

Suspension (04.00)

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Suspension (04.00)

Road Wheel Alignment (04.00) Maintenance

Specifications

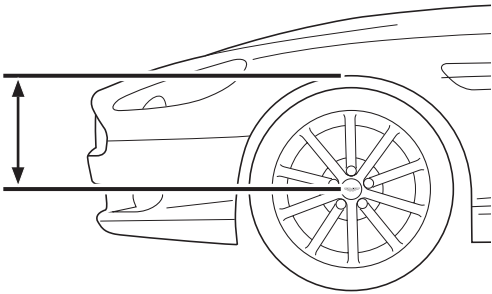
	Front	Rear
Toe	2.5' ($\pm 2'$)	10' (+5' / -0')
Total Toe	5' ($\pm 4'$)	20' (+10' / -0')
Camber	-15' ($\pm 5'$)	-1° 30' ($\pm 5'$)
Cross Camber	0' ($\pm 10'$)	0' ($\pm 10'$)
Caster	5° (+30' / -15')	N/A
Cross Castor	0° ($\pm 15'$)	N/A
KPI	10° 51'	N/A
Bumpstop free travel	12.0 mm	14.5 mm
Normal Ride Height	2 x 68 kg (driver and passenger seat) + 14 kg in the boot + full fuel tank.	

Ride height is measured from the centre of the road wheel, vertically, up to the road wheel arch.

Check tyre pressures before checking road wheel alignment.

	Front	Rear
Ride Height	378.5mm (± 15 mm)	376.5mm (± 15 mm)

Wheel centre to wheel arch (front and rear)



Over time this vehicle's ride height will settle (up to 20mm). Therefore, as this vehicle ages it's ride height will tend to sit towards the lower end of the ride height tolerance band. This needs to be taken into account when checking vehicle ride height.

Repair Operation Time (ROT)	
Item	Code
All Wheel Alignment	04.00.AD

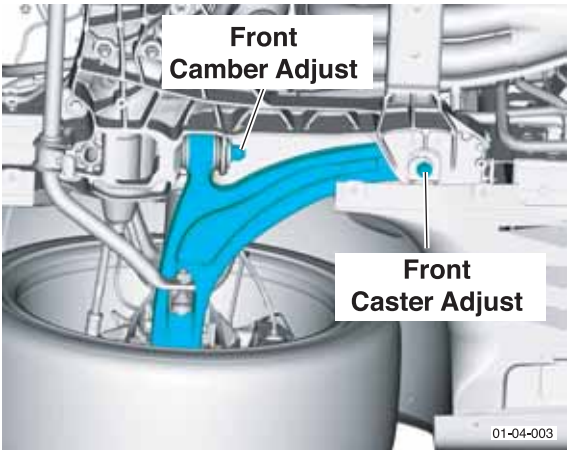
Refer to the geometry setup tool manufacture operating instructions.

Check vehicle geometry in the following order:

- 1 Caster Angle
- 2 Camber Angle
- 3 Toe

Adjustments to caster, camber and toe settings may impact each other. After checking / adjusting each setting, minor adjustments to caster, camber and toe may have to be made to reach the correct set up for the vehicle.

Both LH and RH Toe need to be adjusted when adjusting caster and camber.



Caster Angle

Adjustment (Front)

Check and if required adjust the camber angle. If the camber angle is correct but the caster angle is still incorrect, suspect damage to the suspension components.

*Ensure that the vehicle is at normal ride height.
Check tyre pressures.*

1. Check the caster settings. Follow the equipment manufacturer's instructions.
2. Release the cam bolt lock nuts.
3. Rotate the lower arm caster adjustment cam bolts.
4. When the caster angle is correct, tighten the cam bolt lock nuts.
5. Re-check alignment settings. Adjust if required.

Camber Angle

Adjustment

*Ensure that the vehicle is at normal ride height.
Check tyre pressures.*

1. Check the camber settings. Follow the equipment manufacturer's instructions.
2. Release the cam bolt lock nuts.
3. Rotate the lower arm camber adjustment cam bolt to adjust the camber angle.
4. Tighten the cam bolt lock nuts.
5. Re-check alignment settings. Adjust if required.

Toe

Adjustment (Front)

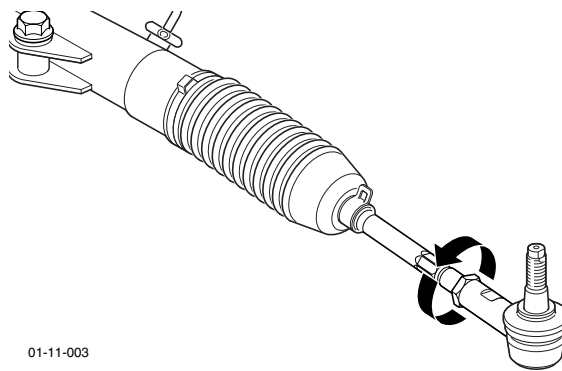
*Ensure that the vehicle is at normal ride height.
Check tyre pressures.*

1. Start the engine and centre the steering rack.
2. Turn the engine off. Lock the steering position.
3. Check the Toe settings. Follow the equipment manufacturer's instructions.

If Adjustment is Required.

4. Clean the lock nuts and the threads of the track-rod ends.

Do not allow the steering gear boot to twist when the track-rod ends are rotated. If required release the steering gear boot clamps.



5. Loosen the lock nuts and rotate the track-rod ends (in equal amounts) to adjust the Toe.
6. Tighten the lock nuts to **70 Nm.**, and re-check the Toe. Adjust if required.

When correct, secure the steering gear boot clamps (if released).

Adjustment (Rear)

*Ensure that the vehicle is at normal ride height.
Check tyre pressures.*

1. Check the toe settings. Follow the equipment manufacturer's instructions.
2. Release the cam bolt lock nuts.
3. Rotate the toe control rod adjustment cam bolt to adjust the rear toe.
4. Tighten the lock nut.
5. Re check the Toe settings. Adjust if required.



ASTON MARTIN

Suspension (04.00)

Front Suspension (04.01)

Description

Suspension Arms

The upper suspension arm is attached to the body structure. The lower suspension arm is attached to the front subframe.

Each upper suspension arm has a press-fit ball joint, and two interleaved rubber bushes. Two bolts attach the upper suspension arm to the body structure.

Each lower suspension arm has a press fit ball joint and metal-to-rubber bonded bushes which are attached to the front subframe by two eccentric cam bolts (Camber and castor settings).

Anti-roll Bar

The anti-roll bar, is attached to the subframe in two positions by rubber bushes and clamps. The outer ends of the anti-roll bar are attached to the lower suspension arms by drop links. The anti-roll bar provides the required stiffness to control body roll.

Vertical link

The Vertical link (Knuckle Joint) swivels on the upper and lower suspension arms via ball joints, and carries the hub, a unit 3 wheel bearing (including the ABS encoder ring), the wheel speed sensor, the brake caliper, and the brake disc and shield. The position of the Vertical link is determined by the movement of the steering rack, which is connected to the Vertical link by the steering track rod.

Specifications

Torque Figures			
Description		Nm	lb. / ft.
Brake dust shield.		9	7
Bearing Assembly to the Vertical link.		55	41
Vertical Link to the Lower Suspension Arm.		90	66.5
Vertical Link to the Upper Suspension Arm.		90	66.5
Track-rod End Lock Nut.		70	52
Vehicle Ride Height Sensor.	M8	22.5	17
	M5	9	7
Anti-roll Bar Link Nuts		110	81.5
Anti-roll Bar Mounting Bolts		22.5	17
Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)			

Torque the following suspension fixings with the vehicle at normal ride height

Lower Suspension Arm front bush to the Subframe		115	85
Lower Suspension Arm rear bush to the Subframe.		185	137
Upper Suspension Arm to the Front Structure		115	85
Spring and Damper Bolts	Top	22.5	17
	Lower	175	129.5

Normal ride height 2 x 68 kg + 14kg in the boot + full fuel tank.

Symptoms

Symptom	Possible Cause	Action
Crabbing	Front or rear suspension components / road wheel alignment Drive axle damaged	Inspect front and rear suspension systems. Check / adjust road wheel alignment New drive axle.
Front 'Bottoming' or Riding Low	Spring(s) Dampers	Check ride height. Check dampers.
Drift / Pull	Unequal tyre pressure Incorrect road wheel alignment Tyres Unevenly loaded or overloaded vehicle Damaged steering components Brake drag	Check / adjust tyre pressures. Inspect tyre for excessive wear. Check / adjust road wheel alignment. Check / adjust tyre pressures. Inspect tyre for excessive wear. Notify customer of incorrect vehicle loading. Check steering system for mechanical or hydraulic bias. Check brakes. Check steering system for mechanical or hydraulic bias.
Rough Ride	Spring(s) Shock absorber(s)	Check springs. Check shock absorbers.
Incorrect Tyre Wear	Incorrect tyre pressure Excessive front or rear Toe (rapid inner or outer edge wear) Excessive negative or positive camber (rapid or outer edge wear) Tyres out of balance (tyres cupped or dished)	Check and adjust tyre pressure. Inspect tyre for excessive wear. Check and adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2). Check and adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2). Balance tyres.
'Shimmy' or 'Road Wheel Tramp'	Loose road wheel nut(s) Loose front suspension Front road wheel bearing(s) Road wheel / tyres Shock absorber(s) Spring(s) Loose, worn or damaged ball joint(s) Loose, worn or damaged steering components Front road wheel alignment Worn or damaged suspension bushes	Check and tighten road wheel nuts to specification. Check and tighten suspension fixings to specification. Check road wheel bearings. Check road wheels / tyres. Check shock absorbers. Check springs. Check ball joint(s) (Refer to 'Ball Joints', page 4-2-4). Check components. Check and adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2). Check suspension bushes
Poor 'Return ability' of Steering	Ball joints Steering components	Check ball joint(s). Check for excessive friction in steering system. Check tyre pressures
Steering Wheel Off-Centre	Unequal front or rear Toe settings Steering components	Check and adjust road wheel alignment. Check and install new components as required.
Sway or Roll	Overloaded, unevenly or incorrectly loaded vehicle Loose road wheel nut(s) Spring(s) Shock absorber(s) Loose front stabilizer bar or rear stabilizer bar	Notify customer of incorrect vehicle loading Check. Tighten road wheel nut(s) to specification Check. Install new springs as required. Check. Install new shock absorbers as required. Check. Tighten anti-roll bar to specification.

Symptom	Possible Cause	Action
Vibration / Noise	Tyres / road wheel Road wheel bearing assemblies Brake components Suspension components Spring and damper units Steering components	Check. Install new components as required.
Vehicle Leans to One Side	Unevenly loaded or overloaded vehicle Front or rear suspension components Spring and damper assemblies Incorrect ride height. Lateral tilt out of specification Suspension bushes not torqued at ride height	Notify customer of incorrect vehicle loading. Inspect front and rear suspension systems. Check spring and damper assemblies. Check ride height. Check / adjust suspension bushes torque.
Wander	Unevenly loaded or overloaded vehicle Ball joint(s) Front road wheel bearing(s) Loose, worn or damaged suspension components Loose suspension fasteners Steering components Road wheel alignment (excessive total front Toe-out)	Notify customer of incorrect vehicle loading. Check ball joint(s) (Refer to 'Ball Joints', page 4-2-4). Check road wheel bearings. Check suspension components. Check and tighten suspension fasteners to specification. Check steering components for wear and / or free play. Check / adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

Maintenance

Caution

Treat the suspension components with care. The suspension components are liable to damage if struck with, e.g. a metal faced hammer.

Road Wheel Bearing

Inspection

1. Raise and support the vehicle.
2. Make sure the road wheel rotates freely and that the brake pads are sufficiently retracted, allowing free movement of the road wheel.
3. Firmly grasp the road wheel at the top and bottom. Attempt to move the road wheel inward / outward while lifting the weight of the road wheel off the road wheel bearing.
Observe upper and lower ball joints for movement.
4. If there is any excess movement in the road wheel bearing, replace the bearing assembly.



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Ball Joints

Inspection

1. Raise and support the vehicle.

Prior to carrying out any inspection of the ball joints, inspect the road wheel bearings.

2. Pull and push the bottom of the road wheel. Check for any relative movement between the ball joint and the lower suspension arm.
Install new components if required.



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3. Pull and push the top of road wheel. Check the relative movement between the ball joint and the upper suspension arm.
Install new components as required.
4. Lower the vehicle.

Front Suspension

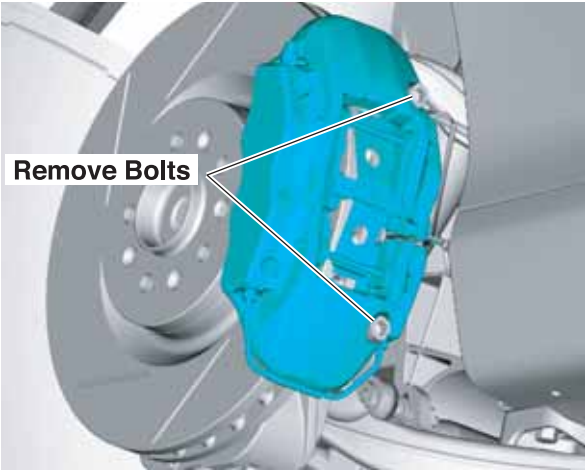
Repair Operation Time (ROT)	
Item	Code
Upper Suspension Arm	(LH) 04.01.NB
	(RH) 04.01.PB
Lower Suspension Arm	(LH) 04.01.LB
	(RH) 04.01.MB
Vertical link	(LH) 04.01.GB
	(RH) 04.01.HB
Spring and Damper Unit	(LH) 04.03.AB
	(RH) 04.03.BB
Anti-roll Bar	04.01.AB

Caution

Treat the suspension components with care. The suspension components are liable to damage if struck with, e.g. a metal faced hammer.

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the brake caliper (bolts x2). Move the brake caliper to one side and secure.

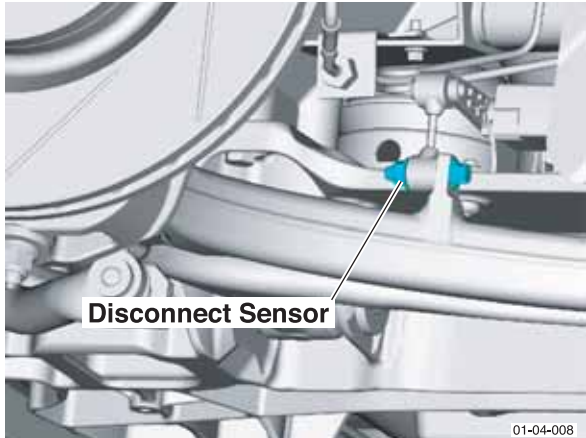


4. Disconnect the ABS sensor wiring harness plug.



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5. Disconnect the vehicle ride height sensor.

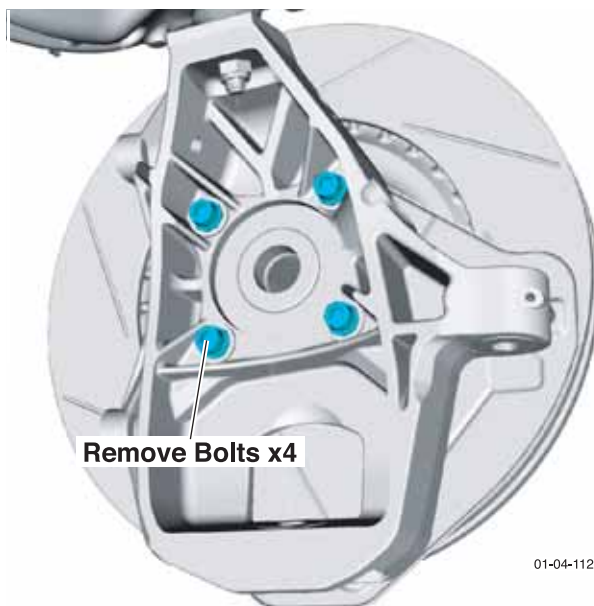
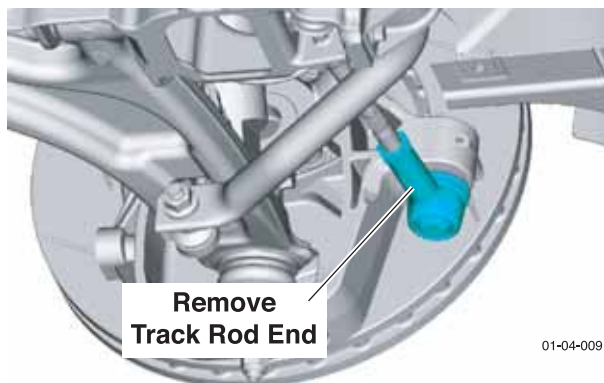


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6. Using service tool (Refer to '204-523 (Ball Joint Splitter)', page 20-1-3), remove the track rod-end.
8. If required, remove the hub from the vertical link.

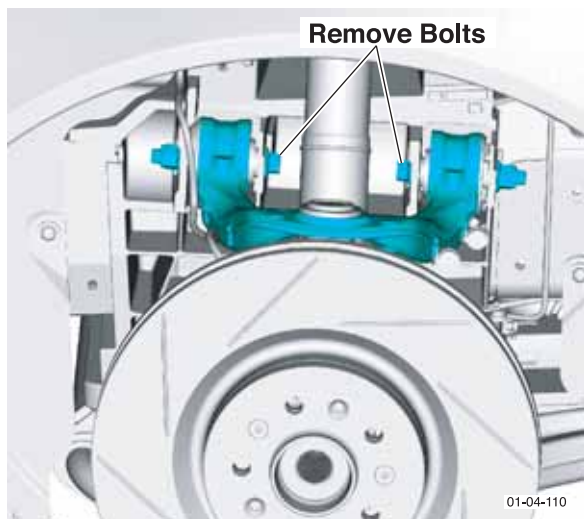
Caution
Do not use a hammer, etc., to 'shock' the track rod-end.

Take care not to damage the ball joint boot.

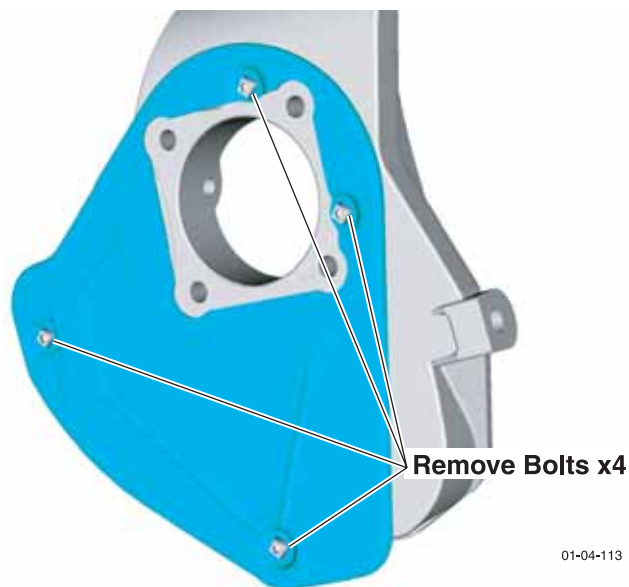


7. Remove the upper suspension arm and vertical link as a unit.

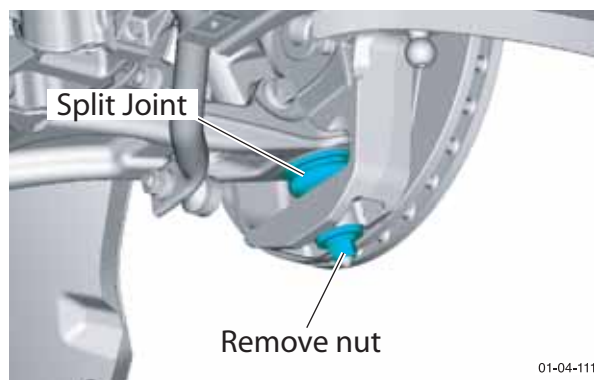
- 7.1 Remove bolts (x2) that secure the upper suspension arm to the body structure.



- 8.2 Press the hub from the vertical link.
- 8.3 Remove the brake dust shield (bolts x4).



- 7.2 Using service tool (Refer to '204-523 (Ball Joint Splitter)', page 20-1-3), remove the vertical link from the lower suspension arm.



- 7.3 If required separate the upper suspension arm from the vertical link.

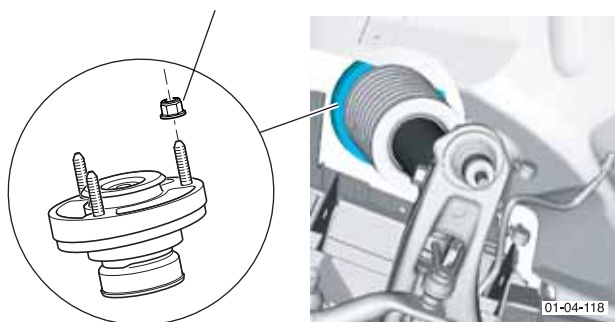
9. Remove the spring and damper assembly.

Caution
Ensure the damper is fully extended.

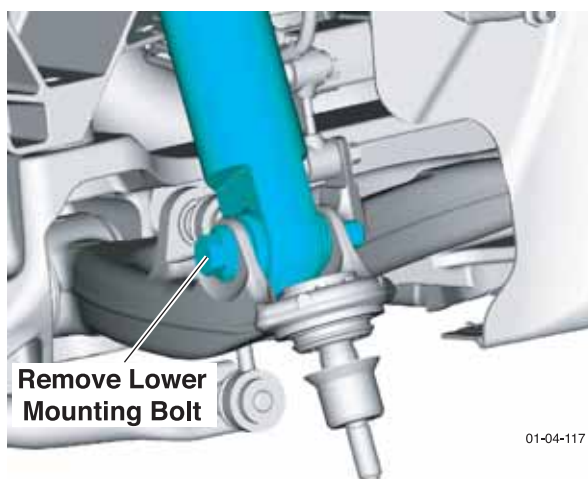
If removing both spring and damper units - the engine bay cross brace will be released.

- 9.1 Remove nuts (x3) from the top of the spring and damper assembly.

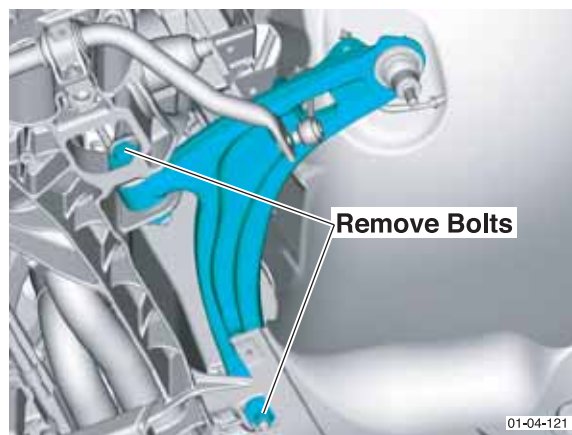
Remove Nuts x3



- 9.2 Remove the spring and damper assembly lower mounting bolt.



11. Remove bolts (x2) that secure the lower suspension arm to the subframe. Withdraw the lower suspension arm.

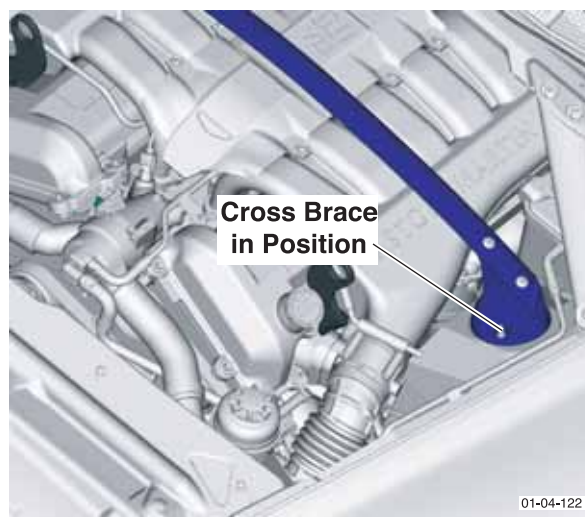


Installation

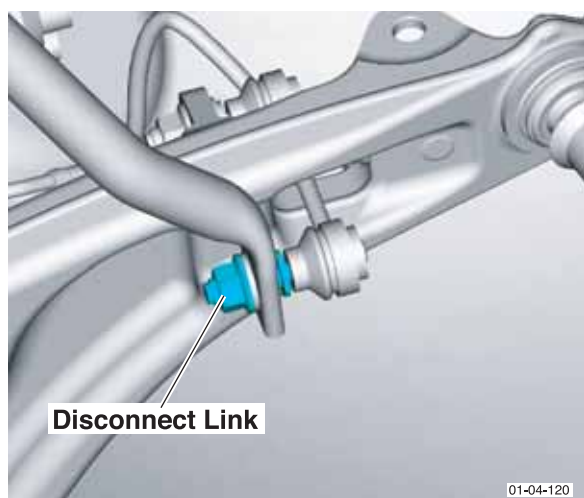
Caution

Final tightening of the suspension components must be carried out with the suspension arms at normal ride height. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

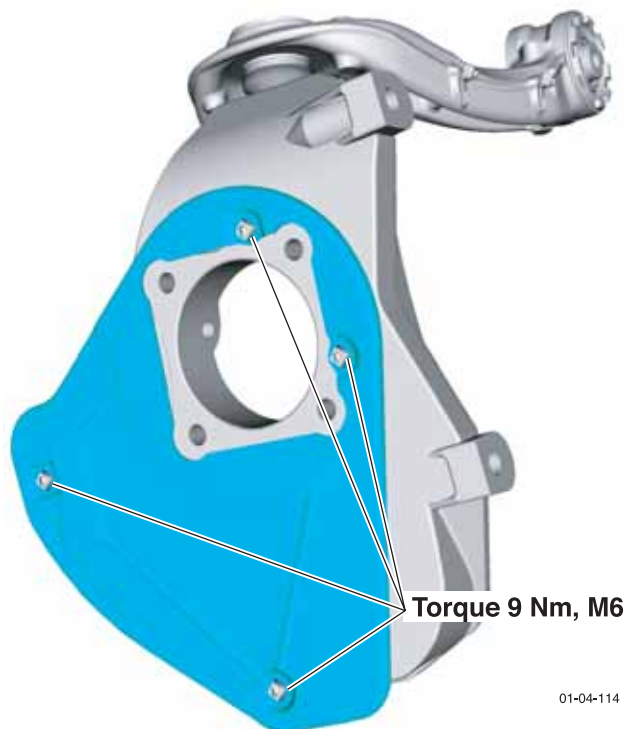
1. Install the lower suspension arm to the subframe. Do not torque.
2. Place the engine bay cross brace, complete with mounts, in position. Install the spring and damper assembly. Do not torque bolts.



10. Disconnect the anti-roll bar link assembly.



3. Install the bearing assembly to the vertical link (if removed).
- 3.1 Install the brake dust shield. Torque bolts (x3) to **9 Nm**.

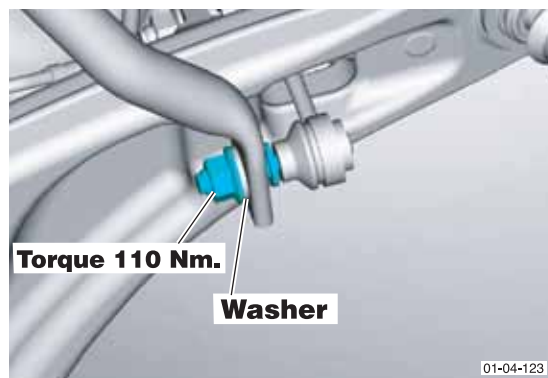


- 3.2 Install the bearing assembly. Torque bolts to **55 Nm**.

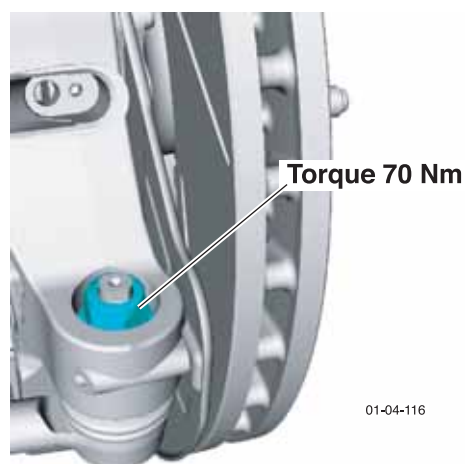


4. Install the anti-roll bar link assembly to the lower arm. Torque to **110 Nm**.

Ensure that the washer installs as shown below.



5. Install the upper suspension arm to the vertical link, if removed. Torque nut to **90 Nm**.
6. Install the vertical link to the lower suspension arm. Torque nut to **90 Nm**.
7. Install the upper suspension arm to the body structure. Do not torque.
8. Install the track-rod end. Torque nut to **70 Nm**.



9. Install the vehicle ride height sensor (LH side). Torque nut to **22.5 Nm**.
10. Install the ABS sensor wiring harness plug.
11. Install the brake caliper (Refer to 'Brake Caliper (Front and Rear)', page 6-1-3). Torque bolts to **20 Nm + 66°-70°**

12. Torque the suspension fixings with the vehicle at normal ride height (Refer to 'Specifications', page 4-2-1):

- Lower suspension arm to the subframe (rear bush) - **185 Nm**.
- Lower suspension arm to the subframe (front bush) - **115 Nm**.
- Upper suspension arm to the front structure - **115 Nm**.
- Spring and damper bolts to (top) **25.5 Nm**. (bottom) **175 Nm**.

The engine bay cross brace must be torqued with the weight of the vehicle on the roadwheels.

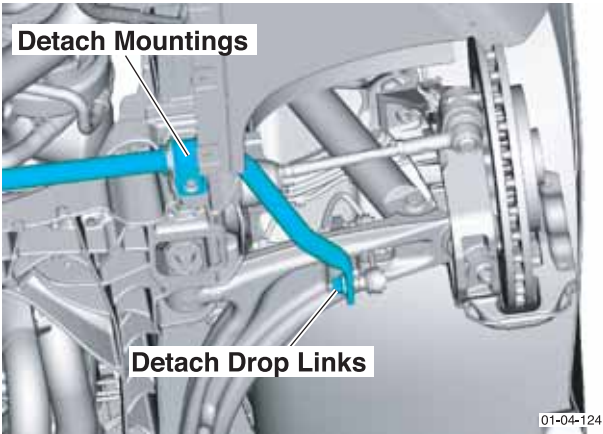
13. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
14. Check / adjust the Camber, Castor and Toe settings.

Anti-roll Bar

Repair Operation Time (ROT)	
Item	Code
Anti-roll Bar Renew	04.01.AB

Removal

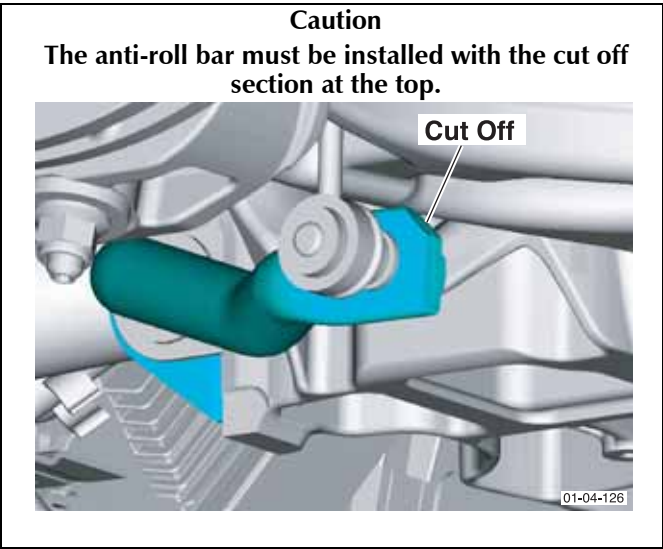
1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the front undertray.
4. Remove the anti-roll bar from the anti-roll bar drop links.



5. Remove the anti-roll bar mountings (strap and bush) from the subframe and withdraw the anti-roll bar.

Installation

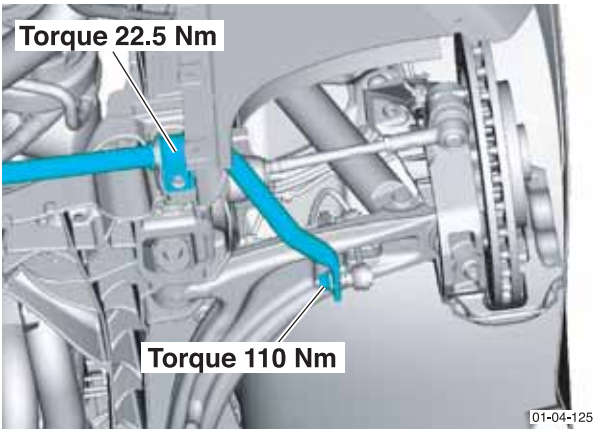
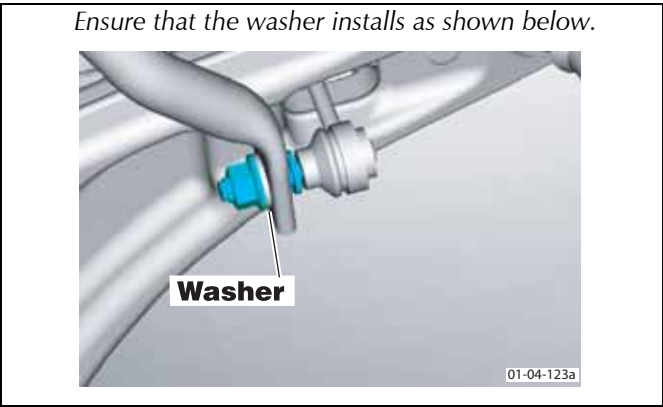
1. Place the anti-roll bar in position and install the stabiliser mountings.



2. Connect the anti-roll bar to the anti-roll bar drop links. Torque the fixings.
- Anti-roll bar mounting bolts to **22.5 Nm**.

Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)

- Anti-roll bar link nuts to **110 Nm**.



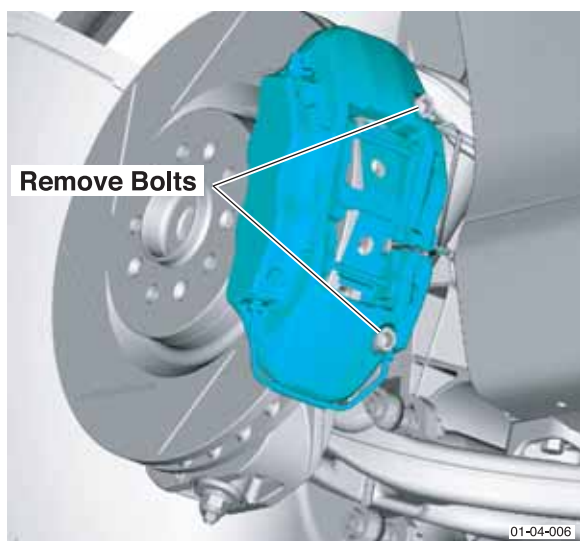
3. Install the front undertray.
4. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Vertical Link

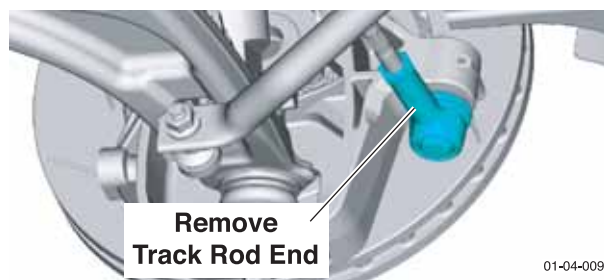
Repair Operation Time (ROT)	
Item	Code
Vertical link Renew	(LH) 04.01.GB
	(RH) 04.01.HB

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the brake caliper bolts (x2). Move the brake caliper to one side and secure.



4. Disconnect the ABS sensor wiring harness plug.
5. Remove the track-rod end.



6. Separate the lower suspension arm from the vertical link
 - 6.1 Install service tool (Refer to '204-524 (Front Suspension Support)', page 20-1-4). Lower the vehicle until the lower suspension arm is horizontal.
 - 6.2 Using a service tool(Refer to '204-523 (Ball Joint Splitter)', page 20-1-3) part the lower suspension arm from the Vertical link.

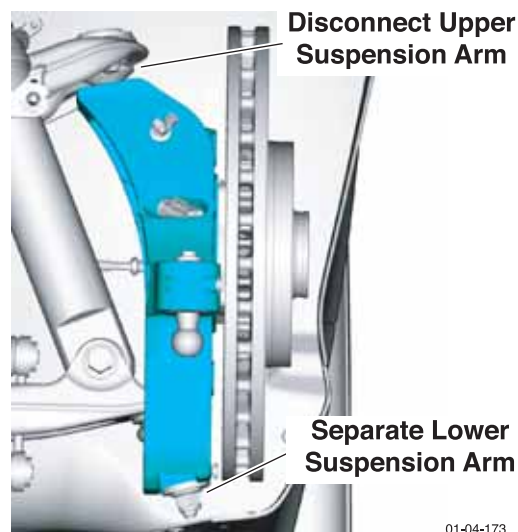
Caution

Do not use a hammer, etc., to 'shock' the track rod-end.

Take care not to damage the ball joint boot.

- 6.3 Raise the vehicle and remove the service tool (Refer to '204-524 (Front Suspension Support)', page 20-1-4).

7. Disconnect the upper suspension arm from the vertical link.



Installation

1. Install the vertical link to the lower suspension arm. Torque bolt to **90 Nm**.
2. Install the vertical link to the upper suspension arm. Torque bolt to **90 Nm**.
3. Install the track-rod end. Torque nut to **70 Nm**.
4. Connect the ABS sensor wiring harness plug.
5. Install the brake caliper (Refer to 'Brake Caliper (Front and Rear)', page 6-1-3). Torque bolts to **20 Nm + 66°-70°**.
6. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
7. Check / adjust the Camber, Caster and Toe settings.

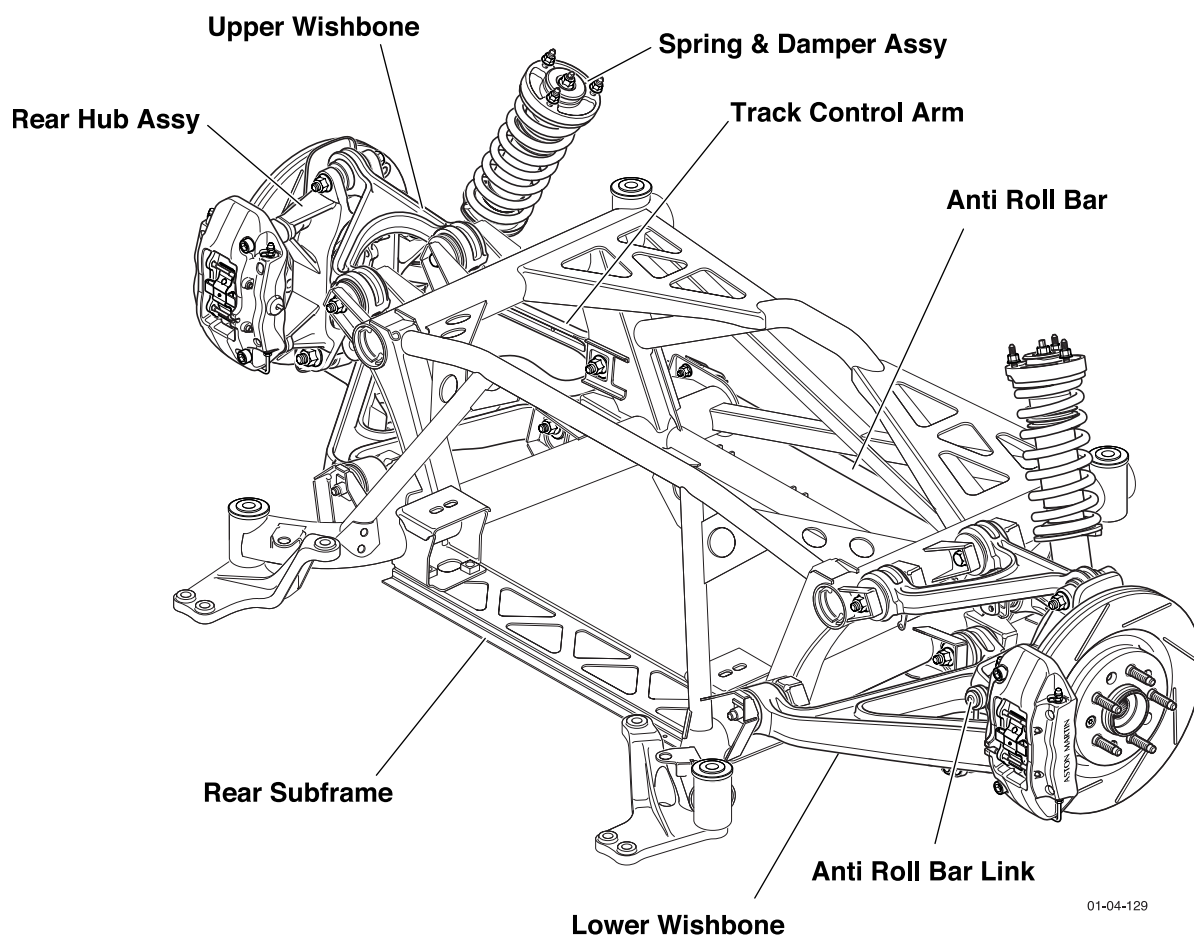


ASTON MARTIN

Suspension (04.00)

Rear Suspension (04.02)

Description



Suspension Arms

The upper suspension arms are each installed with a press-fit ball joint, and two interleaved rubber bushes. Two bolts attach each upper suspension arm to the rear subframe.

The lower suspension arms each have press fit ball joints installed and metal-to-rubber bonded bushes which are attach to the rear subframe by two eccentric cam bolts.

The camber setting is adjusted by rotating the lower suspension arm rear eccentric cam bolt.

Anti-roll Bar

An anti-roll bar, mounted on the rear subframe connects to the LH and RH lower suspension arms via drop links. The drop links, with a ball joint at either end, transmit vertical movement of the rear suspension to the anti-roll bar, minimising body roll.

Vertical Link

The vertical link carries the hub, the cartridge wheel bearing, the ABS rotor, the wheel speed sensor, the brake caliper, the hand brake caliper and the brake disc and shield.

A toe control (track-rod) arm secures the rear of the vertical link to the subframe. The toe control arm is adjustable, on an eccentric cam, to alter the rear road wheel toe alignment.

Specifications

Torque Figures

Description	Nm	lb. / ft.
Brake Dust Shield.	9	7
Bearing Assembly to the Vertical link.	50	37
Halfshaft Nut	300	221.5
Spring and Damper Bracket Mounting	75-80	55.5-59.5
Spring and Damper Top Mounting to Bracket	22.5	17
Spring and Damper Lower Mounting	175	129.5
Track rod Arm to Vertical Link	115	85
Anti-roll Bar Link	110	81.5
Anti-roll Bar Mounting Bolts	30	22.5
Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)		
Ride Height Sensor	M8 22.5	

Torque the following suspension fixings with the vehicle at normal ride height

Vertical Link to the Lower Suspension Arm.	175	129.5
Vertical Link to the Upper Suspension Arm.	90	66.5
Lower Suspension Arm to the Subframe.	115	85
Upper Suspension Arm to the Subframe	115	85
Track-Rod Arm to Subframe	115	85

Normal ride height: 2 x 68 kg + 14kg in the boot + full fuel tank.

Maintenance

For details on:

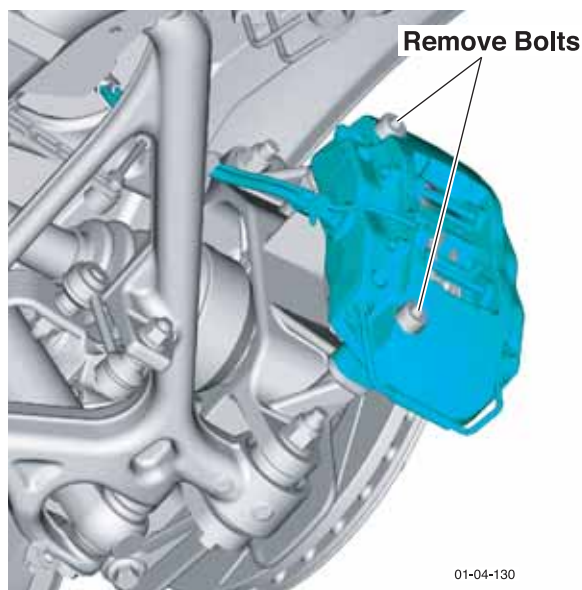
- Alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2)
- Inspections (Refer to 'Suspension (04.00)', page 4-2-1)
- Symptoms
- Road Wheel Bearing Procedures
- Ball Joints Procedures

Rear Suspension

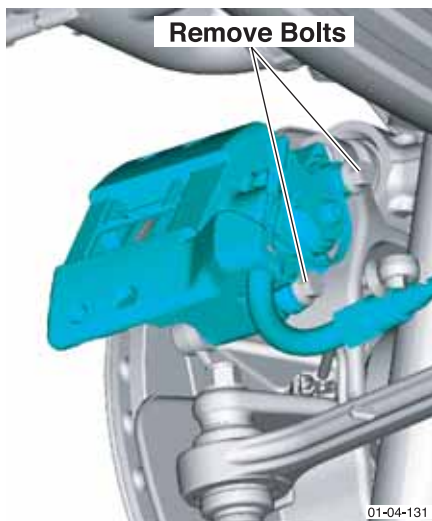
Repair Operation Time (ROT)	
Item	Code
Upper Suspension Arm Renew	(LH) 04.02.RB
	(RH) 04.02.SB
Lower Suspension Arm Renew	(LH) 04.02.NB
	(RH) 04.02.PB
Vertical link Renew	(LH) 04.02.CB
	(RH) 04.02.HB
Spring and Damper Unit Renew	(LH) 04.03.CB
	(RH) 04.03.DB
Anti-roll Bar Renew	04.02.AB

Removal

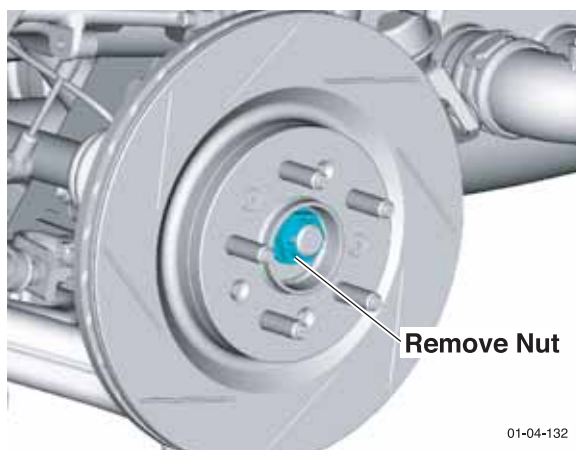
1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the bolts securing the service brake and handbrake calipers to the vertical link. Move the calipers to one side and secure.



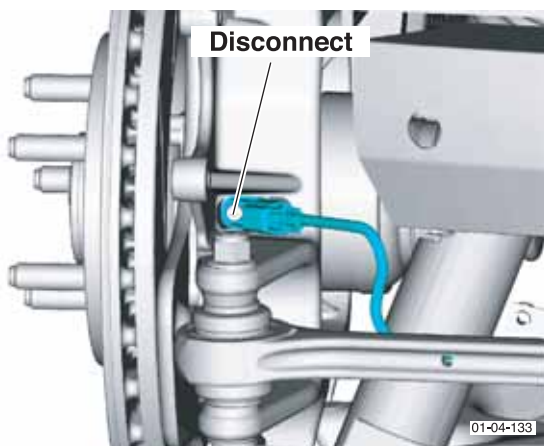
01-04-130



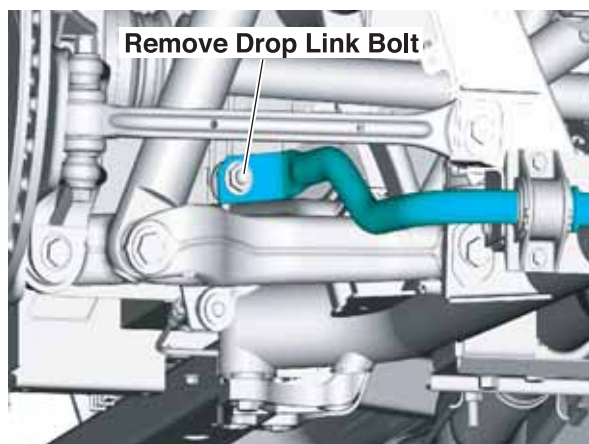
4. Remove the halfshaft nut.



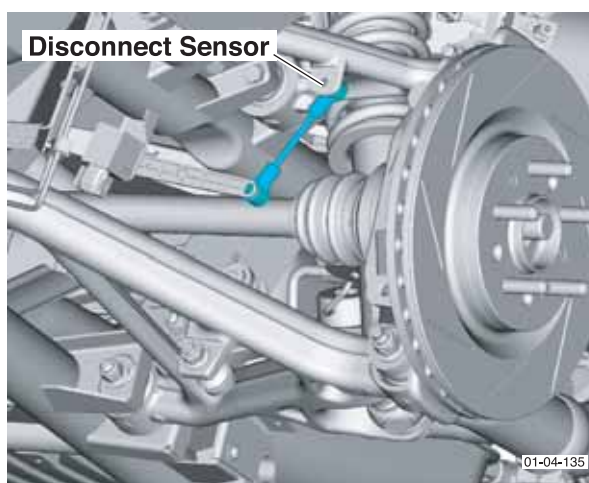
5. Disconnect the ABS sensor wiring harness plug.



6. Remove the anti-roll bar drop links.



7. Disconnect the vehicle height sensor (LH side).

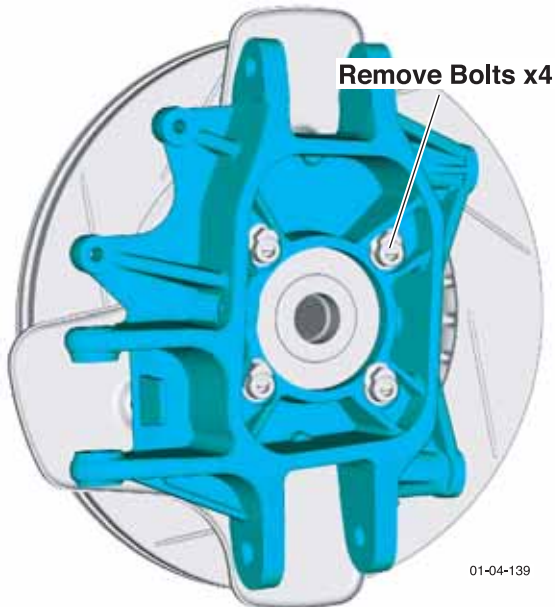


8. Remove the bolt that secures the track-rod arm to the vertical link.
9. Remove the bolt that secures the upper suspension arm to the vertical link.
10. Press the halfshaft from the vertical link.
11. Remove the bolt that secures the vertical link to the lower suspension arm.

12. If required, remove the bearing assembly from the vertical link.

12.1 Remove bolts (x4) that secure the bearing assembly to the vertical link.

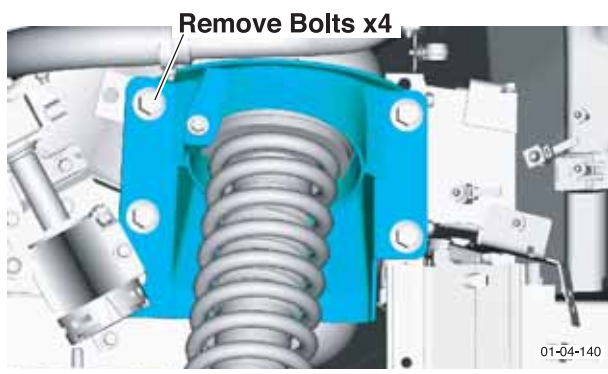
12.2 Press the bearing assembly from the vertical link.



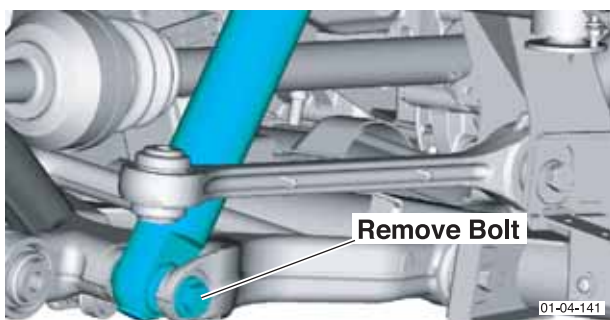
13. Remove the spring and damper assembly.

Ensure the damper is fully extended.

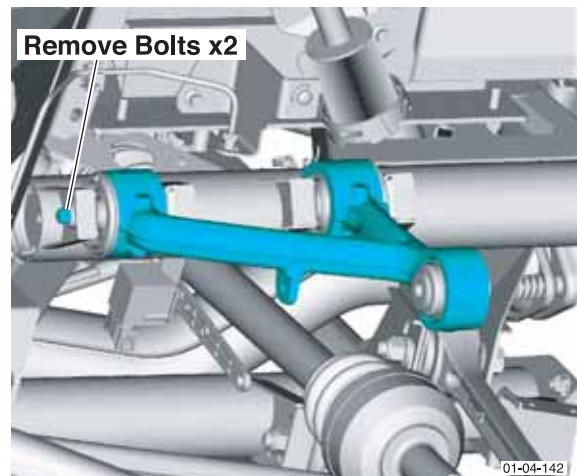
13.1 Remove the bolts (x4) from the spring and damper assembly upper mounting bracket.



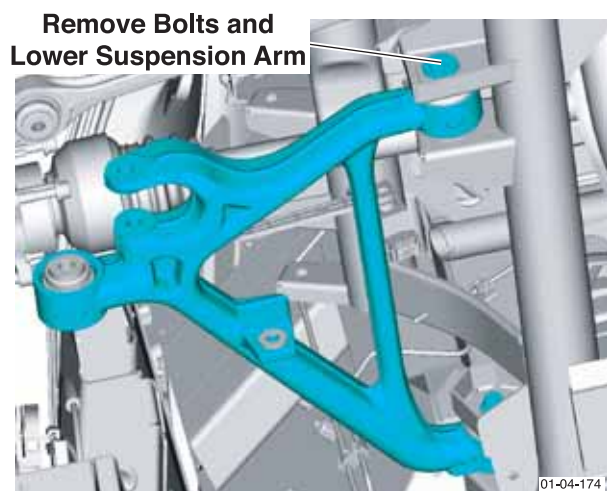
13.2 Remove the bolt from the lower spring and damper mounting. Withdraw the spring and damper assembly.



14. Remove the upper suspension arm.



15. Remove the lower suspension arm.

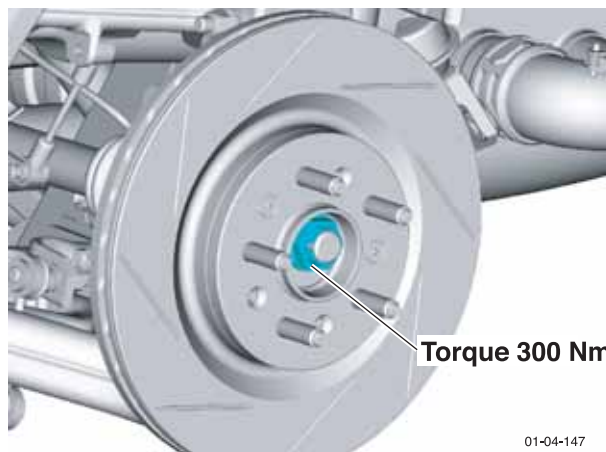
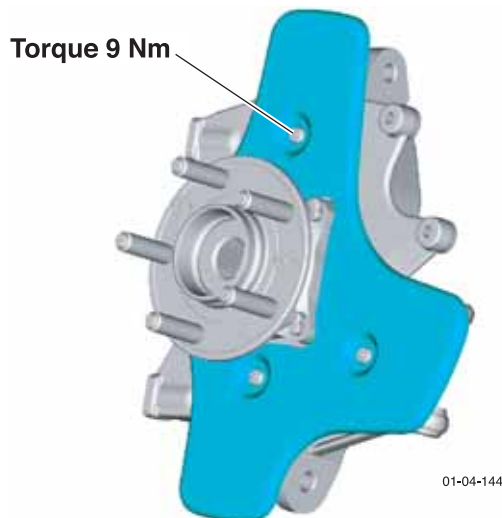


Installation

1. Install the lower suspension arm to the rear subframe. Do not torque.
2. Install the spring and damper assemblies. Torque to:
 - Top mounting bracket bolts (x4) - **75-80 Nm.**
 - Bottom mounting bolt - **175 Nm.**
3. Install the upper suspension arm to the subframe. Do not torque.

4. Install the bearing assembly (if removed).

- Bearing bolts to **50 Nm**.
- Dust shield bolts to **9 Nm**.



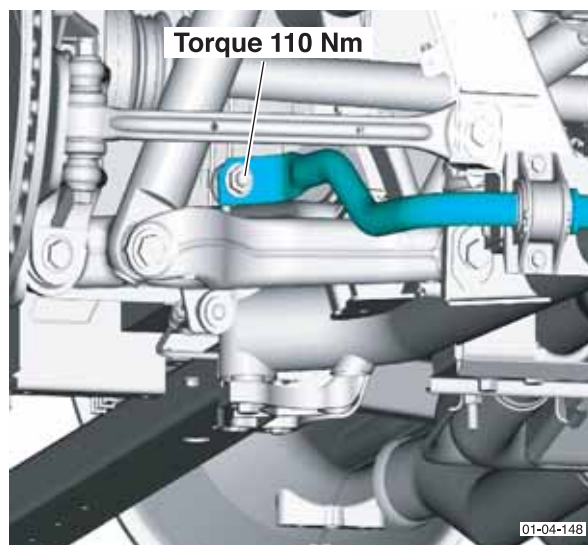
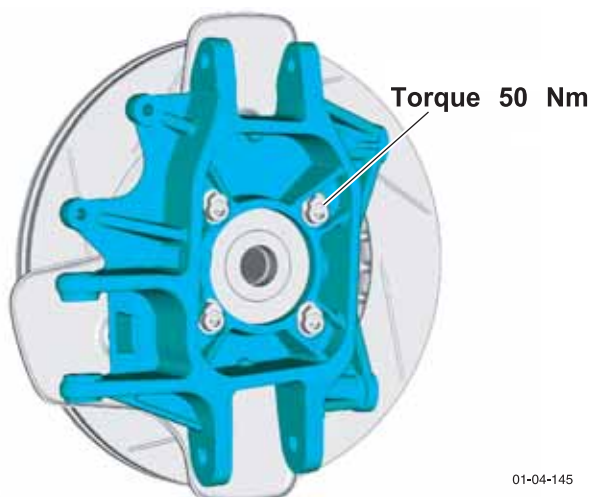
9. Install the service brake and the handbrake calipers.

Torque bolts to:

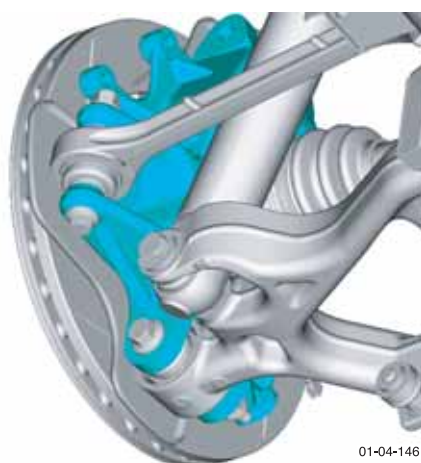
- Service brake caliper to **20 Nm. + 66°-70°**
- Handbrake caliper to **15 Nm. + 90°-94°**

10. Install the anti-roll bar drop link. Torque to **110 Nm**.

Ensure that the washer is installed between the nut and the anti-roll bar.



5. Install the vertical link. Do not torque bolts.



11. Install the vehicle ride height sensor (LH side).

Torque nut to - **22.5 Nm**.

12. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

6. Install the track-rod end. Do not torque.

7. Connect the ABS sensor wiring harness plug.

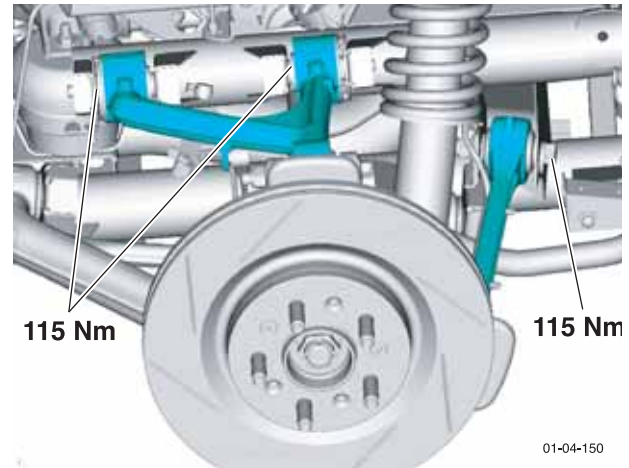
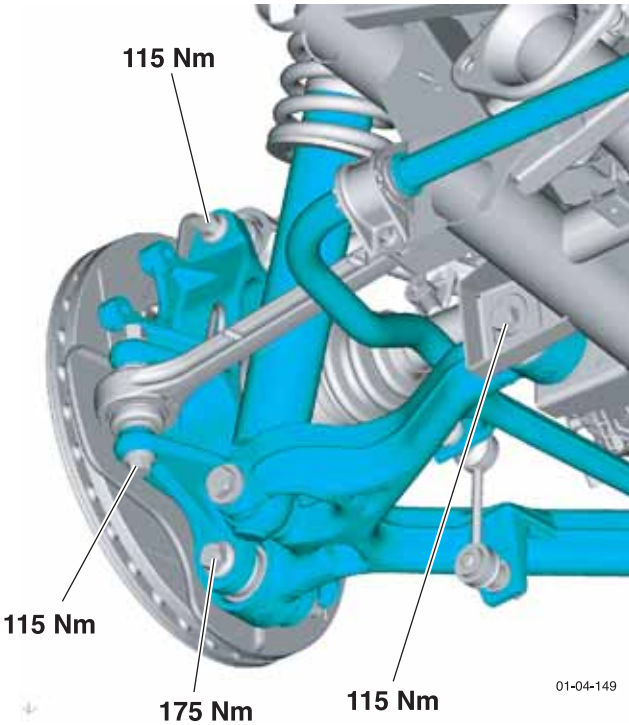
8. Install the halfshaft nut. Torque to **300 Nm**.

Caution

Final tightening of the suspension components must be carried out with the suspension arms at normal ride height. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

13. Torque the suspension fixings with the vehicle at normal ride height (Refer to 'Specifications', page 4-1-2).

- Lower suspension arm to the subframe - **115 Nm.**
- Vertical link to the lower suspension arm - **175 Nm.**
- Upper suspension arm to the vertical link - **115 Nm.**
- Upper suspension arm to the subframe - **115 Nm.**
- Track-rod end to vertical link - **115 Nm.**
- Track-rod arm to subframe - **115 Nm.**

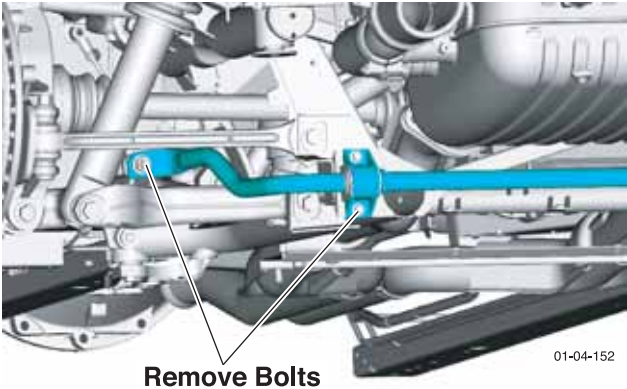


Anti-roll Bar

Repair Operation Time (ROT)	
Item	Code
Anti-roll Bar Renew	04.02.AB

Removal

1. Remove the rear under tray.
2. Disconnect the anti-roll bar link assembly from the lower arm (x2).



3. Remove the bolts (x2) from the bush strap (x2).
4. Withdraw the anti-roll bar.

Installation

Caution

Final tightening of the suspension components must be carried out with the suspension arms at normal ride height. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

1. Place the anti-roll bar in position.
 - 1.1 Install both bush straps (bolts x4). Do not torque.

Caution

The anti-roll bar must be installed with the cut off section at the top.



- 1.2 Secure both ends of the anti-roll bar link assembly to the lower arm (bolts x2).

Torque the fixings.

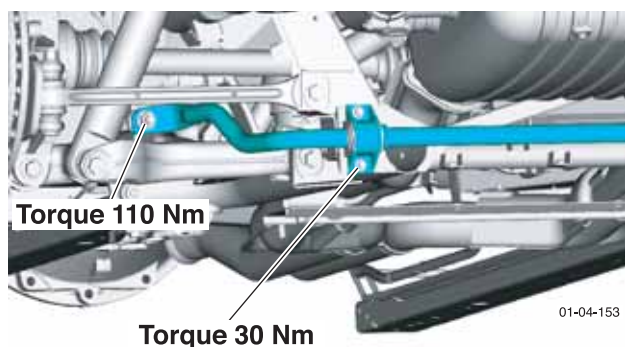
- Anti-roll bar mounting bolts to **30 Nm.**

Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)

14. Check / adjust the Camber and Toe settings.

- Anti-roll bar link nuts to **110 Nm**.

Ensure that the washer installs between the stud and the suspension arm.



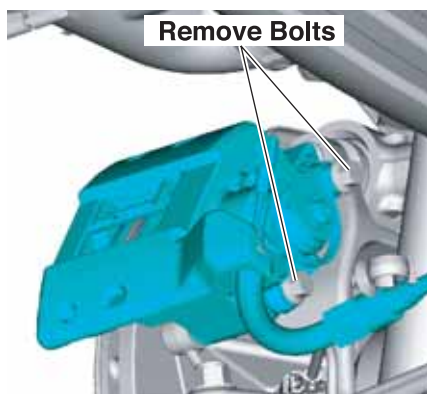
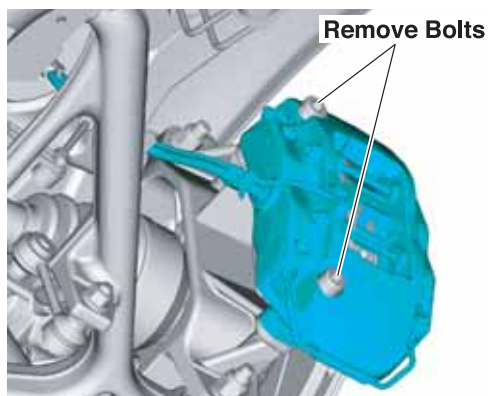
2. Install the rear undertray.

Vertical link

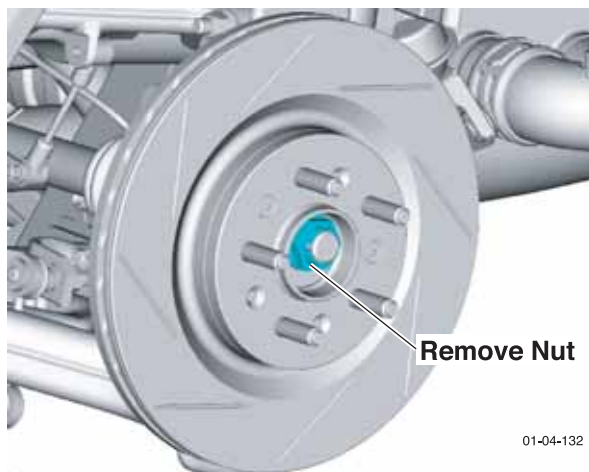
Repair Operation Time (ROT)	
Item	Code
Vertical link Renew	(LH) 04.02.GB
	(RH) 04.02.HB

Removal

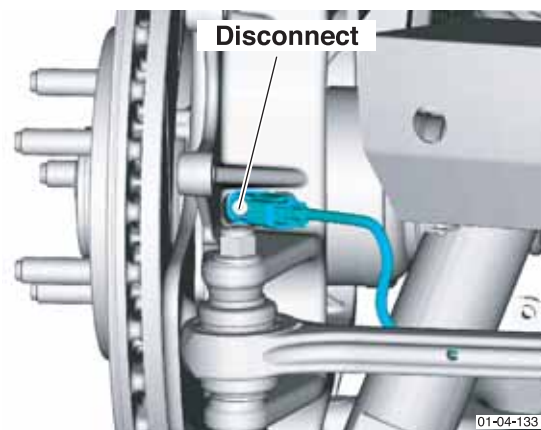
1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the service brake and handbrake calipers. Move the calipers to one side and secure.



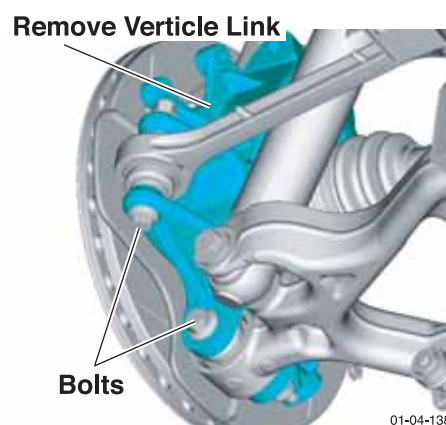
4. Remove the halfshaft nut.



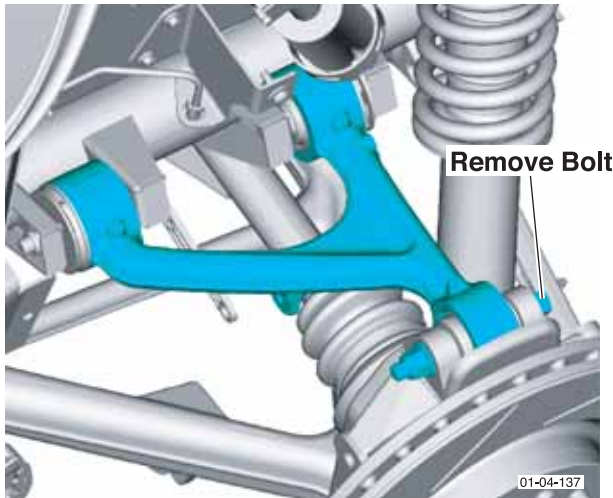
5. Disconnect the ABS sensor wiring harness plug.



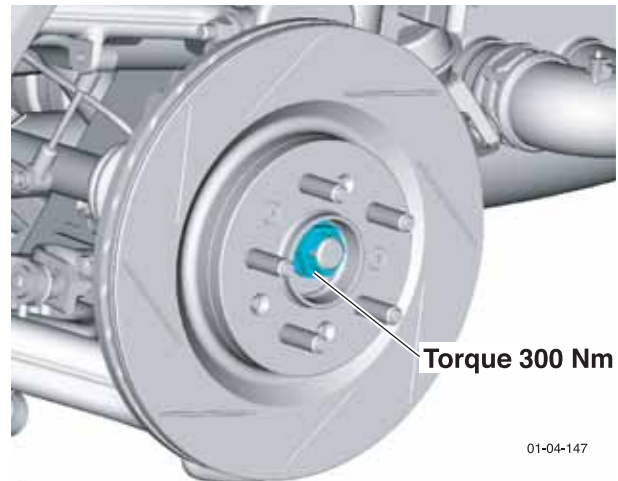
6. Disconnect the track-rod arm.



7. Disconnect the upper suspension arm.



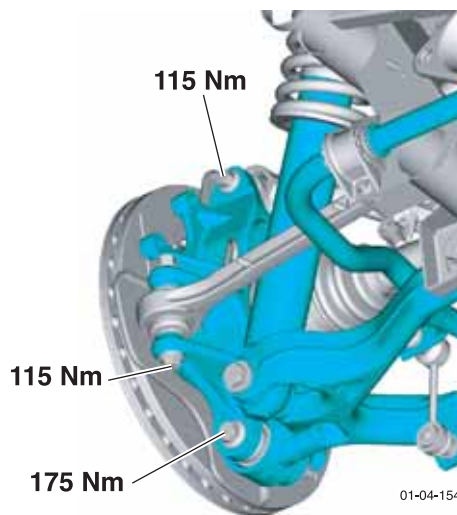
7. Install the halfshaft nut. Torque to **300 Nm**.



8. Press the halfshaft from the vertical link.
9. Remove the Vertical link from the lower suspension arm.

Installation

1. Install the vertical link to the lower suspension arm.
2. Install the halfshaft through the vertical link.
3. Install the vertical link to the upper suspension arm.
4. Torque the following:
 - Vertical link to the **lower** suspension arm - **175 Nm**.
 - Vertical link to the **upper** suspension arm - **115 Nm**.
5. Install the track-rod arm. Torque to - **115 Nm**.



8. Install the service brake and the handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1). Torque bolts to:
 - Service brake caliper to **20 Nm. + 66°-70°**
 - Handbrake caliper to **15 Nm. +90°- 94°**
9. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
10. Check / adjust the Camber and Toe settings.

6. Connect the ABS sensor wiring harness plug.

Suspension (04.00)

Shock Absorber System (04.03)

Description

Movement of each road spring is independently damped by a telescopic, hydraulically-controlled shock absorber. Each shock absorber is installed coaxially within the road spring. Front spring and damper assemblies are located between the upper suspension arm and attach to the lower suspension arm and the body structure.

Rear spring and damper assemblies attach to the lower suspension arm and the rear subframe, via a mounting bracket, laying to the rear of the upper suspension arm.

Specifications

Torque Figures

Description	Nm	lb. / ft.
Front		
Spring and Damper Top Mounts	22.5	17
Spring and Damper Bottom Mount	175	129.5
Upper Suspension Arm	115	85
Rear		
Spring and Damper Bracket Mounting	75-80	55.5-59.5
Spring and Damper Top Mounting to Bracket	22.5	17
Spring and Damper Lower Mounting	175	129.5
Vertical Link to Lower Suspension Arm	175	129.5
Track-rod Arm to Lower Suspension Arm	115	85

Maintenance (Front)

Spring and Damper Assembly

Repair Operation Time (ROT)

Item	Code
Spring and Damper Unit Renew	(LH) 04.03.AB
	(RH) 04.03.BB

Removal

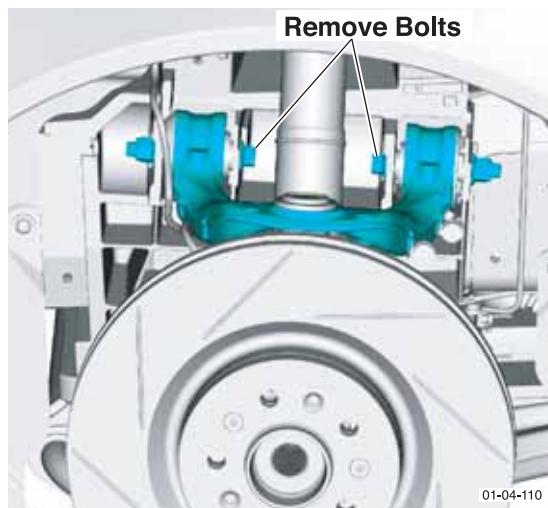
1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Disconnect the ABS sensor wiring harness plug.

4. Remove the upper suspension arm from the body structure.

Allow the upper suspension arm and the Vertical link to fall back, giving access to the spring and damper assembly.

Caution

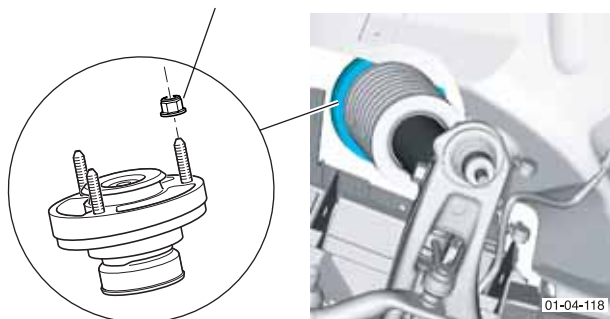
Ensure the brake flex hose is not over stretched.



Ensure the spring and damper assembly is fully extended.

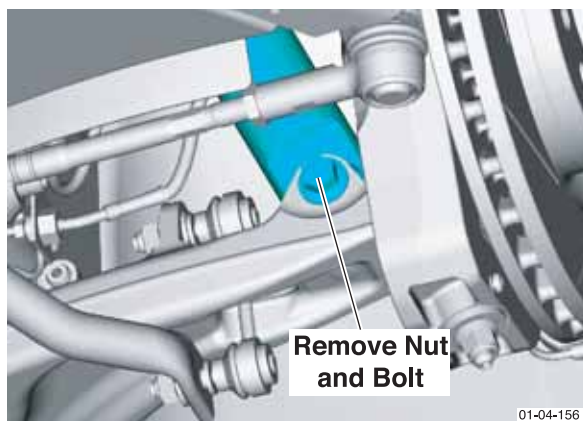
5. Remove the spring and damper top mount nuts (x3).

Remove Nuts x3



If removing both spring and damper units - the engine bay cross brace will be released.

6. Remove the lower mounting nut and bolt. Withdraw the spring and damper assembly.



Installation

If removed, place the engine bay cross brace, complete with mounts, in position.



Caution

Ensure the brake flex hose is not over stretched.

1. Install the spring and damper unit. Do not torque bolts.

The engine bay cross brace mount must be torqued with the weight of the vehicle on the roadwheels.

2. Install the upper suspension arm. Do not torque.
3. Connect the ABS sensor wiring harness plug.
4. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

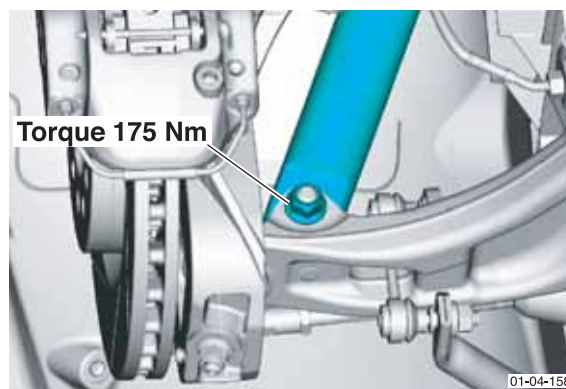
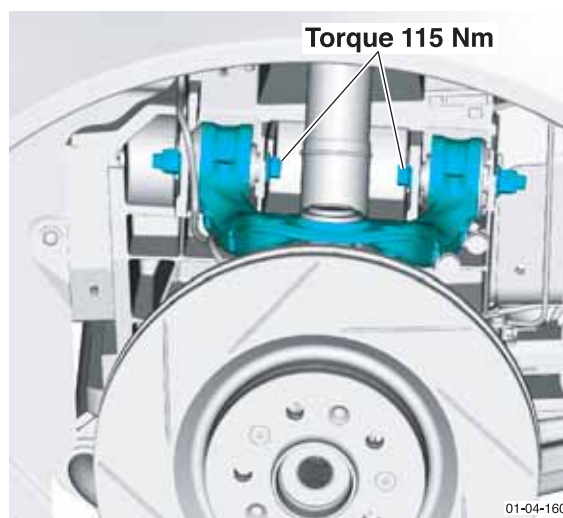
Caution

Final tightening of the suspension components must be carried out with the full weight of the vehicle on its road wheels. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

5. Torque the suspension fixings with the vehicle at normal ride height:

- Upper suspension arm to the front structure - **115 Nm**.
- Spring and damper bolts to (top) **22.5 Nm**.
(bottom) **175 Nm**.

The engine bay cross brace must be torqued with the weight of the vehicle on the roadwheels.

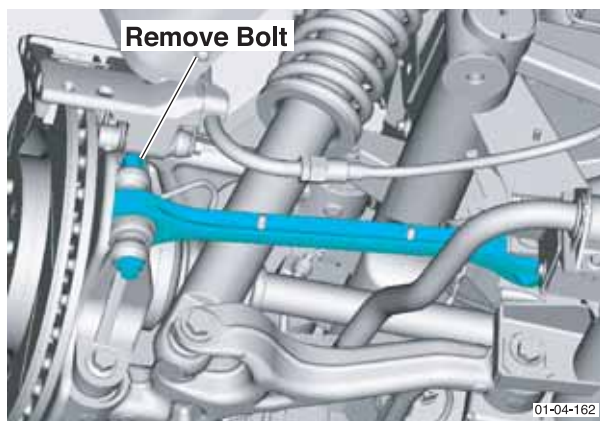


Maintenance (Rear) Spring and Damper Assembly

Repair Operation Time (ROT)	
Item	Code
Spring and Damper Unit Renew	(LH) 04.03.CB
	(RH) 04.03.DB

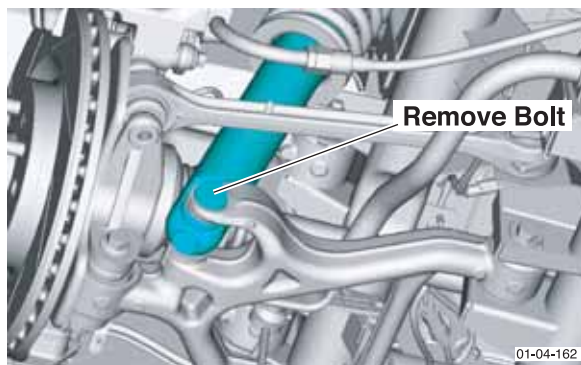
Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the track-rod arm bolt.

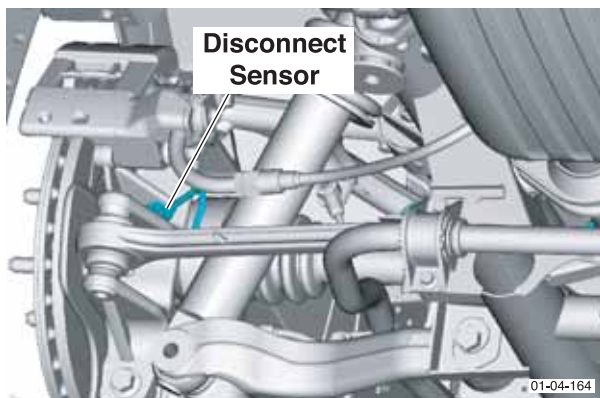


Ensure the spring and damper assembly is fully extended.

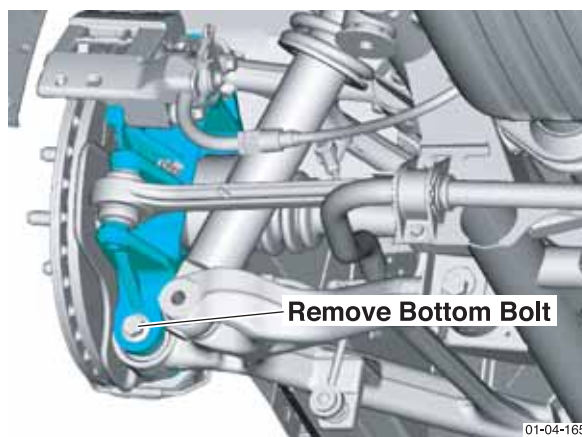
4. Remove the bolt from the lower spring and damper mounting.



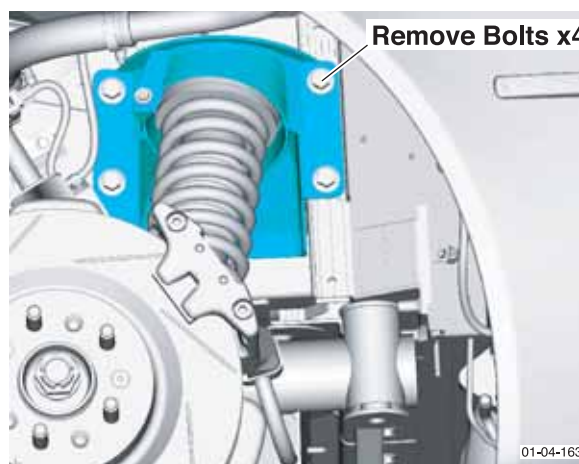
5. Disconnect the ABS sensor wiring harness plug.



6. Remove the vertical link lower bolt.



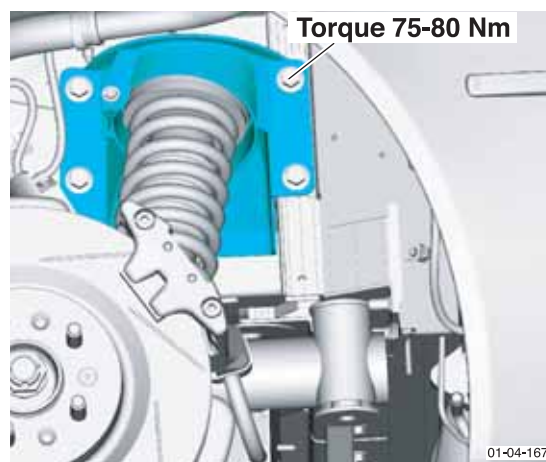
7. Remove the bolts (x4) from the spring and damper assembly upper mounting.



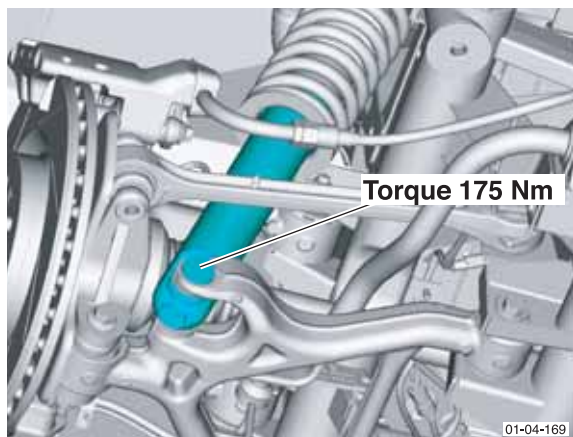
8. Withdraw the spring and damper assembly.

Installation

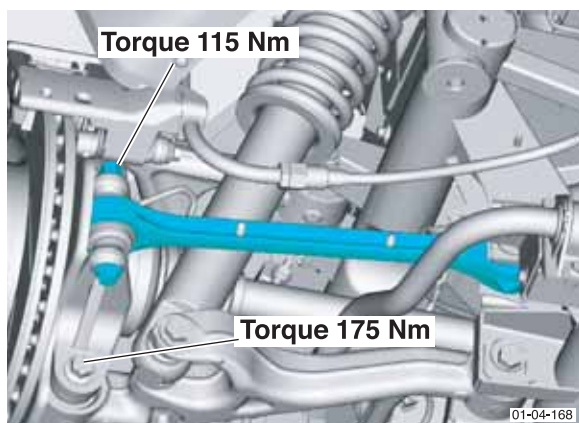
1. Install the spring and damper assembly upper mounting bracket. Torque bolts (x4) to 75-80 Nm.



2. Install the spring and damper assembly to the lower suspension arm. Torque bolt to **175 Nm**.



3. Install the vertical link to the lower suspension arm. Torque to **175 Nm**.
4. Install the track-rod arm. Torque to **115 Nm**.



5. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
6. Check / adjust the Camber and Toe settings.

Suspension (04.00)

Road Wheels and Tyres (04.04) Specifications

Warning
Do not mix different types of tyres on the same vehicle such as radial, bias or bias belted tyres except in emergencies (temporary spare usage).

Warning
Never run the engine with one wheel off the ground, for example when changing a wheel. The wheel resting on the ground may cause the vehicle to move.

Warning
After market aerosol tyre sealants are extremely flammable. Always question the customer to make sure these products have not been used.

Warning
Always wear safety goggles or a face shield when performing any work with wheel and tyre assemblies.

Warning
Check road wheel nuts torque at 32 km (20 miles) after any wheel change or any time the wheel nuts are loosened.

Warning
When changing a wheel, make sure that the vehicle cannot move. Always apply the parking brake and select the transmission park position (Automatic transmission only).

Warning
Reduce air pressure as much as possible by pushing the valve core plunger in before removing the valve core.

Warning
Each individual axle, road wheel and tyre has its own maximum weight or tyre inflation rating. Do not overload or over-inflate beyond the capacity of the lowest rated components of the system.

Caution
Do not clean the aluminium alloy wheels with steel wool, abrasive type cleaners or detergents. Failure to follow these instructions may result in damage to the vehicle.

Caution
Paraffin (kerosene) must not be used as a cleansing agent on tyres.

Tyres

The tyres recommended by Aston Martin meet the high speed performance of this vehicle. Only tyres of identical specification may be installed as replacements. Under no circumstances must cross-ply tyres be installed.

Warning
Correct tyre installation is critical to personal and vehicle safety. The recommended tyres for this vehicle are asymmetrical and must be installed to the wheel with the tyre mark 'Outside' on the outside of the wheel rim.

Unique Aston Martin lightweight aluminium alloy road wheels.

- Front - 8.5J x 19
- Rear - 9.5J x 19

The tyres are made exclusively for Aston Martin.

- Front - Bridgestone 235/40 ZR 19
- Rear - Bridgestone 275/35 ZR 19

Tyre Pressures

Tyre pressures must be checked with the tyres cold.

Warning
PDI Inspection.
Tyre pressures must be reduced to normal level during PDI. The vehicle must never be run on road with elevated tyre pressures, driveability may be seriously compromised.

Caution
In order to protect tyres against flat spots during storage and transportation, tyre pressures should be increased to 65 - 70 psi (450 - 500 kPa). Ensure that the tyre pressure are set to the recommended tyre pressures before driving.

- Front - 2.5 bar (250 kPa / 36 psi)
- Rear - 2.6 bar (260 kPa / 38 psi)

Torque Figures

Description	Nm	lb. / ft.
Road wheel nuts	135	100
	In two stages. (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7)	



USA Tyre Gradings

The following information relates to the tyre grading system developed by the National Highway Traffic Safety Administration which grades tyres by tread wear, traction and temperature performance.

Tread Wear

Tread wear grade is a comparative rating based on the wear rate of the tyre when tested under controlled conditions (specified government test course). For example, a tyre graded 150 would wear one and a half times less on the government course than a tyre graded 100. Relative performance of the tyres depends upon actual conditions of use and may depart significantly from normal due to variations in driving habits, service practices and differences in road characteristics and climate.

Traction

Traction grades, A (highest), B and C represent a tyre's ability to stop in wet conditions measured on specified government test surfaces of asphalt and concrete.

⚠ Warning ⚠
PDI Inspection.
Traction grade is based on braking (straight ahead) traction tests and does not include cornering (turning) traction.

Temperature

Temperature grades, A (highest), B and C, represent a tyre's resistance to the generation of wear and its ability to dissipate heat when tested under controlled conditions (specified indoor laboratory test road wheel). Sustained high temperature can cause the material of a tyre to degenerate and reduce tyre life; excessive temperatures can lead to sudden tyre failure. Grade 'C' corresponds to a level of performance which all passenger vehicle tyres must meet under Federal Motor Vehicle Safety Standard No. 109. Grades 'B' and 'A' represent higher levels of performance than the minimum required by law.

⚠ Warning ⚠
Temperature grade is established for a tyre that is properly inflated and not overloaded. Excessive speed, under inflation or excessive loading, whether separately or in combination, can cause heat build-up and possible tyre failure.

Maintenance

Factory installed tyres and road wheels are designed to operate satisfactory when inflated to the recommended inflation pressures (Refer to 'Inspection and Verification', page 4-5-3). The recommended pressures apply to vehicle loads up to and including the full-rated load capacity.

Correct tyre pressures and driving technique have an important influence on tyre life. Heavy cornering, excessively rapid acceleration and unnecessary sharp braking increase tyre wear.

Replacement tyres should follow the recommended:

- | | |
|----------------|----------------------------|
| • Size | • Load range |
| • Speed rating | • Radial construction type |
- The use of any other size or type may seriously affect:
- | | |
|--|---|
| • Safety | • Vehicle ground clearance |
| • Ride | • Tyre clearance between body and chassis |
| • Handling | • Wheel bearing life |
| • Speedometer and Odometer calibration | • Brake cooling |

Wheels need to be renewed when:

- | | |
|--------------------|---|
| • Impact damaged | • Wheel stud holes or seats become damaged |
| • Heavily corroded | • They have excessive radial or lateral runout. |
| • Porous | |

Safety

⚠ Warning ⚠
Do not mix different types of tyres on the same vehicle. Handling may be seriously affected resulting in loss of control.

⚠ Warning ⚠
Ensure that tyres are mounted with the sidewall marking 'Outside' showing on the outer sidewall face. Correct tyre rotational direction is critical.

⚠ Warning ⚠
A tyre and wheel must always be correctly matched. Wider or narrower tyres than recommended could cause danger through sudden deflation.

⚠ Warning ⚠
When changing a wheel, make sure that the vehicle cannot move. Always apply the parking brake and select the transmission park position (Automatic transmission only).

⚠ Warning ⚠
Never run the engine with one wheel off the ground, for example, when changing the wheel. The wheel resting on the ground may cause the vehicle to move.

⚠ Warning ⚠
Always tighten the wheel nuts to specification. Too tight may cause damage, too loose may allow the wheel to become detached.

⚠ Warning ⚠

Use only wheels and wheel nuts supplied by Aston Martin. After market wheels or wheel nuts may not install or function correctly and could cause injury or damage.

Tyre Replacement and Wheel Interchanging

Caution

When a new tyre is installed, always renew the tyre valve.

When replacement of tyres is required it is preferable to install a complete vehicle set. Should either the front or rear tyres only show excessive wear, new tyres must be installed to replace worn ones. Under no circumstances interchange tyres from side to side, front to rear or vice versa as individual tyre wear produces unique characteristics depending upon their position. If the position is changed after wear has occurred, the performance of the tyre will be adversely affected.

New tyres must be balanced before installing to the vehicle.

Winter (Snow) tyres

Winter tyres must only be installed in complete four-wheel sets of the same type. The maximum speed with winter tyres installed (without snow chains) is 210 km/h (131 mile/h) for H rated tyres or 240 km/h (149 mile/h) for V rated tyres.

When using snow chains, note that:

- Snow chains must only be installed to the rear wheels
- Only Aston Martin snow chains should be used
- Snow chains must not be used on roads which are clear of snow
- The maximum speed with winter tyres and snow chains fitted is 48 km/h (30 mile/h)
- Traction control must be switched Off when using snow chains

Inspection and Verification

Verify the customer's concern by driving the vehicle.

Visually inspect for obvious signs of damage:

Visual Inspection Chart

- | | |
|---|--|
| • Incorrect tyre pressure | • Ply separation |
| • Wheel imbalance | • Embedded objects |
| • Bulges (blister) | • Impact damage |
| • Cuts | • Incorrect speed rating |
| • Abrasions | • Incorrect load rating |
| • Tyres worn beyond tread wear indicators | • Tyres installed with the 'Outside' marking not shown |
- 1 If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
 - 2 If the concern is not visually evident, verify the symptom and refer to Symptom Chart.

Tyre Wear

Tread wear indicators (A) are moulded into the bottom of the tread grooves across the width of the tyre. When the tread wear indicators become visible at the surface of the tread, in two or more adjacent tread grooves, only 1.6 mm of tread remains.



Tyre tread depth and condition must comply with prevailing local legislation.

To maximize tyre performance, inspect the tyres for signs of incorrect inflation and uneven wear which may indicate a need for balancing, rotation or front suspension alignment. Tyres should also be checked frequently for cuts, stone bruises, abrasions, blisters, and for objects that may have become embedded in the tread. More frequent inspections are recommended when rapid or extreme temperature changes occur or when road surfaces are rough or occasionally littered with debris.

Tyre Wear Diagnosis

New tyres should be installed if the wear indicators are exposed or if there is severe shoulder wear. Shoulder wear is usually caused by either excessive camber or excessive toe on radial tyres.

Sometimes incorrect rear toe settings or damaged struts will cause severe cupping' or scalloped' tyre wear on non-drive wheels.

Incorrect rear toe alignment will also cause other unusual wear patterns.

Road Test

A tyre vibration diagnostic procedure always begins with a road test. The road test and customer interview (if available) will provide much of the information needed to find the source of a vibration.

During the road test, drive the vehicle on a road that is smooth and free of undulations. If vibration is apparent, note and record the following:

- The speed at which the vibration occurs
- What type of vibration occurs in each speed range
- How the vibration is affected by changes in the following types of vibration-sensitivity:

Torque Sensitive - This means that the condition may be improved or made worse by accelerating, decelerating, coasting, maintaining a steady vehicle speed or applying engine torque.

Vehicle Speed Sensitive - This means that the vibration always occurs at the same vehicle speed and is not affected by engine torque, engine speed or the transmission gear selected.

Engine Speed Sensitive - This means that the vibration occurs at varying vehicle speeds when a different transmission gear is selected. It may sometimes be isolated by increasing or decreasing engine speed with the transmission in NEUTRAL or by stall testing with the transmission in gear. If the condition is engine speed sensitive, the cause is probably not related to the tyres.

If the road test indicates that there is tyre whine, but no shake or vibration, the noise originates with the contact between the tyre and the road surface.

A thumping noise usually means that the tyre has a flat or soft spot making a noise as they slap the roadway. Tyre whine may be distinguished from axle noise. Tyre whine remains the same over a range of speeds.

Symptoms

Symptom	Possible Source(s):	Action(s)
Tyres show excess wear on edge of treads	Tyres under-inflated Vehicle overloaded	Correct pressure to specification. Correct as required.
Tyres show excess wear on edge of treads (having the correct tyre pressures)	Incorrect toe setting	Set to specification.
Tyres show excess wear in center of tread	Tyres over-inflated	Correct pressure to specification.
Other excessive tyre wear problems	Incorrect tyre pressure	Correct pressure to specification.
	Incorrect tyre and wheel usage	Install correct tyre and wheel combination.
	Geometry out of alignment	Check and adjust.
	Loose, worn or damaged suspension components	Inspect, repair or install new suspension components as necessary.
	Wheel and tyre assembly out of balance	Balance wheel and tyre assembly.
	Excessive lateral or radial runout of wheel or tyre	Check, repair or install a new wheel or tyre as necessary.
Wheel mounting is difficult	Incorrect application or mismatched parts, including wheel studs and wheel nuts. Corroded, worn or damaged parts	Clean or install new parts.
Wobble or shimmy affecting wheel runout	Damaged wheel (eventually damaging wheel bearings and causing uneven tyre wear)	Inspect wheel rims for damage and runout. Install a new wheel rim as necessary.
Excessive vibration, rough steering or severe tyre wear	Loose or incorrect attaching parts	Tighten or install new parts.

Symptom	Possible Source(s):	Action(s)
Vehicle vibrations	Tyres and wheels mismatched	Install correct tyre and wheel combination.
	Inflation pressure too high or too low	Correct pressure to specification
	Uneven tyre wear	Refer to Diagnosis and Testing.
	Out-of-balance wheel, tyre, wheel hub or disc assembly	Determine the out-of-balance component and balance or install a new part.
	Damaged or distorted wheel from road impact hazard or incorrect handling	Install a new wheel.
	Excessive radial runout	Install a new wheel or tyre. Check for incorrect wheel and tyre specifications.
	Excessive lateral runout	Install a new wheel or tyre.
	Incorrectly seated tyre	Remount the tyre.
	Loose wheel mountings - damaged wheel studs, wheel nuts, worn or broken wheel hub face or foreign material on mounting faces	Tighten or install new parts. Clean mounting surfaces.
	Defective wheel bearings	Install a new bearing set.
	Brake disc imbalance	
	Water in tyres	Remove water.
	Loose engine or transmission mounts	Install new mount nuts / install new mounts.
	Incorrect front end alignment	Align front end.
	Loose or worn driveline or suspension parts	Repair or install new parts.
Damaged wheel hub stud threads	Excessive driveshaft runout or imbalance	Install a new driveshaft.
	Worn or damaged flexible drive joint	Install a new driveshaft.
Broken wheel studs	Sliding wheel across the wheel studs during installation. Loose wheel nuts	Install new wheel studs.
Corrosion and contamination streaks from the wheel hub wheel stud holes	Loose or over tightened wheel nuts	Install new wheel studs.
Damaged wheel nuts	Loose wheel nuts	Check complete assembly. Install new parts.
Frozen wheel nuts	Loose wheel assembly	Install new wheel nuts.
	Over-tightened wheel nuts	Install new wheel nuts.
	Corrosion or galling	If corrosion is light, wire brush away corrosion. If corrosion is excessive install new wheel studs and wheel nuts.

Tyre Damage

Symptom	Description
Age Deterioration	Cracking and crazing of the tread and sidewall rubber, sometimes accompanied by carcass deformation. An indication that the tyres have been in service for a very long time.
Neglected Cut	Damage through accidental cuts or penetrations will extend in use due to continued flexing and / or ingress of moisture and road matter.
Impact Fracture	Resultant damage from impact fractures is not always visible externally and, therefore, as a safety precaution the tyre should be removed and examined.
	Casing fracture caused by severe localized impact through driving over kerbs, hitting potholes and / or objects in the road.
	A double fracture caused by crushing the side wall of the tyre between an object and the rim flange.
	In both instances, such damage can lead to sudden and dangerous tyre deflation some time after the impact occurred.

Repairs

In view of the high performance capability of the vehicle, damaged tyres should be renewed and not repaired.

Caution

When a new tyre is installed, always renew the tyre valve.

Care of Alloy Road Wheels

Aluminium alloy road wheels are covered with a protective coating. To prevent corrosion it is essential that this coating is not damaged. When removing or installing tyres only equipment utilizing spigot or stud hole clamping must be used. The equipment must not have any moving parts which contact the road wheel, and tyre levers must not be used.

To clean road wheels use warm soapy water; stubborn stains can be removed using a soft brush or by using a proprietary alloy road wheel cleaner.

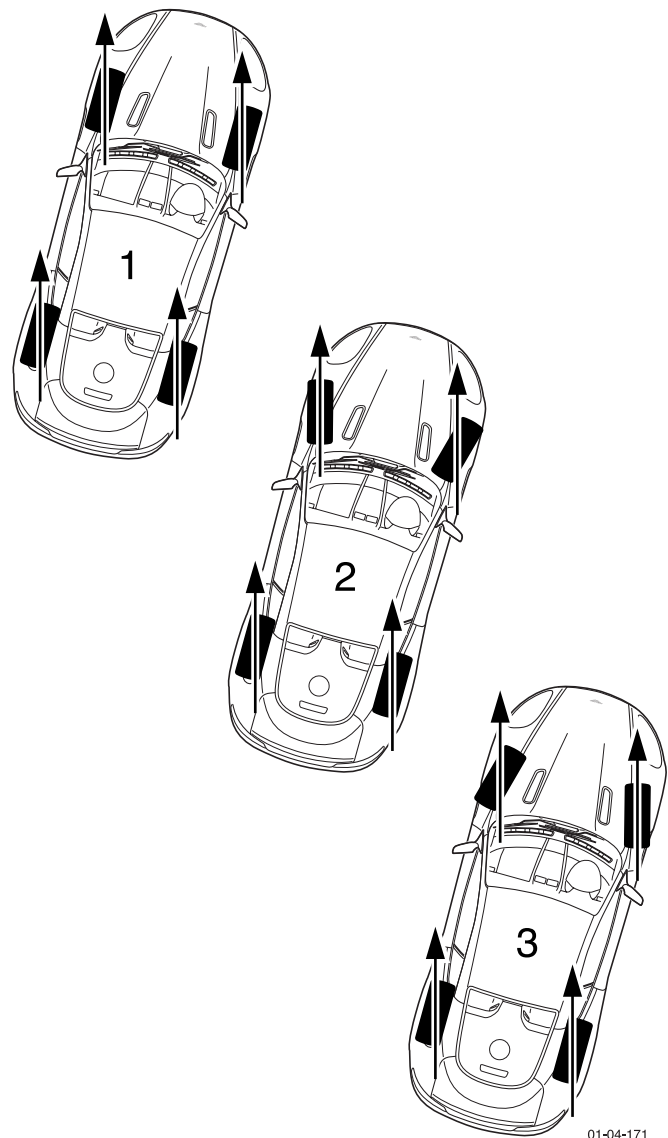
Road Wheel Alignment

It is important that correct road wheel alignment be maintained. Misalignment causes tyre tread to be scrubbed off laterally because the natural direction of the road wheel differs from that of the vehicle.

A sharp 'fin' protrusion on the edge of each pattern rib is a sure sign of misalignment.

- 'Fins' on the inside edges of the pattern ribs, particularly on the nearside tyre, indicate Toe-in.
- 'Fins' on the outside edges, particularly on the offside tyre, indicate Toe-out.

With minor misalignment, the evidence is less noticeable and sharp pattern edges may be caused by road camber even when the road wheel alignment is correct. In such cases it is better to make sure by checking with an alignment gauge. Road camber affects the direction of the vehicle by imposing a side thrust and, if left to follow its natural course, the vehicle will drift towards its nearside. This is instinctively corrected by steering towards the road centre and, as a result, the vehicle runs crabwise. The diagram shows why nearside tyres are very sensitive to too much Toe-in and offside tyres to Toe-out.



01-04-171

It also shows why sharp 'fins' appear on one tyre but not on the other, and why the direction of misalignment can be determined by noting the position of the 'fins'. Severe misalignment produces clear evidence on both tyres.

Front road wheels on a moving vehicle should be parallel. Tyre wear can be affected noticeably by quite small variations from this condition. It will be noted from the diagram that even with parallel road wheels, the vehicle is still out of line with its direction of movement, but there is less tendency for the wear to be concentrated on one tyre.

The near front tyre sometimes persists in wearing faster and more unevenly than the other tyres, even when the mechanical condition of the vehicle and tyre maintenance are satisfactory. The more severe the average road camber, the more marked this tendency will be.

Misalignment Effects

Misalignment	Effect
Road wheels are correctly aligned but crabbing due to road camber	All tyres will wear equally.
Shows road wheels 'Toed-out' in motion	RH front tyre will wear faster.
Shows road wheels 'Toed-in' in motion	LH front tyre will wear faster.

Alignment Precautions

The following alignment precautions should be observed:

1. The vehicle should have come to rest from a forward movement. This ensures, as far as possible, that the road wheels are in natural running positions.
2. It is preferable for alignment to be checked with the vehicle laden (Refer to 'Specifications', page 4-1-2).

Road Wheel and Tyre Balance

Static Balance

For smooth riding, precise steering and the avoidance of high speed 'tramp' or 'road wheel hop', all tyres are balance checked to predetermined limits. To ensure the best degree of tyre balance, the covers are marked with yellow spots on the outer sidewall and these indicate the lightest balance point of the cover.

The original degree of balance is not necessarily maintained. It can be affected by uneven tread wear, tyre removal or refitting, by road wheel damage or eccentricity. The vehicle may also become sensitive to imbalance due to normal wear of moving parts. If roughness or high speed steering troubles develop and mechanical investigation fails to disclose a possible cause, road wheel and tyre balance should be suspected.

⚠ Warning ⚠

If balancing equipment is used to dynamically balance road wheels, always jack both rear road wheels off the ground when rear road wheel balancing, otherwise damage may be caused to differential. This is doubly important in case of vehicles installed with a limited slip differential, as in addition to possible damage to the differential, the vehicle may drive itself off the jack or stand.

Dynamic Balance

Static imbalance can be measured when the tyre and road wheel assembly is stationary. There is another form known as dynamic imbalance which can be detected only when the assembly is revolving.

There may be no heavy spot, i.e. there is no natural tendency for the tyre and road wheel assembly to rotate about its centre due to gravity, but the weight may be unevenly distributed each side of the tyre centre line. Laterally, the eccentric road wheels give the same effect. During rotation, the offset weight distribution sets up a situation which tends to steer the road wheel to the right and left alternately.

Dynamic imbalance of the tyre and road wheel assemblies can be measured on suitable tyre balancing equipment, and corrections implemented. Where it is clear that a damaged road wheel is the primary cause of severe imbalance, it is advisable for the road wheel to be renewed.

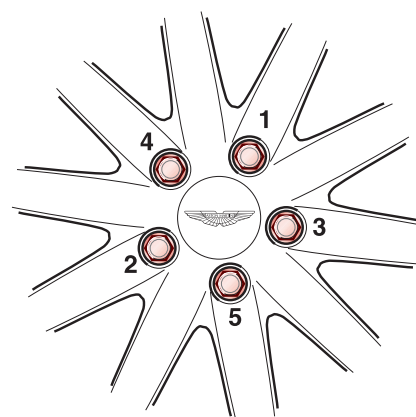
Road Wheel Nut Torque Tightening

Repair Operation Time (ROT)	
Item	Code
Road Wheel	(LHF) 04.04.AB
	(RHF) 04.04.CB
	(LHR) 04.04.BB
	(RHR) 04.04.DB

Order - Tighten every second nut until all five nuts are tightened.

Tighten all road wheel nuts in two stages.

1. To 80 Nm (60 lb. / ft) in one continuous movement.
2. To 135 Nm (100 lb. / ft.) in one continuous movement.



Inform the customer that the wheel nuts are to be torque checked after 32 km (20 mile).

Tyre Pressure Sensing (Option)

⚠ Warning ⚠

Tyre pressure sensing is not intended to replace driver awareness of tyre performance or the need for recommended weekly checks on tyre condition and pressure.

Tyre pressure sensing monitors the vehicle tyre pressures and feeds-back this information to the driver.

Each road wheel is installed with a tyre pressure sensing device which sends tyre pressure information to a control unit mounted in the centre, rear wall of the boot.

Each pressure sensing device has a colour coded collar. Ensure the coloured collars are always installed in their original positions, i.e. after new tyres are installed.

Road wheel	Colour
Front right	Green
Front Left	Red
Rear Right	Blue
Rear Left	Yellow

The control unit provides a visual warning by illuminating the tyre pressure warning lamp (A) on the instrument panel if any tyre pressure falls below specification.



Pressure Sensing with Winter Wheels and Tyres

If the tyre pressure sensing option is installed on the vehicle, the winter road wheel and tyre option with the tyre pressure sensing system should be installed. The tyre pressure sensing system will need to be programmed to recognize additional tyres.

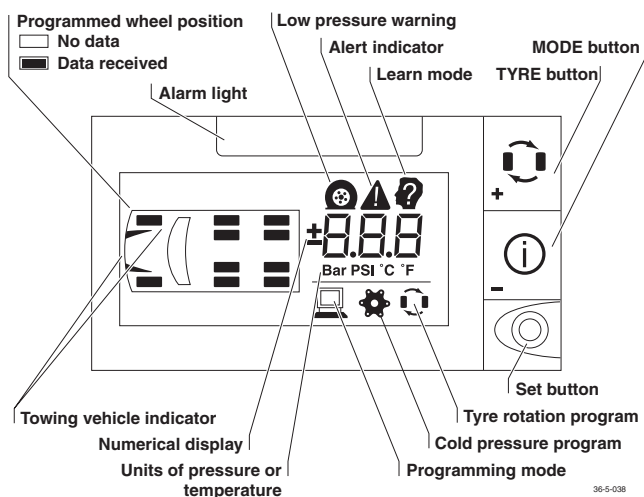
Warnings

Instrument Cluster	Lamp constant / Message 'Check Tyres'.
Control module	Tyre LED constant red .
Fault	Tyre pressure below specification.
Action	
Reduce speed to 48 km/h (30 mph). Stop in safe place as soon as possible.	
One of the coloured LEDs on the control module will illuminate to indicate which tyre requires inflating. The LED colour corresponds to the colour of the band below each tyre valve cap. Inspect affected tyre. Re-inflate if necessary. If on inspection the tyre is found to be OK, continue at 48 km/h (30 mph) maximum.	
<i>Ensure that the coloured band remains in position.</i>	
Instrument Cluster	Lamp constant / Message 'Check Tyres'.
Control module	Tyre LED constant amber .
Fault	Tyre transmitter fault.
Action	
Reduce speed to 48 km/h (30 mph). Stop in safe place as soon as possible.	
Inspect affected tyre. Re-inflate if necessary.	
If on inspection the tyre is found to be OK, continue at 48 km/h (30 mph) maximum.	
Instrument Cluster	Lamp constant / Message 'Tyre system Fault'
Control module	Module LED constant amber .
Fault	Control module fault.
Action	
Stop in safe place as soon as possible.	
Check all tyres for flats. If OK, continue at 48 km/h (30 mph) maximum.	

Display Unit

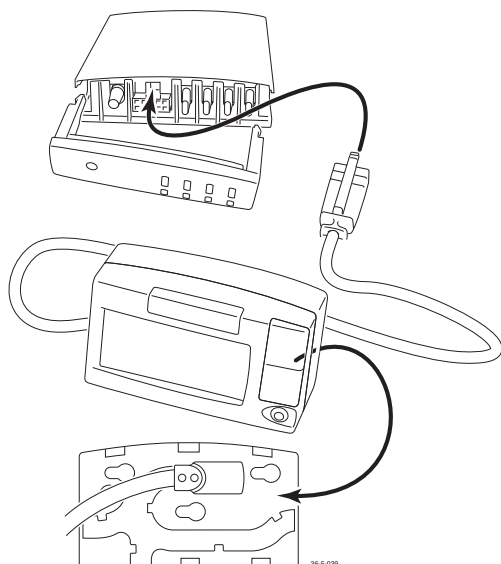
The display unit provides additional features when correctly connected to a previously installed 'Smartyre' system. The display unit connects directly to the front of the basic 'Smartyre' receiver and is powered from the vehicle circuits. The display will be fully illuminated during use but will go into 'Energy Saver' mode when no activity is detected.

Display Panel



Connection and Normal Operation

1. Remove the front bezel of the Pressure Sensor Receiver. Install the extension lead to the display unit and to the receiver module. Turn on the ignition. All icons will illuminate briefly and then extinguish leaving only the vehicle outline.



2. When tyre pressure data is received, (drive the vehicle or spin the road wheels), all the road wheel icons will appear. Press the Tyre icon to access the recorded data for each of the four road wheels.
3. Press the Mode button to scroll through the pressure, temperature and pressure deviation readings for the selected tyre.

4. If any tyre pressure sensor is defective, the display will show three dashes to indicate the absence of data for that tyre.
5. To return to normal mode, press the SET button.

System Programming

The system may be programmed by the user on three different levels. Enter Programming Mode by pressing the 'Set' button:

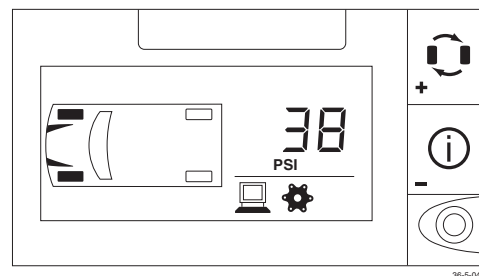
- 2 seconds to enter level 1
- 5 seconds to enter level 2
- 10 seconds to enter level 3

The following parameters may be set in each level:

- | | |
|----------------|---|
| Level 1 | <ul style="list-style-type: none"> • Cold Pressure • Tyre Rotation • Low Pressure Warning • Pressure Deviation • High Temperature Alert • Units Selection |
| Level 2 | <ul style="list-style-type: none"> • Slope • Learn Transmitter ID |
| Level 3 | <ul style="list-style-type: none"> • Low Pressure Alert |

Level 1 Programming

Cold inflation pressure

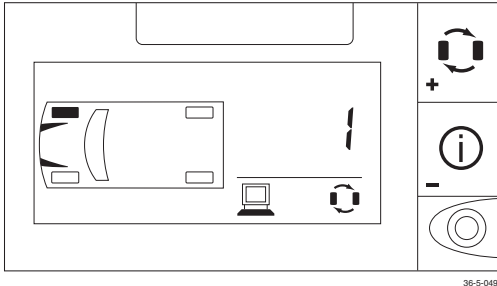


1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Tyre' to select the front or rear axle. Front or rear tyres will be highlighted.
3. Press 'Mode' to show the current value. Press 'Tyre' to increase or 'Mode' to decrease the current value.
4. Press 'Set' to save the new values.
5. Repeat steps 2 - 4 to set the cold inflation pressure for other the axle.

Tyre Rotation

⚠ Warning ⚠

The road wheels and tyres are asymmetrical and different sizes front and rear. They must not be rotated front to rear. This function should be used only to verify correct tyre position. Do not change the programmed data.



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' repeatedly until 'Tyre Rotation' icon is displayed.
3. Press 'Tyre' to scroll to a tyre position. Press 'Mode' to display the current sensor identity.

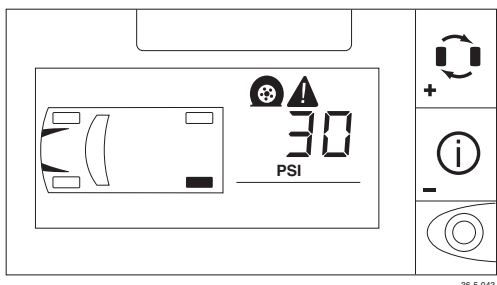
Each sensor is identified by the colour of a washer on the tyre valve. Tyres are always installed in fixed positions and must remain as follows:

- Right Front - Green (Code 1)
- Left Front - Red (Code 2)
- Right Rear - Blue (Code 3)
- Left Rear - Yellow (Code 4)

If the current data is incorrect, revise as follows:

4. Ensure that the road wheels and tyres are installed in the correct locations (see the colour code list above). Note the correct code number for each road wheel.
5. Use 'Tyre' or 'Mode' to correct the sensor identity code if required.
6. Repeat for the remaining tyres.
7. Press 'Set' twice to exit the programme.

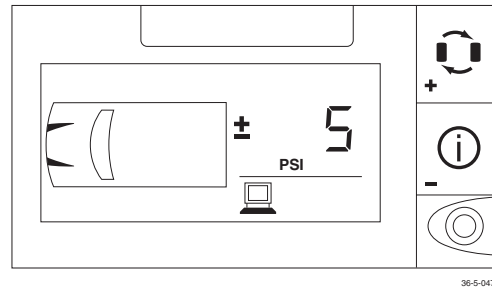
Low Pressure Warning



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' repeatedly until 'Flat Tyre' icon is displayed.
3. Press 'Tyre' to scroll to the desired axle. Press 'Mode' to display the current low pressure warning value.
4. Press 'Tyre' to increase or 'Mode' to decrease current value.

5. Press 'Set' to enter the new value into memory.

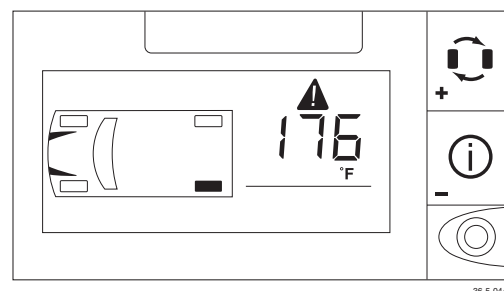
Pressure Deviation Alert



This function sets the threshold for warning of a deviation from normal tyre pressures.

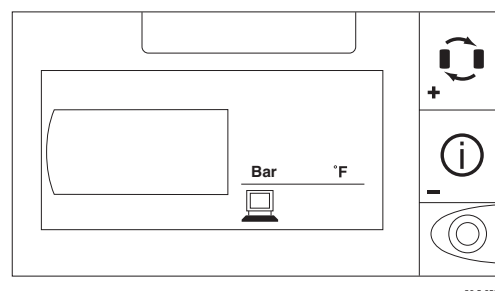
1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' repeatedly until the '+-' icon is displayed.
3. Press 'Tyre' to display the current value.
4. Press 'Tyre' to increase or 'Mode' to decrease the current value
5. Press 'Set' to save the amended value.
6. Press 'Set' again to revert to normal operation.

High Temperature Alert



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' until 'alert' icon is displayed.
3. Press 'Tyre' to display the current value of the high temperature alert.
4. Press 'Tyre' to increase or 'Mode' to decrease current value
5. Press 'Set' to save the amended value.
6. Press 'Set' again to return to normal mode.

Units Selection



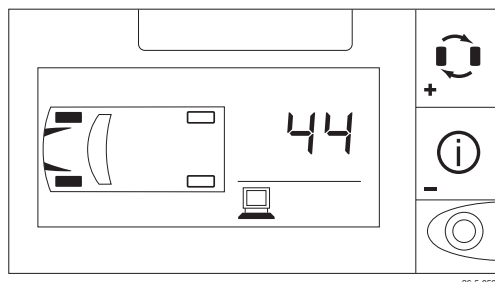
Use this function to select the combination of units for pressure and temperature.

1. Press 'Set' for 2 seconds to enter level 1 programming.

2. Press 'Mode' until pressure / temperature units are displayed.
3. Press 'Tyre' to enter 'Units Selection' mode.
4. Use 'Tyre' or 'Mode' to scroll through four combinations of pressure / temperature units.
5. Press 'Set' to save the selected combination of units.
6. Press the 'Set' button again to revert to normal mode.

Level 2 Programming

Slope



Sets rate of pressure change for tyres in use. This parameter is set at manufacture and is specific only to the recommended tyres for DB9.

1. Press 'Set' for 5 seconds to enter level 2 programming.
2. Press 'Tyre' until the desired vehicle axle is displayed.
3. Press 'Mode' to display the current SLOPE entry (DB9 is set at?)
4. If required, use 'Tyre' to increase or 'Mode' to decrease current value.
5. Press 'Set' to save the final value.
6. Press 'Set' again to return to normal mode.

Transmitter Learn Mode

This mode is used to add or delete transmitters from the system memory. It is vital that transmitter signals are correctly recognised to avoid system reaction to other transmitters (e.g. from passing vehicles with similar sensors).

1. Remove a Redundant Transmitter
 - 1.1 Press 'Set' for 5 seconds to enter level 2 programming.
 - 1.2 Press 'Mode' to select 'Transmitter Learn' mode.
 - 1.3 Press 'Tyre' to display possible tyre positions (filled rectangles represent currently programmed transmitters).
 - 1.4 Press 'Tyre' to scroll to the desired position.
 - 1.5 To delete a transmitter, press the 'Mode' once.
 - 1.6 If required, scroll to other positions using 'Tyre' and, if required, delete any other transmitters using 'Mode' button.

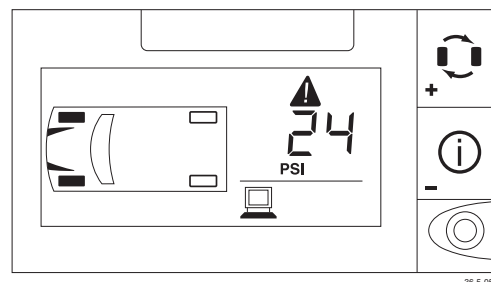
2. Add new Transmitters.
 - 2.1 Press 'Set' for 5 seconds to enter level 2 programming.
 - 2.2 Press 'Mode' to select 'Transmitter Learn' mode.
 - 2.3 Press 'Tyre' to display possible tyre positions (filled rectangles represent currently programmed transmitters).
 - 2.4 Press 'Tyre' to scroll to the desired position. The chosen road wheel icon will flash.
 - 2.5 Program a new transmitter by either:
 - 2.6 Vigorously shaking the transmitter (bounce the road wheel on the ground) to promote a transmission.
 - 2.7 Inflate or deflate the tyre by more than 3 psi (0.2 bar).

The unit will 'beep' when new transmitter is recognised.

- 2.8 Press 'Tyre' to scroll to the next position. Repeat steps 4 and 5 as required to programme additional transmitters.
- 2.9 Press 'Set' to save the new transmitter data and to exit 'learn' mode. If no error is found, the system will return to 'normal' mode.

Level 3 Programming

Low Pressure Alert



1. Press 'Set' for 10 seconds to enter level 3 programming.
2. Press 'Tyre' button to scroll to the desired axle.
3. Press 'Mode' to view the current low pressure alert value.
4. Press 'Tyre' to increase the current value or press 'Mode' to the decrease current value.
5. Press 'Set' to save when the desired value is reached.
6. Repeat steps 2 to 5 until the Low Pressure Alert Level has been set for all road wheels.
7. Press 'Set' button to exit this mode.
8. Press the 'Set' button again to return to normal mode.



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