STEERING

CONTENTS

120002166

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

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

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

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B-Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

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

GENERAL INFORMATION

120002167

Engine speed-responsive hydraulic power steering has been adopted as standard in all vehicle models. The main features are as follows. Four-spoke steering wheels have been adopted. In addition, SRS (Supplemental Restraint System) is provided as an option in all vehicles.

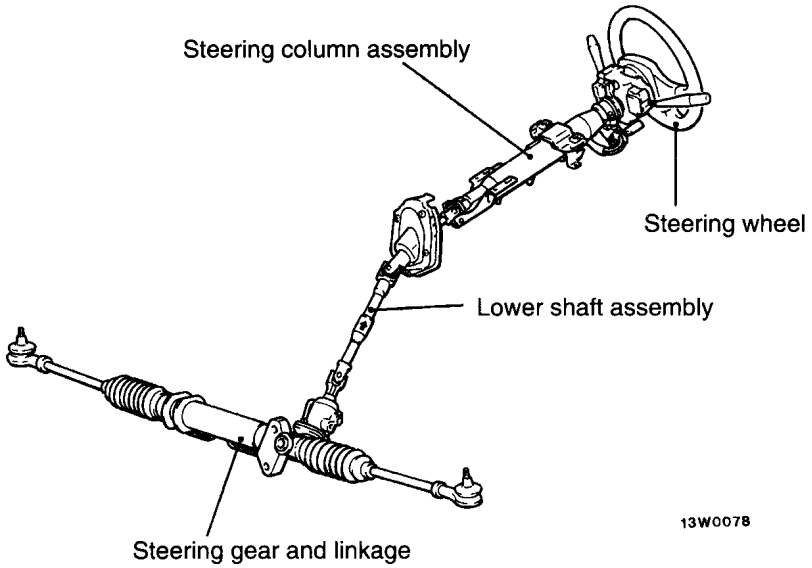
The steering column in all vehicles has a shock absorber mechanism and a tilt steering mechanism. A vane-type oil pump with a fluid flow control system included has been adopted.
The steering gear and linkage is an integral rack and pinion type.

Items		Specifications
Gear box	Type	Rack and pinion
Oil pump	Type	Vane type
	Displacement mℓ/rev.	9.6
	Relief set pressure kPa	9,300–10,000

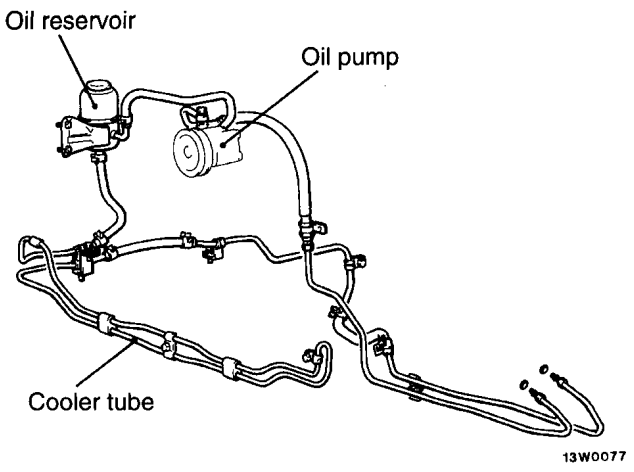
CONSTRUCTION DIAGRAM

120002168

L.H. drive vehicles



<4G6>



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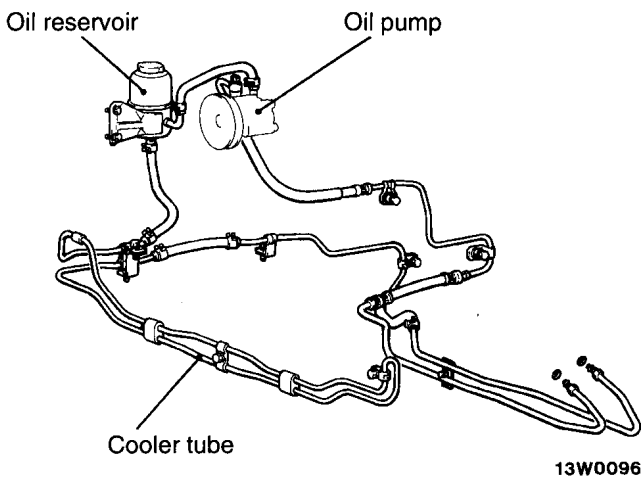

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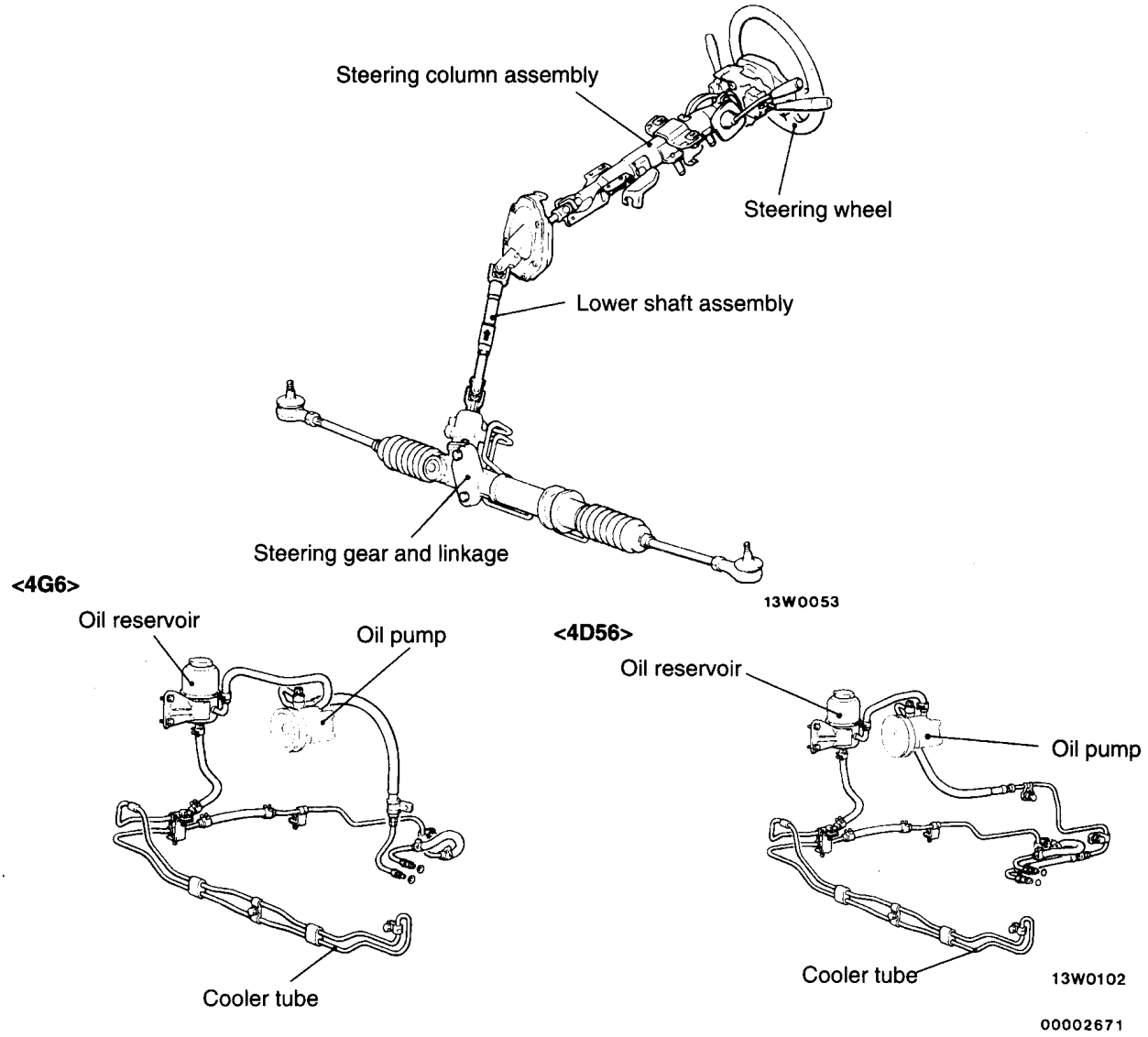
R.H. drive vehicles



SERVICE SPECIFICATIONS

120002169

Items			Standard value	Limit
Steering wheel free play mm		With engine running	–	30
		With engine stopped	10 or less	–
Steering angle	2WD	Inner wheel	37° 45' $\binom{+0°}{-3°}$	–
		Outer wheel	33° 55'	–
	4WD	Inner wheel	32° 23' $\binom{+0°}{-3°}$	–
		Outer wheel	32° 07'	–
Variation of tie rod end ball joint shaft direction mm			–	1.5
Tie rod end ball joint starting torque Nm			0.5–2.5	–
Engine idle speed r/min		4G64, 4D56	750	–
		4G63-M/T	800	–
		4G63-A/T	850	–
Stationary steering effort N			36 or less	–
V-Belt deflection mm/tension N	4G6	When belt tension is inspected	5.5–7.5/294–490	–
		When belt tension is readjusted	6.0–7.0/343–441	–
		When new belt is installed	4.0–6.0/490–686	–
	4D56	When belt tension is inspected	8.0–12.0/294–490	–
		When belt tension is readjusted	9.0–11.0/343–441	–
		When new belt is installed	6.0–8.0/490–686	–
Oil pump relief pressure kPa			9,300–10,000	–
Oil pump pressure kPa	Pressure under no-load conditions		981 or less	–
	Steering gear retention hydraulic pressure		9,300–10,000	–
Oil pressure switch operating pressure kPa		OFF→ON	1,765–2,354	–
		ON→OFF	981–2,354	–
Total pinion preload (Change in torque: 0.4 Nm) Nm			0.6–1.32	–
Tie-rod joint swing resistance N			6–21	–
Tie-rod joint swing torque Nm			1.5–5	–

LUBRICANTS

120000022

Items	Specified lubricants	Quantity
Bellows	Silicone grease	As required
Power steering fluid	Automatic transmission fluid DEXRON or DEXRON II	1.0ℓ
Flow control valve	Automatic transmission fluid DEXRON or DEXRON II	As required
Friction surface of rotor, vane, cam ring and pump cover		
O-ring		

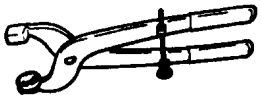
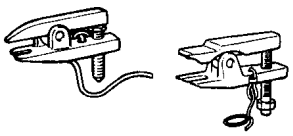
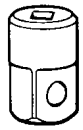
SEALANT

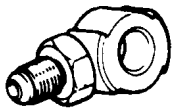
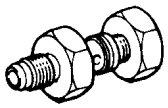
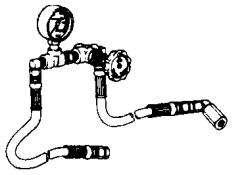
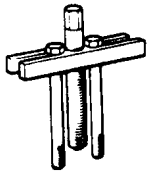
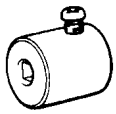
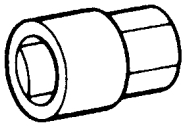
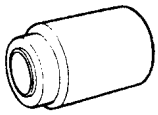
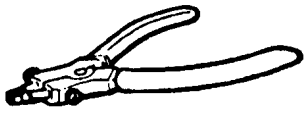
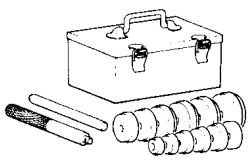
120000023

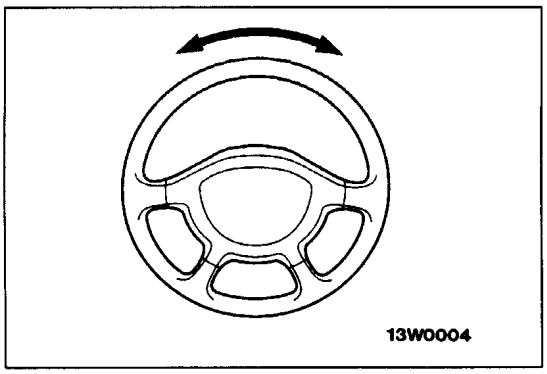
Items	Specified sealant	Remarks
Power steering rack support cover screw	3M ATD Part No. 8661 or equivalent	Semi-drying sealants
Dust cover lip for tie rod end ball joint		

SPECIAL TOOLS

120002521

Tool	Number	Name	Use
	MB990948	Linkage joint gauge	Ball joint variation check for shaft direction
	MB991113 or MB990635	Steering linkage puller	Disconnection of tie-rod end
	MB990685	Torque wrench	• Measurement of the ball joint starting torque • Measurement of the pinion shaft preload
	MB990326	Preload socket	Measurement of the ball joint starting torque

Tool	Number	Name	Use
	MB990993 or MB991217	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
	MB990994	Power steering oil pressure gauge adapter (hose side)	
	MB990662	Oil pressure gauge assembly	
	MB990803	Steering wheel puller	Disconnection of the steering wheel
	MB991006	Preload socket	Measurement of the pinion shaft preload
	MB991204	Torque wrench socket	Adjustment of rack support Removal of rack support cover
	MB990776	Front axle base	Installation of dust cover for tie rod end ball joint
	MB990628	Snap ring pliers	To remove and install the snap ring of the pulley and shaft
	MB990925	Bearing and oil seal installer set	Installation of the oil seal and bearing (Refer to GROUP 26 – Special Tools.)



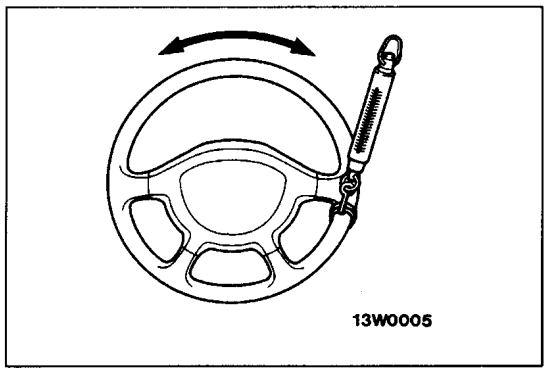
SERVICE ADJUSTMENT PROCEDURES

120000025

STEERING WHEEL FREE PLAY CHECK

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

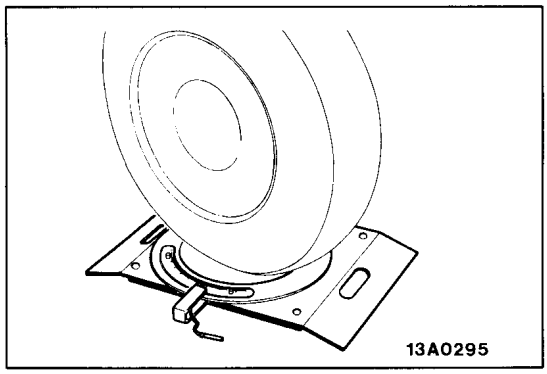
   Limit: 30 mm
3. When play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.



4. If the free play still exceeds the limit value, set steering wheel straight ahead with engine stopped. Load 5 N towards steering wheel circumference and check play.

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

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



STEERING ANGLE CHECK

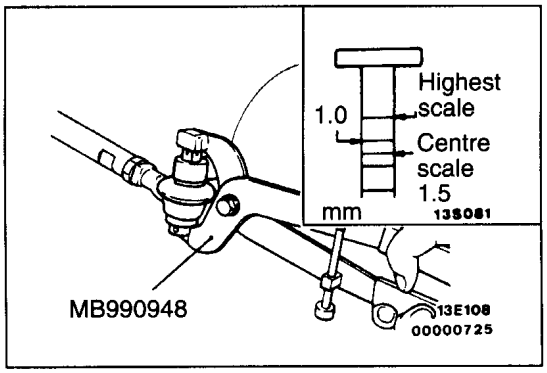
120000026

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

   Standard value:

Items	2WD	4WD
Inside wheel	37° 45' $\binom{+0°}{-3°}$	32° 23' $\binom{+0°}{-3°}$
Outside wheel	33° 55'	32° 07'

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

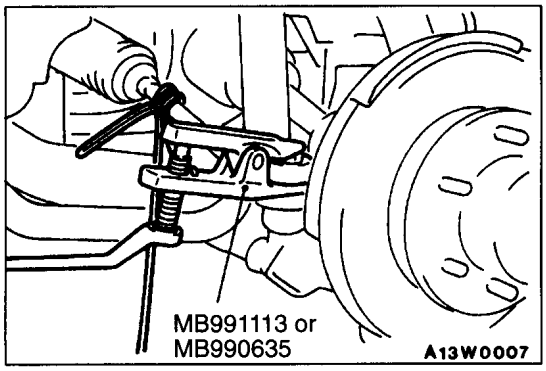


TIE ROD END BALL JOINT VARIATION CHECK (SHAFT DIRECTION) 120000027

1. Hold ball joint with the special tool.
2. Set special tool scale at its highest and measure variation with ball stud compressed. The variation should locate between the highest and centre scales.

   Limit: 1.5 mm
3. When the variation exceeds the centre scale, replace the tie-rod end.

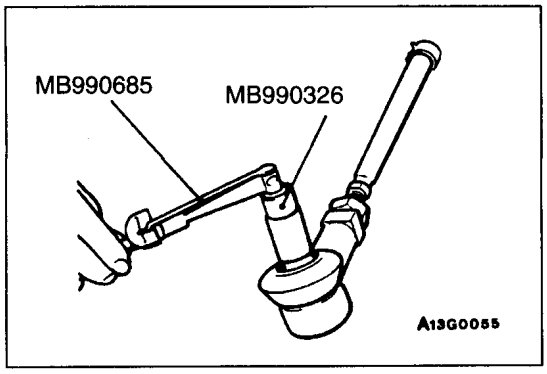
   Caution
   Even if the variation is within the limit, check ball joint starting torque.



TIE ROD END BALL JOINT STARTING TORQUE CHECK 120000028

1. Disconnect tie rod and knuckle with special tool.

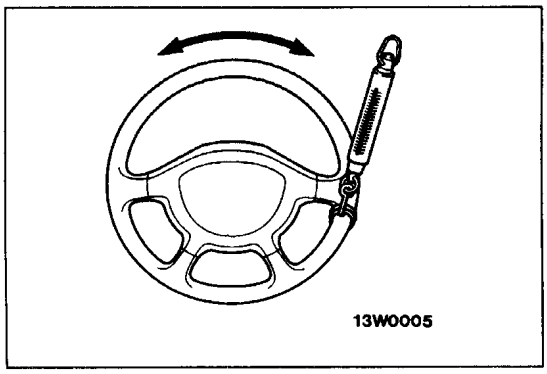
   Caution
   1. **Using the special tool, loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.**
   2. **Supprot the special tool with a cord, etc. to prevent it from coming off.**



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

   Standard value: 0.5–2.5 Nm
3. When the starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check ball joint for end play or ratcheting. If none of these, the joint is still serviceable.
5. Tighten the nut to the specified torque, and then install a new split pin.

   Tightening torque: 39 Nm



STATIONARY STEERING EFFORT CHECK

120002170

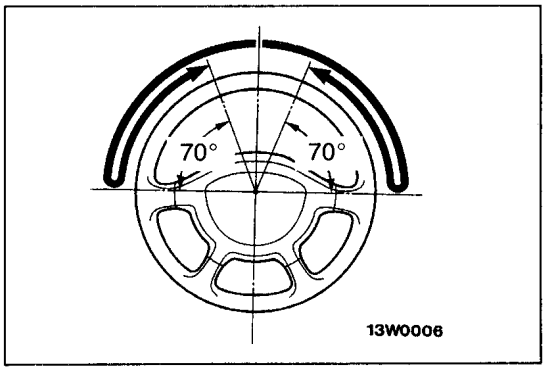
1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and check whether or not the engine idle speed is the standard value.

   Standard value:

Engine idle speed r/min	Remarks
750	4G64, 4D56
800	4G63-M/T
850	4G63-A/T

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

   Standard value: Steering effort: 36 N or less
   Fluctuation allowance: 5 N or less



CHECKING STEERING WHEEL RETURN TO CENTRE

120000030

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

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

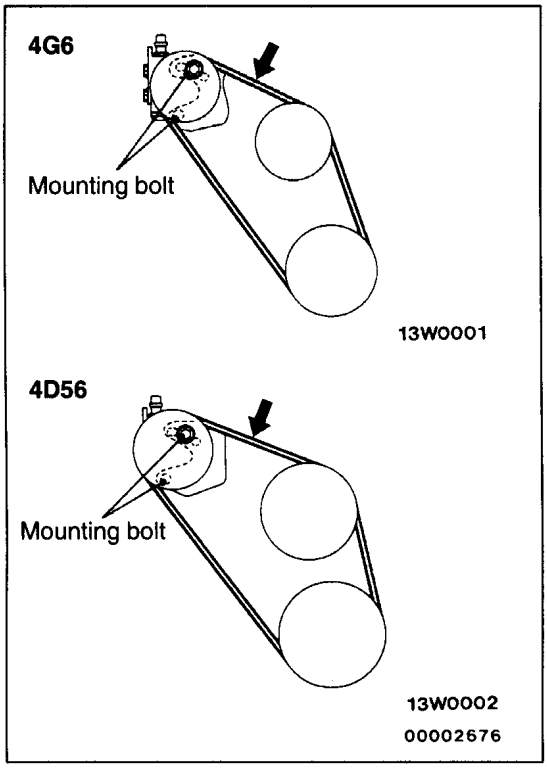
   NOTE
   There will be a momentary feeling or "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

DRIVE BELT TENSION CHECK

120002171

Check to be sure that the belt is not damaged and that the drive-belt is correctly attached to the groove of the pulley.

NOTE
If there is abnormal noise or belt slippage, check the belt tension and check for unusual wear or abrasion, or damage, of the pulley contact surface, and for scars or scratches on the pulley.



1. Press in drive belt at the illustrated position with about 98 N and measure deflection or use a belt tension gauge to check whether the belt tension is at the standard value.

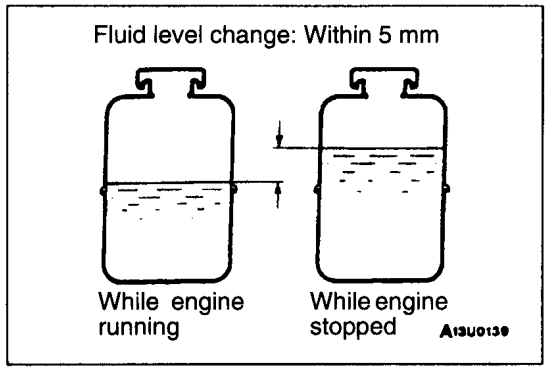
Standard value:

4G6	Deflection mm	Tension N
When belt tension is inspected	5.5–7.5	294–490
When belt tension is readjusted	6.0–7.0	343–441
When new belt is installed	4.0–6.0	490–686

4D56	Deflection mm	Tension N
When belt tension is inspected	8.0–12.0	294–490
When belt tension is readjusted	9.0–11.0	343–441
When new belt is installed	6.0–8.0	490–686

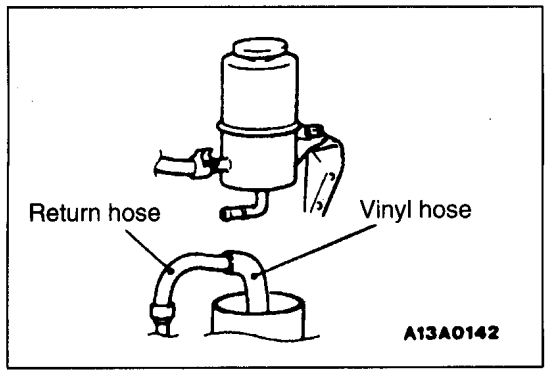
2. If the deflection is out of the standard values, adjust the belt tension using the following procedure.

   Loosen the oil pump mounting bolt, and then move the oil pump to adjust the V-belt tension to the standard value.



FLUID LEVEL CHECK 120000032

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



FLUID REPLACEMENT 120000033

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. On vehicles with a petrol engine, disconnect the high tension cable. On vehicles with a diesel engine, remove the fuel cut valve connector attached to the injection pump.

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

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

Specified fluid: Automatic transmission fluid DEXRON or DEXRON II

BLEEDING 120000034

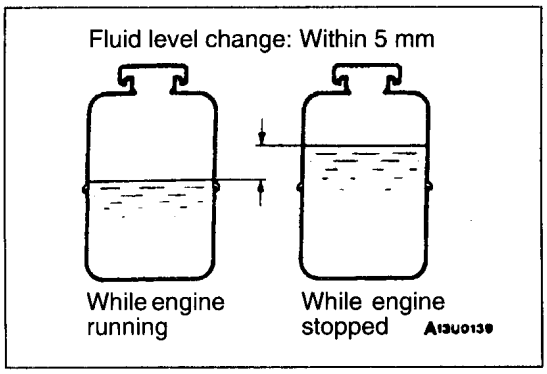
1. Jack up the front wheels and support them by using a rigid rack.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right five or six times.
4. On vehicles with a petrol engine, disconnect the high-tension cable. On vehicles with a diesel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

Caution
Be careful not to position the high-tension cable near the carburettor or 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 filter.**
2. **If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.**

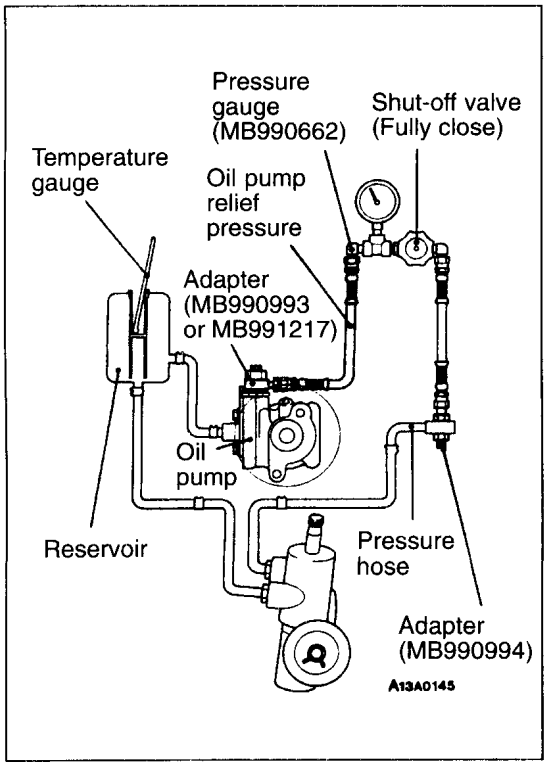
6. On vehicles with a petrol engine, connect the ignition cable. On vehicles with a diesel engine, connect the fuel cut valve connector attached to the injection pump. Start the engine (idling).
7. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
8. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
9. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.



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

Caution

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



OIL PUMP PRESSURE TEST

120002176

CHECKING THE OIL PUMP RELIEF PRESSURE

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

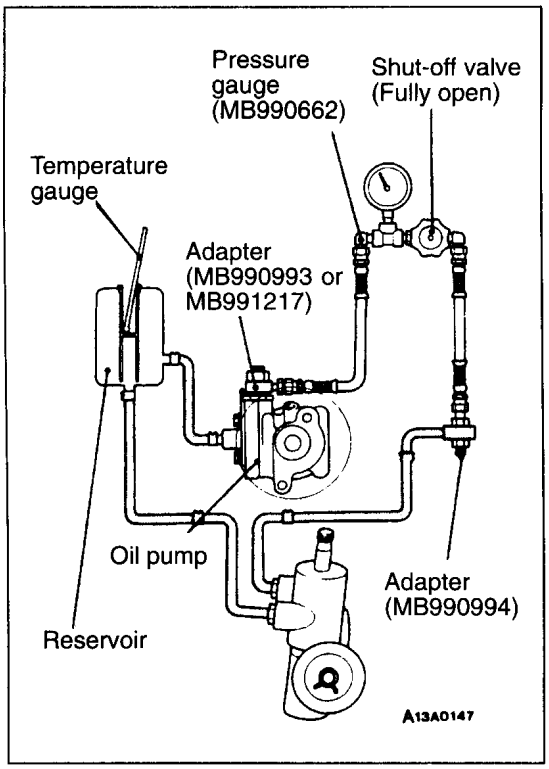
   Standard value: 9,300–10,000 kPa

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

5. If it is not within the standard value, overhaul the oil pump.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.

   Tightening torque: 18 Nm

7. Bleed the system.



CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS

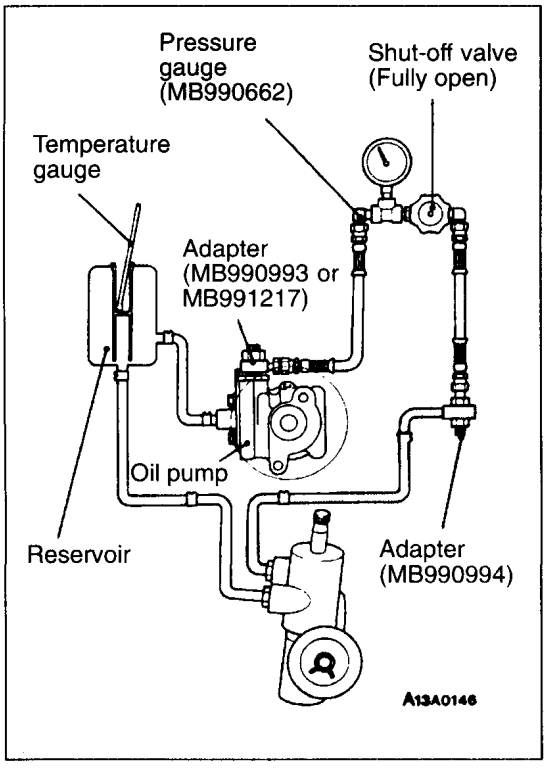
1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C.
3. Start the engine and idle it at 1,000±100 r/min.
4. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

   Standard value: 981 kPa or less

5. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.

   Tightening torque: 18 Nm

7. Bleed the system.



CHECKING THE STEERING GEAR RETENTION HYDRAULIC PRESSURE

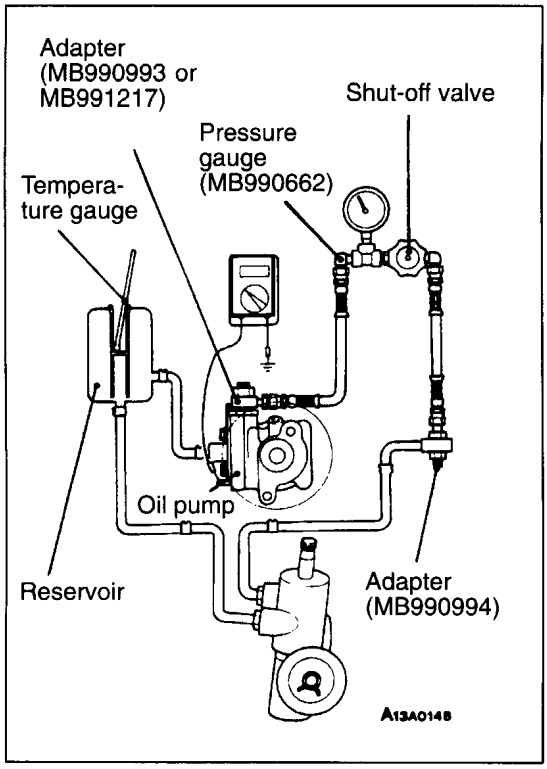
1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C.
3. Start the engine and idle it at 1,000±100 r/min.
4. Fully open the shut-off valve of the pressure gauge.
5. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

   Standard value: 9,300–10,000 kPa

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

   Tightening torque: 18 Nm

8. Bleed the system.



POWER STEERING OIL PRESSURE SWITCH CHECK <Petrol>

120000036

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

   Standard value: 1,765–2,354 kPa

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: 981–2,354 kPa

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

   Tightening torque: 18 Nm

8. Bleed the system.

STEERING WHEEL AND SHAFT

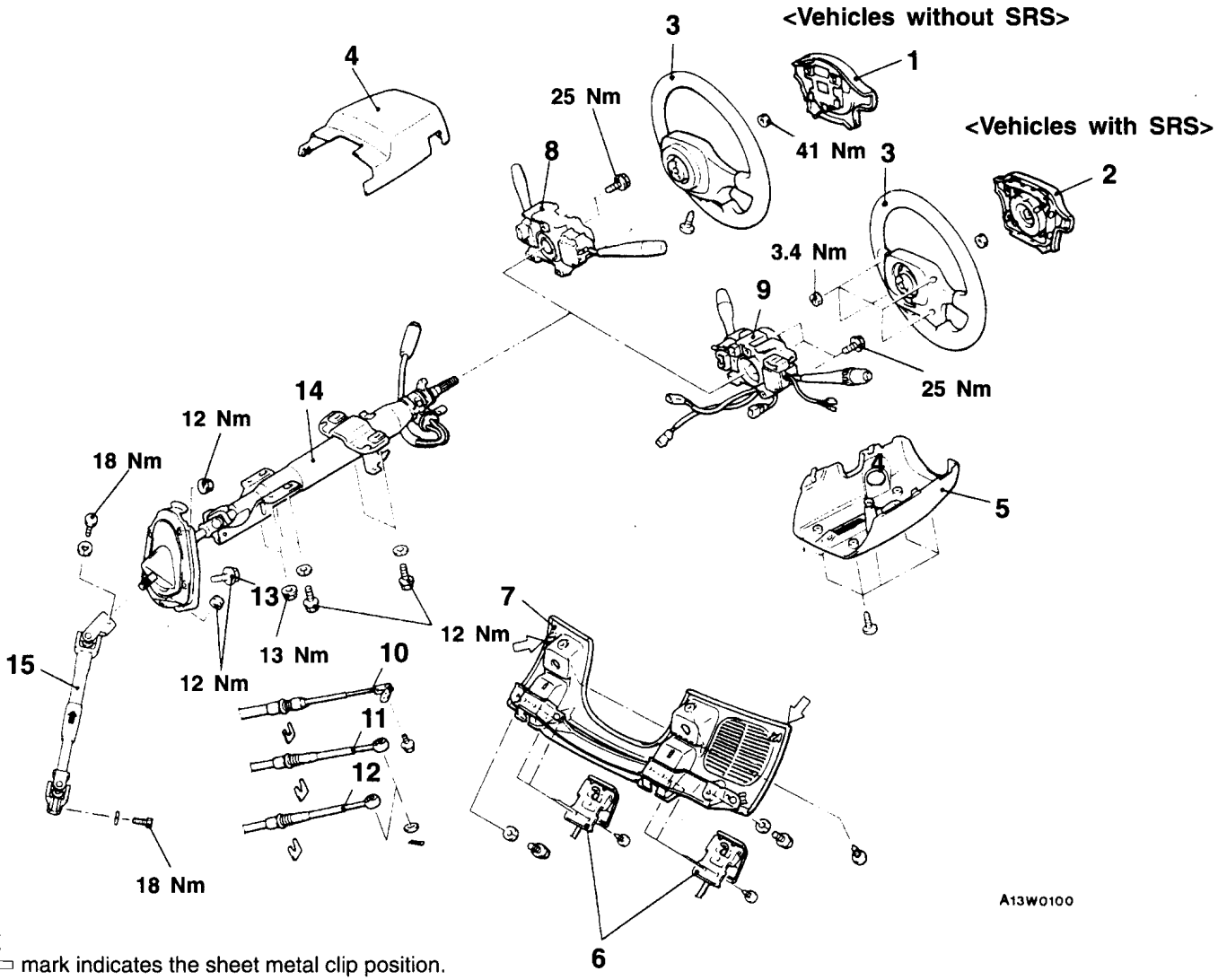
120002172

REMOVAL AND INSTALLATION

<L.H. drive vehicles>

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

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



NOTE
The ⇦ mark indicates the sheet metal clip position.

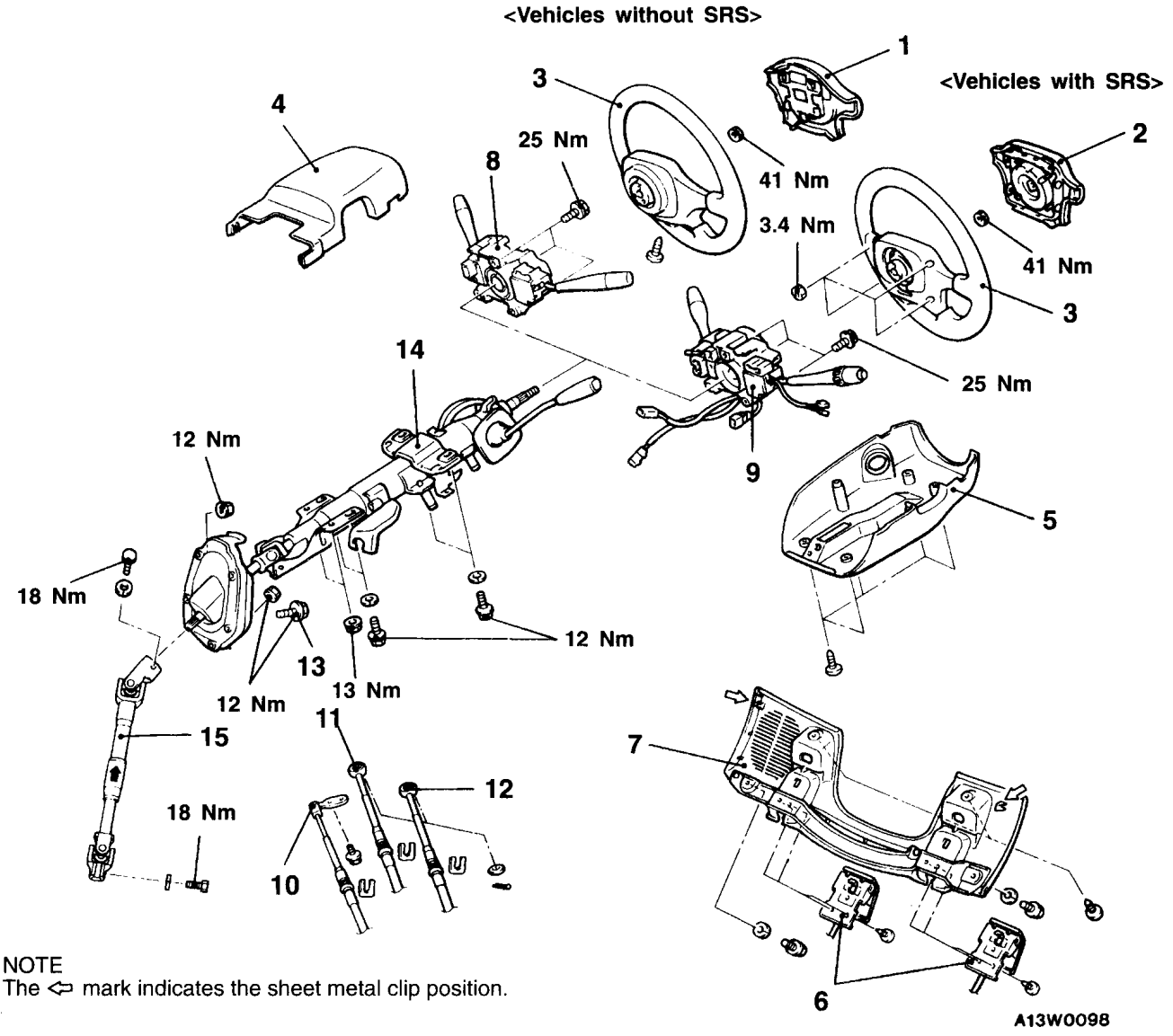
Removal steps

1. Horn pad <Vehicles without SRS>
2. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
◀A▶ ▶C◀ 3. Steering wheel
4. Upper column cover
5. Lower column cover
6. Hood lock release handle and fuel lid lock release handle
7. Instrument under cover
▶B◀ 8. Column switch
▶B◀ 9. Clock spring and column switch (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
10. Transmission control cable assembly <A/T> (Refer to GROUP 23 – Transmission Control.)
11. Shift cable assembly <M/T–Column shift> (Refer to GROUP 22 – Transmission Control.)
12. Select cable assembly <M/T–Column shift> (Refer to GROUP 22 – Transmission Control.)
13. Retainer attachment bolt
14. Steering column assembly
▶A◀ 15. Lower shaft assembly

<R.H. drive vehicles>

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

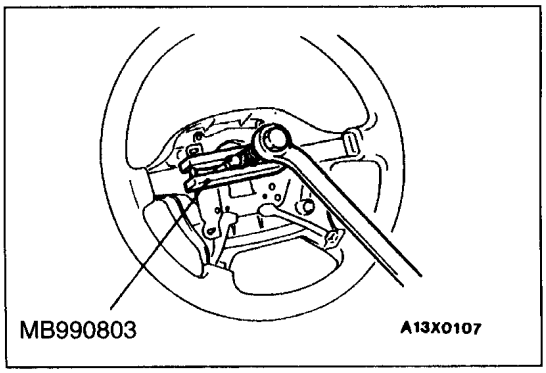
Post-installation Operation
- Checking Steering Wheel Position with Wheels Straight Ahead



NOTE
The ⇦ mark indicates the sheet metal clip position.

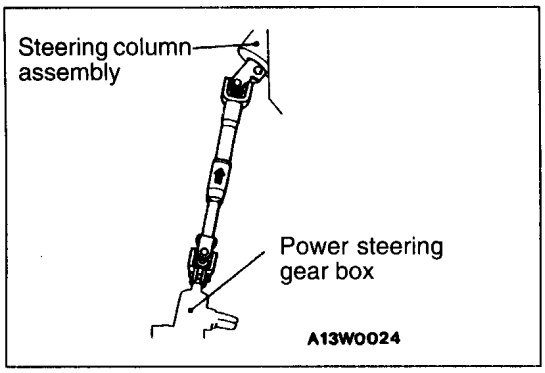
Removal steps

1. Horn pad <Vehicles without SRS>
2. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
◀A▶ ▶C◀ 3. Steering wheel
4. Upper column cover
5. Lower column cover
6. Hood lock release handle and fuel lid lock release handle
7. Instrument under cover
▶B◀ 8. Column switch
▶B◀ 9. Clock spring and column switch (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
10. Transmission control cable assembly <A/T> (Refer to GROUP 23 – Transmission Control.)
11. Shift cable assembly <M/T–Column shift> (Refer to GROUP 22 – Transmission Control.)
12. Select cable assembly <M/T–Column shift> (Refer to GROUP 22 – Transmission Control.)
13. Retainer attachment bolt
14. Steering column assembly
▶A◀ 15. Lower shaft assembly



REMOVAL SERVICE POINT

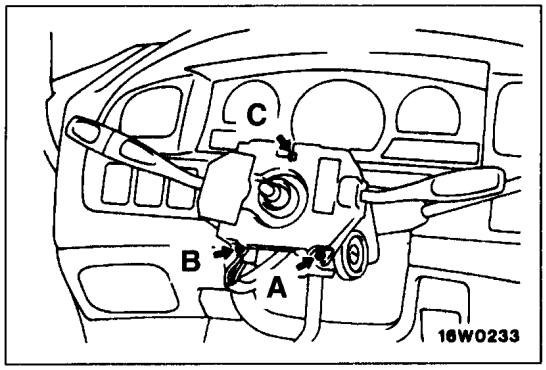
◀A▶ STEERING WHEEL REMOVAL



INSTALLATION SERVICE POINTS

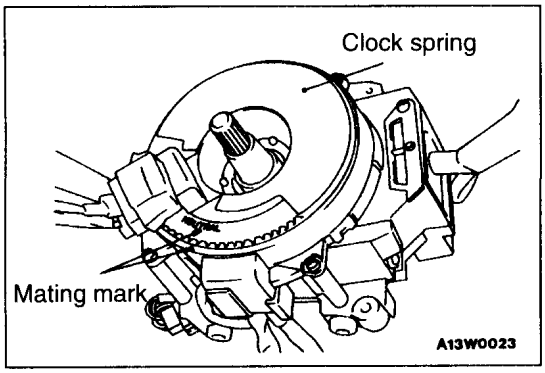
▶A◀ LOWER SHAFT ASSEMBLY INSTALLATION

Install the shaft so that its arrow faces upwards.



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

Tighten the screws in an alphabetical order.



▶C◀ STEERING WHEEL INSTALLATION

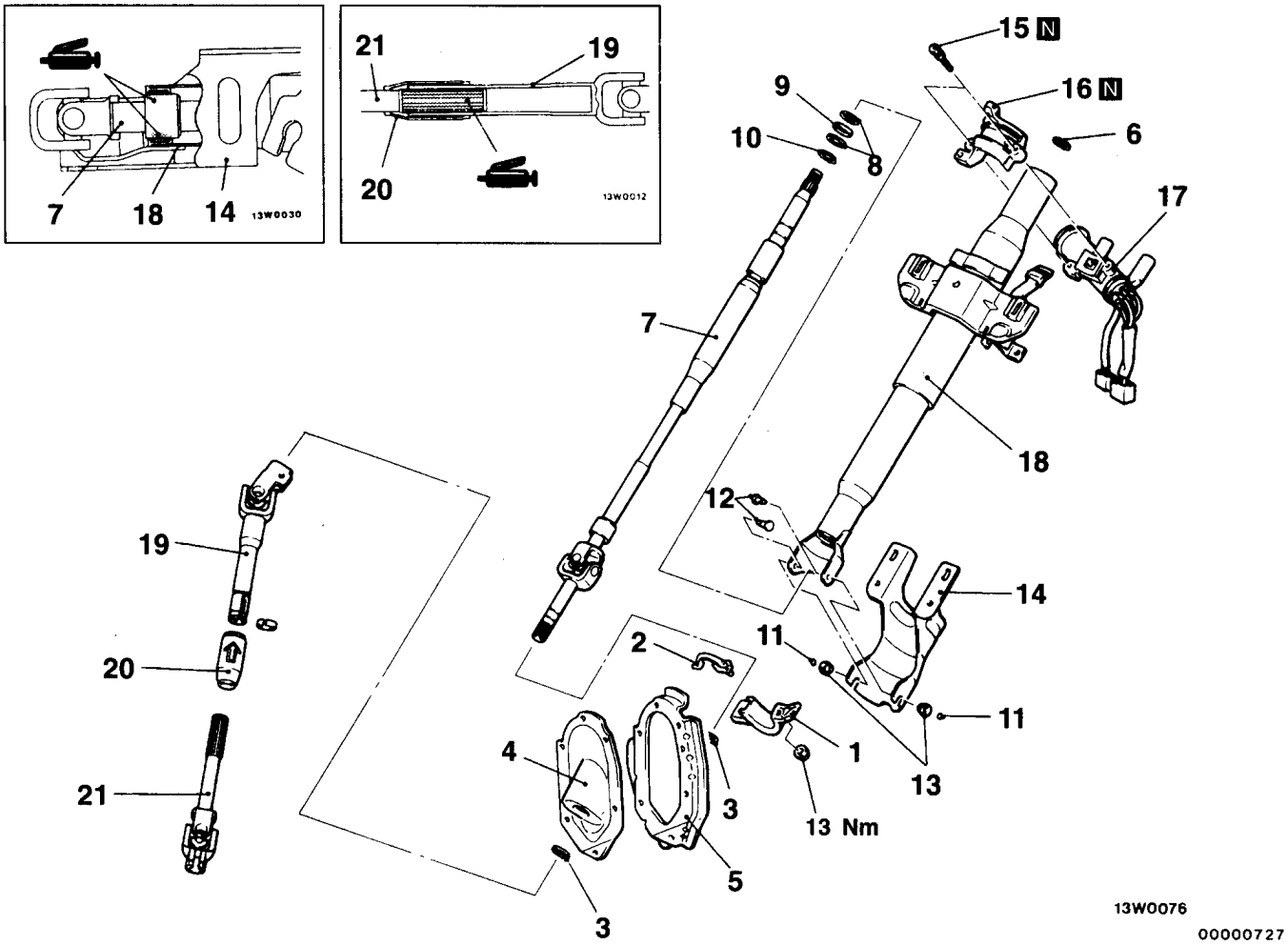
Line up the "NEUTRAL" mark of the clock spring with the mating mark before installing the steering wheel.

Caution

If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

STEERING COLUMN ASSEMBLY, LOWER SHAFT ASSEMBLY DISASSEMBLY AND REASSEMBLY

120000038

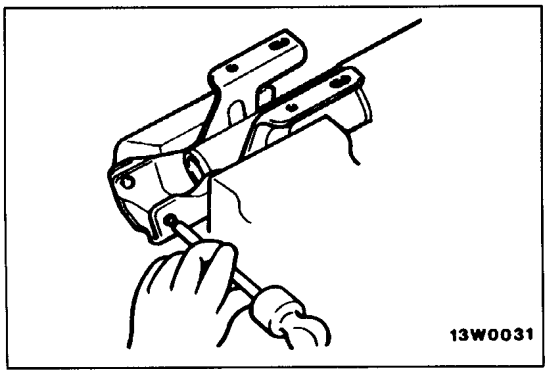


Steering column assembly disassembly steps

- ▶B◀ 1. Steering shaft bracket A
- ▶B◀ 2. Steering shaft bracket B
- 3. Snap ring
- 4. Joint cover
- 5. Retainer
- 6. Snap ring
- 7. Steering shaft assembly
- 8. Bearing spacer stopper
- 9. Bearing spacer
- 10. Snap ring
- 11. Snap ring
- ◀A▶ 12. Clevis pin
- 13. Bushing
- 14. Tilt lower bracket
- ▶A◀ 15. Special bolt
- ◀B▶ ▶A◀ 16. Steering lock bracket
- ◀B▶ ▶A◀ 17. Steering lock cylinder
- 18. Steering column

Lower shaft assembly disassembly steps

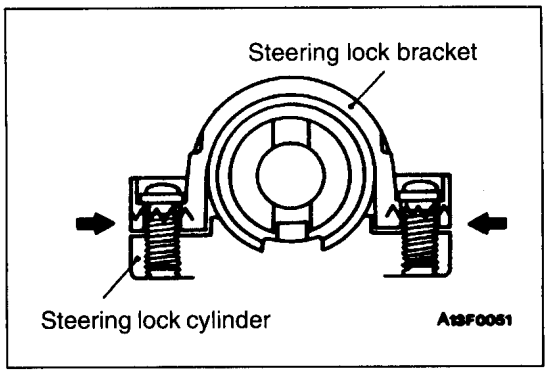
- 19. Pipe assembly
- 20. Dust cover
- 21. Shaft assembly



DISASSEMBLY SERVICE POINTS

◀A▶ CLEVIS PIN REMOVAL

Use a punch to remove the clevis pin.



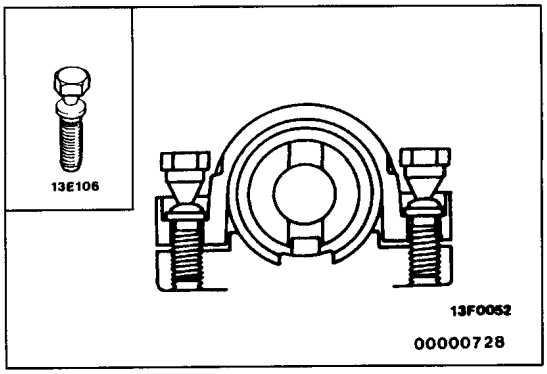
◀B▶ STEERING LOCK BRACKET/STEERING LOCK CYLINDER REMOVAL

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 POINTS

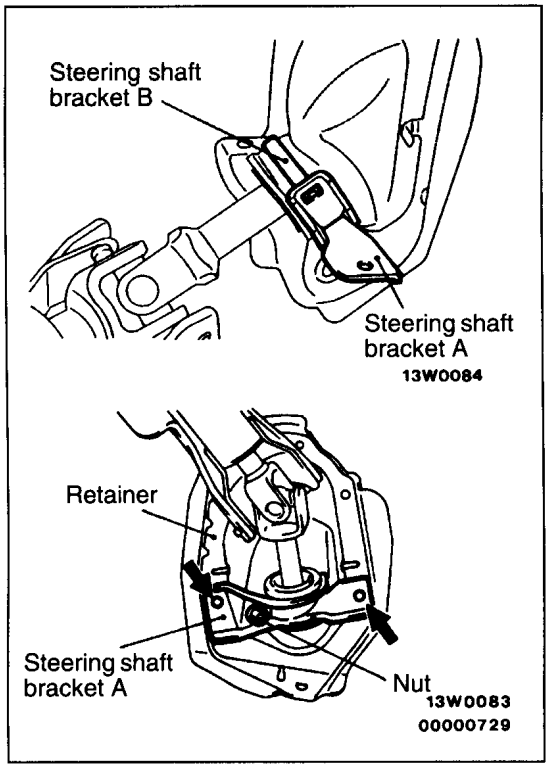
▶A◀ STEERING LOCK CYLINDER/STEERING LOCK BRACKET/SPECIAL BOLT INSTALLATION

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



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

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



▶B◀ STEERING SHAFT BRACKET B /STEERING SHAFT BRACKET A INSTALLATION

(1) Hook steering shaft bracket B into the hole in steering shaft bracket A.

(2) Position steering shaft bracket A so that the holes indicated by the arrows are aligned with the holes in the retainer, and then tighten the nut to the specified torque.

Tightening torque: 13 Nm

POWER STEERING GEAR BOX

120000039

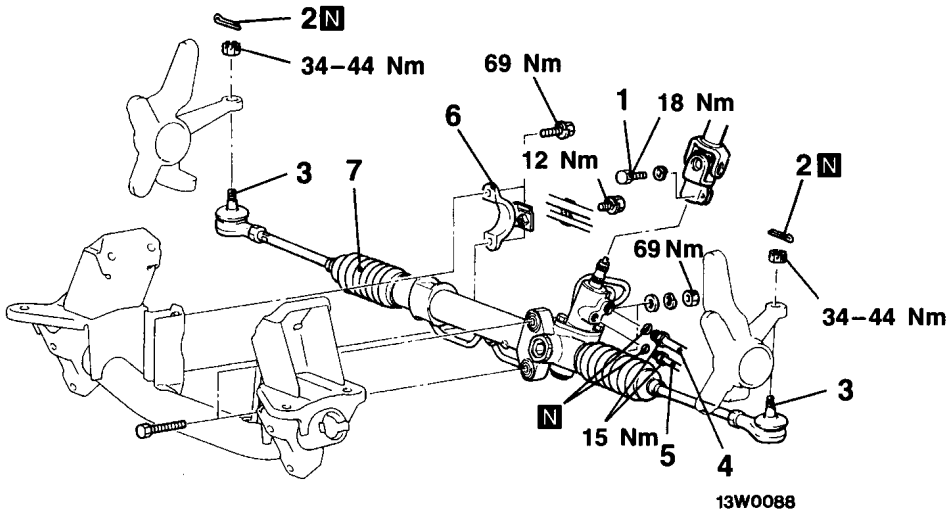
REMOVAL AND INSTALLATION

CAUTION: SRS
For vehicles with SRS, before removal of steering gear box, refer to GROUP 52B, 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.

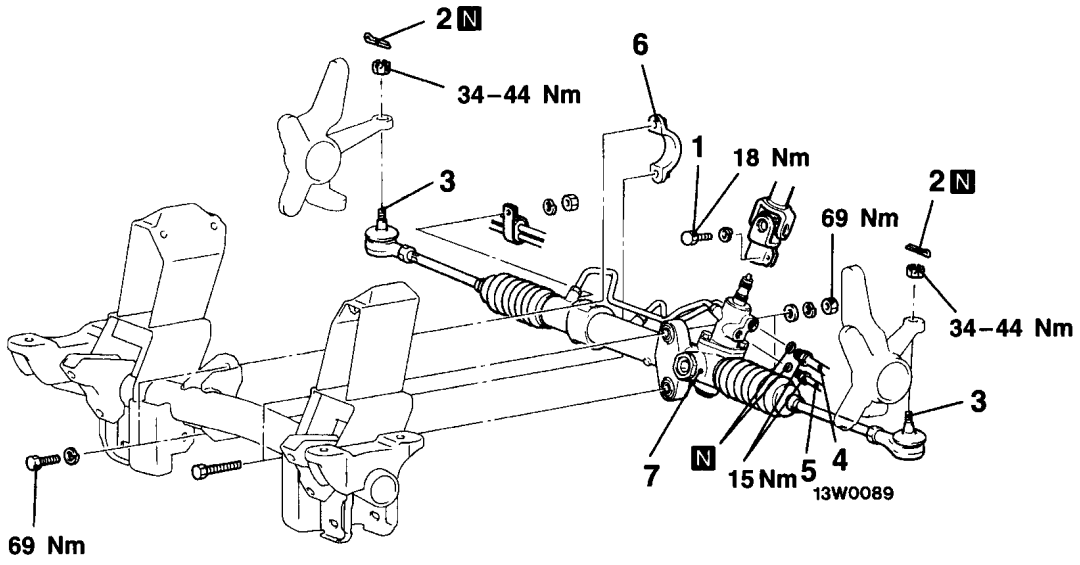
Pre-removal Operation
(1) Power Steering Fluid Draining (Refer to P. 37A-10.)
(2) Air Cleaner Assembly Removal
(3) Under Cover Removal (Refer to GROUP 42 – Under Cover.)

Post-installation Operation
(1) Under Cover Installation (Refer to GROUP 42 – Under Cover.)
(2) Air Cleaner Assembly Installation
(3) Power Steering Fluid Supplying (Refer to P. 37A-10.)
(4) Power Steering Fluid Line Bleeding (Refer to P. 37A-11.)
(5) Steering Wheel Position with Wheels Straight Ahead Checking
(6) Front Wheel Alignment Adjustment (Refer to GROUP 33A – Service Adjustment Procedures.)

<2WD>



<4WD>



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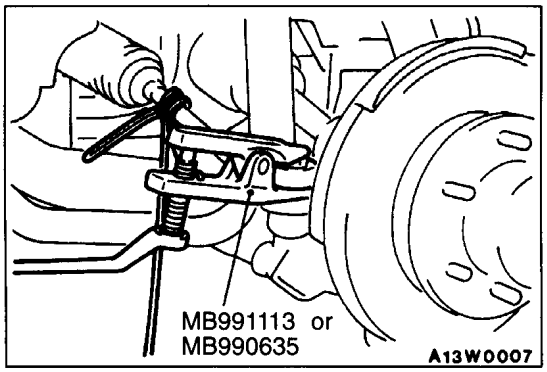
Removal steps

1. Lower shaft assembly and gear box connecting bolt
2. Split pin
◀A▶ 3. Connection for tie-rod end and knuckle
4. Connection for return tube
5. Connection for pressure tube
6. Clamp
◀B▶ 7. Gear box 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.**

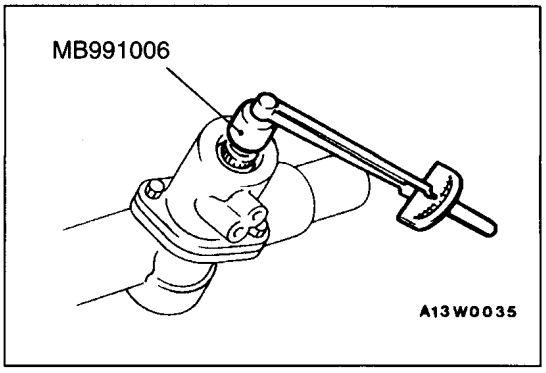
◀B▶ GEAR BOX ASSEMBLY REMOVAL

(1) Move the rack completely to the right and then remove the gear box from the crossmember.
(2) While tilting the gear box downward, remove it to the left.

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

INSPECTION

- Check the rubber parts for cracks and breakage.

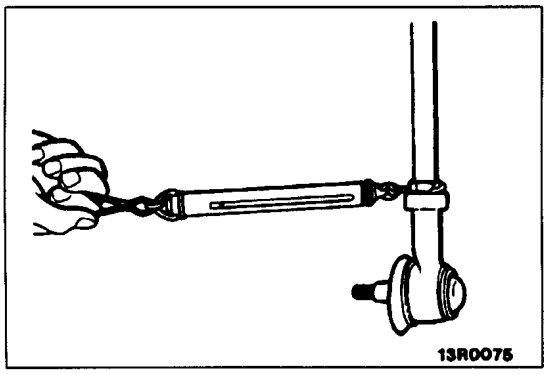


GEAR BOX TOTAL PINION TORQUE

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

Standard value: 0.6–1.32
[Change in torque: 0.4 Nm]

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



CHECK THE TIE ROD FOR SWING RESISTANCE

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

Standard value: 6–21 N [1.5–5 Nm]

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

DISASSEMBLY AND REASSEMBLY

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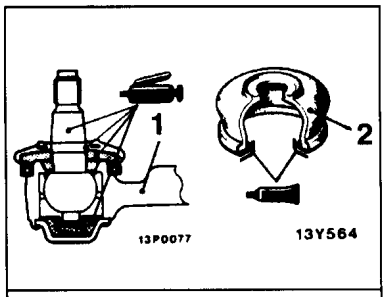
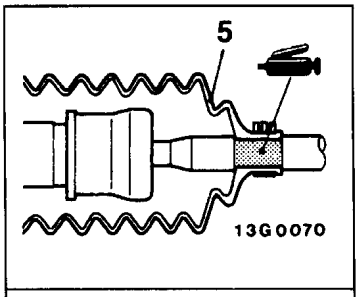
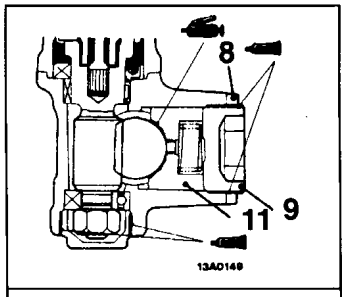


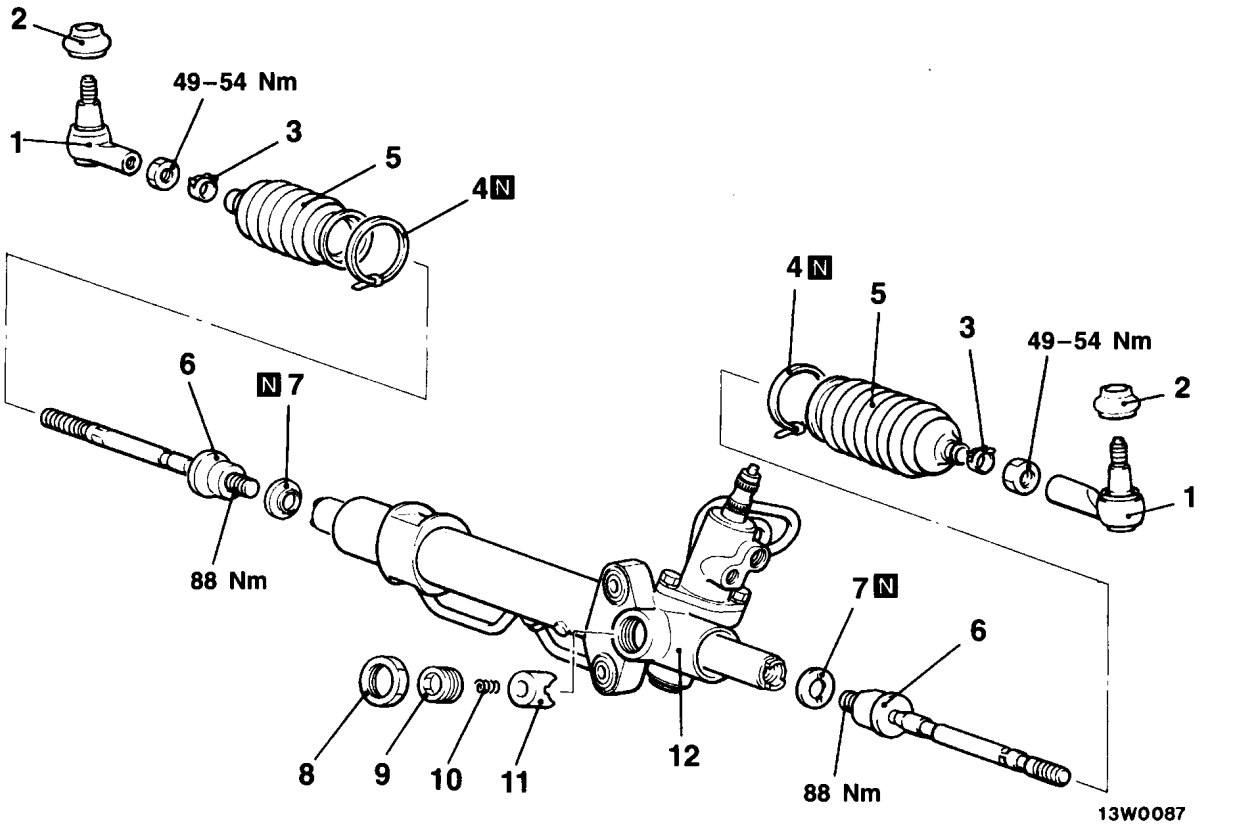
Sealant: 3M ATD Part No. 8661 or equivalent



Grease: Silicone grease



Sealant: 3M ATD Part No. 8661 or equivalent



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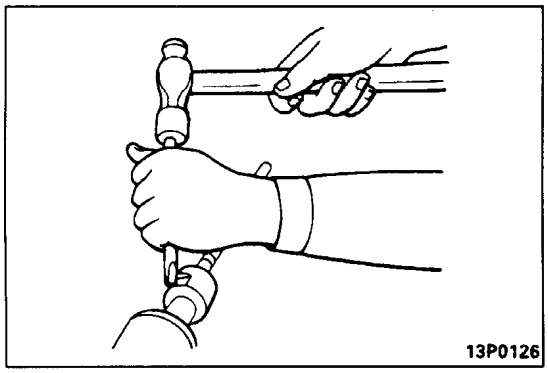
Disassembly steps

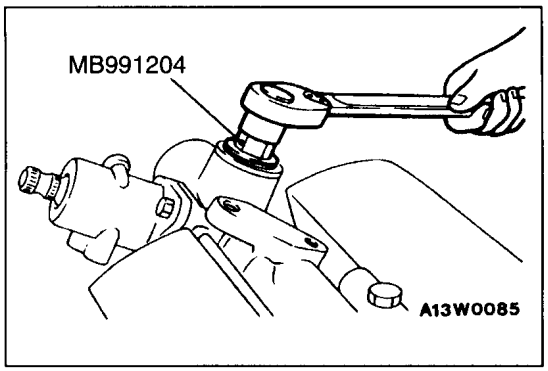
- ▶D◀ 1. Tie rod end
- ▶C◀ 2. Dust cover
- 3. Bellows clip
- 4. Bellows band
- 5. Bellows
- ◀A▶ ▶B◀ 6. Tie rod
- ◀A▶ ▶B◀ 7. Tab washer
- 8. Locking nut
- ▶A◀ • Total pinion torque adjustment
- ◀B▶ 9. Rack support cover
- 10. Rack support spring
- 11. Rack support
- 12. Gear box



DISASSEMBLY SERVICE POINTS

◀A▶ TIE ROD/TAB WASHER REMOVAL

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



◀B▶ RACK SUPPORT COVER REMOVAL

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

INSPECTION

RACK

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

PINION AND VALVE ASSEMBLY

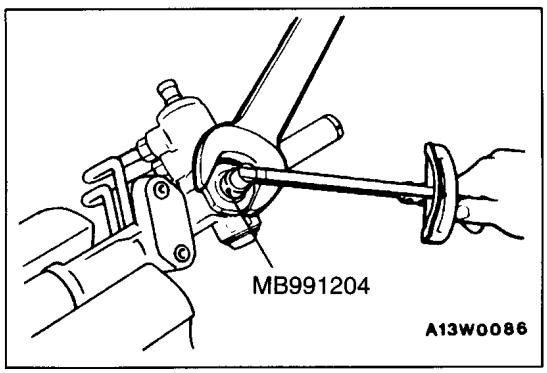
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING

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

OTHERS

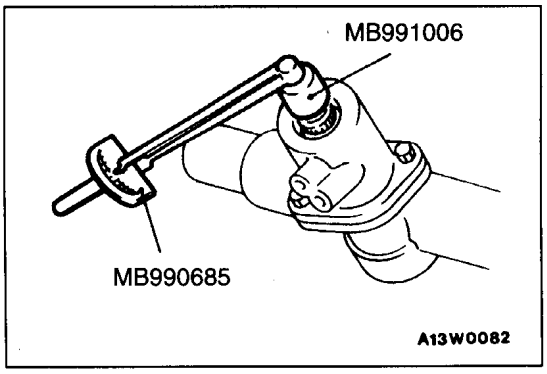
- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.



REASSEMBLY SERVICE POINTS

▶A◀ TOTAL PINION TORQUE ADJUSTMENT

(1) Position rack at its centre. Tighten rack support cover to 15 Nm.
(2) In neutral position, rotate pinion shaft clockwise one turn/4–6 seconds with special tool. Return rack support cover 30°–60° and adjust torque to the standard value.



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

Standard value: 0.6–1.32 Nm

[Change in torque: 0.4 Nm]

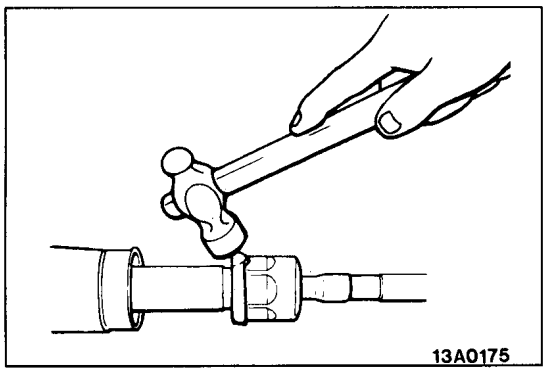
Caution

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

NOTE

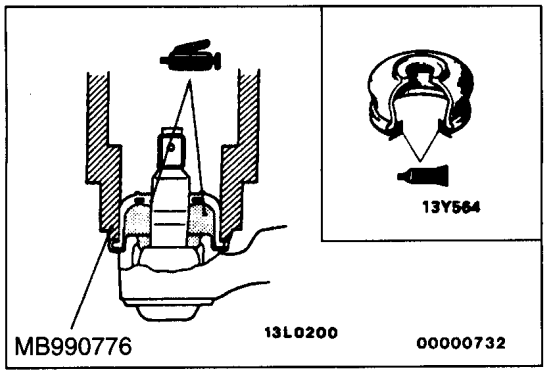
When it cannot be adjusted within the specified return angle, check rack support cover components or replace.

(4) After adjusting, lock rack support cover with lock nut.



▶B◀ TAB WASHER/TIE ROD INSTALLATION

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

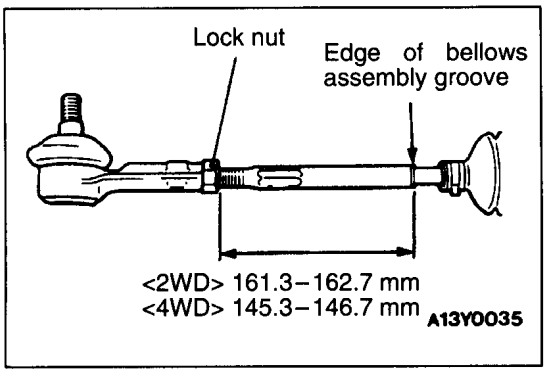


▶C◀ DUST COVER INSTALLATION

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

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

(3) Using the special tool, install the dust cover to the tie rod end ball joint.



▶D◀ TIE ROD END INSTALLATION

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

POWER STEERING OIL PUMP

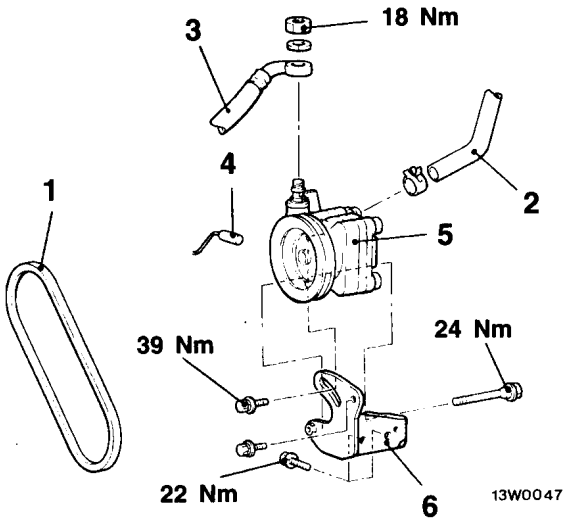
120002173

REMOVAL AND INSTALLATION

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

Post-installation Operation
- Power Steering Fluid Supplying (Refer to P. 37A-10.)
- Drive-belt Tension Adjusting (Refer to P. 37A-9.)
- Power Steering Fluid Line Bleeding (Refer to P. 37A-11.)
- Oil Pump Pressure Check (Refer to P. 37A-12.)

<4G6>



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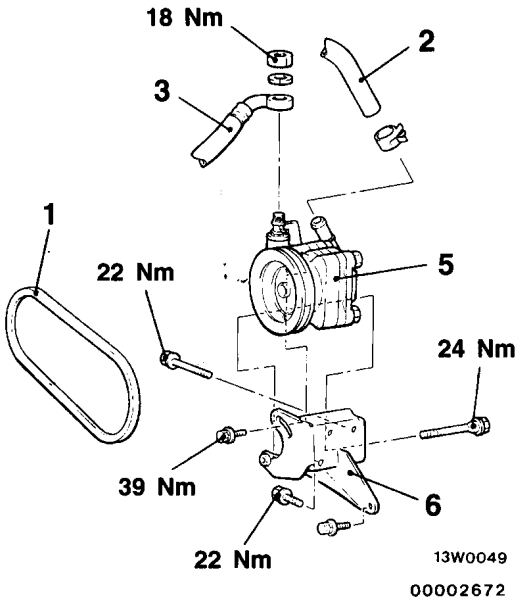
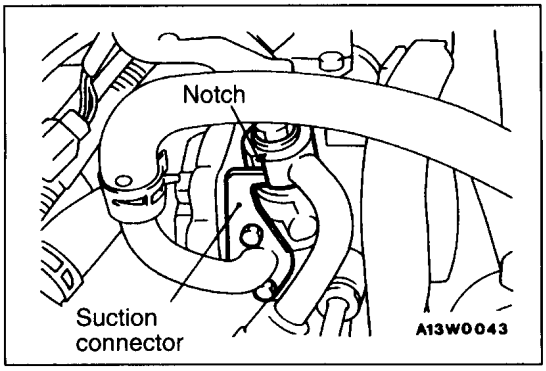


Removal steps

1. Drive-belt
▶B◀ 2. Suction hose
▶A◀ 3. Pressure hose
4. Pressure switch connector
5. Oil pump
6. Oil pump bracket

INSPECTION

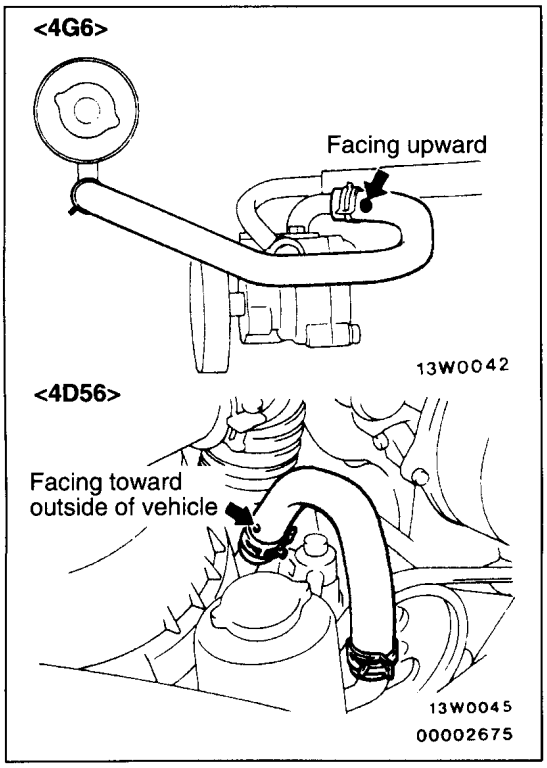
Check the drive-belt for cracks.
Check the pulley assembly for uneven rotation.



INSTALLATION SERVICE POINTS

▶A◀ PRESSURE HOSE INSTALLATION

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

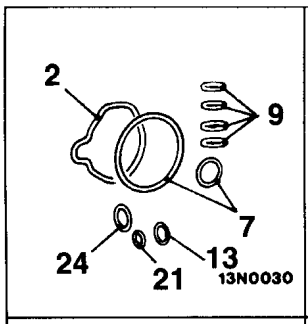


▶B◀ SUCTION HOSE INSTALLATION

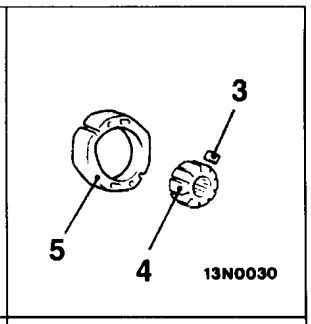
Install the hose so that the marking is positioned as shown in the illustration.

DISASSEMBLY AND REASSEMBLY

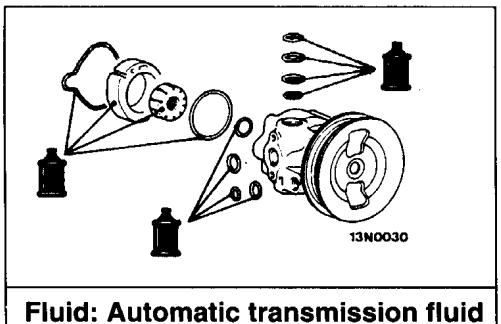
120002174



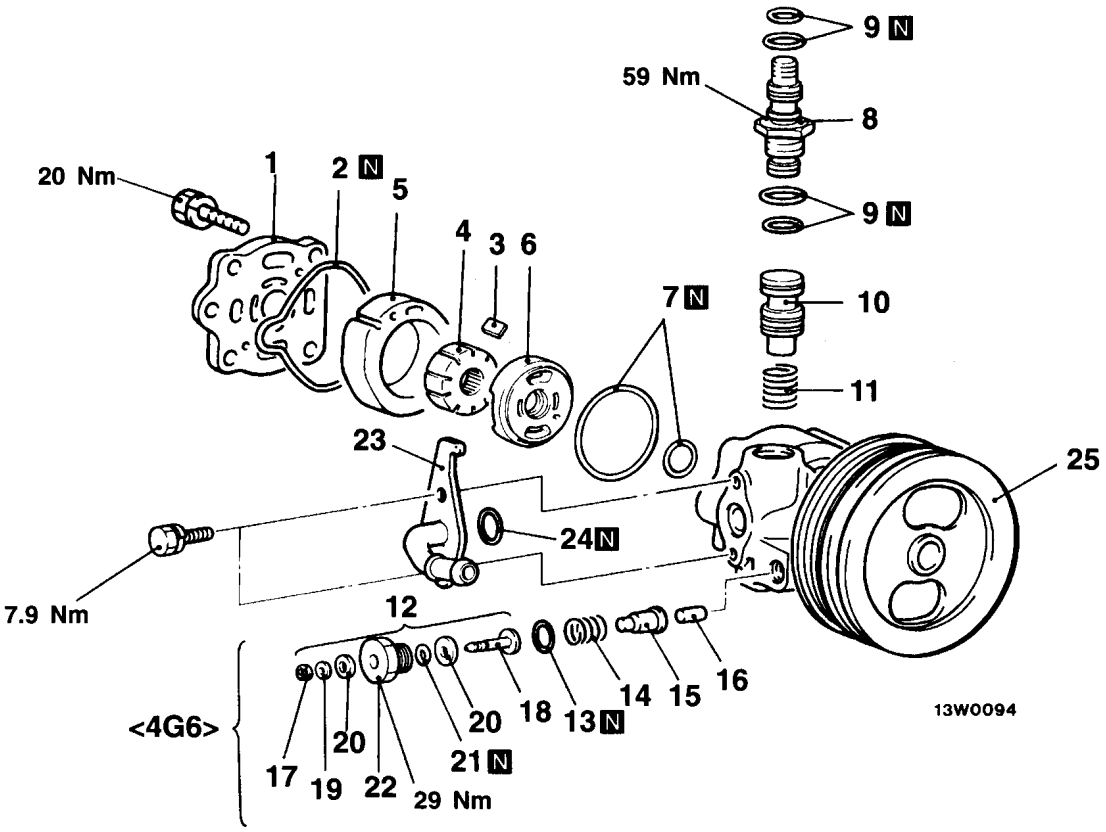
Oil pump seal kit



Oil pump cartridge kit



Fluid: Automatic transmission fluid DEXRON or DEXRON II



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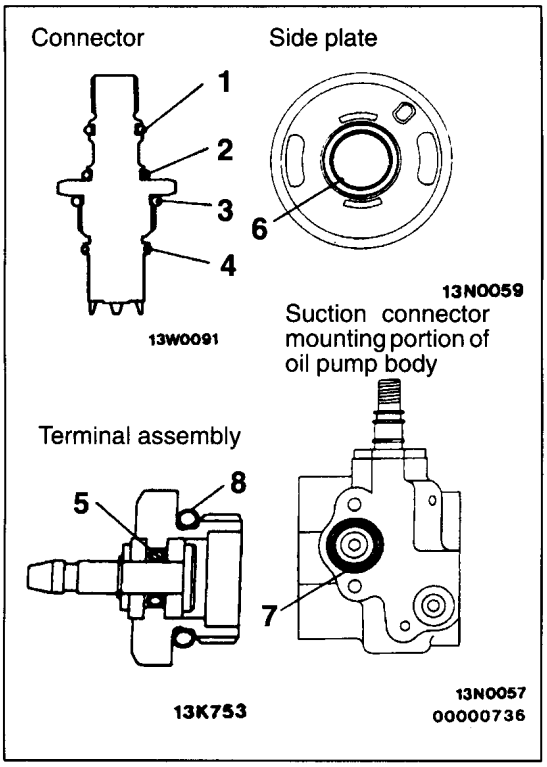
Disassembly steps

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

Caution
Do not disassemble the flow control valve.

INSPECTION

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

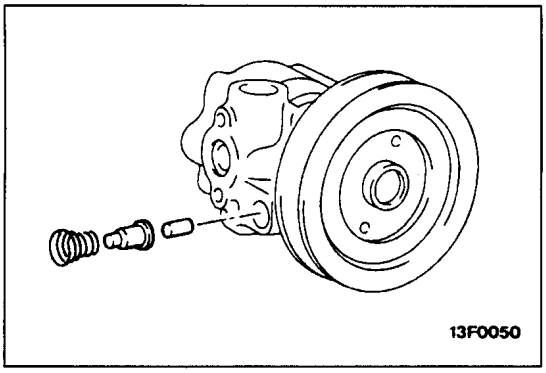


REASSEMBLY SERVICE POINTS

▶A◀ O-RINGS INSTALLATION

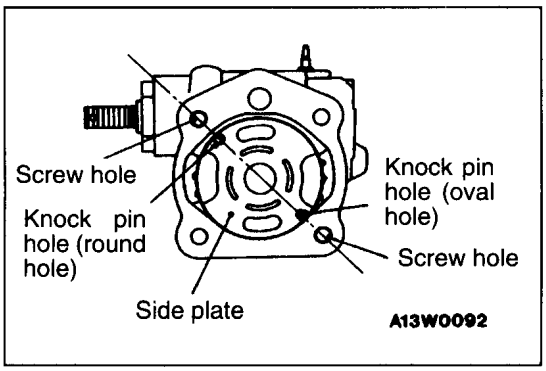
Apply specified fluid on O-rings to install.

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



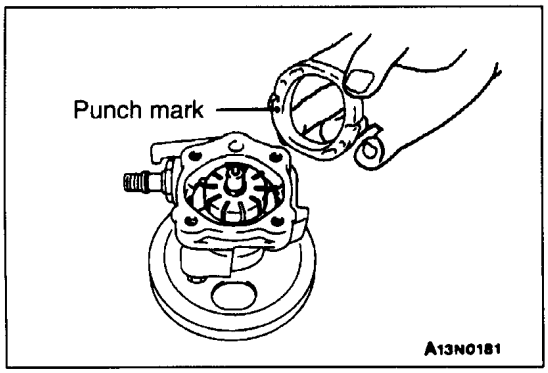
▶B◀ SPRING INSTALLATION

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



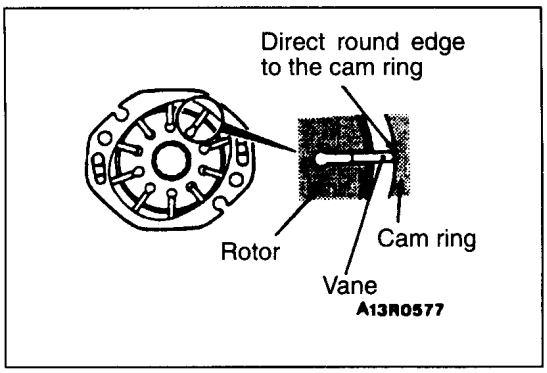
▶C◀ SIDE PLATE INSTALLATION

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



▶D◀ CAM RING INSTALLATION

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



▶E◀ VANE INSTALLATION

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

POWER STEERING HOSES

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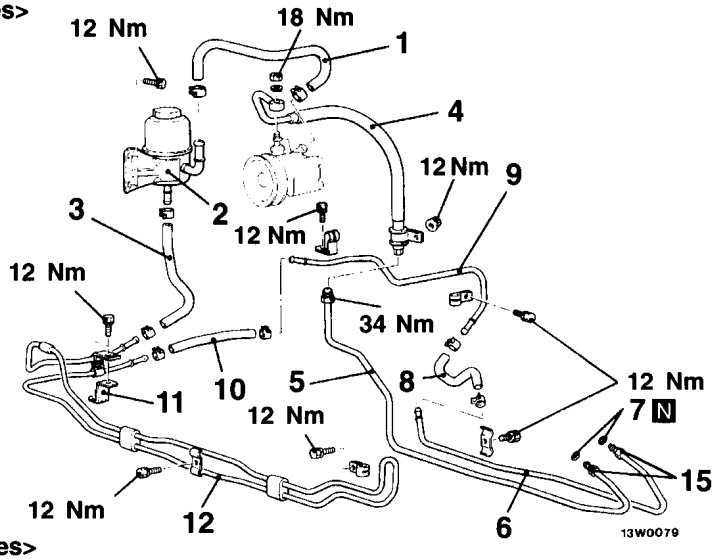
REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-10.)
- Front Bumper Removal (Refer to GROUP 51 – Front Bumper.)

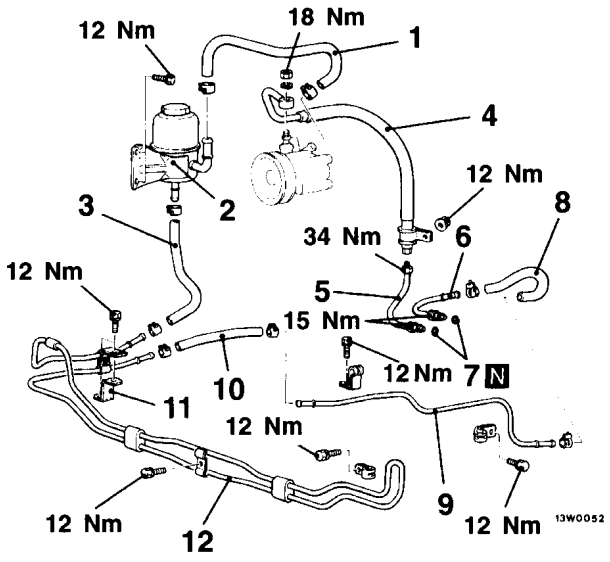
Post-installation Operation
- Front Bumper Installation (Refer to GROUP 51 – Front Bumper.)
- Power Steering Fluid Supplying (Refer to P.37A-10.)
- Power Steering Fluid Line Bleeding (Refer to P. 37A-11.)

4G6 – 2WD

<L.H. drive vehicles>



<R.H. drive vehicles>



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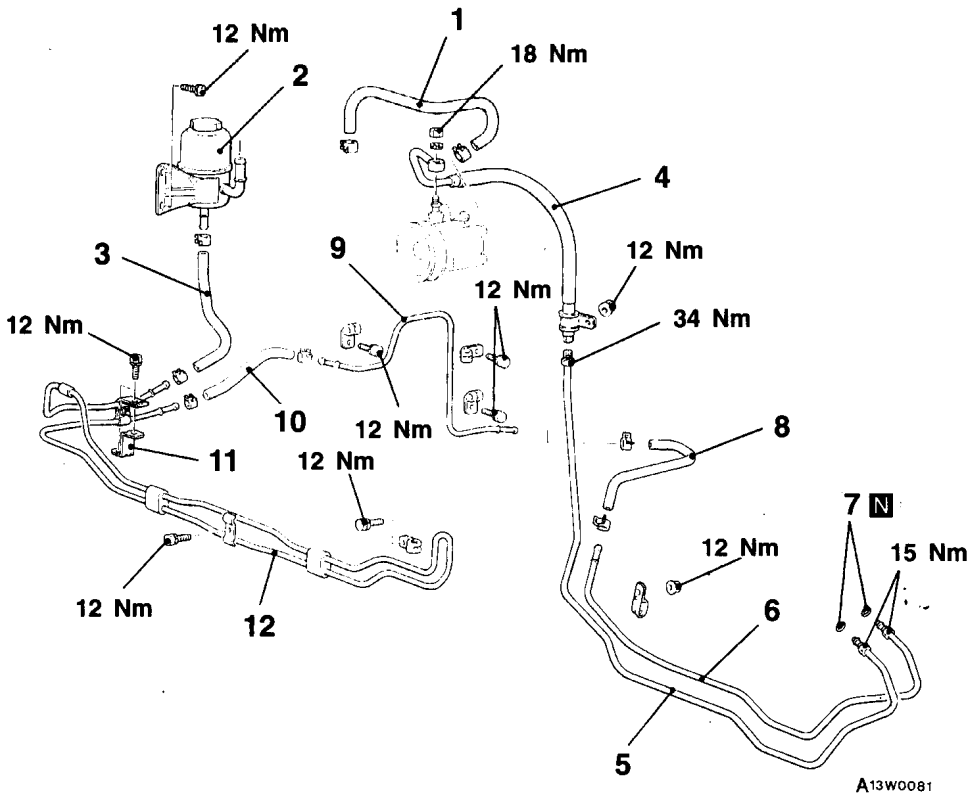
Removal steps

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

4G6 – 4WD

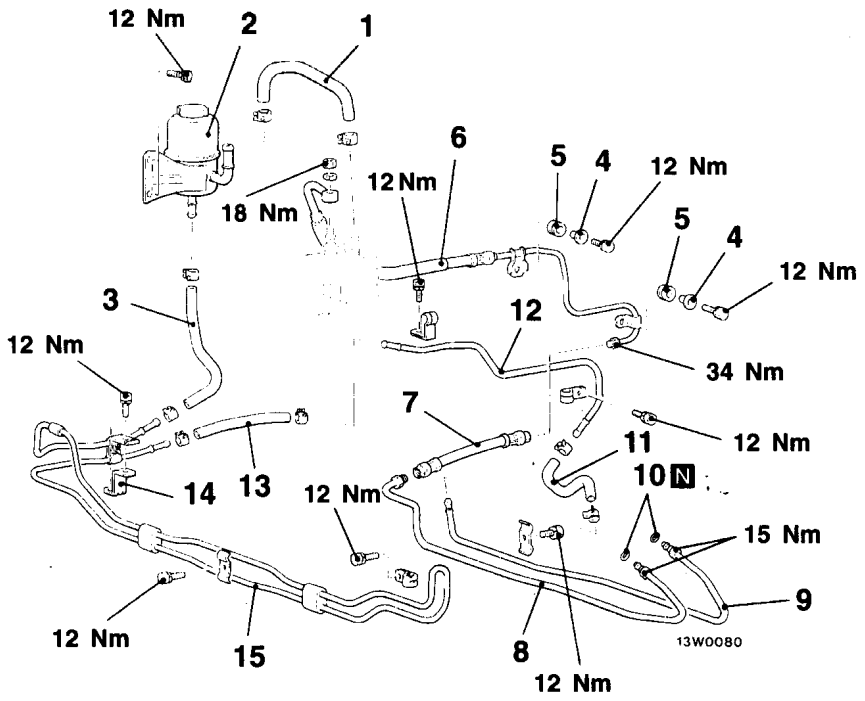


Removal steps

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

4D56 – 2WD

<L.H. drive vehicles>



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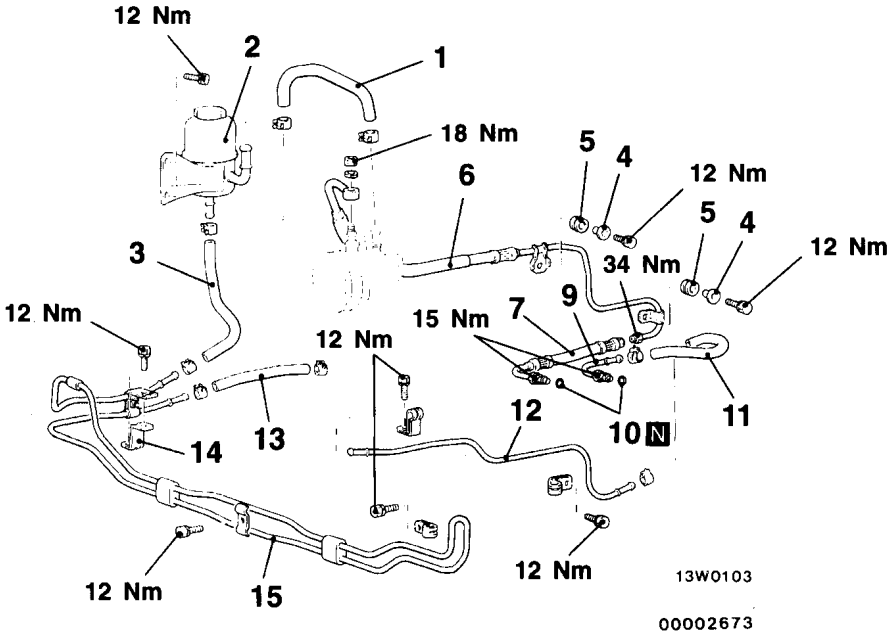
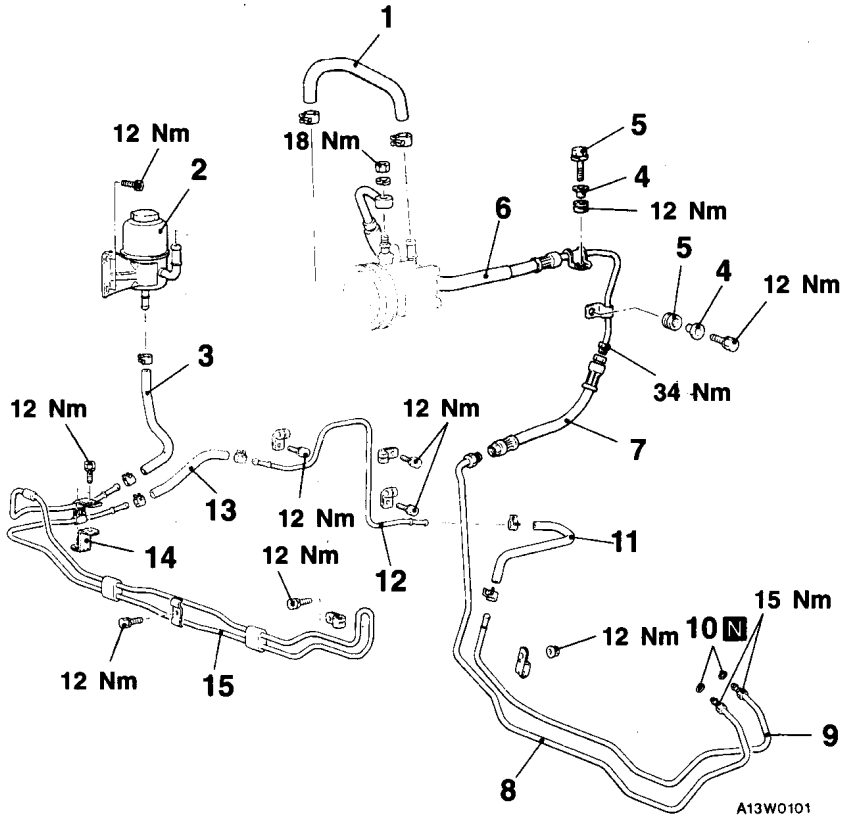


Removal steps

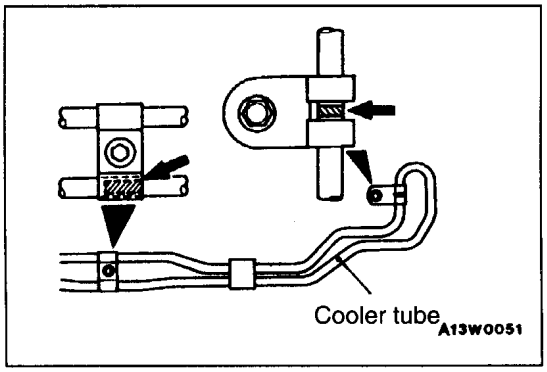
- ▶E◀ 1. Suction hose
- 2. Oil reservoir
- ▶D◀ 3. Return hose
- 4. Distance piece
- 5. Bushing
- ▶C◀ 6. Pressure hose
- 7. Pressure hose
- 8. Pressure tube
- 9. Return tube
- 10. O-ring
- ▶B◀ 11. Return hose
- 12. Return tube
- 13. Return hose
- 14. Cooler tube bracket
- ▶A◀ 15. Cooler tube

4G56 – 4WD



Removal steps

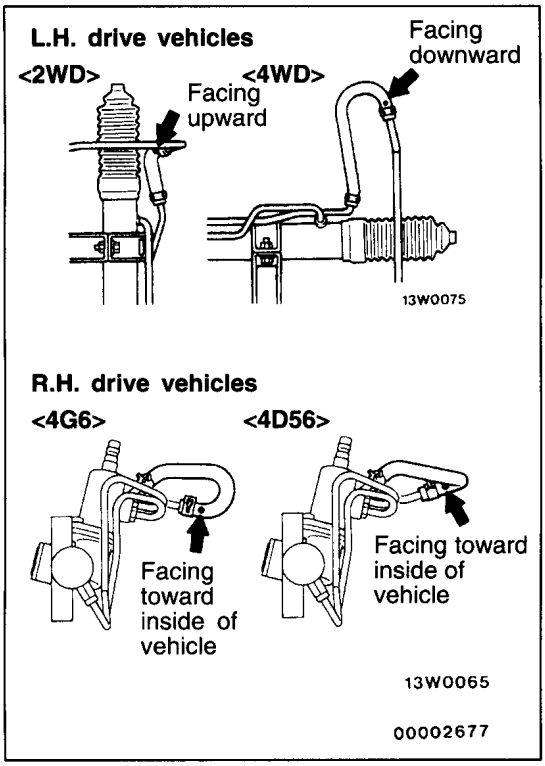
- ▶E◀ 1. Suction hose
- 2. Oil reservoir
- ▶D◀ 3. Return hose
- 4. Distance piece
- 5. Bushing
- ▶C◀ 6. Pressure hose
- 7. Pressure hose
- 8. Pressure tube
- 9. Return tube
- 10. O-ring
- ▶B◀ 11. Return hose
- 12. Return tube
- 13. Return hose
- 14. Cooler tube bracket
- ▶A◀ 15. Cooler tube



INSTALLATION SERVICE POINTS

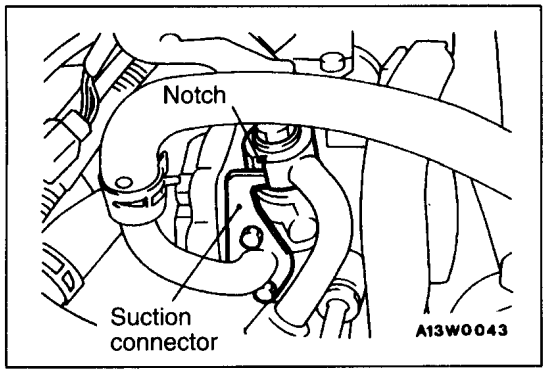
▶A◀ COOLER TUBE INSTALLATION

Connect the cooler tube so that the marking is positioned as shown in the illustration.



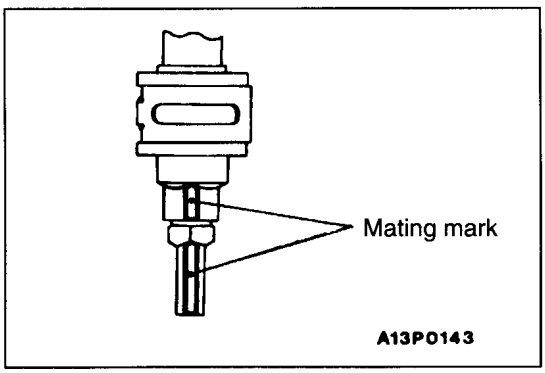
▶B◀ RETURN HOSE INSTALLATION

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

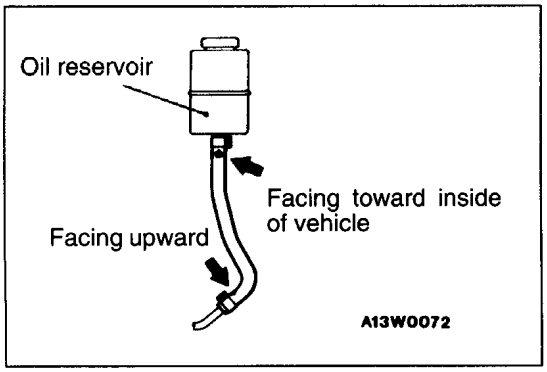


▶C◀ PRESSURE HOSE INSTALLATION

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

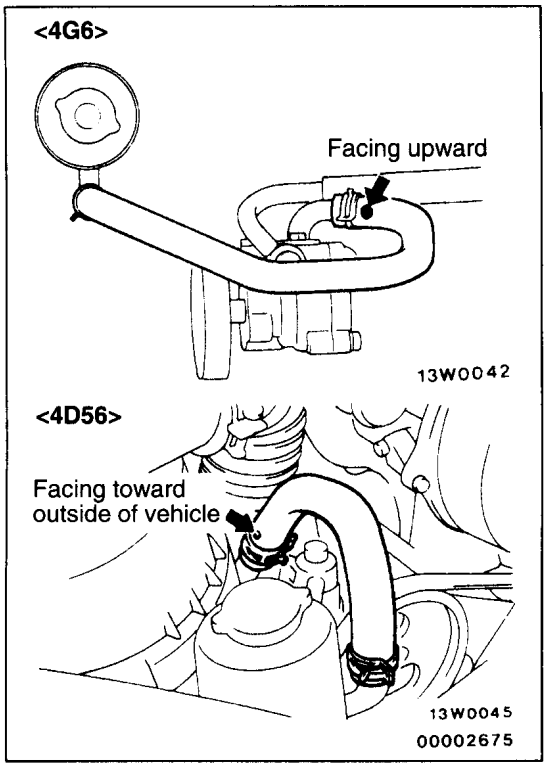


(2) Align the marks on the pressure hose and pressure tube, and install the pressure hose. <4G6>



▶D◀ RETURN HOSE INSTALLATION

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



▶E◀ SUCTION HOSE INSTALLATION

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