REAR SUSPENSION

GROUP 25

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Rear suspension features a De Dion type axle. This design, which combines the advantages of rigid axles and those of independent axles, permits a reduction in unsprung mass; it also improves rear wheel geometry ensuring that the wheels remain perpendicular and provide full adhesion around corners and on rough surfaces at all times.

Triangular De Dion tubular structure is connected at front to a cross member, bolted to body through antivibration bushing. Thrust generated by driving wheels is transmitted to body through this point. At rear, axle is anchored by a Watt’s linkage hinged to axle through a rocker connected to body by means of two transverse links. Watt’s linkage transverse links react in push or pull fashion with forces equal to those transmitted by wheels to axle, to prevent lateral body movement.

Rear suspension also includes coil springs, hydraulic telescopic shock absorbers and anti-roll bar.
DE DION AXLE

REMOVAL

1. Place car on a lift, lock front wheels using suitable chocks and slacken rear wheel nuts.

2. Vehicles equipped with (ABS) MARK II wheel antilock system only.
   a. Free the rear impulse pick-up cables from the De Dion axle.
   b. Back off nuts ② and remove the impulse pick-ups ①, complete with supports, from the wheel hubs without disconnecting them electrically.
   c. Put the impulse pick-ups in a safe place, taking great care to avoid damage to them, where they do not hinder operations.

3. Install tool A.2.0075 on hydraulic lift, raise rear axle by 40 cm min. and apply support stands; remove rear wheels.

4. Remove exhaust line as directed in "Group 04 - Exhaust System - Removal".

5. Remove transmission remote control rod and isostatic control as directed in "Group 13 - External controls - Complete control - Removal".

6. Back off screws ①, retrieve associated washers and lock plates and remove axle shafts ②.

CAUTION:

Take care not to damage joint bellows ③ during removal operation.

7. Back off lock nuts ① and associated nuts, retrieve rubber cushions ② and cups ③, disconnect anti-roll bar ⑤ from De Dion axle ④.

8. Back off lock nuts ① and nuts ②, retrieve rubber cushions ④ and cups ③ and remove shock absorber ⑤.

---

1 Rear impulse pick-up
2 Nuts securing impulse pick-up support to wheel hub

1 Axle shaft screw
2 Axle shaft
3 Joint bellows

1 Lock nut
2 Rubber cushion
3 Cup
4 De Dion axle
5 Anti-roll bar

1 Lock nut
2 Shock absorber - axle retaining nut
3 Cup
4 Rubber cushion
5 Shock absorber

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10. Lower hydraulic lift until coil springs are fully unloaded.
11. Take out coil springs 1 from seats along with pads 3 and seals 2.

12. Disconnect speedometer and back-up light switch cables.
13. Support power train by means of a suitable tool and hydraulic lift.

14. Back off and remove bolts securing propeller shaft joint to clutch fork.
15. Slacken screw 1 and back off screws 2.

16. Lower power train, back off and remove bolts 1.
17. Back off and remove screw 2 and take off cross member.
18. Install cross member to support power train, remove supporting tool and axle with Watt's linkage.

19. Tighten nuts securing propeller shaft joint to clutch fork to the specified torque, (see Group 15 - Transmission - Inspection Specifications - Tightening Torques).
20. Tighten axle shaft/wheel shaft retaining screws to the specified torque (see Group 17 - Axle Shafts - Inspection Specifications - Tightening Torques).

- Vehicles equipped with (ABS) MARK II wheel antilock system only.
  a. Install the impulse pick-ups in reverse order of removal, observing the following tightening torque.

**INSTALLATION**
Install by reversing the removal sequence and following the instructions given below.
- Before tightening propeller shaft joint to clutch fork, lubricate centralization

1  Power train/cross member securing bolts
2  Axle-cross member screw
REAR SUSPENSION

b. Ensure that the impulse pick-up cables are well secured to their anchor points and properly fixed to the suspension unit to prevent damage when the vehicle is running.

c. Check the air gap between the impulse pick-ups and impulse emitting wheel (see: Group 22 - Inspection Specifications - Checks and Adjustments - Adjustment of the Air Gap between the Impulse Pick-ups and Impulse Emitting Wheels).

* Check car trim and rear wheel geometrie (see: Group 00 - Car Model Specific Manual - Car Trim Check).

REAR WHEEL HUBS

1 Axle shaft
2 Wheel shaft
3 Bearing
4 Lock ring
5 Impulse emitting wheel (*)
6 Wheel hub
7 Washer
8 Nut
9 Lock nut
10 Cotter

(*) For vehicles equipped with ABS MARK II wheel anti-lock braking system only

DISASSEMBLY

1. Place De Dion axle 1 on a suitable bench. Remove cotter 2 from wheel shaft and take off lock nut 3.

2. Install a retainer tool to prevent wheel shaft rotation.

3. Back off nut 2 retaining hub to wheel shaft and take off associated washer 1.

1 De Dion axle
2 Cotter
3 Lock nut

1 Washer
2 Nut

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4. Wheel hub extraction.
   a. Vehicles not equipped with (ABS) MARK II wheel antilock system.
      Install tools A.2.0380 and A.3.0327, remove wheel hub and remove tools.
   b. Vehicles equipped with (ABS) MARK II wheel antilock system only.
      Assemble percussion tool A.3.0617 on tool A.3.0327 then, working as per Group 22 - (ABS) MARK II Braking System with Wheel Antilock - Impulse Pick-ups and Impulse Emitting Wheels - Rear Impulse Emitting Wheels - Removal step 5, extract the wheel hub and retrieve the tool.
   5. Vehicles equipped with (ABS) MARK II wheel antilock system only.
      If necessary, separate the impulse emitting wheel from the wheel hub by operating as described in Group 22 - (ABS) MARK II Braking System with Wheel Antilock - Impulse Pick-ups and Impulse Emitting Wheels - Rear Impulse Emitting Wheels - Removal step 6.
   6. Take off wheel shaft 1.

7. Using a punch, release two staked areas ② on bearing lock ring ①.

8. Using wrench A.5.0187, back off bearing lock ring.

9. Install tool A.3.0432 and using two wrenches, take out bearing from hub.

INSPECTION
Clean all parts.
1. Check axle seat, wheel shaft and hub for damage or distortion; replace as necessary.
2. Replace hub bearing.

ASSEMBLY
1. Install tool A.3.0432 and install hub bearing after thorough cleaning and lubrication.
2. Using two wrenches, insert bearing fully home and remove tools.
3. Apply antiseize lubricant (R. GORI Never Seez) to bearing lock ring; tighten to the specified torque using tool A.5.0187.
REAR SUSPENSION

1: Tightening torque
- Wheel hub bearing lock ring
  226 to 265 N·m
  (23 to 27 kg·m)
  (166.7 to 195.5 ft·lb)

b. With the aid of a press, fit the impulse emitting wheels on the hubs and check correct installation (see: Group 22 - (ABS) MARK II Braking System with Wheel Antilock - Inspection Specifications - Checks and Adjustments - Rear Impulse Emitting Wheels).

6. Install hub 1 and wheel shaft 2.

9. Install lock nut 1 and insert cotter 2.

CAUTION:
Right and left bearing lock rings are not interchangeable as they are provided with opposite threads.

4. Stake lock ring 2 on seat notches 1.

7. Install washer, tighten nut securing hub to wheel shaft to the specified torque holding wheel shaft to prevent rotation.

DE DION AXLE
ANTIVIBRATION BUSHING

DISASSEMBLY

1. Using a punch, release staked area in antivibration bushing seat top.

5. Vehicles equipped with (ABS) MARK II wheel antilock system only. If previously disassembled, reassemble the impulse emitting wheels thus.
   a. Clean the impulse emitting wheels thoroughly ensuring they are not damaged in any way.

1: Tightening torque
Wheel hub retaining nut
  265 to 324 N·m
  (27 to 33 kg·m)
  (195.5 to 239 ft·lb)

8. Using a brush, apply grease film protective fluid (MILLA Protective LT or HOUGHTON Rust Veto 1064) to wheel shaft threaded end.

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REAR SUSPENSION

2. Take off antivibration bushing ③ upper washer ② from seat ①.

INSPECTION
Clean antivibration bushing, seat and washers.
1. Check axle and antivibration bushing seat for damage or distortion; replace axle if necessary.
2. Check antivibration bushing for damage ensuring that rubber is not worn; replace if necessary.

ASSEMBLY
1. Remove any burrs from staked area in antivibration bushing seat.
2. Insert lower washer, install tool A.3.0435 with lead-in and insert antivibration bushing; remove tool.

3. Position upper washer on antivibration bushing, install tool A.3.0435 with smaller inserter ring and operate tool until bushing is fully home.

4. Using a punch, stake antivibration bushing seat at several points to prevent upper washer workout. Remove tool.

A.3.0435

1. Seat
2. Upper washer
3. Antivibration bushing

A.3.0435
REAR SUSPENSION

VATT'S LINKAGE

DISASSEMBLY

1. Using a punch, release staked area on nut 1 retaining rocker 2 to De Dion axle 3.

CAUTION:
The following operations can be carried out also with De Dion axle installed on vehicle after disconnecting transverse links from body proceeding as specified in "De Dion axle Removal", para. 9.

2. Back off nut, remove outer washer, take off rocker 2 together with two transverse links 1 from pin 4 on axle and retrieve inner washer 3.

1 Nut
2 Rocker
3 De Dion axle

1 Transverse link
2 Rocker
3 Inner washer
4 Pin

N-m
(1Kg-m)
(ft-lb)
3. Clamp rocker in a vice provided with protective jaw liners and disassemble transverse links by backing off bolts.

4. Press out transverse link anti vibration bushings.

5. Press out rocker anti vibration bushing.

ASSEMBLY
1. Press rocker antivibration bushing home, chamfered end first.

2. Press transverse link anti vibration bushing home, chamfered end first.

3. Connect transverse links to rocker and rocker to De Dion axle, by reversing the disassembly sequence.

CAUTION:
Do not tighten bolts and nut fully; final tightening must be carried out with static laden vehicle adhering to the torques specified below.

SHOCK ABSORBERS
REMOVAL
1. Place car on a lift.
2. Remove rear seat cushion.
3. Back off side and center screws, and remove seat back by raising it clear.

4. Back off nuts and lock nuts, retrieve rubber cushions and cups, and remove shock absorbers from body.

1. Lock nut
2. Shock absorber to body nut
3. Rubber cushion
4. Cup
5. Raise car.
6. Back off nut \( \textcircled{3} \), retrieve rubber cushion \( \textcircled{5} \) and cup \( \textcircled{4} \), remove shock absorber \( \textcircled{1} \) from axle \( \textcircled{2} \).

1. Shock absorber
2. De Dion axle
3. Shock absorber to axle nut
4. Cup
5. Rubber cushion

**INSPECTION**

1. Check shock absorber efficiency and replace in case of oil leakage.
2. If necessary, check shock absorber settings (see Group 21 - Inspection Specifications - Checks and Adjustments). Replace if necessary.

**INSTALLATION**

Install by reversing the removal sequence and adhere to the following tightening torque.

1. **Tightening torque**
   - Shock absorber upper and lower lock nuts (after driving nut to end of thread)
     - 23 to 27 N·m
     - 2.3 to 2.8 kg·m
     - 17 to 19.9 ft·lb

**ANTI-ROLL BAR**

**REMOVAL**

1. Raise car on a lift.
2. Disconnect hand brake control cable, back-up light switch \( \textcircled{2} \) and speedometer \( \textcircled{1} \) wiring harness.
3. Back off nuts retaining anti-roll bar conn. rods to axle and retrieve associated cups and rubber cushions.
4. Back off 4 screws \( \textcircled{1} \) and remove anti-roll bar \( \textcircled{2} \) from body.

1. Speedometer cable connection
2. Back-up light cable connection
3. Anti-roll bar to body screws
4. Anti-roll bar
5. Back off and remove bolts \( \textcircled{1} \), disconnect anti-roll bar \( \textcircled{3} \) from De Dion axle \( \textcircled{2} \).

**CAUTION:**

Take care not to damage brake system pipe; disconnect from three-way connection if necessary.

**INSPECTION**

1. Check anti-roll bar and conn. rods for damage or distortion; replace if necessary.
2. Check rubber cushions connecting supports to body and to conn. rods and axle for wear; replace if necessary.

**INSTALLATION**

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

- Wet inner surface of anti-roll bar support rubber cushions using the recommended type of grease (SPCA Spagraphe or ISECO Ergon Rubber Grease no. 3).
- Adhere to the following tightening torques.

1. **Tightening torques**
   - Bolt, power train rear support to body
     - 44 to 54 N·m
     - (4.5 to 5.5 kg·m)
     - (32.5 to 39.8 ft·lb)
   - Lock nuts, anti-roll bar to axle
     - 23 to 27 N·m
     - (2.3 to 2.8 kg·m)
     - (17 to 19.9 ft·lb)
   - Screws, anti-roll bar support to body
     - 19 to 24 N·m
     - (1.9 to 2.4 kg·m)
     - (14 to 17.7 ft·lb)

Adjust hand brake (see Group 22 - Hand Brake - Adjustment).
# REAR SUSPENSION

## INSPECTION SPECIFICATIONS

### GENERAL REQUIREMENTS

### FLUIDS AND LUBRICANTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Recommended product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear anti-roll bar support rubber cushion inner surface</td>
<td>GREASE</td>
<td>SPCA: Spagraph</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISECO: Ergon Rubber Grease n. 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part. no. 3671-69816</td>
</tr>
<tr>
<td>Wheel hub bearing lock ring</td>
<td>FLUID</td>
<td>Antiseizure compound R. GORI: Never Seez</td>
</tr>
<tr>
<td>Shock absorber lower pin</td>
<td></td>
<td>Part. no. 3671-69850</td>
</tr>
<tr>
<td>Transverse link screws</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel shaft threaded end</td>
<td>FLUID</td>
<td>Grease coating</td>
</tr>
<tr>
<td>Apply using a brush after tightening wheel hub</td>
<td></td>
<td>MILLA: Protective LT</td>
</tr>
<tr>
<td>nut and before installing lock nut</td>
<td></td>
<td>HOUGHTON: Rust Veto 1064</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part. no. 4100-81210</td>
</tr>
</tbody>
</table>

### CHECKS AND ADJUSTMENTS

### REAR SUSPENSION SPRING LOAD GRADES

Springs of equal load grade must be installed on the same axle

<table>
<thead>
<tr>
<th>+Super</th>
<th>Allato</th>
<th>Giulietta</th>
<th>Alfa</th>
<th>GTV 2.0</th>
<th>GTV 6.25</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part. no.</td>
<td>16218.25.090.01</td>
<td>16200.25.510.00</td>
<td>11655.25.510.00</td>
<td>11846.25.510.02</td>
<td>11315.25.090.00</td>
</tr>
</tbody>
</table>

Note: If a tow bar is assembled on cars Allato 90 and Allato 75, normal springs may be replaced by the more rigid type, part. no. 162.10.25.090.00.
# Rear Suspension

## Rear Wheel Geometry

For **Alfa 90** see Print no. PA360500000000 - Workshop Manual - Group 00 - Mechanical Components and Body Maintenance - Wheel Alignment Data.

For **Alfa 75** see Print no. PA371400000000 - Workshop Manual - Group 00 - Mechanical Components and Body Maintenance - Wheel Alignment Data.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toe-in (a)</strong></td>
<td>0° ± 10'</td>
</tr>
<tr>
<td>(Max. difference between right and left wheels)</td>
<td>10'</td>
</tr>
<tr>
<td><strong>Camber (d)</strong></td>
<td>0° ± 30'</td>
</tr>
<tr>
<td>(Max. difference between right and left wheels)</td>
<td>20'</td>
</tr>
</tbody>
</table>

## Vehicle Trim

See Group 21 - Checks and Adjustments - Vehicle trim.

## Tightening Torques

<table>
<thead>
<tr>
<th>Description</th>
<th>[N·m (kg·m)]</th>
<th>[ft·lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock ring, wheel hub bearing</td>
<td>226 to 265</td>
<td>(166.7 to 195.5)</td>
</tr>
<tr>
<td></td>
<td>(226 to 265)</td>
<td>(166.7 to 195.5)</td>
</tr>
<tr>
<td>Nut, wheel hub</td>
<td>265 to 324</td>
<td>(195.5 to 239)</td>
</tr>
<tr>
<td></td>
<td>(195.5 to 239)</td>
<td>(195.5 to 239)</td>
</tr>
<tr>
<td>Screws, power train cross member to body</td>
<td>39 to 44</td>
<td>(28.8 to 32.5)</td>
</tr>
<tr>
<td></td>
<td>(4 to 4.5)</td>
<td>(4 to 4.5)</td>
</tr>
<tr>
<td>Screws, axle to power train cross member</td>
<td>88 to 108</td>
<td>(64.9 to 79.7)</td>
</tr>
<tr>
<td></td>
<td>(9 to 11)</td>
<td>(9 to 11)</td>
</tr>
<tr>
<td>Bolts, Watt's linkage transverse links to rocker and body supports</td>
<td>39 to 49</td>
<td>(28.8 to 36.1)</td>
</tr>
<tr>
<td></td>
<td>(4 to 5)</td>
<td>(4 to 5)</td>
</tr>
<tr>
<td>Nuts securing impulse pick-up supports - wheel hubs (1)</td>
<td>9 to 10</td>
<td>(6.6 to 7.4)</td>
</tr>
<tr>
<td></td>
<td>(0.9 to 1)</td>
<td>(0.9 to 1)</td>
</tr>
<tr>
<td>Nut, rocker to De Dion axle pin</td>
<td>59 to 98</td>
<td>(43.5 to 72.3)</td>
</tr>
<tr>
<td></td>
<td>(6 to 10)</td>
<td>(6 to 10)</td>
</tr>
<tr>
<td>Lock nuts, top and bottom, shock absorber (nut on thread end)</td>
<td>23 to 27</td>
<td>(17 to 19.9)</td>
</tr>
<tr>
<td></td>
<td>(2.3 to 2.8)</td>
<td>(2.3 to 2.8)</td>
</tr>
<tr>
<td>Lock nuts, anti-roll bar to axle</td>
<td>23 to 27</td>
<td>(17 to 19.9)</td>
</tr>
<tr>
<td></td>
<td>(2.3 to 2.8)</td>
<td>(2.3 to 2.8)</td>
</tr>
<tr>
<td>Screws, anti-roll bar to body</td>
<td>19 to 24</td>
<td>(14 to 17.7)</td>
</tr>
<tr>
<td></td>
<td>(1.9 to 2.4)</td>
<td>(1.9 to 2.4)</td>
</tr>
</tbody>
</table>

(1) For vehicles equipped with (ABS) MARK II wheel anti-lock braking system
## TROUBLESHOOTING

In case of noise assumed to originate from rear suspension, carefully check to ensure that it is not caused by tyres, road surface, exhaust system, engine, power train or wheel bearings.

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>• Loose wheel screws</td>
<td>Tighten to the specified torque</td>
</tr>
<tr>
<td></td>
<td>• One or more loose bolts</td>
<td>Tighten to the specified torque</td>
</tr>
<tr>
<td></td>
<td>• Defective shock absorber</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Worn or damaged wheel bearing</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Wheel and tyre out of balance</td>
<td>Balance</td>
</tr>
<tr>
<td></td>
<td>• Rubber parts damaged</td>
<td>Replace damaged parts</td>
</tr>
</tbody>
</table>

**Instability on the move.**
This problem is also connected to front suspensions. For troubleshooting, also refer to group 21.

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Loose wheel screws</td>
<td>Tighten to the specified torque</td>
</tr>
<tr>
<td></td>
<td>• Defective shock absorber</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>• Weak coil springs</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Damaged transverse link antivibration bushings</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>• Loose transverse link connections</td>
<td>Tighten or replace</td>
</tr>
</tbody>
</table>
# REAR SUSPENSION

## TOOLS

<table>
<thead>
<tr>
<th>Part. No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.2.0075</td>
<td>Support, car raising</td>
<td>25-3</td>
</tr>
<tr>
<td>A.2.0380</td>
<td>Remover, rear wheel hub (use with A.3.0327)</td>
<td>25-6</td>
</tr>
<tr>
<td>A.3.0327</td>
<td>Puller hubs (use with A.2.0380)</td>
<td>25-6</td>
</tr>
<tr>
<td>A.3.0617</td>
<td>Percussion tool for rear wheel hub pulling (to be used with tool A.3.0327 without screw) (*)</td>
<td>25-6</td>
</tr>
<tr>
<td>A.3.0432</td>
<td>Remover-replacer, hubs and rear bearings</td>
<td>25-6</td>
</tr>
<tr>
<td>A.3.0435</td>
<td>Remover-replacer, axle antivibration bushing</td>
<td>25-8</td>
</tr>
<tr>
<td>A.5.0187</td>
<td>Wrench, rear wheel hub bearing lock nut</td>
<td>25-6</td>
</tr>
</tbody>
</table>

(*) For vehicles equipped with (ABS) MARK II wheel antilock braking system