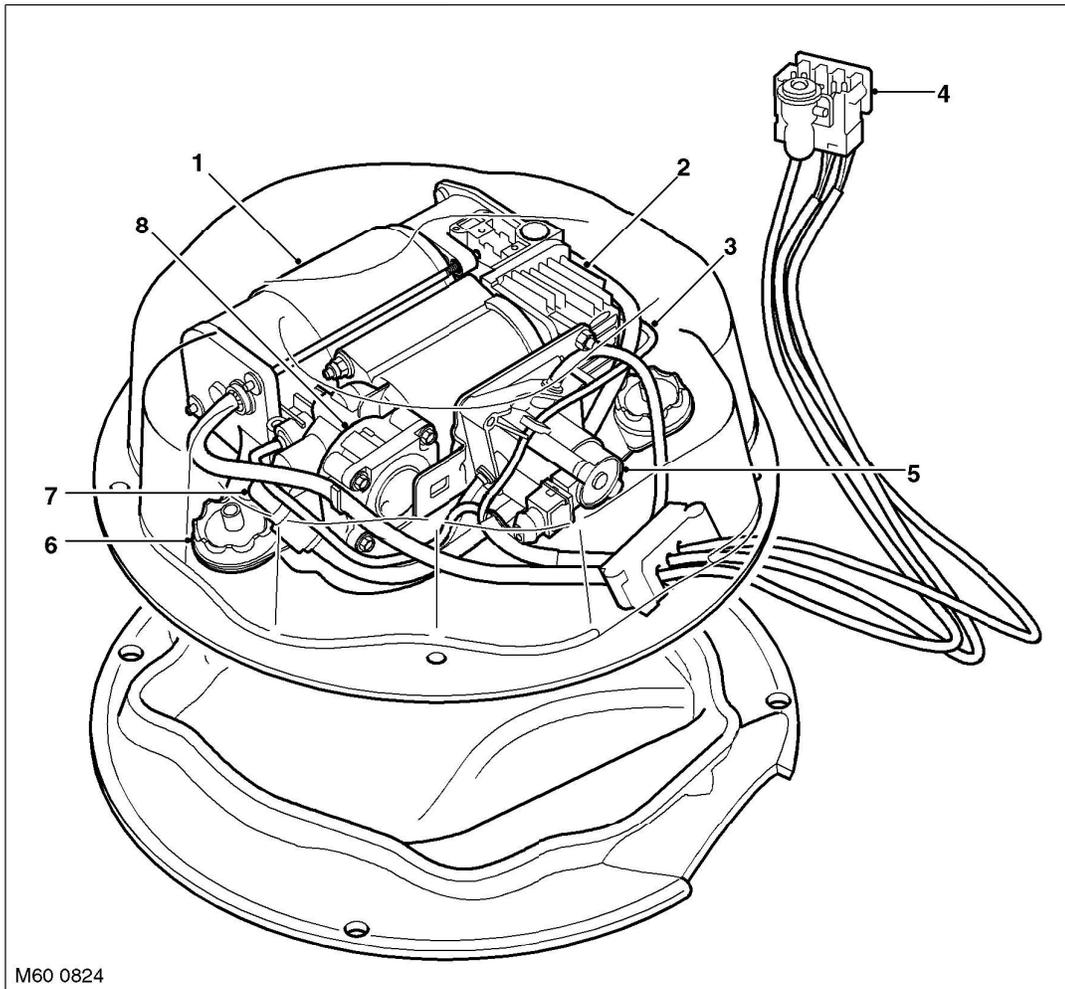


Air Supply Unit



M60 0824

- | | |
|--|-------------------------------|
| 1 Electric motor | 5 High pressure exhaust valve |
| 2 Compressor | 6 Rubber mounting (3 off) |
| 3 Compressor temperature sensor | 7 Exhaust hose |
| 4 Electrical and air supply connectors | 8 Exhaust pilot valve |

The air supply unit is located in a sealed housing which is mounted in the spare wheel well. The unit is secured with four bolts into threaded inserts in the vehicle floorpan. The unit is connected to the system via a single air pipe and harness wiring and multiplug. The air pipe from the unit passes through a grommet in the wheel well. It is important to ensure that this grommet is not disturbed and correctly installed. Incorrect fitment will allow water to enter the wheel well leading to possible damage to and failure of the air supply unit.

The unit comprises a piston compressor, a 12V electric motor, a solenoid operated exhaust pilot valve, a pressure relief valve and an air dryer unit.

The electric motor, compressor, air dryer and pressure limiting and exhaust valve are mounted on a frame which in turn is mounted on flexible rubber mountings to reduce operating noise.

Removal of the air supply unit does not require depressurisation of the air suspension system. The corner and the reservoir valves close, retaining the air in the system.

SUSPENSION

The electric motor drives a crank with an eccentric pin to which a connecting rod is attached. The connecting rod has a piston which fits in the bore of the compressor. Operation of the motor rotates the crank, moving the piston in the bore of the compressor. The compressor is attached with special bolts to the motor housing and sealed with an O-ring. The compressor has a temperature sensor located in its housing. The sensor measures the compressor temperature which is measured by the air suspension ECU.

Attached to the compressor is the air dryer which contains a silicate box for removing moisture from the compressed air. Air supplied to inflate the air springs passes through the air dryer. When the air springs are deflated, the exhaust air also passes through the air dryer, removing the moisture from the unit.

Attached to the end of the air dryer unit is a solenoid operated exhaust pilot valve. This valve is opened when the air springs are to be deflated.

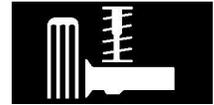
Located in the same housing as the exhaust pilot valve is a pressure limiting valve which, on systems without an external pressure relief valve, protects the air springs from over inflation. The valve is pneumatically operated, responding to air pressure applied to it to overcome pressure from a spring located behind the valve. The pressure limiting valve also operates when the exhaust pilot valve is opened, allowing air returning from the air springs to be exhausted.

The compressor is used to supply air pressure to the air suspension reservoir. The ECU monitors the pressure within the reservoir and, when the engine is running, maintains a pressure of:

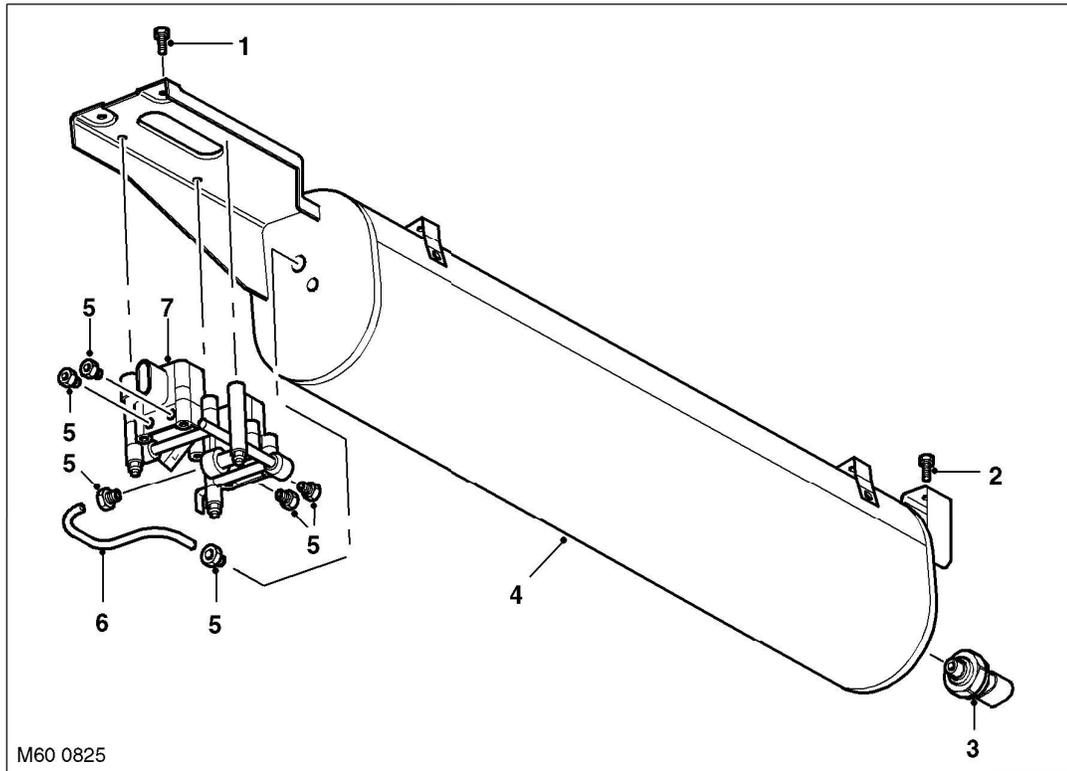
- 13.7 bar (199 lbf/in²), in systems without an external pressure relief valve
- 11.8 bar (171 lbf/in²), in systems with an external pressure relief valve

There are a number of conditions that will inhibit operation of the air suspension compressor. It is vitally important that these inhibits are not confused with a system malfunction. A full list of compressor inhibits is contained in the Air Suspension Control section.

A temperature sensor is located within the compressor. If the compressor temperature rises above set limits, the ECU will inhibit compressor operation.



Reservoir



- | | |
|------------------------------------|--|
| 1 Reservoir mounting screw – front | 5 Air hose connectors |
| 2 Reservoir mounting screw – rear | 6 Hose – reservoir pressure to valve block |
| 3 Air pressure sensor | 7 Valve block |
| 4 Reservoir | |

The air suspension reservoir is fabricated from aluminium and is located under the RH sill of the vehicle. The reservoir is secured with four bolts to the underside of the vehicle. The reservoir has an additional bracket on the forward facing end which provides the mounting for the valve block. A pressure sensor is screwed into the rear face of the reservoir. The sensor is connected to the air suspension ECU and measures the pressure within the reservoir. The pressure sensor cannot be replaced. If failure of the sensor occurs, the reservoir, complete with the sensor must be replaced.

The reservoir supplies pressurised air to the four air springs, via the valve block, to enable the air suspension system to carry out ride height changes.

Valve Block

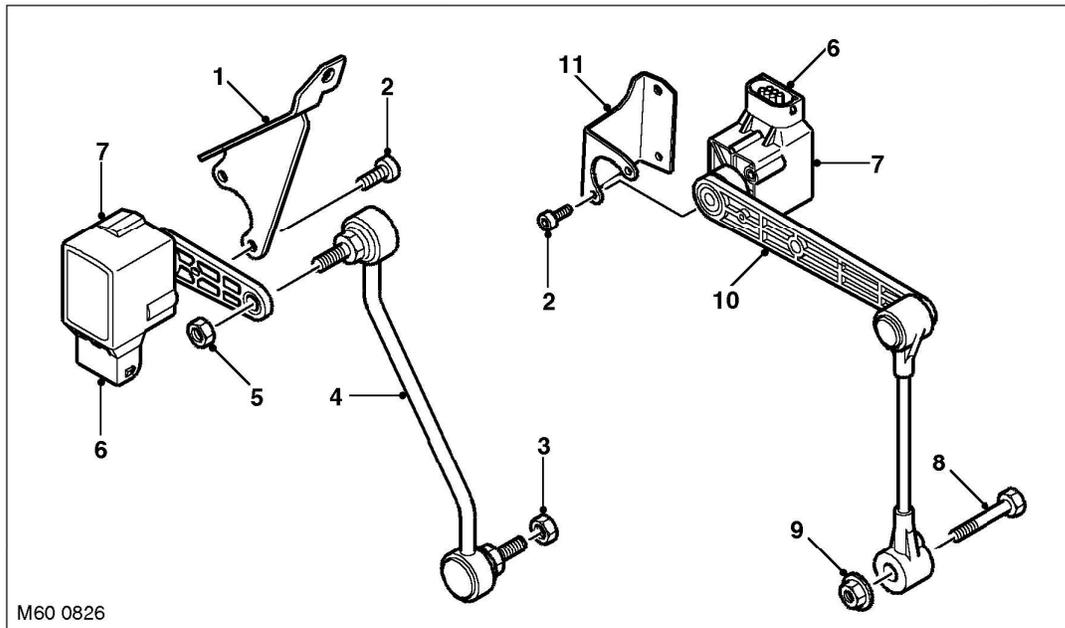
The five way air suspension valve block is located under the RH sill of the vehicle, and is mounted forward of the air reservoir. The valve block is held in place on the air reservoir support bracket by 3 studs and secured by nuts. The studs are bonded into rubber mounts which isolates solenoid operation from the vehicle.

The valve block contains five solenoid operated valves which are controlled by the air suspension ECU. Four of the valves, known as corner valves, control the air flow to and from air springs, via the cross-link valves. The fifth valve, known as the reservoir valve, controls the air pressure supply from the reservoir to the air springs, via the corner valves and cross-link valves and also from the compressor to the reservoir.

Removal of the valve block will require full depressurisation of the air suspension system. The valve block is a non-seviceable item and should not be disassembled.

SUSPENSION

Height Sensors



- | | |
|--------------------------|--------------------------|
| 1 Bracket – front sensor | 7 Sensor |
| 2 Screw | 8 Bolt |
| 3 Nut | 9 Nut |
| 4 Connecting link | 10 Connecting link |
| 5 Nut | 11 Bracket – rear sensor |
| 6 Electrical connector | |

A height sensor is fitted in each corner of the vehicle to monitor the ride height of the vehicle. The sensors are mounted on the front and rear subframes, with a mechanical link to the suspension lower arms. There are six different types of sensor fitted to Range Rover:

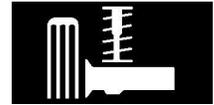
- LH front height sensor – All vehicles
- RH front height sensor – Halogen headlamps fitted
- RH front height sensor – Xenon headlamps fitted
- LH rear height sensor – All vehicles.
- RH rear height sensor – Halogen headlamps fitted
- RH rear height sensor – Xenon headlamps fitted.

NOTE: RH front and RH rear height sensors fitted to vehicles with Xenon headlamps have a white stripe across the back face of the sensor housing for identification.

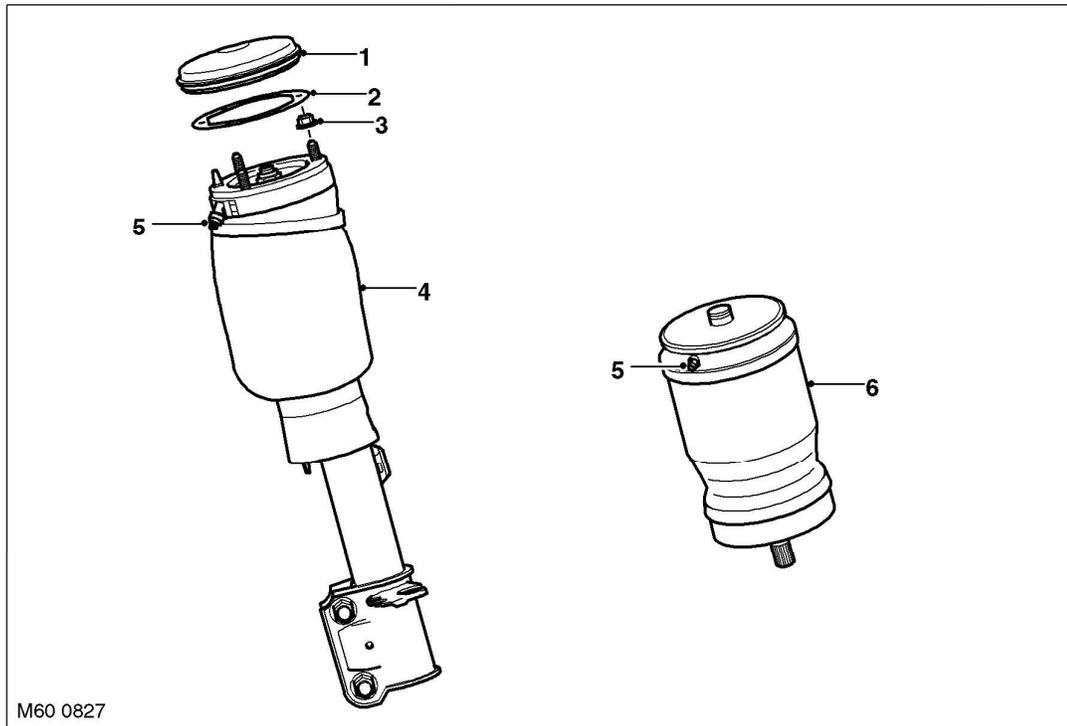
The height sensors are attached to brackets on the subframes and are connected to the lower arms by links. The links allow articulation of the arm to allow for suspension travel. Each sensor is connected by a six pin multiplug. Standard height sensors use three of the six pins and height sensors for vehicles fitted with xenon headlamps use all six.

The height sensors contain a circuit board with a Hall effect sensor. The sensor is supplied with a reference voltage from the air suspension ECU which measures the returned voltage to determine the sensor arm position. The sensors used on vehicles with xenon headlamps use a sensor with a second circuit. This second circuit is used by the xenon headlamp levelling ECU.

The front sensor ball jointed linkage is a serviceable item. The rear sensor linkage cannot be serviced and must be changed as a complete assembly.



Air Springs



- 1 Cover
- 2 Seal plate
- 3 Nut

- 4 Front air spring
- 5 Air hose connector
- 6 Rear air spring

The air springs on the front and rear suspension are similar in construction. The air springs are manufactured from a flexible rubber. Each air spring forms an air tight cavity which provides the required spring rate for each corner of the vehicle.

As the air spring is compressed, the rubber material compresses and rolls down the side of the vertical housing below the spring. An air connection port is located on the top of each spring and allows air to be added or removed from each spring. The port is connected via a Voss connector and a plastic tube to the valve block on the reservoir.

Replacement of an individual air spring does not require a full depressurisation of the air suspension system. Only the corner concerned need be depressurised.

When servicing of an air spring or a full system depressurisation is required, the weight of the vehicle must be supported before the system is depressurised. On reassembly, the air spring must be fully pressurised before the weight of the vehicle is applied to it.

Air Pipes

The system is interconnected via yellow and black nylon pipes. The yellow pipes denote RH side and the black pipes denote LH side. The pipes are attached to the subframes and vehicle body with clips. To ensure that the correct routing is maintained, the pipes have timing marks which align with various clip positions. The timing marks are in the form of a white band around the pipe, indicating the clip position. If the correct routing is not achieved, unnecessary tension at the pipe joints will occur resulting in possible early failure.

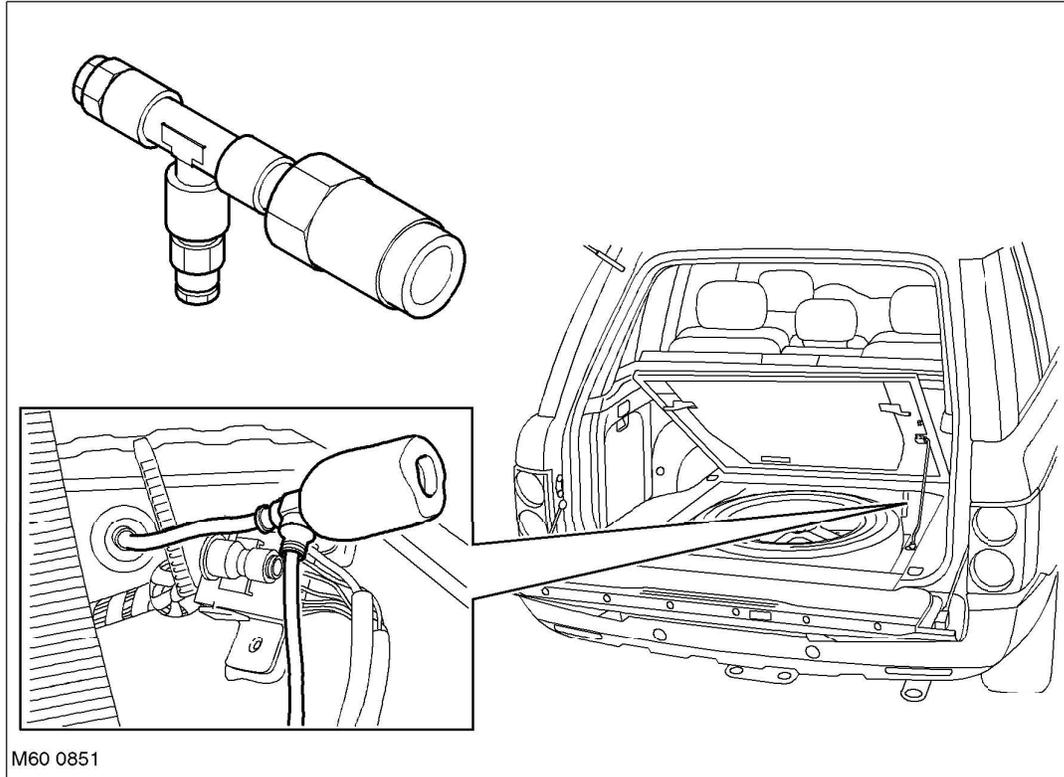
SUSPENSION

External Pressure Relief Valve

On vehicles from VIN 106310 onwards, the maximum system pressure was reduced from 13.7 to 11.8 bar (199 to 171 lbf/in²) with the introduction of a new level of software for the air suspension ECU. For systems running with the higher operating pressure, a relief valve in the air supply unit protects the subsequent components in the circuit. The relief valve in the air supply unit became redundant with the introduction of the lower maximum system pressure, so an external pressure relief valve was introduced to maintain protection.

The external pressure relief valve is installed in the air pipe between the compressor and the reservoir, in the front right corner of the spare wheel well. If the pressure of the air from the compressor increases to 12.3 bar (178 lbf/in²), the external pressure relief valve opens and releases excess pressure to atmosphere.

External Pressure Relief Valve Location



Leak Detection

Leak detection can be carried out using a Land Rover approved leak detection spray.

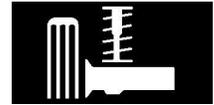
If the vehicle appears to be leaking, perform a leak check on all aspects of the system, i.e.; air spring hose fittings and the associated connections on the valve block and cross-link valve, air springs, reservoir. Failure to correctly diagnose leakage will result in unnecessary exchange of serviceable components and recurrence of original problem.

Air Suspension ECU

The air suspension ECU monitors vehicle ride height via four height sensors. The ECU has three modes of operation:

- Normal
- Periodic Wake-Up
- Transportation.

When a new air suspension ECU is fitted, the air suspension system will not function until configured with TestBook/T4.

**Normal Mode**

The air suspension ECU will enter normal mode when it receives a 'wake up' signal from the Body Control Unit (BCU). The BCU will provide the 'wake up' signal when the following occurs:

- A door is opened.
- The vehicle is unlocked using the remote handset.
- The ignition is switched on.

The BCU will continue to supply the 'wake up' signal for 15 minutes after the ignition is switched off. The air suspension ECU will then remain active for a further 10–15 seconds to enable any new data to be written to its Electronic Erasable Programmable Read Only Memory (EEPROM).

If the BCU has supplied a 'wake up' signal, but the ignition is off, the air suspension ECU will enter an Inactive Mode. Under these circumstances, air suspension functionality is reduced. Although the air suspension ECU will continue to monitor vehicle ride height and make any necessary adjustments, to keep the vehicle at the correct height, all ride height selections made via the rotary switch will be ignored. The ECU will not illuminate the LED's or allow the compressor to fill the reservoir. If a height increase is necessary and the pressure in the air reservoir is below 9 bar (130 lbf/in²), the ECU will power the compressor to raise the vehicle back to the correct height.

If the ignition is switched on but the engine is not running, the air suspension ECU will continue to monitor vehicle ride height and make any necessary adjustments. Downwards ride height selections made via the rotary switch will be accepted, and the LED's will illuminate as normal. Upward ride height selections made via the rotary control switch will be rejected. However, if the vehicle height decreases (e.g. if a load is added to the car), the ECU will return the vehicle to the current ride height. These height changes are made using the air suspension reservoir providing the available air pressure is more than 9 bar (130 lbf/in²). If the air pressure is less than 9 bar (130 lbf/in²), the compressor is used for the height changes. Filling of the reservoir remains inhibited.

Periodic Wake-Up Mode

When the 'wake up' signal is removed by the BCU, the air suspension ECU powers down. After it powers down, the air suspension ECU will wake up approximately every six hours and level the vehicle ride height. The air suspension ECU will determine which corner of the vehicle is lowest, and adjust the remaining corners to the same level. This action takes approximately 6–10 seconds to perform. The air suspension ECU will then remain active for a further 10–15 seconds to enable any new data to be written to its EEPROM.

If the air suspension ECU fails to level the vehicle (if there is an obstruction beneath the vehicle for instance), periodic wake-up mode will be suspended until the air suspension ECU receives a wake-up signal from the BCU.

NOTE: The air suspension ECU will not raise the vehicle in this mode.

Transportation Mode

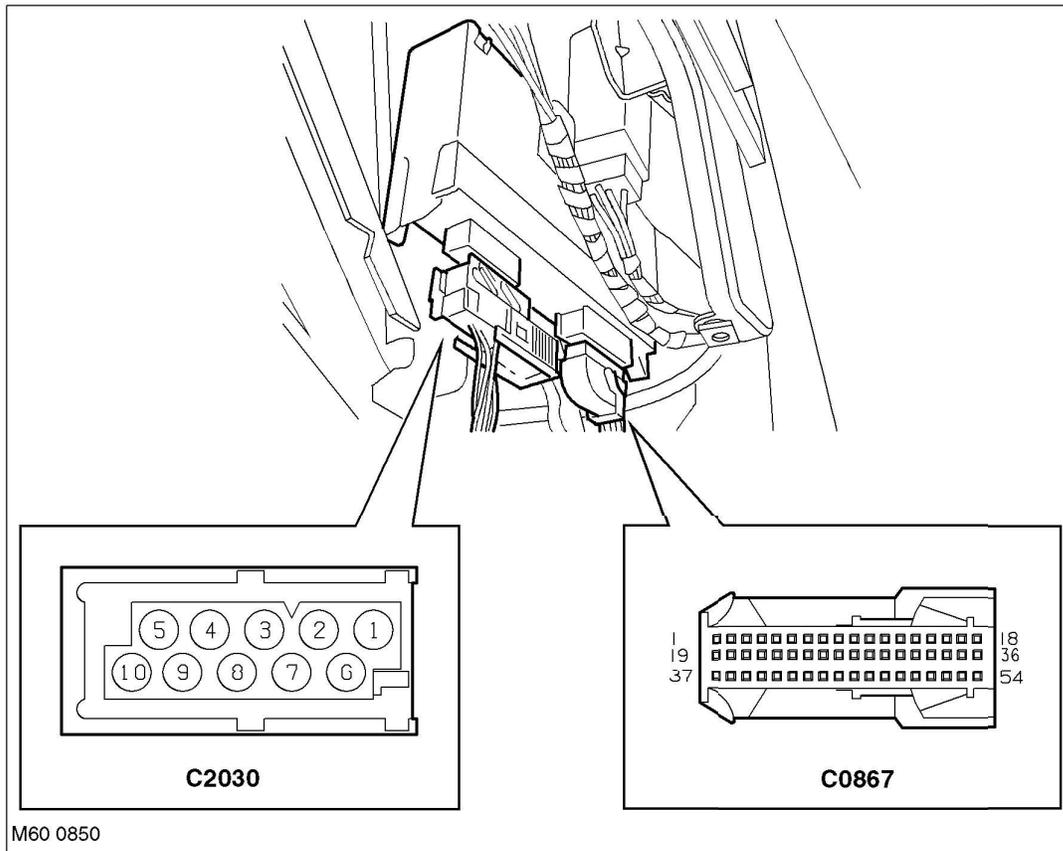
To enable the vehicle to be delivered safely from the factory to the dealership, the air suspension system is set in transportation mode. When the engine is running, the ride height will be set at 'Transportation High', which is 20 mm below standard ride height. All four LED's will remain illuminated.

When the engine is not running, the air suspension ECU will drop the ride height by 40 mm (Transportation Low). All four LED's will flash.

When the ride height is at 'Transportation Low' the vehicle can be lashed to a transporter, without the risk of loosening due to the suspension ride height lowering.

SUSPENSION

Air Suspension ECU Harness Connectors



M60 0850

Air Suspension ECU Harness Connector C0867 Pin Details

Pin No.	Description	Input/Output
1	Not used	–
2	CAN bus high	Input/Output
3	Control switch up selection	Input
4	Control switch hold selection	Input
5	Control switch motorway ride height LED	Output
6	Front RH corner valve control	Output
7	Front LH and RH corner valves power supply	Output
8	Front LH corner valve control	Output
9	Rear RH corner valves control	Output
10	Rear LH and RH corner valves power supply	Output
11	Rear LH corner valve control	Output
12	Reservoir valve control	Input
13	Reservoir valve power supply	Output
14	Exhaust pilot valve power supply	Output
15	Exhaust pilot valve control	Output
16	Air suspension compressor rrelay control	Output
17	High pressure exhaust valve power supply	Output
18 and 19	Not used	–
20	CAN bus low	Input/Output
21	Control switch down selection	Input
22	Control switch off-road ride height LED	Output
23	Control switch access ride height LED	Output



Pin No.	Description	Input/Output
24	Front RH height sensor signal	Input
25	Front LH height sensor signal	Input
26	Rear RH height sensor signal	Input
27	Rear LH height sensor signal	Input
28	Air pressure sensor signal	Input
29 and 30	Not used	-
31	Temperature sensor	Input
32	Front LH height sensor power supply	Output
33	Front RH height sensor power supply	Output
34	Air pressure sensor power supply	Output
35	High pressure exhaust valve control	Output
36	Not used	-
37	K bus	Input/Output
38	Wake up signal	Input
39	Access mode selection switch (on driver's door module)	Input
40	Control switch standard ride height LED	Output
41	Control switch hold switch LED	Output
42	Front RH height sensor ground	-
43	Front LH height sensor ground	-
44	Rear RH height sensor ground	-
45	Rear LH height sensor ground	-
46	Air pressure sensor ground	-
47 and 48	Not used	-
49	Temperature sensor ground	-
50	Rear RH height sensor power supply	Output
51	Rear LH height sensor power supply	Output
52 to 54	Not used	-

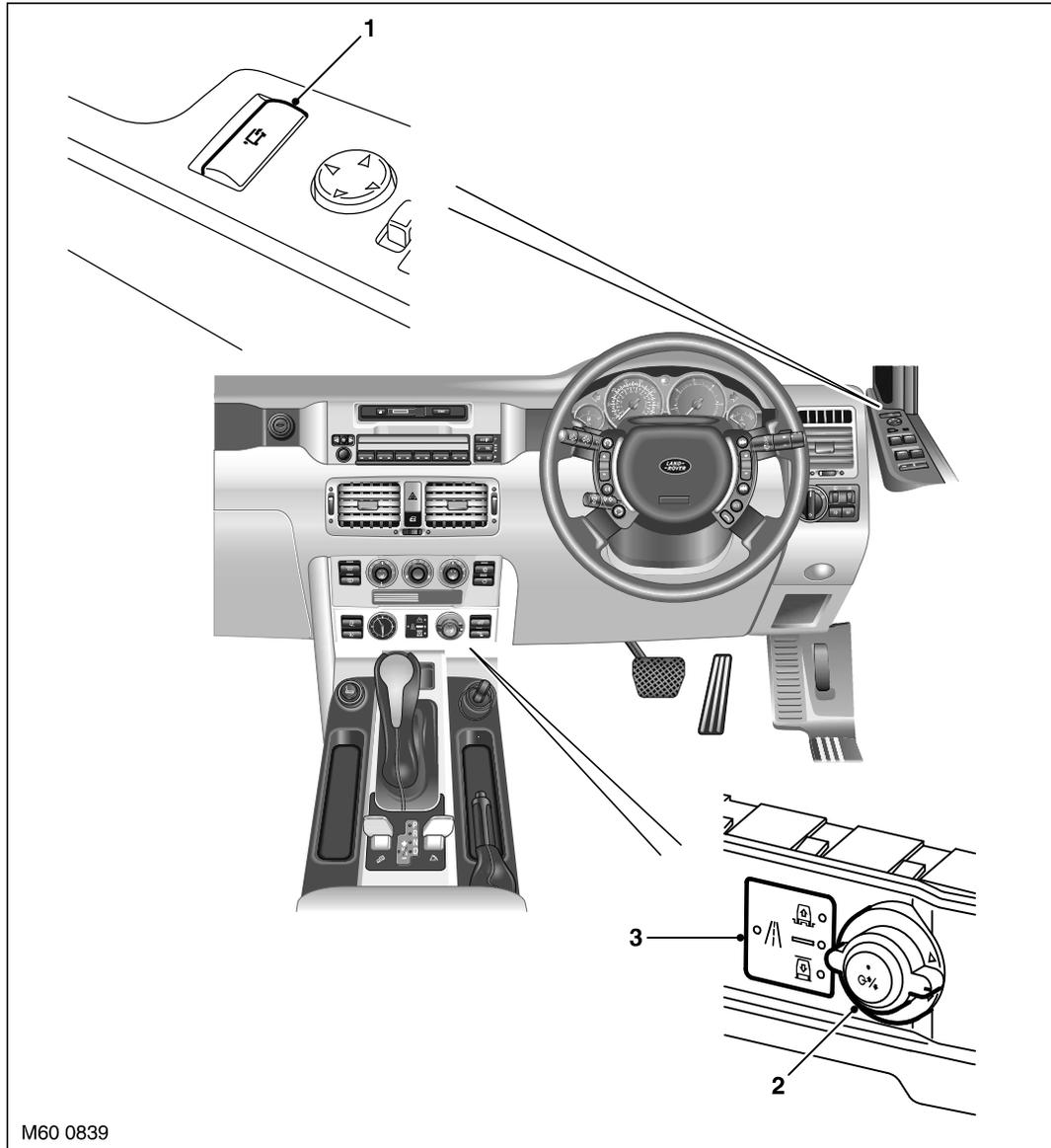
Air Suspension ECU Harness Connector C2030 Pin Details

Pin No.	Description	Input/Output
1	Not used	-
2	Front cross link valve control signal	Output
3	Rear cross link valve control signal	Output
4	Not used	-
5	Ground	-
6	Not used	-
7	Rear cross link valve power supply	Output
8	Front cross link valve power supply	Output
9	Not used	-
10	Battery power supply	Input

SUSPENSION

Air Suspension Control

Air Suspension Control Switch



- 1 Driver's door module access switch
- 2 Air suspension rotary control switch

- 3 Air suspension LED display

The air suspension ECU is able to provide four different ride heights:

- Standard
- Off-road
- Motorway
- Access.

The ride heights are selected via the rotary control switch mounted on the centre console. Rotating the switch upwards or downwards selects a different ride height (providing all the criteria outlined below are met). The centre of the rotary switch contains the 'Hold' switch. The 'Hold' switch prevents the air suspension ECU from automatically changing from the currently selected ride height, and prevents the user selecting a new ride height.