

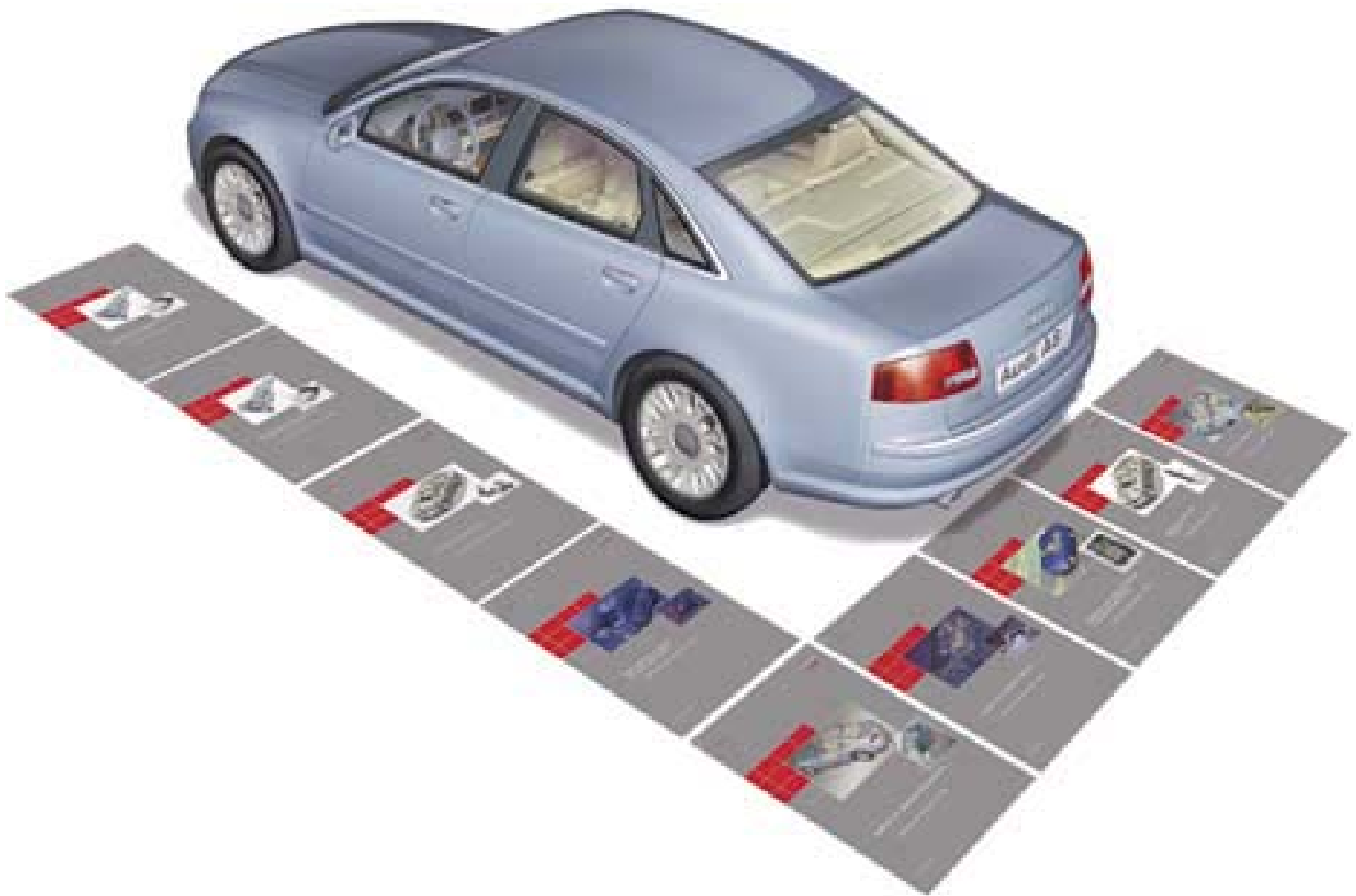


## AUDI A8 '03 - Technical Features

### Self Study Programme 282

## Complete vehicle information

The design and operation of the Audi A8 '03 are described in the following Self Study Programmes:



- SSP 283 – 6-speed automatic gearbox 09E in the Audi A8 '03 - Part 1
- SSP 284 – 6-speed automatic gearbox 09E in the Audi A8 '03 - Part 2
- SSP 285 – Running gear in the Audi A8 '03
- SSP 286 – New data bus systems - LIN, MOST, Bluetooth™
- SSP 287 – Audi A8 '03 - Electrical components
- SSP 288 – Audi A8 '03 - Distributed functions
- SSP 289 – Adaptive cruise control in the Audi A8 '03
- SSP 292 – Adaptive air suspension in the Audi A8 '03
- SSP 293 – Audi A8 '03 - Infotainment



Other helpful information on the Audi A8 '03 can be found on the adjacent CD ROMs.



Electrical system



CAN data bus 2



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The Self Study Programme contains information on design features and functions.

**The Self Study Programme is not intended as a Workshop Manual. Values given are only intended to help explain the subject matter and relate to the software version applicable at the time of SSP compilation.**

Use should always be made of the latest technical publications when performing maintenance and repair work.

**New**



**Attention  
Note**



# Introduction



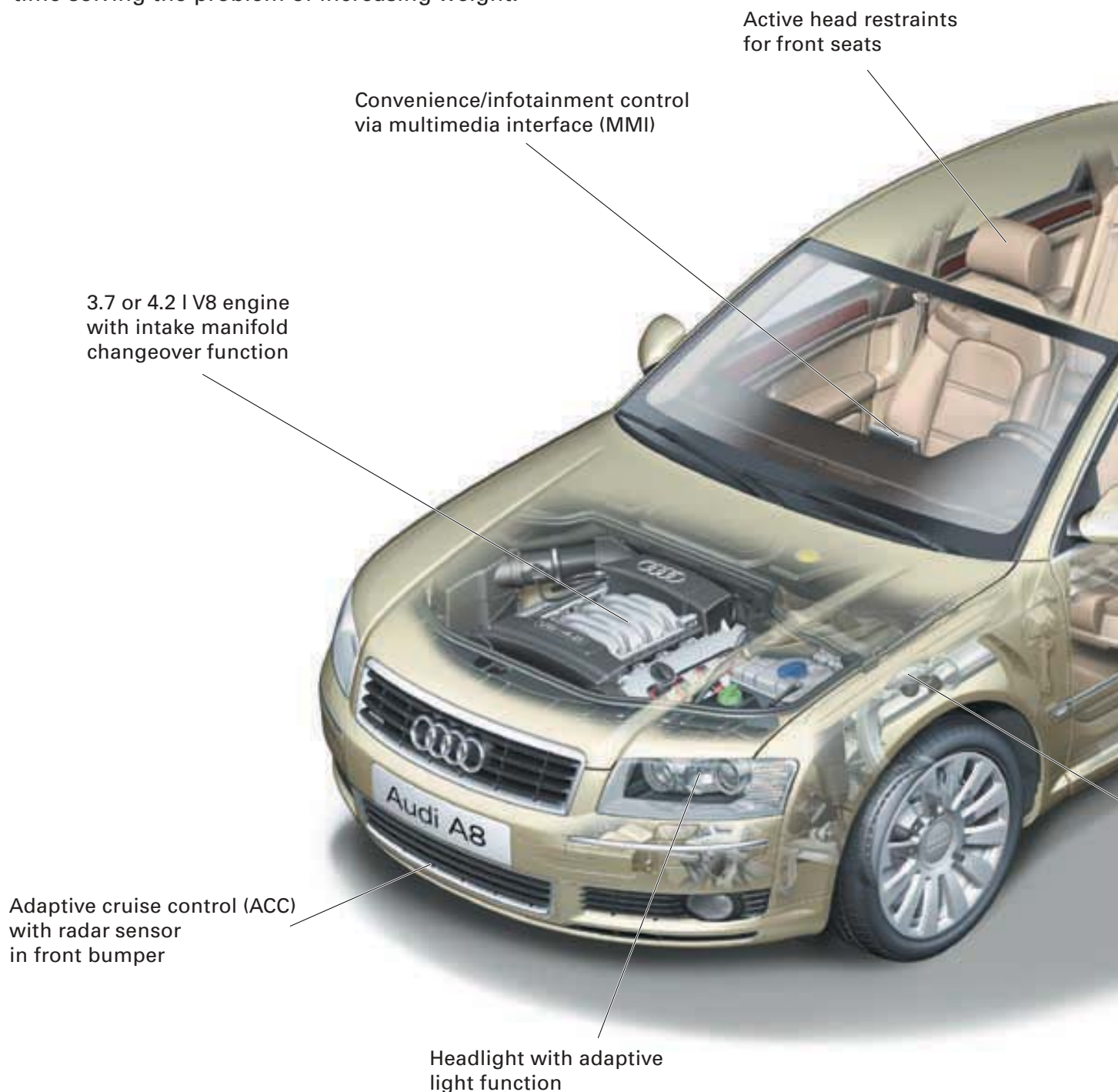
## Introduction

The new Audi A8 is designed to replace its predecessor of the same name which achieved a total production figure of 105,092 since its introduction in June 1994. This was the first standard saloon with aluminium body and epitomised a new philosophy in the luxury vehicle sector.

The weight-saving Audi Space Frame ASF represented a major breakthrough in terms of enhanced vehicle dynamics, whilst at the same time solving the problem of increasing weight.

This body concept was further perfected in the Audi A2 and the design of the Audi A8 '03 reflects the experience gained from both projects.

The aim when developing the Audi A8 '03 was not merely to surpass its predecessor in terms of technical features and details.



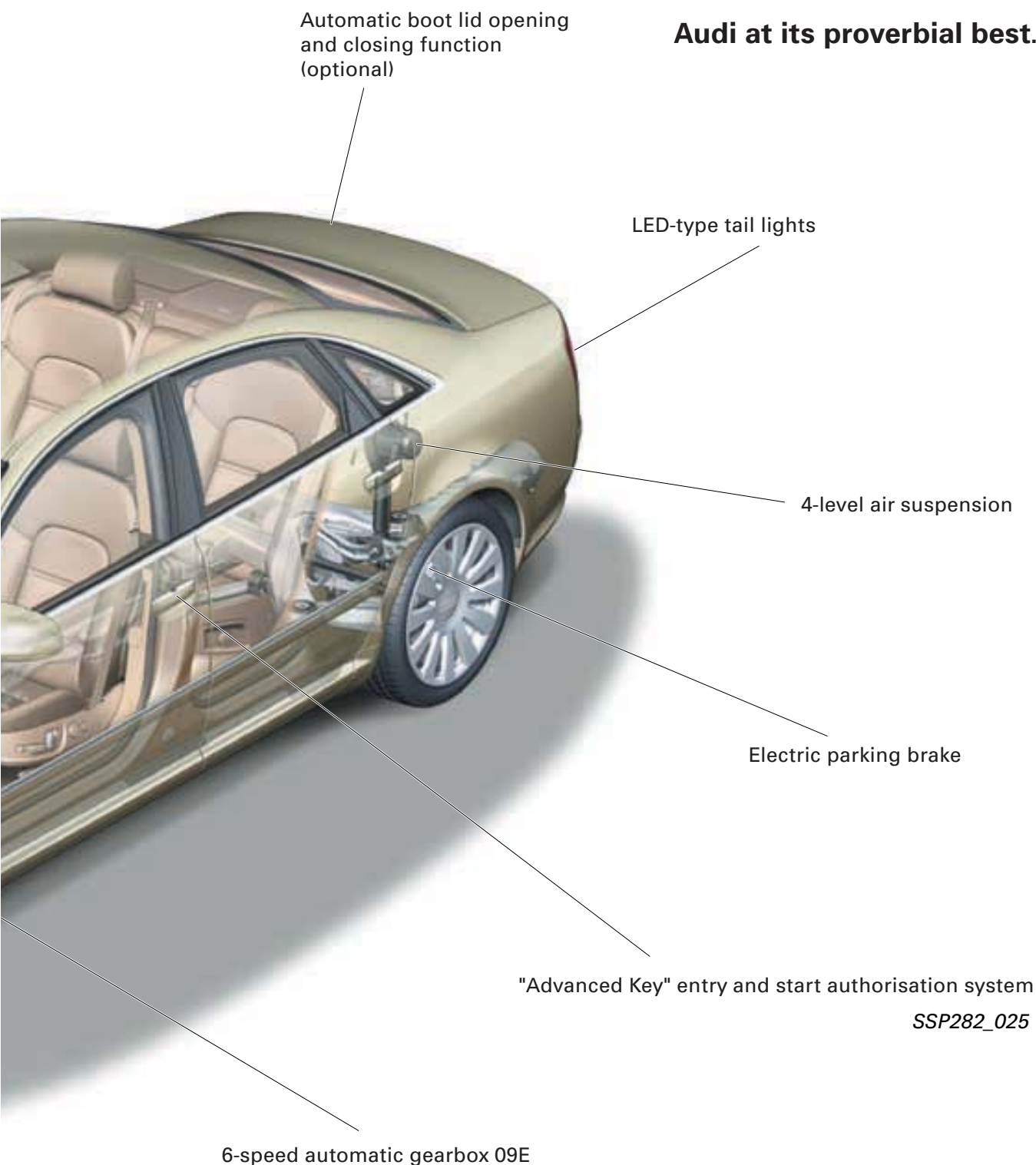


As the Audi flagship, the new Audi A8 is intended to symbolise the product identity of the next Audi generation.

An uncompromising sporty character, clear-cut design, innovative technological systems and the highest possible quality level combine to provide an unforgettable driving experience.

In other words:

**Audi at its proverbial best.**

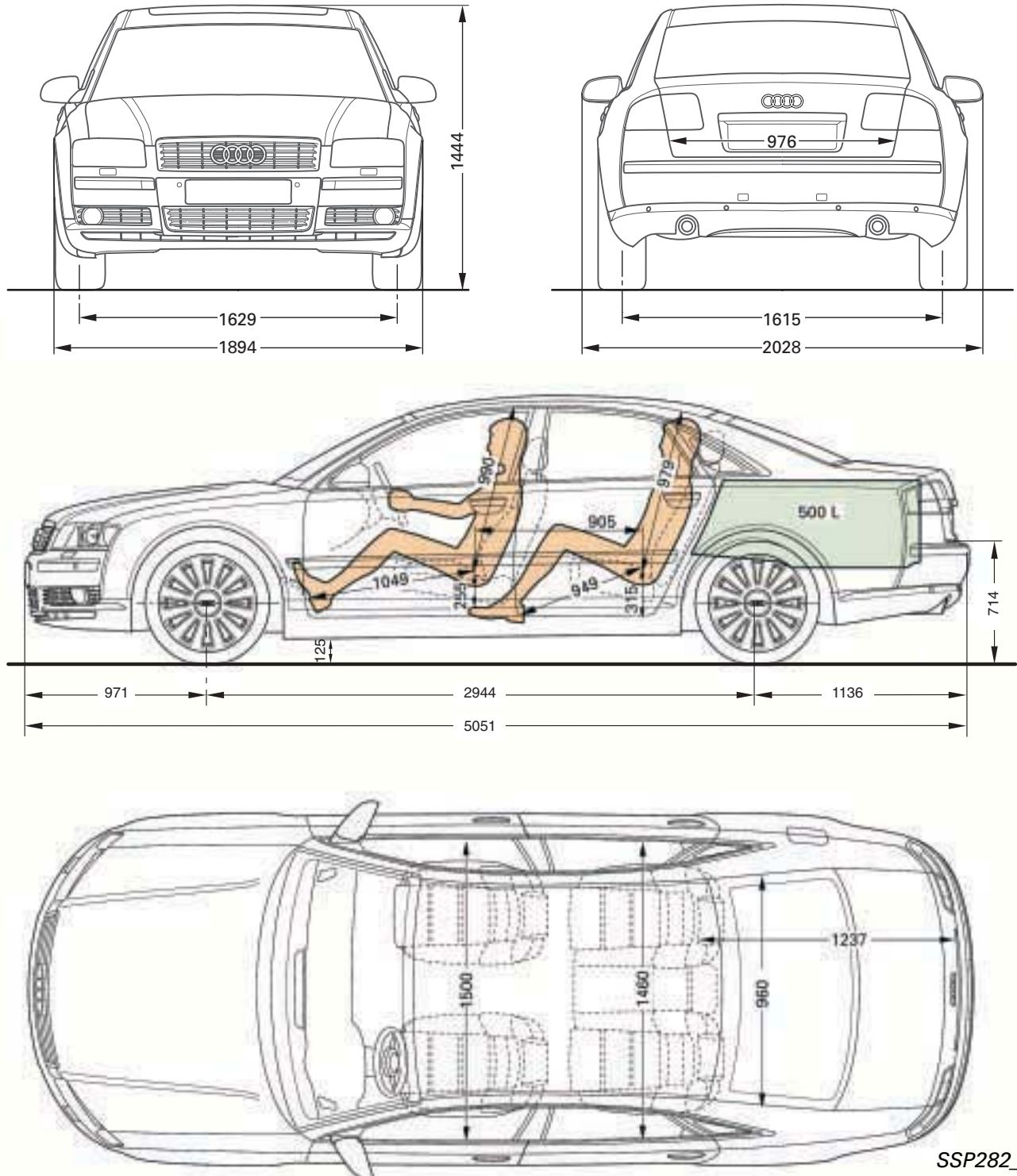


SSP282\_025



# Body

## Brief outline



SSP282\_026

|                |                   |                            |                     |
|----------------|-------------------|----------------------------|---------------------|
| Kerb weight    | 1,780 kg          | Gross weight               | 2,380 kg            |
| Turning circle | 12 m              | Luggage compartment volume | approx. 500 l       |
| Tank capacity  | approx. 90 litres | Drag coefficient           | 0.27 C <sub>d</sub> |

## Body

The Audi A8 '03 sets new standards in its class by combining lightweight construction with outstanding stability. This is achieved through the use of innovative Audi Space Frame technology for the body design of the Audi A8.

The technical progress reflected by the unique body concept stems from the consistent implementation of experience gained from the aluminium Audi A8 and A2 models.

Based on the findings obtained from these vehicles, it was possible to further reduce the number of body components and significantly increase the level of automation in the production process as compared to the Audi A8 predecessor model.



SSP282\_027

The static torsional rigidity of the new Audi A8 body is 60 % higher than that of the previous Audi A8 body.

A crucial contribution is made to the increased rigidity level by the advanced Audi Space Frame structure.

Characteristic features of the new structure:

- Large castings with numerous integrated functions and a high degree of joint strength
- IHF\* sections – optimum cross sections at all locations, for example at side of roof frame
- Sheet metal panels with high levels of local rigidity thanks to the use of special technologies designed to achieve differing functional cross sections and structures

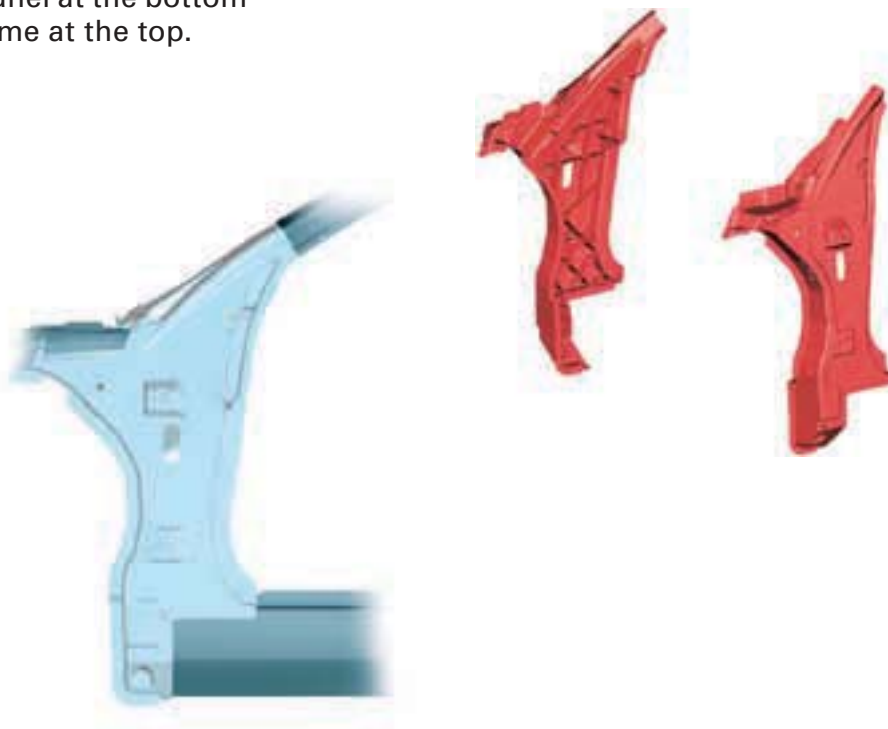
\*IHF = Internal high-pressure forming

# Body

## A-pillar



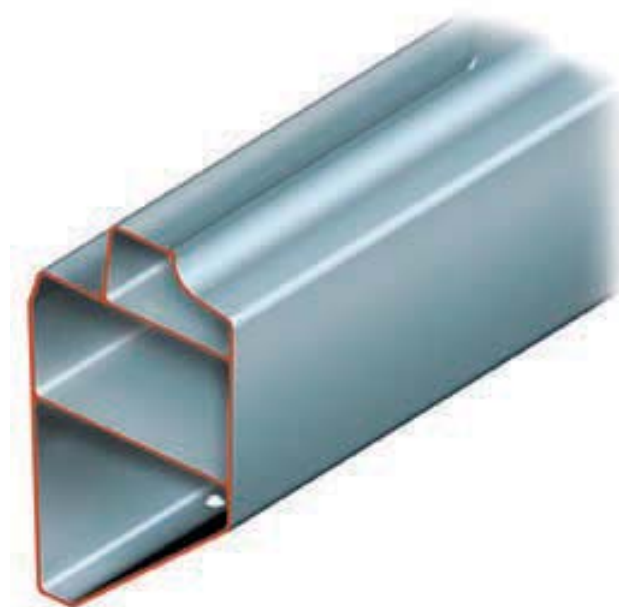
The A-pillar is made of two cast shells connected by rivets and welds. The shells enclose the sill panel at the bottom and the continuous roof frame at the top.



SSP282\_029

## Sill panel

Use is made for the sill panel of a 3-piece extruded section. The extruded section must be replaced in the event of sill panel damage. Depending on the nature of the damage, either the entire section has to be replaced or parts of it by way of three separating sleeves.



SSP282\_030



## Rear end

The rear end has been completely redeveloped. The two large central castings are the one connecting the sill panel/longitudinal member and the C/D-pillar connecting element.

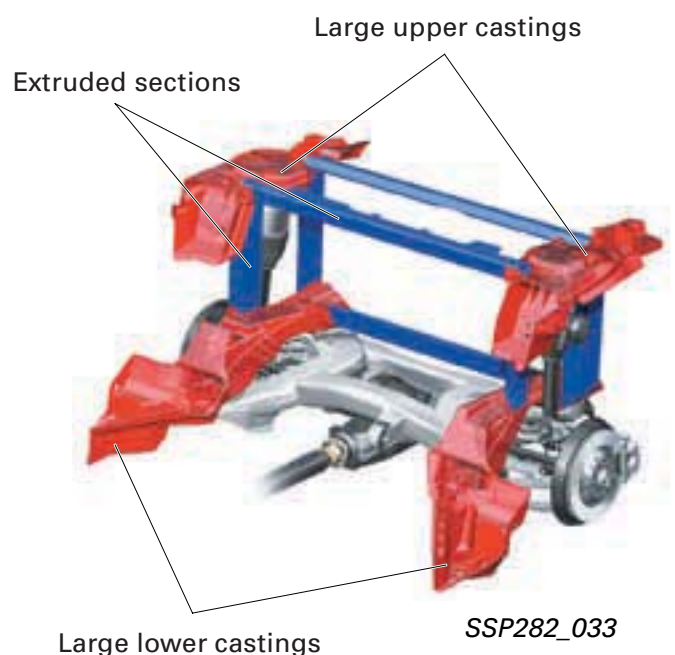
The sill panel/longitudinal member connecting element is the largest casting. It supports the entire rear sub-frame and links the rear longitudinal member to the sill panel. Its great rigidity is designed to protect the tank in between in the event of a rear-end collision.



SSP282\_032

The C/D-pillar connecting element (large upper casting) accommodates the suspension strut at the top and the seat belt at the front, in addition to forming the terminating side section of the roof frame.

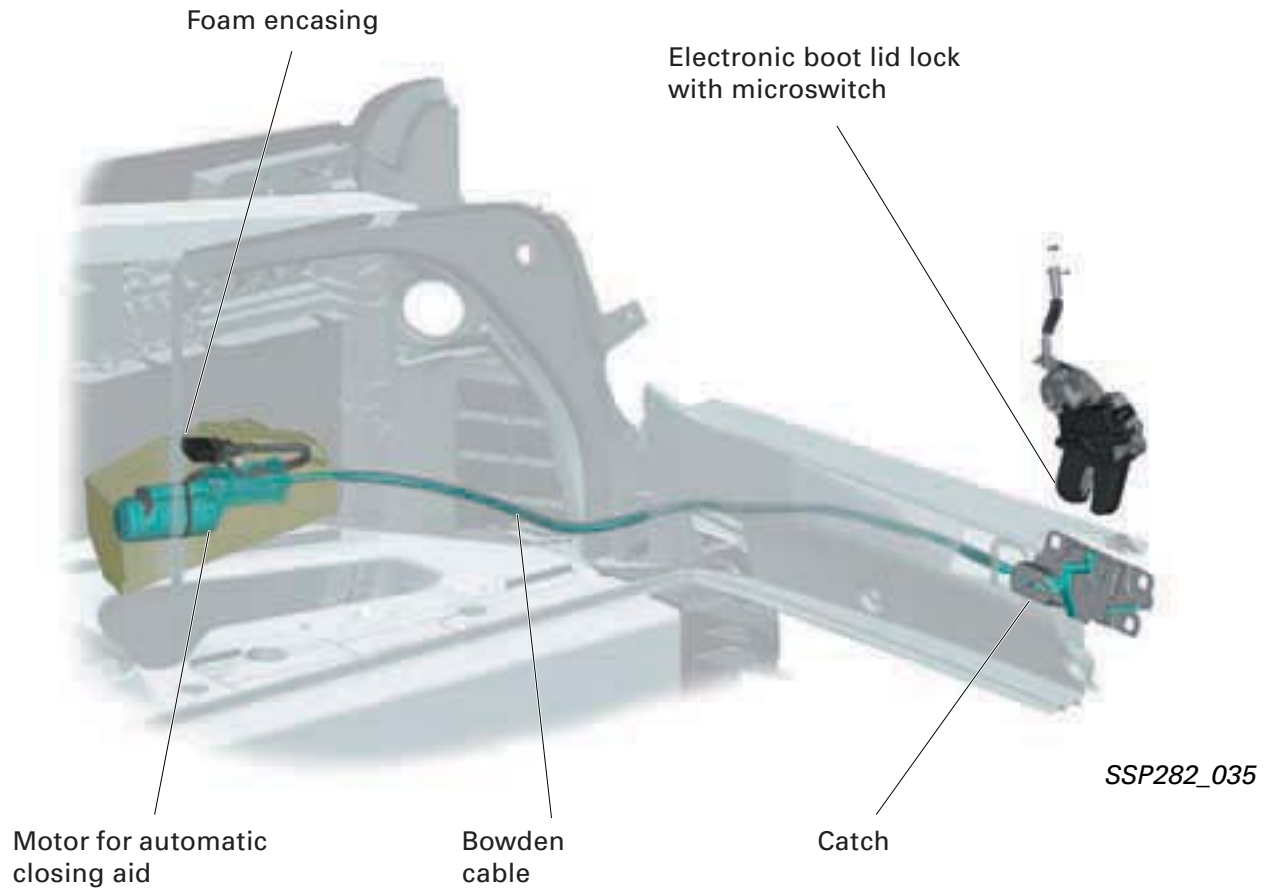
The large upper and lower castings are interlinked by way of two straight extruded sections and form the framework for the air suspension strut holder.



SSP282\_033

# Body

## Boot lid

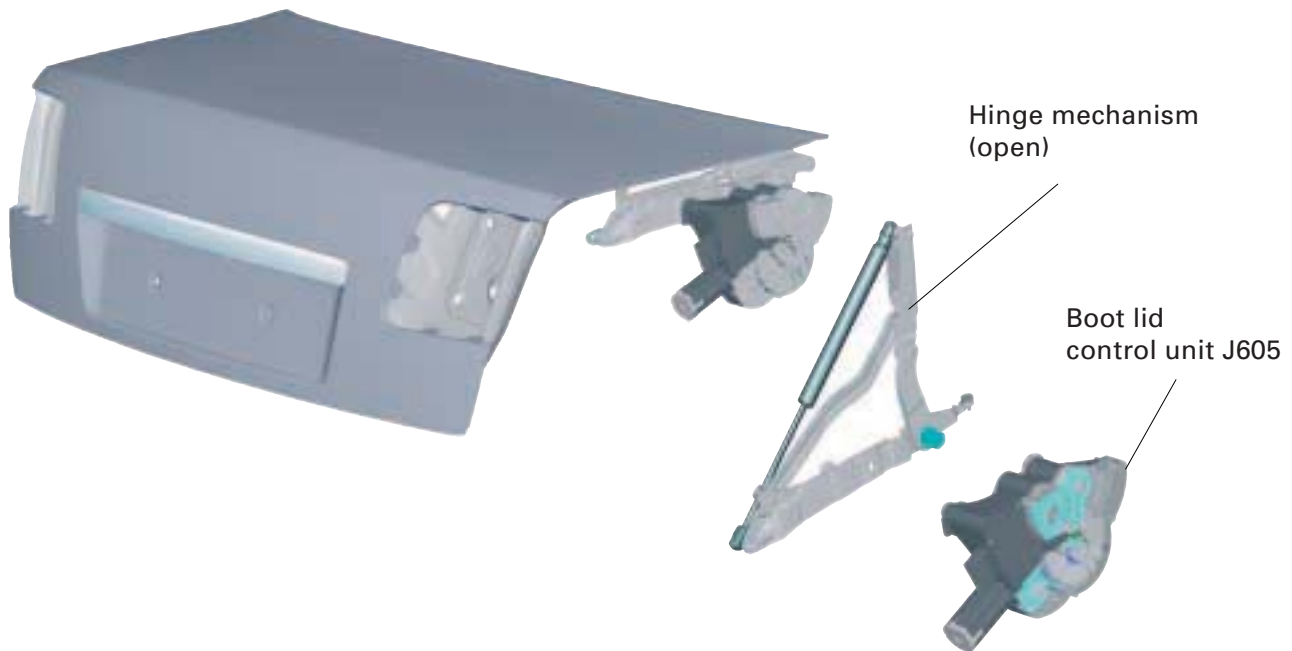


A standard feature is an automatic closing aid, which is actuated by a Bowden cable separately from the catch. After the latch has closed, a mechanism pulls the catch downwards, overcoming the build-up of pressure occurring. On locking, a microswitch in the boot lid lock transmits a signal to the control unit to activate the automatic closing aid.



The drive unit is only encased in foam and inserted between side panel and battery.

## Automatic boot lid



Button in driver's door



Button on boot lid



Vehicle key

SSP282\_036

Pressing the button in the driver's door or on the boot lid, or remote control actuation, effects release and motor-driven opening of the boot lid. Automatic boot lid closing can only be implemented by way of the boot lid button.

An electric motor flanged directly to the swivel joint of the right boot lid hinge opens or closes the boot lid.

In the event of manual boot lid actuation, the electric motor is disconnected by way of a magnetic coupling, thus permitting the boot lid to be moved by hand. On closing the boot lid, the drive is deactivated via a microswitch at the latch and the automatic closing aid activated.



As a general rule, interruption of automatic actuation always causes the boot lid to be disconnected from the drive unit and thus set to manual mode.

# Body

## Front doors



The doors are made up of a combination of aluminium panels, aluminium sections and aluminium castings.

Optimised rib geometry and wall thickness in the hinge and lock mounting castings formed the basis for ideal implementation of the lightweight construction concept.

Door shell and door frame are connected at the door pre-assembly stage by means of fitted bolts to ensure the accurate assignment of both components. Window lifter frame, window lifter motor/gear mechanism, door control unit and speaker are pre-assembled on a base plate and bolted to the door subframe.



SSP282\_039

## Rear doors

Large, high-strength side impact members are integrated into the door to provide even load distribution in the event of side impact.

## Seats

Backrest adjustment –  
The angle of the top  $\frac{1}{3}$  of the backrest can be adjusted by 15° for enhanced shoulder comfort.

Lumbar support with massage function over a length of 60 mm



Crash-active, electronic head restraint with 70 mm height adjustment

Thorax/pelvis side airbag

Backrest fan

SSP282\_116

Electric seat depth adjustment – As the structure moves forwards it pulls the padding with it and so extends the seat area by 50 mm.

Seat cushion fan

A new seat concept was developed for the Audi A8 '03.

The basic seat features the following standard functions:

- Electric seat length, height and angle adjustment
- Electric backrest angle adjustment
- Front crash-active head restraints (refer to Page 21)

The basic seat can additionally be fitted with

- Four-way lumbar support
- Seat memory for driver and front passenger
- Electrically adjustable head restraints
- Electric belt height adjusters

Extra features of sports and comfort seats:

- Electric top 1/3 backrest adjustment
- Electric seat depth adjustment

Optional extras for comfort seat:

- Climate function (refer to Page 85)
- and/or massage function

The massage function is implemented by way of rhythmic action of the electromechanical lumbar support, thus massaging and relaxing the back muscles.

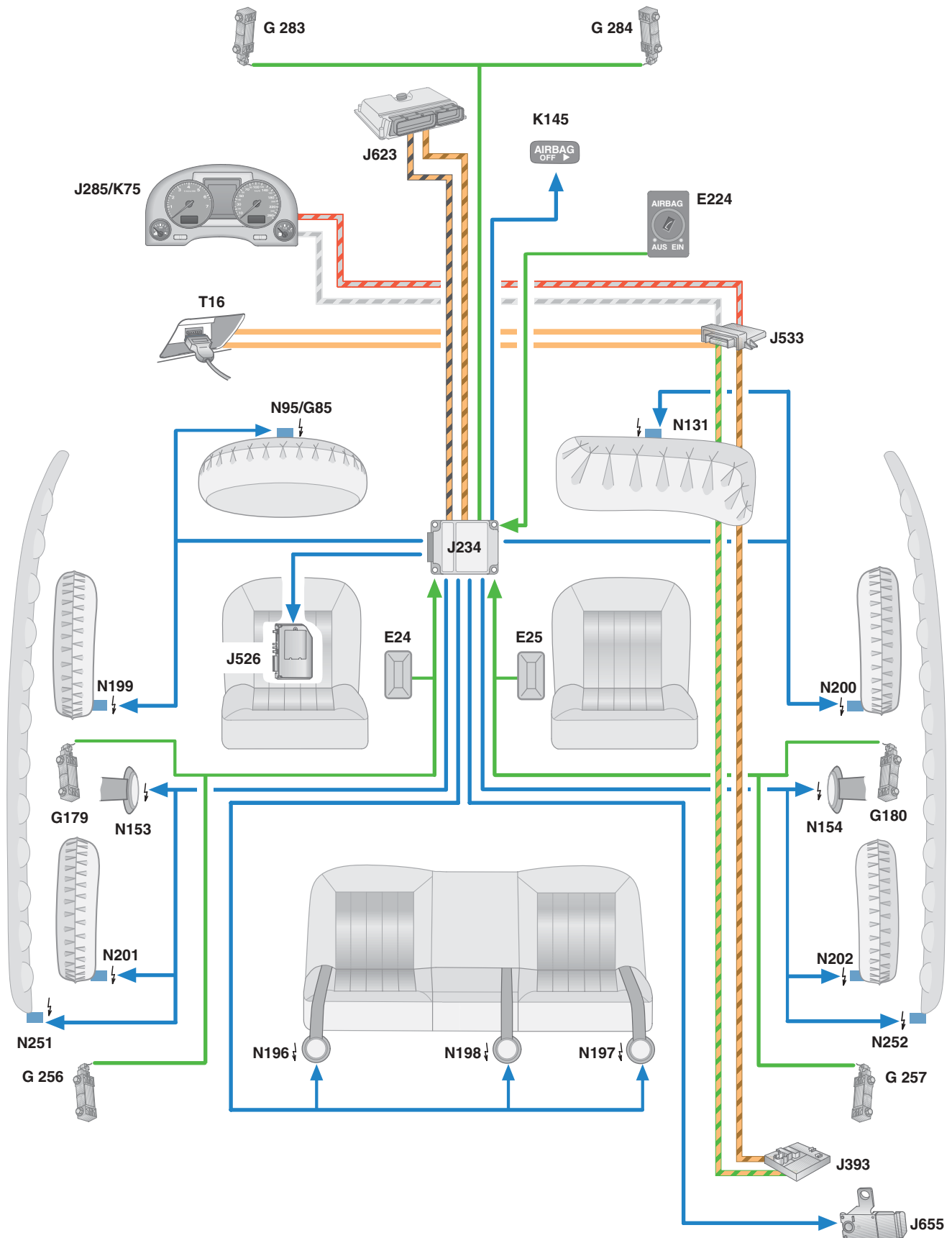
The fixed rear seat bench versions correspond to those of the front seats, with the third head restraint being fully retractable. Electric individual seats are however only available as "Basic" and "Comfort" versions.





# Passenger Protection

## System layout



Use is made in the Audi A8 '03 of the 8.4E+ airbag system with the aim of attaining greater occupant safety whilst reducing the impact. This was achieved, for example, by way of two-stage front airbag triggering, active front head restraints and a battery cut-off element.

The wide range of sensors permits detection not only of head-on collision and side impact, but also of rear-end collisions.



## Key

E24 Driver side belt switch  
E25 Front passenger side belt switch  
E224 Airbag disabling key switch,  
front passenger side

G85 Steering angle sender  
G179 Side airbag crash sensor,  
driver side (B-pillar)  
G180 Side airbag crash sensor,  
front passenger side (B-pillar)  
G256 Rear side airbag crash sensor,  
driver side  
G257 Rear side airbag crash sensor,  
front passenger side  
G283 Front airbag crash sensor,  
driver side  
G284 Front airbag crash sensor,  
front passenger side

J234 Airbag control unit  
J285 Control unit with display  
in dash panel insert  
J393 Convenience system central  
control unit  
J526 Telephone/telematics control unit  
J533 Data bus diagnostic interface  
(gateway)  
J623 Engine control unit  
J655 Battery cut-off relay

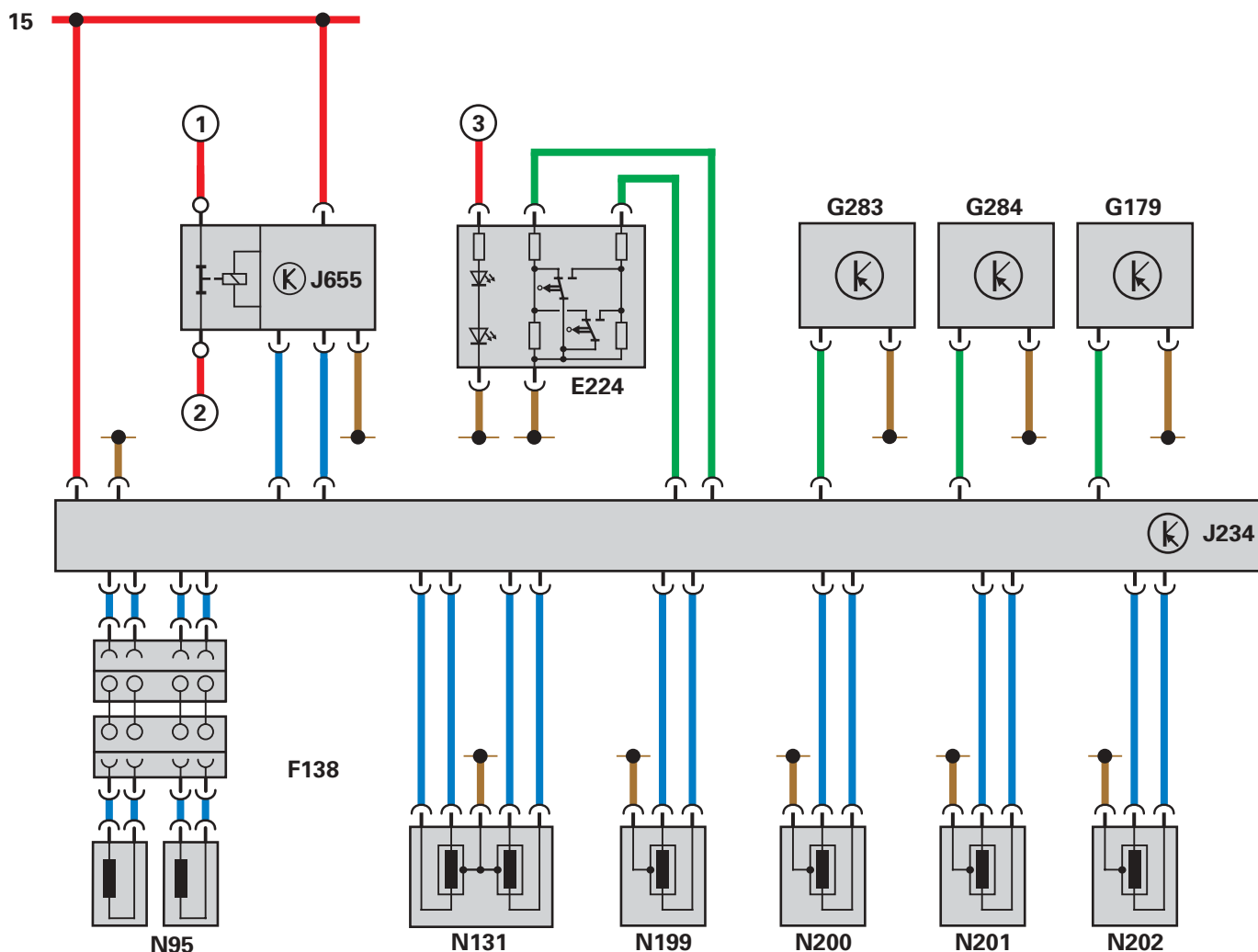
K75 Airbag warning lamp  
K145 Airbag disabled warning lamp,  
front passenger side

N95 Driver side airbag igniter  
N131 Airbag igniter 1, front passenger side  
N153 Belt tensioner igniter 1, driver side  
N154 Belt tensioner igniter 2,  
front passenger side  
N196 Rear belt tensioner igniter,  
driver side  
N197 Rear belt tensioner igniter,  
front passenger side  
N198 Rear belt tensioner igniter,  
centre  
N199 Side airbag igniter, driver side  
N200 Side airbag igniter,  
front passenger side  
N201 Rear side airbag igniter,  
driver side  
N202 Rear side airbag igniter,  
front passenger side  
N251 Curtain airbag igniter, driver side  
N252 Curtain airbag igniter,  
front passenger side

T16 16-pin connector  
(diagnostic connection)

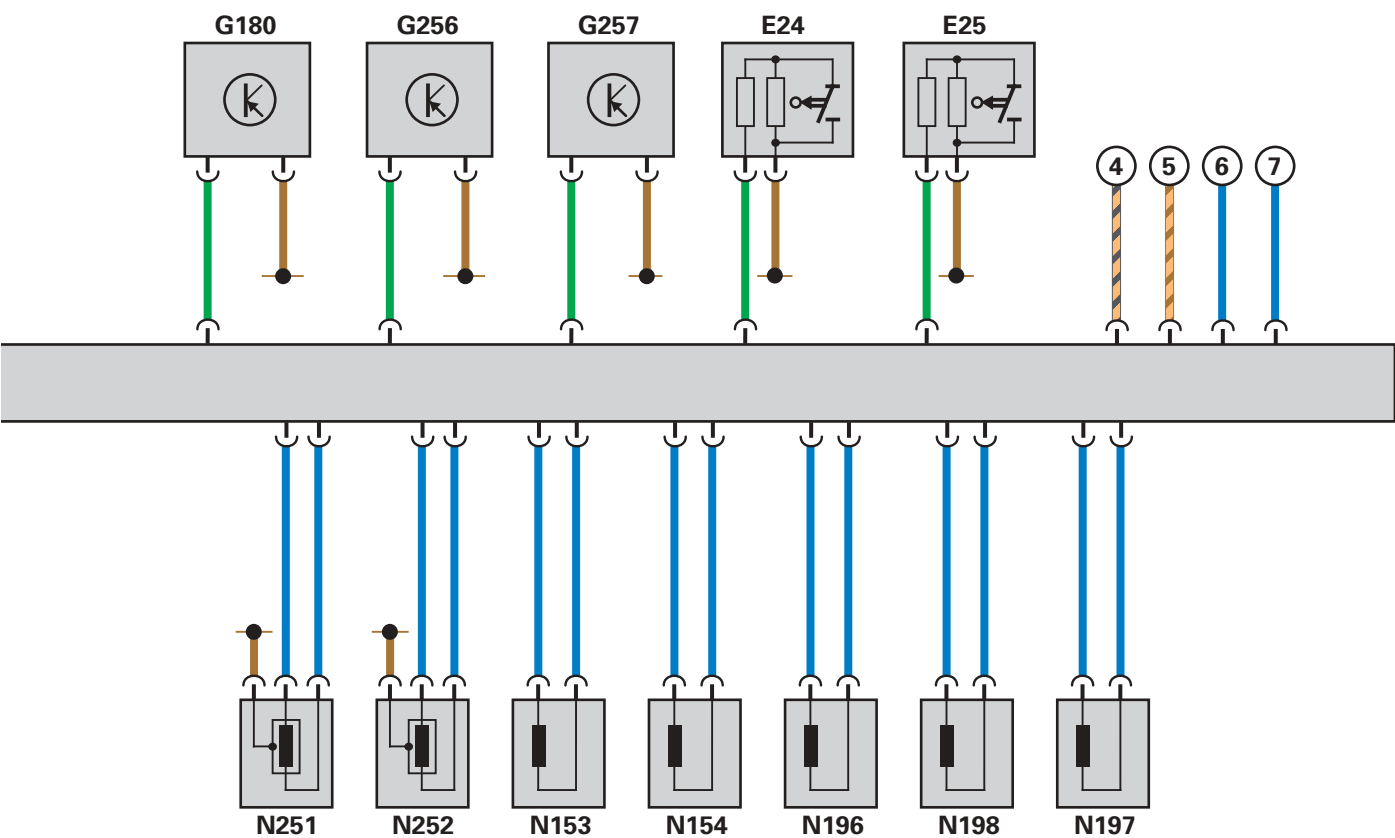
# Passenger Protection

## Block diagram



## Key

|      |   |      |   |
|------|---|------|---|
| E24  | Driver side belt switch                             | J234 | Airbag control unit                               |
| E25  | Front passenger side belt switch                    | J655 | Battery cut-off relay                             |
| E224 | Airbag disabling key switch, front passenger side   |      |   |
| F138 | Airbag coil connector/return spring with slip ring  | N95  | Driver side airbag igniter                        |
| G179 | Side airbag crash sensor, driver side               | N131 | Airbag igniter 1, front passenger side            |
| G180 | Side airbag crash sensor, front passenger side      | N153 | Belt tensioner igniter 1, driver side             |
| G256 | Rear side airbag crash sensor, driver side          | N154 | Belt tensioner igniter 2, front passenger side    |
| G257 | Rear side airbag crash sensor, front passenger side | N196 | Rear belt tensioner igniter, driver side          |
| G283 | Front airbag crash sensor, driver side              | N197 | Rear belt tensioner igniter, front passenger side |
| G284 | Front airbag crash sensor, front passenger side     | N198 | Rear belt tensioner igniter, centre               |
|      |   | N199 | Side airbag igniter, driver side                  |
|      |   | N200 | Side airbag igniter, front passenger side         |
|      |   | N201 | Rear side airbag igniter, driver side             |
|      |   | N202 | Rear side airbag igniter, front passenger side    |



SSP282\_069

### Additional signals

N251 Curtain airbag igniter, driver side  
N252 Curtain airbag igniter, front passenger side

- ① Battery A (positive)
- ② Positive connection to starter B and alternator C
- ③ Terminal 58s
- ④ Drive system CAN (High)
- ⑤ Drive system CAN (Low)
- ⑥ Crash signal
- ⑦ Airbag disabled warning lamp, front passenger side K145

### Colour code

- = Input signal
- = Output signal
- = Positive supply
- = Earth

# Passenger Protection

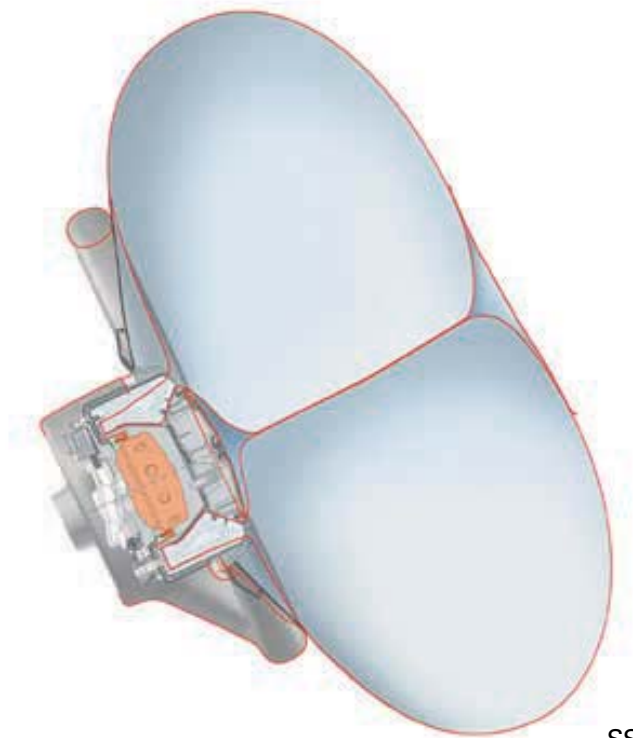
## Safety systems

### 2-stage front airbags

The 2-stage triggering of the front airbags provides optimum restraint in crash situations at around 30 km/h. There is a separate firing pellet for each stage in the driver's and front passenger's airbag. These ignite successively at specified time intervals.



### Ring airbag



SSP282\_070

A so-called "ring airbag", which inflates like a life belt, is used on the driver's side. This radial inflation method affords particular protection to drivers sitting very close to the steering wheel. The centre of the steering wheel does not move as the airbag unfolds and is inflated in the form of a ring. A rectangular fabric layer is additionally sewn to three sides of the ring. One side is left free to allow the airbag to slide over the non-moving centre section of the steering wheel.

This airbag design satisfies the requirements of the latest American legislation and involves compliance with biomechanical values for so-called "Out Of Position" (OOP) driver posture. If the driver's head or upper part of the body is very close to the steering wheel at the time of airbag unfolding (OOP), this airbag concept can prevent serious injury.



### Front passenger's airbag deactivation

An optional feature of the Audi A8 '03 is a new airbag disabling key switch for the front passenger's side E224.

Two resistance paths are integrated into this switch to permit detection of individual faults. A fault in the key switch is indicated by flashing of the front passenger's side airbag disabled warning lamp K145 located in the centre console next to the hazard warning switch.



SSP282\_081

### Front knee airbags (USA)



SSP282\_114

The USA version of the Audi A8 '03 is fitted with driver's and front passenger's knee airbags as standard, thus optimising driver and front passenger movement in a crash situation.

In this way, severe impact in the knee zone is avoided. Knee airbags are required by legislation in the USA.

# Passenger Protection

## Detection of rear-end collision

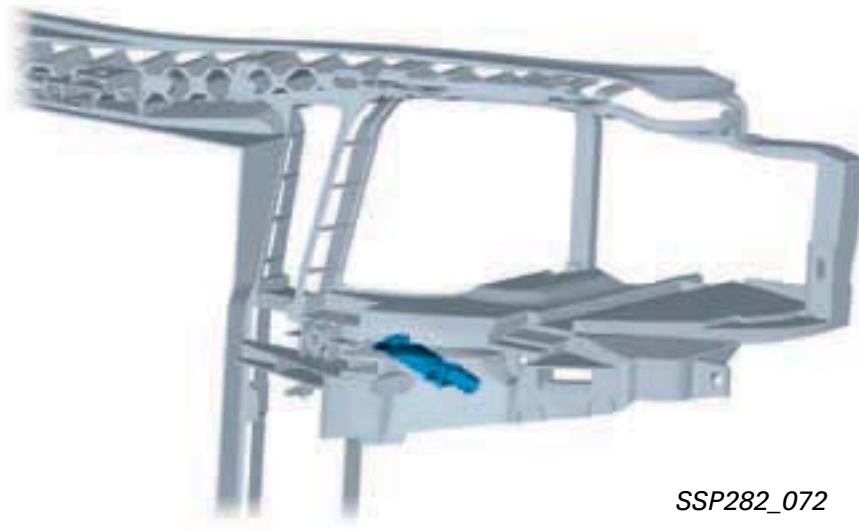
Rear-end collisions are detected by way of a sensor in the airbag control unit J234 and a plausibility function involving the driver's and front passenger's front airbag crash sensors G283 and G284.



## Up-front sensors

For the first time, use is made in the Audi A8 '03 of so-called up-front sensors.

These take the form of two additional front-end acceleration sensors on the right and left beneath the corresponding headlight.



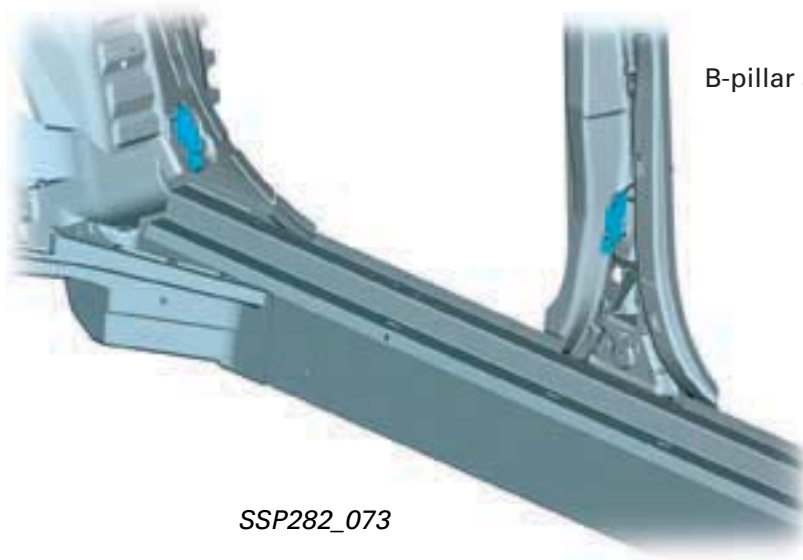
SSP282\_072

## Lateral acceleration sensors

Further acceleration sensors are located at the B and C-pillars.

C-pillar sensor

B-pillar sensor

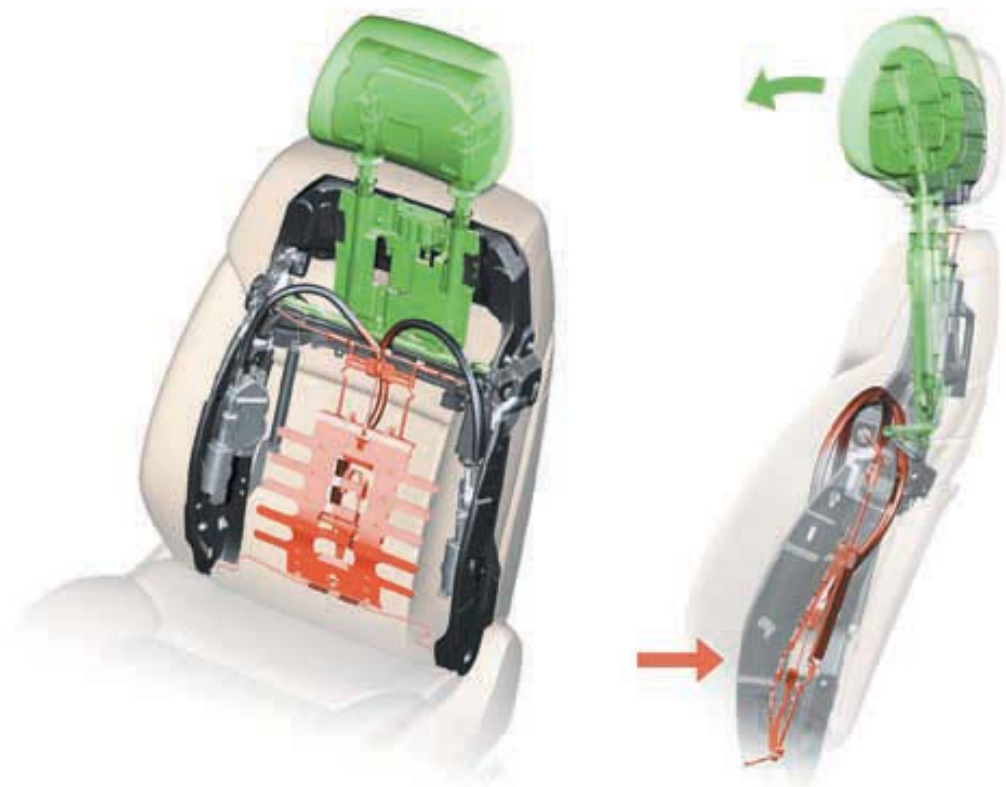


SSP282\_073

### Active head restraints

The front seats of the Audi A8 '03 are provided with active head restraints. With this system, the head restraints move forwards in the event of a rear-end collision to shorten the distance between head and restraint.

The danger of cervical vertebrae injury is greatly diminished by reducing the relative acceleration between shoulder and head. In head-on collision situations, the mechanics of centrifugal weight are neutralised.



SSP282\_082

### Belt tensioners

Five belt tensioners are fitted as standard. There is no centre belt tensioner if the rear seats are electrically adjustable.

# Passenger Protection

## Battery cut-off relay J655

The battery cut-off relay is a battery isolating element designed to disconnect starter and alternator power from the electrical system in the event of a crash.

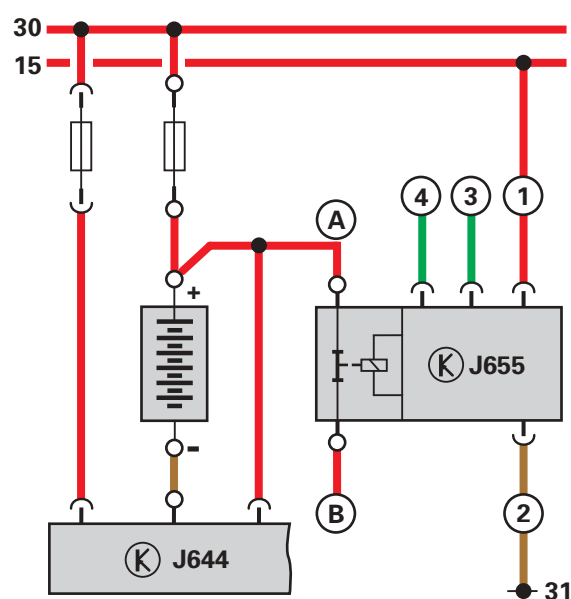


| Terminal      | Pin | Input/output                 | Description                                   |
|---------------|-----|------------------------------|---|
| 30, battery   | A   | Input<br>(screw connection)  | $U_{\text{bat.}}$ term. 30/battery            |
| 87            | B   | Output<br>(screw connection) | Output  |
| Terminal 15   | 1   | Input<br>(plug connection)   | Positive power supply, interruptible          |
| Vehicle earth | 2   | Input<br>(plug connection)   | Earth from airbag control unit J234           |
| Crash signal  | 3   | Input<br>(plug connection)   | Crash signal from airbag control unit J234    |
| Diagnosis     | 4   | Input<br>(plug connection)   | Diagnostic wire from airbag control unit J234 |

## Block diagram

J644 Energy management control unit

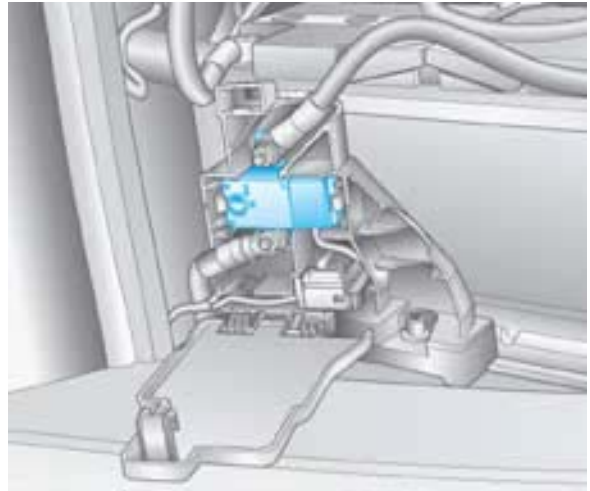
J655 Battery cut-off relay



SSP282\_076

## Fitting location

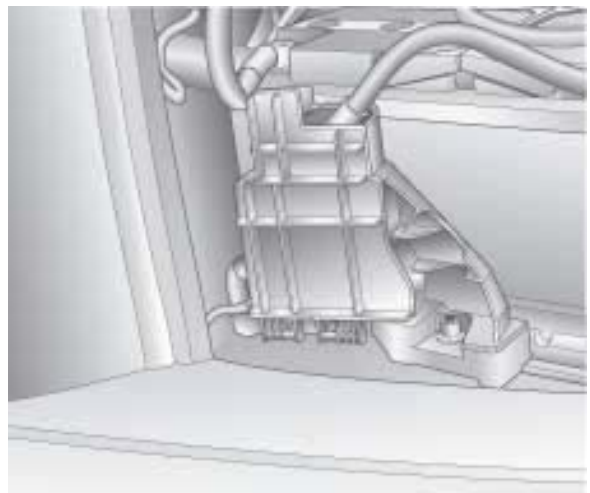
The battery cut-off relay is located in front of the battery.



SSP282\_083

## Triggering

The airbag control unit J234 provides the battery cut-off element with the triggering command via a discrete wire. Triggering of this element by the airbag control unit causes a white panel to appear in the element window instead of a copper coil. Following isolation, the battery cut-off element can be manually reset by way of the yellow knob.

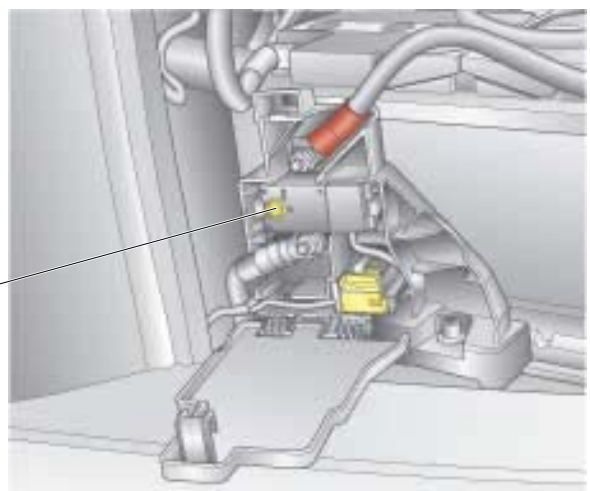
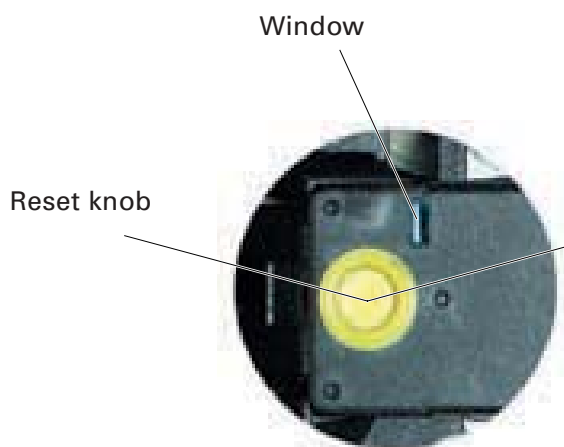


SSP282\_079



## Control element test

The control element test in the airbag control unit also triggers the battery cut-off relay. It should be ensured that the relay is manually reset, as otherwise the battery cannot be charged.



SSP282\_077





# Engine, Mechanics

## Technical data

### V8 4.2 I 5V engine

Engine code

letters: BFM

Capacity: 4,172 cm<sup>3</sup>

Bore: 84.5 mm

Stroke: 93.0 mm

Compression

ratio: 11 : 1

Power: 246 kW (335 hp)  
at 6,500 rpm

Torque: 430 Nm at 3,500 rpm

Camshaft

adjustment  
range: 22° CS advance

Valves: 5 per cylinder

Engine

management: ME7.1.1

Emission

standard: EU 4

Firing

order: 1 - 5 - 4 - 8 - 6 - 3 - 7 - 2

Capacities: 7.5 l engine oil (incl. filter)

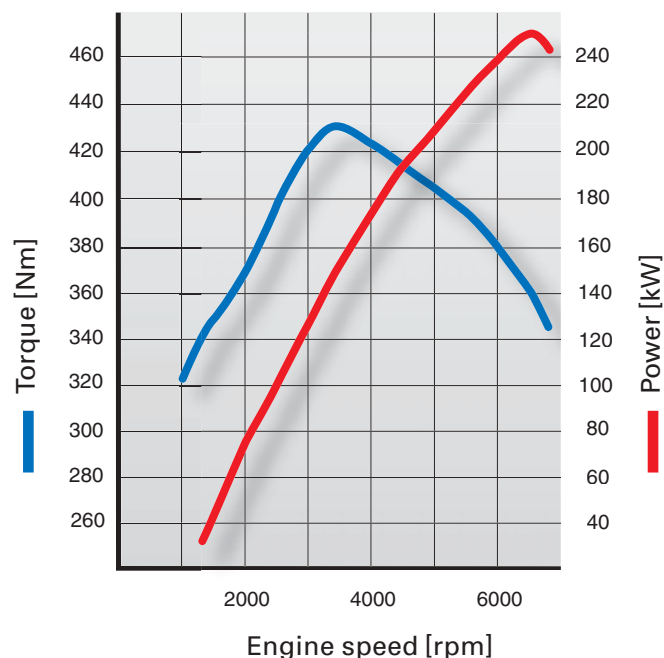
Consumption: Urban: 17.5 - 17.6 l/100 km  
Non-urban: 8.7 - 8.8 l/100 km  
Average: 11.9 - 12.0 l/100 km

Acceleration

0 - 100 km/h: 0 - 80 km/h – 4.8 s  
0 - 100 km/h – 6.3 s

Fuel:

Premium Plus Unleaded  
98/95 RON



SSP282\_002



SSP282\_012

CS = Crankshaft

## V8 3.7 I 5V engine

Engine code

letters: BFL

Capacity: 3,697 cm<sup>3</sup>

Bore: 84.5 mm

Stroke: 82.4 mm

Compression

ratio: 11 : 1

Power: 206 kW (280 hp)  
at 6,000 rpm

Torque: 360 Nm at 3,750 rpm

Camshaft  
adjustment

range: 13° CS advance

Valves: 5 per cylinder

Engine  
management: ME7.1.1

Emission  
standard: EU 4

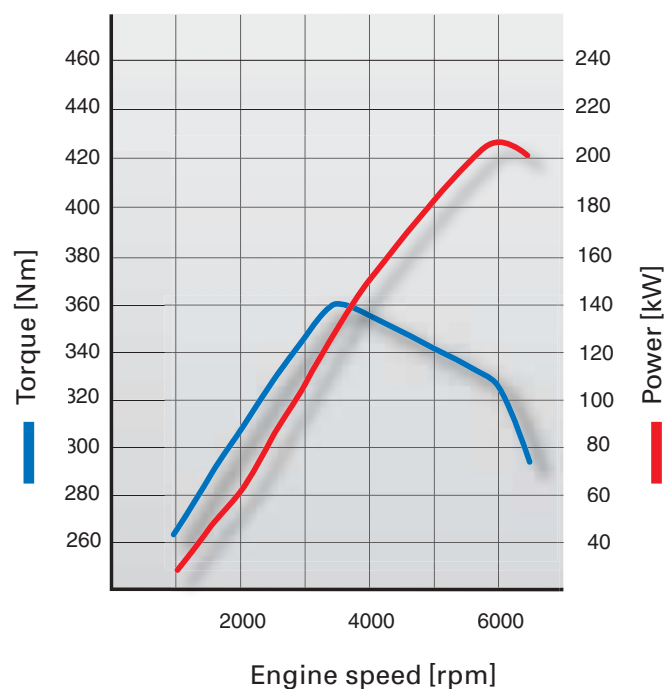
Firing  
order: 1 - 5 - 4 - 8 - 6 - 3 - 7 - 2

Capacities: 7.5 l engine oil (incl. filter)

Consumption: Urban: 17.1 - 17.3 l/100 km  
Non-urban: 8.6 - 8.8 l/100 km  
Average: 11.7 - 11.9 l/100 km

Acceleration  
0 - 100 km/h: 0 - 80 km/h – 5.6 s  
0 - 100 km/h – 7.3 s

Fuel: Premium Plus Unleaded 98/95 RON



SSP282\_001



SSP282\_011

# Engine, Mechanics

## V8 5V 3.7 l/4.2 l engine

The 3.7 l and 4.2 l V8 engines were adopted from the predecessor model with certain modifications.



Design and operation are described in SSP 217.

These modifications relate to the intake and exhaust systems and are described in the following.

### Variable-intake manifold in 4.2 l engine

This takes the form of a 2-stage variable-intake manifold made of a die-cast magnesium alloy, bonded and bolted together in four sections.



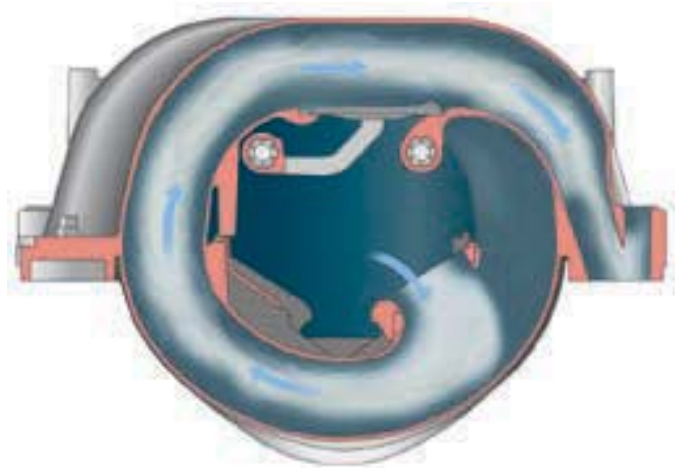
The intake manifold must be replaced as a complete unit when performing repairs.

The two-stage design permits the use of two intake paths with large cross section.



SSP282\_013

- Long intake path, 705 mm
- Changeover flap closed for high torque



SSP282\_014

Each of the two splined shafts is fitted with four flaps per cylinder bank. The shape of the rubber-encased flaps ensures unimpeded air flow in the torque position and reliable power position sealing of the duct. This is a prerequisite for utilisation of the gas-dynamic resonance effects. In the power position, the backs of the flaps take on the shape of the duct wall, thus allowing low-resistance intake air flow into the cylinders.

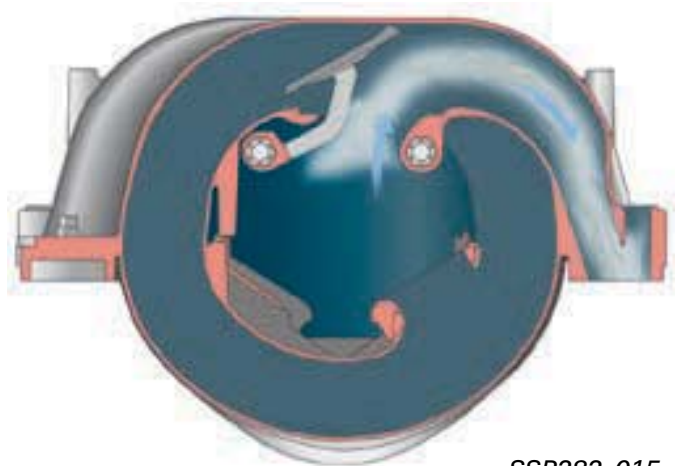
Mechanical couplings provide a link with the vacuum units for adjustment of the two shafts and thus the intake manifold flaps.



SSP282\_016

- Short intake path, 322 mm
- Changeover flap open for high power with high air throughput

Changeover from long to short at 4,480 rpm  
Changeover from short to long at 4,320 rpm

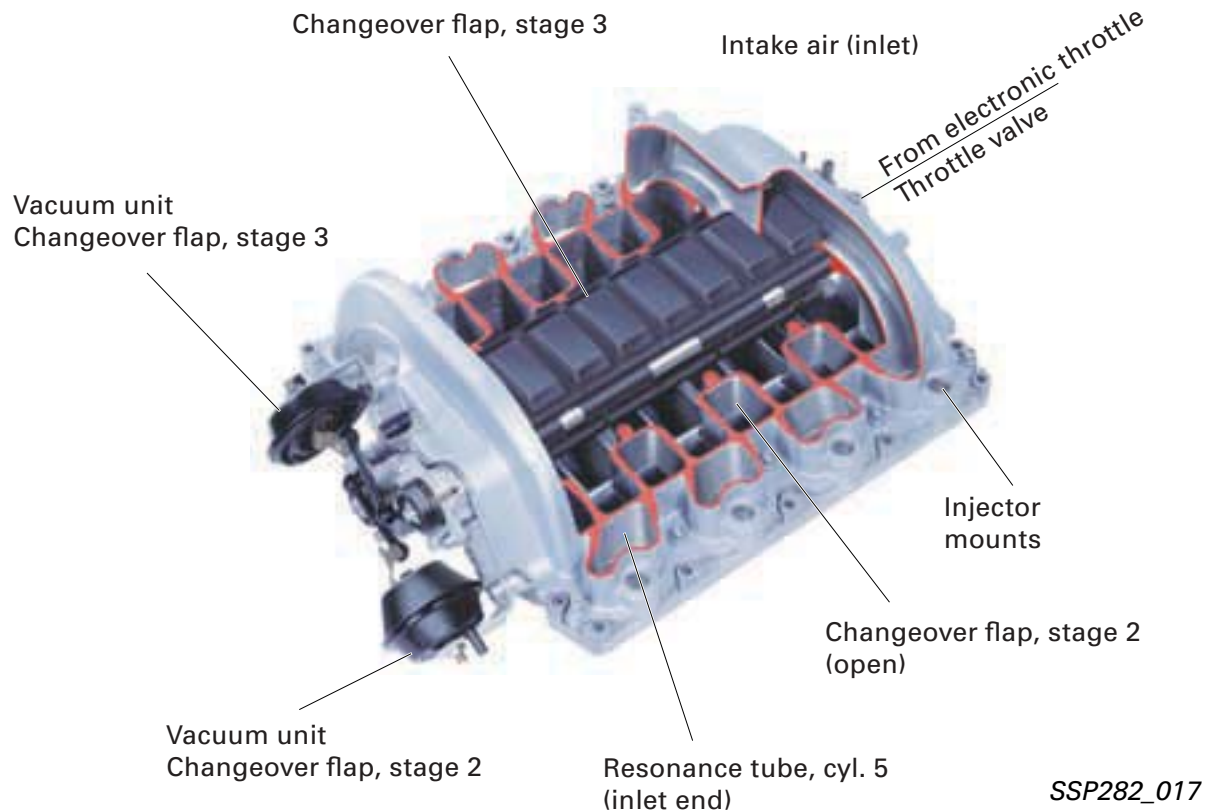


SSP282\_015



# Engine, Mechanics

## Variable-intake manifold in 3.7 l engine



This is the same 3-stage variable-intake manifold as previously fitted in the V8 engine.

Due to the piston stroke of only 82.4 mm, three resonance tube lengths are required to achieve resonance effects in the lower engine speed range.

Changeover points:

- Long to short at 3,280 rpm
- Short to long at 3,120 rpm
- Short to shorter at 5,120 rpm
- Shorter to short at 4,920 rpm



Operation of the 3-stage variable-intake manifold is described in SSP 217.