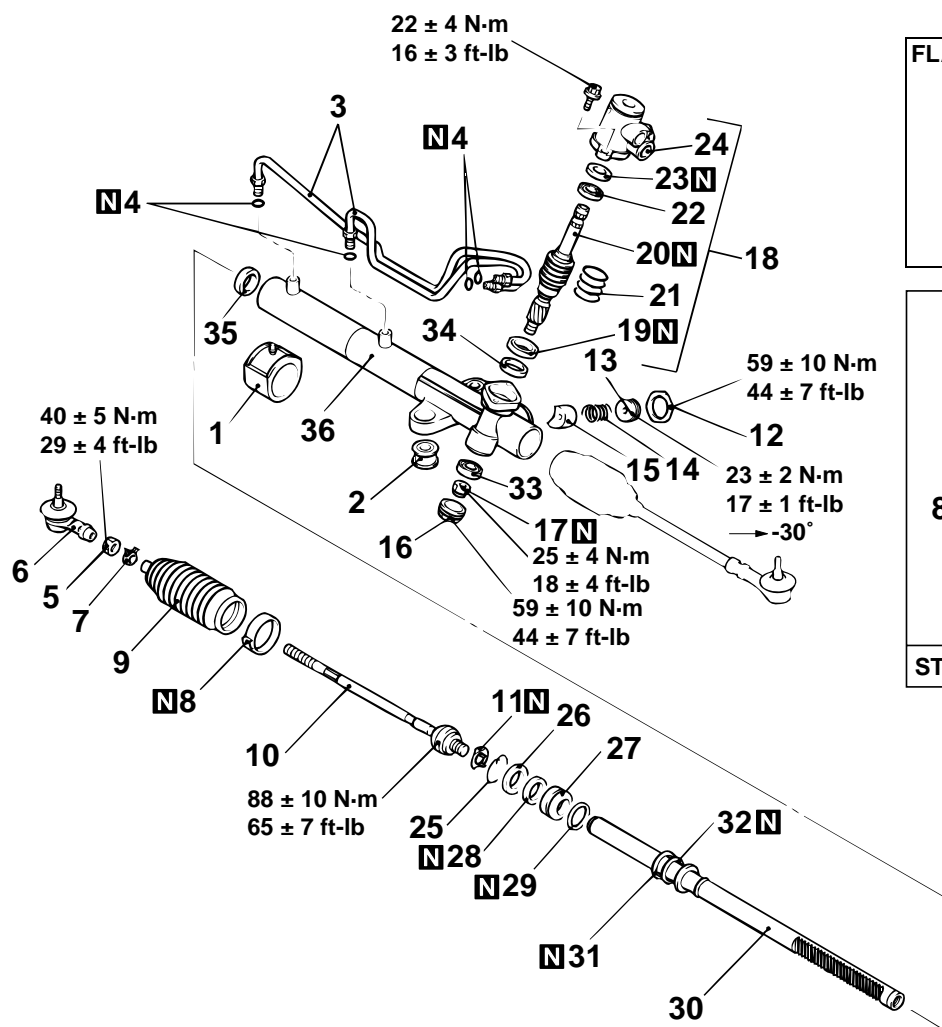
TIE ROD END BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with your finger.
2. If the dust cover is cracked or damaged, replace the tie rod end. (Refer to [P.37A-33](#).)

NOTE: Cracks or damage of the dust cover may damage the ball joint. If it is damaged during service work, replace the dust cover. (Refer to [P.37A-45](#).)

DISASSEMBLY AND ASSEMBLY

M1372011100245



AC100244 AB

DISASSEMBLY STEPS

- >>O<< 1. GEAR MOUNTING RUBBER CUSHION
2. GEAR HOUSING MOUNTING BUSHING
3. FEED PIPE
4. O-RING
>>N<< 5. LOCK NUT
>>N<< 6. TIE ROD END
7. CLIP
>>M<< 8. BAND
9. BELLOWS
>>L<< 10. TIE ROD
>>L<< 11. TAB WASHER
>>K<< • TOTAL PINION TORQUE ADJUSTMENT

>>J<< 12. JAM NUT
<<A>> >>J<< 13. RACK SUPPORT COVER
14. SUPPORT SPRING
15. RACK SUPPORT
>>I<< 16. END PLUG

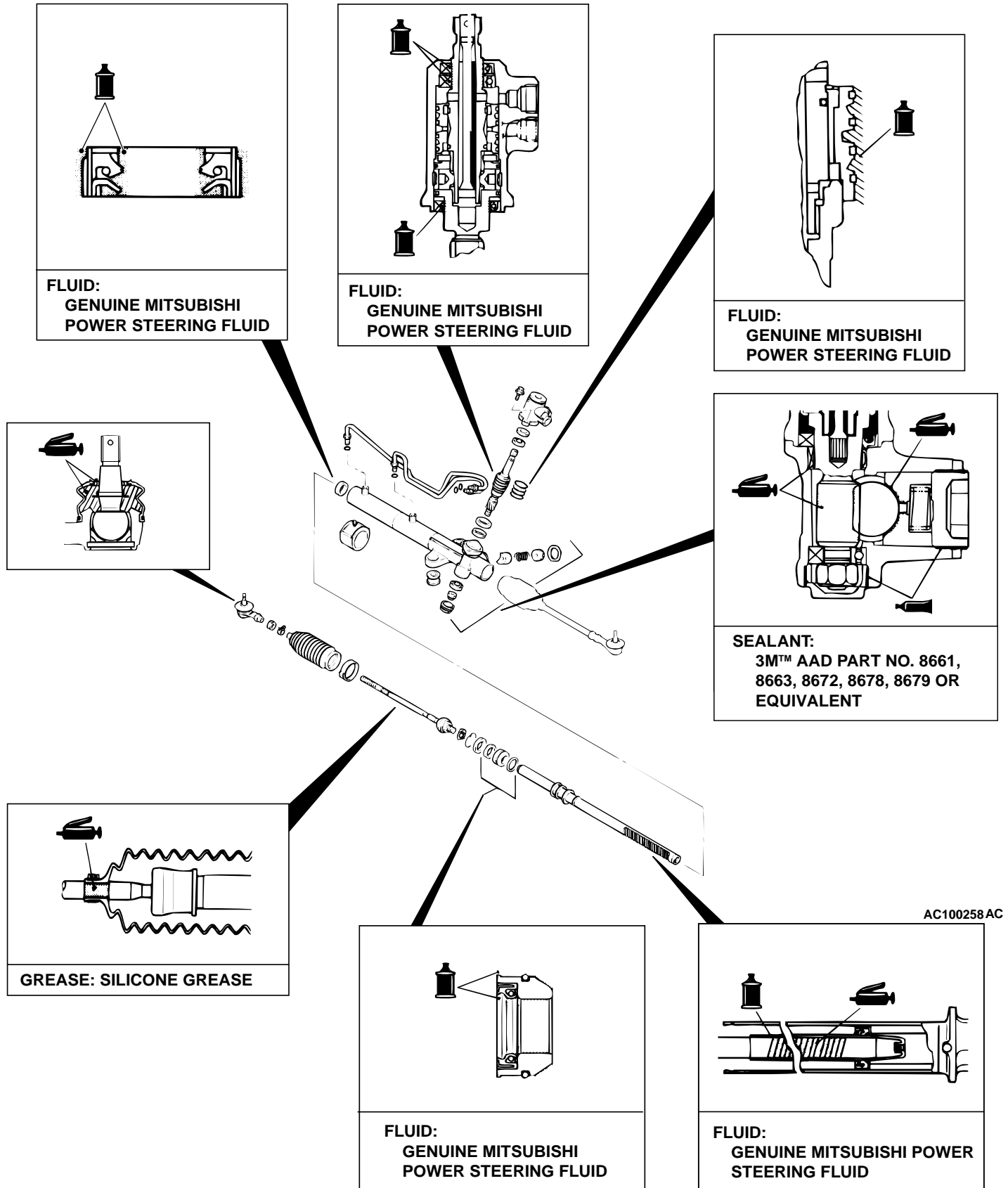
DISASSEMBLY STEPS (Continued)

17. JAM NUT
18. VALVE HOUSING ASSEMBLY
<> >>H<< 19. LOWER OIL SEAL
<> 20. PINION AND VALVE ASSEMBLY
<<C>> >>G<< 21. SEAL RING
<<D>> >>F<< 22. UPPER BEARING
<<D>> >>F<< 23. UPPER OIL SEAL
24. VALVE HOUSING
<<E>> >>E<< 25. CIRCLIP
<<F>> 26. RACK STOPPER
<<F>> >>D<< 27. RACK BUSHING
<<F>> >>D<< 28. OIL SEAL
<<F>> >>D<< 29. O-RING
<<F>> >>C<< 30. RACK ASSEMBLY
<<C>> 31. SEAL RING
32. O-RING
<<G>> >>B<< 33. LOWER BEARING
<<H>> >>B<< 34. NEEDLE BEARING
<<I>> >>A<< 35. OIL SEAL
36. GEAR HOUSING

Required Special Tools:

- MB990776: Front Axle Base
- MB990927: Installer Adapter
- MB990938: Bar (Snap-in type)
- MB990939: Brass Bar
- MB990941: Torque Tube Bearing Installer
- MB991006: Preload Socket
- MB991120: Needle Bearing Puller
- MB991152: Dust Cover Installer
- MB991197: Bar (Long type)
- MB991199: Oil Seal Installer
- MB991202: Oil Seal and Bearing Installer
- MB991203: Oil Seal and Bearing Installer
- MB991204: Torque Wrench Socket
- MB991212: Rack Installer
- MB991317: Seal Ring Installer
- MB991561: Boot Band Crimping Tool
- MB991621: Piston Driver

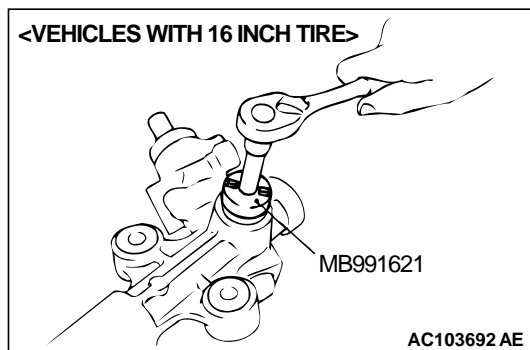
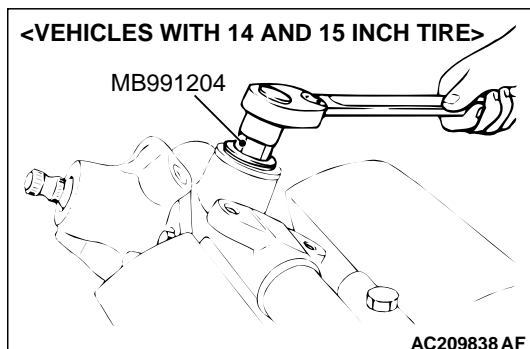
LUBRICATION AND SEALING POINTS



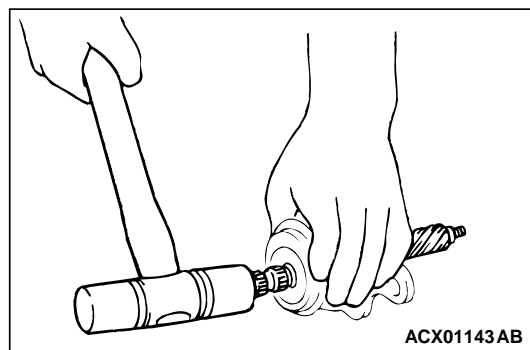
DISASSEMBLY SERVICE POINTS**<<A>> RACK SUPPORT COVER REMOVAL**

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

- MB991204: Torque Wrench Socket <Vehicles with 14 and 15 inch tire>
- MB991621: Piston Driver <Vehicles with 16 inch tire>

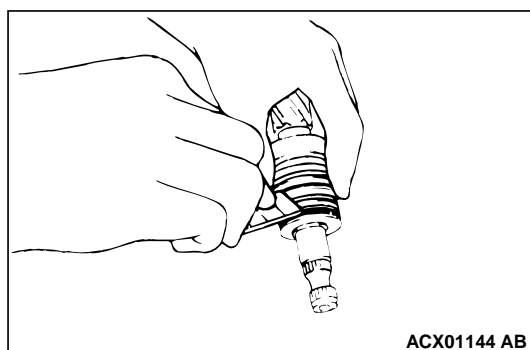
**<> LOWER OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL**

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

**<<C>> SEAL RING REMOVAL****⚠ CAUTION**

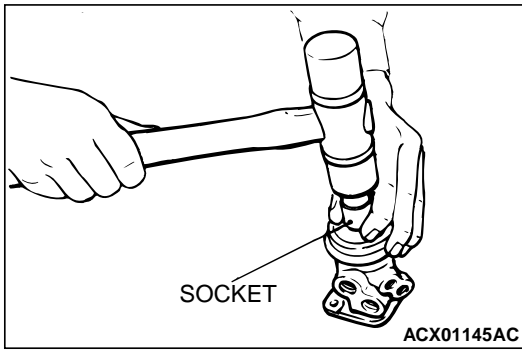
When cutting the seal ring, be careful not to damage the pinion and valve assembly or the rack.

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



<<D>> UPPER BEARING/UPPER OIL SEAL REMOVAL

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

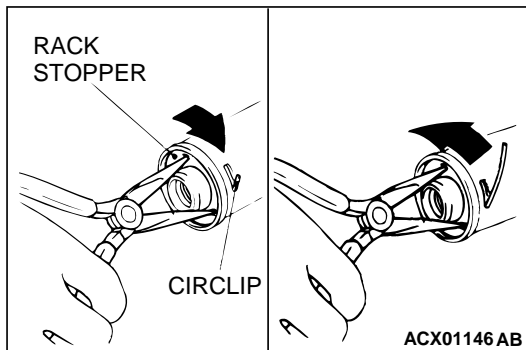


<<E>> CIRCLIP REMOVAL

⚠ CAUTION

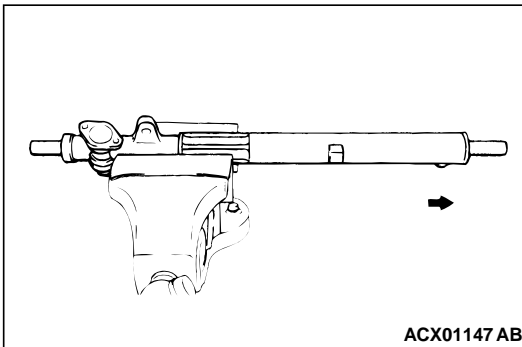
If the rack stopper is first turned counterclockwise, the circlip will get caught in the slot in the housing and the rack stopper will not turn.

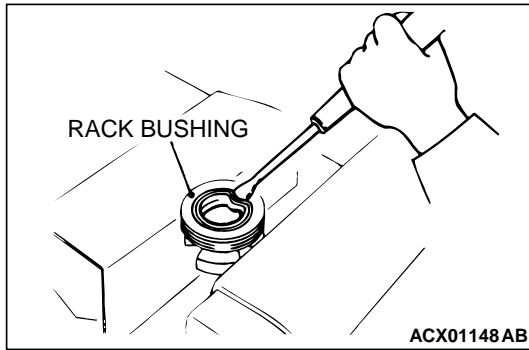
1. Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
2. Turn the rack stopper counterclockwise to remove the circlip.



<<F>> RACK STOPPER/RACK BUSHING/OIL SEAL/O-RING/RACK ASSEMBLY REMOVAL

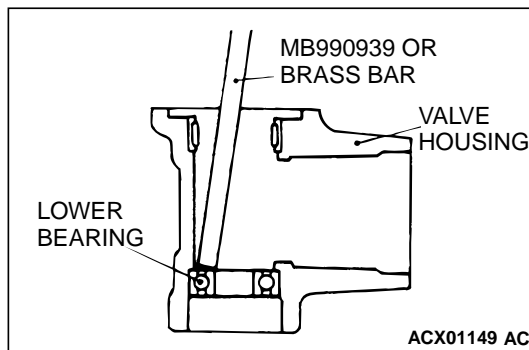
1. Pull out the rack slowly. Take out the rack stopper and the rack bushing at the same time.



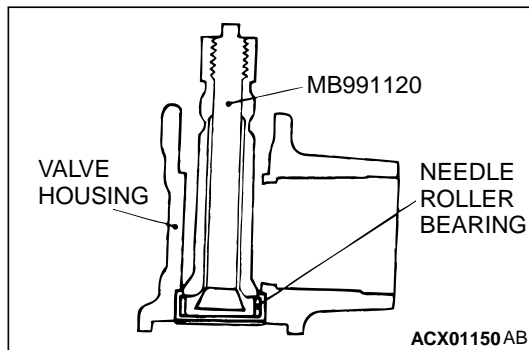
**⚠ CAUTION**

Do not damage the oil seal press fitting surface.

2. Partially bend the oil seal and remove it from the rack bushing.

**<<G>> LOWER BEARING REMOVAL**

Use a brass bar or special tool MB990939 to remove the ball bearing from the gear housing.

**<<H>> NEEDLE BEARING REMOVAL****⚠ CAUTION**

Do not open special tool MB991120 excessively to prevent damaging housing interior.

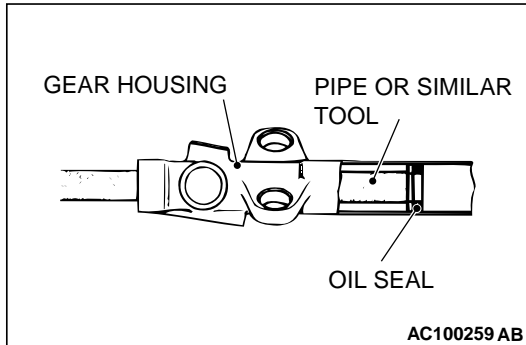
Use special tool MB991120 to remove the needle roller bearing from the rack housing.

<<I>> OIL SEAL REMOVAL

CAUTION

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

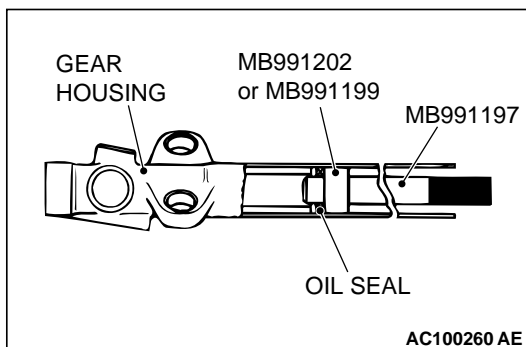
Use a piece of pipe or similar tool to remove the oil seal from the gear housing.



ASSEMBLY SERVICE POINTS

>>A<< OIL SEAL INSTALLATION

1. Apply a coating of GENUINE MITSUBISHI POWER STEERING FLUID to the both sides of the oil seal.
2. Using the following special tools, press the oil seal into the rack housing.
 - MB991197: Bar (long type)
 - MB991199: Oil Seal Installer <Vehicles with 16 inch tire>
 - MB991202: Oil Seal and Bearing Installer <Vehicles with 14 and 15 inch tire>



>>B<< NEEDLE BEARING/LOWER BEARING INSTALLATION

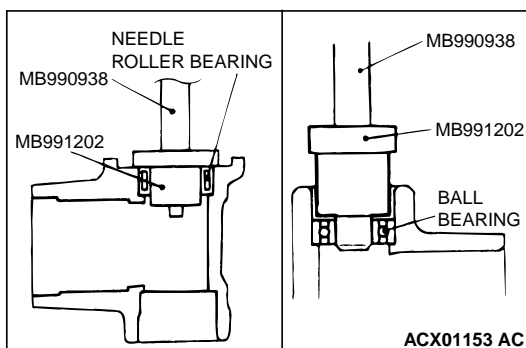
1. Apply GENUINE MITSUBISHI POWER STEERING FLUID to housing, bearing and oil seal press fitting surface.

CAUTION

Press-fit straight. The valve housing is aluminum, and may become deformed if press-fit on an angle.

2. Press fit needle bearing/lower bearing with the following special tools.

- MB990938: Bar (snap-in type)
- MB991202: Oil Seal and Bearing Installer

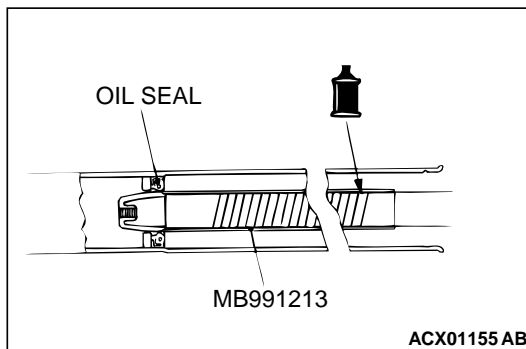
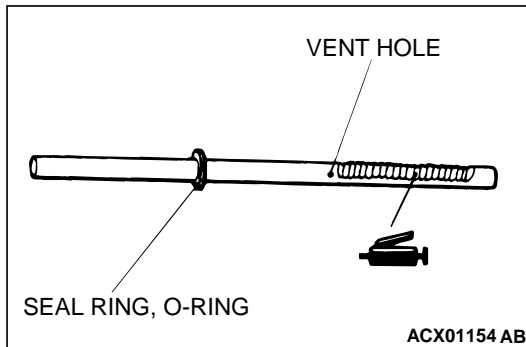


>>C<< RACK ASSEMBLY INSTALLATION

⚠ CAUTION

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

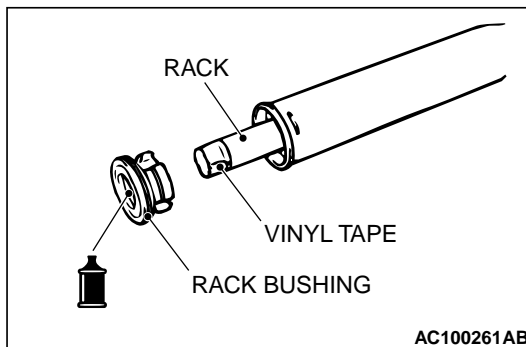
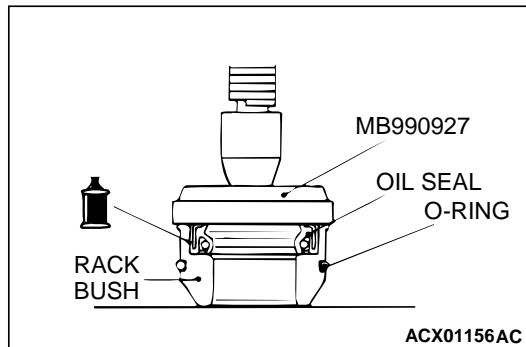
1. Apply a coating of multipurpose grease to the rack teeth face.



2. Cover rack serrations with special tool MB991213.
3. Apply GENUINE MITSUBISHI POWER STEERING FLUID to special tool MB991213.
4. Align the center of the oil seal with the rack to prevent the retainer spring from slipping. Slowly insert the rack from power cylinder side.

>>D<< OIL SEAL/RACK BUSHING INSTALLATION

1. Apply GENUINE MITSUBISHI POWER STEERING FLUID to the outer surface of the oil seal. Using the special tool MB990927, press in the oil seal until it is flush with the bushing end face.



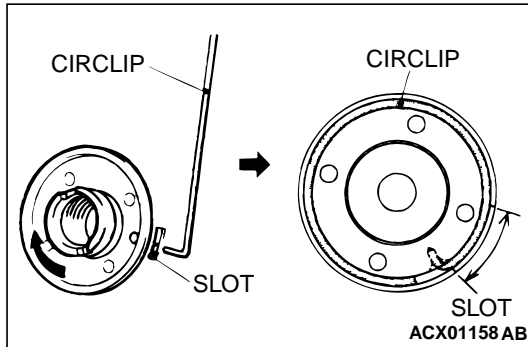
2. Apply GENUINE MITSUBISHI POWER STEERING FLUID to the oil seal inner surface and the O-ring.
3. Wrap the rack end with plastic tape, and push the rack bushing onto the rack.

>>E<< CIRCLIP INSTALLATION

⚠ CAUTION

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

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

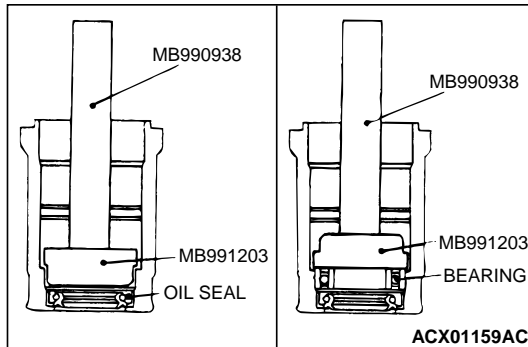


>>F<< UPPER OIL SEAL/UPPER BEARING INSTALLATION

Apply a coating of GENUINE MITSUBISHI POWER STEERING FLUID to the outside of the upper oil seal/upper bearing.

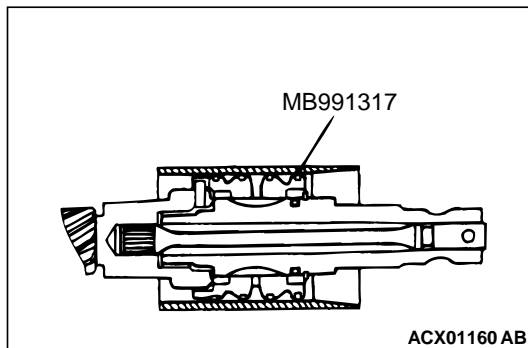
Using special tools MB990938 and MB991203, press the upper oil seal/upper bearing into the valve housing.

- MB990938: Bar (Snap-in type)
- MB991203: Oil Seal and Bearing Installer



>>G<< SEAL RING INSTALLATION

Because the seal rings expand after installation, tighten after installing by using special tool MB991317 to compress the rings, or press down by hand.

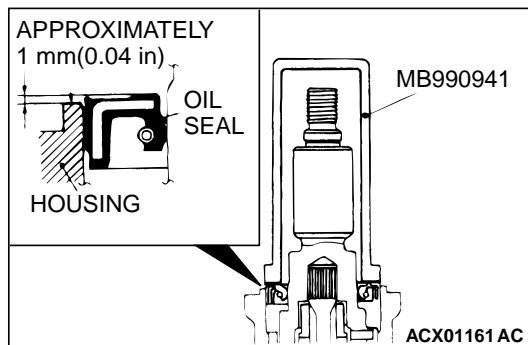


>>H<< OIL SEAL INSTALLATION

⚠ CAUTION

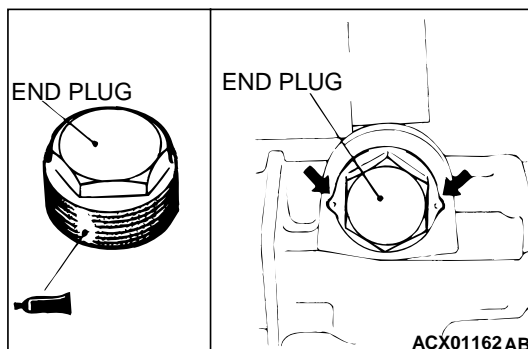
To eliminate a seal malfunction at the valve housing alignment surface, the upper surface of the oil seal should project outward approximately 1 mm (0.04 inch) from the housing edge surface.

Using special tool MB990941, press the oil seal into the valve housing.



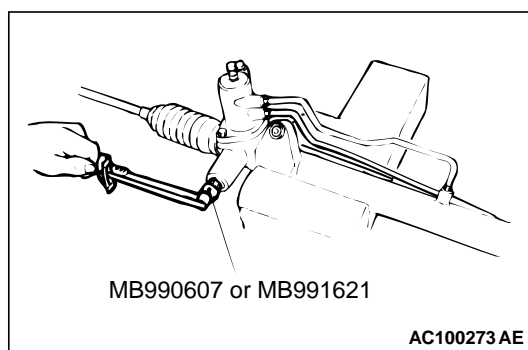
>>I<< END PLUG INSTALLATION

1. Apply 3M™ AAD Part number 8661, 8663, 8672, 8678, 8679 or equivalent to the threaded part of the end plug.
2. Secure the threaded portion of the end plug at two places by using a punch.



>>J<< RACK SUPPORT COVER/JAM NUT INSTALLATION

1. Position the rack at its center.
2. Apply 3M™ AAD Part number 8661, 8663, 8672, 8678, 8679 or equivalent to the threaded part of the rack support cover.
3. Use special tool MB991204 to tighten the rack support cover to 23 ± 2 N·m (17 ± 1 ft-lb).
 - MB990607: Torque Wrench Socket <Vehicles with 14 and 15 inch tire>
 - MB991621: Piston Driver <Vehicles with 16 inch tire>
4. Turn the rack support cover 30 degree angle counterclockwise.
5. Use special tool MB991204 to hold the rack support cover, and then tighten the jam nut to 59 ± 10 N·m (44 ± 7 ft-lb).



>>K<< TOTAL PINION TORQUE ADJUSTMENT

⚠ CAUTION

- Be sure there is no ratcheting or catching when operating the rack towards the shaft.
- Measure the total pinion torque through the whole stroke of the rack.

1. Using special tool MB991006, rotate the pinion shaft at the rate of one rotation in four to six seconds to check the total pinion torque and the change in torque.

Standard value:

0.6 – 1.6 N·m (5.3 – 14.2 in-lb) <Vehicles with 14 and 15 inch tire>

0.7 – 2.1 N·m (6.2– 18.6 in-lb) <Vehicles with 16 inch tire>

[Change in torque:]

0.4 N·m (3.5 in-lb) or less <Vehicles with 14 and 15 inch tire>

0.6 N·m (5.3 in-lb) or less <Vehicles with 16 inch tire>

⚠ CAUTION

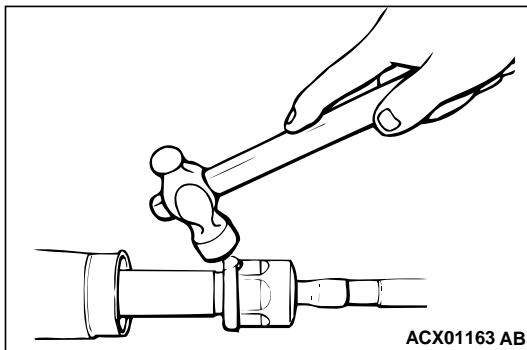
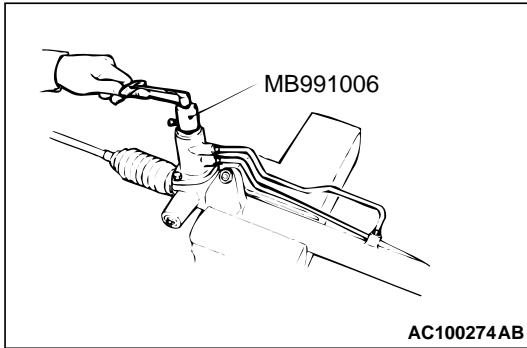
When adjusting, set at the highest value of the standard value range.

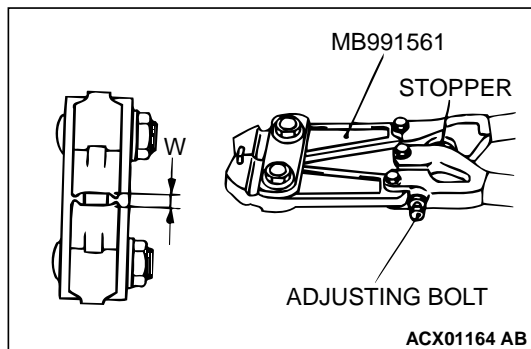
2. If the total pinion torque or the change in torque is outside the standard value, move the rack support cover 0 – 30 degree angle, and adjust the pinion torque again.

NOTE: If the total pinion torque 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 tab washer end (two locations) to tie rod notch.



**>>M<< BELLOWS BAND INSTALLATION**

1. Turn the adjusting bolt of special tool MB991561 to adjust the opening dimension (W) to the standard value.

NOTE: The dimension (W) is adjusted by approximately 0.7 mm (0.03 inch) per one turn.

NOTE: Do not turn the adjusting bolt more than one turn.

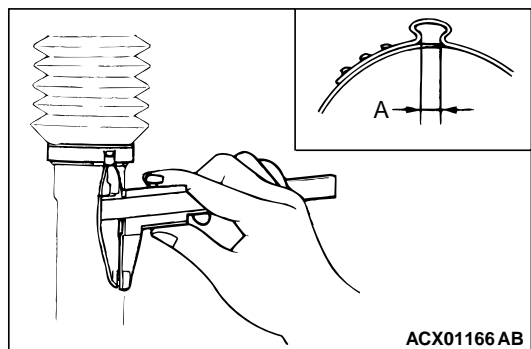
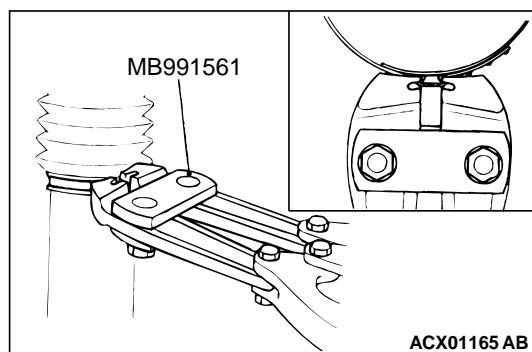
Standard value (W): 2.9 mm (0.11 inch)

<When more than 2.9 mm (0.11 inch)>: Screw in the adjusting bolt.

<When less than 2.9 mm (0.11 inch)>: Loosen the adjusting bolt.

⚠ CAUTION

- Hold the rack housing, and use special tool to crimp the bellows band securely.
 - Crimp the bellows band until touches the stopper.
2. Use special tool MB991561 to crimp the bellows band.



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

Standard value (A): 2.4 – 2.8 mm (0.09 – 0.11 inch)

<When more than 2.8 mm (0.11 inch)>: Readjust the dimension (W) of step (1) to the value calculated by the following equation, and repeat step (2).

$W = 5.5 \text{ mm (0.22 inch)} - A$ [Example: if (A) is 2.9 mm (0.11 inch), (W) is 2.6 mm (0.10 inch).]

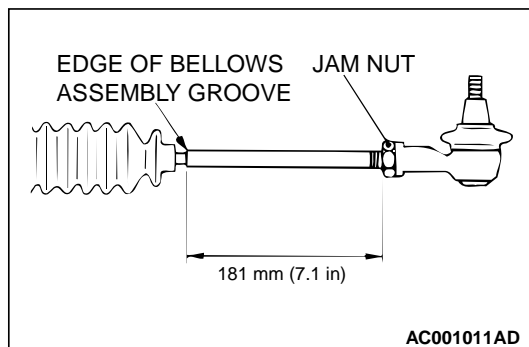
<When less than 2.4 mm (0.09 inch)>: Remove the bellows band, readjust the dimension (W) of step (1) to the value calculated by the following equation, and use a new bellows band to repeat steps (2) to (3).

$W = 5.5 \text{ mm (0.22 inch)} - A$ [Example: if (A) is 2.3 mm (0.09 inch), (W) is 3.2 mm (0.13 inch).]

>>N<< TIE ROD END/TIE ROD END JAM NUT INSTALLATION

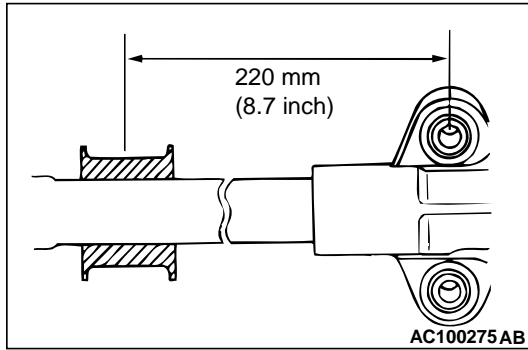
Screw in the tie rod end to achieve the right and left length as illustrated. Lock with the jam nut.

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



>>O<< GEAR MOUNTING RUBBER INSTALLATION

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



TIE ROD END BALL JOINT DUST COVER REPLACEMENT

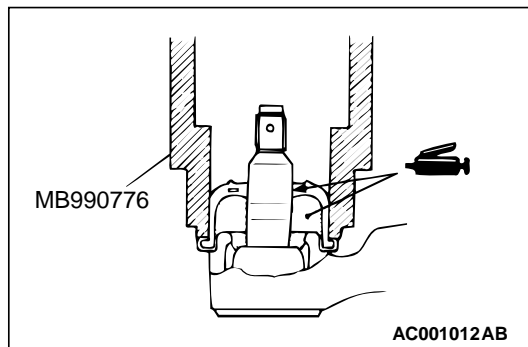
M1372008200361

Required Special Tool:

- MB990776: Front Axle Base

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

1. Apply multipurpose grease SAE J310, NLGI No.2 or equivalent to the lip and inside of the dust cover.
2. Drive in the dust cover with special tool MB990776 until it is fully seated.
3. Check the dust cover for cracks or damage by pushing it with your finger.



POWER STEERING OIL PUMP ASSEMBLY**REMOVAL AND INSTALLATION**

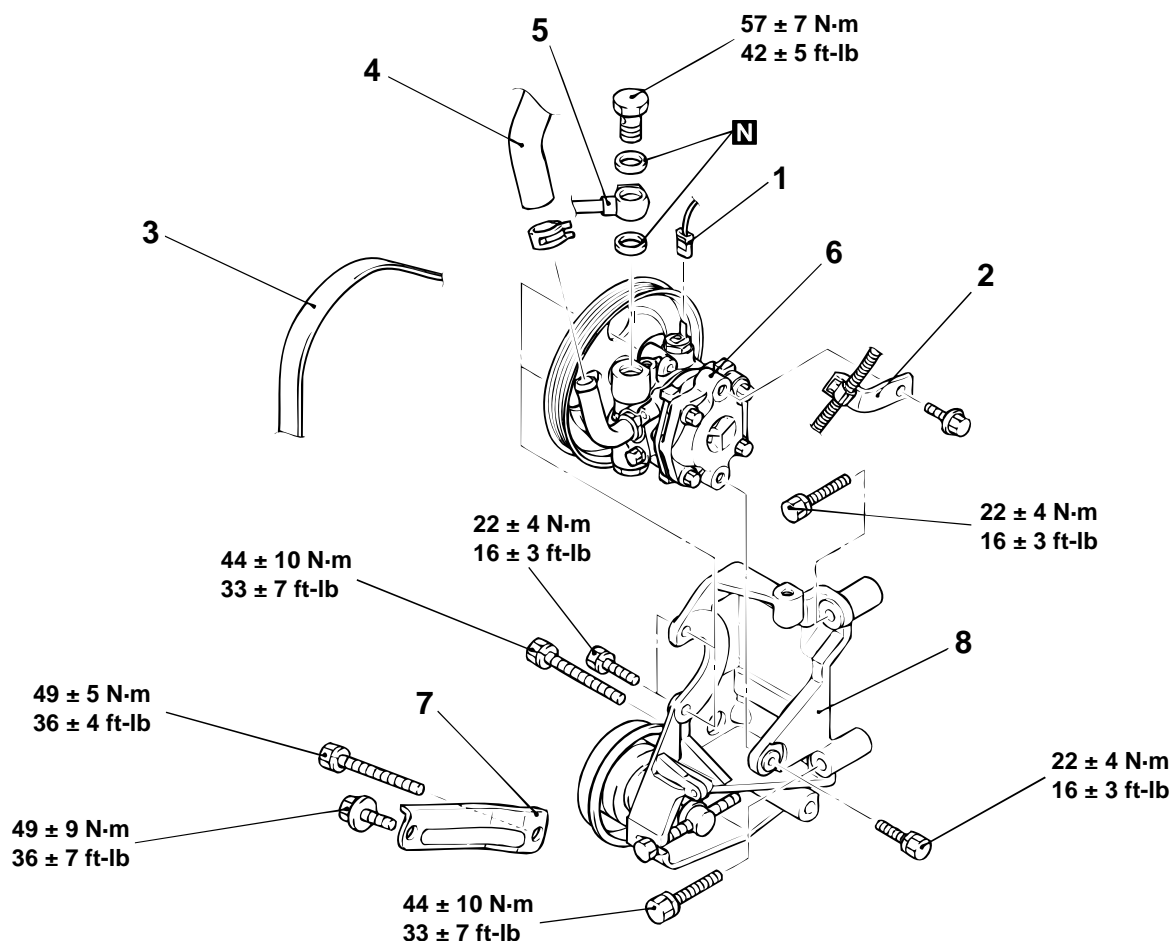
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<2.0L ENGINE>**Pre-removal Operation**

- Power Steering Fluid Draining (Refer to [P.37A-19.](#))

Post-installation Operation

- Power Steering Fluid Supplying and Bleeding (Refer to [P.37A-20.](#))
- Drive Belt Tension Adjusting (Refer to GROUP 00, Maintenance Service – Drive Belts [P.00-45.](#))



AC100395 AB

REMOVAL STEPS

1. PRESSURE SWITCH CONNECTOR
2. A/C COMPRESSURE HARNESS CONNECTOR BRACKET
3. DRIVE BELT (REFER TO GROUP 11A, ENGINE ASSEMBLY [P.11A-20.](#))
- >>A<< 4. SUCTION HOSE

<<A>>

REMOVAL STEPS (Continued)

5. PRESSURE HOSE
6. OIL PUMP ASSEMBLY
7. POWER STEERING PUMP BRACKET STAY
8. POWER STEERING PUMP BRACKET

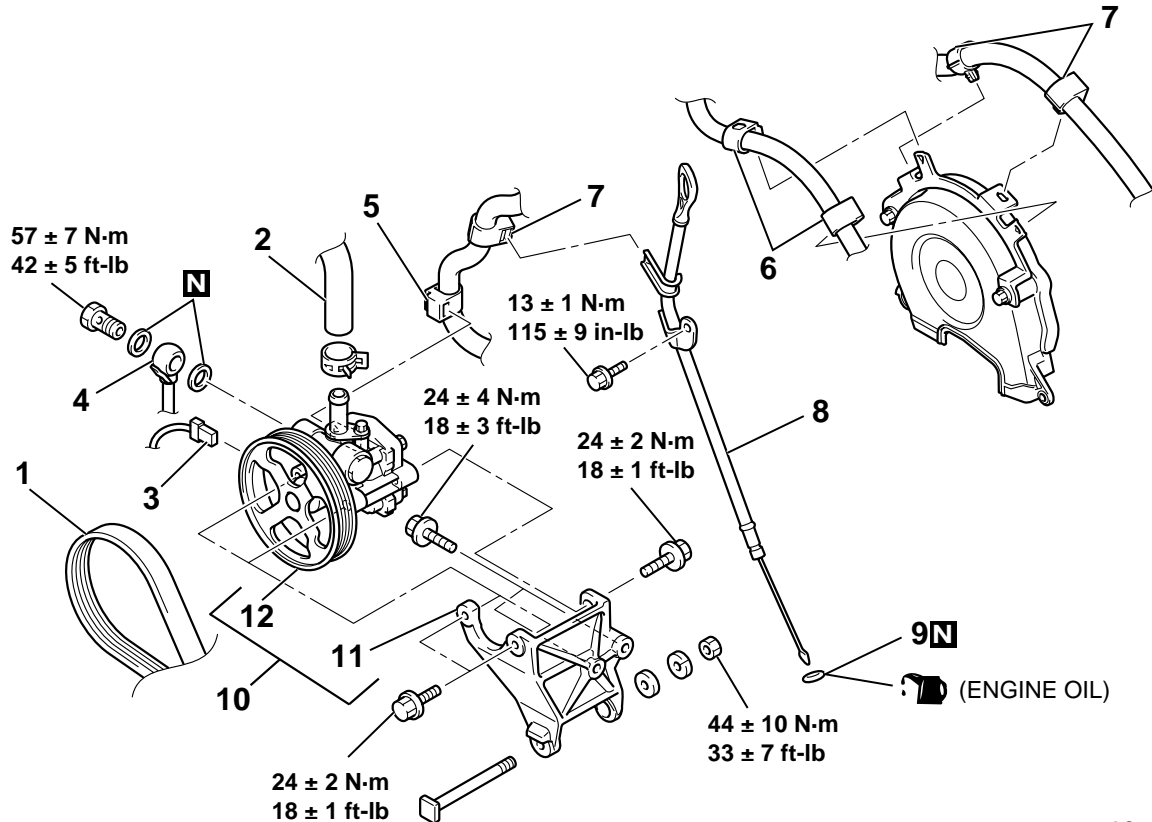
<2.4L ENGINE>

Pre-removal Operation

- Power Steering Fluid Draining (Refer to [P.37A-19](#)).

Post-installation Operation

- Power Steering Fluid Supplying and Bleeding (Refer to [P.37A-20](#)).
- Drive Belt Tension Adjusting (Refer to GROUP 00, Maintenance Service – Drive Belts [P.00-45](#)).



AC305528AC

REMOVAL STEPS

1. DRIVE BELT (REFER TO GROUP 11C, ENGINE ASSEMBLY [P.11C-17](#).)
- >>A<< 2. SUCTION HOSE
3. PRESSURE SWITCH CONNECTOR
4. PRESSURE HOSE
5. POWER STEERING OIL PRESSURE SENSOR HARNESS CLAMP
6. CONTROL WIRING HARNESS CLAMP

<<A>>

REMOVAL STEPS (Continued)

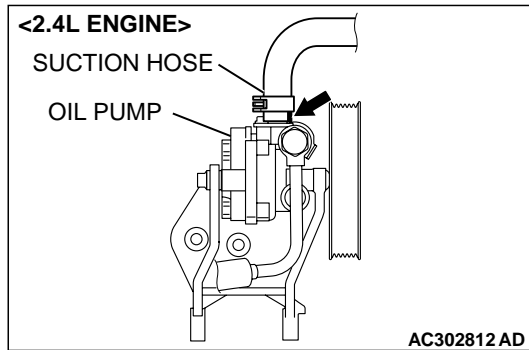
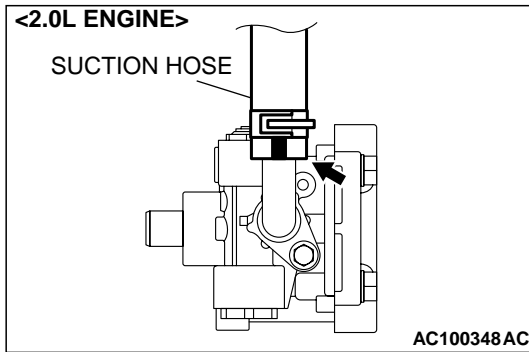
7. BATTERY WIRING HARNESS CLUMP
8. ENGIN OIL DIPSTICK AND DIPSTICK GUIDE
9. O-RING
10. OIL PUMP AND BRACKET ASSMBLY
11. BRACKET
12. OIL PUMP ASSEMBLY

REMOVAL SERVICE POINT**<<A>> OIL PUMP ASSEMBLY REMOVAL**

With the engine lifted by the jack, remove the oil pump assembly mounting bolt (lower side) at the pulley side.

INSTALLATION SERVICE POINT**>>A<< SUCTION HOSE INSTALLATION**

Install the suction hose so that the marking is positioned as shown in the illustration.

**INSPECTION**

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Check the drive belt for cracks.

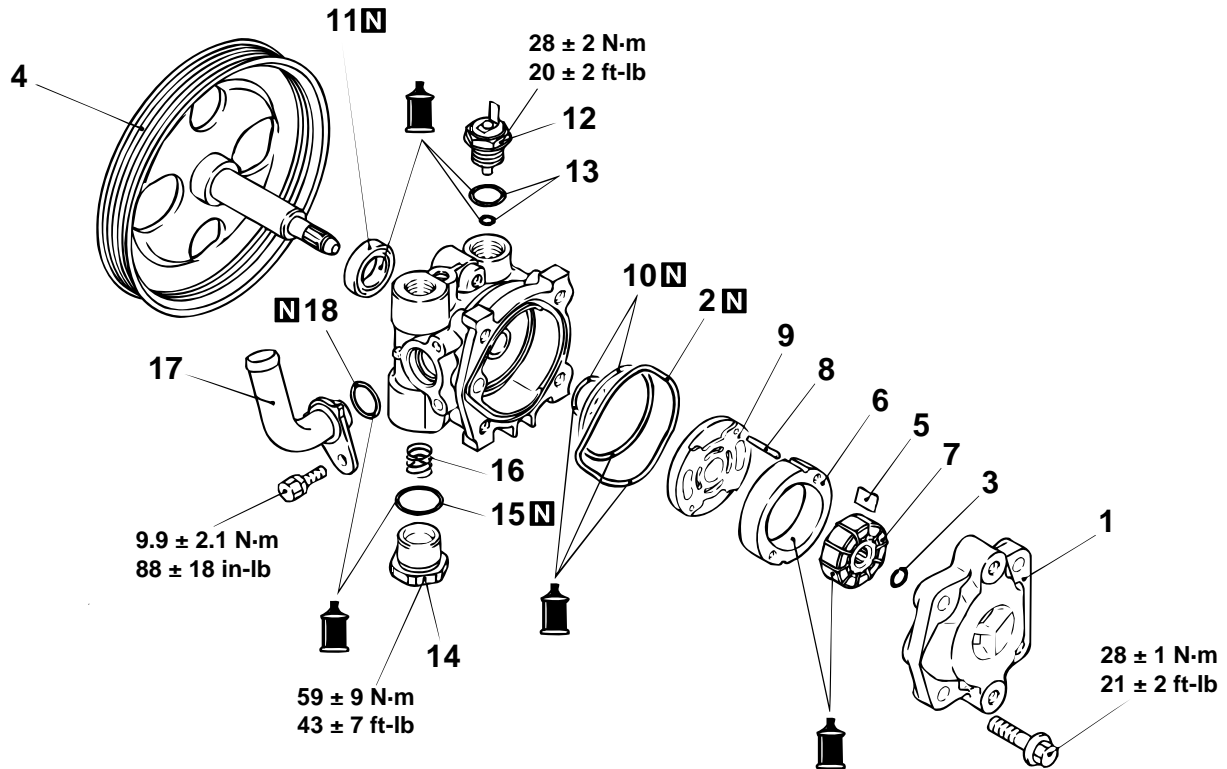
Check the driveshaft assembly for uneven rotation.

DISASSEMBLY AND ASSEMBLY

⚠ CAUTION

Never disassemble the terminal assembly. It cannot be reassembled.

<2.0L ENGINE>



: GENUINE MITSUBISHI POWER STEERING FLUID

AC100143 AG

OIL PUMP SEAL KIT	OIL PUMP CARTRIDGE KIT	OIL PUMP PULLEY AND SHAFT KIT

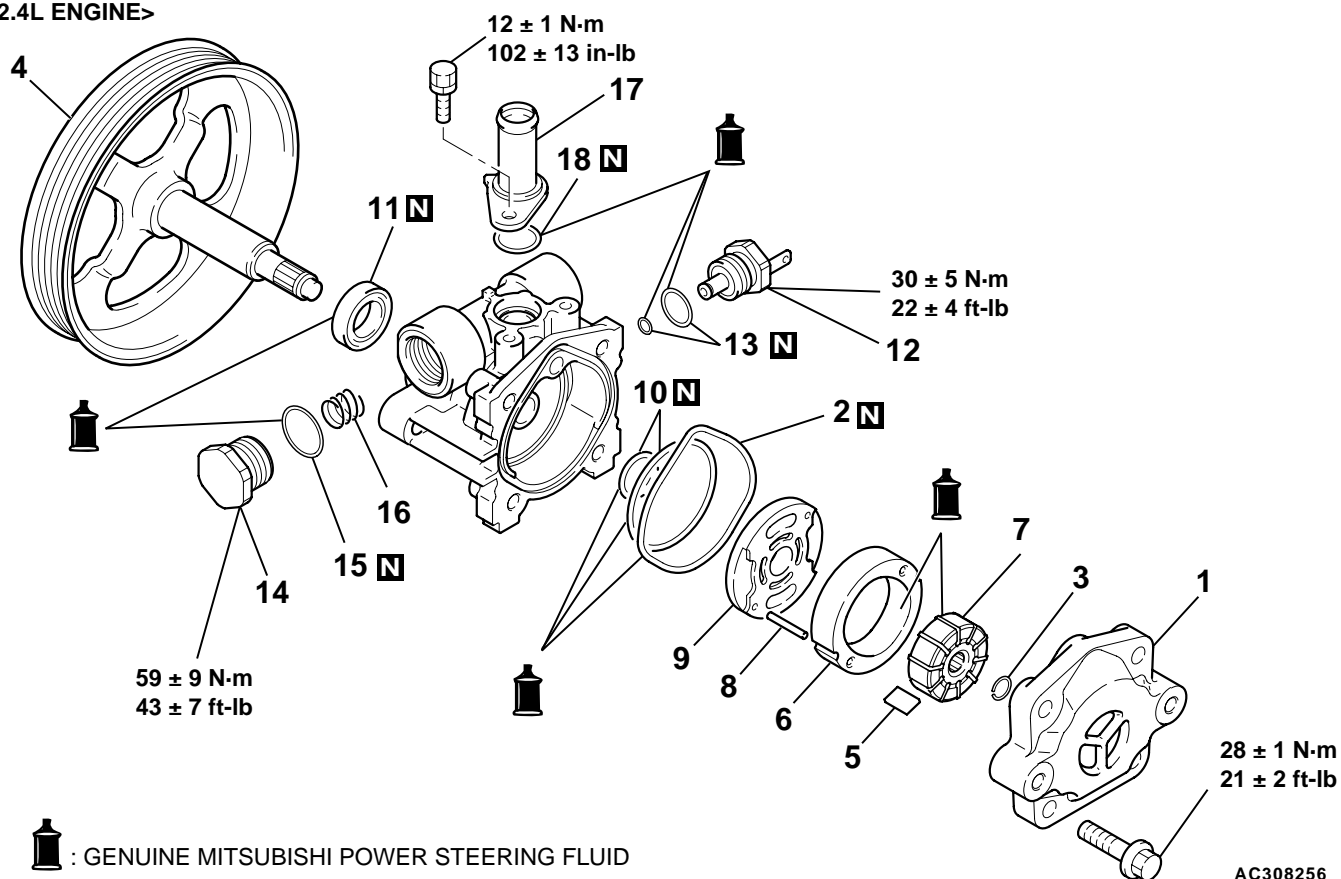
DISASSEMBLY STEPS

1. PUMP COVER
2. O-RING
3. SNAP RING
4. PULLEY AND SHAFT
5. VANES
- >>C<< 6. CAM RING
7. ROTOR
8. PIN
9. SIDE PLATE

DISASSEMBLY STEPS (Continued)

- >>A<< 10. O-RING
- >>B<< 11. OIL SEAL
12. TERMINAL ASSEMBLY
- >>A<< 13. O-RING
14. PLUG ASSEMBLY
- >>A<< 15. O-RING
16. FLOW CONTROL SPRING
17. SUCTION CONNECTOR
- >>A<< 18. O-RING

<2.4L ENGINE>



<p>AC308255</p>	<p>AC308254</p>	<p>AC308253</p>
OIL PUMP PULLEY AND SHAFT KIT	OIL PUMP CARTRIDGE KIT	OIL PUMP SEAL KIT

AC308851AC

DISASSEMBLY STEPS

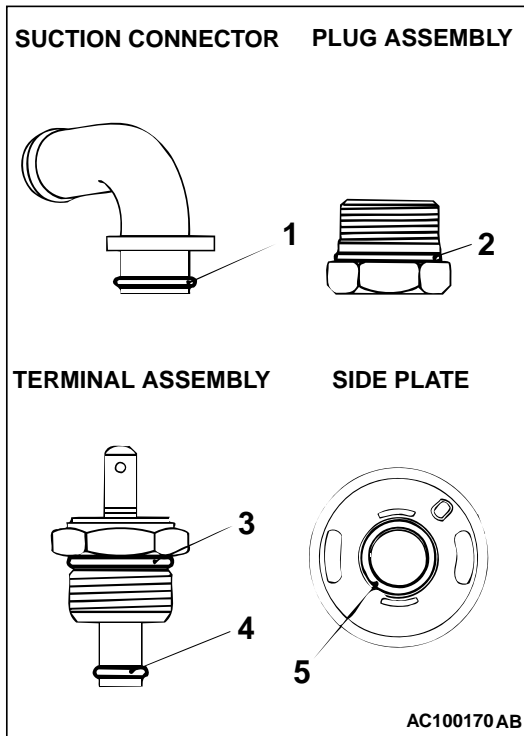
1. PUMP COVER
2. O-RING
3. SNAP RING
4. PULLEY AND SHAFT
5. VANES
- >>C<< 6. CAM RING
7. ROTOR
8. PIN
9. SIDE PLATE

DISASSEMBLY STEPS (Continued)

- >>A<< 10. O-RING
- >>B<< 11. OIL SEAL
12. TERMINAL ASSEMBLY
- >>A<< 13. O-RING
14. PLUG ASSEMBLY
- >>A<< 15. O-RING
16. FLOW CONTROL SPRING
17. SUCTION CONNECTOR
- >>A<< 18. O-RING

ASSEMBLY SERVICE POINTS

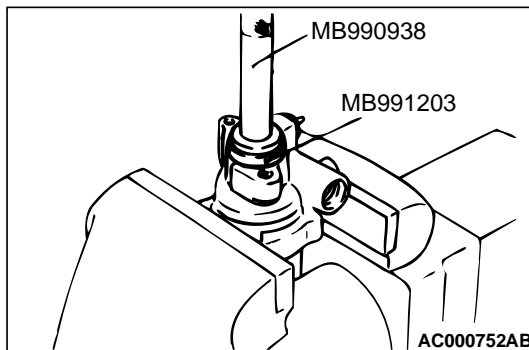
>>A<< O-RING INSTALLATION



NO.	ID × WIDTH mm (in)
1	15.8 × 2.4 (0.62 × 0.09)
2	21.0 × 1.9 (0.83 × 0.07)
3	14.8 × 2.4 (0.58 × 0.09)
4	3.8 × 1.9 (0.15 × 0.07)
5	14.8 × 1.9 (0.58 × 0.07)

>>B<< OIL SEAL INSTALLATION

Use special tool MB991203 and MB990938 to install the oil seal.

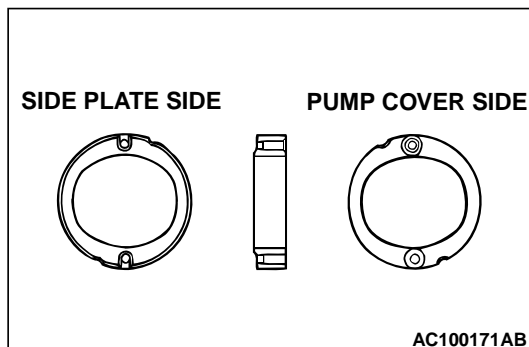


>>C<< CAM RING INSTALLATION

⚠ CAUTION

Be sure to install the cam ring in the correct direction as shown.

Install the cam ring as shown in the illustration.



INSPECTION

M1372005500222

- Check the valve subassembly for clogging.
- Check the driveshaft assembly for wear or damage.
- Check the rotor and vane groove 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 <2.0L>

M1372005700475

⚠ WARNING

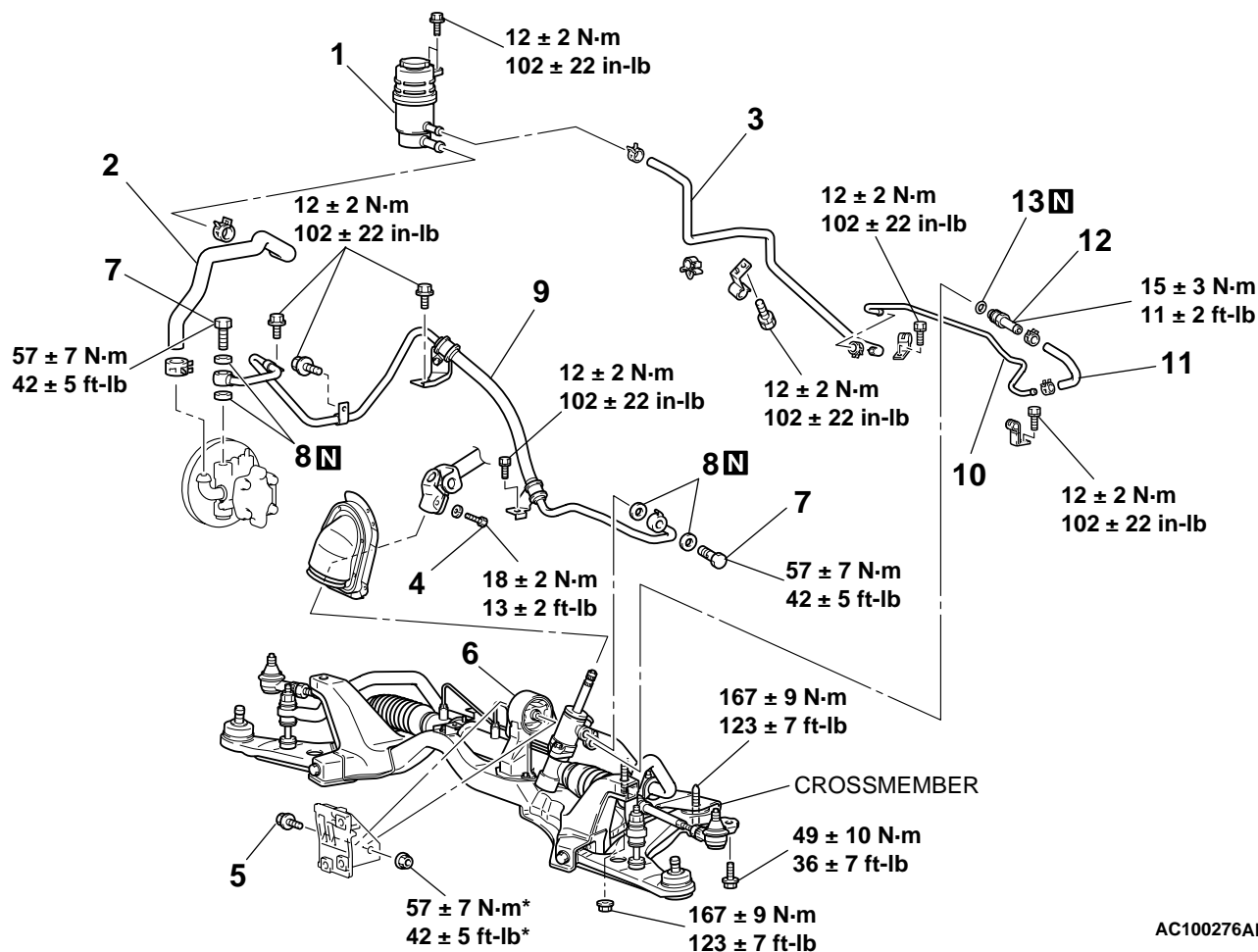
Before removing the steering gear box, refer to GROUP 52B. Center the front wheels and remove the ignition key. Failure to do so may damage the SRS clock spring and render the SRS system inoperative, risking serious injury.

⚠ CAUTION

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

Pre-removal and Post-installation Operation

- Power Steering Fluid Draining and Refilling (Refer to P.37A-19.)



AC100276AD

REMOVAL STEPS

1. OIL RESERVOIR
- >>C<< 2. SUCTION HOSE
- >>B<< 3. RETURN HOSE
 - CLOCK SPRING (REFER TO GROUP 52B, AIR BAG MODULES AND CLOCK SPRING [P.52B-205.](#))
 - CENTER MEMBER (REFER TO GROUP 32, ENGINE ROLL STOPPER AND CENTRE MEMBER REMOVAL AND INSTALLATION [P.32-7.](#)) <<A>>
 - FRONT EXHAUST PIPE (REFER TO GROUP 15, EXHAUST MANIFOLD REMOVAL AND INSTALLATION [P.15-13.](#)) <<A>>
4. STEERING GEAR AND JOINT CONNECTING BOLT

REMOVAL STEPS (Continued)

5. REAR ROLL STOPPER CONNECTING BOLT
6. REAR ROLL STOPPER (REFER TO GROUP 32, ENGINE ROLL STOPPER AND CENTRE MEMBER REMOVAL AND INSTALLATION [P.32-7.](#))
7. EYE BOLT
8. GASKET
9. PRESSURE HOSE ASSEMBLY
10. RETURN TUBE
- >>A<< 11. RETURN HOSE
12. RETURN TUBE
13. O-RING

REMOVAL SERVICE POINTS

<<A>> EYE BOLT/RETURN TUBE REMOVAL

1. Loosen the crossmember mounting bolts and nuts, and lower the crossmember to a position so that the eye bolts or return tube at the steering gear side can be removed.

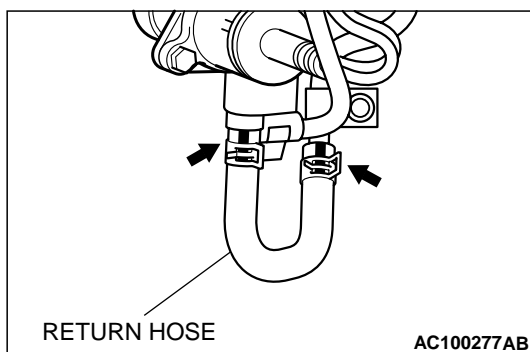
NOTE: In this case, do not remove the crossmember mounting bolts and nuts.

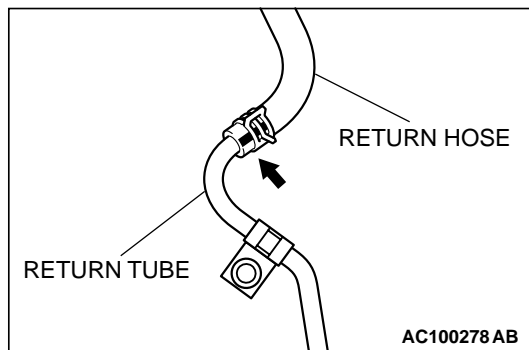
2. Remove the eye bolts or return tube.

INSTALLATION SERVICE POINTS

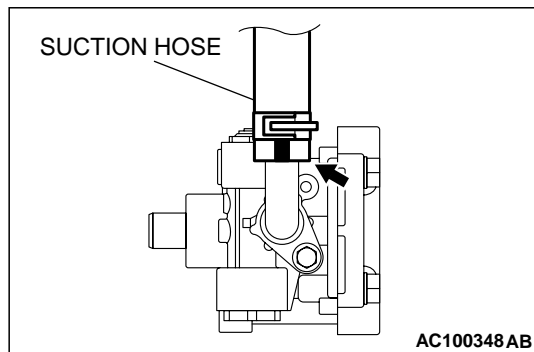
>>A<< RETURN HOSE INSTALLATION

Install the return hose so that the marking is positioned as shown in the illustration.



**>>B<< RETURN HOSE INSTALLATION**

Install the return hose so that the marking is positioned as shown in the illustration.

**>>C<< SUCTION HOSE INSTALLATION**

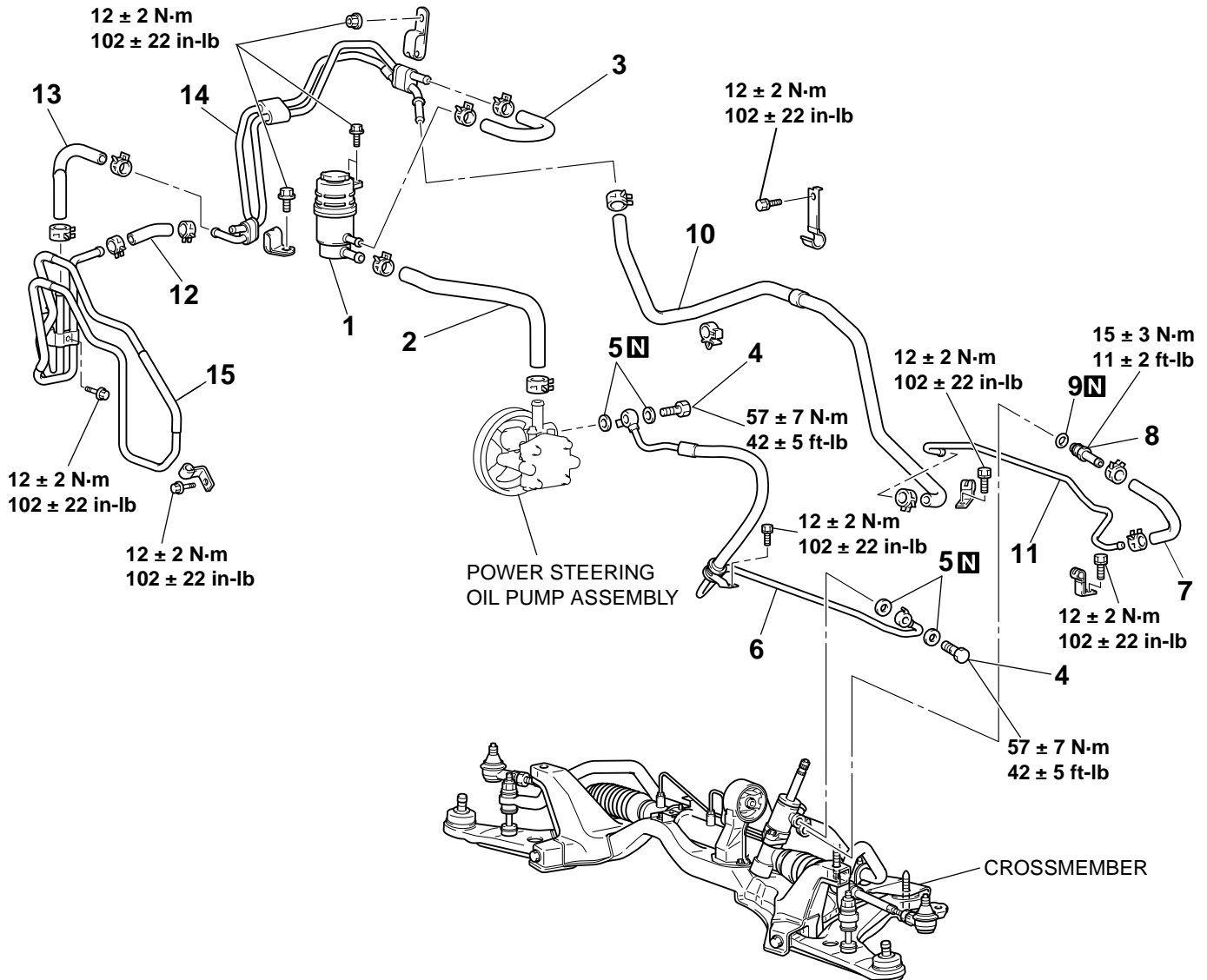
Install the suction hose so that the marking is positioned as shown in the illustration.

REMOVAL AND INSTALLATION <2.4L ENGINE>

M1372005700464

Pre-removal and Post-installation Operation

- Power Steering Fluid Draining and Refilling (Refer to P.37A-19.)



AC309229 AB

REMOVAL STEPS

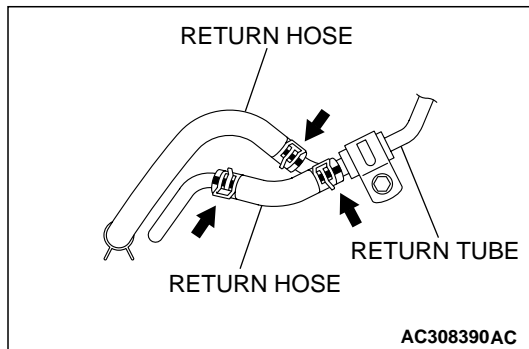
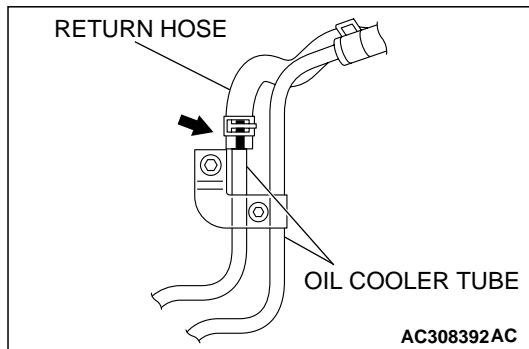
- OIL RESERVOIR
- >>E<< SUCTION HOSE
- >>D<< RETURN HOSE
 - STABILIZER LINK (REFER TO GROUP 33A, LOWER ARM P.33A-14).
- EYE BOLT
- GASKET
- PRESSURE HOSE ASSEMBLY

REMOVAL STEPS (Continued)

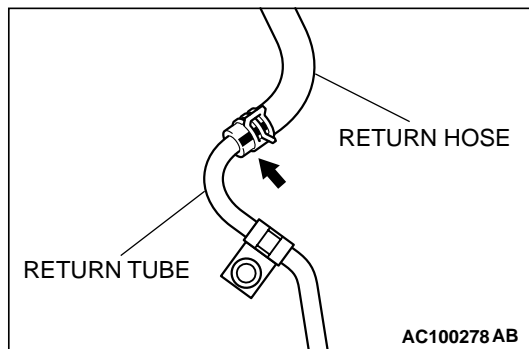
- >>C<< RETURN HOSE
- RETURN TUBE
- O-RING
- >>B<< RETURN HOSE
- RETURN TUBE
- >>A<< RETURN HOSE
- >>A<< RETURN HOSE
- RETURN TUBE
- RETURN HOSE
- OIL COOLER TUBE

INSTALLATION SERVICE POINTS**>>A<< RETURN HOSE INSTALLATION**

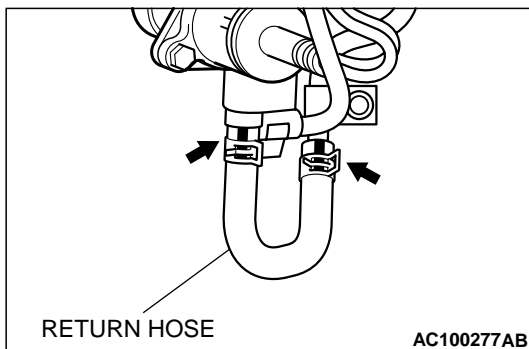
Install the return hose so that the markings are positioned as shown in the illustration.

**>>B<<RETURN HOSE INSTALLATION**

Install the return hose so that the markings are positioned as shown in the illustration.

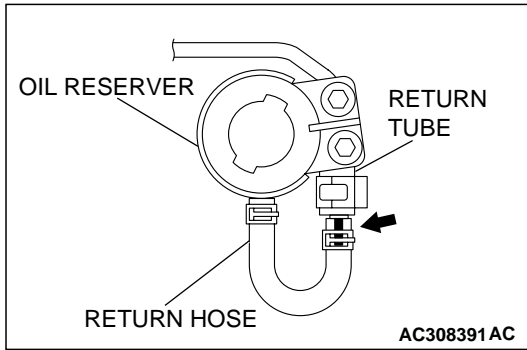
**>>C<< RETURN HOSE INSTALLATION**

Install the return hose so that the marking is positioned as shown in the illustration.



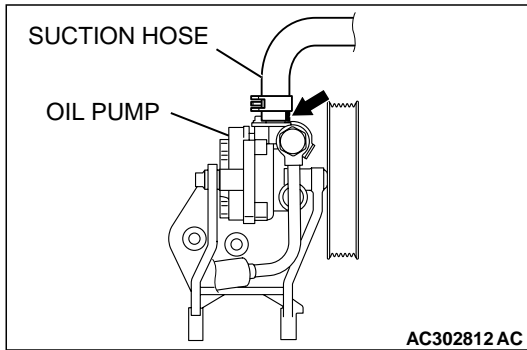
>>D<< RETURN HOSE INSTALLATION

Install the return hose so that the markings are positioned as shown in the illustration.



>>E<< SUCTION HOSE INSTALLATION

Install the suction hose so that the marking is positioned as shown in the illustration.



SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1372008400332

ITEM		SPECIFICATION
Power steering gear box and linkage		
Cylinder clamp assembly nut, gear box assembly bolt		70 ± 10 N·m (52 ± 7 ft-lb)
End plug		59 ± 10 N·m (44 ± 7 ft-lb)
Feed tube flare nut		15 ± 3 N·m (11 ± 2 ft-lb)
Pinion and valve assembly jam nut		25 ± 4 N·m (18 ± 4 ft-lb)
Rack support cover		23 ± 2 N·m (17 ± 1 ft-lb)
Rack support cover jam nut		59 ± 10 N·m (44 ± 7 ft-lb)
Return hose flare nut, pressure tube flare nut		15 ± 3 N·m (11 ± 2 ft-lb)
Tie rod		88 ± 10 N·m (65 ± 7 ft-lb)
Tie rod end nut		40 ± 5 N·m (29 ± 4 ft-lb)
Valve housing bolt		22 ± 4 N·m (16 ± 3 ft-lb)
Power steering hose <2.0L ENGINE>		
Crossmember mounting bolt		49 ± 10 N·m (36 ± 7 ft-lb)
Crossmember mounting nut		167 ± 9 N·m (123 ± 7 ft-lb)
Crossmember and lower arm connecting bolt		167 ± 9 N·m (123 ± 7 ft-lb)
Oil pump eye bolt		57 ± 7 N·m (42 ± 5 ft-lb)
Oil reservoir, pressure hose, pressure tube, return tube, cooler tube bolt		12 ± 2 N·m (102 ± 22 in-lb)
Pressure tube flare nut		15 ± 3 N·m (11 ± 2 ft-lb)
Power steering hose <2.4L ENGINE>		
Oil pump eye bolt		57 ± 7 N·m (42 ± 5 ft-lb)
Oil reservoir bolt		12 ± 2 N·m (102 ± 22 in-lb)
Pressure hose eye bolt		57 ± 7 N·m (42 ± 5 ft-lb)
Pressure hose, pressure tube, return hose, return tube clamp bolt		12 ± 2 N·m (102 ± 22 in-lb)
Power steering oil pump		
Oil pump bolt	2.0L ENGINE	22 ± 4 N·m (16 ± 3 ft-lb)
	2.4L ENGINE	24 ± 4 N·m (18 ± 3 ft-lb)
Oil pump bracket bolt	2.0L ENGINE (M8)	22 ± 4 N·m (16 ± 3 ft-lb)
	2.0L ENGINE (M10)	44 ± 10 N·m (33 ± 7 ft-lb)
Oil pump bracket bolt	2.4L ENGINE	24 ± 2 N·m (18 ± 1 ft-lb)
Oil pump bracket nut	2.4L ENGINE	44 ± 10 N·m (33 ± 7 ft-lb)
Plug assembly		59 ± 9 N·m (43 ± 7 ft-lb)
Power steering pump bracket stay bolt	2.4L ENGINE	49 ± 9 N·m (36 ± 7 ft-lb)
Power steering pump bracket stay washer assembly bolt	2.0L ENGINE	49 ± 5 N·m (36 ± 4 ft-lb)

ITEM		SPECIFICATION
Pressure switch assembly	2.0L ENGINE	28 ± 2 N·m (20 ± 2 ft-lb)
	2.4L ENGINE	30 ± 5 N·m (22 ± 4 ft-lb)
Pump cover bolt		28 ± 1 N·m (21 ± 2 ft-lb)
Suction pipe bolt	2.0L ENGINE	9.9 ± 2.1 N·m (88 ± 18 in-lb)
	2.4L ENGINE	12 ± 1 N·m (102 ± 13 in-lb)
Power steering wheel and shaft		
Steering shaft and gear box connecting bolt		18 ± 2 N·m (13 ± 1 ft-lb)
Steering column assembly bolt		12 ± 2 N·m (102 ± 22 in-lb)
Steering cover assembly bolt		5.0 ± 1.0 N·m (44 ± 9 in-lb)
Hexagon socket head bolt		50 ± 5 N·m (37 ± 4 ft-lb)

GENERAL SPECIFICATIONS

M1372000200301

ITEM			SPECIFICATION
Power steering gear box	Type		Rack and pinion
	Gear ratio		45.74
	Rack stroke mm (in)	Vehicles with 14 and 15 inch tire	146 (5.7)
		Vehicles with 16 inch tire	131 (5.1)
Oil pump	Type		Vane type
	Displacement cm ³ /rev (cu in/rev)		8.1 (0.49)
	Relief set pressure MPa (psi)		8.8 (1,276)

SERVICE SPECIFICATIONS

M1372000300427

ITEM			STANDARD VALUE	LIMIT
Steering wheel free play mm (in)	With engine running		–	30 (1.2)
	With engine stopped		10 (0.4) or less	–
Steering angle	Inside wheel	Vehicle with 14 and 15 inch tire	39°30' ± 1°30'	–
		Vehicle with 16 inch tire	33°40' +1°00'/-2°00'	–
	Outside wheel (reference)	Vehicle with 14 and 15 inch tire	32°30'	–
		Vehicle with 16 inch tire	28°46'	–
Toe-in mm (in)			1 ± 2 (0.04 ± 0.09)	–
Tie rod end ball joint breakaway torque N·m (in-lb)			0.5 – 2.5 (4.4 – 22.1)	–
Tie rod swing resistance N (lb) [Tie rod swing torque N·m (in-lb)]			6 – 16 (26.7 – 84.5) [1.5 – 4.9 (13.2 – 43.4)]	–
Engine idle speed r/min			700 ± 50	–
Stationary steering effort N (lb) [Fluctuation allowance N (lb)]			29 (6.5) or less [5.9 (1.33) or less]	–

ITEM		STANDARD VALUE	LIMIT
Oil pump pressure MPa (psi)	Oil pump relief pressure	8.8 – 9.5 (1,276 – 1,378)	–
	Pressure under no-load conditions	0.8 – 1.0 (116 – 145)	–
	Steering gear retention hydraulic pressure	8.8 – 9.5 (1,276 – 1,378)	–
Oil pressure switch operating pressure MPa (psi)	OFF → ON	1.5 – 2.0 (217 – 290)	–
	ON → OFF	0.7 – 2.0 (102 – 290)	–
Gear box total pinion torque N·m (in-lb) [Change in torque N·m (in-lb)]	Vehicles with 14 and 15 inch tire	0.6 – 1.6 (5.3 – 14.2) [0.4 (3.5) or less]	–
	Vehicles with 16 inch tire	0.7 – 2.1 (6.2 – 18.6) [0.6 (5.3) or less]	–
Opening dimension of special tool MB991561 mm (in)		2.9 (0.11)	–
Band crimped width mm (in)		2.4 – 2.8 (0.09 – 0.11)	–

LUBRICANTS

M1372000400394

ITEM		SPECIFIED LUBRICANT	QUANTITY dm ³ (qt)
Gear box	Bearing	GENUINE MITSUBISHI POWER STEERING FLUID	As required
	O-ring		
	Oil seal		
	Special tool (MB991213)		
	Pinion and valve assembly seal ring part		
	Bellows	Silicon grease	As required
Oil pump	Power steering fluid	GENUINE MITSUBISHI POWER STEERING FLUID	0.6 (0.57)
	Friction surface of rotor vane, cam ring and pump cover	GENUINE MITSUBISHI POWER STEERING FLUID	As required
	O-ring		

SEALANTS

M1372000500391

ITEM		SPECIFIED SEALANT
Steering shaft cover bolt hole on the toeboard		3M™ AAD Part No.8663 Windo-weld Resealant or equivalent
Power steering gear box	End plug	3M™ AAD Part No.8661, 8663, 8672, 8678, 8679 or equivalent
	Rack support cover	