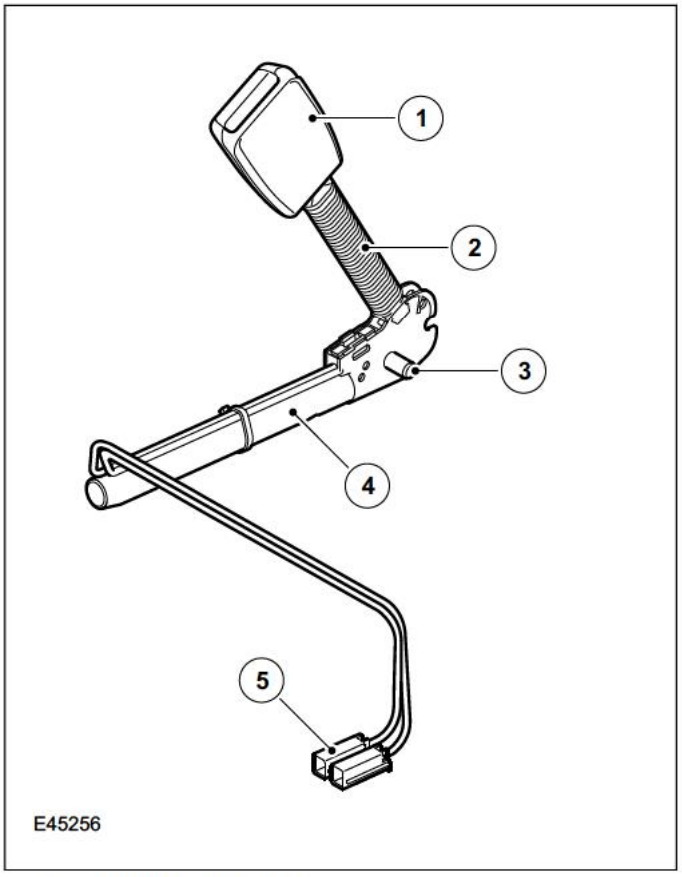
1 Securing screw
2 Air curtain
3 Securing screw
4 Rear tether
5 Gas guide pipe
6 Inflator mounting bracket
7 Inflator
8 Rear tether anchor
9 Tether housing
10 Rear tether
11 Front tether anchor

The third row side air curtains are installed on the cant rails above the rear quarter windows, behind the headliner.

Each side air curtain has an inflator, which is attached to the 'D' pillar by a mounting bracket and two screws. The inflator is connected to the air curtain by a gas guide pipe. The gas guide pipe and air curtain are secured to the cant rail by two screws. Tethers are attached to the front and rear of the air curtain. The front tether is anchored to the 'C' pillar. The rear tether is anchored to the 'D' pillar and held in position by a tether housing.

When a third row side air curtain deploys, it extends downwards from behind the headliner. The expanding air curtain tightens the tethers, which retain the air curtain in position against the rear quarter window.

PRETENSIONERS



1 Safety belt buckle
2 Boot
3 Anchor bolt
4 Piston and tube
5 Electrical connectors for inflator and buckle switch

The pretensioners are used to tighten the front safety belts during a collision to ensure the occupants are securely held in their seats. A pretensioner is integrated into each front safety belt buckle.

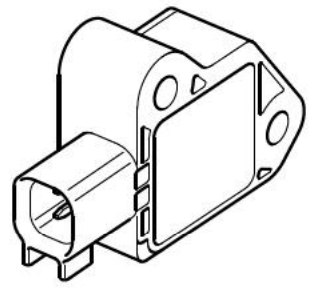
Each pretensioner has a tube containing an inflator and a piston. The inflator is connected to the restraints control module. The piston is attached to a steel cable, the opposite end of which is attached to the safety belt buckle.

On receipt of a fire signal from the restraints control module, the inflator generates nitrogen gas that rapidly expands to drive the piston along the tube, pulling the cable and drawing the safety belt buckle downwards.

SAFETY BELT SENSORS

The buckle of each front safety belt incorporates a Hall effect sensor that provides a safety belt status signal to the restraints control module. The restraints control module broadcasts the status of the two front safety belts on the high speed Controller Area Network (CAN) bus for use by the instrument cluster.

IMPACT SENSORS


E45257

Impact sensors are installed in the front and both sides of the vehicle. The use of multiple impact sensors provides shorter air bag trigger times, through faster detection of lateral and longitudinal acceleration, and improves detection accuracy.

There are two front impact sensors attached to brackets on the body front support frame, just above each front longitudinal.

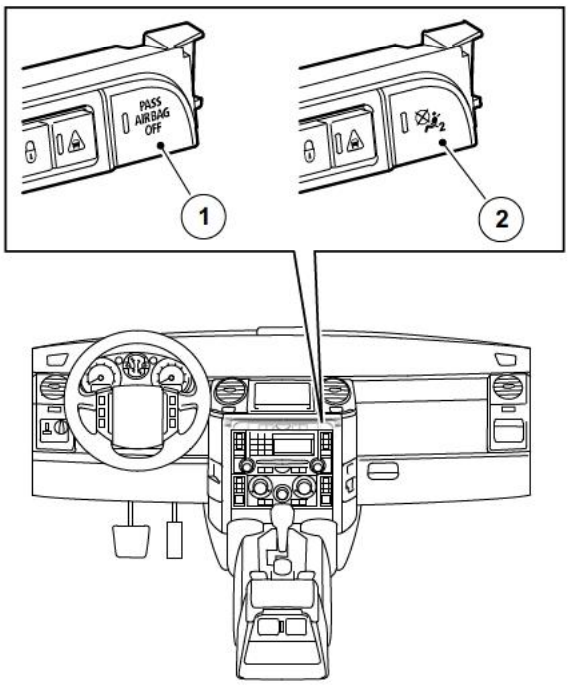
There are six side impact sensors located in the passenger compartment, as follows:

- One attached to each front door.
- One attached to the base of each B pillar.
- One attached to the top of each rear wheel arch.

Each impact sensor incorporates an accelerometer and a microcontroller powered by a feed from the restraints control module. The power feed also provides the interface connection through which the side impact sensor communicates with the restraints control module using serial data messages. Acceleration is evaluated by the microcontroller and transmitted to the restraints control module, which then makes the decision on whether or not to activate the air bags and pretensioners.

When the ignition is switched on the restraints control module supplies power to the impact sensors, which perform a self test. After satisfactory self tests the impact sensors continually output ‘sensor active’ messages to the restraints control module. If a fault is detected the relevant impact sensor sends a fault message, instead of the sensor active message, to the restraints control module. The restraints control module then stores a related fault code and illuminates the air bag warning indicator.

PASSENGER AIR BAG DEACTIVATION INDICATOR



1 Deactivation indicator

2 Not used

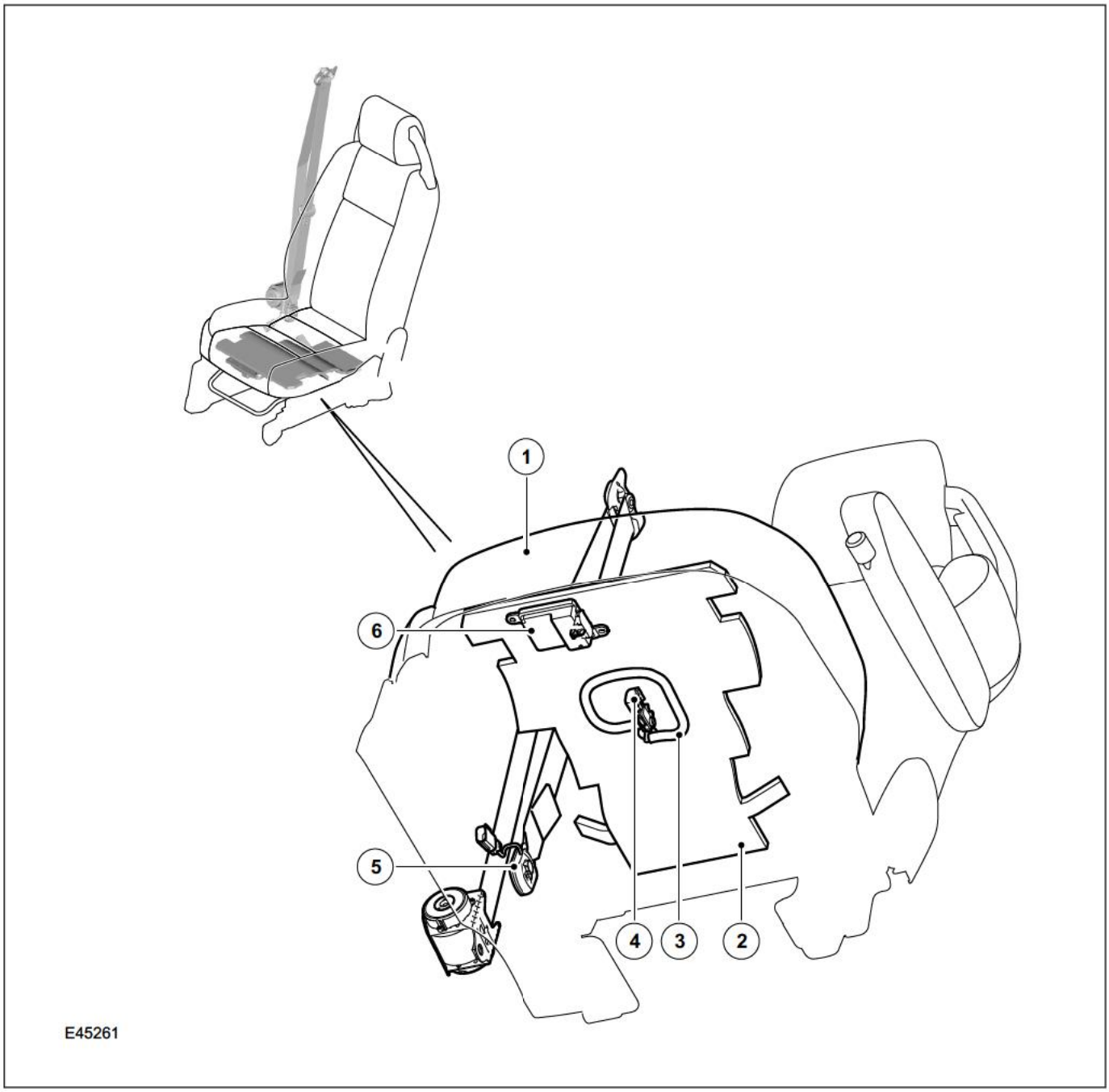
The passenger air bag deactivation indicator is installed on the center switch pack of the instrument panel. When appropriate, the indicator illuminates to advise front seat occupants that the passenger air bag is disabled. Operation of the indicator is controlled by the restraints control module. The restraints control module illuminates the indicator when:

- There is a fault with the passenger air bag firing circuit(s).
- Required by passenger seat occupant monitoring (see below).

OCCUPANT MONITORING

Occupant monitoring provides the restraints control module with the occupancy status of the front passenger seat. The restraints control module uses the occupancy status for control of the passenger air bag deactivation indicator. Occupancy status is determined by an occupant classification system.

Occupant Classification System



1 Seat cushion
2 Pressure pad
3 Pressure tube
4 Pressure sensor
5 Safety belt tension sensor
6 Occupant classification module

The occupant classification system can determine if the front passenger seat is unoccupied, occupied by a small person, or occupied by a large person. The occupant classification system consists of:

- A pressure pad, installed under the cushion of the front passenger seat, which is connected to a pressure sensor.
- A safety belt tension sensor, integrated into the anchor point of the front passenger safety belt.
- An occupant classification module, installed under the front passenger seat.

The pressure pad is a silicone filled bladder. Any load on the pressure pad is detected by the pressure sensor.

The safety belt tension sensor is a strain gauge that measures the load applied by the safety belt anchor to the anchor bolt.

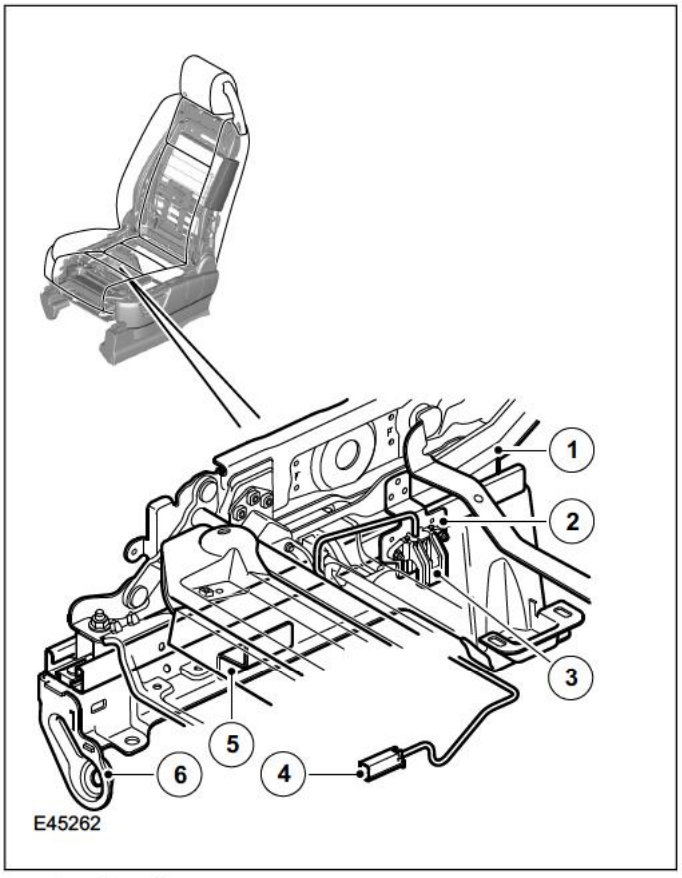
The occupant classification module supplies a reference voltage to the pressure sensor and the safety belt tension sensor and, from the return signals, measures the loads acting on the pressure pad and the safety belt tension sensor. The load measurement from the safety belt tension sensor is used to produce a correction factor for the load measurement from the pressure pad. The tightness of the safety belt affects the load acting on the pressure pad, so without the correction factor the occupant classification module cannot derive an accurate occupancy status.

The occupant classification module translates the load readings into a seat occupancy status and transmits the result to the restraints control module, on a dedicated high speed CAN bus link. The occupant classification module incorporates two load limits for the seat cushion: When the load exceeds the lower limit, but is less than the upper limit, the occupant is classified as small; when the upper limit is exceeded, the occupant is classified as large.

The occupant classification system has four possible states:

- **Empty** Passenger air bag operation is disabled and the passenger air bag deactivation indicator remains off.
- **Occupied inhibit** The seat is occupied by a small person. Passenger air bag operation is disabled and the passenger air bag deactivation indicator is illuminated.
- **Occupied allow** The seat is occupied by a large person. Passenger air bag operation is enabled and the passenger air bag deactivation indicator remains off.
- **Error** There is a fault with the system. Only stage 1 (slowest deployment speed) passenger air bag operation is enabled and the passenger air bag deactivation indicator remains off.

SEAT POSITION SENSOR



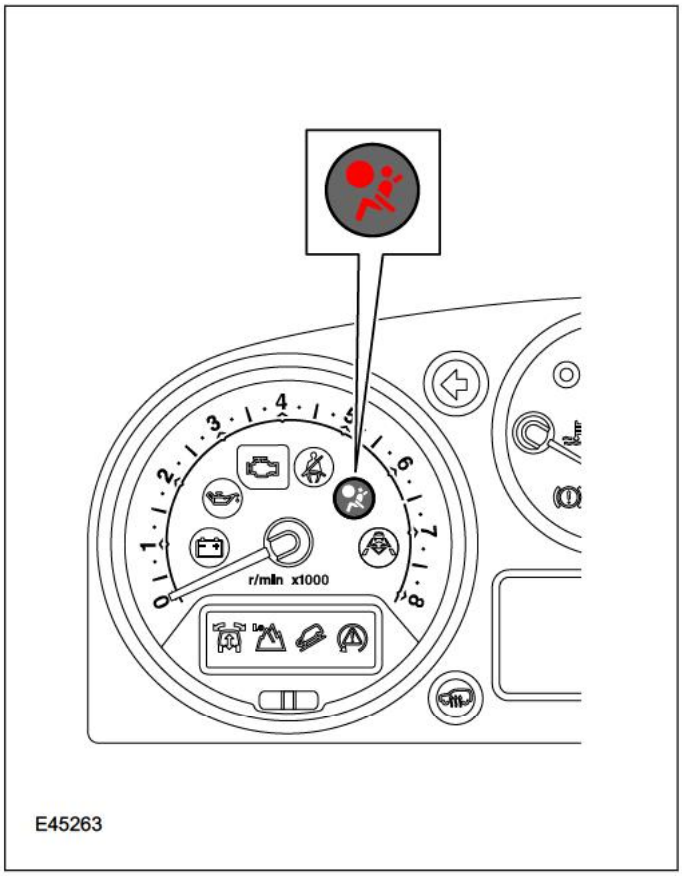
1 Seat frame

2 Mounting plate
3 Seat position sensor
4 Electrical connector
5 Target plate
6 Seat base

The seat position sensor allows the restraints control module to detect when the driver seat is forward of a given point on the seat track. The seat position sensor consists of a Hall effect sensor attached to the driver seat frame and a target plate on the seat base. While the ignition is on, the restraints control module supplies the sensor with a power supply of 12V nominal, and monitors the return voltage. When the seat frame moves forwards, the sensor moves over the target plate, which changes the reluctance of the sensor. The change of voltage is detected by the restraints control module and used as a switching point. The switching point is when the center of the sensor is 3 ± 4 mm from the leading edge of the target plate.

When the driver seat is forward of the switching point, the restraints control module increases the time delay between firing the two stages of the inflator in the driver air bag. When the driver seat is rearward of the switching point, uses the normal time delay between firing the two stages.

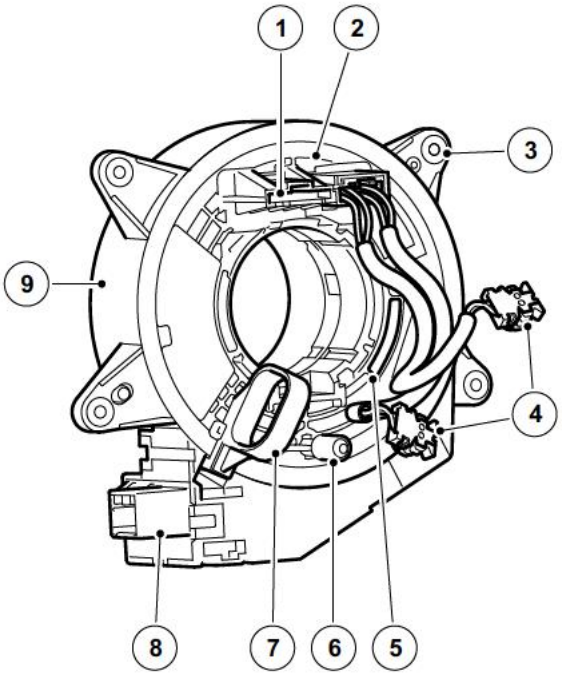
AIR BAG WARNING INDICATOR



The air bag warning indicator consists of a red Light Emitting Diode (LED) behind a SRS graphic in the tachometer of the instrument cluster.

Operation of the air bag warning indicator is controlled by a high speed CAN bus message from the restraints control module to the instrument cluster. The restraints control module illuminates the air bag warning indicator if a fault is detected, and for approximately 6 seconds during the bulb check at the beginning of each ignition cycle.

CLOCKSPRING



E45264

1 Electrical connector for steering wheel switch packs and horn
2 Inner rotor
3 Outer housing securing lug
4 Driver air bag link leads
5 Viewing window
6 Drive peg
7 Stopper
8 Electrical connector for steering column harness
9 Outer cover

The clockspring is installed on the steering column to provide the electrical interface between the fixed wiring harness of the steering column and the components that rotate with the steering wheel, i.e. the driver air bag, the horn and the steering wheel switch packs.

The clockspring consists of a plastic cassette which incorporates an outer cover fixed to the steering column and an inner rotor which turns with the steering wheel. Four securing lugs attach the cover to the multifunction switch on the steering column. The rotor is keyed to the steering wheel by a drive peg. A lug on the underside of the rotor operates the self-cancelling feature of the turn signal indicator switch. A ribbon lead, threaded on rollers in the rotor, links two connectors on the cover to two connectors on the rotor. Link leads for the driver air bag are installed in one of the connectors on the rotor.

To prevent damage to the ribbon lead, both the steering and the clockspring must be centralized when removing and installing the clockspring or the steering wheel. The clockspring is centralized when the drive peg is at six o'clock and 50 - 100% of a yellow wheel is visible in the viewing window.

Replacement clocksprings are fitted with a stopper, which locks the cover to the rotor, in the central position. The stopper must be broken off when the replacement clockspring is installed.