FRONT SUSPENSION

GROUP 21

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Front suspension is independent, connected to body by transverse links. Two longitudinal torsion bars are connected at the front to the links and at the rear to the chassis.

Front suspension also includes hydraulic double-acting shock absorbers connecting body and lower links and a anti-roll bar improving stability on cornering. Link upward and downward movement is restricted by bump blocks secured to cross member.
FRONT SUSPENSION

ANTI-ROLL BAR

REMOVAL
Raise car on a lift, back off nuts 2 and capscrews 3 and disconnect anti-roll bar 1.

INSPECTION
Clean all parts.
1. Check that anti-roll bar and conn. rods are not damaged or bent and anti-vibration bushing seats are not worn; replace as necessary.
2. Check that rubber cushions, anti-vibration bushings and rubber components are not worn; replace damaged parts as necessary.

ASSEMBLY
1. Lubricate inner surface of anti-roll bar support rubber cushions using the recommended grease (ISECO Ergon Rubber Grease no. 3; SPCA Spagran; REIN NACH Sferul B2AR) and install on anti-roll bar.
2. Install anti-vibration bushings on conn. rods.
3. Clamp anti-roll bar in a vice and insert conn. rods on anti-roll bar spigots.

INSTALLATION
Lubricate anti-roll bar supports on lower links using the recommended anti-seize (R. GORI Never Seez) and install by reversing the removal sequence.

1: Tightening torques
Nut securing anti-roll bar conn. rod to lower link
18 to 23 N·m
(1.8 to 2.3 kg·m)
(13.3 to 17 ft·lb)
Anti-roll bar pad support capscrews
25 to 29 N·m
(2.5 to 3 kg·m)
(18.4 to 21.4 ft·lb)

DISASSEMBLY
1. Apply markings on anti-roll bar and conn. rods.
2. Using a press, remove conn. rods from anti-roll bar.
3. Take off anti-vibration bushings 4 from conn. rod 3 and rubber cushions 1 from anti-roll bar 2.

1 Rubber cushions
2 Anti-roll bar
3 Conn. rod
4 Anti-vibration bushing
6. Position tools A.2.0265 and A.2.0069 on a column lift and insert in link seats and raise unit.

7. Remove cotter pin, back off nut and disconnect lower link 1 from steering knuckle 2 using tool A.3.0377.

1 Lower link
2 Steering knuckle
STEERING KNUCKLES AND WHEEL HUBS

1. Place car on a lift, operate parking brake, load car statically and slacken wheel nuts.
2. Back off capscrews 2 and disconnect shock absorber 1 from lower link 3.

3. Raise car and support it at the front by means of stands and remove wheels.
4. Remove anti-roll bar (see: Anti-roll bar - Removal).
5. Vehicles equipped with (ABS) MARK II wheel antilock system only.
   a. Back off screw 1 securing cable plate 2 to the upper link of the suspension.
   b. Back off nuts 4 and remove the impulse pick-up 5, complete with support from the steering knuckle without disconnecting it electrically.
   c. Put the impulse pick-up aside in a safe place, taking great care not to damage it and ensuring it does not hinder operations.

1. Shock absorber
2. Capscrews
3. Lower link

6. Impulse emitting wheel (*)
7. Brake disc
8. Capscrew
9. Cotter pin
10. Hub cover
11. Nut
12. Washer
13. Outer bearing
14. Wheel hub

(*) For vehicles equipped with (ABS) MARK II wheel antilock braking system only.
8. Unload torsion bar by lowering lift.  
   Disconnect brake fluid pipe from front caliper after draining brake fluid reservoir.

---

**WARNING:**
Brake caliper may be removed from steering knuckle without disconnecting from hydraulic system, thereby avoiding having to refill and bleed the system.

10. Remove cotter pin, back off nut and disconnect steering linkage 1 from steering knuckle 2 using tool A.3.0156.

---

12. Remove steering knuckle along with wheel hub.

---

**DISASSEMBLY**

1. Install wheel hub unit in a vice; using a punch, push and take off brake pad pins 1, remove cross shaped spring 2 and pads 3.

3. Remove brake caliper assembly.

---

11. Remove cotter pin, back off nut and disconnect upper link 1 from steering knuckle 2 using tool A.3.0377.

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4. Take off hub cover 4 and cotter pin 1.
5. Back off nut 2 and remove together with washer 3.

CAUTION:
Prevent shocks to bearing.

10. Back off 2 capscrews 1 securing wheel hub 2 to brake disc 3 and separate the two parts.

6. Remove hub with brake disc and place on bench.

8. Vehicles equipped with (ABS) MARK II wheel antilock system only. Using suitable pliers remove the retaining ring 1 and separate the impulse emitting wheel 2 from the wheel hub.

1 Capscrew
2 Wheel hub
3 Brake disc

11. Using a screwdriver, take off seal from hub. When removed, the seal must be replaced.

7. Remove splash guard 1 backing off 3 retaining nuts 2.

9. Remove outer bearing 1 from hub.

1 Outer bearing

1 Retaining ring
2 Impulse emitting wheel
12. Take off inner bearing (1) from seat.

INSPECTION

Thoroughly clean bearings and other parts and dry by blowing compressed air.

Wheel bearing

In case of pitting, roughness or ovality on race or taper roller surfaces, replace bearing.

CAUTION:

Bearings must be replaced in pairs, i.e. both inner and outer.

Steering knuckle and hub

Check wheel hub and steering knuckle; replace damaged parts as necessary.

ASSEMBLY


3. Lubricate bearing cups using bearing grease (AGIP Grease 33 FD or IP Autogrease FD) and pack hub recess with 50 g of grease. This quantity must not be exceeded otherwise bearing friction will result in overheating, grease leakage, etc.

4. Lubricate hub inner bearing using grease as per para. 3 and install.

5. Grease (ISECO Molykote BR2) the seal and install it on hub.
FRONT SUSPENSION

INSTALLATION

1. Position tools A.2.0265 and A.2.0069 as previously specified and load torsion bar to connect steering knuckle to both lower and upper links.
2. Install by reversing the removal sequence and following the instructions detailed below.
3. Tighten nut securing upper link ball joint to steering knuckle to the specified torque (see Inspection Specifications - Tightening Torques).
4. Tighten the following parts to the specified torque.

 Tightening torques

- Steering knuckle - impulse pick-up support securing nuts
  - 9 thru 10 N·m
  - (0.9 thru 1 kg·m)
  - (6.6 thru 7.4 ft·lb)

- Suspension upper link - impulse pick-up cable plate securing screw
  - 9 thru 10 N·m
  - (0.9 thru 1 kg·m)
  - (6.6 thru 7.4 ft·lb)

5. Vehicles equipped with (ABS) MARK II wheel antilock system only.
   a. Re-install the impulse pick-up in reverse order of removal, observing the following tightening torques.

 Tightening torques

- Steering knuckle - impulse pick-up support securing nuts
  - 9 thru 10 N·m
  - (0.9 thru 1 kg·m)
  - (6.6 thru 7.4 ft·lb)

6. Check car trim and front wheel geometry (see: Group 00 - Car Model Specific Manual - Car Trim Check).

b. Ensure that impulse pick-up cables have been well secured to their anchor points to avoid damage when vehicle is running.
c. Check the air gap between the impulse pick-ups removed and their respective impulse emitting wheels (see: Group 22 - Inspection Specifications - Checks and Adjustments - Adjustment of Air Gap between Impulse Pick-ups and Impulse Emitting Wheels).
6. Install and secure splash guard through 3 nuts.
7. Secure brake disc to hub through 2 capscrews.
8. Vehicles equipped with (ABS) MARK II wheel antilock system only. Reassemble the impulse emitting wheel on the hub (having thoroughly cleaned it and checked for good condition) then secure it with the retaining ring.
9. Apply grease (ISECO Molykote BR2) to steering knuckle, threaded end, washer and retaining nut. Wet seal outer surface using the recommended oil (AGIP Rotra MP SAE 80W90 or IP Pontax HD 80W90).
10. Install hub on steering knuckle and then install outer bearing, lubricated with grease as per para. 3, washer and nut. 
11. Tighten nut to the specified torque and rotate hub to settle the bearings. Slacken nut and retighten to the specified torque.

12. Vehicles not equipped with (ABS) MARK II wheel antilock system only.
   a. Back off nut through 90° and insert cotter pin. If nut slot and steering knuckle hole are not aligned, further tighten nut as necessary to permit cotter pin insertion.
   b. Settle bearings by tapping steering knuckle end using a mallet and check that washer is not locked (ensure that washer can be moved by slight pressure prising with a screwdriver between washer and hub). If washer is locked, remove cotter pin and back off nut to insert cotter pin in a hole perpendicular to the hole previously used. Tap steering knuckle end with a mallet and recheck washer fit.
   c. Bend cotter pin and install hub cover.
13. Vehicles equipped with (ABS) MARK II wheel antilock system only. Check front hub bearing clearance.

Front hub bearing clearance check
a. Install a comparator on a magnetic base (or suitable tool) so that it touches the steering knuckle axis (preload the comparator to 1 mm (0.04 in)).

b. Move the wheel hub axially (back and forth) and read the clearance indicated on the comparator. This clearance should come within specified values.

Front hub bearing clearance: 
\[ G = 0.02 \text{ thru } 0.12 \text{ mm} \] 
(0.0008 thru 0.0048 in)

14. Install brake caliper on steering knuckle by reversing the removal sequence and tighten two capscrews to the specified torque.

15. Insert pads 1 in brake caliper 2, install cross spring 3 home and insert retaining pins 4.
REMOVAL

1. Place the car on a platform lift.

CAUTION:
Remove underhood components as necessary to gain access to nuts securing shock absorbers to body.

2. From engine compartment, detach shock absorbers from body by removing locknuts ①, nuts ②, washers ③ and associated rubber cushions.

3. Raise car and disconnect shock absorbers ① from lower links by backing off capscrews ②.

4. Remove shock absorbers.

INSPECTION

1. Check shock absorbers and replace if affected by oil leakage.
2. If necessary, check shock absorbers settings (see Inspection Specifications - Checks and Adjustments). Replace as necessary.

INSTALLATION

Install by reversing the removal sequence.

①: Tightening torques
- Shock absorber to body locknut
  24 to 29 N·m
  (2.4 to 3 kg·m)
  (17.7 to 21.4 ft·lb)
- Shock absorber to lower link capscrews
  25 to 31 N·m
  (2.5 to 3.2 kg·m)
  (18.4 to 22.9 ft·lb)
LOWER LINKS AND TORSION BARS

REMOVAL

1. Proceed as specified in "Steering knuckles and Wheel hubs - Removal" up to para. 8 (excluding step 5).
2. Remove cover 1 from torsion bar seat 2.
3. Mark torsion bar at front and rear, install tool A.3.0374 and nut along with forcing screw A.3.0374/0001 and remove torsion bar from seat.
4. Back off bolts 1 and remove lower link 2 retrieving spacers.
5. Take off torsion bar from the front.

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CAUTION:
On cars provided with rear torsion bar connecting crossmember, carry out the following operations:
  a. Proceed as specified under

"Steering knuckles and Wheel hubs - Removal" up to para. 8 (excluding step 5).
  b. Back off and remove rear cover from torsion bar crossmember, mark bars and associated seats, install tool A.3.0374 and take off torsion bar.
  c. Remove lower link and torsion bar as specified in "Lower links and Torsion Bars - Removal", paragraphs 4 and 5.

LOWER LINK

DISASSEMBLY

1. Clamp lower link in a vice, remove plastic cover 1 from torsion bar seat and back off nut 2.

2. Back off and remove lockring 1.

3. Remove two nuts 1 and associated washers preventing support 2 rotation.

4. Install tool A.3.0372 on link support front threaded spigot, take off front bush and retrieve associated washer.

5. Position link support in seat, insert tool washer A.3.0373 in torsion bar seat and secure on link support threaded spigot through a nut. Tighten tool A.3.0372 on link support front threaded spigot and take off rear bush 1.


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5. Tighten tool A.3.0372 on link support rear threaded spigot and insert rear bush 1.

1 Lower link
2 Ball joint

2. Tighten ball joint nut to the specified torque.

①: Tightening torque
Ball joint/lower link nut
15 to 19 N·m
(1.5 to 2 kg·m)
(11.1 to 14.0 ft·lb)

3. Lubricate bush/lower link recess using 6 g of recommended grease (ISECO Molykote Longterm no. 2).
4. Insert support ③, washer ② of tool A.3.0372 and rear bush ① in link.

CAUTION:
Washers must be positioned with chamfer facing toward support.

1 Rear bush
2 Washer
3 Link support

1 Rear bush
2 Washer
3 Link support

1 Ball joint
2 Lower link

INSPECTION
Clean all parts.
1. Check that link and support are not damaged or bent and that antivibration bushing seats are not worn; otherwise replace link or support.
2. Replace ball joint if roughness or excessive play is detected.
3. Check anti-vibration bushings for damage; in particular, ensure that rubber components are not worn; replace as necessary.

ASSEMBLY

6. Retrieve tool A.3.0372 and take off link support.
7. Install link support in seat with washers ①.
8. Move support forward, insert front bush ① in support spigot, position tool washer A.3.0373 on support spigot threaded end and secure through a nut ②.


10. Insert two washers in threaded support ends, tighten two nuts to the specified torque, simultaneously preventing support rotation.

   ①: Tightening torque
   Lower link support end nut
   30 to 34 N·m
   (3 to 3.5 kg·m)
   (22.1 to 25.1 ft·lb)

11. Tighten lockring on link to the specified torque.

   ①: Tightening torque
   Lower link lockring
   20 to 34 N·m
   (2 to 3.5 kg·m)
   (14.8 to 25.1 ft·lb)

12. Tighten lockring nut to the specified torque.

   ①: Tightening torque
   Lower link lockring nut
   59 to 70 N·m
   (6 to 7.2 kg·m)
   (43.5 to 51.6 ft·lb)

13. Insert plastic cover in torsion bar seat.

**INSTALLATION**

Install by reversing the removal sequence and following the instructions given below.

- Before inserting torsion bar in seat, apply the recommended grease (R. GORI Never Seez) on seat and torsion bar splines.

---

**CAUTION:**

Ensure that plastic cover is in position on lower link splined seat.

- On bar assembly align reference marks applied on disassembly, and match colour references.
  - Right bar - blue mark and letter D or R on front end.
  - Left bar - yellow mark and letter S or L on front end.
- Tighten the following components to the specified torque.

   ①: Tightening torques
   Lower link/body bolts
   64 to 74 N·m
   (6.8 to 7.5 kg·m)
   (47.2 to 54.6 ft·lb)

   Lower link ball joint/steering knuckle nut
   45 to 55 N·m
   (4.6 to 5.6 kg·m)
   (33.2 to 40.6 ft·lb)

---
UPPER LINKS AND TIE RODS

1 Nut
2 Washer
3 Bump block
4 Bump block
5 Washer
6 Outer pin

UPPER LINKS

REMOVAL
1. Proceed as specified in “Steering knuckles and Wheel hubs - Removal” up to para. 6.
2. Remove cotter pin, back off nut and disconnect upper link ① from steering knuckle ② using tool A.3.0377.
3. Lower the column lift to unload lower link previously loaded.
4. Remove shock absorber (see Shock Absorbers - Removal).
5. Remove cotter pin ③, back off nut ② and disconnect tie rod ① from link ④.
6. Back off bolt ① and remove upper link.

CAUTION:
On cars not provided with bolt securing upper link to tie rod, to remove

1 Bolt

A.3.0377

1 Upper link
2 Steering knuckle

T 39 - 44
(4 - 4.5)
(28.8 - 32.5)

T N·m
(Kg·m)
(ft·lb)

T 39 - 44
(4 - 4.5)
(28.8 - 32.5)

13 Anti vibration bushing
14 Nut
15 Capscrew
16 Upper link

7 Nut
8 Bushing
9 Nut
10 Inner pin
11 Cotter pin
12 Self locking nut

INFORMATION
1. Anti-vibrating bushing

INSPECTION
1. Check upper link for damage or distortion and anti-vibration bushing seat for wear; replace as necessary.
2. Replace ball joint if affected by roughness or excessive play.
3. Check that anti-vibration bushing is not damaged and in particular that the rubber portion is not worn; otherwise replace as necessary.

INSTALLATION
1. If previously removed, install anti-vibration bushing ② using tool A.3.0367 at the press (with adapter ③ and lead in taper ①) and tool A.3.0368.

CAUTION:
Insert anti-vibration bushing from chamfered side.

2. Apply the recommended lubricant (R. GORI Never Seez) on bolt securing upper link to body.
3. Connect upper link to body through securing bolt.
4. Raise upper link by 1 to 2 mm and tighten kink bolt and tie rod nut to the specified torque.

 Tightening torques
Upper link/body securing bolt
39 to 44 N·m
(4 to 4.5 kg·m)
(28.8 to 32.5 ft·lb)

Tie rod/upper link retaining nut
39 to 44 N·m
(4 to 4.5 kg·m)
(28.8 to 32.5 ft·lb)

5. Install by reversing the removal sequence.

6. Vehicles equipped with (ABS) MARK II wheel antilock system only.
a. Re-install the impulse pick-up in reverse order of removal, observing the following tightening torques.

 Tightening torques
Steering knuckle - impulse pick-up support securing nuts
9 thru 10 N·m
(0.9 thru 1 kg·m)
(6.6 thru 7.4 ft·lb)

Suspension upper link - impulse pick-up cable plate securing screw
9 thru 10 N·m
(0.9 thru 1 kg·m)
(6.6 thru 7.4 ft·lb)

b. Ensure that impulse pick-up cables have been well secured to their anchor points to avoid damage when vehicle is running.
c. Check the air gap between the impulse pick-ups removed and their respective impulse emitting wheels (see: Group 22 - Inspection Specifications - Checks and Adjustments - Adjustment of Air Gap between Impulse Pick-ups and Impulse Emitting Wheels).

TIE RODS

REMOVAL
1. Place car on a platform lift.
2. From engine compartment, remove nut ① retrievering washer ② and rubber cushion.

1 Nut
2 Washer

3. Raise lift, remove cotter pin ① and back off nut ②. Remove tie rod ③.

1 Cotter pin
2 Nut
3 Tie rod
4 Bush

CAUTION:
On cars not provided with a bolt securing tie rod to upper link, remove tie rod/upper link assy (see: Upper Link - Removal).

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INSPECTION
Check tie rod for distortion or damage, and bump clocks for wear, replace any damaged parts as necessary.

INSTALLATION
Install by reversing the removal sequence and following the instructions given below.

- Adhere to the specified tightening torques.

1: Tightening torque
   Tie rod to body nut
   Tie rod to upper link nut
   39 to 44 N·m
   (4 to 4.5 kg·m)
   (26.8 to 32.5 ft·lb)

- Check car trim and caster angle (See: Group 00 - Car Model Speci-
  Manual - Car Trim Check).

REAR CROSSMEMBER

For cars provided with torsion bar rear crossmember, carry out the following operations.

REMOVAL
1. With disassembled torsion bars (see: Lower Links and Torsion Bars - Removal) disconnect exhaust piping flexible supports, back off bolts securing crossmember to chassis and take off crossmember.
2. If necessary, take off anti-vibration bushings at the press using a bolster ① and a driver ②.

INSTALLATION
1. If previously removed, install anti-vibration bushings at the press using bolster ①, lead-in taper ② and driver ③.

2. For installation reverse the removal sequence.

1: Tightening torques
   Torsion bar connecting crossmem-
   ber nuts
   64 to 74 N·m
   (6.5 to 7.5 kg·m)
   (47.2 to 54.6 ft·lb)
# FRONT SUSPENSION

## INSPECTION SPECIFICATIONS

### GENERAL REQUIREMENTS

### FLUIDS AND LUBRICANTS

<table>
<thead>
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<th>Description</th>
<th>Type</th>
<th>Recommended product</th>
<th>Quantity</th>
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<td>Wheel hub recess</td>
<td>GREASE</td>
<td>AGIP: Grease 33 FD</td>
<td>50 g</td>
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<td></td>
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<td>IP: Autogrease FD</td>
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<td>Hub sealing ring lip and steering knuckle contact surface</td>
<td>GREASE</td>
<td>ISECO: Molykote BR2</td>
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<td>AGIP: Rotra MP SAE 80W90</td>
<td>Wet</td>
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<td>IP: Pontiack HD 80W90</td>
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<td>Part. no. 3671-69408</td>
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<tr>
<td>Anti-roll bar cushion pad inner surface</td>
<td>GREASE</td>
<td>ISECO: Ergon Rubber Grease n. 3</td>
<td>Wet</td>
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<td>Torsion bar serrations</td>
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<td>R. GORI: Never Seez - Antigrippante</td>
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<td>Anti-roll bar supports (on lower links)</td>
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<td>Bush/lower link recess</td>
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<td>ISECO: Molykote Longterm n. 2</td>
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### CHECKS AND ADJUSTMENTS

## TORSION BARS

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<th>Part. no.</th>
<th>Length (mm)</th>
<th>Diameter (mm)</th>
<th>Minimum trim correction for a tooth (mm)</th>
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<tr>
<td>11611.21.506.00</td>
<td>989 ± 2 (38.9 ± 0.1)</td>
<td>18.4 (0.72)</td>
<td>1.5 (0.06)</td>
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<td>23.4 (0.92)</td>
<td>2.5 (0.10)</td>
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* For cars with a 3 piece welded sheet plate crossmember.
# FRONT SUSPENSION

## FRONT WHEEL GEOMETRY

For **Alfa 156** see Print no. PA360500000000 - Workshop Manual - **Unit 00** - Mechanical Components and Body Maintenance - Wheel Alignment Data.

For **Alfa 147** see Print no. PA371400000000 - Workshop Manual - **Unit 00** - Mechanical Components and Body Maintenance - Wheel Alignment Data.

<table>
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<th>Giulietta</th>
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<td>9°</td>
<td>9°</td>
<td>9°</td>
</tr>
<tr>
<td>Caster (α)</td>
<td>3° ± 30'</td>
<td>3° 30' ± 30'</td>
<td>3° 30' ± 30'</td>
</tr>
<tr>
<td>(Max. difference between right and left wheels)</td>
<td>20'</td>
<td>20'</td>
<td>20'</td>
</tr>
<tr>
<td>Camber (β)</td>
<td>-20° ± 30'</td>
<td>-30° ± 30'</td>
<td>1° ± 30'</td>
</tr>
<tr>
<td>(Max. difference between right and left wheels)</td>
<td>40'</td>
<td>40'</td>
<td>40'</td>
</tr>
</tbody>
</table>

## VEHICLE TRIM

For **Alfa 156** see Print no. PA360500000000 - Workshop Manual - **Unit 00** - Mechanical Components and Body Maintenance - Vehicle trim.

For **Alfa 147** see Print no. PA371400000000 - Workshop Manual - **Unit 00** - Mechanical Components and Body Maintenance - Vehicle trim.

**Vehicle loading diagram for trim check**

Note: Trim check must be carried out with vehicle in kerb weight conditions.

<table>
<thead>
<tr>
<th></th>
<th>Alfetta</th>
<th>Giulietta</th>
<th>GTV 2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>25 kg (55 lb)</td>
<td>25 kg (55 lb)</td>
<td>25 kg (55 lb)</td>
</tr>
<tr>
<td>b</td>
<td>50 kg (110 lb)</td>
<td>50 kg (110 lb)</td>
<td>50 kg (110 lb)</td>
</tr>
<tr>
<td>c</td>
<td>25 kg (55 lb)</td>
<td>25 kg (55 lb)</td>
<td>25 kg (55 lb)</td>
</tr>
<tr>
<td>d</td>
<td>50 kg (110 lb)</td>
<td>50 kg (110 lb)</td>
<td>25 kg (55 lb)</td>
</tr>
<tr>
<td>e</td>
<td></td>
<td></td>
<td>50 kg (110 lb)</td>
</tr>
<tr>
<td>f</td>
<td></td>
<td></td>
<td>50 kg (110 lb)</td>
</tr>
</tbody>
</table>

December 1985
FRONT SUSPENSION

Front trim

B - A = 44 ± 5 mm (1.73 ± 0.2 in)

Rear trim

- Alfetta and models featuring bump blocks co-axial with shock absorbers.

C = 44 ± 5 mm (1.73 ± 0.2 in)

- Giulietta GTV 20 and GTV 6.25

<table>
<thead>
<tr>
<th></th>
<th>Giulietta</th>
<th>GTV 20</th>
<th>GTV 6.25</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>83 ± 5 mm</td>
<td>71 ± 5 mm</td>
<td>71 ± 5 mm</td>
</tr>
<tr>
<td></td>
<td>(3.27 ± 0.2 in)</td>
<td>(2.8 ± 0.2 in)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>-13 ± 5 mm</td>
<td>-25 ± 5 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-0.51 ± 0.2 in)</td>
<td>(-0.98 ± 0.2 in)</td>
<td></td>
</tr>
</tbody>
</table>
BASIC BAR REPLACEMENT

Foreword

Front trim adjustment is accomplished by rotating the torsion bars with respect to reference notes on the front links and rear cross member.

The different number of serrations (35 at the front, 34 and the rear) allows small trim corrections (about 1.5 - 2 - 2.5 mm depending on bar diameter) to be made by repositioning by one tooth at both ends.

Consequently, torsion bar subdivision has been based on diameter rather than vehicle type. A mark, known as the "basic mark" has been put on both ends of the bars.

When operating on the bars, take care not to switch them over, by observing, during assembly, the following marks:
- left bar, yellow mark and letter S or L
- right bar, blue mark and letter D or R

Basic bar installation
a) Choose a basic bar having the same diameter as the one to be replaced.
b) Trace the part no. by referring to the torsion bar table.
c) Take a new bar from the storehouse then install it by aligning the references on the basic marks with those on the crossmember and lower link.
d) Having completed installation, check the trim as per normal procedure, bearing in mind that with a new torsion bar the trim value is 5 mm greater than the normal one.
e) In the event of incorrect trim, adjust by rotating the bar by some teeth.
The exact number of teeth by which the bar is to be rotated is obtained by dividing the trim difference by the minimum trim correction value corresponding to the bar diameter (see torsion bar table).
f) It is emphasized that for a lower trim, by rotating the left bar CCW and the right bar CW, the trim value increases. For greater trim: by rotating the left bar CW and the right bar CCW, the trim value decreases.
# FRONT SUSPENSION

## SHOCK ABSORBER CALIBRATION AND PAIRING

On all vehicles front and rear shock absorbers must be paired as indicated in the calibration table.

**CAUTION:**

In case of substitution, the shock-absorber mounted on the vehicle should always be replaced with those of the same Trade Mark (Spica or Boge).

### Front

values in [N (kg)] (lb)

<table>
<thead>
<tr>
<th>Car type</th>
<th>Part. no.</th>
<th>Compression</th>
<th>Low speed</th>
<th>Rebound</th>
<th>Compression</th>
<th>High speed</th>
<th>Rebound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa 90 Super ≤</td>
<td>161.18.21.072.04</td>
<td>140 to 220 (14.3 to 22.4)</td>
<td>230 to 310 (23.4 to 31.9)</td>
<td>560 to 650 (65.1 to 66.3)</td>
<td>550 to 670 (65.1 to 68.3)</td>
<td>1600 to 1800 (187.4 to 203.5)</td>
<td></td>
</tr>
<tr>
<td>Alfa 75</td>
<td>161.18.21.072.03</td>
<td>(31.5 to 49.5)</td>
<td>(51.7 to 69.7)</td>
<td>(123.6 to 146.1)</td>
<td>(59.1 to 73.4)</td>
<td>(130.4 to 161.9)</td>
<td></td>
</tr>
<tr>
<td>Alfa 90 ≤</td>
<td>113.21.21.072.01</td>
<td>170 to 250 (17.3 to 25.5)</td>
<td>500 to 600 (51 to 61.2)</td>
<td>650 to 650 (65.1 to 66.3)</td>
<td>450 to 590 (65.1 to 68.3)</td>
<td>1850 to 2050 (187.4 to 203.5)</td>
<td></td>
</tr>
<tr>
<td>Alfa 75 turbo and ≤</td>
<td>113.50.21.072.01</td>
<td>(38.2 to 56.2)</td>
<td>(112.4 to 134.9)</td>
<td>(123.6 to 146.1)</td>
<td>(45.9 to 60.1)</td>
<td>(142.7 to 163.1)</td>
<td></td>
</tr>
<tr>
<td>other models</td>
<td>113.19.21.072.01</td>
<td>(29.2 to 56.2)</td>
<td>(56.2 to 95.9)</td>
<td>(213.6 to 224.8)</td>
<td>(85.4 to 125.9)</td>
<td>(224.8 to 308.1)</td>
<td></td>
</tr>
<tr>
<td>Alfetta</td>
<td>113.60.21.072.01</td>
<td>130 to 250 (13.3 to 25.5)</td>
<td>250 to 440 (26.5 to 44.9)</td>
<td>560 to 600 (85.1 to 86.3)</td>
<td>380 to 650 (45.9 to 60.1)</td>
<td>(123.6 to 161.9)</td>
<td></td>
</tr>
<tr>
<td>GTV 2.0</td>
<td>113.19.21.072.01</td>
<td>230 to 310 (23.4 to 31.6)</td>
<td>500 to 650 (55.1 to 66.3)</td>
<td>850 to 2050 (187.4 to 406.8)</td>
<td>310 to 450 (69.7 to 101.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTV 6.25</td>
<td>113.19.21.072.01</td>
<td>(51.7 to 69.7)</td>
<td>(161.9 to 161.9)</td>
<td>(314.7 to 369.7)</td>
<td>(94.9 to 116.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rear

values in [N (kg)] (lb)

<table>
<thead>
<tr>
<th>Car type</th>
<th>Part. no.</th>
<th>Compression</th>
<th>Low speed</th>
<th>Rebound</th>
<th>Compression</th>
<th>High speed</th>
<th>Rebound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa 90 ≤</td>
<td>162.00.25.072.02</td>
<td>110 to 190 (11.2 to 19.4)</td>
<td>90 to 170 (9.2 to 17.3)</td>
<td>310 to 450 (69.7 to 101.1)</td>
<td>420 to 520 (42.8 to 53.5)</td>
<td>1090 to 1270 (111.1 to 129.5)</td>
<td></td>
</tr>
<tr>
<td>Alfa 75</td>
<td>(*)(162.00.25.072.05)</td>
<td>(24.7 to 42.7)</td>
<td>(20.2 to 38.2)</td>
<td>(69.7 to 126.9)</td>
<td>(94.4 to 116.9)</td>
<td>(245 to 285.5)</td>
<td></td>
</tr>
<tr>
<td>Alfetta</td>
<td>116.00.25.072.23</td>
<td>110 to 190 (11.2 to 19.4)</td>
<td>180 to 280 (18.3 to 28.5)</td>
<td>420 to 410 (24.5 to 41.8)</td>
<td>1090 to 1270 (111.1 to 129.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTV 2.0</td>
<td>113.19.25.072.00</td>
<td>(24.7 to 42.7)</td>
<td>(40.5 to 62.9)</td>
<td>(54 to 92.2)</td>
<td>(283.2 to 283.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTV 6.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) The A.R. part number 162.00.25.072.05 shock absorbers substitute the A.R. part number 117.01.25.072.02. The new type shock absorbers can be installed on vehicles already equipped with old type ones.

In case of an old type shock-absorber replacement, it will be necessary to substitute the new upper rubber rebound bumper with the old one (if not damaged). Otherwise it is necessary the total replacement of the old shock-absorber pair.
FRONT SUSPENSION

FRONT WHEEL HUB BEARING CLEARANCE CHECK (*)

a. Slacken nuts securing front wheel concerned.
b. Raise the front of the vehicle and rest it on stands; remove the wheel.
c. Remove hub cover.
d. Install a comparator on a magnetic base (or suitable tool) so that it touches the steering knuckle axis (preload the comparator to 1 mm (0.04 in)).
e. Move the wheel hub axially (back and forth) and read the clearance indicated on the comparator.
This clearance should come within specified values.

Front hub bearing clearance

\[ G = 0.02 \text{ thru } 0.12 \text{ mm} \]
\[ (0.0008 \text{ thru } 0.006 \text{ in}) \]

(*) Vehicles equipped with (ABS) MARK II wheel antilock braking system.

TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Description</th>
<th>[N·m (kg·m) (ft·lb)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nut, wheel hub (stage 1)</td>
<td>20 to 24 (2 to 2.5)</td>
</tr>
<tr>
<td>Nut, wheel hub (stage 2)</td>
<td>5 to 10 (0.5 to 1)</td>
</tr>
<tr>
<td>Nut, lower link support end</td>
<td>29 to 34 (3 to 3.5)</td>
</tr>
<tr>
<td>Locking, lower link</td>
<td>20 to 34 (2 to 3.5)</td>
</tr>
<tr>
<td>Nut, lower link locking</td>
<td>59 to 71 (6 to 7.2)</td>
</tr>
<tr>
<td>Nut, ball joint to lower link</td>
<td>15 to 20 (1.5 to 2)</td>
</tr>
<tr>
<td>Nuts, lower link support to chassis</td>
<td>64 to 74 (6.5 to 7.5)</td>
</tr>
<tr>
<td>Nut, lower link ball joint to steering knuckle</td>
<td>44 to 54 (4.5 to 5.5)</td>
</tr>
<tr>
<td>Nut, upper link ball joint to steering knuckle</td>
<td>80 to 90 (8.2 to 9.2)</td>
</tr>
<tr>
<td>- Rims with four securing screws</td>
<td>46 to 55 (4.6 to 5.6)</td>
</tr>
<tr>
<td>- Rims with five securing screws</td>
<td>39 to 44 (4 to 4.5)</td>
</tr>
<tr>
<td>Nut, upper link to chassis</td>
<td>39 to 44 (4 to 4.5)</td>
</tr>
<tr>
<td>Nut, tie rod to chassis</td>
<td>26 to 44 (2.5 to 3.2)</td>
</tr>
<tr>
<td>Nut, tie rod to upper link</td>
<td>18 to 23 (1.8 to 2.3)</td>
</tr>
<tr>
<td>Nuts, torsion bar connecting crossmember</td>
<td>25 to 29 (2.5 to 3)</td>
</tr>
<tr>
<td>Locknut, shock absorber to chassis</td>
<td>24 to 29 (2.4 to 3)</td>
</tr>
<tr>
<td>Capscrews, shock absorber to lower link</td>
<td>25 to 31 (2.5 to 3.2)</td>
</tr>
<tr>
<td>Nut, anti-roll bar conn. rod (on lower link)</td>
<td>18 to 23 (1.8 to 2.3)</td>
</tr>
<tr>
<td>Capscrews, anti-roll bar cushion pads</td>
<td>25 to 29 (2.5 to 3)</td>
</tr>
<tr>
<td>Capscrews, front brake caliper to steering knuckle</td>
<td>74 to 83 (7.5 to 8.5)</td>
</tr>
<tr>
<td>Nut, steering link ball joint to steering knuckle</td>
<td>45 to 55 (4.6 to 5.6)</td>
</tr>
<tr>
<td>Steering knuckle - impulse pick-up support securing nuts (1)</td>
<td>32 to 40 (3.2 to 4.0)</td>
</tr>
<tr>
<td>Suspension upper link - impulse pick-up cable plate securing screw (1)</td>
<td>9 to 10 (0.9 to 1)</td>
</tr>
</tbody>
</table>

(1) Vehicles equipped with (ABS) MARK II wheel antilock braking system.
## FRONT SUSPENSION

### TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| Shock, vibration or shimmy    | - Shocks on steering wheel from road feedback. May be caused by excessive pinion rack backlash or steering components play.  
- Steering wheel oscillation may be due to steering linkage play or pinion rack backlash, or front wheel vibration.  
- Shimmy is a high frequency oscillation transmitted to steering wheel and often occurs at particular vehicle speeds. | Inflated correct tyre  
Wheel unbalance or rim distortion  
Worn tyres or loose wheel screws  
Worn suspension ball joint  
Incorrect pinion-rack backlash  
Failed suspension linkage rubber bushings  
Excessive steering linkage play  
Loose steering box screws  
Loose or defective shock absorber | Balance or repair  
Replace or tighten  
Replace ball joint  
Adjust backlash  
Replace bushings  
Check and replace as necessary  
Tighten screws  
Tighten or replace |
| Car wanders                   | - This fault is detected with the car on the move on a level road by taking hands off the steering wheel.  
See also: Group 25 - Troubleshooting. | Replace tyres  
Incorrect tyre pressure and/or loose wheel screws  
Different tread wear on right and left tyres  
Asymmetric car trim  
Incorrect wheel geometry  
Brakes binding  
Worn suspension rubber bushings  
Damaged steering-suspension connection | Inflate to correct pressure and/or tighten  
Replace tyre with shallower tread  
Adjust trim  
Adjust  
Check and repair  
Replace worn parts  
Replace defective parts |
## FRONT SUSPENSION

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive steering wheel play</td>
<td>• Incorrect pinion rack backlash</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>• Worn steering components</td>
<td>Replace worn parts</td>
</tr>
<tr>
<td></td>
<td>• Loose steering box screws</td>
<td>Tighten</td>
</tr>
<tr>
<td>Noise</td>
<td>• Incorrect tyre pressure</td>
<td>Inflate to correct pressure</td>
</tr>
<tr>
<td></td>
<td>• Damaged and worn ball joints or steering components, Insufficient lubrication</td>
<td>Replace or lubricate</td>
</tr>
<tr>
<td></td>
<td>• Loose steering linkage or suspension fasteners</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>• Defective shock absorbers</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Inefficient wheel bearings</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Inefficient suspension bushings</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Damaged torsion bars</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Loose shock absorber nut</td>
<td>Tighten</td>
</tr>
<tr>
<td>Tyres squeal on corners</td>
<td>• Incorrect tyre pressure</td>
<td>Inflate to correct pressure</td>
</tr>
<tr>
<td></td>
<td>• Incorrect wheel geometry</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>• Incorrect driving</td>
<td>Avoid incorrect driving</td>
</tr>
<tr>
<td>Uneven tyre wear</td>
<td>- See Group 28 - Wheels and tyres.</td>
<td></td>
</tr>
<tr>
<td>Steering wheel binding</td>
<td>• Incorrect tyre pressure</td>
<td>Inflate to correct pressure</td>
</tr>
<tr>
<td></td>
<td>• Worn tyres</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Incorrect pinion rack backlash</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>- After these preliminary operations, if fault persists check and operate as follows: Raise vehicle front end using a jack and apply stands. Detach steering linkage from steering knuckle and move steering wheel. a) If steering wheel movement is light, check steering linkage or suspension. b) If steering wheel binds, check steering box or steering column.</td>
<td>Lubricate or change lubricant</td>
</tr>
</tbody>
</table>
## FRONT SUSPENSION

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect steering linkage lubrication,</td>
<td>Lubricate correctly, change grease or</td>
<td></td>
</tr>
<tr>
<td>contaminated grease or abnormal</td>
<td>replace worn parts</td>
<td></td>
</tr>
<tr>
<td>steering wear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worn or seized ball joint</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td>Distorted steering linkage</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td>Incorrect wheel geometry</td>
<td>Adjust</td>
<td></td>
</tr>
</tbody>
</table>
## FRONT SUSPENSION

### SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Part. no.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.2.0069</td>
<td>Support, torsion bar load/unload (use with A.2.0265)</td>
<td>21-4/1 21-8/1</td>
</tr>
<tr>
<td>A.2.0265</td>
<td>Loader/unloader, torsion bars (use with A.2.0069)</td>
<td>21-4/1 21-8/1</td>
</tr>
<tr>
<td>A.3.0156</td>
<td>Puller, steering knuckle upper pins</td>
<td>21-5</td>
</tr>
<tr>
<td>A.3.0328</td>
<td>Installer, front hub outer bearing cup</td>
<td>21-7</td>
</tr>
<tr>
<td>A.3.0329</td>
<td>Installer, front hub inner bearing cup</td>
<td>21-7</td>
</tr>
<tr>
<td>A.3.0367</td>
<td>Bolster, upper link anti-vibration bushing removal/installation (use with A.3.0368)</td>
<td>21-15</td>
</tr>
<tr>
<td>A.3.0368</td>
<td>Remover/replacer, upper link anti-vibration bushing (use with A.3.0367)</td>
<td>21-15</td>
</tr>
<tr>
<td>A.3.0372</td>
<td>Remover/replacer, lower link (use with A.3.0373)</td>
<td>21-11 21-12 21-13</td>
</tr>
<tr>
<td>A.3.0373</td>
<td>Toothed washer, lower link removal/installation (use with A.3.0372)</td>
<td>21-11 21-13</td>
</tr>
<tr>
<td>Part. no.</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>A.3.0374</td>
<td>Remover, torsion bars</td>
<td>21-10, 21-11</td>
</tr>
<tr>
<td>A.3.0374/0001</td>
<td>Forcing screw, torsion bar removal</td>
<td>21-10</td>
</tr>
<tr>
<td>A.3.0377</td>
<td>Puller, upper and lower ball joints, steering knuckle</td>
<td>21-4/1, 21-5, 21-14</td>
</tr>
<tr>
<td>A.3.0441</td>
<td>Ring, lower link ball joint removal</td>
<td>21-12</td>
</tr>
<tr>
<td></td>
<td>(use with A.3.0576 and A.3.0575)</td>
<td></td>
</tr>
<tr>
<td>A.3.0442</td>
<td>Ring, lower link ball joint installation</td>
<td>21-12</td>
</tr>
<tr>
<td></td>
<td>(use with A.3.0576 and A.3.0562)</td>
<td></td>
</tr>
<tr>
<td>A.3.0562</td>
<td>Centralizer, front suspension link ball pin installation</td>
<td>21-12</td>
</tr>
<tr>
<td></td>
<td>(use with A.3.0576 and A.3.0442)</td>
<td></td>
</tr>
<tr>
<td>A.3.0576</td>
<td>Centralizer, front suspension link ball pin removal</td>
<td>21-12</td>
</tr>
<tr>
<td></td>
<td>(use with A.3.0576 and A.3.0441)</td>
<td></td>
</tr>
<tr>
<td>A.3.0576</td>
<td>Remover/replacer, front suspension link ball pin</td>
<td>21-12</td>
</tr>
<tr>
<td></td>
<td>(use with A.3.0575; A.3.0441; A.3.0442; A.3.0562)</td>
<td></td>
</tr>
</tbody>
</table>