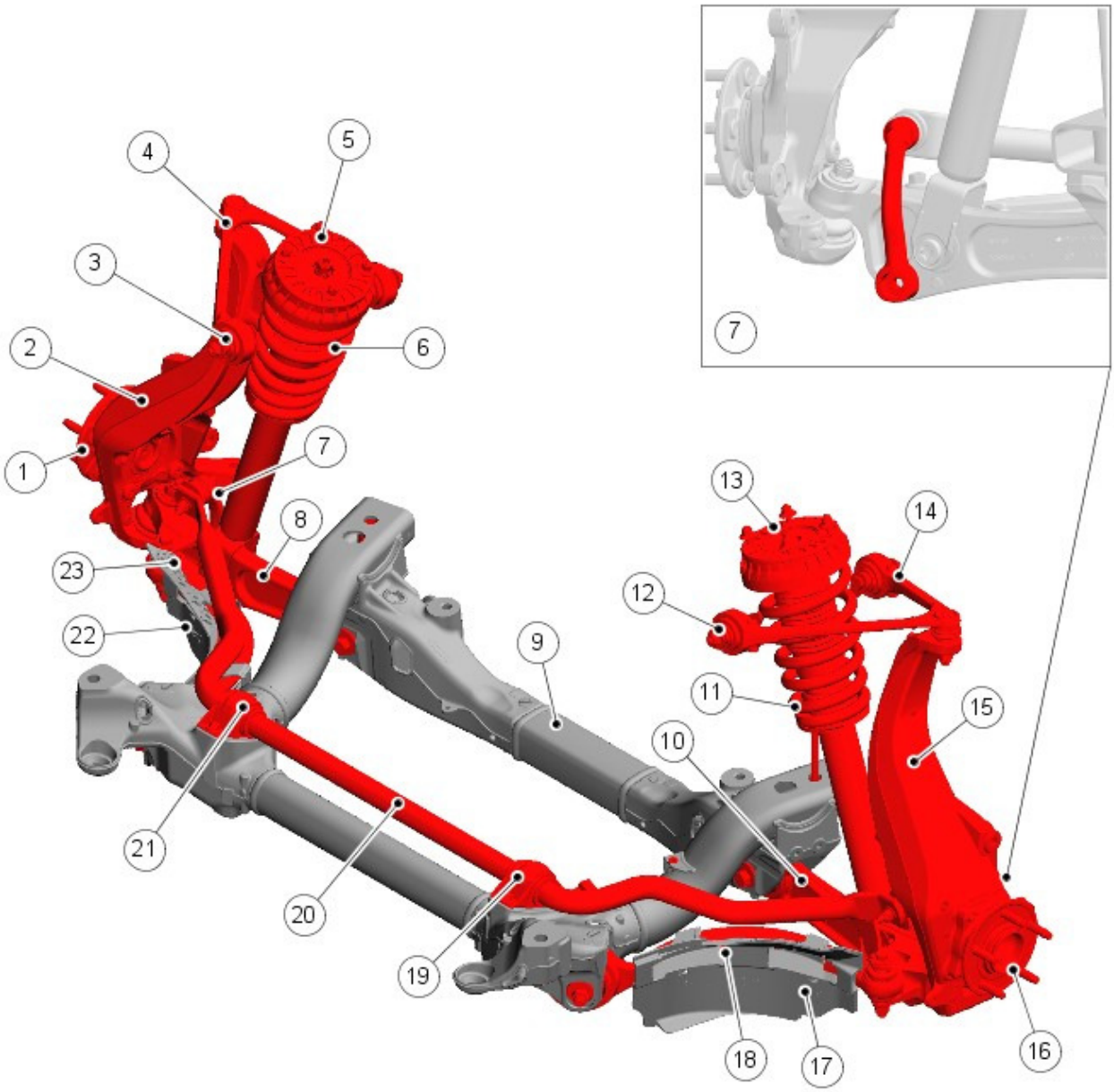
Published: 08-Mar-2013

# Front Suspension - Front Suspension

Description and Operation

## COMPONENT LOCATION




E153430

| Item | Description |
|---|---|
| 1 | Right wheel hub and bearing assembly |
| 2 | Right wheel knuckle |
| 3 | Upper control arm bush (2 off) |
| 4 | Right upper control arm |
| 5 | Right Top Plate |
| 6 | Right spring and shock absorber assembly |
| 7 | Stabilizer link |
| 8 | Rear right lower lateral control arm |
| 9 | Front subframe |
| 10 | Left lower lateral control arm |
| 11 | Left spring and shock absorber assembly |
| | |

| | |
|---|---|
| 12 | Upper control arm bush (2 off) |
| 13 | Left top mount |
| 14 | Left upper control arm |
| 15 | Left wheel knuckle |
| 16 | Front left wheel hub and bearing assembly |
| 17 | Front left lower control arm - Brake scoop |
| 18 | Left lower control arm |
| 19 | Mounting bracket (2 off) |
| 20 | Stabilizer bar |
| 21 | Stabilizer bar bush (2 off) |
| 22 | Front right lower control arm |
| 23 | Front right lower control arm - Brake scoop |

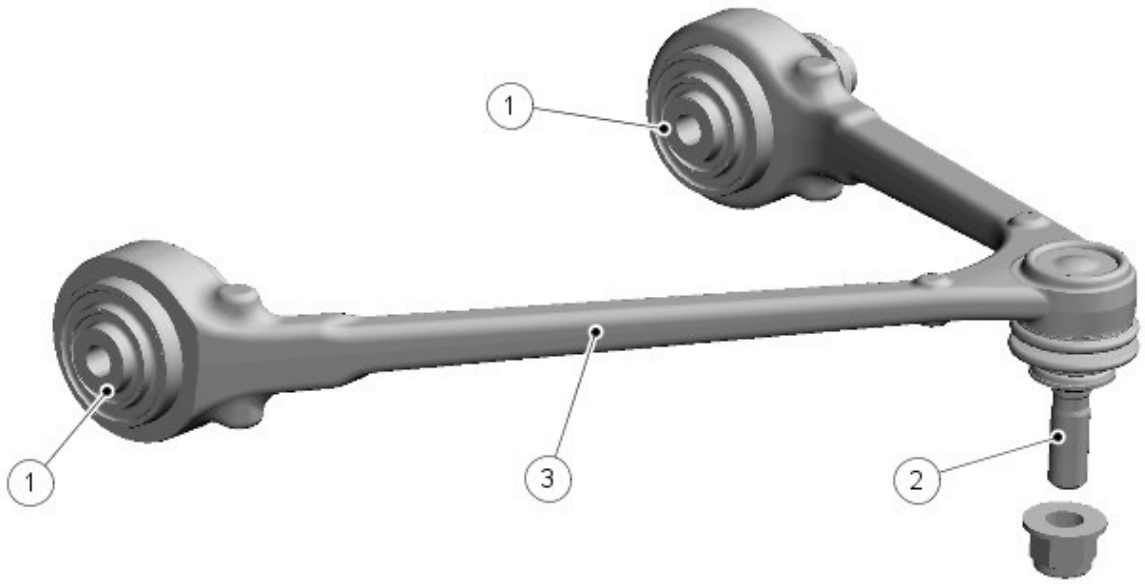
## INTRODUCTION

The front suspension is of a fully independent design. The front suspension components are attached to the front subframe and the vehicle body. The subframe is attached to the vehicle body with four long bolts which pass through bushes located in the subframe.

The front suspension on each side comprises:

- Upper control arm
- Rear lower lateral control arm
- Rear lower control arm
- Wheel knuckle and hub assembly
- Stabilizer bar
- Spring and shock absorber assembly.

## UPPER CONTROL ARM



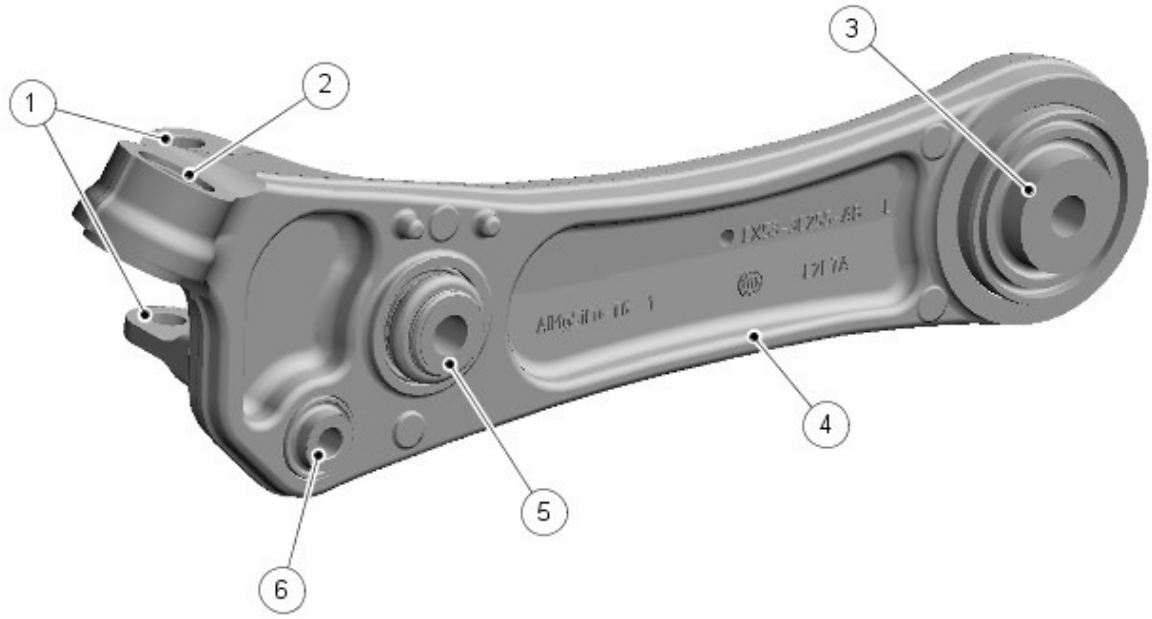

E153431

| Item | Description |
|---|---|
| 1 | Bush (2 off) |
| 2 | Ball joint and locknut |
| 3 | Upper control arm |

The forged aluminum upper control arm is a wishbone design with three mounting points. The two inner mounting points are fitted with bushes. The outer mounting is fitted with a ball joint which locates in a hole in the wheel knuckle and is secured with a locknut.

The inclination of the upper control arm axis provides an anti-dive and anti-squat action during vehicle braking and acceleration and also improves castor trail which in turn improves steering 'feel'.

## REAR LOWER CONTROL ARM



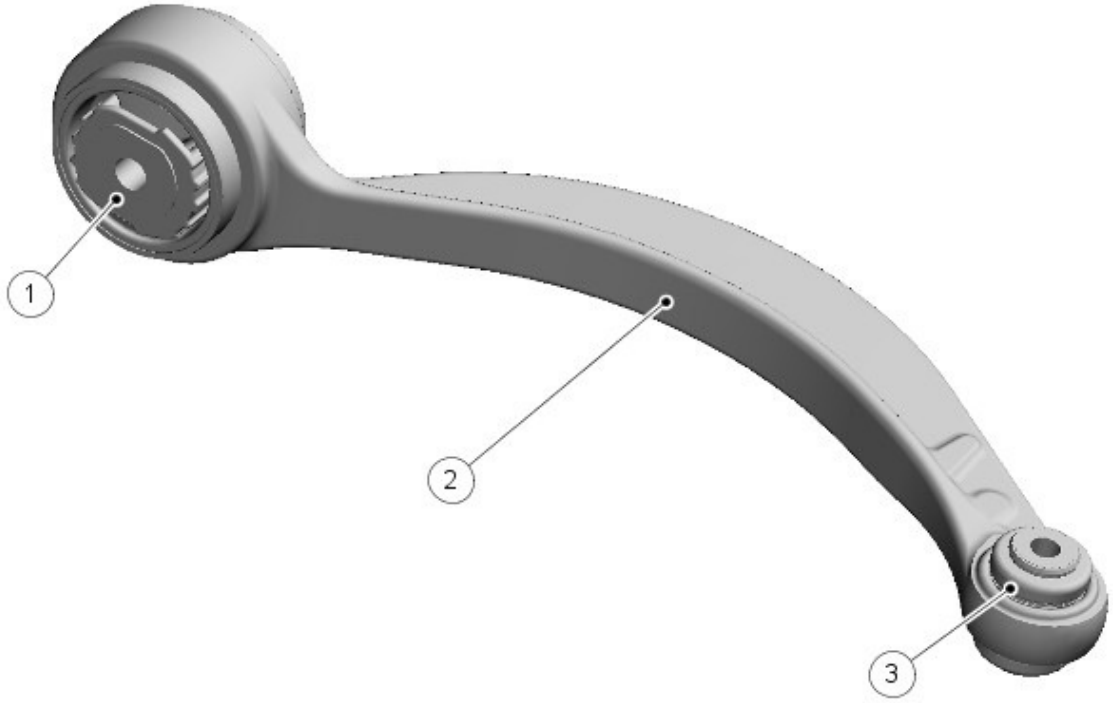

E153432

| Item | Description |
|---|---|
| 1 | Front lower control arm attachment |
| 2 | Wheel knuckle attachment |
| 3 | Rear bush - subframe attachment |
| 4 | Lower lateral control arm |
| 5 | Spring and shock absorber assembly attachment |
| 6 | Bush - stabilizer link attachment |

The forged aluminum rear lower control arm is fitted with a bush in its inner end which locates between brackets on the subframe. The arm is secured with an eccentric bolt, an eccentric washer and a locknut which allow for the adjustment of the suspension camber geometry.

The outer end of the rear lower control arm has a tapered hole which locates on a ball joint fitted to the wheel knuckle. Two cast brackets on the forward face of the rear lower control arm allow for the attachment of the front lower control arm. A threaded insert is fitted behind the two cast brackets and provides for the attachment of the stabilizer link with a bolt. A bush is fitted to a cross-hole in the rear lower control arm which provides the location for the forked attachment of the spring and shock absorber assembly.

## FRONT LOWER CONTROL ARM



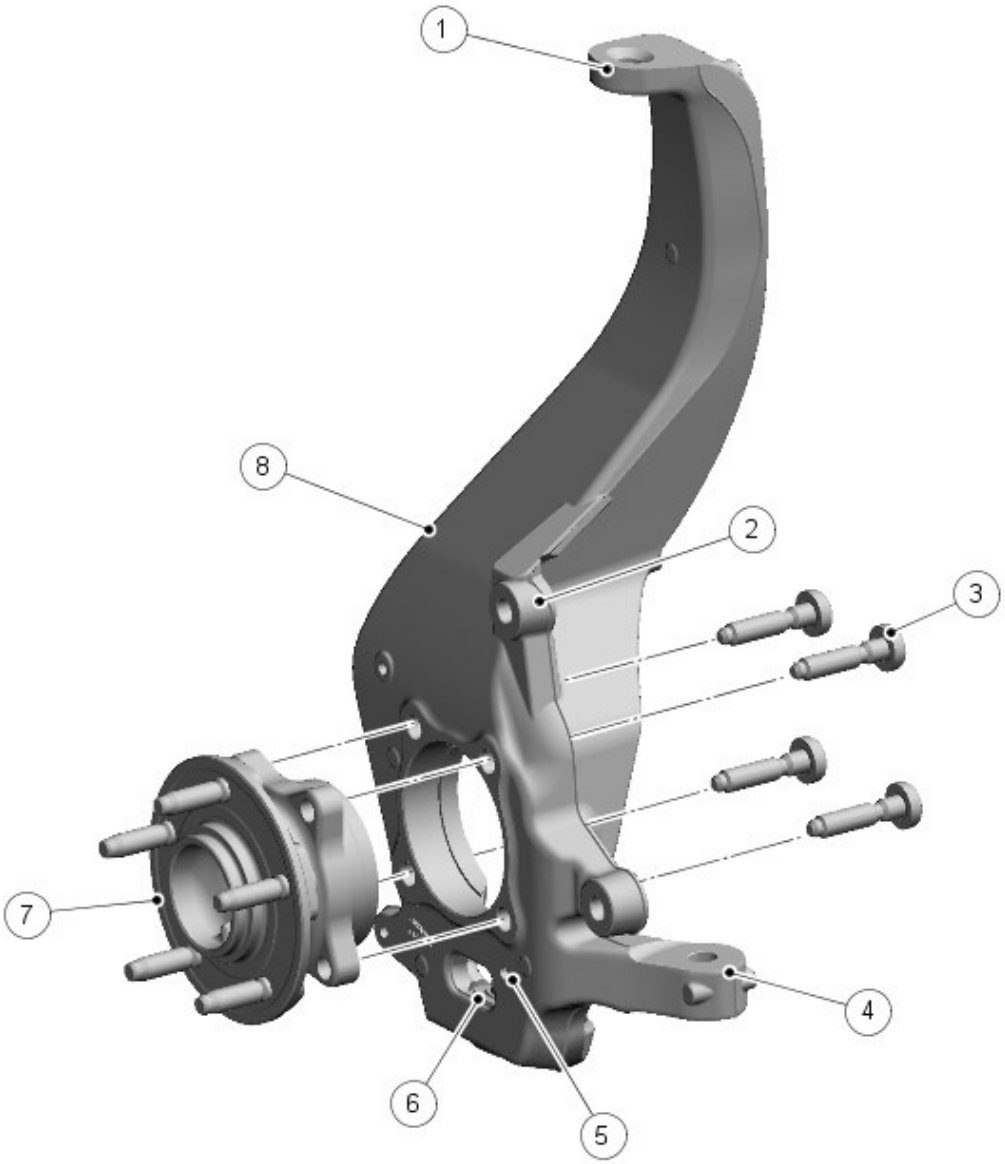

E153433

| Item | Description |
|---|---|
| 1 | Bush |
| 2 | Front lower control arm |
| 3 | Cross axis joint |

The cast front lower control arm is fitted with a bush in its inner end which locates between brackets on the subframe. The arm is secured with an eccentric bolt, an eccentric washer and a locknut which allow for adjustment of the castor and camber geometry.

The outer end of the front lower control arm is fitted with a cross axis joint and locates between the cast brackets on the rear lower lateral control arm. The front lower control arm and rear lower control arm together form a wishbone design.

## WHEEL KNUCKLE




E153434

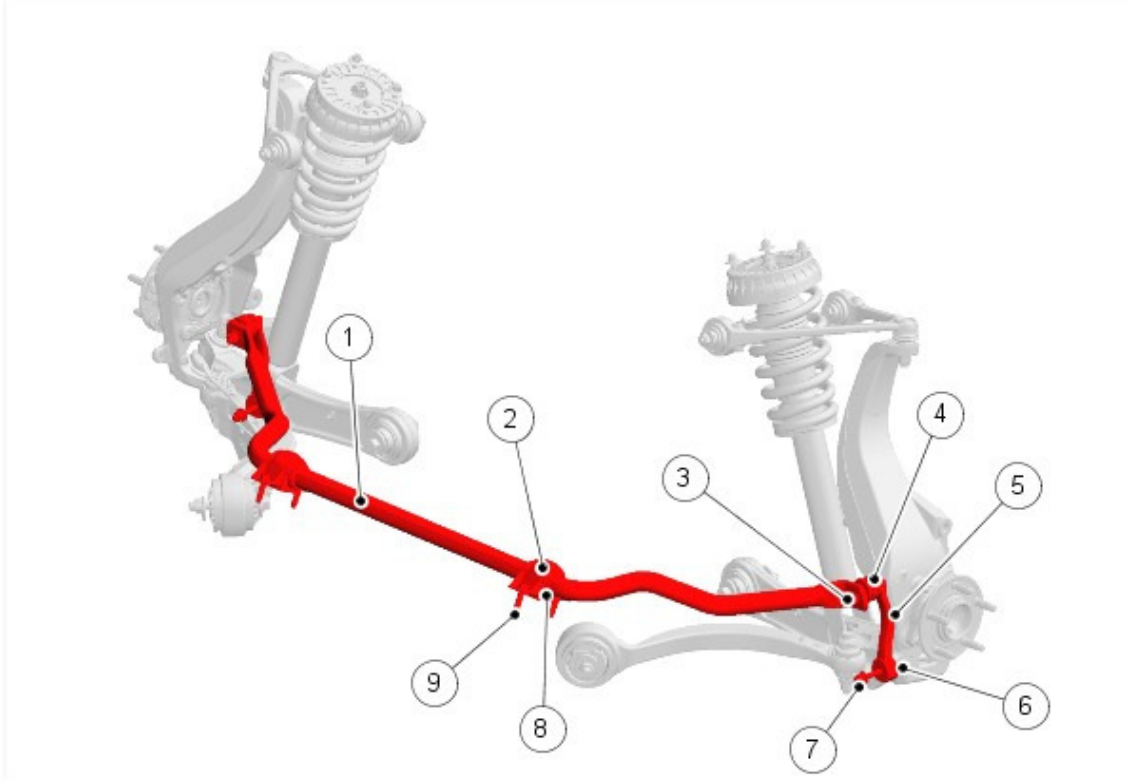
| Item | Description |
|---|---|
| 1 | Upper control arm attachment |
| 2 | Brake caliper attachment |
| 3 | Internal torx bolt (4 off) |
| 4 | Steering tie rod ball joint attachment |
| 5 | Brake disc shield attachment (2 off) |
| 6 | Ball joint - rear lower lateral arm attachment |
| 7 | Wheel hub and bearing assembly |
| 8 | Wheel knuckle |

The cast aluminum wheel knuckle is a swan neck design which provides the attachment for the upper control arm and lower lateral control arm. The lower lateral control arm locates on a non serviceable ball joint integral with the wheel knuckle. The lower boss on the knuckle provides for the attachment of the steering gear tie-rod ball joint.

The wheel knuckle also provides the mounting locations for the wheel hub and bearing assembly, the wheel speed sensor, the brake caliper and the brake disc shield.

The wheel hub and bearing assembly is a non-serviceable component that requires replacement as a complete assembly. A Magnetic encoder ring for the wheel speed sensor is incorporated into the wheel bearing. The assembly is secured to the knuckle with 4 torx bolts.

**STABILIZER BAR**



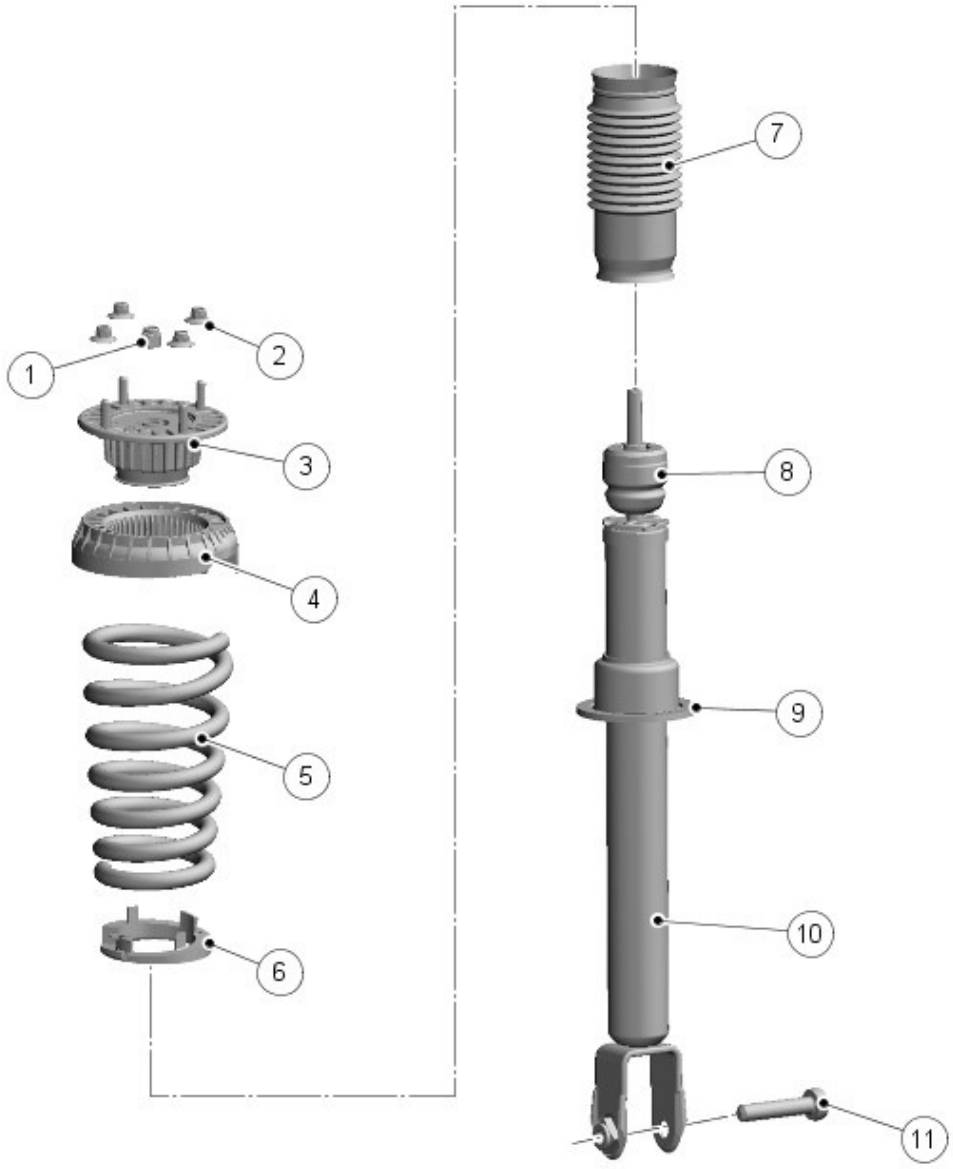

E153435

| Item | Description |
|---|---|
| 1 | Stabilizer bar |
| 2 | Bracket (2 off) |
| 3 | Locknut (2 off) |
| 4 | Ball joint (2 off) |
| 5 | Stabilizer link (2 off) |
| 6 | Locknut (2 off) |
| 7 | Bolt (2 off) |
| 8 | Bush (2 off) |
| 9 | Bolt (4 off) |

The stabilizer bar is attached to the front of the subframe with bushes and mounting brackets. The pressed steel brackets locate over the bushes and are attached to the cross member with bolts screwed into threaded locations in the subframe. The stabilizer bar has crimped, 'anti-shuffle' collars pressed in position on the inside edges of the bushes. The collars prevent sideways movement of the stabilizer bar.

The stabilizer bar is manufactured from 32 mm diameter, manganese steel bar. Each end of the stabilizer bar curves rearwards to attach to a ball joint on a stabilizer bar link. Each stabilizer bar link is secured to a bush in the lower lateral arm with a bolt and locknut. The links allow the stabilizer bar to move with the wheel travel providing maximum effectiveness.

## SPRING AND SHCOK ABSORBER ASSEMBLY




E153436

| Item | Description |
|---|---|
| 1 | Shock absorber self locking nut |
| 2 | Top mount self locking nut (4 off) |
| 3 | Top mount |
| 4 | Upper spring seat |
| 5 | Spring |
| 6 | Lower spring seat |
| 7 | Gaiter |
| 8 | Spring aid |
| 9 | Spring seat |
| 10 | Shock absorber |
| 11 | Bolt |

The spring and shock absorber assemblies are located between the rear lower arm and the front suspension housing in the inner wing. There are two shock absorber variants:

- A conventional oil shock absorber shock absorber.
- On vehicles with the adaptive dynamics system, a continuously variable adaptive shock absorber.
  For additional information, refer to: Vehicle Dynamic Suspension (204-05 Vehicle Dynamic Suspension, Description and Operation).

Different combinations of springs and shock absorbers are available depending on the vehicle model. The conventional and adaptive shock absorber assemblies are of a similar construction.

The shock absorbers are a monotube design with a spring seat located on the shock absorber tube. The lower end of the shock absorber has a forked mounting with a cross hole and captive nut. The fork locates over the rear lower control arm and is secured with a bolt.

The shock absorber functions by restricting the flow of oil through internal galleries in the shock absorber piston, providing damping of undulations in the road surface.

The shock absorber piston is connected to a shock absorber rod which is sealed at its exit point from the shock absorber body. The threaded outer end of the shock absorber rod locates through a hole in the top mount. A self locking nut secures the top mount to the shock absorber rod. On adaptive shock absorbers an electrical connector is incorporated into the outer end of the shock absorber rod.

The shock absorber rod is fitted with a spring aid which prevents the top mount making contact with the top of the shock absorber body during full suspension compression and also assists with the suspension tune.

The spring rate of the coil springs can differ between models and are color coded for identification. The coil spring locates on a spring seat and a lower spring seat which is integral with the shock absorber body. The spring locates in an upper spring seat which is located on the underside of the top mount.

The top mount has four studs which locate through mating holes in the vehicle inner wing and are secured with self locking nuts.