

Opel Astra Opel Kadett

Workshop Manual

Section M

Steering

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POWER STEERING

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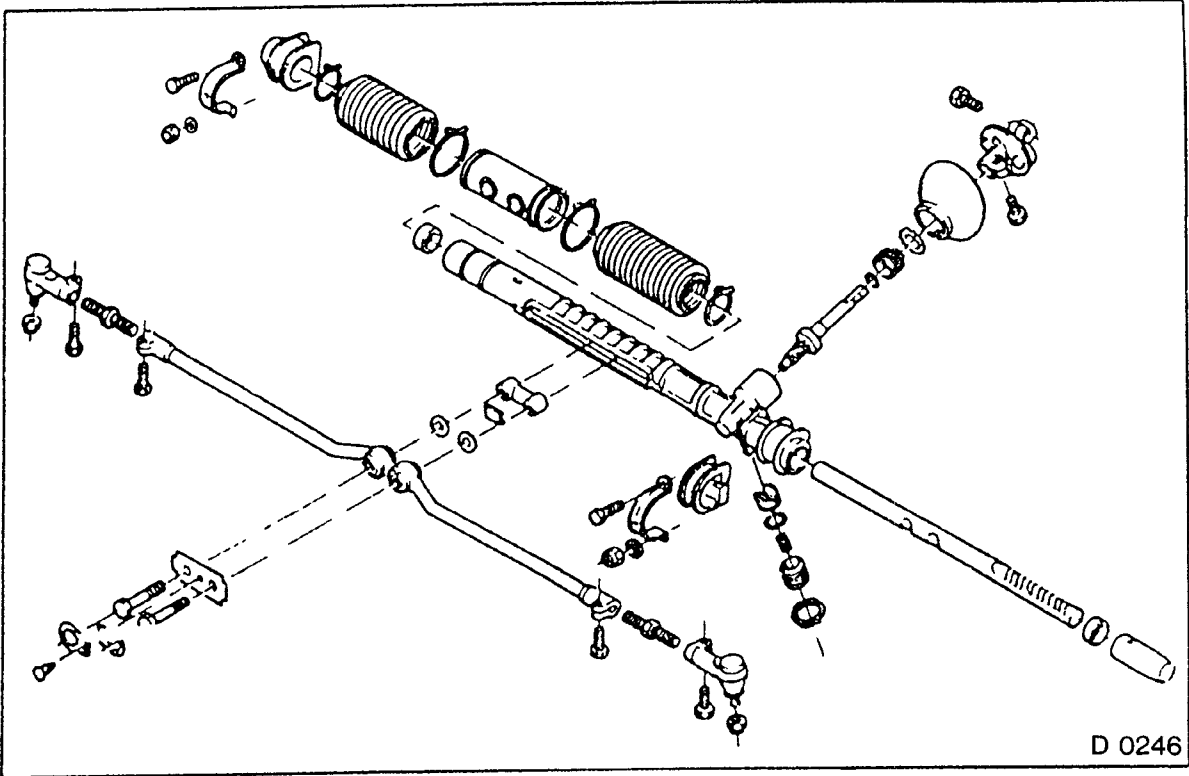


Fig. 1 — Manual Steering Gear Assembly

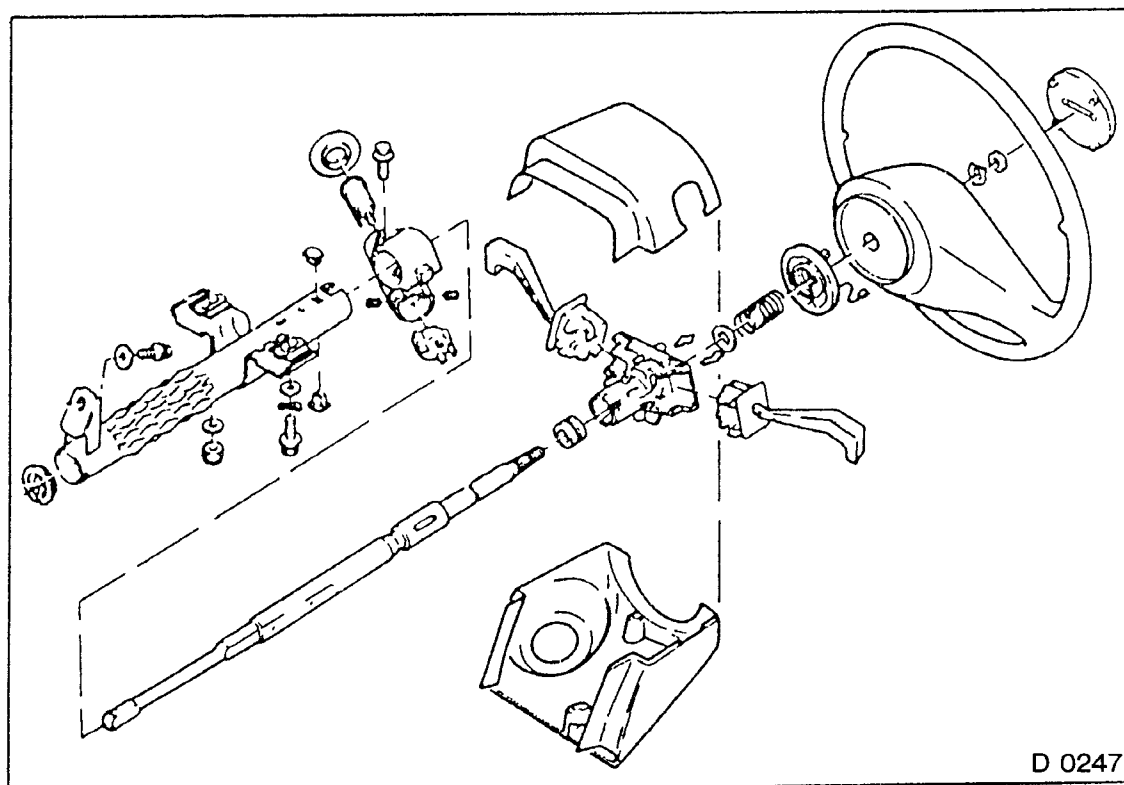


Fig. 2 — Steering Column Assembly

CHECKING AND ADJUSTING OPERATIONS

Straight Ahead Position, Check/Adjust

CAUTION:

After each and every operation on the steering gear or on the steering column assembly (removal and installation or disassembly and assembly), the exact straight ahead position of the steering must be checked.

Straight ahead position is attained when the reference dimension (1) = 325 mm

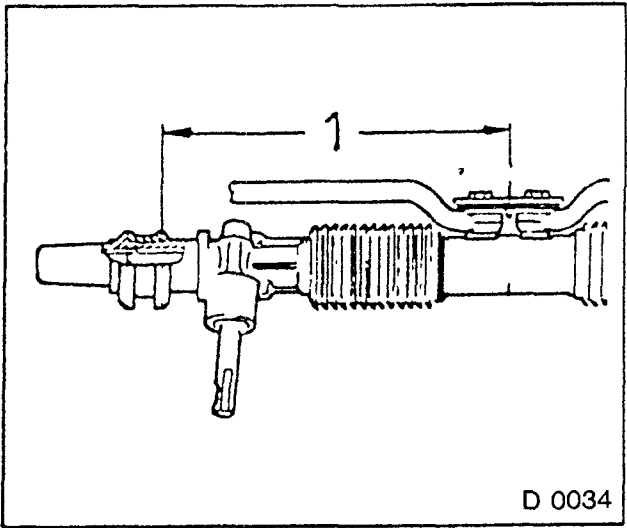


Fig. 4

INSPECT

- 1 Place Reference Gauge KM-476 between tie rod end and left steering gear housing offset fastening.

In this precise straight ahead position.

- A) The clamp flange bolts for the steering shaft should lie horizontally on top.
- B) The steering wheel spokes should slant downwards from centre.

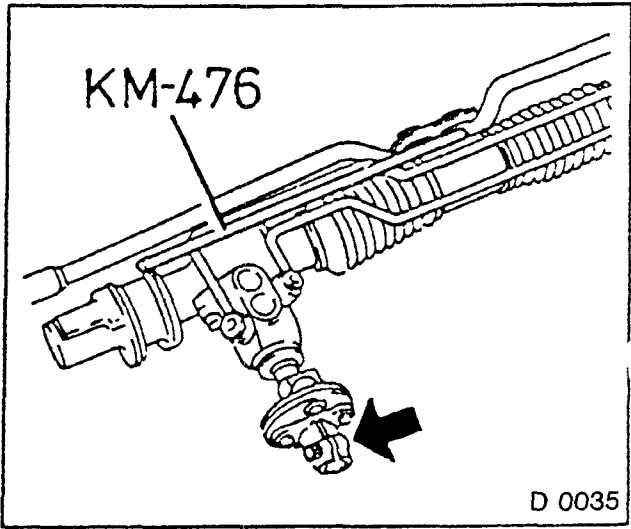


Fig. 5

ADJUST

- 1. When clamp flange bolt is positioned diagonally Fig. 6 — e.g. pinion misplaced by one tooth on steering rack (installation fault) — steering pinion position must be corrected immediately.
- 2 When steering wheel deviates from centre by more than 5° (clamp flange bolt must lie on top and horizontally), remove steering wheel from steering shaft using KM-210-A, and set centrally on shaft teeth.

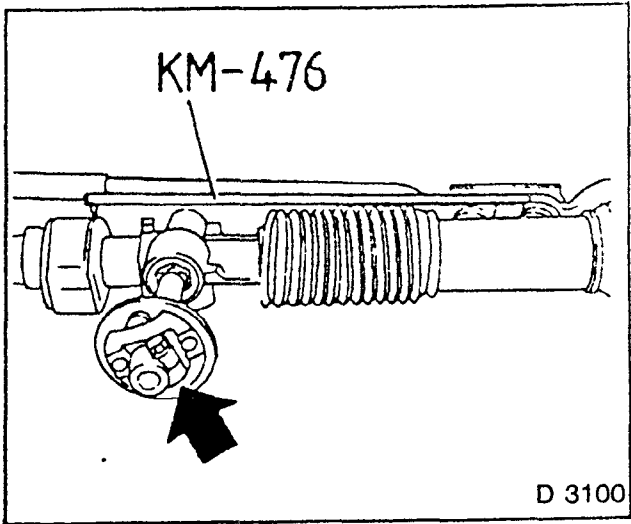


Fig. 6

Hydraulic System, Bleed

INSPECT

- 1 The stationary engine is initially filled up with fluid to MAX mark (1).
2. Start engine and immediately top up fluid to lower MIN mark (2).

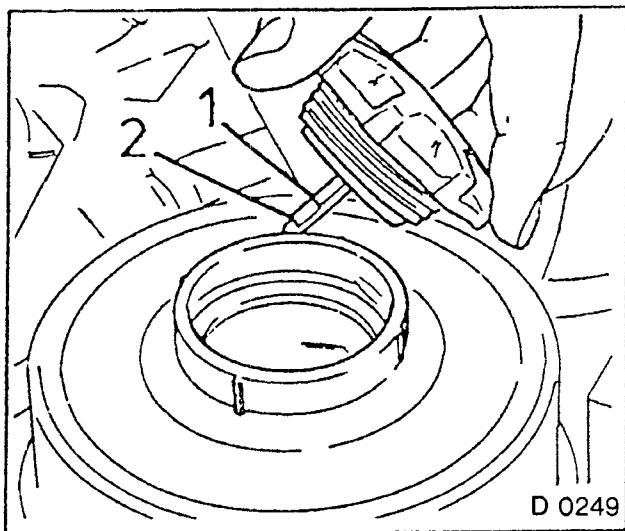


Fig. 7

CAUTION:

THE FLUID PUMP MUST NOT BE ALLOWED TO RUN DRY.

1. Turn steering wheel two to three times approximately 45° slowly to left and right and twice from stop to stop.
2. Correct fluid level in fluid reservoir again.
- 3 Switch of engine and check fluid level.
Fluid at operating temperature — approximately 80°C/176°F to MAX (1).
Fluid cold — approximately 20°C/68°F to MIN (2).

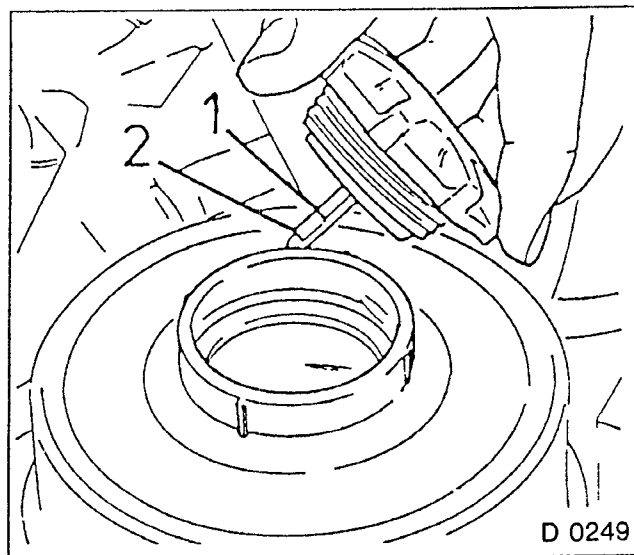


Fig. 8

NOTE:

FLUID SHOULD ONLY BE USED ONCE.

Fluid quality: See Technical Data Page 56.

Use dipstick from fluid reservoir cover to check fluid level

Fluid Pressure — Check

INSPECT

- 1. Fluid pressure.
- 2 Connect Fluid Pressure Measuring Instrument KM-354-B to fluid circuit pressure hose.

NOTE:
FLUID ESCAPES. TOP UP BEFORE PRESSURE CHECK.

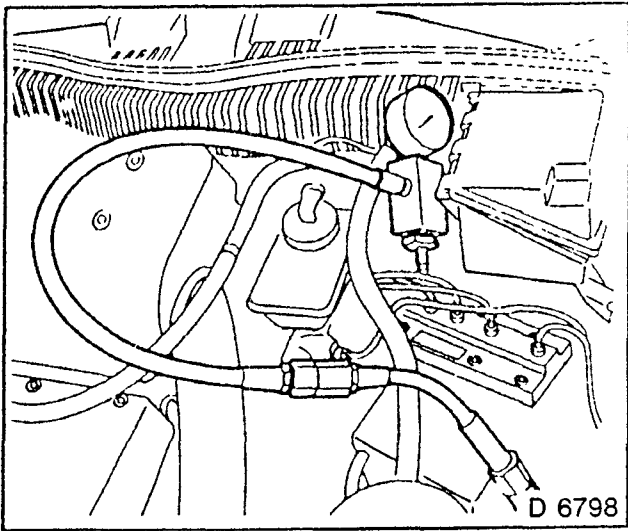


Fig. 9

INSPECT

When the shut-off valve is open, the fluid pressure measuring instrument in steering mid-position shows a pressure of only a few kPa.

When steering wheel is turned to the left or right, pressure increases and attains at each full lock its highest value (see Technical Data Page 56). A smaller difference in pressure at left full lock compared to right is of no significance.

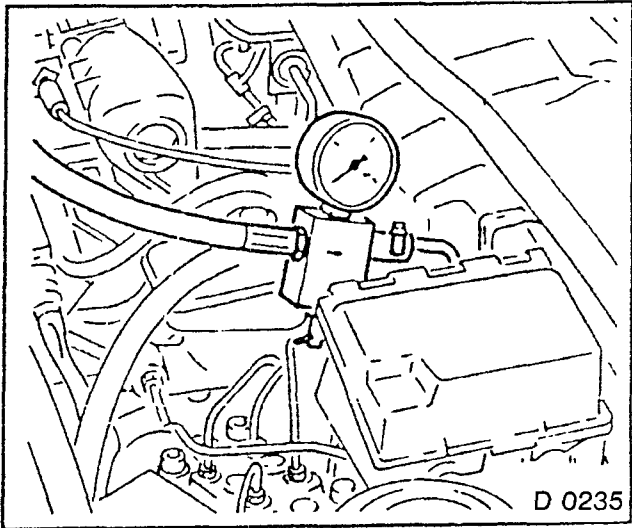


Fig. 10

CAUTION:

NEVER PULL STEERING WHEEL LONGER THAN 10 SECONDS AGAINST THE STOP.

MEASURE

- 1. Read maximum pressure accurately with measurement instrument's shut-off valve open and with steering wheel turned to right and left stop.
- 2. Close shut-off valve, steering in mid-position, and read maximum pressure.

NOTE:

When shut-off valve is closed, pump continues operating with maximum pressure. Close shut-off valve for short periods of time only, while reading off manometer simultaneously (ten seconds maximum). Compare both maximum pressures with one another.

If maximum pressure with shut-off valve closed is noticeably greater than at steering wheel stop; steering gear hydraulics are faulty.

If maximum pressure with shut-off valve closed is less than as given in Technical Data, fluid pump is faulty.

Steering Gear — Remove and Install

REMOVE, DISCONNECT

- 1 Ground cable from battery.
- 2 Pre-volume chamber — DOHC engines only.

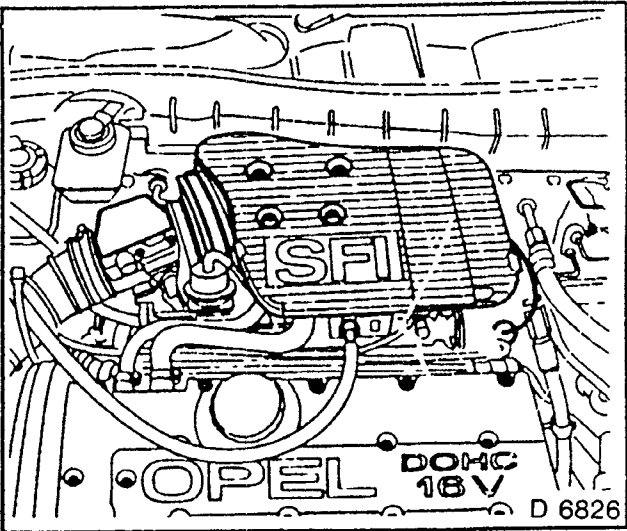


Fig. 11

- 3. Put front wheels in straight-ahead position.

REMOVE, DISCONNECT

- 1. Both tie rods (1) from steering gear.
- 2. Twist protector bolts (A), spacer (B) and washers (C).

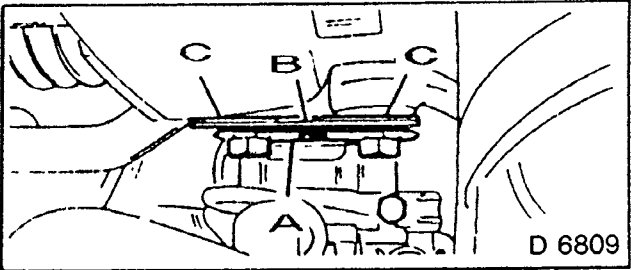


Fig. 12

REMOVE, DISCONNECT

- 1. Left front wheel.
- 2. Left tie rod end (1) from tie rod lever (2) — KM-507-C.

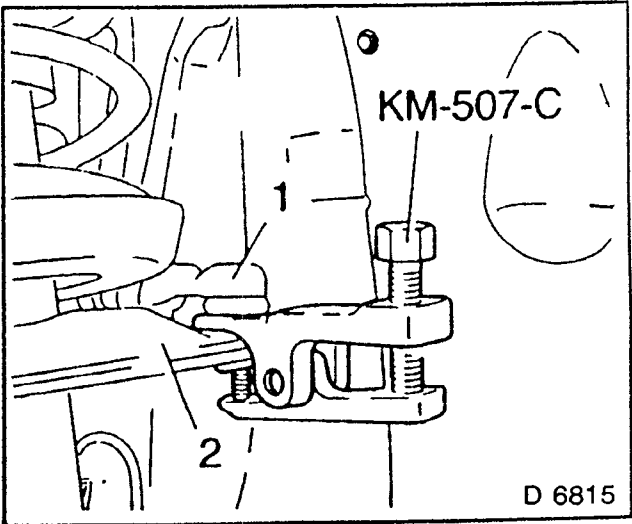


Fig. 13

REMOVE, DISCONNECT

- 1 Footwell panelling.
- 2 Put steering gear in straight-ahead position.
- 3 Loosen steering coupling (arrows), push up.

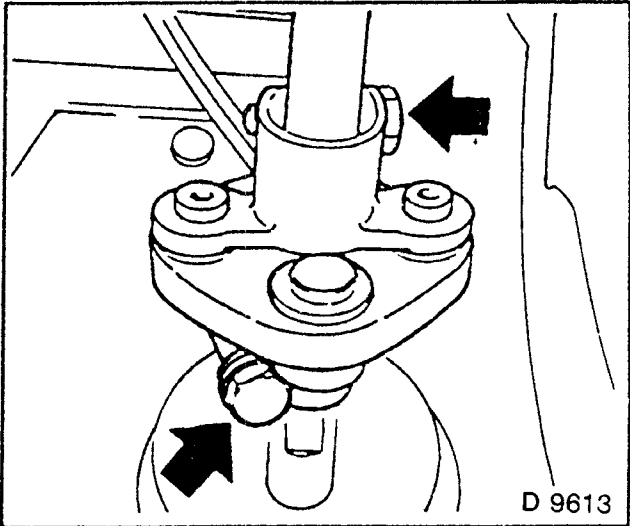


Fig. 14

REMOVE, DISCONNECT

- 1 Brake lamp switch.
- 2 Brake pedal spring.
- 3 Retainer (1).
- 4 Piston rod pin from fork.

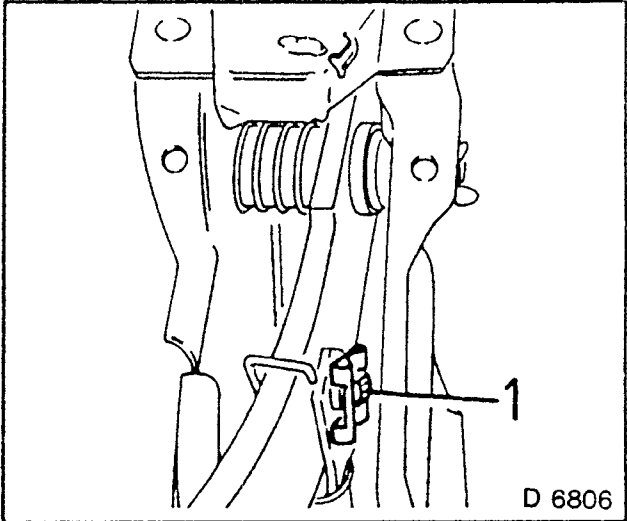


Fig. 15

REMOVE, DISCONNECT

- 1 Clamps from servo lines — for power steering.

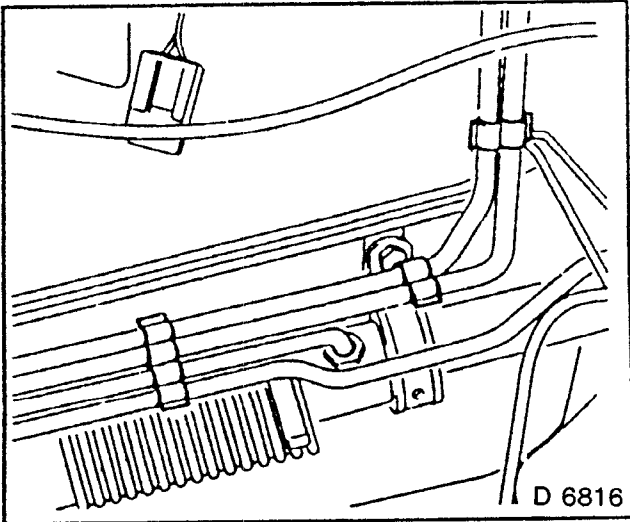


Fig. 16

REMOVE, DISCONNECT

- 1 Coolant compensation tank.
- 2. Remove wiring plug (1).
- 3. Remove hoses (2).
- 4. Close off connections.

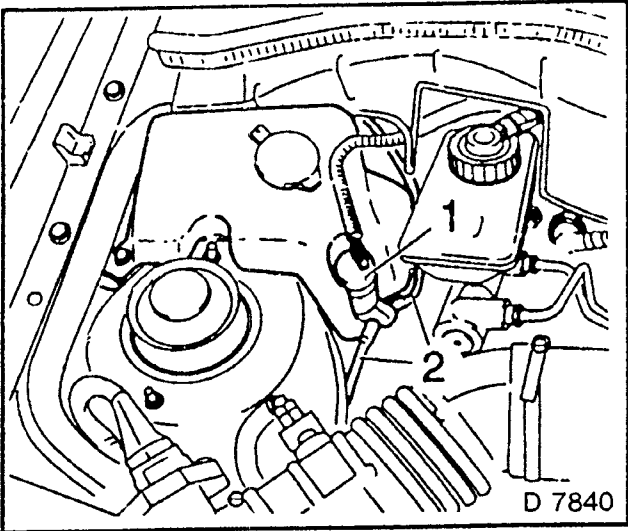


Fig. 17

REMOVE, DISCONNECT

- 1 Remove brake fluid reservoir wiring plug.
- 2. Top up brake fluid reservoir to mark "MAX" and close off with blind screw cap (1).
- 3. Brake lines (2) from brake master cylinder (3).
- 4. Brake master cylinder (arrows).

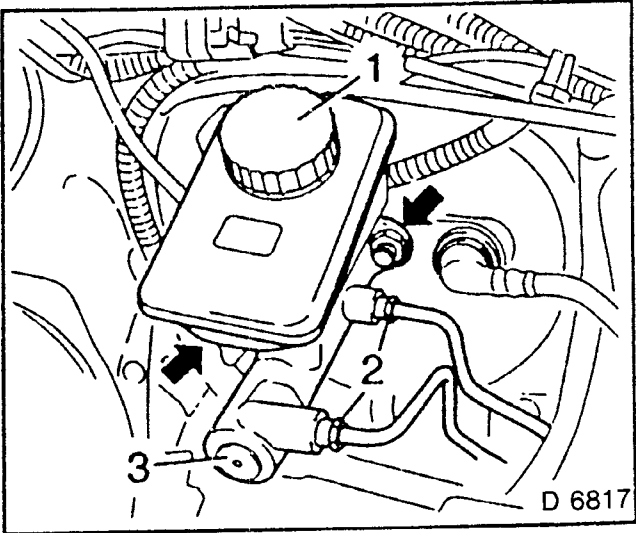


Fig. 18

REMOVE, DISCONNECT

- 1. Brake lines (1) from bulkhead bracket (2).
- 2. Vacuum line (3) from brake servo.

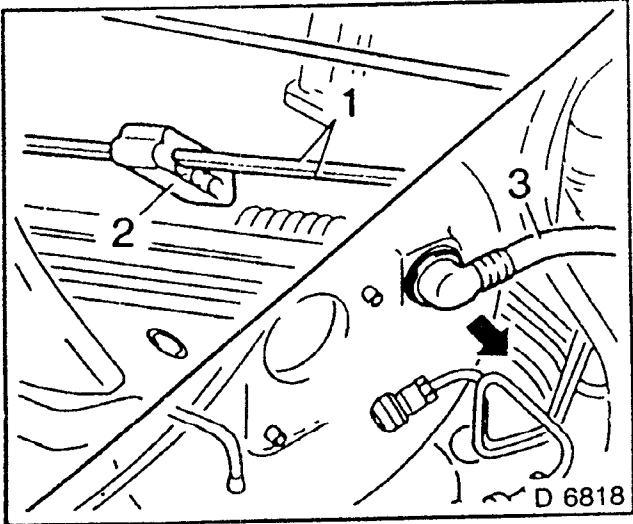


Fig. 19

- 3 Cowl panelling.
- 4. Screen wiper motor with linkage.
- 5. Closure plugs on bottom of cowl.

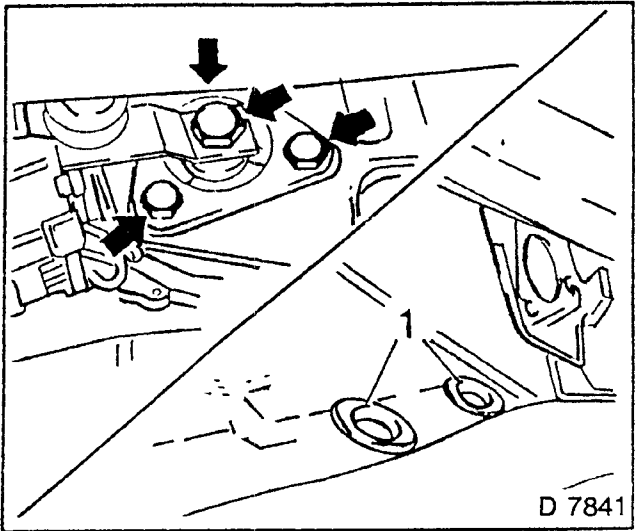


Fig. 20

REMOVE, DISCONNECT

- 1. Brake servo
- 2 Fastening bolts for support through bottom of cowl.
- 3 Remove bolts.

REMOVE, DISCONNECT

- 1. Brake servo with support from bulkhead.
- 2 Front support from brake servo.
- 3. Fork and hex nut from thrust rod.

NOTE

BRAKE SERVO AND SUPPORT ADHERE TO BULKHEAD, AS THEY ARE ATTACHED WITH SEALING COMPOUND.

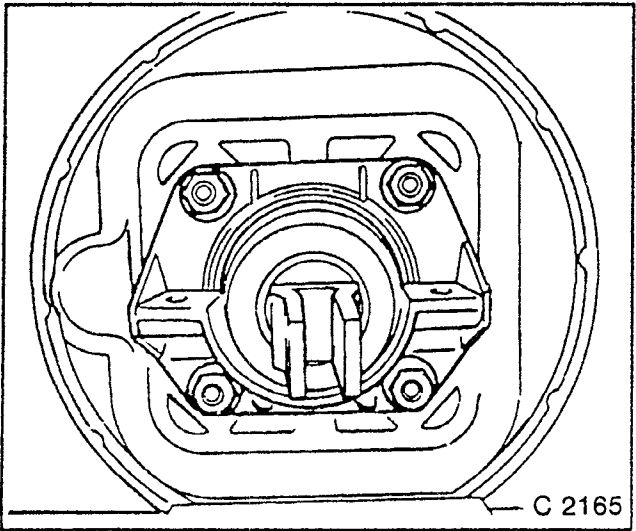


Fig. 21

REMOVE, DISCONNECT

- 1. Connections (arrows) of pressure and return lines — with power steering.
- 2. Close off openings.
- 3. Unclip fastening clamps along lines.

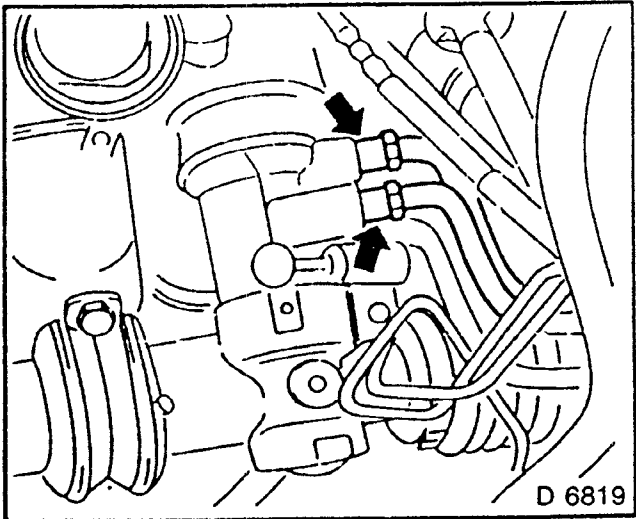


Fig. 22

REMOVE, DISCONNECT

- 1. Steering gear with retaining brackets from bulkhead (arrows).
- 2. Turn left spring strut to left.
- 3. Remove steering gear through left wheel housing.
- 4. Remove rubber buffer.

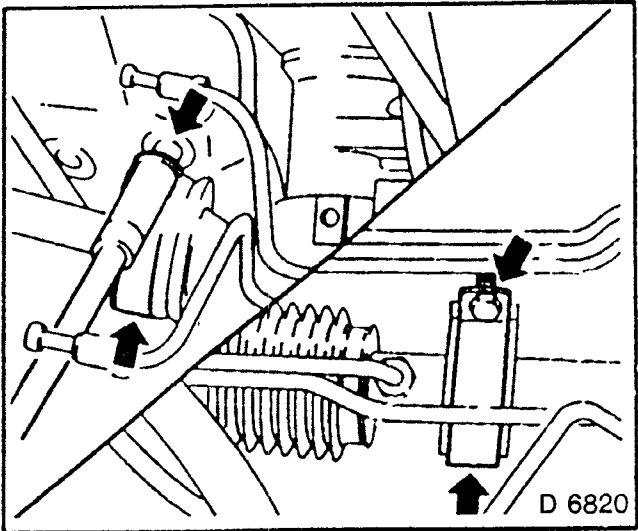


Fig. 23

- 5. Recut thread in bulkhead.
- 6. Place rubber buffer on steering gear.

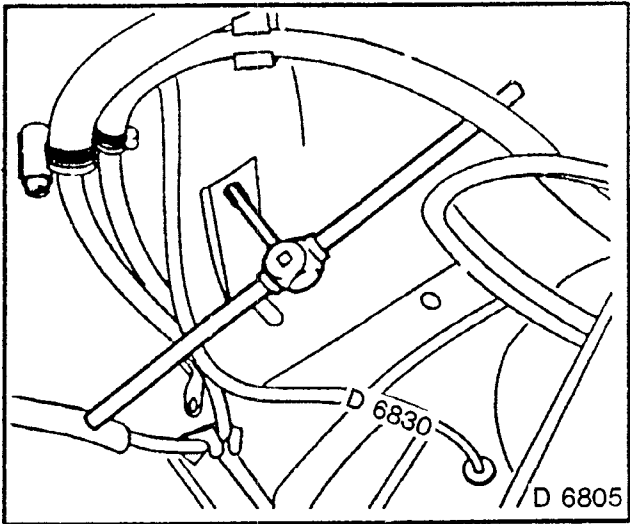


Fig. 24

- 7. Turn left spring strut to left.
- 8. Guide steering gear into engine compartment through left wheel housing.
- 9. Position steering gear with retaining brackets on bulkhead.
- 10. Use new nuts, insert bolts with Locking Compound. LOCKTITE 242.

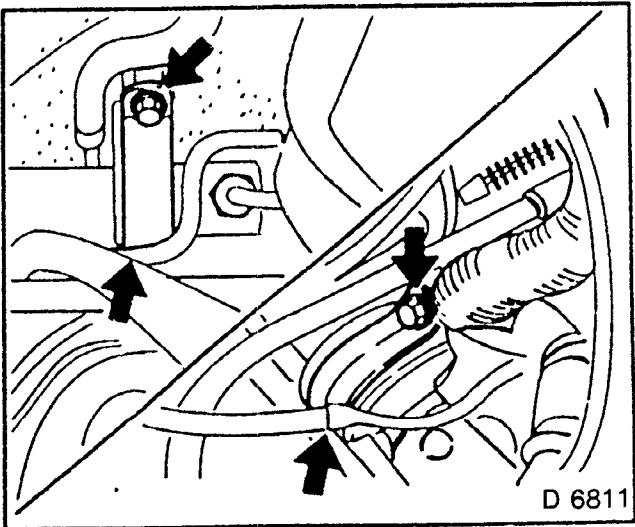


Fig. 25

TIGHTEN (TORQUE)

- 1. Steering gear with retaining brackets to bulkhead — 22 Nm
- 2. Observe straight-ahead position — Checking Gauge KM-476.

- 3. Pressure and return lines — 28 Nm — power steering.

INSTALL, CONNECT

- 1. Fastening clamps along lines — power steering.

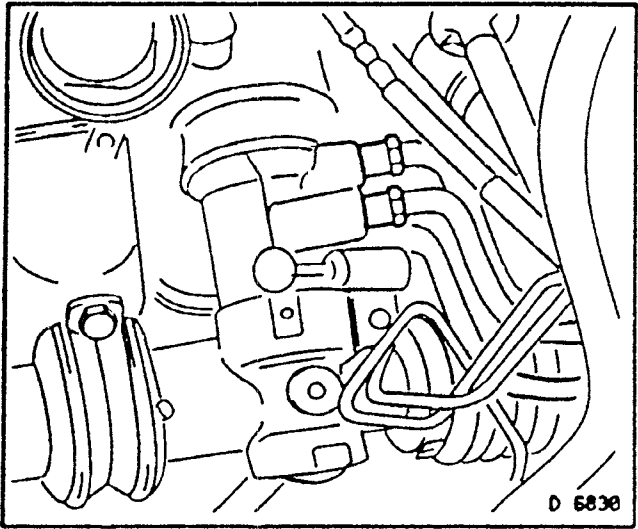


Fig. 26

TIGHTEN (TORQUE)

- 1. Both tie rods to steering gear — 95 Nm — with spacer and washers.
- 2. Secure tie rods with new twist protector.

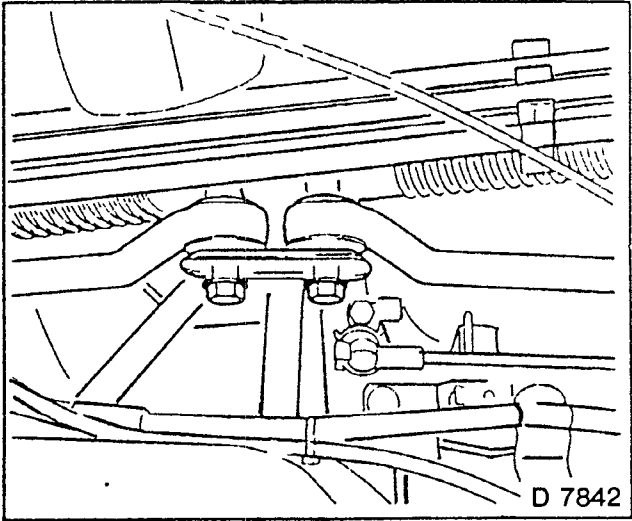


Fig. 27

3. Left tie rod end to tie rod lever — 60 Nm.
4. Left front wheel — 110 Nm

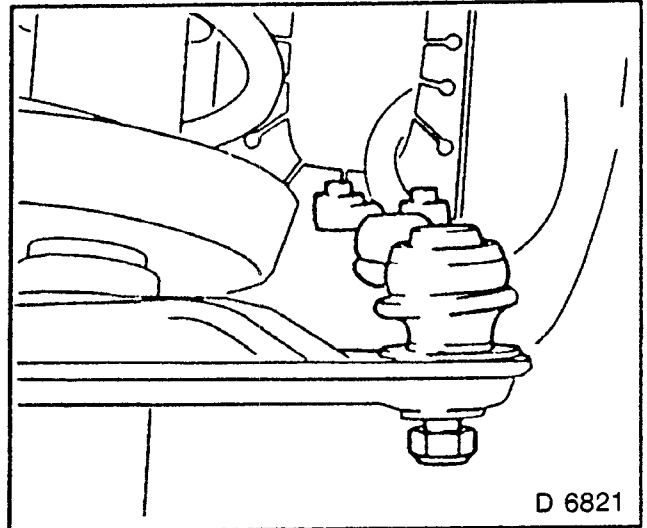


Fig. 28

5. Hex nut and fork on thrust rod — 18 Nm
6. Fork to dimension (1) — 147,7 mm.
7. First clamp new brake servo in vice.
8. Front retaining bracket to brake servo — 20 Nm

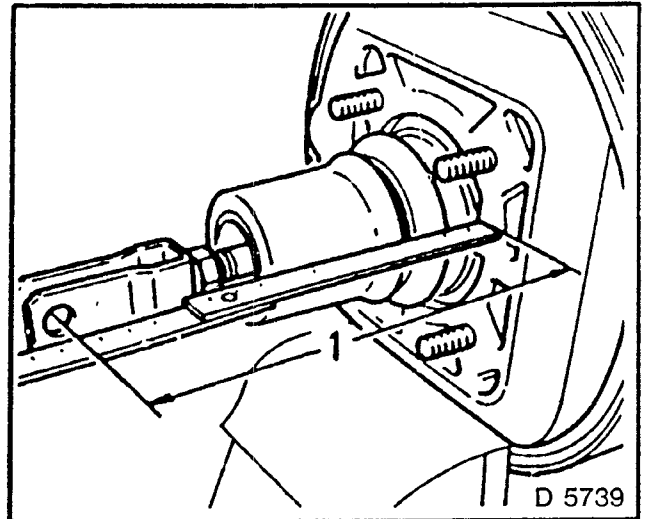


Fig. 29

CLEAN

1. Clean contact surfaces for front and rear retaining brackets with benzine and coat with Adhesive Sealing Compound. L0000589.

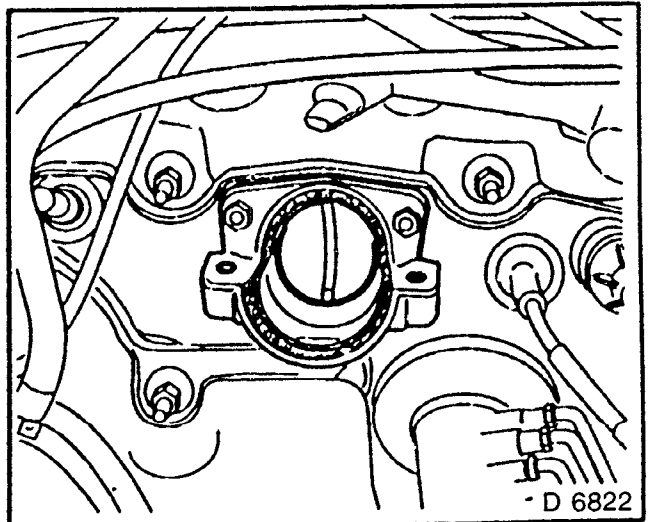


Fig. 30

TIGHTEN (TORQUE)

- 1 Brake servo with retaining bracket to bulkhead — 22 Nm
- 2. Coat fastening bolts thinly with Locking Compound LOCKTITE 242.

INSTALL, CONNECT

- 1 Closure plugs (1) on bottom of cowl.
- 2. Screen wiper motor (arrows).
- 3. Cowl panelling.

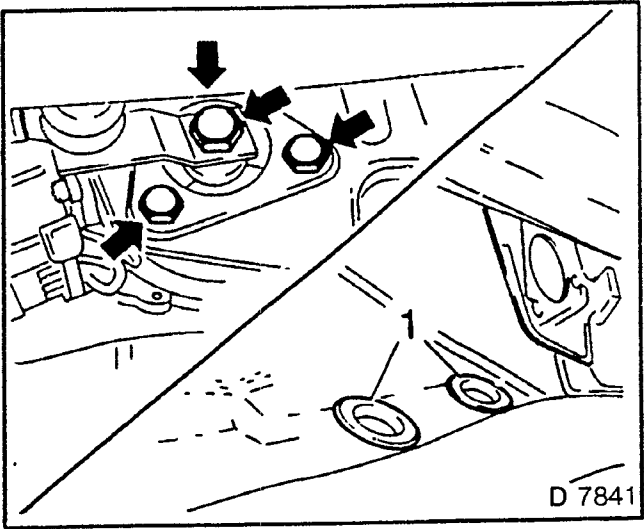


Fig. 31

TIGHTEN (TORQUE)

- 1 Brake master cylinder to brake servo — 22 Nm
- 2 Brake lines to brake master cylinder — 16 Nm

INSTALL, CONNECT

- 1. Vacuum pipe in brake servo.

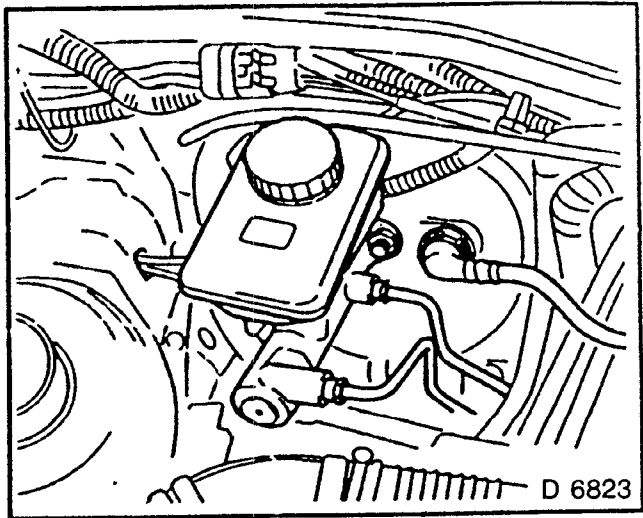


Fig. 32

- 2. Windscreen washer system fluid reservoir to wheel well — 2 Nm
- 3. Connect hoses and wiring plugs.

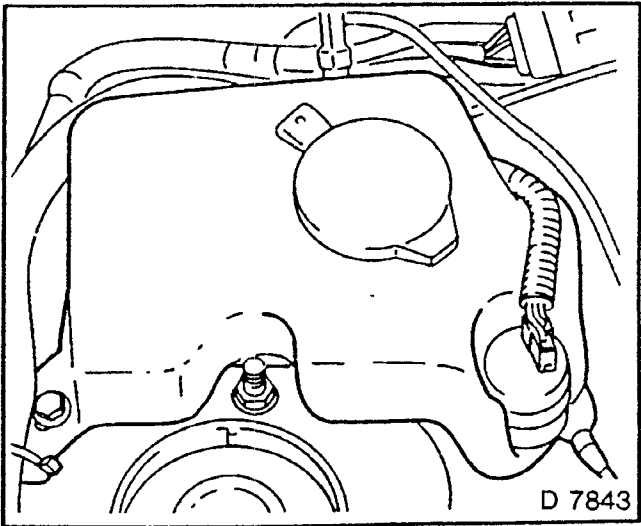


Fig. 33

- 4. Remove brake fluid reservoir blind screw cap.
- 5. Unscrew brake fluid float.
- 6. Connect wiring plug.

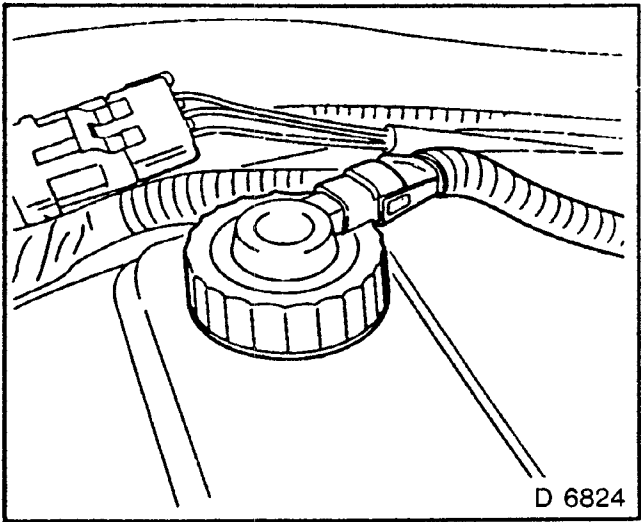


Fig. 34

TIGHTEN (TORQUE)

- 1 Push steering coupling onto steering pinion.
- 2. Clamp bolt, steering pinion to steering coupling — 22 Nm
- 3. Clamp bolt, steering shaft to steering coupling — 22 Nm

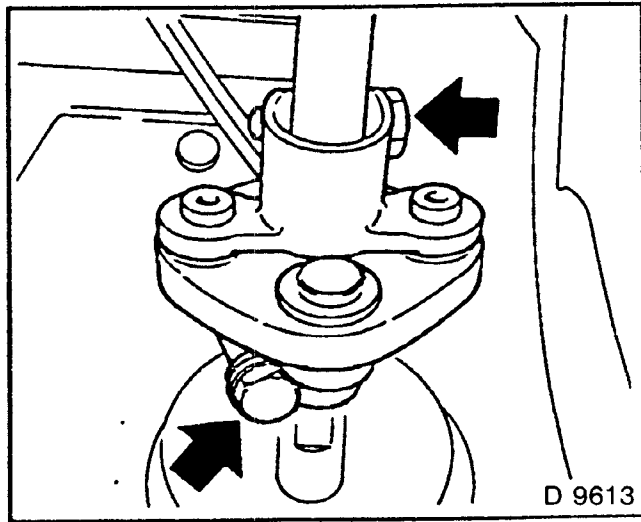


Fig. 35

INSTALL, CONNECT

- 1. Piston rod stud in fork.
- 2 Retainer (1).
- 3. Brake pedal spring.
- 4. Brake lamp switch.
- 5. Footwell panelling.

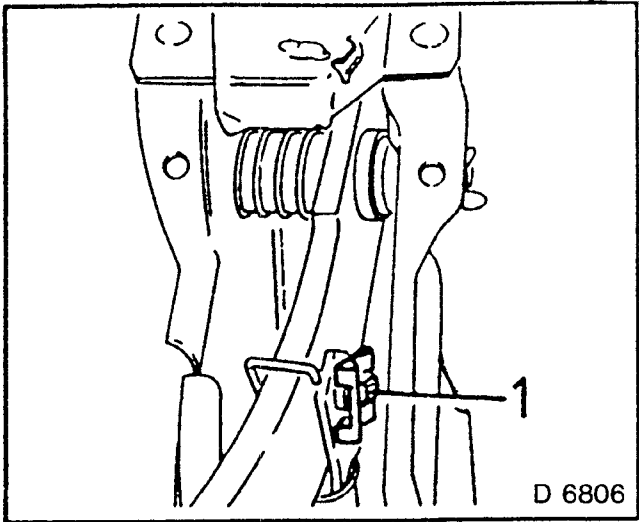


Fig 36

- 6. Pre-volume chamber — DOHC engines only (see Section J).
- 7. Ground cable to battery.
- 8. Bleed brake system and check for leaks (see Section H).
- 9. Check brake servo — (see Section H).

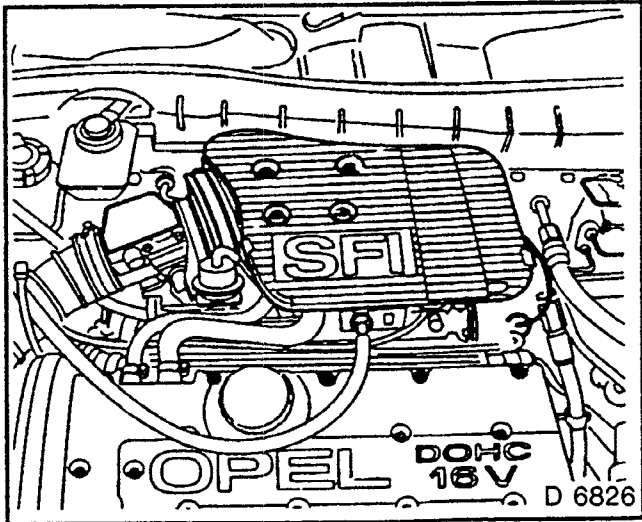


Fig. 37

Steering Gear, Seal — Power Steering

REMOVE, DISCONNECT

1. Brake servo
2. Pipe leads and also pressure and return line from steering gear.

CLEAN

1. Sealing surfaces and lines.

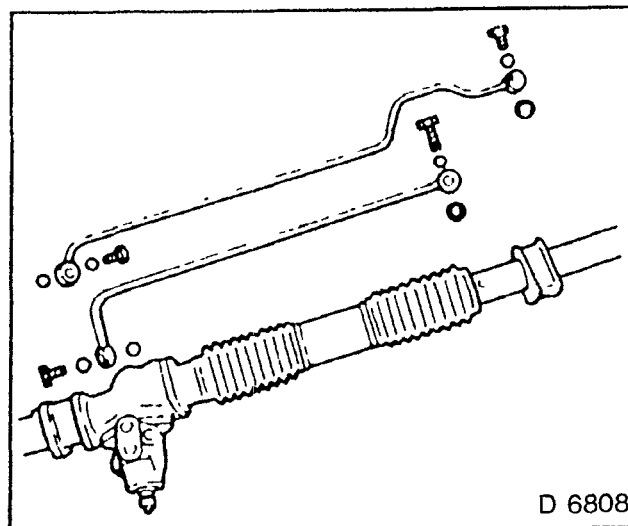


Fig. 38

CAUTION:

ALWAYS RENEW SEAL RINGS. SEALING OPERATIONS ARE TO BE CARRIED OUT WITH EXTREME CARE.

TIGHTEN (TORQUE)

1. Pipe lines to steering gear — 37,5 Nm
Neither pipe line should lie against the folding covers.
2. Pressure and return line to steering gear — 28 Nm
3. Install brake servo.
4. Bleed hydraulic system and check for leaks.

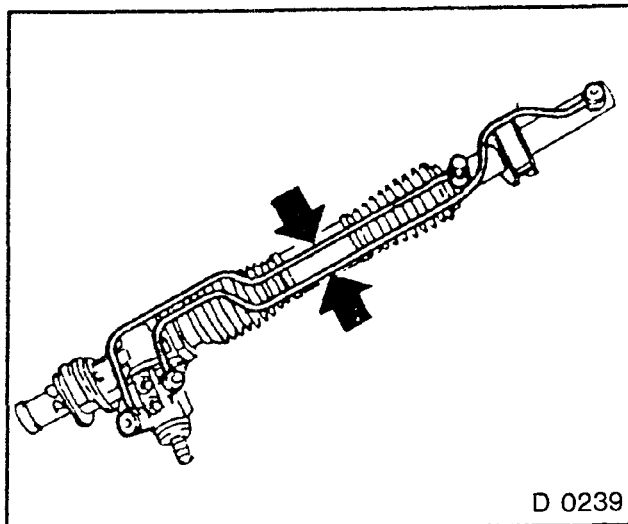


Fig. 39

Steering, Adjust

See "Steering Gear, Overhaul".

Steering Gear, Overhaul

REMOVE, DISCONNECT

1. Steering gear.

DISASSEMBLE

- 1. Steering gear.
- 2. Rubber bearing rings with retaining bracket and bulkhead rubber seal from steering gear housing.
- 3. Both clamp wires from folding covers.
- 4. Both folding covers with housing pipe from steering gear housing.

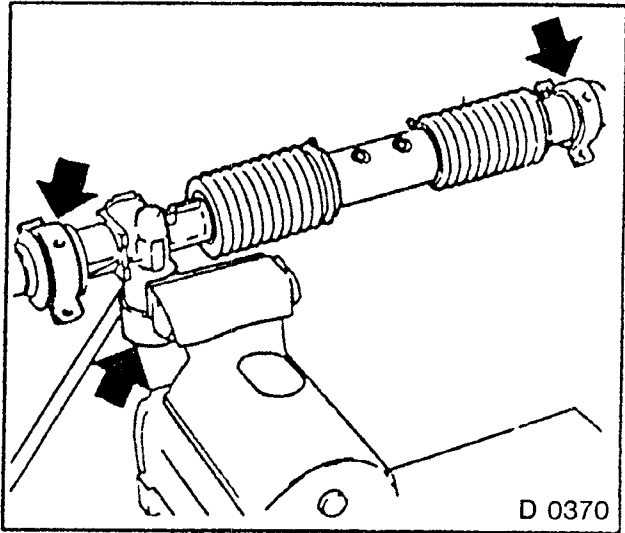


Fig. 40

- 5. Sliding piece and guide piece from steering rack.
- 6. Steel plate hex nut for adjustment screw —KM-472.

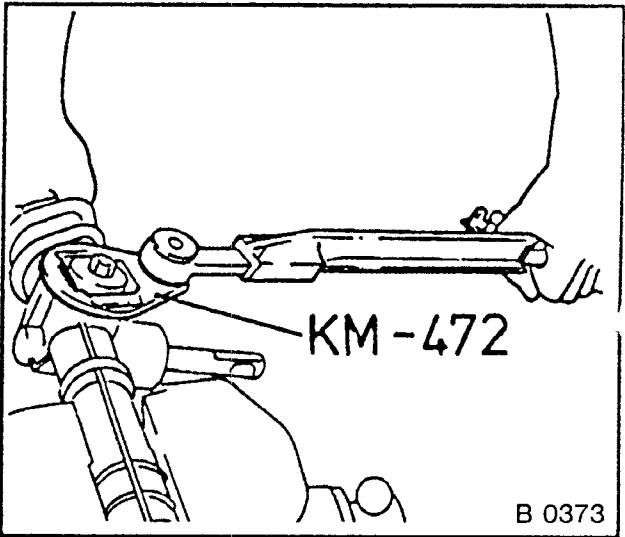


Fig. 41.

- 7. Unscrew adjustment screw.
- 8. Pressure spring from adjustment screw opening.
- 9. Steering gear.
- 10. Rubber bearing ring with retaining bracket and bulkhead rubber seal from steering gear housing.
- 11. Both clamp wires from folding cover.
- 12. Both folding covers with housing pipe from steering gear housing.

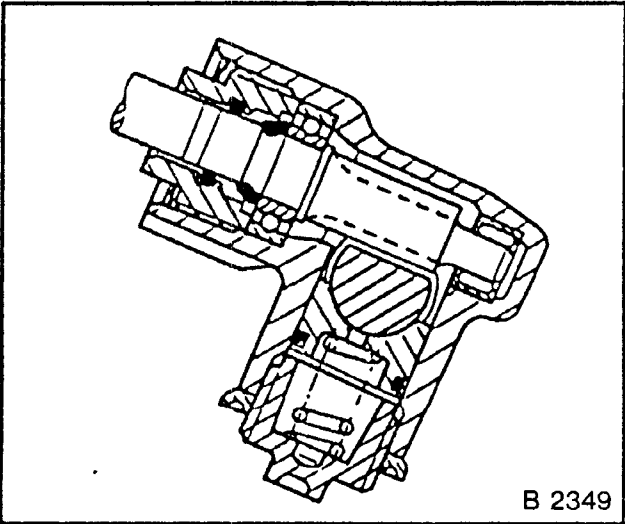


Fig. 42

- 13 Plate retaining ring, bolt for pinion fastening.
- 14. Replace bolt O-ring.

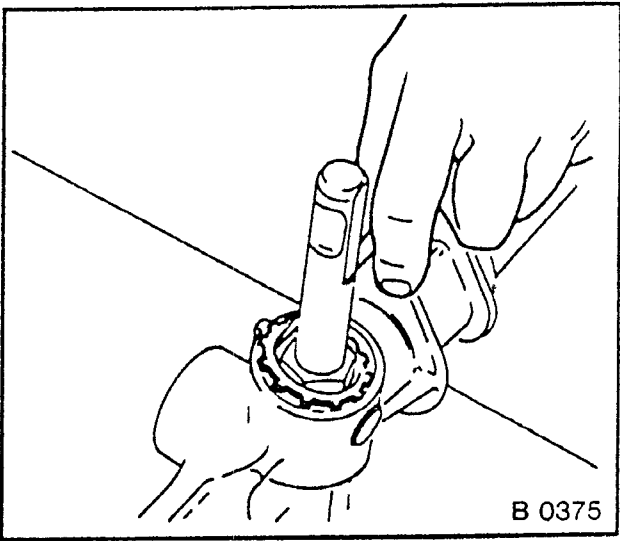


Fig. 43

- 15. Guide segment from adjustment screws opening.
- 16. Guide segment lies under suction in housing opening.
- 17. Replace O-ring.

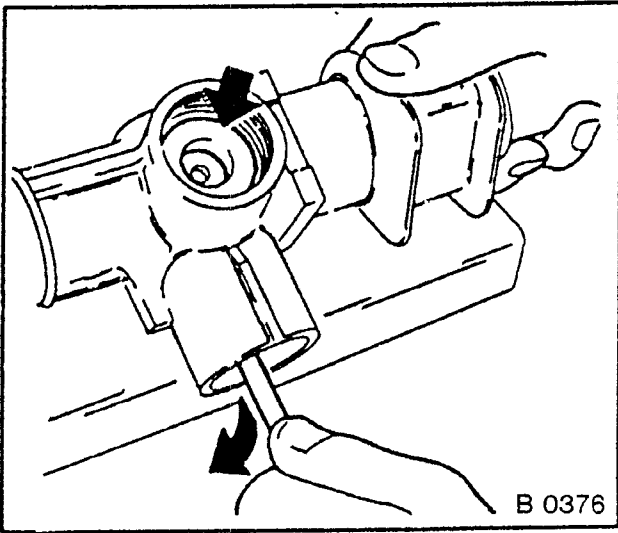


Fig. 44

- 18. Metal sealing cap from steering gear housing.

NOTE:

Further disassembly of the steering gear housing, and also removal of the steering racks bearing bushings and of the pinion needle bearings is not envisaged.

CLEAN

All parts.

INSPECT

- 1. Check all parts for wear and damage — if necessary replace.

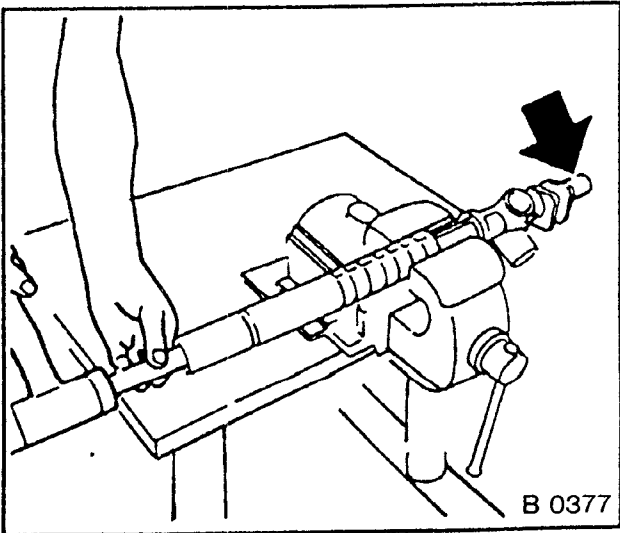


Fig. 45

- 2. If steering racks bearing bushings or pinion needle bearing are damaged, always replace steering gear housing assembly

NOTE:

WHEN REPLACING, NOTE TOTAL STEERING RATIO — SEE TECHNICAL DATA PAGE 56.

ASSEMBLE

- 1. Steering gear.
- 2. Lubricate pinion and steering rack with Steering Grease.
- 3. Fill interior of steering gear housing between steering rack bearings evenly with approximately 50 g steering grease.
- 4. Steering rack and pinion in steering gear housing.

MEASURE

- 1. Steering rack position — dimension (1) = 61 mm — between long steering gear housing end and steering rack facing surface.
- 2. Longitudinal recess (arrow) on pinion shaft points towards left (straight ahead position of steering).

TIGHTEN (TORQUE)

- 1. Fill cavity between bolt and pinion ball bearing with Anti-friction Bearing Grease. B0400852.
- 2. Pinion fastening bolt to housing — 40 Nm
- 3. Secure with plate retaining ring.

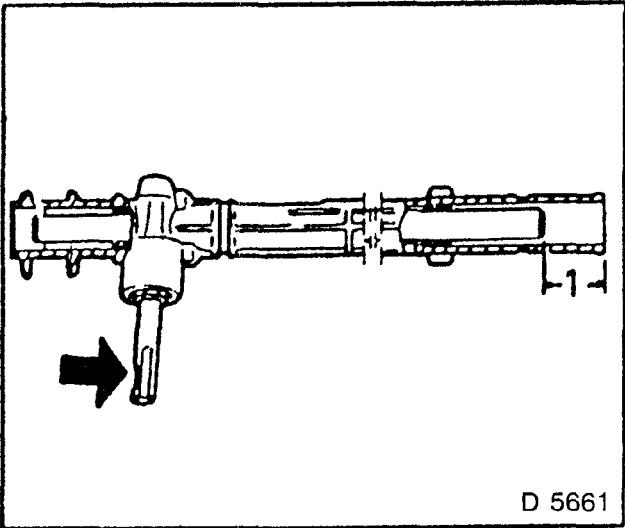


Fig. 46

ASSEMBLE

- 1 Drive in new retaining ring — KM-473

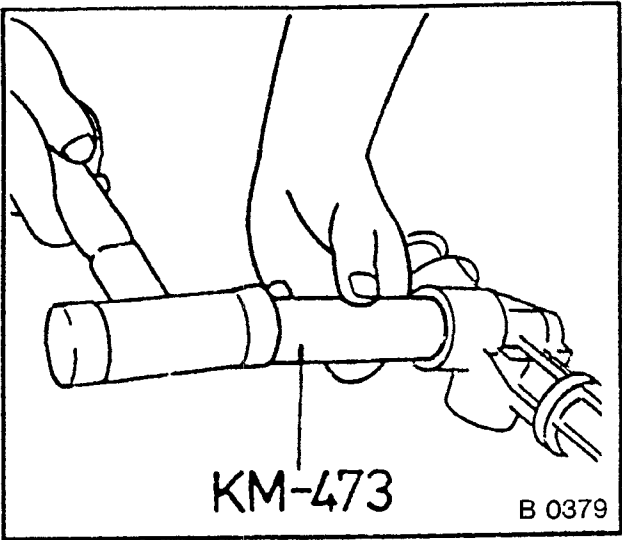


Fig. 47

ADJUST

- 1 Steering gear.
- 2. Screw on sliding and guiding pieces in conjunction with two spacer sleeves (1) with both tie rod fastening bolts to steering rack.

Spacer sleeve — 30 mm high, 25/12.5 mm diameter (own construction)

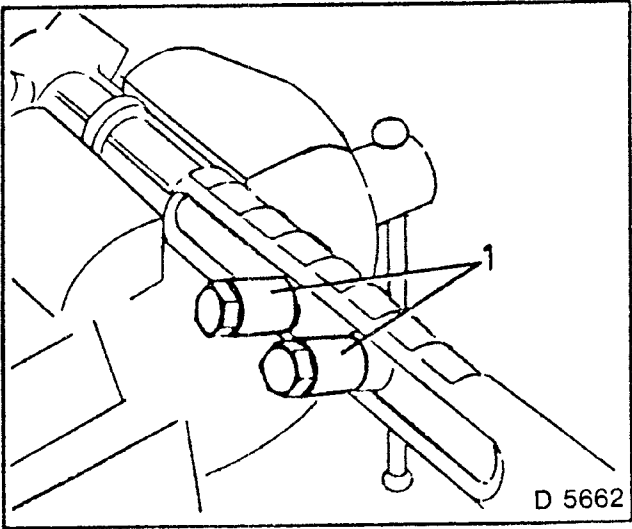


Fig. 48

- 3 Guide segment and pressure spring in adjustment screw opening.
- 4 Adjustment screw until resistance in steering gear housing is noticeable — Target value — 5 Nm (steering gear in straight ahead position).
- 5. Turn back adjustment screw 20° to 40°.

INSPECT

Free play of steering rack over whole range of pinion engagement.

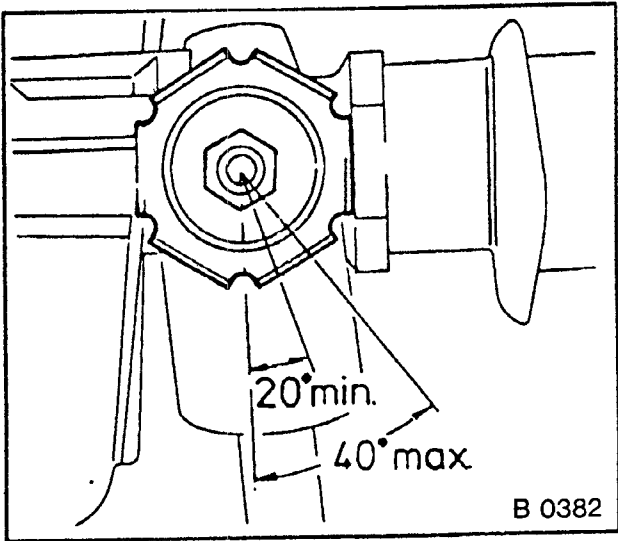


Fig. 49

TIGHTEN (TORQUE)

- 1. Counter nut with KM-472 — 60 Nm
- 2. Counterhold adjustment screw.

NOTE:

AFTER INSTALLATION OF STEERING GEARS, ESTABLISH DURING TEST DRIVE WHETHER STEERING RETURNS ON ITS OWN ACCORD TO STRAIGHT AHEAD POSITION.

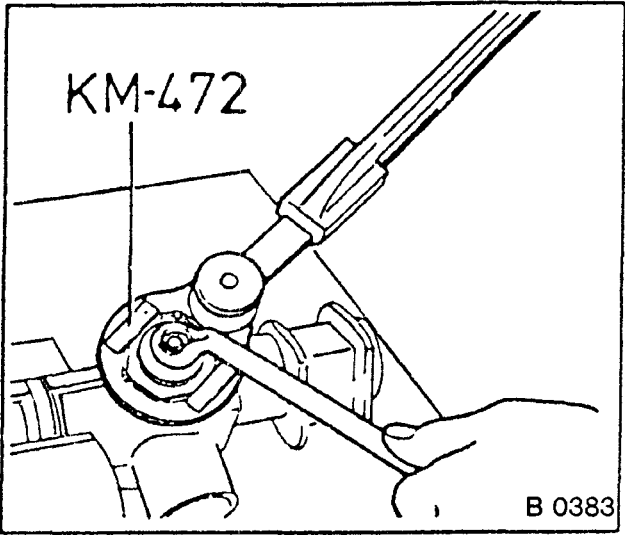


Fig. 50

ASSEMBLE

- 1. New metal sealing cap in short steering gear housing end.
- 2. Housing pipe and both folding covers on steering gear housing.
- 3. First unscrew both tie rod fastening bolts from steering rack.
- 4. Fasten both folding covers with clamp wires.
- 5. Ends of both wires, in steering gear installation position, point upwards

CAUTION:

FOLDING COVER MUST NOT LIE TWISTED.

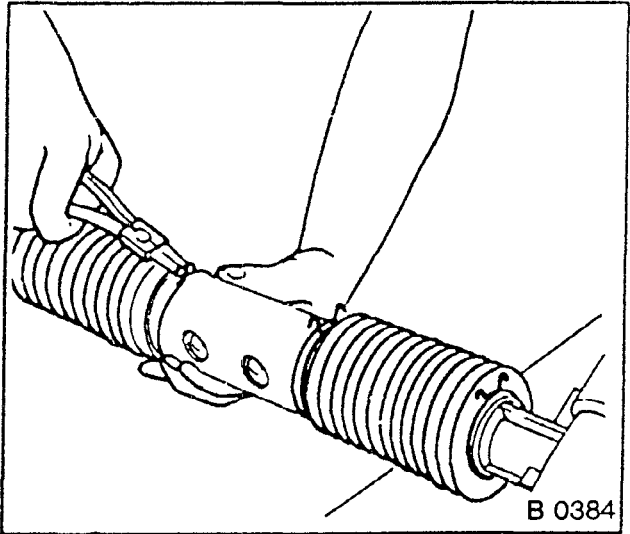


Fig. 51

ASSEMBLE

- 1. Rubber bearing rings with retaining bracket and bulkhead rubber cover on steering gear.
- 2. Inner curve on bracket flange points downwards.

INSTALL, CONNECT

- 1 Steering gear

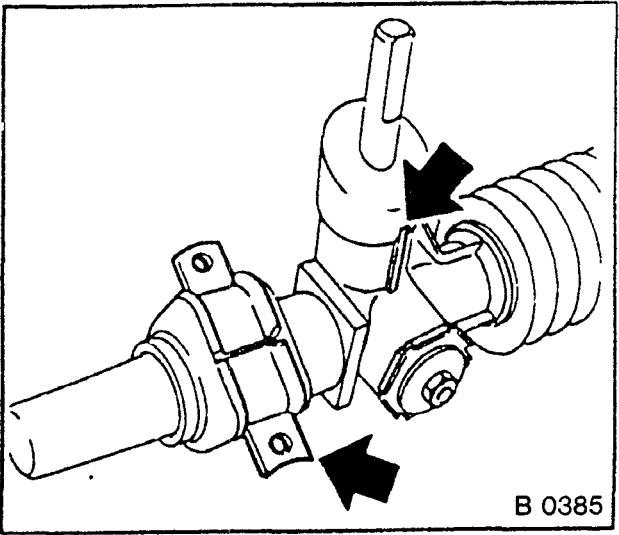


Fig. 52

Folding Cover on Steering Gear — Replace

REMOVE, DISCONNECT

Steering gear page 10.

- 1. Closed rubber bearing ring with retaining bracket from steering gear housing.
- 2. Both folding covers with housing pipe from steering gear housing.

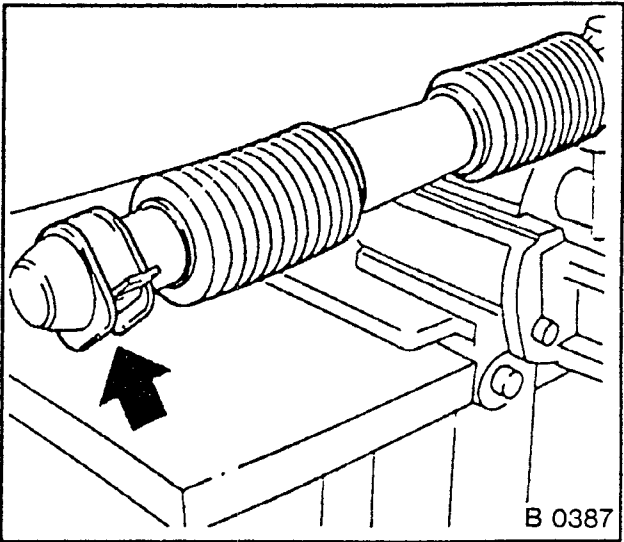


Fig. 53

INSTALL, CONNECT

- 1 Both folding covers with housing pipe onto steering gear housing.
- 2 Inner and outer folding covers with clamp wires.
- 3 Ends of both wires, in steering gear installation position, point upwards.
Folding cover must not lie twisted.
- 4. Closed rubber bearing ring with retaining bracket and bulkhead rubber seal onto steering gear housing.
- 5. Inner curve of bracket flange points downwards.

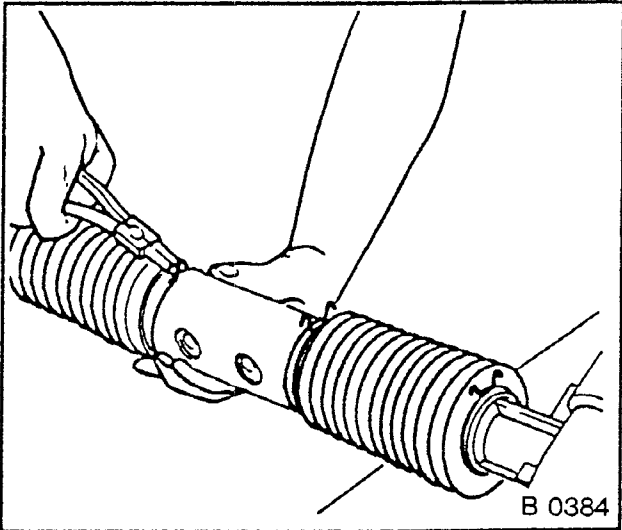


Fig. 54

Steering Linkage — Tie Rod — Replace

REMOVE, DISCONNECT

1. Loosen tie rod clamp flange.
2. Tie rod from steering gear.
3. Tie rod from adjusting bolts — measure screw-on depth.

INSTALL, CONNECT

1. Turn new tie rod (with new damping bushing) onto adjusting bolts.
2. Note left or right version.

TIGHTEN (TORQUE)

1. Tie rod to steering gear — 95 Nm secure.
2. Tie rod clamp flange — 20 Nm

ADJUST

Toe-out — See Section E.

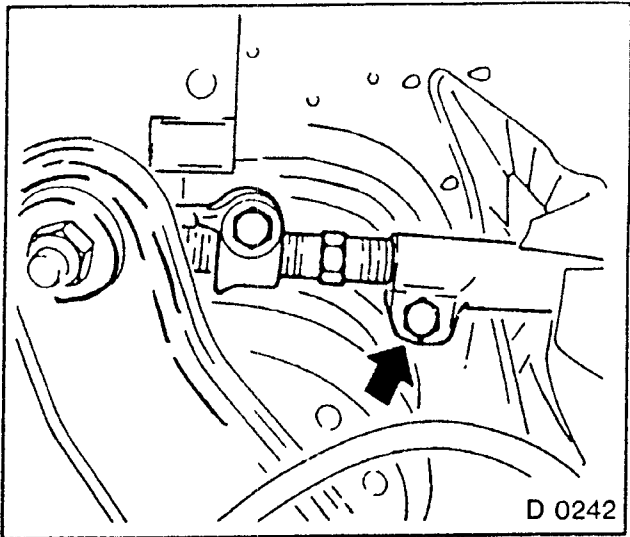


Fig. 55

Tie Rod End — Replace

REMOVE, DISCONNECT

1. Loosen clamp flange.
2. Tie rod end from tie rod lever — KM-507-C.
3. Tie rod end from adjusting bolts — measure screw - on depth.

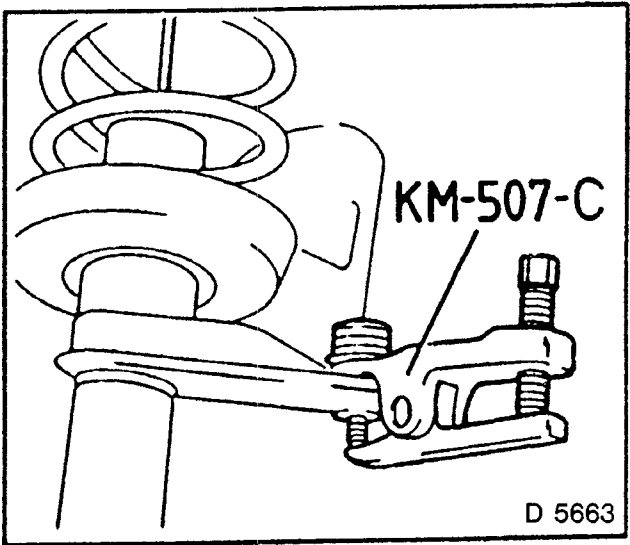


Fig. 56

- 4. Turn new tie rod end onto adjusting bolts.
- 5. Observe screw-on depth.
Right side is marked with "R".

TIGHTEN (TORQUE)

- 1. Tie rod clamp flange — 20 Nm.
- 2. Tie rod end to tie end lever — 60 Nm.
- 3. Use new self-locking nut.

ADJUST

- 1. Toe-out — See Section E.

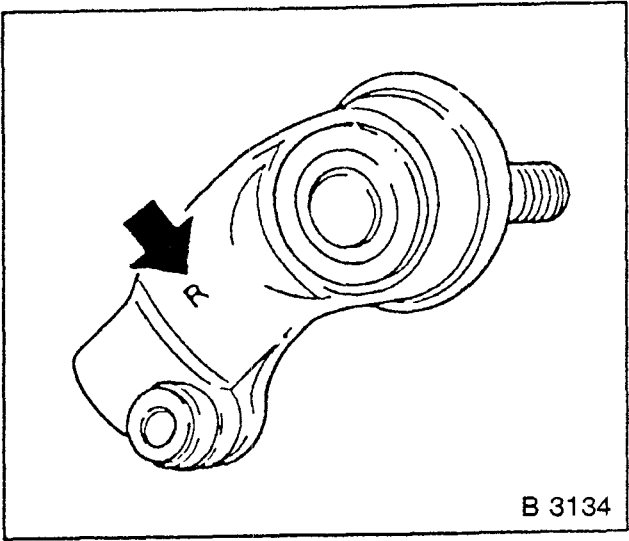


Fig. 57

B 3134

STEERING WHEEL

Steering Wheel/Slip Ring — Replace

REMOVE, DISCONNECT

1. Cover cap with horn button from steering wheel.
2. Steering wheel from steering shaft — KM-210-A, mark steering shaft installation position
3. If necessary, place new contact ring in steering wheel hub. Signal return segment of contact ring points in installation position towards the left.
4. Lubricate contact surface of contact finger on contact plate with commercially available contact agent.

TIGHTEN (TORQUE)

1. Steering wheel to steering shaft — 25 Nm and secure.

INSPECT

1. Steering straight ahead position.

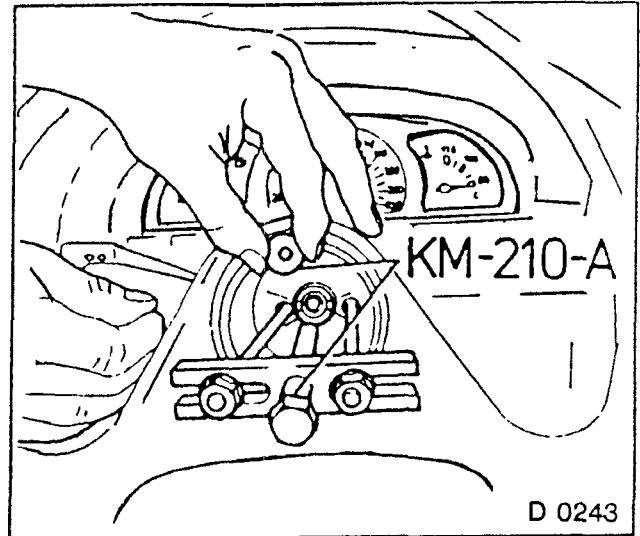


Fig. 58

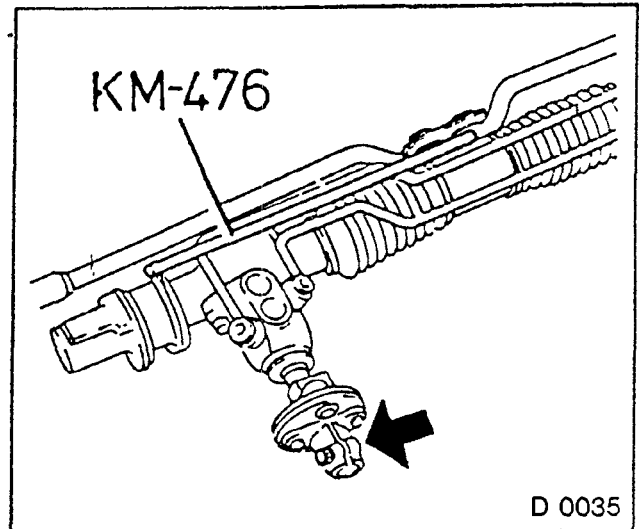


Fig. 59

STEERING COLUMN

Steering Shaft Upper Ball Bearing — Replace

REMOVE, DISCONNECT

- 1. Steering wheel from steering shaft — KM-210-A.
- 2. Two-part signal switch panelling — five bolts.
- 3. Signal switch and wiper switch from switch housing.
- 4. Switch housing, lever out housing safety plug — two pieces.
- 5. Turn switch housing to left and remove from steering column.
- 6. Ball bearing from switch housing — KM-108.
- 7. Press both bearing retaining lugs apart.

INSTALL, CONNECT

- 1. New ball bearing — KM-108.
- 2. Note installation position of bearing and both contact springs.
- 3. Press down both contact springs.
- 4. Engage bearing in retaining lugs.
- 5. Switch housing.
- 6. Use new safety plug.
- 7. Signal switch and wiper switch.
- 8. Two-part signal switch panelling.

TIGHTEN (TORQUE)

- 1. Steering wheel to steering shaft — 25 Nm and secure.

INSPECT

- 1. Straight ahead position of steering.

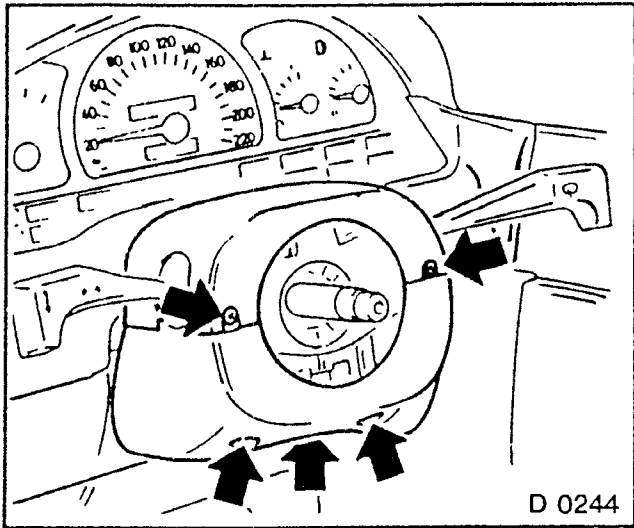


Fig. 60

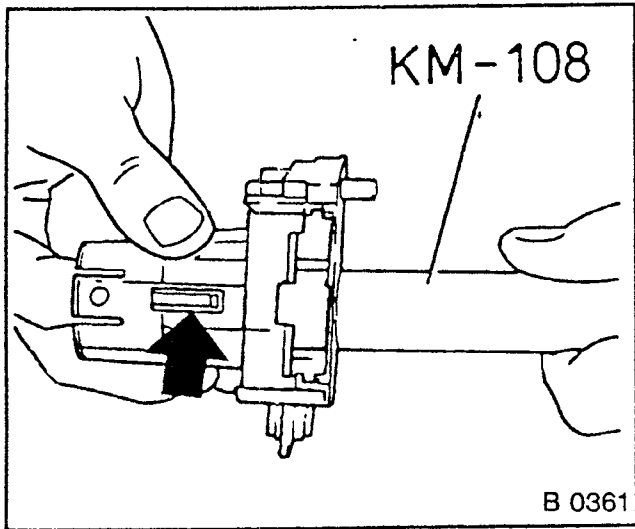


Fig. 61

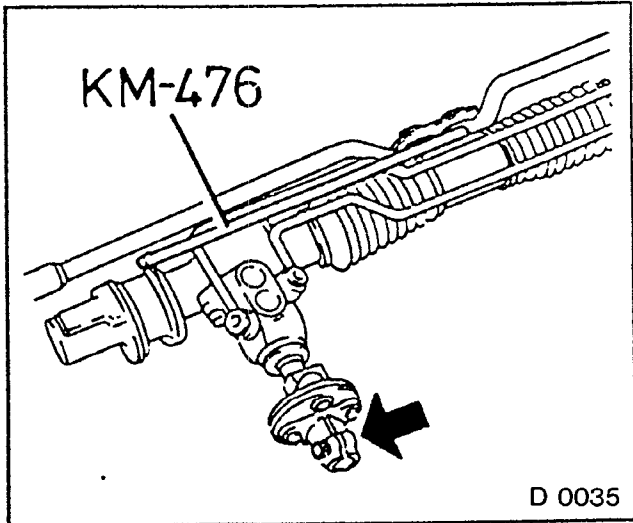


Fig. 62

Steering Column Assembly — Remove and Install

REMOVE, DISCONNECT

- 1 Ground cable from battery.
- 2 Footwell panelling — six retaining clamps.
- 3 Upper and lower signal switch panelling.

Fig. 63 — Steering column with steering wheel removed.

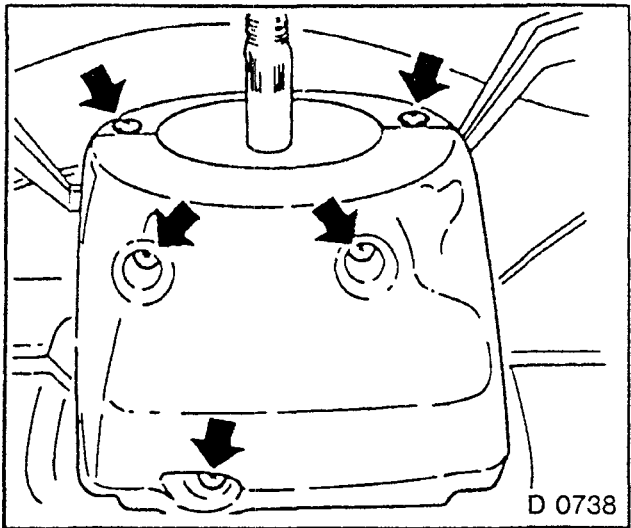


Fig. 63

REMOVE, DISCONNECT

- 1 Lock cylinder
- 2 Press down detent spring in position II with welding rod
- 3 Wiring harness plug for steering and ignition lock from contact part.
- 4 Signal switch and wiper switch.
- 5 Fuse box cover and lower signal switch cover.

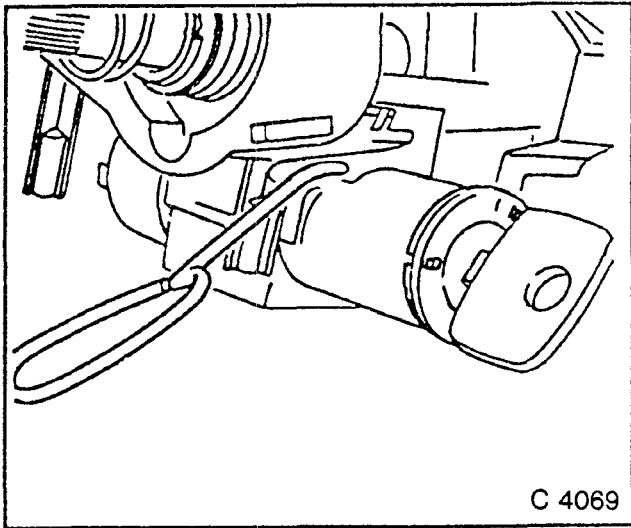


Fig. 64

REMOVE, DISCONNECT

- 1. Clamp bolt for steering shaft flange.
 - 2. Insert loosely seated plastic washer (1) into steering column (2).
 - 3. Hex bolt for steering column fastening.
- Where height adjustable steering wheel is fitted, place steering wheel in highest position.

REMOVE, DISCONNECT

- 1. Shear plates from instrument panel.
One hex bolt (right), one shear bolt (left).

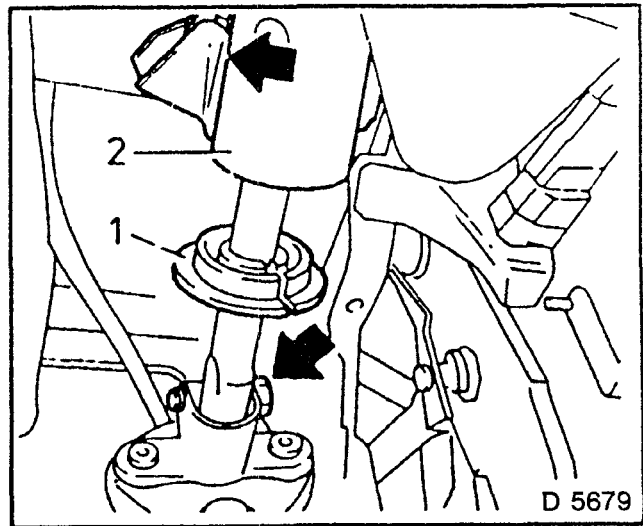


Fig. 65

2. Enlarge installation aperture in marked area by several millimetres (e.g. with round file), so that a centre punch or drill with a flexible shaft can be applied at right angles to the shear bolt.
3. Punch shear bolt centrally. Punch approximately 160 mm long and drill with \varnothing 2.5 mm drill (1) with flexible shaft (2), then drill with a \varnothing 4.5 mm drill.
4. Screw out shear bolt — screwdriver.
5. Steering column assembly from steering shaft flange.

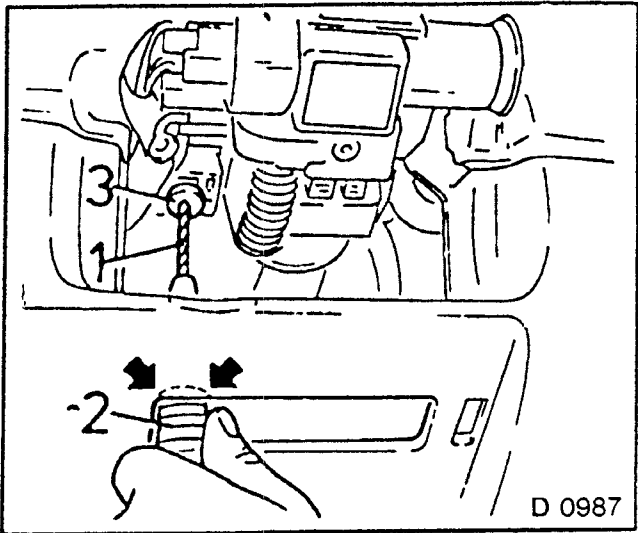


Fig. 66

INSTALL, CONNECT

1. Steering column assembly.
2. Insert synthetic washer (1) in steering column for centering steering shaft.
3. **Carefully** insert steering shaft in steering shaft flange.
4. Pre-install shear plate, steering column support and steering shaft flange clamp bolt.

Note straight ahead position of steering.

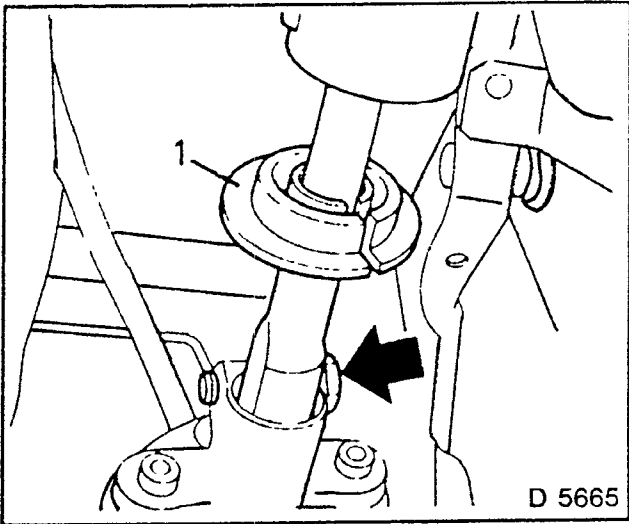


Fig. 67

TIGHTEN (TORQUE)

- 1 Steering column with bracket to bulkhead — 22 Nm.
- 2 Shear plate to instrument panel — 22 Nm.
3. Left side — shear bolt.
- 4 Clamp bolt, steering shaft to steering coupling — 22 Nm.
5. Press synthetic washer (1) out of steering column.

INSTALL, CONNECT

1. Wiring harness plug for steering and ignition lock into contact part.
2. Signal switch and wiper switch in switch housing.

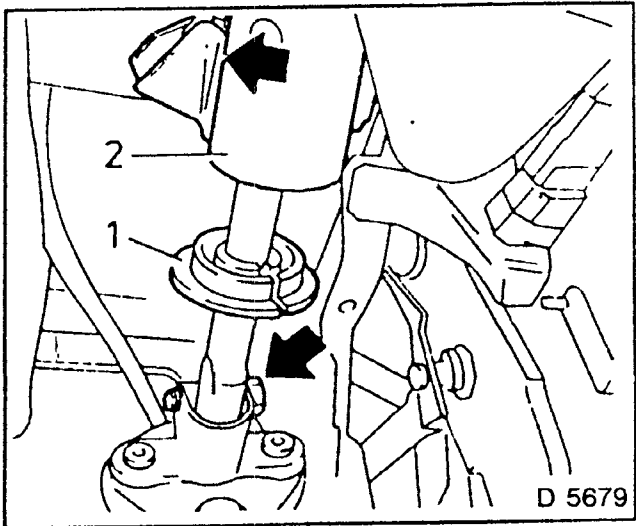


Fig. 68

- 3. Two-part signal switch panelling.
- 4. Rubber cover for steering and ignition lock.
- 5 Lock cylinder.
- 6 Footwell panelling.
- 7. Fuse box cover.
- 8. Lower steering column jacket.
- 9 Ground cable to battery.

INSPECT

- 1 Straight ahead position of steering

**Steering Column Assembly
— Disassemble and
Assemble**

Steering column with fixed steering wheel.
Steering column assembly installed.

REMOVE, DISCONNECT

- 1. Ground cable from battery.
- 2. Cover cap with horn button from steering wheel.
- 3 Steering wheel nut from steering shaft.
- 4. Steering wheel — KM-210-A, mark installation position.
- 5 Puller hook claws point outwards.

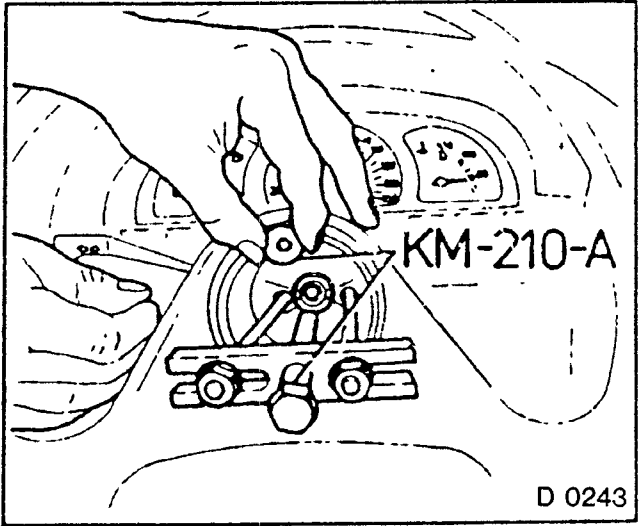


Fig. 69

- 6. Two-part signal switch panelling, lock cylinder.
- 7 Press down detent spring in position II with welding rod.
- 8. Signal switch and wiper switch.
- 9. Depress both locking lugs (top and bottom).
- 10. Switch housing — lever out housing safety plug.
- 11. Ball bearing from switch housing — KM-108.
- 12. Press both bearing retaining lugs apart.

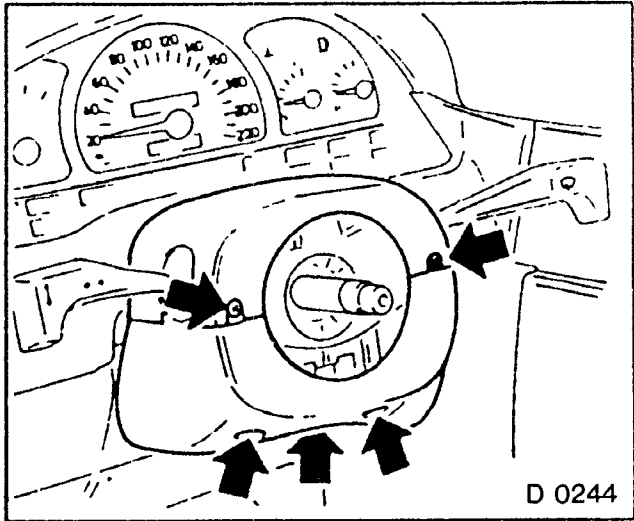


Fig. 70

INSTALL, CONNECT

- 1. New ball bearing in switch housing — KM-108
- 2. Note thrust washer (1) in front of ball bearing.
- 3. Note installation position of bearing and both contact springs (2).
- 4. Press down both contact springs.

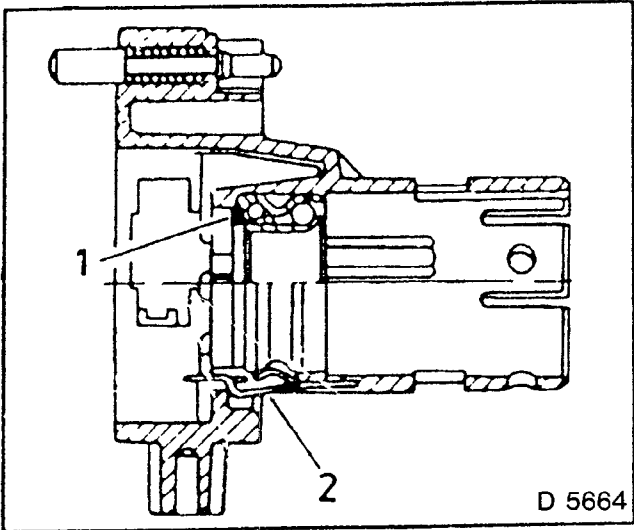


Fig. 71

REMOVE, DISCONNECT

- 1. Contact part. (Fig. 72 shows steering wheel with height adjustment).
- 2. Wiring harness plug from contact part, both threaded pins.
- 3. Steering shaft from steering shaft flange.
- 4. Insert the loosely seated synthetic washer into steering column.
- 5. Steering shaft from steering column.

CAUTION:

DO NOT KNOCK OR BUMP THE SHAFT.

ASSEMBLE

- 1. Steering shaft onto disc joint.
- 2. Contact part onto steering and ignition lock housing.
- 3. Switch housing onto steering column — new safety plug.
- 4. Signal switch and wiper switch — with inserted wiring harness plugs — onto housing.
- 5. Upper and lower signal switch panelling.
- 6. Lock cylinder for steering and ignition lock.
- 7. Lock cylinder and contact part same switch position.
- 8. Rubber cover onto housing for steering and ignition lock.
- 9. Disc and pressure spring onto steering shaft ball bearing.

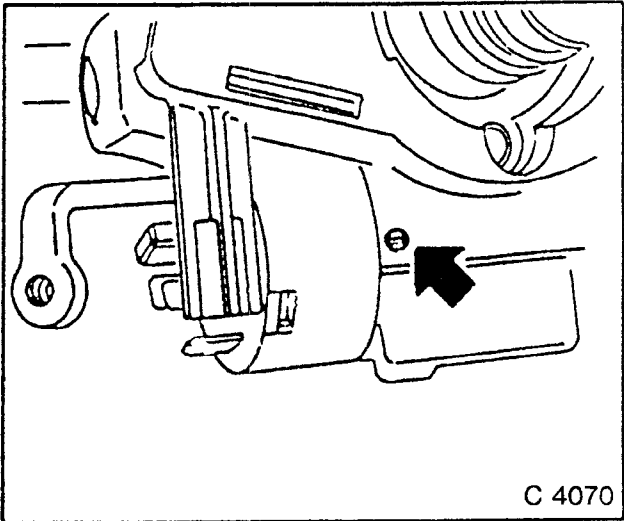


Fig. 72

TIGHTEN (TORQUE)

- 1. Steering wheel to steering shaft — 25 Nm and secure.
- 2. Installation position — press in steering shaft until it lies on steering shaft ball bearing.
- 3. Clamp bolt and steering shaft to steering coupling — 22 Nm.
- 4. Press synthetic washer, previously inserted into steering column (1), out of column (sits loosely on steering shaft).
- 5. Ground cable to battery.

INSPECT

- 1. Straight ahead position of steering.

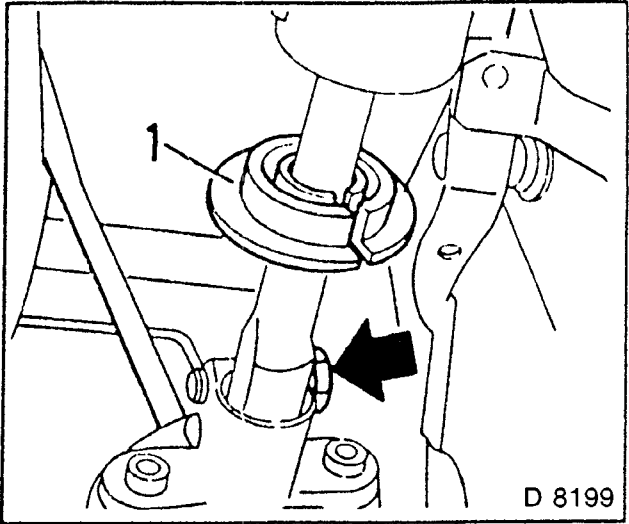


Fig. 73

Steering Column Assembly — Disassemble and Assemble

Steering column with height adjustable steering wheel

Steering column assembly installed

REMOVE, DISCONNECT

- 1. Ground cable from battery.
- 2. Cover cap with horn button from steering wheel.
- 3. Steering wheel from shaft — KM-210-A. Mark installation position.
- 4. Puller hook claws point outwards.
- 5. Hand adjustment lever for steering wheel height adjustment.
- 6. Signal switch panelling — five bolts.
- 7. Lock cylinder — press down detent spring in position II.
- 8. Contact part — remove wiring harness plug, unscrew set screws.
- 9. Switch housing — two bolts, push in direction of steering wheel.

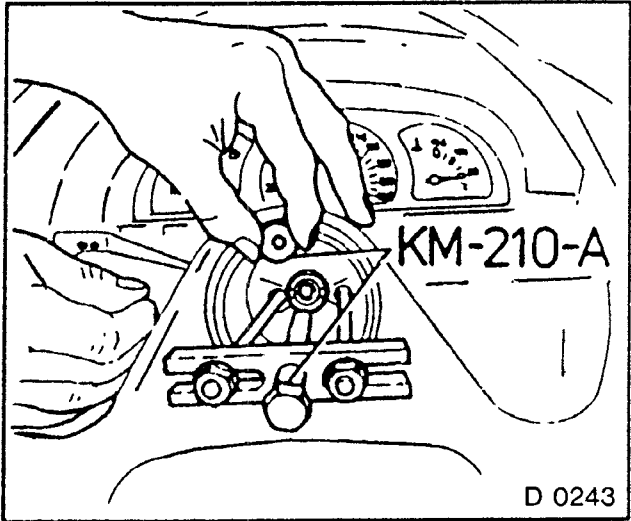


Fig. 74

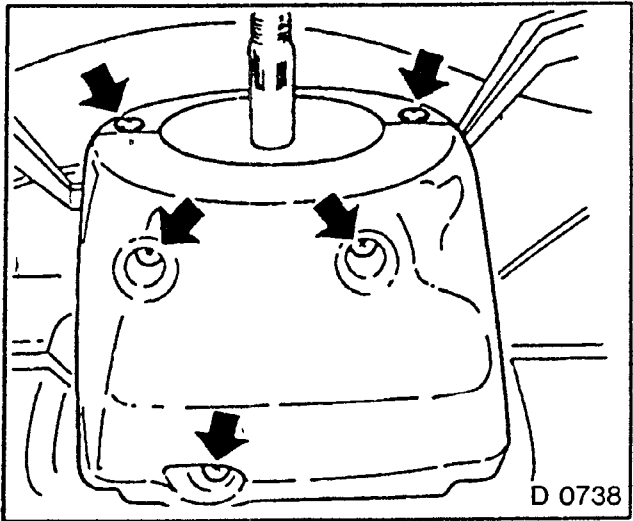


Fig. 75

REMOVE, DISCONNECT

- 1 Signal switch and wiper switch — with switch lever.
- 2. Depress both locking lugs (top and bottom).
- 3. Upper and lower steering column jacket — six bolts

REMOVE, DISCONNECT

STEERING COLUMN

- 1 Depresser ring for pressure spring from steering shaft.
- 2. Press depresser ring with Adapter KM-538 in conjunction with KM-J-23653-A downwards.
- 3. Remove from retaining ring with sharp-nose pliers and screwdriver.

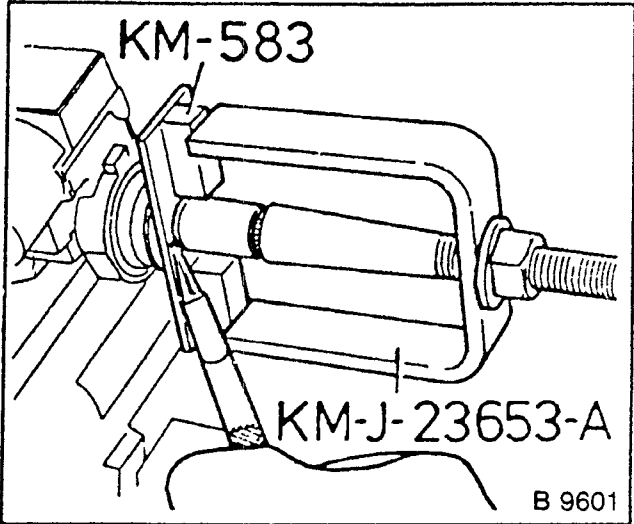


Fig. 76

DISASSEMBLE

STEERING COLUMN

- 1 Pressure spring for bearing.
- 2. Pressure ring
- 3. Bearing ring for outer bearing from steering shaft.
- 1 Retaining ring
- 2 Depressor ring
- 3 Pressure spring for bearing
- 4 Pressure ring
- 5 Bearing ring for outer bearing

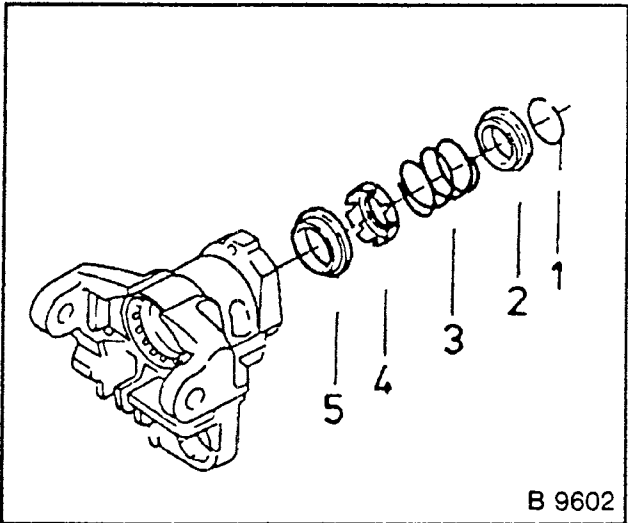


Fig. 77

REMOVE, DISCONNECT

- 1. Pressure spring for height adjustment — KM-584.

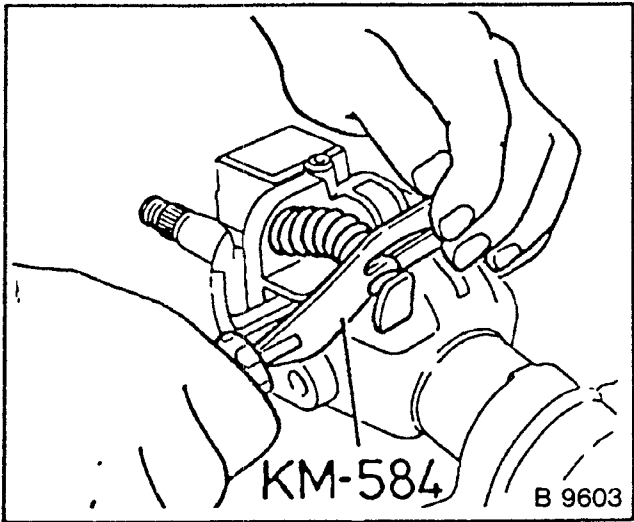


Fig. 78

DISASSEMBLE

- 1. Both fulcrum bearing pins from bearing housing — KM-585.
- 2 Remove bearing housing.

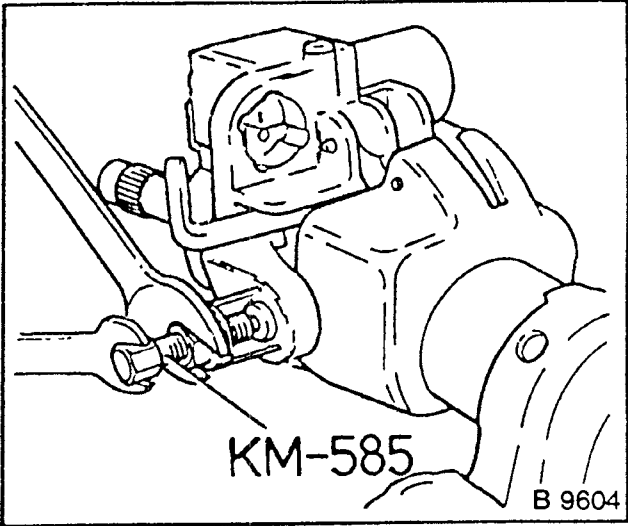


Fig. 79

- 3. Housing for steering and ignition lock from bearing housing — ONLY when replacing bearing housing or ignition lock housing.
- 4. Drill of both bolt heads — drill \varnothing 6.5 mm.

ASSEMBLE

- 1. Fasten new housing with two retaining screws.
- 2. Install new bolts (not microencapsulated) with Sealing Compound. LOCKTITE 242.
- 3. Cut threaded holes M 6 free. Housing is only delivered in assembly with ball bearings.

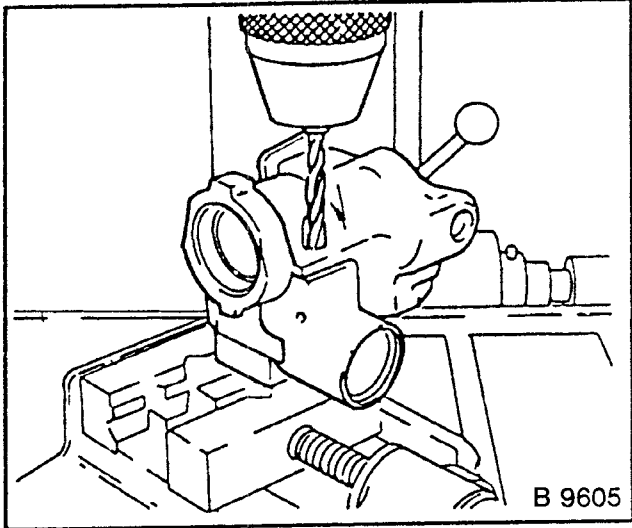


Fig. 80

DISASSEMBLE

- 1. Adjust lever and both detent levers from bearing housing.
- 2. Steering shaft universal joint.
- 3 If necessary, replace parts and reassemble.
- 4. Wire springs must lie in recesses of each half of joint.
- 5. Bearing ring for inner bearing from upper steering shaft part — ONLY when replacing bearing housing with both ball bearings.
- 6. Press off ring carefully with hammer and chisel.

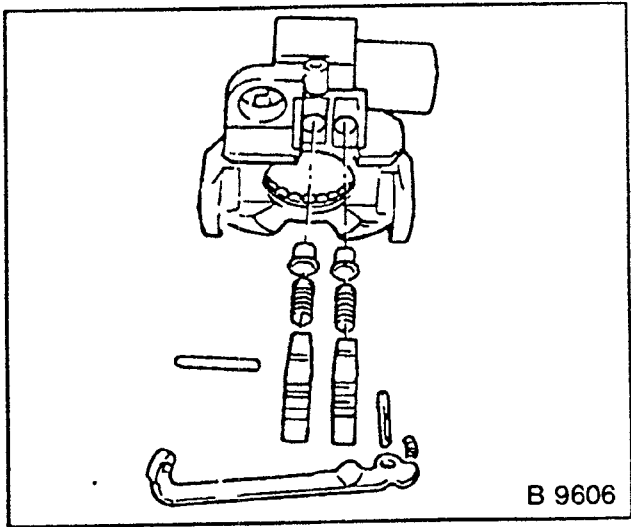


Fig. 81

ASSEMBLE

Steering column.

- 1. New bearing ring onto upper steering shaft part — KM-311.
- 2. Adjust lever and both detent levers to bearing housing.
- 3. Both fulcrum bearing pins in bearing housing.
- 4. Pressure spring for height adjustment — KM-584.
- 5. Bearing ring for outer bearing onto steering shaft.
- 6. Pressure ring, pressure spring for bearing.
- 7. Depressor ring for pressure spring onto steering shaft.

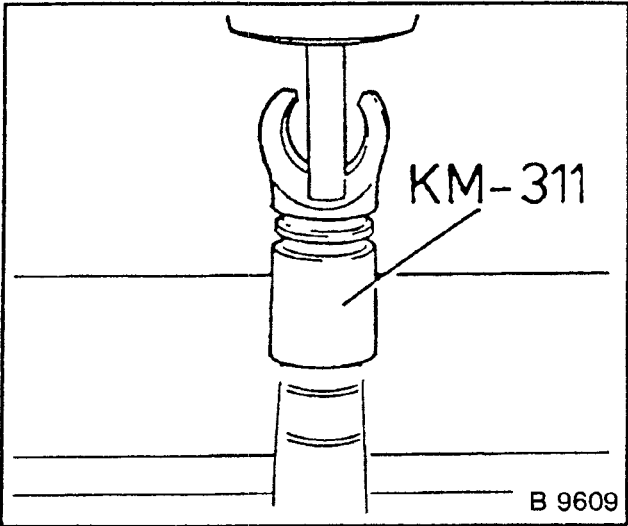


Fig. 82

NOTE:

Fastening of fulcrum bearing pins onto bearing housing.

In each case, bottom out in three places.

INSPECT

- 1. Gap between housing and both stop buffers in top steering wheel lock position with feeler gauge.
- 2. Exact fit, without moving the steering wheel further
- 3. If necessary, adjust gap with left and/or right stop buffer.

INSTALL, CONNECT

- 1. Steering column assembly

INSPECT

- 1. Straight ahead position.

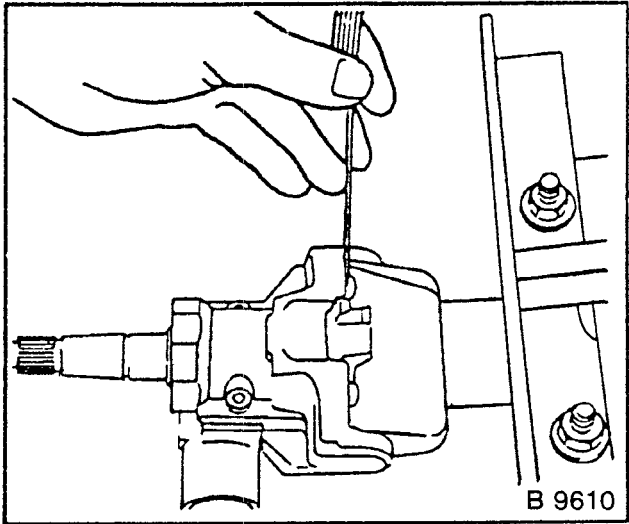


Fig. 83

Disc Joint — Replace

Steering gear in straight ahead position.

REMOVE, DISCONNECT

1. Clamp bolts for steering shaft and steering pinion from disc joint.
2. Steering gear from bulkhead.
3. Push disc joint onto steering shaft.
4. Disc joint.

TIGHTEN (TORQUE)

1. Steering gear to bulkhead — 22 Nm.
2. Steering gear must be in straight ahead position.
3. Clamp bolt, steering pinion to steering coupling — 22 Nm.
4. Clamp bolt, steering shaft to steering coupling — 22 Nm.
5. Pull steering shaft until it lies on steering shaft ball bearing.

INSPECT

1. Straight ahead position.

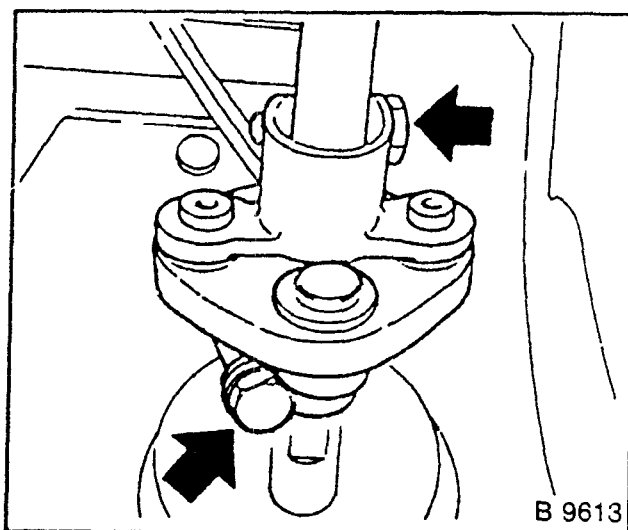


Fig. 84

Upper Steering Shaft — Replace

"Steering Column Assembly, Disassemble and Assemble", page 33.

Steering Column — Replace

REMOVE, DISCONNECT

1. Steering column assembly.
2. Steering column in vice.

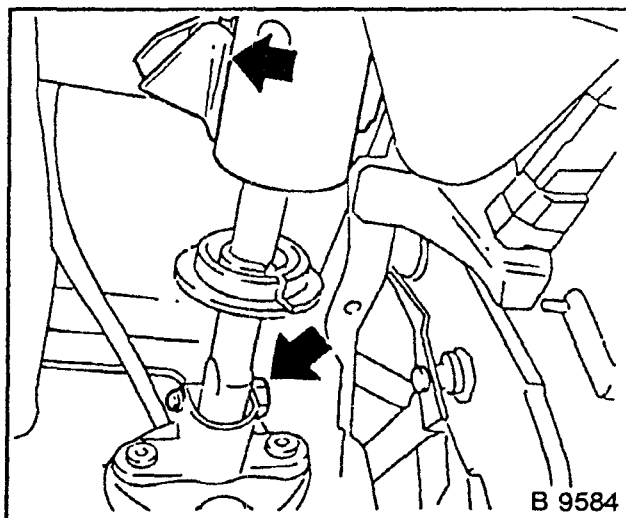


Fig. 85

DISASSEMBLE

1. Housing for steering and ignition lock from steering column.
2. Drill off screw head — drill \varnothing 8.5 mm
3. Replace steering column.

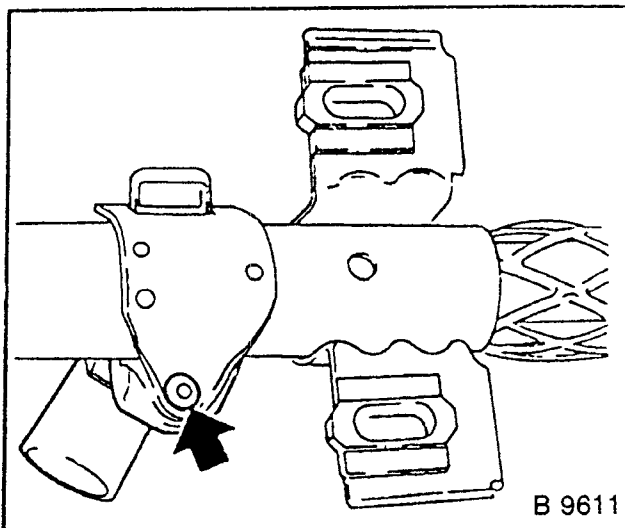


Fig. 86

ASSEMBLE

1. Housing for steering and ignition lock onto steering column.
2. Insert new bolt (not microencapsulated) with Sealing Compound. LOCKTITE 242.

INSTALL, CONNECT

1. Steering column.
2. Check straight ahead position.

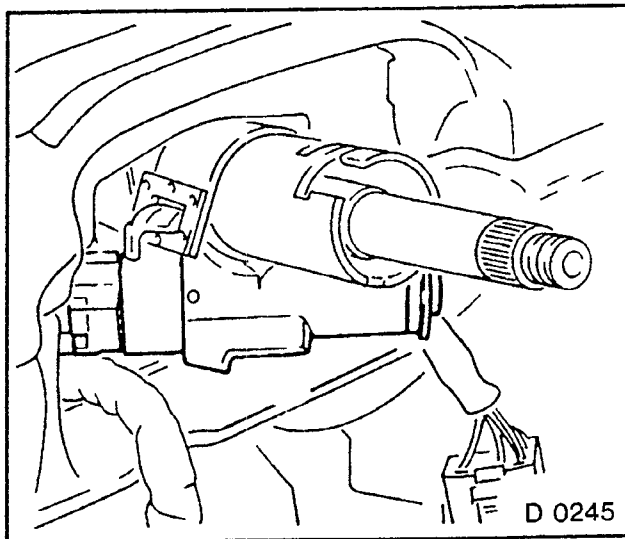


Fig. 87

POWER STEERING

General

Design:

Power steering gear rack with “rotary sliding valve”.

Adjustment of steering is not necessary.

An overhaul or disassembly of power steering gears is not envisaged for dealer workshops.

Main components of rotary sliding valve:

- Rotary slider with needle bearing (1) surrounded with six control grooves.
- One-part control bushing (2) with six control grooves internally arranged, which correspond to those of the rotary slider.
- Torsion rod (3) positioned centrally on valve.

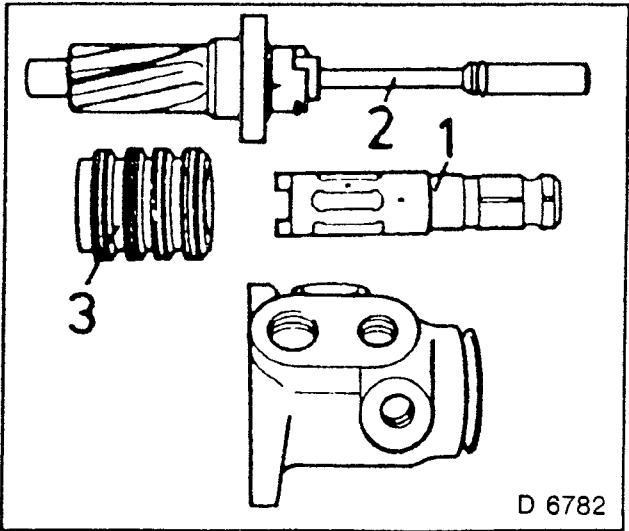


Fig. 88

Hydraulic System, Top up

Top up fluid reservoir to marking “MAX” (1) and start engine.

Top up sinking fluid level immediately to marking “MIN” (2) and allow engine to run for approximately fifteen seconds.

Turn steering to stop and hold in this position for approximately ten seconds.

Carry out this operation to right and left twice.

Check fluid level again:

Fluid at operating temperature (approximately 80°C/176°F) — up to marking “MAX” (1)

Fluid cold (approximately 20°C/68°F) — up to marking “MIN” (2)

Check hydraulic system for leaks.

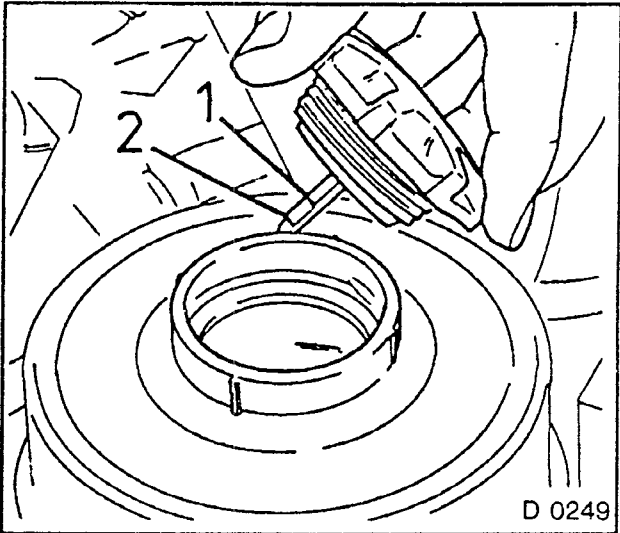


Fig. 89

V-belt for Hydraulic Pump — Replace

Vehicles without AC

REMOVE, DISCONNECT

- 1. V-belt.
- 2. Loosen bolts (1), (2), (3).
- 3. Loosen tensioning screw nuts (Fig 91).

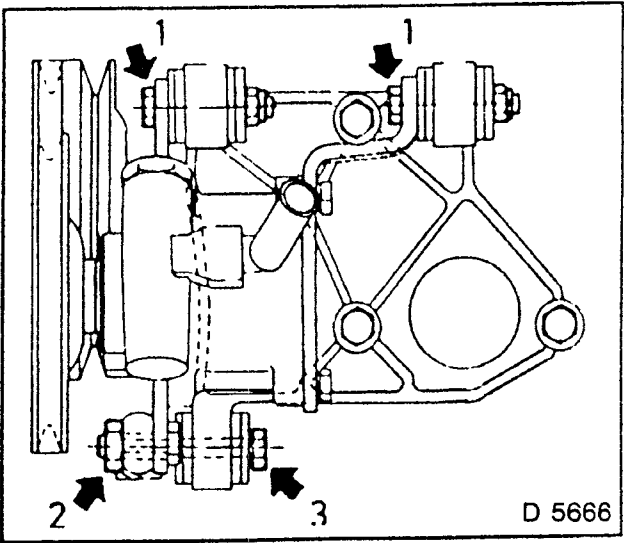


Fig. 90

INSTALL, CONNECT

- 1. New V-belt.
- 2. Adjust V-belt tension — KM-128-A, checking value: see Technical Data (page 56).

TIGHTEN (TORQUE)

- 1. Bolt (1) — 25 Nm.
- 2. Bolt (2) — 40 Nm.
- 3. Bolt (3) — 25 Nm.

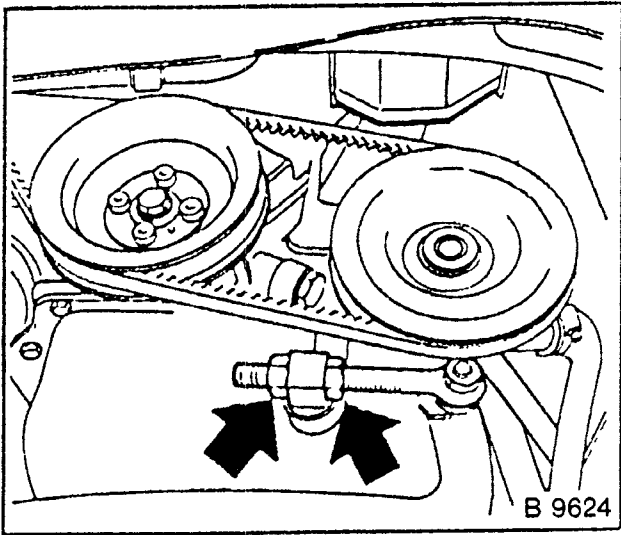


Fig. 91

V-belt for Hydraulic Pump — Replace

Vehicles with AC

REMOVE, DISCONNECT

- 1. V-belt for air conditioning compressor.
- 2. Loosen locking screws at the front and rear clamping bracket.
- 3. Loosen fastening bolt (long) on upper compressor outrigger.
- 4. Loosen lock nut of tensioning screw.
- 5. Push compressor to engine block.

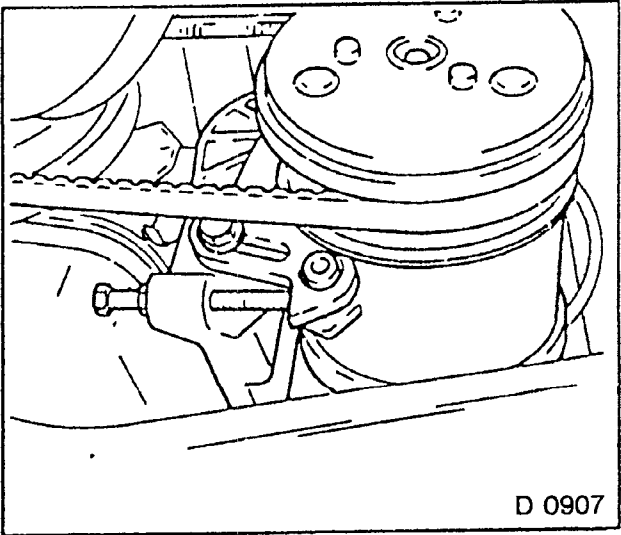


Fig. 92

- 6. V-belt for hydraulic pump
- 7 Loosen fastening bolt (long) at retainer
- 8. Loosen lock nuts and adjustment nuts.
- 9 Release tension on V-belt.
- 10. Replace V-belt.

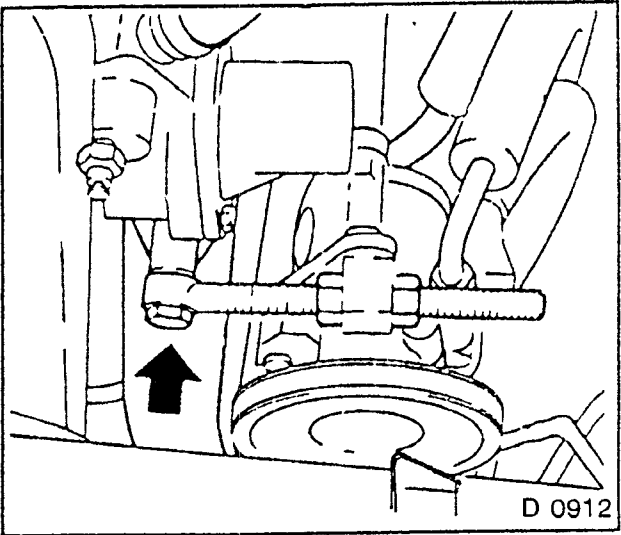


Fig. 93

ADJUST

- 1. V-belt tension — KM-128-A, test values: Technical Data page 56.

TIGHTEN (TORQUE)

- 1. Lock nut to tensioner of hydraulic pump — 40 Nm.
- 2. Fastening bolt (long) to bracket — 25 Nm.

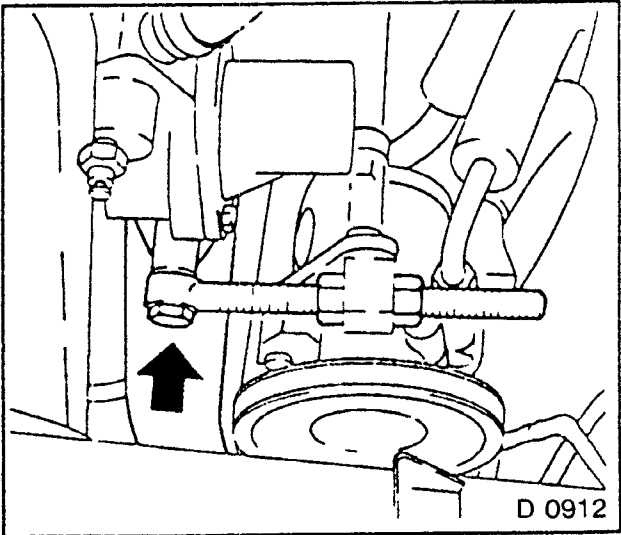


Fig. 94

INSTALL, CONNECT

- 1. V-belt for air conditioning compressor.

ADJUST

- 1. V-belt tension — KM-128-A, test values: Technical Data page 56.

TIGHTEN (TORQUE)

- 1. Lock nut to lower tensioner — 25 Nm.
- 2. Lock bolts to front or rear clamping brackets — 25 Nm.
- 3. Fastening bolts (long) to outrigger — 25 Nm.

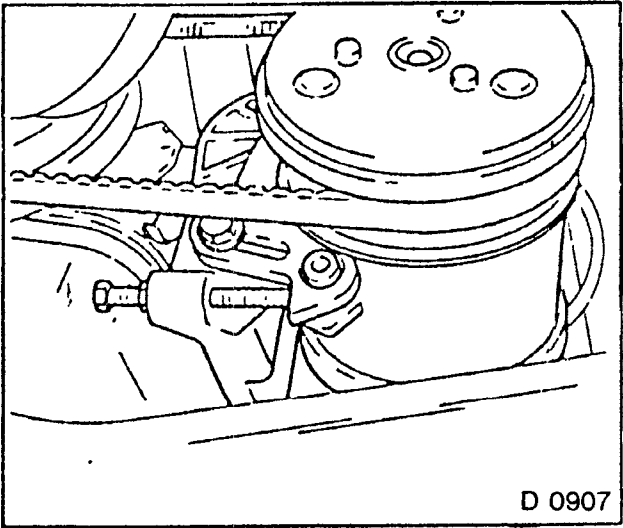


Fig. 95

Ribbed V-belt for Hydraulic Pump — Replace

REMOVE, DISCONNECT

- 1. Air intake hose — if present.
- 2. Loosen clamping bracket.
- 3. Lower alternator fastening.
- 4. Removed ribbed V-belt from hydraulic pump and alternator.
- 5. Replace V-belt.

ADJUST

- 1. Ribbed V-belt tension — KM-612 and torque wrench.
Test values: Technical Data, page 56.

TIGHTEN (TORQUE)

- 1. Clamping bracket to alternator — 25 Nm.
- 2. Lower alternator fastening — M8: 25 Nm.
- 3. Lower alternator fastening — M10: 35 Nm.
- 4. Connect air intake hose — if present.

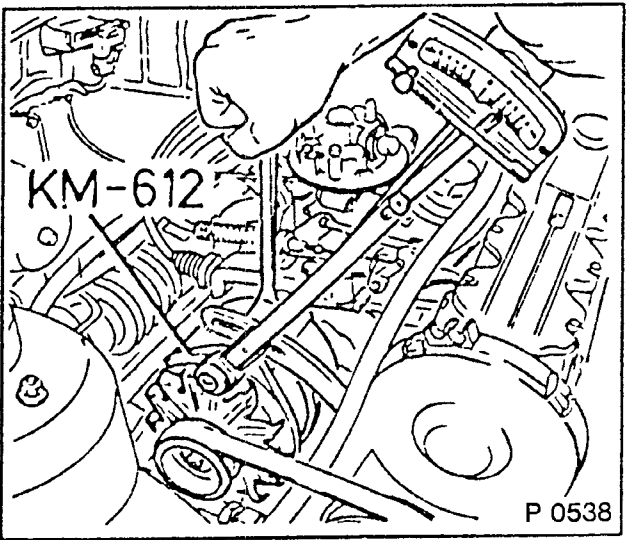


Fig. 96

Fluid Reservoir — Remove and Install

REMOVE, DISCONNECT

- 1. Bracket clamp bolt.
- 2. Both hose connections — fluid escapes.

INSTALL, CONNECT

- 1. Both hose connections.
- 2. Clamp bolt.
- 3. Top up and bleed hydraulic system.

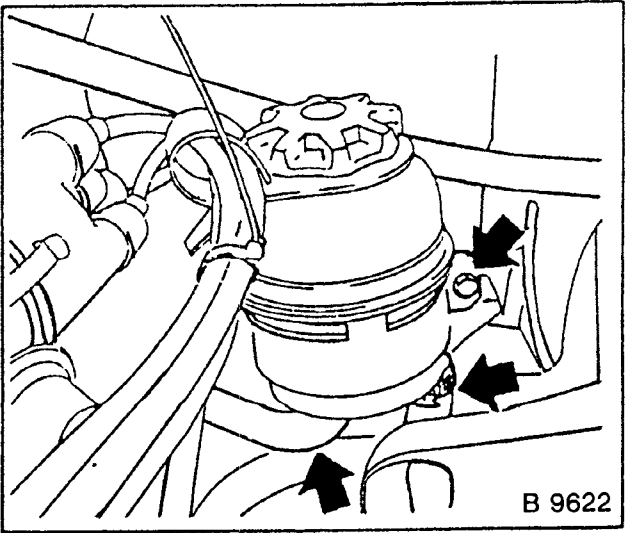


Fig. 97

Hydraulic Lines — Replace

- 1 = Pressure line
- 2 = Expandable hose
- 3 = Suction hose
- 4 = Connection hose
- 5 = Return pipe

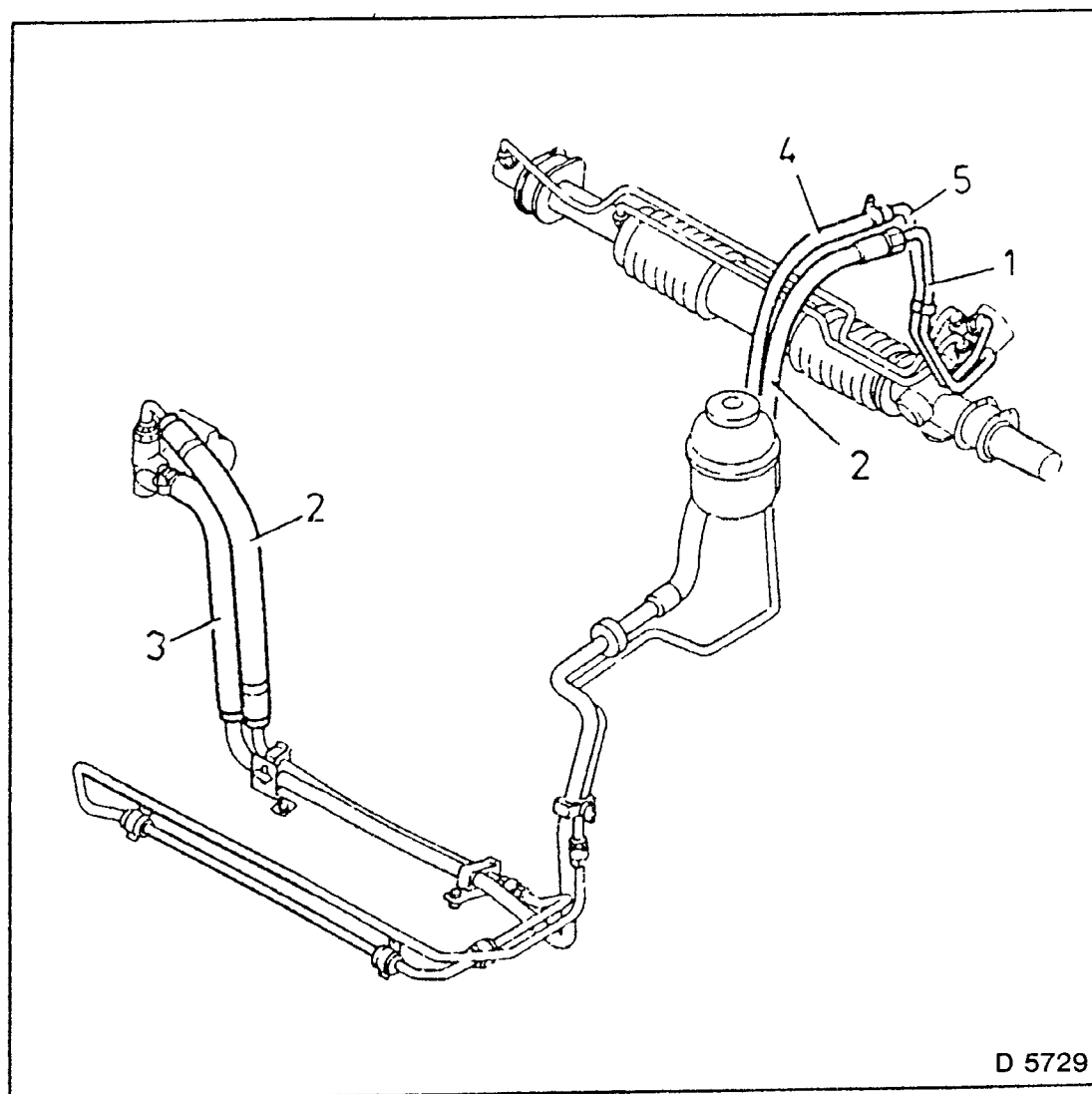


Fig. 98 — Hydraulic lines for power steering

NOTE:

- 1. Fluid escapes when lines and hoses are removed — place collecting pan underneath.
- 2. When installing
 - 1) ensure that routing is not kinked or twisted.
 - 2) avoid places which could chafe or make contact with hot and rotating components.
- 3. Replace plastic hose clamps, gaskets, etc — Parts and Accessories Catalogue.
- 4. After installation, top up hydraulic system.
- 5. Check for leaks with engine running and actuated steering.

REPLACE PRESSURE LINE:

REMOVE, DISCONNECT

- 1 Special bolt from steering gear.
- 2 Union nut from expandable hose.
- 4 Pressure line from fastening elements.

TIGHTEN (TORQUE)

- 1. Pressure line union nut to expandable hose — 28 Nm.
- 2. Pressure line special bolt to steering — 28 Nm (Saginaw).
- 3. Insert pressure line in fastening element.

REPLACE EXPANDABLE HOSE:

REMOVE, DISCONNECT

- 1. Expandable hose union nuts from pressure line or hydraulic pump.
- 2. Expandable hose from fastening element:
 - a) front frame side member (two pieces),
 - b) radiator side member (three pieces).

TIGHTEN (TORQUE)

- 1 Expandable hose union nut to hydraulic pump or pressure line — 28 Nm.
- 2 Bolted fastening elements to radiator side member — 7 Nm.

Coolant Loop — Replace

REMOVE, DISCONNECT

- 1 Front panelling
 - To side member — Two nuts
 - To side bracket — Four bolts
 - Heavy-duty version “Front Member (Radiator Crossmember)” — Four body-bound rivets.

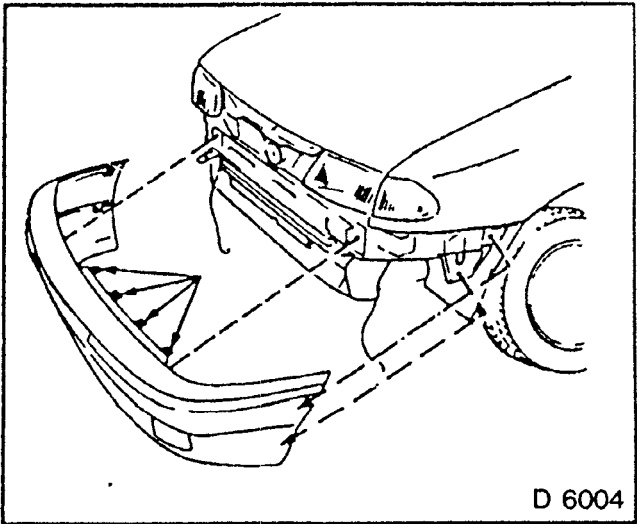


Fig. 99

REPLACE RETURN PIPE:

REMOVE, DISCONNECT

- 1. Special bolt from steering gear.
- 2. Hose clamp from connection hose.

TIGHTEN (TORQUE)

- 1. Hose clamp of connection hose to return pipe — tighten so that it is oil-tight.
- 2. Return pipe special bolt to steering gear — 28 Nm (Saginaw).

REPLACE CONNECTION HOSE:

REMOVE, DISCONNECT

- 1. Hose clamps from return pipe or suction hose.
- 2. Connection hose from fastening element.

INSTALL, CONNECT

- 1. Connection hose — hose clamps to return pipe or suction hose.
- 2. Connection hose to fastening element.

REPLACE SUCTION HOSE:

REMOVE, DISCONNECT

- 1. Hose clamps from compressor or fluid reservoir
- 2. Suction hose from fastening elements:
 - a) front frame side member (two pieces),
 - b) radiator side member (three pieces).

INSTALL, CONNECT

- 1. Suction hose — hose clamps to compressor or fluid reservoir — tighten so that it is oil-tight.
- 2. Bolted fastening elements to radiator side member — 7 Nm.

REMOVE, DISCONNECT

FRONT PANELLING:

- 1. Union nut (1) expandable hose to steering gear.
- 2. Union nut (2), expandable hose to hydraulic pump.

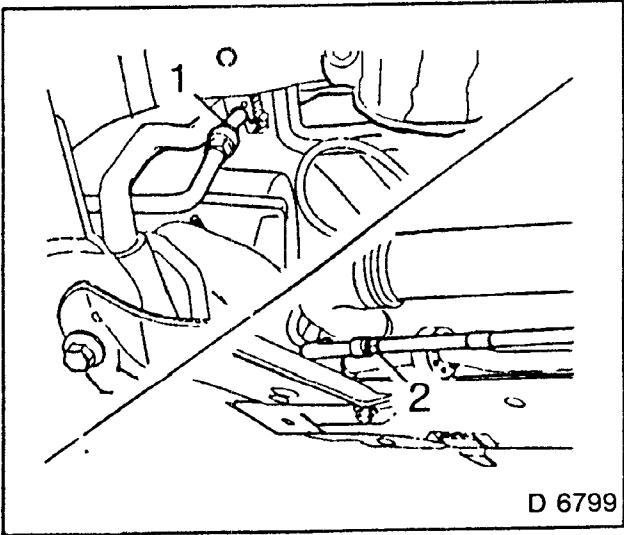


Fig. 100

REMOVE, DISCONNECT

- 1. Coolant loop from brackets (arrows).
- 2. Remove coolant loop towards front.

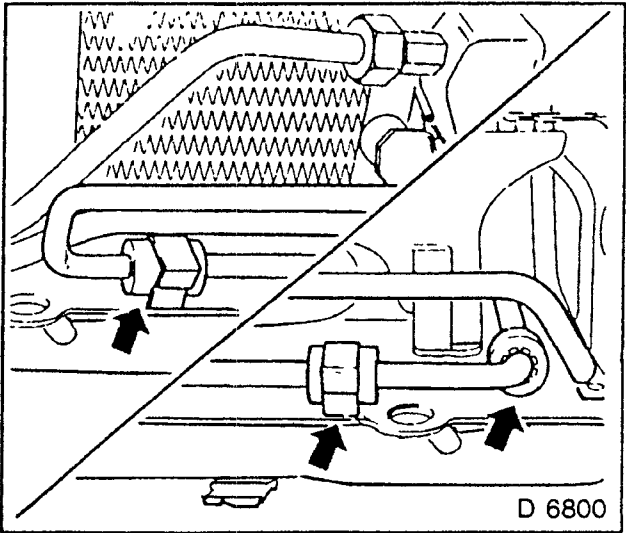


Fig. 101

INSTALL, CONNECT

- 1 Insert coolant loop from front in front body.
- 2. Coolant loop in bracket.

TIGHTEN (TORQUE)

- 1. Union nut (1), expandable hose to steering gear — 28 Nm
- 2. Union nut (2), expandable hose to hydraulic pump — 28 Nm.

INSTALL, CONNECT

- 1 Front panelling

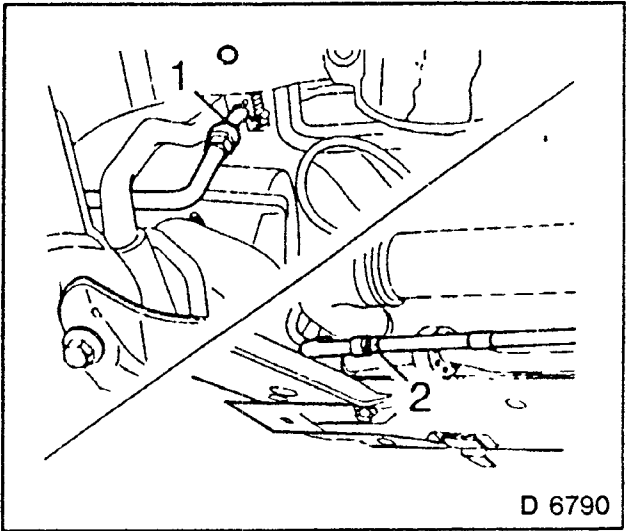


Fig. 102

Hydraulic Pump — Remove and Install

ENGINES WITH DISPLACEMENT UP TO 1.6 LTR.

REMOVE, DISCONNECT

- 1. Air cleaner box.
- 2. Ribbed V-belt.
- 3. Hydraulic pump pulley.

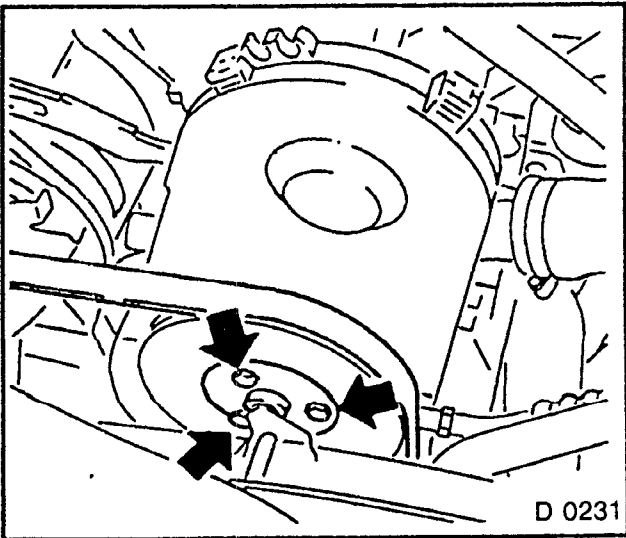


Fig. 103

REMOVE, DISCONNECT

- 1. Upper toothed belt cover
See operation "Toothed Belt, Replace" in Section J.
- 2. Hydraulic pump from cylinder block.
- 3. Remove hydraulic pump — in direction of alternator
- 4. Pressure and return hose. Fluid escapes.
- 5 Close openings.

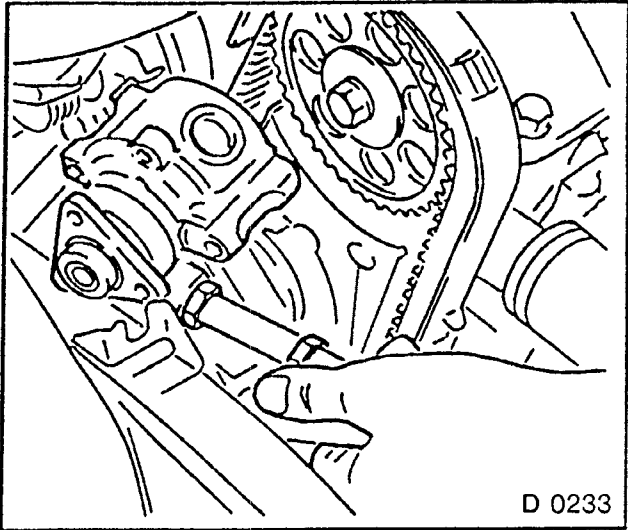


Fig. 104

INSTALL, CONNECT

- 1. Pre-install hydraulic pump onto cylinder block.
- 2. Upper toothed belt cover.

TIGHTEN (TORQUE)

- 1 Hydraulic pump to cylinder block — 30 Nm.
- 2. Pulley to hydraulic pump — 25 Nm.

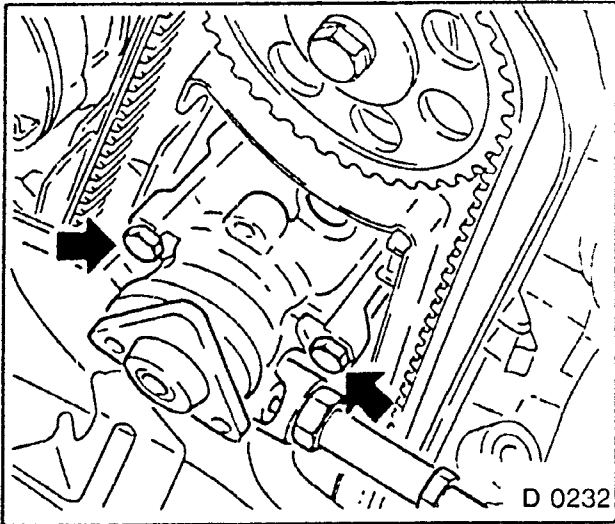


Fig. 105

INSTALL, CONNECT

- 1. Ribbed V-belt — adjust ribbed V-belt tension. See Section J.
- 2 Pressure and return lines to hydraulic pump
- 3 Air cleaner box.
- 4. Top up and bleed hydraulic system.

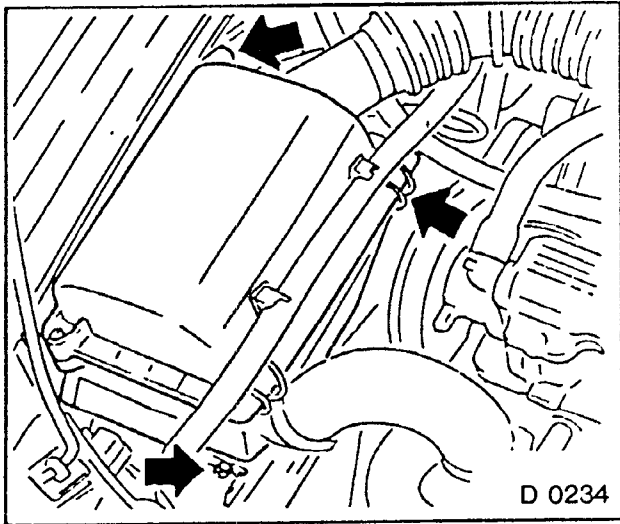


Fig. 106

Hydraulic Pump — Remove and Install

(ON ENGINES ABOVE 1.8 LTR. CAPACITY)

REMOVE, DISCONNECT

1. V-belt.
2. Pressure.
3. Return hose
Fluid escapes — close openings
4. Hydraulic pump from main bracket and rear bracket.

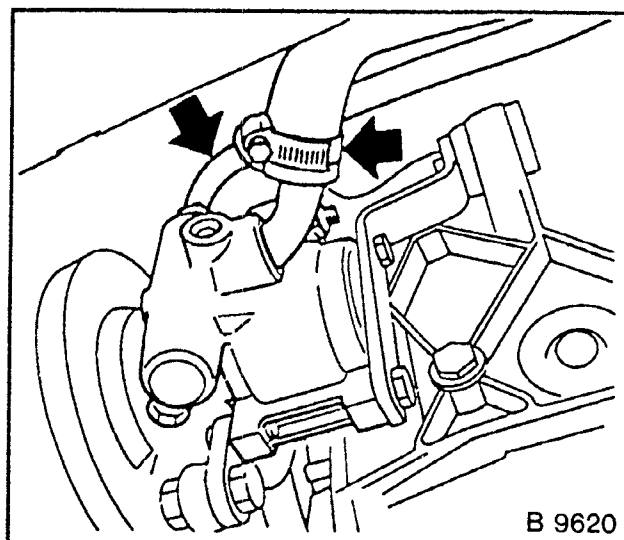


Fig. 107

TIGHTEN (TORQUE)

1. Hydraulic pump to main bracket and rear bracket — 25 Nm.

INSTALL, CONNECT

1. V-belt — check condition, replace if necessary, see operation “V-belt for Hydraulic Pump, Replace”, page 44

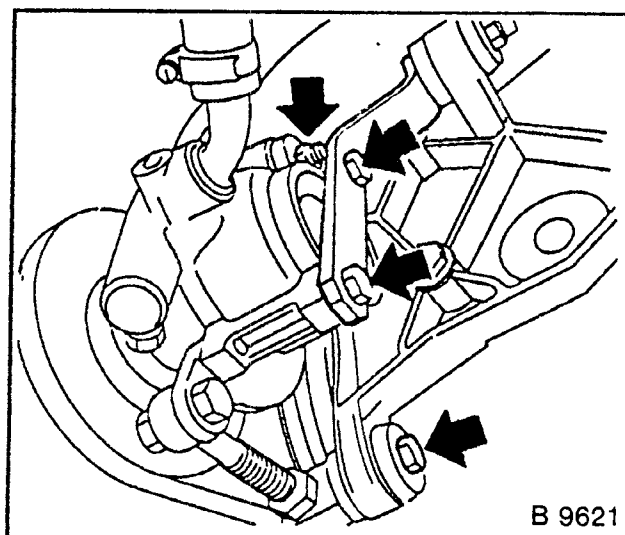


Fig. 108

Hydraulic Pump — Remove and Install

VEHICLES WITH AC

REMOVE, DISCONNECT

1. V-belt for hydraulic pump.
2. Pressure and return hoses — fluid escapes. Close openings.
3. Tensioning screw from engine block (arrow)

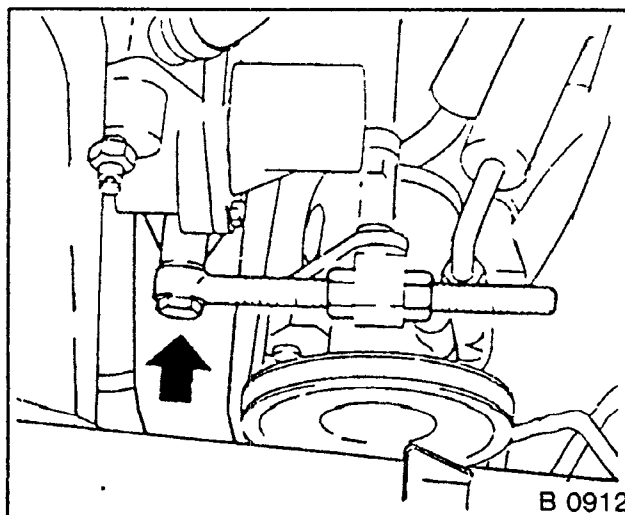


Fig. 109

- 4. Fastening bolts (long, Fig. 110/arrow) from bracket and compressor
- When replacing pump, convert bracket frame with tensioning screw.

INSTALL, CONNECT

- 1 Fastening bolts (long, arrow) to bracket and compressor, tensioning screw to engine block — place in at first
- 2. V-belt for hydraulic pump

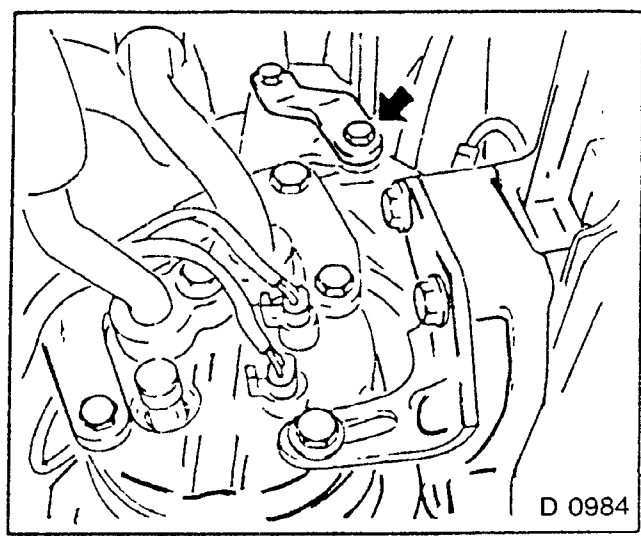


Fig. 110

TIGHTEN (TORQUE)

- 1 Tensioning screw to engine block — 40 Nm.
- 2 Lock nut to tensioning screw — 40 Nm.
- 3. Fastening bolts (long) to bracket — 25 Nm.
- 4. Expandable hose to hydraulic pump — 28 Nm.
- 5. Return hose to hydraulic pump — tighten hose clamp so that it does not leak.
- 6. Top up and bleed hydraulic pump.

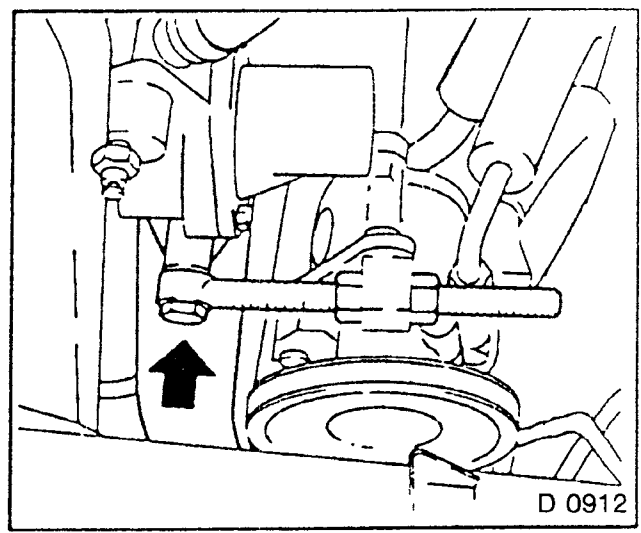
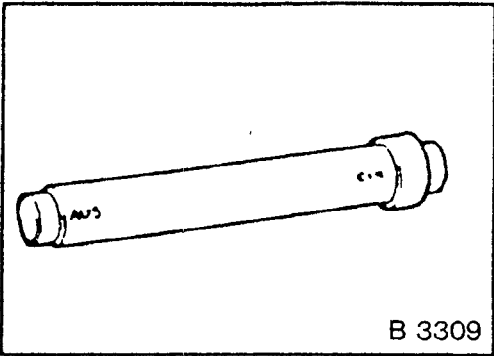


Fig. 111

Special Service Tools

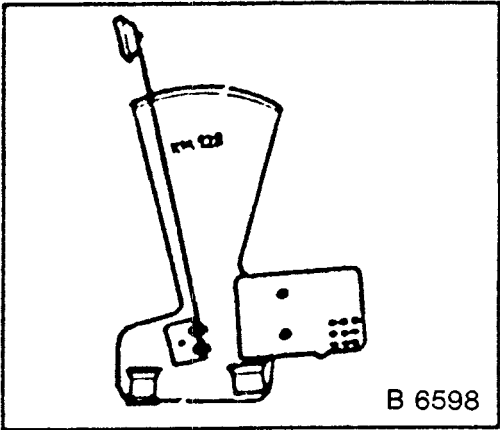
KM — 108 REMOVER/INSTALLER.

To remove and install upper steering shaft bearing.



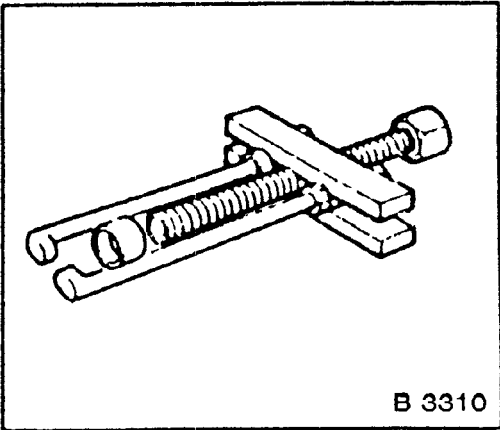
KM — 128 — A BELT TENSION GAUGE.

To check V-belt tension.



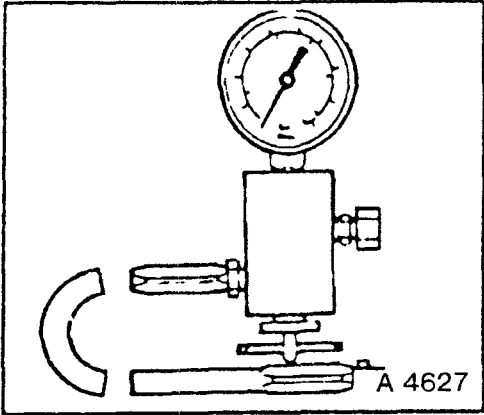
KM — 210 — A STEERING WHEEL PULLER.

To remove steering wheel.



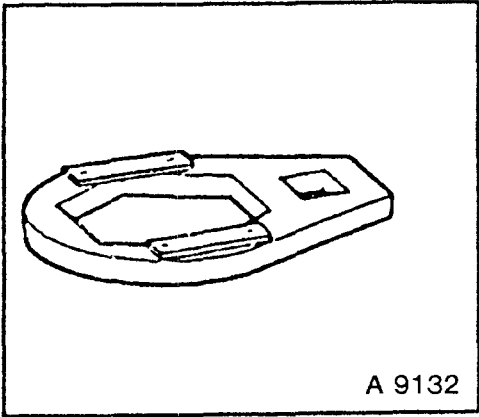
KM — 354 — B PRESSURE TEST KIT.

To check power steering fluid pressure.



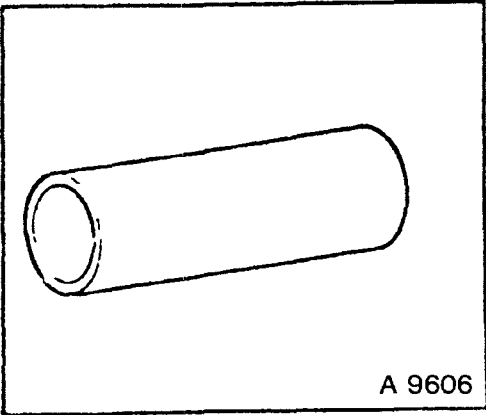
KM — 472 COUNTER NUT WRENCH.

With torque wrench with ratchet.
To loosen and tighten hex lock nut.



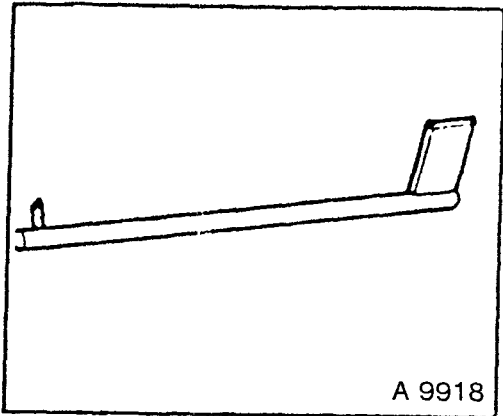
KM — 473 INSTALLING TUBE.

To install retaining ring into steering gear.



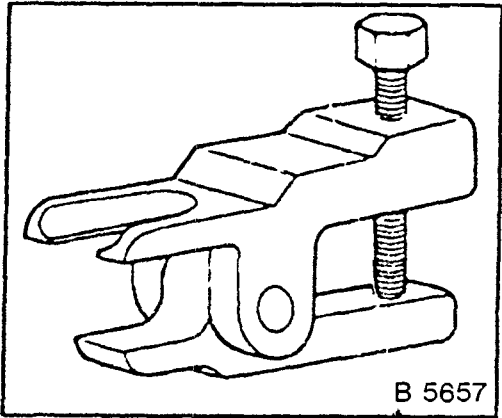
KM — 476 REFERENCE GAUGE.

To check steering straight ahead position.



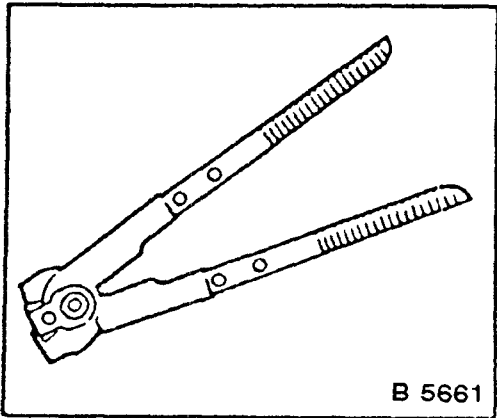
KM — 507 — C BALL JOINT REMOVER.

To remove tie rod joint from tie rod lever.



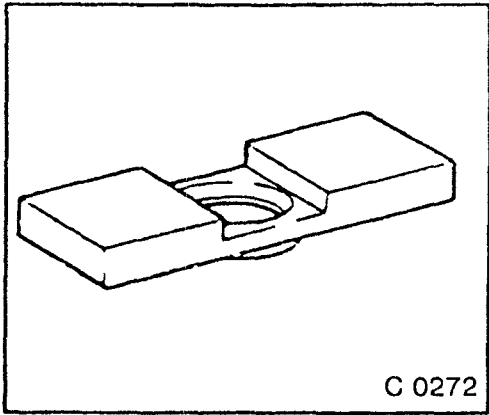
KM — J — 22610 CLAMPING PLIERS.

To clamp retaining band for fastening of folding cover



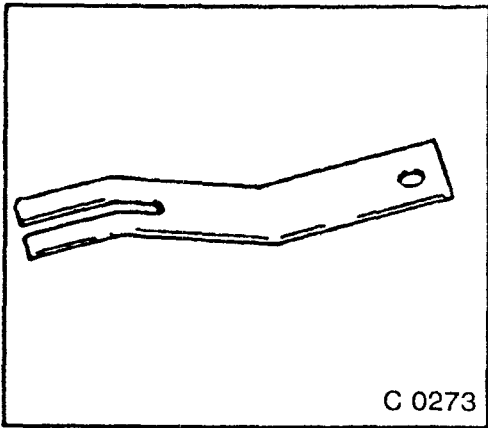
KM — 583 ADAPTER.

With KM — J — 23653 — A
To remove and install retaining ring to steering shaft.
Steering column with "height adjustable steering wheel".



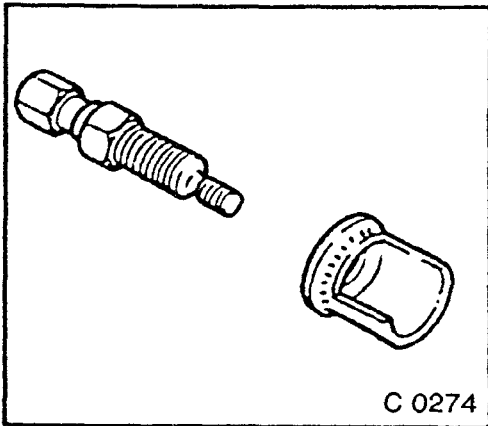
KM — 584 REMOVER/INSTALLER.

To remove and install pressure spring for height adjustment.
Steering column with "height adjustable steering wheel".



KM — 585 REMOVER.

To remove both fulcrum bearing pins from bearing housing.
Steering column with "height adjustable steering wheel".



TECHNICAL DATA

Manual Steering Gear

Total steering ratio:		Pinion identification	Steering rack
Standard version:	22 : 1	no groove	28 teeth
Special version:	24.5 : 1	1 groove	32 teeth
Lubricant: STEERING GREASE			
Filling quantity:		Approximately 50 g.	

Steering Shock Absorber

Design:	Piston shock absorber
Installation:	Parallel to steering gear
Installation dimension:	12.5 to 13.5 mm from front edge of rubber damper plate to front edge of piston rod

Hydraulic Steering Gear

Manufacturer:		Saginaw
Variants:		Right-hand drive
Total steering ratio:		
Standard version:		18 : 1
Special version:		18 : 1, Lower actuating force is attained hydraulically
Fluid quality: SPECIAL FLUID		
Fluid filling quantity:		Approximately 1.0 litre
Fluid pressure at steering wheel full lock/ checking pressure for centre position:		95 to 100 bar
V-belt	Dimensions:	9.5 x 850 mm
	Tension:	Run-in V-belt: 250 to 300 N New V-belt on installation: 450 N
Ribbed V-belt:	Dimensions:	17.8 x 1015 mm
	Tension:	Run-in belt: 50 Nm New belt: 55 Nm

Recommended Torque Values

	Nm
Alternator tensioning bolt to bracket — version with ribbed V-belt.....	25
Bolt, pinion fastening	40
Bolt, steering column bracket to bulkhead	22
Bolt, tensioner to retaining bracket	25
Bolt, tensioning bolt to hydraulic pump	40
Bolt, tie rod to steering gear.	95
Bolts, alternator to bracket — version with ribbed V-belt	30
Bolts, both damping brackets for steering shock absorber to steering gear	12
Bolts, fluid reservoir bracket to battery support and front frame.....	7
Bolts, hydraulic pump bracket to retaining bracket... ..	25
Bolts, pulley to hub of hydraulic pump — version with ribbed V-belt. ..	25
Bolts, retaining bracket to cylinder block	40
Bolts, steering gear retaining bracket to bulkhead	22
Clamp bolt, steering pinion to steering coupling	22
Clamp bolt, steering shaft to steering coupling.	22
Clamp bolt, tie rod	20
Fastening, tie rod joint to tie rod lever	60
Hex lock nut for adjusting bolt	60
Hollow bolt, pressure and return lines to steering gear, ZF	37.5
Hydraulic pump to cylinder block — version with ribbed V-belt.....	30
Nut, lock nut, tensioning bolt to tensioner.....	40
Nut, right, shear plate attachment	22
Nut, steering wheel to steering shaft.....	25
Nuts, steering gear to bulkhead ..	22
Union nut, expandable hose to pressure line.....	28
Union nut, pressure and return lines to steering gear, right-hand drive ..	42.5
Union nut, pressure and return lines to steering gear, Saginaw	28
Union nut, pressure line to hydraulic pump connection.. .	28

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