

## PART 3. POWER STEERING

### SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Steering gear type .....       | Rack and pinion with integral power cylinder        |
| Linkage .....                  | Direct from rack ends to tie rods and steering arms |
| Steering gear valve type ..... | Rotary, integral with pinion                        |
| Pump type .....                | Rotary, vane  |
| Pump output:                   |   |
| 1981 models .....              | 9.5 cc/rev  |
| 1982 models .....              | 7.4 cc/rev  |
| 1983 models .....              | 10.0 cc/rev   |
| 1984 models .....              | 7.4 cc/rev  |
| 1985-1987 models .....         | 5.9 cc/rev  |
| Pump relief pressure:          |   |
| 1981-1982 models .....         | 4921 kPa  |
| 1983-1984 models .....         | 4904 kPa  |
| 1985-1987 models .....         | 4413 kPa  |
| Steering wheel turning effort: |   |
| 1980-1982 models .....         | 24.5 N  |
| 1983-1987 models .....         | 29.4 N  |

### TORQUE WRENCH SETTINGS

|   |       |
|---|-------|
| Steering gear mounting bolts:               |       |
| 1980-1984 models .....                      | 54 Nm |
| 1985-1987 models .....                      | 71 Nm |
| Intermediate shaft:                         |       |
| Universal joint clamp bolt .....            | 26 Nm |
| Rubber coupling bolts .....                 | 20 Nm |
| Rack pad adjusting screw locknut .....      | 49 Nm |
| Inner tie rod ball joint to rack .....      | 78 Nm |
| Outer tie rod end locknut .....             | 88 Nm |
| Outer tie rod end to steering arm nut ..... | 29 Nm |
| Outer tie rod end to steering arm nut ..... | 29 Nm |
| + 0-60 deg to align split pin hole          |       |

### 1. DESCRIPTION

The power steering is a rack and pinion type with an integral power cylinder and a rotary valve to direct the hydraulic pressure to the appropriate side of the piston in the power cylinder. This hydraulic pressure assists the mechanical components which operate in a similar manner to the manual rack and pinion steering system.

The steering gear is mounted on the underside of the front suspension crossmember and the hydraulic pressure is supplied by an engine driven pump.

The rack is connected, by ball joints, to the tie rods on either end which are connected to the steering arms by tie rod ends.

If a fault is encountered within the hydraulic system, such as pump failure or pressure drop due to a broken pipe or leaking seals, the vehicle may still be driven, although steering effort will be substantially increased.

In the interests of safety the vehicle should be driven in this condition for only short distances or to the nearest repair facility where attention to the damaged components can be obtained.

### 2. PRELIMINARY INSPECTION AND TESTING

If the power steering system becomes partially or fully inoperative it is most important that the following preliminary inspection and testing procedures are performed prior to undertaking any trouble shooting or repair operations.

#### PUMP DRIVE BELT

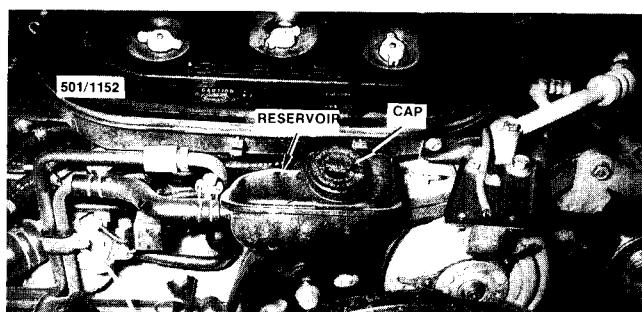
Inspect the pump drive belt for breakage, glazing or wear, renew the drive belt if any of these characteristics are evident.

If the belt is loose but still serviceable adjust the belt as described in the Engine Tune-up section.

*NOTE: In most cases a loose drive belt can be heard squealing when a load is placed on the pump such as when the steering wheel is turned or as the engine is accelerated.*



Checking the power steering pump drive belt for deterioration.



Installed view of the power steering fluid reservoir, 1986 model shown.

## TO CHECK FLUID LEVEL

With the vehicle parked on a level surface, start the engine and run it until the power steering fluid is at the normal operating temperature of approximately 60 deg C. Turn the steering wheel slowly from lock to lock several times and stop the engine.

Check the fluid level in the power steering reservoir reading on the side of the dipstick marked Hot. The dipstick is located on the reservoir cap.

If it is necessary to top up the fluid, fill up to the full mark indicated on the dipstick using the fluid specified in the Lubrication and Maintenance section.

*NOTE: If the fluid is cold, approximately 21 deg C, use the side of the dipstick marked Cold. Do not overfill the reservoir.*

## TO CHECK FOR FLUID LEAKS

Using a suitable solvent clean around all the power steering assemblies and hose or pipe fittings where fluid leakage might prevail and start the engine. Turn the steering wheel from lock to lock several times, stop the engine, and check the system for leakage.

Where leakage is found at pipe or hose fittings, tighten the fitting and repeat the above procedure. In some cases, when tightening the fitting does not rectify the problem, it may be necessary to disconnect the fitting and clean the mating faces.

Where leakage is found in the pump and reservoir assembly, the overhaul procedures are described later in this section.

If it is necessary to renew a hose or pipe refer to In Car Adjustments and Minor Repairs for the hose or pipe removal and installation precautions.

If it is necessary to instal a replacement steering gear assembly or pump and reservoir assembly the removal and installation procedures are described later in this section.

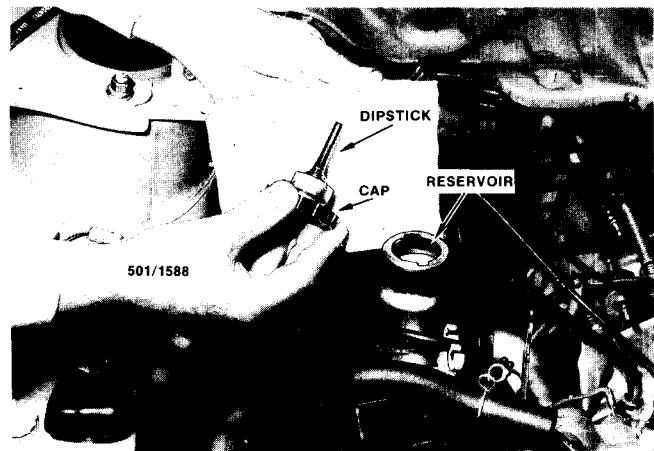
## TO CHECK TURNING EFFORT

Ensure that the tyre pressures and front wheel alignment are correctly adjusted and drive the vehicle on the road until the engine and steering fluid are at the normal operating temperature. Park the vehicle on a dry bitumen or concrete surface.

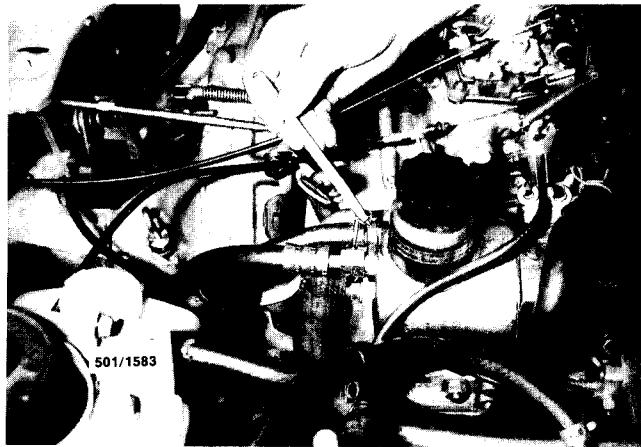
Attach a force gauge to the rim of the steering wheel, start and run the engine at normal idle speed. Pull on the force gauge to obtain alternatively both left and right hand steering locks from the straight ahead position.

The turning effort should for both left and right hand steering locks be approximately equal, they should also be within Specifications.

*NOTE: Increased turning effort may be encountered when the steering wheel is turned rapidly with an engine speed in excess of 2000 rpm.*



Checking the power steering fluid level on the reservoir dipstick, 1983 model shown.



Check the power steering fluid lines for leaks.

## 3. IN CAR ADJUSTMENTS AND MINOR REPAIRS

### PUMP DRIVE BELT TENSION

The correct procedure to adjust the pump drive belts is described in the Engine Tune-up section.

It is most essential that the pump drive belts are adjusted enough to prevent slipping but without imposing excessive load on the pump bearings.

On 1985-1987 non-airconditioned models should the deflection of the drive belts be unequal both drive belts should be renewed as a matched pair.

### TO PURGE THE POWER STEERING SYSTEM OF AIR

- (1) Ensure that the fluid reservoir is full of fluid.
- (2) Raise the front of the vehicle and support it on chassis stands.
- (3) Turn the steering wheel slowly from lock to lock until air bubbles cease appearing in the reservoir and the fluid level remains constant.

*NOTE: During this operation ensure that the fluid level is kept on the Full mark to avoid introducing more air into the system.*

(4) With the engine running at normal idle speed, turn the steering wheel slowly from lock to lock until air bubbles cease appearing in the reservoir and the fluid level remains constant.

*NOTE: It is unacceptable for the fluid level to alter more than 3 mm during the above operation.*

(5) Lower the vehicle to the ground and repeat operation (4).

(6) Road test the vehicle and check for oil leaks. With the engine stopped, check the fluid level on the dipstick as previously described.

## TO FLUSH THE POWER STEERING SYSTEM

(1) Disconnect the fluid return hose at the pump reservoir and place the end of the hose in a suitable clean container. Plug the return hose fitting on the reservoir.

(2) Fill the reservoir with the recommended fluid.

(3) Raise the front of the vehicle and support it on chassis stands.

(4) Turn the steering wheel slowly from lock to lock and, constantly filling the reservoir with new fluid, flush approximately two litres of fluid through the system until the fluid flowing out of the return hose is clean and free from contaminants.

(5) Lower the vehicle to the ground, remove the plug and connect the fluid return hose to the reservoir. Check and top up the fluid level in the reservoir.

(6) Road test the vehicle and check for leaks. With the engine stopped, check the fluid level on the dipstick as previously described.

## FLUID LINES

When fluid lines are disconnected it is important that all openings are plugged to prevent the entry of dirt. Any fluid lost during repair operations must be replenished and the system purged of air. Do not allow power steering fluid to contact any engine drive belts and ensure that the fluid lines are positioned clear of other components to prevent chaffing.

## 4. POWER STEERING PUMP

### Special Equipment Required:

To Dismantle and Assemble — Suitable puller, press and press plates

### TO REMOVE AND INSTAL

(1) Disconnect the negative battery terminal.

(2) Disconnect the fluid lines from the power steering pump. Plug the openings to prevent the loss of fluid and the entry of dirt.

(3) On 1980-1984 models, carefully remove the cap from the centre of the idler pulley using suitable pliers and a cloth pad, loosen the locking bolt approximately two turns then turn the adjusting bolt to relieve the tension from the pump drive belt.

(4) On 1985-1987 models, loosen the alternator mounting and adjusting bolts and relieve the tension from the pump drive belts.

(5) Remove the power steering pump drive belt/s.

(6) On 1980-1984 models remove the air cleaner as described in the Fuel System section.

(7) Remove the power steering pump mounting bolts and manoeuvre the power steering pump from the engine compartment.

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

(1) Adjust the drive belts as described in the Engine Tune-up section.

(2) Fill the reservoir and check the fluid level as previously described.

(3) Purge the system of air as previously described.

(4) Road test the vehicle and check for fluid leaks.

### TO DISMANTLE

(1) Carefully clamp the power steering pump in a vice using timber to provide protection.

(2) Where fitted, remove the spark plug lead/hose mounting bracket from the top of the pump body.

(3) Remove the pulley retaining bolts and washers and the nut from the end of the pump shaft.

(4) Remove the pulley from the front of the pump shaft.

(5) Remove the reservoir cap and where fitted, the fluid filter from the reservoir.

(6) On 1980-1984 models remove the pipe connector union and the bolt from the end of the reservoir. Remove and discard the 'O' rings.

On 1985-1987 models remove the flange bolts and lift the reservoir off the front pump body. Remove and discard the 'O' ring.

(7) On 1980-1984 models, tapping carefully on the front edge of the reservoir with a soft hammer, remove the reservoir from the pump body. Remove and discard the 'O' ring from the pump body.

Remove the spring clip and withdraw the filter and magnet from the reservoir.

(8) Carefully clamp the front pump body in a vice with suitable jaw protection and on 1985-1987 models remove the connector from the side of the front pump body and withdraw the relief valve and spring.

(9) Remove the retaining bolts and detach the rear pump body.

(10) On 1985-1987 models remove the snap ring from the rear end of the pump shaft, remove the rear

end plate, the cam ring, the rotor with vanes and the front end plate where fitted, from the front of the pump body, remove and discard the gasket.

(11) On 1980-1984 models, remove and discard the 'O' rings from the rear pump body.

(12) On 1980-1984 models, remove the relief valve and spring from the rear pump body.

(13) On 1980-1984 models remove the pulley flange from the front end of the pump shaft using a suitable puller. Remove the key from the shaft using suitable pliers.

(14) Using a suitable screwdriver, remove the outer seal from the front pump body noting the direction of the seal lip. Remove the snap ring, using suitable snap ring pliers.

(15) Pushing on the spline end of the pump shaft, remove the pump shaft, bearing and spacer from the front pump body section. Note the installed position of the spacer, where fitted.

(16) Using a press and suitable press plates remove the bearing from the pump shaft.

(17) On 1980-1984 models, using a suitable punch, remove the inner seal from the front pump body, noting the direction of the seal lip.

(18) Remove the rotor with vanes, cam ring and end plates from the rear end of the front pump body.

## TO INSPECT

(1) Clean the pump components in suitable cleaning solvent and blow dry with compressed air.

(2) Inspect the front and rear pump body machined surfaces for wear, scratches and damage.

(3) Inspect the pump shaft for bend and wear on the seal contact surfaces.

(4) Inspect the end plates, cam ring, rotor and vanes for wear, scratches and damage.

(5) Inspect the relief valve for wear, scratches and damage and the spring for cracks and bend.

(6) Inspect the shaft bearing for wear and damage and the bolts, spacer, key and connector for wear and damage. Renew all the unserviceable components.

## TO ASSEMBLE

*NOTE: Lubricate all the pump components with the specified power steering fluid and pack the seals with suitable grease before assembly.*

(1) On 1980-1984 models, using a suitable tube to contact the outer edge, press a new inner seal into the front pump body with the seal lip facing the direction noted during dismantling.

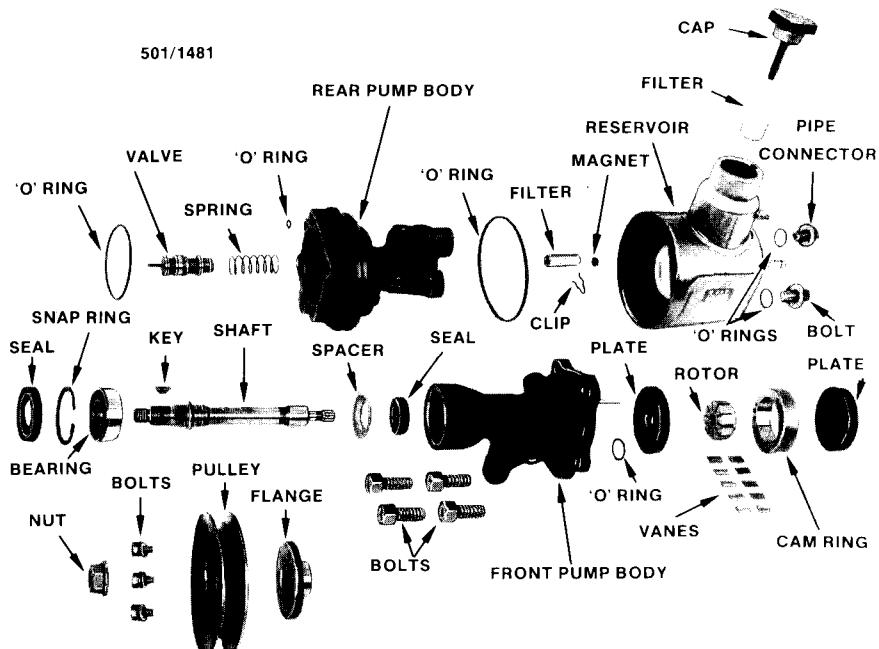
(2) Using a press and suitable press plates instal the bearing onto the pump shaft. Instal the spacer in the position noted during dismantling.

(3) Using a suitable tube to contact the bearing outer race, press the pump shaft into the front pump body ensuring that the spacer where fitted, does not damage the pump body or the seal.

(4) Instal the snap ring to the groove in the front pump body bore adjacent to the bearing. Rotate the snap ring in the groove to verify correct installation.

(5) Using a suitable tube to contact the outer edge, press a new outer seal into the front pump body with the seal lip facing the direction noted during dismantling.

(6) On 1980-1984 models instal the key and the pulley flange to the front end of the pump shaft.



Dismantled view of the power steering pump, 1983 model shown.

(7) On 1980-1984 models, instal the relief valve spring in the rear pump body. Push the relief valve squarely into the rear pump body avoiding any twisting movement. Check the valve for free, smooth operation.

(8) On 1980-1984 models, instal a new 'O' ring to the recess in the front pump body and instal the front end plate ensuring that the chamfered end of the shaft holes face the front pump body.

(9) Instal the rotor on the pump shaft and instal the vanes with the radius ground edge facing the outside.

(10) Instal the cam ring with the chamfered ends of the pin holes facing the front of the pump body.

(11) Instal the rear end plate with the chamfered ends of the pin holes facing the cam ring.

(12) Instal new 'O' rings or a new gasket, as applicable, to the rear pump body, press the rear pump body squarely onto the front pump body and instal the retaining bolts.

(13) Tighten the retaining bolts to a torque of 59 Nm on 1980-1984 models and 29 Nm on 1985-1987 models.

(14) On 1980-1984 models, instal a new 'O' ring to the rear pump body to seal the reservoir.

(15) On 1980-1984 models instal the magnet and filter into the reservoir and instal the spring clip.

(16) On 1980-1984 models using a soft hammer, carefully tap the reservoir onto the rear pump body.

(17) On 1980-1984 models renew the pipe connector union 'O' ring and instal the pipe connector union to the end of the reservoir.

(18) On 1980-1984 models renew the bolt 'O' ring and instal the bolt to the end of the reservoir.

(19) On 1980-1984 models tighten the connector and bolt to a torque of 49 Nm.

(20) On 1985-1987 models instal the relief valve and spring in the side of the front pump body. Renew the connector 'O' ring, instal the connector and tighten to a torque of 59 Nm.

(21) Instal the pulley to the front of the pump shaft and tighten the retaining nut and bolts where fitted, securely.

(22) On 1985-1987 models renew the 'O' ring on the reservoir flange and instal the reservoir. Tighten the flange bolts securely.

(23) Instal the fluid filter where fitted and the reservoir cap to the reservoir.

(24) Turn the pump shaft by hand and check for smooth rotation. If binding occurs, dismantle the pump and check for presence of dirt, foreign matter or misalignment. Clean the pump or rectify faults and repeat the assembly procedure.

## 5. POWER STEERING GEAR ASSEMBLY

### TO REMOVE AND INSTAL

(1) Disconnect the negative battery terminal.

(2) Raise the front of the vehicle, support it on chassis stands and remove the front wheels.

(3) Disconnect the outer tie rod ends from the steering arms.

(4) Where fitted, remove the bolts and disconnect the rubber coupling from the pinion flange, or remove the clamp bolt from the intermediate shaft lower universal joint, as applicable.

*NOTE: Suitably mark the components of the intermediate shaft to aid assembly.*

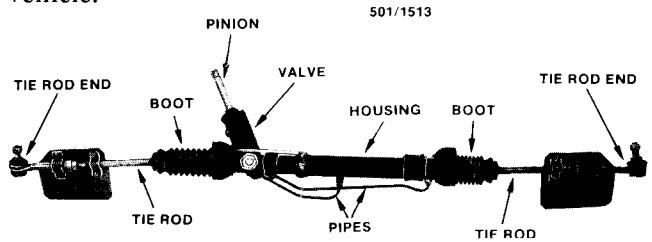
(5) Remove the exhaust engine pipe as described in the Engine section and remove the cross-member plate.

(6) Disconnect the fluid lines from the steering gear assembly, plug the lines to prevent leakage. Plug the holes in the steering gear to prevent the entry of dirt.

(7) Remove the steering gear mounting bolts from the suspension crossmember.

(8) Lower the steering gear until it is clear of the intermediate shaft.

(9) Rotate the steering rearward and withdraw the steering gear out of the right hand side of the vehicle.



**Power steering gear removed from the vehicle, 1983 model shown.**

*NOTE: Special equipment is required to overhaul the power steering rack and pinion assembly. It is therefore recommended that should an overhaul be required the assembly be taken to a specialised workshop for the overhaul to be carried out.*

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

(1) Being careful to avoid damage to the rubber boots, slide the steering gear assembly into the cross-member from the right hand side of the vehicle.

(2) Rotate the steering gear assembly and insert the pinion into the intermediate shaft lower universal joint or, where fitted, connect the pinion flange to the rubber coupling, aligning the marks made during removal.

(3) Instal the steering gear mounting clamps and tighten the mounting bolts to the specified torque ensuring that the clamp on the pinion end of the steering gear assembly is tightened first. Instal the crossmember plate and tighten the retaining bolts securely.

(4) Where fitted, instal the intermediate shaft

lower universal joint clamp bolt or the rubber coupling bolts. Tighten the bolts to the specified torque.

(5) Connect the fluid lines to the steering gear assembly and tighten the connections securely.

(6) Connect the outer tie rod ends to the steering arms and tighten the retaining nuts to the specified torque.

(7) Fill the power steering pump reservoir and check the fluid level as previously described.

(8) Purge the system of air as previously described.

(9) Adjust the toe in/out as described in the Front Suspension section.

## 6. STEERING COLUMN

To remove, instal, dismantle and assemble the steering column follow the procedures outlined in Part 2. Conventional Steering.

## 7. INTERMEDIATE SHAFT

To remove and instal the intermediate shaft follow the procedures outlined in Part 2. Conventional Steering.