

STEERING

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37209000132

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

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) and GROUP 00 - Maintenance Service before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

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

GENERAL INFORMATION

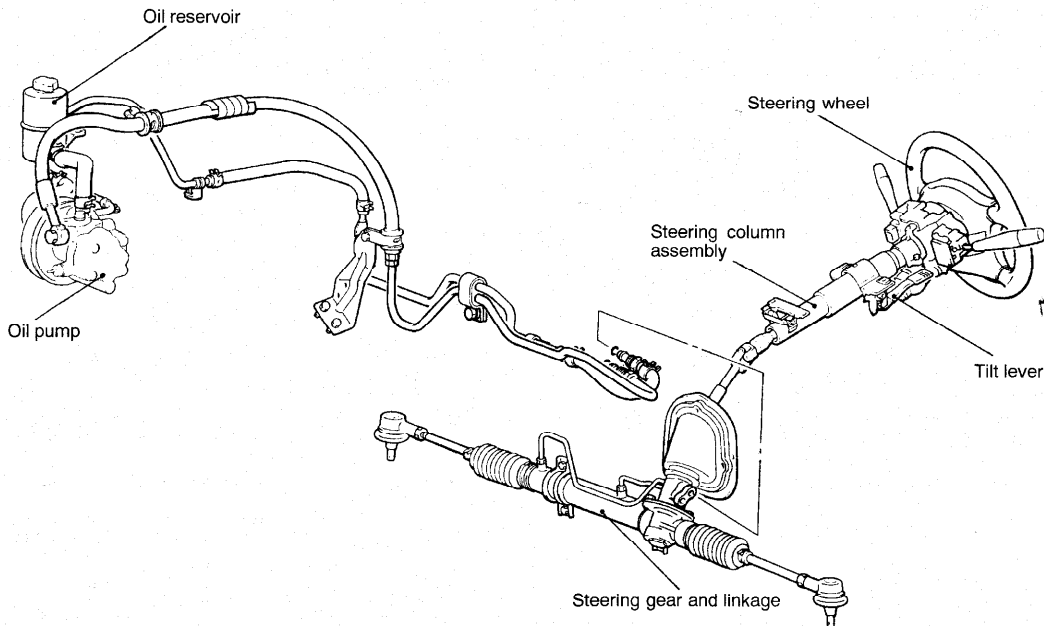
37200010110

The steering wheel is a 4-spoke type. The steering column is equipped with both shock absorbing and tilt steering mechanisms. The manual steering gear is a rack and pinion type with constant gear ratio which features light weight, compact size, good response to steering wheel movement and excellent feeling of steering.

The power steering is an integral rack and pinion type that combines the steering gear and linkage into one light-weight and compact assembly. The steering system uses a vane oil pump with a fluid flow control system, so that steering effort varies with engine speed.

Items		Specifications
Gear box	Steering gear type	Rack and pinion
Oil pump	Oil pump type	Vane type
	Displacement cm ³ /rev. (cu.in./rev.)	5.9 (.36)
	Relief set pressure MPa (psi)	9.8 (1,422)

CONSTRUCTION DIAGRAM



SERVICE SPECIFICATIONS

37200030109

Items		Standard value	Limit
Steering wheel free play mm (in.)	Manual steering	-	30 (1.18)
	Power steering (with engine stopped)	10 (.39) or less	-
	Power steering (during hydraulic operation)	-	30 (1.18)
Steering angle	Inner wheel	37°30' ± 2°00'	-
	Outer wheel	31°40'	-
Tie-rod end ball joint breakaway torque Nm (in.lbs.)		0.20 - 0.48 (1.7 - 4.3)	-
Stationary steering effort N (lbs.) [Fluctuation allowance]		29 (6.6) or less [5.9 (1.3) or less]	-
Oil pump pressure MPa (psi)	Oil pump relief pressure	9.8 (1,422)	-
	Pressure under no load conditions	0.2 - 0.5 (28 - 71)	-
	Steering gear retention hydraulic pressure	9.8 (1,422)	-
Oil pressure switch operating pressure MPa (psi)	OFF → ON	1.5 - 2.0 (213 - 285)	-
	ON → OFF	0.7 - 2.0 (100 - 285)	-
Total pinion torque Nm (ft.lbs.)	Manual steering gear box	0.3 - 1.4 (.2 - 1.0)	-
	Power steering gear box	0.6 - 1.4 (.4 - 1.0)	-
Tie-rod joint swing resistance N (lbs.)		7 - 24 (1.5 - 5.3)	-
Tie-rod joint swing torque Nm (ft.lbs.)		1.5 - 4.9 (1.1 - 3.6)	-

LUBRICANTS

37200040102

Items		Specified lubricants	Quantity
Manual steering gear box	Bellows	Silicone grease	As required
Power steering gear box	Bearing, O-ring and oil seal	Automatic transmission fluid "DEXRON II"	As required
	Bushing inside rack stopper		
	Special tool (MB991212)		
	Pinion and valve assembly seal ring part		
	Bellows	Silicone grease	As required
Oil pump	Power steering fluid	Automatic transmission fluid "DEXRON II"	0.9 dm ³ (.95 U.S.qt.)
	Flow control valve	Automatic transmission fluid "DEXRON II"	As required
	Friction surface of rotor, vane cam ring and pump cover		
	Automatic transmission fluid "DEXRON II"		

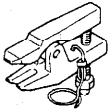
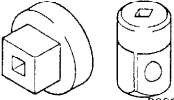
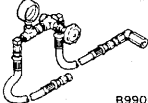
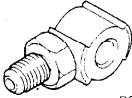
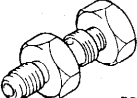

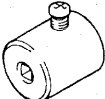
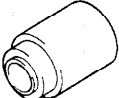
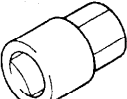
SEALANT

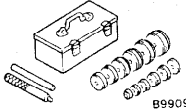
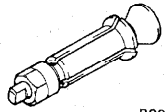
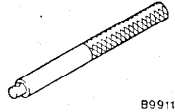

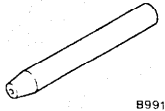
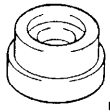
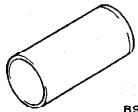
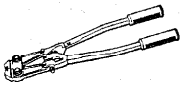
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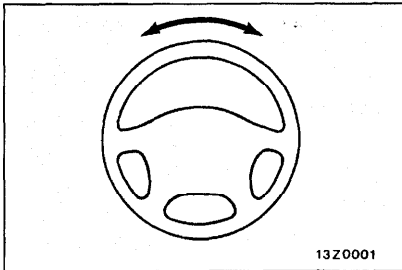
Items	Specified sealant	Remarks
Power steering rack support cover screw	3M ATD Part No.8663 or equivalent	Semi-drying sealant
Dust cover lip for tie-rod end ball joint		

SPECIAL TOOLS

3720060122

Tool	Tool number and name	Supersession	Application
 B991113	MB991113 or MB990635 Steering linkage puller	MB991113-01, MB990635-01 or general service tool	Tie-rod end disconnection
 B990326	MB990326 Preload socket	General service tool	Tie-rod end ball joint breakaway torque check
 B990662	MB990662 Oil pressure gauge assembly	MB990662-01	Oil pump pressure test
 B990993	MB990993 or MB991217 Power steering oil pressure gauge adapter (pump side)	MB990993-01	
 B990994	MB990994 Power steering oil pressure gauge adapter (hose side)	MB990994-01	
 B990803	MB990803 Steering wheel puller	General service tool	Steering wheel removal
 B991006	MB991006 Preload socket	MB991006-01	Gear box total pinion torque check
 B990776	MB990776 Front axle base	MB990776-01	Dust cover installation
 B991204	MB991204 Torque wrench socket		Rack support adjustment Rack support cover removal

Tool	Tool number and name	Supersession	Application
 <p style="text-align: center;">B990925</p>	MB990925 Bearing and oil seal installer set	MB990925-01 or General service tool	Oil seal and bearing installation MB990926, MB990927, MB990938, MB990939
 <p style="text-align: center;">B991120</p>	MB991120 Needle bearing puller	Tool not available	Needle roller bearing removal
 <p style="text-align: center;">B991197</p>	MB991197 Bar (long type)	General service tool	Back-up washer and oil seal installation
 <p style="text-align: center;">B991202</p>	MB991202 Oil seal and bearing installer	General service tool	Back-up washer, oil seal and needle roller bearing installation
 <p style="text-align: center;">B991212</p>	MB991212 Rack installer		Rack installation
 <p style="text-align: center;">B991203</p>	MB991203 Oil seal and bearing installer	Tool not available	Oil seal and bearing installation
 <p style="text-align: center;">B991317</p>	MB991317 Seal ring installer	Tool not available	Seal ring installation
	MB991561 Boot band crimping tool		Bellows band installation



13Z0001

ON-VEHICLE SERVICE

37200100091

STEERING WHEEL FREE PLAY CHECK

<Manual steering>

1. Set the front wheels straight ahead.
2. Measure the steering wheel play when the wheels start to move when turning the steering wheel slightly in both directions.

Limit: 30 mm (1.18 mm)

3. When the play exceeds the limit, check the play in the steering shaft and linkage connections. Correct or replace a defective part.
4. When step (3) is OK, check the following to adjust:
 - Remove the steering gear box, check and adjust the gear box total pinion torque.

<Power steering>

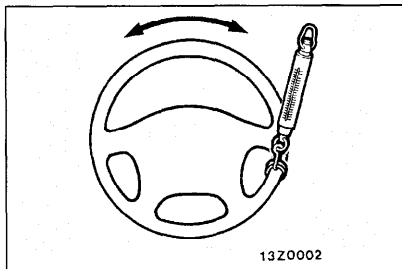
1. With the engine running (during hydraulic operation), set the front wheels straight ahead.
2. Measure the steering wheel play when the wheels start to move when turning the steering wheel slightly in both directions.

Limit: 30 mm (1.18 in.)

3. When the play exceeds the limit, check the play on the steering shaft and linkage connections. Correct or replace a defective part.
4. If the free play still exceeds the limit value, set the steering wheel straight ahead with the engine stopped. Load 4.9 N (1.1 lbs.) toward the steering wheel circumference and check the play.

Standard value (steering wheel play with the engine stopped): 10 mm (.39 in.) or less

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



13Z0002

STEERING ANGLE CHECK

37200110117

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

Standard value:

Inner wheel 37°30' ± 2°00'

Outer wheel 31°40'

2. When the angle is not within the standard value, the toe is probably incorrect. Adjust the toe (Refer to GROUP 33A - On-vehicle Service) and recheck the steering angle.

TIE-ROD END BALL JOINT BREAKAWAY TORQUE CHECK

37200150096

1. Disconnect tie-rod and knuckle with special tool.

Caution

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

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

Standard value: 0.20 - 0.48 Nm (1.7 - 4.3 in.lbs.)

3. If the measured value exceeds the standard value, replace the tie-rod end.
4. If the measured value is lower than the standard value, check that ball joint turns smoothly without excessive play. If so, it is possible to use that ball joint.

STATIONARY STEERING EFFORT CHECK

37200170108

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 $1,000 \pm 100$ r/min.

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

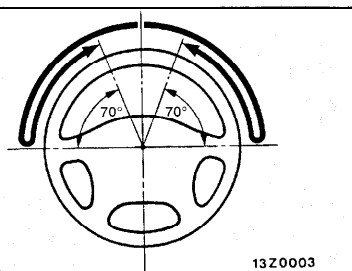
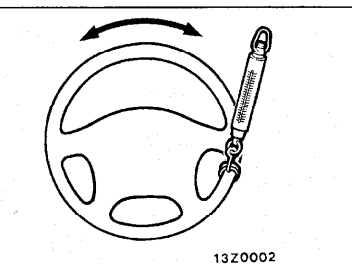
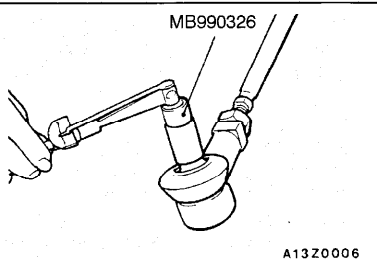
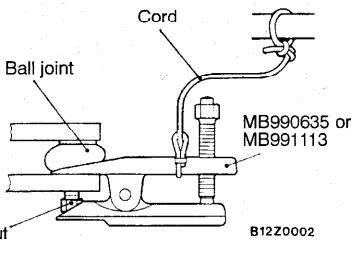
3. Attach a spring scale to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant fluctuation of the required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

Standard value:**Steering effort: 29 N (6.6 lbs.) or less****Fluctuation allowance: 5.9 N (1.3 lbs.) or less****STEERING WHEEL RETURN TO CENTER CHECK**

37200180101

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

1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is not difference in the steering effort required and the wheel return during left and right turns.
2. At a speed of about 35 km/h (22 mph), 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 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.)

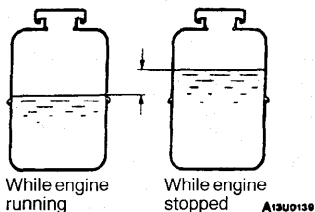
DRIVE BELT TENSION CHECK

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Refer to GROUP 11A - On-vehicle Service.

Refer to GROUP 11C - On-vehicle Service.

Fluid level change: Within 5 mm (.20 in.)



FLUID LEVEL CHECK

37200200081

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 (.20 in.) or more, air bleeding should be done.

FLUID REPLACEMENT

37200210084

1. Raise the front wheels on a jack, and then support them with jack stands.
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 spark plug cable.

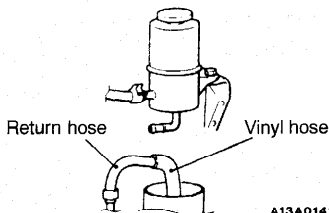
Caution

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

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

Specified fluid:

Automatic transmission fluid "DEXRON II"



BLEEDING

37200220094

1. Jack up the front wheels and support them by using a jack stands.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right five or six times.
4. Disconnect the high-tension cable.

Caution

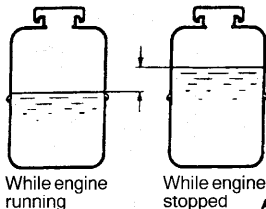
Be careful not to position the high-tension cable near the delivery pipe.

5. While operating the starting motor intermittently, turn the steering wheel all the way to the left and right 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 filler.**
 2. **If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.**
6. Connect the high-tension cable.
 7. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
 8. Confirm that the fluid is not milky, and that the level is between the high and low dipstick marks.
 9. Confirm that there is very little change in the fluid level when the steering wheel is turned to the left and right.

Fluid level change: Within 5 mm (.20 in.)



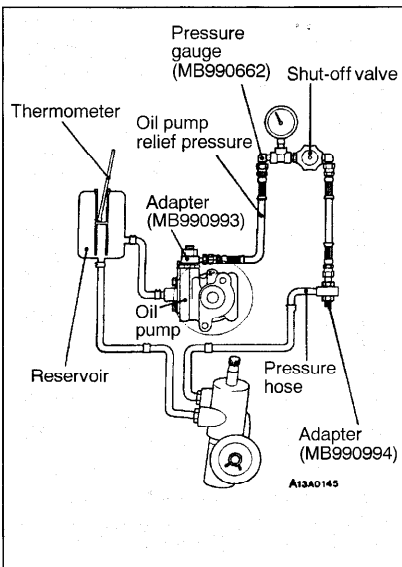
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10. Confirm that the change in the fluid level is no more than 5 mm (.20 in.) when the engine is stopped and when it is running.
11. If the change of the fluid level is 5 mm (.20 in.) or more, the air has not been completely bled from the system, and thus must be bled completely.

Caution

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

OIL PUMP PRESSURE TEST



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 (122 - 140°F).
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: 9.8 MPa (1,422 psi)

Caution

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

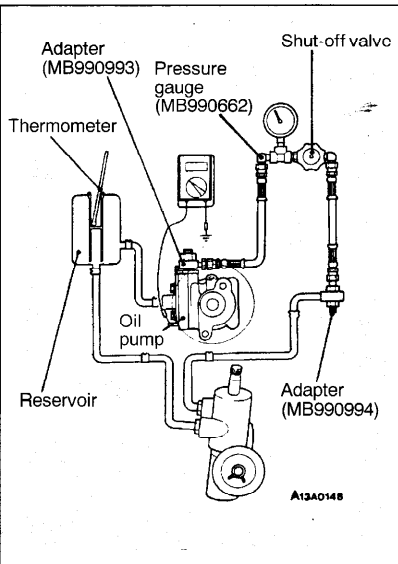
5. If it is not within the standard value, replace the oil pump.
 6. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.
- Standard value: 0.2 - 0.5 MPa (28 - 71 psi)**
7. If it is not within 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. Fully open the shut-off valve of the pressure gauge.
 9. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is at the standard value.

Standard value: 9.8 MPa (1,422 psi)

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

Tightening torque: 18 Nm (13 ft.lbs.)

12. Bleed the system.



POWER STEERING OIL PRESSURE SWITCH CHECK

37200720099

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 (122 - 140°F).
3. The engine should be idling.
4. Disconnect the connection of the connector for the oil pressure switch, and place an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure, then check whether or not the hydraulic pressure that activates the switch is the standard value.

Standard value: 1.5-2.0 MPa (213 - 285 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 (100 - 285 psi)

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

Tightening torque: 18 Nm (13 ft.lbs.)

8. Bleed the system.

STEERING WHEEL AND SHAFT

REMOVAL AND INSTALLATION

CAUTION: SRS

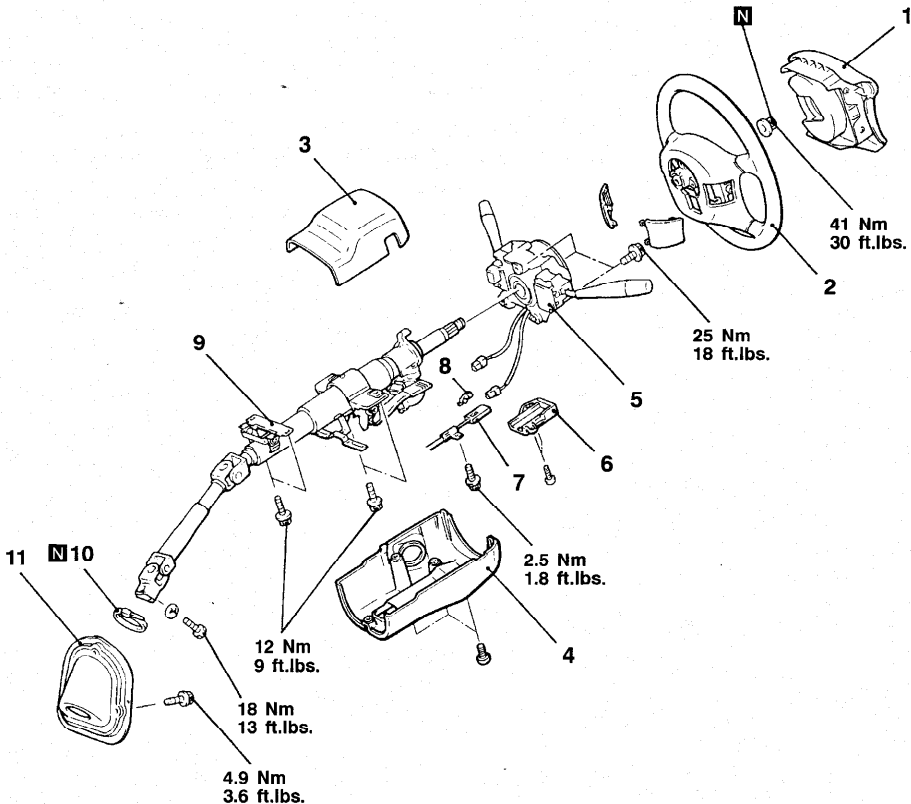
Before removal of air bag module, refer to: **GROUP 52B - Service Precautions, GROUP 52B - Air Bag Modules and Clock Spring**

Pre-removal Operation

- Knee Protector Assembly Removal
(Refer to GROUP 52A - Instrument Panel.)

Post-installation Operation

- (1) Knee Protector Assembly Installation
(Refer to GROUP 52A - Instrument Panel.)
- (2) Checking Steering Wheel Position with Wheels Straight Ahead



A13M0049

Removal steps

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

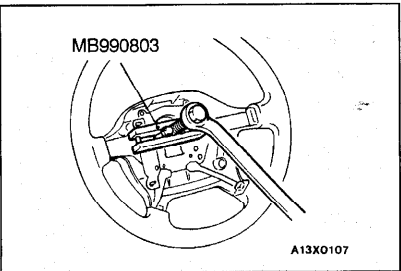
6. Key interlock cable cover
7. Key interlock cable
8. Slider
9. Steering shaft assembly
10. Band
11. Steering cover assembly

◀A▶

▶A◀

REMOVAL SERVICE POINT

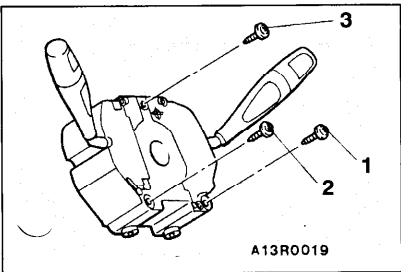
◀A▶ **STEERING WHEEL REMOVAL**



INSTALLATION SERVICE POINT

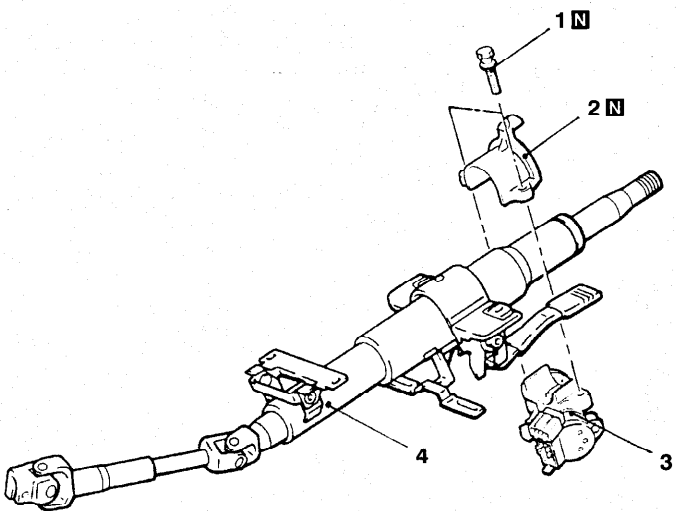
▶A◀ **CLOCK SPRING AND COLUMN SWITCH INSTALLATION**

Tighten the screws in the order shown in the illustration.



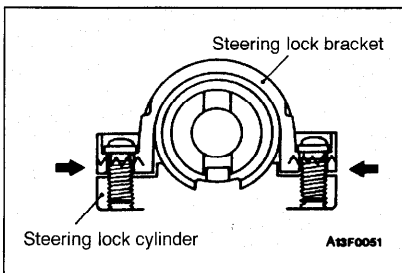
DISASSEMBLY AND REASSEMBLY

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Disassembly steps

- ◀A▶ ▶A◀ 1. Special bolt
- ▶A◀ ▶A◀ 2. Steering lock bracket
- ▶A◀ ▶A◀ 3. Steering lock cylinder
- ▶A◀ ▶A◀ 4. Steering shaft

**DISASSEMBLY SERVICE POINT****◀▶ STEERING LOCK BRACKET/STEERING LOCK CYLINDER REMOVAL**

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

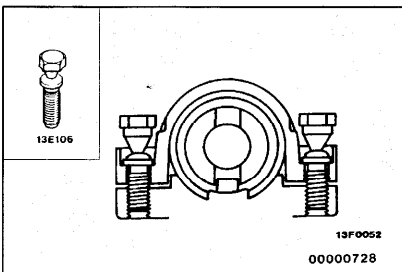
REASSEMBLY SERVICE POINT**▶◀ STEERING LOCK CYLINDER/STEERING LOCK BRACKET/SPECIAL BOLT INSTALLATION**

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

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

Caution

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



MANUAL STEERING GEAR BOX

REMOVAL AND INSTALLATION

CAUTION: SRS

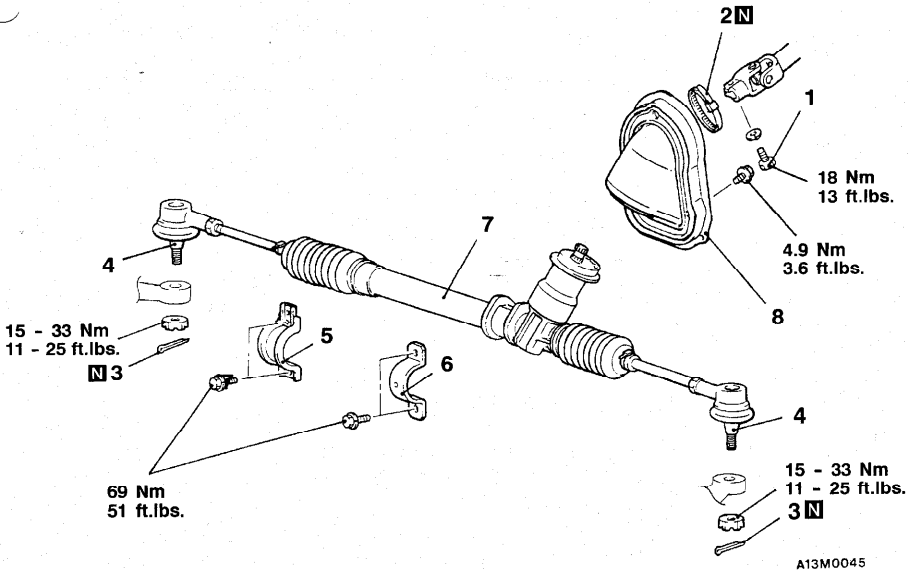
Before removing the steering box, refer to GROUP 52B - General Information, center the front wheels, and remove the ignition key. Failure to do so may damage the SRS clock spring and render the SRS system inoperative, risking a serious driver's injury.

Pre-removal Operation

- Center Member Removal (Refer to GROUP 32.)
- Front Exhaust Pipe Removal (Refer to GROUP 15.)

Post-installation Operation

- Press the dust cover with a finger to check whether the dust cover is cracked or damaged.
- Front Exhaust Pipe Installation (Refer to GROUP 15.)
- Center Member Installation (Refer to GROUP 32.)
- Checking Steering Wheel Position with Wheels Straight Ahead
- Front Wheel Alignment Adjustment (Refer to GROUP 33A.)



Removal steps

1. Steering shaft assembly and gear box connecting bolt
2. Band
3. Cotter pin
4. Tie-rod end and knuckle connection

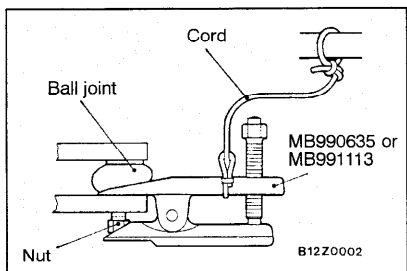
5. Cylinder clamp
6. Gear housing clamp
7. Gear box assembly
8. Steering cover assembly

REMOVAL SERVICE POINTS

◀A▶ TIE-ROD END DISCONNECTION

Caution

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



◀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

37100230032

- Check the rubber parts for cracks and breakage.

GEAR BOX TOTAL PINION TORQUE

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

Standard value: 0.3 - 1.4 Nm (.2 - 1.0 ft.lbs.)

[Change in torque: 0.4 Nm (.3 ft.lbs.)]

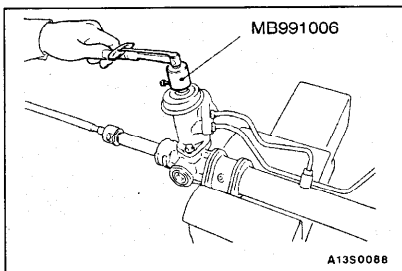
Caution

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

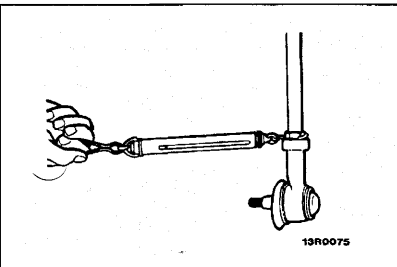
NOTE

When measuring, remove the bellows from the rack housing. Measure the pinion torque through the whole stroke of the rack.

If the measured value is not within the standard range, first adjust the rack support cover, and then check the total pinion 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.



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 scale.

Standard value:

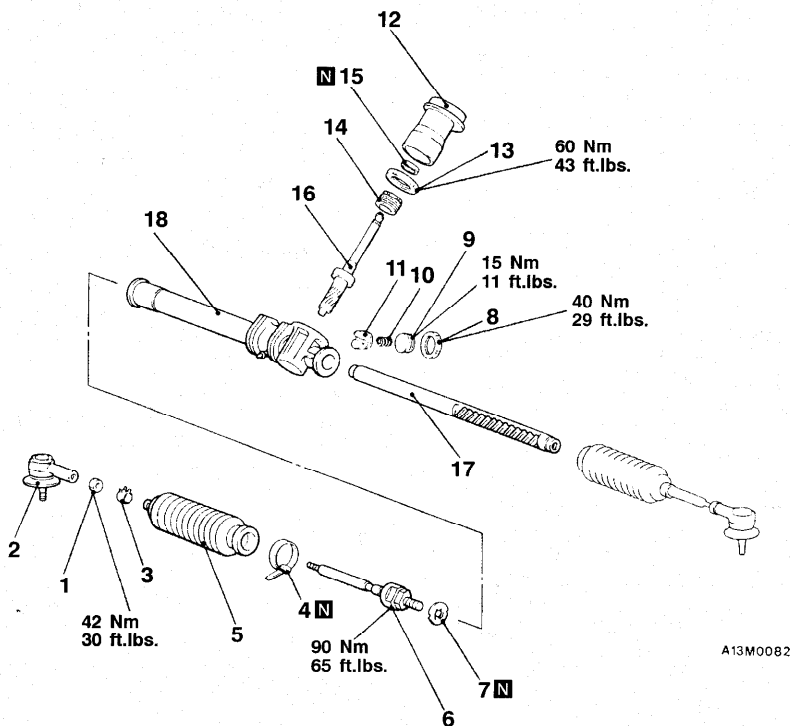
7 - 24 N (1.5 - 5.3 lbs.)

[1.5 - 4.9 Nm (1.1 - 3.6 ft.lbs.)]

- (3) When the measured value exceeds the standard value, replace the tie-rod end.
- (4) When the measured value is lower than the standard value, check that ball joint turns smoothly without excessive play. If so, it is possible to use that ball joint.

DISASSEMBLY AND REASSEMBLY

37100240035



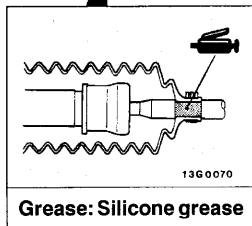
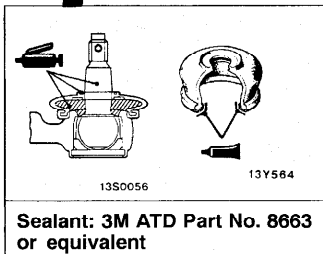
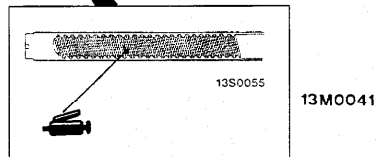
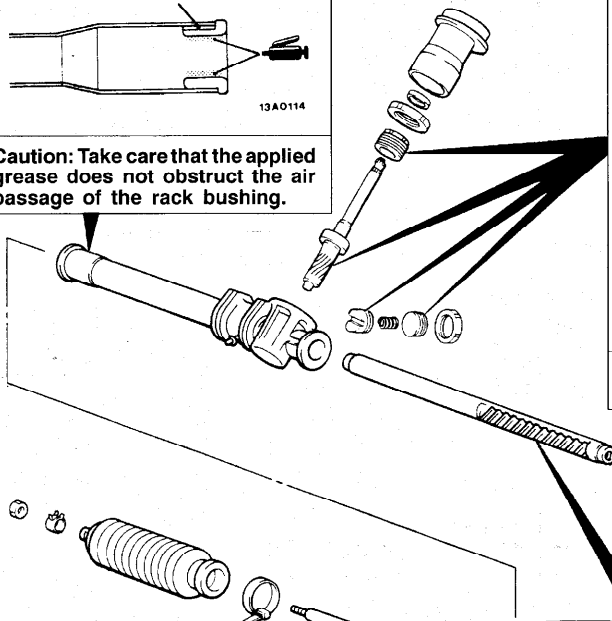
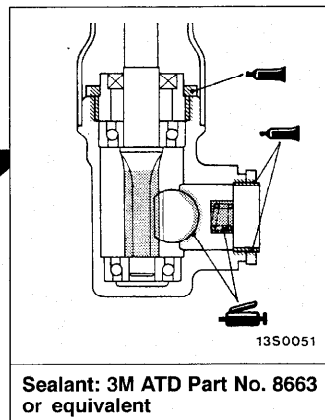
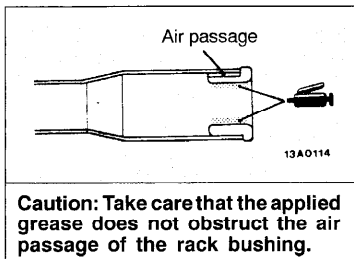
A13M0082

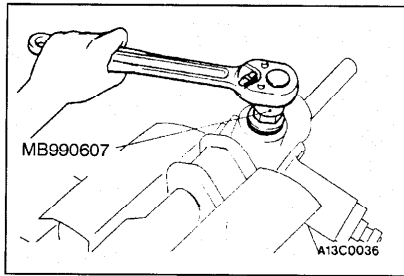
Disassembly steps

- ▶E◀ 1. Tie-rod end lock nut
- ▶E◀ 2. Tie-rod end
- ▶E◀ 3. Bellows clip
- ▶E◀ 4. Bellows band
- ▶E◀ 5. Bellows
- ▶D◀ 6. Tie-rod
- ▶D◀ 7. Tab washer
- ▶C◀ ● Total pinion torque adjustment
- ▶C◀ 8. Locking nut
- ◀A▶ ▶B▶ 9. Rack support cover

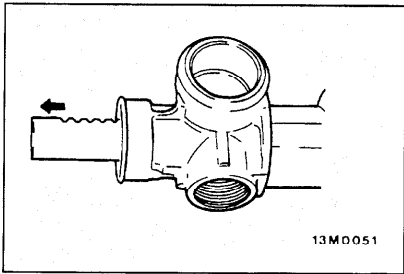
- ▶A◀ 10. Rack support spring
- ▶A◀ 11. Rack support
- ▶A◀ 12. Joint cover
- ▶A◀ 13. Locking nut
- ▶A◀ 14. Top cover
- ▶A◀ 15. Oil seal
- ▶A◀ 16. Pinion
- ▶A◀ 17. Rack
- ▶A◀ 18. Gear housing

Lubrication and Sealing Points



**DISASSEMBLY SERVICE POINTS****◀A▶ RACK SUPPORT COVER REMOVAL**

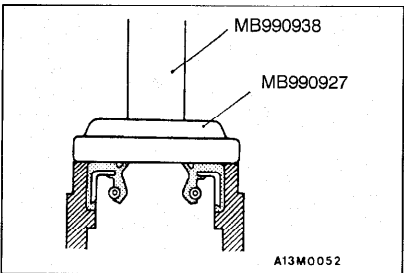
Use the special tool to remove the rack support cover from the gear box.

**◀B▶ RACK REMOVAL**

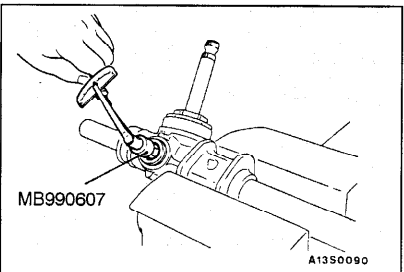
Pull out the rack from the gear housing in the direction shown in the illustration.

Caution

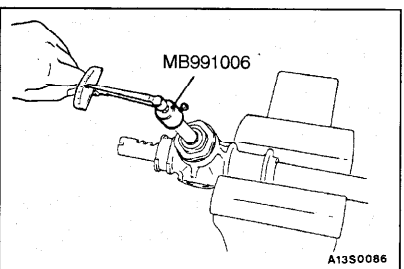
If the rack is pulled out in the wrong direction, the bushing in the gear box may be damaged by the rack threads.

**REASSEMBLY SERVICE POINTS****▶A◀ OIL SEAL INSTALLATION**

Use the special tool to press the oil seal in the top plug.

**▶B◀ RACK SUPPORT COVER INSTALLATION**

Position the rack at its center and tighten the rack support cover to 15 Nm (11 ft.lbs.).

**▶C◀ TOTAL PINION TORQUE ADJUSTMENT**

- (1) In neutral position, use the special tool to rotate the pinion shaft clockwise one turn per 4 - 6 seconds. Return the rack support cover 30° - 60° and adjust the torque to the standard value.

Standard value: 0.3 - 1.4 mm (3 - 12 in. lbs.)
[Torque variation: 0.4 Nm (3 in. lbs.)]

Caution

1. When adjusting, set the standard value at its highest value.
2. Assure no ratcheting or catching when operating the rack toward the shaft direction.

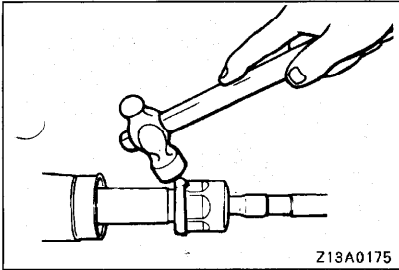
NOTE

When it cannot be adjusted within the specified return angle, check or replace the rack support cover components.

- (2) After adjusting, secure the rack support cover with the lock nut.

►D◀ TAB WASHER/TIE-ROD INSTALLATION

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



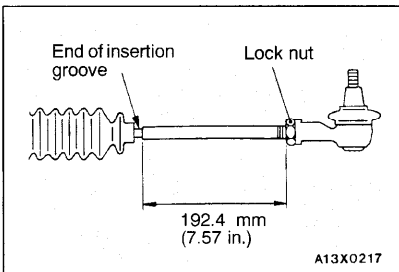
Z13A0175

►E◀ TIE-ROD END/TIE-ROD END LOCK NUT INSTALLATION

Screw in the tie-rod end to adjust the dimension shown to the specified. Secure the lock nut.

NOTE

Fully tighten the lock nut after installing the gear box and adjusting the toe-in.



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INSPECTION

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DUST COVER REPLACEMENT

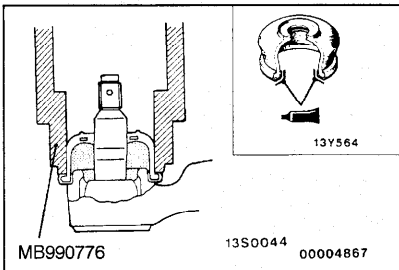
Replace the dust cover only when it has been cracked or damaged by mistake during the maintenance work.

- (1) Remove the dust cover.
- (2) Pack the dust cover interior with multi-purpose grease.
- (3) Apply the specified sealant to the dust cover lip.

Specified sealant:

3M ATD Part No. 8663 or equivalent

- (4) Use the special tool to install the dust cover to the tie-rod end ball joint.
- (5) Press the dust cover with a finger to check whether the dust cover is cracked or damaged.
 - Check the rack support for uneven wear or damage.
 - Check the rack support spring for deterioration.
 - Check the rack pinion tooth surfaces for wear or damage.
 - Check the ball bearings or pinion bushing for noise, uneven rotation, or damage.
 - Check the rack bushing for damage.
 - Check the dust cover for cracks or damage.



MB990776

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POWER STEERING GEAR BOX

37200390245

REMOVAL AND INSTALLATION

CAUTION: SRS

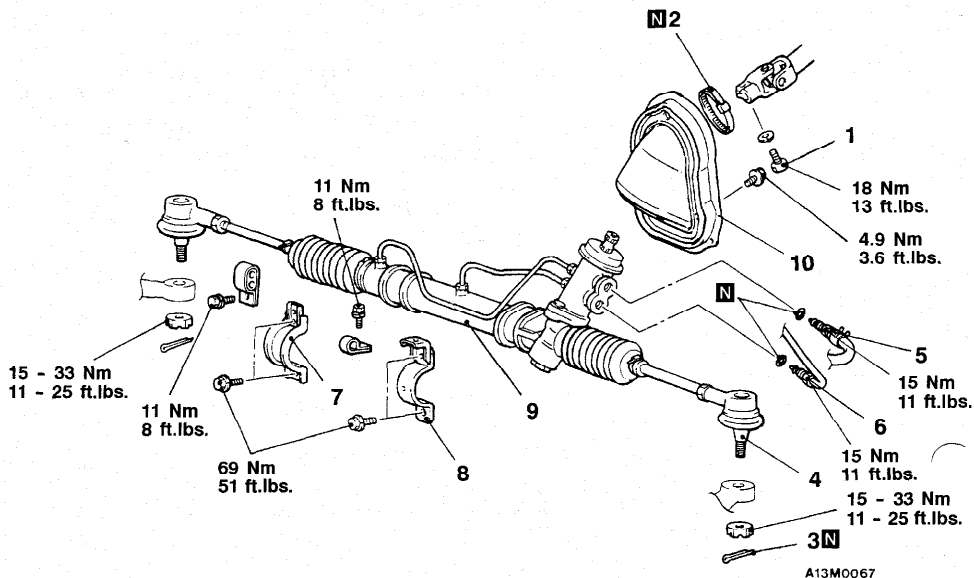
Before removal of steering gear box, refer to GROUP 52B - General Information, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37A-8.)
- Center Member Removal (Refer to GROUP 32.)
- Front Exhaust Pipe Removal (Refer to GROUP 15.)

Post-installation Operation

- Press the dust cover with a finger to check whether the dust cover is cracked or damaged.
- Front Exhaust Pipe Installation (Refer to GROUP 15.)
- Center Member Installation (Refer to GROUP 32.)
- Power Steering Fluid Supplying (Refer to P.37A-8.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-9.)
- Checking Steering Wheel Position with Wheels Straight Ahead
- Front Wheel Alignment Adjustment (Refer to GROUP 33A.)

**Removal steps**

1. Steering shaft assembly and gear box connecting bolt
2. Band
3. Cotter pin
4. Tie-rod end and knuckle connection
5. Return tube connection
6. Pressure tube connection
7. Cylinder clamp
8. Gear housing clamp
9. Gear box assembly
10. Steering cover assembly

REMOVAL SERVICE POINTS**◀A▶ TIE-ROD END DISCONNECTION**

Refer to P.37A-16.

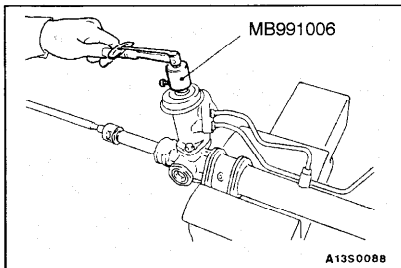
◀B▶ GEAR BOX ASSEMBLY REMOVAL

Refer to P.37A-16.

INSPECTION

Refer to P.37A-17.

3720040085

**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: 0.6 - 1.4 Nm (.4 - 1.0 ft.lbs.)

[Change in torque: 0.4 Nm (.3 ft.lbs.)]

Caution

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

NOTE

When measuring, remove the bellows from the rack housing. Measure the pinion torque through the whole stroke of the rack.

If the measured value is not within the standard range, first adjust the rack support cover, and then check the total pinion torque again.

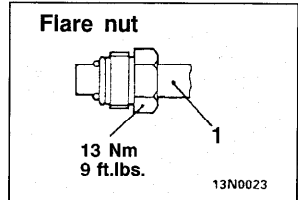
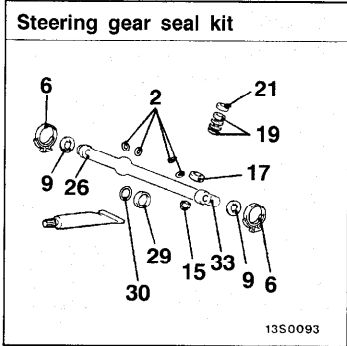
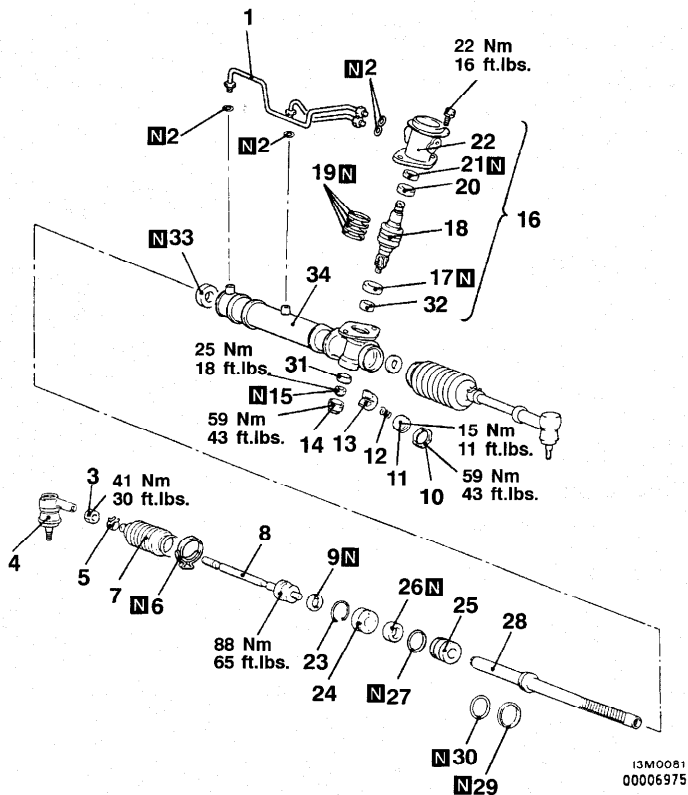
If the total pinion torque cannot be adjusted to within the standard range by adjusting the rack support cover, check the rack support cover, rack support spring, rack support and replace any parts if necessary.

CHECK THE TIE-ROD FOR SWING RESISTANCE

Refer to P.37A-17.

DISASSEMBLY AND REASSEMBLY

37200410095

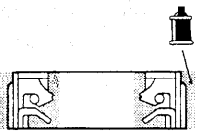


Disassembly steps

- 1. Feed pipe
- 2. O-ring
- ▶N▶ 3. Tie-rod end locking nut
- ▶N▶ 4. Tie-rod end
- ▶M▶ 5. Bellows clip
- ▶M▶ 6. Bellows band
- ▶L▶ 7. Bellows
- ▶L▶ 8. Tie-rod
- ▶L▶ 9. Tab washer
- ▶K▶ ● Total pinion torque adjustment
- ▶A▶ ▶J▶ 10. Locking nut
- ▶I▶ ▶J▶ 11. Rack support cover
- ▶I▶ ▶J▶ 12. Rack support spring
- ▶I▶ ▶J▶ 13. Rack support
- ▶I▶ ▶J▶ 14. End plug
- ▶I▶ ▶J▶ 15. Self-locking nut
- ▶B▶ ▶H▶ 16. Valve housing assembly
- ▶B▶ ▶H▶ 17. Oil seal

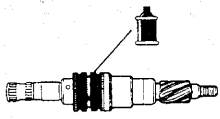
- ▶B▶ ▶G▶ 18. Pinion and valve assembly
- ▶C▶ ▶G▶ 19. Seal ring
- ▶D▶ ▶F▶ 20. Ball bearing
- ▶D▶ ▶F▶ 21. Oil seal
- ▶E▶ ▶E▶ 22. Valve housing
- ▶F▶ ▶D▶ 23. Circlip
- ▶F▶ ▶D▶ 24. Rack stopper
- ▶G▶ ▶D▶ 25. Rack bushing
- ▶F▶ ▶C▶ 26. Oil seal
- ▶C▶ ▶C▶ 27. O-ring
- ▶H▶ ▶B▶ 28. Rack
- ▶H▶ ▶B▶ 29. Seal ring
- ▶J▶ ▶A▶ 30. O-ring
- ▶J▶ ▶B▶ 31. Ball bearing
- ▶J▶ ▶B▶ 32. Needle roller bearing
- ▶J▶ ▶A▶ 33. Oil seal
- ▶J▶ ▶A▶ 34. Rack housing

Lubrication and Sealing Points



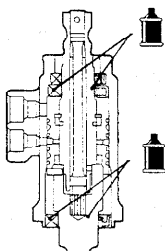
13S0075

Fluid:
Automatic transmission fluid "DEXRON II"



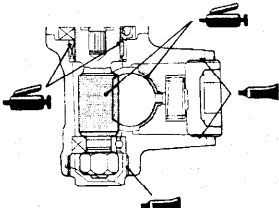
13C0026

Fluid:
Automatic transmission fluid "DEXRON II"



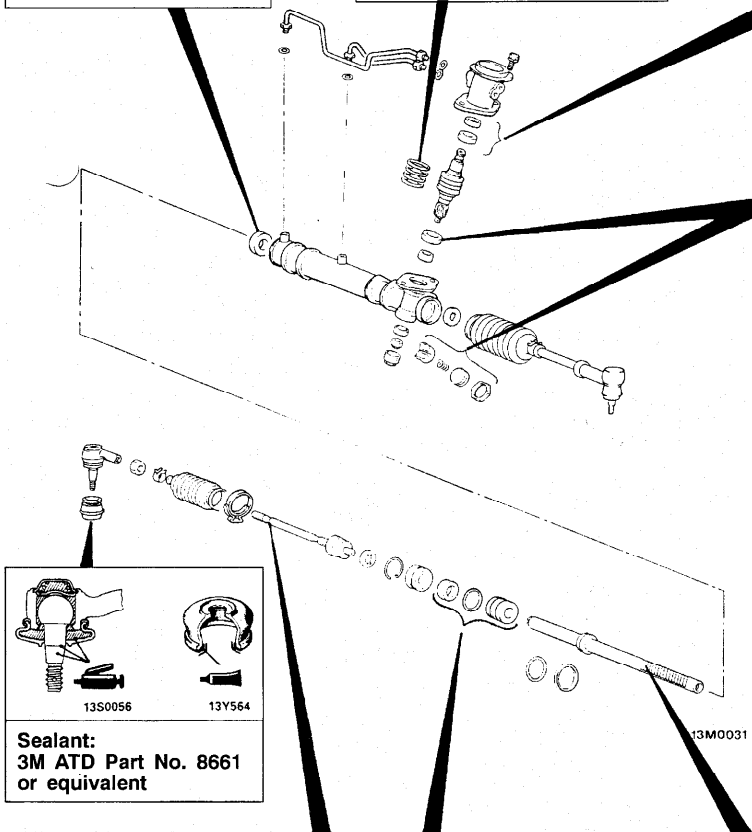
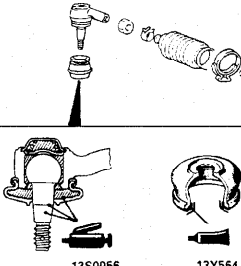
13C0025

Fluid:
Automatic transmission fluid "DEXRON II"



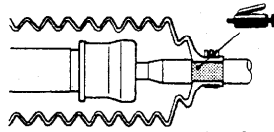
13F0031

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

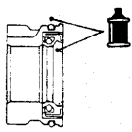
13S0056 13Y564

Sealant:
3M ATD Part No. 8661 or equivalent



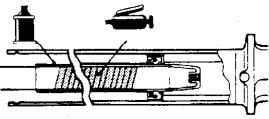
13C0070

Grease: Silicone grease



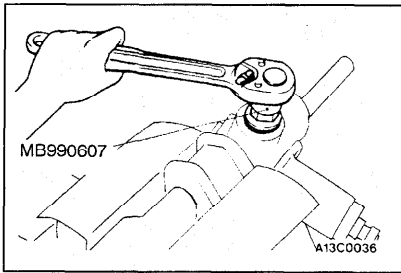
13N0019

Fluid:
Automatic transmission fluid "DEXRON II"

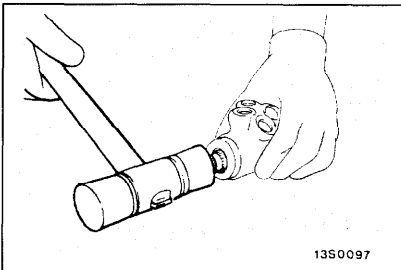


13S0072

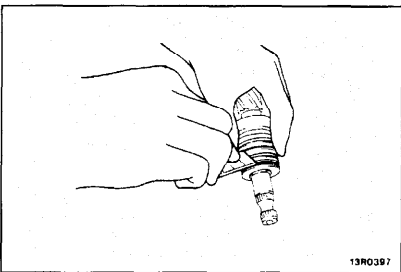
Fluid:
Automatic transmission fluid "DEXRON II"
Grease: Repair kit grease

**DISASSEMBLY SERVICE POINTS****◀A▶ RACK SUPPORT COVER REMOVAL**

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

**◀B▶ OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL**

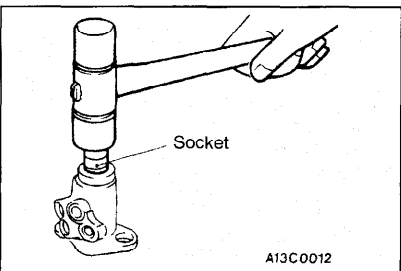
Using a plastic hammer, gently tap the pinion to remove it.

**◀C▶ SEAL RING REMOVAL**

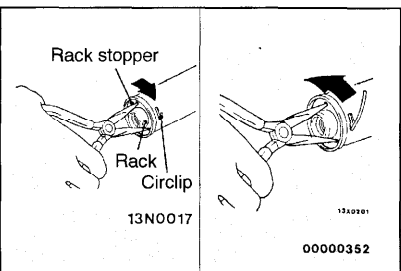
Cut the seal ring and remove it from the pinion and valve assembly and the rack.

Caution

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

**◀D▶ BALL BEARING/OIL SEAL REMOVAL**

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

**◀E▶ CIRCLIP REMOVAL**

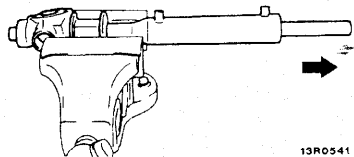
- (1) Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
- (2) Turn the rack stopper counterclockwise to remove the circlip.

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.

◀F▶ **RACK STOPPER/RACK BUSHING/RACK REMOVAL**

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

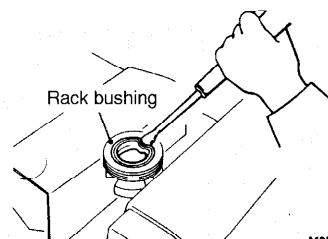


13R0541

◀G▶ **OIL SEAL REMOVAL**

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

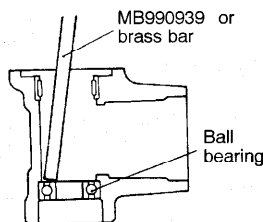
Caution
Do not damage the oil seal press fitting surface of the rack bushing.



A13R0377

◀H▶ **BALL BEARING REMOVAL**

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

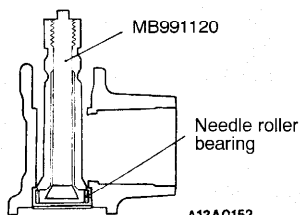


A13A0119

◀I▶ **NEEDLE ROLLER BEARING REMOVAL**

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

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

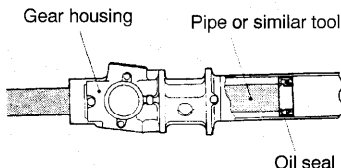


A13A0152

◀J▶ **OIL SEAL REMOVAL**

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

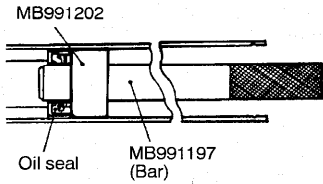
Caution
Be careful not to damage the inner surface of the rack cylinder of the gear housing.



A13S0070

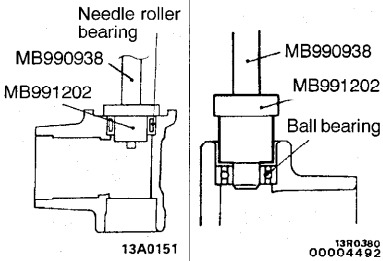
REASSEMBLY SERVICE POINTS

▶A◀ OIL SEAL INSTALLATION



A13S0069

▶B◀ NEEDLE ROLLER BEARING/BALL BEARING INSTALLATION

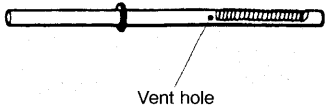


▶C◀ RACK INSTALLATION

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

Caution

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



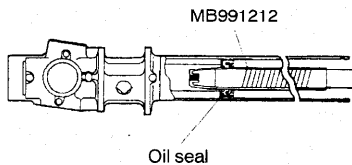
13K583

- (2) Cover rack serrations with special tool.
- (3) Apply the specified fluid to the special tool.

Specified fluid:

Automatic transmission fluid "DEXRON II"

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



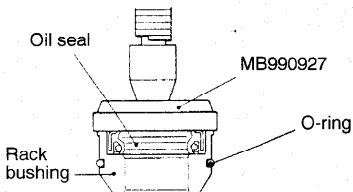
A13S0071

▶D◀ OIL SEAL/RACK BUSHING INSTALLATION

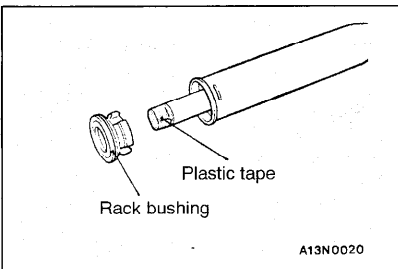
- (1) Apply the specified fluid to the outer surface of the oil seal. Press-fit the oil seal using the special tool until it is flush with the bushing end face.

Specified fluid:

Automatic transmission fluid "DEXRON II"



A13S0112

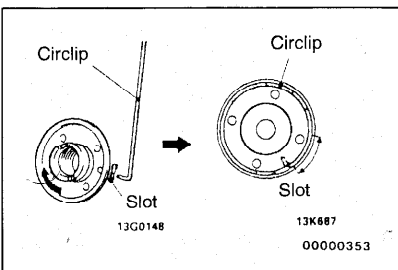


- (2) Apply the specified fluid to the oil seal inner surface and the O-ring.

Specified fluid:

Automatic transmission fluid "DEXRON II"

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

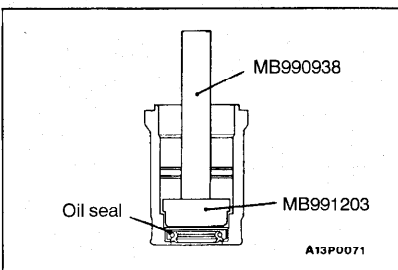


►E◀ CIRCLIP INSTALLATION

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

Caution

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

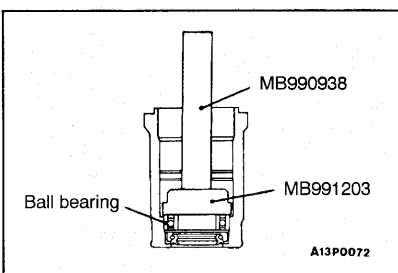


►F◀ OIL SEAL/BALL BEARING INSTALLATION

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

Specified fluid:

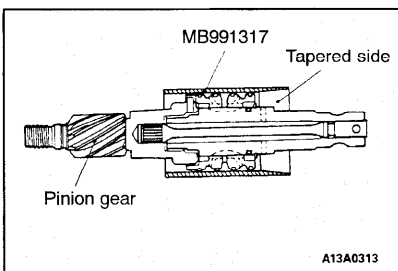
Automatic transmission fluid "DEXRON II"



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

Specified fluid:

Automatic transmission fluid "DEXRON II"



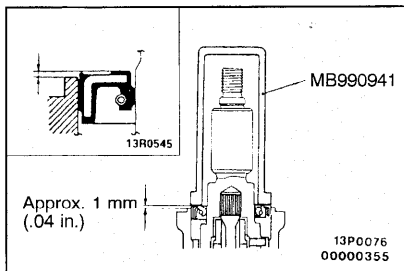
►G◀ SEAL RING INSTALLATION

- (1) Knead the seal ring to soften it.
- (2) Apply the specified fluid to the seal ring, and install to the rack groove.

Specified fluid:

Automatic transmission fluid "DEXRON II"

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

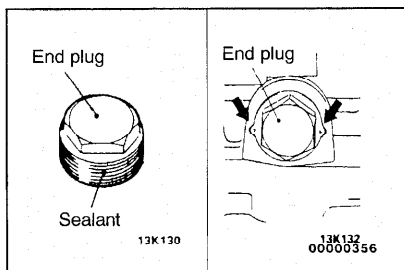


►H◄ OIL SEAL INSTALLATION

Use the special tool to press the oil seal into the valve housing. The upper surface of the oil seal should project outward approx. 1 mm (.04 in.) from the housing edge surface.

Caution

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



►I◄ END PLUG INSTALLATION

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

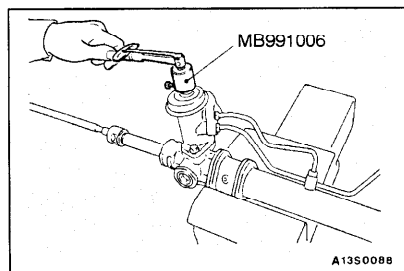
Specified sealant:

3M ATD Part No.8661 or equivalent

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

►J◄ RACK SUPPORT COVER INSTALLATION

Position the rack at its center. Tighten the rack support cover to 15 Nm (11 ft.lbs.).



►K◄ TOTAL PINION TORQUE ADJUSTMENT

- (1) In neutral position, rotate the pinion shaft clockwise one turn/4 - 6 seconds with the special tool. Return the rack support cover 30° - 60° and adjust torque to the standard value.
- (2) Using the special tools, turn 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 - 1.4 Nm (.4 - 1.0 ft.lbs.)

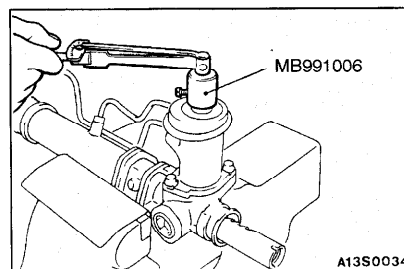
[Change in torque: 0.4 Nm (.3 ft.lbs.)]

Caution

1. When adjusting, set the standard value at its highest value.
2. Assure no ratcheting or catching when operating the rack toward the shaft direction.

NOTE

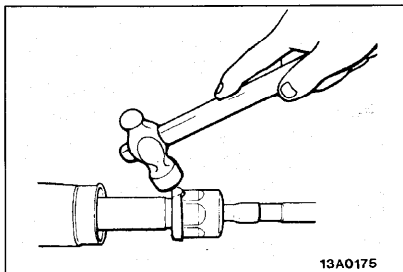
When it cannot be adjusted within the specified return angle, check or replace the rack support cover components.



- (3) After adjusting, lock the rack support cover with lock nut.

►L◄ TAB WASHER/TIE-ROD INSTALLATION

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



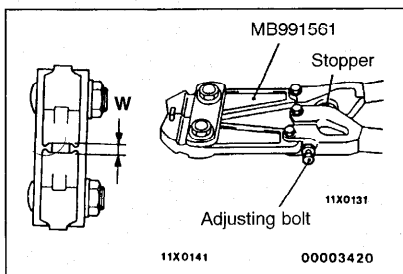
►M◄ BELLOWS BAND INSTALLATION

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

Standard value (W): 2.9 mm (.114 in.)
 <When more than 2.9 mm (.114 in.)>
Screw in the adjusting bolt.
 <When less than 2.9 mm (.114 in.)>
Loosen the adjusting bolt.

NOTE

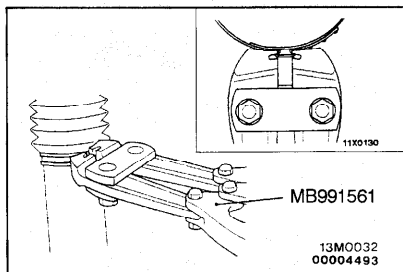
- (1) The dimension (W) is adjusted by approx. 0.7 mm (.028 in.) per one turn.
- (2) Do not turn the adjusting bolt more than one turn.



- (2) Use the special tool to crimp the bellows band.

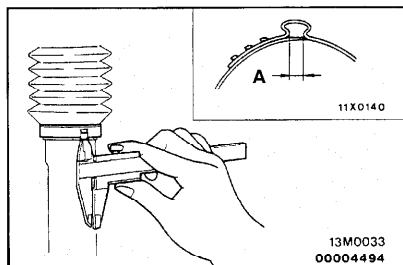
Caution

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



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

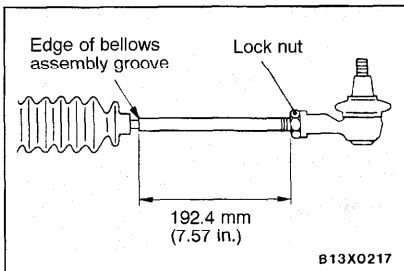
Standard value (A): 2.4 - 2.8 mm (.094 - .110 in.)
 <When more than 2.8 mm (.110 in.)>
Readjust the dimension (W) of step (1) to the value calculated by the following equation, and repeat step (2).
W = 5.5 mm (.217 in.) - A [Example: If (A) is 2.9 mm (.114 in.), (W) is 2.6 mm (.102 in.)]



<When less than 2.4 mm (.094 - .110 in.)>

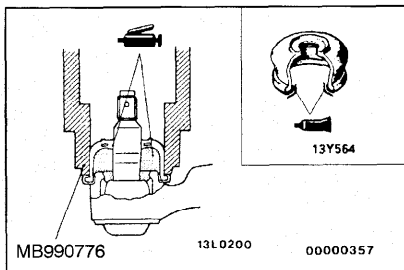
Remove the bellows band, readjust the dimension (W) of step (1) to the value calculated by the following equation, and use a new bellows band to repeat steps (2) to (3).

$W = 5.5 \text{ mm } (.217 \text{ in.}) - A$ [Example: If (A) is 2.3 mm (.091 in.), (W) is 3.2 mm (.126 in.)]



►◄ TIE-ROD END/TIE-ROD END LOCKING NUT INSTALLATION

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



INSPECTION

37200440070

DUST COVER REPLACEMENT

Replace the dust cover only when it has been cracked or damaged by mistake during the maintenance work.

- (1) Remove the dust cover.
- (2) Pack the dust cover interior with multipurpose grease.
- (3) Apply the specified sealant to the dust cover lip.

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

- (4) Using the special tool, install the dust cover to the tie-rod end ball joint.
- (5) Press the dust cover with a finger to check whether the dust cover is cracked or damaged.

RACK CHECK

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

PINION AND VALVE ASSEMBLY CHECK

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

BEARING CHECK

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

OTHER CHECK

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

POWER STEERING OIL PUMP

REMOVAL AND INSTALLATION

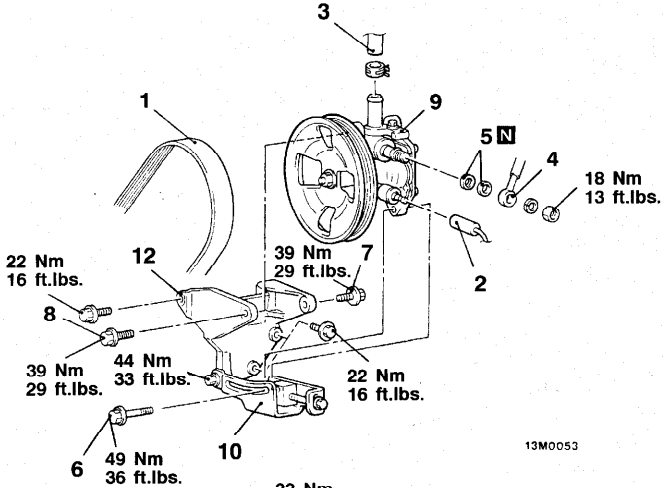
Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37A-8.)

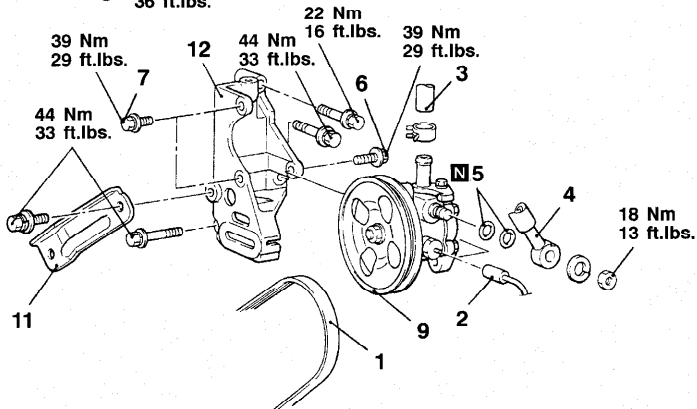
Post-installation Operation

- Power Steering Fluid Level Check (Refer to P.37A-8.)
- Drive Belt Tension Adjusting (Refer to GROUP 11A - On-vehicle Service, and GROUP 11C - On-vehicle Service.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-9.)
- Oil Pump Pressure Test (Refer to P.37A-10.)

<1.5L Engine>



<1.8L Engine>

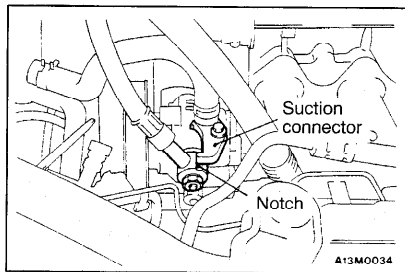


Removal steps

1. Drive belt
2. Pressure switch connector
3. Suction hose
4. Pressure hose
5. O-ring
6. Bolt

7. Bolt
8. Bolt
9. Oil pump
10. Oil pump brace
11. Oil pump bracket stay
12. Oil pump bracket





INSTALLATION SERVICE POINT

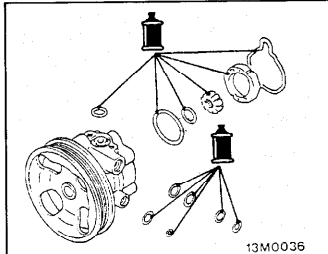
▶A◀ PRESSURE HOSE INSTALLATION

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

INSPECTION

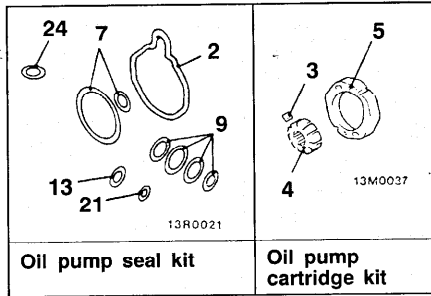
- Check the drive belt for cracks.
- Check the pulley assembly for uneven rotation.

DISASSEMBLY AND REASSEMBLY



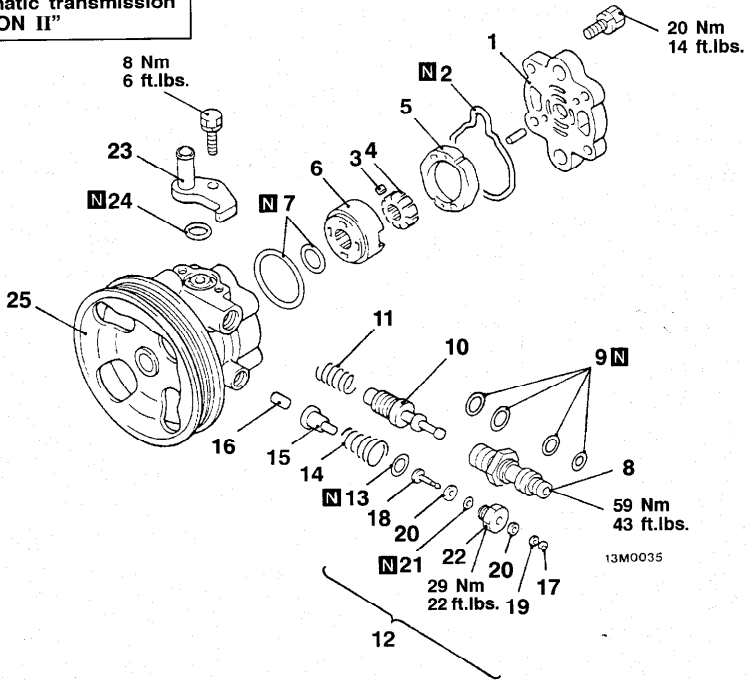
13M0036

Fluid: Automatic transmission fluid "DEXRON II"



Oil pump seal kit

Oil pump cartridge kit



00004856

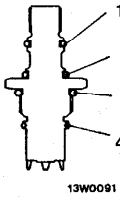
Disassembly steps

- 1. Pump cover
- 2. O-ring
- ▶E◀ 3. Vanes
- ▶D◀ 4. Rotor
- ▶C◀ 5. Cam ring
- ▶A◀ 6. Side plate
- 7. O-ring
- ▶A◀ 8. Connector
- 9. O-ring
- 10. Flow control valve
- 11. Flow control spring
- 12. Terminal assembly
- ▶A◀ 13. O-ring
- ▶B◀ 14. Spring

- 15. Plunger
- 16. Piston rod
- 17. Snap ring
- 18. Terminal
- 19. Washer
- 20. Insulator
- ▶A◀ 21. O-ring
- ▶A◀ 22. Plug
- 23. Suction connector
- ▶A◀ 24. O-ring
- 25. Oil pump body and pulley assembly

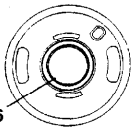
Caution
Do not disassemble the flow control valve.

Connector



13W0091

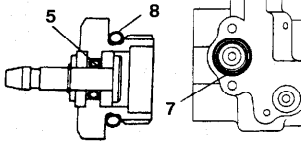
Side plate



13N0059

Suction connector
mounting portion of
oil pump body

Terminal assembly



13K753

13N0057
00000736

REASSEMBLY SERVICE POINTS

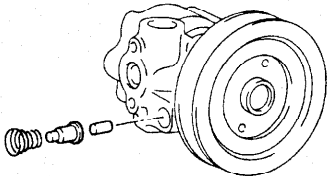
▶A◀ O-RING INSTALLATION

Apply the specified fluid on O-rings before.

No.	I.D. × Width mm (in.)
1	11.0 × 1.9 (.433 × .075)
2	13.0 × 1.9 (.512 × .075)
3	17.8 × 2.4 (.701 × .094)
4	13.5 × 1.5 (.531 × .059)
5	3.8 × 1.9 (.150 × .074)
6	16.8 × 2.4 (.661 × .094)
7	17.8 × 2.4 (.701 × .094)
8	13.0 × 1.9 (.511 × .075)

▶B◀ SPRING INSTALLATION

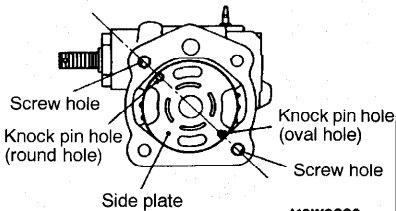
Fit the spring to the oil pump body with the larger diameter end at the terminal assembly side.



13F0050

▶C◀ SIDE PLATE INSTALLATION

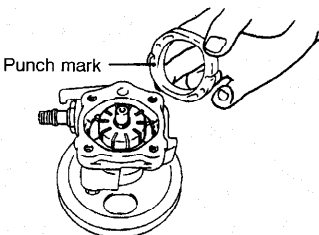
Install the side plate so that the screw hole in the oil pump body and the knock pin holes in the side plate are all in a straight line.



A13W0092

▶D◀ CAM RING INSTALLATION

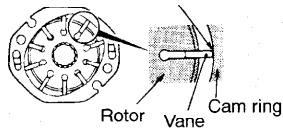
Install the cam ring with the punch mark facing the side plate.



A13N0181

►E◄ VANE INSTALLATION

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



A13R0577

INSPECTION

37200550087

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

POWER STEERING HOSES

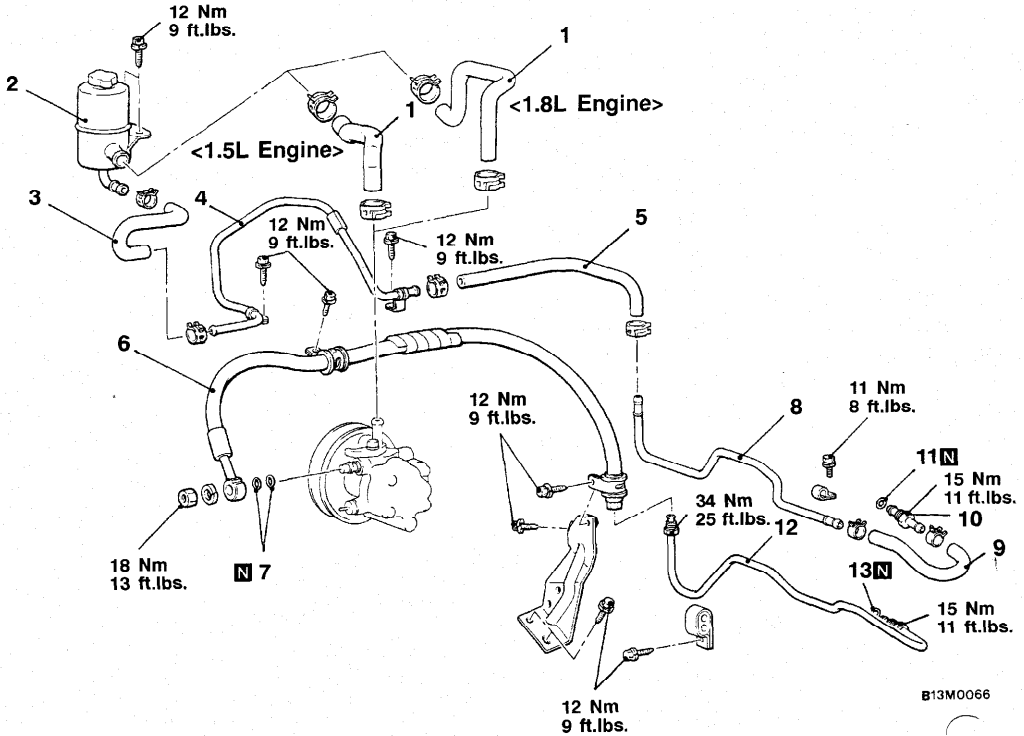
REMOVAL AND INSTALLATION

Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37A-8.)

Post-installation Operation

- Power Steering Fluid Level Check (Refer to P.37A-8.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-9.)



Removal steps

1. Suction hose
2. Oil reservoir
3. Return hose
4. Return tube
5. Return hose
6. Pressure hose

7. O-ring
8. Return tube
9. O-ring
10. Pressure tube
11. O-ring



INSTALLATION SERVICE POINT**▶A◀ PRESSURE HOSE/PRESSURE TUBE
INSTALLATION**

- (1) Connect the pressure hose so that its notched part contacts the suction connector.

- (2) Align the mating marks on the pressure hose and pressure tube, and install the pressure hose.

