

Chapter 12

Steering

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Airbag Warning



Always disable the airbag system when working on steering components. Disabling the airbag system is simply a matter of disconnecting the negative battery terminal and waiting 90 seconds.

Use extreme caution when working around the airbag system. When carrying a live airbag assembly, always carry it with the trim cover facing away from you.

When storing the assembly on a bench, always store it with the trim cover facing up and avoid placing anything near or on the assembly.

Specifications

STEERING GEAR

Make	Toyota
Type	Power assisted rack and pinion
Steering turning effort	8 Nm
Steering wheel turns, lock to lock	3.5
Maximum steering wheel freeplay	30 mm
Rack lubricant type:	
Teeth and bushes	Molybdenum disulphide lithium based grease
Seals	Power steering fluid

STEERING PUMP

Type	Constant displacement vane
Fluid type	Dexron II or III
Maximum pump rotating torque	3 Nm
Minimum oil pressure	8 335 kPa

TORQUE WRENCH SETTINGS

Airbag retaining bolts	9 Nm
Coupling clamp bolts	35 Nm
Floor plate to firewall bolts	8 Nm
Horn pad and airbag assembly retaining screws	9 Nm
Inner tie rod to steering gear	103 Nm
Intermediate shaft steering column clamp bolt	35 Nm
Pivot bolt	43 Nm
Pressure line to pump	47 Nm
Pressure line to steering gear	44 Nm
Pump adjuster locknut	43 Nm
Pump bracket bolts	43 Nm
Pump housing bolts	24 Nm
Pump pulley nut	43 Nm
Return line to steering gear	44 Nm
Steering column retaining nuts	26 Nm
Steering gear mounting and clamp nut and bolts	165 Nm
Steering gear long mounting nut and bolt	190 Nm
Steering wheel retaining nut	35 Nm
Tie rod end lock nut	55 Nm
Tie rod end stud nut	90 Nm
Pressure port union to pump housing	83 Nm

Description

The rack and pinion steering gear has an integral power cylinder which consists of a piston mounted on the rack and operating in a cylinder which is incorporated in the rack housing.

Hydraulic pressure is supplied by a pump which is operated by the drive belt. The fluid reservoir is mounted on the pump body. Power steering fluid is directed from the pump through the power steering gear assembly and then returns to the power steering pump reservoir.

The hydraulic pressure is directed to the appropriate side of the steering gear piston using the flex of the inbuilt pinion torsion bar to operate a rotary valve which controls the oil flow.

No lubrication of the steering gear or the steering pump is required in service and in the event of a loss of power assistance, the steering will continue to operate, but will require substantially increased effort. However, as the steering gear and the pump are lubricated by the power steering fluid, the cause of the loss of power assistance or the fluid loss must be determined and promptly repaired to prevent damage to the steering pump and to a lesser extent, the steering gear.

Tie rods are connected to each end of the rack by ball housings. Sealed ball joint tie rod ends connect the tie rods to the steering arms.

The steering gear assembly is protected against the entry of dust and water by a seal on the top of the pinion housing and by

corrugated rubber boots attached to the tie rods and the ends of the steering gear housing.

The energy absorbing steering column is designed to compress in the event of a severe front end collision. The energy absorbing component is the steering shaft. Steering components should be handled with care when removing or installing the steering column assembly.

On models with an airbag, a clock spring is used to connect wiring from the steering column to the steering wheel mounted switches and airbag. The clock spring contains a ribbon wire that can be damaged if it is rotated past the steering lock to lock position.

On models without an airbag the steering wheel mounted switches are connected to stationary wiring via a slip ring assembly.



Disable the airbag system by disconnecting the negative battery terminal and waiting 90 seconds before carrying out repairs on the steering system.

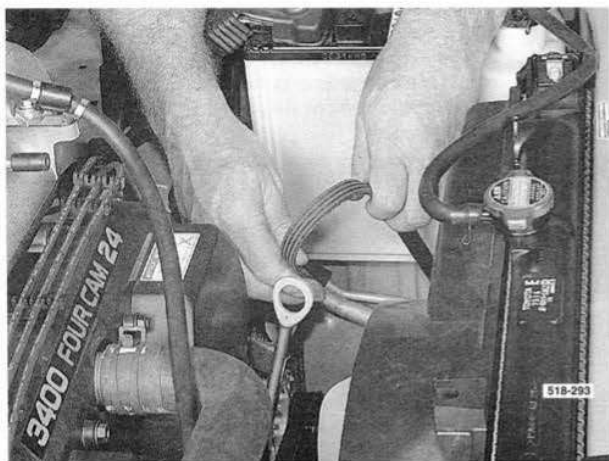
Always place the front wheels in the straight ahead position, remove the key from the ignition and engage the steering lock before separating the steering column shaft or the intermediate shaft with the clock spring installed. Damage to the clock spring will result if the steering column is rotated past the normal lock to lock positions resulting in failure of the horn, airbag and where fitted, cruise control systems.

Routine Maintenance

DRIVE BELT

The power steering pump is driven by the power steering belt which is tensioned by a tensioner pulley.

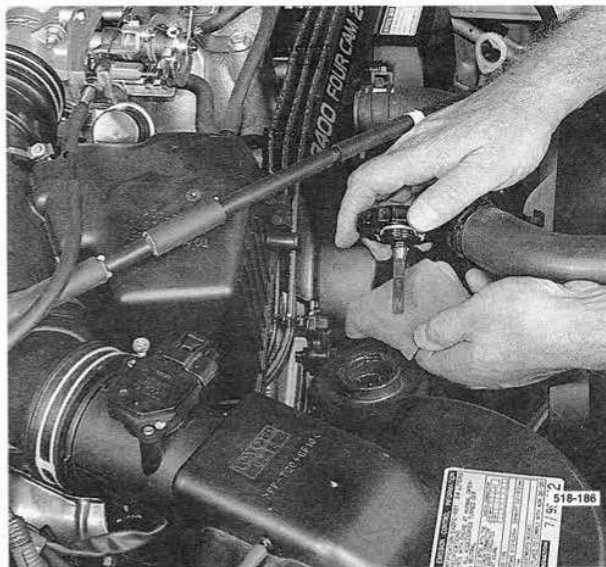
Inspect the power steering belt for breakage, glazing, wear and correct tension as described in Engine (chapter 4).



Check the power steering belt for cracking, glazing or deterioration.

POWER STEERING FLUID

Check the fluid level in the power steering reservoir when the fluid is at normal operating temperature. With the engine idling, turn the steering wheel from lock to lock several times and stop



Checking the power steering fluid level.

the engine. Check the level using the Hot scale on the dipstick which is incorporated in the reservoir cap.

If the level is read with the engine idling, the level may be up to 5 mm lower.

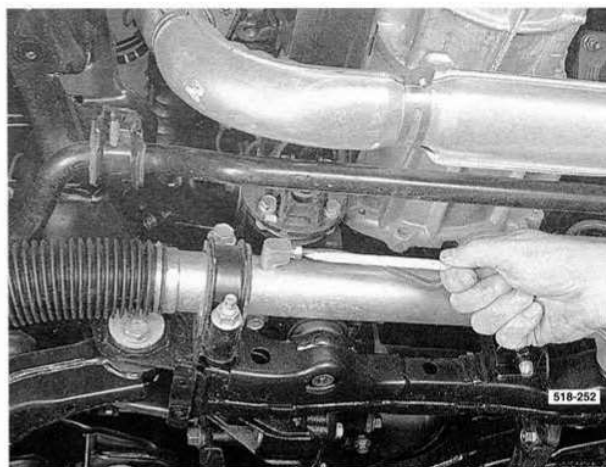
TO CHECK FOR FLUID LEAKS

Using a suitable solvent, clean around all power steering components and hoses or pipe fittings where fluid leakage might occur and then start the engine. Turn the steering wheel from one steering lock to the other several times and stop the engine. Check for leakage. Where leakage is found at any of the pipe or hose fittings, tighten and recheck. Renew the O rings in the fittings if necessary.



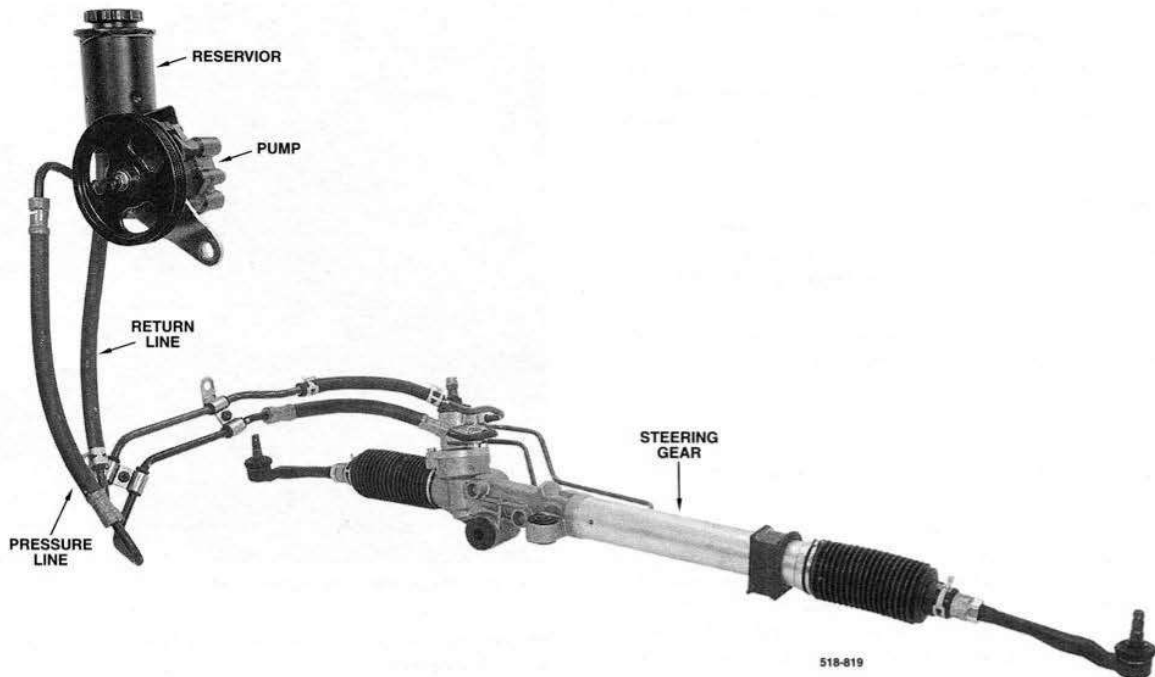
Do not hold the steering against the lock stops for more than five seconds.

If necessary, add fluid until the level reaches the Full mark on the dipstick. Do not overfill the reservoir.



Check for fluid leaks at the power steering hydraulic lines.

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**Power steering components.**

Due to the cost of special tools necessary to repair items such as power steering pump or steering gear, it is recommended that the services of an authorised dealer or a steering specialist be engaged, or that exchange units be installed should these units be leaking.

HYDRAULIC LINES AND HOSES

Check the hydraulic lines and hoses for signs of deterioration, especially chafing. Ensure that the fittings at the pump and steering gear are secure and all retaining brackets installed.

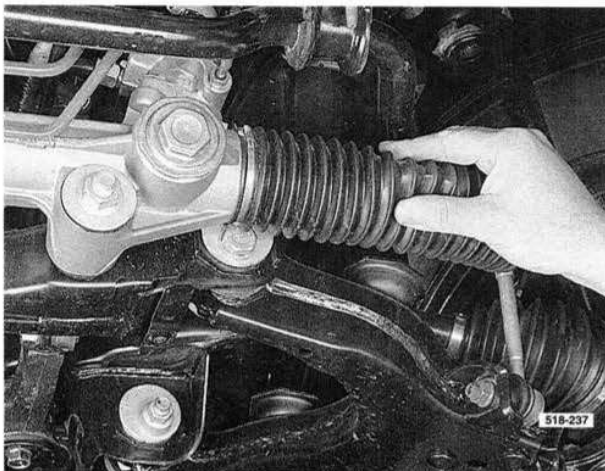
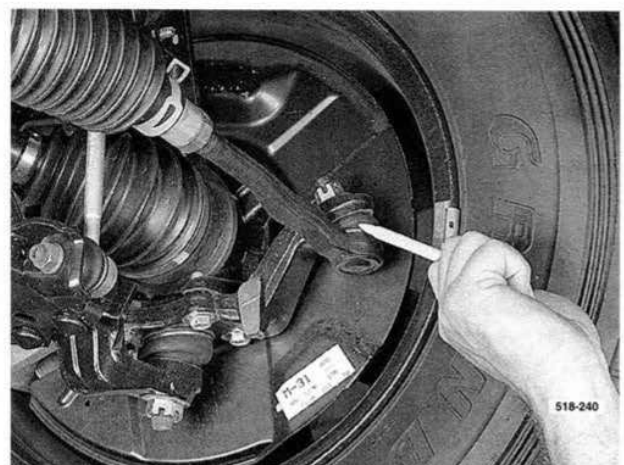
STEERING GEAR AND TIE ROD ENDS

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.

- 2 Inspect the steering gear mounting brackets to ensure that the retaining bolts are secure.
- 3 Check that the tie rod ends are securely connected to each steering knuckle.
- 4 Lower the vehicle to the ground and have an assistant rotate (rock) the steering wheel back and forth approximately 40 mm either side from the straight ahead position.
- 5 Check for any looseness or freeplay, at all of the steering components while an assistant rocks the steering wheel as previously described.



Looseness will be visible by movement between components as the steering wheel is rotated. Common places of wear are tie rods, tie rod ends, steering shaft universal joints and all the pivot points of the front suspension.

**Checking the boots for cracking or deterioration.****Check for movement at the tie rod end.**

If a tie rod is suspect, grip the rubber boot between thumb and fore finger so as to feel movement between the tie rod ball housing and the tie rod while an assistant rocks the steering wheel.

Trouble Shooting

EXCESSIVE PLAY OR LOOSENESS IN STEERING GEAR

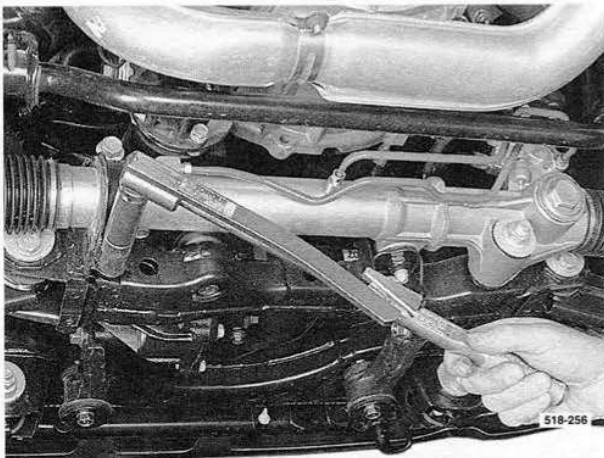
- 1 Tie rod end loose or worn: Tighten or renew the tie rod end.
- 2 Steering gear assembly loose on the crossmember: Inspect for damage and tighten the steering gear retaining nuts and bolts to the specified torque.
- 3 Worn intermediate shaft universal joint or coupling: Renew the shaft or coupling. Also ensure that the coupling clamp bolts and the intermediate shaft to steering column clamp bolt are secure.
- 4 Steering wheel retaining nut loose: Remove the horn pad or airbag and tighten the steering wheel retaining nut to the specified torque.
- 5 Steering gear worn: Overhaul or renew the steering gear as necessary.

i Looseness or freeplay in the steering gear is best assessed with the weight of the vehicle on the front wheels.

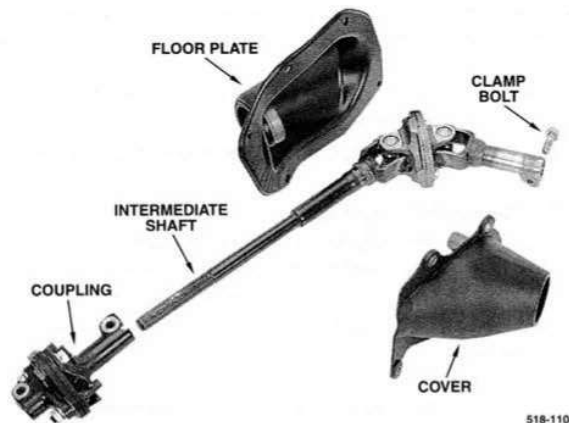
Start the engine and have an assistant turn the steering wheel from left to right approximately 40 mm, while the inspection is being made.

HEAVY STEERING

- 1 Low or uneven tyre pressures: Check and inflate the tyres to the recommended pressure.
- 2 Low fluid level in the power steering reservoir: Check for leakage and repair or renew any faulty components as necessary. Top up the reservoir fluid.
- 3 Suspension worn or out of alignment: Check the front suspension for wear, renew any faulty components as necessary and realign the front wheels.
- 4 Binding in the intermediate shaft universal joints: Check the joints and renew the intermediate shaft assembly if necessary.



Checking the steering gear mounting bolts for the correct torque.



Intermediate shaft components.

- 5 Insufficient steering pump pressure: Check the drive belt condition and the reservoir fluid level. Check the flow control valve. Renew the pump assembly if necessary.
- 6 Check steering turning effort: Remove the horn pad or where fitted, airbag as described later in this chapter. With the engine idling and using a torque wrench, measure the turning effort in both directions. Check and repair or renew the necessary components if the turning effort is greater than specified.

i Ensure that both front tyres have ample depth of tread and are inflated to the correct pressure. Check the front suspension components for wear as described in Front Axle and Suspension (chapter 13) before having the alignment checked.

STEERING PULLS TO ONE SIDE

- 1 Uneven tyre wear or pressures: Check the condition of the tyres and inflate to the recommended pressure.
- 2 Tyre construction fault: Check by swapping the front wheels and test drive. If a tyre construction fault is present the vehicle will pull in the opposite direction.
- 3 Incorrect front wheel alignment: Check and align the front wheels.



Checking the tie rod ball housing for wear by moving the wheel and feeling movement at the ball.

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- 4 Dragging brakes: Check each wheel for dragging brakes and rectify as necessary. Refer to the Trouble Shooting heading in Brakes (chapter 15).
- 5 Damaged suspension: Inspect and renew the damaged components as necessary.
- 6 Faulty steering gear: Overhaul or renew the steering gear.

STEERING WHEEL SHAKES

- 1 Tyre or wheel imbalance: Check the wheels for missing balance weights. Balance the wheels as necessary.
- 2 Tyre out of round or flat spotted: Raise the vehicle and rotate the wheels by hand to check for out of roundness or tread separation.



Always wear protective gloves when checking tyres in this way. If a steel belt has separated, strands of steel can stick out and cause injury.

- 3 Worn or loose hub bearings: Check the condition of the front hub bearings and renew the hub assembly if necessary.
- 4 Worn tie rod or tie rod end: Check the tie rod and tie rod end for wear and renew as necessary.



A worn tie rod or tie rod end shake or shudder will be more prominent when braking.

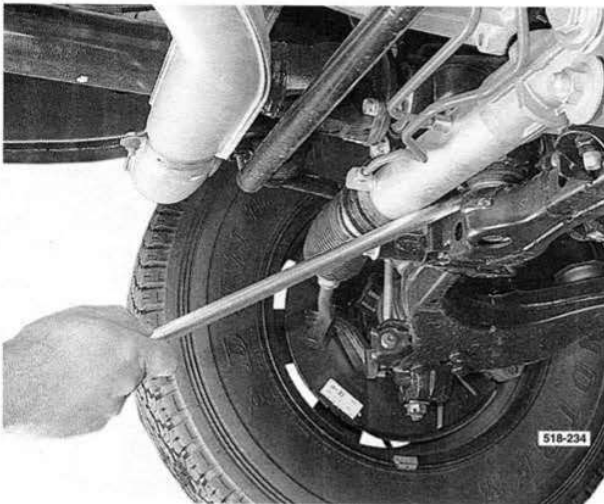
- 5 Faulty or worn suspension components: Check and renew the suspension components as described in Front Axle and Suspension (chapter 13).



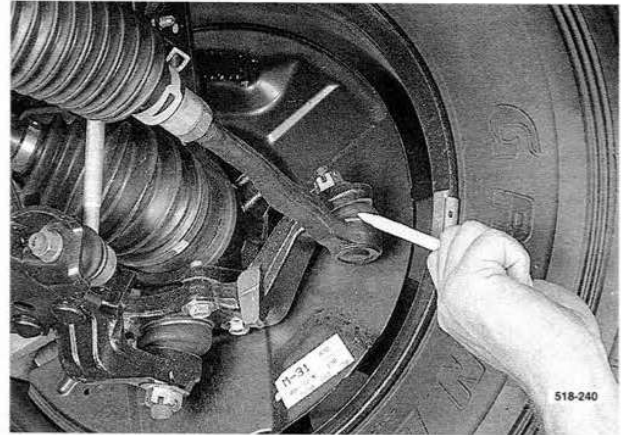
Check for excessive play or looseness in the steering gear as previously described. Raise the front of the vehicle and check the front hub bearings as described in Front Axle and Suspension (chapter 13).

STEERING ERRATIC OR WANDERING

- 1 Worn front tyres: Check and renew the tyres as necessary.
- 2 Incorrect wheel alignment: Check and adjust the wheel alignment.



Checking that the steering gear is securely mounted to the cross member.



Check for movement at the tie rod end.

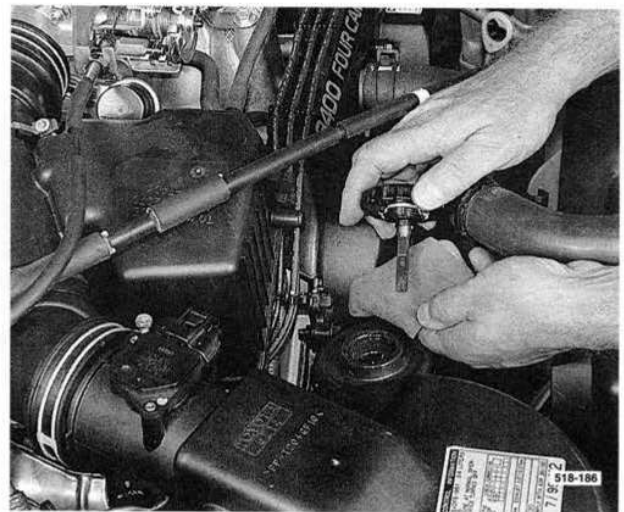
- 3 Steering gear loose on the crossmember: Inspect for damage and tighten the steering gear mounting bolts and nuts to the specified torque.
- 4 Worn tie rod ends: Renew the worn tie rod ends.
- 5 Worn or damaged front hub bearings: Check the condition of the front hub bearings and renew the hub assembly if necessary.
- 6 Worn steering gear: Overhaul or renew the steering gear.



Incorrect or uneven camber is indicated by uneven wear of the tyres. Check and adjust the front wheel alignment.

FAILURE OF POWER ASSISTANCE

- 1 Broken drive belt: Renew the drive belt as described in Engine (chapter 4).
- 2 Low fluid level in the pump reservoir: Check for leakage and repair or renew the faulty components as necessary. Replenish the fluid level.
- 3 Insufficient pump pressure: Check the drive belt tension and the reservoir fluid level. Check the pump outlet filter in the flow control valve. If necessary renew the pump assembly.



Checking the power steering fluid level.

- 4 Faulty power steering gear assembly: Renew or repair the power steering gear assembly.



If the power assistance fails, the vehicle should only be driven the minimum distance necessary for repairs to be performed.

NOISE IN POWER STEERING

- 1 Loose or defective drive belt: Check, and if necessary renew the drive belt as described in Engine (chapter 4).
- 2 Air in the steering hydraulic system: Bleed the air from the system.
- 3 Loose or incorrectly installed power steering lines: Tighten and/or correctly install the lines.
- 4 Loose pump pivot bolt or adjuster locknut: Inspect for damage, if necessary renew the damaged components and tighten the bolts to the specified torque.
- 5 Worn pump: Renew or repair the pump as necessary.

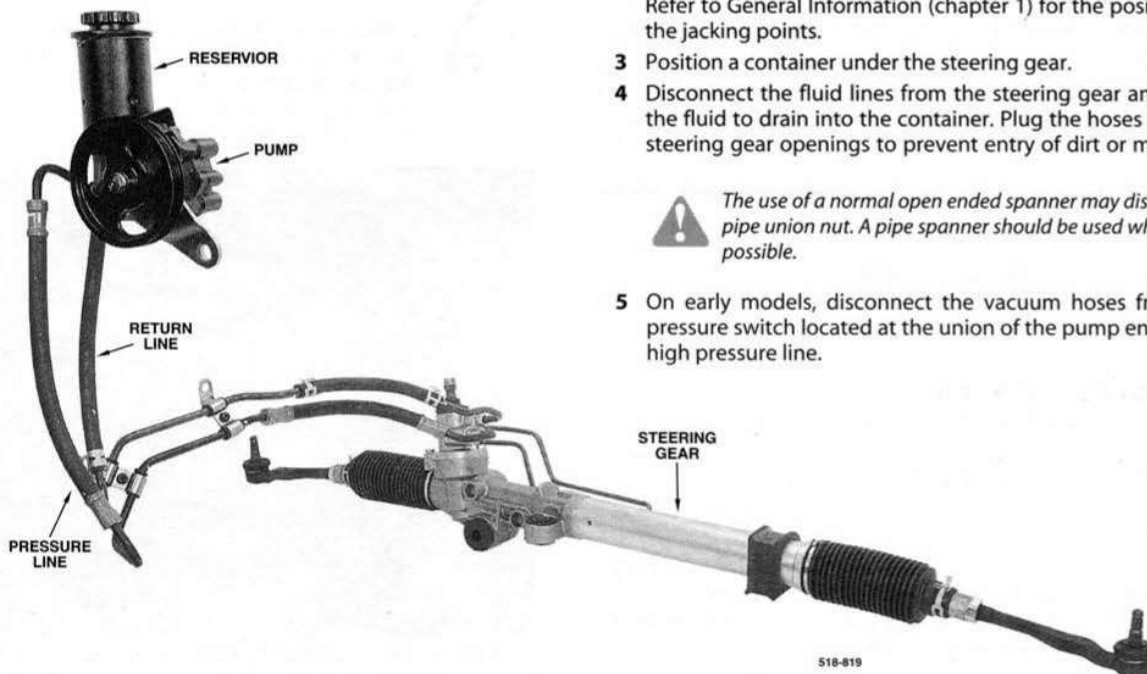


Restricted pipes or hoses can also cause noisy power steering. Check for kinks or damage to the pipes and hoses.

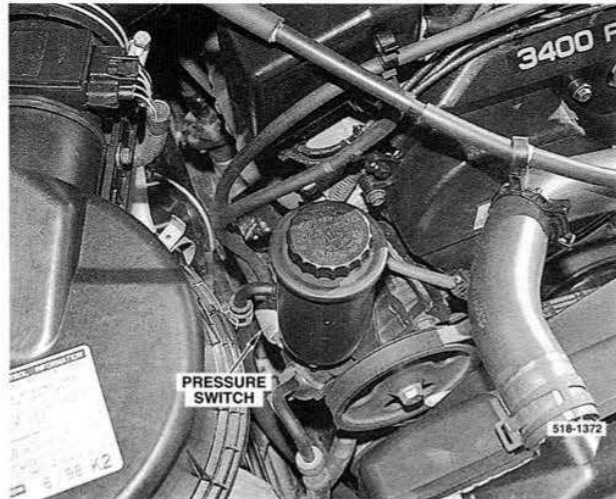
Hydraulic System

TO BLEED THE SYSTEM

- 1 Check that the pump reservoir is filled to the Full Cold mark on the dipstick. Top up if necessary.
- 2 Run the engine for two or three seconds and stop the engine.
- 3 Top up the reservoir to the correct level.



Power steering components.



Power steering pressure switch location. Early models.

- 4 Repeat the above operations until the level remains constant at the correct mark on the dipstick.
- 5 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 6 With the engine idling, turn the steering from lock to lock three times, lightly contacting the lock stop each time and holding it there for 2 to 3 seconds.
- 7 Stop the engine and top up the reservoir as necessary.

TO RENEW HYDRAULIC LINES

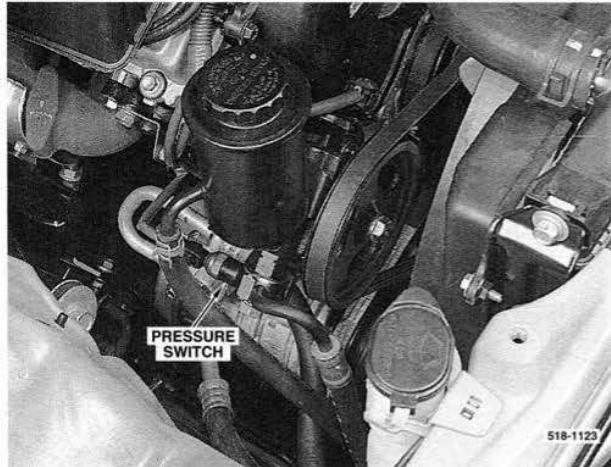
- 1 Use an oil pump or large syringe to remove as much oil as possible from the power steering reservoir.
- 2 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 3 Position a container under the steering gear.
- 4 Disconnect the fluid lines from the steering gear and allow the fluid to drain into the container. Plug the hoses and the steering gear openings to prevent entry of dirt or moisture.



The use of a normal open ended spanner may distort the pipe union nut. A pipe spanner should be used where possible.

- 5 On early models, disconnect the vacuum hoses from the pressure switch located at the union of the pump end of the high pressure line.

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Power steering, pressure switch location. Late models.

- 6 On late models, disconnect the wire from the pressure switch located at the union of the pump end of the high pressure line.
- 7 Remove the banjo bolt retaining the pressure line to the power steering pump.
- 8 Using pliers, loosen and slide the clamp along the return hose, then disconnect the return hose from the power steering reservoir. Plug the openings to prevent entry of dirt or moisture.
- 9 Remove the bolts retaining the power steering lines to the chassis and manoeuvre the lines from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Manoeuvre the lines into the engine compartment.
- 2 Install the pressure line to the power steering pump with the locating tang touching the body.
- 3 Tighten the unions and hose clamps securely.
- 4 Ensure that the lines are routed correctly.
- 5 Refill and bleed the power steering system and check for leaks as previously described in this chapter.

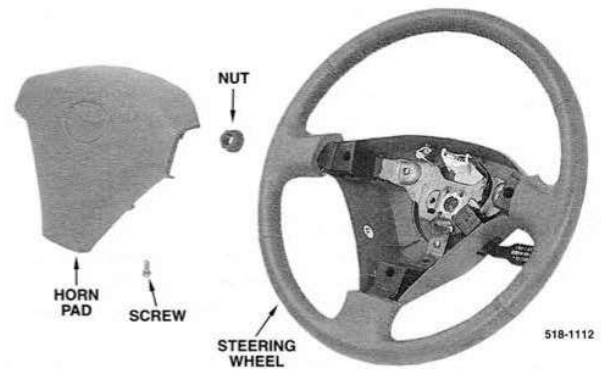
Steering Wheel



To Remove and Install airbag — T 30 Torx socket.

TO REMOVE AND INSTALL

- 1 On models with an airbag, proceed as follows:
 - a Disable the airbag system by disconnecting the negative battery terminal and waiting 90 seconds.
 - b Remove the plugs from either side of the steering wheel and remove the retaining bolts.
 - c Partially withdraw the airbag assembly, slide the lock tab sideways and disconnect the airbag wiring connector.
 - d Disconnect the horn wiring connector and remove the airbag assembly from the vehicle.
 - e Disconnect the wiring connector at the top of the clock spring.



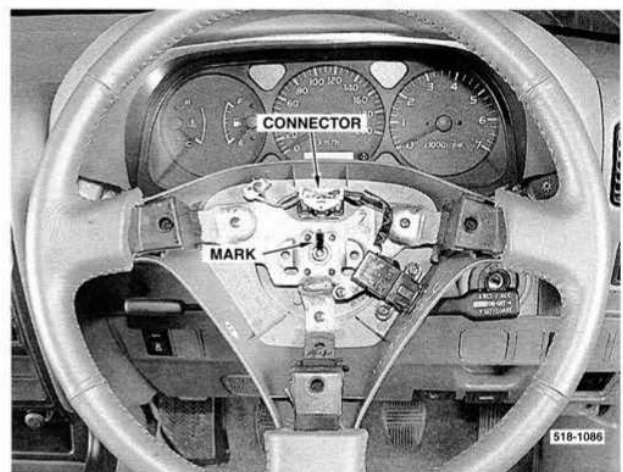
Steering wheel components. Models without an airbag.

- 2 On models without an airbag, proceed as follows:
 - a Disconnect the negative battery terminal.
 - b Remove the horn pad retaining screw from beneath the steering wheel and partially withdraw the horn pad. Disconnect the horn switch wire and remove the horn pad.
 - c Disconnect the wiring connector at the top of the slip ring.
- 3 Remove the nut retaining the steering wheel to the steering shaft.
- 4 Mark the alignment of the steering wheel and steering shaft to aid installation. Temporarily install the nut loosely on the shaft.
- 5 Hold the sides of the steering wheel and rock the wheel back and forth while at the same time moving your hands around the wheel. Continue to do this until the steering wheel separates from the steering shaft.

If the steering wheel fails to separate using the above method, install a steering wheel puller to the wheel and tighten the centre bolt until the wheel is loose.



If using a puller to remove the steering wheel, use caution not to damage the threads on the end of the steering shaft. Do not strike the end of the puller or the steering shaft as sharp blows can cause irreparable damage to the collapsible steering shaft.



Horn pad removed showing the horn and cruise control switch wiring connector and the matchmark between the steering wheel and steering column.

- 6 Lift the steering wheel from the steering shaft, guiding the wiring through the aperture in the steering wheel.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Ensure that the threads on the steering shaft and nut are clean and free of burrs.
- 2 Install the steering wheel to the steering shaft, guiding the clock spring wiring through the aperture in the steering wheel. Align the marks made on removal, install the nut and tighten to the specified torque.
- 3 Connect the wiring connector to the top of the clock spring or slip ring.
- 4 On models with an airbag, connect the airbag and horn wiring connectors and install the airbag to the steering wheel. Tighten the retaining bolts to the specified torque and install the covers to either side of the steering wheel.
- 5 On models without an airbag, connect the horn switch wire and install the horn pad to the steering wheel. Tighten the screw securely.

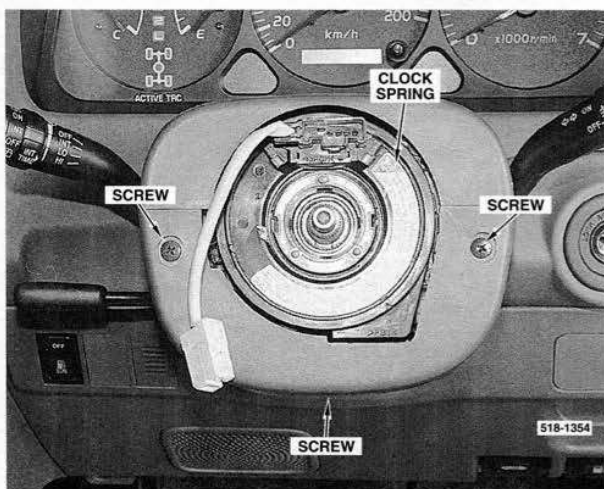
Clock Spring

The clock spring is only used on models with an airbag and consists of a ribbon wire that can rotate with the steering wheel. The ribbon wire transmits power to and from the various switches on the steering wheel as well as supplying power to trigger the drivers airbag. The ribbon wire within the clock spring can be broken by rotating the clock spring past its normal operating limits.

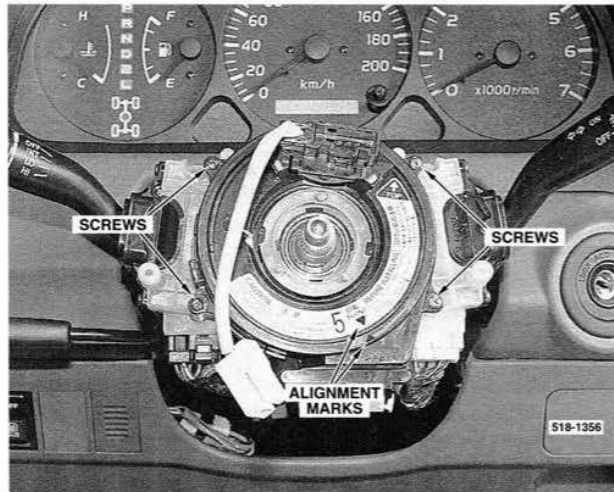
The clock spring can rotate freely once the steering wheel is removed by rotating the outer race while holding the inner race still. If doubt exists to the position of the clock spring, remove the clock spring, centralise the steering gear then centralise the clock spring.

TO REMOVE AND INSTALL

- 1 Place the front wheels in the straight ahead position and remove the ignition key.
- 2 Remove the steering wheel, as previously described.
- 3 Remove the screws retaining the steering column covers. Separate and remove the covers from the steering column.



Location of the steering column cover retaining screws.



Clock spring shown with marks aligned. Also shown is the retaining screws.



It may be necessary to tilt the steering column to its lowermost position. If difficulty is experienced removing the covers it may be necessary to remove the lower dash panel. If necessary, refer to Body (chapter 17).

- 4 Disconnect the clock spring wiring connector from the clock spring.
- 5 Remove the screws retaining the clock spring and remove it from the combination switch.



Do not turn the steering while the clock spring is removed. If the steering is moved, centralise the steering and the clock spring before installation as described later in this chapter.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Position the clock spring onto the combination switch assembly. Tighten the screws securely.
- 2 Connect the wiring connector to the clock spring.
- 3 Install the covers and tighten the screws securely.
- 4 Install the steering wheel as previously described.

TO CENTRALISE

- 1 Rotate the outer hub clockwise until resistance is felt.
- 2 Rotate the outer hub anticlockwise approximately 3 turns and then align the arrows on the face of the clock spring as shown in the illustration.

Steering Column Assembly

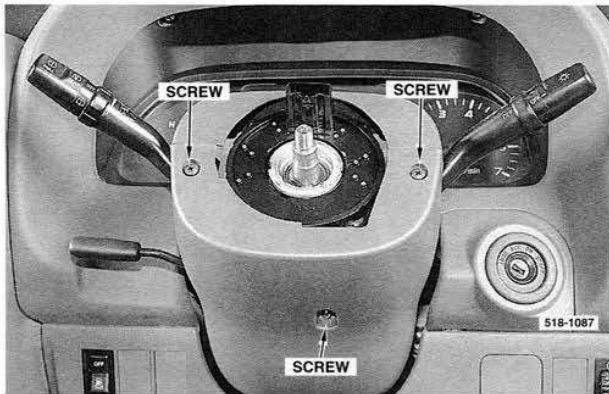
TO REMOVE AND INSTALL



Always disconnect the steering column from the intermediate shaft assembly before removing the nuts retaining the steering column to the instrument panel. Omitting to do so will damage the intermediate shaft.

- 1 Disconnect the negative battery terminal.

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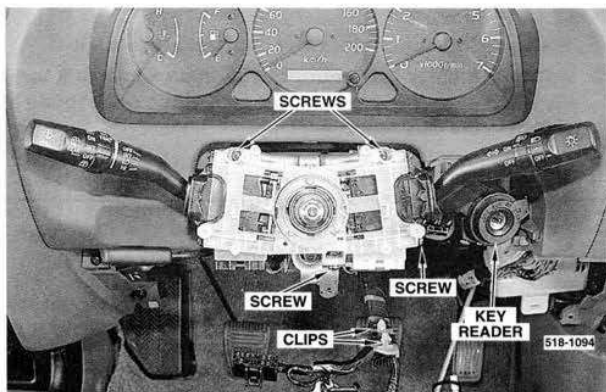


Location of the steering column cover retaining screws.



Where fitted the airbag(s) will be disabled 90 seconds after disconnecting the battery terminal.

- 2 Ensure that the ignition key is removed and the steering is locked.
- 3 Working under the steering column, remove the lower dash panel as follows.
 - a Remove the screws retaining the bonnet and fuel filler door remote handles. Push the handles toward the front of the vehicle, to release the hooks, and manoeuvre the handles from the lower dash panel.
 - b Remove the bolt and screw retaining the lower dash panel.
 - c Partially remove the panel, disconnect the wiring connectors and withdraw the panel from the dashboard.
- 4 Remove the screws and the steering column covers.
- 5 Remove the air duct from beneath the steering column.
- 6 Remove the steering wheel as previously described.
- 7 Disconnect the wiring from the rear of the ignition switch. Remove the foam from, and disconnect the key reader and ignition lock illumination wiring connector beneath the lock cylinder housing.
- 8 Release the wiring harness clips from the steering column and manoeuvre the wiring clear of the work area.
- 9 Remove the combination switch screws and remove the assembly from the steering column.



Combination switch retaining screw location. If necessary, the combination switch assembly can be removed with the slip ring or clock spring attached.

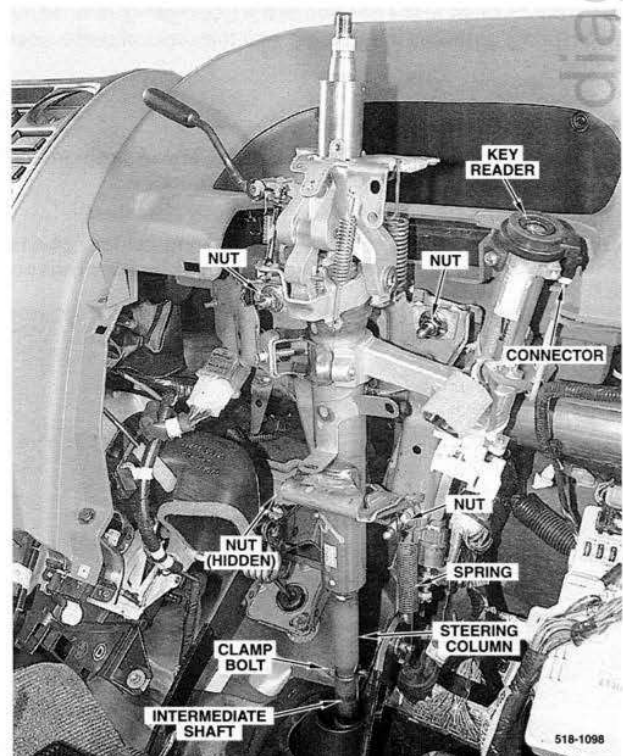
- 10 Remove the ignition lock surround panel by pulling it straight out of the dashboard.
- 11 Using long nose pliers, disconnect the brake pedal return spring from the steering column.
- 12 Place a matchmark between the steering column and the intermediate shaft to assist with installation.
- 13 Remove the intermediate shaft clamp bolt and while supporting the column, remove the nuts retaining the steering column to the instrument panel.
- 14 Manoeuvre the steering column from the vehicle.
- 15 Examine the steering column for damage, cracks or distortion. Renew as necessary.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Ensure that the marks made on removal are aligned and install the steering column to the vehicle.
- 2 Tighten the nuts retaining the steering column to the instrument panel and the intermediate shaft clamp bolt to the specified torque.
- 3 Connect the brake pedal return spring to the steering column.
- 4 Connect the wiring to the ignition switch, key reader and ignition lock illumination wiring connector. Install the foam over the connector.
- 5 Install the combination switch assembly and tighten the screws securely.



On models with an airbag, ensure that the steering gear is in the straight ahead position before installing the clock spring. If doubt exists about the position of the clock spring, it should be centralised as described under the Clock Spring heading.



Location of the steering column retaining nuts and the intermediate shaft clamp bolt.

- 6 Connect the wiring harness to the brackets on the steering column and install the wiring connectors to the combination switch. Install the wiring connector to the slip ring, or on models with an airbag, the clock spring.
- 7 Install the steering column covers and tighten the screws securely.
- 8 Install the steering wheel as previously described.
- 9 Install the air duct securely to the heater box and install the lower dash panel.

Ignition Switch and Lock Cylinder

The removal and installation procedure for the lock cylinder is covered in Body Electrical (chapter 16). The ignition switch is part of the steering lock and is renewed as described under the following heading.

Steering Lock

TO REMOVE AND INSTALL

- 1 Remove the steering column as previously described.
- 2 Secure the steering column in a vice with soft jaws.
- 3 Using a centre punch, mark the centre of the shear bolts and using a 3 to 4 mm drill, drill a hole in the centre of the shear bolts.
- 4 Remove the shear bolts using a screw extractor (Easy Out).
- 5 Remove the steering lock assembly from the steering column.

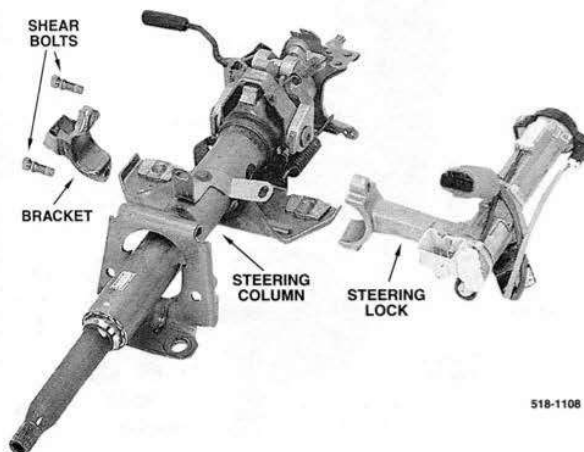
Installation is a reversal of the removal procedure with attention to the following points:

- 1 Renew the shear bolts.
- 2 Tighten the shear bolts until the head of the bolt shears off.
- 3 Install the steering column as previously described.

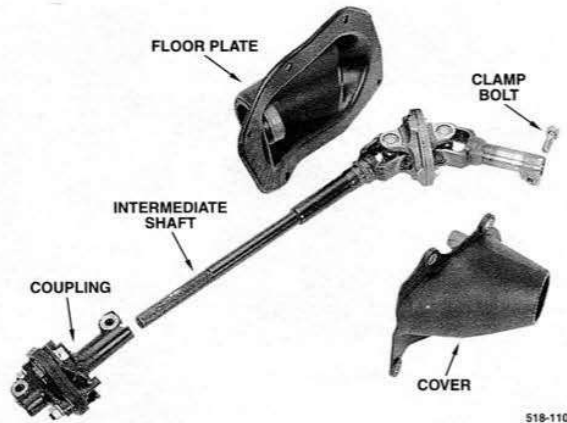
Intermediate Shaft

TO REMOVE AND INSTALL

- 1 Disconnect the negative battery terminal.



Steering column components.

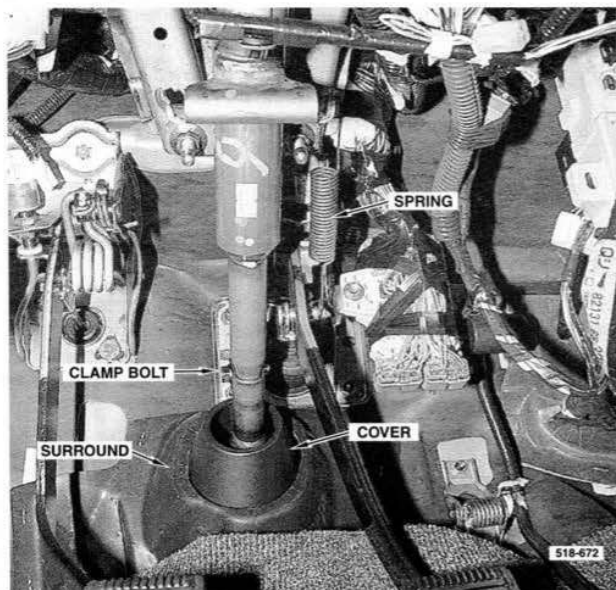


Intermediate shaft components.



Where fitted, the airbag(s) will be disabled in 90 seconds after disconnecting the battery terminal.

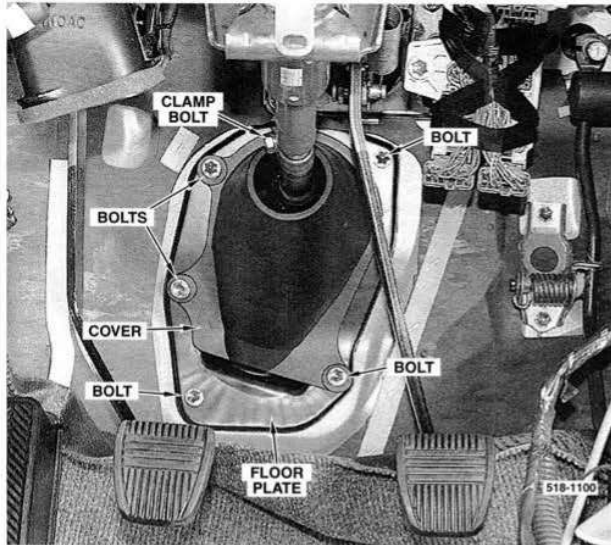
- 2 Lock the steering wheel in the straight ahead position.
- 3 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 4 Suitably mark the relationship of the intermediate shaft coupling to the steering gear pinion, and the lower end of the intermediate shaft.
- 5 Remove the bolts from the intermediate shaft coupling.
- 6 Slide the coupling upwards onto the intermediate shaft, disengage the coupling from the steering gear pinion and slide the coupling down from the intermediate shaft.
- 7 Working inside the vehicle, fold back the carpet and remove the surround from around the steering column floor plate.
- 8 Remove the bolts retaining the cover and the floor plate. Suspend the cover from the steering column clear of the work area.



Fold back the carpet to remove the surround and cover.

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Surround removed showing the floor plate and cover retaining bolts.

- 9 Remove the bolt from the universal joint clamp and slide the intermediate shaft down from the steering column. Remove the intermediate shaft and floor plate from the inside of the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Install the floor plate and the intermediate shaft into the vehicle. Ensure that the marks made on removal align, and slide the intermediate shaft clamp onto the steering column. Install the clamp bolt and tighten to the specified torque.
- 2 Install the floor plate cover and tighten the retaining bolts.
- 3 Install the surround around the cover.
- 4 Working beneath the vehicle, align the marks made on removal and install the coupling onto the intermediate shaft and then slide the coupling onto the steering gear pinion shaft. Install the clamp bolts and tighten the bolts to the specified torque.



If the steering was unlocked and rotated with the intermediate shaft removed, the clock spring must be centralised as described under the Clock Spring heading before the steering column is rotated.

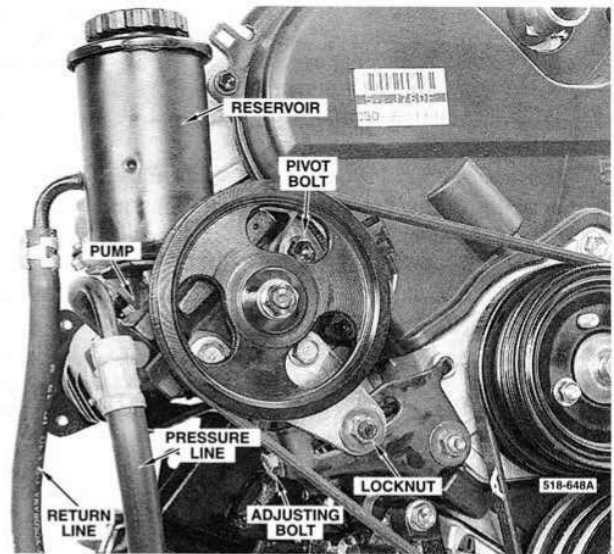
Steering Pump

As extensive knowledge and equipment is required to overhaul the power steering pump, it is not a worthwhile repair proposition for the home mechanic. It is recommended that a faulty pump be replaced with an exchange unit obtained through an authorised dealer or a steering specialist.

A view of a dismantled power steering pump is included for operators who are competent to overhaul the pump.

TO REMOVE AND INSTALL

- 1 Disconnect the negative battery terminal.
- 2 Remove the air cleaner assembly. If necessary, refer to Part 1 of Fuel and Engine Management (chapter 7).

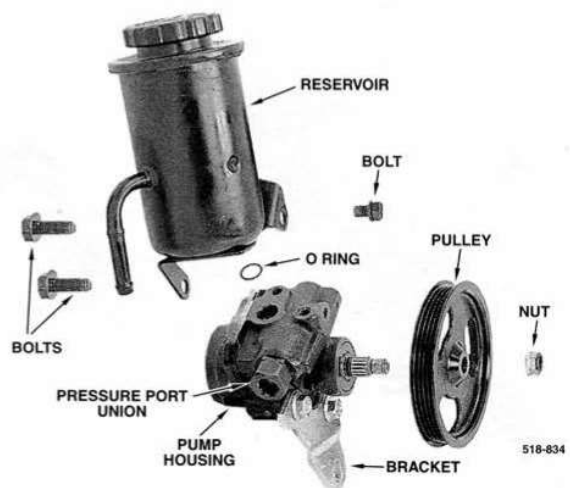


Power steering pump installed.

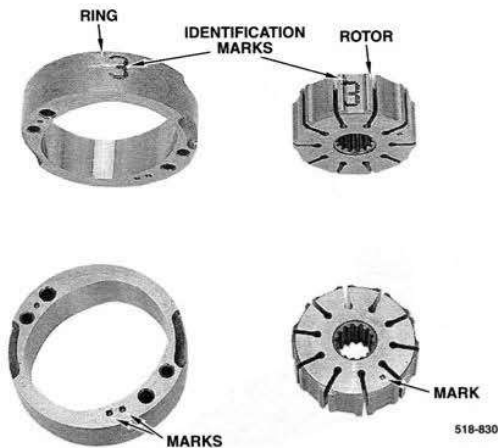
- 3 Release the drive belt tension and remove the drive belt from the power steering pump. Refer to Engine (chapter 4), if necessary.
- 4 On early models, disconnect the vacuum hoses or on late models, disconnect the wiring connector from the power steering pressure switch.
- 5 Remove the stoneguards from beneath the engine and place a suitable container beneath the power steering pump in the engine compartment.
- 6 Use an oil pump or large syringe to remove as much oil as possible from the power steering reservoir.
- 7 Loosen the clamp retaining the return line to the pump and remove the pressure line from the pump outlet fitting. Plug the openings to prevent the entry of dirt and excessive loss of fluid.



The use of a normal open ended spanner to loosen the pressure line may distort the pipe union nut. Use a pipe spanner if available.



Steering pump components.



The power steering pump rotor and ring are a selective fit. If renewing the rotor and/or ring, ensure that the identification numbers are the same. The marks must face the same direction on assembly

- 8 Remove the lock nut and pivot bolt and withdraw the pump from the vehicle.

i It may be necessary to rotate the pulley to gain access to the pivot bolt.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Install the drive belt as described in Engine (chapter 4).
- 2 Ensure that the lug on the pressure line union rests against the pump body and tighten the banjo bolt to the specified torque using a pipe spanner.
- 3 Fill the reservoir to the Full Cold mark on the dipstick and bleed the system as described under the Hydraulic System heading.

Steering Gear Assembly



To Remove Tie Rod Assembly – Suitable spanner or large adjustable wrench.
To Install Tie Rod Assembly – Suitable torque wrench adaptor and torque wrench.

To overhaul the steering gear, extensive knowledge and a range of special tools are required, therefore it is not a worthwhile proposition for the home mechanic.

If the steering gear has a fault such as leaking seals or a problem with the rack and pinion, it is recommended that an exchange unit is installed. Exchange units should be available through an authorised dealer or a steering specialist. A detailed removal and installation procedure is included for this purpose.

The procedures to renew the rubber boots, tie rod ends and tie rod assemblies are described later in this chapter.



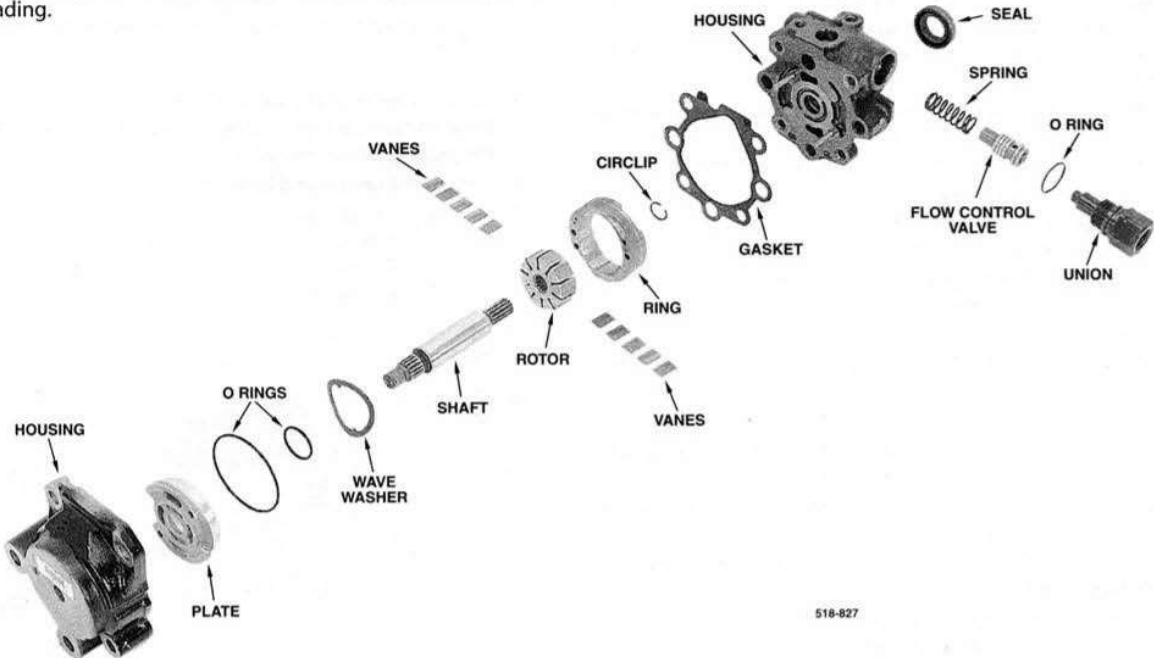
On models with an airbag, if removing the steering gear assembly from the vehicle, it is necessary to set the wheels in the straight ahead position, remove the ignition key and engage the steering lock so that the steering column cannot be moved past the normal lock to lock position once the steering gear assembly has been removed. Damage to the clock spring will result if the above procedure is not carried out.

TO REMOVE AND INSTALL

- 1 Disconnect the negative battery terminal.

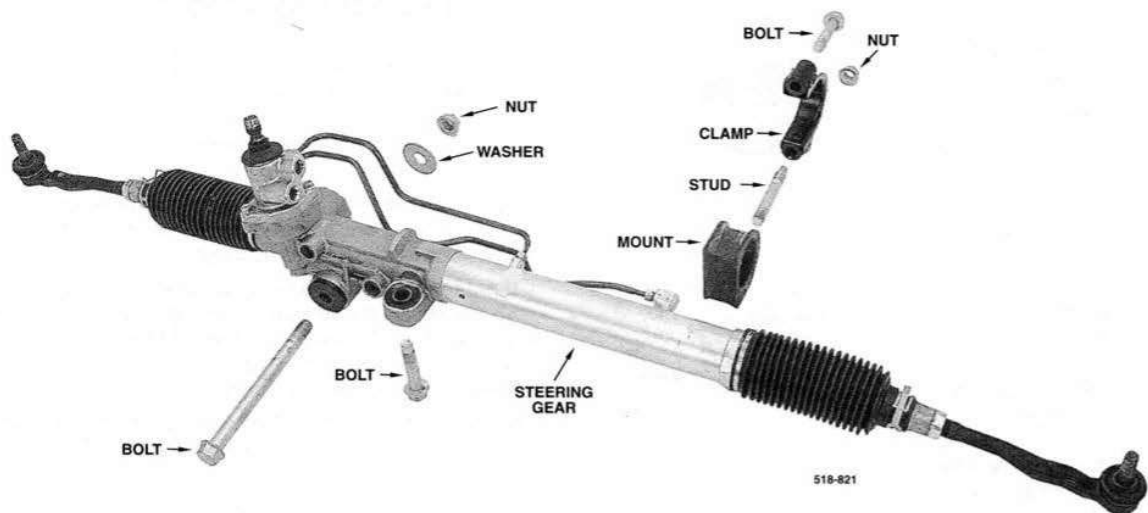


Where fitted the airbag(s) will be disabled 90 seconds after disconnecting the battery terminal.



Power steering pump dismantled.

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**Steering gear assembly.**

- 2 Lock the steering wheel in the straight ahead position.
- 3 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 4 Working beneath the vehicle, suitably mark the relationship of the intermediate shaft coupling to the steering gear pinion, and the lower end of the intermediate shaft.
- 5 Remove the bolts from the intermediate shaft coupling.
- 6 Slide the coupling upwards onto the intermediate shaft, disengage the coupling from the steering gear pinion and slide the coupling down from the intermediate shaft.
- 7 Position a suitable container under the steering gear. Disconnect the pressure and return lines from the steering gear using a suitable pipe spanner. Avoid using a normal open ended spanner as it may distort the fittings. Discard the O rings.
- 8 Drain the excess fluid into the container and plug the ends of the lines to prevent the entry of dirt.
- 9 Remove the split pins and loosen the tie rod end stud nuts.
- 10 Disconnect the tie rod ends from the steering arms using a two legged puller. Remove the nuts and disconnect the tie rods from the steering arms.
- 11 Remove the steering gear mounting bolts from the vehicle crossmember and manoeuvre the steering gear from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Ensure that the steering gear is in the central position.
- 2 Apply Permatex Lock Nut and tighten the steering gear mounting bolts and nut to the specified torque.
- 3 Tighten the tie rod end stud nuts to the specified torque and install new split pins.
- 4 Tighten the pressure and return line union nuts using a suitable pipe spanner.
- 5 Align the marks made on removal and install the coupling to the intermediate shaft and then slide the coupling onto the steering gear pinion shaft. Install the clamp bolts and tighten to the specified torque.

i If the steering was unlocked and rotated with the intermediate shaft removed, the clock spring must be centralised as described under the Clock Spring heading before the steering column is rotated.

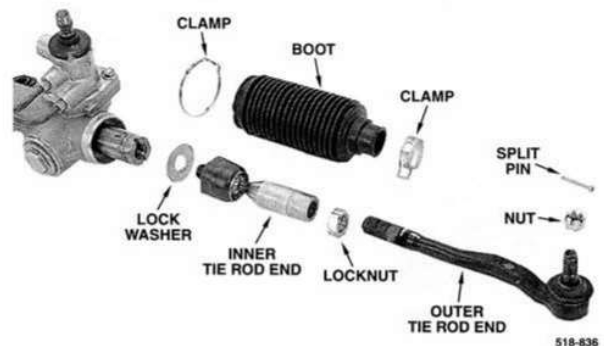
- 6 Bleed the system as previously described.
- 7 Check and if necessary, adjust the toe in as described in Front Axle and Suspension (chapter 13).

TO RENEW TIE ROD END

- 1 Disconnect the negative battery terminal.

i Where fitted the airbag(s) will be disconnected 90 seconds after disconnecting the battery terminal.

- 2 Raise the front of the vehicle and support on chassis stand. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the relevant front wheel.
- 3 Loosen the tie rod end locknut.
- 4 Remove the split pin and loosen the tie rod end stud nut. Disconnect the tie rod end from the steering arm using a two legged puller. Remove the nut and withdraw the tie rod end from the steering arm.

**Tie rod components.**

- 5 Unscrew the tie rod end from the tie rod, noting the exact number of turns necessary to remove it.
- 6 Screw the locknut onto the new tie rod end.
- 7 Screw the new tie rod end onto the tie rod the same number of turns noted during removal.
- 8 Connect the tie rod end to the steering arm. Tighten the stud nut and the tie rod end locknut to the specified torque. Install a new split pin to the stud nut.
- 9 Install the front wheel and lower the vehicle to the ground.
- 10 Check and if necessary, adjust the front wheel toe in as described in Front Axle and Suspension (chapter 13). Ensure that the rubber boots are not twisted when the adjustment is complete.

TO RENEW STEERING GEAR RUBBER BOOT

- 1 Remove the relevant tie rod end as previously described.
- 2 Release the clips securing the boot using a pair of pliers to disengage the locking teeth on the inner clip.
- 3 Remove the rubber boot from the tie rod.
- 4 Turn the steering to full lock and check that the rack lubricant is not contaminated with grit or dirt. If necessary, clean the rack and coat the teeth and sliding surfaces with the specified grease.
- 5 Centralise the steering gear.
- 6 Install the new boot to the tie rod and push it onto the steering gear housing. Install and secure the clips.

- 7 Install the tie rod end as previously described.

TO RENEW TIE ROD ASSEMBLY

- 1 Remove the tie rod end and rubber boot as previously described.
- 2 To remove the right hand tie rod, turn the steering to the left hand lock.
- 3 Using a small cold chisel and hammer straighten the folded parts of the locking washer.
- 4 Using a suitable spanner, grip the exposed section of the steering rack and remove the tie rod from the rack. Discard the lock washer.
- 5 To remove the left hand tie rod, rotate the steering until the left hand side of the rack is exposed.
- 6 Using the method described in steps 3 and 4, remove the left hand tie rod from the rack.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Using a new lock washer, install a new tie rod to the steering rack and tighten to the specified torque. Ensure that the rack is held stationary with a suitable spanner or damage to the steering gear may result.
- 2 Support the rack with a hammer or dolly wrapped in cloth and using a hammer, fold the lock washer over the tie rod ball housing.
- 3 Install the rubber boots and tie rod ends as previously described.