

Alternator

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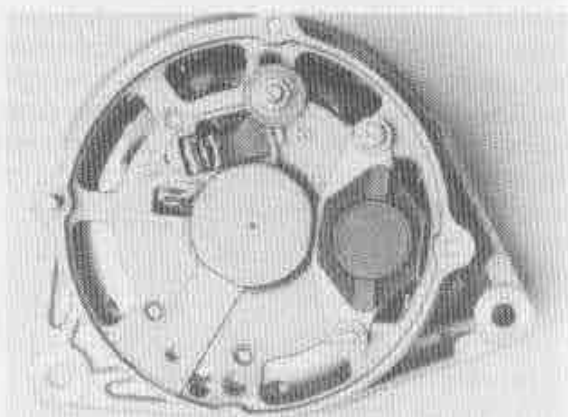
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When the engine is running, the alternator supplies the various electrical components and also charges the battery.

The pulley is equipped with vanes to dissipate the heat generated in the alternator. When the pulley is rotating, the vanes draw air through the alternator to provide the necessary cooling.

The alternator is mounted on the side of the engine and driven by twin V-belts.

Two alternator models are in use, depending on the variant and market specification: The Bosch 70 A and 80 A.



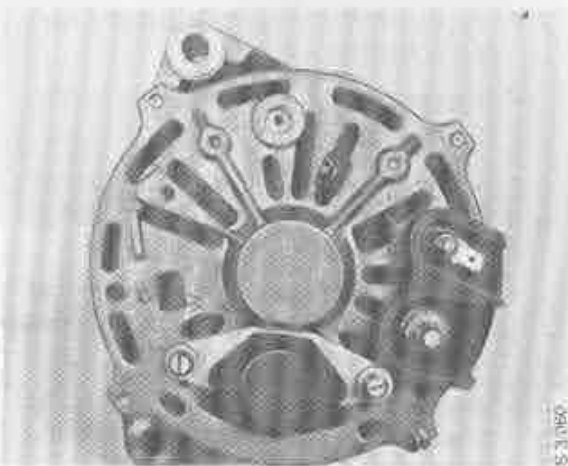
Bosch 70 A alternator

Principle of operation

When the ignition is switched on, the circuit will be closed from the ignition switch via the warning lamp to terminal D+ on the alternator. Current will then flow through the rotor winding and to earth through the voltage regulator.

Current flowing through the rotor generates a magnetic field around the rotor. When the engine is started and the rotor starts to rotate, the magnetic field will also rotate, generating an alternating current in the stator windings. The alternating current is rectified in the rectifier diodes, and the direct current will be supplied to the battery via terminal B+.

The current from the stator windings also flows through the excitation diodes to the voltage regulator, where it is used for controlling the output voltage. When the voltage has risen to about 14 V or above, the regulator will reduce the current flowing through the rotor winding.



Bosch 80 A alternator

321-2 Alternator

This weakens the magnetic field and thus reduces the current generated in the stator windings.

The voltage regulator thus limits the voltage to a maximum of approximately 14 V.

The warning lamp is also affected by the voltage supplied by the stator windings via terminal D+ on the regulator, so that when the voltage on both sides of the warning lamp is the same, the lamp will not be alight. The lamp therefore indicates whether the alternator is charging.

No current limiting relay is required, since the alternator limits the current itself. When the alternator is running at high speed, the frequency of the induced alternating current will also be high, and when the output current has reached a given value, the resulting resistance (impedance) will be of such magnitude that any further current increase would be impossible.

Caution:

Never:

- earth the excitation terminals of the alternator or regulator or the interconnecting cable.
- reverse the polarity of the regulator.
- disconnect the regulator or battery while the alternator is running.
- remove the alternator while the battery is connected.
- run the alternator if the cable between the negative terminals of the alternator and the regulator is not connected.
- test the alternator and regulator assemblies in the car or on a test bench unless the battery is connected.
- reverse the polarity of the battery, as this may result in serious damage to the alternator.

Alternators should be overhauled only by specialist workshops. It is vitally important that they are dismantled and tested correctly, as seemingly minor errors may lead to serious damage.

Caution:

To avoid damage to the alternator, disconnect the negative (-) battery cable and all alternator connections before carrying out any electric welding on the car.

Internal circuitry

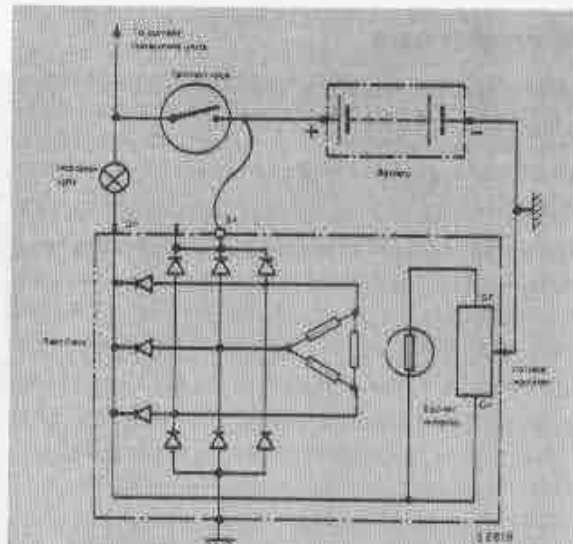
The alternator, which is internally ventilated, has a 12-pole rotor and six silicon diodes for rectification. The 80 A alternator has 12 silicon diodes for rectification and an additional two for the "third circuit".

An excitation diode is connected to each of the three stator windings. The excitation diodes are interconnected at terminal D+. The stator windings form three phases. Those of the Bosch 80 A are star-connected, and those of the Bosch 70 A are delta-connected.

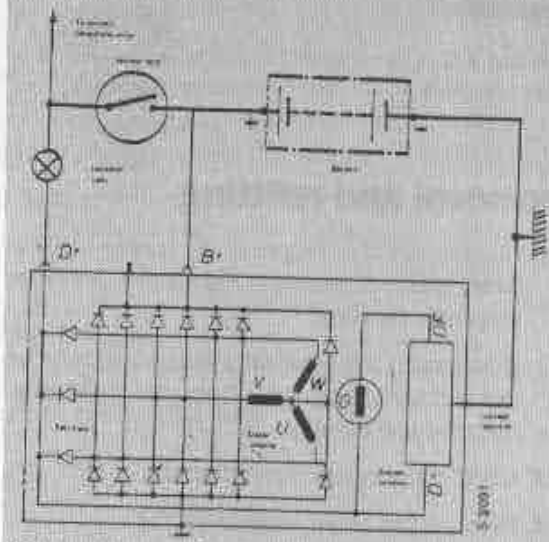
The six (14 on the 80 A) rectifier diodes are connected in the form of a bridge circuit, i.e. three (seven on the 80 A) diodes are connected for normal polarity (anode to the terminal) and three (seven on the 80 A) for reversed polarity (anode to earth).

The diode holder is either insulated from the stator frame (earth) or directly earthed, according to the polarity. The excitation winding is mounted in the rotor, which has claw-type poles, with alternate claws acting as north pole and south pole.

The excitation current is supplied to the rotor coil via slip rings on the rotor.

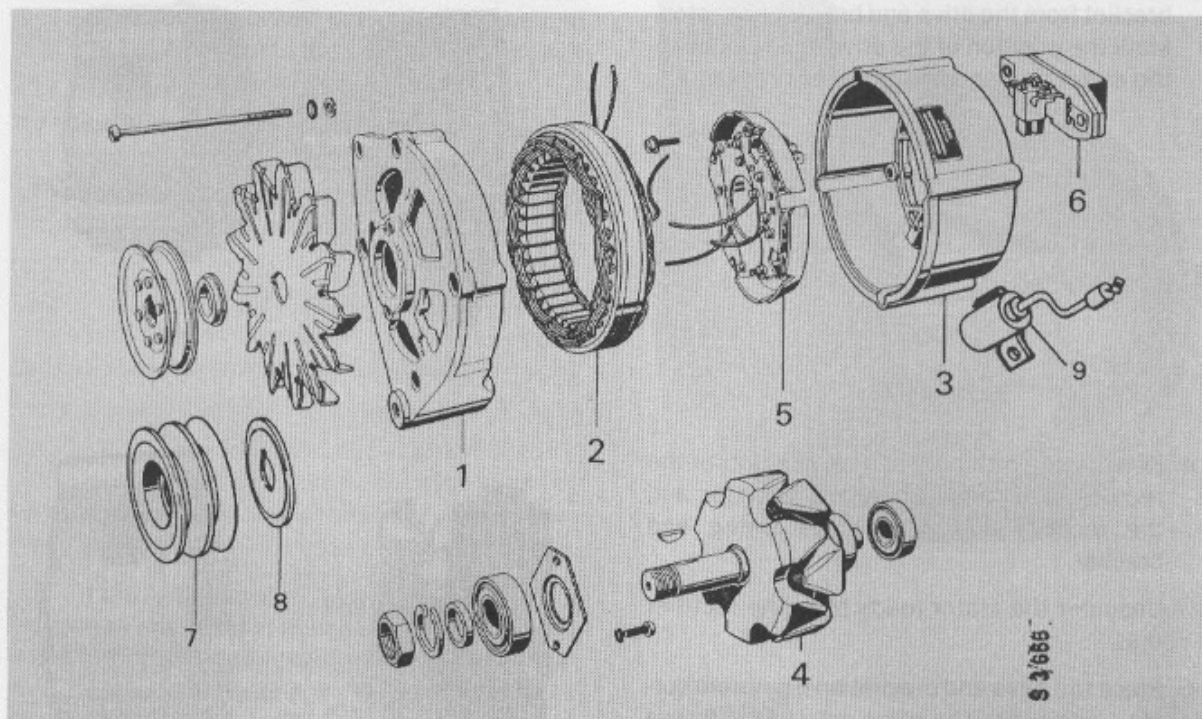


Wiring diagram for the Bosch 70 A alternator



Wiring diagram for the Bosch 80 A alternator

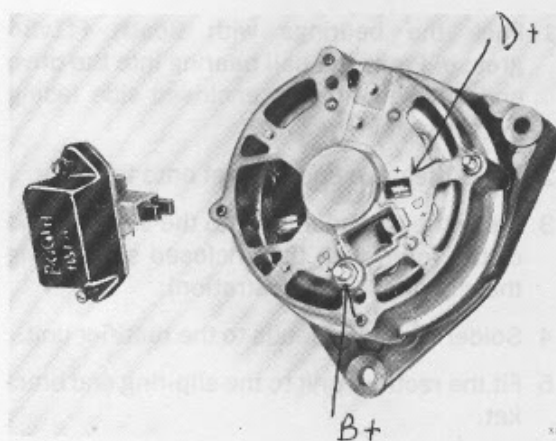
To dismantle



The Bosch 70 A and 80 A alternators

- 1 Drive end bracket
- 2 Stator
- 3 Slip-ring end bracket
- 4 Rotor
- 5 Rectifier unit
- 6 Voltage regulator and brush-holders
- 7 Pulley
- 8 Large thrust washer (80 A only)
- 9 Interference suppressor (capacitor) (80 A only)

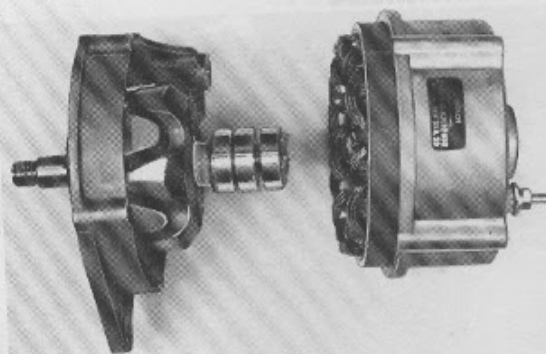
- 1 Clamp the pulley and remove the pulley nut, using a 22 mm socket. Remove the pulley and fan.
- 2 Remove the voltage regulator from the alternator.



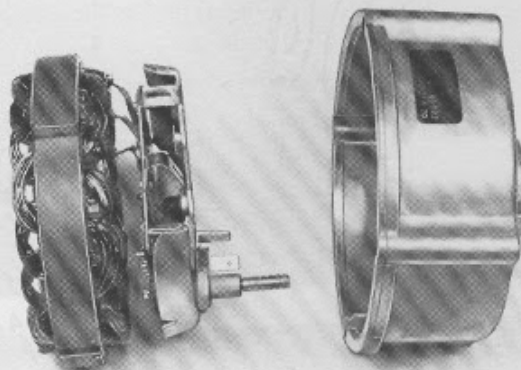
Voltage regulator removed from alternator

321-6 Alternator

- 3 Separate the stator and slip-ring end bracket from the drive end bracket and rotor. Mark the position of the drive end relative to the stator ring and slip-ring end bracket.



- 4 Remove the retaining screws and nut for the rectifier unit, and separate the stator and the rectifier unit from the slip-ring end bracket.
- 5 Unsolder the stator leads from the rectifier unit.
- 6 Place the drive end bracket on a suitable surface and press the rotor out carefully. The bearing can now be dismantled. To avoid damage, prevent the rotor from falling as it comes free of the bracket.
- 7 Use an extractor to remove the ball bearing at the slip-ring end.



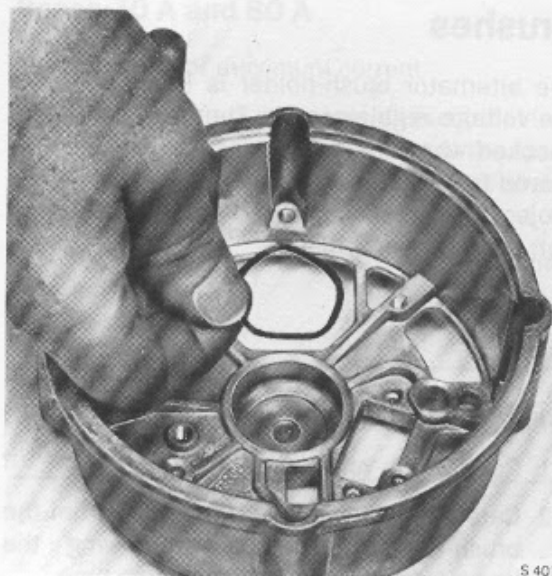
To assemble

- 1 Pack the bearings with Bosch Ft1v34 grease. Press the ball bearing into the drive end bracket with the enclosed side facing the drive.
- 2 Press the drive end bracket onto the rotor.
- 3 Press the ball bearing onto the slip-ring end of the rotor, with the enclosed side facing the slip rings (see illustration).
- 4 Solder the stator leads to the rectifier unit.
- 5 Fit the rectifier unit to the slip-ring end bracket.



S 998

- 6 Place the snap ring for the bearing in the slip-ring end bracket, and refit the drive end bracket and rotor to the slip-ring end bracket and stator, as described earlier.
- 7 Check the length of the brushes. With the brush-holder removed, the brushes should project at least 5 mm (0.2 in) from the brush-holder. Refit the brush-holder.



S 4018

- 8 Fit the fan and pulley. Make sure that the washers are fitted in the correct order (see illustration). Tighten the nut to a torque of 34 - 39 Nm (25 - 29 lbf ft).

(If the fan has done more than 100 000 km (60 000 miles) at the time of overhaul, it should be replaced.)



S 4018

D. To check the brush-holder and connections (brush-holder or rotor removed)

- 1 Check that the brushes move freely in the holder.
- 2 Check the wear on the brushes. The brushes should project at least 5 mm (0.2 in) from the holder when the holder is fitted.
- 3 Check that the brushes are well insulated from each other. Measure the resistance between the brushes.
- 4 Check that the contact between each brush and the "-" or DF terminal is good.

Current too high

Possible causes:

- a Voltage regulator defective
- b Poor contact between regulator and alternator

Alternator noisy

Possible causes:

- a Alternator drive belt very worn
- b Pulley incorrectly fitted
- c Alternator and crankshaft pulleys misaligned
- d Bearings worn or defective
- e Rectifier diode short-circuited
- f Alternator mountings loose

E. Insulation test on assembled alternator

After the alternator has been dismantled and re-assembled, check the insulation between terminal B+ and earth by means of an insulation tester.

Fault-tracing

Alternator not charging

Possible causes:

- a Alternator drive belt slack
- b Charging circuit and/or earth circuit open
- c Brushes defective
- d Short-circuit in diode
- e Excitation circuit open
- f Voltage regulator defective
- g Rotor winding open
- h Stator earthing
- i Earth connection of excitation diode unit open or short-circuited

Insufficient or irregular output current

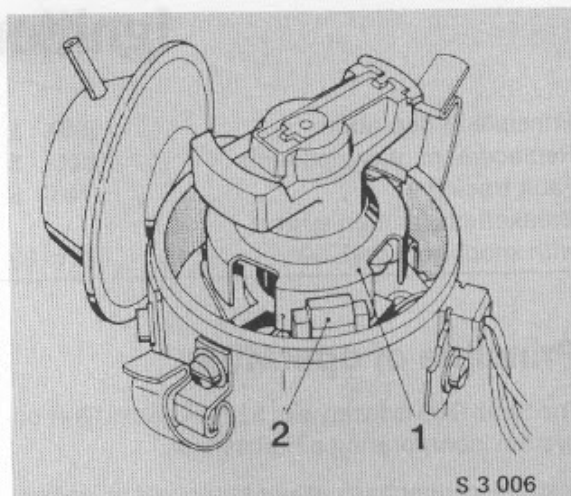
Possible causes:

- a Alternator drive belt slack
- b Irregular breaking in-charging circuit
- c Brushes worn
- d Voltage regulator defective
- e Rectifier diode open or short-circuited
- f Rotor partially short-circuited
- g Stator connection to earth broken or partially short-circuited

340-2 Ignition system

Note:

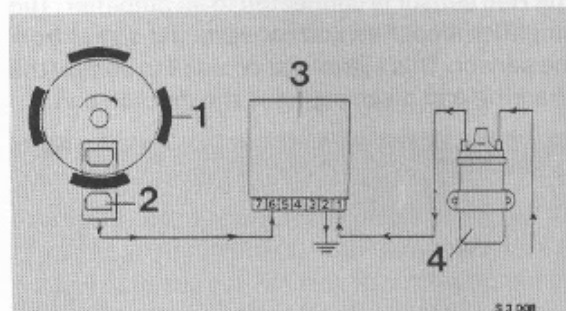
The Hall sensor and the rotor cannot be removed separately. If the sensor unit is suspected of being defective, the entire distributor must be replaced.



- 1 Slotted rotor
- 2 Hall sensor

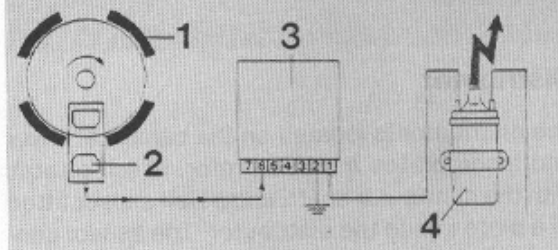
Charging the ignition coil

The slotted rotor breaks the magnetic field. No voltage is generated in the Hall sensor. The amplifier is energised, the primary circuit is closed and the primary winding charges the ignition coil.



Firing instant

The slot in the rotor is in line with the Hall sensor. The voltage generated in the sensor is sensed by the amplifier, which breaks the primary circuit. The spark-firing voltage is now induced in the secondary winding of the coil.



- 1 Slotted rotor
- 2 Hall sensor
- 3 Amplifier
- 4 Ignition coil

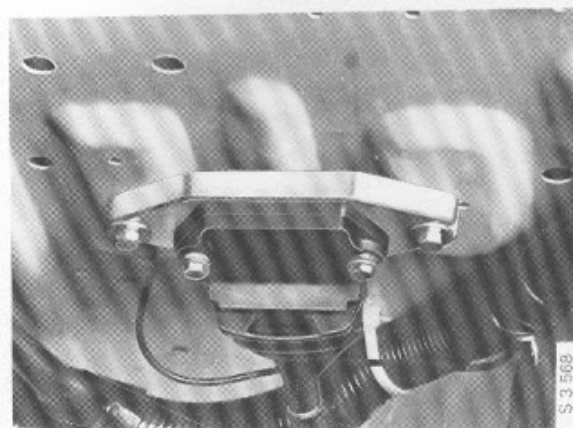
Amplifier

The amplifier is mounted on a cooling plate, forward of the left-hand wheel housing.

The amplifier amplifies and converts the pulse from the distributor. The amplified and converted pulse is then used to control the charging and discharging of the coil.

The amplifier also monitors and controls the dwell angle.

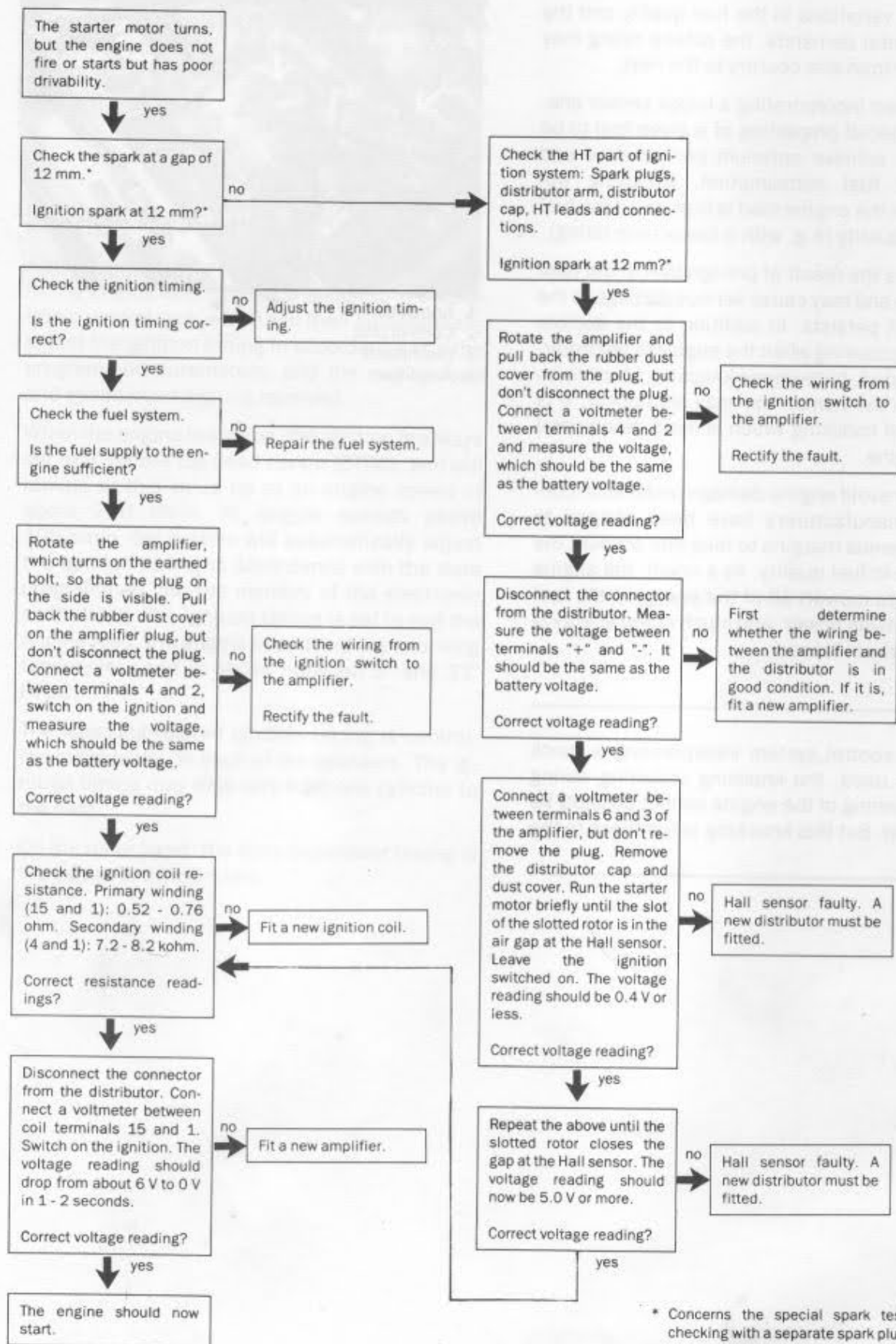
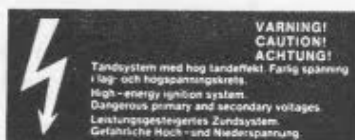
The use of hybrid technology in the design of the module has made it possible to produce an extremely compact amplifier.



Fault-tracing chart

Conditions for testing

Battery fully-charged, fuel in tank, engine and ambient temperatures 32 - 104°F (0 - 40°C). (The temperature has a considerable effect on the values recorded.)



* Concerns the special spark tester. When checking with a separate spark plug, the electrode gap should be about 4 mm (0.16 in).

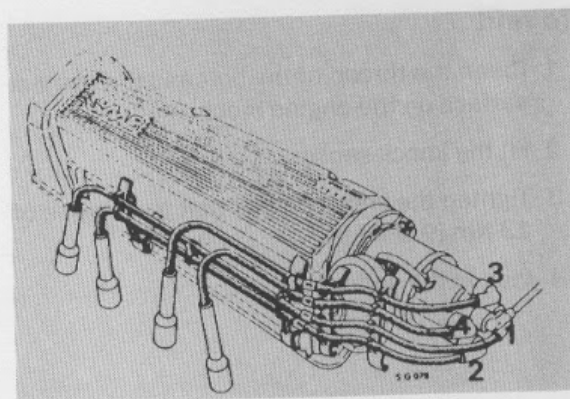
Caution

Remember to check that the car is in neutral before switching on the starter motor.

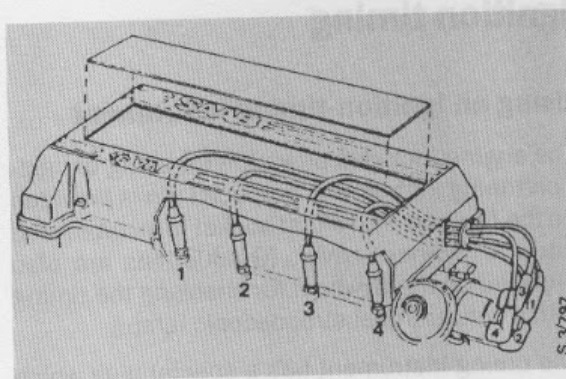
When the engine is being run by means of the TSI, the ignition switch is by-passed, and the radiator fan will therefore not run. So if the engine is run for more than about ten minutes, the ignition system should be switched on by means of the ignition switch, to enable the fan to run. This is necessary because if the engine runs too hot, a faulty reading of the CO content in the exhaust is likely to be obtained.

Note:

Bear in mind that when the ignition is switched on, all other electrical components connected across the ignition switch will also be switched on.



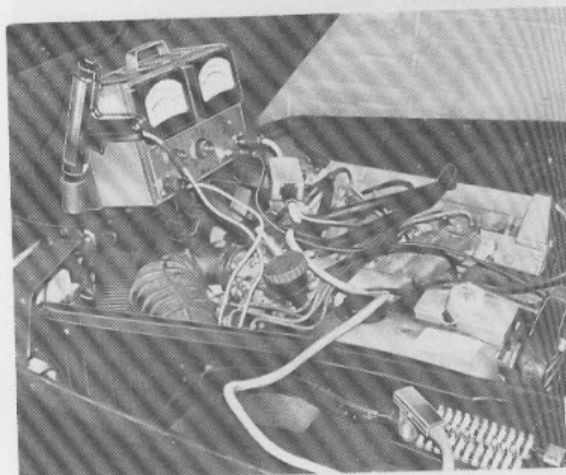
Location of HT leads - 8-valve model



Location of HT leads - 16-valve model

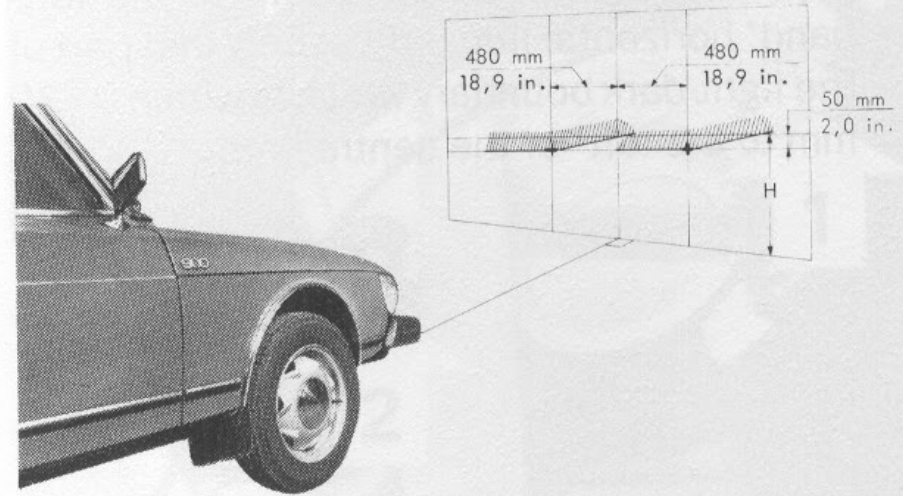
Checking and adjusting the timing

- 1 Connect the timing service instrument (TSI) or equivalent equipment.
- 2 Disconnect the vacuum hose from the throttle housing or carburetter.
- 3 Start the engine and run it as specified in section 023, "Technical data".
- 4 Check the timing and adjust as necessary.



Alignment against panel or wall

- 1 Check the tyre pressures, load the car as it would normally be loaded and position the car on a level surface, 16.5 ft (5m) from the panel.
- 2 Mark on the panel the height of the headlamp centre above the ground.
- 3 Switch on the dipped beams and cover one lamp.
- 4 Check and adjust the beam so that the horizontal part of the light/dark boundary lies 2.0 in (50 mm) below and to the left (right for a left asymmetric lamp) of the headlamp centre. See the illustration. The sloping part of the light/dark boundary should lie fully to the right (left for a left asymmetric lamp) of the mark, and should thus meet the horizontal part precisely under the headlamp centre.
- 5 Align the other headlamp in the same way.
- 6 Check that the full beam has an even spread. If the light pattern is irregular, or if any difficulty is experienced in setting the dipped beam correctly, check that the bulb is properly seated, or fit a new bulb if necessary.



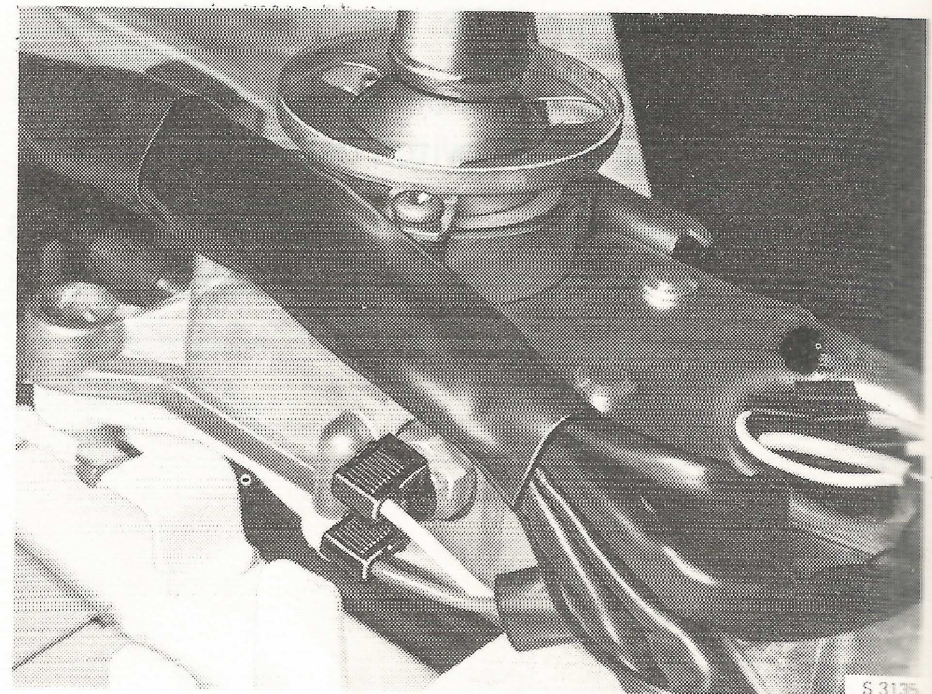
Aligning the lamp against a panel - right asymmetric lamp

H = Height of headlamp centre above the ground

Reversing light switch (manual gearbox)

On cars with manual gearbox, the reversing light switch is located under the console, to the left of the gear lever. The switch closes when the gear lever is moved to the reverse gear position.

In certain cases, the reversing light switch may enter the gear-lever housing too far when it is screwed in, and be damaged. This can be avoided by fitting a washer (part No. 79 74 686) between the switch and the gear-lever housing.



361-2 Direction indicators

To remove the direction indicator stalk switch

The direction indicator/dip switch and wiper/washer switch are located on a bracket fitted on the steering column bearing bracket. The bracket can be removed after removing the steering column bearing bracket.



Steering swivel member

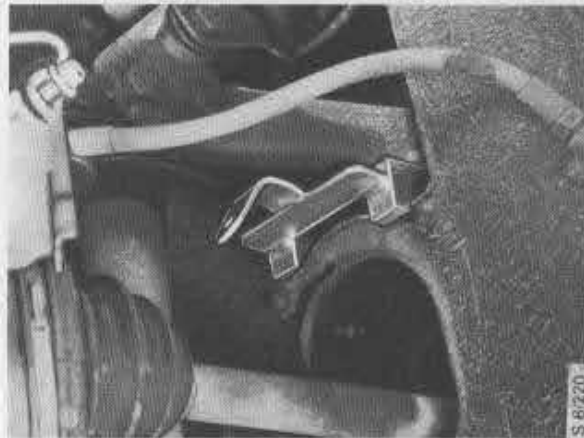
Checking ball-joint play 631-1
Replacing a ball joint 631-2

Replacing ball-joint seals 631-3

Checking ball-joint play

For any ball-joint play to be detected, the wishbones must be relieved of the tension imposed by the coil spring and damper.

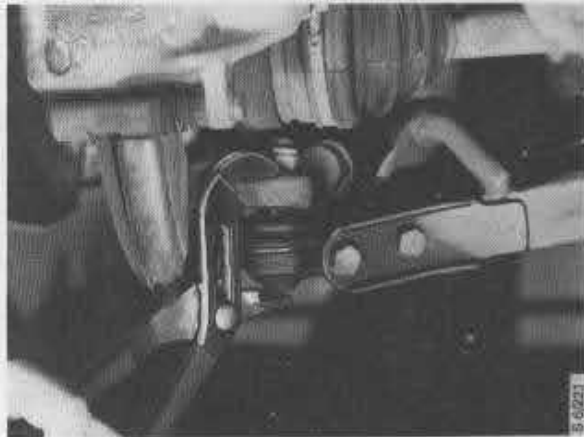
- 1 Fit insert 83 93 209 under the top wishbone.



- 2 Check the axial play in the top and bottom ball joints:

Use a pair of water pump pliers to compress the ball joint.

Maximum axial play: 2 mm.



- 3 Check the radial play in the top and bottom ball joints:

Insert a lever between the wishbone and the steering swivel member. Take care not to pinch and damage the rubber seal!

Maximum radial play: 1 mm.

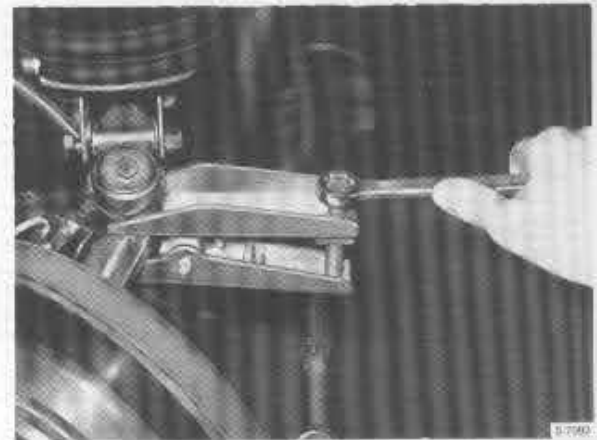


- 4 Inspect the rubber seals for damage and replace any that are defective.

Replacing ball joints

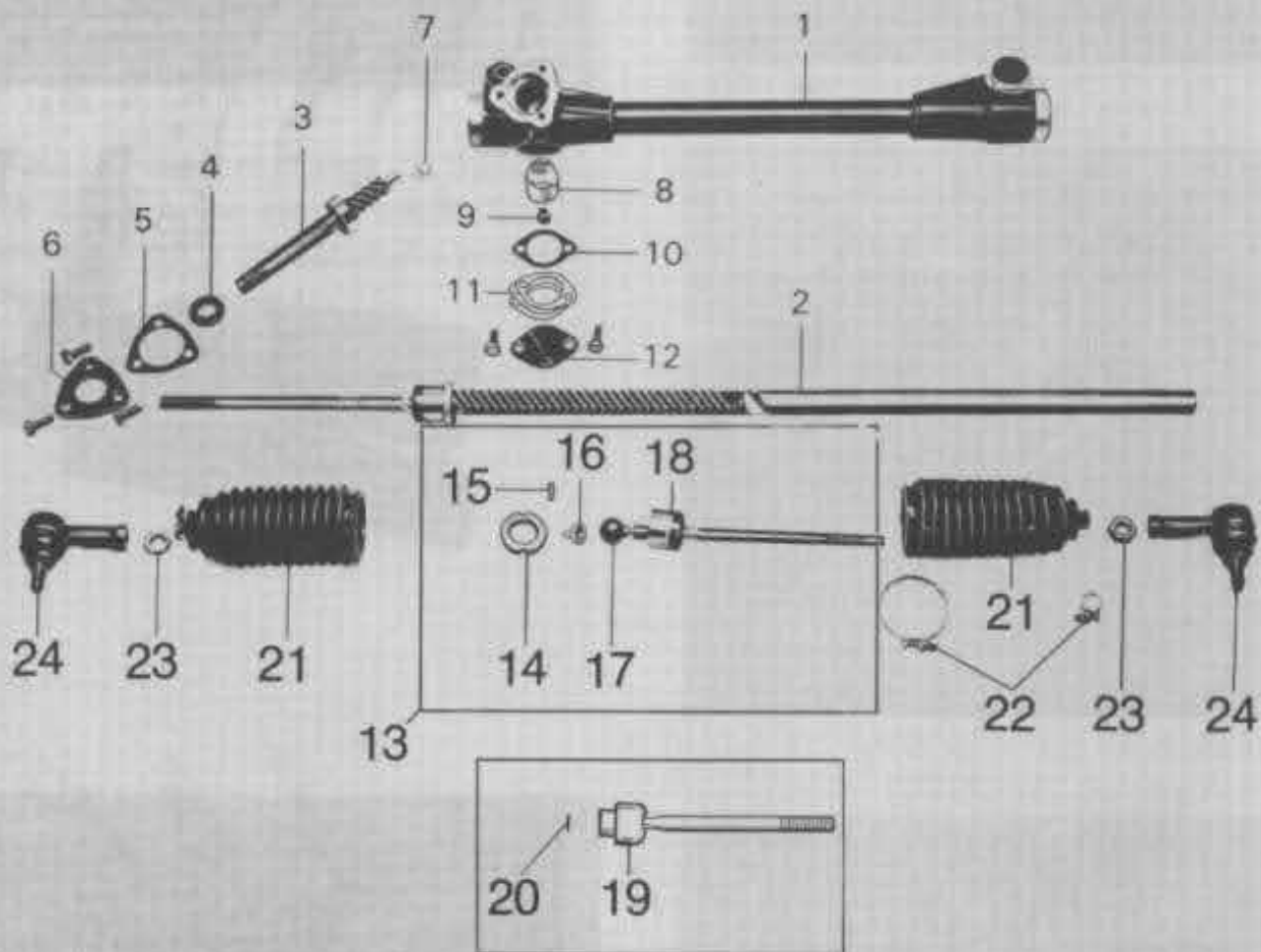
The following method applies to both top and bottom ball joints.

- 1 Raise and support the car and remove the road wheel.
- 2 Place a jack under the outer end of the wishbone and raise the wishbone slightly to relieve the load on the bump stop. Undo the bottom mounting on the damper.
- 3 Lower the jack until the drive shaft is just making contact with the edge of the aperture in the body (leave the jack in position as a support for when you remove the ball joint).
- 4 Undo the nut securing the ball joint to the steering swivel member. Separate the ball joint using tool 89 95 409.



- 5 Remove the ball joint from the steering swivel member. Tie up or support the steering swivel member to prevent the brake lines from being damaged.
- 6 Fit the new ball joint to the steering swivel member and tighten the nut.
- 7 Using new locknuts, secure the ball joint to the wishbone.





Rack-and-pinion gear

- | | |
|--------------------------------------|--|
| 1 Rack housing | 13 Adjustable inner ball joint (M81 and earlier) |
| 2 Rack | 14 Locknut |
| 3 Pinion shaft complete with bearing | 15 Locking pin |
| 4 Seal | 16 Inner bearing cap |
| 5 Gasket | 17 Track rod |
| 6 Cover plate | 18 Outer bearing cap |
| 7 Needle bearing | 19 Nonadjustable inner ball joint (M82 onwards) |
| 8 Damping yoke | 20 Spacer |
| 9 Spring | 21 Gaiter |
| 10 Gasket | 22 Clips |
| 11 Shims | 23 Locknut |
| 12 Cover plate | 24 Track-rod ends |

Caution

The collapsible steering column must be handled with care. If it is knocked or treated roughly the preset length of the telescopic section can be altered and the energy-absorbing properties of the column impaired.

When fitting the steering column, make doubly certain that the splined joint is slid fully home on the pinion shaft, so that the groove in the shaft lines up with the pinch-bolt. The joint should slide easily onto the shaft; should the splines bind, never tap or hammer the top of the column.

Similarly, never hammer or use any form of impact tool to remove or refit the steering wheel.

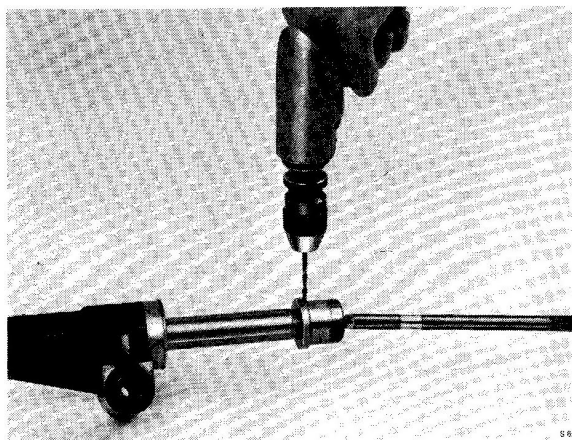
When the front wheels are off the ground, never forcibly swivel a front wheel, causing the steering to spin to full lock. **This can very easily result in serious damage to the steering system.** Operating the rack-and-pinion gear by swivelling a road wheel will cause the steering wheel to spin at high torque, exerting a powerful torsional stress on the steering column when the rotation is arrested by the stop in the rack-and-pinion gear.

To dismantle

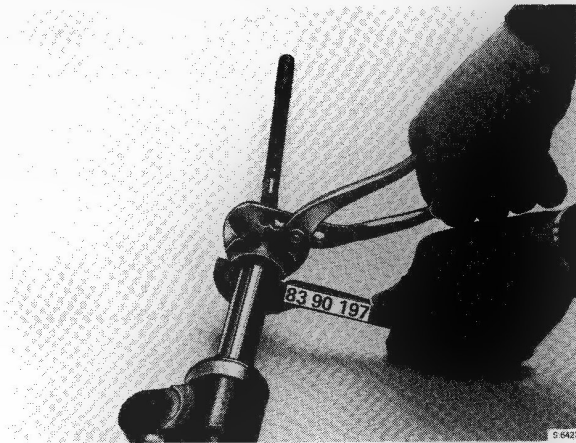
- 1 Undo the locknuts and unscrew the track-rod ends.
- 2 Slacken the clips and remove the rack gaiters.
- 3 Separating adjustable inner ball joints:
 - Drill out the pins in the inner ball joint
Drill diameter: 4 mm; length of pin: 9.4 mm.

Caution

Do not drill too deep.

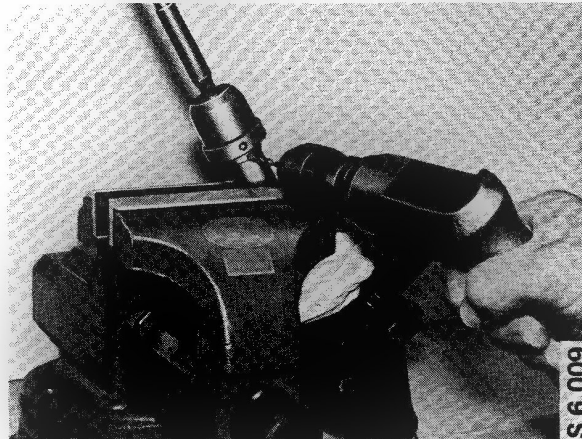


- Remove the outer bearing caps and locknuts using 'C' spanner 83 90 197 and water pump pliers.



4 Separating nonadjustable inner ball joints:

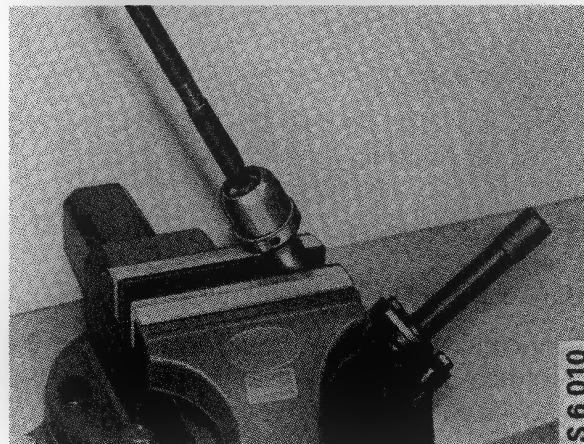
- Place suitable protection around the rack and then drill out the tab in the locking groove. Drill diameter: 4 mm.



- Clamp the rack, pinion end down, in a soft-jaw vice.

Caution

Under no circumstances must force be applied to the pinion when undoing or tightening the ball joint.



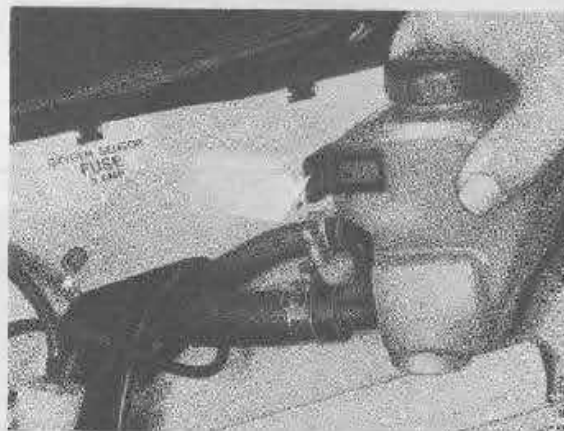
- Undo the inner ball joint using 'C' spanner 89 96 472.



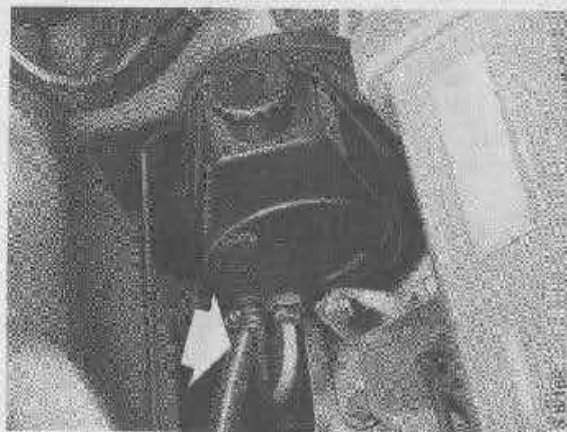
To remove

- 1 Drain the fluid from the system as follows:

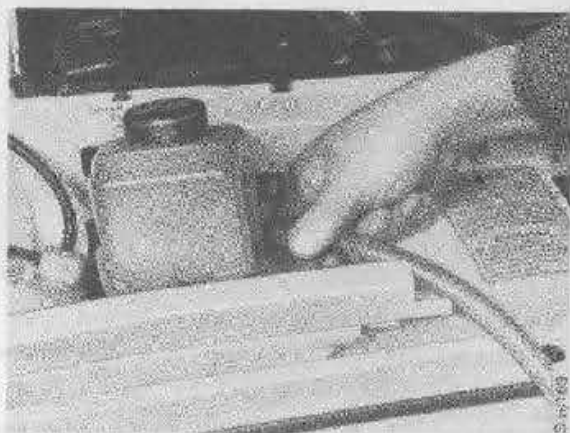
- Cars with B202 engine: Undo the fixings for the fluid reservoir and disconnect the return hose. Plug the opening in the reservoir.



Cars with B201 engine: Disconnect the return hose from the pump and plug the opening.



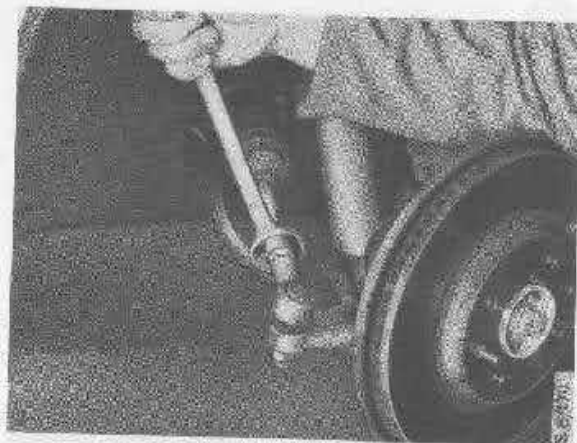
- Connect a length of hose or tubing to the return hose and place the other end in a receptacle having a capacity of at least one litre.



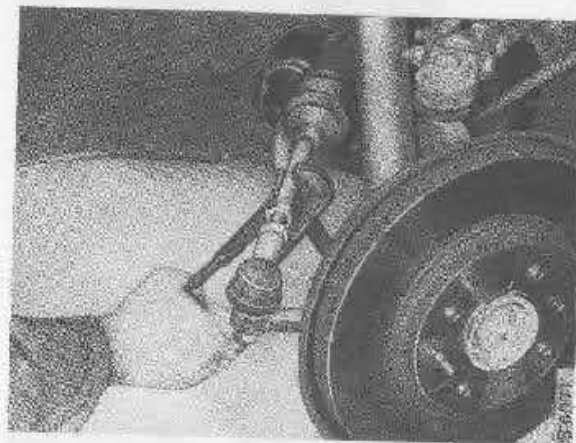
- Start the engine and allow the fluid to be pumped out of the system. Turn the steering wheel twice from lock to lock to drain the system completely.
- Cars with B202 engine: Reconnect the return hose to the fluid reservoir and secure the reservoir.

Cars with B201 engine: Reconnect the return hose to the pump.

- 2 Remove the front wheels.
- 3 Slacken the locknuts on the track rods but then return them loosely to their original position to minimize toe-in adjustment after the steering gear has been refitted.

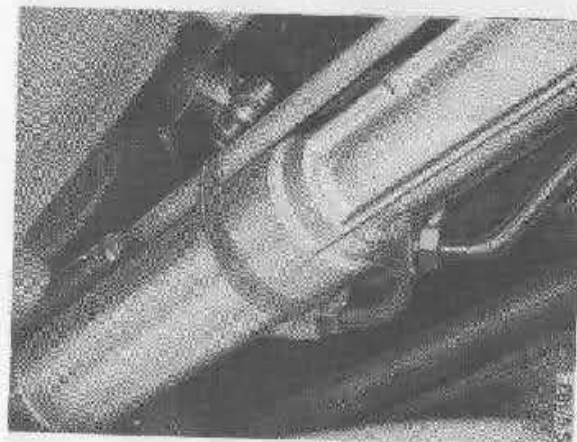


- 4 Unscrew the track rod from the track-rod end, ensuring that the rubber gaiter does not turn with the rod. Measure the distance between the locknut and the end of the track rod; this measurement will assist in setting the correct toe-in after refitting the steering gear.

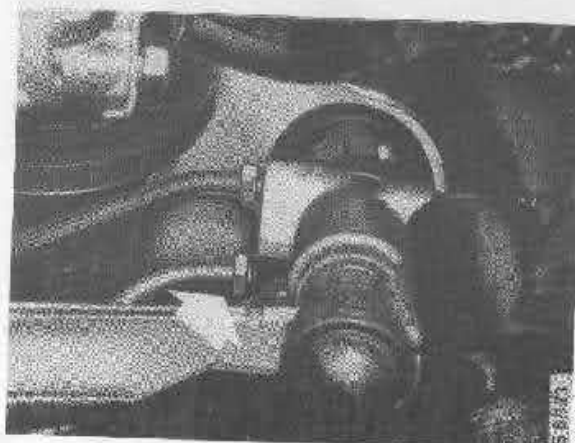


- 5 Remove the strap holding the return pipe to the rack housing and snip through the tie securing the flow hose to the pipe between the control valve and the servo cylinder.

Cars with B201 engine, M87 and earlier: Snip off the tie round the handbrake cables and rack housing.



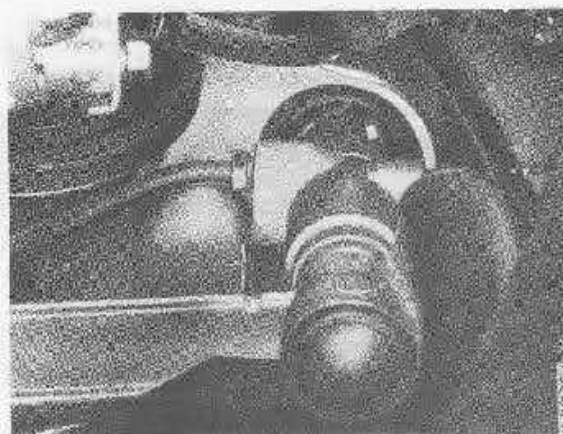
- 6 Disconnect the flow pipe from the control valve (18-mm spanner). Fit some absorbent paper to the end of the pipe to prevent spillage and rest the hose on the exhaust pipe.



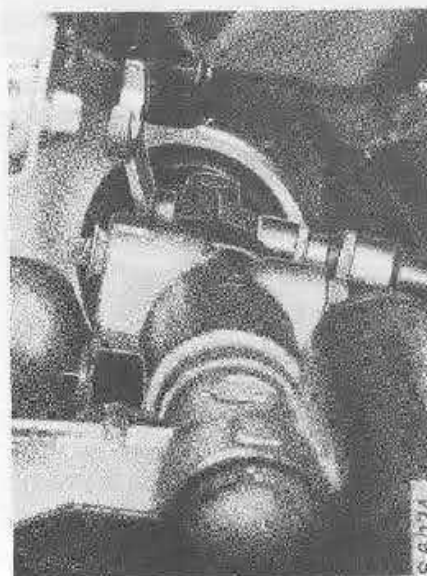
644-4 Power-assisted steering system

7 Disconnect the return pipe from the control valve (16-mm spanner). Tie the return pipe to the speedometer cable.

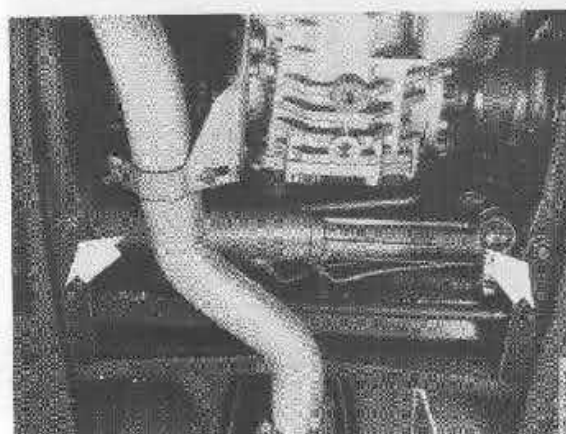
8 Plug the openings in the control valve.



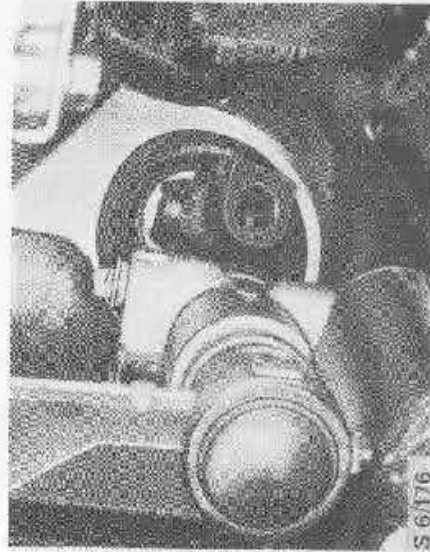
9 Remove the pinch-bolt from the universal joint between the pinion shaft and the intermediate shaft.



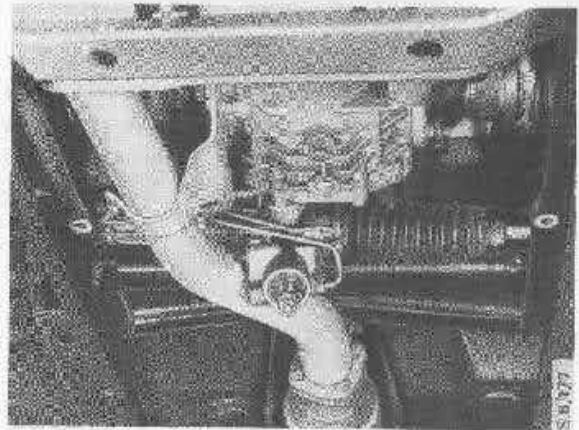
10 Remove the securing bolts for the rack-and-pinion gear assembly.



- 11 Separate the pinion shaft from the intermediate shaft.

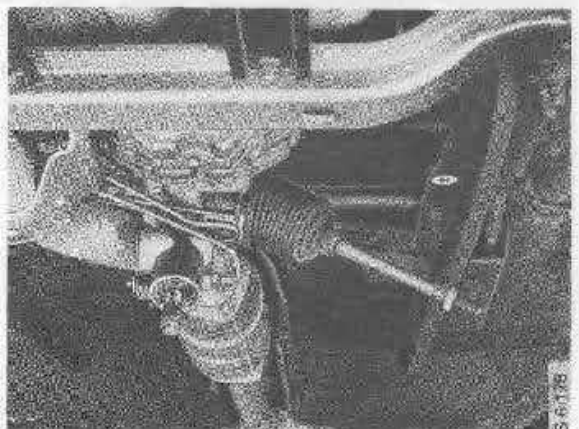


- 12 Turn the rack-and-pinion gear assembly towards the front, so that the pinion shaft points downwards, and then move the assembly as far as it will go to the right (looking towards the front of the car).



- 13 Rotate the pinion shaft until the rack is at the RH end of its travel.

- 14 Position the LH track rod underneath the subframe member.



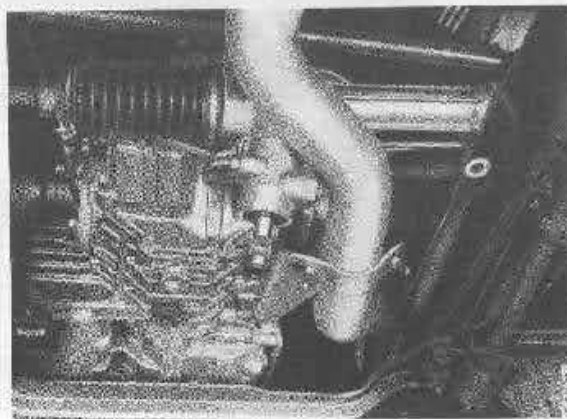
- 15 Move the rack to the LH end of its travel and lower the assembly out of the car.

To refit

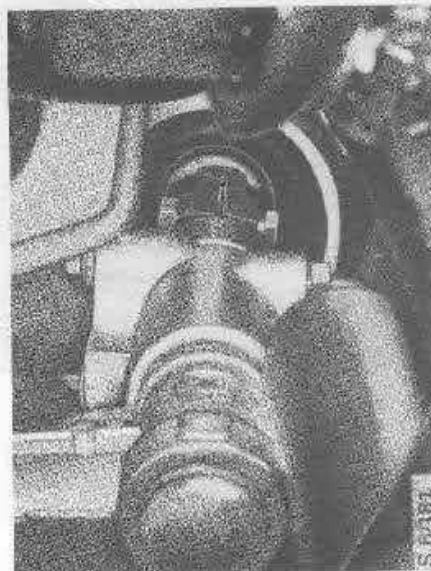
- 1 Move the rack to the LH end of its travel (pinion end), hold the assembly with the pinion shaft pointing downwards and lift the assembly into position.



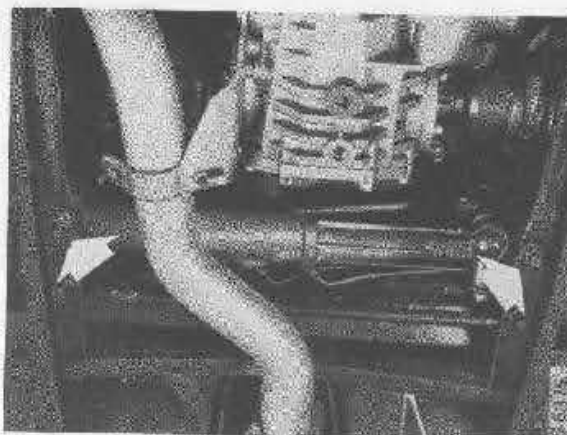
- 2 Move the rack to the RH end of its travel.
- 3 Lift the LH track rod over the subframe member.
- 4 Return the rack to the centre position. The slot for the pinch-bolt in the pinion shaft should be towards the rear of the car when the pinion shaft is pointing downwards.



- 5 Rotate the entire assembly forwards to bring the pinion shaft to the top.
- 6 Connect the pinion shaft to the intermediate shaft and refit the pinch-bolt and nut, leaving them slack.



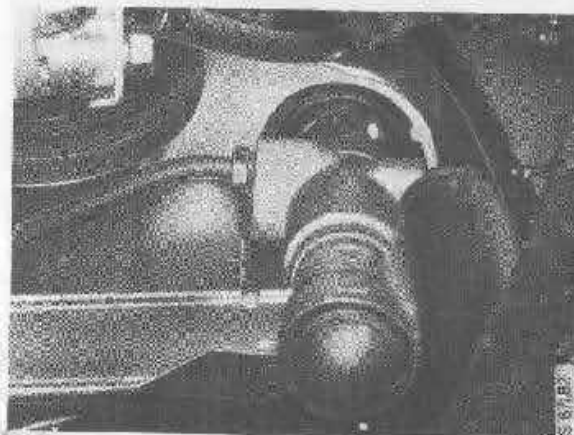
- 7 Tighten the fixing bolts.



- 8 Tighten the pinch-bolt in the universal joint between the pinion shaft and intermediate shaft.

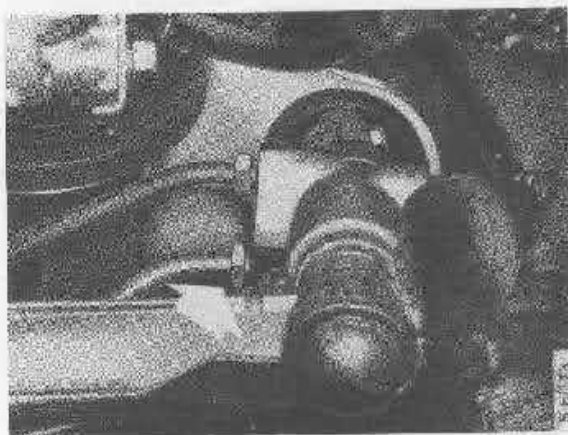


- 9 Check the condition of the "O" ring on the return pipe and then reconnect the return pipe to the pinion housing (16-mm spanner).



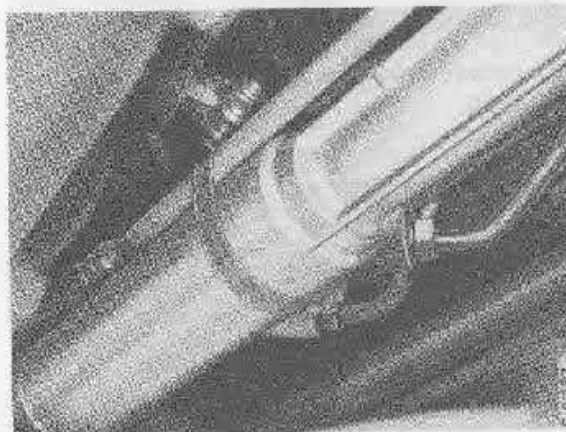
644-8 Power-assisted steering system

- 10 Check the condition of the "O" ring on the flow line and reconnect the flow pipe to the pinion housing (18-mm spanner).

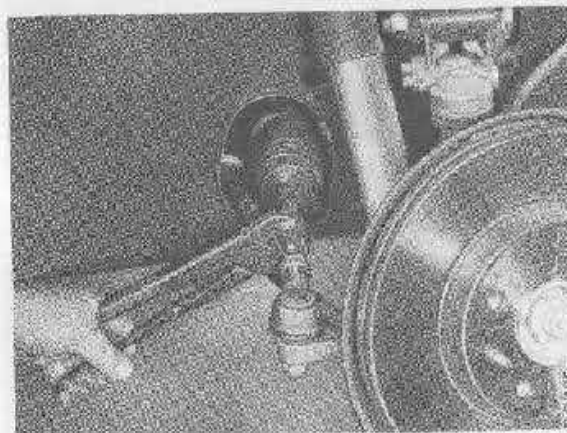


- 11 Fit a strap around the return pipe and rack housing and use a cable tie to hold the pipe to one of the flow pipes between the control valve and servo cylinder.
Note that the pressure-equalizing capillary tube between the rubber gaiters **must not be clipped or tied in any way.**

Cars with B201 engine, M87 and earlier: Fit a cable tie around the handbrake cables and rack housing.



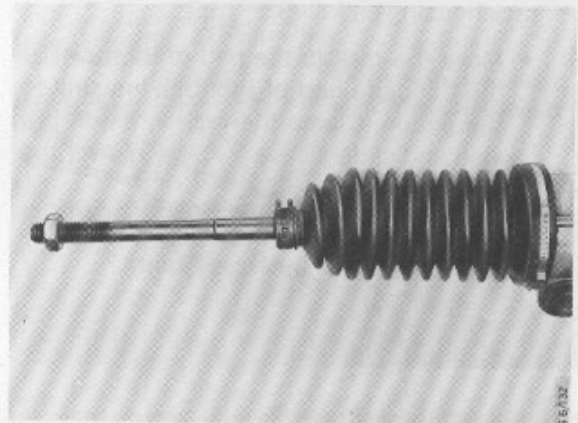
- 12 Screw the track rods onto the track-rod ends until they make contact with the locknuts. Leave the locknuts slack until after the toe-in has been checked.



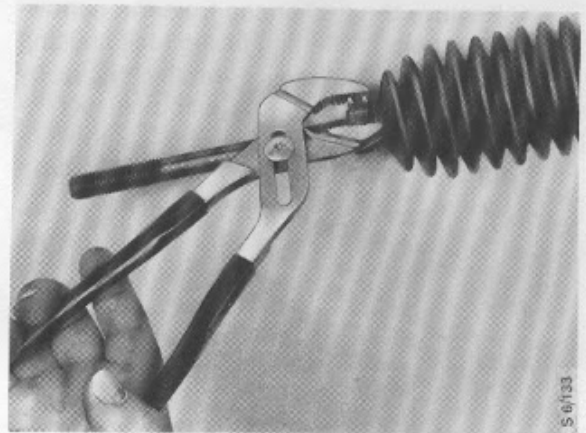
- 13 Refit the wheels.
14 Fill the system with 75 cl (0.8 liq qt) of Texaco 4634 power steering fluid.
15 Bleed the system as follows: with the engine switched off and the front wheels off the ground, turn the steering wheel from lock to lock three or four times.
16 Lower the car, start the engine and turn the steering wheel lock to lock twice more to check that the system is working properly. Check the fluid level.
17 Measure the toe-in and adjust as necessary.
18 Tighten the locknuts on the track rods.

To dismantle

- 1 Measure and note the distance between the locknut and the end of the track rod (on both sides) to minimize adjustment of toe-in on refitting, and then remove the nut.

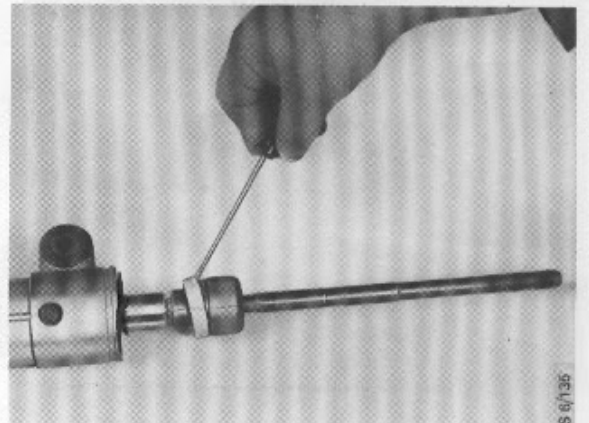


- 2 Remove the rubber gaiters and pressure-equalizing capillary tube.

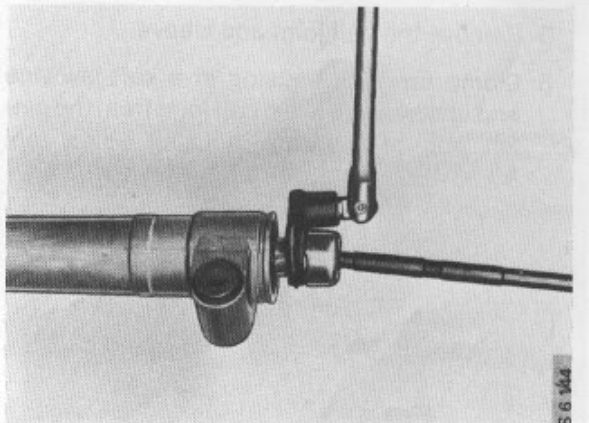


- 3 Remove the inner ball joint at the greater distance from the pinion as follows:

- Undo and slide back the end stop.



- Clamp the rack in a soft-jaw vice and undo the inner ball joint using tool 89 96 480.



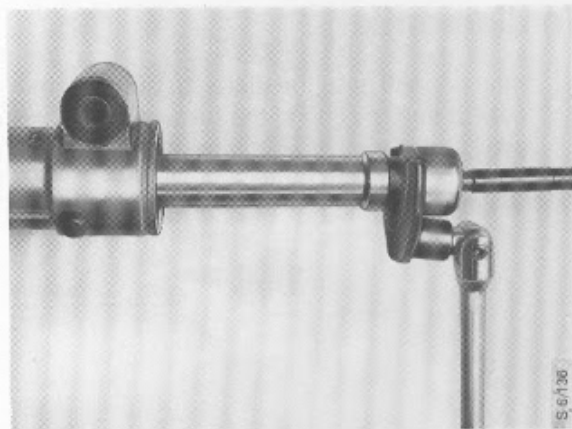
N.B.

Under no circumstances hold the pinion when undoing or tightening the ball joint.

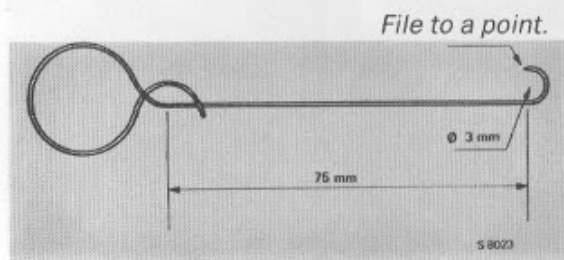
644-10 Power-assisted steering system

4 Remove the circlip from inside the end of the rack housing as follows:

- Move the rack to the end of its travel at the opposite end of the rack housing to the pinion. Clamp the rack in a soft-jaw vice and slide sleeve 89 96 407 over the rack.
- Push in the spring-loaded seal retainer by screwing on the inner ball joint.

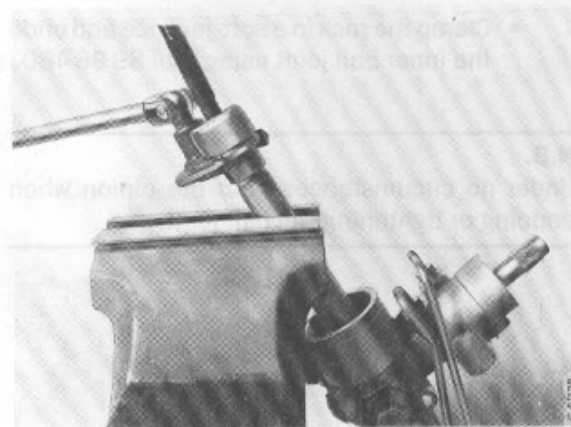


- Remove the rubber cap from the narrow-bore hole in the end of the rack housing and push in the end of the circlip by means of a sawn-off electrical screwdriver (3x15 mm). Bend back and withdraw the circlip using a hook made from a piece of 1-mm piano wire (see drawing).

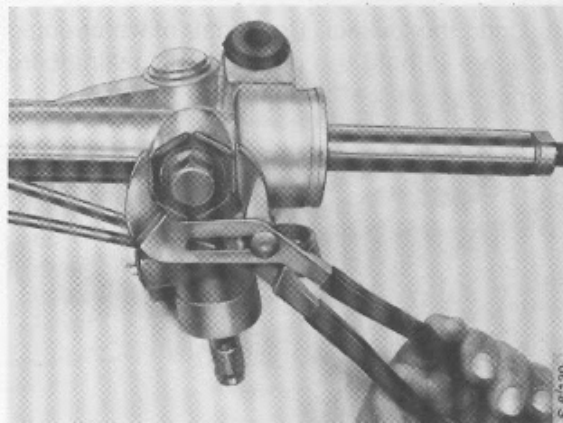


5 Remove the ball joint and sleeve.

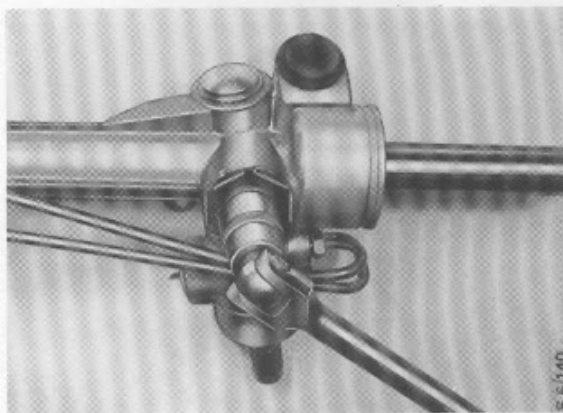
6 Clamp the rack housing in a soft-jaw vice and unscrew the inner ball joint from the pinion end of the rack housing using tool 89 96 480.



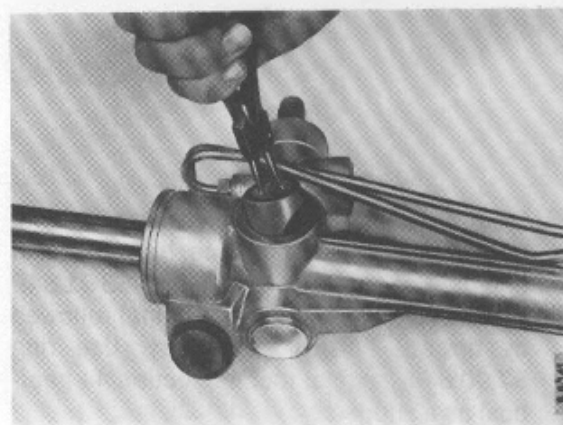
7 Remove the locknut for the damper yoke.



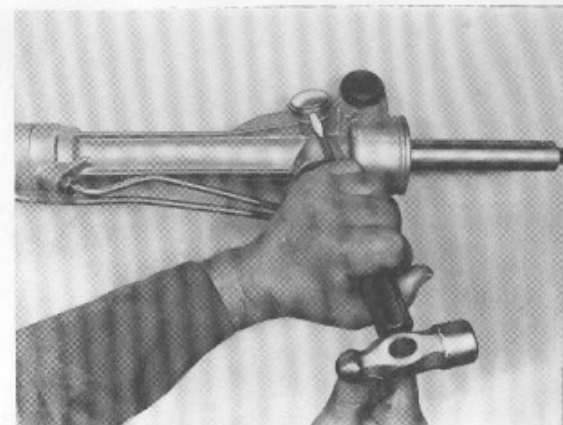
8 Remove the adjusting screw and spring.



9 Lift out the damper yoke. If it proves obstinate, tap the housing gently on the workbench.

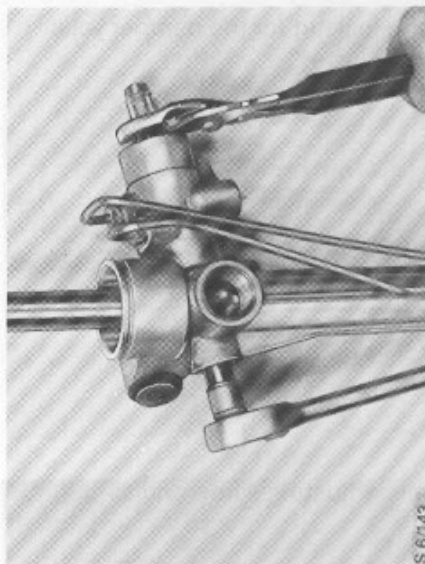


10 Tap off the end cap on the bottom of the pinion housing.



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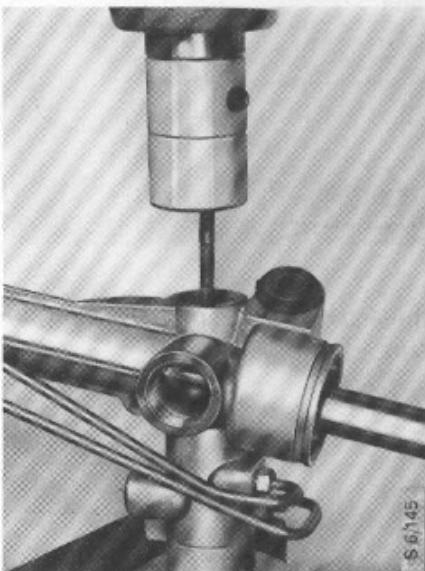
- 11 Undo the locknut. Use a pair of water pump pliers to hold the pinion shaft, taking care not to damage the splines.



- 12 Remove the circlip from the top of the valve.



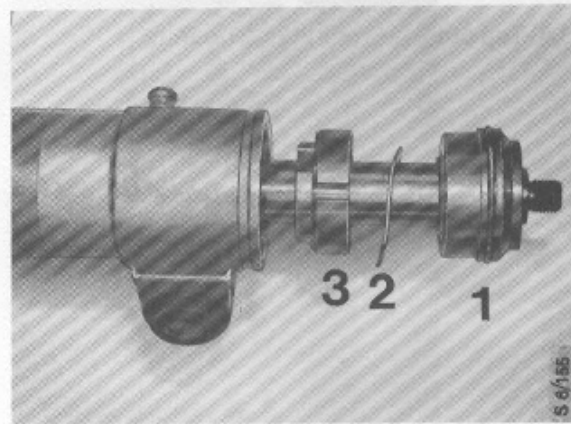
- 13 Press out the pinion and valve complete with needle bearing, bearing race, hydraulic seal and dust cap. Start by using tool 83 91 849 (special tool for section 2 - engine) followed by an M8 bolt, if necessary. Use ring 87 90 644 (special tool for section 4 - gear-box) as a support.



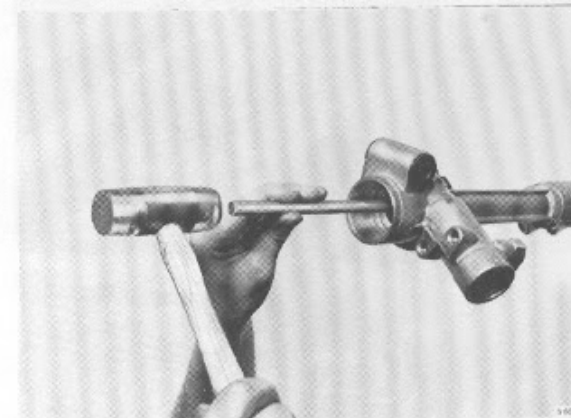
14 Withdraw the rack.



15 Remove the outer hydraulic seal (1), the wave spring washer (2) and the bush (3).

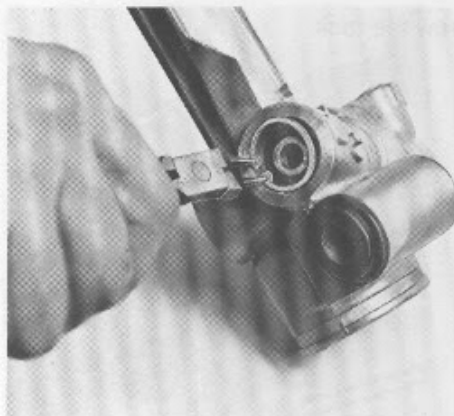


16 Remove the inner seal using tool 89 96 399 and a long drift.

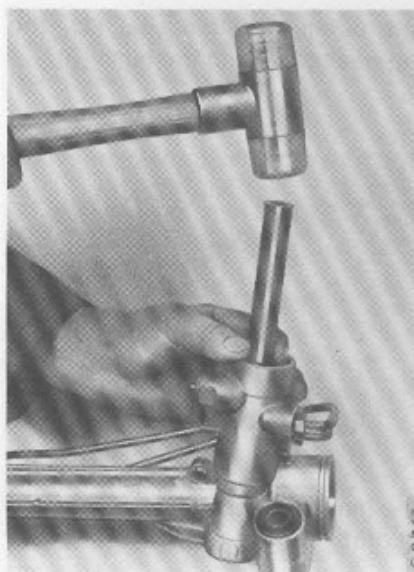
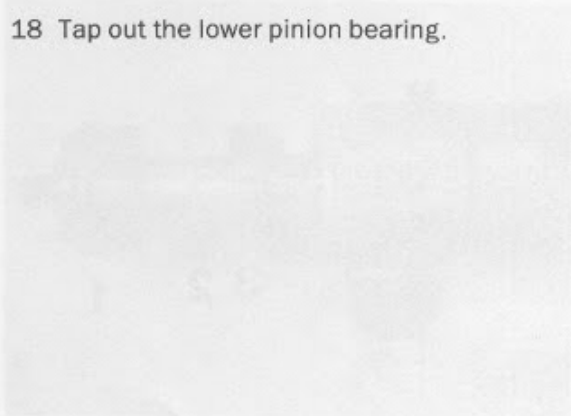


644-14 Power-assisted steering system

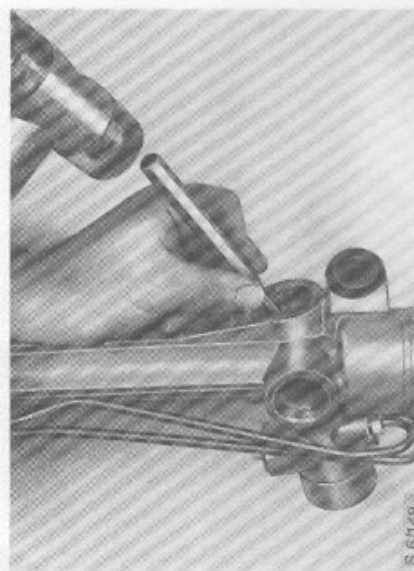
- 17 Remove the circlip from inside the pinion housing.



- 18 Tap out the lower pinion bearing.

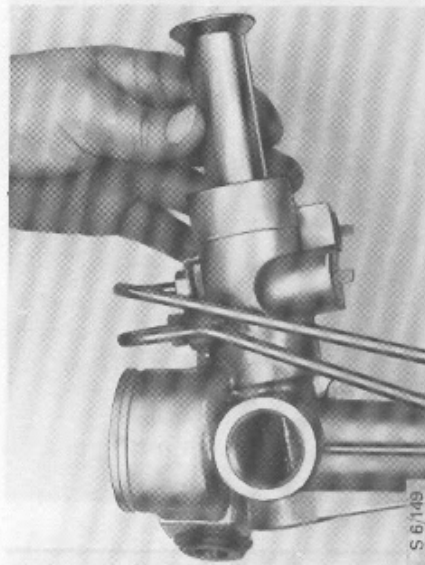


- 19 Tap out the bush and seal using a drift.

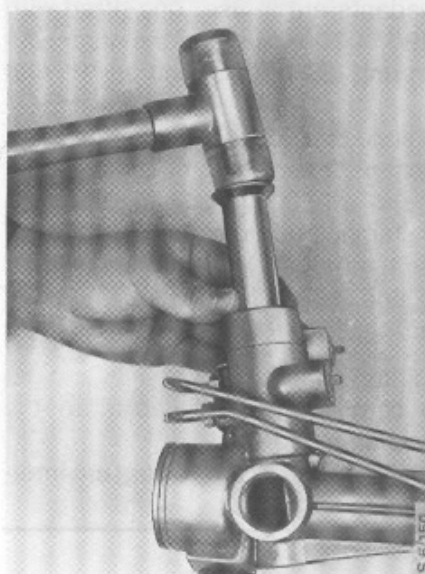


To assemble

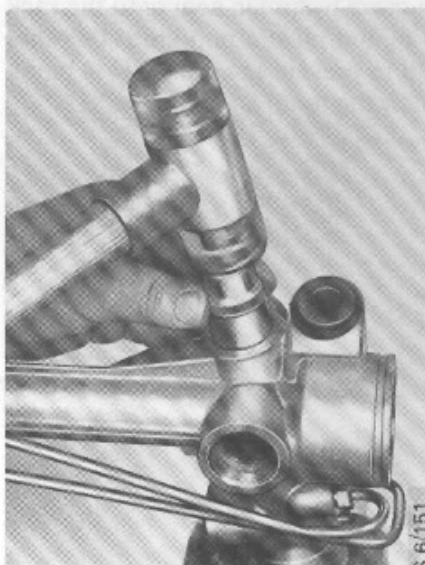
- 1 Fit the bush with the aid of tool 89 96 407.



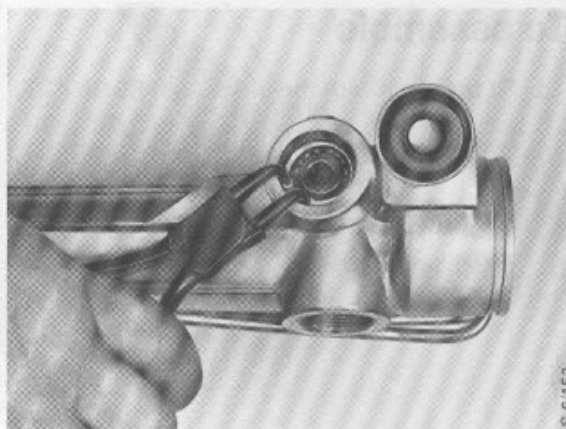
- 2 Tap in the seal, with the chamfered side up-permost.



- 3 Tap in the lower pinion bearing using a suitable socket (e.g. 19 mm) as a drift.



- 4 Fit the circlip.



- 5 Inspect the condition of the piston ring on the rack.

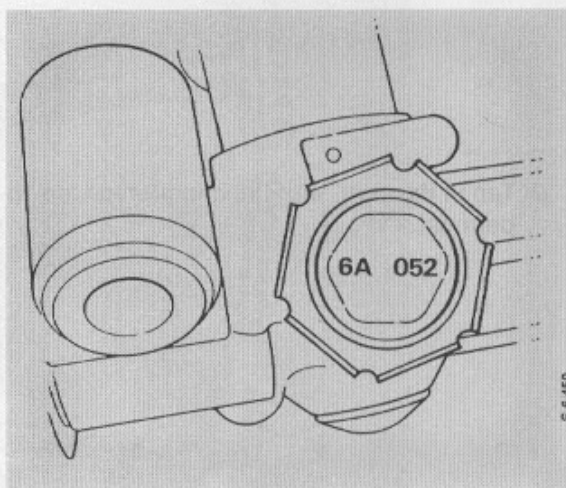
N.B.

Two piston variants are in use: one fitted with piston ring 89 37 070 alone; and the other with both a piston ring (89 70 873) and an "O" ring (89 70 865).

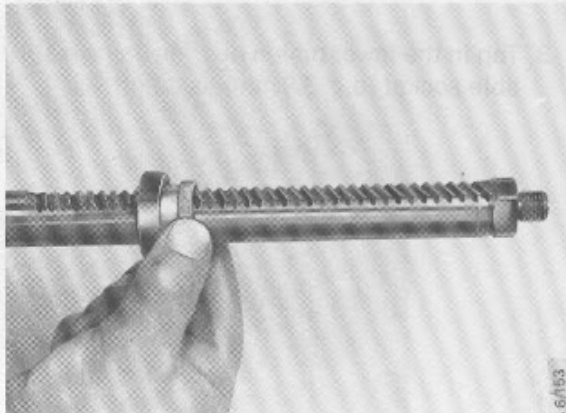
As from date code 6A 052 on the steering gear, the piston must be fitted with both a piston ring (89 70 873) and an "O" ring (89 70 865). The date code is stamped on the damping yoke adjusting screw; the first digit denotes the year of manufacture, and the last three digits the day of manufacture.

Pistons requiring both a piston ring and an "O" ring also carry a groove adjacent to the groove for the piston ring.

Neither the piston rings nor the "O" ring are interchangeable.

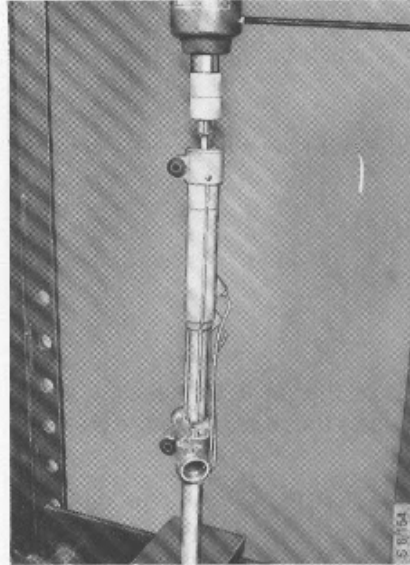


- 6 Slide the inner hydraulic seal onto the rack followed by the plastic end stop. Use tool 89 95 946 to prevent the rubber seal being damaged by the teeth on the rack.

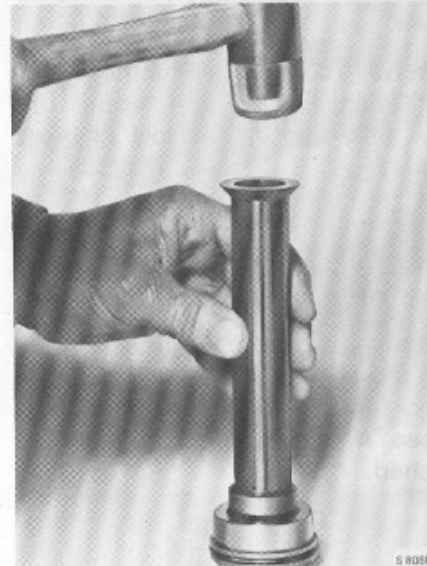


- 7 Press the rack into the housing, using a 17-mm socket and a short extension piece between the press and the rack, and tool 83 90 148 (special tool for section 4 - gear-box) as a support.

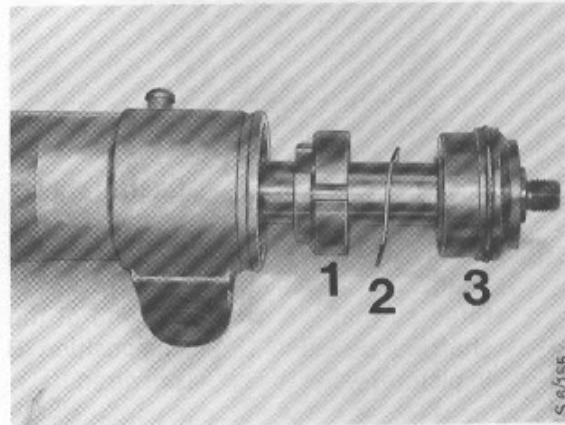
Maximum pressing force:
2,200 N (506 lbf)



- 8 Fit a new "O" ring onto the outer seal retainer. Inspect the seal itself; if it is in good condition it can be refitted. If a new seal is required, use tool 89 96 407 to fit it.



- 9 Fit the bush (1) on the rack, with the narrower end inwards.
- 10 Slide the wave spring washer (2) up to the bush and then fit the hydraulic seal (3). Take care not to damage the sealing lip.



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- 11 Carefully drive in the seal retainer using tool 83 90 148 (special tool for section 4 - gearbox).
- 12 Centre the rack and rotate it to enable it to mesh with the pinion.

- 13 Fit new seals on the valve. Remove any burrs on the splines as these can damage the dust seal.

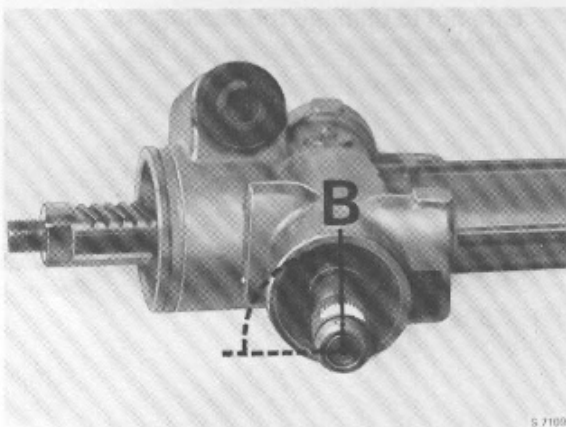
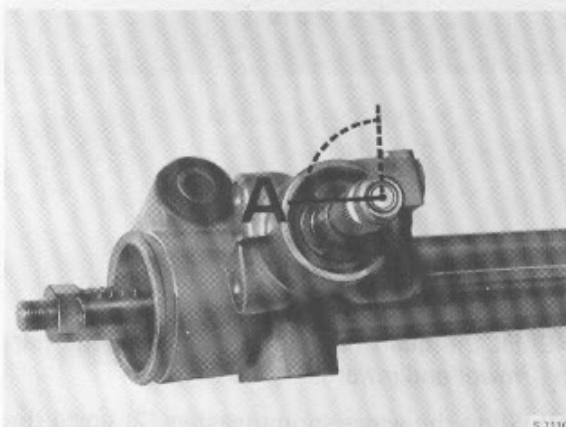
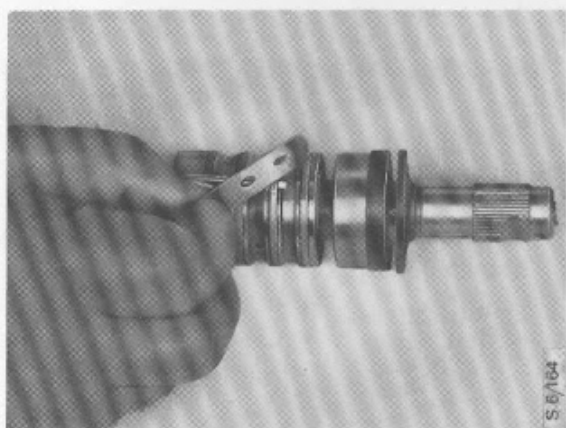
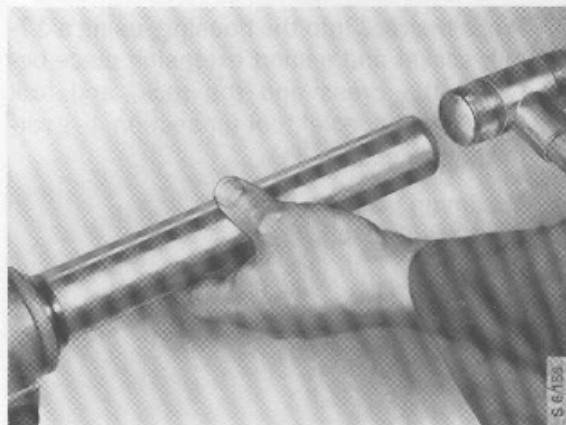
Inspect the four PTFE rings on the valve to see whether they are split. If not, use a razor blade to make a 5 - 7-mm long slit through each ring. Cut the slits by applying pressure - do not saw.

The slits serve to compensate for the loss of power assistance that can occur immediately after starting at low ambient temperatures.

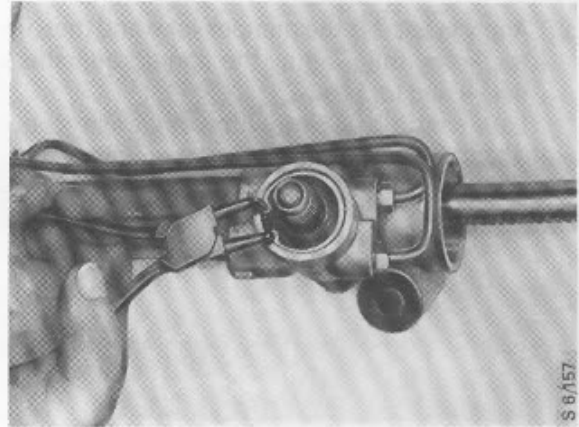
- 14 Fit the servo valve and pinion unit as follows:

- Hold the valve body with the slot in the end of the shaft pointing to the left (at 9 o'clock looking towards the front of the car - see "A" in picture) as the teeth are enmeshed.

- Slide the valve unit in as far as it will go and then tap it home using sleeve 78 41 067 (special tool for section 4 - gearbox). The pinion should now be rotated so that the slot in the end of the shaft will be in the 12 o'clock position (B in picture) when the rack is centred.



- Fit the circlip.

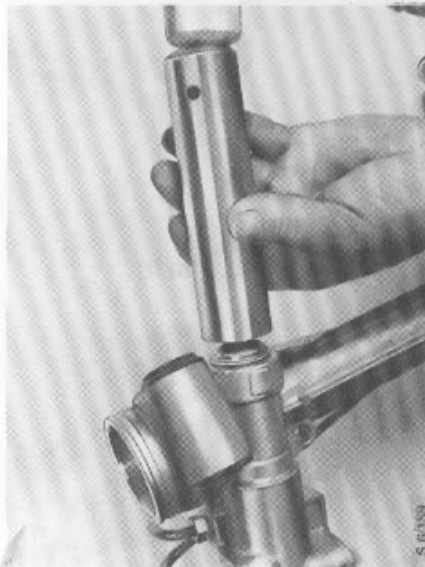


- 15 Fit and tighten the locknut on the pinion shaft, using water pump pliers to grip the other end of the shaft.

Tightening torque:
30 - 45 Nm (22.2 - 33.3 lbf ft)



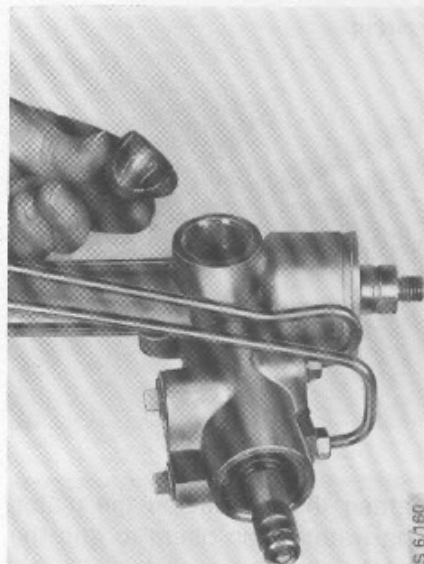
- 16 Fit the bottom end cap by tapping it home using sleeve 78 41 067 (special tool for section 4 - gearbox).



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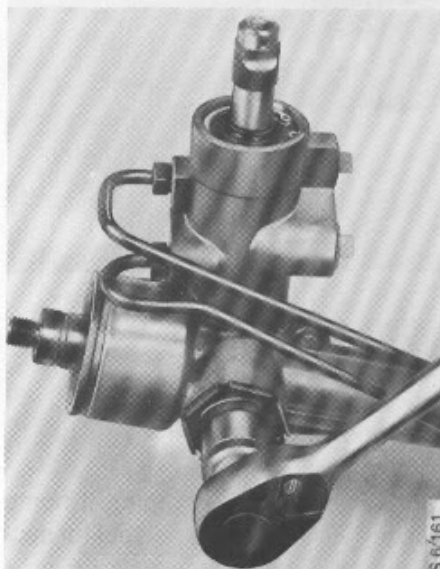
- 17 Apply grease to the damper yoke and then fit the yoke, followed by the spring, adjusting screw and locknut.

Lubricant: Shell EP B2 lithium grease (code 71303), Shell Retinax A or the equivalent.



Adjust the radial pressure on the rack as follows:

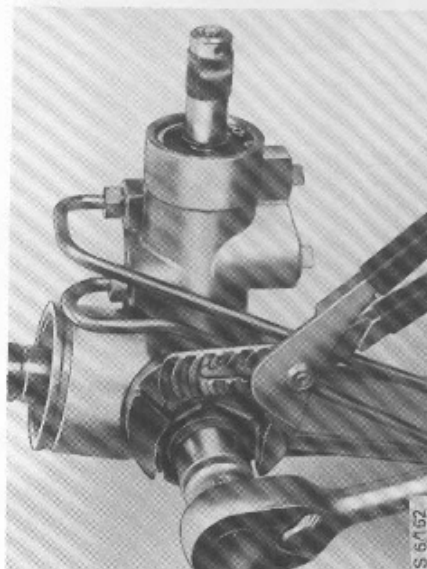
- Screw the adjusting screw right home.
- Back off the adjusting screw by between 40° and 60°.



- Tighten the locknut.

Tightening torque:

60 - 90 Nm (44.4 - 66.6 lbf ft)



- 18 Fit the inner ball joint complete with end stop onto the pinion end of the rack. Mount the rack housing in a soft-jaw vice.

N.B.

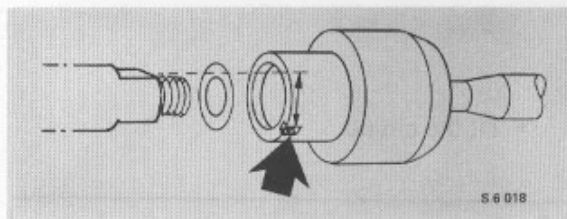
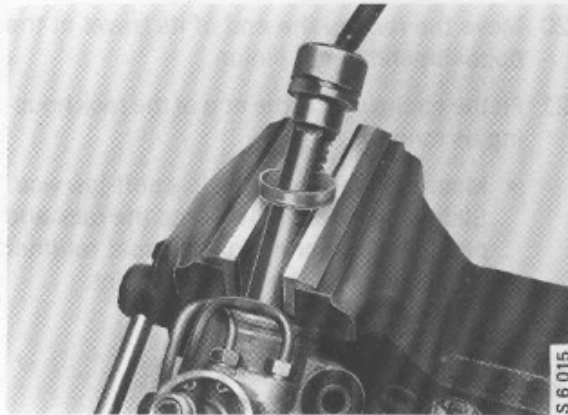
Under no circumstances hold the pinion when undoing or tightening the ball joint.

- When refitting the old ball joint, a special spacer, part no. 89 46 360, must be fitted to offset the old peening marks by 90°.

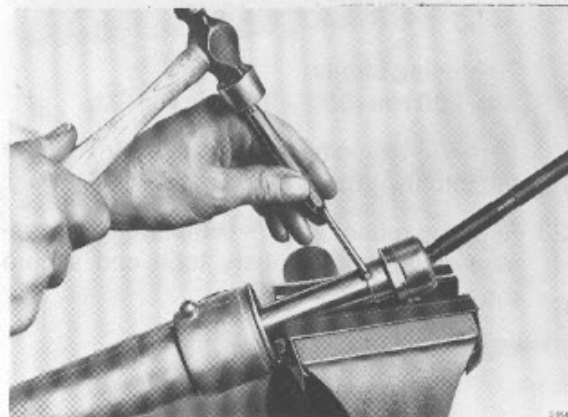
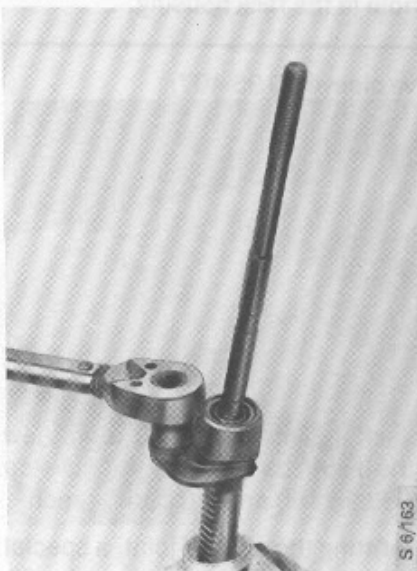
- 19 Tighten the ball joint using tool 89 96 480 and a torque wrench.

Tightening torque:
80 - 100 Nm (59.2 - 74.0 lbf ft)

Lock the ball joint to the rack by driving the tab into the groove in the rack.



Old peening mark offset by 90°



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- 20 Move the rack to the end of its travel at the opposite end to the pinion.
- 21 Fit the circlip inside the end of the rack housing as follows:
 - Mount the rack housing in a soft-jaw vice. Slide sleeve 89 96 407 onto the rack and press in the spring-loaded seal retainer by screwing on the inner ball joint.

- Fit the circlip.

N.B.

To enable the circlip to be removed again in the future, one end of the circlip must be directly in line with the hole in the rack housing.

- Remove sleeve 89 96 407.

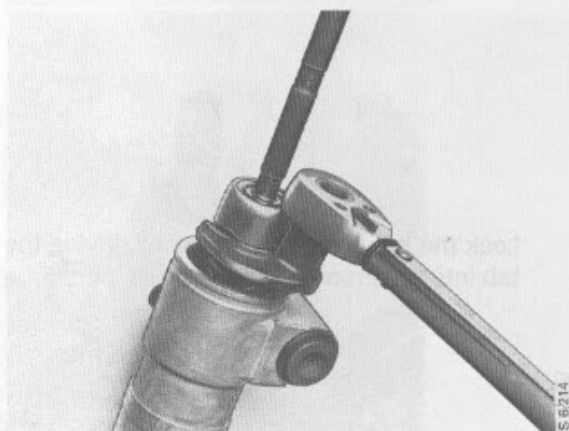
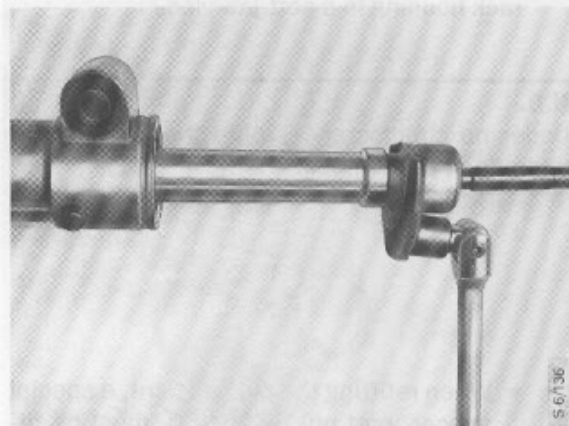
- 22 With the rack again mounted in a soft-jaw vice, fit the inner ball joint and end stop using tool 89 96 480 and a torque wrench.
 - When refitting the old ball joint, a special spacer, part no. 89 46 360, must be fitted to offset the old peening marks by 90°.

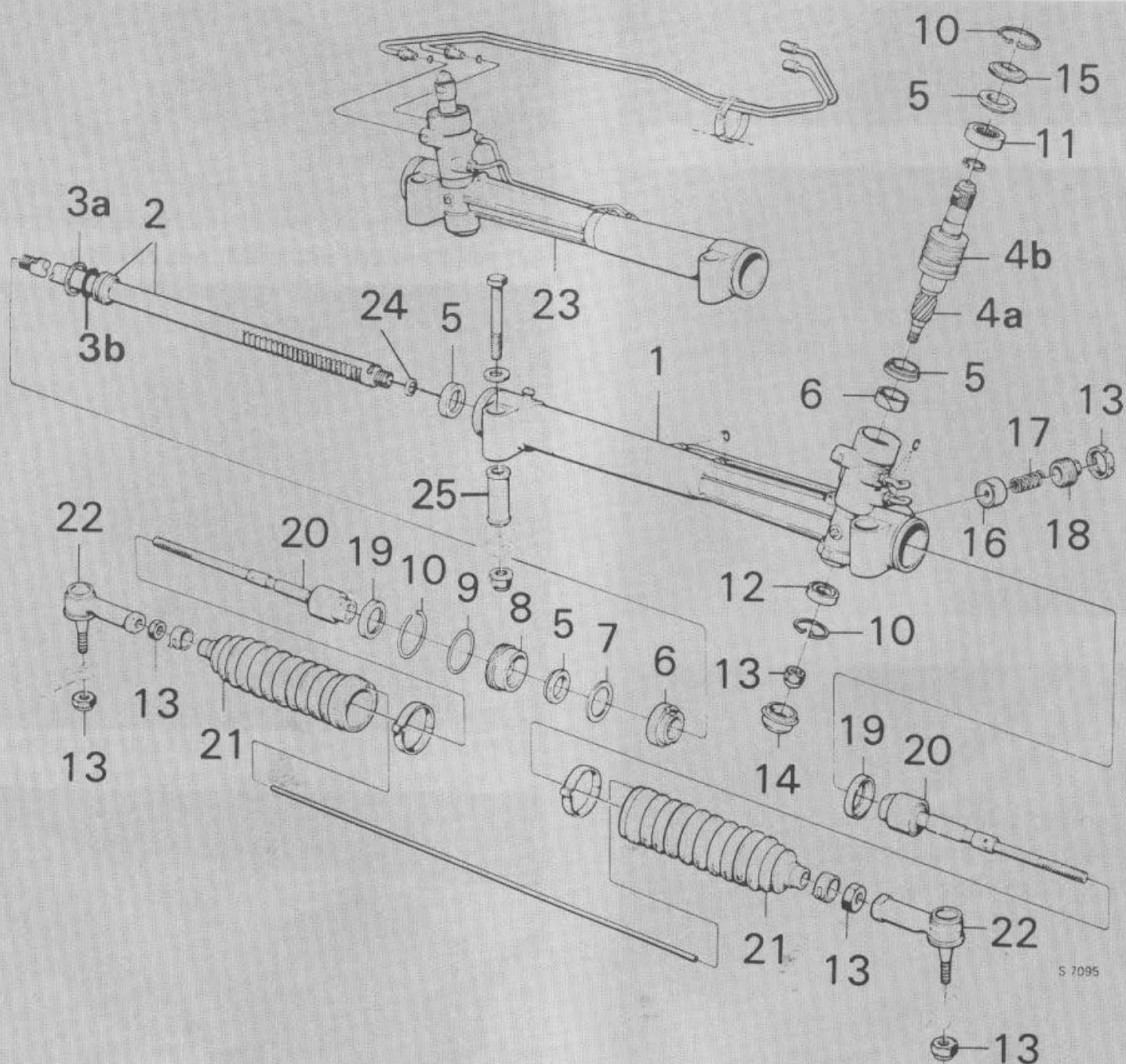
Tightening torque:

80 - 100 Nm (59.2 - 74.0 lbf ft)

Lock the ball joint to the rack by driving the tab into the groove in the rack.

- 23 Refit the rubber gaiters complete with pressure-equalizing capillary tube and secure the clips.





S 7095

Power-assisted steering system

- | | | |
|----------------------|----------------------------|--|
| 1 Rack housing | 8 Seal retainer | 17 Spring |
| 2 Rack with piston | 9 "O" ring | 18 Adjusting screw |
| 3a Piston ring | 10 Circlip | 19 Thrust washer (end stop) |
| 3b "O" ring | 11 Needle bearing and race | 20 Inner ball joint and track rod assembly |
| 4a Pinion | 12 Ball bearing | 21 Rubber gaiter |
| 4b Control valve | 13 Locknut | 22 Track-rod end |
| 5 Hydraulic seal | 14 End cap | 23 RHD variant |
| 6 Bush | 15 Dust cap | 24 Shim (on reassembly) |
| 7 Wave spring washer | 16 Damper yoke | 25 Rubber bush |

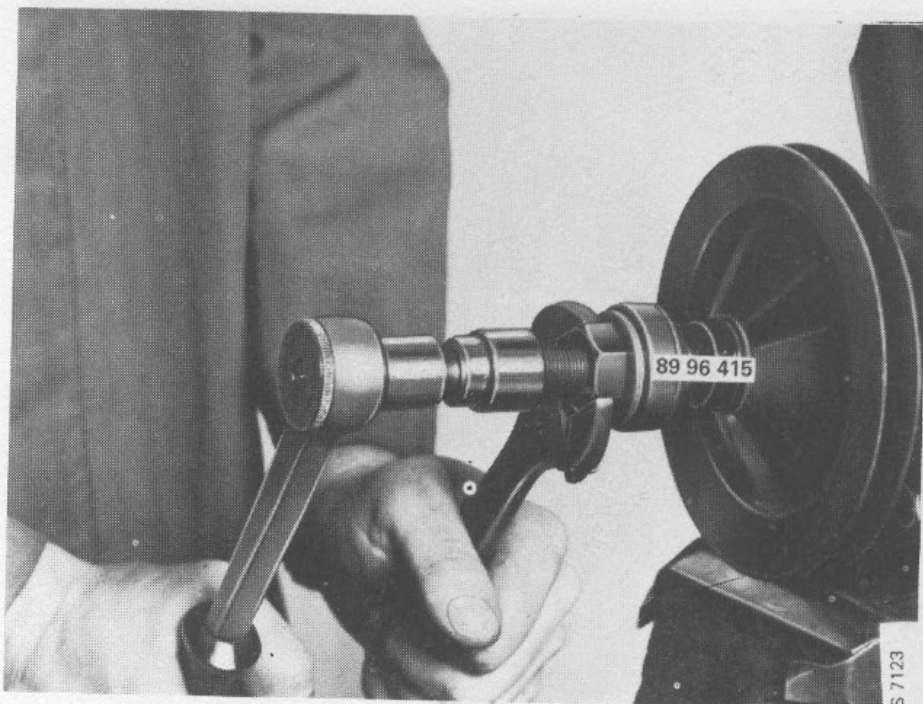
Removal/refitting of servo pump pulley

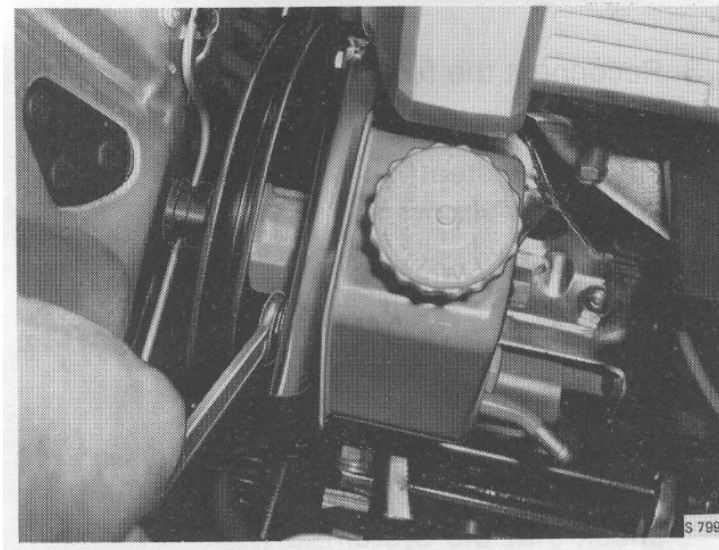
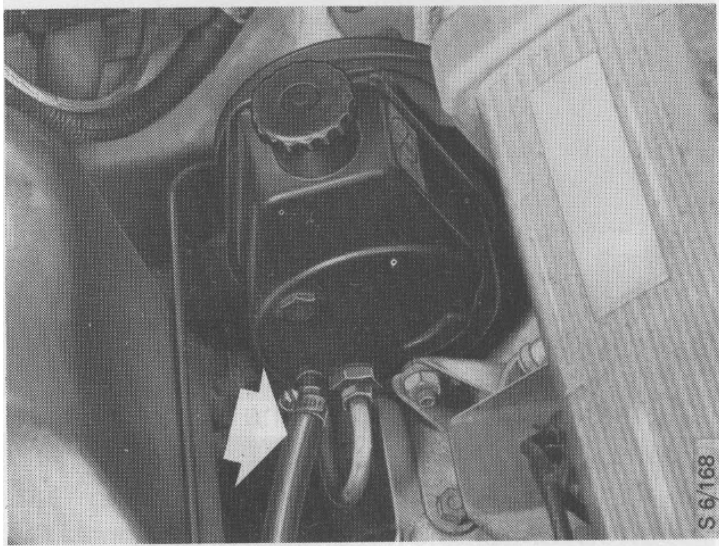
The procedure is the same for all pump variants.

- 1 Remove the pulley from the pump shaft using puller 89 96 423.



- 2 Refit the pulley onto the pump shaft using tool 89 96 415.





Check the fluid level



To change the glued windscreen

The windscreen is glued to the flange in the windscreen opening. This improves the strength and rigidity of the body.

A special polyurethane adhesive is used for glueing the windscreen. For strength reasons, this must not be replaced by any other type of glue or by tape.

Spacers for fitting the windscreen in position are taped to every new windscreen supplied.

The external decorative strip is produced in the form of a ring. It is held in position by means of a plastic retaining strip secured to the edge of the windscreen.

Materials

Adhesive, cleaning agent and primer are available as spares (spares type 45) in kits that are sufficient for one windscreen.

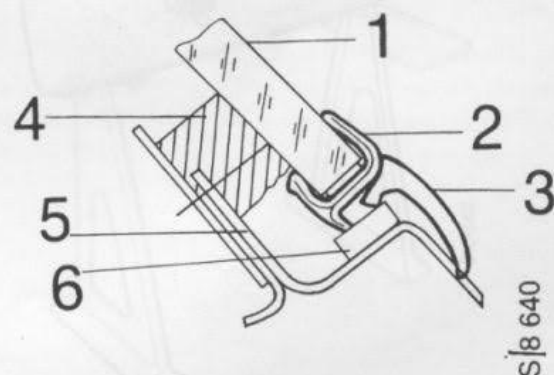
Note

Only the adhesive, cleaning agent and primer supplied as genuine spares have been tested and approved.

To change the windscreen

The space between the edge of the windscreen and the body is covered by a decorative strip which is kept in position by a strip retainer.

The decorative strip and its retainer must first be removed before the adhesive can be cut to remove the windscreen.



- 1 Windscreen
- 2 Strip retainer
- 3 Decorative strip
- 4 Adhesive
- 5 Body flange
- 6 Spacer

To remove the windscreen

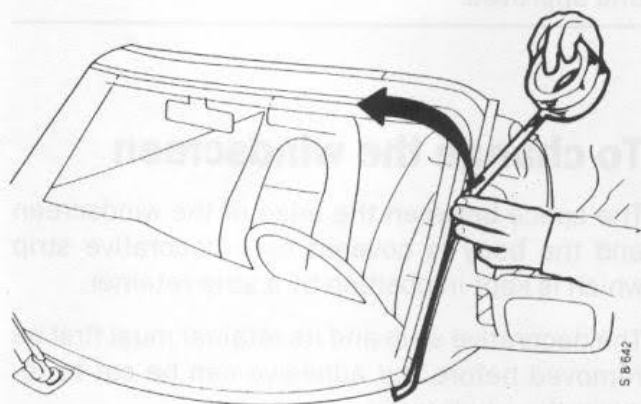
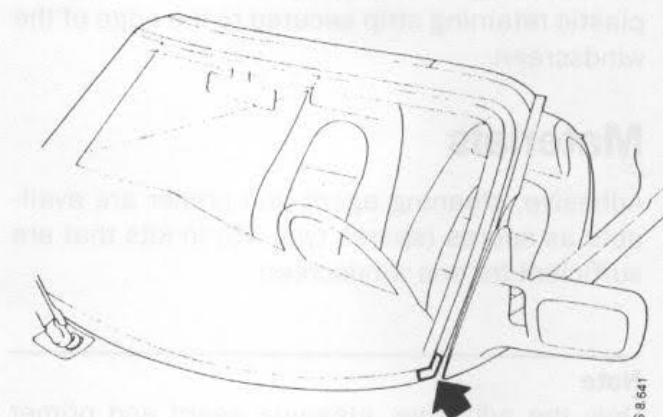
- 1 Use a screwdriver to remove the strip retainer joint pieces in the bottom corners.

Sheet metal and paintwork repairs

Due to the risk of corrosion, it is not recommended to use sheet metal repairs on the windscreen frame. If a sheet metal repair is necessary, it must be painted with a corrosion-resistant paint. The paint must be applied to the entire surface of the repair, including the edges. The paint must be allowed to dry for at least 24 hours before the windscreen is reinstalled. The use of sheet metal repairs is not recommended for the windscreen frame.

- 2 Remove the decorative strip.

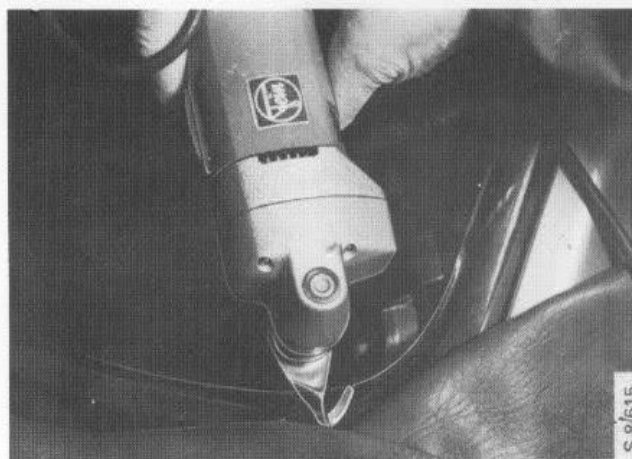
- 3 Tape the edges all round to avoid damaging the paintwork.



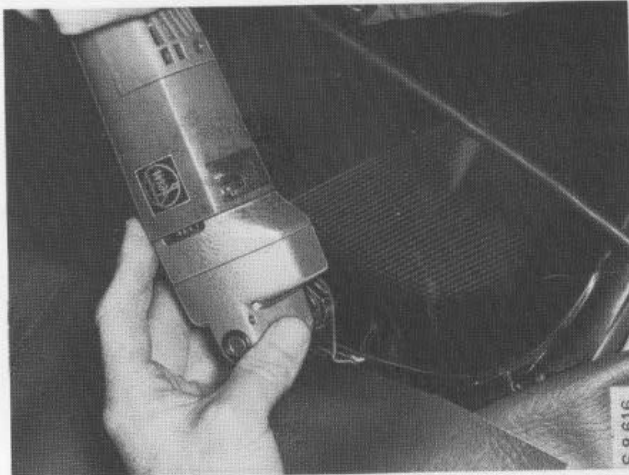
- 4 Lift out and remove the strip retainer.

- 5 Cut away the windscreen.

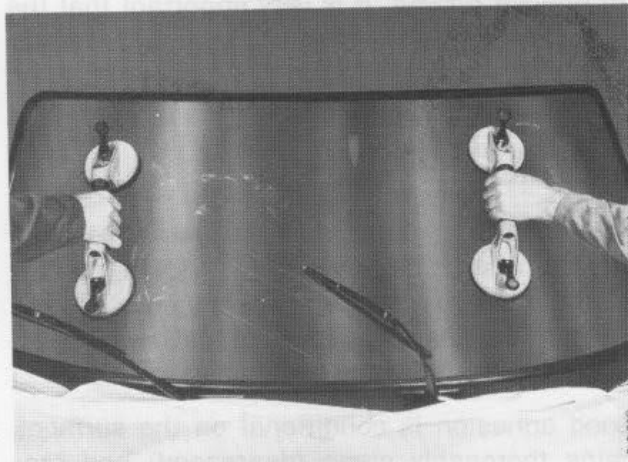
- Start with a 24 mm long knife.
- Start the machine and insert the knife through the bead of adhesive.



- Move the machine clockwise and cut away the adhesive all round.
If the windscreen is not released, it may be necessary to cut again, using the 36 mm long knife.

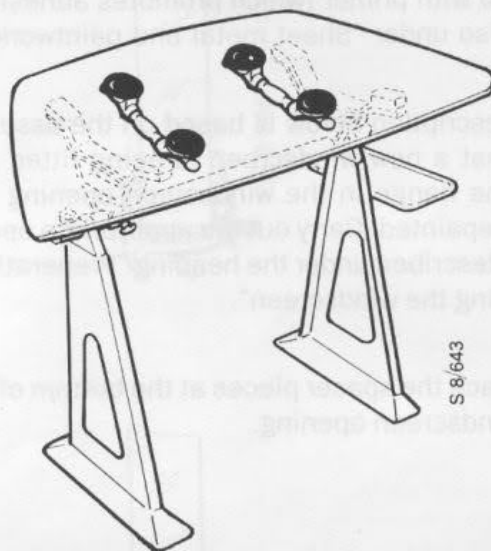


- 6 Fit the lifting handles and remove the windscreen. Note the locations of the handles.
- 7 Remove the protective tape from the body.



Preparations for fitting the windscreen

- 1 Fit the lifting handles to the outside of the windscreen and place it on a stand, with the inside up.



- 2 Cut down the bead of adhesive on the windscreen flange and on the windscreen (if it is to be refitted) to a maximum height of 2 mm, using the trimming knife.



Note

Old adhesive which adheres firmly provides a good anchor for the new bead of adhesive. Any loose adhesive on the paintwork and windscreen must be removed. Wash the surface with cleaning agent and apply the primer.

- 3 Touch up any paintwork damage that will be concealed by the decorative strip.

Note

To prevent rusting, it is very important that the paintwork should be in good condition.

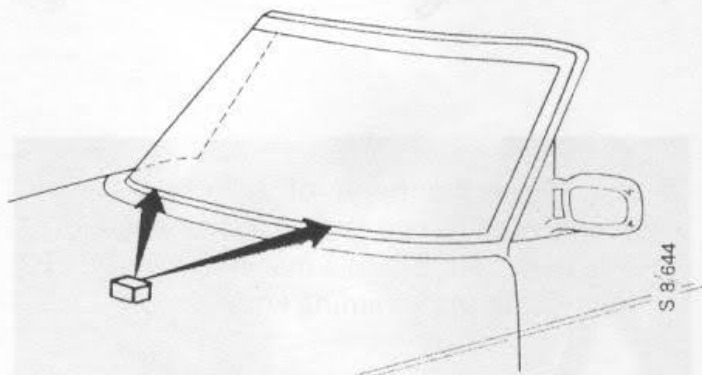
To fit the windscreen

The car must be standing on its wheels on a level surface when the windscreen is being fitted. Note that only the adhesive, primer and cleaning agent in the genuine spares kit has been tested and approved for fitting the windscreen.

Good adhesion is conditional on the surfaces being thoroughly clean (degreased) and pre-treated with primer (which promotes adhesion). See also under "Sheet metal and paintwork repairs".

The description below is based on the assumption that a new windscreen is being fitted and that the flange in the windscreen opening has been repainted. Carry out the appropriate operations described under the heading "Preparations for fitting the windscreen".

- 1 Place the spacer pieces at the bottom of the windscreen opening.



- 2 Carefully wash the edge of the windscreen and the flange in the opening with cleaning agent. Wet the surface thoroughly with a piece of cloth and then wipe it dry with another piece of cloth.

Note

Fatty residues will remain if the cleaning agent is allowed to dry naturally. Always use clean, lint-free cloth. Turn the cloth frequently and take a new piece of cloth for every object.

- 3 Apply primer to the edge of the windscreen and the flange in the windscreen opening. See the description in item 5.

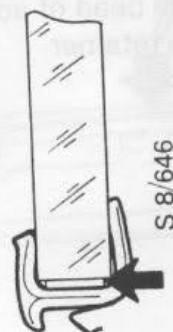
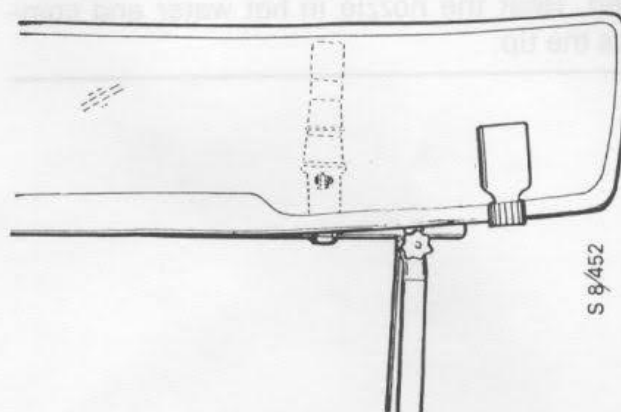
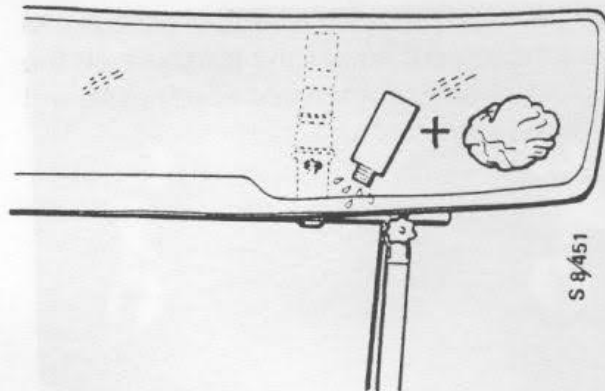
- 4 Fit the strip retainer.

Note

The decorative strip can be fitted with the windscreen in position, but it is an advantage to be able to adjust the height of the windscreen by means of the strip.

Note

Press the strip into place (don't use a mallet to hammer it into place) so that the sealing compound in the strip will seal correctly.



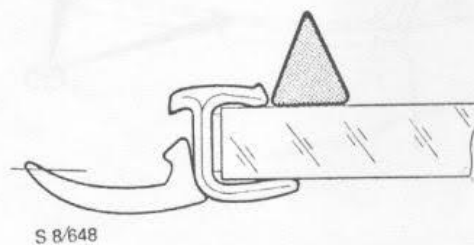
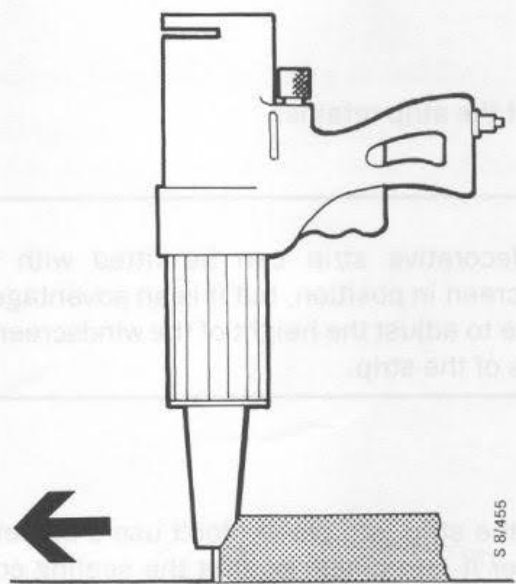
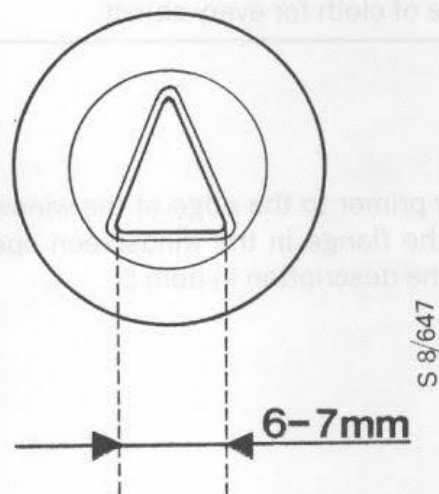
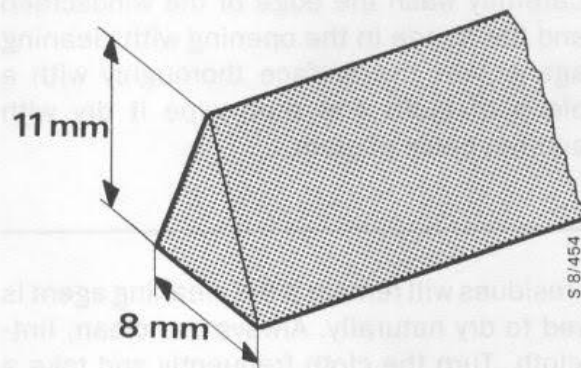
- 5 Use the nozzle to apply a bead of adhesive to the windscreen. Adjust the pressure on the applicator so that the bead of adhesive will have the correct shape.

Note

The width of the applicator nozzle must be adjusted. Heat the nozzle in hot water and compress the tip.

- Hold the nozzle at right angles to the windscreen and apply the bead of adhesive along the edge of the strip retainer.

Check that there are no gaps in the bead of adhesive.

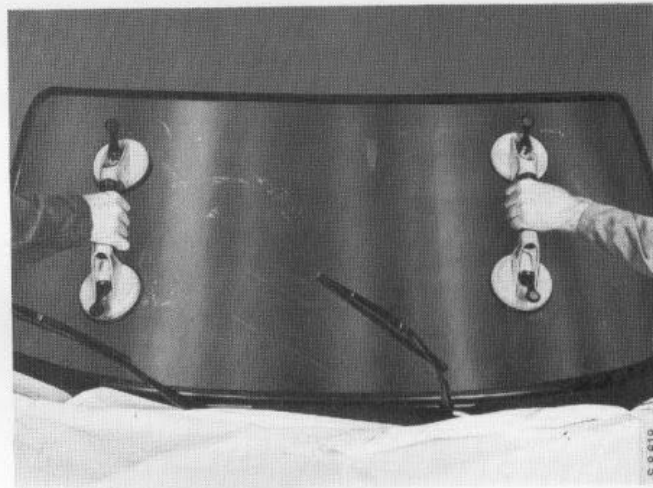


- 6 Fit the windscreen into place and check that the decorative strip is correctly in position. Press down the windscreen so that the decorative strip is in contact with the body all round.

Hardening and leakage testing

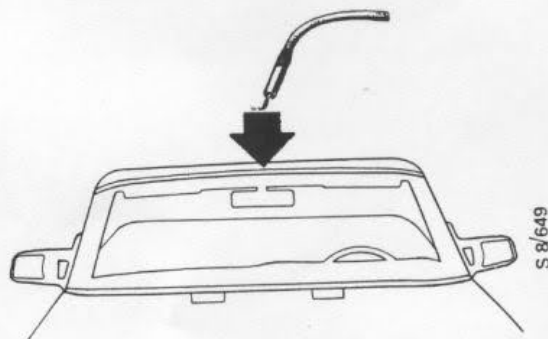
Hardening is accelerated by moisture and heat. Tightness testing can therefore be carried out immediately after fitting. It is advantageous if fitting of the windscreen is planned so that the car can be left undisturbed overnight. The adhesive will then have a longer time to harden, which is particularly important in the winter.

The car can be moved after about two hours.



Tightness testing and sealing of any leakage

- 1 Raise the decorative strip slightly at the centre of the top edge and pour in some water.



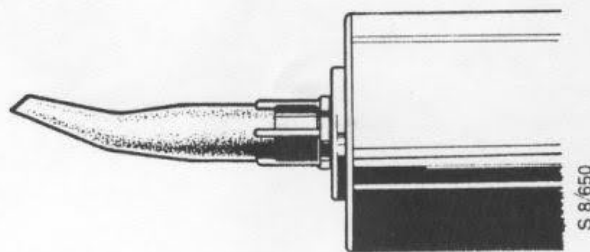
- 2 Check from the inside of the car that no water leaks in.
 - 3 Seal any leakage from the inside.
- Bend a tipped standard nozzle.
 - Inject the adhesive and smooth it out with a piece of wood (dip the piece of wood in soapy water, so that the adhesive will not stick to it).

Cleaning

Petrol (gasoline) is recommended for removing residues of adhesive.

Note

Take care when cleaning the inside of the windscreen, so that you will not disturb it before the adhesive has set.



Sedan

Four-door

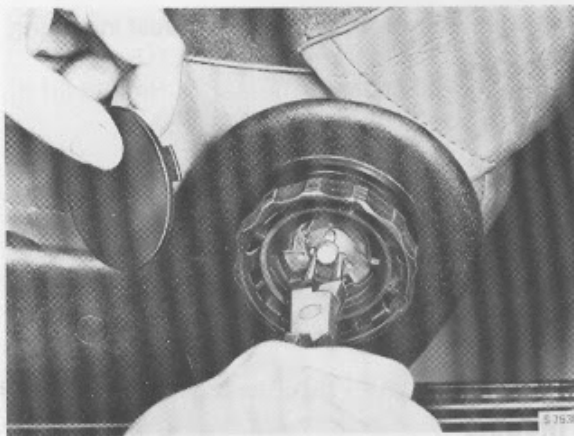
- a Free the safety padding from the windshield pillars and fold it out of the way.
- b Remove the moulding from the rear window sealing strip.
- c Tape the sealing strip to the roof to prevent its falling out of the window frame when the window is removed.
- d Disconnect the heating element cables for the rear window.
- e Remove the rear window.
- f Slide the headlining forward slightly, to free it from the corner pieces at the back.
- g Withdraw the headlining through the rear-window aperture.

On the two-door Sedan, the headlining can be removed through the right-hand door, provided that a certain amount of care is taken.

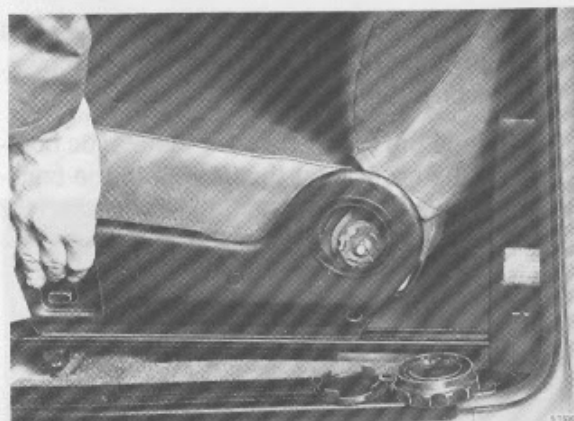
Refit in the reverse order.

Separating the backrest from the seat cushion

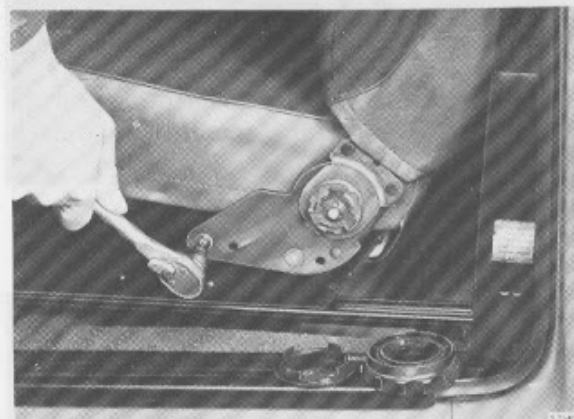
- 1 Remove the cover on the backrest adjusting knob, rotate the bayonet clip and then remove the knob.



- 2 Remove the plastic cover from the side of the seat.



- 3 Remove the two screws as illustrated. The screws have HIGRIP No. 8 dodecagonal heads. Ideally the HIGRIP No. 8 socket should be used or, failing that, a 6 mm hexagon socket bit or an XZN No. 8 dodecagonal socket, can be used although the fit will be inferior.



- 4 Up to 1982 models:
Remove the circlip on the opposite side. (The circlip locks the backrest frame pivot in against the seat frame.) The backrest can now be separated from the seat.

As from 1983 models:

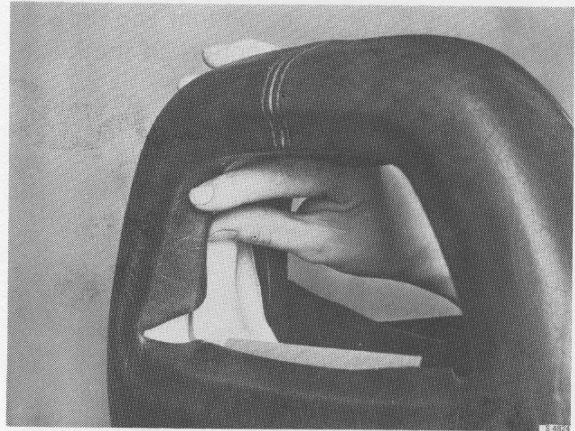
Remove the screws securing the mechanism to the seat frame. Unhook the backrest from the seat.



5 Fold back the flaps from the grooves inside the aperture.

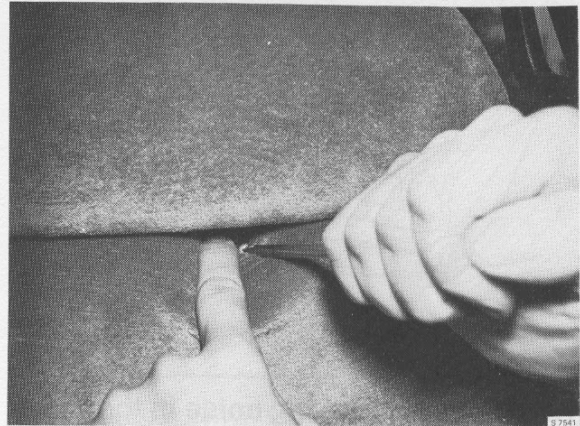
6 Remove the cover.

To refit, reverse the removal procedure.

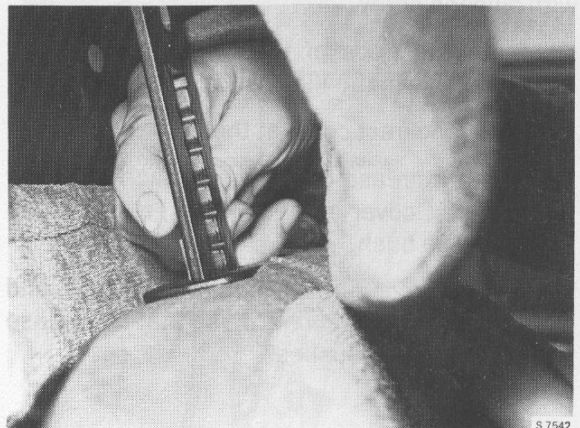


Changing the backrest cover, as from 1980 models

- 1 Raise the head restraint to the upper position.
- 2 Remove the self-tapping screw from the upper front edge of the backrest (accessible if the cover is carefully pulled down).

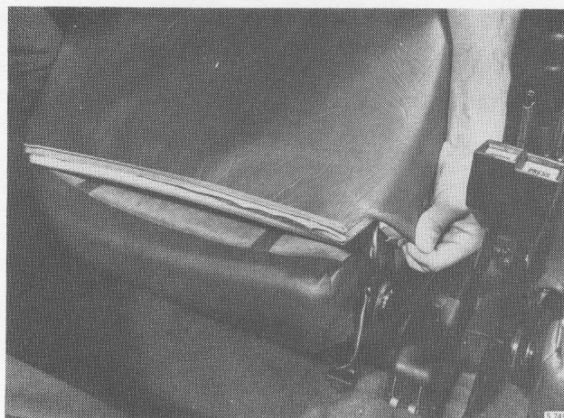


- 3 Press the two spring-loaded tongues of the head restraint mounting catch towards each other. Pull up the head restraint and remove it.

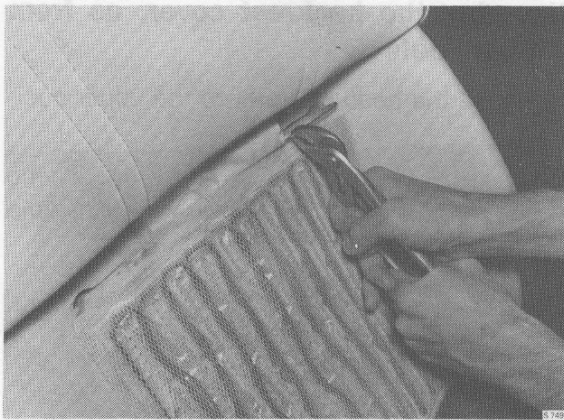


852-8 Seats, seat cushions and carpeting

- 4 Unzip the cover at the bottom and unhook both the hooks at the bottom of the backrest, one on either side.



- 5 Roll up the cover and unhook both the wires which hold it front and back. Remove the cover.



To eliminate creaking noise in the backrest

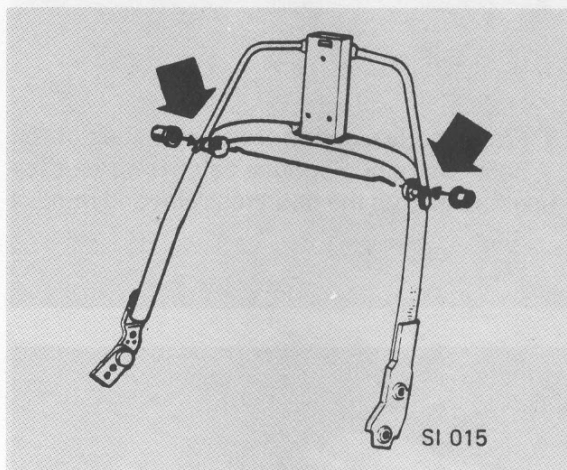
Lubricate the backrest pivot pin on the inside with silicone spray.

Lubricate the ends of the wire in the plastic bushes shown in the illustration as follows:

Unzip the backrest cover at the bottom.

Take a little grease on a finger, reach up under the backrest cover and apply the grease to the wire near the bush.

Repeat the procedure on the opposite side, and move the wire back and forth, so that the grease will enter into the bushes.



To check the heating pads (insufficient heat)

Note

When checking the passenger seat, the seat switch must be closed.

- 1 Disconnect the connector through which power is supplied to the heating element.
- 2 Switch on the ignition and check that the supply to the connector is live. Use a test lamp.

If the supply to the connector is live, check the circuits in the seat cushion and backrest as follows:

- 3 Connect a buzzer to the seat connector. Cool the thermostat by spraying aerosol refrigerant onto it.

If the circuit is in good condition but the seat still fails to warm up, the heating wires may be too close to the thermostat.

If the heating wires are too close to the thermostat:

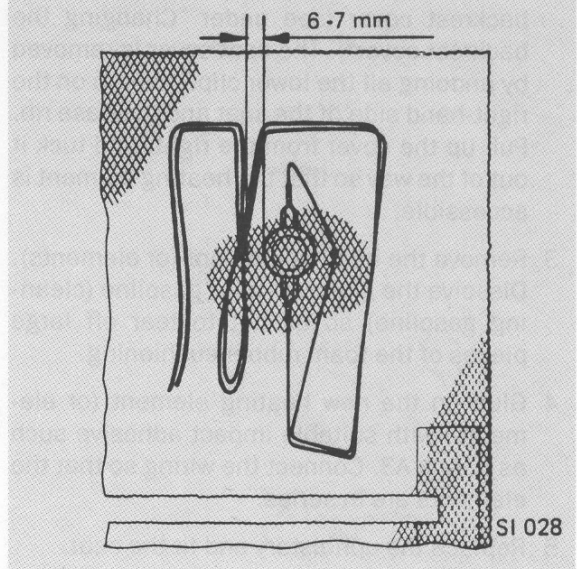
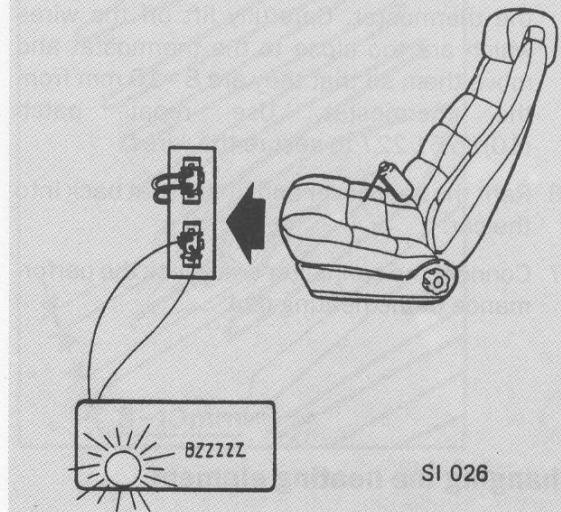
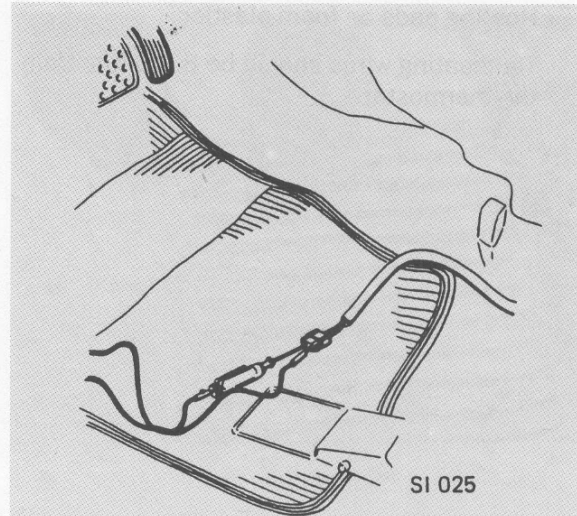
- 4 Remove the seat from the car

Release the seat cushion cover by removing the clips at the bottom edge, the tensioning spring on the right-hand side of the seat and the bottom tensioning spring. Raise the seat cover so that the thermostat will be accessible.

- 5 Heating pads on netting:

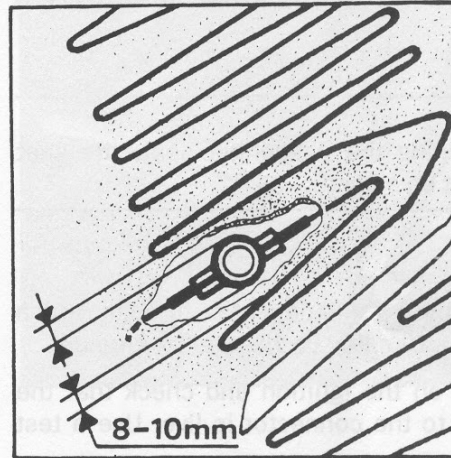
Adjust the distance between the heating wires and the thermostat to 6 - 7 mm. Secure the wires with thread, for instance.

If necessary, use impact adhesive to secure the heating pad in position.



Heating pads on foam plastic:

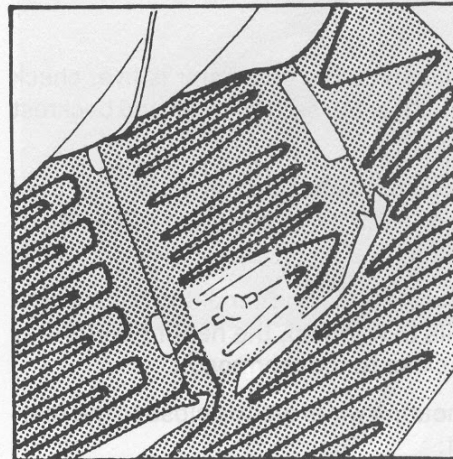
The heating wires should be 8 -10 mm from the thermostat.



SI 106

Carefully cut away the foam plastic around the thermostat. Carefully lift off the wires which are too close to the thermostat and move them so that they are 8 - 10 mm from the thermostat. Use repair patch (10)95 51 227 to secure the wires.

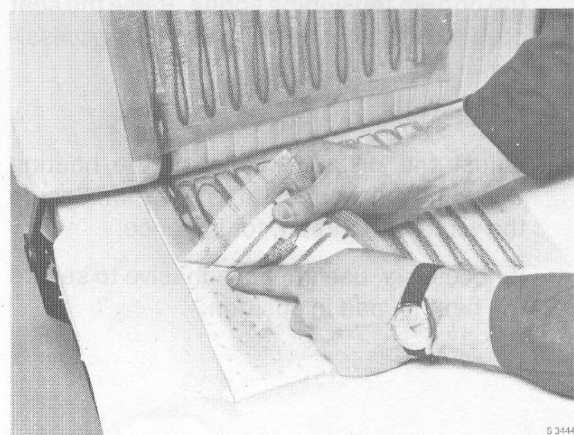
- 6 Refit the seat cover and fit the seat back into the car.
- 7 Connect the connector and check the performance of the heating pad.



SI 107

Changing the heating element

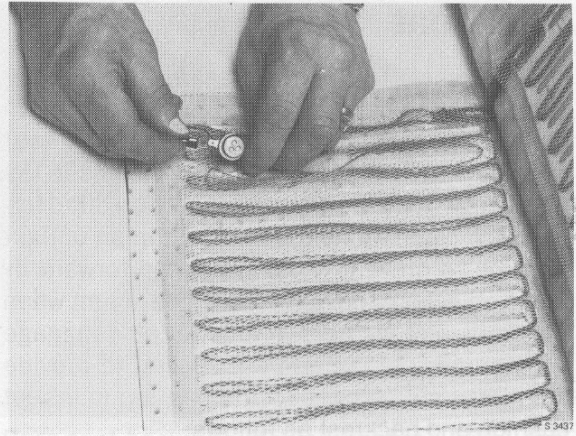
- 1 Take out the seat.
- 2 Remove the seat upholstery. Remove the backrest cover (see under "Changing the backrest cover"). The seat cover is removed by undoing all the lower clips, the rib on the right-hand side of the seat and the base rib. Pull up the cover from the right, and tuck it out of the way so that the heating element is accessible.
- 3 Remove the heating element (or elements). Dissolve the glue with pure gasoline (cleaning gasoline) so as not to tear off large pieces of the foam rubber cushioning.
- 4 Glue on the new heating element (or elements) with suitable impact adhesive such as Bostik A3. Connect the wiring so that the elements are in series.
- 5 Replace the upholstery and fit the seat.



S 3444

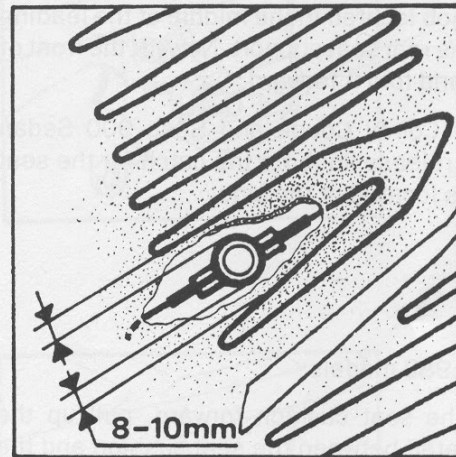
To change the thermostat (on netting)

Remove the seat cover, see points 1-2 "Changing the heating element". Remove the binding threads from the thermostat cables, after which the thermostat can be pulled out and replaced. Fit binding threads to the new thermostat to eliminate the risk of the cables working loose after a time. Check that the distance between the thermostat and the nearest heating wire is at least 6 - 7 mm (see page 852-9).



To change the thermostat (in foam plastic)

- 1 Release and lift off the seat cover, so that the thermostat will be accessible.
- 2 Carefully cut away the foam plastic around the thermostat. Fit a new thermostat and locate it so that the heating wires are at least 8 - 10 mm from the thermostat.
- 3 Secure the thermostat and the heating wires with repair patches (10)95 51 227.
- 4 Replace the seat cover and fit the seat back into the car.
- 5 Connect the connector and check the performance of the thermostat.



SI 106

Vacuum hoses

IN = 850 mm

1 = 850 mm, recirculation damper

2 = 550 mm, centre facia outlet

3 = 50 + 750 + 750 mm, outer facia outlet

4 = 400 mm, defroster

5 = 500 mm, floor damper, left-hand

6 = 550 mm, floor damper, right-hand

A. Vacuum connection

B. Air distribution control

