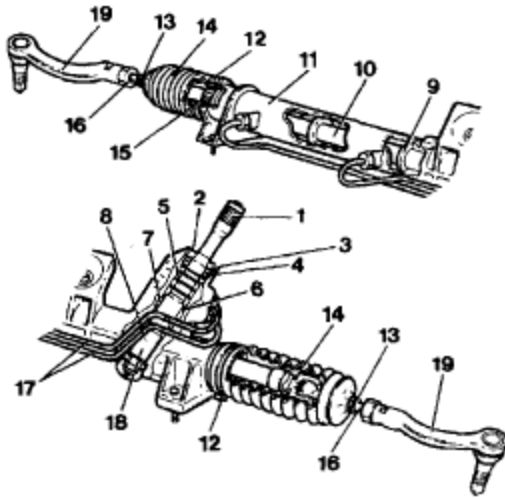


Description and Operation - Steering Gear

Design

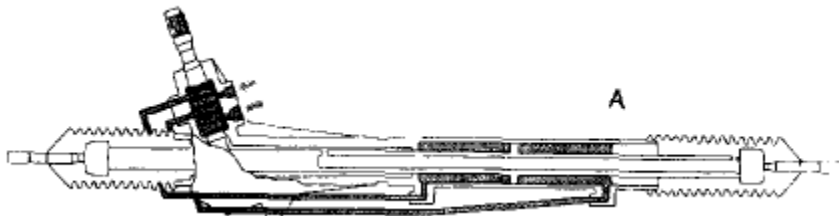


Legend

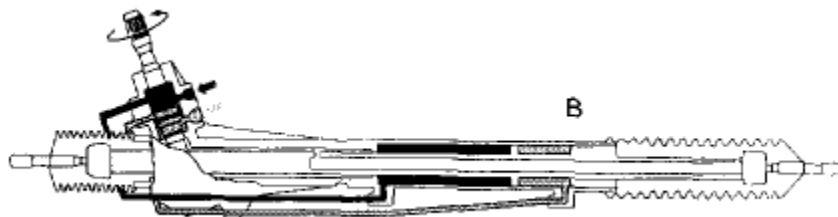
1. Input shaft pinion
2. Dust cover
3. Seal
4. Roller bearing
5. Rotary valve
6. Seal
7. Sliding bearing
8. Actuating piston
9. Rack seal
10. Rack
11. Cylinder pipe
12. Clamp
13. Clip
14. Protective bellow
15. Sliding bearing
16. [Tie rod](#)
17. Oil pipe
18. Gear drive (pinion)
19. Outer [ball joint](#)
20. Piston
21. Steering gear housing The steering gear is of the rack and pinion type with the mechanical and servo assisted elements combined in one module. This means that even if the servo assistance was lost the mechanical [steering](#) would remain. The mechanical element consists of the gear drive (18), steering rack (10) and [tie rods](#)

(19). The gear drive is carried by a journey bearing (7) and a roller bearing in the steering gear housing. The input shaft is carried in a roller bearing (4). The right end of the steering rack is supported in a bearing. The rack is actuated in the housing by the gear drive (18) and spring-loaded pre-tensioning piston. A cylinder pipe (11) is secured to the steering gear housing (21). This pipe also acts as the operating cylinder for the [power steering pump](#) piston. Oil from the [power steering pump](#) is controlled in the valve housing. This is integrated with the steering gear housing. The steering gear input shaft is connected to the gear drive with a torsion bar. The steering gear is connected to the [tie rods](#) that have [ball joints](#) at the ends. The inner ball joints are inside rubber boots and fastened directly onto the steering rack. The outer [ball joints](#) are permanently greased and fixed onto the [tie rods](#). The mechanical element of the steering gear is lubricated with a semi-fluid grease and separated from the servo element with seals (6 and 9). In a [steering](#) operation when one rubber boot is compressed and the other stretched air can pass from one boot to the other via the hollow steering rack and the non pressurized part of the steering gear housing.

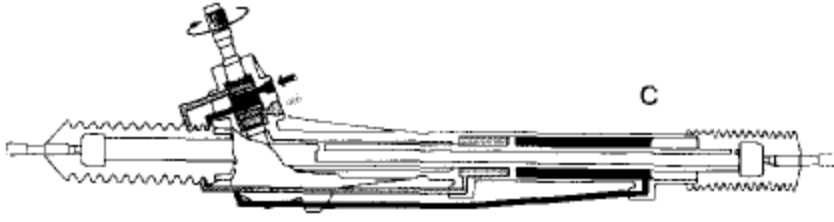
Operation of steering gear and fluid flow



A. Neutral position, the fluid can flow freely through the steering gear.

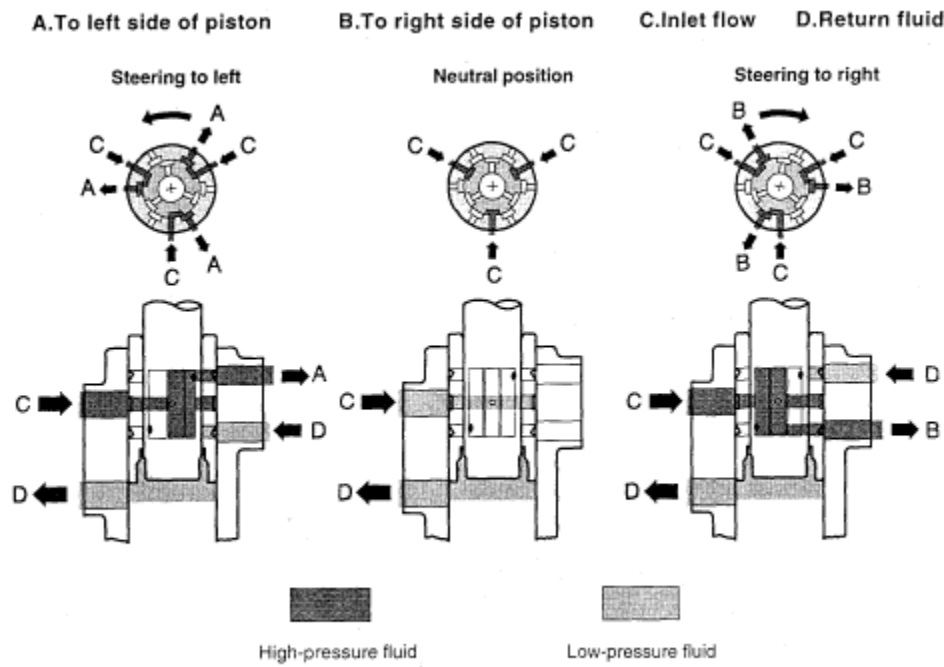


B. [Steering](#) left Fluid under high pressure flows from the [power steering pump](#) into the valve housing through the upper terminal. From the valve housing, the fluid flows via the rotary valve into the external pipe in the steering gear and acts on the piston (20) and steering rack (10). See the diagram found above in Design. The steering rack is therefore forced to the right.



C. Steering right Fluid under high pressure flows from the power steering pump into the valve housing through the upper terminal. Fluid flows into the steering gear via the external pipe and acts on the piston (20) and steering rack (10). The steering rack is forced to the left.

Rotary valve assembly



The steering gear input shaft acts on the steering gear drive. The shaft has external lugs. There is radial play between the lugs.

A torsion bar that joins the input shaft to the gear drive holds the lugs in a position where the play is equal on each side when there is no steering input on the shaft. The torsion bar is pressed into the gear drive. The torsion bar is secured to the input shaft with a pressed in locking pin.

A rotary valve is located in the valve assembly and fixed to the gear drive with a lock pin. The valve operating range is radial between six narrow vertical channels in the rotary

valve and six milled grooves in the input shaft. The valve is balanced as a complete unit and cannot be rebalanced.

The valve is open when the car engine is running and there is no [steering](#) input. In the open position the servo oil flows through the valve freely and none of the ducts to the operating cylinders are blocked.

When the [steering wheel](#) is turned to the left and the wheel resistance is so great that the torsion bar inertia is overcome, the steering gear input shaft moves to the left in relation to the torsion bar. The input shaft moves within the play allowed between the lugs. With this movement the input shaft stops the free flow through the valve and sends the fluid through the upper feed pipe to the left-hand side of the piston.

As long as the torsion bar is affected by [steering](#) input the oil pressure continues to push the steering rack to the right. If the steering input diminishes the torsion bar springs back and the valve assembly returns to the center position so that the oil can circulate freely within the valve assembly.

The function when turning right is, in principle, the same as to the left. The only difference is that the steering gear input shaft sends the high pressure fluid through the valve's lower feed pipe to the right side of the piston.