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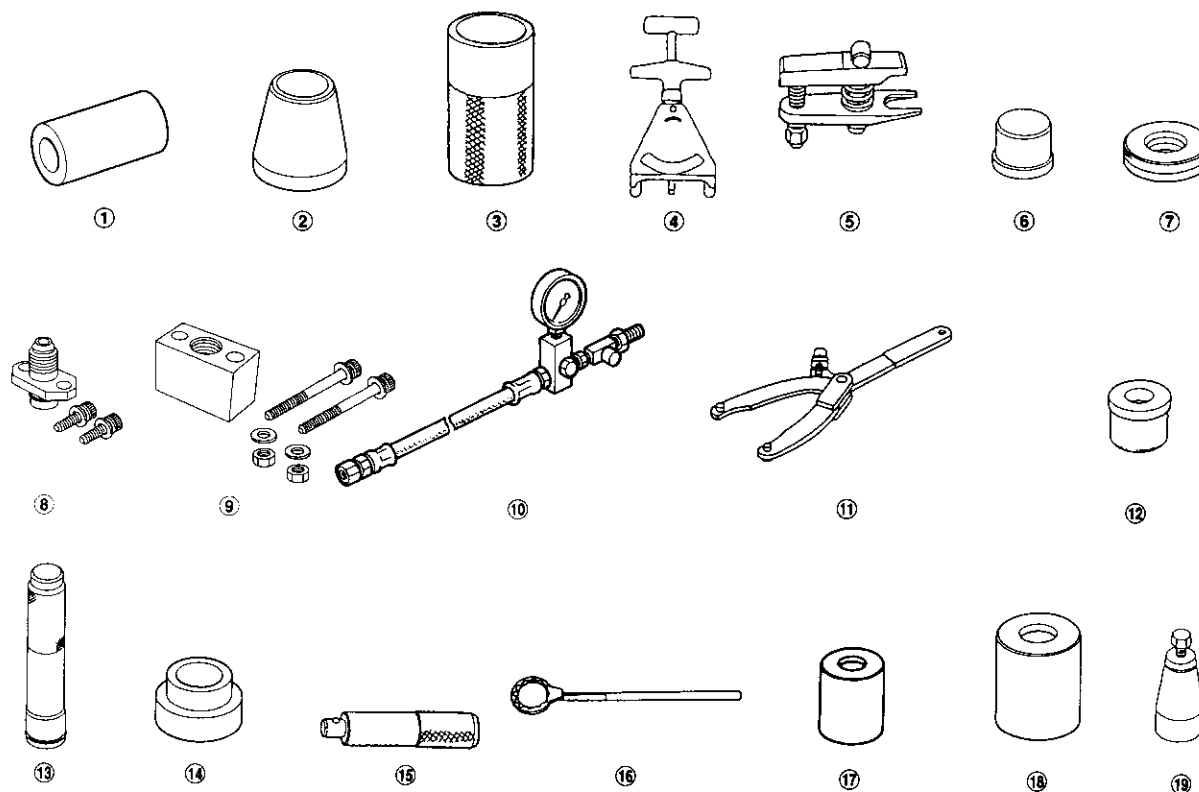
Ball Joint Boot Replacement 17-68



Special Tools

Ref. No	Tool Number	Description	Qty	Page Reference
①	07GAF - PH70100	Pilot Collar	1	17-54
②	07GAG - SD4010A or 07GAG - SD40100	Piston Seal Ring Guide	1	17-59
③	07GAG - SD4020A or 07GAG - SD40200	Piston Seal Ring Sizing Tool	1	17-59
④	*07JGG - 001010A	Belt Tension Gauge	1	17-32
⑤	07MAC - SL00200	Ball Joint Remover, 28 mm	1	17-6, 47
⑥	07NAD - SR3020A	Cylinder End Seal Remover Attachment	1	17-51
⑦	07NAG - SR3090A or 07NAG - SR30900	Piston Seal Ring Sizing Tool	1	17-56
⑧	07RAK - S040110	P/S Joint Adaptor (Pump)	1	17-34
⑨	07RAK - S040121 or 07RAK - S040120	P/S Joint Adaptor (Hose)	1	17-34
⑩	07406 - 001000A or 07406 - 0010001	P/S Pressure Gauge	1	17-34
⑪	07725 - 0030000	Universal Holder	1	17-42, 46
⑫	07746 - 0010100	Attachment, 32 x 35 mm	1	17-57, 58
⑬	07746 - 0020100	Driver, 22 mm I.D.	1	17-10
⑭	07746 - 0030300	Attachment, 30 mm I.D.	1	17-44
⑮	07749 - 0010000	Driver	1	17-57
⑯	07916 - SA50001	Locknut Wrench, 40 mm	1	17-5, 33
⑰	07965 - SA50500	Front Hub Dis/Assembly Tool	1	17-68
⑱	07974 - SA5020A or 07974 - SA50200	Sleeve Seal Ring Sizing Tool	1	17-57
⑲	07974 - SA50800	Ball Joint Boot Clip Guide	1	17-57, 68

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





Component Locations

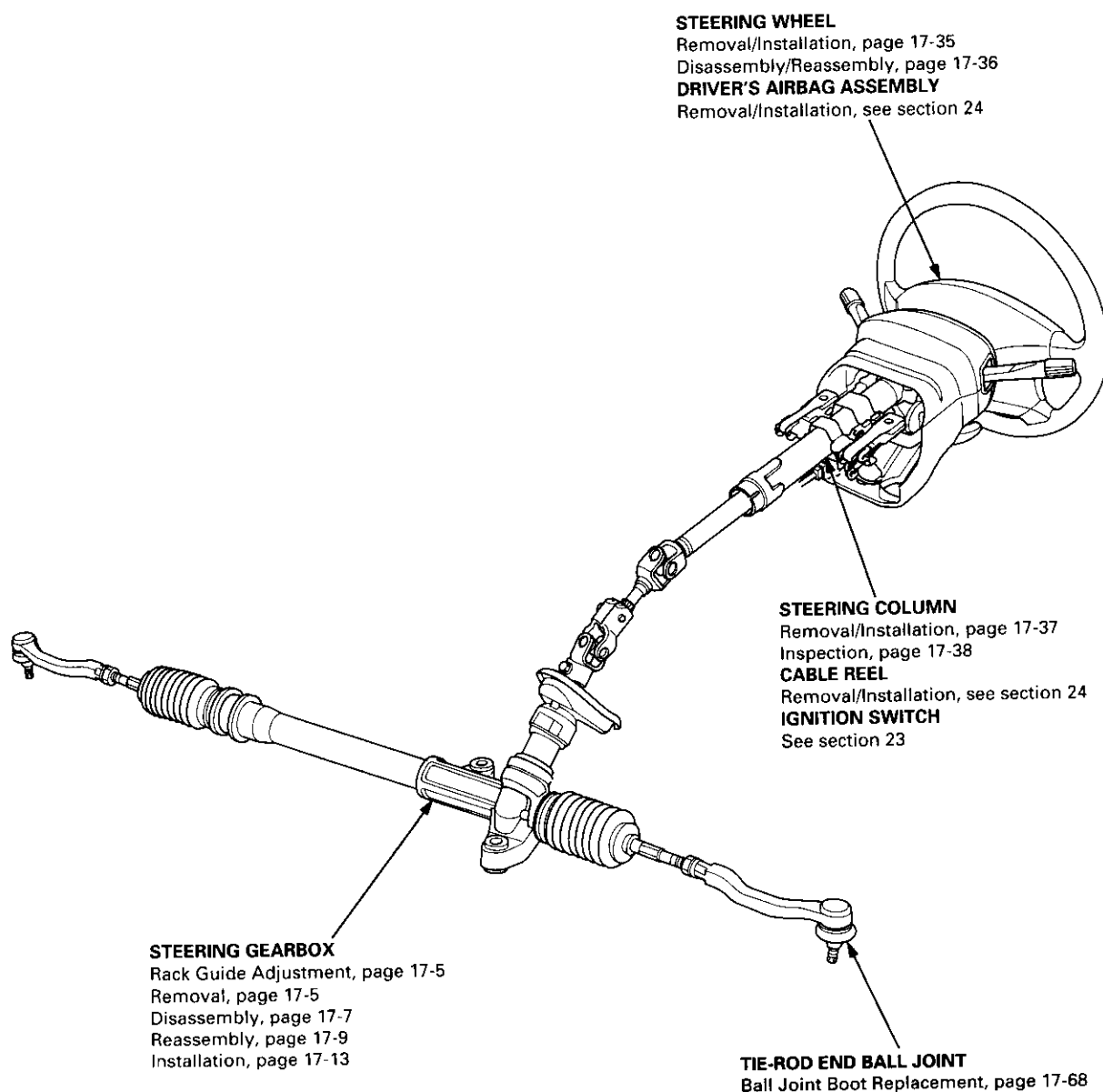
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Manual Steering

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.



Inspection and Adjustment

Steering Operation

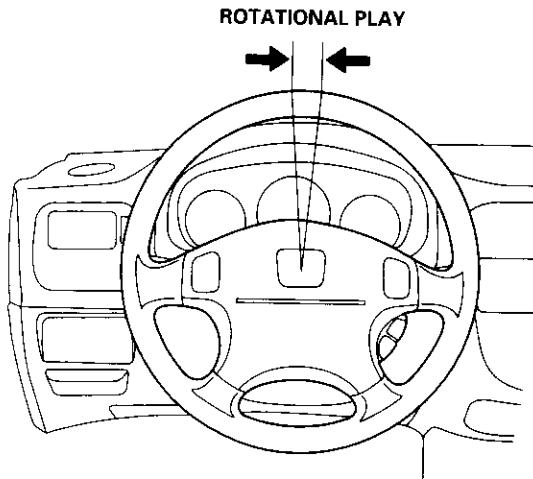
Steering Wheel Rotational Play

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

ROTATIONAL PLAY: 0 – 10 mm (0 – 0.4 in)

If the play exceeds the service limit, perform rack guide adjustment (see page 17-5).

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



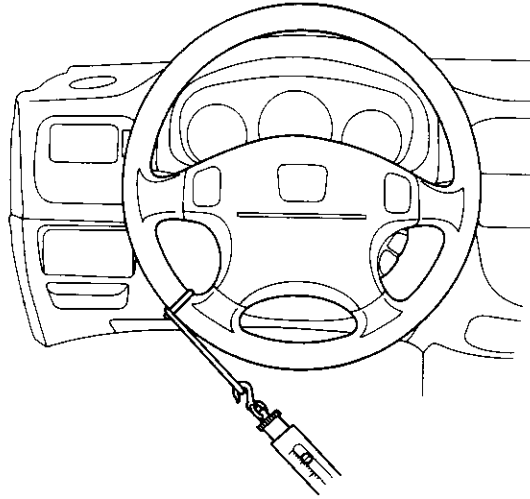
Steering Effort Check

Raise the front wheels off the ground.

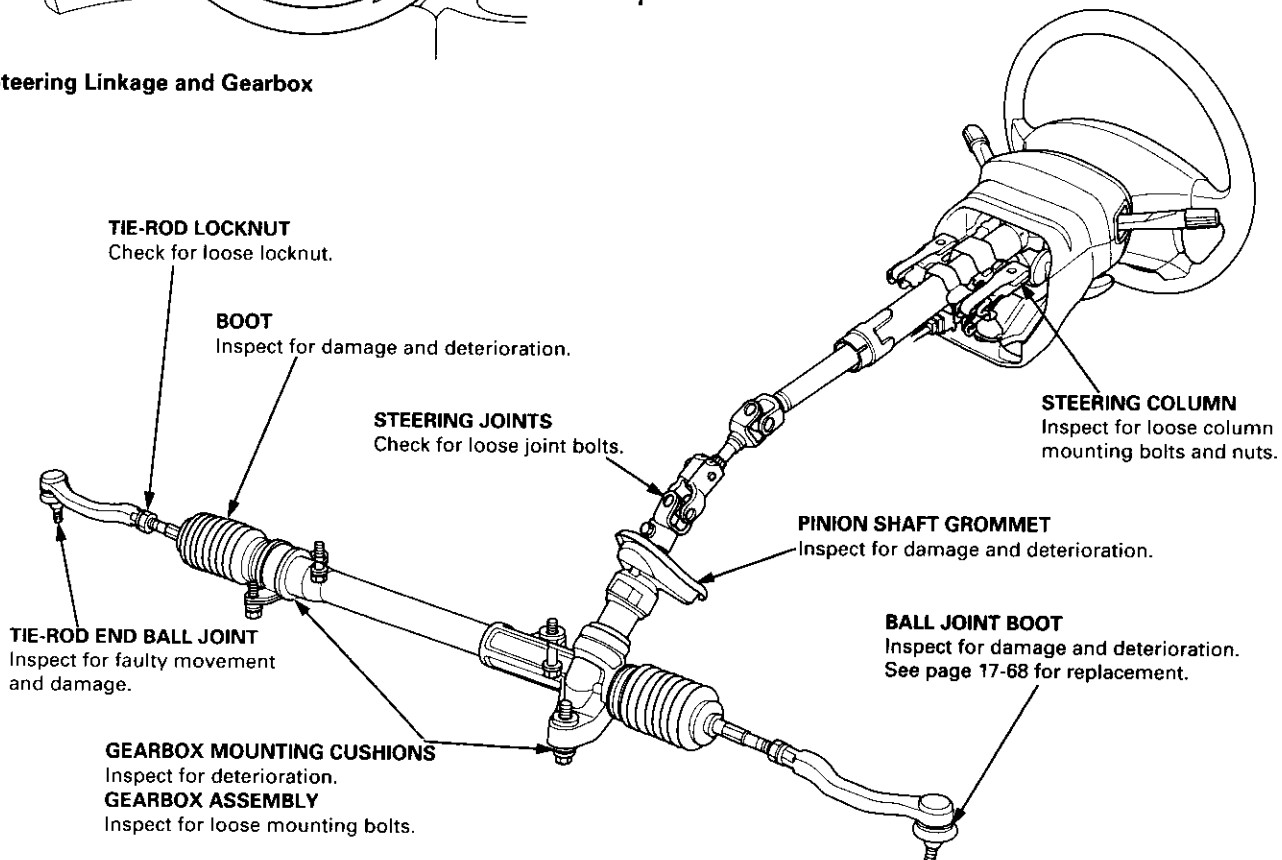
Turn the steering wheel with a spring scale and check its reading.

Standard: 15 N (1.5 kgf, 3.3 lbf) maximum

If it reads more, perform rack guide adjustment (see page 17-5).



Steering Linkage and Gearbox

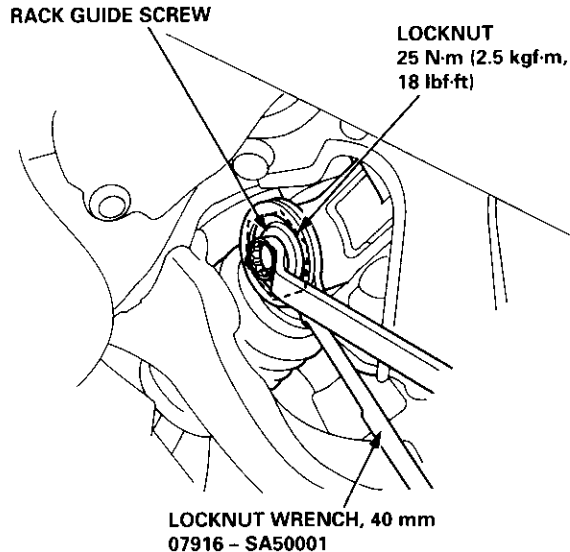




Rack Guide Adjustment

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 until it compresses the spring and seats against the rack guide, then loosen it.
3. Retighten the rack guide screw to 4 N-m (0.4 kgf-m, 2.9 lbf-ft), then back it off to specified angle.

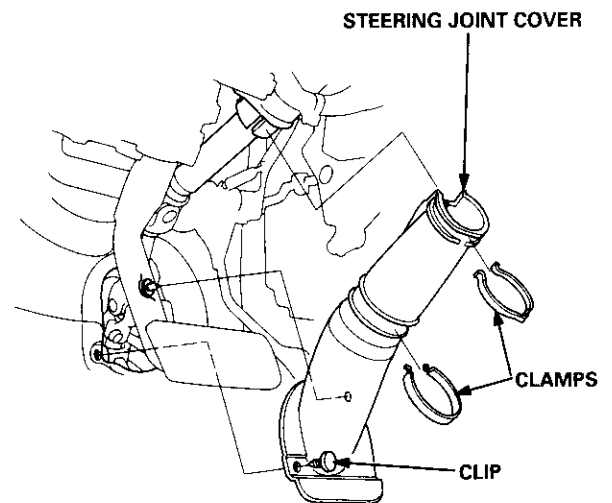
Specified Return Angle: 30° max.

4. Tighten the locknut while holding the rack guide screw.
5. Check for tight or loose steering through the complete turning travel.
6. Recheck steering effort (see page 17-4).

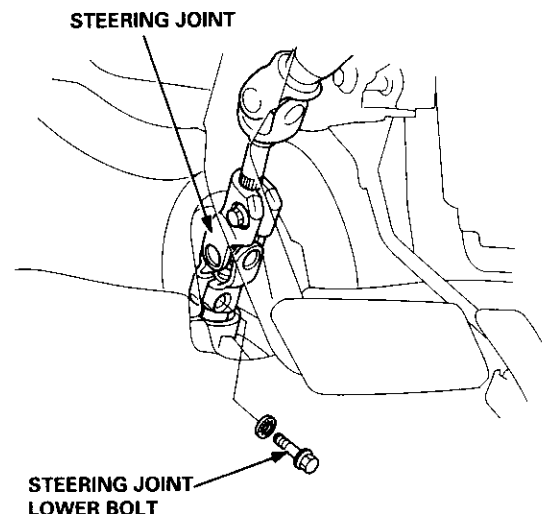
Removal

NOTE: Using solvent and a brush, to wash any oil and dirt off the gearbox. Blow dry with compressed air.

1. Raise the front of vehicle, and support it on safety stands in the proper locations (see section 1).
2. Remove the front wheels.
3. Remove the steering wheel (see page 17-35).
4. Remove the steering joint cover.



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

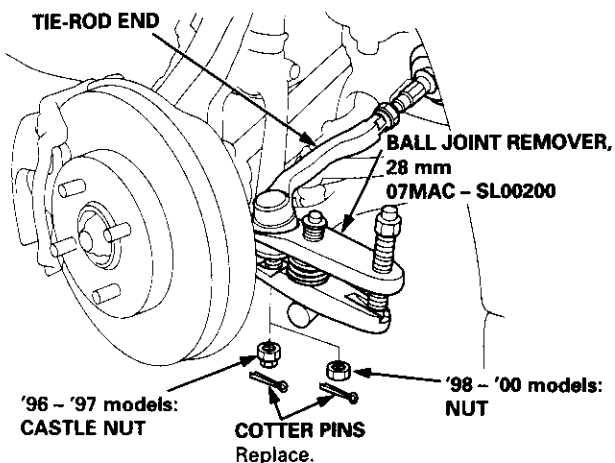


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Steering Gearbox

Removal (cont'd)

6. Remove the cotter pin from the castle nut ('96 - '97 models) or nut ('98 - '00 models) and remove the nut.



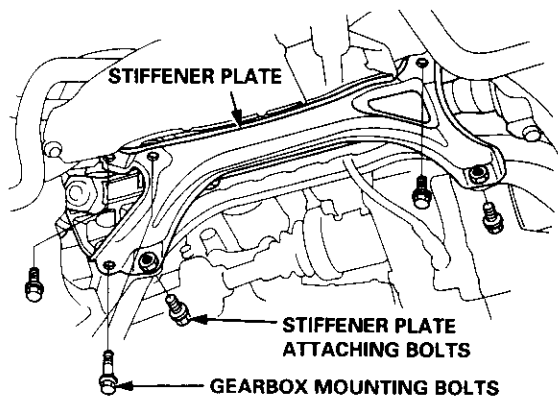
7. Install the 10 mm hex nut on the ball joint. Be sure that the 10 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

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

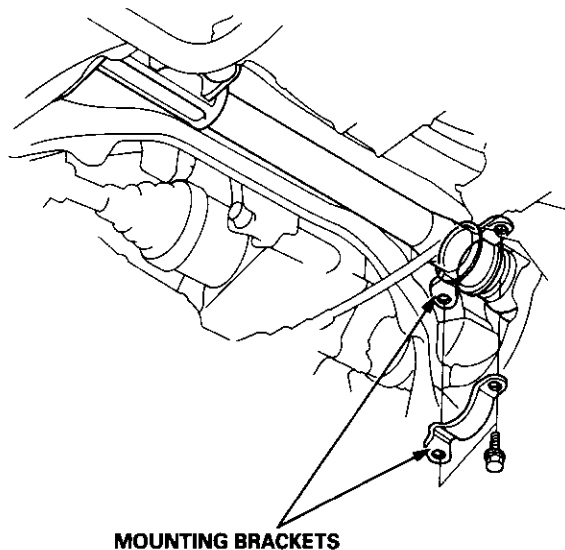
8. Separate the tie-rod ball joint and knuckle using the special tool.

CAUTION: Avoid damaging the ball joint boot.

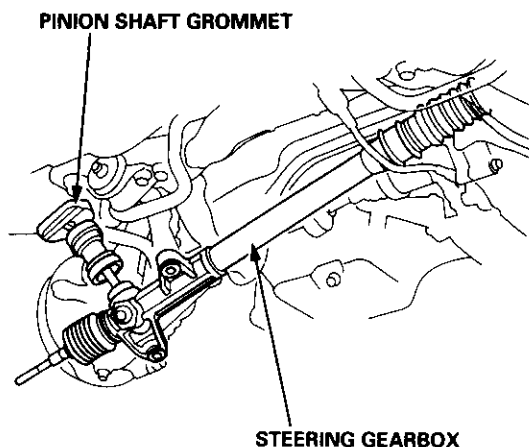
9. Remove the left tie-rod end, then slide the rack all the way to the right.
10. Separate the exhaust pipe A or TWC (see section 9).
11. Disconnect the shift linkage (see section 13 or section 14).
12. Remove the stiffener plate.



13. Remove the mounting bracket.



14. Pull the steering gearbox all the way down to clear the pinion shaft from the bulkhead, then remove the pinion shaft grommet.
15. 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 car.



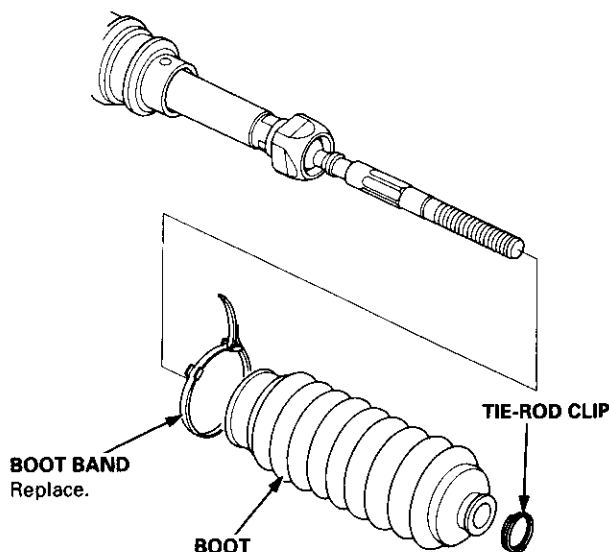


Disassembly

1. Place the gearbox in a vise with a soft jaws, then clamp the gearbox at the mount bracket or gear housing.

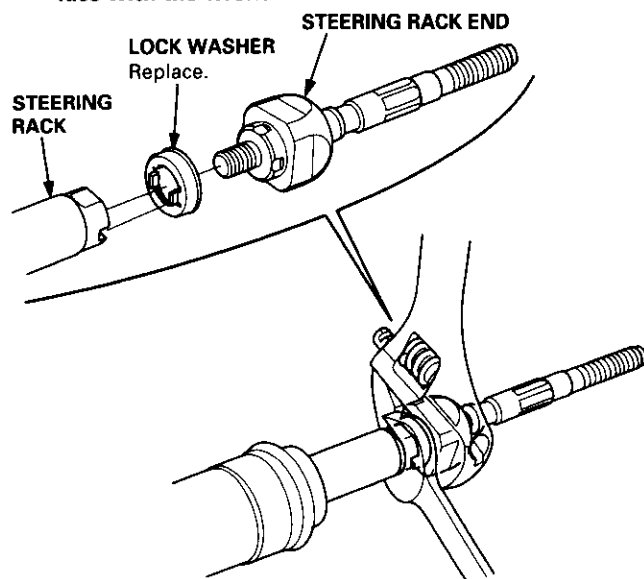
CAUTION: Be careful not to distort the gear housing by clamping it too tight in the vise incorrectly.

2. Remove the tie-rod end and locknut.
3. Remove the boot bands and tie-rod clips. Pull the boots away from the ends of the gearbox.

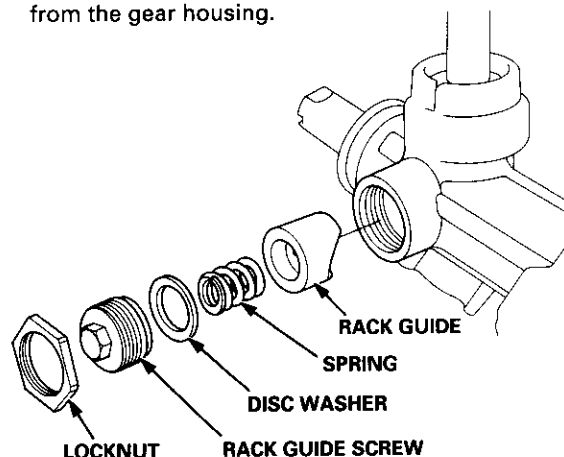


4. Hold the steering rack with one wrench, and unscrew the rack end with another wrench.

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



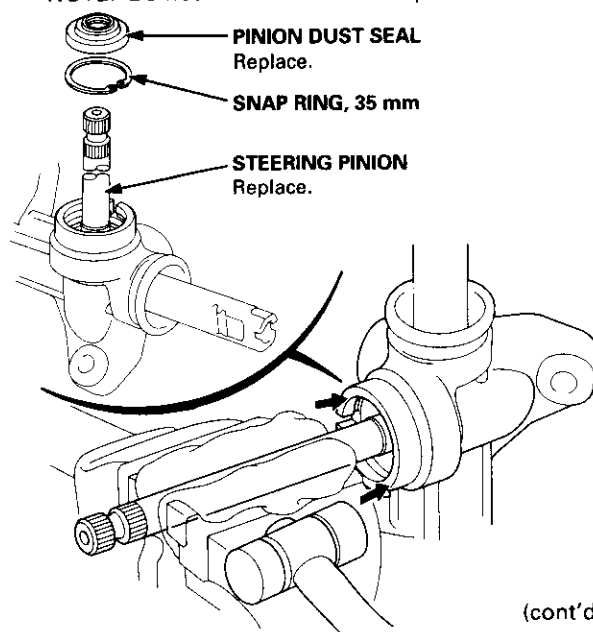
5. Push the right end of the rack back into the cylinder housing so the smooth surface that rides against the seal won't be damaged.
6. Loosen the locknut, and remove the rack guide screw.
7. Remove the disc washer, spring and rack guide from the gear housing.



8. Remove the pinion dust seal and the 35 mm snap ring.
9. Hold the pinion shaft with a vise securely. Remove the pinion by tapping evenly around the flanged section of the gearbox with a plastic hammer.

CAUTION: Do not tap on the steering rack.

NOTE: Do not reuse the removed pinion.



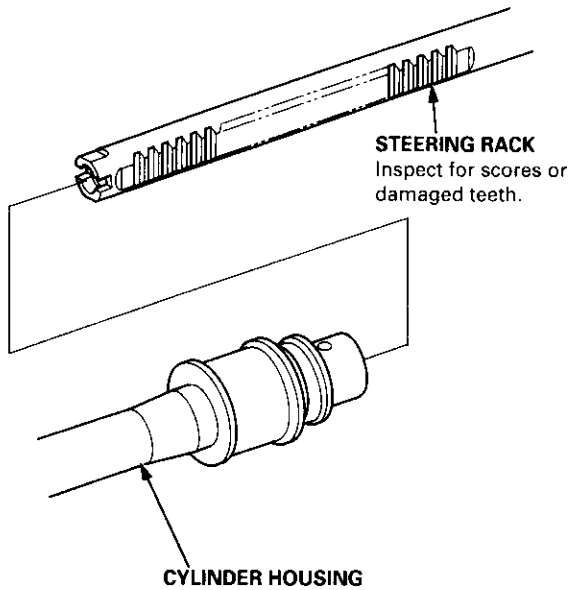
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Steering Gearbox

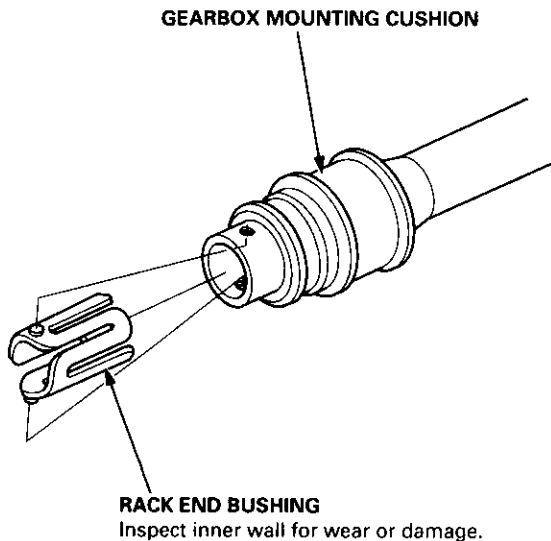
Disassembly (cont'd)

10. Slide the steering rack out of the cylinder housing.

CAUTION: Be careful not to damage the bushing in the cylinder housing.



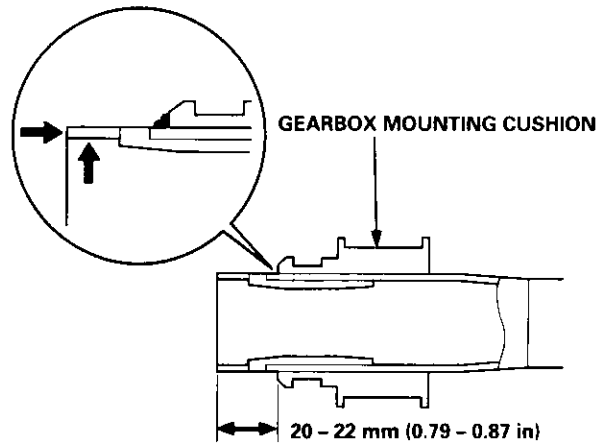
11. Remove the rack end bushing.



12. Replace the gearbox mounting cushion if necessary:

- To remove the cushion, use a sharp knife and make a cut down the length of the cushion. Be careful not to damage the paint on the outside of the cylinder housing. Remove the old cushion.
- Apply weatherstrip adhesive to the inside of the new cushion. Install the cushion onto the cylinder housing and position it 20 – 22 mm (0.79 – 0.87 in) from the end of the cylinder housing as shown.

NOTE: After installing the cushion, wipe off any excess adhesive that may have dripped into the inside of the cylinder housing.

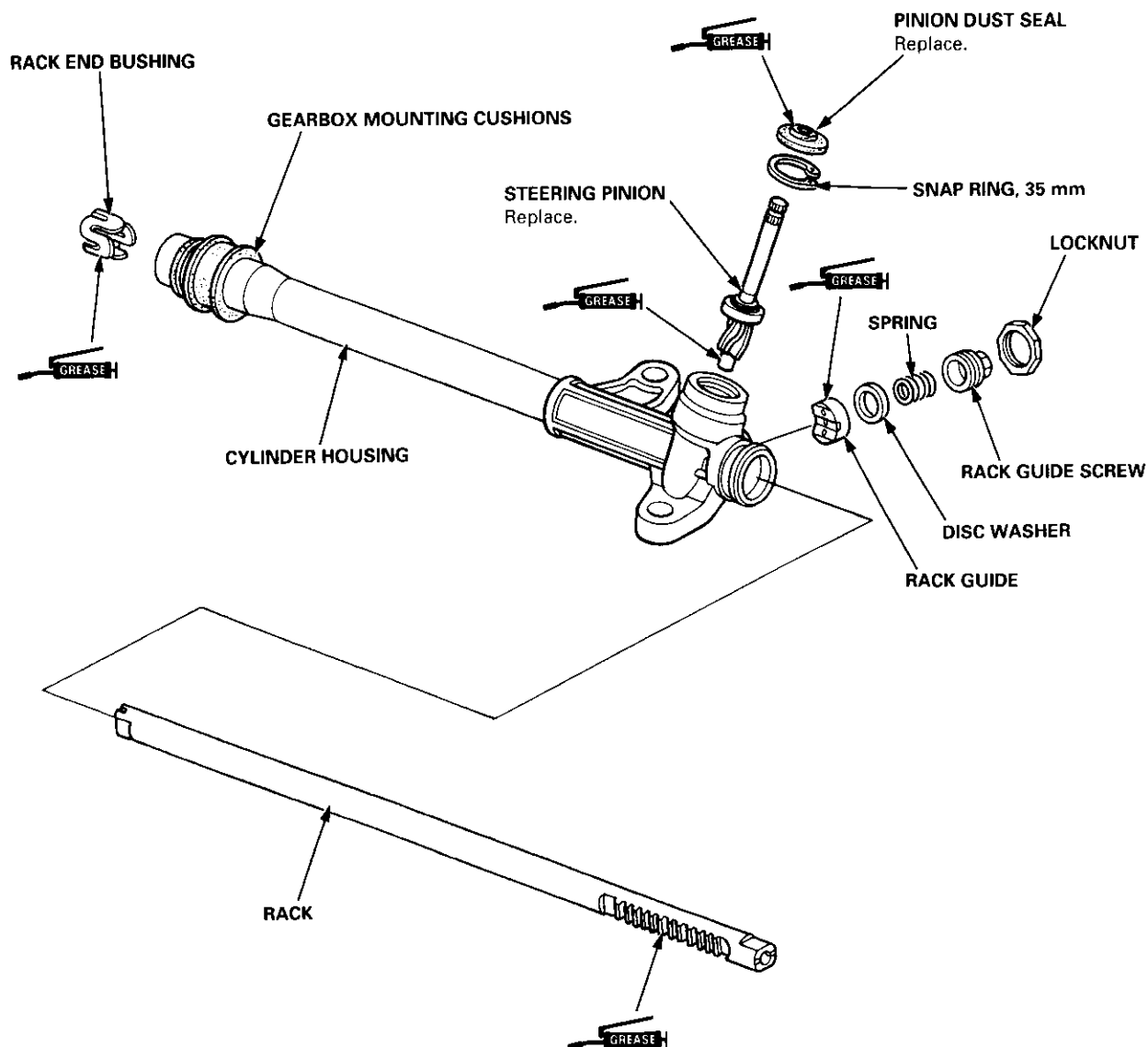




Reassembly

NOTE:

- Clean the disassembled parts with solvent, and dry them with compressed air. Do not dip the rubber parts in solvent.
- Always replace the non-reuseable parts with new ones before assembly.
- Do not allow dust, dirt, or other foreign materials to enter the steering gearbox.



(cont'd)

Steering Gearbox

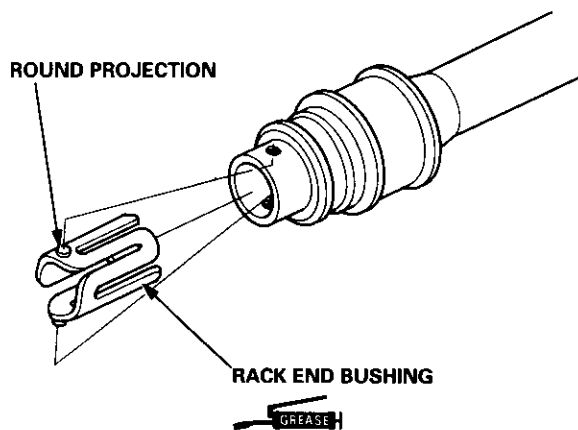
Reassembly (cont'd)

1. Apply a thin coat of grease to the inside surface of the rack end bushing.

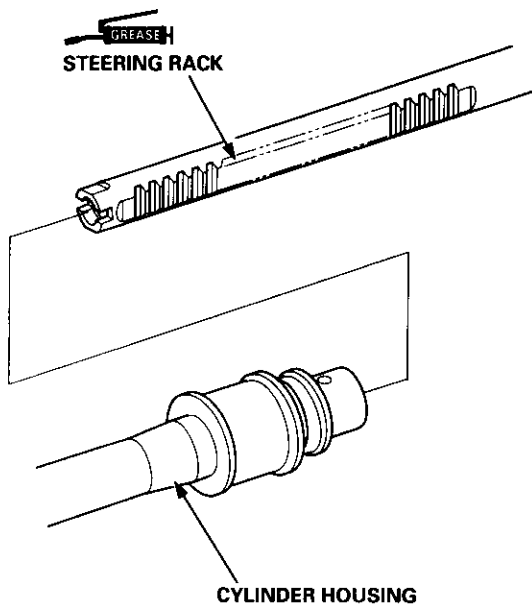
Grease quantity: 1 – 3 g (0.04 – 0.1 oz)

CAUTION: Do not fill the slots with grease; they must remain open to serve as air passages.

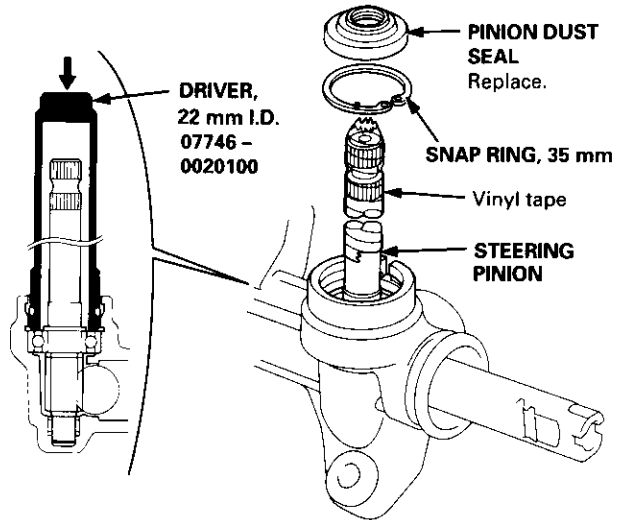
2. Install the rack end bushing by aligning the round projection on the bushing with the hole in the cylinder housing



3. Grease the steering rack teeth.
4. Install the steering rack into the cylinder housing carefully to avoid damaging the rack end bushing.

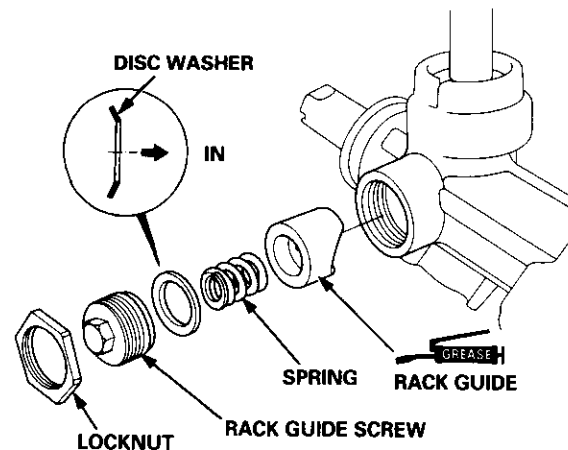


5. Drive in the steering pinion in the gear housing with the special tools.



6. Install the 35 mm snap ring securely in the gear housing groove.
7. Apply vinyl tape to the pinion shaft, then coat the vinyl tape with grease.
8. Install the pinion dust seal on the gear housing until it seats properly, then remove the tape.
9. Grease the sliding surface of the rack guide, and install it on to the gear housing.
10. Install the spring, disc washer and rack guide screw on the gear housing.

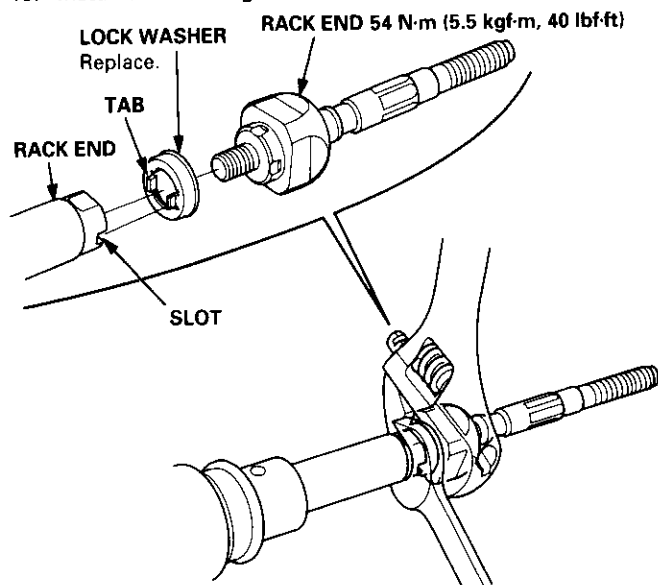
NOTE: Install the disc washer with its convex side facing in.



11. Adjust the rack guide screw (see page 17-5).

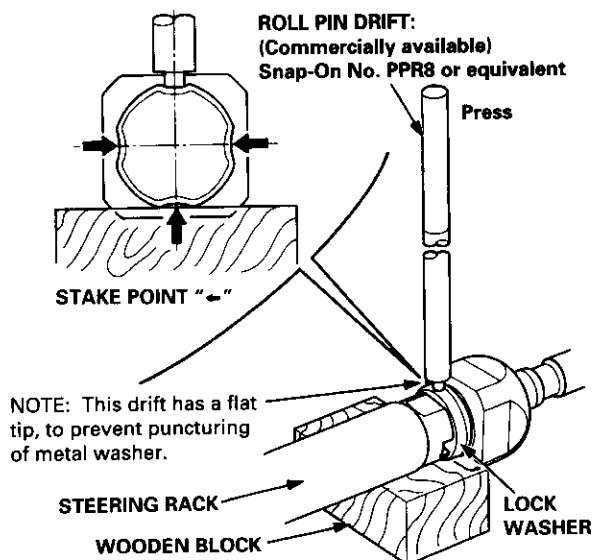


12. Install the new lock washer in the groove in the steering rack.
13. Install the steering rack end into the rack.

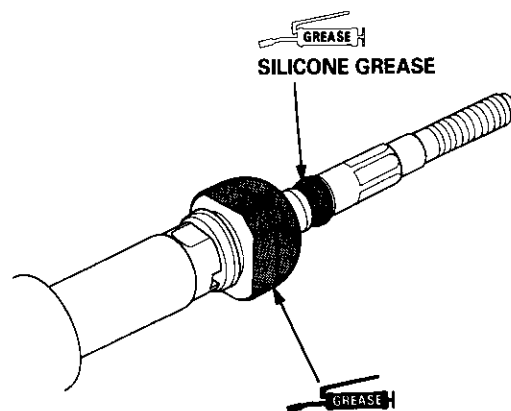


14. Hold the steering rack with a wrench and tighten the rack end with another.
- CAUTION:** Be careful not to damage the rack surface with the wrench.
15. After tightening the rack ends, stake the four sections of the lock washer with a roll pin drift and a mallet.

- 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.

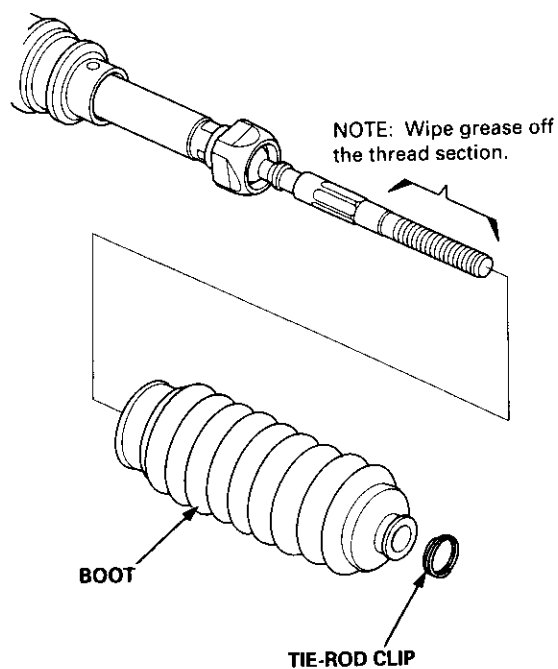


16. Apply grease around the outside of the rack end housing.



17. Apply a light coat of silicone grease to the boot grooves on the rack ends.
18. Install the boots in the rack end with the tie-rod clips.

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



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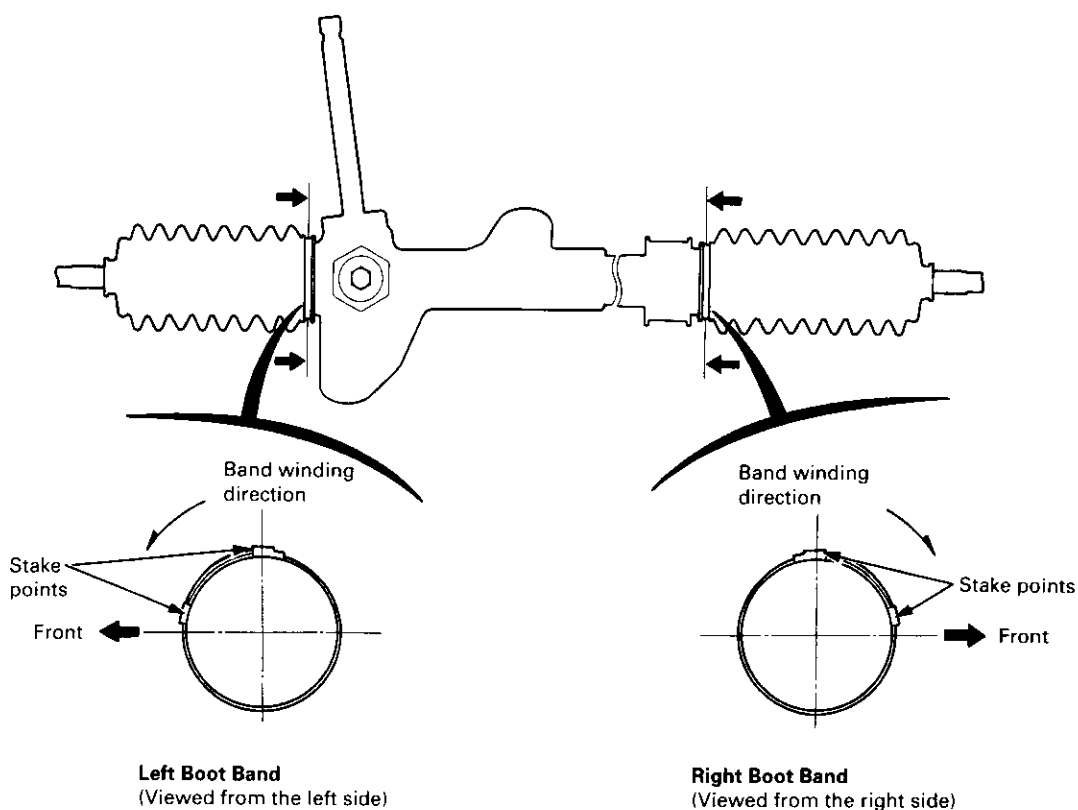
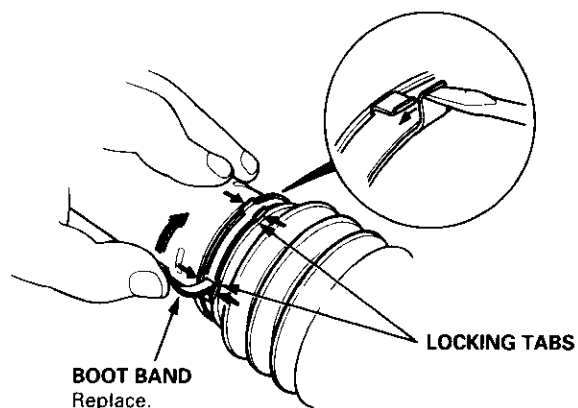
Steering Gearbox

Reassembly (cont'd)

19. Install the boot band so that the locking tabs of the band (stake points) are in the range shown below. (Tabs should face up and slightly forward.)
20. Bend both sets of locking tabs.
21. Lightly tap on the doubled-over portions to reduce their height.

CAUTION: Stake the band locking tabs firmly.

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

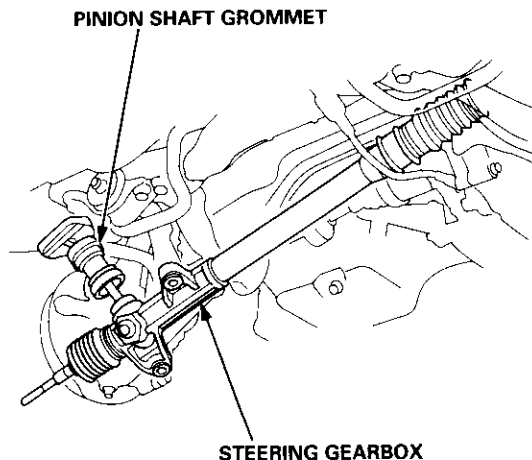




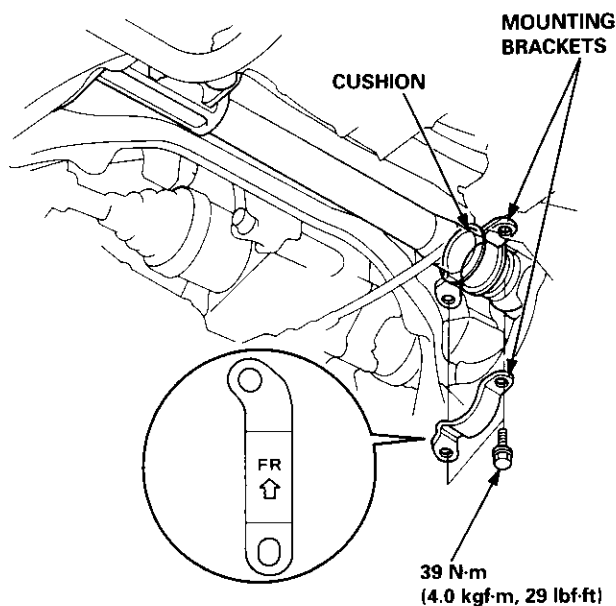
Installation

1. Slide the rack all the way to the right.
2. Install the pinion shaft grommet, and insert the pinion shaft up through the bulkhead.

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

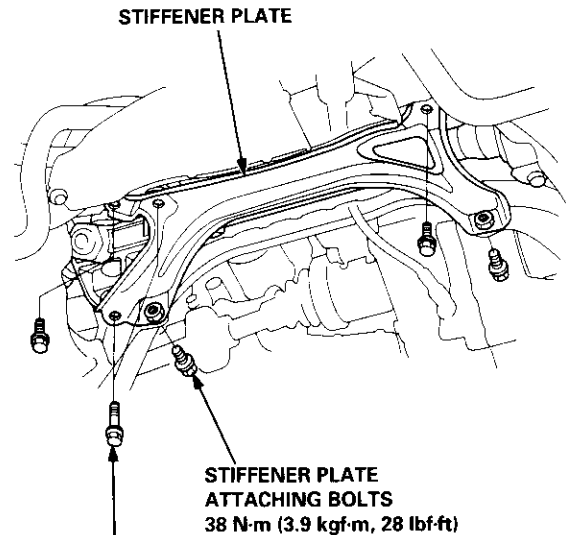


3. Install the mounting brackets with the two gearbox mounting bolts on the cushion.



NOTE: The arrow on the bracket point toward the front.

4. Install the stiffener plate with the two gearbox mounting bolts and stiffener plate attaching bolts.
NOTE: Install the bolts loosely first, then tighten them securely.

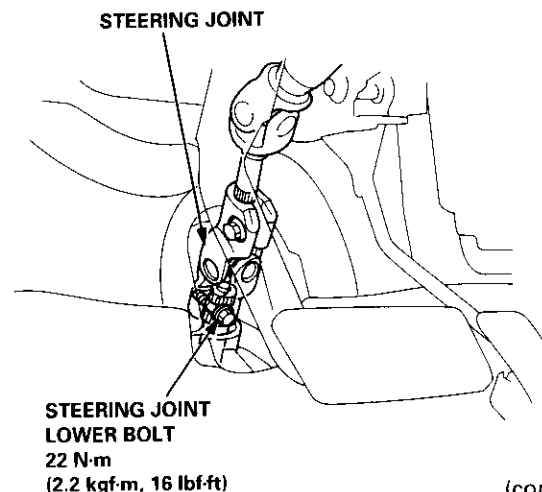


GEARBOX MOUNTING BOLTS
43 N-m (4.4 kgf-m, 32 lbf-ft)

5. Center the steering rack within its stroke.
6. 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 steering wheel 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.

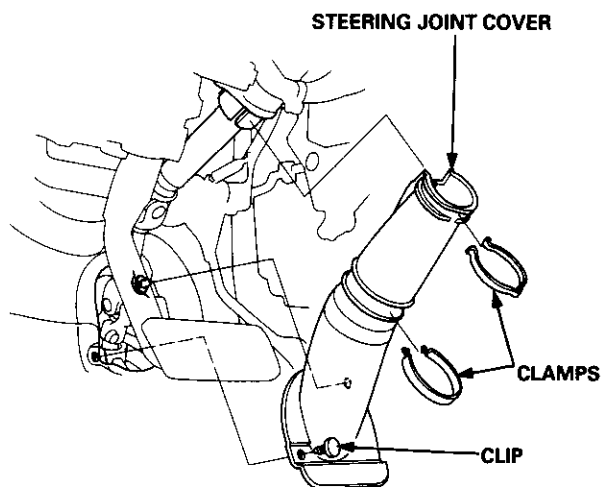


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Steering Gearbox

Installation (cont'd)

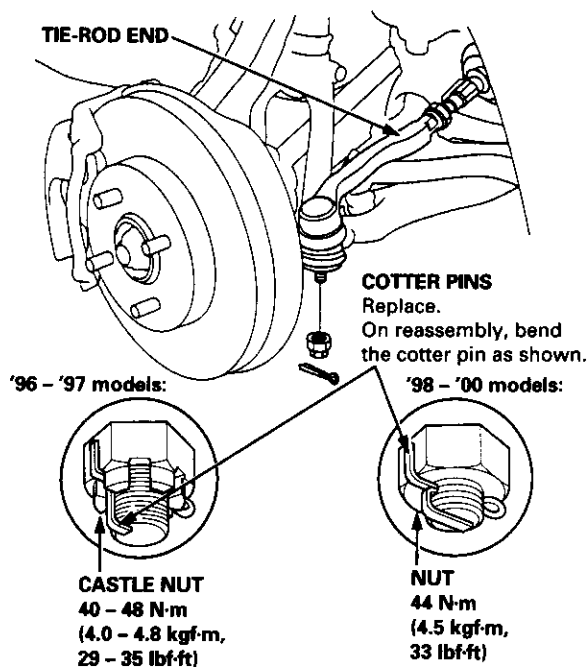
7. Center the cable reel by first rotating it clockwise until it stops. Then rotate it counterclockwise (approximately two turns) until the arrow mark on the label points straight up. Reinstall the steering wheel (see page 17-35).
8. Install the steering joint cover with the clamps and clips.



9. Reconnect the tie-rod ends to the steering knuckles, then tighten the castle nut ('96 - '97 models) or nut ('98 - '00 models) 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 ('96 - '97 models only).



10. Install the exhaust pipe A or TWC (see section 9).
11. Connect the shift linkage (see section 13 or section 14).
12. Install the front wheels.
13. After installation, perform the following checks.
 - 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.



Component Locations

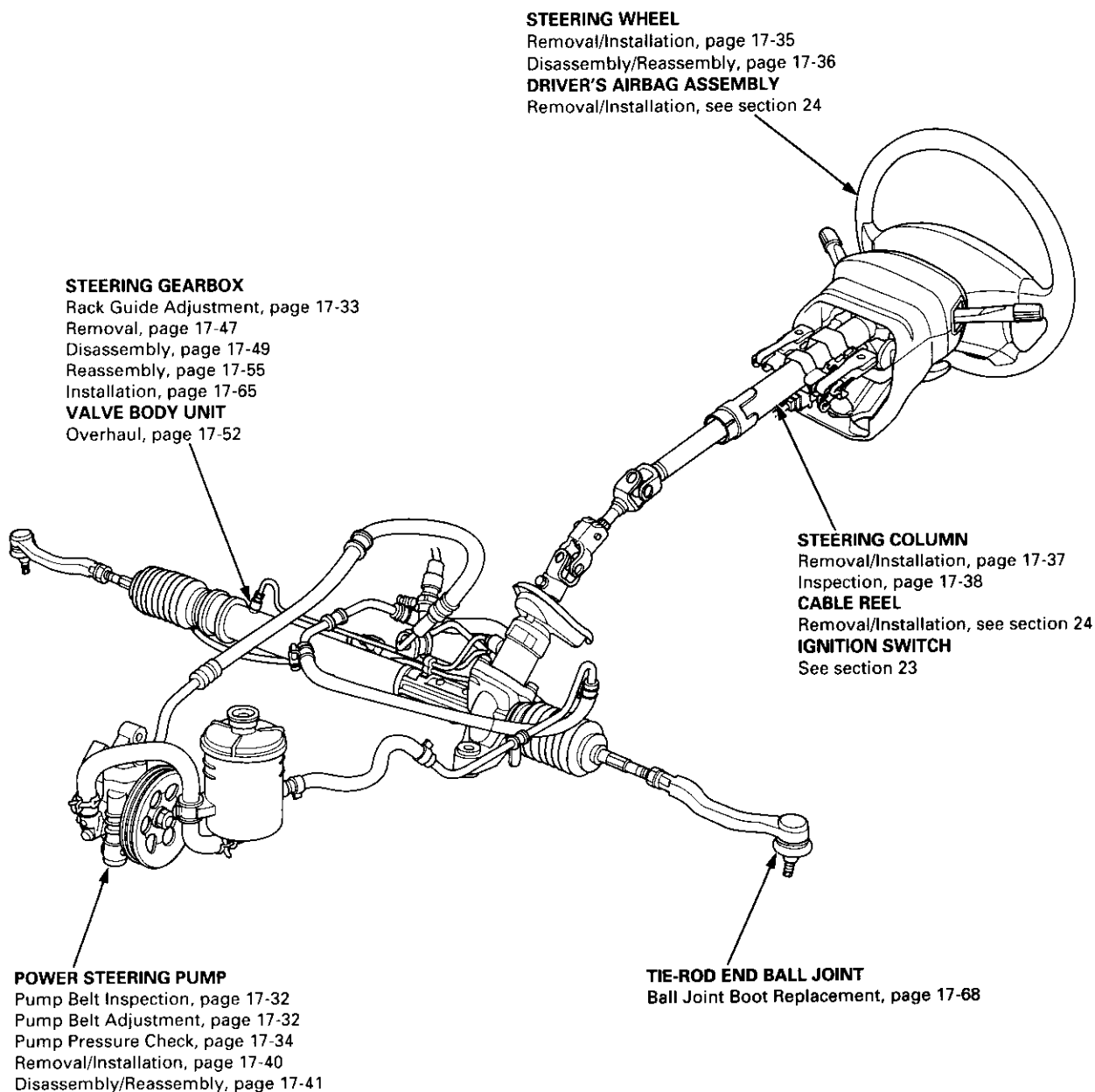
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Power Steering:

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.

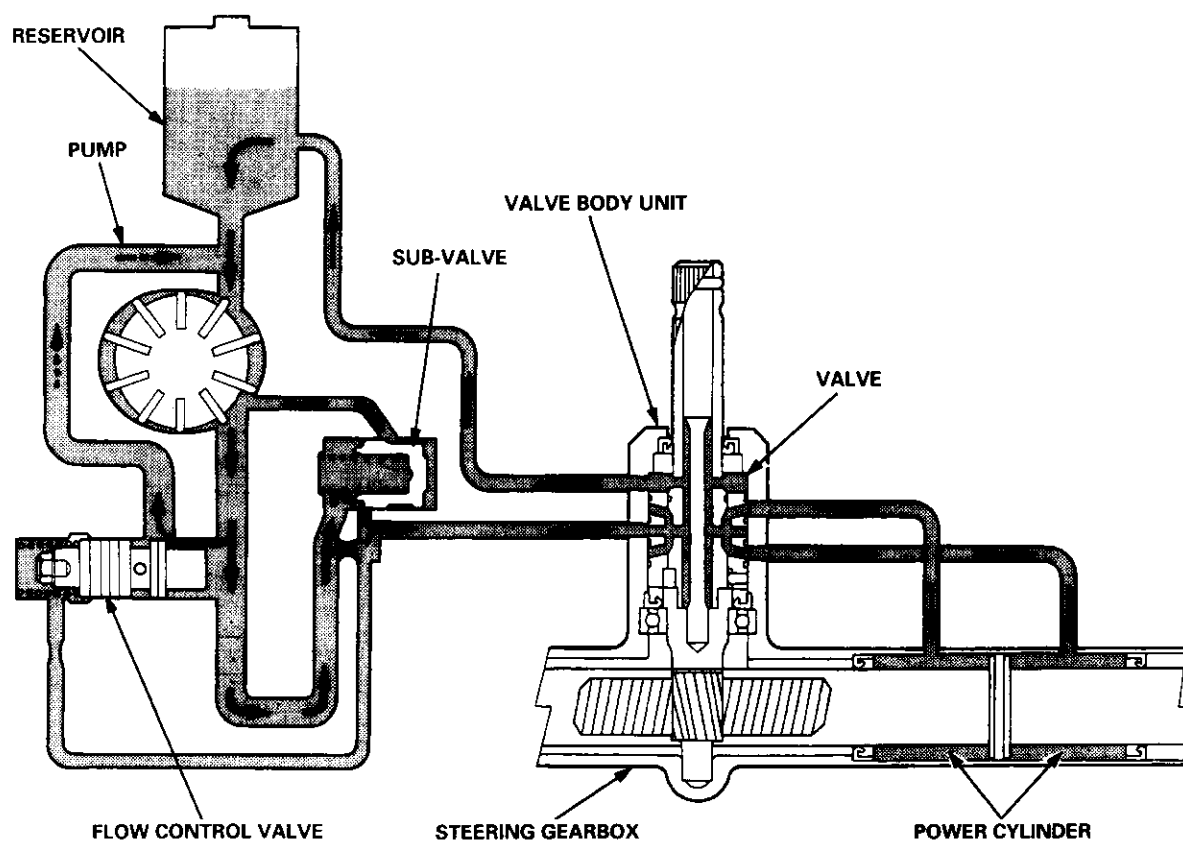
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.



System Description

Fluid Flow Diagram

The system is a compact rotary-valve-type power steering, connected to the steering gearbox. The fluid pressure is provided by a vane-type pump which is driven by the engine crank pulley. The amount of fluid and pressure is regulated by the flow control valve built into the pump. The fluid pressure from the pump is delivered to the valve body unit around the pinion of the steering gearbox. The valve inside the valve body unit controls the hydraulic pressure and changes the direction of the flow. The fluid then flows to the power cylinder, where rack thrust is generated. Fluid returning from the power cylinder flows back to the reservoir, where the fluid is "filtered" and supplied to the pump again.

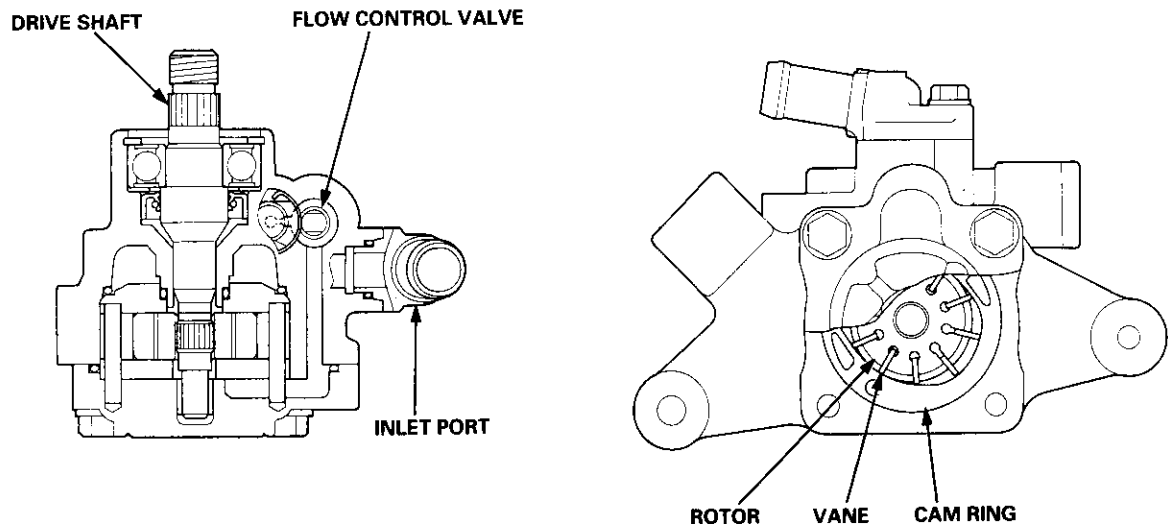




Steering Pump

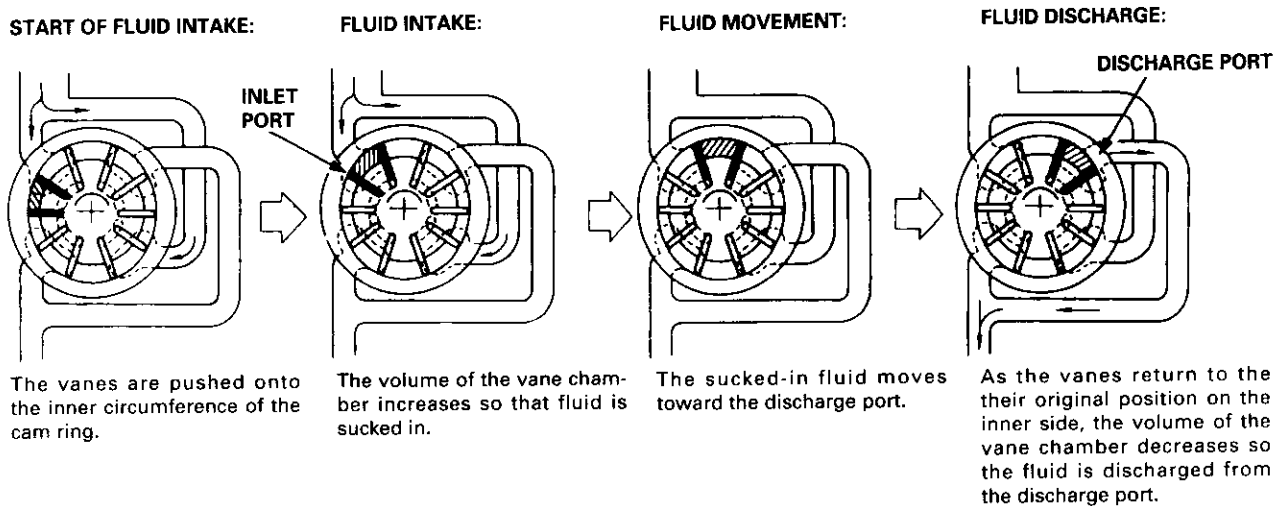
Construction

The pump is a vane-type incorporating a flow control valve (with an integrated relief valve) and is driven by a POLY-V-belt from the crank pulley. The pump features 10 vanes. Each vane performs two intake/discharge operations for every rotation of the rotor. This means that the hydraulic fluid pressure pulse becomes extremely small during discharge.



Operation

The belt-driven pulley rotates the rotor through the drive shaft. As the rotor rotates, the hydraulic pressure is applied to the vane chamber of the rotor and the vanes will rotate while being pushed onto the inner circumference of the cam ring. The inner circumference of the cam ring has an extended portion with respect to the center of the shaft, so the vanes move downward in the axial direction as the rotor rotates. As a result of this roller movement, the internal volume of the vane chamber will change, resulting in fluid intake and discharge.

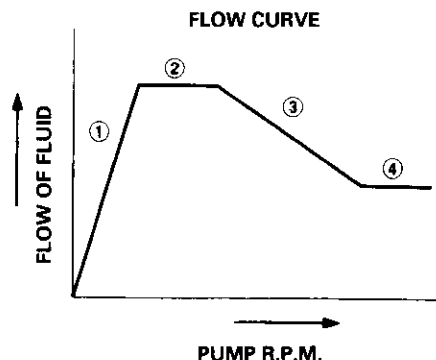


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System Description

Steering Pump (cont'd)

The flow control valve and sub-valve in the pump performs the following steps ① through ④ to control the flow of fluid, that is to increase the discharge volume when engine speed is low, and to decrease it when the engine speed increases. The assistance thrust of the steering gearbox changes in compliance with the change in the discharge volume.



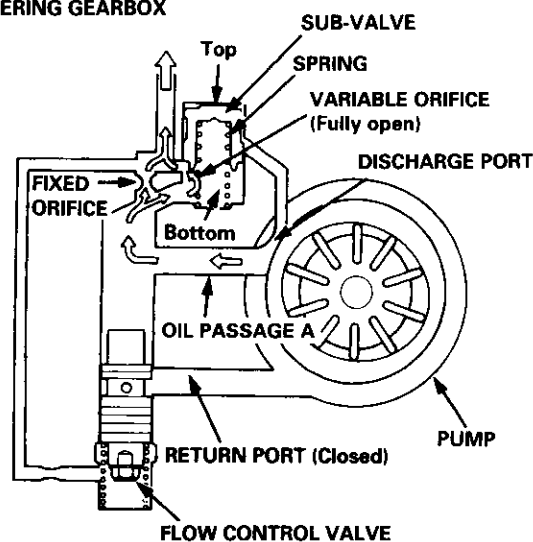
- ① When the engine starts, fluid discharged from the discharge port starts to flow through oil passage A, the fixed orifice and the variable orifice to the steering gearbox. When the engine speed is extremely low, the return port is closed by the flow control valve.

Fluid pressure discharged from the discharge port is applied to the top of the sub-valve, and the fluid pressure that passed through oil passage A is applied to the bottom of the sub-valve. When this happens, the pressure difference between the ends of oil passage A, which is caused by the resistance oil passage A when the fluid flows through the passage, is applied to the sub-valve. However, the pressure difference applied to the sub-valve, that is the force that pushes the sub-valve down, is too small to overcome the spring force, and the variable orifice is fully open when the engine speed is extremely low.

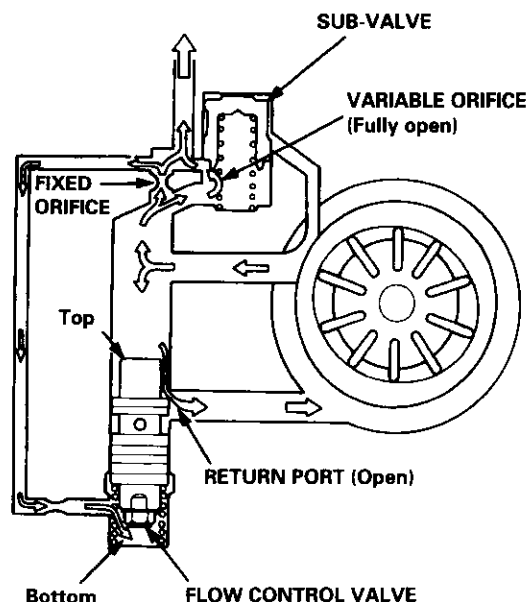
- ② Because the fluid volume flowing through the fixed orifice and variable orifice increases, a pressure difference is created between the ends of these orifices, and it increases in proportion to the engine speed. As the fluid pressure that passed the fixed orifice and variable orifice is directed to the bottom of the flow control valve, a pressure difference is created between the top and bottom of the valve, which pushes down the flow control valve and opens the return port. As a result, part of the fluid discharged from the discharge port returns to the pump suction port, keeping the discharge volume constant.

In this condition, the sub-valve does not move, and the variable orifice stays fully open.

To STEERING GEARBOX



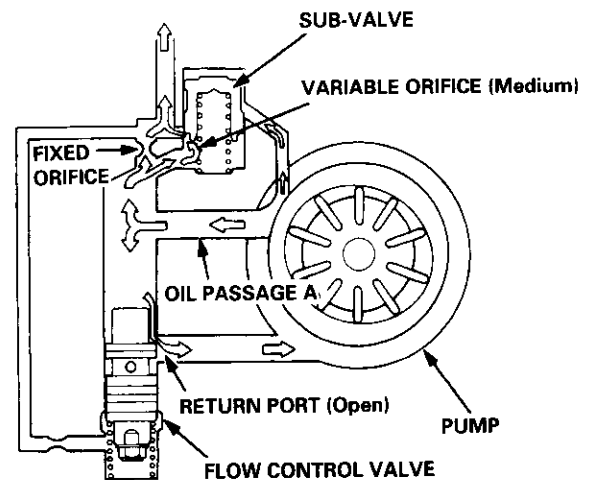
To STEERING GEARBOX





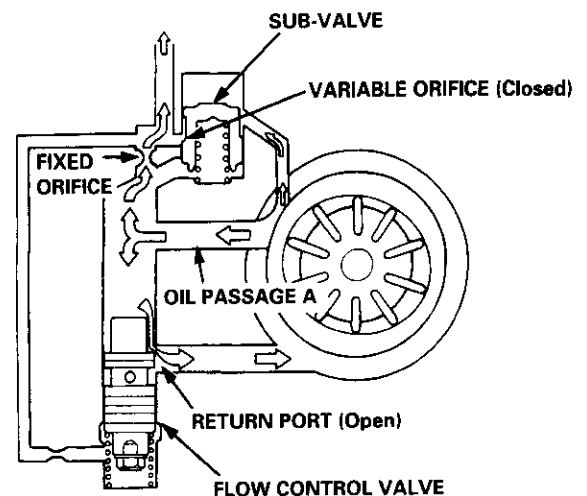
- ③ The fluid volume that flows through oil passage A and the pressure difference applied to the sub-valve increase in proportion to the engine speed. The sub-valve lowers overcoming the spring force, and it starts to close the variable orifice to regulate the discharge volume. When this happens, the fluid volume flowing to the steering gearbox decreases as the engine speed increases. At the same time, the flow control valve continues to control the fluid volume to the return port.

To STEERING GEARBOX



- ④ As the engine speed increases further, the pressure difference at the sub-valve increases further as well. The sub-valve then closes the variable orifice completely, regulating the discharge volume further. When this happens, the fluid volume discharged from the pump to the steering gearbox is regulated and maintained at a given level until the engine speed reaches the high speed range. The flow control valve functions continues to control the fluid volume to the return port.

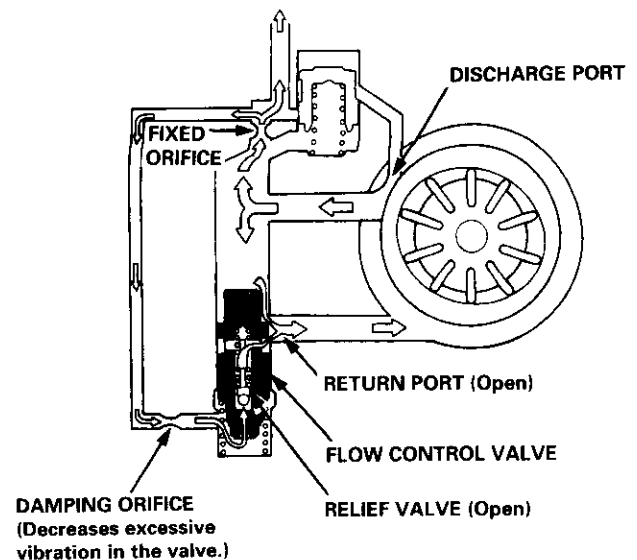
To STEERING GEARBOX



Pressure Relief

Pressure at the discharge side of the fixed orifice is directed to the bottom of the flow control valve. When the pressure builds up, the relief valve in the flow control valve opens to release the pressure at the bottom of the valve. This allows the flow control valve to be pushed back by the pressure difference, and the fluid volume to the pump return port increases.

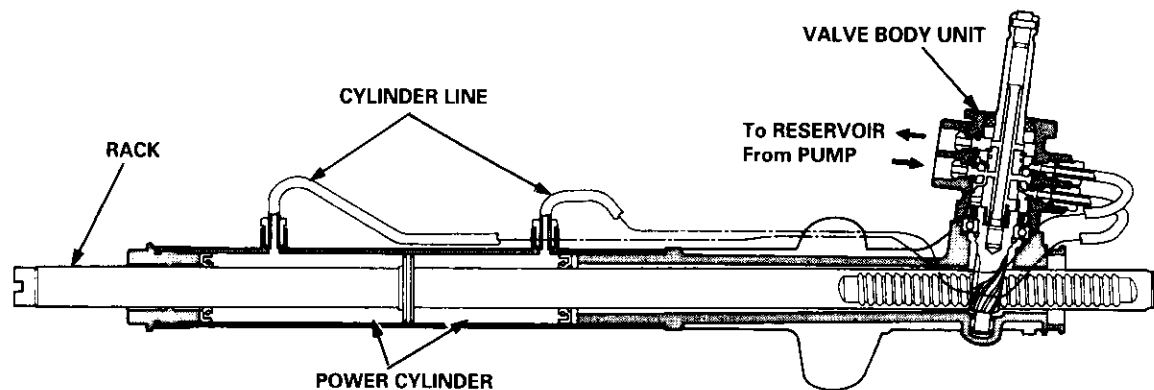
As explained above, the system keeps the pump discharge pressure (relief pressure) from exceeding the given level by controlling the volume of the fluid to the pump return port.



System Description

Steering Gearbox

The rack-and-pinion type steering gearbox has a valve body unit incorporated with the pinion to control the steering fluid pressure. Steering fluid from the pump is regulated by a rotary valve in the valve body unit and is sent through the cylinder line to the power cylinder, where hydraulic pressure is applied. The steering fluid in the other side of the power cylinder returns through the cylinder line and valve body unit to the reservoir.

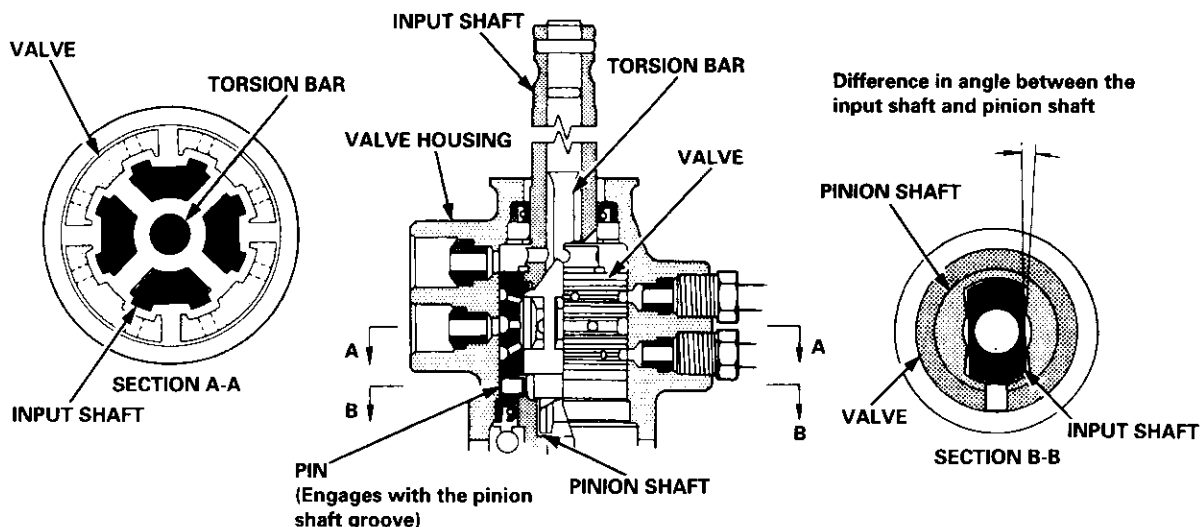


Valve Body Unit

Inside the valve body unit is the valve, which is coaxial with the pinion shaft, and controls the steering fluid pressure. The valve housing is connected with the fluid line from the pump, the return line to the reservoir, and the two cylinder lines from the respective power cylinder. The pinion shaft is double-structured with the input shaft connected to the pinion gear, both of which are interconnected with the torsion bar.

The pin inserted in the valve and the pinion shaft groove engage; this allows the pinion shaft to rotate together with the valve. Because of this construction, the difference in angle in the circumferential direction between the input shaft and the valve becomes larger according to the torsional strength of the pinion or steering resistance. However, maximum torsion between the shafts is regulated by the engaged splines of the shafts at the pin engagement section to hold the torsion bar within the set value.

This allows the steering system to function as an ordinary rack-and-pinion type steering if the steering fluid is not pressurized because of a faulty pump.

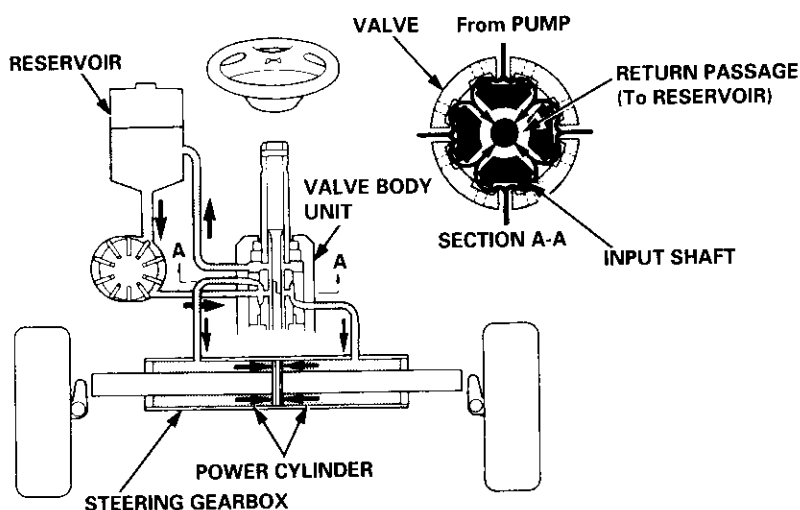




Pressure Control

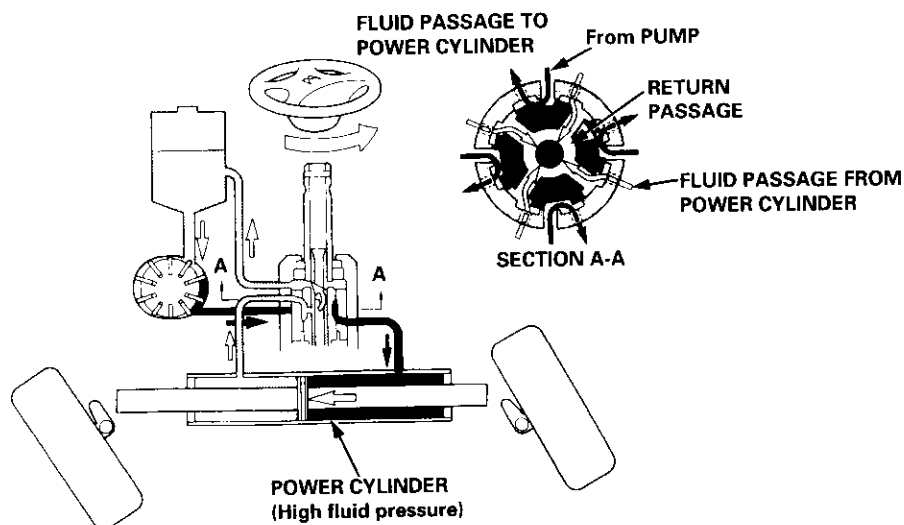
Low assist at higher speeds:

When steering resistance is low, such as when driving at high speeds, or when driving straight ahead, the input shaft is near or in the neutral position, so there is little or no flow to any of the power cylinder orifices. Most of the feed pressure from the pump is bypassed to the reservoir. Because of this, the pressure stays the same in both sides of the power cylinder, resulting in low or no assist.



High assist at lower speeds:

When steering resistance is high, such as when driving at low speeds, or when turning the wheel with the vehicle stopped, the difference in angle created between the input shaft and the valve opens the fluid passage on one side, and closes the fluid passage on the other side, at each pair of orifices. The fluid pressure increases in the side of the power cylinder fed by the larger fluid passage. This increased pressure pushes on the rack piston, allowing the steering wheel to be turned with light effort. On the other side of the power cylinder, the return passage opens allowing the steering fluid to return through the input shaft to the reservoir. The fluid passages to the power cylinder automatically change in size, increasing as the steering resistance increases. In other words, the passages become larger and power assist increases when the steering effort would normally be high, (for example, when parking or making low speed turns), and the passages become smaller and power assist decreases when the steering effort would normally be low, (for example, when driving at high speeds or straight ahead).



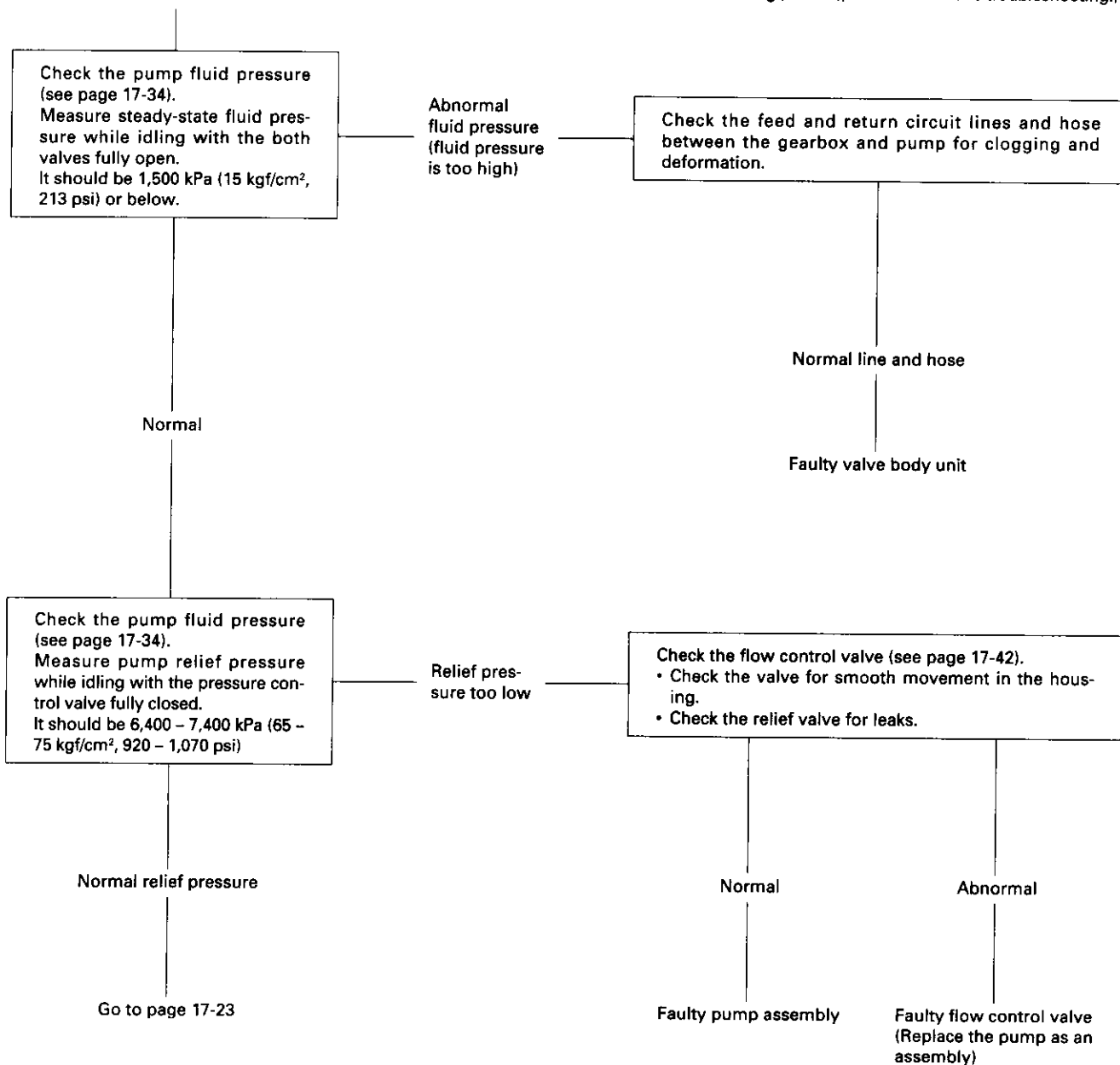
Troubleshooting

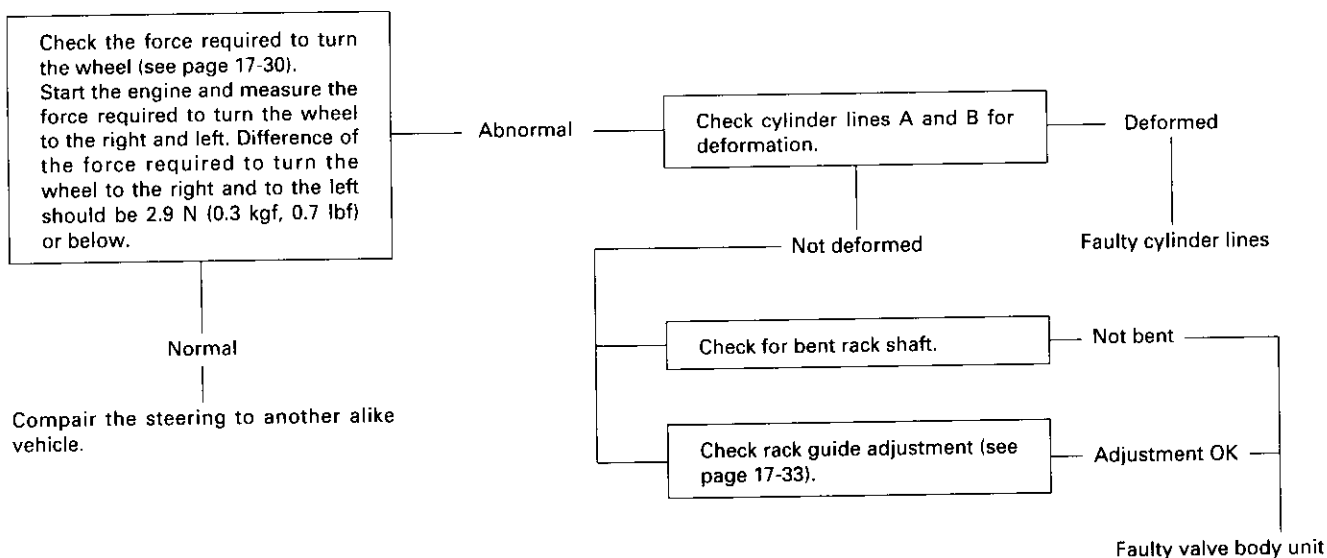
General Troubleshooting

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?

Hard Steering (Check the power assist, see page 17-30. If the force is over 29 N (3.0 kgf, 6.6 lbf), Proceed with this troubleshooting.)





(cont'd)

Troubleshooting

General Troubleshooting (cont'd)

Assist (excessively light steering) at high speed.

Check the rack guide for proper adjustment (see page 17-33).

If the problem is not corrected by adjusting the rack guide, adjust the front wheel alignment (see section 18).

Shock or vibration when wheel is turned to full lock.

Check the rack guide for proper adjustment (see page 17-33).

Rack guide was backed off excessively.

Adjust the rack guide.

Rack guide is adjusted properly.

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

Check the belt for slippage and adjust as necessary (see page 17-32).

Steering wheel will not return smoothly.

Check cylinder lines A and B for deformation.

A or B cylinder line is deformed; replace it.

A and B cylinder lines are normal, check wheel alignment (see section 18).

Wheel alignment is abnormal, adjust as needed.

Wheel alignment is normal. Check the steering wheel operation and power assist check (see page 17-30).

If the measurements are out of specifications, adjust the rack guide.

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



Uneven or rough steering.

Improperly adjusted rack guide.

Adjust the rack guide (see page 17-33).

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 17-32).

Idle speed low or erratic.

If the engine stalls when the wheel is turned while car 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 17-32) or replace belt.

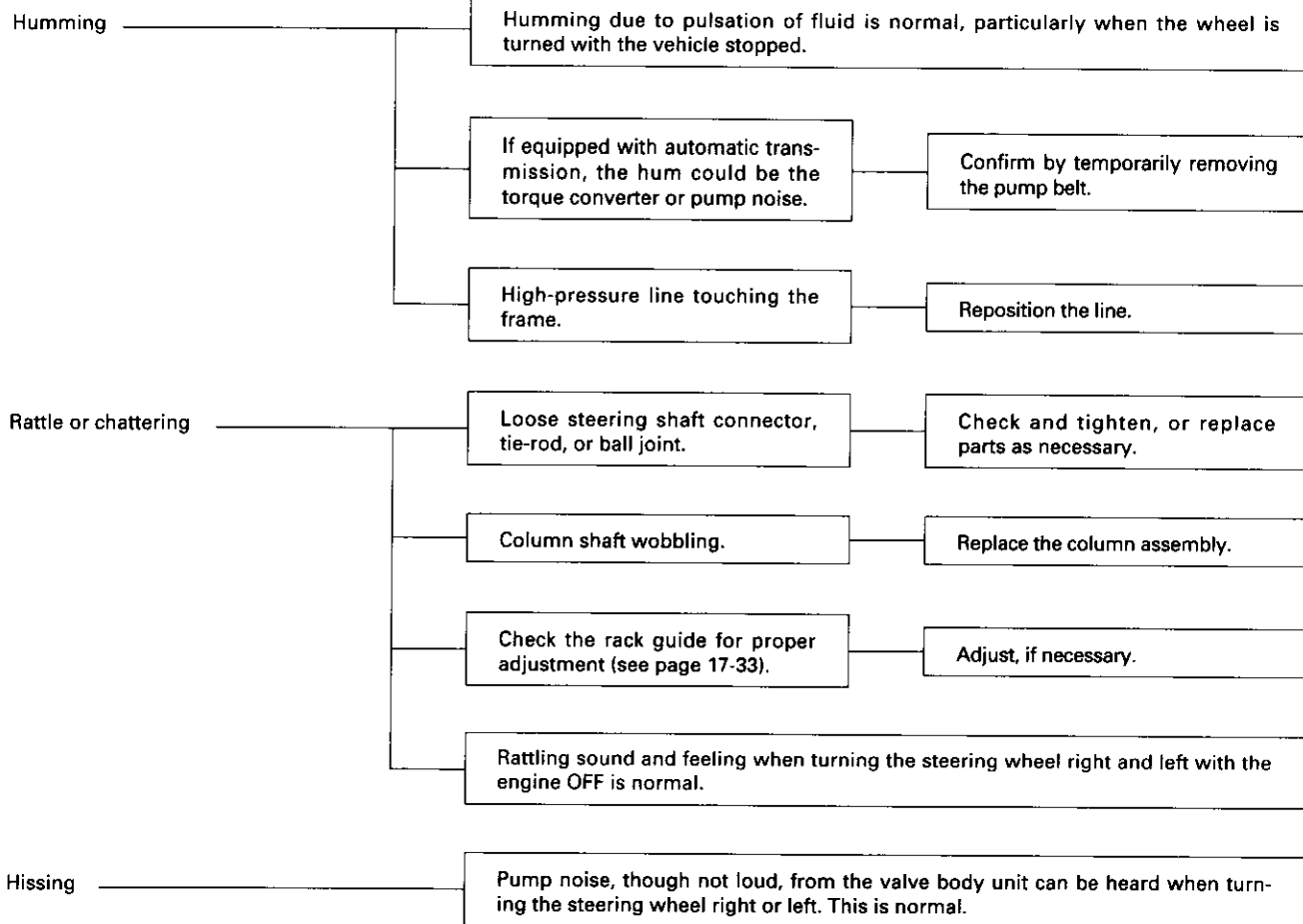
Install the power steering pressure gauge. Close the pressure control valve fully and measure the pump pressure (see page 17-34).

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.

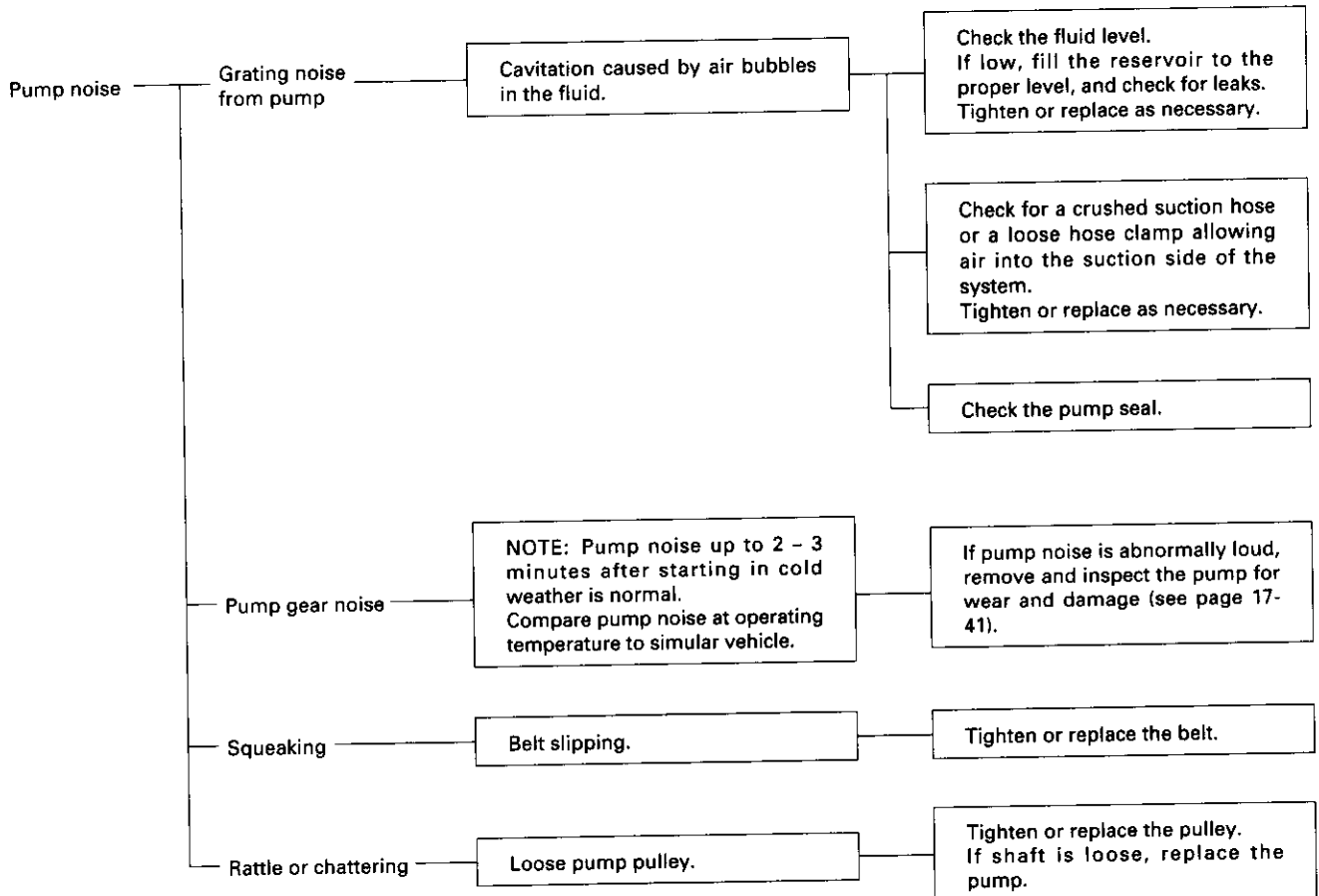
Troubleshooting

Noise and Vibration

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



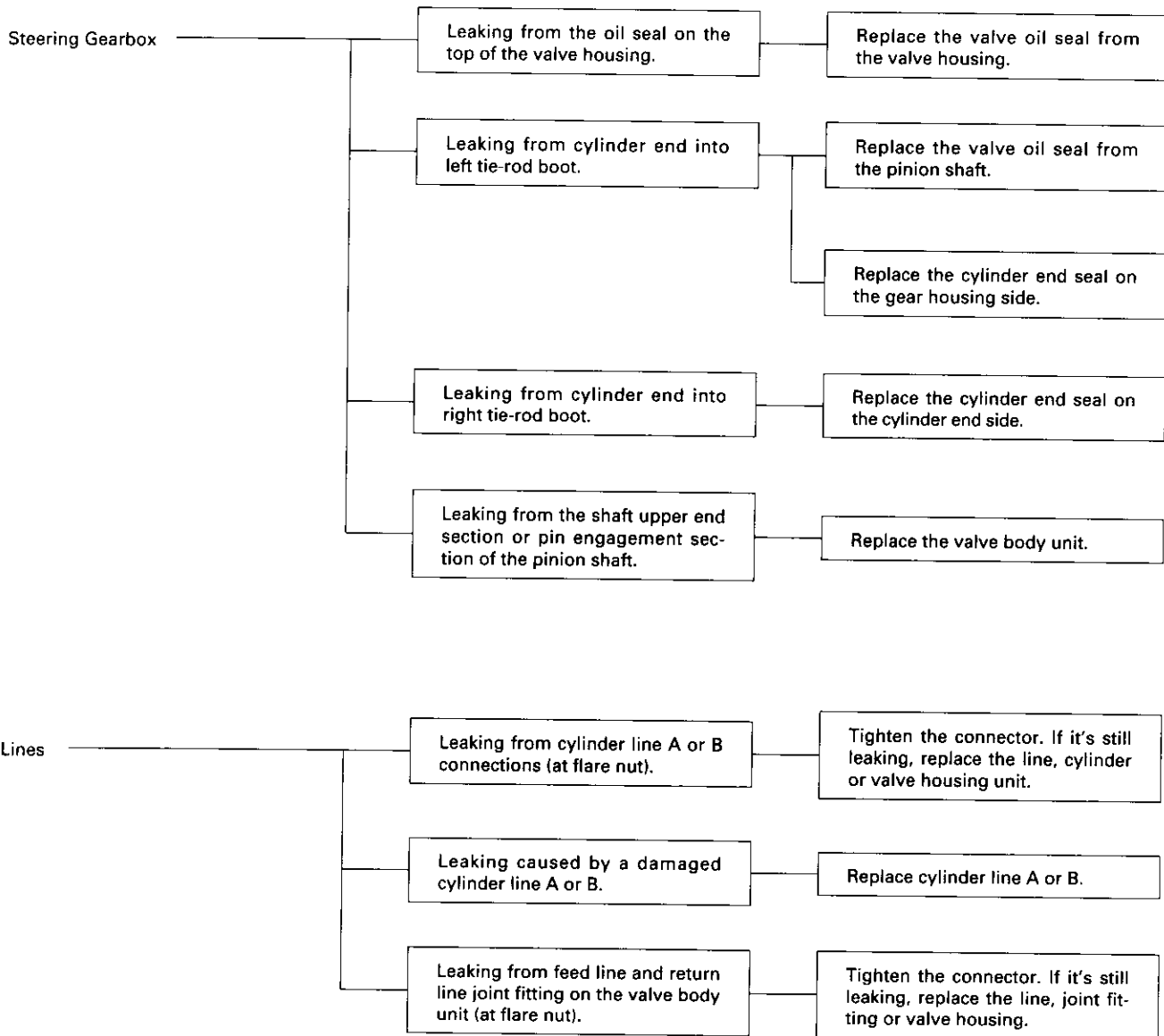
CAUTION: When inspecting, do not hold the steering wheel all the way to the right or the left.

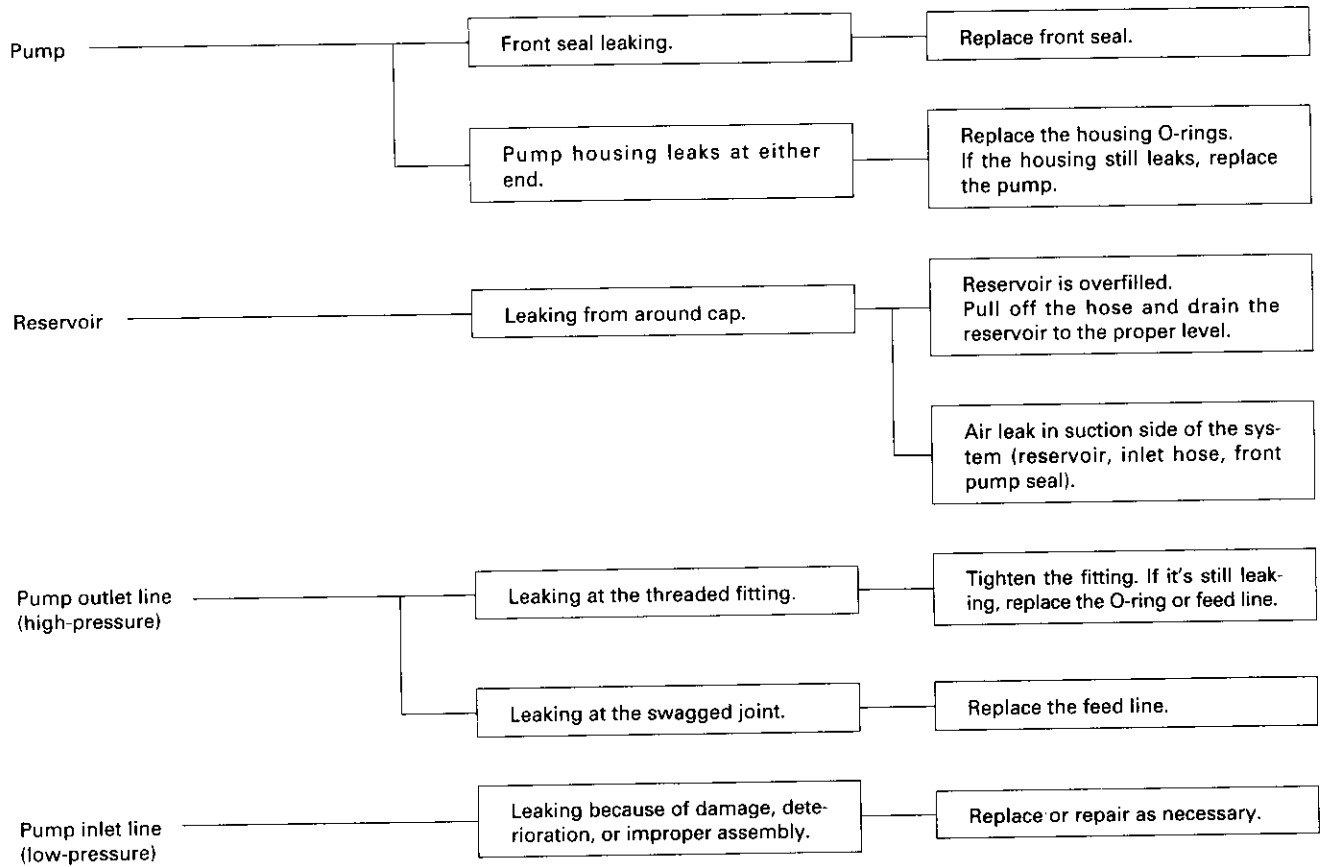


Troubleshooting

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

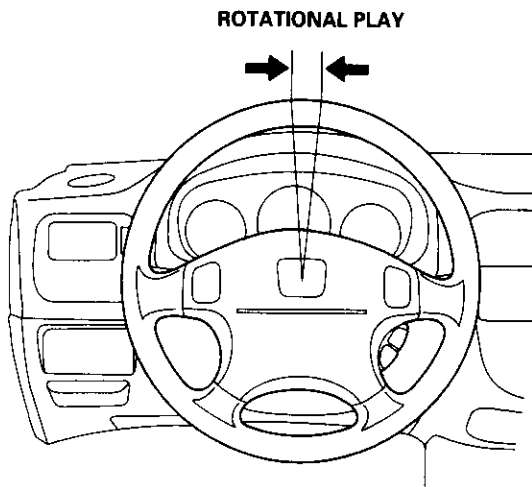
Steering Operation

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)

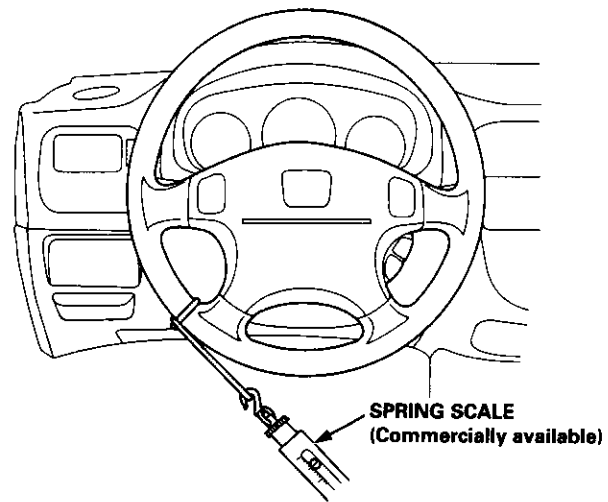
If the play exceeds the service limit, perform rack guide adjustment (see page 17-33).

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

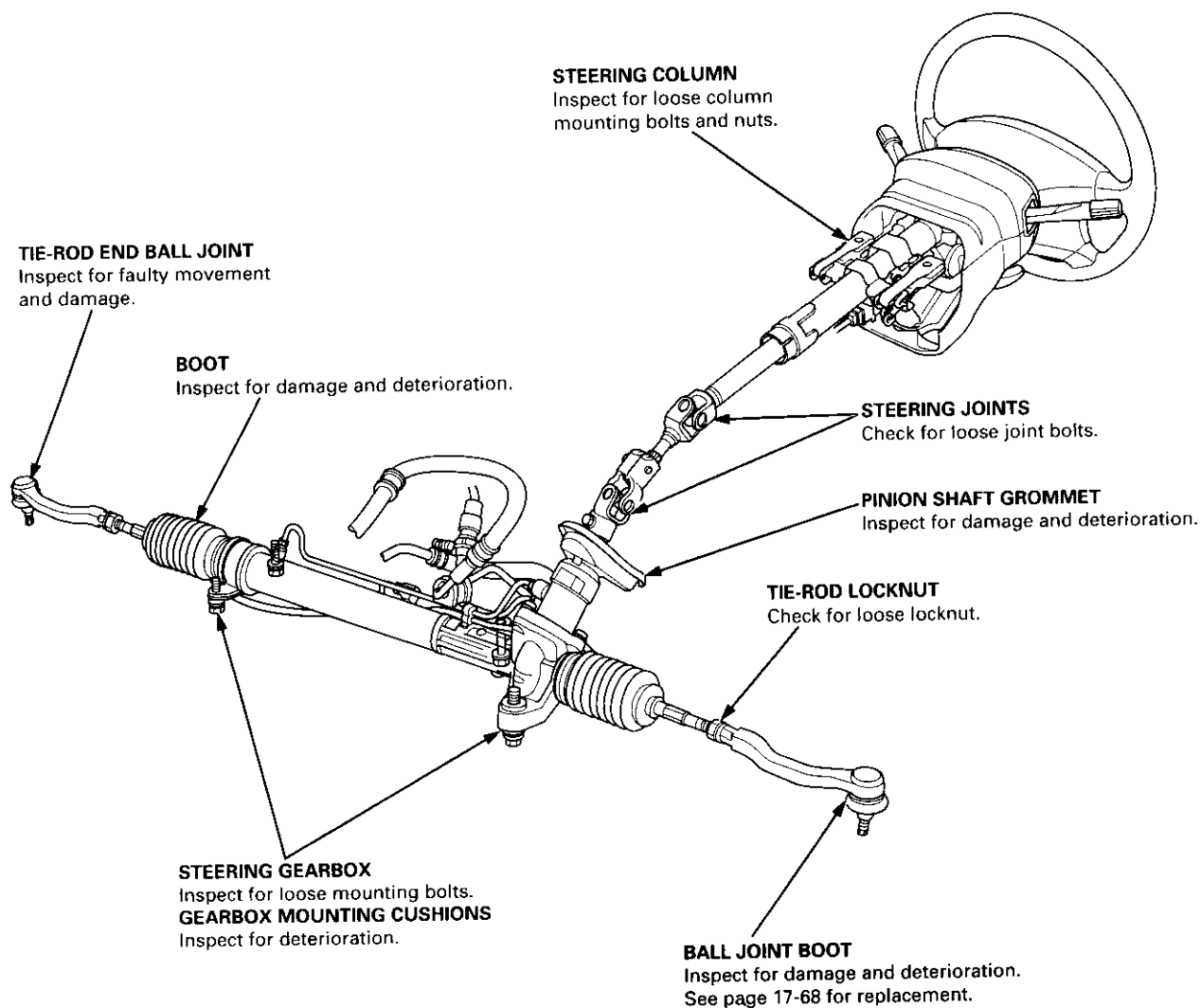
1. Check the power steering fluid level (see page 17-33) and pump belt tension (see page 17-32).
2. Start the engine, allow it to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid.
3. Attach a spring scale to the steering wheel. With the engine idling and the vehicle 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:

'99 - '00 models: B16A2 Engine Type only

Used Belt: 390 - 540 N (40 - 55 kgf, 88 - 120 lbf)

New Belt: 740 - 880 N (75 - 90 kgf, 170 - 200 lbf)

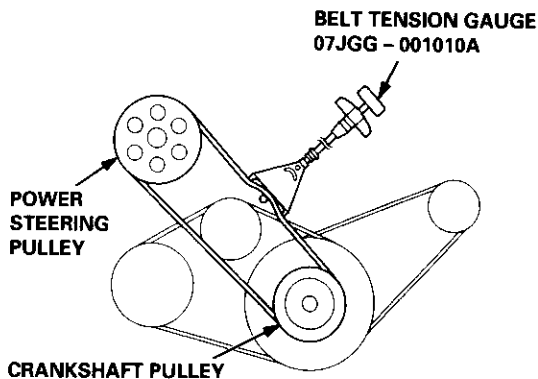
'96 - '00 models: Other Engine Types

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:

'99 - '00 models: B16A2 Engine Type only

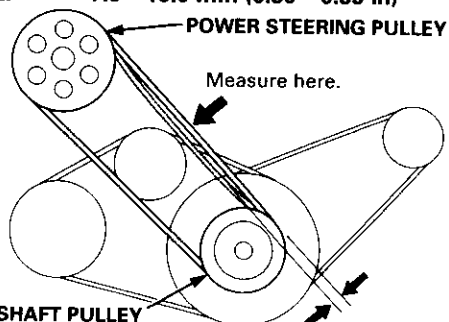
Used Belt: 7.5 - 11.0 mm (0.30 - 0.43 in)

New Belt: 5.0 - 7.0 mm (0.20 - 0.28 in)

'96 - '00 models: Other Engine Types

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

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

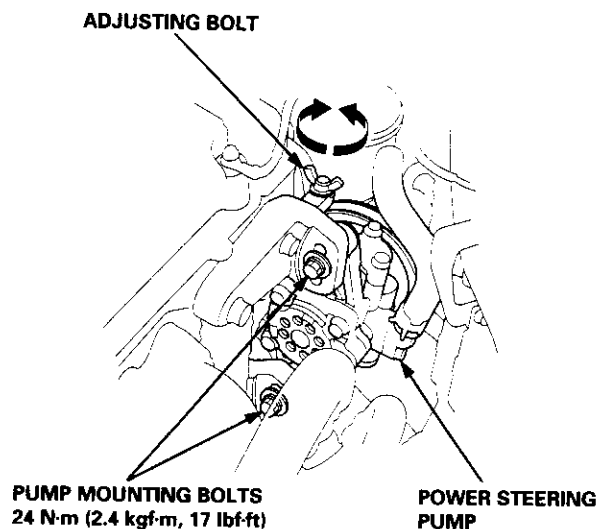


Adjustment

1. Loosen the power steering pump mounting bolts.
2. Adjust the belt tension.

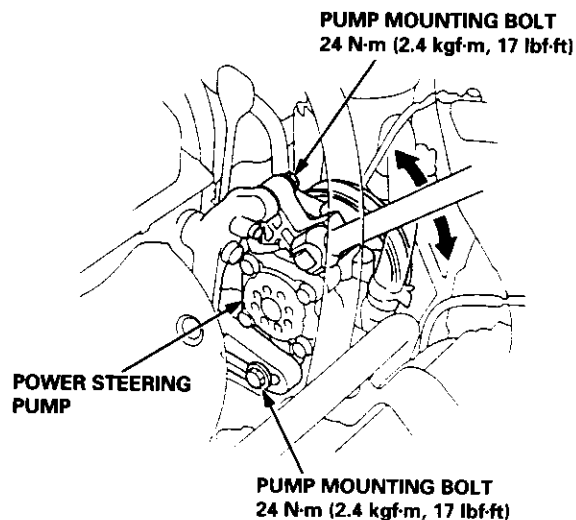
'99 - '00 models: B16A2 Engine Type only

- Turn the adjusting bolt by hand to get the proper belt tension, then retighten the mounting bolts.



'96 - '00 models: Other Engine Types

- Pry power steering pump away from the engine with a wrench to get 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.



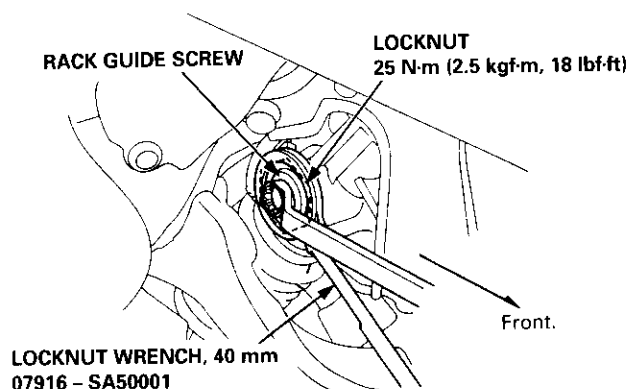
Rack Guide Adjustment

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

1. Loosen the rack guide screw locknut with the special tool.

'96 - '97 models:

Loosen the rack guide screw.



'98 - '00 models:

Remove the rack guide screw and remove the old sealant off of the threaded section.

Apply new sealant all around the threads. Loosely install 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 17-30).
 - 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.

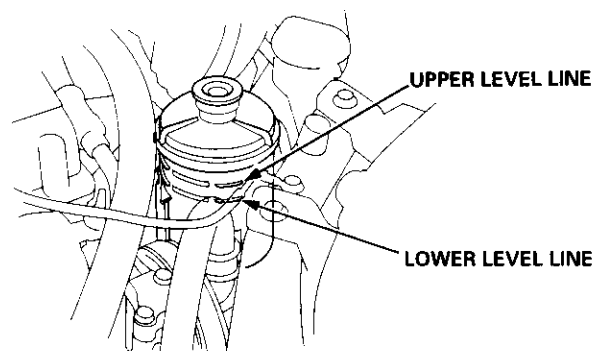
SYSTEM CAPACITY:

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

at disassembly

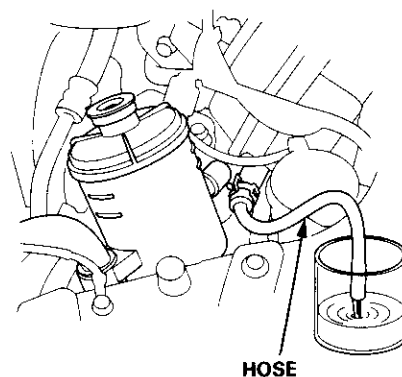
RESERVOIR CAPACITY:

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. Reinstall 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

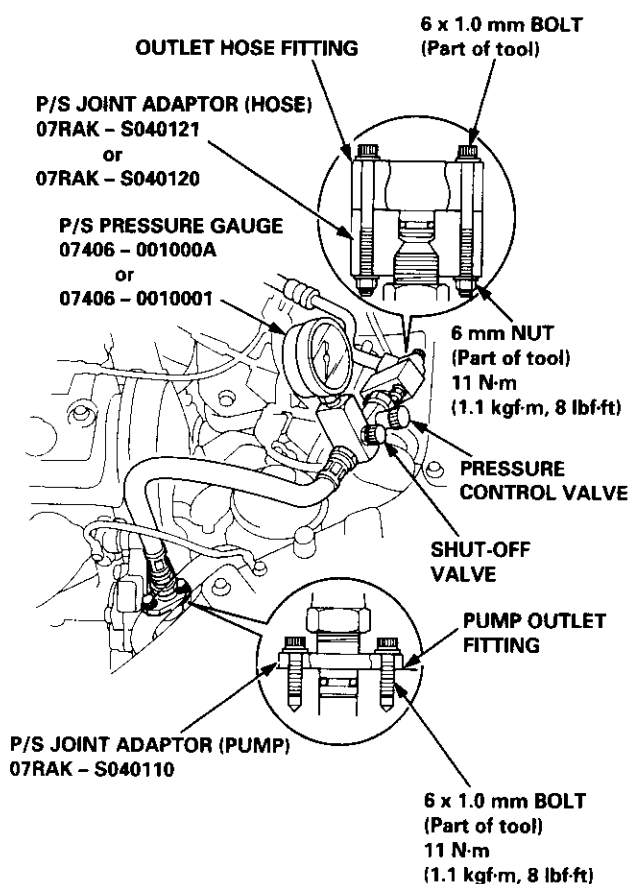
Pump Pressure Check

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 outlet line 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.

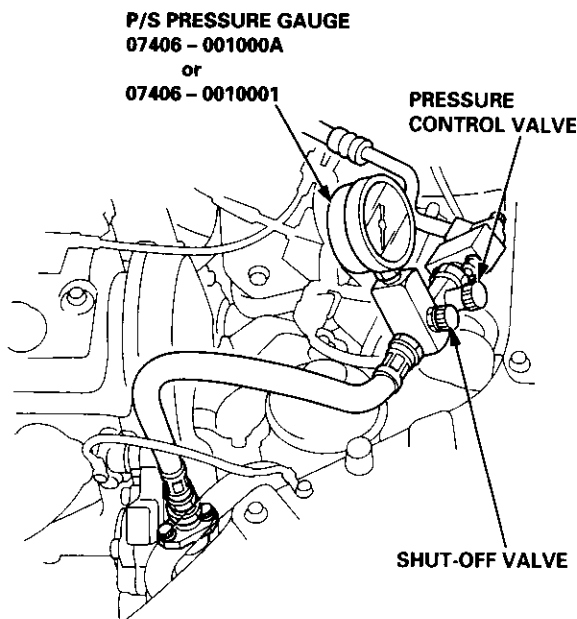


4. Open the shut-off valve fully.
5. Open the pressure control valve fully.

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 line or valve body unit (see General Troubleshooting 17-22).
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.



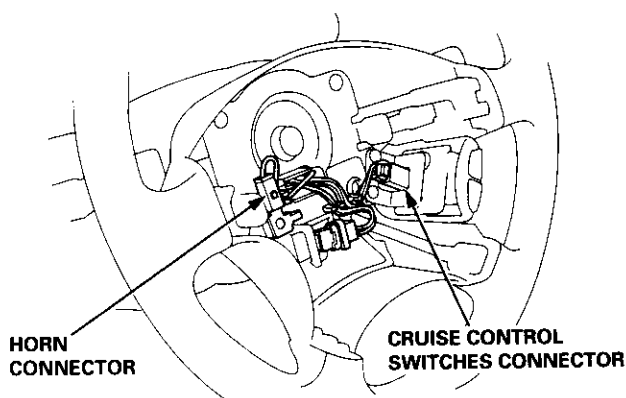


Removal

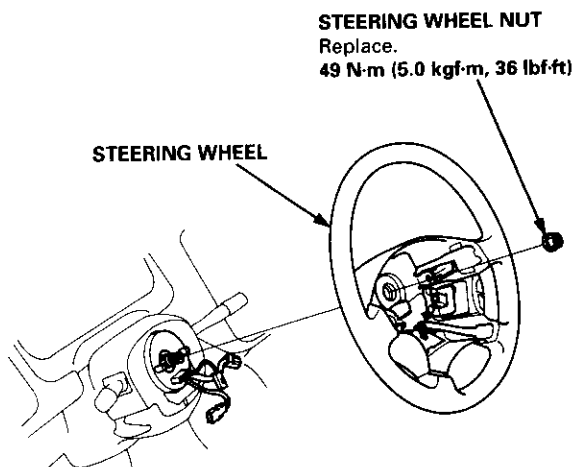
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

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.



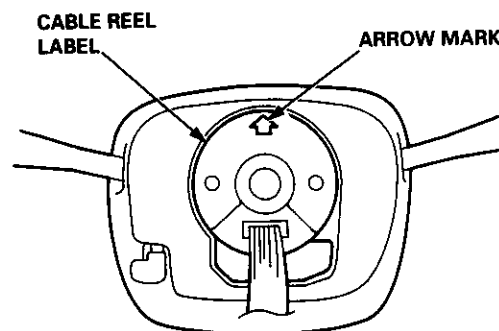
4. Remove the steering wheel by rocking it slightly from side-to-side as you pull steadily with both hands.

Installation

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

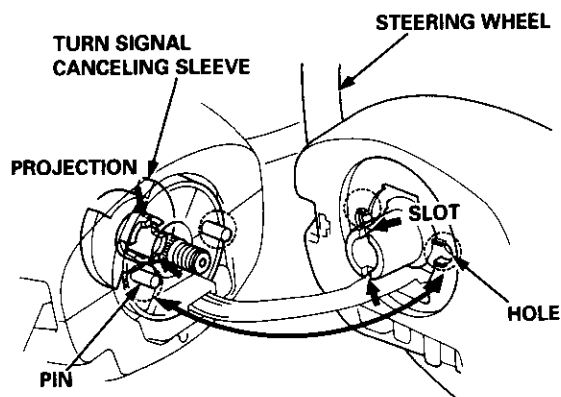
NOTE: Before installing the steering wheel, align the front wheels straight ahead.

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.

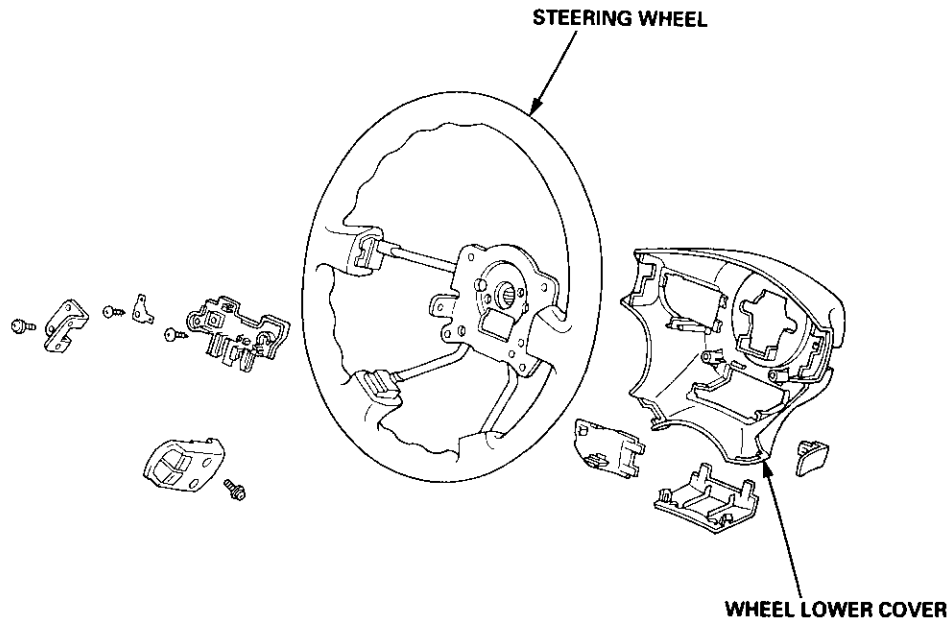
NOTE: Be sure the steering wheel shaft engages the cable reel and canceling sleeve.



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





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).

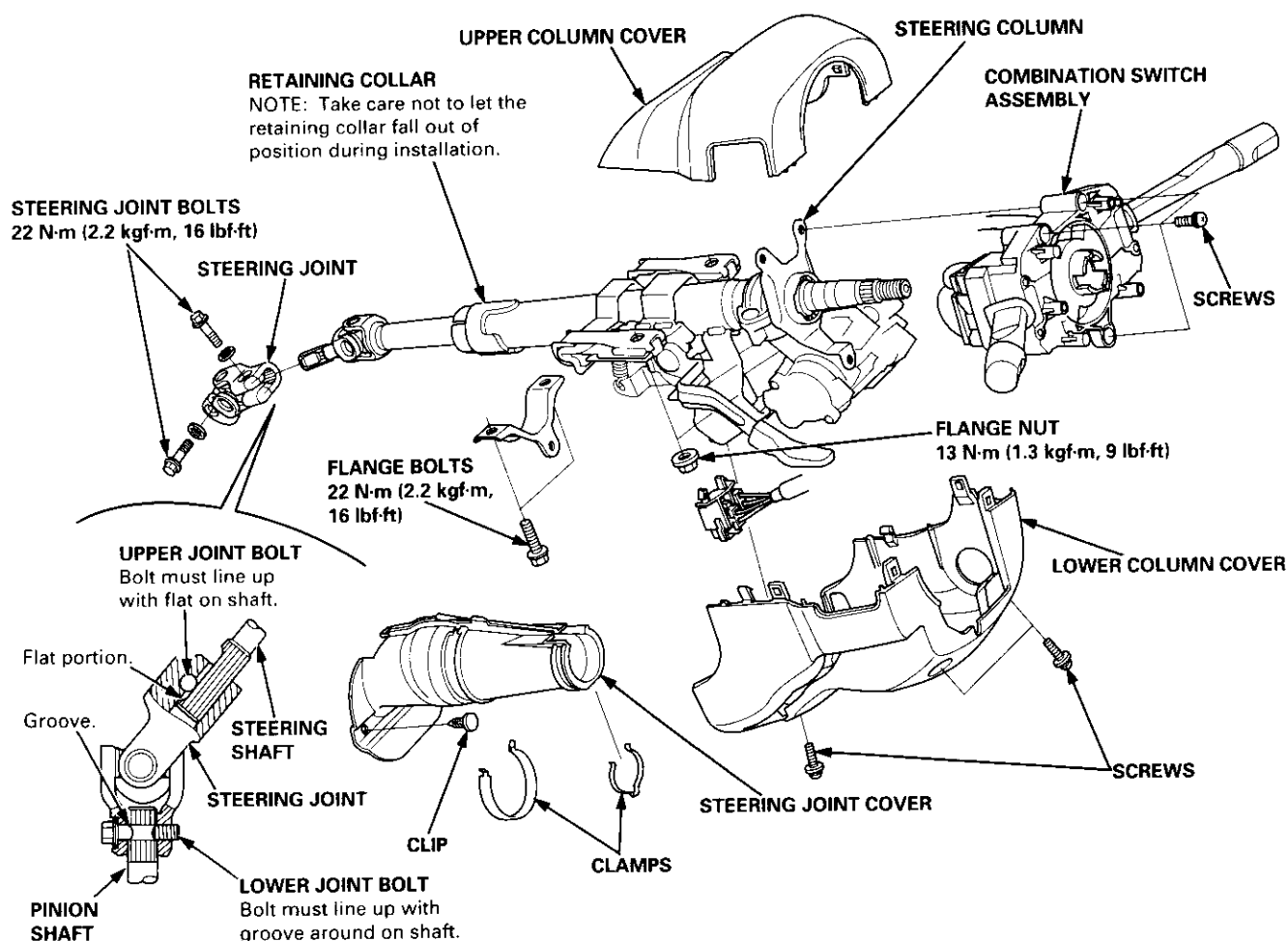
1. Remove the steering wheel (see page 17-35).
2. Remove the driver's dashboard lower cover and driver's knee bolster (see section 20).
3. Remove the combination switch assembly from the steering column shaft by disconnecting the connectors.
4. Disconnect the ignition switch connectors.
5. Remove the 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.

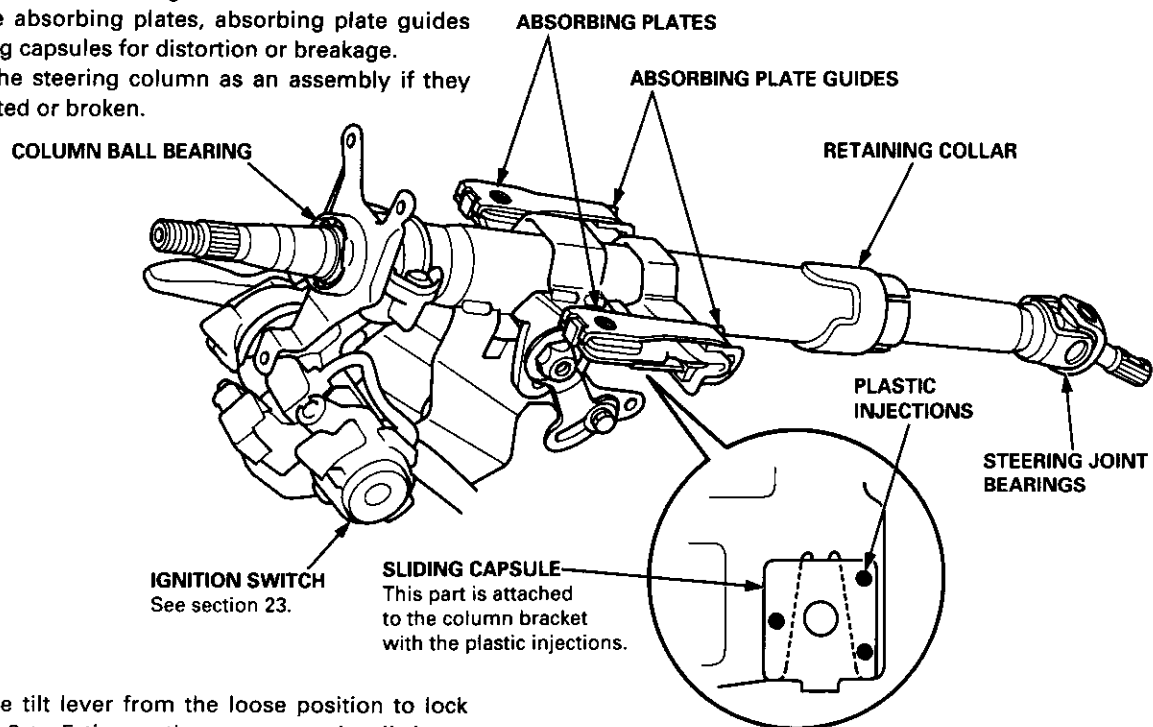


Steering Column

Inspection

NOTE: The tilt steering column type is shown; the conventional steering column is similar except for the tilt mechanism.

- 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 retaining collar.
- Check the absorbing plates, absorbing plate guides and sliding capsules for distortion or breakage. Replace the steering column as an assembly if they are distorted or broken.

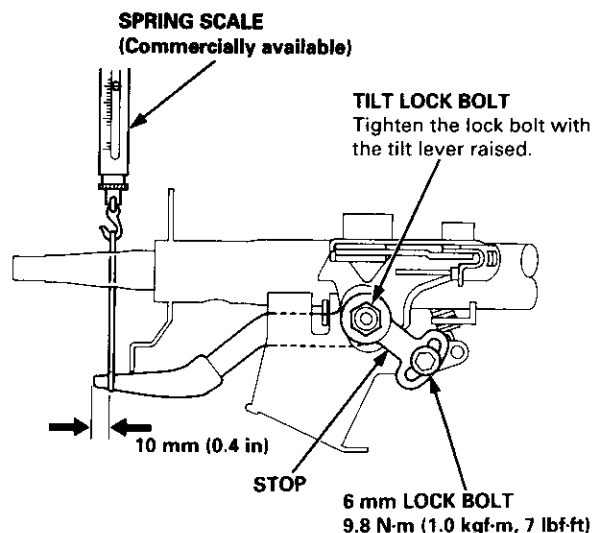


1. Move the tilt lever from the loose position to lock position 3 to 5 times; then measure the tilt lever preload 10 mm (0.4 in) from the end of the tilt lever.

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.



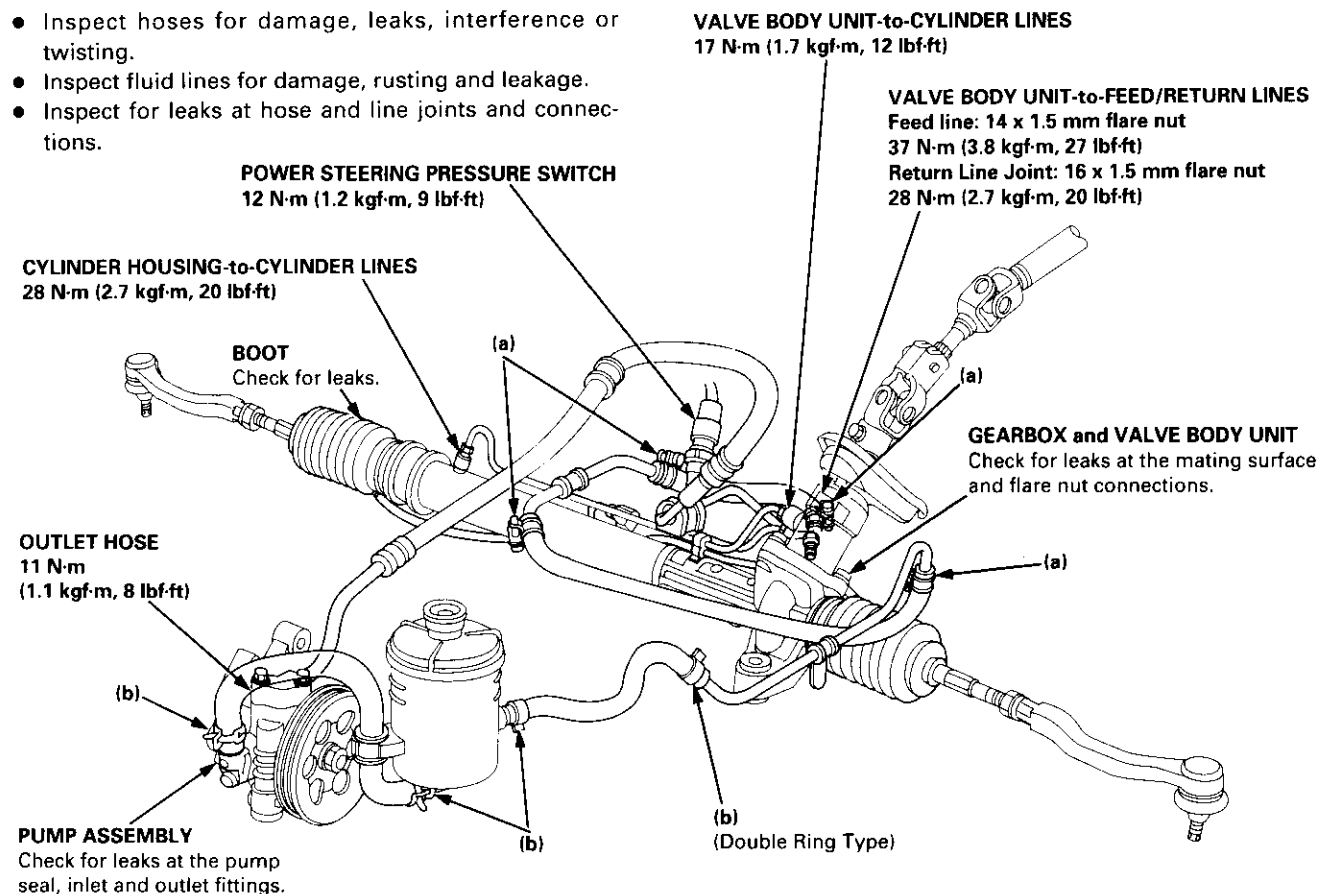


Power Steering Hoses, Lines

Fluid Leakage Inspection

HOSES and LINES

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



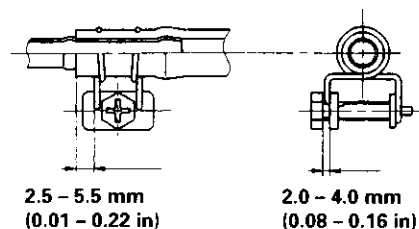
Replacement

NOTE:

- Connect each hose to the corresponding pipe 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 power steering fluid to the specified level on the reservoir and check for leaks.

ADJUSTABLE HOSE CLAMP:

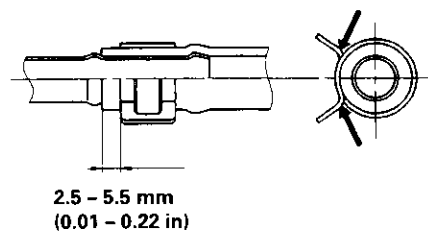
- Position the adjustable hose clamps at the points indicated (a) in the drawing above.
- Slide the hose over the line until it contacts the stop.



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 (b) in the drawing above.
- Slide the hose over the line until it contacts the stop.

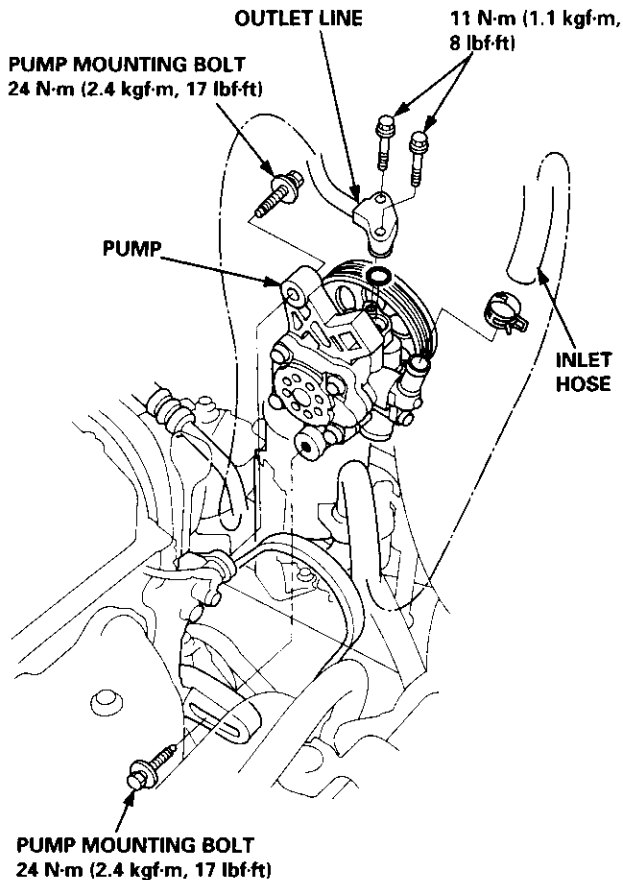


Power Steering Pump

Removal/Installation

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 and adjusting bolt ('99 – '00 models: B16A2 Engine Type only).



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

4. Remove the pump mounting bolts and adjusting bolt ('99 – '00 models: B16A2 Engine Type only), then remove the pump.

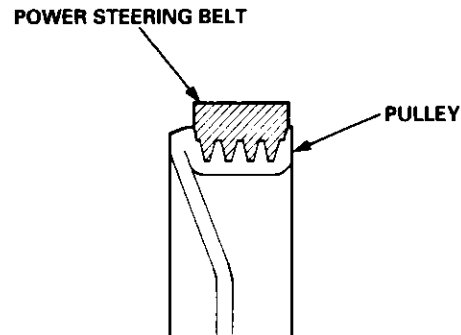
NOTE:

- Do not turn the steering wheel with the pump removed.
- 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 line. Tighten the pump fittings securely.
6. Loosely install the pump in the pump bracket with mounting bolts and adjusting bolt ('99 – '00 models: B16A2 Engine Type only).
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 in the power steering belt or pulley faces. Clean off any fluid or grease before installation.



8. Adjust the pump belt (see page 17-32).
9. Fill the reservoir to the upper level line (see page 17-33).

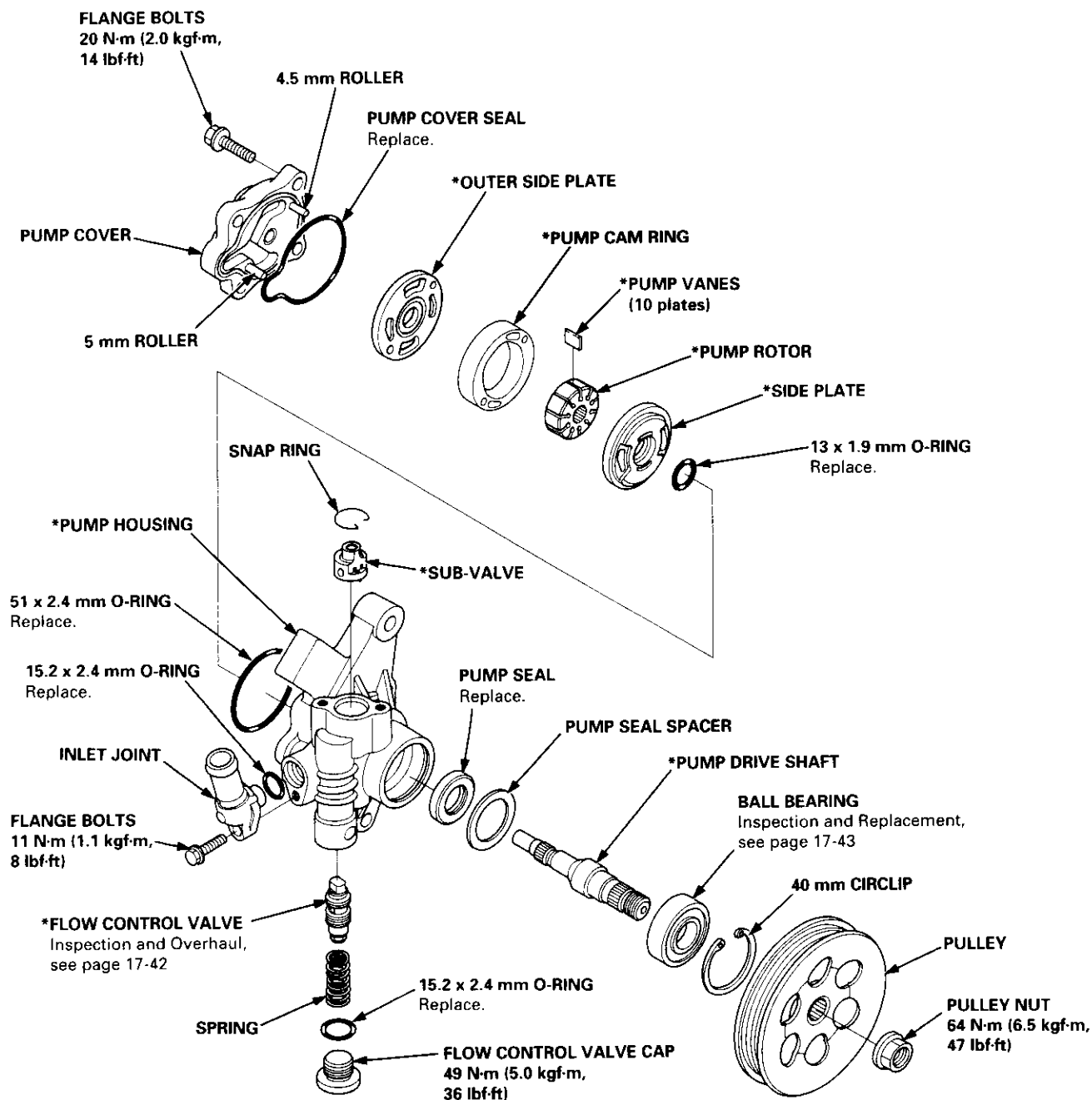


Disassembly

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.



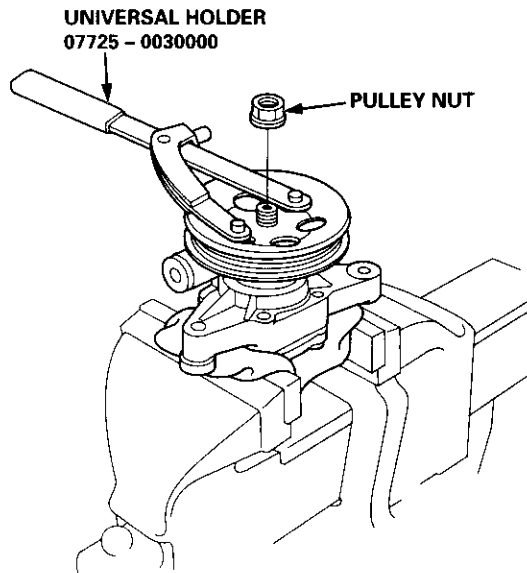
(cont'd)

Power Steering Pump

Disassembly (cont'd)

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.

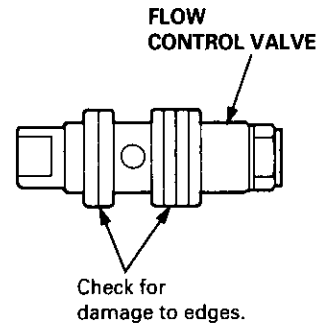


3. Loosen the flow control valve cap with a hex wrench and remove it.
4. Remove the O-ring, flow control valve and spring.
5. Remove the inlet joint and O-ring.
6. Remove the pump cover and pump cover seal.
7. Remove the outer side plate, pump cam ring, pump rotor, pump vanes, side plate and O-rings.
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.

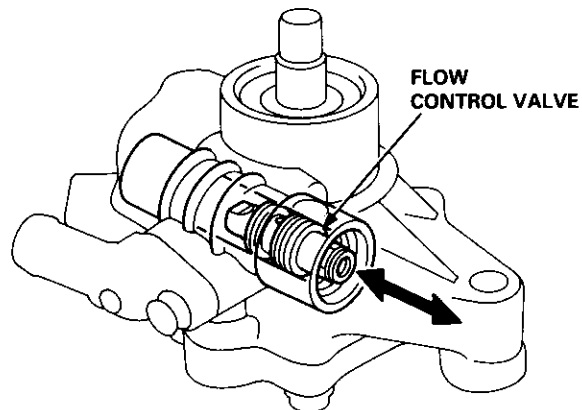
Inspection

Flow Control Valve:

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

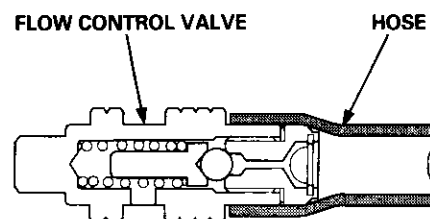


2. Inspect the bore the flow control valve for scratches or wear.
3. Slip the valve back in the pump, and check that it moves in and out smoothly.



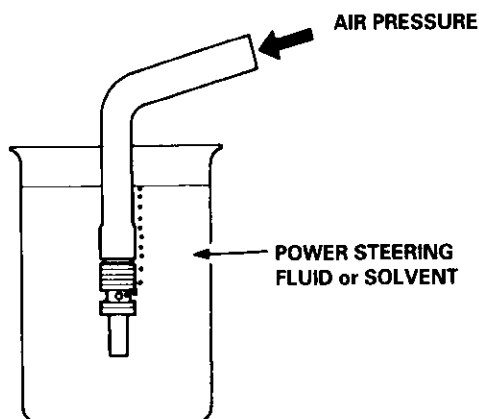
If OK, go on step 4; if not, replace the pump as an assembly. The flow control valve is not available separately.

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

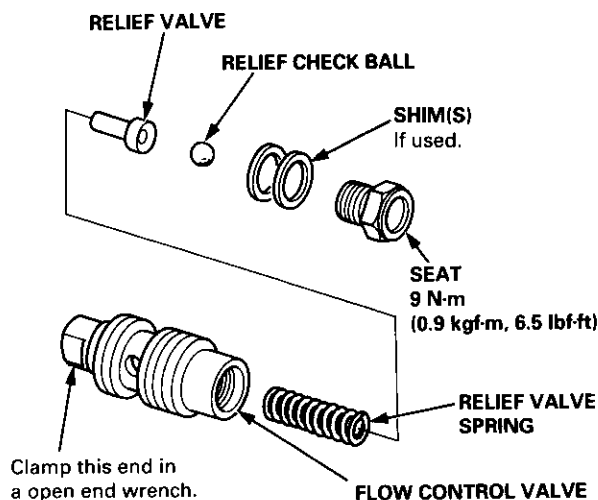




5. Submerge the valve in a container of power steering fluid or solvent, and blow in the hose. If air bubbles leak through the valve at less than 98 kPa (1.0 kgf/cm², 14.2 psi), repair it as follows.



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

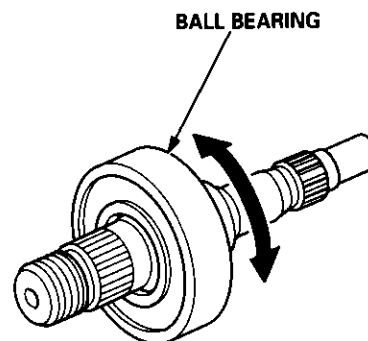


8. Clean all the parts in solvent, dry them off, then reassemble and retest the valve. If the flow control valve tests OK, reinstall it in the pump. If the flow control valve still leaks air, replace the pump as an assembly. The flow control valve is not available separately.

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.

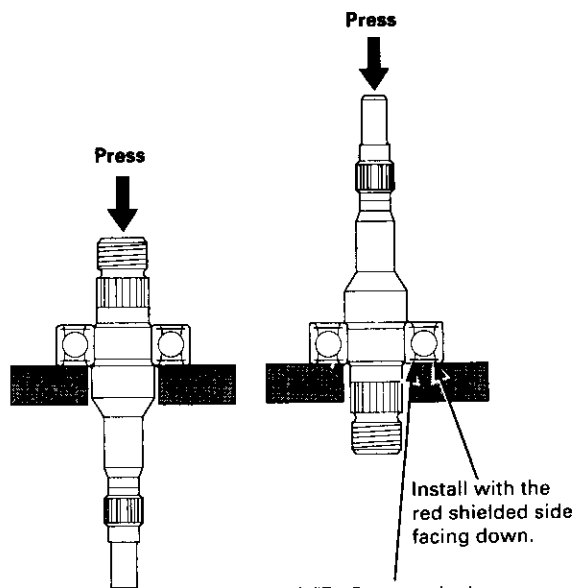
Ball Bearing:

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



2. Remove and discard the ball bearing using a press as shown.
3. Install the new ball bearing using a press as shown.

Ball Bearing Replacement:

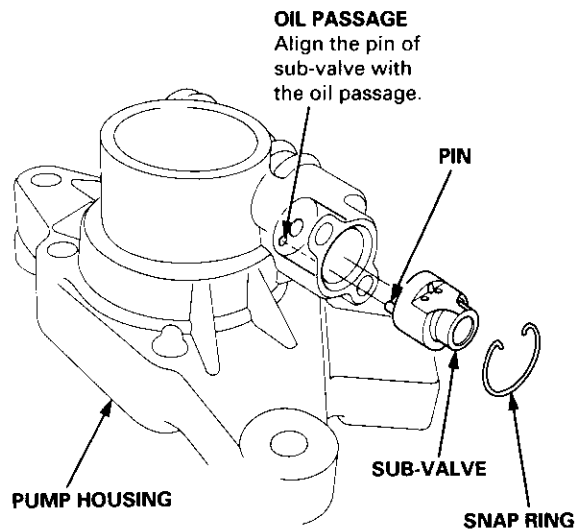


NOTE: Support the inner race with the tool securely.

Power Steering Pump

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.

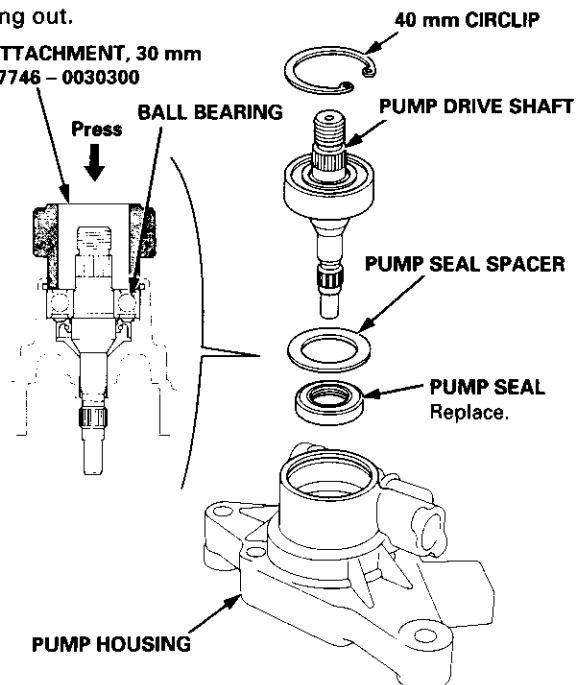


2. Install the new pump seal in the pump housing by hand, then install the pump seal spacer.

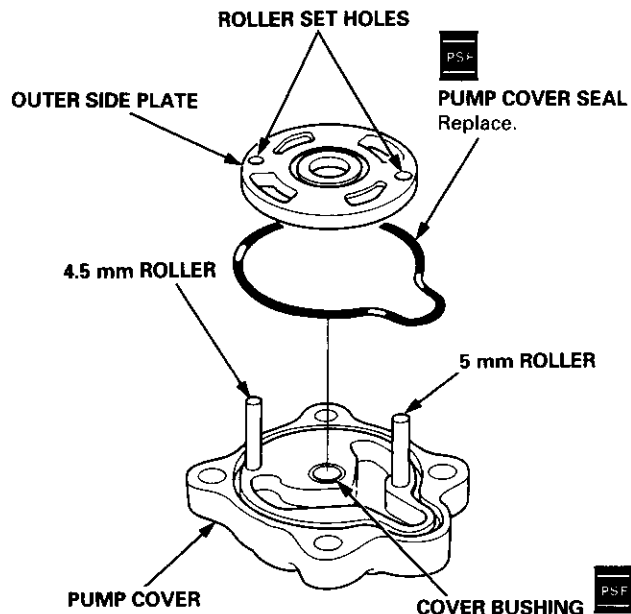
NOTE: Insert the pump seal with its grooved side facing in.

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.

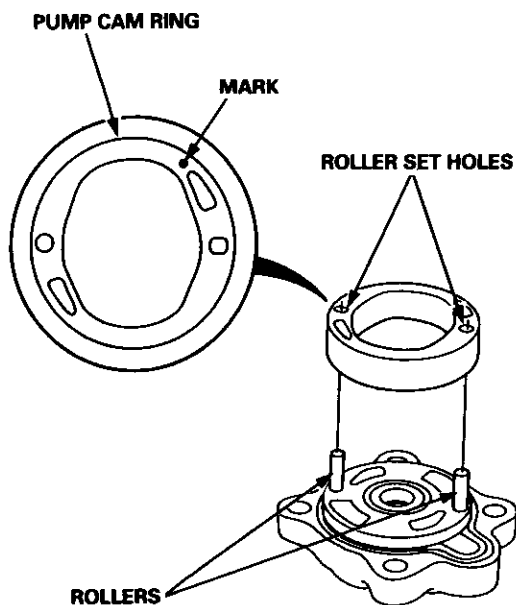
ATTACHMENT, 30 mm
07746 - 0030300



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.

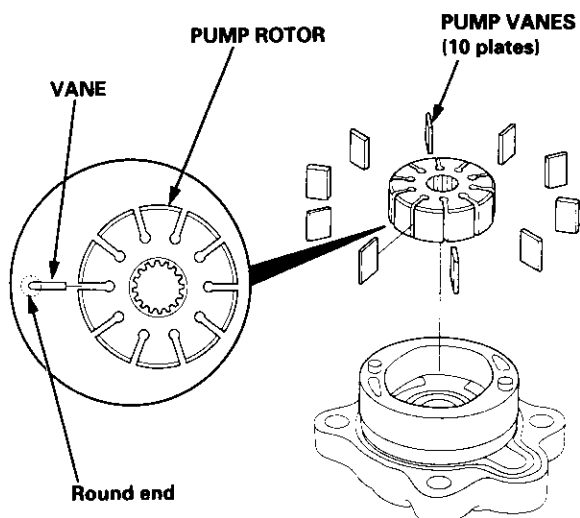




8. Assemble pump rotor to the pump cover with the "O" marks on the rotor facing down.

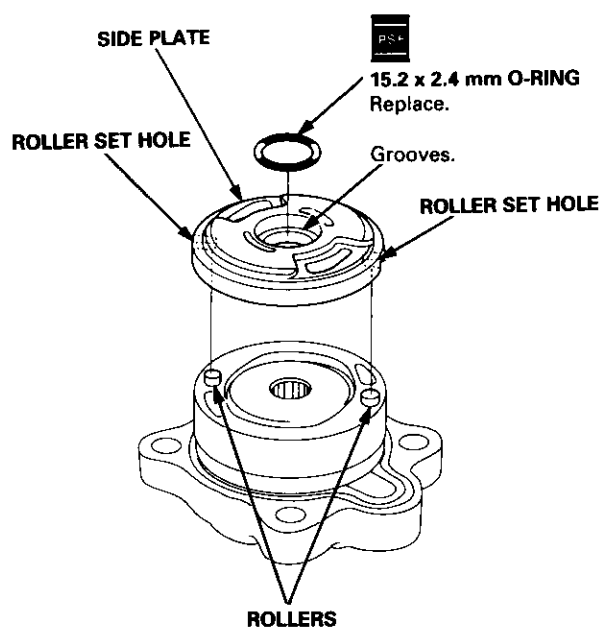
9. Set the 10 vanes in the grooves in the rotor.

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



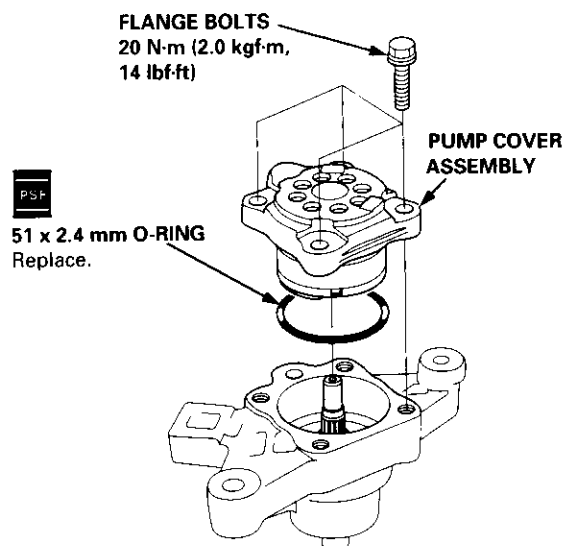
10. Coat the O-ring with power steering fluid, and install it into the grooves in the side plate.

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.

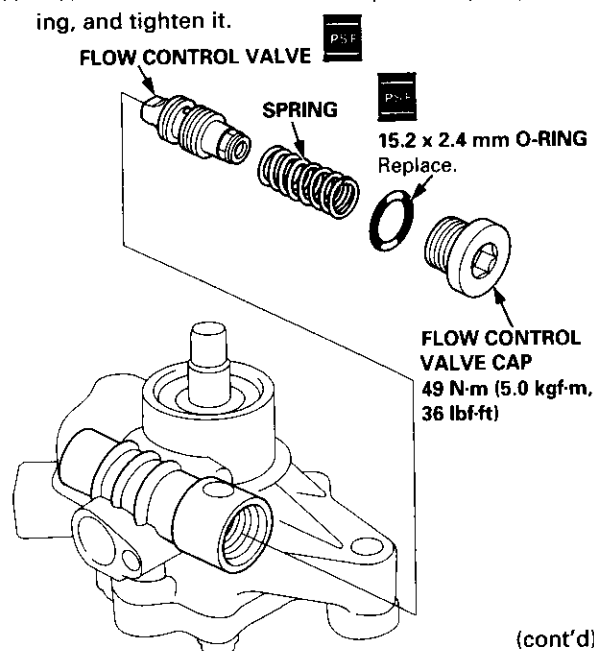


14. Coat the flow control valve with power steering fluid.

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.

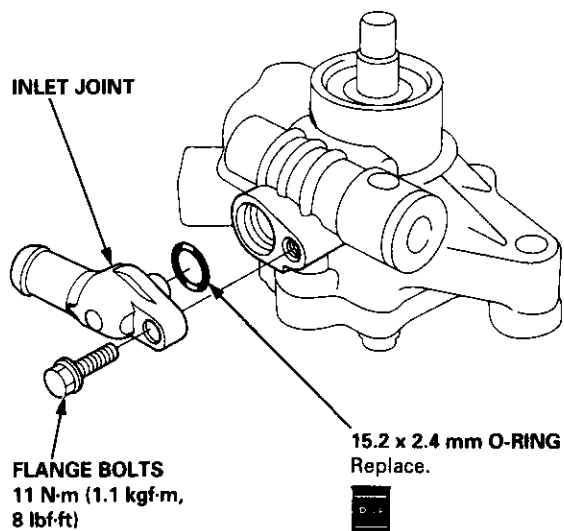


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Power Steering Pump

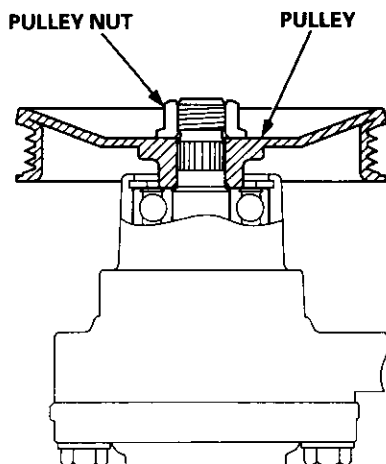
Reassembly (cont'd)

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.

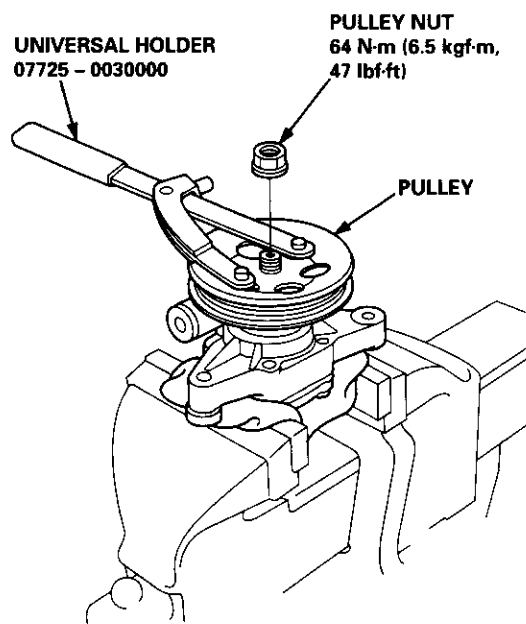


20. Install the pulley as shown below, then loosely install the pulley nut. Hold the steering pump in a vise with soft jaws.

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.



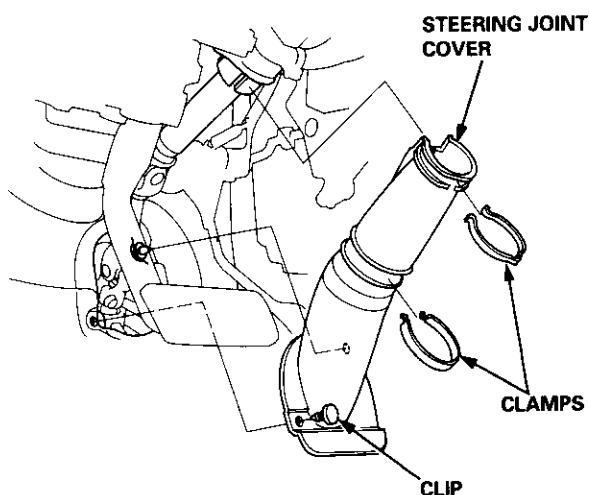
22. Check that the pump turns smoothly by turning the pulley by hand.



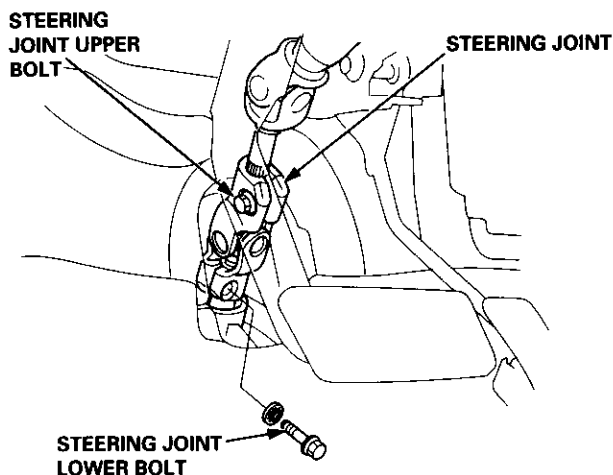
Removal

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.

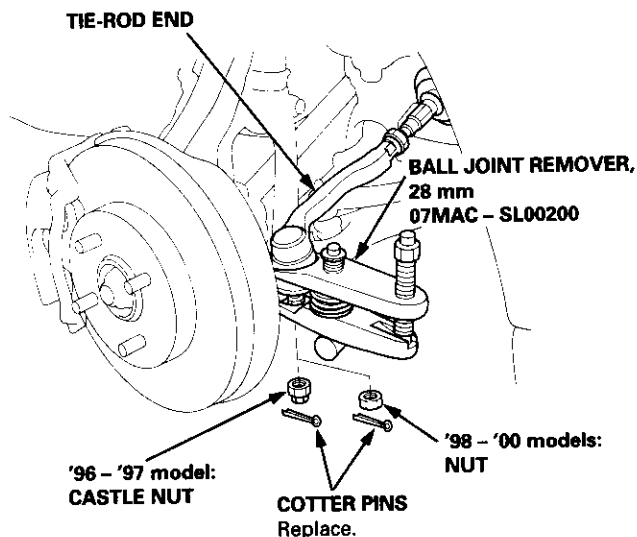
1. Drain the power steering fluid as described on page 17-33.
2. Raise the front of vehicle, and support it on safety stands in the proper locations (see section 1).
3. Remove the front wheels.
4. Remove the driver's airbag assembly, and steering wheel (see page 17-35).
5. Remove the steering joint cover.



6. Remove the steering joint lower bolt, and loosen the steering joint upper bolt. Disconnect the steering joint by moving the joint toward the column.



7. Remove the cotter pin from the castle nut ('96 - '97 models) or nut ('98 - '00 models) 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. Separate the exhaust pipe A or TWC (see section 9).
12. Disconnect the shift linkage (see section 13 or section 14).

(cont'd)

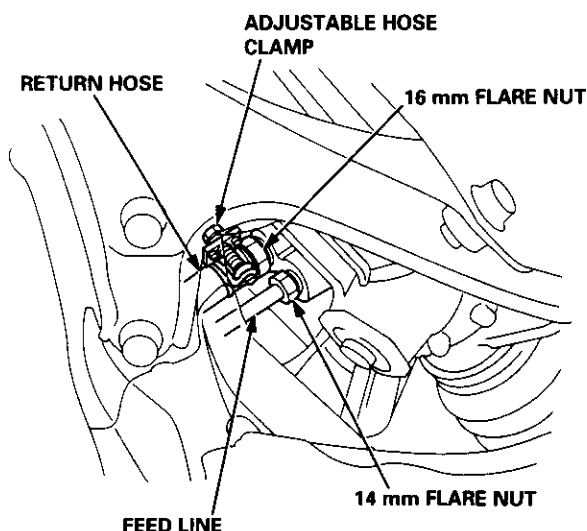
Steering Gearbox

Removal (cont'd)

13. Loosen the 14 mm flare nut and disconnect the feed line.
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.

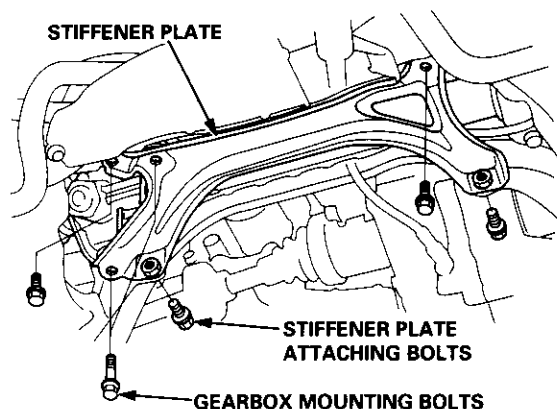
CAUTION: After disconnecting the hose and line, plug or seal the hose and line with a piece of tape or equivalent to prevent foreign materials from entering the valve body unit.

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

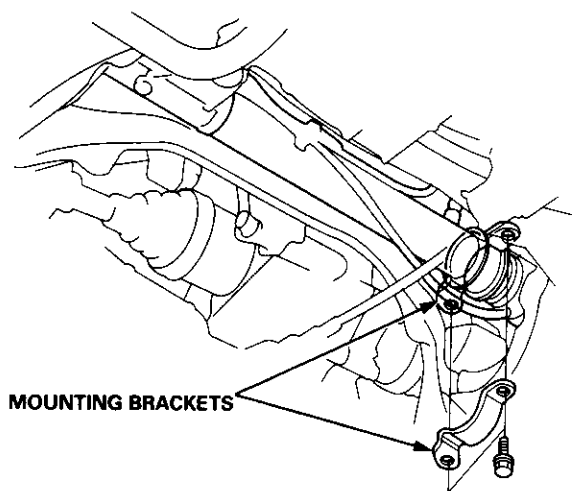


16. Remove the stiffener plate.

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

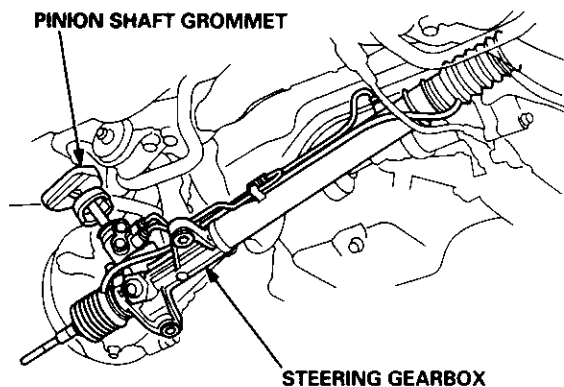


17. Remove the mounting brackets.



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 feed line and cylinder lines when removing the gearbox.





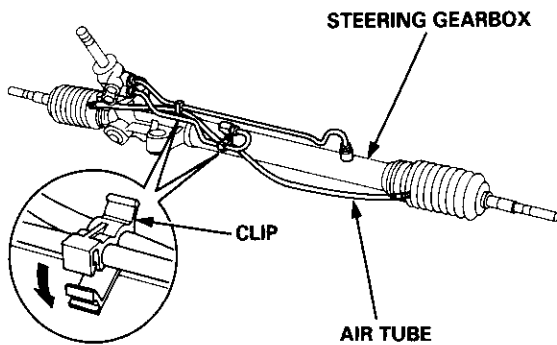
Disassembly

Steering Rack Disassembly

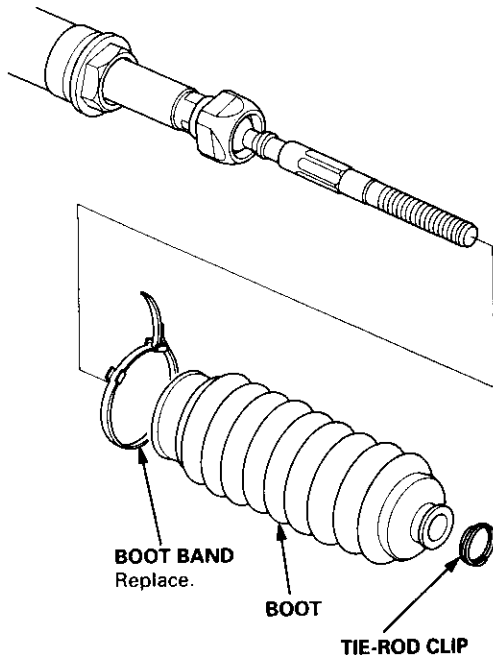
NOTE:

- Before 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 17-47).
2. Remove the tie-rod end and locknut.
3. Remove air tube and clips.



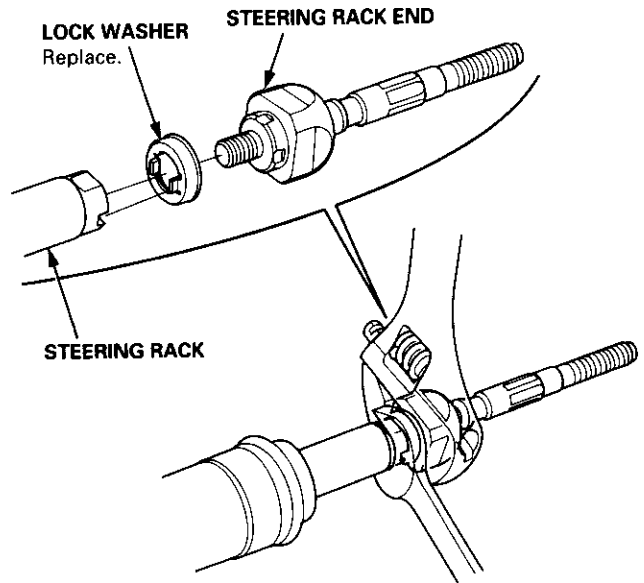
4. Remove the boot bands and tie-rod clips. Pull the boots away from the ends of the gearbox.



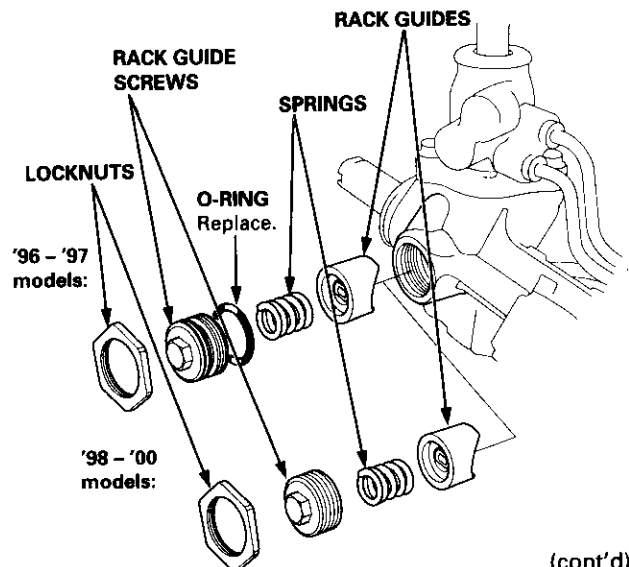
5. Hold the steering rack with a wrench ('98 - '00 models: left end only), and unscrew the rack end with another wrench.

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

NOTE: '96 - '97 models is shown.



6. Loosen the locknut, then remove the rack guide screw and O-ring ('96 - '97 models only).
7. Remove the spring and the rack guide from the gear housing.

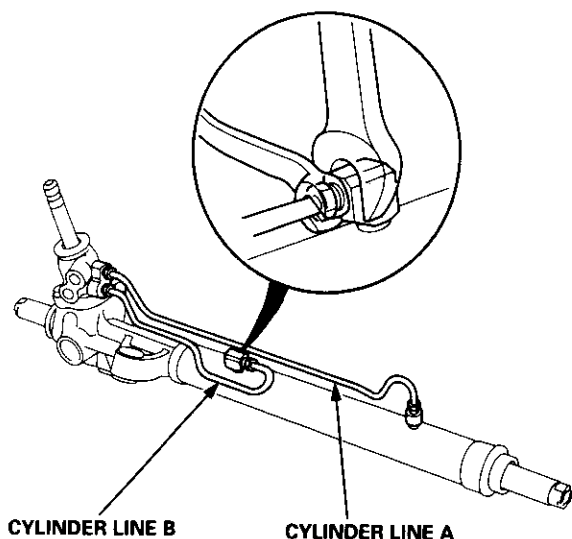


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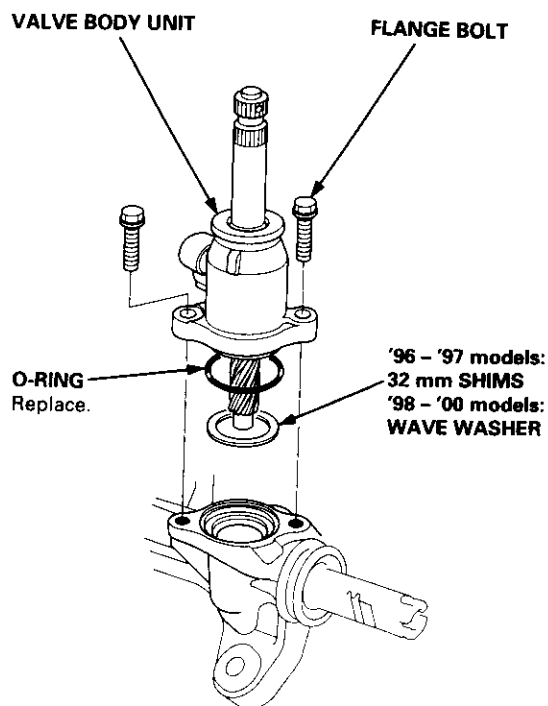
Steering Gearbox

Disassembly (cont'd)

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



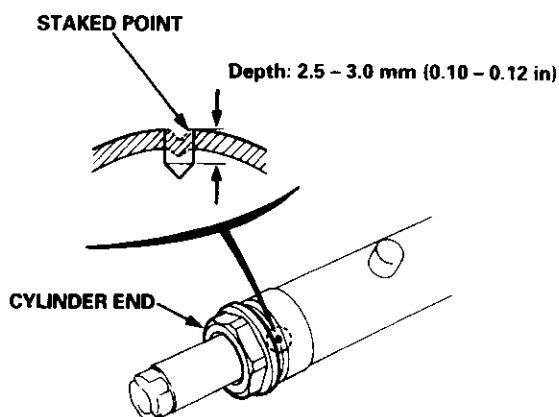
9. Drain the fluid from the cylinder fittings by slowly moving the steering rack back and forth.
10. Remove the two flange bolts, then remove the valve body unit from the gearbox. (See page 17-52 for valve body unit disassembly.)



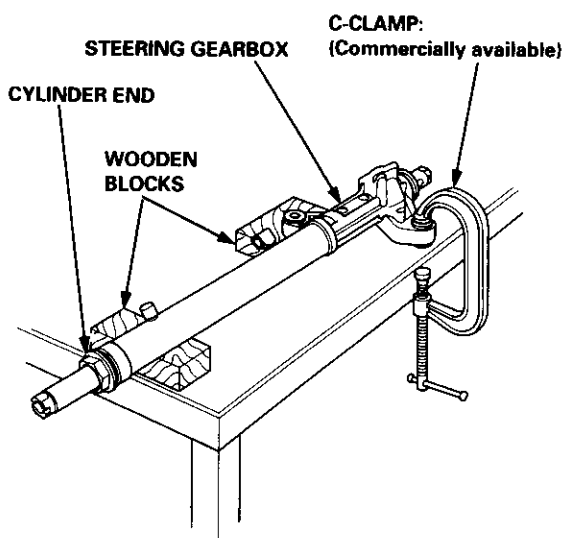
11. Drill a 3 mm (0.12 in) diameter hole approximately 2.5 – 3.0 mm (0.10 – 0.12 in) in depth in the staked point on the cylinder.

CAUTION:

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



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

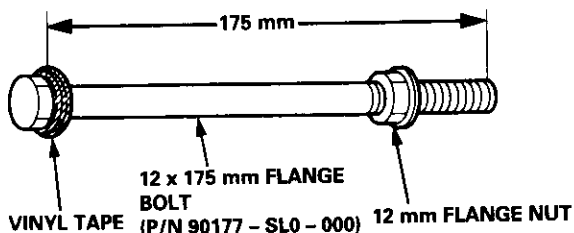


13. Loosen and remove the cylinder end.

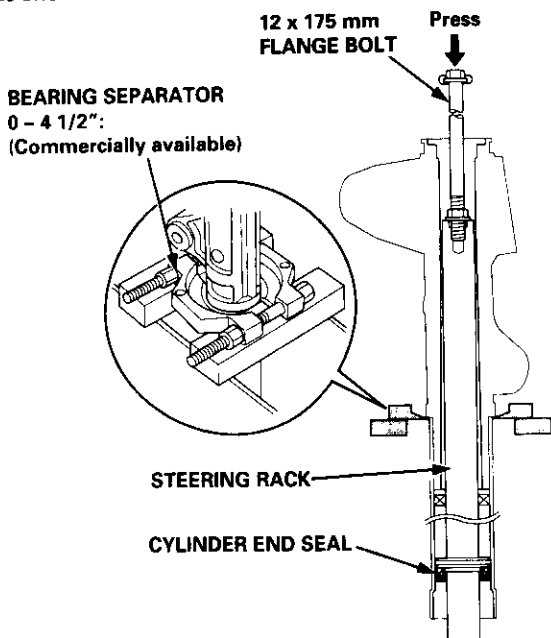


14. Assemble a 12 x 1.25 mm flange nut onto a 12 x 175 mm grade 10 flange bolt as shown.

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.



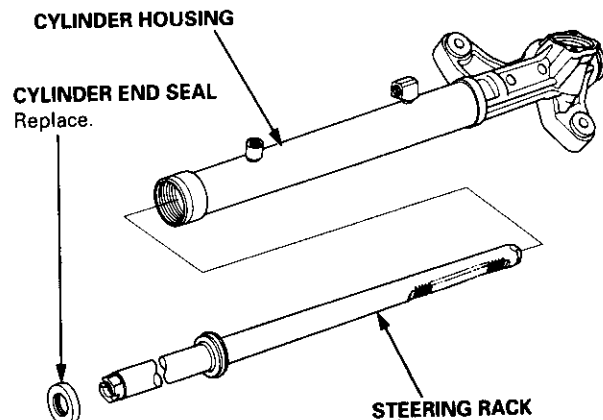
17. Set the gearbox in a press so the gear housing point upward, then press the cylinder end seal and steering rack out of the gearbox.

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

CAUTION:

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

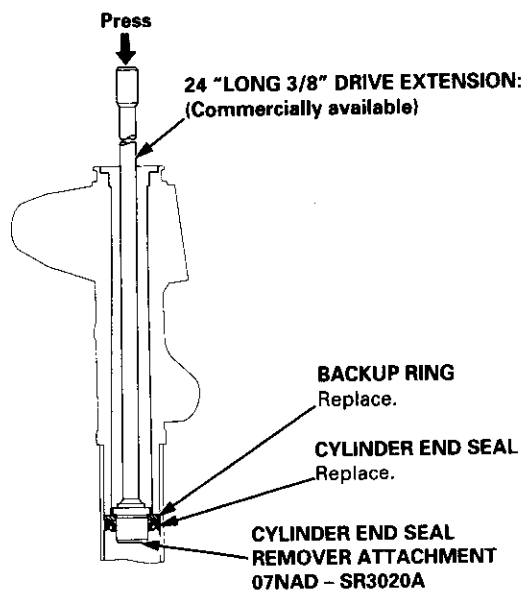
NOTE: Make sure that the special tool is securely positioned on the backup ring edges.

CAUTION: Be careful not damage to inner surface of the cylinder housing with the special tool.

21. Set the gearbox in a press, then press out the cylinder end seal and backup ring from the gearbox.

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.



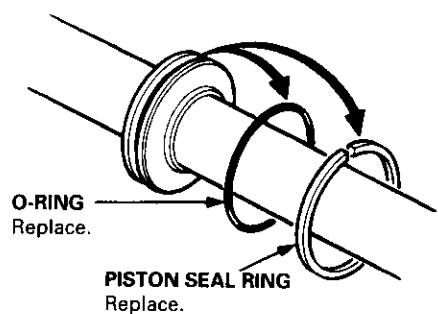
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Steering Gearbox

Disassembly (cont'd)

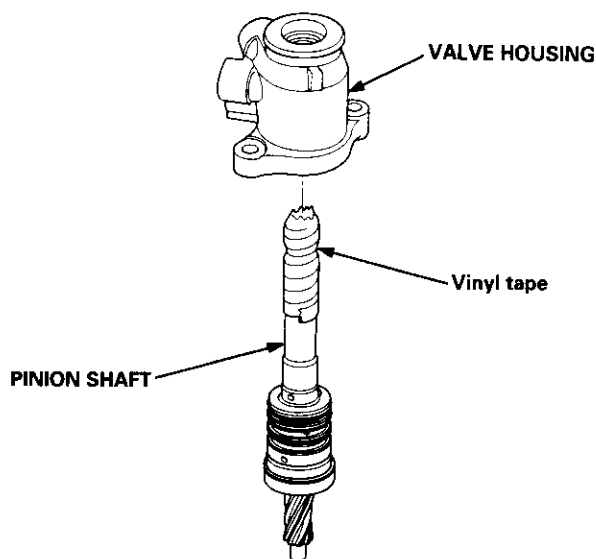
22. Carefully pry the piston seal ring and O-ring off the piston rack.

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.

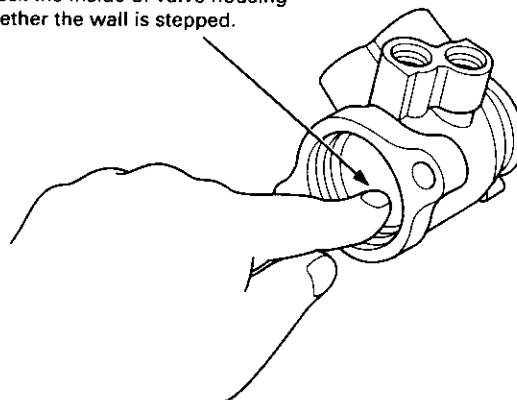


25. Check the inner wall of the valve housing where the seal ring slides with your finger. If there is a step in the wall, the valve housing is worn. Replace the valve housing.

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.

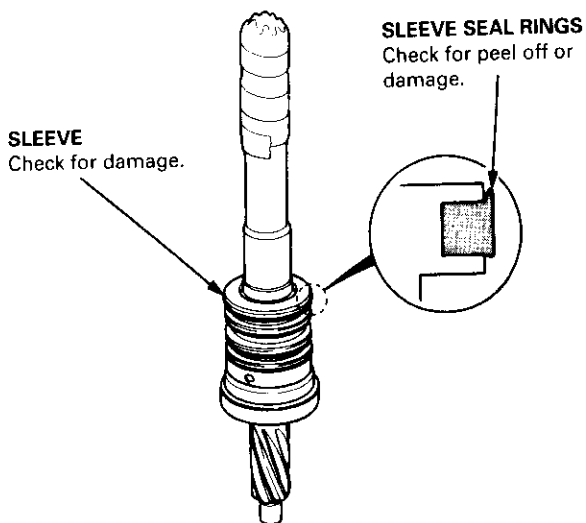
Check the inside of valve housing whether the wall is stepped.



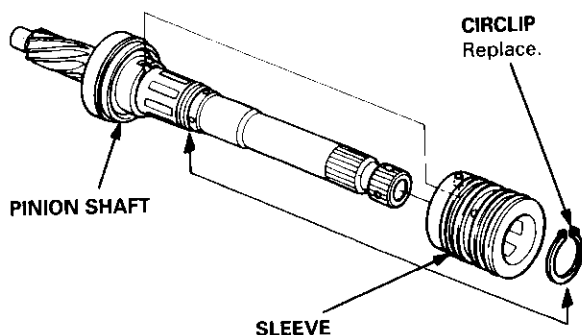


26. Check for wear, burrs and other damage to the edges of the grooves in the sleeve.

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.

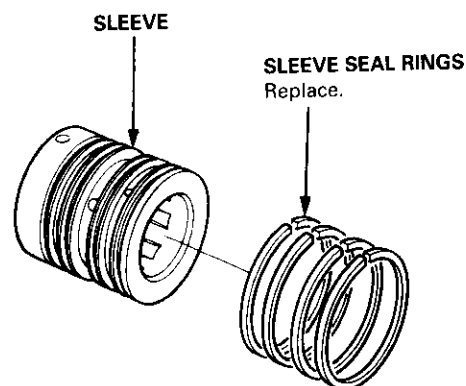


27. Remove the circlip and pinion shaft sleeve from the pinion shaft.



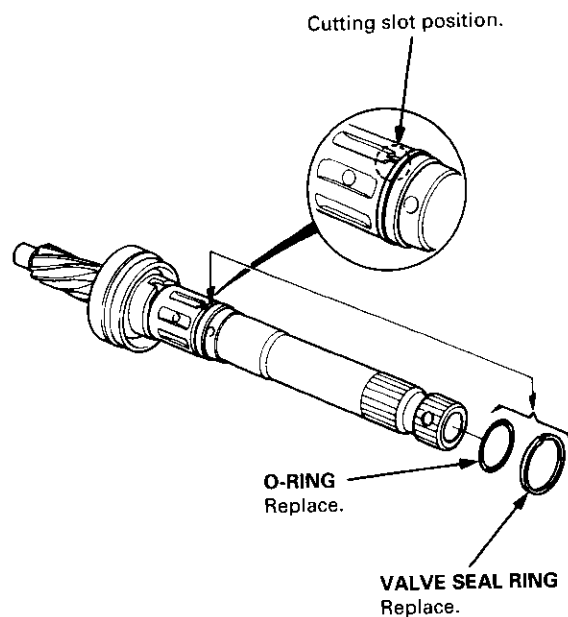
28. Using a cutter or an equivalent tool, cut and remove the four seal rings from the sleeve.

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.



(cont'd)

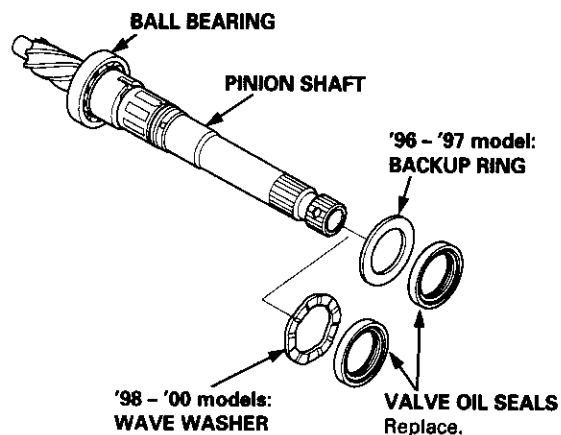
Steering Gearbox

Disassembly (cont'd)

30. Remove the valve oil seal and backup ring ('96 - '97 models) or wave washer ('98 - '00 models) from the pinion shaft.

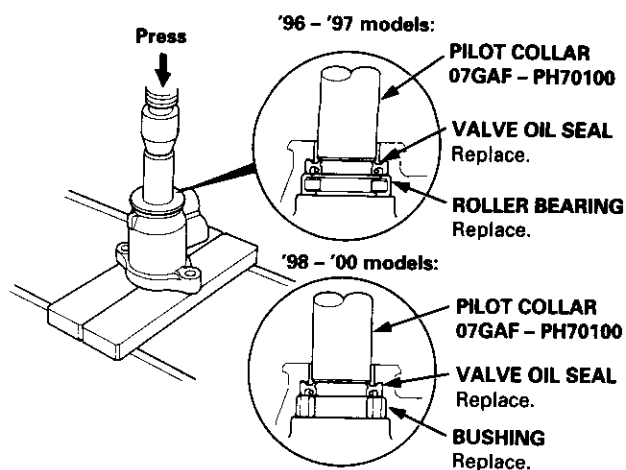
NOTE:

- 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 ('96 - '97 models) or bushing ('98 - '00 models) out of the valve housing using a hydraulic press and special tool shown below.

NOTE: Do not use a hammer; it will damage the special tool.

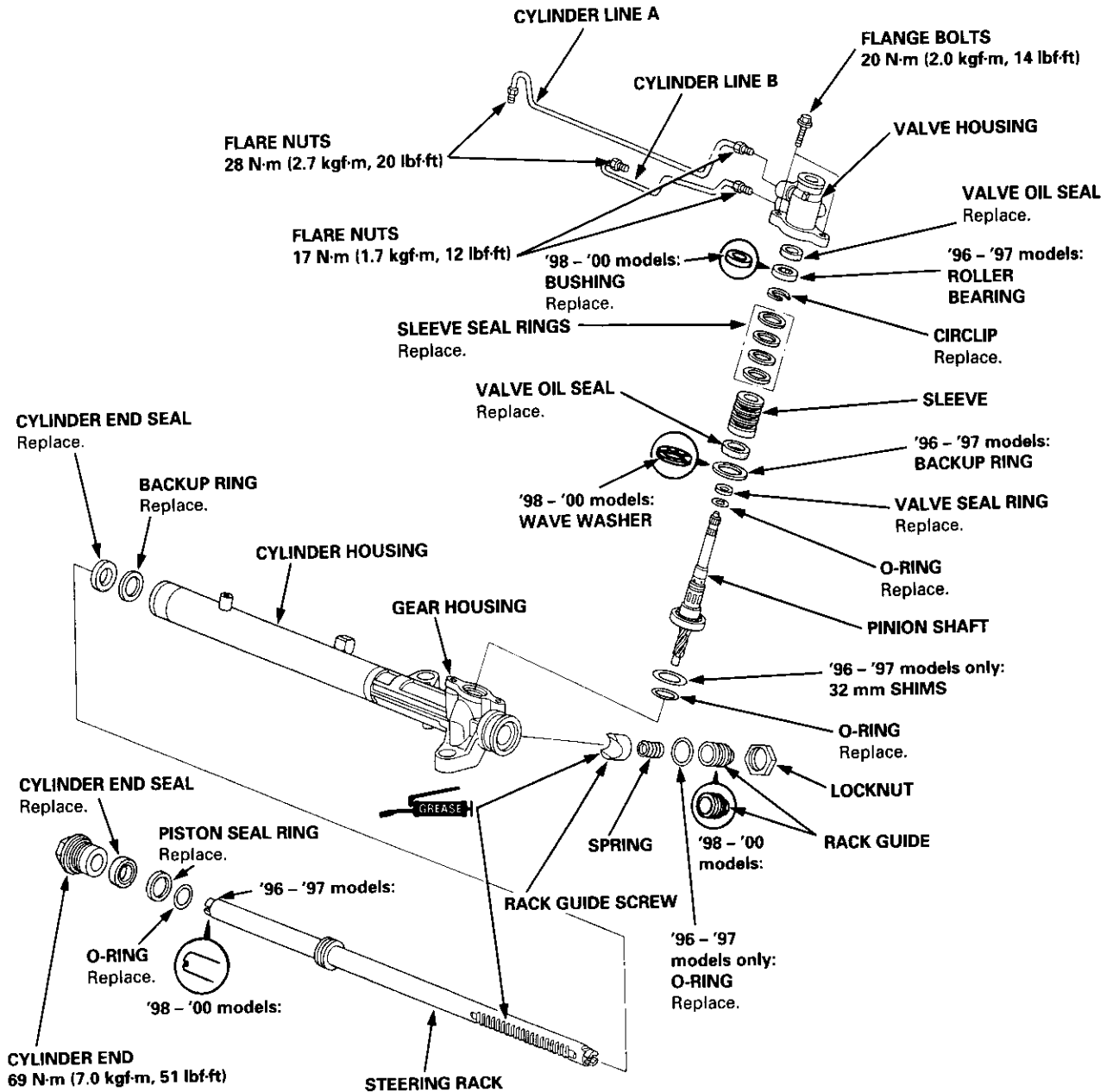




Reassembly

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.



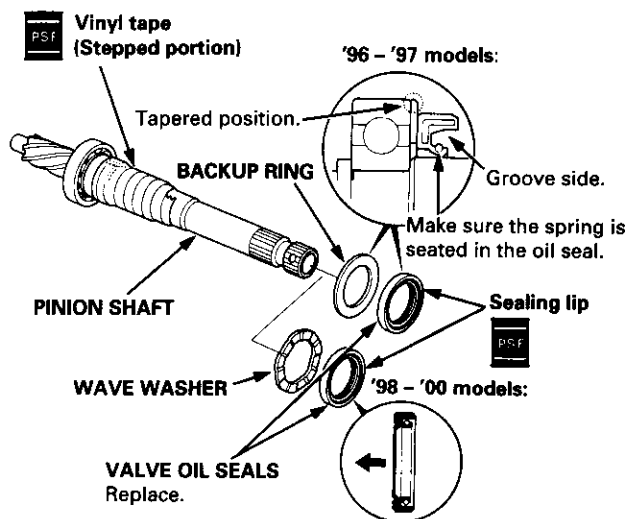
(cont'd)

Steering Gearbox

Reassembly (cont'd)

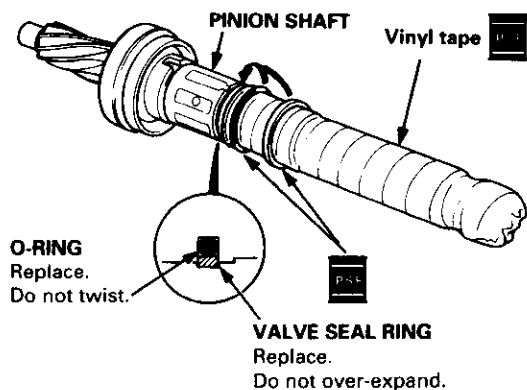
Valve Body Unit Reassembly

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 ('96 - '97 models) or wave washer ('98 - '00 models) with its tapered side as shown below.
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.

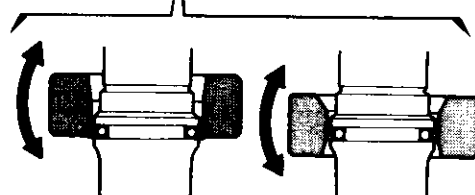
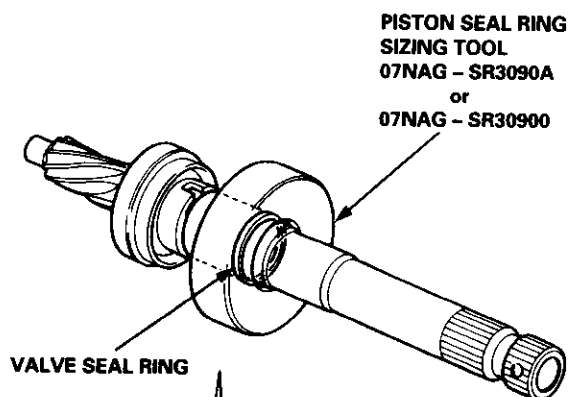


CAUTION: Install the valve oil seal with its grooved side facing opposite the bearing.

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.



Use the larger diameter end of the special tool first to make the valve seal ring fit in the pinion shaft.

Make the valve seal ring fit snugly in the pinion shaft using the other end (smaller diameter end) of the special tool.



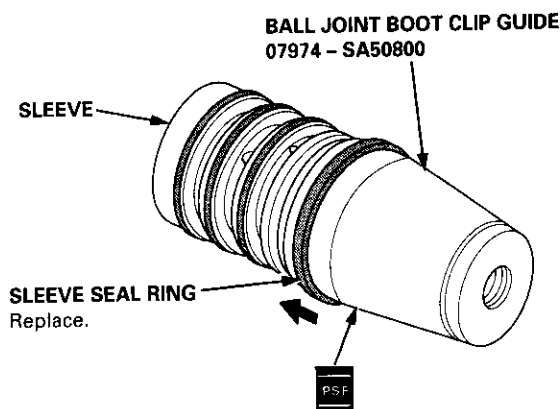
13. Apply power steering fluid to the surface of the special tool. Set the new seal rings over the special tool from the smaller diameter end of the tool, and expand the seal rings. Do two rings at a time from each end of the sleeve.

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.

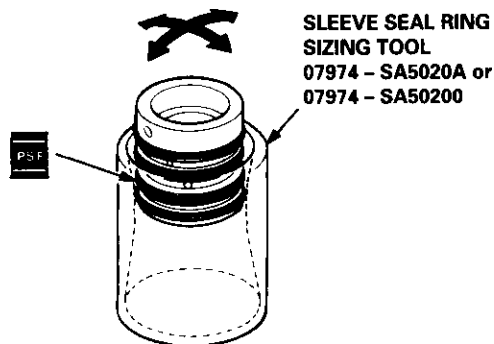
14. Set the special tool in the grooves in the sleeve, and set each ring in each groove securely.

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.

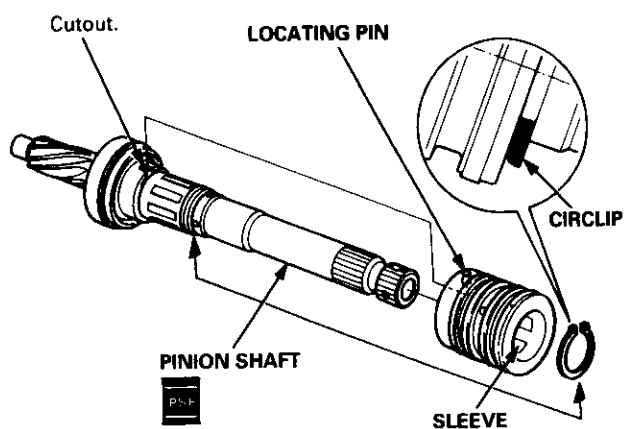
NOTE: Be sure that the seal rings are not turned up.



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.

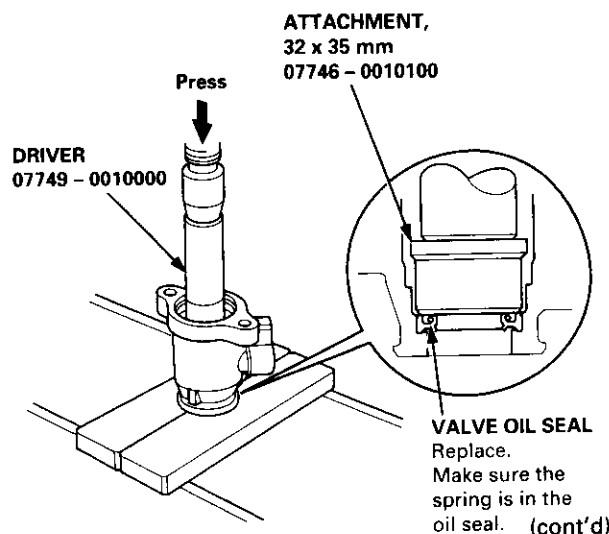
NOTE:

- 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.

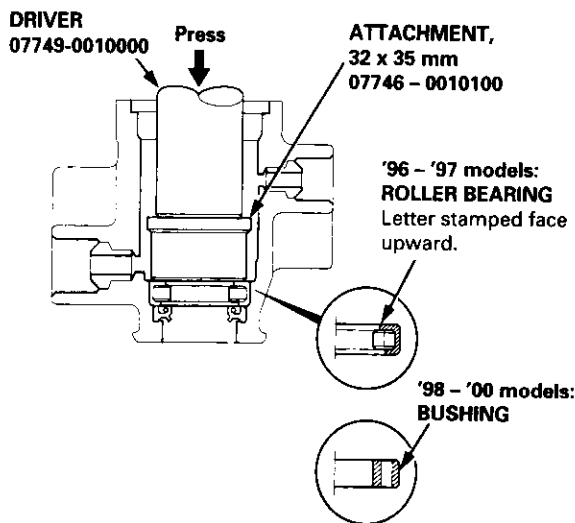


Steering Gearbox

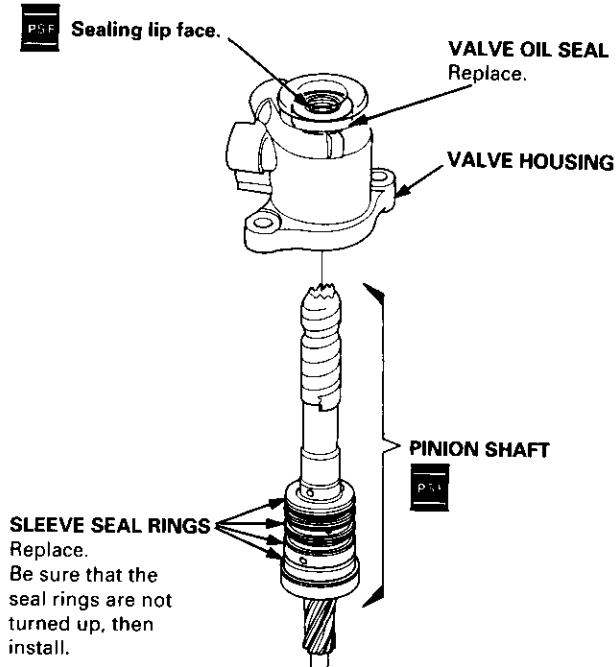
Reassembly (cont'd)

20. Press the new bearing ('96 - '97 models) or new bushing ('98 - '00 models) into the valve housing using a hydraulic press and special tool as shown.

NOTE: Place the roller bearing ('96 - '97 models) 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.



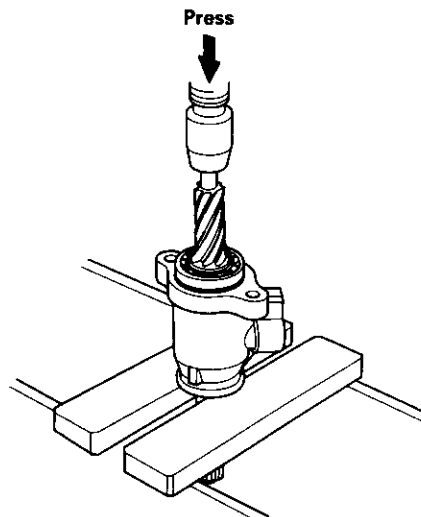
22. Insert the pinion shaft into the valve housing.

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.





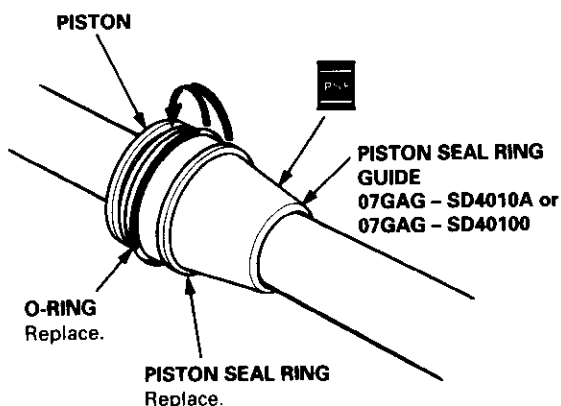
Steering Rack Reassembly

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.

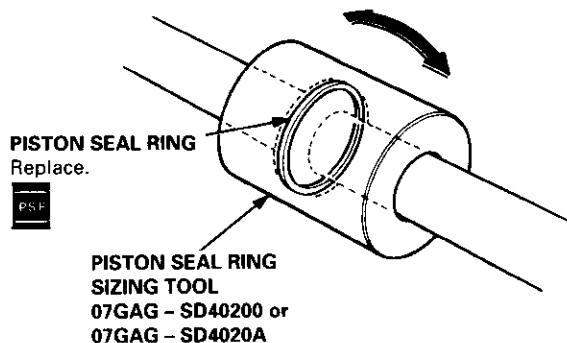
NOTE:

- 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.

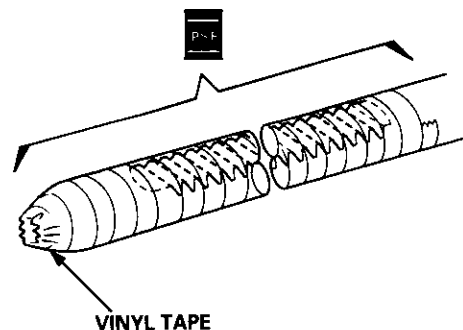


28. Coat the piston seal ring and the inside of the special tool with power steering fluid.
29. Carefully slide the tool onto the rack and over the piston seal ring.
30. Move the special tool back and forth several times to make the piston seal ring fit snugly in the piston.



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

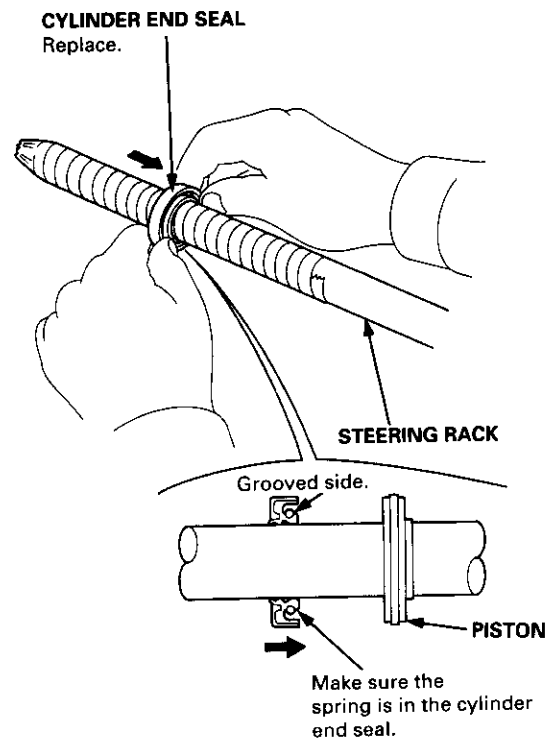
NOTE: Make sure that the vinyl tape is wrapped carefully so that there is no stepped portion.



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.



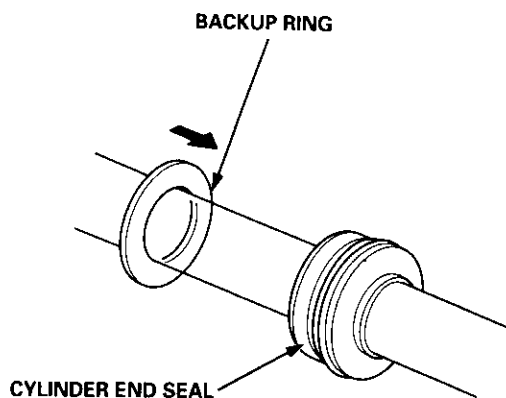
34. Remove the vinyl tape from the steering rack.
- NOTE: Remove any residue of tape adhesive.

(cont'd)

Steering Gearbox

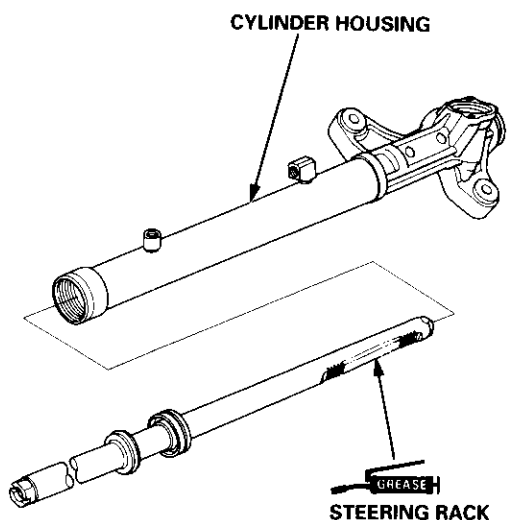
Reassembly (cont'd)

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



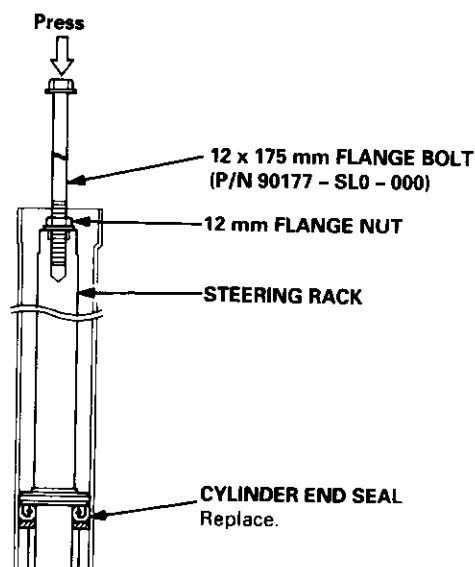
36. Grease the steering rack teeth, then insert the steering rack into the gear housing.

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



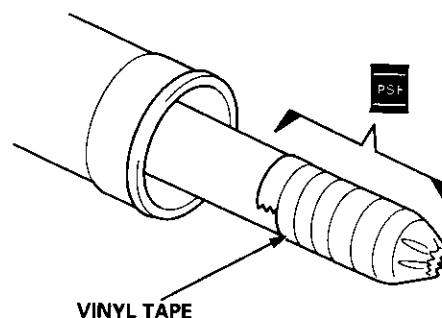
37. Install the flange bolt into the end of the steering rack until it bottoms in the hole, then back the flange bolt out 1/4 turn. Hold the flange bolt and tighten the flange nut against the rack by hand.
38. Install the cylinder end seal into the bottom of the cylinder by pressing on the bolt with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

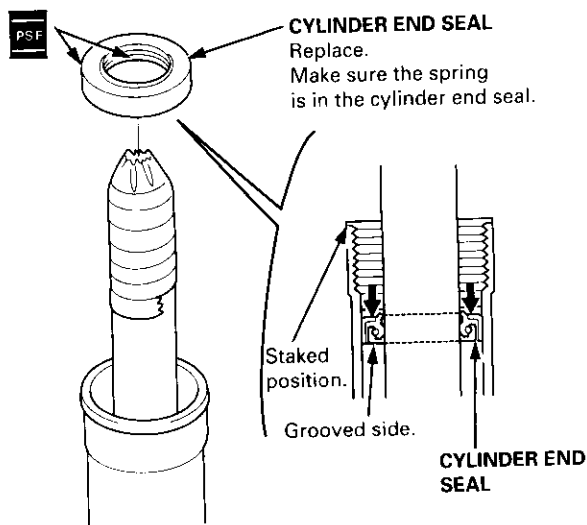
NOTE: Make sure that the vinyl tape is wrapped carefully so that there is no stepped portion.





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.

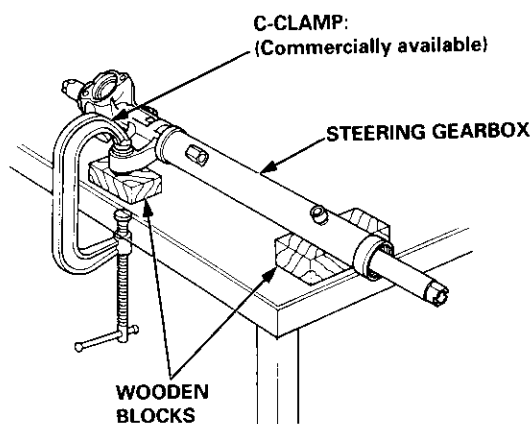
CAUTION: When installing the cylinder end seal, be careful not damage the sealing face of the seal with the threads and burrs at the staked position of the cylinder housing.



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.

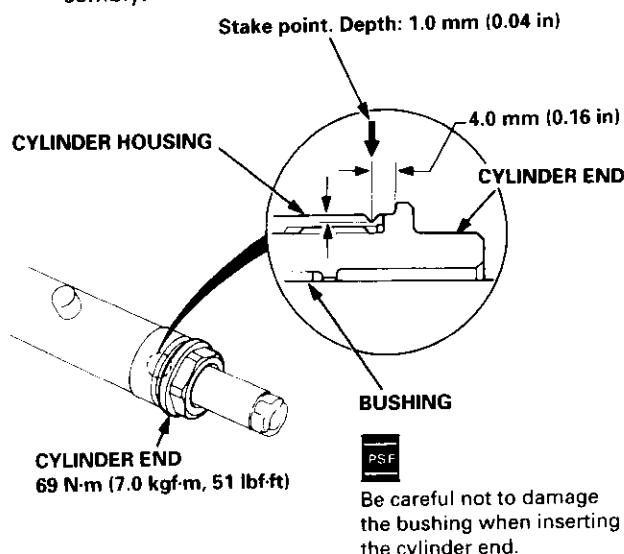


46. Coat the inside surface of the cylinder end with power steering fluid, then install the cylinder end by screwing it into the cylinder housing.

47. Remove the C-clamp from the steering gearbox.

48. After tightening the cylinder end, stake the point of the cylinder housing shown below. For '98 - '00 models go to step 51.

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



49. Select the 32 mm shim(s) ('96 - '97 model only).

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)

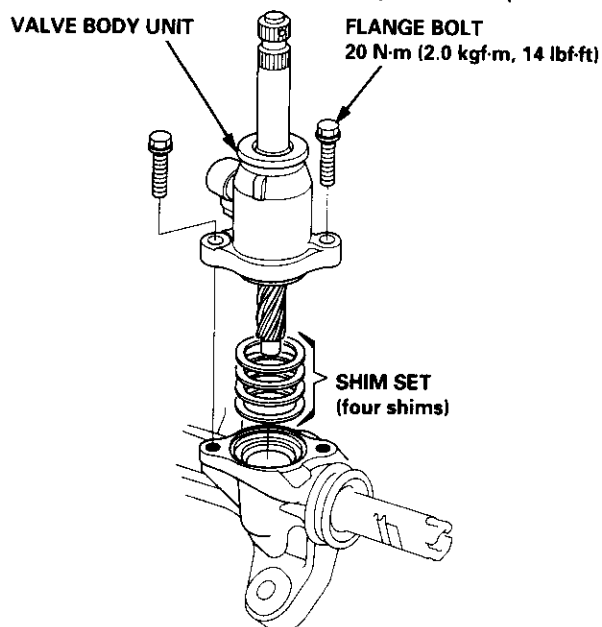
CAUTION: The four 32 mm shims do not have thickness identification marks. Measure the thickness of each shim using a micrometer, and mark the shim for identification.

(cont'd)

Steering Gearbox

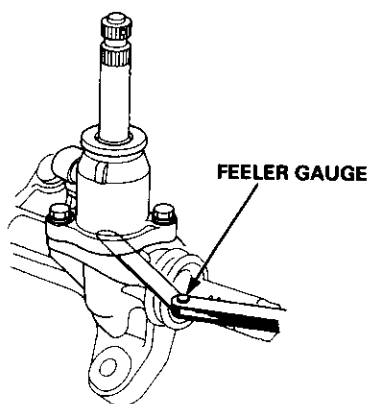
Reassembly (cont'd)

- 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:

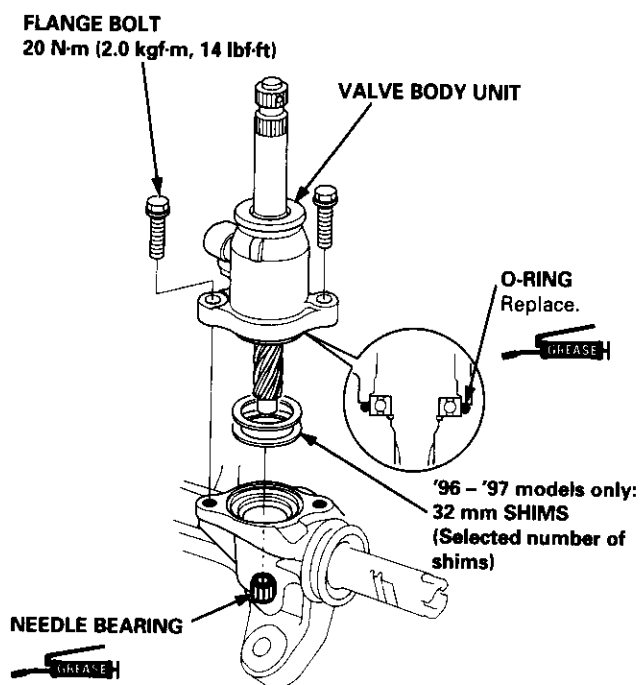
Measurement is 0.28 mm (0.011 in):

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

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 ('96 - '97 models only) 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).

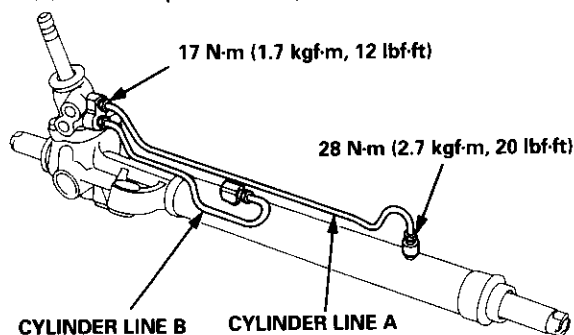
54. Tighten the flange bolts to the specified torque.



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 gear housing.

57. '96 - '97 models:

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

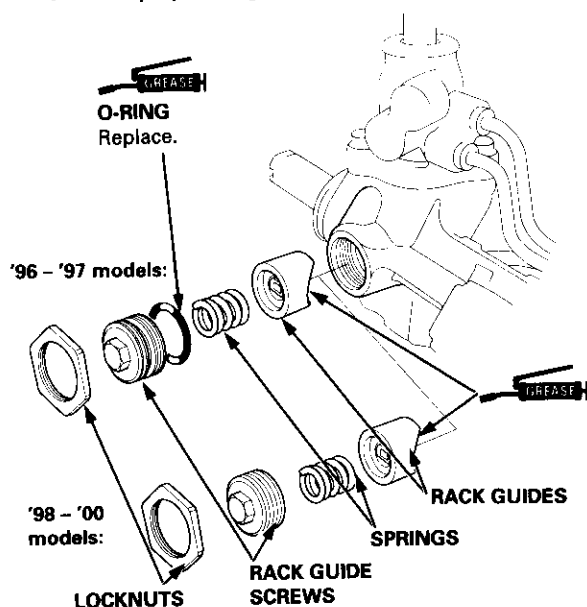
'98 - '00 models:

Remove the old sealant off of the threaded section, then apply new sealant all around the threads.

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

59. Adjust the rack guide screw (see page 17-33).

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



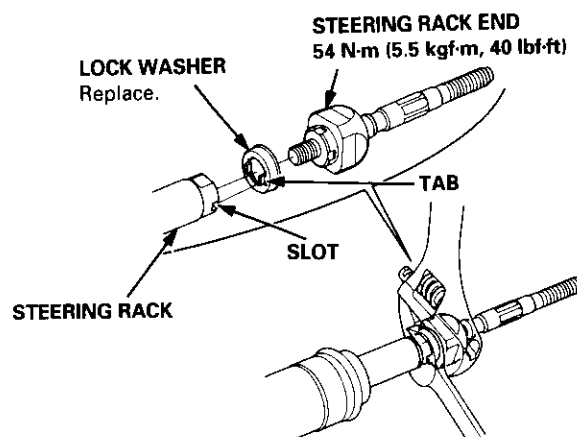
60. Install the new lockwasher in the groove in the steering rack.

61. Screw each rack ends into the rack.

62. Hold the steering rack with a wrench ('98 - '00 models: left end only), and tighten the rack ends.

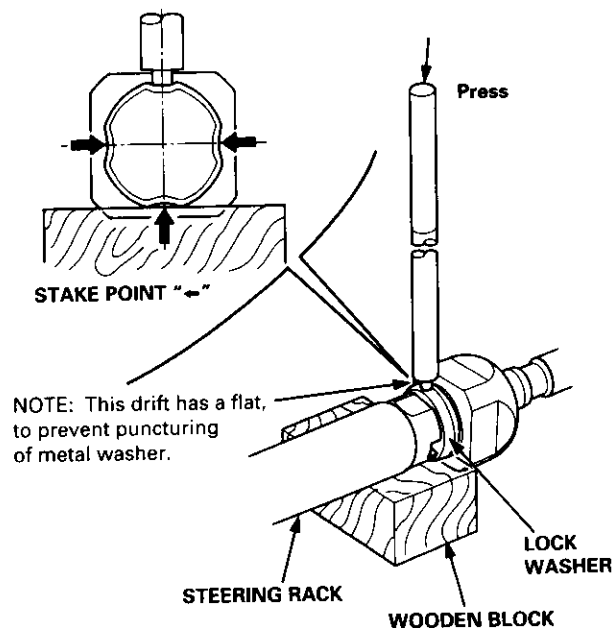
CAUTION: Be careful not to damage the rack surface with the wrench.

NOTE: '96 - '97 model is shown.



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.



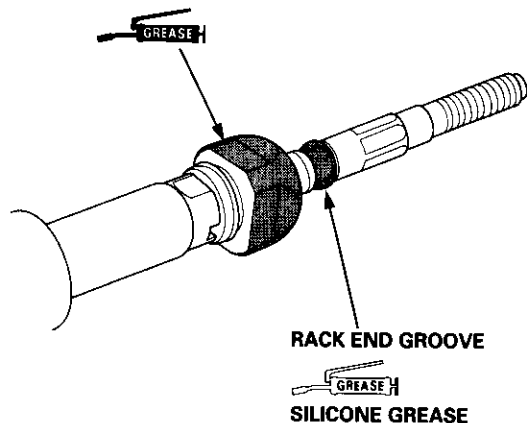
NOTE: This drift has a flat, to prevent puncturing of metal washer.

(cont'd)

Steering Gearbox

Reassembly (cont'd)

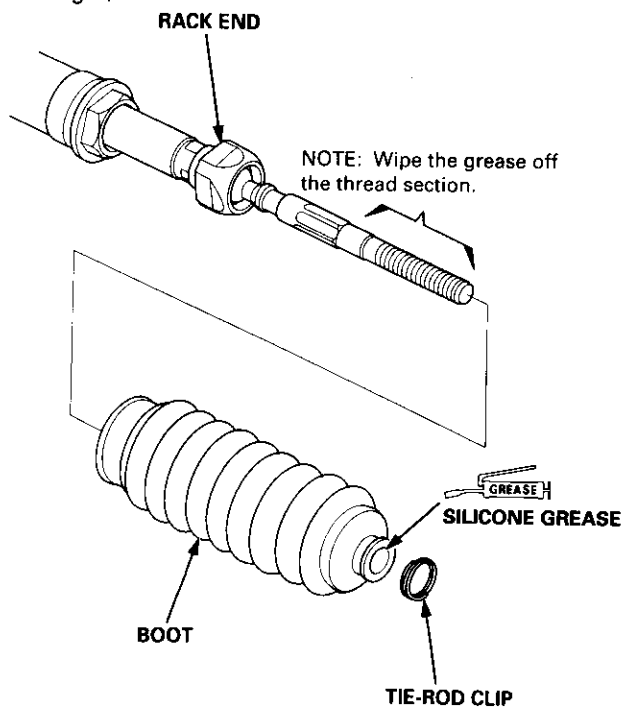
64. Apply grease to the circumference of the rack end housing.



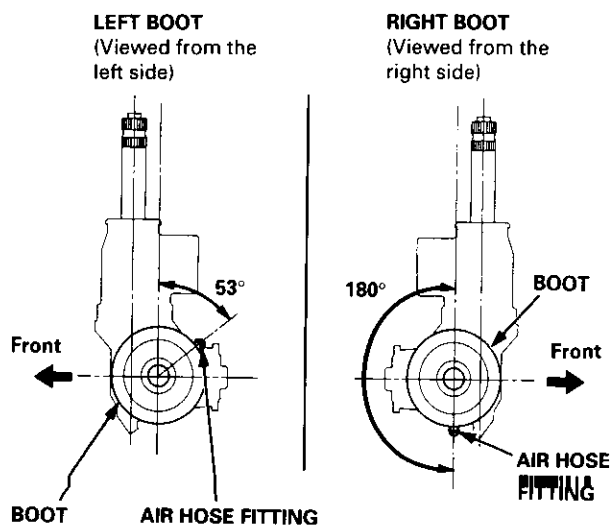
65. Apply a light coat of silicone grease to the boot grooves on the rack ends.

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).

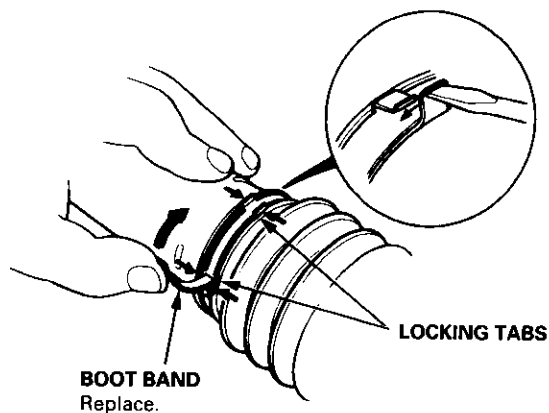


67. Adjust the air hose fitting position of the boots by turning it as shown below.



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

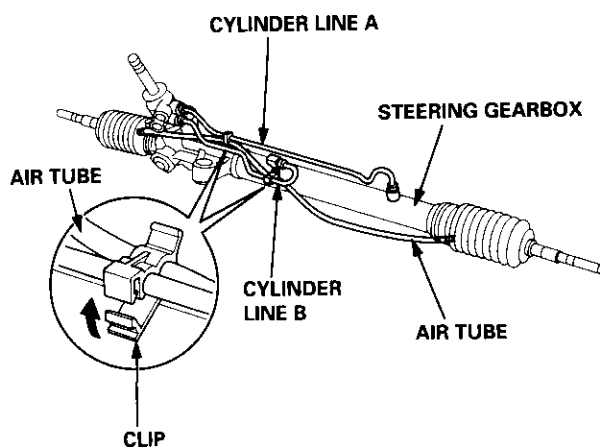
CAUTION: Stake the band locking tabs firmly.



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.



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.

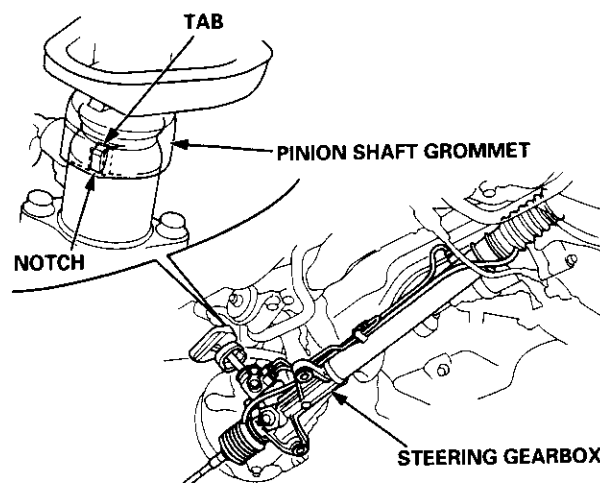


Installation

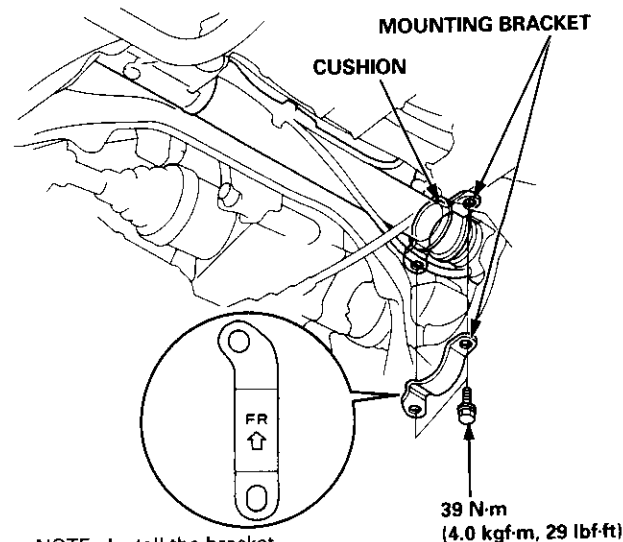
CAUTION: Be careful not to bend or damage the feed line and cylinder lines when installing the gearbox.

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.

(cont'd)

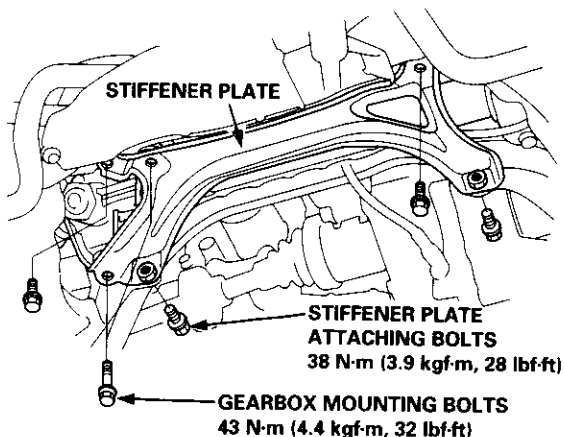
Steering Gearbox

Installation (cont'd)

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

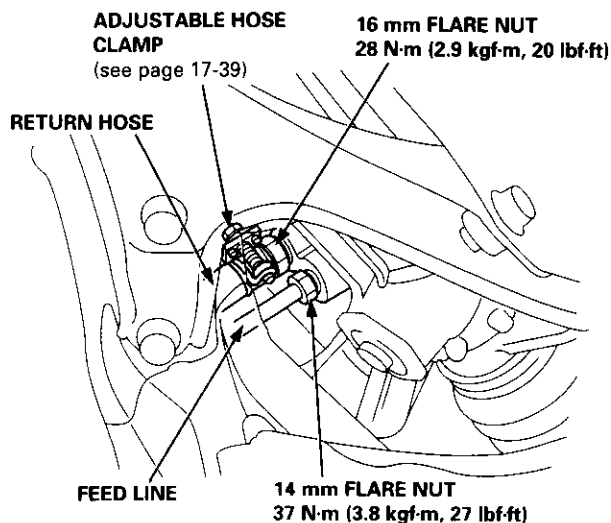
CAUTION: Be sure the air tube is not caught or pinched by stiffener plate.

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 feed line 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.

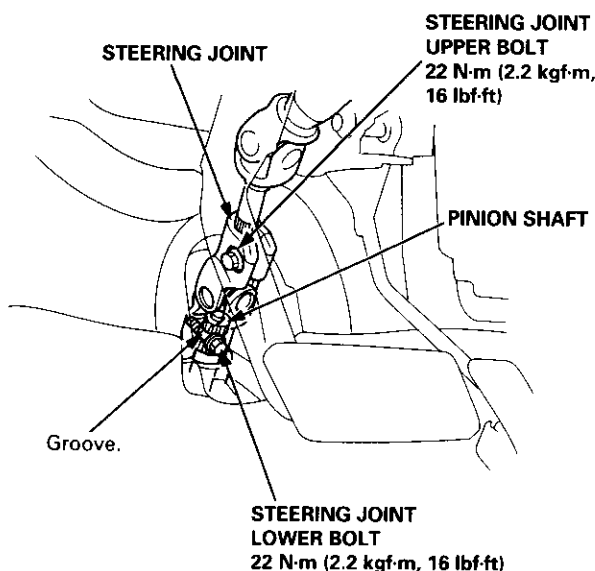


9. Center the steering rack within its stroke.

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 upper and lower steering joint bolt.

NOTE:

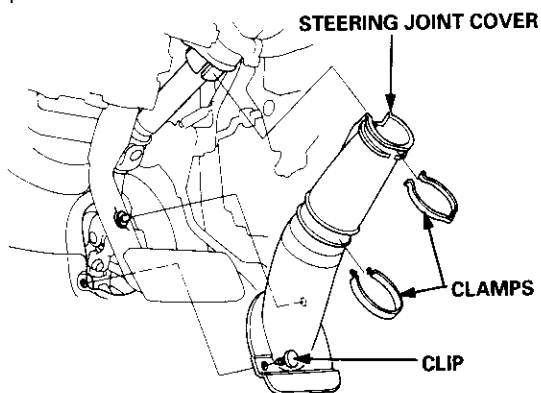
- Connect the steering shaft and pinion with the cable reel and steering rack centered.
- Be sure that the lower steering joint bolt is securely in the groove in the steering gearbox pinion.
- If the steering wheel and rack are not centered, reposition the serrations at lower end of the steering joint.



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 17-35).



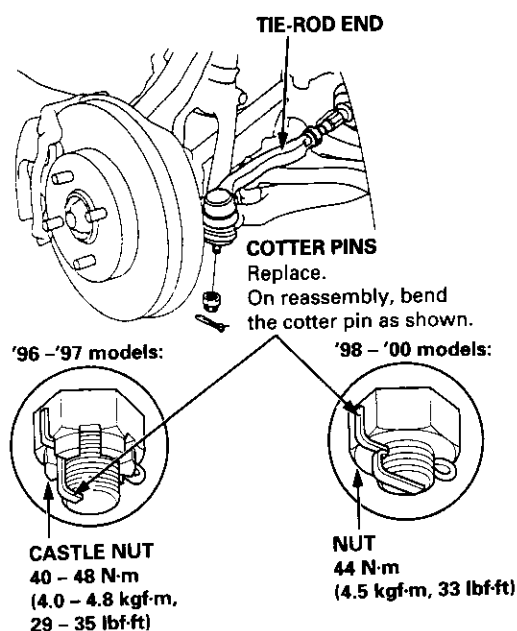
12. Install the steering joint cover with the clamps and a clip.



13. Reconnect the tie-rod ends to the steering knuckles, tighten the castle nut ('96 - '97 models) or nut ('98 - '00 models) 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 ('96 - '97 models only).



14. Install the exhaust pipe A or TWC (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 17-33).
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 17-39).
 - 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

'96 - '97 models:

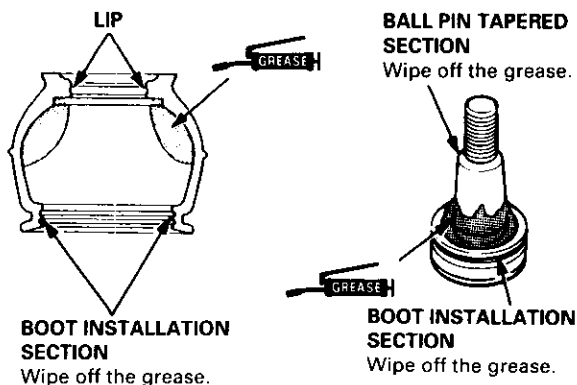
1. Remove the boot set ring and the boot.

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

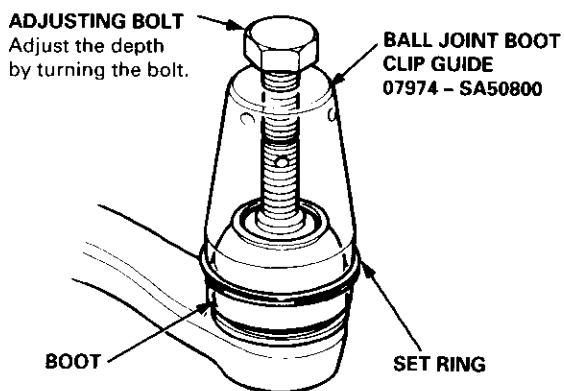
2. Pack the interior of the boot and lip with grease.
3. Wipe the grease off the sliding surface of the ball pin, then pack the lower area with fresh grease.

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.

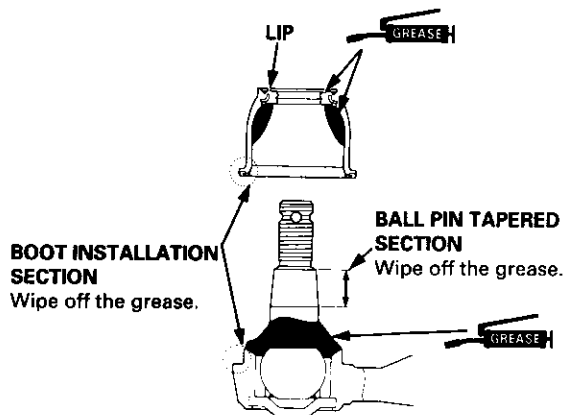
'98 - '00 models:

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

1. Remove the boot from the tie-rod end, and wipe the old grease off the ball pin.
2. Pack the lower area of the ball pin with fresh grease.
3. Pack the interior of the new boot and lip with fresh grease.

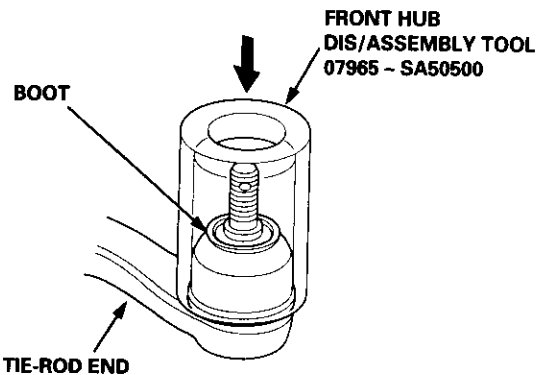
CAUTION:

- 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 new boot using the special tool as shown below.

NOTE: The boot must not be a gap at the boot installation sections.



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