# STEERING

## GROUP 23

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Steering is rack and pinion, mechanical or power assisted depending on car model.

Tie rods are directly connected to rack. To afford the driver increased protection in the event of frontal impact steering unit is offset rearward.

For the same reason, steering column is split and incorporates two universal joints. Two types of steering columns are installed depending on car model.

On **Alfa 90** and **Alfa 75**, steering column support is secured to body through sliding pads permitting steering wheel adjustment for height and reach. On other models, steering column support is hinged to chassis, permitting steering wheel adjustment for height.
STEERING WHEEL

REMOVAL
1. Disconnect battery ground cable.
2. Remove hub cover 1 by finger pressure.
3. Back off 4 horn capscrews 1, disconnect lead 2, and remove pushbutton.
4. Back off nut 1, remove washer and take off steering wheel 2 using tool A.3.0451.

INSTALLATION
Install steering wheel on car by reversing the removal sequence and adhering to the instructions given below.
- Align wheels.
- Position steering wheel on steering column, centralize spokes and tighten nut to the specified torque (see Inspection Specifications - Tightening Torques).
- Rotate steering wheel in both directions and check for binding.
- Check horn operation.

ANTITHEFT - IGNITION SWITCH

REMOVAL AND INSTALLATION
1. Back off capscrews and remove upper and lower half cowl 1 of steering column.

CAUTION:
Ignition switch 2 capscrew must be tightened until hex. head is wrenched off.
STEERING COLUMN WITH STEERING WHEEL ADJUSTABLE
FOR HEIGHT AND REACH

1. Steering box pinion capscrew
2. Nut
3. Cotter pin
4. Lower U-joint
5. Lower steering column
6. Upper U-joint
7. Sliding sleeve nut
8. Retaining plate
9. Capscrew
10. Bushing
11. Sliding pad seal
12. Steering column support
13. Steering wheel adjusting lever
14. Washer
15. Pin
16. Anti-theft capscrew
17. Upper steering column
18. Needle roller bushing
19. Washer
20. Nut
21. Sliding pad seal
22. Nut
23. Ball bearing
24. Retaining ring
25. Washer
26. Capscrew

REMOVAL
1. Remove steering wheel (see Steering Wheel - Removal).
2. Back off 6 upper and lower half cowl capscrews and remove cowl.
3. Unlock steering column through the lever, lower and remove upper half cowl.
4. Disconnect connectors ③, back off capscrews ① and remove turn signal switch unit ②.
5. Cars provided with manual cold start device.
Dis connect connections ④ from cold start device control, remove control by releasing spring ② and disconnect from support ③ withdrawing cable ⑤ from associated slot.

1. Capscrews
2. Turn signal switch unit
3. Turn signal switch unit connectors

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1. Clamp steering column support with upper steering column in a vice provided with jaw liners.
2. Using hammer and punch, back off capscrew securing anti-theft to steering column support.

6. Back off nut, remove lever with associated washers and disconnect steering column from bracket.
7. Remove bolt and disconnect steering column from bracket retrieving spacer.

8. Slacken nut and take off steering column disconnecting from intermediate shaft sleeve.

10. Back off 3 capscrews and take off intermediate shaft with boot and retaining plate.
STANDING

1. Anti-theft 
2. Leads
5. Back off and remove lower bearing plate capscrews 1.

7. Using a plastic mallet, tap lower end of upper steering column 1.

1 Upper steering column

8. Take off upper steering column with needle roller bushing 2 from steering column support 3 and retrieve bearing 3.

1 Capscrews 
2 Plate
6. Remove lower bearing retaining ring.

1 Needle roller bushing 
2 Steering column support 
3 Ball bearing
9. Take off needle roller bushing from steering column.

ASSEMBLY
1. Lubricate lower ball bearing using the recommended grease (AGIP F1 Grease 33 FD or IP Autogrease FD).
2. Insert steering column 2 in support 3 and press ball bearing 1 home in steering column bottom.

1 Ball bearing 
2 Steering column 
3 Steering column support
3. Install bearing retaining ring ensuring that it is pressed fully home.

INSPECTION
Clean all parts.
1. Check needle roller bushing and ball bearing for damage or malfunction; replace as necessary.
2. Check upper steering column ensuring that bearing and needle roller bushing working surfaces are not scored. Check spines for damage or undue wear. Also check anti-theft pin recess.
4. Place lower bearing retaining plate in position and lock through associated capscrews.

5. Lubricate needle roller bushing seat on steering column support using the recommended grease (SPCA Spagrap or ISECO Ergon Rubber Grease n. 3). 

6. Insert upper needle roller bushing fully home between steering column and support and check that steering column rotates without binding or excessive clearance.

8. Centralize antitheft device, insert capscrew available as spare and tighten until head is wrenched off.

1. Locking capscrew

9. Install lead connector aligning reference marks previously applied.

INSTALLATION

CAUTION:
Sliding sleeve nut connecting steering column to intermediate shaft spline must be tightened to obtain 34 to 44 N (3.5 to 4.5 kgf) (7.7 to 9.9 lb) end sliding load on spline.

Install by reversing the removal sequence and adhering to the instructions given below.

- Correctly position turn signal switch unit on steering column.
- Apply the recommended grease (ISECO Molykot Paste G) on steering column support flanges and on steering column and sliding sleeve splines.
- Adhere to the following tightening torques.

 Tightening torques
Steering column/upper support nut (with steering wheel lever locked)
  21 to 26 N·m
  (2.2 to 2.7 kg·m)
  (15.5 to 19.2 ft·lb)

Intermediate shaft/steering unit pinion U-joint bolt
  15 N·m
  (1.5 kg·m)
  (11.1 ft·lb)

Tighten to permit cotter pin insertion.

1 Needle roller bushing

7. Insert antitheft device feeding leads through associated slot.

1 Antitheft device
2 Slot
3 Leads
STEERING

STEERING COLUMN WITH STEERING WHEEL ADJUSTABLE FOR HEIGHT

1. Steering unit pinion capscrew
2. Cotter pin
3. Nut
4. Lower U-joint
5. Lower steering column
6. Capscrew
7. Upper U-joint
8. Nut

9. Washers
10. Lower needle roller bushing
11. Antivibration bushing
12. Steering wheel adjusting lever
13. Washer
14. Pin
15. Antitheft capscrew
16. Upper steering column
17. Upper needle roller bushing
18. Washer
19. Nut
20. Steering column support
21. Capscrew
22. Nut

REMOVAL
1. Remove steering wheel (see: Steering Wheel - Removal).
2. Back off lower half cowl capscrews 1 and remove cowl 2.
3. Cut lead clip and disconnect turn signal switch unit wiring harness.
4. Remove turn signal switch unit 1 by backing off 2 bolts 2.
5. Disconnect antitheft wiring harness.
6. Slacken and remove bolt 1 securing U-joint 3 to lower steering column 2.

1. Capscrews
2. Lower half cowl

1. Turn signal switch unit
2. Bolts

1. Bolt
2. Lower steering column
3. U-joint

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7. Back off and remove bolt ③ securing steering column support ③ to body.
8. Remove adjusting lever pin after backing off associated nut ①.

2. Take off U-joint ① and 2 washers ② from upper steering column lower end.

3. Using hammer and punch, back off capscrew ① securing antitheft to steering column support ②.

4. Disconnect lead ends from connector and mark relative position.
5. Take off antitheft ① without damaging leads ②.

9. Remove steering column and retrieve upper half cowl.

DISASSEMBLY
1. Clamp steering column support ① with attached upper steering column in a vice provided with protective jaw liners and back off upper U-joint ③ securing bolt ②.

6. With unit clamped in vice and using a plastic mallet, tap on steering column lower end ② to remove it from support ① with associated upper needle roller bushing.

7. Remove upper needle roller bushing from steering column and take off lower needle roller bushing from steering column support.

1 U-joint
2 Washers

1 Nut
2 Adjusting lever
3 Steering column support
4 Bolt

1 Steering column support
2 Bolt
3 U-joint

1 Antitheft device
2 Leads

1 Locking screw
2 Antitheft device

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8. Remove antivibration bushing from seat in steering column support bottom.

1. Steering column support

2. Lubricate needle roller bushing seat on steering column support using the recommended grease (SPCA Spagraphe or ISECO Ergon Rubber Grease No. 3).

3. Using tool A.3.0346, insert lower needle roller bushing fully home in seat on steering column support.

6. Insert antitheft device 1 feeding leads 2 through associated slot 3.

7. Centralize antitheft device, insert cap-screw 1 available as spare and tighten until head is wrenched off.

INSPECTION

Clean all parts.
1. Check steering column needle roller bushings for damage or malfunction; replace as necessary.
2. Check that U-joint is not damaged.
3. Check upper steering column ensuring that bearing and needle roller bushing working surfaces are not scored. Check splines for damage or undue wear. Also check antitheft pin recess.
4. Check antitheft and steering column support for damage; replace as necessary.

ASSEMBLY

1. At the press, insert ball joint in seat on steering column support bottom.

4. Introduce steering column from steering column support top and insert in lower bushing.

5. Using tool A.3.0346, insert upper needle roller bushing in seat on steering column support and check that steering column rotates freely without binding or excessive clearance.
8. Install lead connector aligning reference marks previously applied.
9. Install U-joint with associated washers on steering column lower end.

INSTALLATION
Install by reversing the removal sequence and following the instructions given below.
1. Place front wheels in straight ahead driving position and install upper half cowl, steering column and steering wheel with spokes horizontal.
2. Secure steering column support to body and U-joint to lower steering column installing bolt without tightening.
3. Take off steering wheel.
4. Install turn signal switch unit, lower half cowl and steering wheel (see steering Wheel-Installation).

5. Tighten U-joint/lower steering column bolt ensuring freedom from binding or excessive clearance between steering wheel ① and half cowl ②.
6. Install horn pushbutton, hub, and connect battery lead.
7. Check turn signal switch and horn operation.

POWERS STEERING

1 Reservoir
2 Hose
3 Pipe
4 Pump/steering unit pipe
5 Reservoir/pump pipe
6 Steering pump pulley
7 Steering pump
8 Equalizer air pipe
9 Steering unit

Direction of fluid flow
DESCRIPTION

- Power steering consists of:
  - Reservoir ①
  - Pump ②
  - Hydraulic piping
  - Steering unit ③
- The reservoir provided with filter feeds circuit and eliminates impurities.
- The V-belt crankshaft-driven pump is a swash plate and radial piston unit supplying fluid under pressure to hydraulic control valve integral with steering unit.
  The pump is of the energy-saving type in that, even in changing operating conditions, it draws only the amount of fluid necessary for power steering operation.
  - A pump-mounted relief valve maintains delivery pressure at a safe level.
  - On steering wheel rotation, pinion on the end of steering column moves the rack, tie rods and steering knuckles to steer the road wheels. Simultaneously, hydraulic control valve is activated to supply fluid under pressure to actuating cylinder. The resulting boost on steering wheel rotation reduces driver's effort.
- Thus, steering is a mechanical unit with assistance in the form of hydraulic power boost. Consequently, in case of fluid supply failure the unit operates as a normal mechanical non-assisted device.
REMOVAL

1. Place car on a platform lift and restrain rear wheels using suitable chocks.

WARNING:
If the engine is warm proceed with caution.

2. Disconnect battery.
3. Back off reservoir cap and draw fluid using a syringe and replace cap.

4. Slacken front wheel nuts. Raise car front end and prop with support stands. Remove front wheels.
5. Raise car on platform lift and disconnect two fittings from steering unit from underside of body.

CAUTION:
After removal, put back the two fitting capscrews on steering unit.

1. Fluid delivery/return pipe fitting
2. Power steering unit
6. Take off cotter pin back off and remove bolt and take off sleeve from steering pinion.

8. Back off 4 capscrews and remove support and bracket from right side of car.

9. Suitably turn steering unit with attached tie rods and take off from left side of car.

1. Power steering fluid reservoir
4. Cotter pin
2. Bolt
3. Power steering unit
4. U-joint sleeve

7. Remove ball joint pins from steering knuckles.
   a. Take off nut cotter pin.
   b. Back off and remove unit.
   c. Using puller A.3.0156, take off ball joint pins.

1. Steering unit to body capscrew
2. Bracket
3. Support

1. Power steering unit
DISASSEMBLY

CAUTION:
Measure ball joint protrusion from tie rods to be restored on assembly.

1. Slacken locknut, back off and remove ball joint from tie rod.

2. If necessary, back off and remove 4 fittings from power steering unit.
3. If necessary, remove pipe from associated fittings.

4. Cut clips and remove bellows on both sides, along with rubber rings on tie rod.

5. Remove staked metal on ball joints back off and remove joints from rack.

INSPECTION
Clean and visually inspect all parts carefully.

a. Check that tie rod ball joints are not damaged or worn, and that they rotate freely without binding or excessive play.
b. Check that tie rods are not damaged or distorted.
c. Check rubber bellows, if cracked or scored replace without hesitation.

ASSEMBLY
Assemble by reversing the disassembly sequence and following the instructions given below:

a. Tighten tie rods on rack to the specified torque.

b. Stake tie rod ball joint.

 Tightening torque
Tie rod ball joint
63 to 77 N·m
(6.4 to 7.9 kg·m)
(46.5 to 56.8 ft·lb)
c. Using plastic clips, secure bellows and pipes centrally on steering unit.
d. Tighten pipe fitting to the specified torque.

**T** : Tightening torque
Pipe fitting to steering unit
20 N·m
(2.2 to 2.4 kg·m)
(14.8 ft·lb)
e. Install locknut and ball joint on tie rods. Check that ball joint protrusion is as measured on disassembly; in case of replacement, restore specified fitted length.

**Tie rod ball joint assembly data**
\[ N = 26 \text{ mm (1.02 in)} \]

2. Suitably turn steering unit and position on vehicle from left side.
3. From right side, install cushion support and steering unit/cross member cap screws from left to right and tighten to the specified torque.

**T** : Tightening torque
Steering box/cross member cap screws
27 to 30 N·m
(2.7 to 3.0 kg·m)
(19.9 to 22.1 ft·lb)
4. With road wheels in straight-ahead driving position, check that steering wheel spokes are centralized and install intermediate shaft U-joint on steering pinion. Insert bolt in spline, tighten bolt and insert cotter pin.
5. Connect ball joint pins to steering knuckles from both car sides. Tighten nuts to the specified torque and insert another cotter pin.

**T** : Tightening torque
Ball joint/steering knuckle nut
45 to 55 N·m
(4.5 to 5.5 kg·m)
(33.2 to 40.6 ft·lb)
6. Install front wheels and tighten nuts to the specified torque (see: Group 28 - Inspection Specifications). Remove stands.
7. Raise car and connect fluid delivery/return pipes to power steering control valve and tighten to the specified torque.

**T** : Tightening torque
Fluid delivery pipe fitting
22 to 24 N·m
(2.2 to 2.4 kg·m)
(16.2 to 17.7 ft·lb)
Fluid return pipe fitting
38 to 43 N·m
(3.9 to 4.4 kg·m)
(28 to 31.7 ft·lb)
8. After installation check toe-out (see Group 00 - Wheel Alignment). Tighten tie rod ball joint locknut to the specified torque.

**T** : Tightening torque
Ball joint locknut
54 to 88 N·m
(5.5 to 9 kg·m)
(39.8 to 64.9 ft·lb)
9. Connect battery.
10. Fill power steering circuit with fluid and bleed the system.
   a. Fill reservoir with the recommended fluid (AGIF F1 ATF DEXRON B 11297; IP DEXRON FLUID B 11297; quantity: 0.8 kg).
   b. Start engine and while idling rotate steering wheel in both directions from lock to lock; this operation facilitates fluid circulation and drains any air in reservoir.
   c. Top up reservoir with the recommended fluid to the correct level.
STEERING PUMP

REPLACEMENT TURBODIESEL VERSION

Removal
1. Place car on a platform lift and restrain rear wheels using suitable chocks.

[CAUTION: If the engine is warm proceed with caution.]

2. Disconnect battery.
3. Back off reservoir cap and draw fluid using a syringe and replace cap.
4. Disconnect pipe 1 from separator 2 and hose 4 from turbocharger inlet 3.
5. Remove air cleaner cover 5, pipe 1 and hose 4. Remove filter element.

6. Back off bolts 5 and remove air cleaner housing from side wall.

7. Disconnect alternator supply and indicator leads.
8. Raise car and back off bolt 3 but do not remove. Lower car.
9. Back off bolts 1 and 4, slacken and remove alternator belt. Remove alternator 2 and belt stretcher bracket 3 taking off lower bolt previously backed off.
10. Back off 3 capscrews 5 and remove outer half pulley 6 together with spacers and pump belt.

For the following paragraphs refer to exploded view on page 23-17.
12. Raise car and back off two rear support 2 capscrews 4.
13. Lower car, back off two capscrews 7 and remove front support 5 together with steering pump 4 from engine block.
14. Provisionally install outer half pulley 10, previously removed, with associated spacers 9. Clamp pulley in a vice provided with protective liners and back off nut 11.

1. Install pulley on pump shaft and correctly position key; tighten nut.
2. Secure front support and steering pump to engine. Start 2 capscrews, raise car, tighten capscrews securing rear support to engine block. Lower car and tighten front support capscrews previously started.
3. Connect fluid delivery/return pipe fittings to pump (front and rear respectively) and tighten to the specified torque.

7: Tightening torque
Fluid delivery pipe fitting to steering pump fitting
28 to 31 N-m
(2.9 to 3.2 kg-m)
(20.7 to 22.9 ft-lb)

Fluid return pipe fitting to steering pump fitting
46 to 50 N-m
(4.6 to 5.1 kg-m)
(33.2 to 36.9 ft-lb)

5. Install steering pump drive belt and associated half pulley with spacers correctly selected to obtain the right belt tension.

Check that yield “P” is 15 mm (0.6 in) for a force “P” of 147 ± 10 N (15 ± 1 kg; 33 ± 2 lb).

WARNING:
Increase spacer thickness to reduce belt tension and vice versa.

6. Install alternator with attached belt stretcher bracket and start but do not tighten lower bolt; the same bolt is used to secure outlet pipe support to steering pump.
7. Secure belt stretcher bracket to pump front support and engine cover and tighten capscrew and bolt.
8. Install alternator belt, adjust belt tension, and tighten upper bolt on belt stretcher bracket.

11. Back off and disconnect fittings 1 from pump.

WARNING:
Tighten fittings capscrews on pump together with seals.

15. Take off pulley with pump shaft and retrieve key 5.

16. Back off two capscrews 3 and detach pump 4 from front support 5.
17. Back off two capscrews 1 and detach pump 4 from rear support 2.

Installation
1. Install steering pump on supports and secure through associated capscrews.

WARNING:
Correctly position supports as pump must be placed with oil pipe fittings facing upward.

1 Fluid delivery/return pipe fittings
2 Steering pump
Check that yield "P" is 20 mm (0.8 in) for a force "P" of 150 N (15 kg; 33 lb) applied midway on belt leg.
9. After adjustment, raise car on a platform lift and tighten alternator lower bolt previously started.
10. Lower car and connect alternator supply and indicator leads.
11. Complete installation reversing the removal procedure then operate as instructed in Hydraulic System Filling and Bleeding.

REPLACEMENT GASOLINE VERSION (4-cylinder)

Removal
1. Disconnect battery.
2. Empty power steering fluid reservoir using a syringe.
3. Back off and disconnect fittings and from pump.
5. Back off capscrews and remove pump with attached drive pulley and front bracket.

Installation
Install by reversing the removal sequence and adhering to the instructions given below:
- Move stretcher bracket and adjust drive belt tension: belt tension is correct when yield is 13 mm (0.5 in) under a 147 to 294 N (15 to 30 kg; 33 to 66 lb) force applied midway on belt leg.
- Adhere to the following tightening torques.

7: Tightening torques
Fluid return pipe fitting to steering pump fitting
45 to 50 N·m
(4.6 to 5.1 kg·m)
(33.2 to 36.9 ft·lb)
Fluid delivery pipe fitting to steering pump fitting
28 to 31 N·m
(2.9 to 3.2 kg·m)
(20.7 to 22.9 ft·lb)
- Operate as indicated in Hydraulic System Filling and Bleeding.

REPLACEMENT GASOLINE VERSION (6-cylinder)

Removal
1. Disconnect battery terminals and remove battery.
2. Empty power steering fluid reservoir using a syringe.
3. Back off and disconnect fittings and from pump.
4. Slacken three capscrews on front bracket and two pump/rear bracket capscrews.
5. Move pump to slacken drive belt. Take belt off drive pulleys.

Installation
Install by reversing the removal sequence and adhering to the instructions given below:
- Move pump to adjust drive belt tension: belt tension is correct when yield is 13 mm (0.5 in) under a 147 to 294 N (15 to 30 kg; 33 to 66 lb) force applied midway on belt leg.
- Adhere to the following tightening torques.

1. Front bracket/engine block capscrews
2. Front bracket
3. Delivery pipe fitting
4. Return pipe fitting
5. Front bracket
6. Back off and remove two capscrews and capscrews. Remove power steering pump.

1. Pump/front bracket capscrew
2. Pump/rear bracket capscrews

7. If necessary, remove pump drive pulley.
STEERING

1. Tightening torques
   Fluid return pipe fitting to steering pump fitting
   45 to 50 N·m
   (4.6 to 5.1 kg·m)
   (33.2 to 36.9 ft·lb)

   Fluid delivery pipe fitting to steering pump fitting
   28 to 31 N·m
   (2.9 to 3.2 kg·m)
   (20.7 to 22.9 ft·lb)

   - Operate as instructed in Hydraulic System Filling and Bleeding.

HYDRAULIC SYSTEM FILLING AND BLEEDING
1. To up the tank with specified oil (AGIP ATF DEXRON B 11297; IP DEXRON FLUID B 11297) to the limit.
2. On the pump fitting, loosen the return pipe fitting from the reservoir to the pump until a little oil flows out and all air is bled.
3. Lock the fitting to the specified torque.

1: Tightening torque
   Return pipe fitting on steering pump fitting.
   45 to 50 N·m
   (4.6 to 5.1 kg·m)
   (33.2 to 36.9 ft·lb)

4. Start the engine and feed the tank until level settles.
5. With the engine running, carry out a few full steering locks to right and left, then top up the oil in the tank to the “Max” mark.
6. Reassemble the tank plug.

POWER STEERING LINES

REPLACEMENT
Applicable to all lines.
1. Place car on a platform lift and restrain rear wheels using suitable chocks.

   CAUTION:
   If the engine is warm proceed with caution.

   2. Back off reservoir cap, draw fluid using a syringe and replace cap.
   3. Having concluded, tighten the fittings to the specified torques and refill system as instructed in Hydraulic System Filling and Bleeding.

   There are different procedures for the various types of piping.

   Power steering unit piping
   a. Raise car and unscrew from the steering unit 1 the pipe fittings 3 of the pipe 2 being disconnected then remove the pipe.

   ![Diagram of power steering unit piping]

   1 Power steering unit
   2 Pipes
   3 Fittings

   b. Install pipe reversing the removal sequence.

   Steering unit/reservoir hose
   Turbo diesel version.
   a. Remove battery together with plastic tray.
   b. Disconnect reservoir inlet hose by slackening clip.
   c. Raise car on a platform lift; disconnect reservoir hose fitting from steering unit and remove hose.
   d. Connect hose reversing the removal sequence.

   Gasoline version.
   Remove hose from lower fitting on steering unit and hose clip on reservoir.

   Reservoir-pump and pump-steering unit connecting pipes
   Turbo diesel version.
   a. Remove battery together with plastic tray.
   b. Remove air cleaner housing and alternator as specified in “Power Steering Pump - Removal” from para. 4 to para. 9.
   c. Back off pipe fittings from steering pump.
   d. If pipe to be removed connects reservoir to pump, slacken clip securing pipe to reservoir and disconnect.

   If pipe to be removed connects pump to steering unit, raise car and back off fitting securing pipe to steering unit; lower car.
   e. Free pipe from clips and remove.

   WARNING:
   a. To facilitate assembly, first secure piping on pump side.
   b. Piping should not be excessively bent and must be aligned and secured to car through suitable clips.

Gasoline version.
   a. Remove clip and detach pipe from reservoir.
   b. Back off pipe fitting from steering pump.
   c. Raise car and disconnect pipe from steering unit; withdraw pipe through grommet on body.

   WARNING:
   1. To facilitate assembly, first secure piping on pump side.
   2. Piping should not be excessively bent and must be aligned and secured to car through suitable clips.
POWER STEERING
FLUID RESERVOIR

REPLACEMENT
Turbodiesel version.
1. Remove battery together with plastic tray.
2. Back off fluid reservoir cap and draw fluid using a syringe.
3. Disconnect fluid outlet/inlet piping by slackening associated clips.

CAUTION:
Hold piping ends up to prevent oil spillage.

4. Slacken reservoir clip bolt and remove reservoir by withdrawing it from clip 2.

1 Fluid outlet/inlet piping
2 Clip screw
3 Fluid reservoir
4 Reservoir retaining clip

5. Install by reversing the removal sequence and fill reservoir with recommended fluid.

STEERING PUMP
DRIVE BELT

REPLACEMENT
Turbo diesel version.
Steering pump drive belt replacement necessitates alternator drive belt removal.
1. Place car on a platform lift and restrain rear wheels using suitable chocks.

CAUTION:
If the engine is warm proceed with caution.

2. Remove battery together with plastic tray.
3. Slacken bolt securing alternator to belt stretcher bracket.

5. Move alternator to slacken belt and remove belt.
6. Back off 3 split pulley capscrews and remove outer pulley half together with tension spacers; remove belt.

1 Cap screw
2 Outer pulley half

7. To install reverse the removal sequence and adhere to the instructions given below.
• Adjust steering pump belt tension until yield is 15 mm (0.6 in) for a force P of 147 ± 10 N (15 ± 1 kg;
33 ± 2 lb) applied midway on belt leg. To adjust, alter spacers between pulleys half; increase spacer thickness to reduce belt tension and vice versa.
• Adjust alternator belt until yield P is 20 mm (0.8 in) for a force P of 147 ± 10 N (15 ± 1 kg; 33 ± 2 lb) applied midway on belt leg.

REPLACEMENT
Gasoline version - 4-cylinder.
1. Slacken capscrews and, push belt stretcher bracket downward and take off belt.
2. Install new belt over the three drive pulleys and move stretcher bracket to obtain the specified tension.

Belt tension is correct when yield is 13 mm (0.5 in) for a force P of 147 to 294 N (15 to 30 kg; 33 to 66 lb) applied midway on belt leg.
3. Fully tighten capscrew, recheck belt tension and tighten capscrew 3.
REPLACEMENT

Gasoline version - 6-cylinder.
1. Slacken three capscrews retaining front bracket to engine and two capscrews retaining pump to rear bracket.
2. Move pump to loosen belt; remove belt.
3. Install belt and move pump to adjust belt tension. Tighten front/rear bracket capscrews.
4. Check that yield f is 13 mm (0.5 in) for a 147 to 294 N (15 to 30 kg; 33 to 66 lb) load P applied midway on belt leg.

1 Capscrew
2 Stretcher bracket
3 Capscrew

1 Front bracket to engine block capscrews
2 Rear bracket
3 Steering pump
4 Front bracket
MECHANICAL STEERING UNIT

1 Cotter pin
2 Nut
3 Ball joint
4 Washer
5 Locknut
6 Outer clip
7 Bellows
8 Inner clip
9 Tie rod
10 Retainer
11 Rack bushing
12 Rack housing
13 Piston
14 Spring
15 Adjusting screw
16 Spring
17 Cover
18 Rack
19 Retainer
20 Tie rod
21 Seal
22 Pinion bushing
23 Pinion
24 Bearing
25 Bearing retaining ring
26 Pinion retaining ring
27 Lower cover
28 Inner clip
29 Bellows
30 Outer clip
31 Locknut
32 Washer
33 Cotter pin
34 Nut
35 Ball joint

N - m (Kg - m) (ft - lb)

44 ± 54
(4.5 ± 5.5)
(32.5 ± 39.8)

54 ± 88
(5.5 ± 9)
(39.8 ± 64.9)

70 ± 70
(7.1 ± 51.6)

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REMOVAL

1. Place car on a platform lift, apply parking brake and slacken front wheel nuts.
2. From engine compartment, back off steering unit cover capscrews, and remove cover.
3. Take off cotter pin 1 back off and remove U-joint 3 bolt 2 connecting intermediate shaft to pinion and separate joint from pinion.

4. Remove cotter pin, back off nuts and remove ball joint pins 1 from steering knuckles 2 using tool A.3.0156.

DISASSEMBLY

1. Clamp steering unit 1 in a vice and slacken two ball joint 3 locknuts 2 reacting on tie rods 4 applying a wrench to flats on tie rods.

2. Back off ball joints and remove bellows clips 1 and 2.

5. Back off capscrews 1 and remove bracket 2 and support 3 from right side.

6. Back off steering unit/crossmember capscrews from left side.
7. Take off steering unit from opening in left side panel.

1. Cotter pin
2. U-joint/steering unit bolt
3. U-joint
4. Steering unit
5. Ball joint
6. Tie rod
7. Bracket/crossmember capscrew
8. Bracket
9. Support
10. Inner clip
11. Outer clip
3. Take off bellows and straighten retainers 1.

4. Take off rack 1 from teeth side, clamp in vice provided with protective liners, back off and remove two tie rods 2.

5. Remove rubber support from rack housing.
6. Remove pinion lower cover 1 protecting pinion 2.

7. Remove pinion bearing to rack housing 2 retaining ring 1.

8. Remove adjusting screw cover 1 from rack housing.
9. Remove clicking spring 2 from adjusting screw.
10. Back off adjusting screw 3, take off spring 4 and backlash take-up piston 5 controlling clearance between rack housing and rack.

11. Using a plastic mallet, remove pinion with attached bearing from rack housing.

12. Remove rack.
13. Remove rack bushing 1 on side opposite to steering pinion.
**STEERING**

16. Remove bearing 2 to pinion 3 retaining ring 1.

**Rack**
Check rack and pinion teeth for oxidation, score marks or dents and replace as necessary.

**Self-lubricating bushings**
Check self-lubricating bushings for wear; replace as necessary.

**Rack housing**
Check that pinion surface in contact with bushings is smooth and not worn.

**Ball joints**
Check ball joints for damage or wear. They should rotate without binding or excessive play; replace as necessary.

**Tie rods**
Check tie rods for damage or distortion; replace as necessary.

**ASSEMBLY**
Assemble by reversing the removal sequence and adhering to the instructions given below.

1. Install bearing 1 on pinion 2.

**INSPECTION**
Clean all parts.

**Bellows**
Check bellows for cracks or score marks and replace as necessary.

---

1 Rack bushing
2 Bearing
3 Pinion
1 Retaining ring
2 Bearing
3 Pinion
1 Seal
1 Bearing
2 Pinion
1 Bearing
2 Pinion

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2. Insert bearing retaining ring on pinion and check that it is properly seated.
3. Install self-lubricating bushing in steering unit.

4. Insert a new seal in steering unit.
5. Pack steering unit recess with 90 g of grease (AGIP F1 Grease 33 FD or IP Autogrease FD) and lubricate pinion bushing.
6. Insert bushing ① in rack housing ensuring that the two projections ② engage the associated seats ③.

7. Lubricate rack using grease as per para. 5 and insert in rack housing.
8. Insert pinion ② with attached bearing ① in rack housing ③.
9. Install pinion as shown in figure.

10. Insert pinion retaining ring ensuring that it is properly seated.
11. Install pinion lower cover.
12. Lubricate backlash take-up piston and adjusting screw using grease as per para. 5.
13. Insert backlash take-up piston ①, spring ② and adjusting screw ⑤. Insert spring ③ and cover ④.
14. Tighten adjusting screw to 3 N-m (0.3 kg-m) (2.2 ft-lb). Back off screw through 3 notches (equal to 3 clicks on spring). Check rack travel for binding.

CAUTION:
After a brief trial, check adjustment.

15. Install retainers and tie rods ① and tighten to the specified torque.

 Tightening torque
Tie rod on rack.
70 N-m
(7.1 kg-m)
(51.6 ft-lb)
Steering installation length

\[ M = 399.5 \text{ mm (15.73 in)} \]

**INSTALLATION**

Install by reversing the removal sequence and adhering to the instructions given below:

- Position wheels in straight-ahead driving posture and check spoke centralization before connecting U-joint sleeve to steering pinion.
- Apply recommended grease (ISECO Molykote Pasta G) to steering column upper bracket.
- Adjust front wheel toe-out (see Group 00 - Wheel Alignment).
- Adhere to the following tightening torques.

** Tightening torques**

Ball joints locknut (on steering tie rod)

- 54 to 88 N·m
- (6.5 to 9 kg·m)
- (39.8 to 64.9 ft·lb)

- Tie rod ball joint locknut (on steering knuckle)
- 45 to 55 N·m
- (4.5 to 5.5 kg·m)
- (33.2 to 40.6 ft·lb)

Steering unit to crossmember cap-screws
- 27 to 30 N·m
- (2.7 to 3 kg·m)
- (19.9 to 22.1 ft·lb)

---

**INSPECTION SPECIFICATIONS**

**GENERAL REQUIREMENTS**

**FLUIDS AND LUBRICANTS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Recommended product</th>
<th>Quantity</th>
</tr>
</thead>
</table>
| Needle roller bushing housings (on steering column support) | GREASE | SPCA: Spigraph
ISECO: Ergon Rubber Grease n. 3
REINACH Sferul B2 AR Part. no. 3671-69816 |          |                                            |
| Steering unit inner chamber
Rack
Outer recess between housing and rack
Pinion bushing
Backlash take-up piston
Backlash adjusting screw
Steering column support lower bearing | GREASE | AGIP: F1 Grease 33 FD
IP: Autogrease FD
Part. no. 3671-69833 | 90 g   
3.17 oz.          |
STEERING

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Recommended product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mating surfaces of steering wheel adjustment guides on column. Steering column and sliding sleeve spline.</td>
<td>GREASE</td>
<td>ISECO: Molykote Pasta G</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part. no. 3671-69840</td>
<td></td>
</tr>
<tr>
<td>ZF steering rack</td>
<td>OIL</td>
<td>Calyphasol</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Part. no. 3671-69838</td>
<td></td>
</tr>
<tr>
<td>Power steering fluid</td>
<td>OIL</td>
<td>AGIP: ATF DEXRON B 11297</td>
<td>0.8 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IP: DEXRON FLUID B 11297</td>
<td>1.76 lb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part. no. 3631-66525</td>
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</tbody>
</table>

CHECKS AND ADJUSTMENTS

MECHANICAL STEERING
Steering installation dimension
M = 399.5 mm (15.73 in)

Tie rod ball joint installation dimension
N = 26 mm (1.02 in)

POWER STEERING
Steering installation dimension
LHD M = 399.5 mm (15.73 in)
RHD M = 394 mm (15.51 in)

Tie rod ball joint installation dimension
N = 26 mm (1.02 in)

HYDRAULIC POWER STEERING SYSTEM FILLING
1. Before starting engine, fill the tank with recommended oil to the limit.
2. On the pump, loosen the feeding pipe fitting (this pipe leads the oil from the reservoir to the pump) until a little oil flows out and all air is bled.
3. Lock the fitting to the specified torque.
4. Start the engine and feed the tank until level settles.
5. With the engine running, carry out a few full steering locks to right and left, then top up the oil in the tank to the "Max" mark.
6. Reassemble the tank plug.
## TIGHTENING TORQUES [N-m (kg-m; ft-lb)]

<table>
<thead>
<tr>
<th>Description</th>
<th><strong>Alfa 90</strong></th>
<th><strong>Alfa 75</strong></th>
<th><strong>Giuletta</strong></th>
<th><strong>GT V 2.0</strong></th>
<th><strong>GT V 2.5</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tie rod on rack</td>
<td>70 (7.1) (51.6)</td>
<td>70 (7.1) (51.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capscrews, steering unit to crossmember</td>
<td>26 to 29 (2.7 to 3) (19.2 to 21.4)</td>
<td>26 to 29 (2.7 to 3) (19.2 to 21.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locknut, ball joint on tie rod</td>
<td>54 to 88 (5.5 to 9) (38.8 to 64.9)</td>
<td>54 to 88 (5.5 to 9) (38.8 to 64.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nut, tie rod ball joint</td>
<td>44 to 54 (4.5 to 5.5) (32.5 to 39.8)</td>
<td>44 to 54 (4.5 to 5.5) (32.5 to 39.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bolt, intermediate shaft/pinion shaft U-joint (Tighten further to permit cotter pin insertion)</td>
<td>15 (1.5) (11.1)</td>
<td>15 (1.5) (11.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bolts, intermediate shaft/steering column U-joint</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bolt, steering column to lower support on body</td>
<td>4.9 to 7.36 (0.5 to 0.75) (3.6 to 5.4)</td>
<td>13 to 16 (1.3 to 1.6) (9.8 to 11.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nut, steering column to upper support on body (steering wheel lever locked)</td>
<td>21 to 26 (2.1 to 2.6) (15.5 to 19.2)</td>
<td>21 to 26 (2.1 to 2.6) (15.5 to 19.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nut, steering column intermediate shaft sliding sleeve (nut must be tightened to obtain specified sliding load on spline)</td>
<td>34 to 44 (3.5 to 4.6) (7.6 to 9.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nut, steering wheel on steering column</td>
<td>29 to 32 (2.9 to 3.3) (20.6 to 23.6)</td>
<td>30 to 35 (3.1 to 3.6) (22.1 to 25.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) [N (kgf)] (lb)

### Power steering, specific data

<table>
<thead>
<tr>
<th>Description</th>
<th><strong>Alfa 90</strong></th>
<th><strong>Alfa 75</strong></th>
<th><strong>Giuletta</strong></th>
<th><strong>GT V 2.0</strong></th>
<th><strong>GT V 2.5</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tie rod on rack</td>
<td>63 to 77 (6.4 to 7.8) (46.5 to 56.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil delivery pipe on power steering pump fitting</td>
<td>28 to 31 (2.9 to 3.2) (20.7 to 22.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil return pipe adapter on power steering pump fitting</td>
<td>45 to 50 (4.6 to 5.1) (33.2 to 36.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil delivery pipe adapter on control valve fitting</td>
<td>22 to 24 (2.2 to 2.4) (16.2 to 17.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil return pipe adapter on control valve fitting</td>
<td>38 to 43 (3.9 to 4.4) (28 to 31.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil pipe fittings on steering unit</td>
<td>20 (2) (14.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*December 1985*
# STEERING

## TROUBLESHOOTING

### POWER STEERING

Preliminary operations:
- Check tyre for pressure and wear
- Check vehicle trim and wheel alignment
- Place car on level and dry floor and run engine at idle speed.

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low fluid level in reservoir</td>
<td>• Normal air expulsion during operation</td>
<td>Top up reservoir</td>
</tr>
<tr>
<td></td>
<td>• Defective control valve seal</td>
<td>Replace steering unit</td>
</tr>
<tr>
<td></td>
<td>• Leakage through steering unit and pump fittings</td>
<td>Tighten fittings to the specified torque; replace fittings seals if necessary</td>
</tr>
<tr>
<td>Fluid level drops after topping up (even in the absence of visible leakage)</td>
<td>Defective steering unit seals and fluid leakage into bellows</td>
<td>Replace steering unit</td>
</tr>
<tr>
<td>Hard steering</td>
<td>• Low rpm at idle</td>
<td>Adjust engine rpm</td>
</tr>
<tr>
<td></td>
<td>• Steering unit leakage</td>
<td>Replace steering unit</td>
</tr>
<tr>
<td></td>
<td>• Low pump delivery pressure</td>
<td>Adjust belt tension</td>
</tr>
<tr>
<td></td>
<td>• Loose pump drive belt</td>
<td>Replace pump</td>
</tr>
<tr>
<td>Hard steering persists after pump replacement</td>
<td>Defective steering unit</td>
<td>Install pump previously removed and replace steering unit</td>
</tr>
<tr>
<td>Noisy power steering system</td>
<td>• Insufficient fluid</td>
<td>Top up and rotate steering wheel in both directions from lock to lock to bleed system</td>
</tr>
<tr>
<td></td>
<td>• Air in system</td>
<td>Tighten fittings to the specified torque</td>
</tr>
<tr>
<td></td>
<td>• Loose fittings on intake side</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foam in reservoir</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Worn pump shaft seal</td>
<td>Replace pump</td>
</tr>
<tr>
<td></td>
<td>• Fluid reservoir filter clogged</td>
<td>Replace reservoir</td>
</tr>
<tr>
<td></td>
<td>• Loose power steering screws</td>
<td>Tighten to the specified torque</td>
</tr>
<tr>
<td></td>
<td>• Damaged or worn tie rods and/or ball joints</td>
<td>Replace tie rods and/or ball joints</td>
</tr>
<tr>
<td>Damaged bellows</td>
<td>External agents and/or rubber aging</td>
<td>Replace bellows</td>
</tr>
</tbody>
</table>
# STEERING

## MECHANICAL STEERING

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noisy intermediate shaft</td>
<td>• Excessive U-joint play</td>
<td>Replace intermediate shaft</td>
</tr>
<tr>
<td></td>
<td>• Excessive column-intermediate shaft</td>
<td>Replace defective parts</td>
</tr>
<tr>
<td></td>
<td>spline backlash</td>
<td></td>
</tr>
<tr>
<td>Excessive column-intermediate shaft spline sliding</td>
<td>• Excessive wear</td>
<td>Replace defective parts</td>
</tr>
<tr>
<td></td>
<td>• Insufficient adjusting nut tightening</td>
<td>Correctly tighten nut</td>
</tr>
<tr>
<td>Noisy steering column</td>
<td>• Worn and/or damaged column bearing</td>
<td>Replace defective parts</td>
</tr>
<tr>
<td></td>
<td>• Column fouling cowl</td>
<td>Install cowl correctly</td>
</tr>
<tr>
<td></td>
<td>• Loose bolts securing column to upper and lower supports</td>
<td>Tighten correctly</td>
</tr>
<tr>
<td>Difficult axial and radial steering wheel adjustment</td>
<td>• Column-shaft sliding sleeve nut excessively tight</td>
<td>Tighten correctly</td>
</tr>
<tr>
<td></td>
<td>• Insufficient lower column support guide clearance</td>
<td>Replace lower bolt spacer</td>
</tr>
<tr>
<td></td>
<td>• Excessively tight column/upper support nut</td>
<td>Tighten correctly</td>
</tr>
<tr>
<td></td>
<td>• Insufficient lubrication on sliding surfaces of column supports and column/shaft spline</td>
<td>Lubricate</td>
</tr>
<tr>
<td>Excessive steering wheel play</td>
<td>• Loose steering unit capscrews</td>
<td>Tighten screws</td>
</tr>
<tr>
<td></td>
<td>• Damaged tie rods or U-joints</td>
<td>Replace defective parts</td>
</tr>
<tr>
<td>Noisy steering</td>
<td>• Loose steering unit capscrews</td>
<td>Tighten screws</td>
</tr>
<tr>
<td></td>
<td>• Worn steering linkage</td>
<td>Replace defective parts</td>
</tr>
<tr>
<td></td>
<td>• Excessive pinion/rack backlash</td>
<td>Adjust backlash</td>
</tr>
<tr>
<td>Hard steering</td>
<td>• Incorrect suspension geometry</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>• Worn or under-inflated tyres</td>
<td>Check and replace or adjust</td>
</tr>
<tr>
<td></td>
<td>• Insufficient pinion/rack backlash</td>
<td>Adjust backlash</td>
</tr>
<tr>
<td></td>
<td>• Insufficient lubrication</td>
<td>Lubricate</td>
</tr>
<tr>
<td></td>
<td>• Damaged U-joints</td>
<td>Replace U-joints</td>
</tr>
<tr>
<td></td>
<td>• Steering column fouling turn signal switch unit</td>
<td>Check for correct turn signal switch unit installation</td>
</tr>
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</table>
## SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.3.0156</td>
<td>Puller steering lever ball joint</td>
<td>23-14</td>
</tr>
<tr>
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<td>23-24</td>
</tr>
<tr>
<td>A.3.0346</td>
<td>Installer, column and steering unit bushings</td>
<td>23-10</td>
</tr>
<tr>
<td>A.3.0451</td>
<td>Puller, steering wheel</td>
<td>23-3</td>
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