

Steering

Special Tools	17-2	*Steering Column	
Component Locations		Removal/Installation	17-19
Index	17-3	Inspection	17-20
Troubleshooting		Steering Lock Replacement	17-21
General Troubleshooting	17-4	Power Steering Hoses, Lines	
Noise and Vibration	17-8	Fluid Leakage Inspection	17-22
Fluid Leaks	17-10	Replacement	17-22
Inspection and Adjustment		Power Steering Pump	
Steering Operation	17-12	Replacement	17-23
Power Assist Check		Disassembly	17-24
With vehicle Parked	17-12	Inspection	17-25
Steering Linkage and Gearbox	17-13	Reassembly	17-27
Pump Belt	17-14	Power Steering Gearbox	
Rack Guide Adjustment	17-15	Removal	17-30
Fluid Replacement	17-15	Disassembly	17-32
Pump Pressure Check	17-16	Reassembly	17-38
*Steering Wheel		Installation	17-48
Removal	17-17	Ball Joint Boot Replacement	17-50
Installation	17-17		
Disassembly/Reassembly	17-18		



SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

(If the steering wheel and steering column maintenance are required)

The Acura 1.6EL SRS includes a driver's airbag located in the steering wheel hub, and a passenger's airbag located in the dashboard above the glove box. Information necessary to safely service the SRS is included in this Service Manual. Items marked with an asterisk (*) on the contents page include, or are located near, SRS components. Servicing, disassembling or replacing these items will require special precautions and tools, and should therefore be done by an authorized Acura dealer.

▲ WARNING

- To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of severe frontal collision, all SRS service work must be performed by an authorized Acura dealer.
- Improper service procedures, including incorrect removal and installation of the SRS, could lead to personal injury caused by unintentional activation of the airbags.
- Do not bump the SRS unit. Otherwise, the system may fail in case of a collision, or the airbags may deploy when the ignition switch is ON (II).
- All SRS electrical wiring harnesses are covered with yellow insulation. Related components are located in the steering column, front console, dashboard, dashboard lower panel, and in the dashboard above the glove box. Do not use electrical test equipment on these circuits.

NOTE: The original radio has a coded theft protection circuit. Be sure to get the customer's code number before
— disconnecting the battery.

— removing the No. 47 (7.5 A) fuse from the under-hood fuse/relay box.

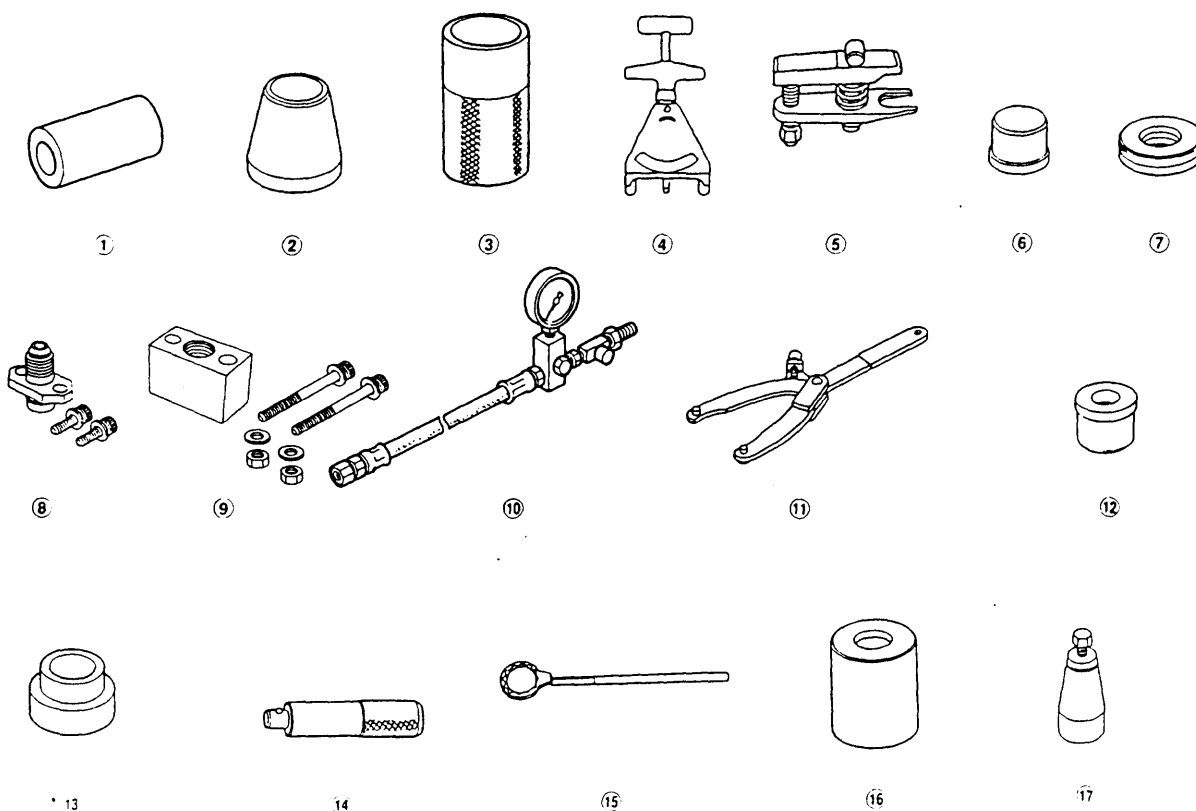
— removing the radio.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

Special Tools

Ref. No	Tool Number	Description	Qty	Page Reference
①	07GAF - PH70100	Pilot Collar	1	17-37
②	07GAG - SD40100 or 07GAG - SD4010A	Piston Seal Ring Guide	1	17-42
③	07GAG - SD40200 or 07GAG - SD4020A	Piston Seal Ring Sizing Tool	1	17-42
④	*07JGG - 001010A	Belt Tension Gauge	1	17-14
⑤	07MAC - SL00200	Ball Joint Remover, 28 mm	1	17-30
⑥	07NAD - SR3020A	Cylinder End Seal Remover Attachment	1	17-34
⑦	07NAG - SR30900 or 07NAG - SR3090A	Piston Seal Ring Sizing Tool	1	17-39
⑧	07RAK - S040110	P/S Joint Adaptor (Pump)	1	17-16
⑨	07RAK - S040120	P/S Joint Adaptor (Hose)	1	17-16
⑩	07406 - 0010001	P/S Pressure Gauge	1	17-16
⑪	07725 - 0030000	Universal Holder	1	17-25, 29
⑫	07746 - 0010100	Attachment, 32 x 35 mm	1	17-40, 41
⑬	07746 - 0030300	Attachment, 30 mm I.D.	1	17-27
⑭	07749 - 0010000	Driver	1	17-40
⑮	07916 - SA50001	Locknut Wrench, 40 mm	1	17-15
⑯	07974 - SA50200 or 07974 - SA5020A	Sleeve Seal Ring Sizing Tool	1	17-40
⑰	07974 - SA50800	Ball Joint Boot Clip Guide	1	17-50, 40

* Included in the Belt Tension Gauge, 07TGG - 001000A.





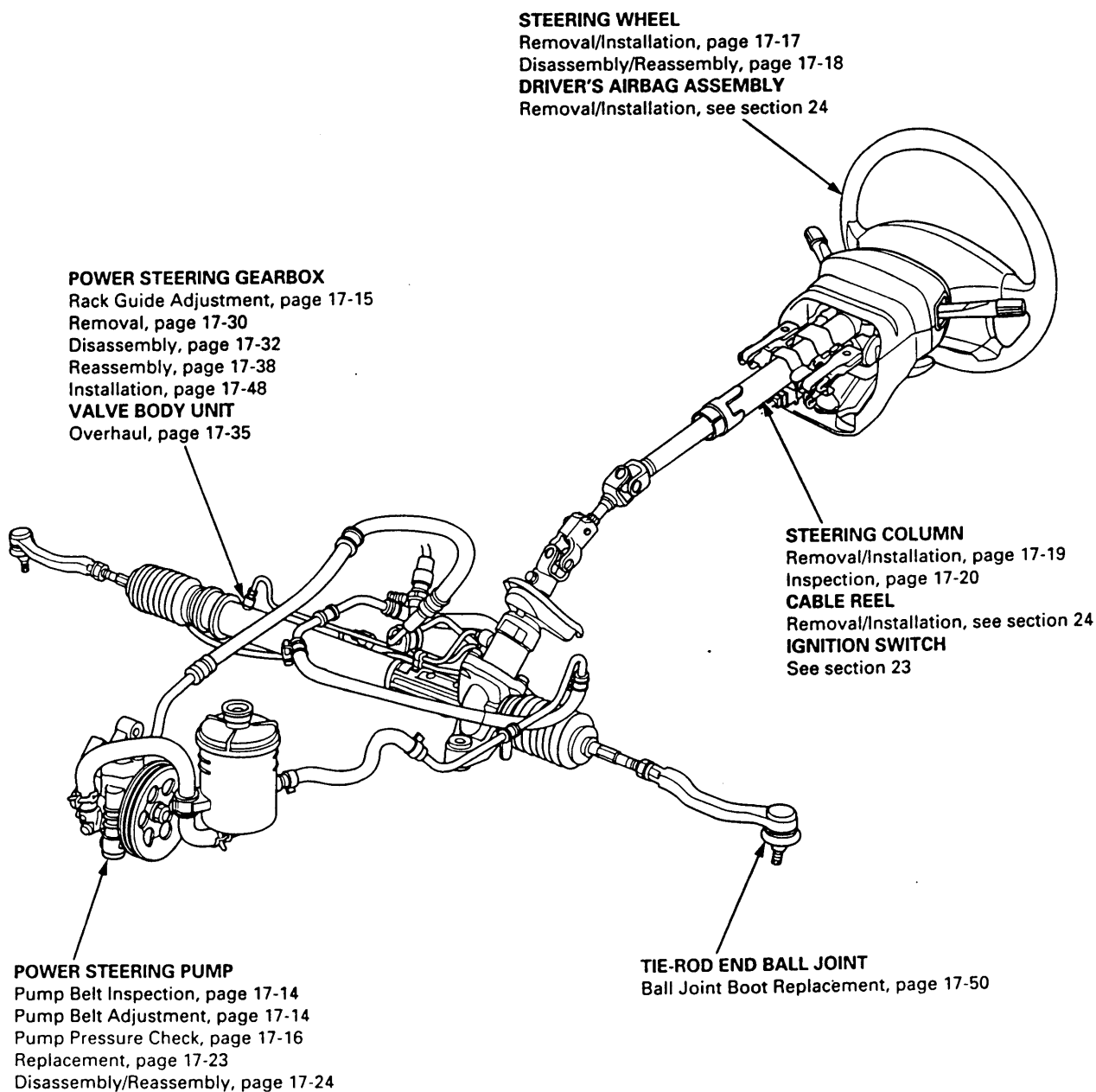
Component Locations

Index

NOTE:

- If an intact airbag assembly has been removed from a scrapped vehicle or has been found defective or damaged during transit, storage or service, it should be deployed (see section 24).
- Before removing the gearbox, remove the driver's airbag assembly and steering wheel.
- After installing the gearbox, check the wheel alignment and adjust if necessary.

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

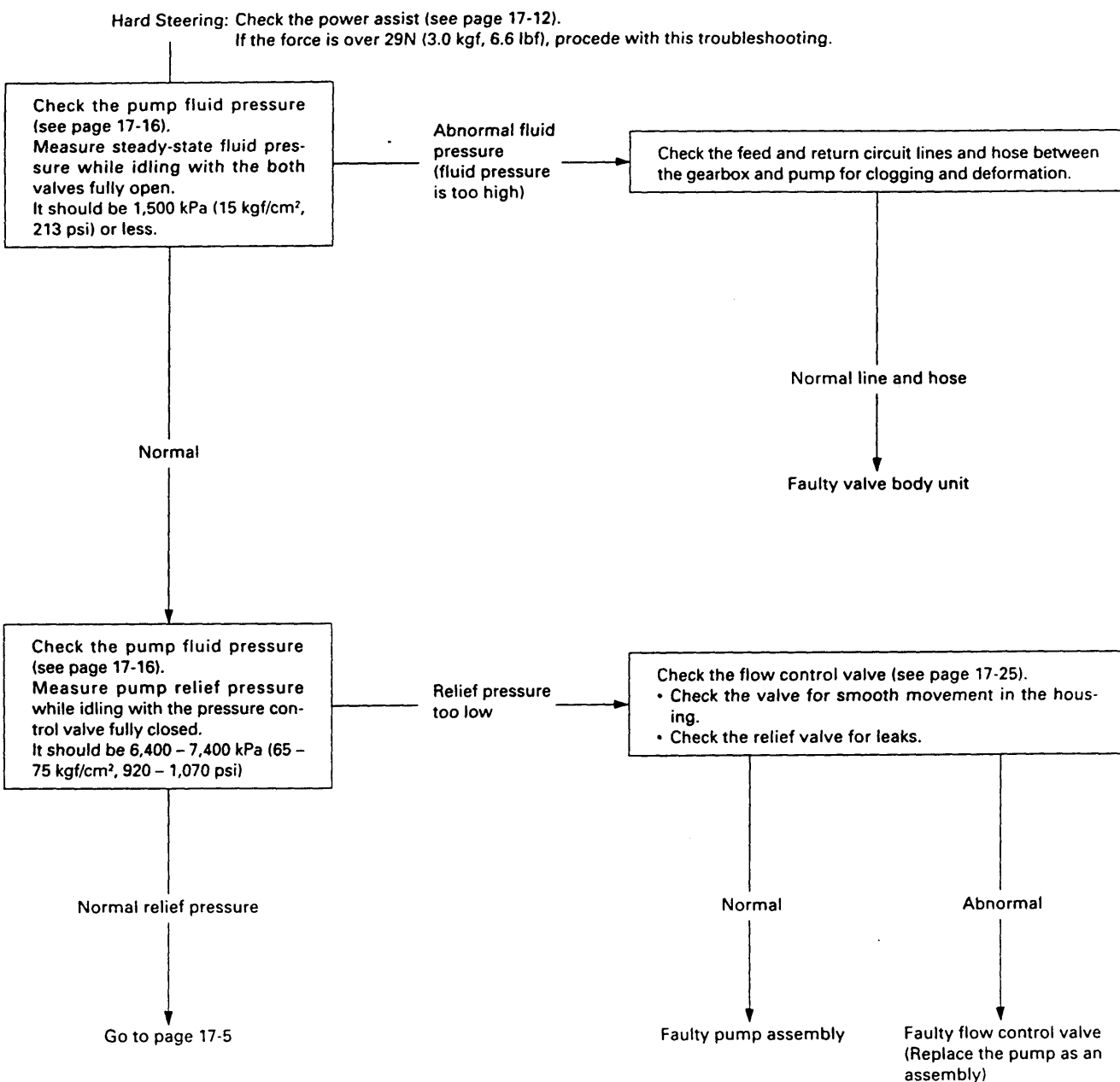


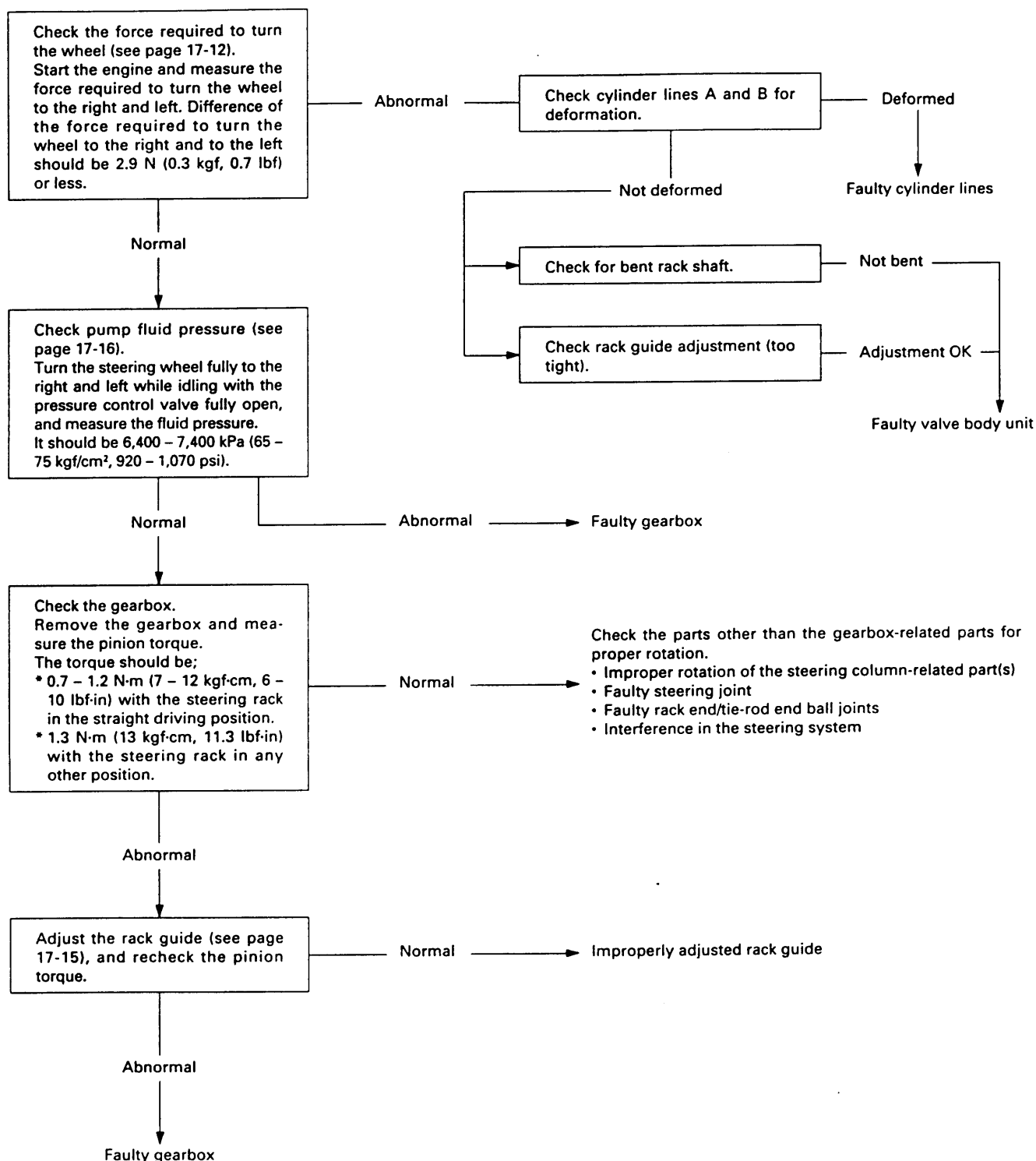
Troubleshooting

General Troubleshooting

Check the following before you begin:

- Has the suspension been modified in a way that would affect steering?
- Are tire sizes, tire variety and air pressure correct?
- Is the steering wheel original equipment or equivalent?
- Is the power steering pump belt properly adjusted?
- Is steering fluid reservoir filled to proper level?
- Is the engine idle speed correct and steady?

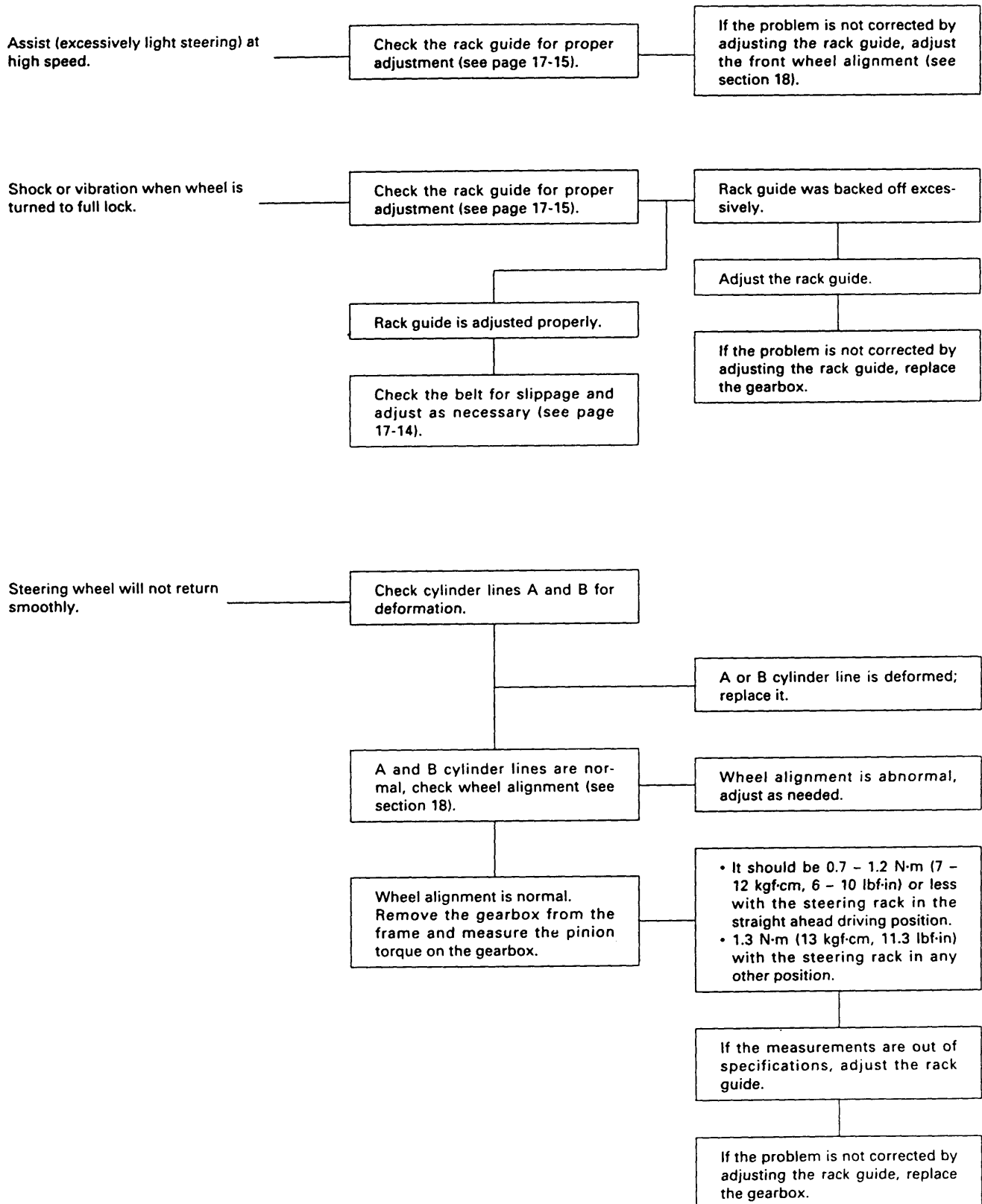




(cont'd)

Troubleshooting

General Troubleshooting (cont'd)





Uneven or rough steering.

Improperly adjusted rack guide.

Adjust the rack guide (see page 17-15).

If the problem is not corrected by adjusting the rack guide, replace the gearbox.

Belt slipping on pulley.

Adjust the belt tension. Replace the belt, if necessary (see page 17-14).

Idle speed low or erratic.

If the engine stalls when the wheel is turned while the vehicle is stopped or moving at low speed, adjust the idle speed (see section 11).

Air in reservoir, or check power steering fluid level.

Check power steering fluid level. If the level is excessively low, check for leaks in the system. Add fluid to the specified level.

If fluid level is OK, check O-rings and seals on both ends of the pump inlet hose, and the P/S pump housing mating surfaces and the pump shaft oil seal for suction leaks. Replace parts as necessary.

Steering wheel kicks back during wide turns.

Pump belt slipping on pulley (pump stops momentarily).

Adjust the belt tension (see page 17-14) or replace belt.

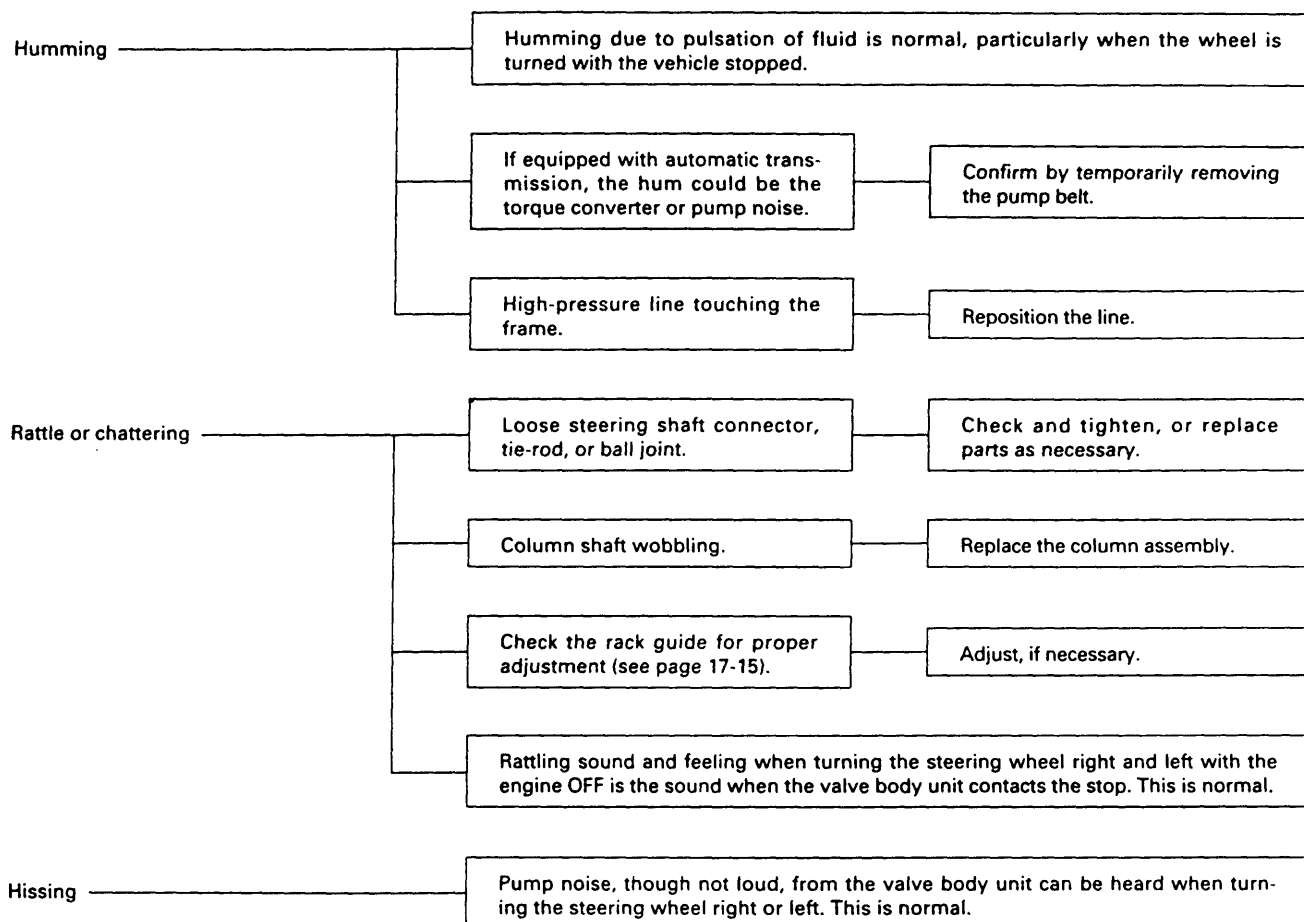
Install the power steering pressure gauge. Close the pressure control valve fully and measure the pump pressure (see page 17-16).

Check if pump pressure is normal and the gauge needle travel is 500 kPa (5 kgf/cm², 71 psi) or less. Check the flow control valve if the needle travel exceeds 500 kPa (5 kgf/cm², 71 psi). If the flow control valve is normal, replace the pump as an assembly.

Troubleshooting

Noise and Vibration

NOTE: Pump noise in first 2 – 3 minutes after starting in cold weather is normal.



CAUTION: When inspecting, do not hold the steering wheel all the way to the right or the left.

Steering Wheel

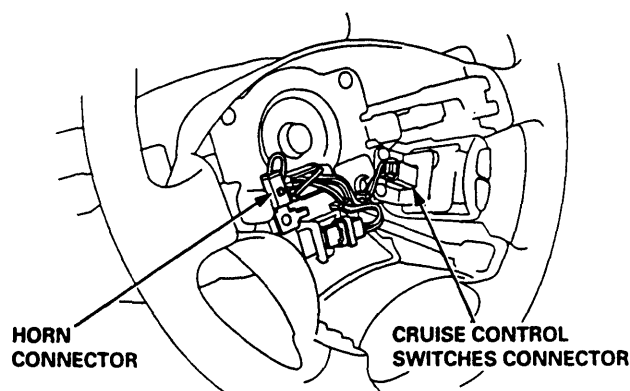


Removal

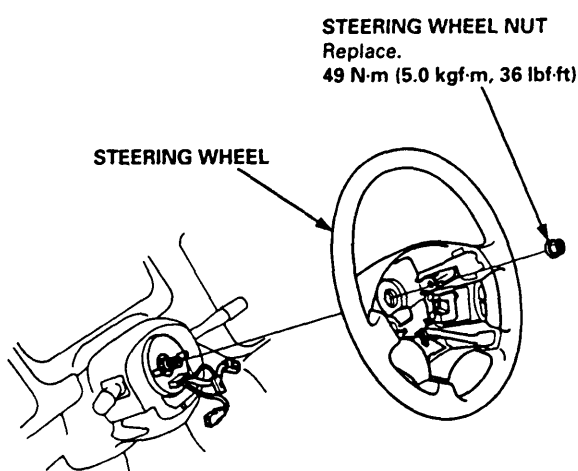
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

NOTE: Before removing the steering wheel, align the front wheels straight ahead.

1. Remove the driver's airbag assembly from the steering wheel (see section 24).
2. Disconnect the horn connector and cruise control switches connector.



3. Remove the steering wheel nut.



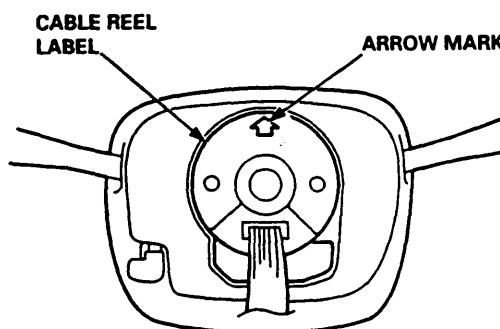
4. Remove the steering wheel by rocking it slightly from side-to-side as you pull steadily with both hands.

Installation

CAUTION: Do not tap on the steering wheel or steering column shaft when installing the steering wheel.

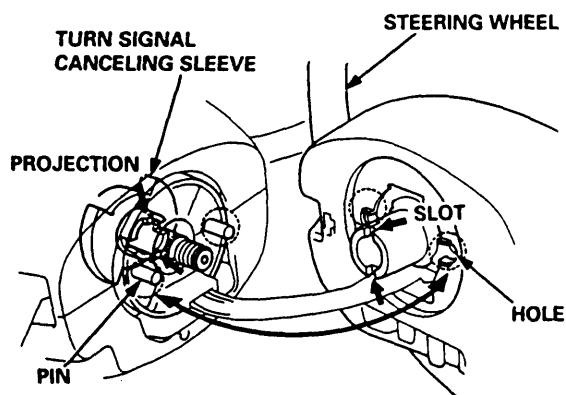
NOTE: Before installing the steering wheel, align the front wheels straight ahead.

1. Before installing the steering wheel, center the cable reel. Do this by first rotating the cable reel clockwise until it stops. Then rotate it counterclockwise approximately two turns. The arrow mark on the cable reel label should point straight up.



2. Install the steering wheel with the steering wheel nut.

NOTE: Be sure the steering wheel shaft engages the cable reel and canceling sleeve.

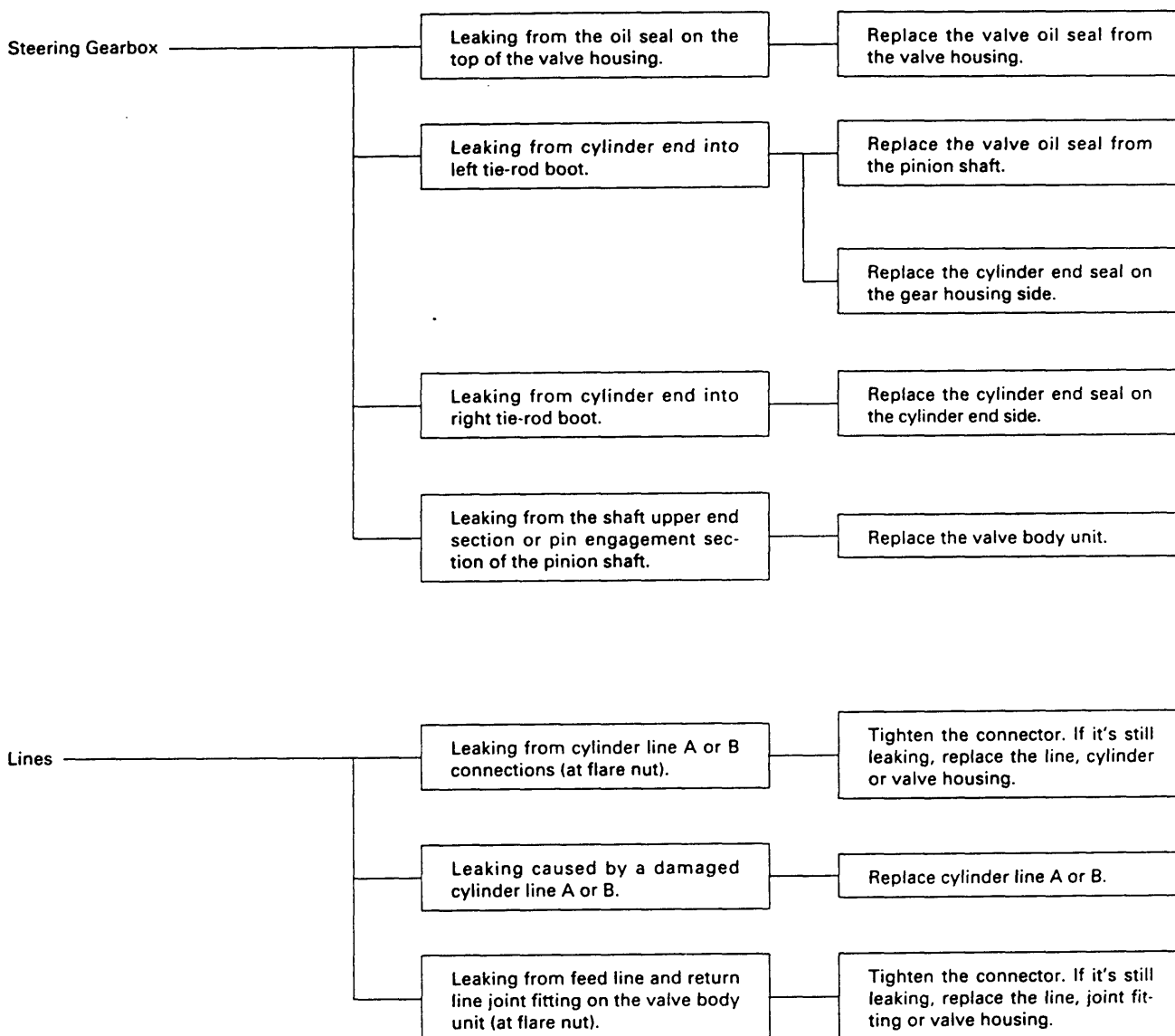


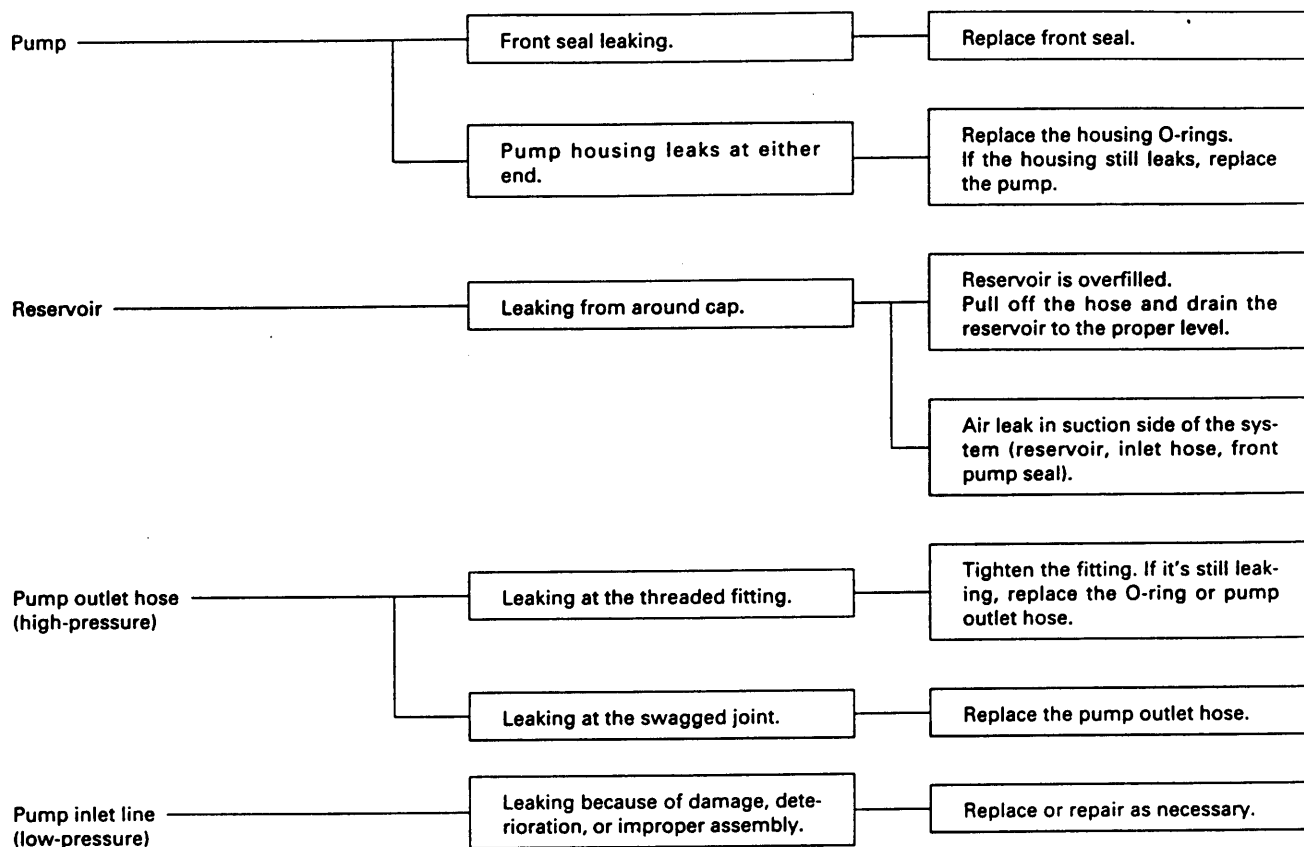
3. Attach the cruise control switches connector to the steering wheel clip.
4. Connect the horn connector.
5. Install the driver's airbag assembly, and confirm proper system operation (see section 24).
6. Check the horn and cruise control switches for proper operations.

Troubleshooting

Fluid Leaks

Check the gearbox assembly for oil leaks carefully. Oil can leak out of various points, depending on location of the faulty oil seals/seal rings. Check the following before removing the gearbox from the frame.





Inspection and Adjustment

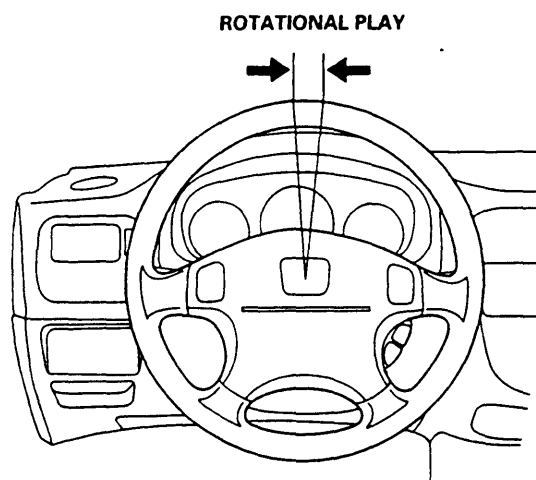
Steering Operation

Place the front wheels in the straight ahead position, and measure the distance the steering wheel can be turned without moving the front wheels.

ROTATIONAL PLAY: 0 – 10 mm (0 – 0.39 in)

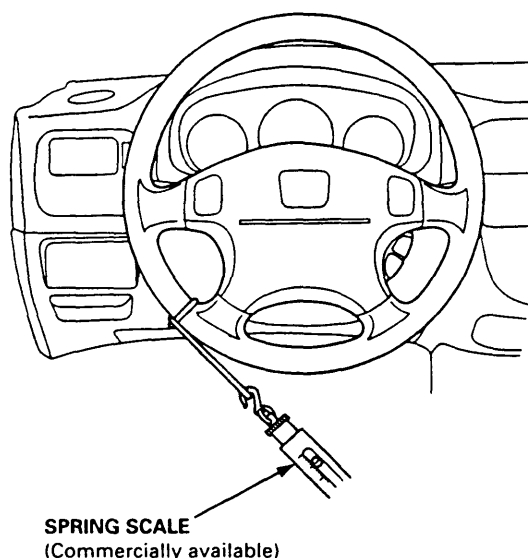
If the play exceeds the service limit, perform rack guide adjustment (see page 17-15).

If the play is still excessive after rack guide adjustment, inspect the steering linkage and gearbox as described on the next page.



Power Assist Check with Vehicle Parked

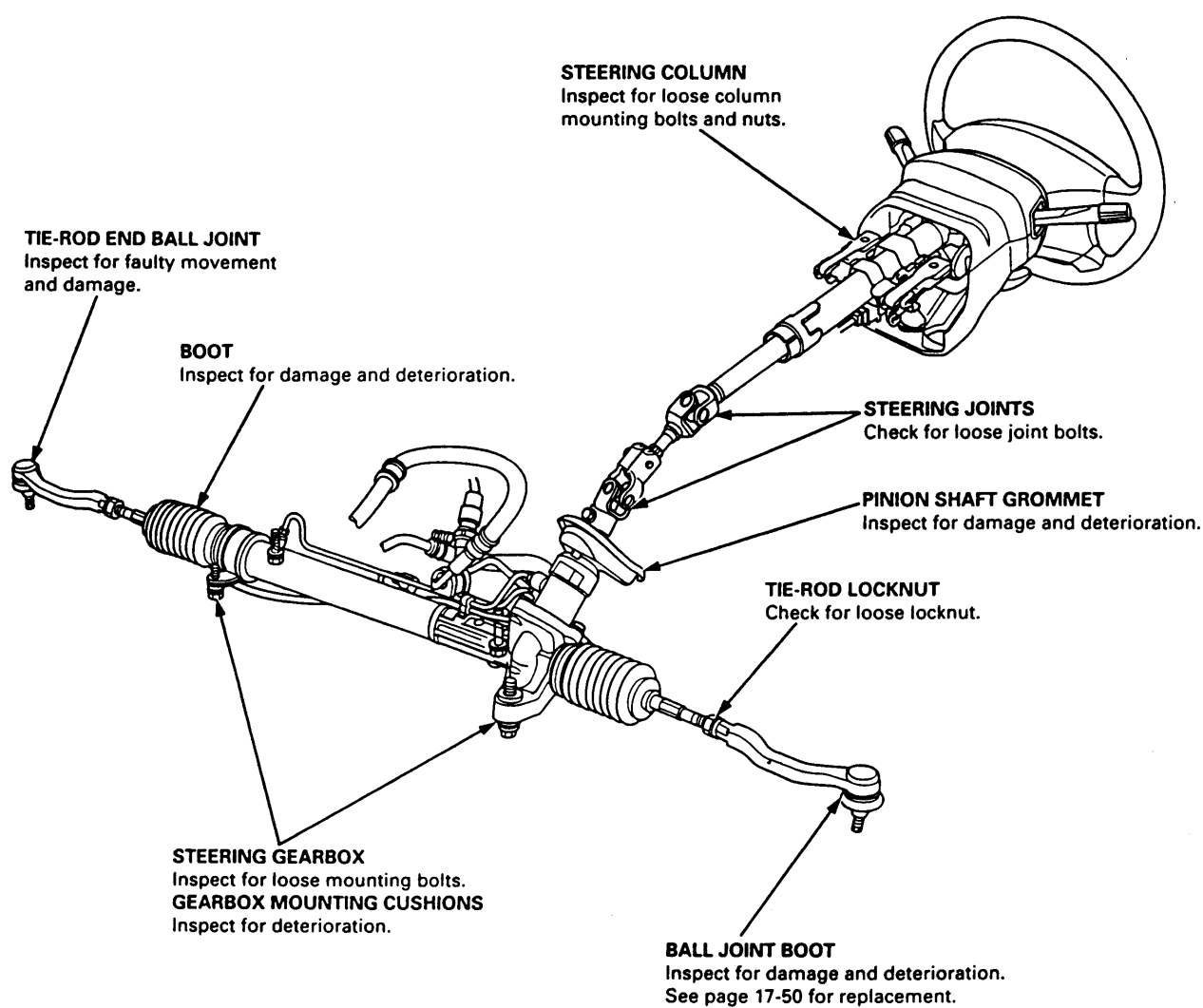
1. Check the power steering fluid level (see page 17-15) and pump belt tension (see page 17-14).
2. Start the engine, allow it to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid.
3. Attach a spring scale to the steering wheel. With the engine idling and the vehicle on a clean, dry floor, pull the scale as shown and read it as soon as the tires begin to turn.



4. The scale should read no more than 29 N (3.0 kgf, 6.6 lbf). If it reads more, check the gearbox and pump.



Steering Linkage and Gearbox



Inspection and Adjustment

Pump Belt

NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

Inspection

Attach the special tool to the belt and measure the tension of the belt.

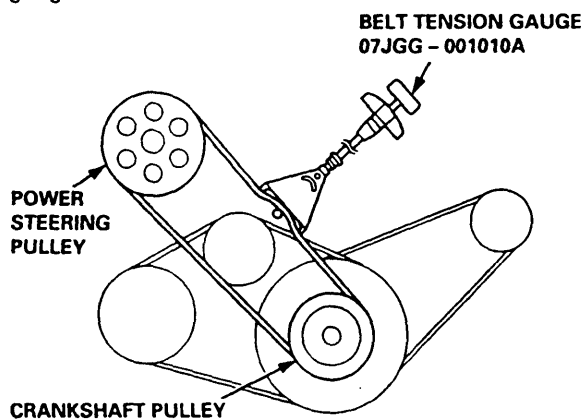
Tension:

Used Belt: 340 – 490 N (35 – 50 kgf, 77 – 110 lbf)

New Belt: 640 – 780 N (65 – 80 kgf, 143 – 176 lbf)

NOTE:

- If there are cracks or any damage evident on the belt, replace it with a new one.
- Follow the manufacturer's instructions for the tension gauge.



Inspect the pump belt for cracks or any damage. Replace the belt with a new one if necessary.

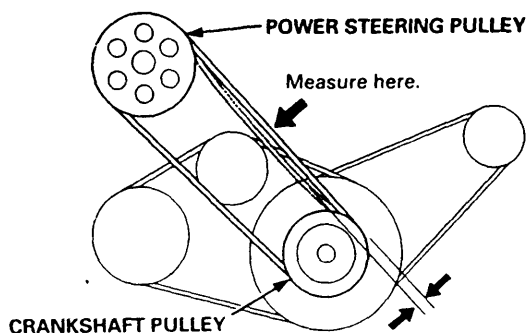
Measurement without Belt Tension Gauge:

Apply a force of 98 N (10 kgf, 22 lbf) and measure the deflection between the power steering pump and the crankshaft pulleys.

Deflection:

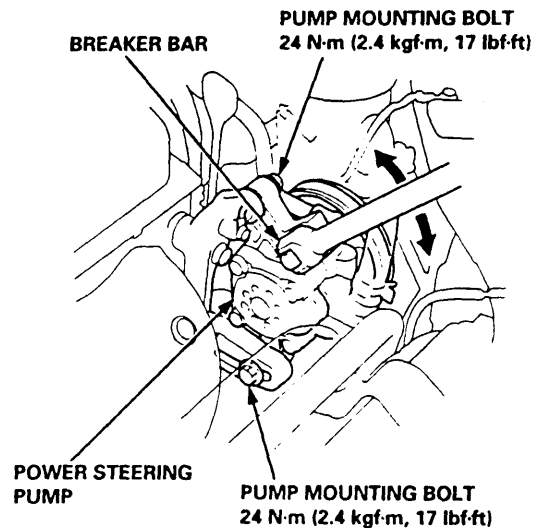
Used Belt: 10.5 – 14.0 mm (0.41 – 0.55 in)

New Belt: 7.5 – 10.0 mm (0.30 – 0.39 in)



Adjustment

1. Loosen the power steering pump mounting bolts.



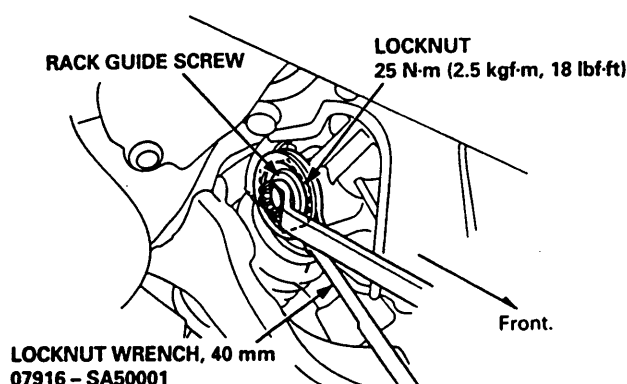
2. Adjust the belt tension by moving the power steering pump with a 1/2" drive breaker bar to obtain the proper belt tension, then retighten the mounting bolts.
3. Start the engine and turn the steering wheel from lock-to-lock several times, then stop the engine and recheck the deflection of the belt.



Rack Guide Adjustment

NOTE: Perform the rack guide adjustment with the wheels in the straight ahead position.

1. Loosen the rack guide screw locknut with the special tool, then loosen the rack guide screw.



2. Tighten the rack guide screw to 25 N·m (2.5 kgf·m, 18 lbf·ft), then loosen it.
3. Retighten the rack guide screw to 3.9 N·m (0.4 kgf·m, 2.9 lbf·ft), then back it off to specified angle.

Specified Return Angle: 20° max.

4. Tighten the locknut while holding the rack guide screw.
5. Check for tight or loose steering through the complete turning travel.
6. Perform following inspections:
 - Steering operation (see page 17-12).
 - Power assist with vehicle parked.

Fluid Replacement

Check the reservoir at regular intervals, and add fluid as necessary.

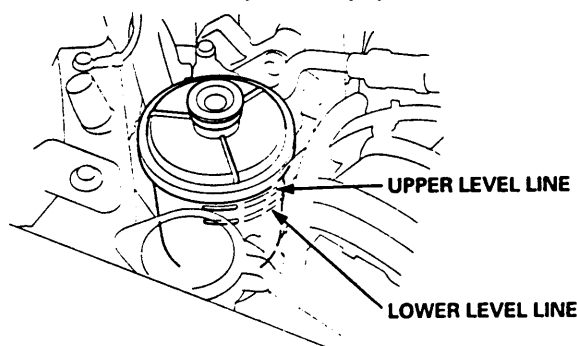
CAUTION: Always use Genuine HONDA Power Steering Fluid-V or S. Using any other type of power steering fluid or automatic transmission fluid can cause increased wear and poor steering in cold weather.

SYSTEM CAPACITY:

0.85 liter (0.90 US. qt, 0.75 Imp.qt)
at disassembly

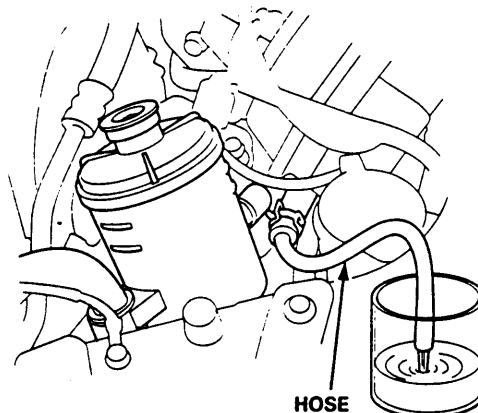
RESERVOIR CAPACITY:

0.4 liter (0.42 US. qt, 0.35 Imp.qt)



1. Raise the reservoir, then disconnect the return hose.
2. Connect a hose of suitable diameter to the disconnected return hose, and put the hose end in a suitable container.

CAUTION: Take care not to spill the fluid on the body and parts. Wipe off any spilled fluid at once.



3. Start the engine, let it run at idle, and turn the steering wheel from lock-to-lock several times. When fluid stops running out of the hose, shut off the engine. Discard the fluid.
4. Refit the return hose on the reservoir.
5. Fill the reservoir to the upper level line.
6. Start the engine and run it at fast idle, then turn the steering from lock-to-lock several times to bleed air from the system.
7. Recheck the fluid level and add some if necessary.
CAUTION: Do not fill the reservoir beyond the upper level line.

Inspection and Adjustment

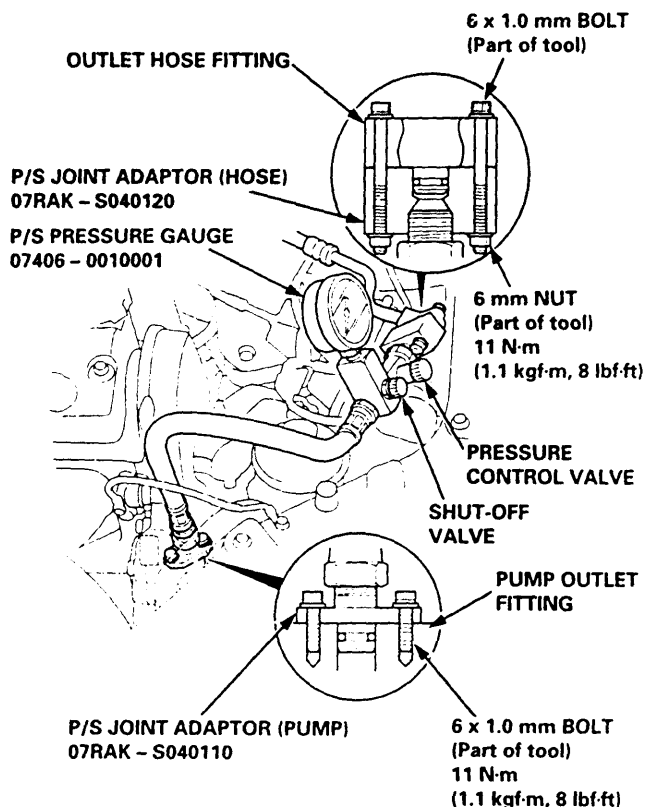
Pump Pressure Check

Check the fluid pressure as follows to determine whether the trouble is in the pump or gearbox.

NOTE: First check the power steering fluid level and pump belt tension.

CAUTION: Disconnect the high pressure hose with care so as not to spill the power steering fluid on the frame and other parts.

1. Disconnect the pump outlet from the pump outlet fitting, then install the P/S joint adaptor (pump) on the pump outlet.
2. Connect the P/S joint adaptor (hose) to the power steering pressure gauge, then connect the outlet hose to the adaptor.
3. Install the power steering pressure gauge to the P/S joint adaptor (pump) as shown.

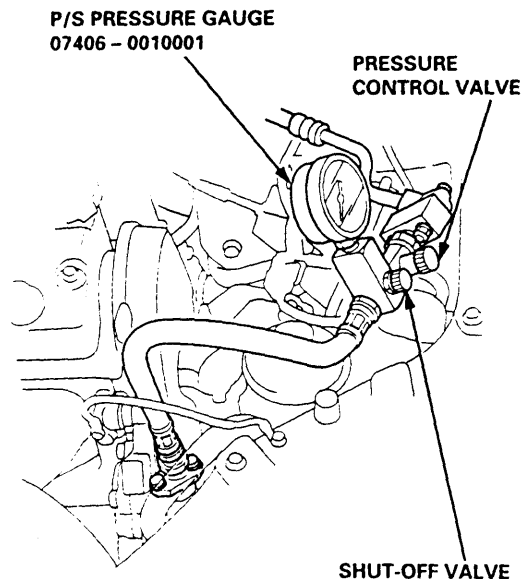


4. Open the shut-off valve fully.
5. Open the pressure control valve fully.

6. Start the engine and let it idle.
7. Turn the steering wheel from lock-to-lock several times to warm the fluid to operating temperature.
8. Measure steady-state fluid pressure while idling. If the pump is in good condition, the gauge should read less than 1500 kPa (15 kgf/cm², 213 psi). If it reads high, check the outlet hose or valve body unit (see General Troubleshooting 17-4).
9. Close the pressure control valve, then close the shut-off valve gradually until the pressure gauge needle is stable. Read the pressure.
10. Immediately open the pressure control valve fully.

CAUTION: Do not keep the pressure control valve closed more than 5 seconds or the pump could be damaged by over-heating.

If the pump is in good condition, the gauge should read at least 6,400 – 7,400 kPa (65 – 75 kgf/cm², 920 – 1,070 psi). A low reading means pump output is too low for full assist. Repair or replace the pump.



Steering Wheel

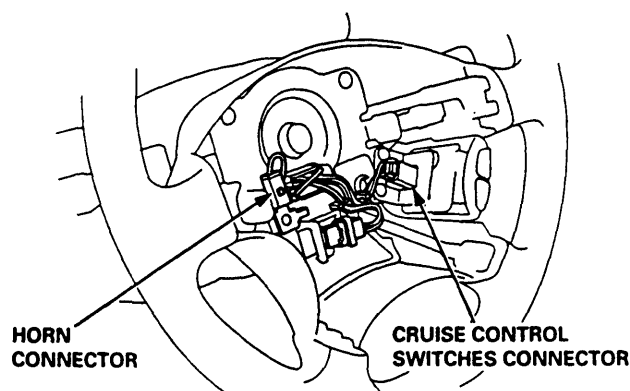


Removal

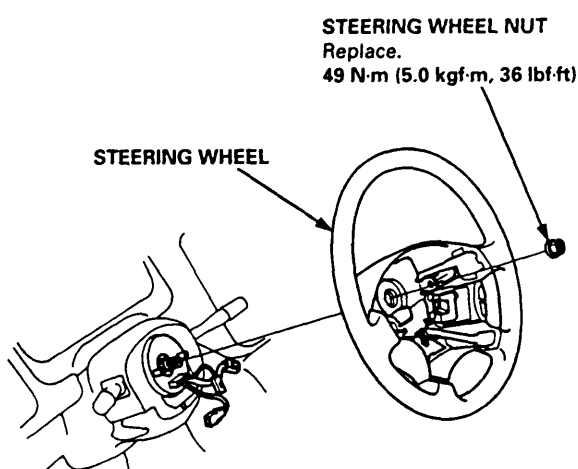
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

NOTE: Before removing the steering wheel, align the front wheels straight ahead.

1. Remove the driver's airbag assembly from the steering wheel (see section 24).
2. Disconnect the horn connector and cruise control switches connector.



3. Remove the steering wheel nut.



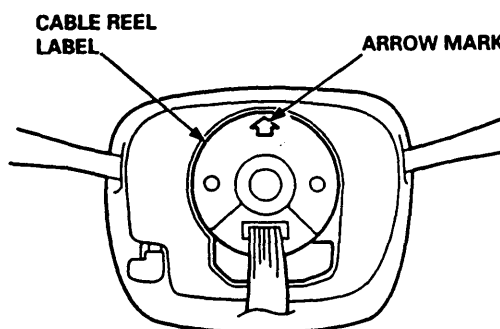
4. Remove the steering wheel by rocking it slightly from side-to-side as you pull steadily with both hands.

Installation

CAUTION: Do not tap on the steering wheel or steering column shaft when installing the steering wheel.

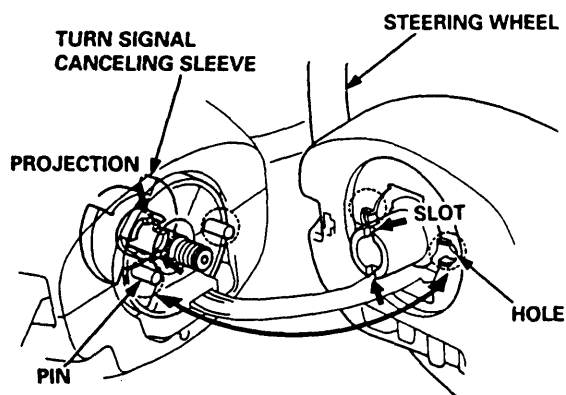
NOTE: Before installing the steering wheel, align the front wheels straight ahead.

1. Before installing the steering wheel, center the cable reel. Do this by first rotating the cable reel clockwise until it stops. Then rotate it counterclockwise approximately two turns. The arrow mark on the cable reel label should point straight up.



2. Install the steering wheel with the steering wheel nut.

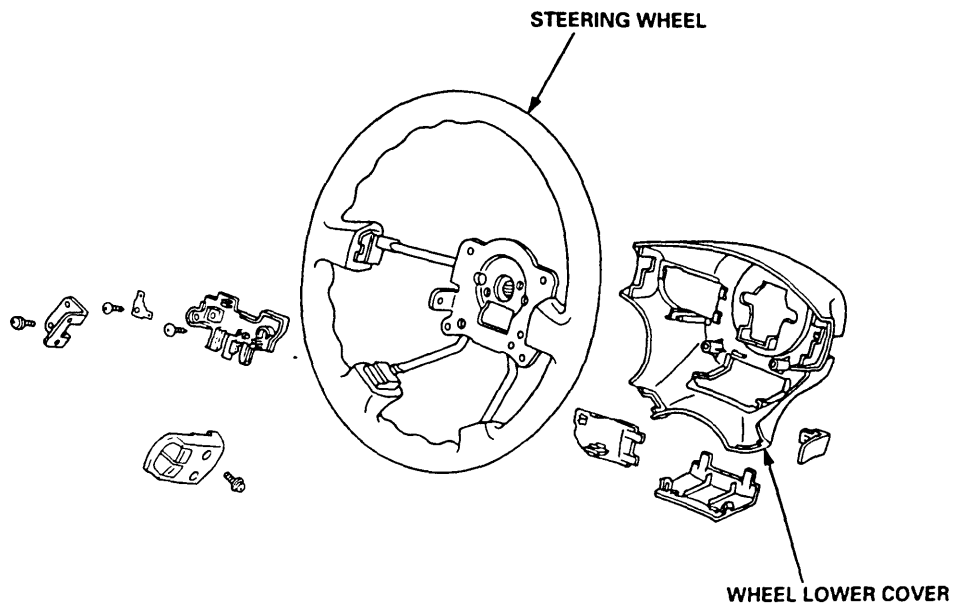
NOTE: Be sure the steering wheel shaft engages the cable reel and canceling sleeve.



3. Attach the cruise control switches connector to the steering wheel clip.
4. Connect the horn connector.
5. Install the driver's airbag assembly, and confirm proper system operation (see section 24).
6. Check the horn and cruise control switches for proper operations.

Steering Wheel

Disassembly/Reassembly





Steering Column

Removal/Installation

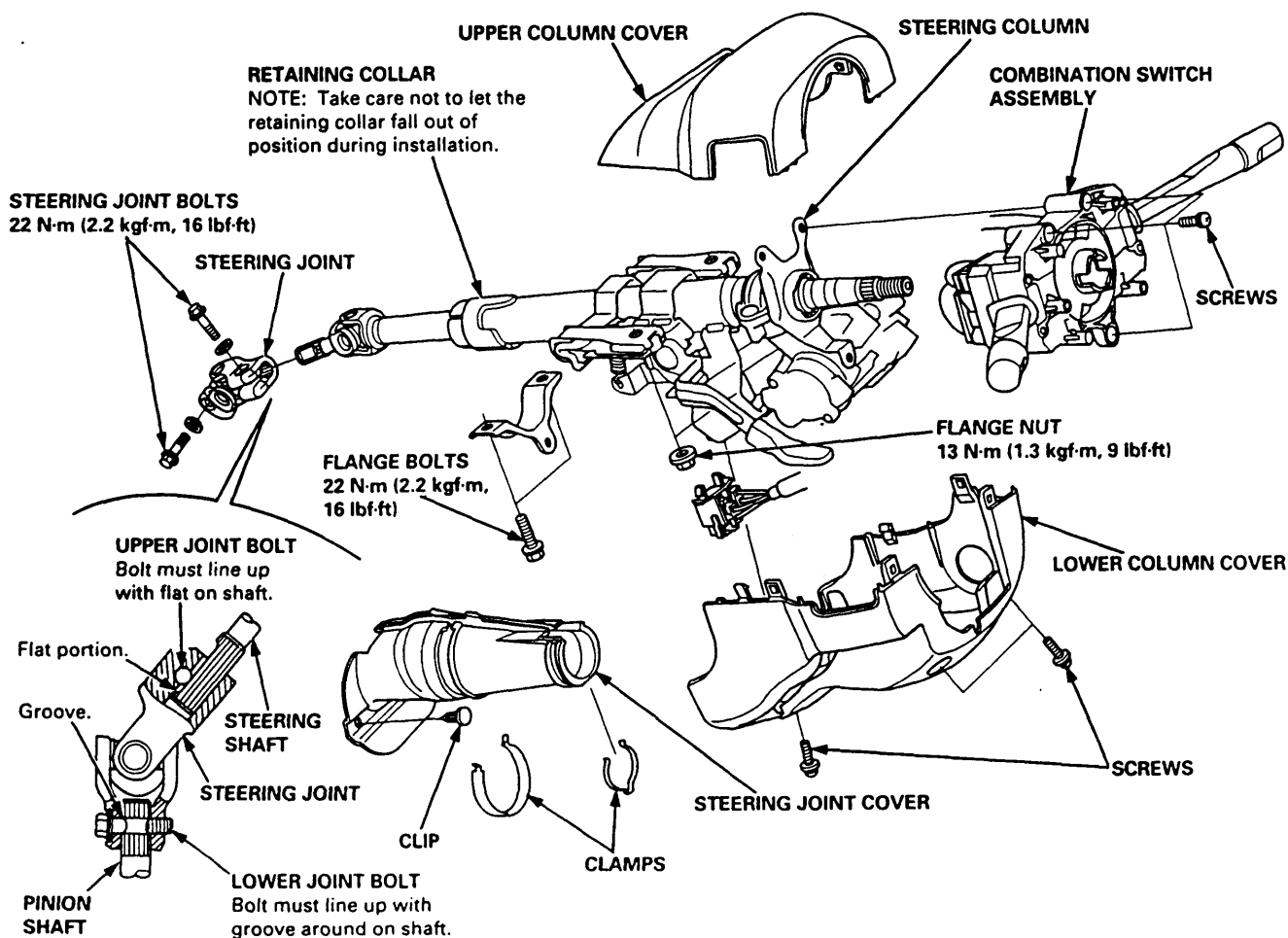
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

NOTE: Before removing the steering column for SRS, remove the driver's airbag assembly and cable reel (see section 24).

1. Remove the steering wheel (see page 17-17).
2. Remove the driver's dashboard lower cover and driver's knee bolster (see section 20).
3. Remove the combination switch assembly from the steering column shaft by disconnecting the connectors.
4. Disconnect the ignition switch connectors.
5. Remove the steering joint cover.
6. Remove the steering joint bolts.
7. Disconnect the steering joint by moving the joint toward the column, and remove it from the column shaft.
8. Remove the steering column by removing the attaching nuts and bolt.

9. Installation is the reverse of the removal procedure.
NOTE:

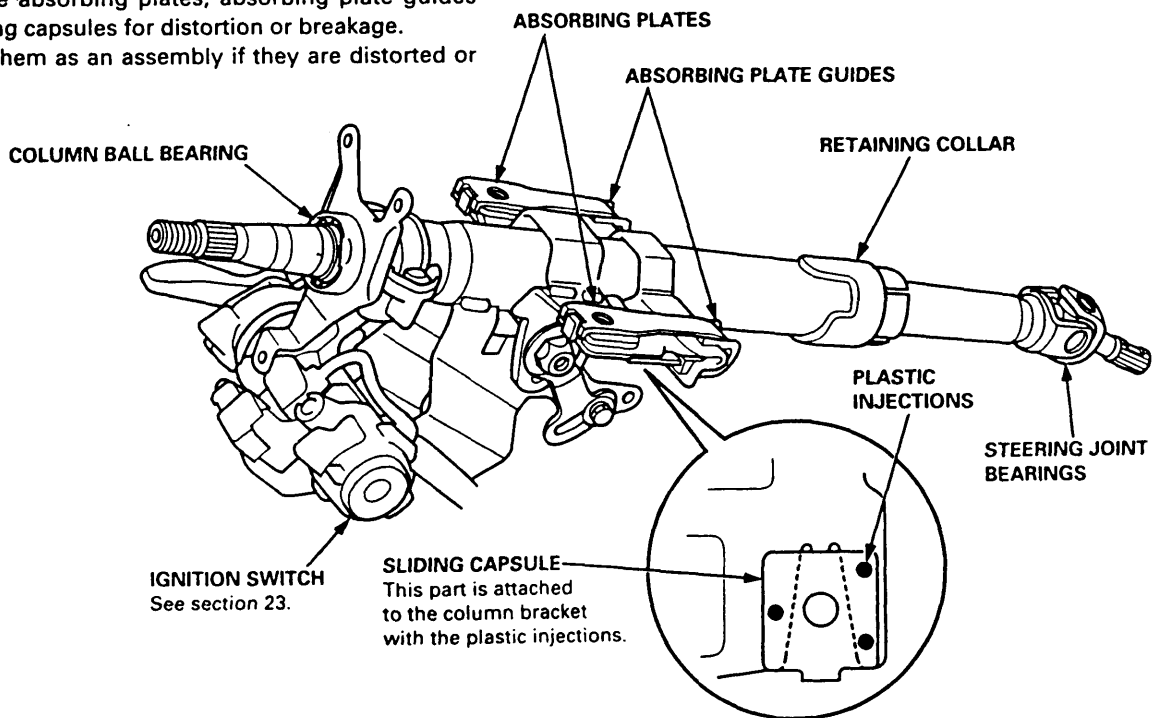
- Make sure the steering joint is connected as follows:
 - a. Insert the upper end of the steering joint onto the steering shaft (line up the bolt hole with the flat on the shaft), and loosely install the upper joint bolt.
 - b. Slip the lower end of the steering joint onto the pinion shaft (line up the bolt hole with the groove around the shaft), and loosely install the lower joint bolt.Be sure that the lower joint bolt is securely in the groove in the pinion shaft.
 - c. Pull on the steering joint to make sure that the steering joint is fully seated. Then tighten the joint bolts.
- Be sure the wires are not caught or pinched by any parts when installing the column.
 - Make sure the wire harness is routed and fastened properly.
 - Make sure the connectors are properly connected.



Steering Column

Inspection

- Check the steering column ball bearing and the steering joint bearings for play and proper movement. If there is noise or if there is excessive play, replace the steering column as an assembly.
- Check the retaining collar for damage. If it is damaged, replace the steering column as an assembly.
- Check the absorbing plates, absorbing plate guides and sliding capsules for distortion or breakage. Replace them as an assembly if they are distorted or broken.

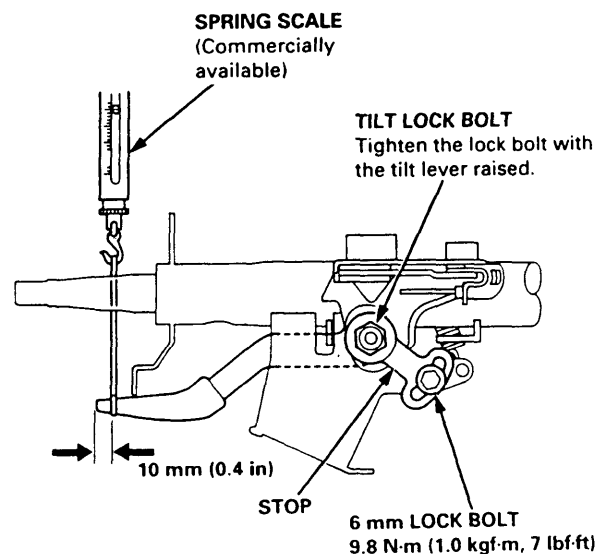


1. Move the tilt lever from the loose position to the lock position 3 to 5 times; then measure the tilt lever preload 10 mm (0.4 in) from the end of the tilt lever.

Preload: 70 – 90 N (7 – 9 kgf, 15 – 20 lbf)

2. If the measurement is out of the specification, adjust the preload using the following procedures.
 - a. Loosen the tilt lever, and set the steering column in the neutral position.
 - b. Remove the 6 mm lock bolt and remove the stop.
 - c. Adjust the preload by turning the tilt lock bolt left or right.
 - d. Pull up the tilt lever to the uppermost position, and install the stop. Check the preload again. If the measurement is still out of specification, repeat the above procedures "a" through "c" to adjust.

CAUTION: Be careful not to loosen the tilt lever when installing the stop or tightening the 6 mm lock bolt.

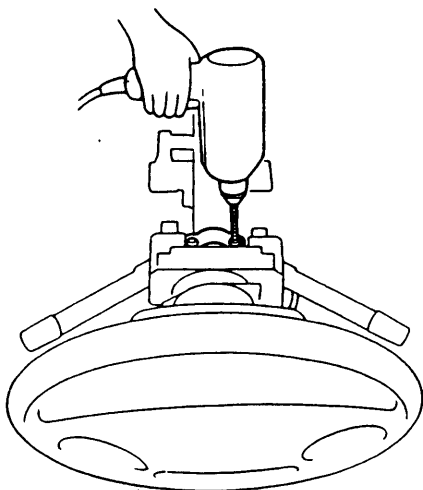




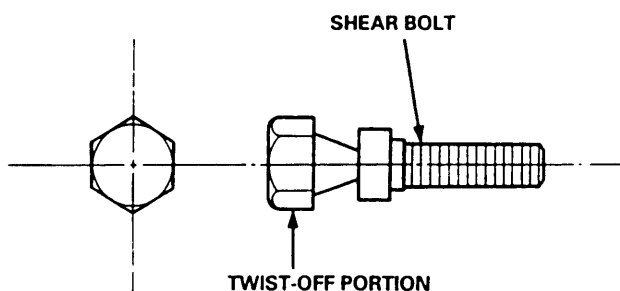
Steering Lock Replacement

1. Remove the steering column (see page 17-19).
2. Center punch each of the two shear bolts, and drill their heads off with a 5 mm (3/16 in) drill bit.

CAUTION: Do not damage the switch body when removing the shear bolts.



3. Remove the shear bolts from the switch body.
4. Install the switch body without the key inserted.
5. Loosely tighten the new shear bolts.
6. Insert the ignition key, and check for proper operation of the steering wheel lock and that the ignition key turns freely.
7. Tighten the shear bolts until the hex heads twist off.

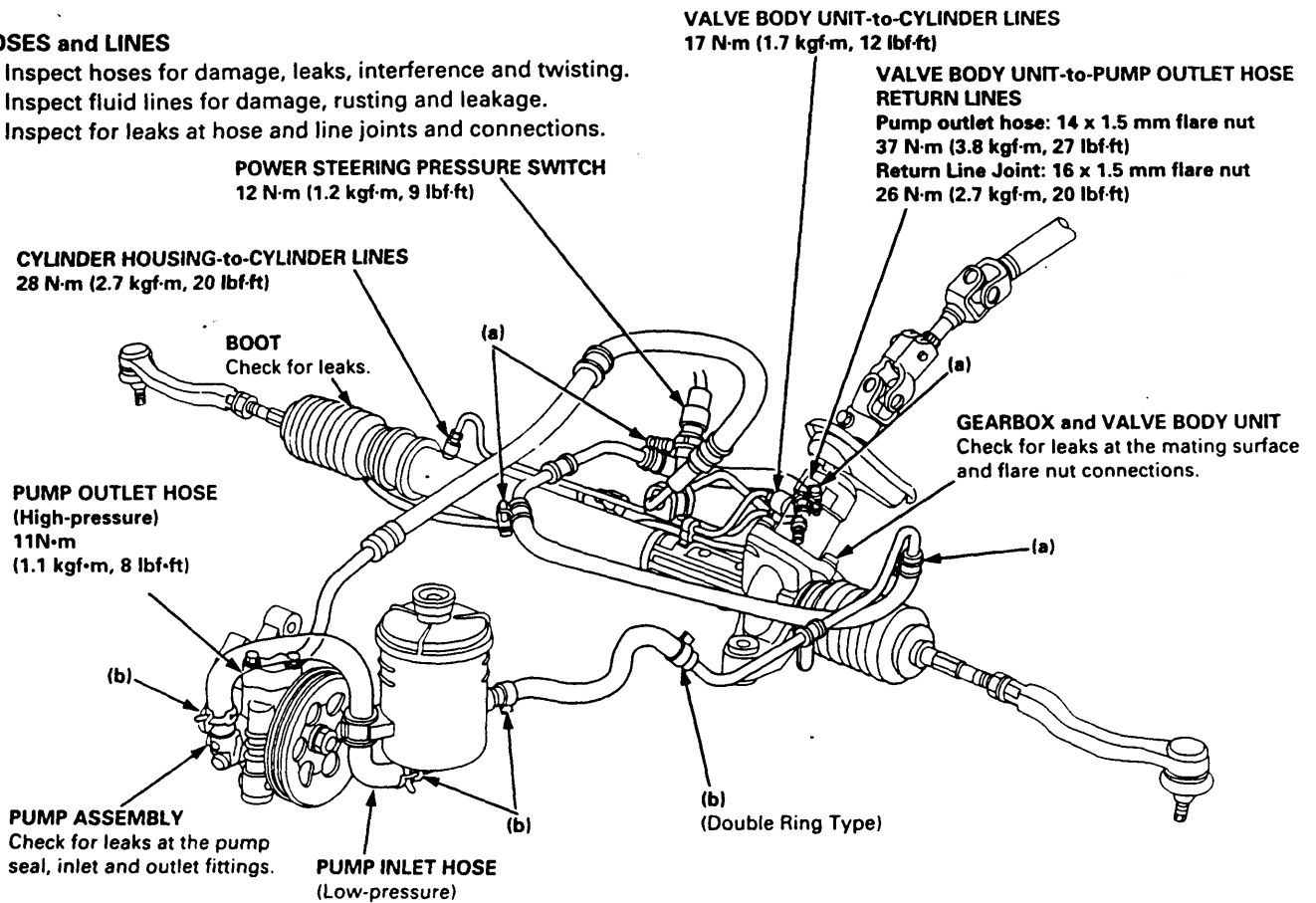


Power Steering Hoses, Lines

Fluid Leakage Inspection

HOSES and LINES

- Inspect hoses for damage, leaks, interference and twisting.
- Inspect fluid lines for damage, rusting and leakage.
- Inspect for leaks at hose and line joints and connections.



Replacement

NOTE:

- Connect each hose to the corresponding line securely until it contacts the stop on the line. Install the clamp or adjustable clamp at the specified distance from the hose end as shown.
- Add the recommended power steering fluid to the specified level on the reservoir and check for leaks.

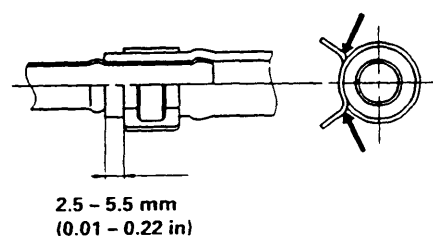
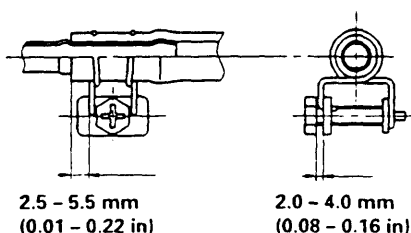
ADJUSTABLE HOSE CLAMP:

- Position the adjustable hose clamps at the points indicated by (a) in the drawing above.
- Slide the hose over the line until it contacts the stop.

CAUTION: Check all clamps for deterioration or deformation; replace with the clamps new ones if necessary.

HOSE CLAMP:

- Position the hose clamps at the points indicated by (b) in the drawing above.
- Slide the hose over the line until it contacts the stop.



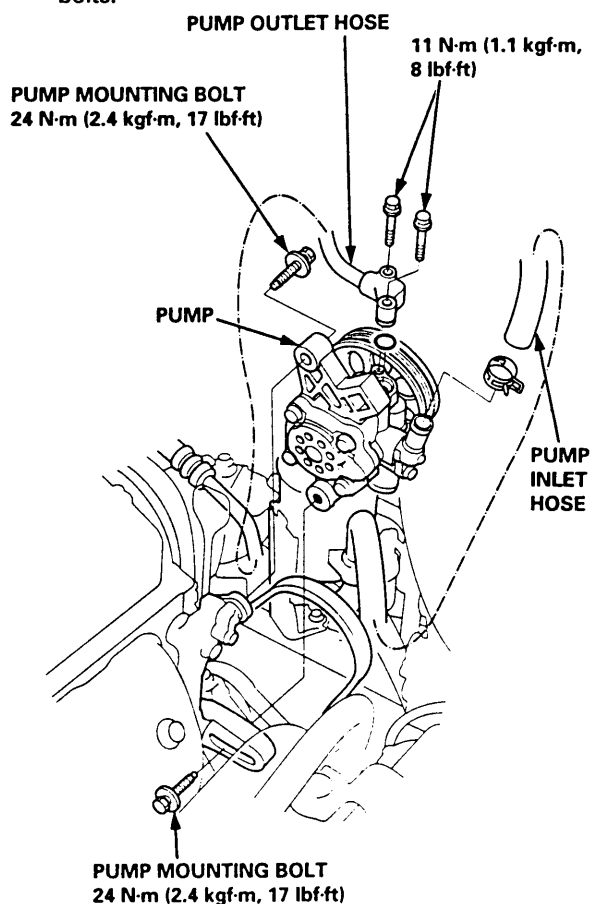


Power Steering Pump

Replacement

NOTE: Before disconnecting the hoses from the pump, place a suitable container under the vehicle.

1. Remove the belt by loosening the pump mounting bolts.



2. Cover the A/C compressor with several shop towels to protect it from spilled power steering fluid. Disconnect the inlet hose and the outlet hose from the pump, and plug them.

NOTE: Take care not to spill the fluid on the body or parts. Wipe off any spilled fluid at once.

3. Remove the pump mounting bolts, then remove the pump.

NOTE: Do not turn the steering wheel with the pump removed.

4. Wrap the opening of the pump with a piece of tape to prevent foreign material from entering the pump.

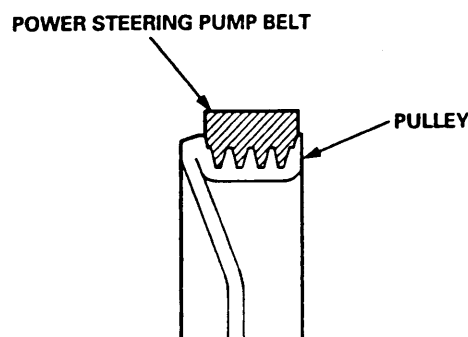
5. Connect the inlet hose and the outlet hose. Tighten the pump fittings securely.

6. Loosely install the pump in the pump bracket with mounting bolts.

7. Install the pump belt.

CAUTION:

- Make sure that the power steering belt is properly positioned on the pulleys.
- Do not get power steering fluid or grease on the power steering belt or pulley faces. Clean off any fluid or grease before installation.



8. Adjust the pump belt (see page 17-14).
9. Fill the reservoir to the upper level line (see page 17-15).

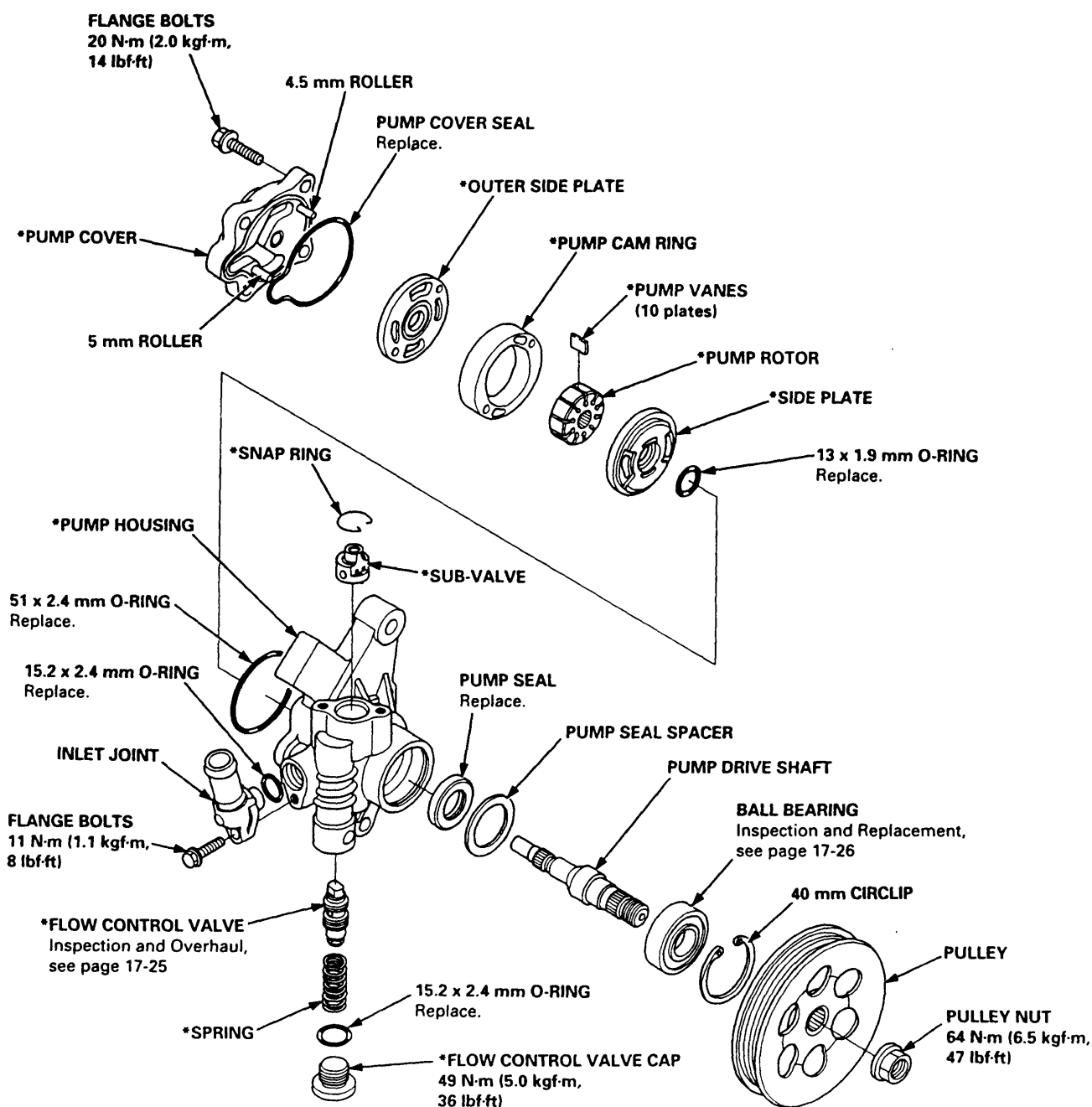
Power Steering Pump

Disassembly

CAUTION: The power steering components are made of aluminum. Avoid damaging the components during assembly.

NOTE:

- Clean the disassembled parts with a solvent, and dry them with compressed air. Do not dip the rubber parts in a solvent.
- Always replace the O-rings and rubber seals with new ones before assembly.
- Apply recommended power steering fluid to the parts indicated in the assembly procedures.
- Do not allow dust, dirt, or other foreign materials to enter the power steering system.
- Replace the pump as an assembly if the parts indicated with asterisk (*) are worn or damaged.

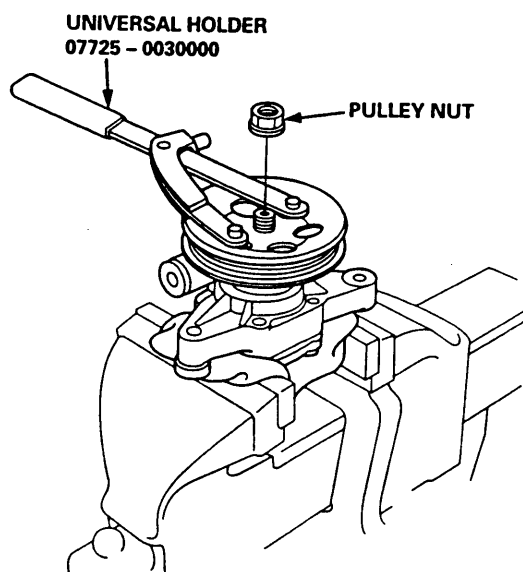




Inspection

1. Drain the fluid from the pump.
2. Hold the steering pump in a vise with soft jaws, hold the pulley with the special tool, and remove the pulley nut and pulley.

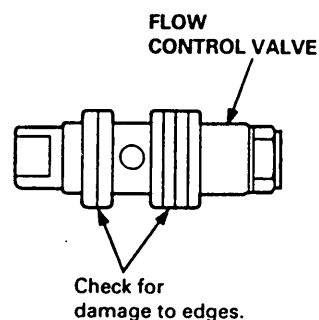
CAUTION: Be careful not to damage the pump housing with the jaws of the vise and extension bar.



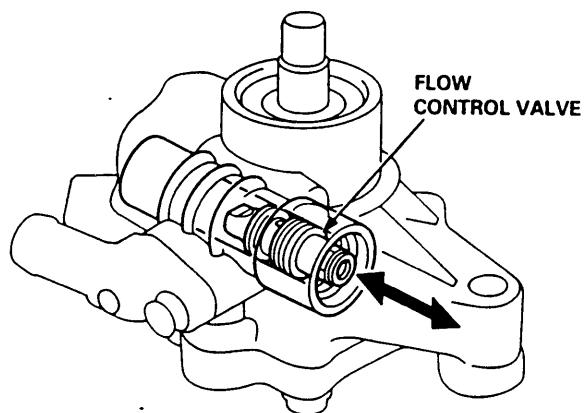
3. Loosen the flow control valve cap with a hex wrench and remove it.
4. Remove the O-ring, flow control valve and spring.
5. Remove the inlet joint and O-ring.
6. Remove the pump cover and pump cover seal.
7. Remove the outer side plate, pump cam ring, pump rotor, pump vanes, side plate and O-rings.
8. Remove the snap ring, then remove the sub-valve from the pump housing.
9. Remove the circlip, then remove the pump drive shaft by tapping the shaft end with the plastic hammer.
10. Remove the pump seal spacer and pump seal.

Flow Control Valve:

1. Check the flow control valve for wear, burrs, and other damage to the edges of the grooves in the valve.

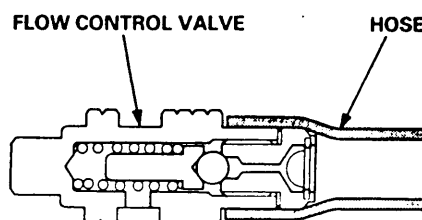


2. Inspect the bore of the flow control valve for scratches or wear.
3. Slip the valve back in the pump, and check that it moves in and out smoothly.



If OK, go on step 4; if not, replace the pump as an assembly. The flow control valve is not available separately.

4. Attach a hose to the end of the valve as shown.

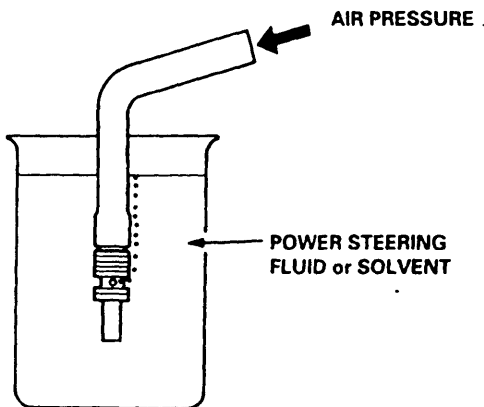


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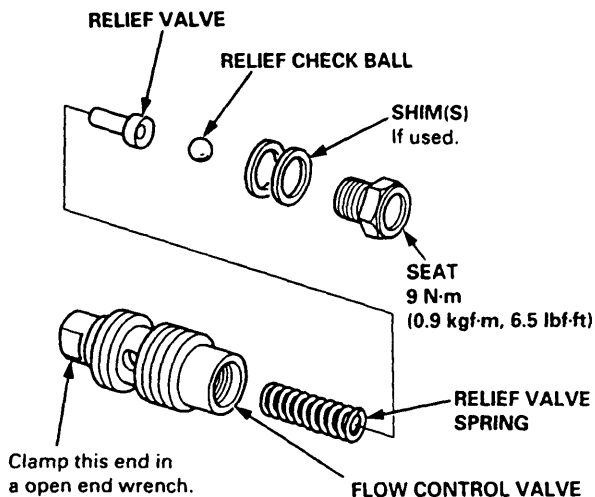
Power Steering Pump

Inspection (cont'd)

- Submerge the valve in a container of power steering fluid or solvent, and blow in the hose. If air bubbles leak through the valve at less than 98 kPa (1.0 kgf/cm², 14.2 psi), repair it as follows.



- Hold the bottom end of the valve with an open end wrench.
- Unscrew the seat in the top end of the valve, and remove any shims, the relief check ball, relief valve and relief valve spring.

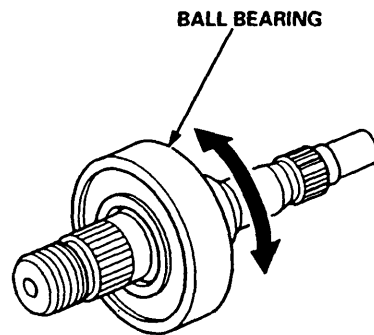


- Clean all the parts in solvent, dry them off, then reassemble and retest the valve. If the flow control valve tests OK, reinstall it in the pump. If the flow control valve still leaks air, replace the pump as an assembly. The flow control valve is not available separately.

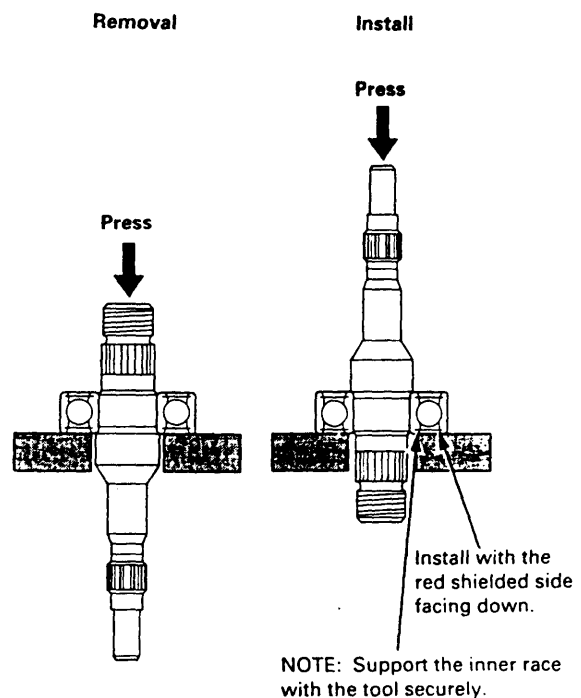
NOTE: If necessary, relief pressure is adjusted at the factory by adding shims under the check ball seat. If you found shims in your valve, be sure you reinstall as many as you took out.

Ball Bearing:

- Inspect the ball bearing by rotating the outer race slowly. If any play or roughness is felt, replace the ball bearing.



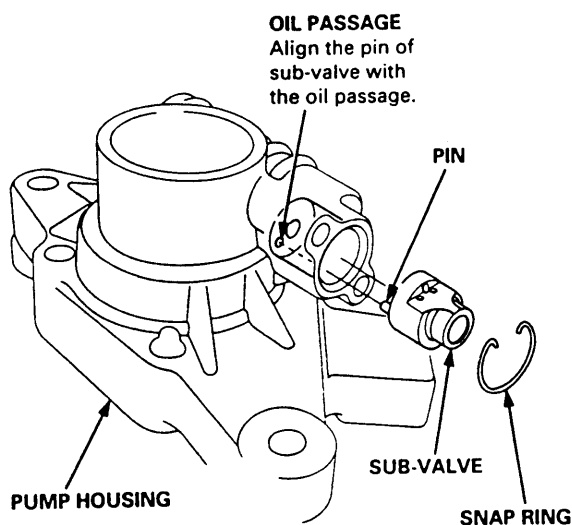
- Replace the ball bearing using a press as shown.





Reassembly

1. Align the pin of the sub-valve with the oil passage in pump housing, and push down the sub-valve. Install the snap ring properly.



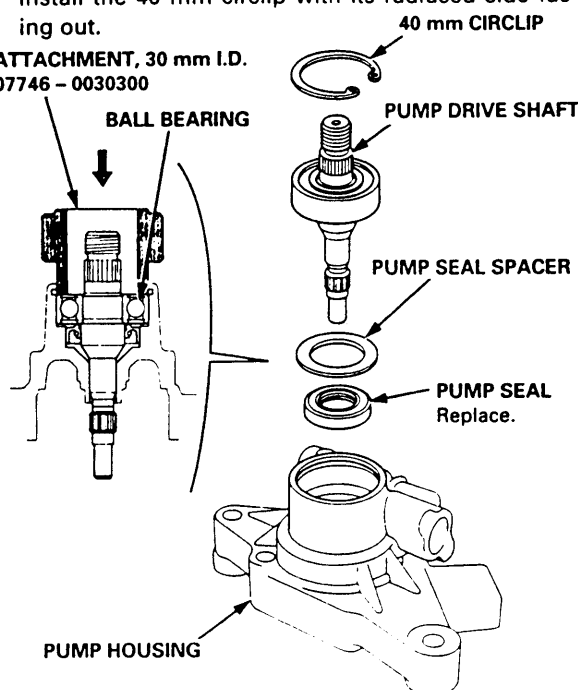
2. Install the new pump seal in the pump housing by hand, then install the pump seal spacer.

NOTE: Insert the pump seal with its grooved side facing in.

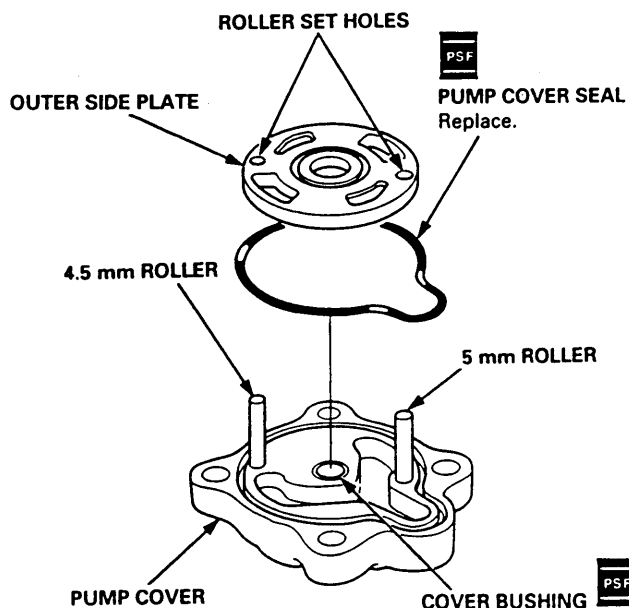
3. Position the pump drive shaft in the pump housing, then drive it in using a special tool as shown.

4. Install the 40 mm circlip with its radiused side facing out.

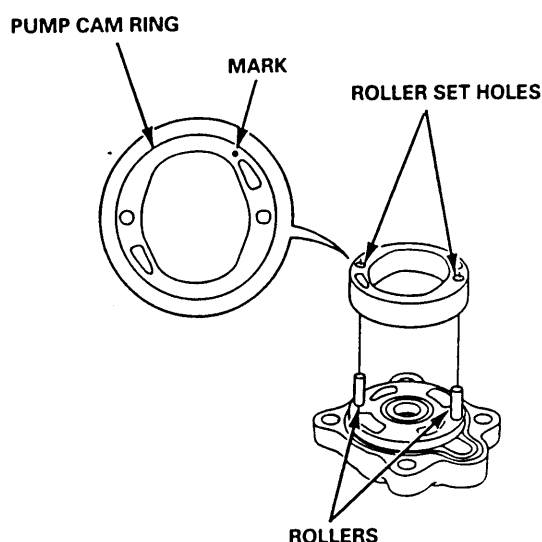
ATTACHMENT, 30 mm I.D.
07746 - 0030300



5. Coat the pump cover seal and the cover bushing with the power steering fluid, then install the pump cover seal into the groove in the pump cover.
6. Install the outer side plate over the two rollers.



7. Set the pump cam ring over the two rollers with the "O" mark on the cam ring upward.



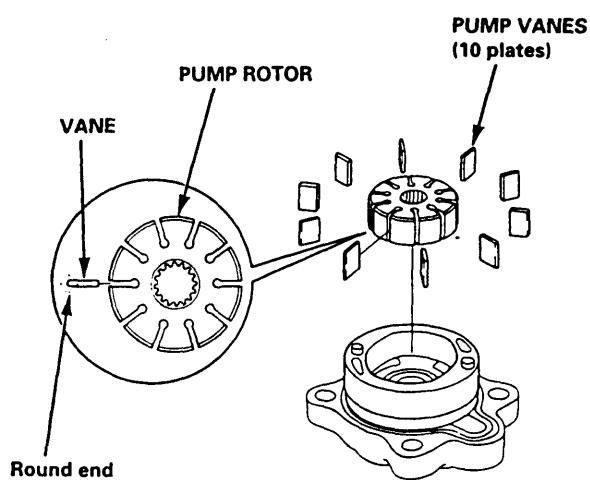
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Power Steering Pump

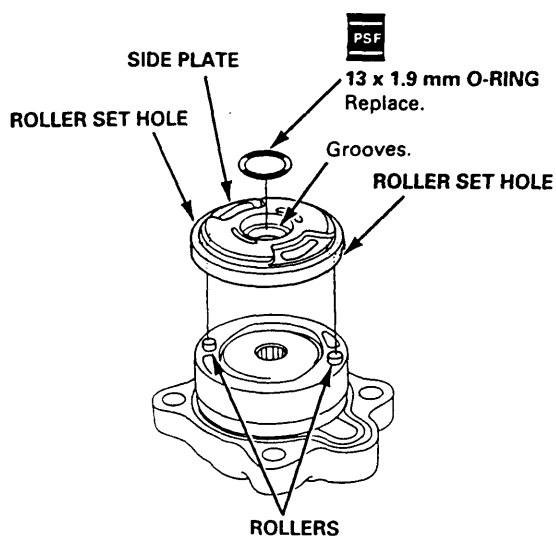
Reassembly (cont'd)

8. Install the pump rotor to the pump cover.
9. Set the 10 vanes in the grooves in the rotor.

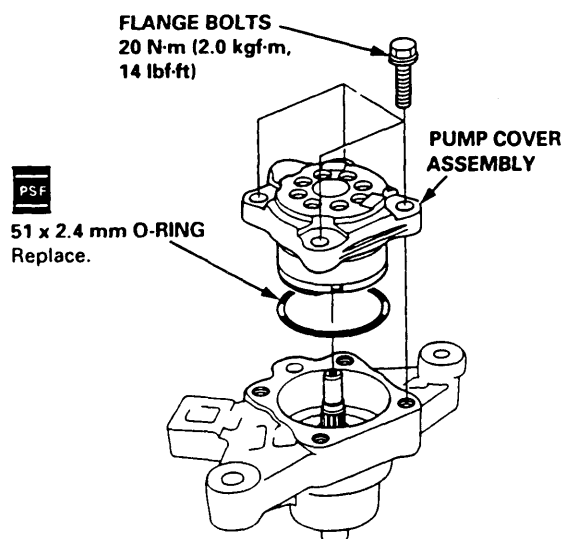
NOTE: Be sure that the round ends of the vanes are in contact with the sliding surface of the cam ring.



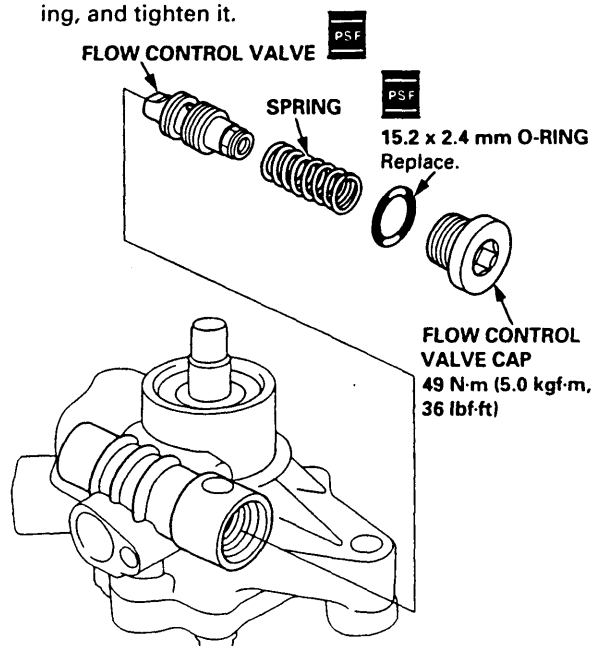
10. Coat the O-ring with power steering fluid, and install it into the grooves in the side plate.
11. Install the side plate on the cam ring by aligning the roller set holes in the side plate with the rollers.



12. Coat the O-ring with power steering fluid, and position it into the pump housing.
13. Install the pump cover assembly in the pump housing.



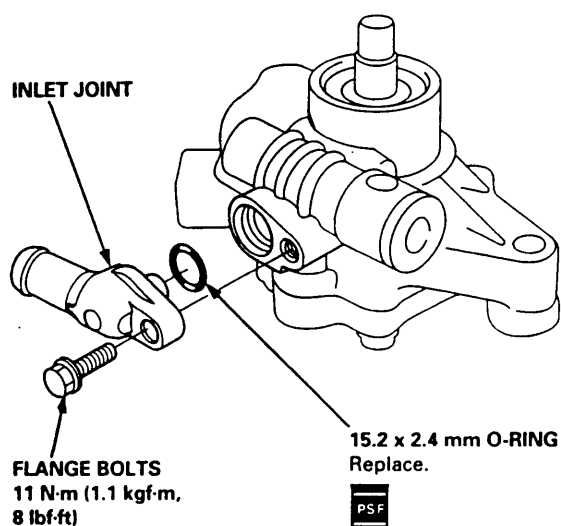
14. Coat the flow control valve with power steering fluid.
15. Install the flow control valve and spring on the pump housing.
16. Coat the O-ring with power steering fluid, and install it on the flow control valve cap.
17. Install the flow control valve cap on the pump housing, and tighten it.





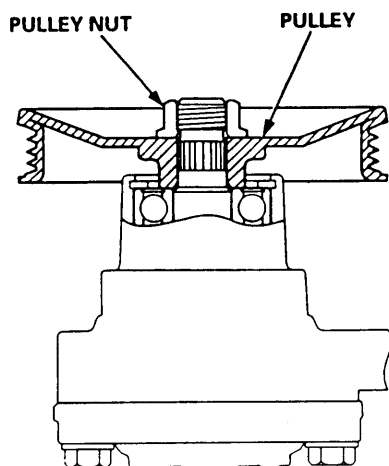
18. Coat the O-ring with power steering fluid, and install it into the grooves in the inlet joint.

19. Install the inlet joint on the pump housing.

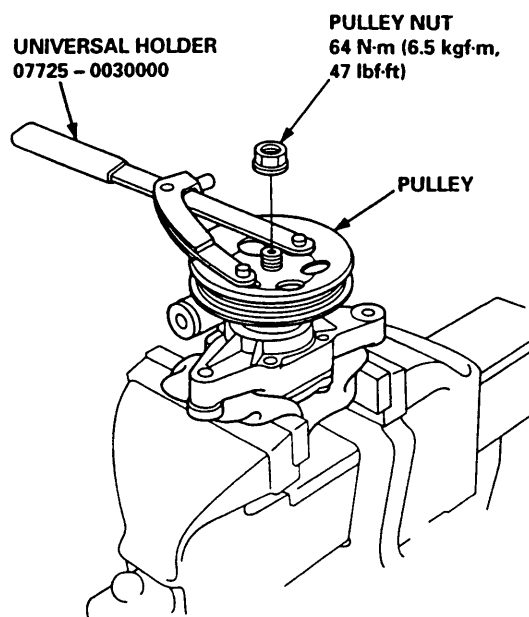


20. Install the pulley as shown below, then loosely install the pulley nut. Hold the steering pump in a vise with soft jaws.

CAUTION: Be careful not to damage the pump housing with the jaws of the vise.



21. Hold the pulley with the special tool, and tighten the pulley nut.



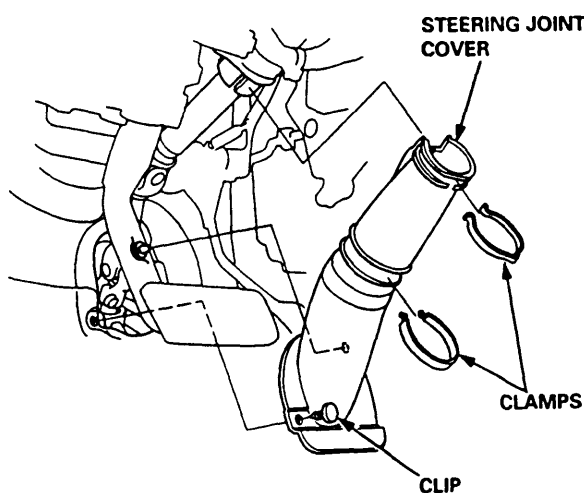
22. Check that the pump turns smoothly by turning the pulley by hand.

Power Steering Gearbox

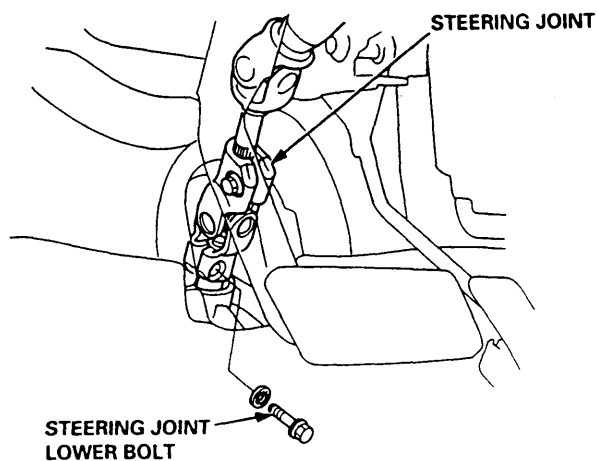
Removal

NOTE: Using solvent and a brush, wash any oil and dirt off the valve body unit its lines, and the end if the gear-box. Blow dry with compressed air.

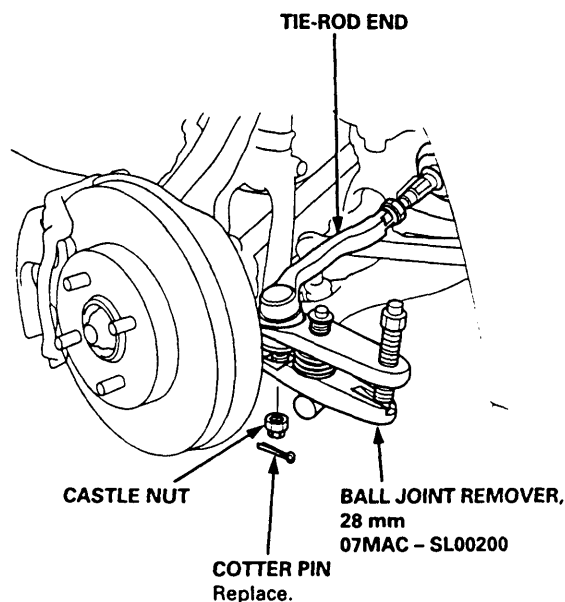
1. Drain the power steering fluid as described on page 17-15.
2. Raise the front of vehicle, and support it on safety stands in the proper locations (see section 1).
3. Remove the front wheels.
4. Remove the driver's airbag assembly, and steering wheel (see page 17-17).
5. Remove the steering joint cover.



6. Remove the steering joint lower bolt, and disconnect the steering joint by moving the joint toward the column.



7. Remove the cotter pin from the castle nut and remove the nut.



8. Install the 10 mm hex nut on the ball joint. Be sure that the 10 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the special tool.

NOTE: Remove the ball joint using the special tool. Refer to section 18 for how to use the ball joint remover.

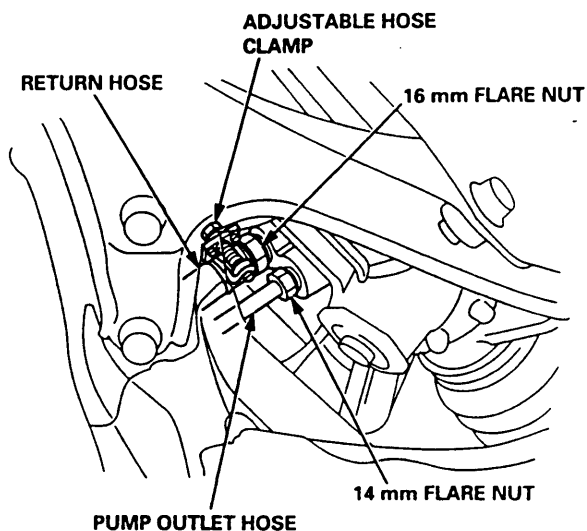
9. Separate the tie-rod ball joint and knuckle using the special tool.

CAUTION: Avoid damaging the ball joint boot.

10. Remove the left tie-rod end, then slide the rack all the way to the right.
11. Remove exhaust pipe A (see section 9).
12. Disconnect the shift linkage (see section 13 or section 14).



13. Loosen the 14 mm flare nut and disconnect the pump outlet hose.



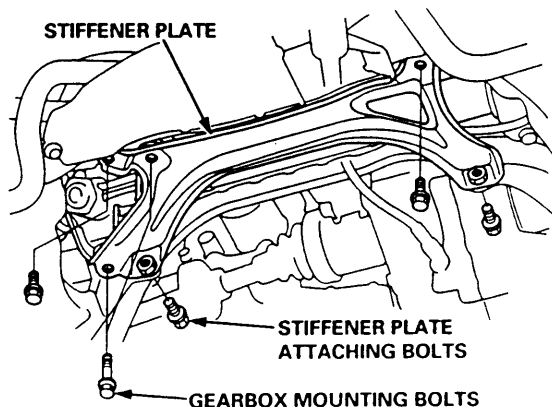
14. Loosen the adjustable hose clamp and disconnect the return hose.
15. Loosen the 16 mm flare nut and remove the return hose joint from the valve body unit.

CAUTION: After disconnecting the hose and line, plug or seal the hose and line with a piece of tape or equivalent to prevent foreign materials from entering the valve body unit.

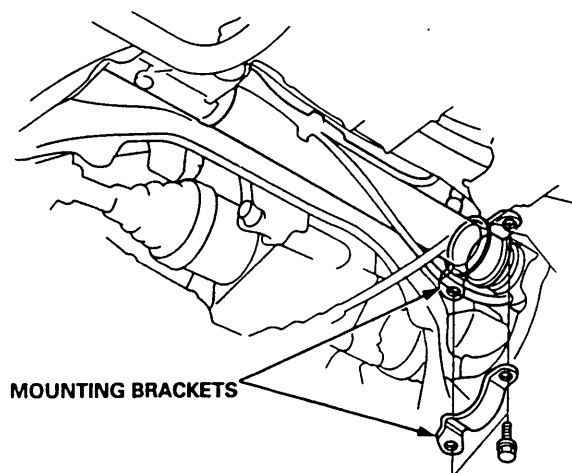
NOTE: Do not loosen the cylinder line A and B between the valve body unit and cylinder.

16. Remove the stiffener plate.

NOTE: Some stiffener plate attaching bolts are also used as gearbox mounting bolts. The gearbox will tilt to side when these bolts are removed.

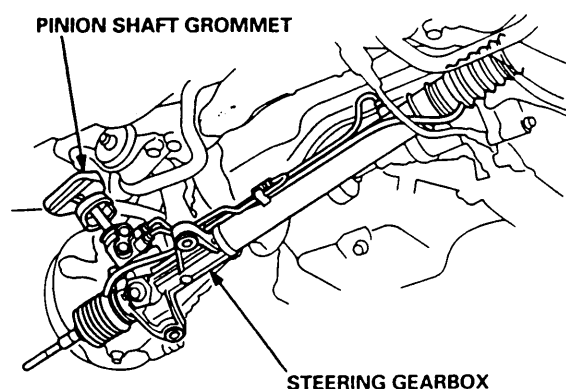


17. Remove the mounting brackets.



18. Pull the steering gearbox all the way down to clear the pinion shaft from the bulkhead, then remove the pinion shaft grommet.
19. Move the steering gearbox to right so the left rack end clears the rear beam, then tilt the left side down to remove it from the vehicle.

CAUTION: Be careful not to bend or damage the pump outlet hose and cylinder lines when removing the gearbox.



Power Steering Gearbox

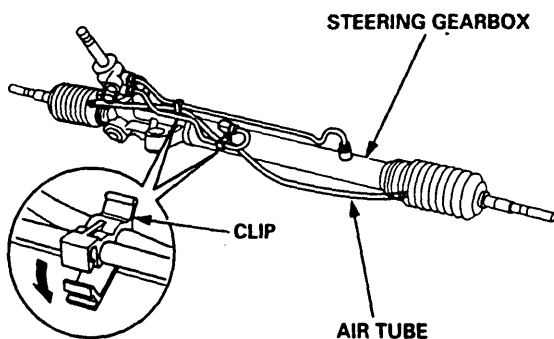
Disassembly

Steering Rack Disassembly

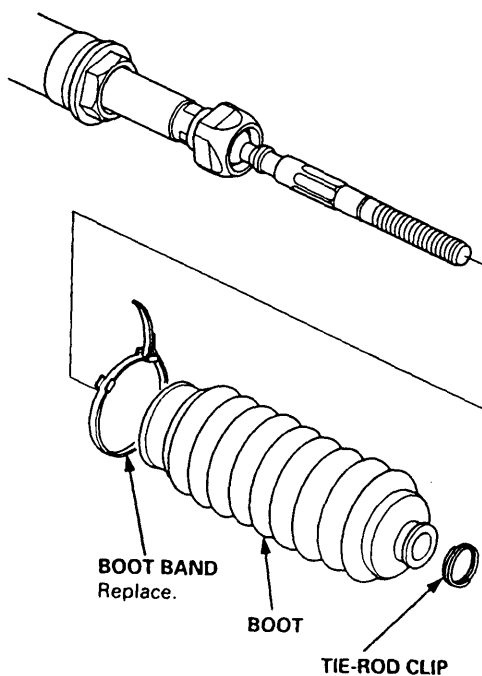
NOTE:

- Before you disassemble the gearbox, wash it off with solvent and a brush.
- Do not dip seals and O-rings in solvent.

1. Remove the steering gearbox (see page 17-30).
2. Remove the tie-rod end and locknut.
3. Remove air tube and clips.

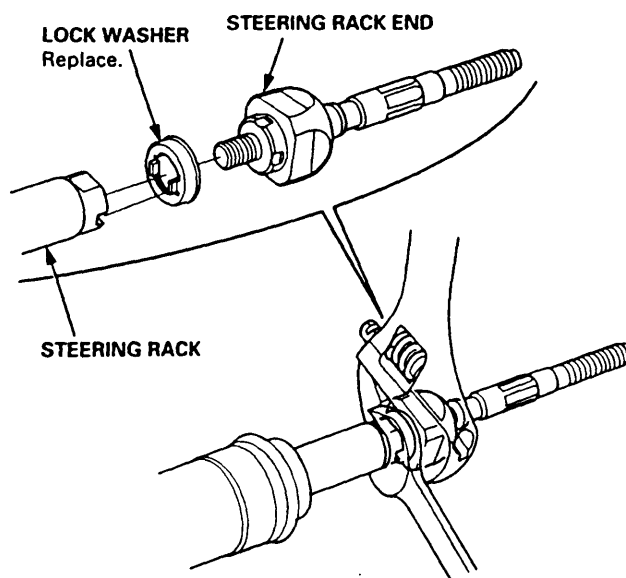


4. Remove the boot bands and tie-rod clips. Pull the boots away from the ends of the gearbox.

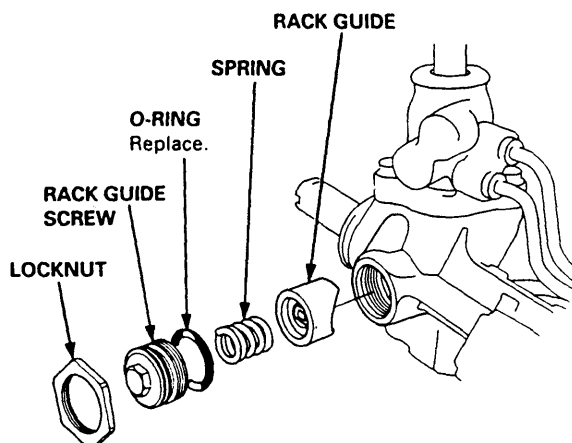


5. Hold the steering rack with a wrench, and unscrew the rack end with another wrench.

CAUTION: Be careful not to damage the rack surface with the wrench.

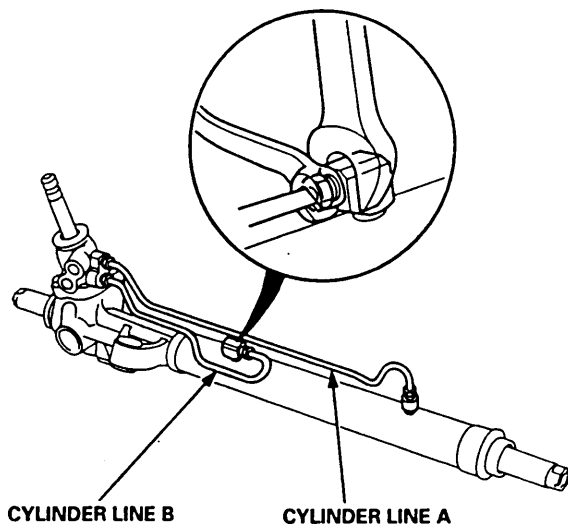


6. Loosen the locknut, then remove the rack guide screw and O-ring.
7. Remove the spring and the rack guide from the gearbox housing.

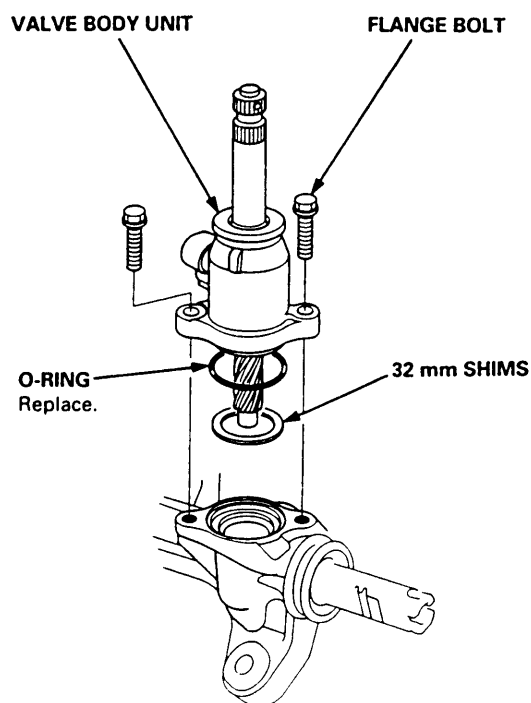




8. Remove cylinder lines A and B from the gearbox.



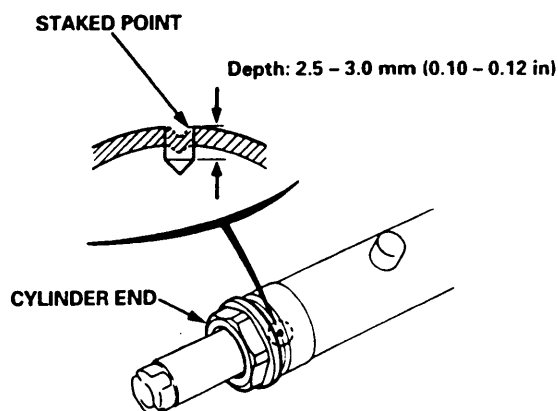
9. Drain the fluid from the cylinder fittings by slowly moving the steering rack back and forth.
10. Remove the two flange bolts, then remove the valve body unit from the gearbox housing. (See page 17-35 for valve body unit disassembly.)



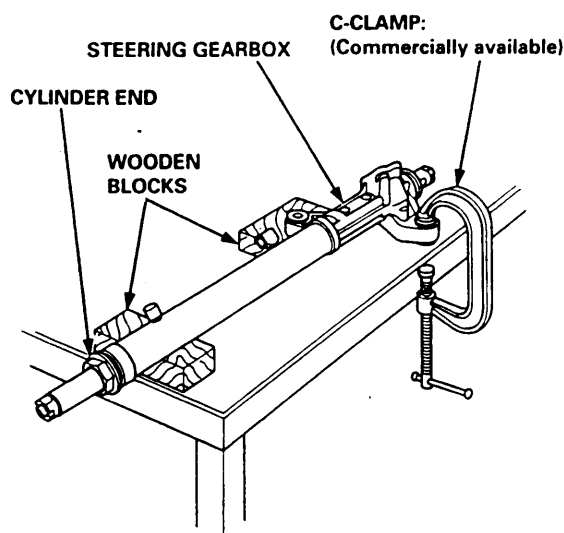
11. Drill a 3 mm (0.12 in) diameter hole approximately 2.5 – 3.0 mm (0.10 – 0.12 in) in depth in the staked point on the cylinder.

CAUTION:

- Do not allow metal shavings to enter the cylinder.
- After removing the cylinder end, remove any burrs at the staked point.



12. Hold the steering gearbox using a C-clamp as shown.



13. Loosen and remove the cylinder end.

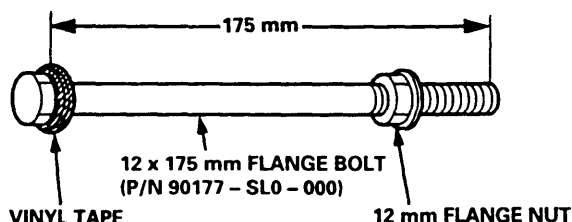
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Power Steering Gearbox

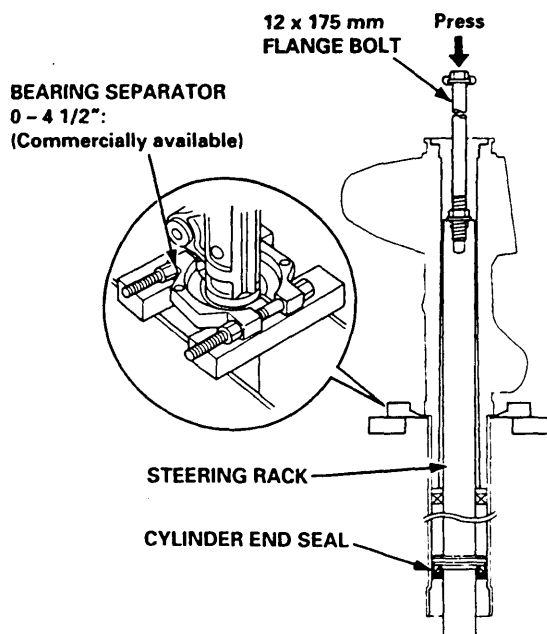
Disassembly (cont'd)

14. Assemble a 12 x 1.25 mm flange nut onto a 12 x 175 mm grade 10 flange bolt as shown.

NOTE: Wrap the flange portion of the bolt with vinyl tape to protect the cylinder.



15. Install the flange bolt into the end of the steering rack until it bottoms in the hole, then back the flange bolt out 1/4 turn. Hold the flange bolt, and tighten the flange nut against the rack by hand.
16. Install the bearing separator on the gearbox housing as shown.



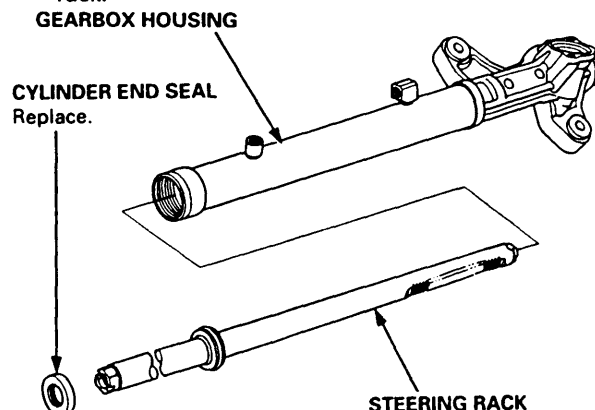
17. Set the gearbox in a press so the gearbox housing points upward, then press the cylinder end seal and steering rack out of the gearbox housing.

NOTE: Hold the steering rack to keep it from falling when pressed clear.

CAUTION:

- Be careful not damage to inner surface of the cylinder with the flange bolt.
- Do not place your fingers under the steering rack.

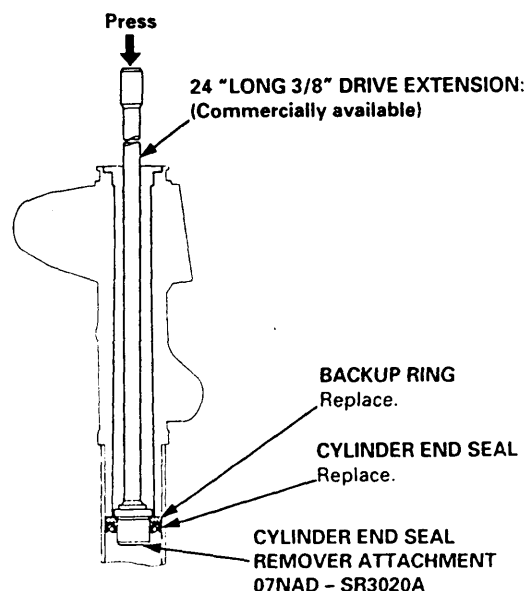
18. Remove the 12 mm bolt and nut from the steering rack.
19. Remove the cylinder end seal from the steering rack.



20. Insert a 24" long, 3/8" drive extension and the special tool into the cylinder from the gearbox side.
NOTE: Make sure that the special tool is securely positioned on the backup ring edges.
CAUTION: Be careful not damage to inner surface of the cylinder with the special tool.
21. Set the gearbox housing in a press, then press out the cylinder end seal and backup ring from the gearbox housing.

CAUTION:

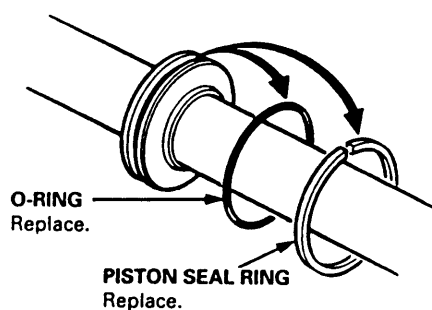
- Keep the tool straight to avoid damaging the cylinder wall. Check the tool angle, and correct it if necessary, when removing the cylinder end seal.
- Use a press to remove the cylinder end seal. Do not try to remove the seal by striking the tool. It will break the backup ring, and the cylinder end seal will remain in the gearbox housing.





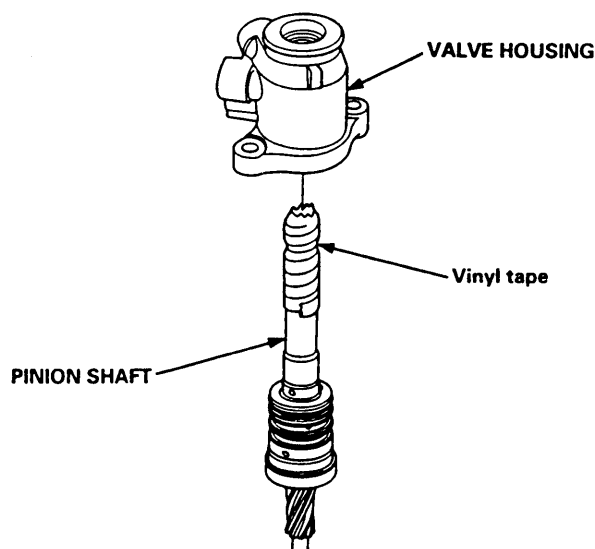
22. Carefully pry the piston seal ring and O-ring off the piston rack.

CAUTION: Be careful not to damage the inside of seal ring groove and piston edges when removing the seal ring.



Valve Body Unit Disassembly

23. Before removing the valve housing, apply vinyl tape to splines of the pinion shaft.
24. Separate the valve housing from the pinion shaft/valve using a press.

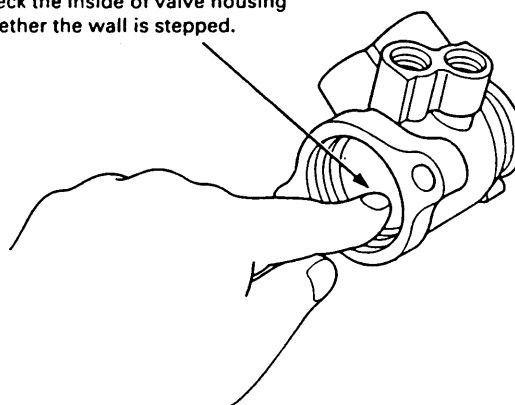


25. Check the inner wall of the valve housing where the seal ring slides with your finger. If there is a step in the wall, the valve housing is worn. Replace the valve housing.

NOTE:

- There may be the sliding marks from the seal ring on the wall of the valve housing. Replace the valve housing only if the wall is stepped.
- When the valve housing is replaced, install new shim(s) on the bearing surface of the housing to adjust the thickness.

Check the inside of valve housing whether the wall is stepped.



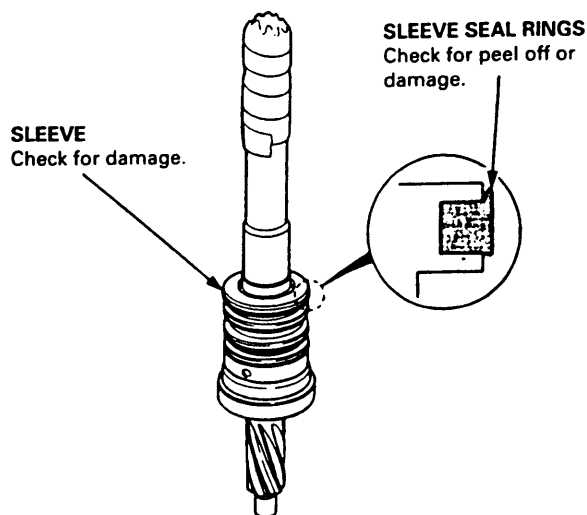
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Power Steering Gearbox

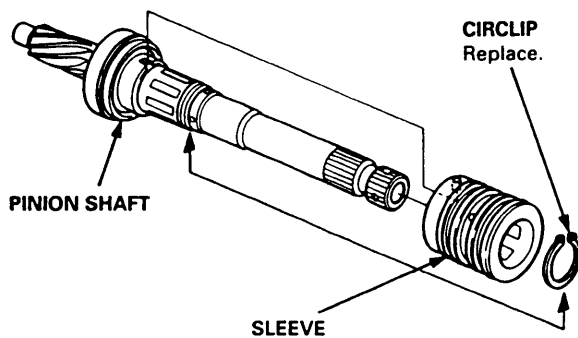
Disassembly (cont'd)

26. Check for wear, burrs and other damage to the edges of the grooves in the sleeve.

NOTE: The pinion shaft and sleeve are a precision matched set. If either the pinion shaft or sleeve must be replaced, replace both parts as a set.

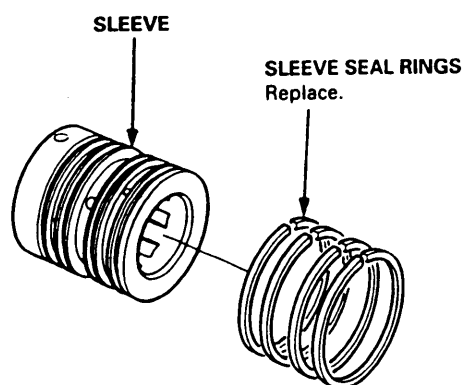


27. Remove the circlip and pinion shaft sleeve from the pinion shaft.



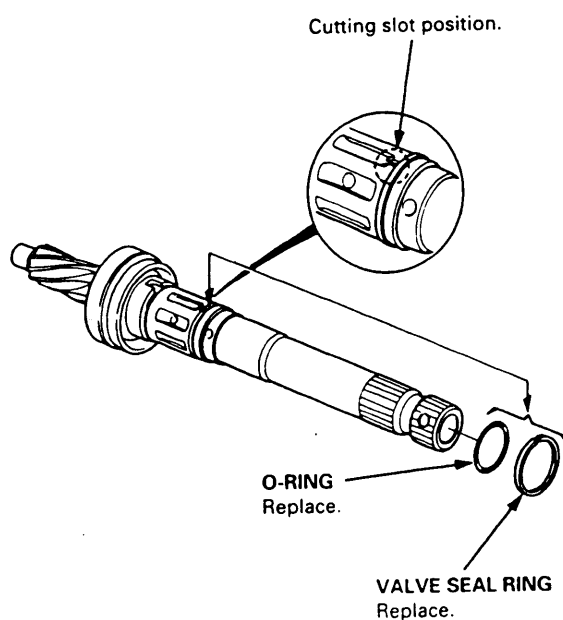
28. Using a cutter or an equivalent tool, cut and remove the four seal rings from the sleeve.

CAUTION: Be careful not to damage the edges of the sleeve grooves and outer surface when removing the seal rings.



29. Using a cutter or an equivalent tool, cut the valve seal ring and O-ring at the groove the pinion shaft. Remove the valve seal ring and O-ring.

CAUTION: Be careful not to damage the edges of the pinion shaft groove and outer surface when removing the valve seal ring and O-ring.

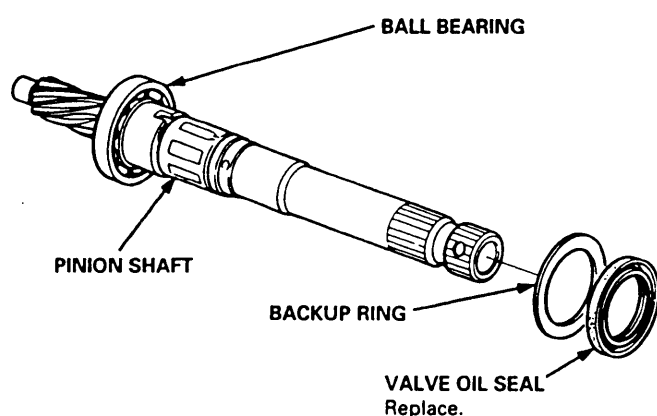




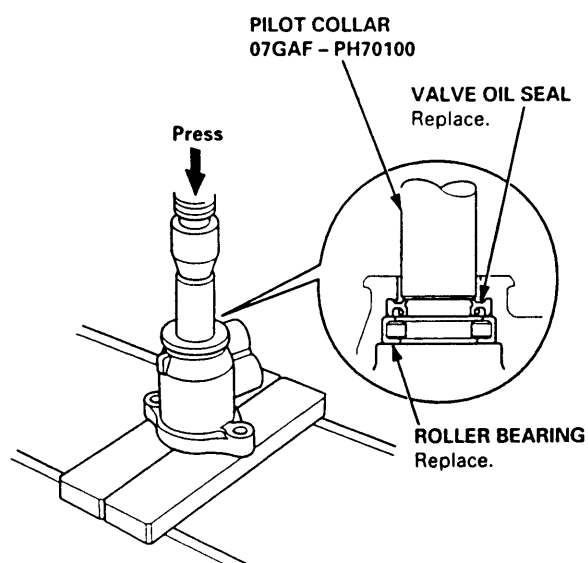
30. Remove the valve oil seal and backup ring from the pinion shaft.

NOTE:

- Inspect the ball bearing by rotating the outer race slowly. If there is any excessive play, replace the pinion shaft and sleeve as an assembly.
- The pinion shaft and sleeve are a precise fit; do not intermix old and new pinion shafts and sleeves.



31. Press the valve oil seal and roller bearing out of the valve housing using a hydraulic press and special tool shown below.

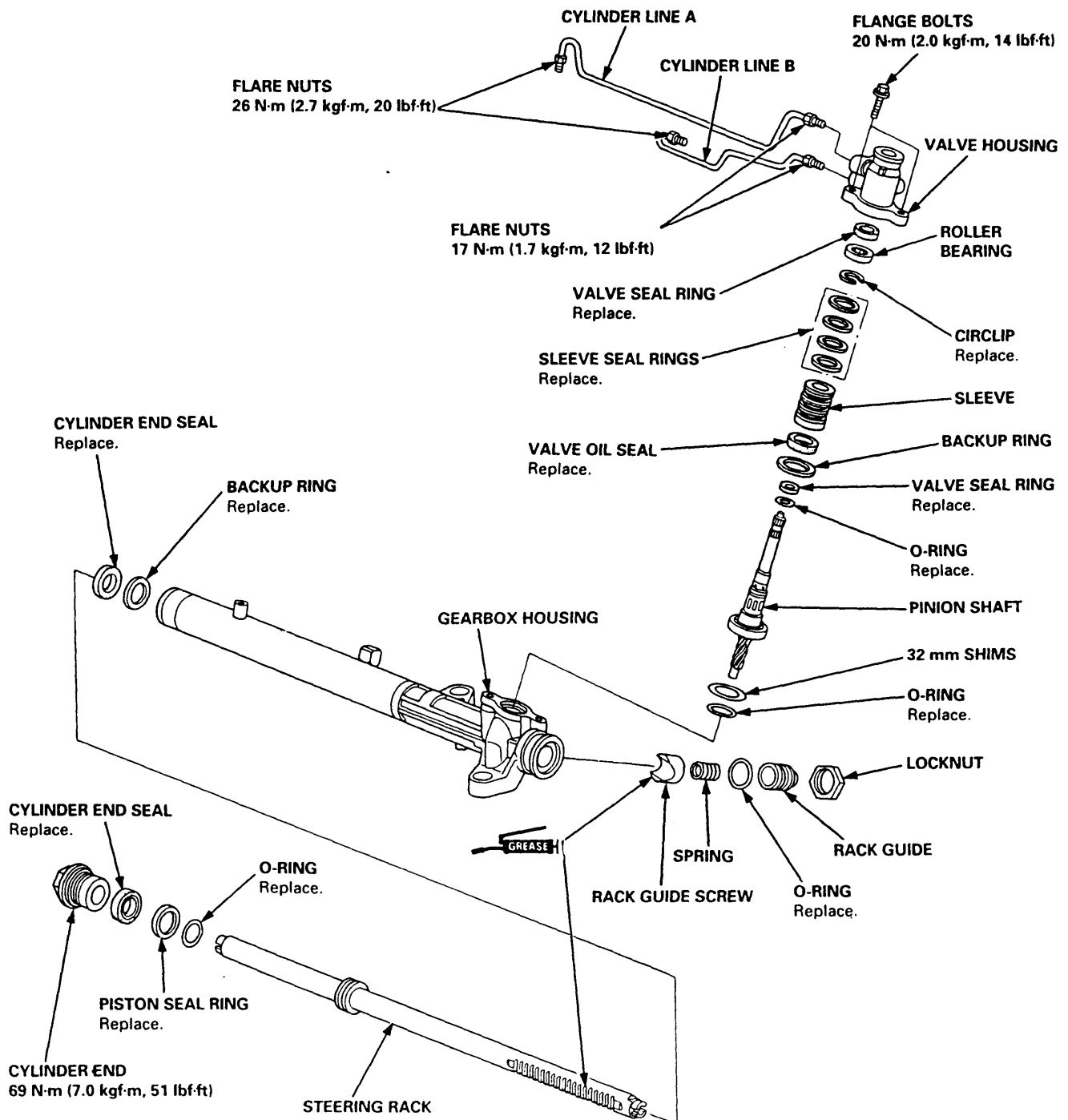


Power Steering Gearbox

Reassembly

NOTE:

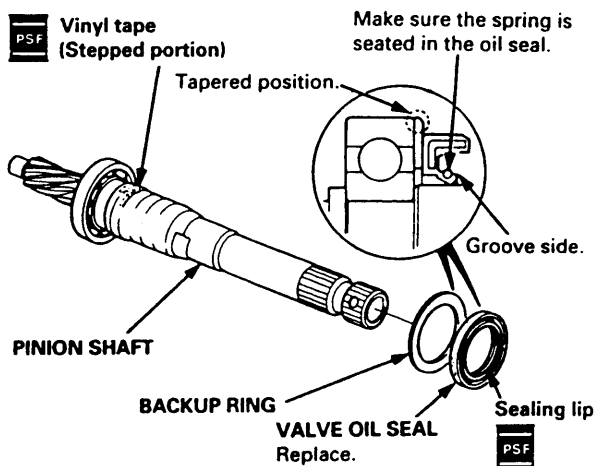
- Clean the disassembled parts with a solvent, and dry them with compressed air. Do not dip the rubber parts in a solvent.
- Always replace the O-rings and rubber seals with new ones before assembly.
- Apply the recommended power steering fluid to the parts indicated in the assembly procedures.
- Do not allow dust, dirt, or other foreign materials to enter the power steering system.
- Use the appropriate special tools where necessary.





Valve Body Unit Reassembly

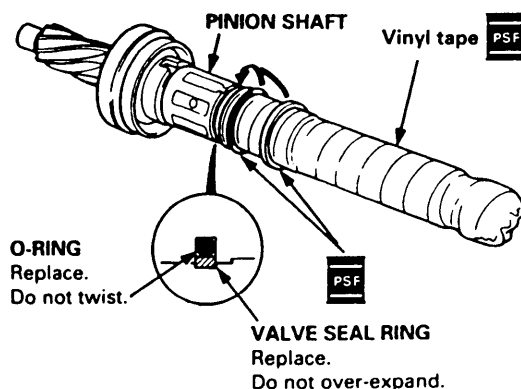
1. Apply vinyl tape to the stepped portion of the pinion shaft, and coat the surface of the vinyl tape with the power steering fluid.



2. Install the backup ring with its tapered side as shown above.
3. Coat the inside surface of the new valve oil seal with power steering fluid.
4. Slide the valve oil seal over the pinion shaft, being careful not to damage the sealing lip.

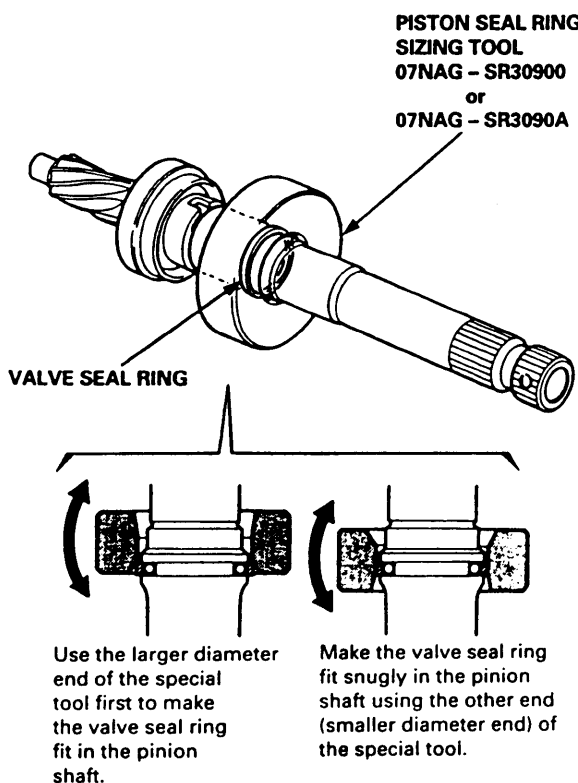
CAUTION: Install the valve oil seal with its grooved side facing opposite the bearing.

5. Apply vinyl tape to the splines and stepped portion of the shaft, and coat the surface of the vinyl tape with the power steering fluid.



6. Fit the new O-ring in the groove of the pinion shaft. Then slide the new valve seal ring over the shaft and the groove in on the pinion shaft.
7. Remove the vinyl tape from the pinion shaft.

8. Apply power steering fluid to the surface of the valve seal ring that was installed on the pinion shaft.
9. Apply power steering fluid to the inside of the special tool. Set the larger diameter end of the special tool over the valve seal ring.
10. Move the special tool up and down several times to make the valve seal ring fit in the pinion shaft.



11. Remove the special tool.
12. Turn the special tool over, and set the smaller diameter end of the special tool over the valve seal ring. Move the special tool up and down several times to make the valve seal ring fit snugly in the pinion shaft.

(cont'd)

Power Steering Gearbox

Reassembly (cont'd)

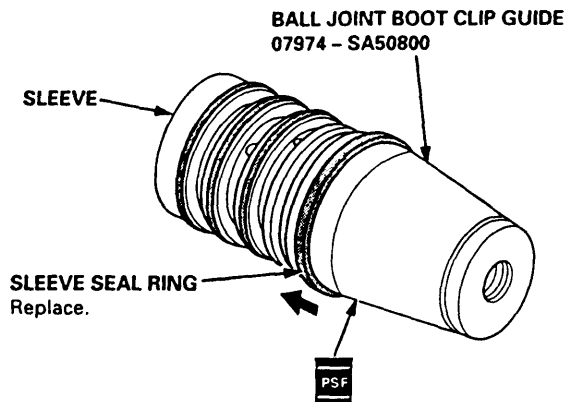
13. Apply power steering fluid to the surface of the special tool. Set the new seal rings over the special tool from the smaller diameter end of the tool, and expand the seal rings. Do two rings at a time from each end of the sleeve.

NOTE:

- Do not over-expand the seal ring. Install the resin seal rings with care so as not to damage them. After installation, be sure to contract the seal rings using the special tool (sizing tool).
- There are two types of sleeve seal rings: black and brown. Do not mix the different types of sleeve seal rings as they are not compatible.

14. Align the special tool with each groove in the sleeve, and slide a sleeve seal ring into each groove.

NOTE: After installation, compress the seal rings with your fingers temporarily.

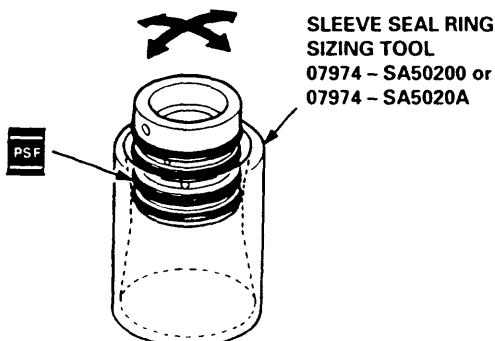


15. Apply power steering fluid to the seal rings on the sleeve, and to the entire inside surface of the special tool.

16. Insert the sleeve into the special tool slowly.

17. Move the sleeve each direction several times to make the seal rings snugly fit in the sleeve.

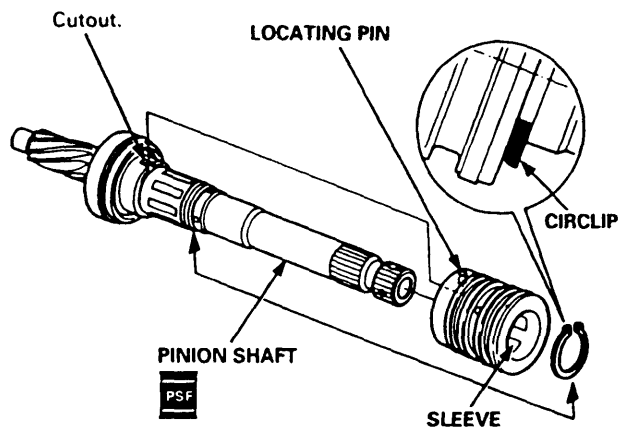
NOTE: Be sure that the seal rings are not turned up.



18. Apply power steering fluid to the surface of the pinion shaft. Assemble the sleeve over the pinion shaft by aligning the locating pin on the inside of the sleeve with the cutout in the shaft. Then install the new circlip securely in the pinion shaft groove.

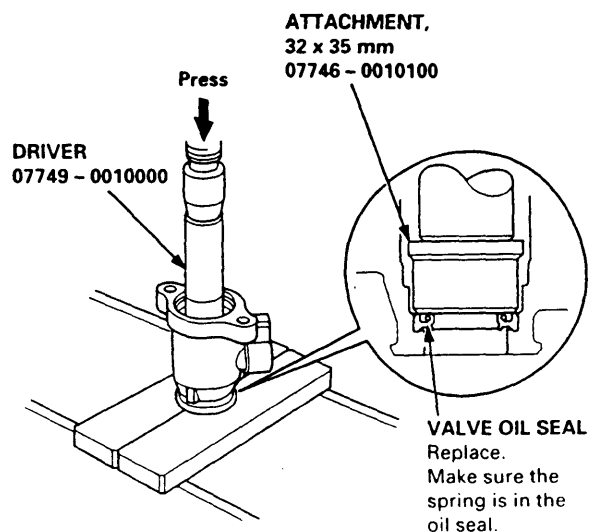
NOTE:

- Be careful not to damage the valve seal ring when inserting the sleeve.
- Install the circlip with its radiused side toward the sleeve.



19. Apply power steering fluid to the seal ring lip of the valve oil seal, then install the seal in the valve housing using a hydraulic press and special tools as shown.

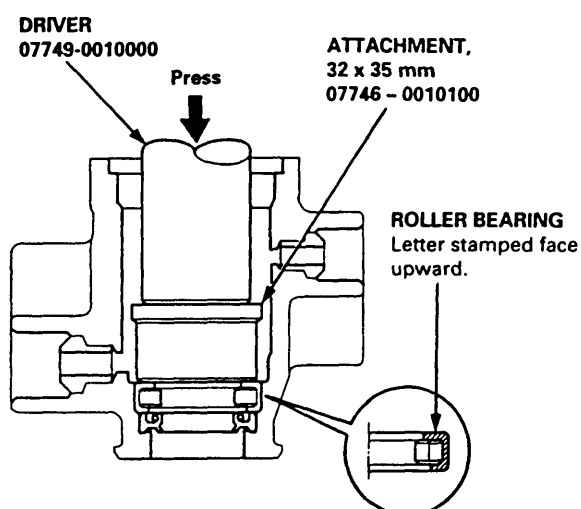
CAUTION: Install the valve oil seal with its grooved side facing the tool.



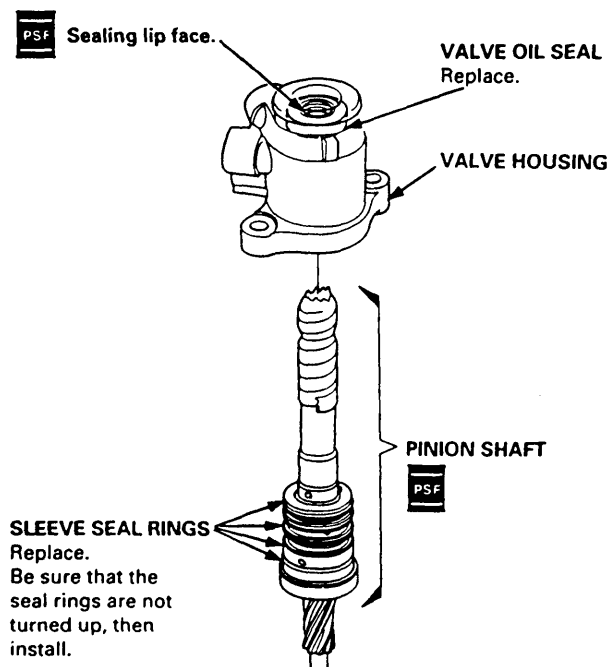


20. Press the new bearing into the valve housing using a hydraulic press and special tool as shown.

NOTE: Place the roller bearing on the valve housing with the stamped letter facing up towards the valve side.



21. Apply vinyl tape to the pinion shaft, then coat the vinyl tape with power steering fluid.



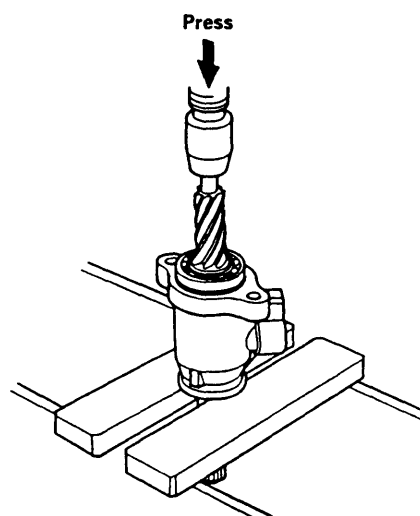
22. Insert the pinion shaft into the valve housing.

CAUTION: Be careful not to damage the valve seal rings.

23. Remove the vinyl tape from the pinion shaft.

24. Press the pinion shaft/sleeve using a hydraulic press as shown.

NOTE: Check that the pinion shaft/sleeve turns smoothly by turning the pinion shaft.



(cont'd)

Power Steering Gearbox

Reassembly (cont'd)

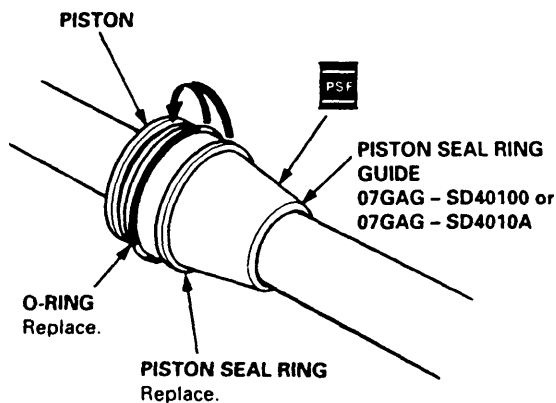
Steering Rack Reassembly

25. Coat the piston seal ring guide with power steering fluid, then slide it onto the rack, big end first.
26. Position the new O-ring and new piston seal ring on the special tool, then slide them down toward the big end of the tool.

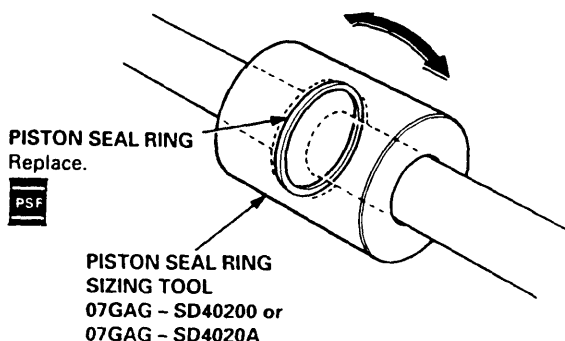
NOTE:

- Do not over expand the resin seal rings. Install the resin seal rings with care so as not to damage them. After installation, be sure to contract the seal ring using the special tool (sizing tool).
- Replace the piston's O-ring and seal ring as a set.

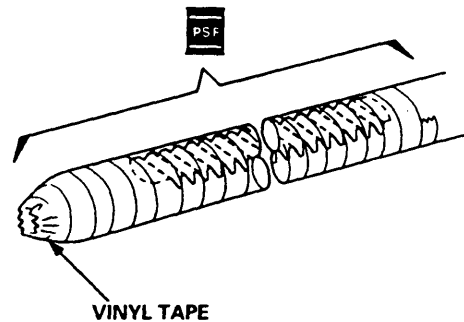
27. Pull the O-ring off into the piston groove, then pull the piston seal ring off into the piston groove on top of the O-ring.



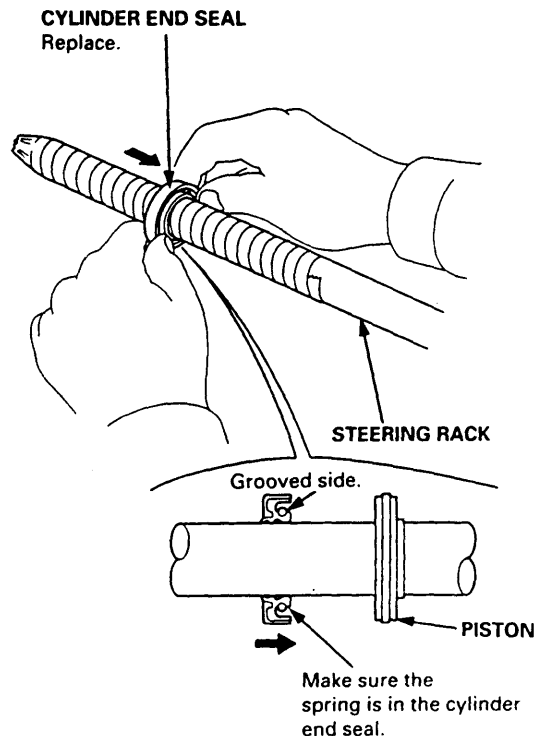
28. Coat the piston seal ring and the inside of the special tool with power steering fluid.
29. Carefully slide the tool onto the rack and over the piston seal ring.
30. Move the special tool back and forth several times to make the piston seal ring fits snugly in the piston.



31. Wrap vinyl tape around the rack teeth and rack end edges, then coat the surface of the tape with the power steering fluid.
NOTE: Make sure that the vinyl tape is wrapped carefully so that there is no stepped portion.



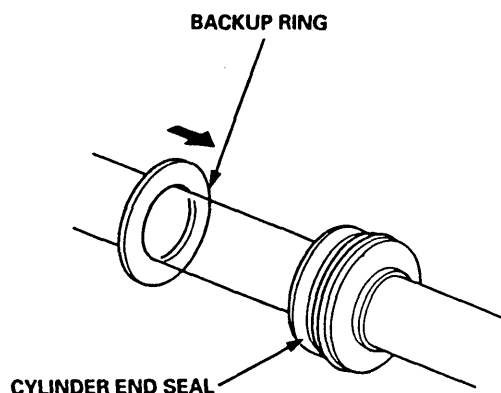
32. Coat the inside surface of the new cylinder end seal with power steering fluid.
33. Install the cylinder end seal onto the steering rack with its grooved side toward the piston.
CAUTION: When installing the cylinder end seal, be careful not damage the sealing lip face of the seal with the edges or teeth of the steering rack.



34. Remove the vinyl tape from the steering rack.
NOTE: Remove any residue of tape adhesive.

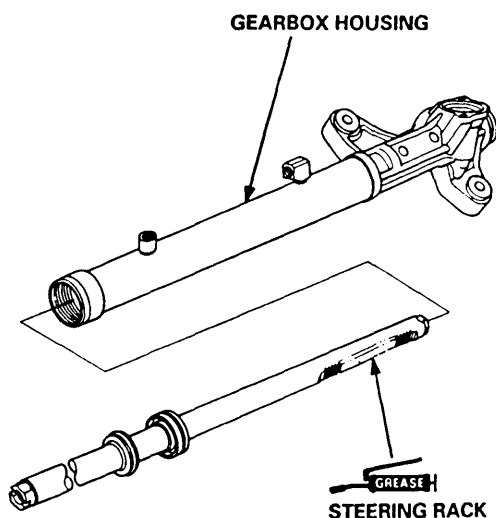


35. Install the new backup ring on the steering rack, then place the cylinder end seal to piston.



36. Grease the steering rack teeth, then insert the steering rack into the gearbox housing.

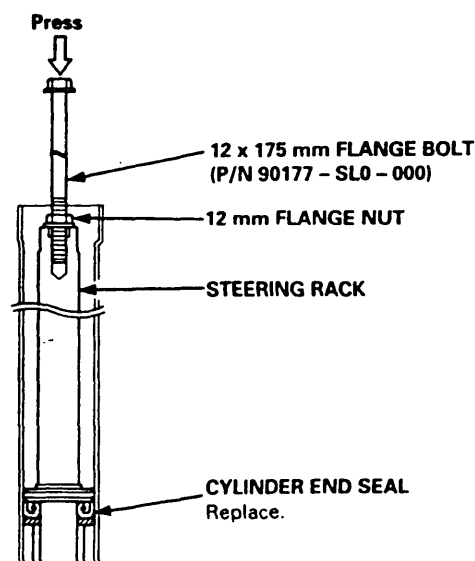
CAUTION: Be careful not to damage to inner surface of the cylinder with the rack edges.



37. Install the flange bolt into the end of the steering rack until it bottoms in the hole, then back the flange bolt out 1/4 turn. Hold the flange bolt and tighten the flange nut against the rack by hand.

38. Install the cylinder end seal into the bottom of the cylinder by pressing on the bolt with a press as shown.

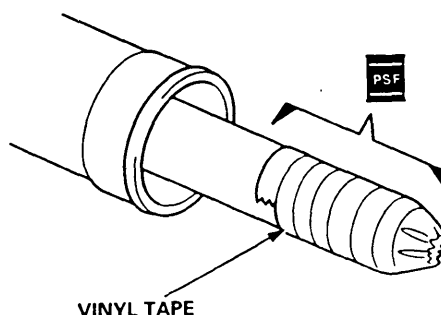
CAUTION: Do not push on the bolt with excessive force as it may damage the cylinder end seal.



39. Remove the flange bolt, and center the steering rack.

40. Wrap vinyl tape around the rack end edges, and coat the surface of the tape with the power steering fluid.

NOTE: Make sure that the vinyl tape is wrapped carefully so that there is no stepped portion.



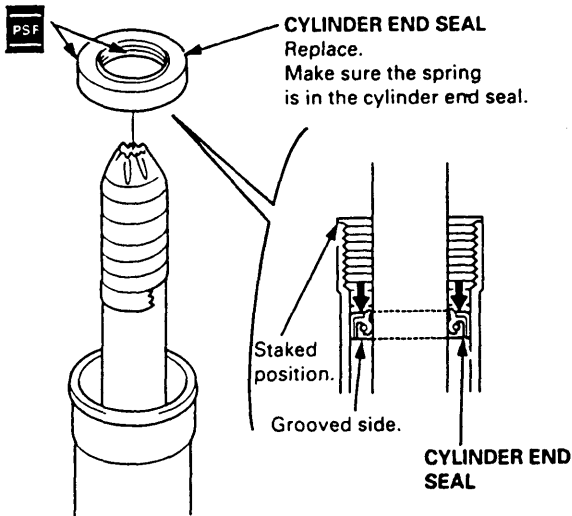
(cont'd)

Power Steering Gearbox

Reassembly (cont'd)

41. Coat the inside surface of the new cylinder end seal with power steering fluid.
42. Install the cylinder end seal onto the steering rack with its grooved side toward the piston.
43. Push in the cylinder end seal with your finger.

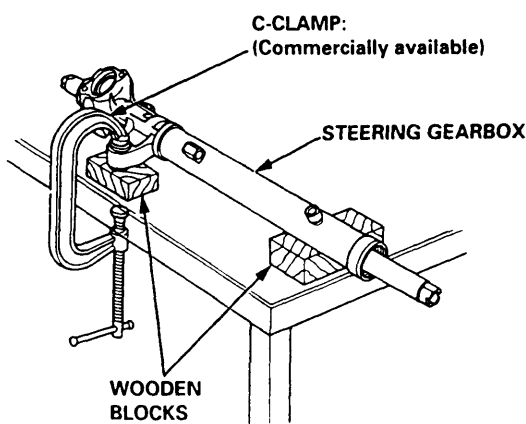
CAUTION: When installing the cylinder end seal, be careful not damage the sealing face of the seal with the threads and burrs at the staked position of the cylinder.



44. Remove the vinyl tape from the steering rack.

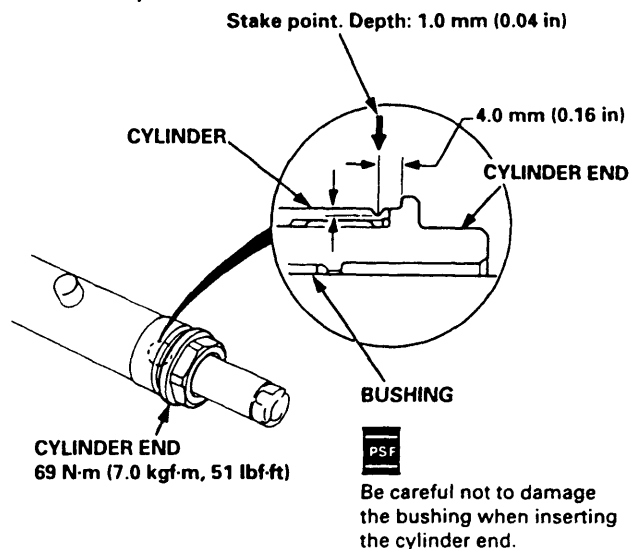
NOTE: Remove any residue of tape adhesive.

45. Hold the steering gearbox using a C-clamp as shown.



46. Coat the inside surface of the cylinder end with power steering fluid, then install the cylinder end by screwing it into the cylinder.
47. Remove the C-clamp from the steering gearbox.
48. After tightening the cylinder end, stake the point of the cylinder housing shown below.

NOTE: Stake the cylinder in the position opposite from where the stake was removed during disassembly.



49. Select the 32 mm shim(s).

NOTE: Only reinstall the original 32 mm shim(s) when the steering gearbox is reassembled without replacing the pinion shaft, valve housing, and gearbox housing with new ones.

If the pinion shaft, valve housing, and gearbox housing are replaced, select the new shim(s) as follows.

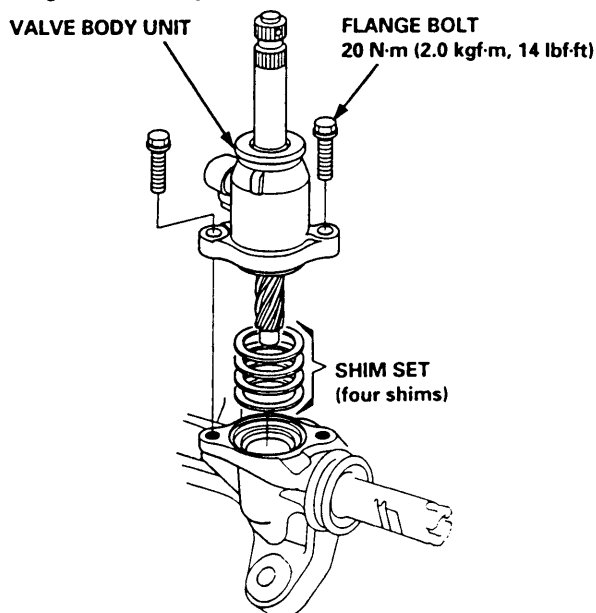
Shim selection:

- a. Set the four 32 mm shims on the bearing surface of the gearbox housing. Total thickness of the four shims should equal no more than 0.70 mm.
Shim set: four 32 mm shims (Thickness: 0.10 mm, 0.15 mm, 0.20 mm, 0.25 mm respectively)

CAUTION: The four 32 mm shims do not have thickness identification marks. Measure the thickness of each shim using a micrometer, and mark the shim for identification.

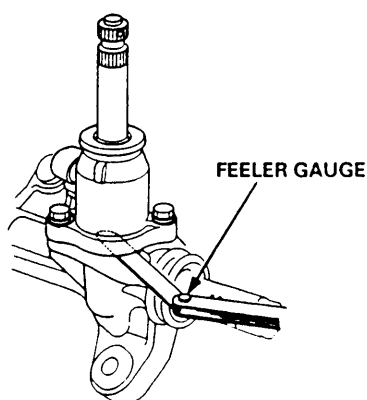


- b. Install the valve body unit on the gearbox, and tighten the flange bolts to the specified torque.



- c. Measure the clearance between the gearbox and valve body unit using a feeler gauge as shown.

NOTE: Measure the clearance at the point midway between the two mounting bolts.



- d. Determine the required thickness of the 32 mm shims by subtracting the clearance obtained in the step "c" from the total thickness of the four shims.
 (Total thickness of the 4 shims) – (Clearance) = Required thickness of the shims

NOTE: Select the shims so that the total thickness is close to, but less than, the required thickness.

Example:

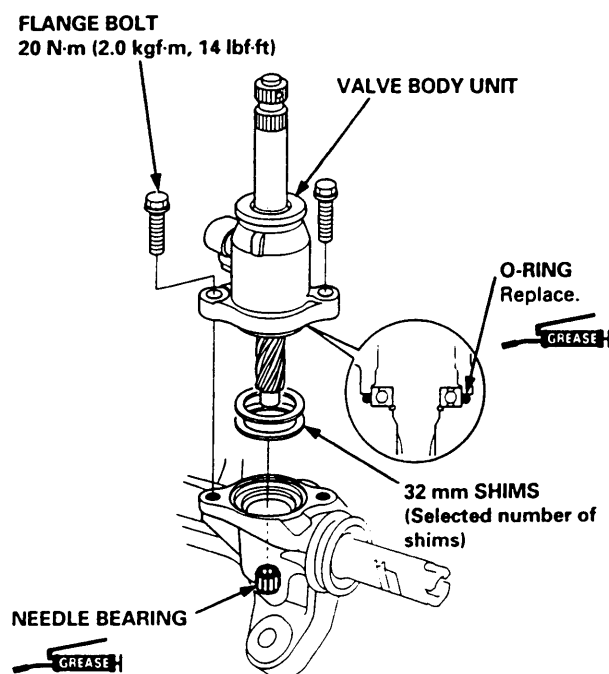
Measurement is 0.28 mm (0.011 in):

$$0.70 - 0.28 = 0.42 \text{ mm } (0.028 - 0.011 = 0.017 \text{ in})$$

The selected shims should be 0.25 mm (0.010 in) and 0.15 mm (0.006 in) in thickness.

If the required shim thickness is 0.10 mm or less, no shims are necessary.

50. Set the selected 32 mm shims on the bearing surface of the gearbox housing.



51. Coat the new O-ring with grease, and carefully fit it on the valve housing.

52. Apply grease to the needle bearing in the gearbox housing.

53. Install the valve body unit on the gearbox housing by engaging the gears.

NOTE: Note the valve body unit installation position (direction of line connection).

54. Tighten the flange bolts to the specified torque.

(cont'd)

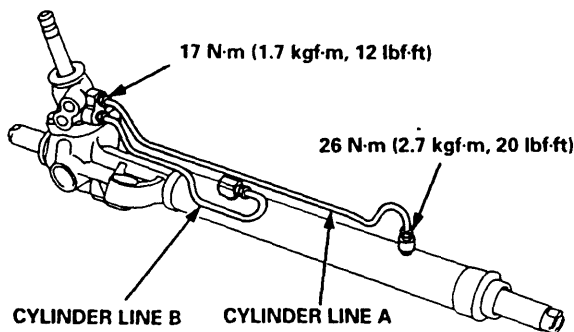
Power Steering Gearbox

Reassembly (cont'd)

55. Install the cylinder lines A and B.

NOTE:

- Clean the joints of the cylinder lines A and B thoroughly. The joints must be free of foreign material.
- Install the cylinder lines A and B by tightening the flare nuts by hand first, then tighten the flare nuts to the specified torque.



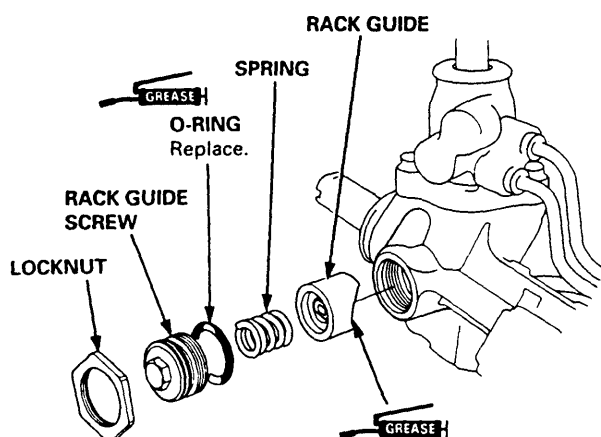
56. Grease the sliding surface of the rack guide, and install it onto the gearbox housing.

57. Apply a thin coat of grease to the new O-ring, and install it on the rack guide screw.

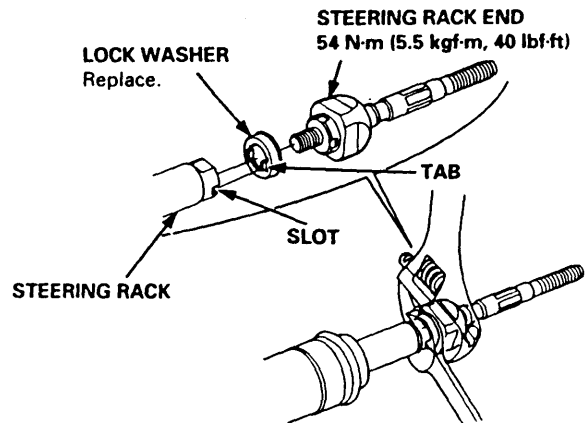
58. Install the spring, rack guide screw and locknut on the gearbox housing.

59. Adjust the rack guide screw (see page 17-15).

NOTE: After adjusting, check that the rack moves smoothly by sliding the rack right and left.



60. Install the new lockwasher in the groove in the steering rack.



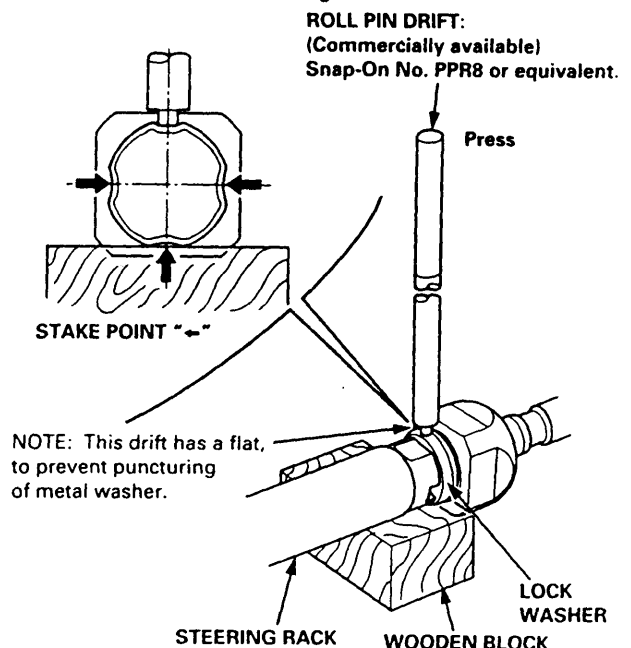
61. Screw each rack ends into the rack.

62. Hold the steering rack with a wrench, and tighten the rack ends.

CAUTION: Be careful not to damage the rack surface with the wrench.

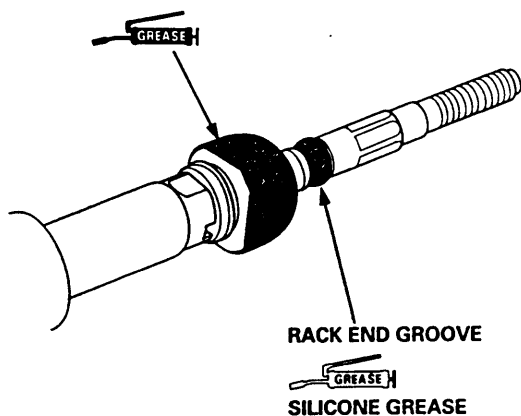
63. After tightening the rack ends, stake the four sections of lock washer with a drift and a mallet.

- Place the wood block on the press table, then set the lock washer section of the rack end on the wood block securely.
- Be sure the tool is aligned with the flat sections of the steering rack end before pressing.
- Stake the lock washer in the center of the flat section of the steering rack end.





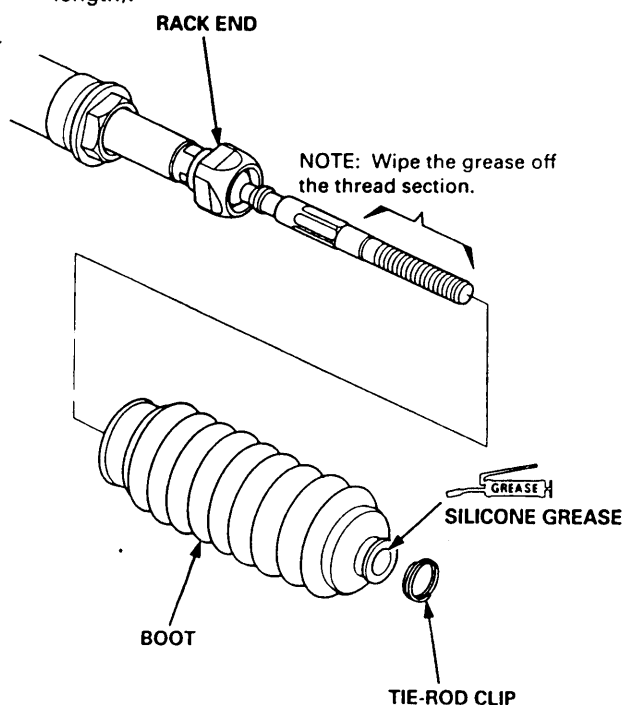
64. Apply grease to the circumference of the rack end housing.



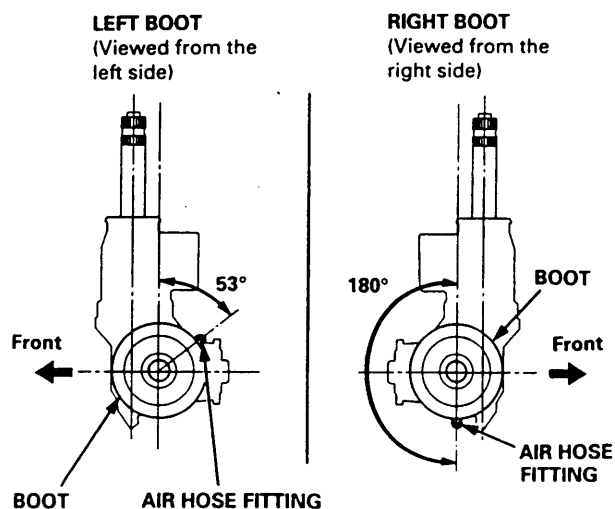
65. Apply a light coat of silicone grease to the boot grooves on the rack ends.

66. Install the boots in the rack end with the tie-rod clips.

NOTE: Install the boots with the rack in the straight ahead position (right and left tie-rods are equal in length).

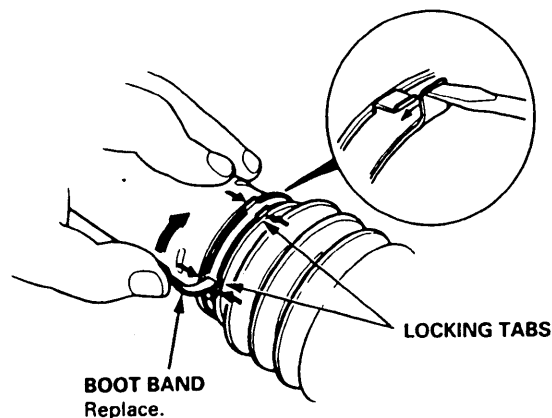


67. Adjust the air hose fitting position of the boots by turning it as shown below.



68. Install new boot bands on the boot, and bend both sets of locking tabs.

CAUTION: Stake the band locking tabs firmly.



69. Lightly tap on the doubled-over portions to reduce their height.

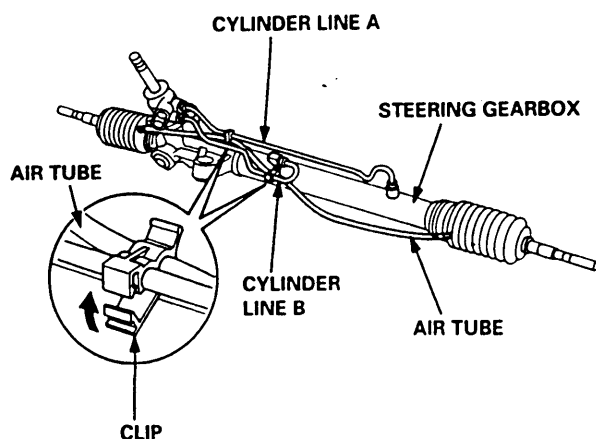
70. Slide the rack right and left to be certain that the boots are not deformed or twisted.

(cont'd)

Power Steering Gearbox

Reassembly (cont'd)

71. Connect the air tube between the right and left boot.
72. Install the clips on the cylinder lines, then clamp the air tube with the clips.

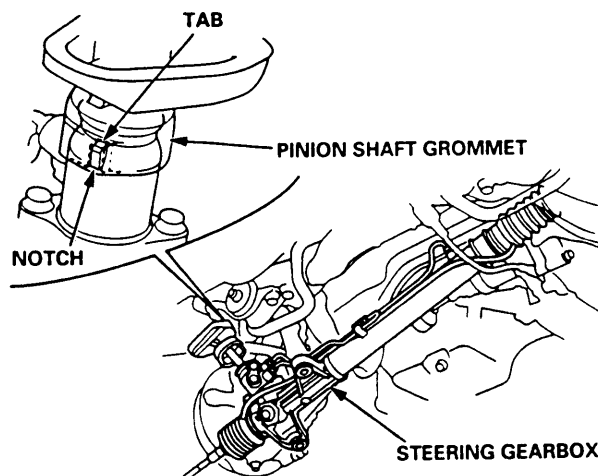


Installation

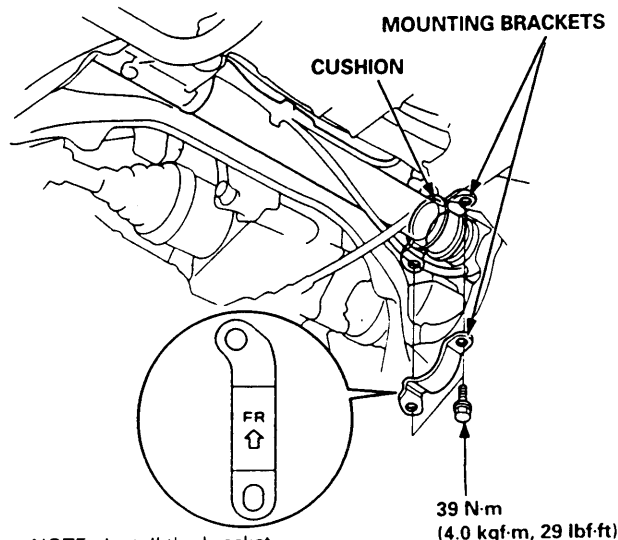
CAUTION: Be careful not to bend or damage the pump outlet hose and cylinder lines when installing the gearbox.

1. Before installing the gearbox, slide the rack all the way to right.
2. Install the mounting cushion on the steering gearbox.
3. Install the pinion shaft grommet, then insert the pinion shaft up through the bulkhead.

NOTE: Align the notch in the pinion shaft grommet with the tab on the valve housing.



4. Install the mounting bracket over the mounting cushion, then install two gearbox mounting bolts.



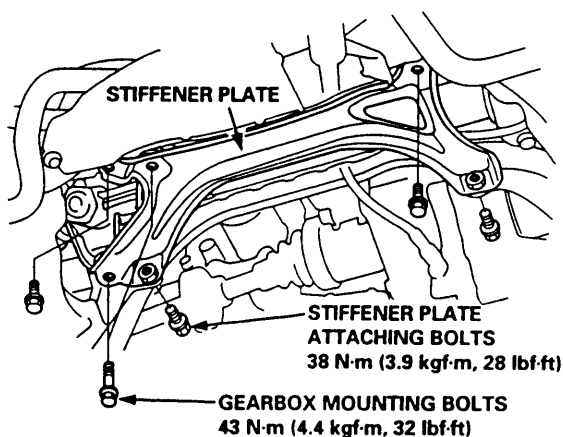
NOTE: Install the bracket with the arrow pointing toward the front.



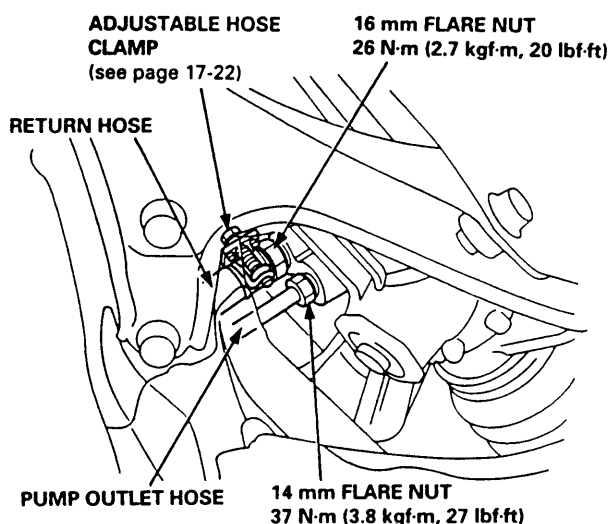
5. Install the stiffener plate with the two gearbox mounting bolts and stiffener plate attaching bolts.

CAUTION: Be sure the air tube is not caught or pinched by stiffener plate.

NOTE: Install the bolts loosely first, then tighten them securely.



6. Install the return hose joint by tightening the 16 mm flare nut.



7. Connect the return hose securely, and tighten the adjustable hose clamp from the engine compartment.
8. Connect the pump outlet hose and tighten the 14 mm flare nut.

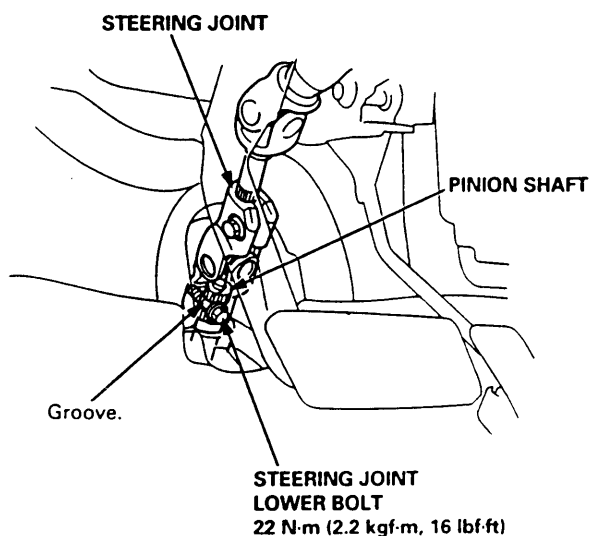
NOTE: Make sure that there is no interference between the fluid lines, the rear beam or any other parts.

9. Center the steering rack within its stroke.

10. Slip the lower end of the steering joint onto the pinion shaft (line up the bolt hole with the groove around the shaft), and tighten the lower bolt.

NOTE:

- Connect the steering shaft and pinion with the cable reel and steering rack centered.
- Be sure that the lower steering joint bolt is securely in the groove in the steering gearbox pinion.
- If the steering wheel and rack are not centered, reposition the serrations at lower end of the steering joint.



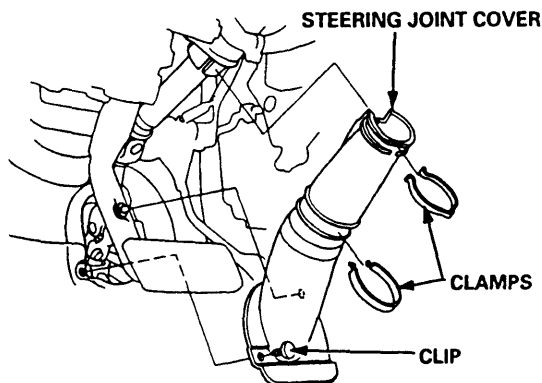
11. Center the cable reel by first rotating it clockwise until it stops. Then rotate it counterclockwise (approximately two turns) until the arrow mark on the label points straight up. Reinstall the steering wheel (see page 17-17).

(cont'd)

Power Steering Gearbox

Installation (cont'd)

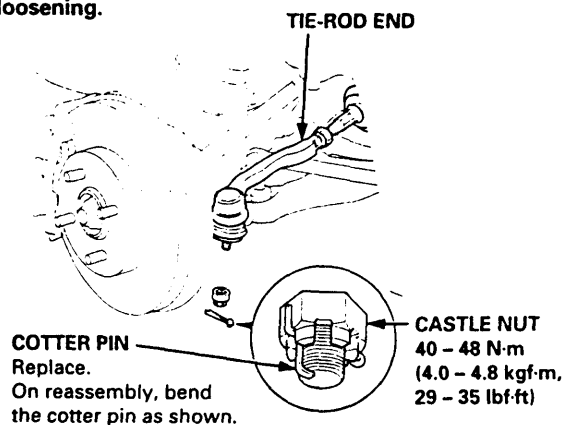
12. Install the steering joint cover with the clamps and a clip.



13. Reconnect the tie-rod ends to the steering knuckles, tighten the castle nut to the specified torque, and install new cotter pins.

NOTE: Before connecting the tie-rod ends, wipe off any grease contamination from the ball joint tapered section and threads.

CAUTION: Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.



14. Install exhaust pipe A (see section 9).
 15. Connect the shift linkage (see section 13 or section 14).
 16. Install the front wheels.
 17. Fill the system with power steering fluid, and bleed air from the system (see page 17-15).
 18. After installation, perform the following checks.
 - Start the engine, allow it to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid. Check the gearbox for leaks (see page 17-22).
 - Adjust the front toe (see section 18).
 - Check the steering wheel spoke angle. Adjust by turning the right and left tie-rods, if necessary.
- NOTE:** Turn the right and left tie-rods equally.

Ball Joint Boot Replacement

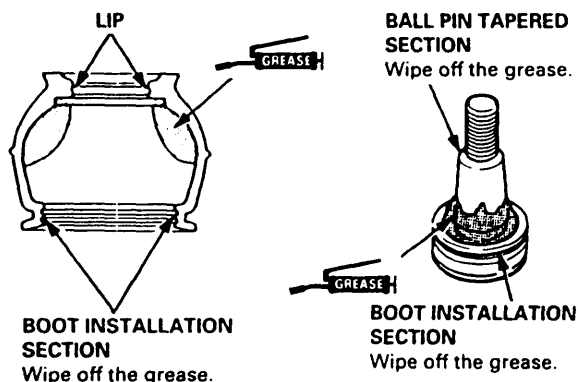
1. Remove the boot set ring and the boot.

CAUTION: Do not contaminate the boot installation section with grease.

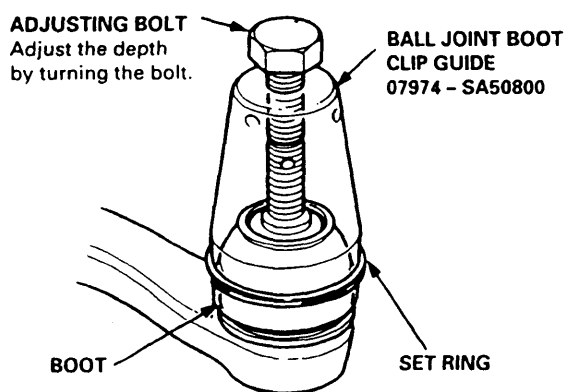
2. Pack the interior of the boot and lip with grease.
3. Wipe the grease off the sliding surface of the ball pin, then pack the lower area with fresh grease.

CAUTION:

- Keep grease off the boot installation section and the tapered section of the ball pin.
- Do not allow dust, dirt, or other foreign materials to enter the boot.



4. Install the boot in the groove of the boot installation section securely, then bleed the air from the boot.



5. Adjust the special tool with the adjusting bolt until the end of the tool aligns with the groove on the boot. Slide the set ring over the tool and into position.

CAUTION: After installing the boot, check the ball pin tapered section for grease contamination and wipe it if necessary.