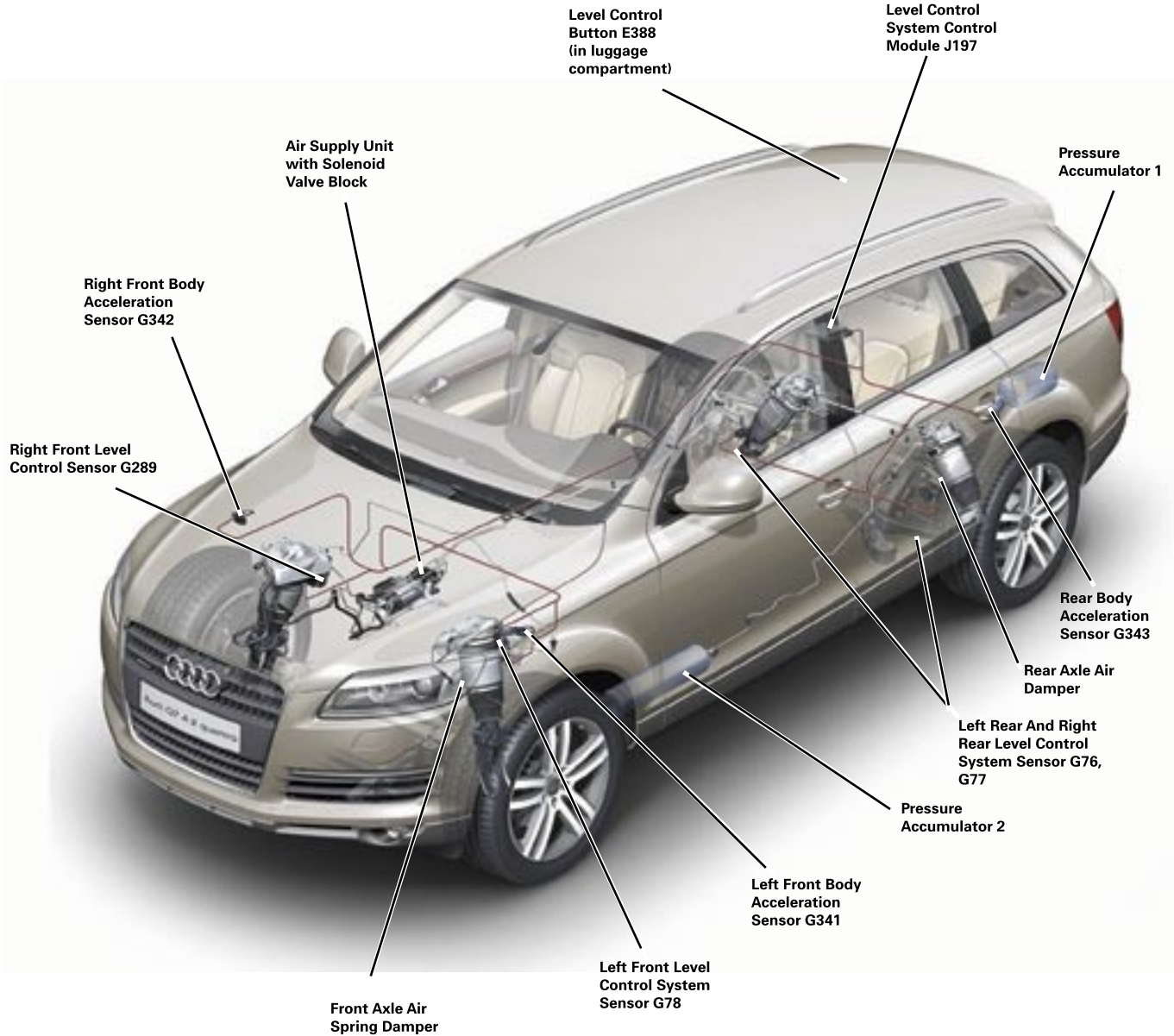


Adaptive Air Suspension

Overview

With the exception of the springs and dampers, the axle components are the same as those of the steel spring suspension. The PR number for the AAS is BK.

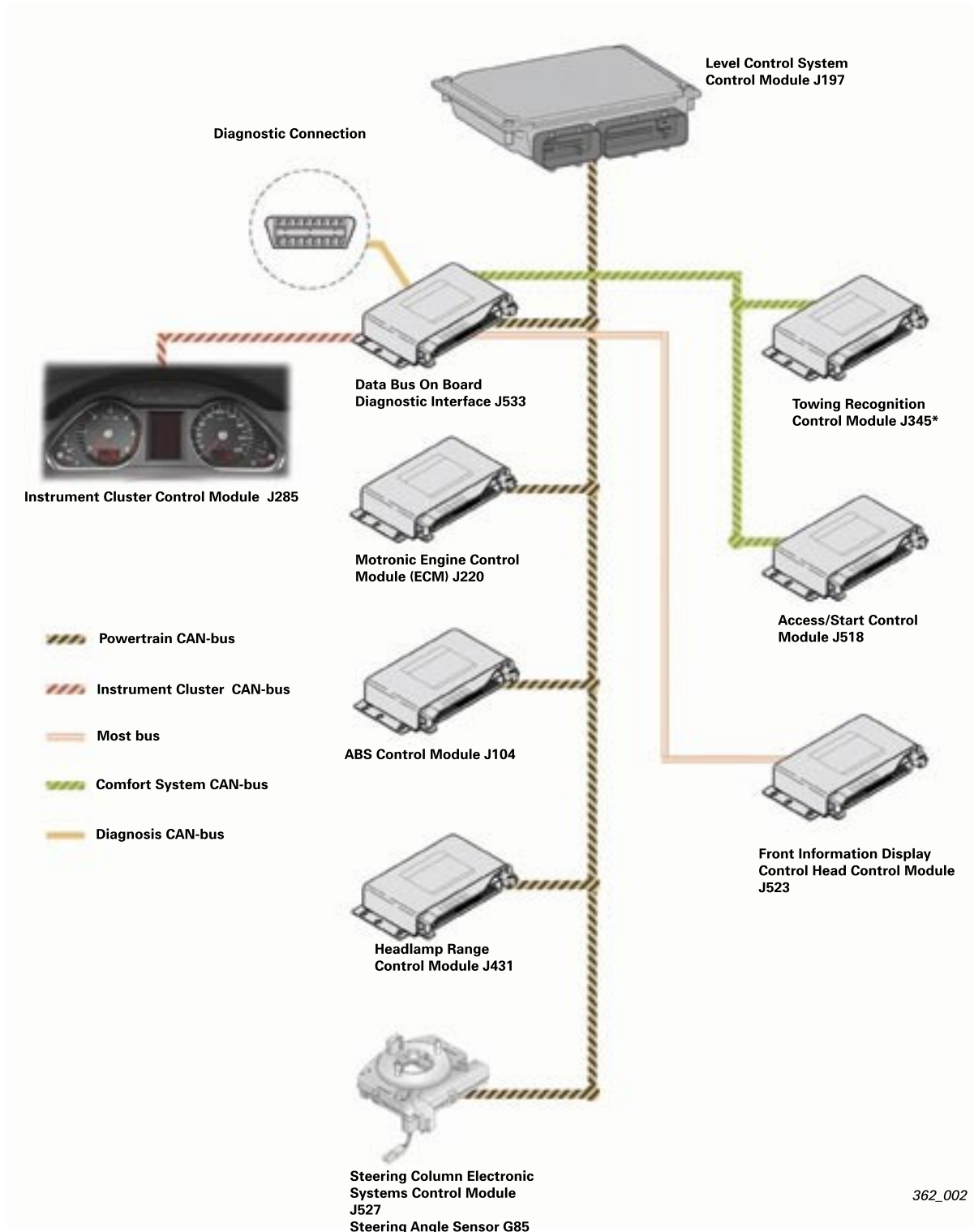


362_001

Adaptive Air Suspension

Overview

System Overview of Networked Components



362_002

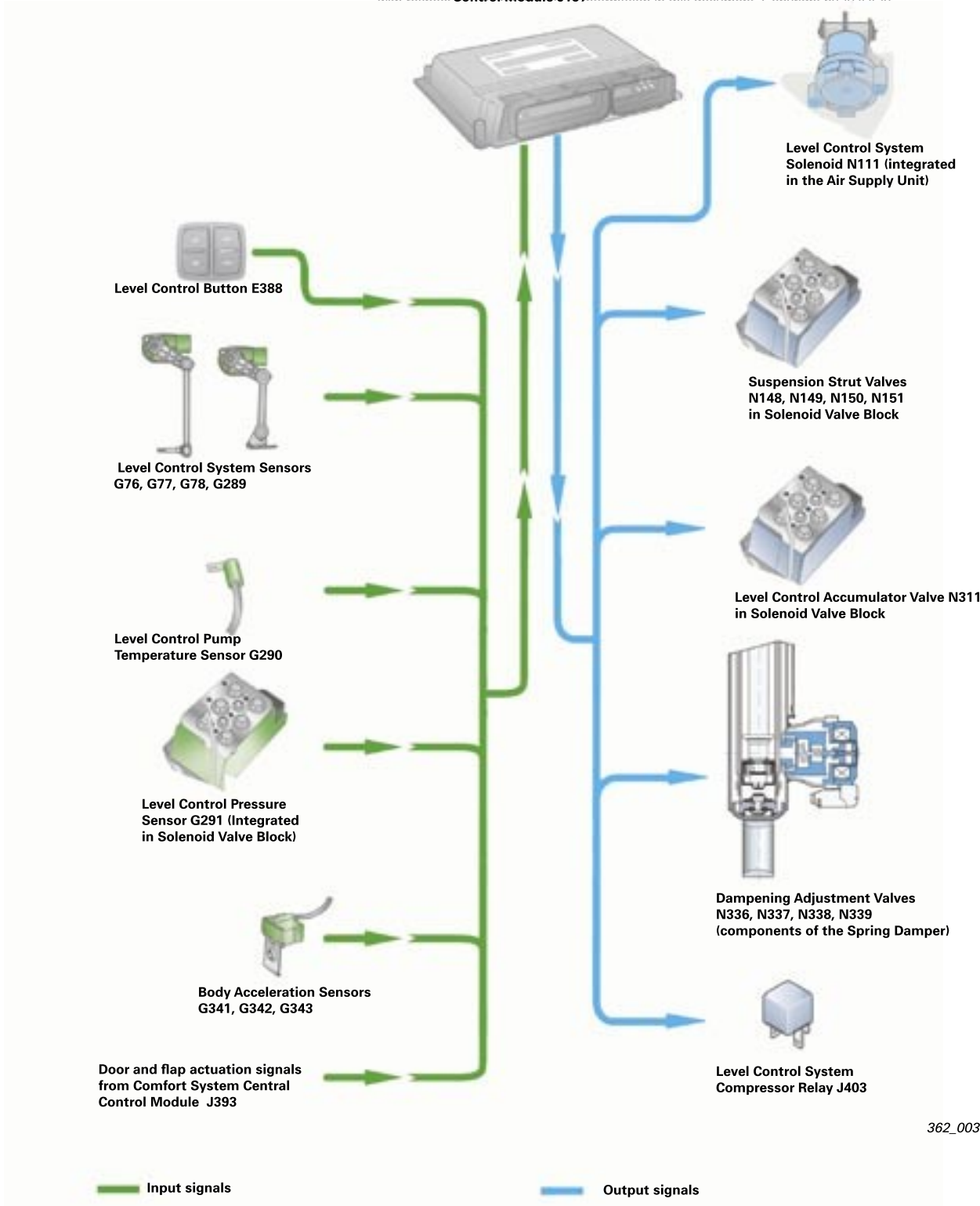
*Trailer towing equipment information was not available at the time of publication. Please consult the appropriate repair manual for the latest information.

Overview



System Overview of Non-Networked Components

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362_003

Adaptive Air Suspension

Overview

Design differences vs. the Adaptive Air Suspension system of the Audi A6

- Two pressure accumulators are used instead of one
- The air supply lines have a larger cross-section (Ø8mm instead of Ø6mm)
- All air lines are molded parts and are not routed in the wiring harness
- The design of the system components is partially modified (due to a different supplier)

Operational Differences vs. the Adaptive Air Suspension system of the Audi A6

- Additional "off-road" mode
- Additional lowering of the rear axle by 1.77 in (45 mm) below normal level for easier loading
- Modified control strategy
- Modified operational and display elements

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System Components

Level Control System Control Module J197

The Control Module is located in the rack on the right side of the luggage compartment. From the input signals, the Control Module determines the signals required to activate the damper valves, the compressor, the pneumatic switching valves and the driver information displays.

The geometry and design of the Control Module are identical to those of the Control Module used in the Audi A6.

An additional signal, compared to those of the Audi A6 and A8L, is the signal coming from the Level Control Button E388 in the luggage compartment for lowering the rear of the vehicle in the loading mode.



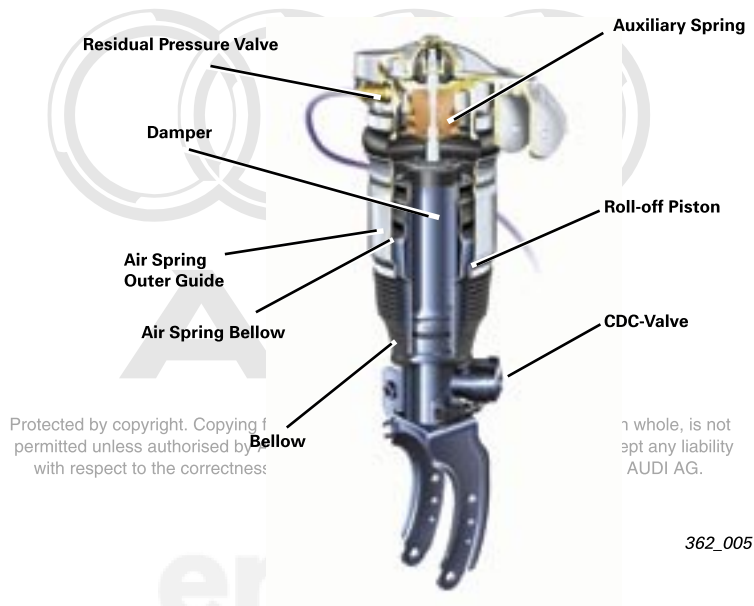
362_004

System Components

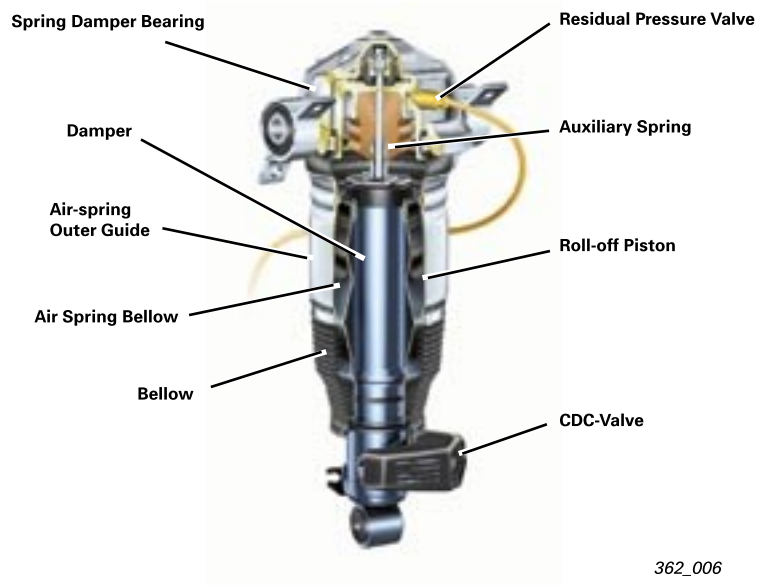
Air Spring Dampers

Air spring dampers are used on the front and rear axles of the Audi Q7. There is no separate spring-damper arrangement as on the Audi A6. The roll-off piston geometry and the damper settings were modified for use in the Audi Q7.

The Residual Pressure Valves ensures that a minimum pressure of about 50 psi (3.5 bar) is maintained in the air springs even if there is a serious leak in the system.



Rear Axle Air-Spring Damper



Adaptive Air Suspension

System Components

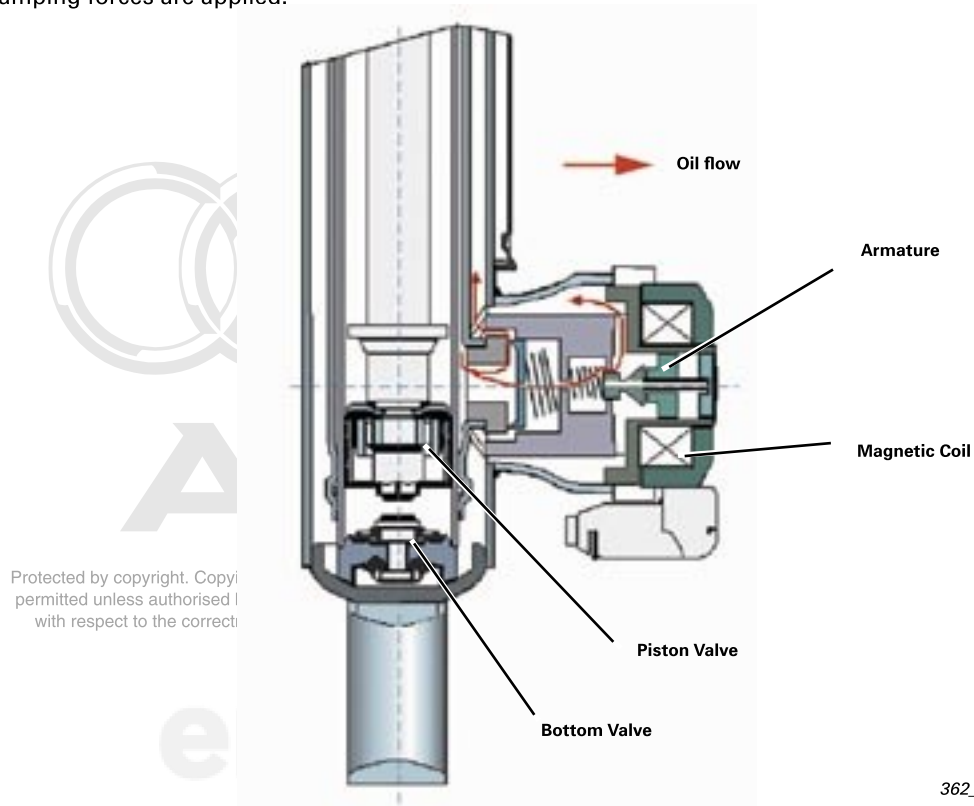
Air Spring Damper CDC Valve

Damping is controlled by a CDC valve (Continuous Damping Control). The valve is mounted externally on the damper tube.

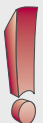
Operation

If the CDC valve is not energized, the slide valve and the cylinder are locked by spring forces in the illustrated position. In this position, damper oil can flow through a defined cross-sectional port from the piston chamber into the compensating chamber (=medium damping force).

The Armature is shifted by applying current to the Magnetic Coil. This changes the opening cross-sections for the damper oil. Large cross sections with therefore low damping forces are achieved with low activation currents (starting at 600 mA). When higher activation currents are applied (from about 1000 mA to about 2000 mA) higher damping forces are applied.



362_008



Note

In the event of a system failure, the valve is de-energized. As a result, the dampers are set to medium settings and the vehicle remains stable.

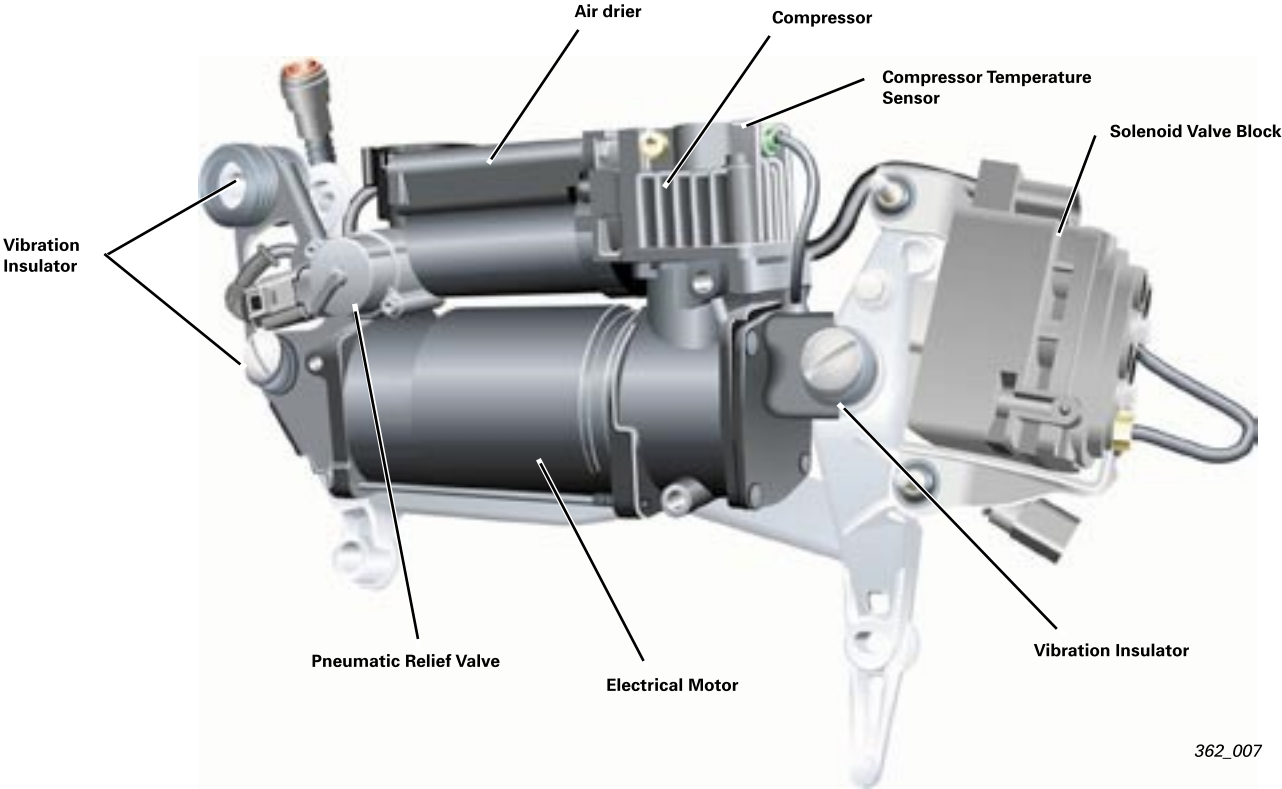
System Components

Air Supply

The air supply unit is installed together with the Solenoid Valve Block on a common bracket, on the vehicle floor, on the right front side of the vehicle.

The maximum system pressure is 240 psi (16.5 bar). The maximum Compressor operating time is determined by its temperature, which is monitored constantly by a sensor as in the Audi A6 and A8L.

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362_007

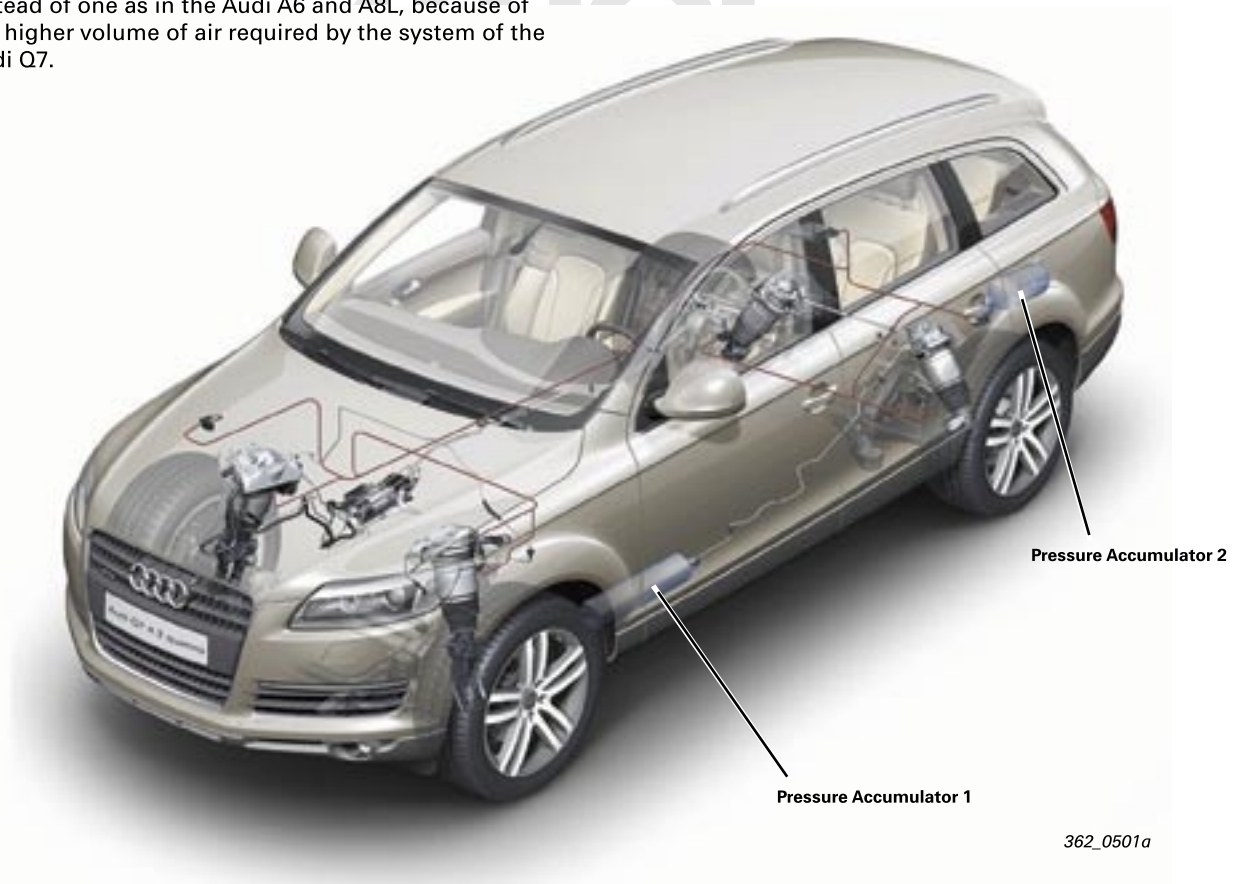
Adaptive Air Suspension

System Components

Pressure Accumulators

The Pressure Accumulators have the following functions:

- Implementation of the vehicle controls (raising the vehicle level) without activating the compressor, thereby reducing the internal noise level, reducing the compressor temperature, and therefore, increasing the availability of the compressor.
- Correction of the vehicle level after occupants exit the vehicle, after 2, 5 and 10 hours as required.
- In the Audi Q7, two pressure accumulators are used instead of one as in the Audi A6 and A8L, because of the higher volume of air required by the system of the Audi Q7.



The pressure accumulators are made of aluminum. The volumes of the front and rear accumulators are 5.2 liters and 4.8 liters respectively. In order to perform a level control with the accumulators, the air pressure in the accumulators must be 43 psi (3 bar) higher than the air pressure in the associated air spring.

The compressor will start and fill the accumulators under the following conditions:

- accumulator pressure drops to approximately 178 psi (12.3 bar) while the system is active and the engine is running and the vehicle speed is higher than 22 mph (35 km/h.)

System Components

Sensors

The vehicle level and the acceleration of the unsprung masses are measured by the vehicle level sensors, as in the Audi A6 and A8L.

Four of these sensors are used on the Audi Q7. They can be monitored through the Measuring Value Blocks using the VAS Scan Tools.



362_079

The acceleration of the vehicle body (acceleration of the sprung masses), is measured by the body acceleration sensors, like in the Audi A6 and A8L.

Two sensors are installed at the front of the vehicle. One in each front wheel housing. A third sensor is located in the rear of the vehicle, in the luggage compartment, on the left side of the spare tire well.



362_077



Audi

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erWin

Adaptive Air Suspension

Vehicle Ride Heights

“Automatic” Mode

In this mode, the vehicle is at its basic height. The damper setting is a compromise between comfortable and sporty and is therefore an optimum setting for most driving situations on paved roads.

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“Comfort” Mode

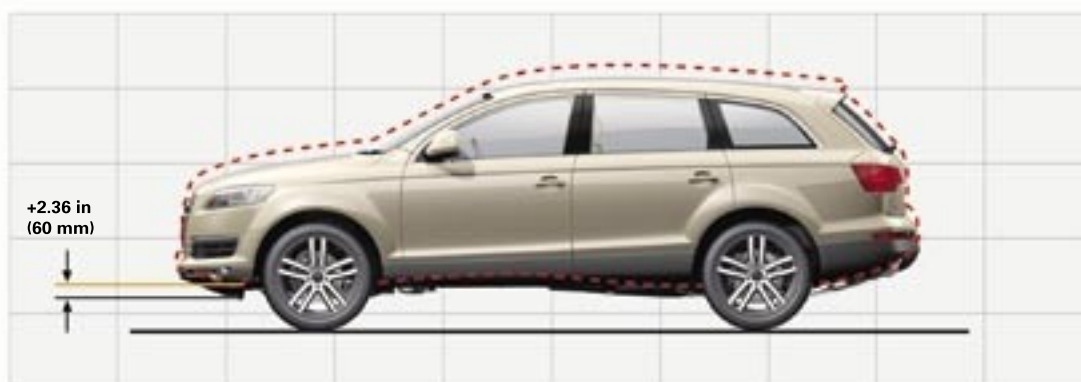
The vehicle is at its basic height, the damper setting is comfort oriented.



362_015

“Lift” Mode

The vehicle is 2.36 in (60 mm) higher than in “automatic” mode, with the same spring and damper settings as in the “automatic” mode.



362_016

Vehicle Ride Heights

“Off-road” Mode

The vehicle is 1 in (25 mm) higher than in “automatic” mode. Numerous ESP functions for improving traction (refer to ESP) are automatically activated. This mode was developed especially for off-road operation.



362_017

“Dynamic” Mode

The vehicle is .6 in (15 mm) lower than in “automatic” mode. The damper control is set to sporty driving.



362_018

“Loading” Mode

In order to improve the vehicle’s ergonomic loading characteristics, the vehicle rear end is lowered by 1.77 in (45 mm) at the rear axle. It is not possible to drive the vehicle in this mode.



362_019



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Adaptive Air Suspension

Vehicle Levels - Modes

“Loading” Mode

The “loading” mode allows the rear of the vehicle to be lowered to make loading of objects into the luggage compartment easier. The “loading” mode can be activated with the MMI or the button at the rear of the vehicle.

This function:

- Can only be activated with the MMI if all the doors are closed.
- Can only be activated by the button on the right hand side of the luggage compartment when all the vehicle doors are closed and the tailgate is open.

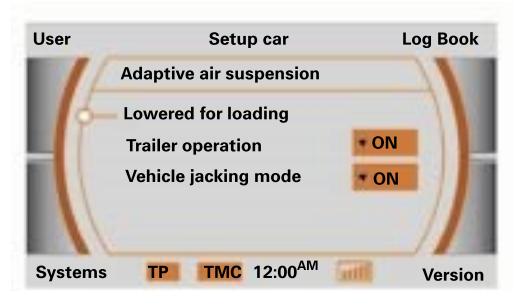


In order to clearly identify when the vehicle is in an active loading mode, the vehicle symbol (illustration on the right) is replaced by the illustration shown below.

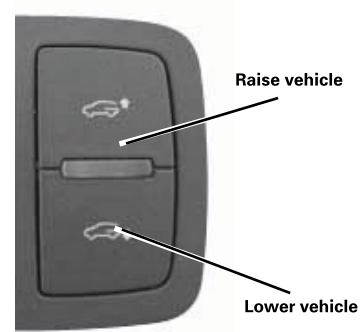
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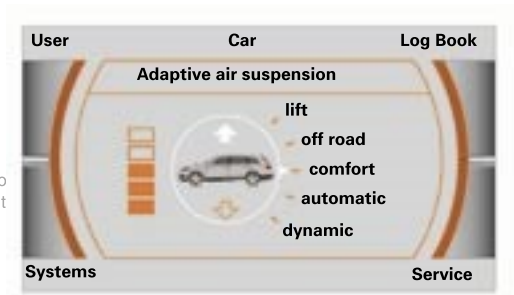
No bars are displayed since the loading level is below the level for vehicle operation.



362_020



362_021



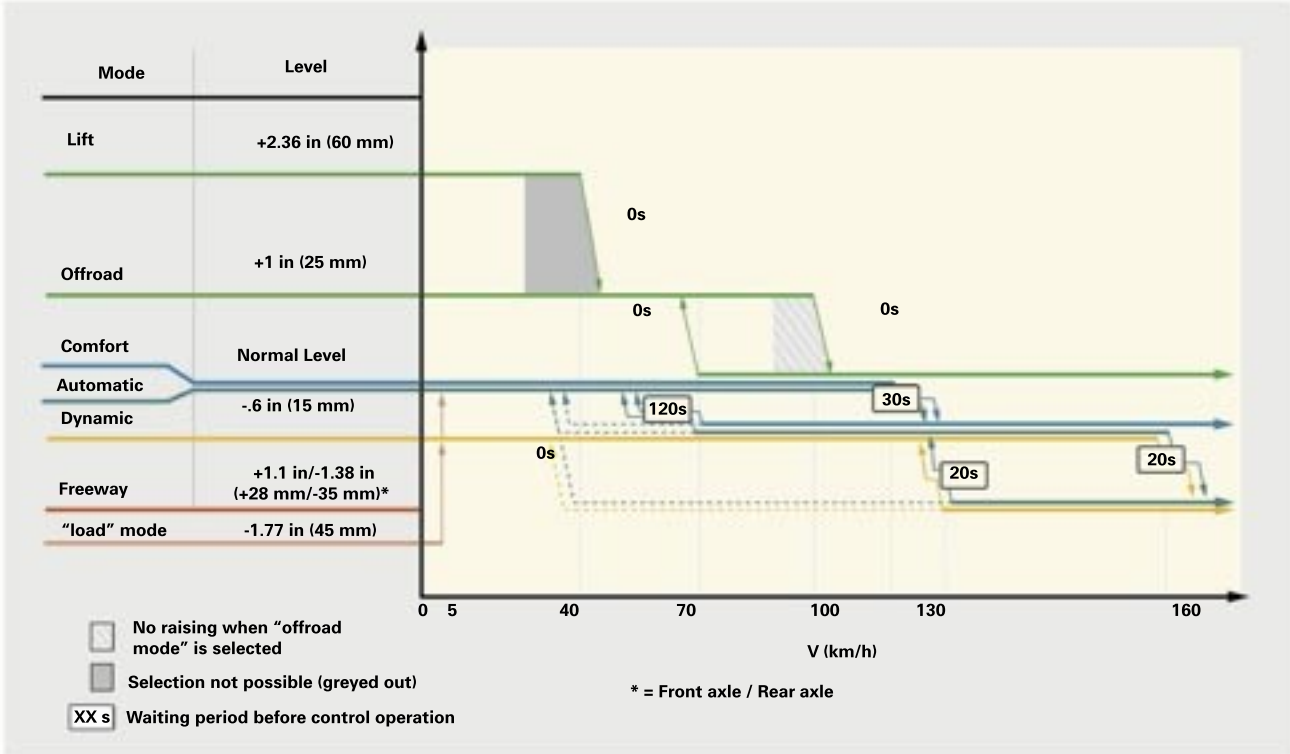
362_027



362_023

Control Characteristics

Control Characteristics without trailer



362_024



Adaptive Air Suspension

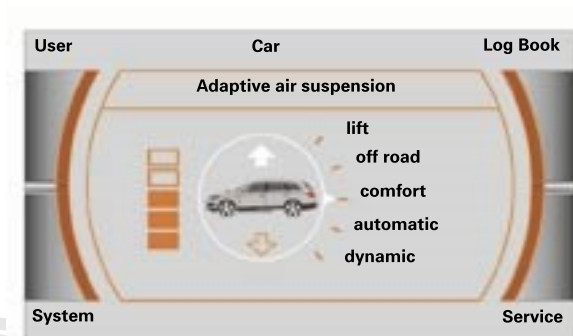
Operation and Displays

Like in the A8L, the Adaptive Air Suspension is operated using the CAR and SETUP buttons and the MMI control knob.



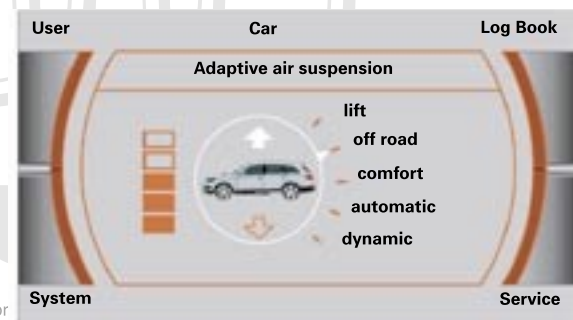
362_026

A new component of the display in the MMI is the additional indicator bar at the left of the vehicle icon. It shows the current vehicle level.



Display in vehicle equipped with MMI

362_027



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362_028

Operation and Displays

A new feature is the temporary display in the center of the instrument panel insert.

The activations of the indicator bar, the target marker and the control arrow are similar to those on the MMI display.

This display can be selected manually with the Reset button on the windshield wiper lever.



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Display in vehicle equipped with highline instrument cluster

362_029

The display is shown automatically when:

- the Off-road mode is selected
- the Lift mode is selected\



Note

The lift mode is exited automatically when the speed threshold is exceeded.

Like in the Audi A6 and A8L, there are two warning lights in the instrument panel insert. They indicate the following conditions:

Yellow warning light (continuous):

- in load mode
- in vehicle jacking mode (level control switched off)
- in the event of system faults
- vehicle is extremely high (when the vehicle is more than 3.15 in (80 mm) above normal level, the warning light flashes)
- during final control test and basic adjustment in service workshop

Green light:

- loading level activated
- dynamic driving mode was selected (display duration about 15 secs.)
- under extreme vehicle load, more than 1 in (25 mm) below normal level (except in "dynamic" mode)

Both lamps (flashing):

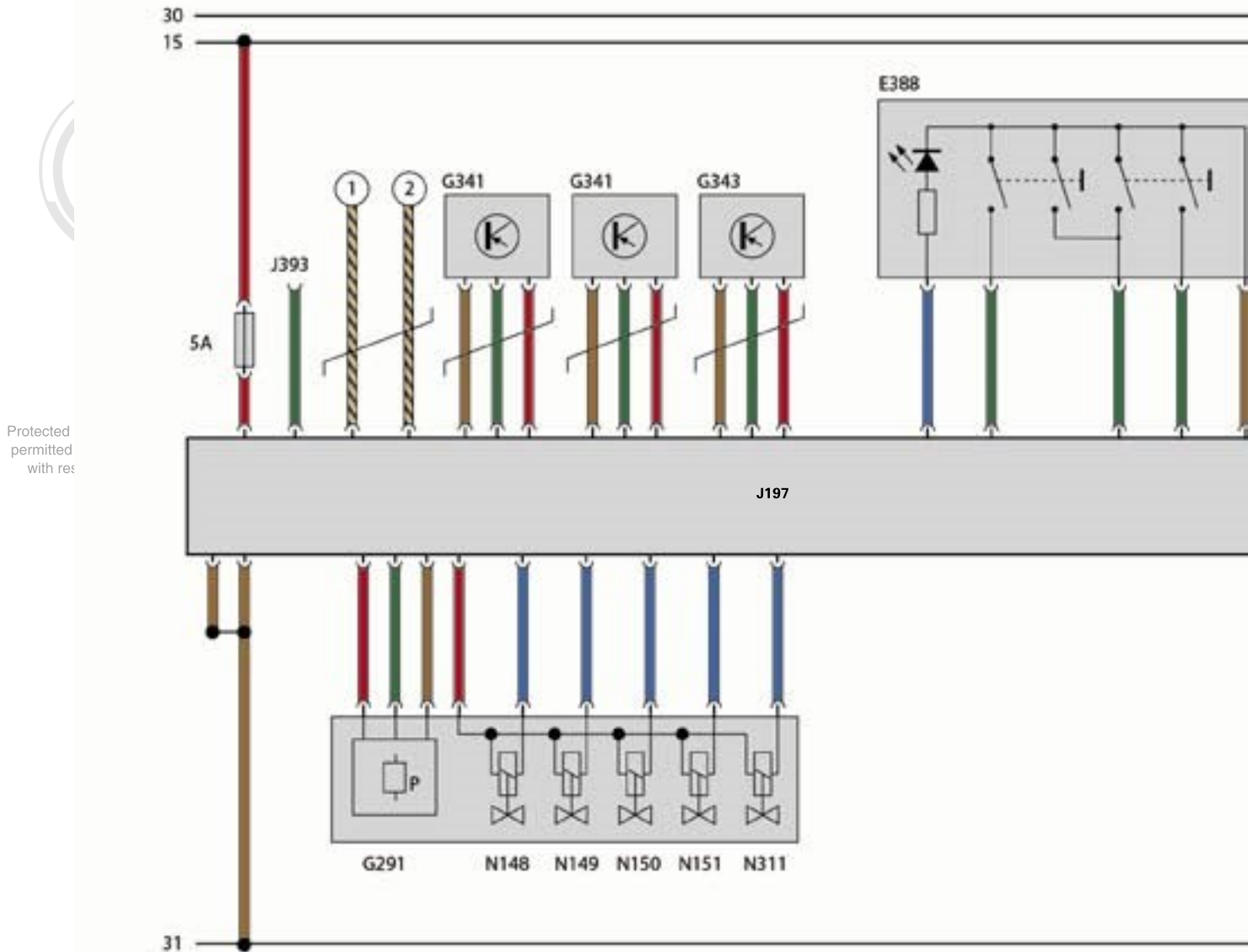
- vehicle extremely heavily loaded (more than 2.56 in (65 mm) below normal level)



362_031

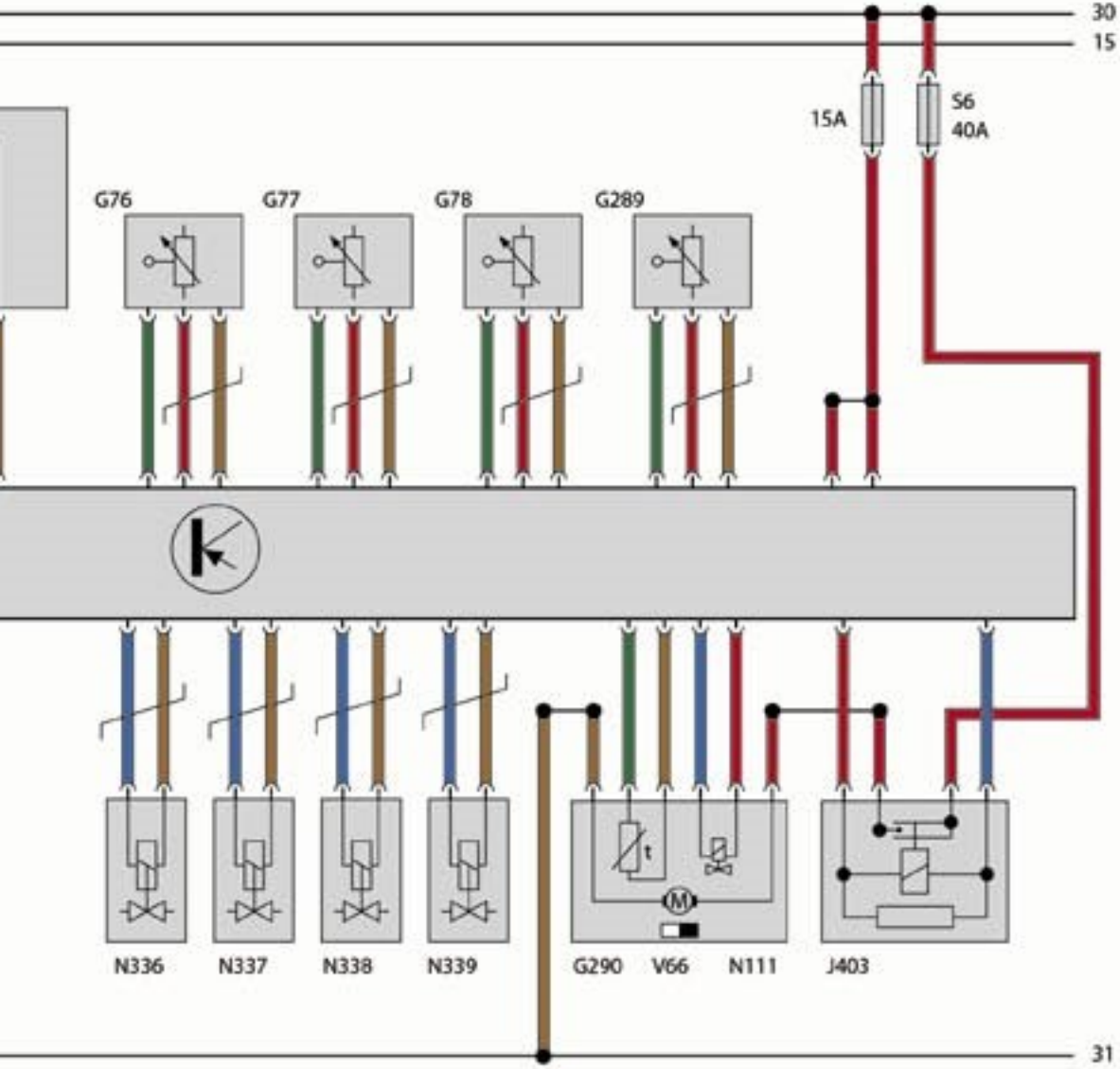
Adaptive Air Suspension

Function diagram



J197 Level Control System Control Module
 G76 Left Rear Level Control System Sensor
 G77 Right Rear Level Control System Sensor
 G78 Left Front Level Control System Sensor
 G289 Right Front Level Control System Sensor
 G290 Level Control Pump Temperature Sensor
 G291 Level Control Pressure Sensor
 J393 Comfort System Central Control Module
 G341 Left Front Body Acceleration Sensor
 G342 Right Front Body Acceleration Sensor
 G343 Rear Body Acceleration Sensor
 J403 Level Control System Compressor Relay

N111 Level Control System Solenoid
 N148 Left Front Suspension Strut Valve
 N149 Right Front Suspension Strut Valve
 N150 Left Rear Suspension Strut Valve
 N151 Right Rear Suspension Strut Valve
 N311 Level Control Accumulator Valve
 N336 Left Front Dampening Adjustment Valve
 N337 Right Front Dampening Adjustment Valve
 N338 Left Rear Dampening Adjustment Valve
 N339 Right Rear Dampening Adjustment Valve
 V66 Level Control System Compressor Motor
 E388 Level Control Button



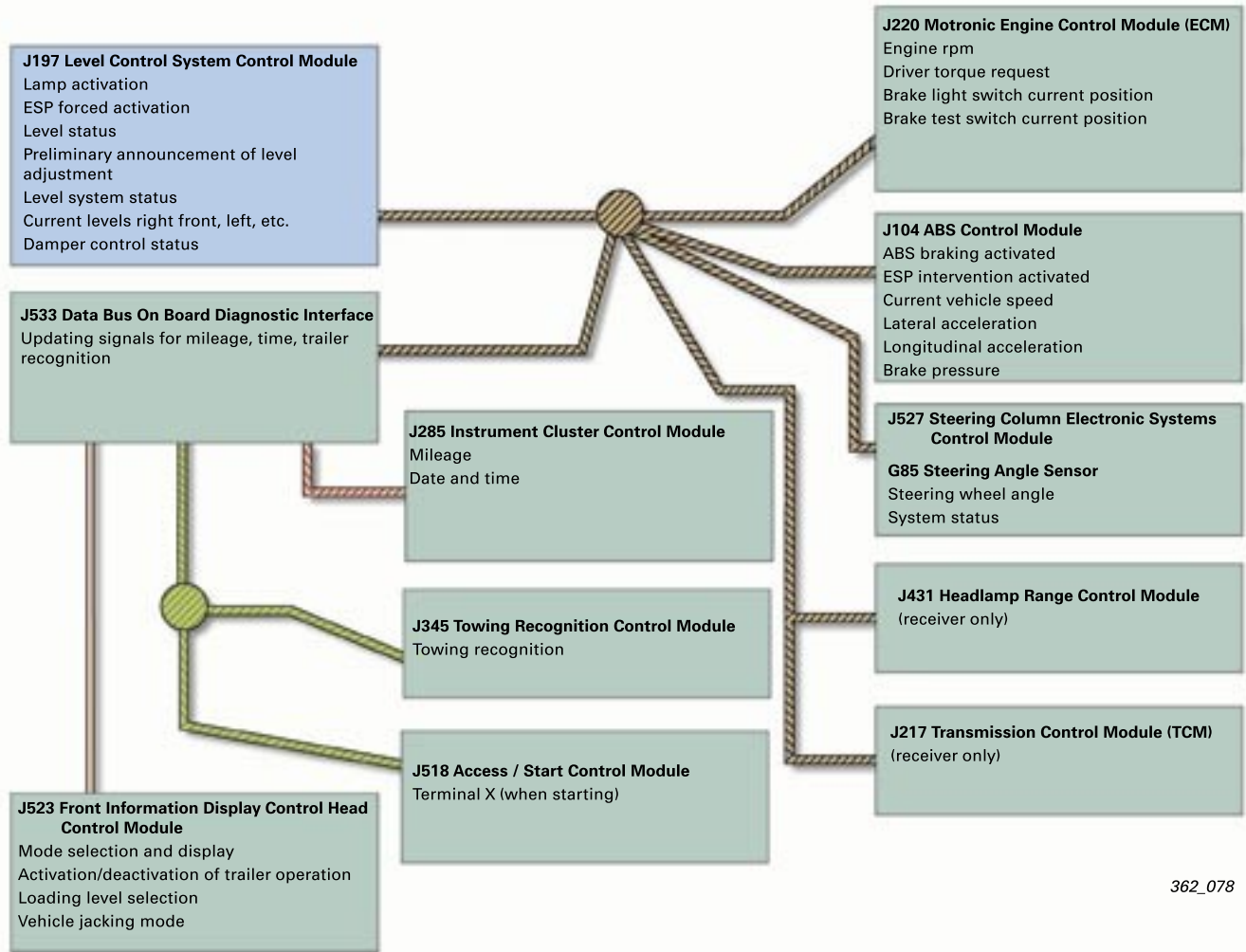
Color Coding







- Input Signal
- Output Signal
- + Power Supply
- Ground
- CAN bus
- 1 CAN-high
- 2 CAN low

362_033

Adaptive Air Suspension

CAN Information Exchange



-  Powertrain CAN-bus
-  Instrument Cluster CAN-bus
-  Comfort System CAN-bus
-  Most bus
-  Information sent by J197
-  Information received by J197