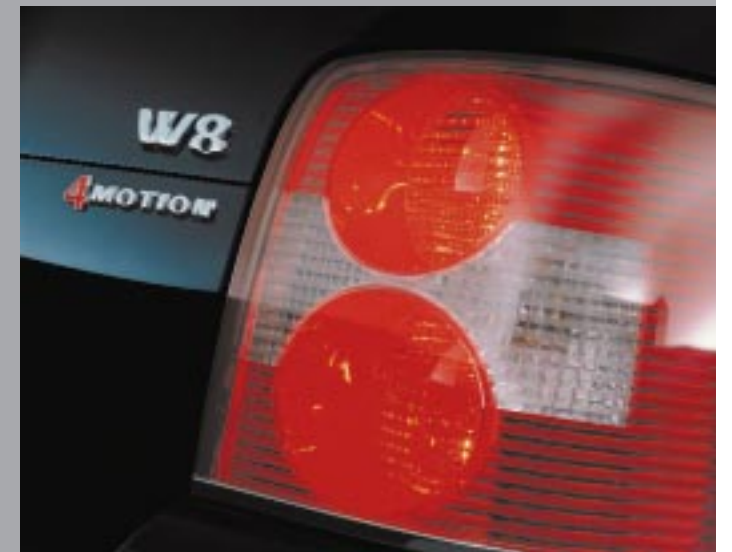


The Passat W8



Volkswagen of America, Inc.
3800 Hamlin Road
Auburn Hills, MI 48326
Printed in U.S.A.
February 2002



Self-Study Program
Course Number 822203



Volkswagen of America, Inc.
Service Training
Printed in U.S.A.
Printed 2/2002
Course Number 822203

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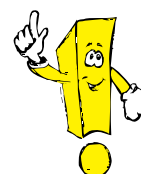
Always check Technical Bulletins and the Volkswagen Worldwide Repair Information System for information that may supersede any information included in this booklet.

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New !



Important/Note!



The Self-Study Program provides you with information regarding designs and functions.

The Self-Study Program is not a Repair Manual.

For maintenance and repair work, always refer to the current technical literature.

The Passat W8

This Self-Study Program presents the Passat W8, new to the North-American market for 2002. We will only explain the design and function of items that are totally new. All the changes described refer to the Passat model year 2002.

The design and function of the W8 engine is described in detail in two separate Self-Study Programs:

- *The W Engine Concept*, Course Number 821203.
- *Passat W8 Engine Management, Motronic ME 7.1.1*, Course Number 843103.



SSP261/002

Introduction

The top model of the Passat range is the first car from Volkswagen equipped with an 8-cylinder engine. The Passat W8 offers luxury class refinement in performance, comfort, safety, quality and equipment.

It will be offered in sedan and wagon versions.

Innovations in the Passat W8

- Six-speed manual transmission, or five-speed automatic transmission with Tiptronic function.
- Special body design refinements to enhance crash protection and acoustics.
- The new W8 engine.
 - 244 cu in (3999 cm³).
 - 270 bhp (201 kW) @ 6,000 rpm.
 - 273 lbs-ft (370 Nm) of torque @ 2,500 rpm.
 - Four valves per cylinder.



Horsepower specification was not final at the time of printing. Please see www.vwwebsource.com for the latest specifications.

- Larger fuel tank with a capacity of 21.1 gallons (80 liters).
- Climatronic air conditioning system.
- Bi-xenon headlights.
- 4MOTION all-wheel drive.
- Dual exhaust system with two chrome tailpipes on each side.
- 7J x 16 alloy wheels.
- P205/55 R16H all-season tires.

The sedan

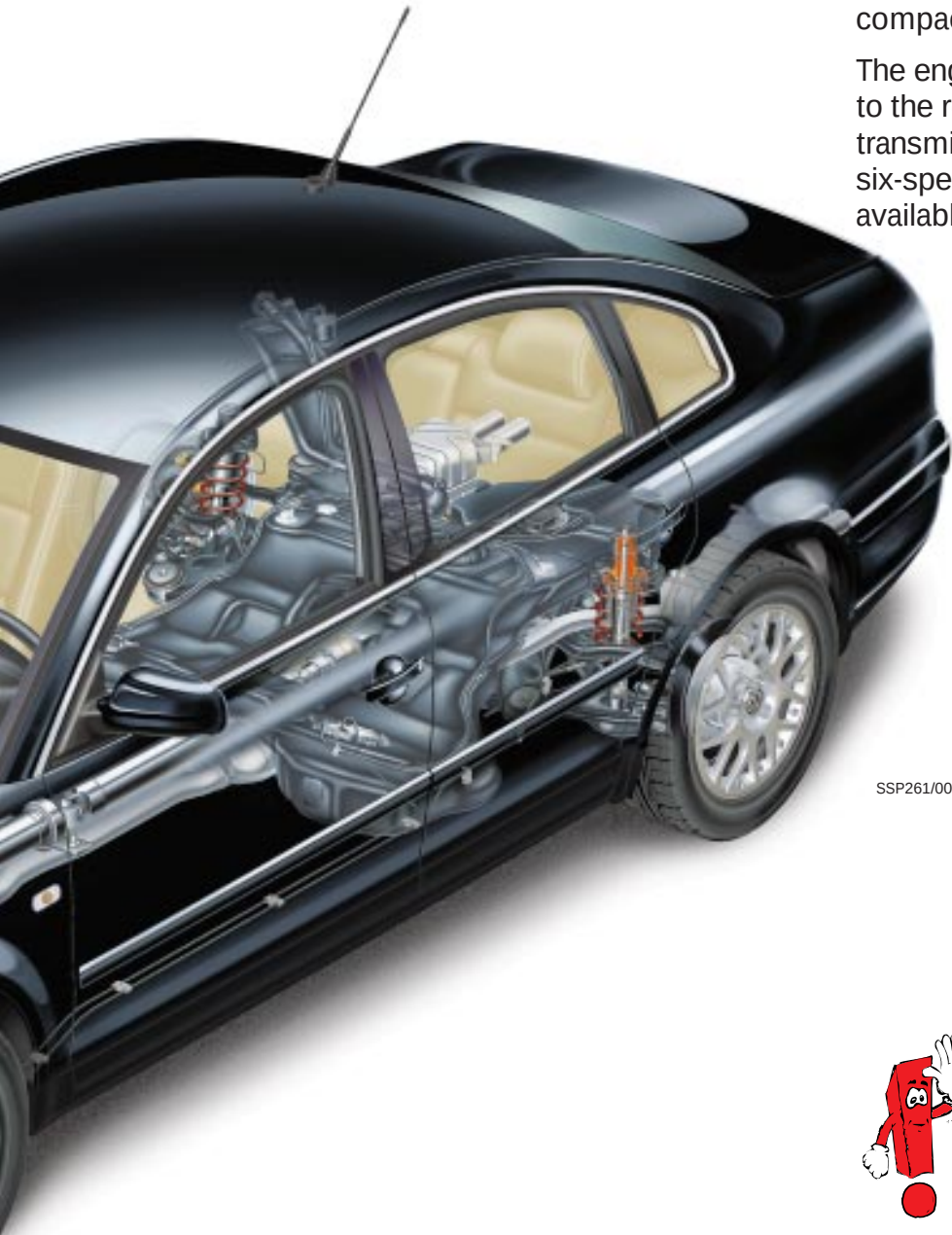


Introduction

This high-quality car is based on the Passat launched in North America in model year 2001.

The W8 engine is a totally new development. One of the most important technical features of the W8 engine is its compact size.

The engine power output is transferred to the road through a five-speed automatic transmission with Tiptronic and 4MOTION. A six-speed manual transmission will be available at a later date.



SSP261/003



For a description of all the available options, please see www.vwwebsource.com for the latest information.

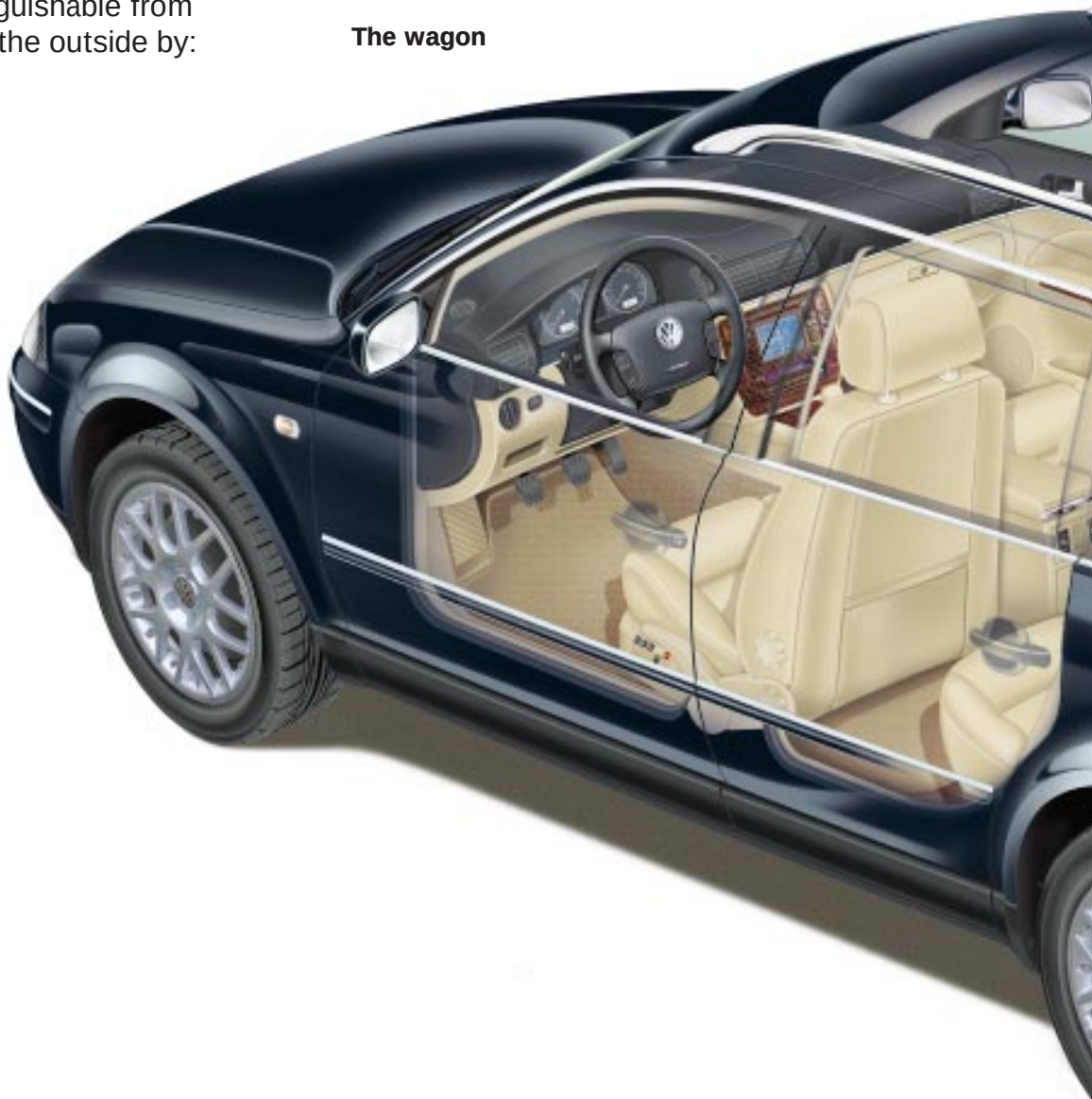
Introduction

All the innovations in the Passat W8 sedan are also available in the wagon body style. The bodies of both the wagon and the sedan have been strengthened to improve their acoustics and increase crash safety.

Whether it is the wagon or the sedan, the new Passat W8 is distinguishable from other Passat models on the outside by:

- Dual exhaust with two chrome tailpipes on each side.
- Bi-xenon headlights.
- Additional chrome body trim.
- 7J x 16 alloy wheels.
- P205/55 R16H all-season tires.

The wagon



Introduction

Inside both body styles, the standard equipment includes:

- Side airbags in the front seats.
- Head airbags front and rear.
- Upgraded pillar and headliner trims.
- Chrome and real wood interior trim.
- Exclusive upholstery.
- On-board computer.
- Multi-function trip computer.

The extensive list of Passat W8 options includes:

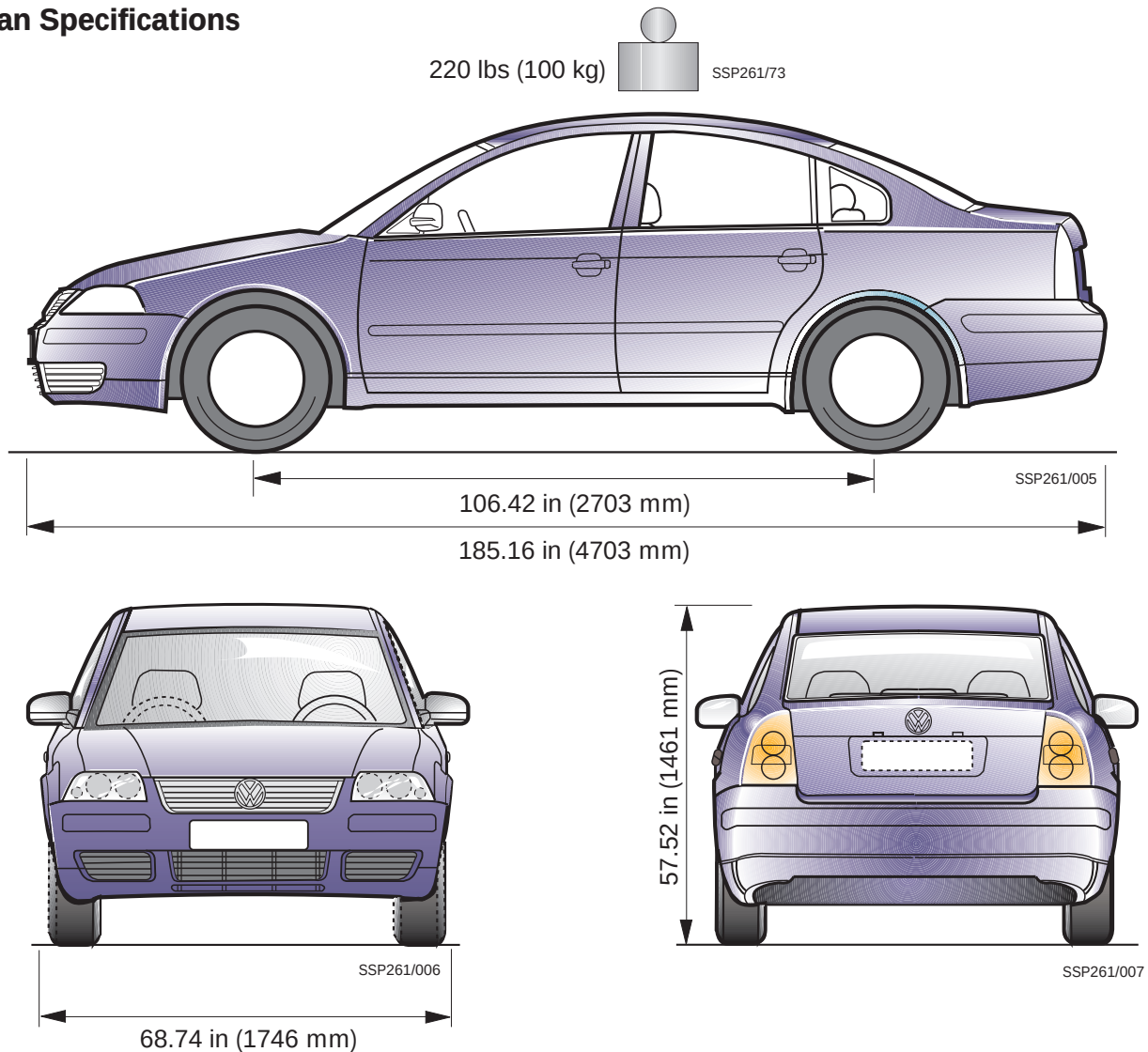
- New luxury leather seats.
- New sport seats.
- A digital sound pack.
- Dark tinted rear windows.



S261/004

Introduction

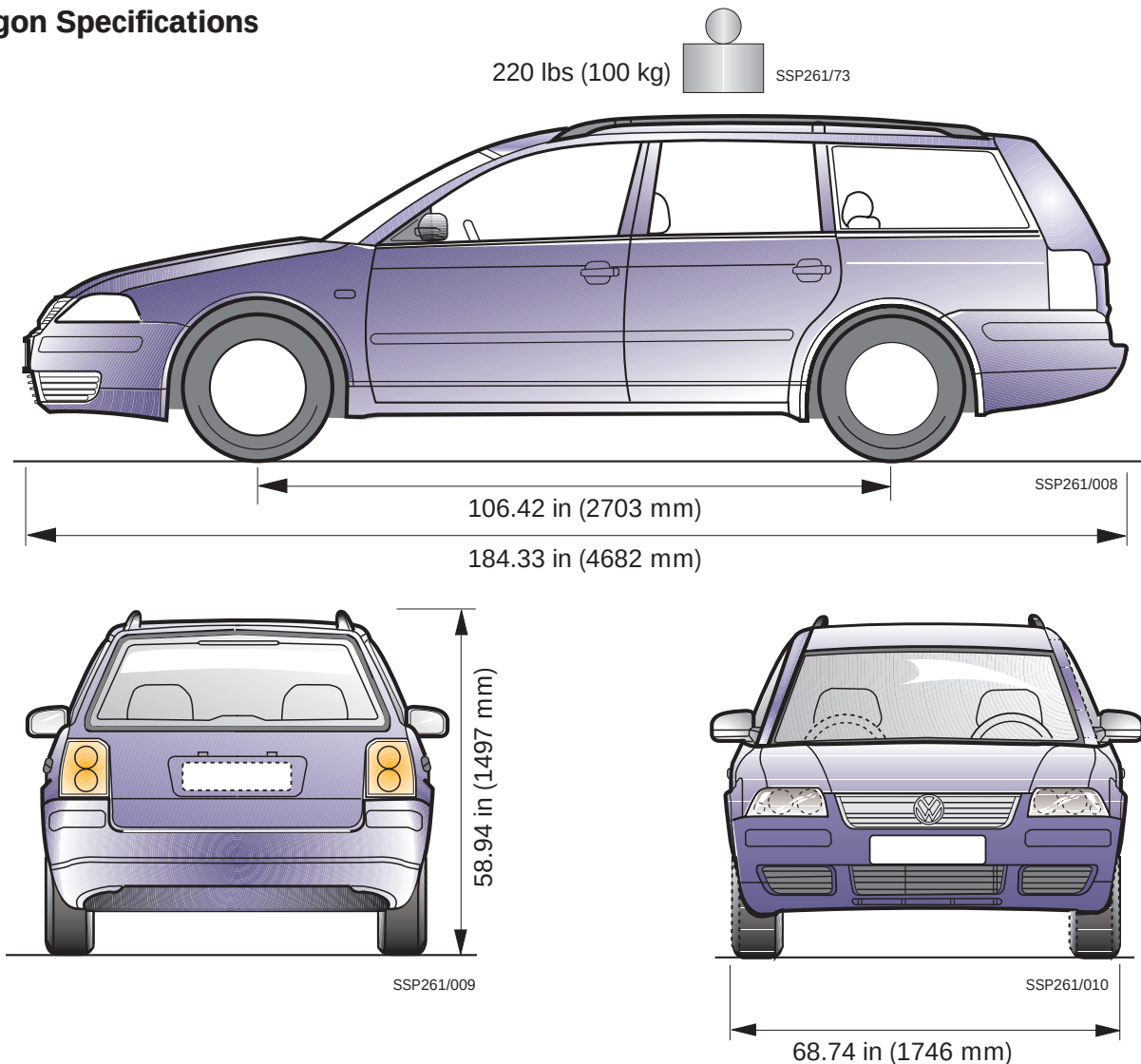
Sedan Specifications



- **Length**
185.16 inches (4703 mm)
- **Width**
68.74 inches (1746 mm)
- **Height**
57.52 inches (1461 mm)
- **Wheelbase**
106.42 inches (2703 mm)
- **Turning circle**
37.7 feet (11.5 m)
- **Fuel tank capacity**
21.1 gallons (80 liters)
- **Front track width**
59.49 inches (1511 mm)
- **Rear track width**
59.45 inches (1510 mm)
- **Permitted gross vehicle weight**
4,894 pounds (2220 kg)
- **Curb weight**
3,671 pounds (1665 kg)
- **Permitted roof load**
220 pounds (100 kg)
- **Drag coefficient**
0.27 C_D

Introduction

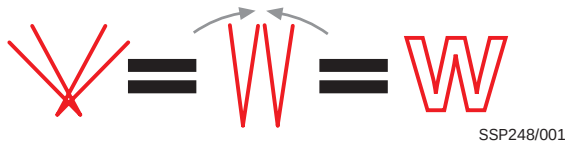
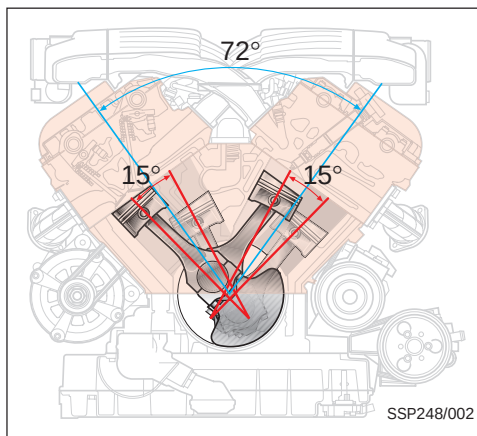
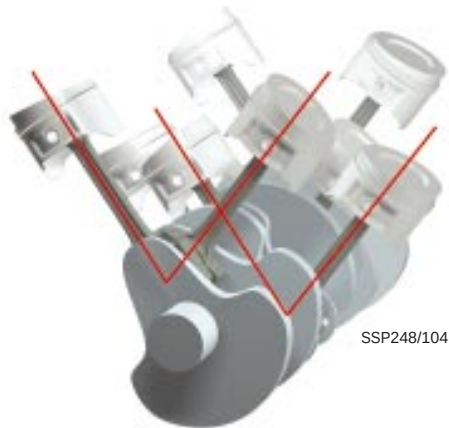
Wagon Specifications



- **Length**
184.33 inches (4682 mm)
- **Width**
68.74 inches (1746 mm)
- **Height**
58.94 inches (1497 mm)
- **Wheelbase**
106.42 inches (2703 mm)
- **Turning circle**
37.7 feet (11.5 m)
- **Fuel tank capacity**
21.1 gallons (80 liters)

- **Front track width**
59.49 inches (1511 mm)
- **Rear track width**
59.45 inches (1510 mm)
- **Permitted gross vehicle weight**
5,049 pounds (2290 kg)
- **Curb weight**
3,803 pounds (1725 kg)
- **Permitted roof load**
220 pounds (100 kg)
- **Drag coefficient**
0.27 C_D

Engine



The W8 Engine

The Passat W8 comes with one engine, the W8.

The new generation W engine series incorporates design features of the V and VR engines. As with the V engines, the cylinders are arranged in two banks. In the W8 engine, these banks of cylinders are aligned at a V-angle of 72 degrees in relation to one another. As in the VR engines, the cylinders within each bank maintain a V-angle of 15 degrees.

This layout achieves a very compact eight-cylinder engine with relatively small dimensions. When the W8 engine is viewed from the front, the cylinder arrangement looks like a double-V. Put the two Vs together, and you get a W. Hence the designation “W engine.”

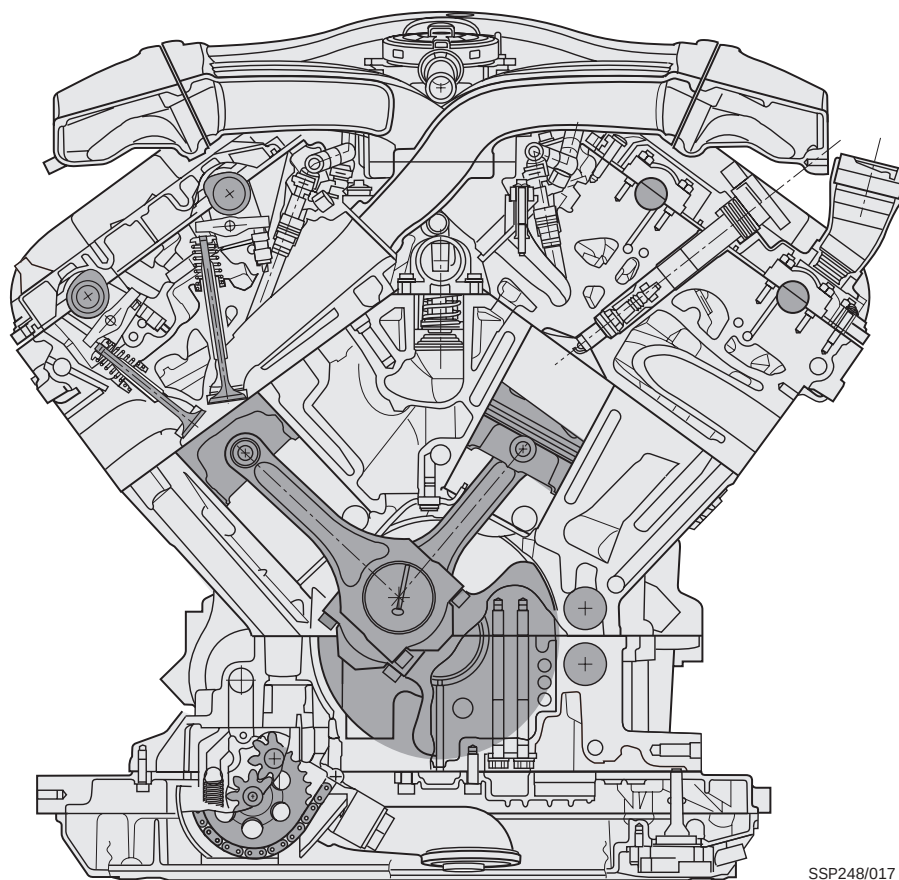
Compared with other eight-cylinder engines, the W8 is relatively lightweight due to its size and through the use of aluminum alloy castings, slim connecting rods, and short pistons.

Four valves per cylinder, low-friction roller rocker fingers, and chain drive for the four overhead camshafts with camshaft timing adjusters are also features of this modern engine.



For more detailed information about the design and function of W engines, please refer to *The W Engine Concept*, Course Number 821203.

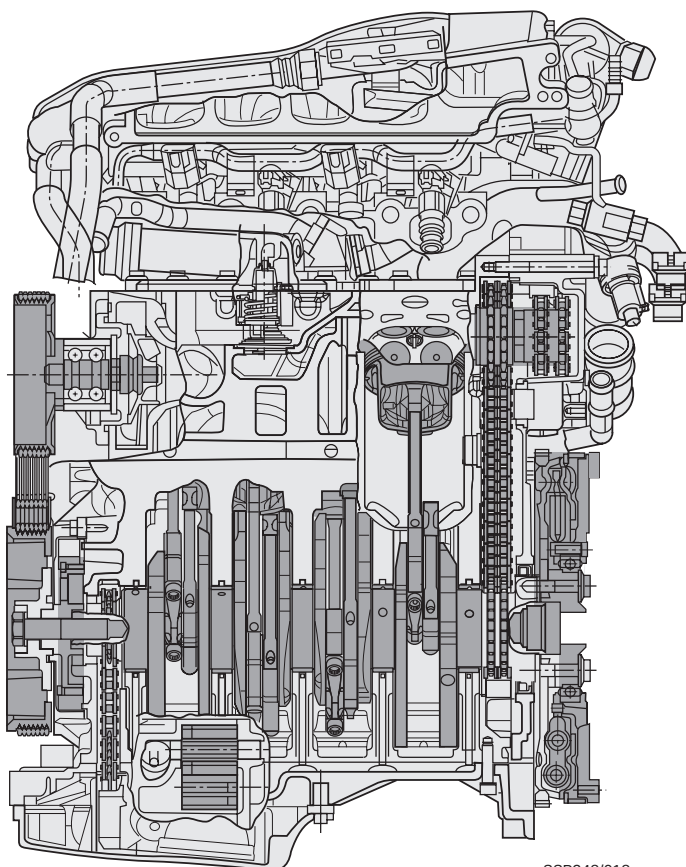
W8 Engine Specifications



SSP248/017

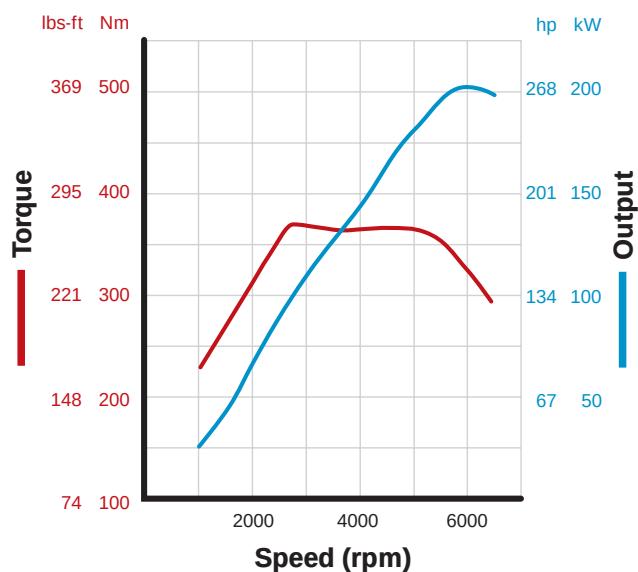
- **Displacement**
244 cu in (3999 cm³)
- **Bore**
3.307 in (84.0 mm)
- **Stroke**
3.550 in (90.168 mm)
- **Number of cylinders**
8
- **Number of cylinder heads**
2
- **Offset**
± 0.492 in (12.5 mm)
- **Bank offset**
0.512 in (13 mm)
- **V-angle of cylinder heads between banks**
72 degrees
- **V-angle of cylinders in a bank**
15 degrees
- **Number of valves**
4 per cylinder
- **Crankshaft journal offset**
−18 degrees
- **Firing order**
1-5-4-8-6-3-7-2

Engine



SSP248/018

Torque and Power Output



SSP248/021

- **Dimensions**
16.5 in (420 mm) long
28.0 in (710 mm) wide
26.9 in (683 mm) high
- **Weight**
Approximately 425 lbs (193 kg)
- **Maximum power output**
Approximately 270 bhp
(201 kW) @ 6,000 rpm
- **Maximum torque**
Approximately 273 lbs-ft
(370 Nm) @ 2,500 rpm
- **Fuel type recommendation**
Premium unleaded gasoline (91 AKI)
- **Engine management system**
Bosch Motronic ME 7.1.1
- **Installation position**
In-line
- **Allocated transmissions**
5HP19 4MOTION,
C90 6-speed 4MOTION



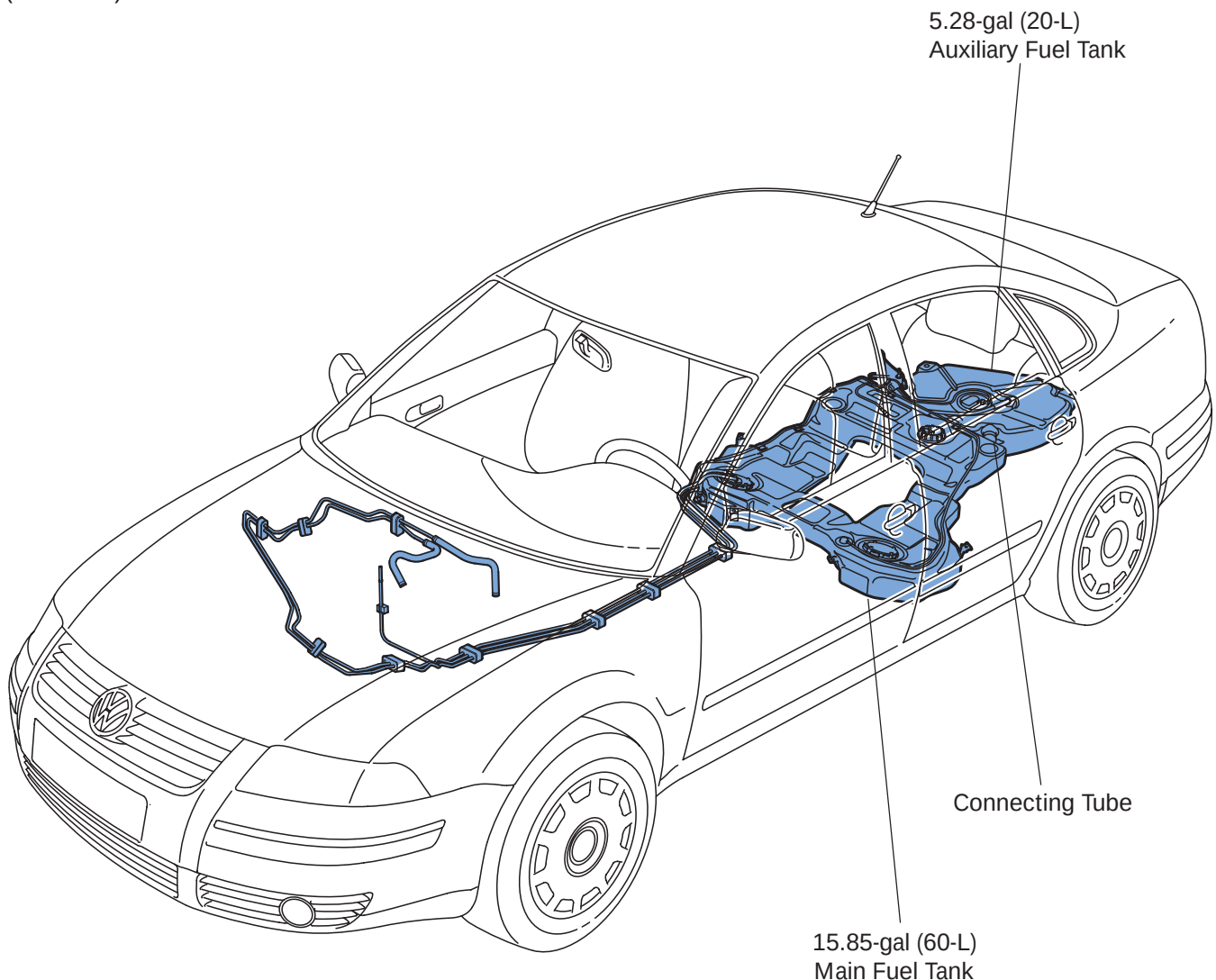
Horsepower and torque specifications were not final at the time of printing. Please see www.vwwebsource.com for the latest specifications.

Fuel Delivery System

Fuel Tanks

The Passat W8 has a combined fuel tank capacity of approximately 21.1 gallons (80 liters). The fuel delivery system includes the 15.85-gallon (60-liter) fuel tank as used on the Passat 2002 4MOTION and an auxiliary tank with a capacity of 5.28 gallons (20 liters).

The two fuel tanks are connected by a tube. The auxiliary fuel tank is located under the spare-wheel well which has been reduced in size to accommodate the tank. There is still enough room to store a temporary spare in the reduced spare-wheel well in the event of a flat tire.



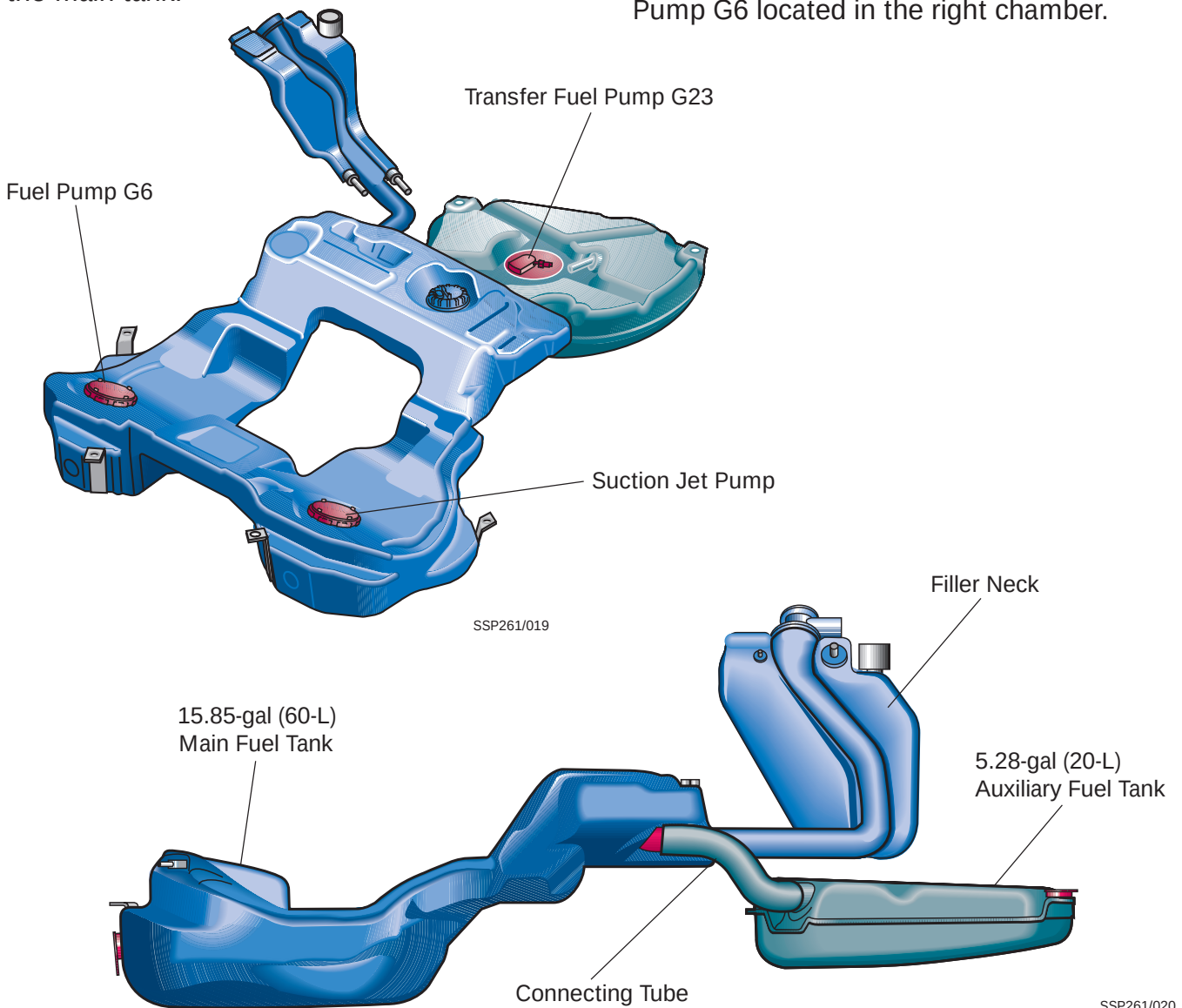
SSP261/018

Fuel Supply

Fuel Pumps

The 15.85-gallon (60-liter) main fuel tank contains an electric Fuel Pump G6 and a suction jet pump (entrainment pump). There is also an electric Transfer Fuel Pump G23 in the 5.28-gallon (20-liter) auxiliary fuel tank. The different heights of the main tank and the auxiliary tank require a controlled evacuation of the two tanks. The engine is always supplied with fuel by the pump in the main tank.

When both tanks are full, fuel is first pumped from the main tank. When the fuel level in the main tank drops to 10.57 gallons (40 liters), the fuel pump in the auxiliary fuel tank is activated and pumps fuel from the auxiliary tank to the main tank. When the auxiliary fuel tank is empty, the remaining fuel is pumped from the main tank. The suction jet pump (entrainment pump) delivers fuel from the left chamber of the main tank to the Fuel Pump G6 located in the right chamber.



Fuel Level Sensors

There are four fuel level sensors that provide information about fuel levels in the various parts of the two tanks. This information is necessary to control evacuation of the tanks and to calculate the amount of fuel remaining in the combined tanks:

- Sender for Fuel Gauge G
- Fuel Level Sensor 2 G169
- Fuel Supply Sensor 3 G237
- Auxiliary Tank Fuel Level Sensor G292

There is also a separate reed-contact sensor that provides a signal when the auxiliary tank is empty:

- Auxiliary Tank Fuel Level Empty Sensor G293

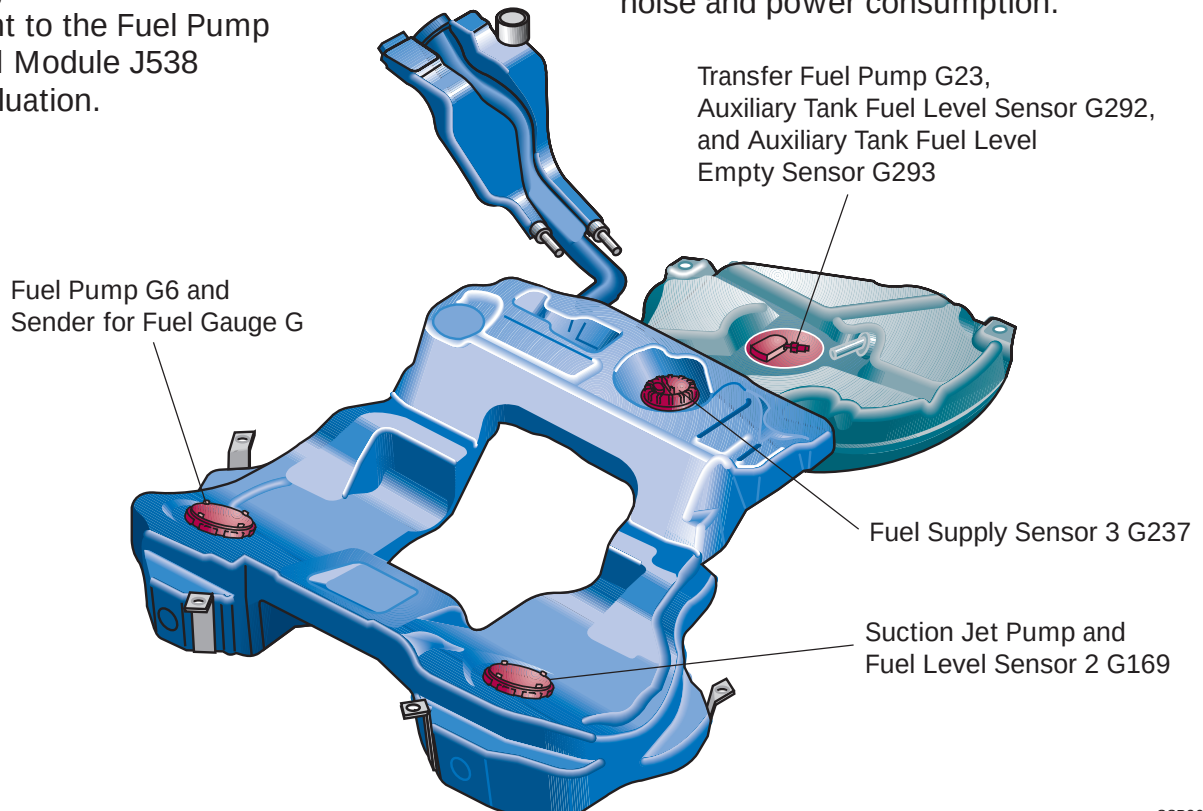
The signals from all these sensors are sent to the Fuel Pump Control Module J538 for evaluation.

Fuel Pump Control

The Fuel Pump G6 in the main fuel tank is controlled by the Motronic Engine Control Module J220. The Transfer Fuel Pump G23 in the auxiliary fuel tank is controlled by the Fuel Pump Control Module J538.

When the Fuel Level Sensor 2 G169 signals a fuel level of 10.57 gallons (40 liters) in the main fuel tank, the Fuel Pump Control Module J538 turns on the Transfer Fuel Pump G23 in the auxiliary fuel tank.

The Transfer Fuel Pump G23 pumps fuel from the auxiliary fuel tank to the main fuel tank until the Auxiliary Tank Fuel Level Empty Sensor G293 signals “auxiliary fuel tank empty.” Then the Fuel Pump Control Module J538 turns off the Transfer Fuel Pump G23. This prevents the pump from running in an empty tank, and reduces noise and power consumption.



SSP261/021

Fuel Supply

Fuel Level Indicator

Because of the differences in the shape, size, and placement of the fuel tanks, signals from four of the fuel level sensors are required to calculate the remaining fuel amount correctly:

- Sender for Fuel Gauge G
- Fuel Level Sensor 2 G169
- Fuel Supply Sensor 3 G237
- Auxiliary Tank Fuel Level Sensor G292

The signals from these four sensors are evaluated in the Fuel Pump Control Module J538 to calculate the combined amount of fuel in the tanks. The resulting signal runs via the convenience CAN data bus to the instrument cluster and is used to control the fuel level indicator reading.

Fuel Pump Control Module J538

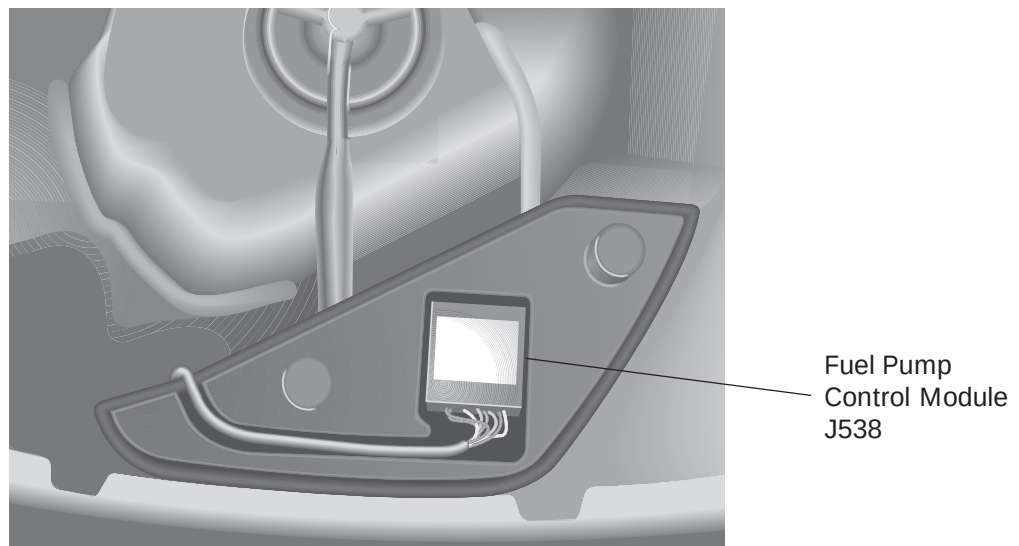
The Fuel Pump Control Module J538 is located in the spare-wheel well, embedded in plastic. It is connected to its input sensors and to the Control Module with

Indicator Unit in Instrument Panel Insert J285 through the convenience CAN data bus. It has the following tasks:

- Evaluates signals from the five fuel level sensors:
 - Sender for Fuel Gauge G
 - Fuel Level Sensor 2 G169
 - Fuel Supply Sensor 3 G237
 - Auxiliary Tank Fuel Level Sensor G292
 - Auxiliary Tank Fuel Level Empty Sensor G293
- Controls the fuel level indicator in the Control Module with Indicator Unit in Instrument Panel Insert J285
- Controls the Transfer Fuel Pump G23 in the auxiliary fuel tank
- Controls the Low Fuel Level Warning Light K105

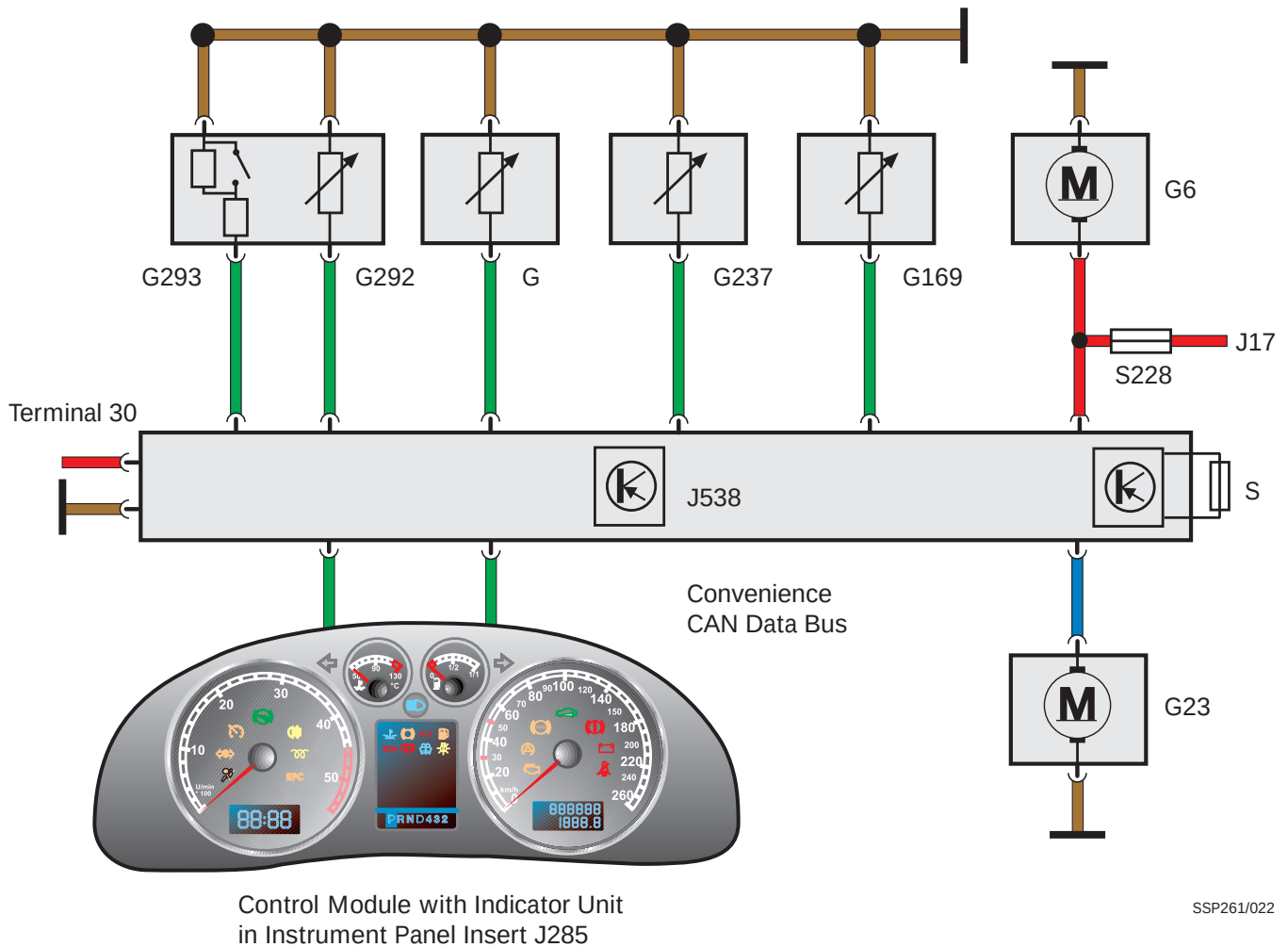
Address Word 58

The Fuel Pump Control Module J538 self-diagnosis can be accessed using Address Word 58.



SSP261/023

Fuel Delivery System Functional Diagram

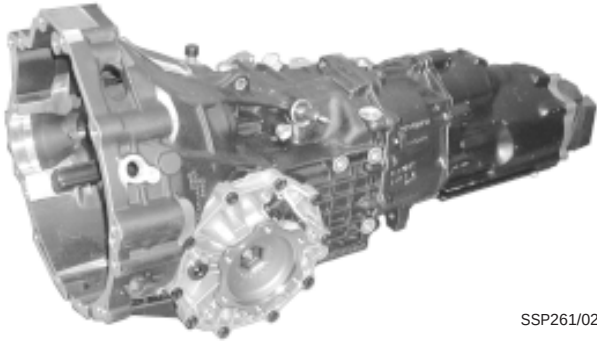


Components

G	Sender for Fuel Gauge
G6	Fuel Pump
G23	Transfer Fuel Pump
G169	Fuel Level Sensor 2
G237	Fuel Supply Sensor 3
G292	Auxiliary Tank Fuel Level Sensor
G293	Auxiliary Tank Fuel Level Empty Sensor

J17	Fuel Pump Relay
J538	Fuel Pump Control Module
S	Fuse (in Fuel Pump Control Module J538)
S228	Fuse in Fuse Holder

Transmissions



SSP261/024

Six-Speed Manual Transmission 01E with 4MOTION All-Wheel Drive

The six-speed manual transmission 01E used on the 2002 Passat is also used on the Passat W8. Since the Passat W8 is supplied with 4MOTION all-wheel drive as standard equipment, a torsen differential is integrated in the transmission to properly distribute the engine torque to all four wheels. The transmission casing is adapted to fit the W8 engine.



SSP261/025

Five-Speed Automatic Transmission 01V with 4MOTION All-Wheel Drive

The five-speed automatic transmission 01V is adapted to fit the W8 engine, including modifications to the casing and gear ratios, as well as the clutches and brakes. A torsen differential is also integrated into the automatic transmission to distribute the engine torque to all four wheels for 4MOTION all-wheel drive.

The five-speed automatic transmission 01V also has:

- Dynamic shift program (DSP).
- Tiptronic function.
- Torque converter with a lockup clutch.

4MOTION All-Wheel Drive

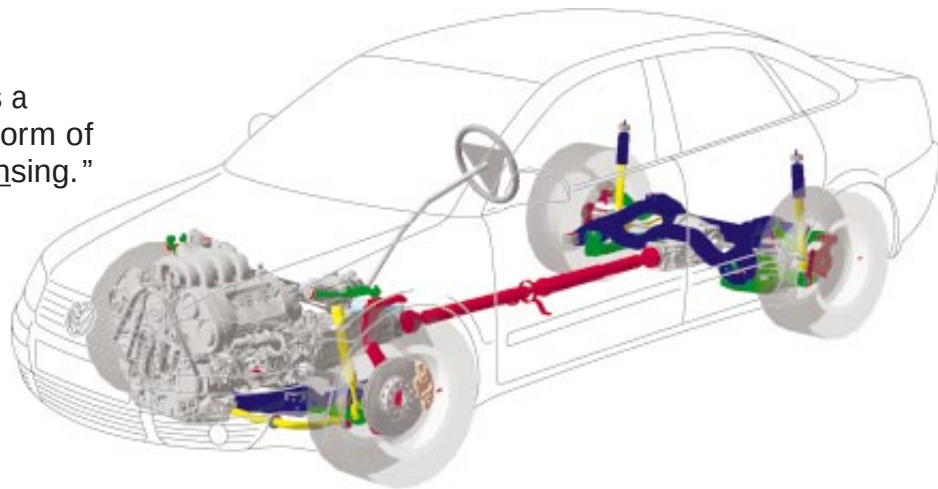
The 4MOTION all-wheel drive system is designed to distribute the drive forces between the front and rear axles to maintain positive engagement at the wheels with traction.

The Torsen differential detects wheel slip in one axle and distributes the drive power to the wheels of an axle with better wheel grip.

The Torsen differential permits limited differences in speed between the front and rear axles to allow for ABS control processes. It operates automatically and reacts independent of driver input.

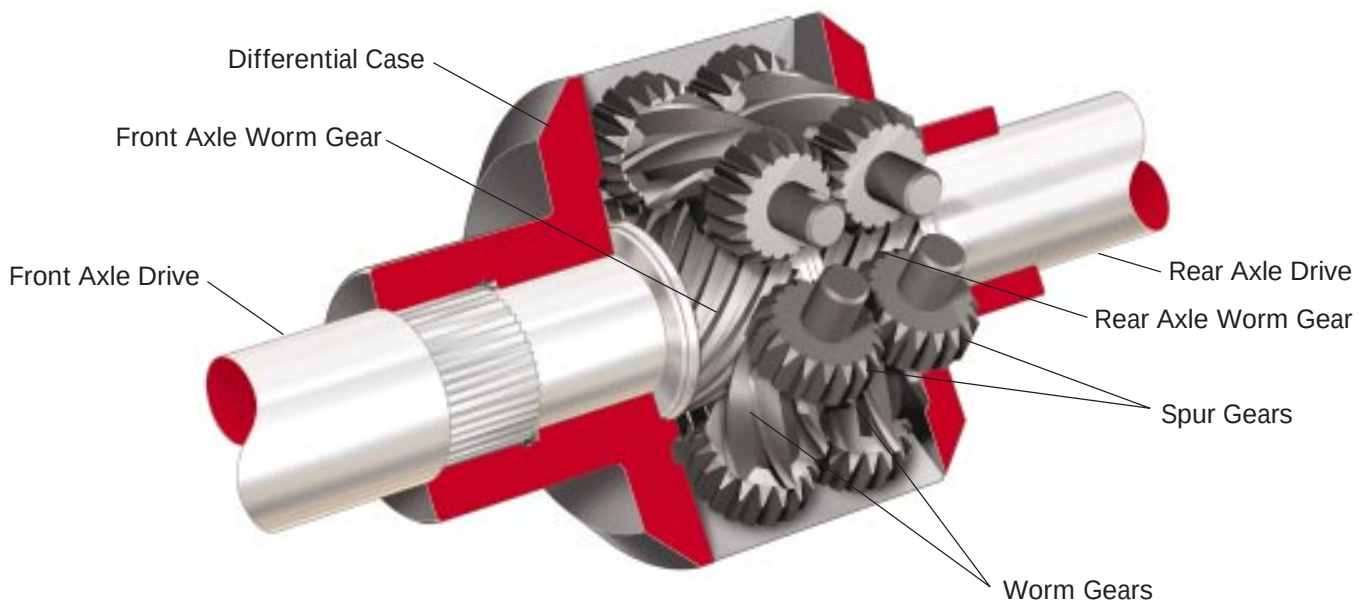


"Torsen" is a combined form of "torque sensing."



SSP261/026

The Torsen Differential



SSP261/027

Running Gear

Four-Link Front Suspension

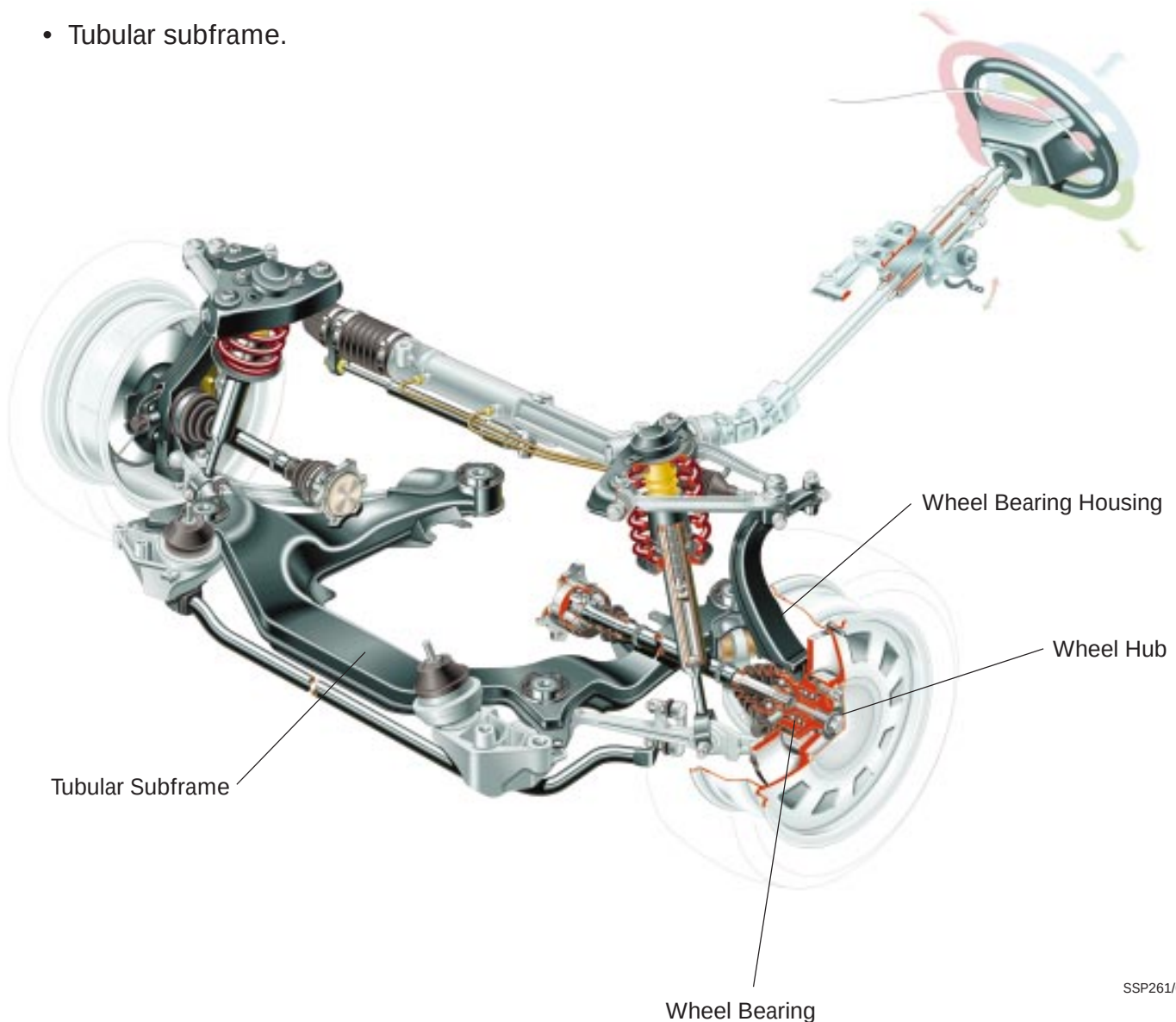
The design of the front axle on the Passat W8 is nearly identical to the Passat model year 2002. The following components have been modified to cope with the higher weight and the resulting axle loads:

- Wheel bearing housing.
- Wheel bearings.
- Wheel hub.
- Tubular subframe.

Steering

The steering on the Passat W8 is the same as on the Passat 2002:

- Steering column is adjustable in height and reach.
- Hydraulic power steering gear.

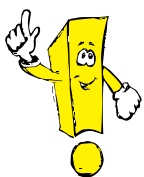
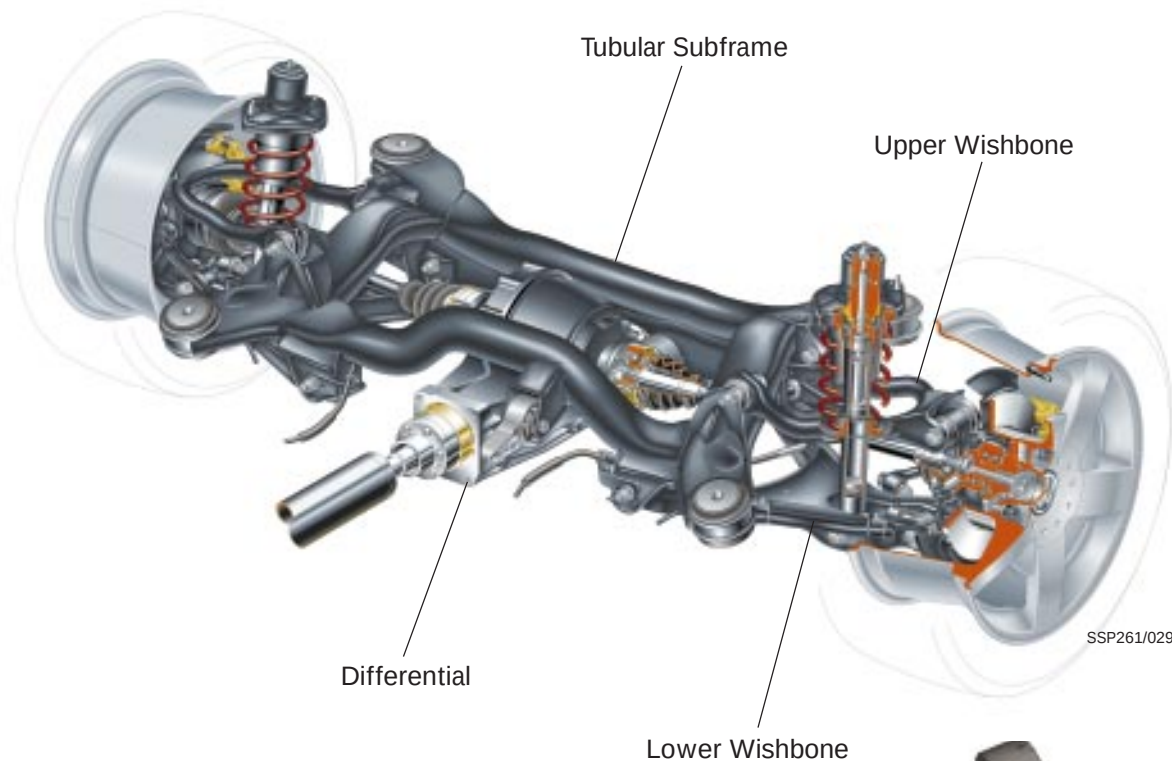


SSP261/028

Double-Wishbone Rear Suspension

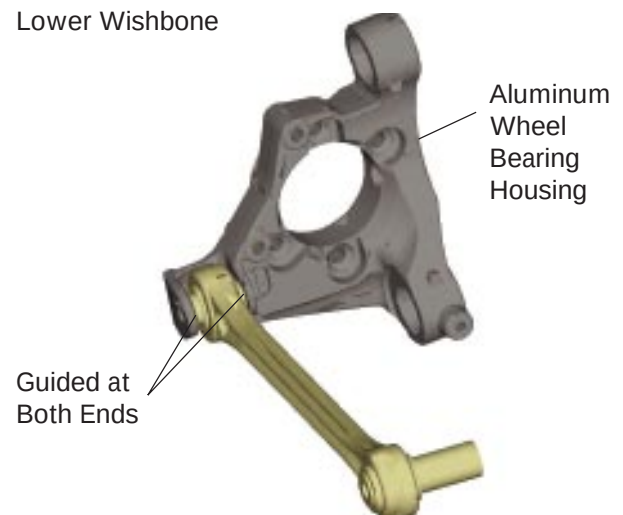
The proven double-wishbone rear suspension with closed tubular subframe is installed on the Passat W8.

What is new are the wheel bearing housings with modified attachments to the track rods.



New wheel bearing housing:

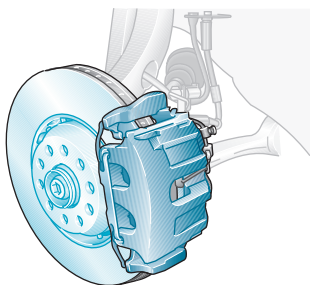
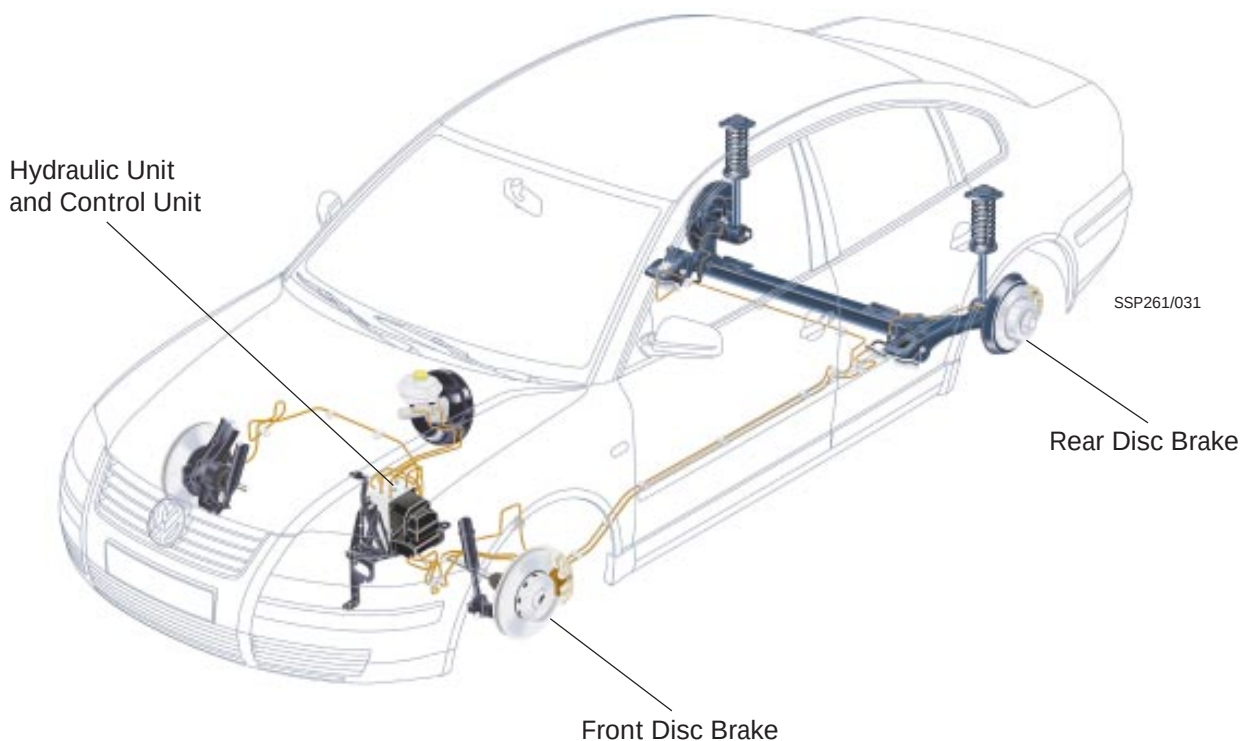
- Wheel bearing housing made of aluminum.
- Track rods guided at both ends.
- Larger track width.



Running Gear

Brake System

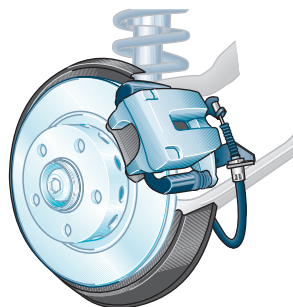
The Passat W8 currently has the most powerful brake system of all Volkswagen car models. It achieves excellent deceleration rates.



Front Disc Brake

Disc diameter x thickness:

- 321 mm x 30 mm



Rear Disc Brake

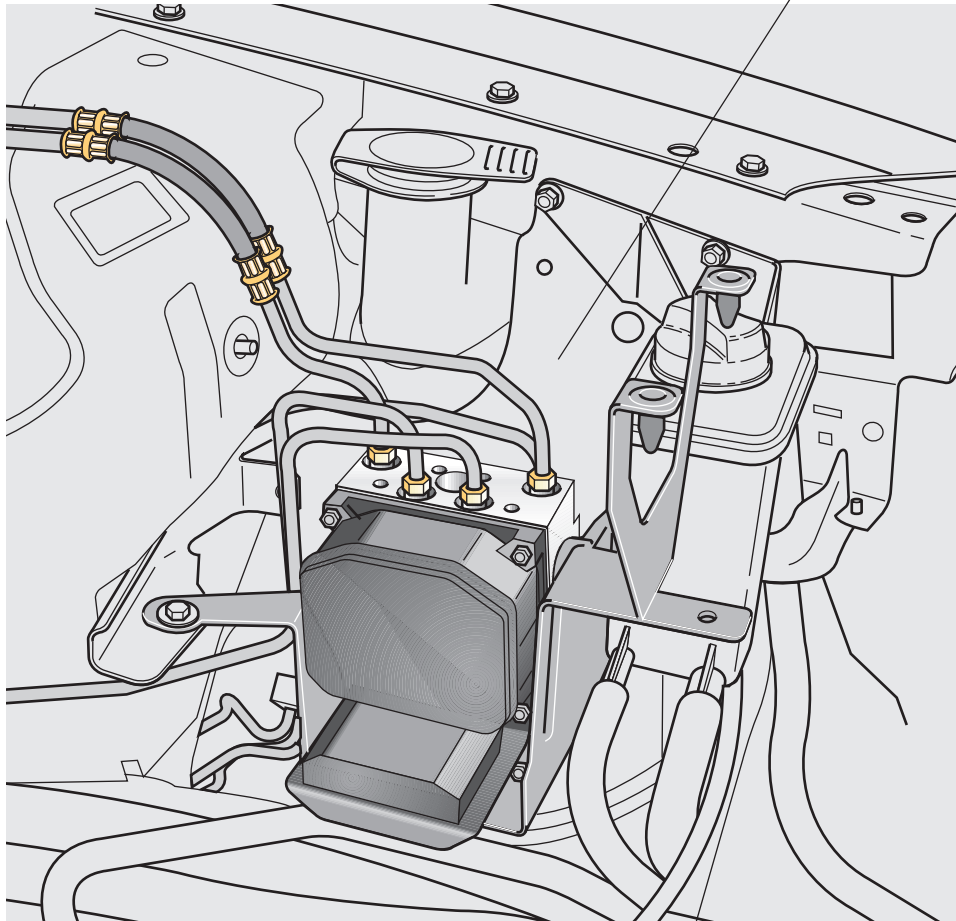
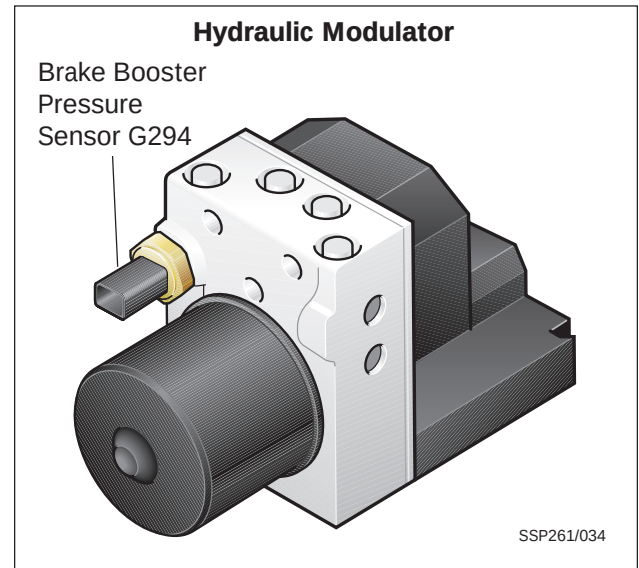
Disc diameter x thickness:

- 269 mm x 22 mm

Hydraulic Modulator

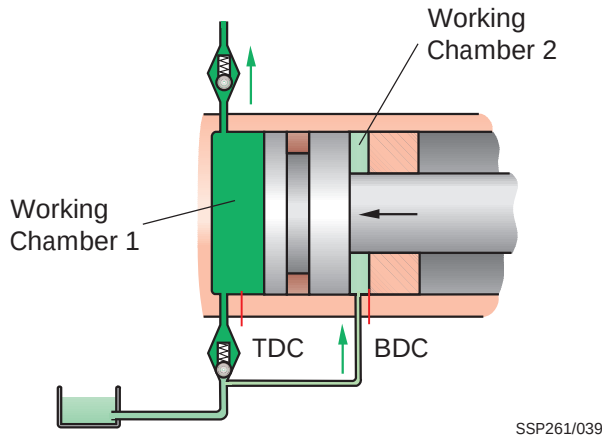
The Passat W8 has the Bosch 5.7 ABS system with Electronic Stabilization Program (ESP) and the hydraulic Brake Assist system. Special features of the Bosch 5.7 ABS system include:

- The hydraulic unit and the control unit form a single hydraulic modulator unit.
- The two-stage ABS Return Flow Pump V39 replaces the Hydraulic Pump for Traction Control V156.
- The Brake Booster Pressure Sensor G294 is installed in the hydraulic unit.

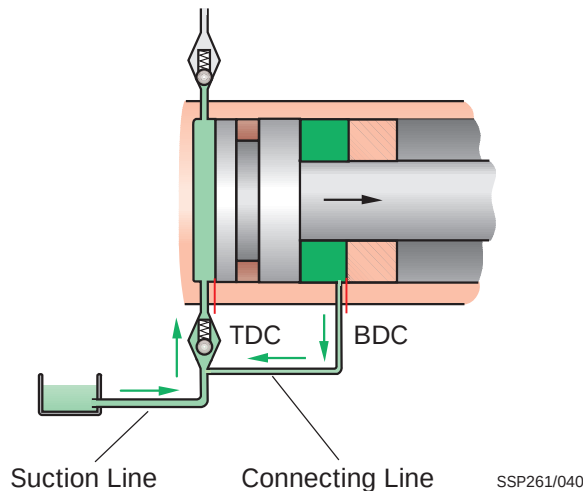


Running Gear

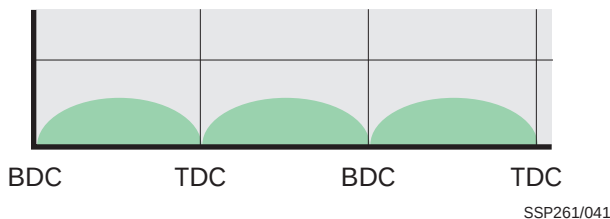
Suction process in working chamber 2.



Suction process in working chamber 1.



A suction process takes place with every piston stroke.



Two-Stage ABS Return Flow Pump V39

The two-stage ABS Return Flow Pump V39 is integrated in the Bosch 5.7 ABS system. When the ESP intervenes, ABS Return Flow Pump V39 supplies the required preliminary pressure in the brake lines.

The piston of the two-stage ABS Return Flow Pump V39 is stepped and has a double-acting function within two working chambers.

Suction is effected in two stages; brake fluid is drawn through the suction line during each stroke of the piston, in both directions.

Since the entire suction volume is supplied almost continuously, the maximum suction flow rate is significantly lower than in single-stage pumps. This diminishes the suction pressure and prevents cavitation. A quick pressure buildup is ensured, even at extremely low temperatures.

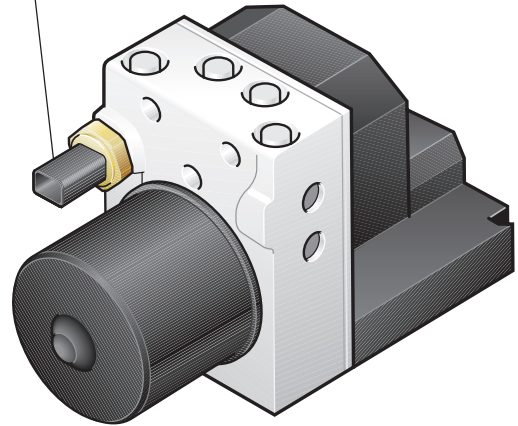


“Cavitation” refers to both the formation of a partial vacuum in a liquid by rapidly moving components like a pump rotor or piston, and the resulting pitting damage to components that the collapse of such a vacuum can cause.

Brake Assist

Brake Assist is integrated in the ABS control unit. Accident research studies have shown that the majority of drivers do not press hard enough on the brakes in critical situations. This means that pressure build-up is insufficient to reach maximum vehicle deceleration. This means that pressure build-up is insufficient to reach maximum vehicle deceleration.

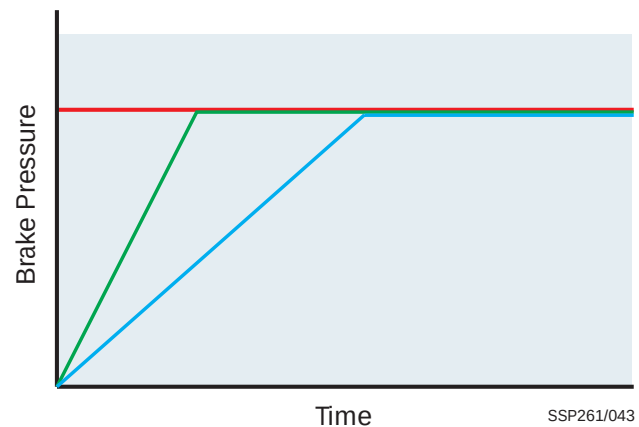
Brake Booster
Pressure Sensor G294



SSP261/034

The Brake Booster Pressure Sensor G294 detects the pressure rise in the brake system. The control unit recognizes an emergency braking action by the rapid rise in brake pressure within a specific period of time. After it detects the emergency situation, the control unit increases the brake pressure automatically to a level exceeding the locking limit, within the ABS control range. This enables maximum deceleration and shortens the vehicle stopping distance.

Pressure rise in brake system.



SSP261/043

- ABS Control Range
- Emergency Braking
- Normal Braking

Body

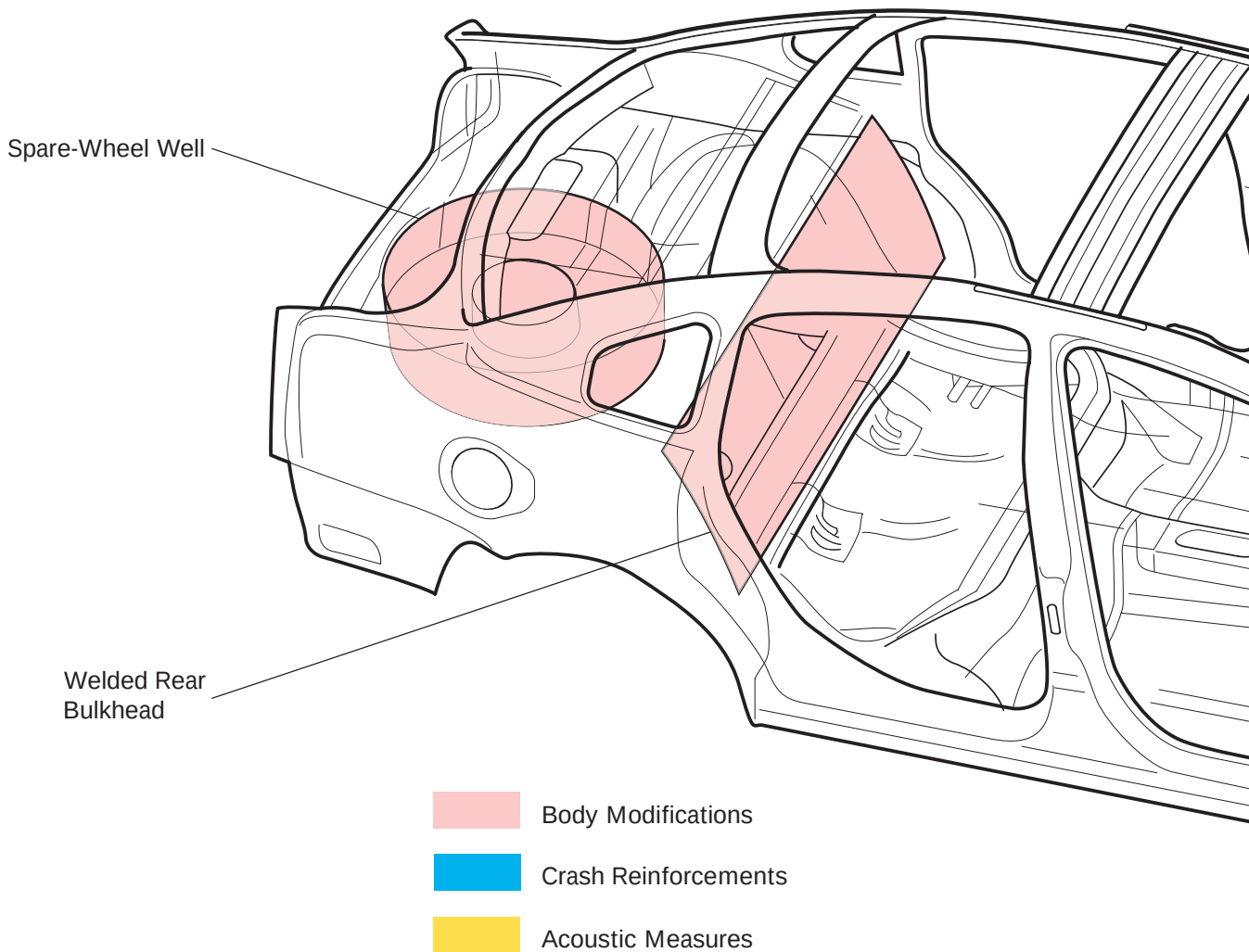
Body Modifications

To fulfill the mandate for greater luxury and safety, the body of the Passat W8 has been strengthened. There is a distinction between reinforcements made to improve the body acoustics and reinforcements made to increase crash safety.

We have also modified the spare-wheel well to accommodate the auxiliary fuel tank. On the sedan, the rear bulkhead is welded to the rear backrest. The backrest of the rear seat bench is not foldable.



The cross strut between the front wheel housings is also used on Passat 2002 models with V6 engines.

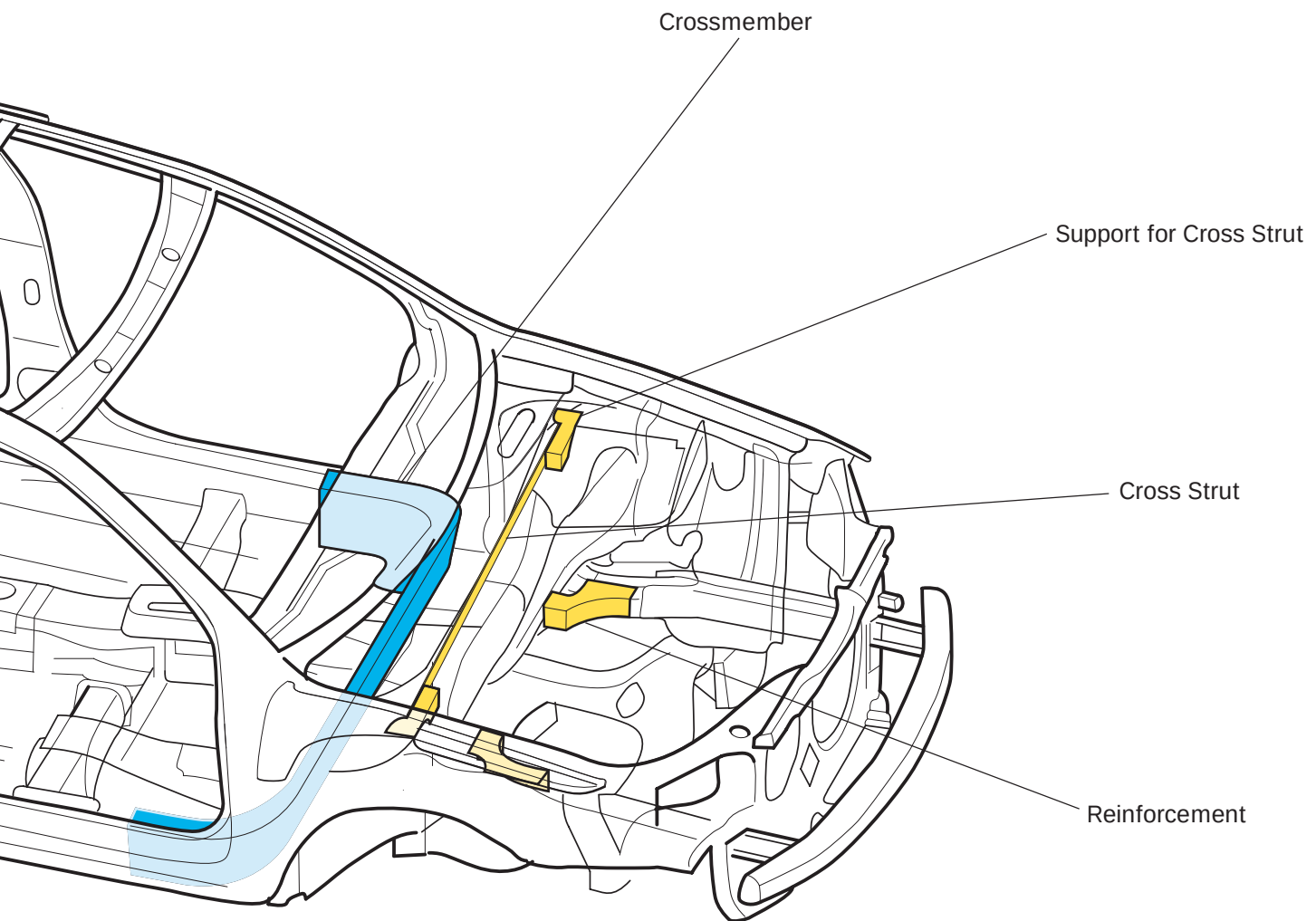


Acoustic Measures

A cross strut is bolted between the front wheel housings. It is fixed to new supports welded to the wheel housings. An additional strut is welded to the front bulkhead near the front side member.

Crash Reinforcements

The front footwell is reinforced by an additional crossmember.



SSP261/011

Occupant Protection

Airbags and Seat Belts

Occupant protection is ensured by the airbag system with driver and passenger front airbags, side airbags and Side Curtain Protection, and three-point seat belts and belt tensioners.

The Passat W8 has two full-size front airbags:

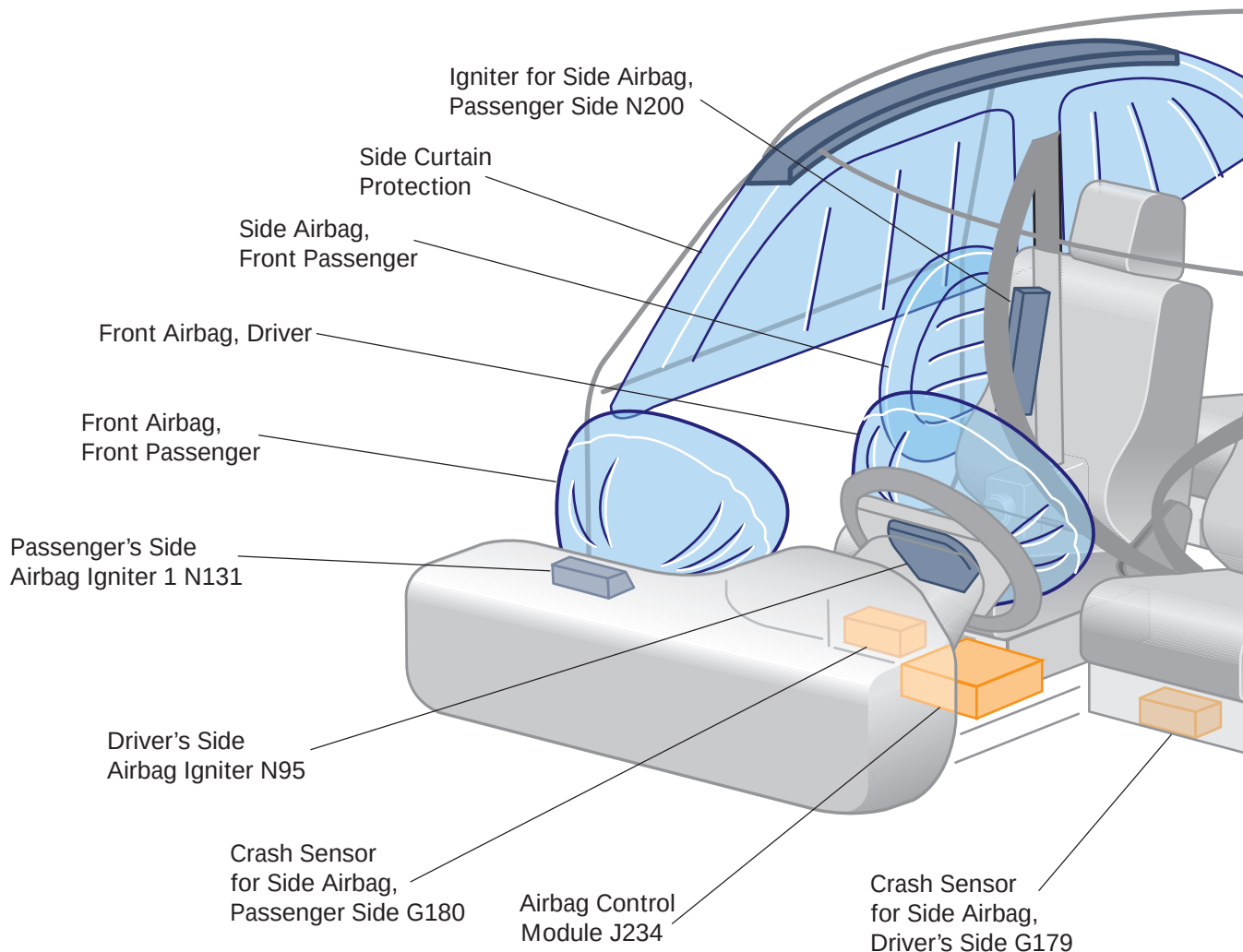
- Driver's side front airbag filling volume is 2.26 cubic feet (64 liters).
- Passenger's side front airbag filling volume is 4.24 cubic feet (120 liters).

The Airbag Control Module J234 is located behind the central console on the tunnel.

The two side airbags are located in the front seats and have a filling volume of 0.42 cubic feet (12 liters). Each Side Curtain Protection curtain has a filling volume of 0.92 cubic feet (26 liters) and is mounted in the vehicle headlining above the doors.

The system has two lateral acceleration sensors which are located below the front seats as on the Passat 2002 model:

- Crash Sensor for Side Airbag, Driver's Side G179
- Crash Sensor for Side Airbag, Passenger Side G180



Occupant Protection

Conventional inertia-reel seat belts are used on the front and outer rear seats.

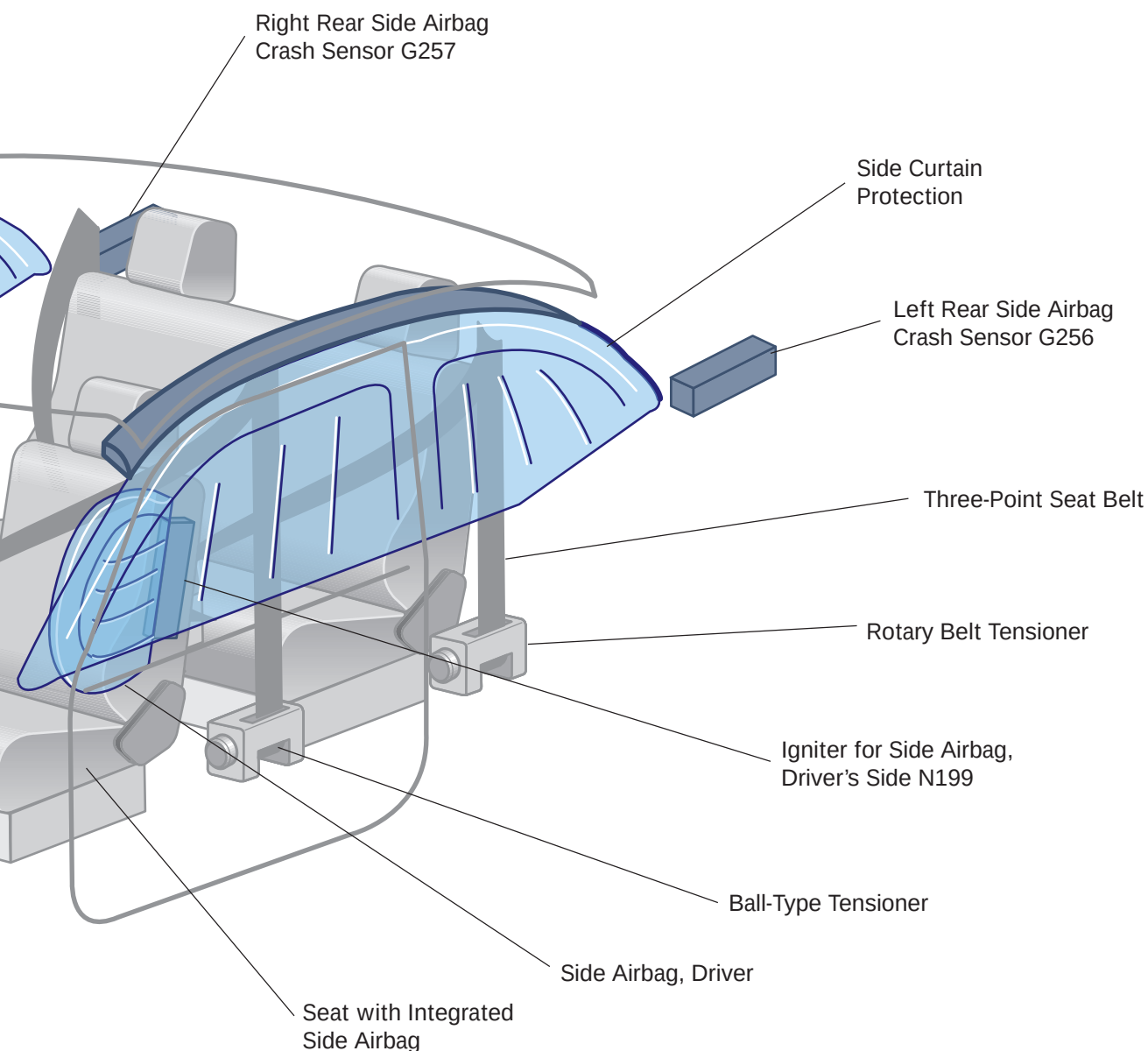
Ball-type tensioners are used on the front seat belts.

The rear seat belts are equipped with rotary belt tensioners.

These two types of belt tensioner are both triggered by combination mechanical and pyrotechnical capsules.



The upper part of the belt buckle is flexible. The lower part is rigidly bolted to the bracket.



SSP261/012

Air Conditioning System

Heating and Air Conditioning System

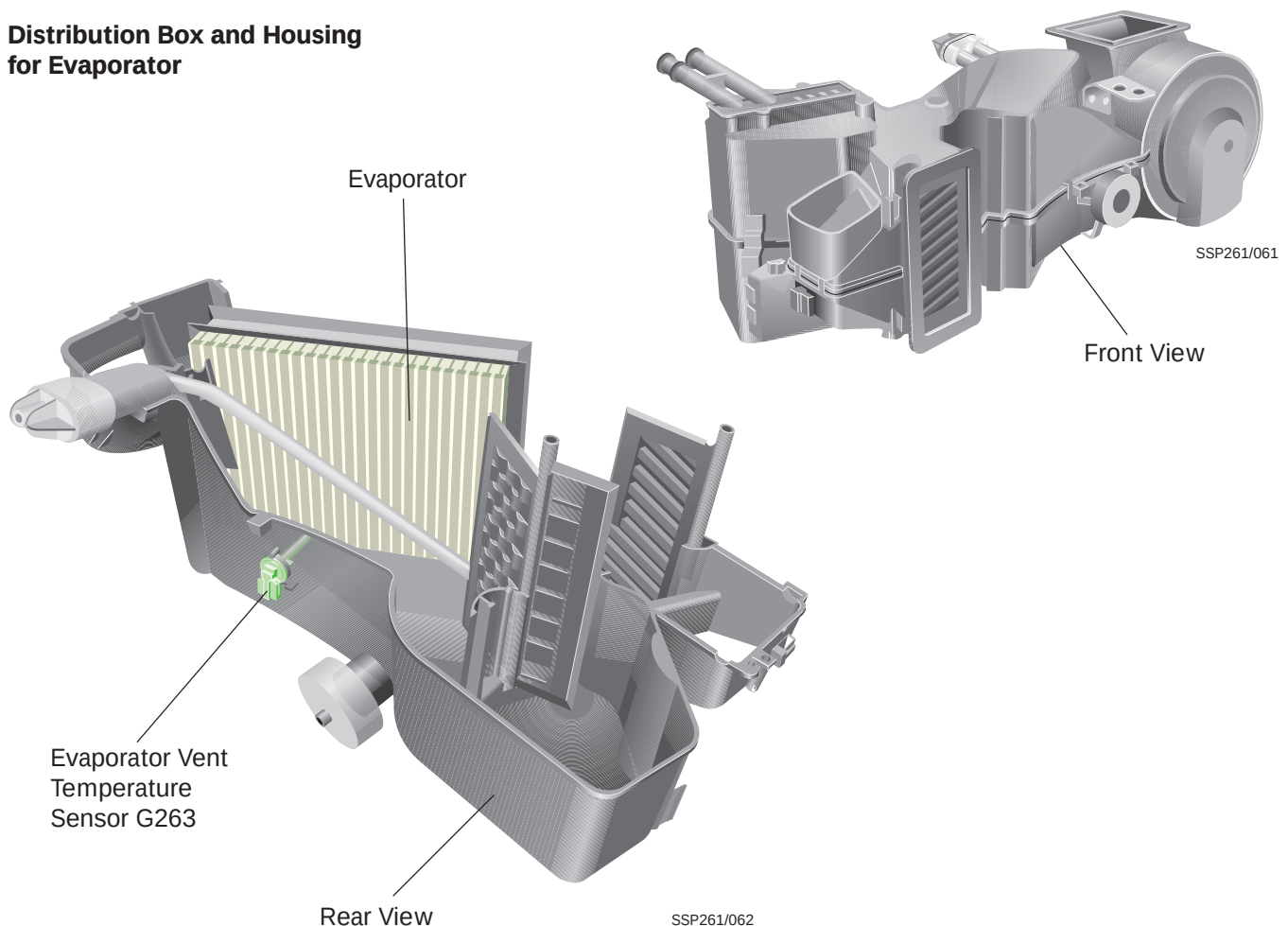
The Climatronic air conditioning system with fully automatic control is offered on the Passat W8.

The incorporation of the following components into the system is the main difference from the previous fully automatic air conditioning system used on the Passat:

- Evaporator Vent Temperature Sensor G263.
- Externally regulated compressor with A/C Compressor Regulator Valve N280 and integrated overload protection.

The interaction between these components in conjunction with the other elements of the Climatronic system results in a needs-orientated temperature control which reduces power consumption and fuel consumption.

Distribution Box and Housing for Evaporator



Air Conditioning System

Externally Controlled A/C Compressor

The compressor basically works on the principle of the swash plate.

The technical features of the externally controlled compressor are:

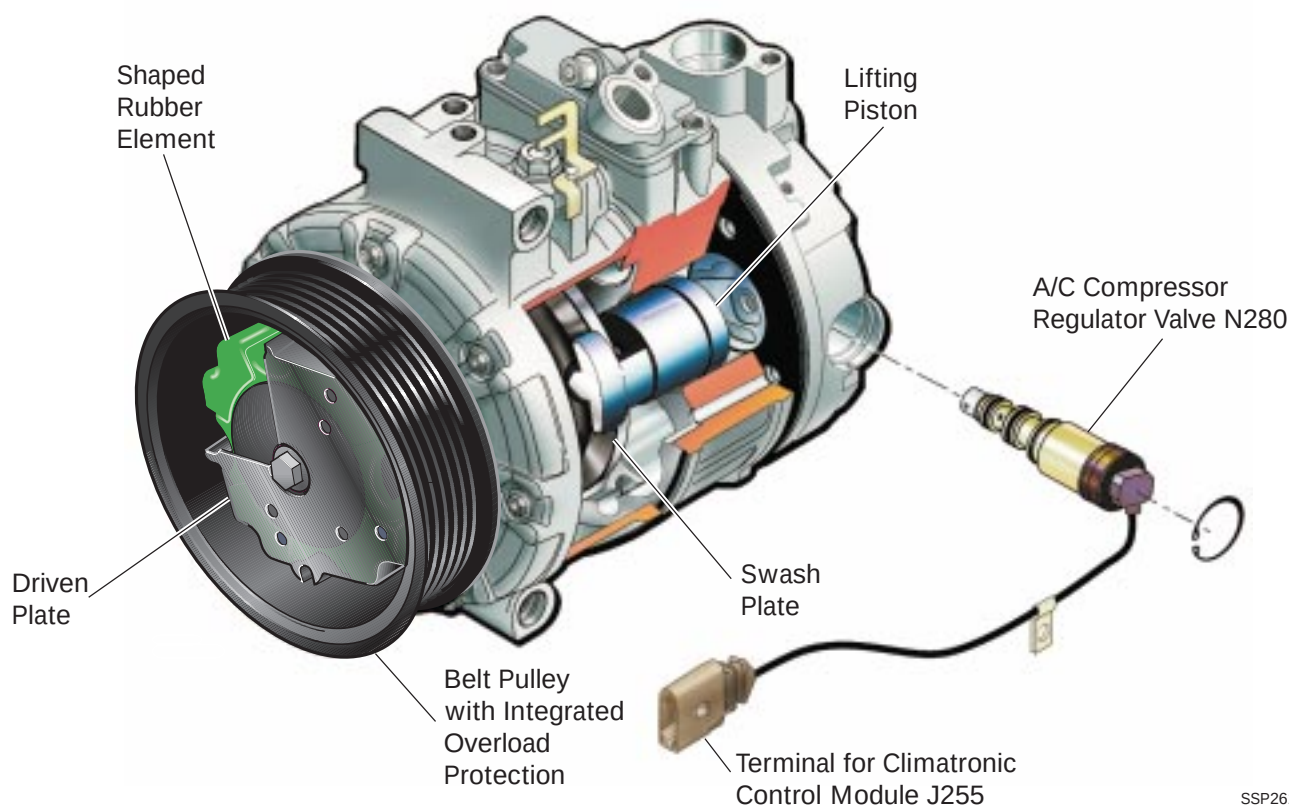
- One-sided swash-plate compressor with seven lifting pistons.
- Variable lifting volume to match the refrigerating capacity demand.
- Hollow pistons.
- Belt pulley drive with integrated overload protection and no magnetic clutch.
- A/C Compressor Regulator Valve N280 to regulate the pressure conditions in the compressor.

Function

The Climatronic Control Module J255 variably controls the A/C Compressor Regulator Valve N280. Depending on the parameters, desired temperature input, ambient and interior temperature, evaporator temperature, and refrigerant pressure in the refrigerant circuit, the pressure conditions on the intake pressure side are changed by a control voltage.

The angle of the swash plate changes. This determines the stroke volume and the resulting refrigeration performance generated.

When the air conditioning system is off the delivery volume of the refrigerant is regulated to under 2%, but the compressor continues to run via the ribbed-belt drive.



SSP261/063

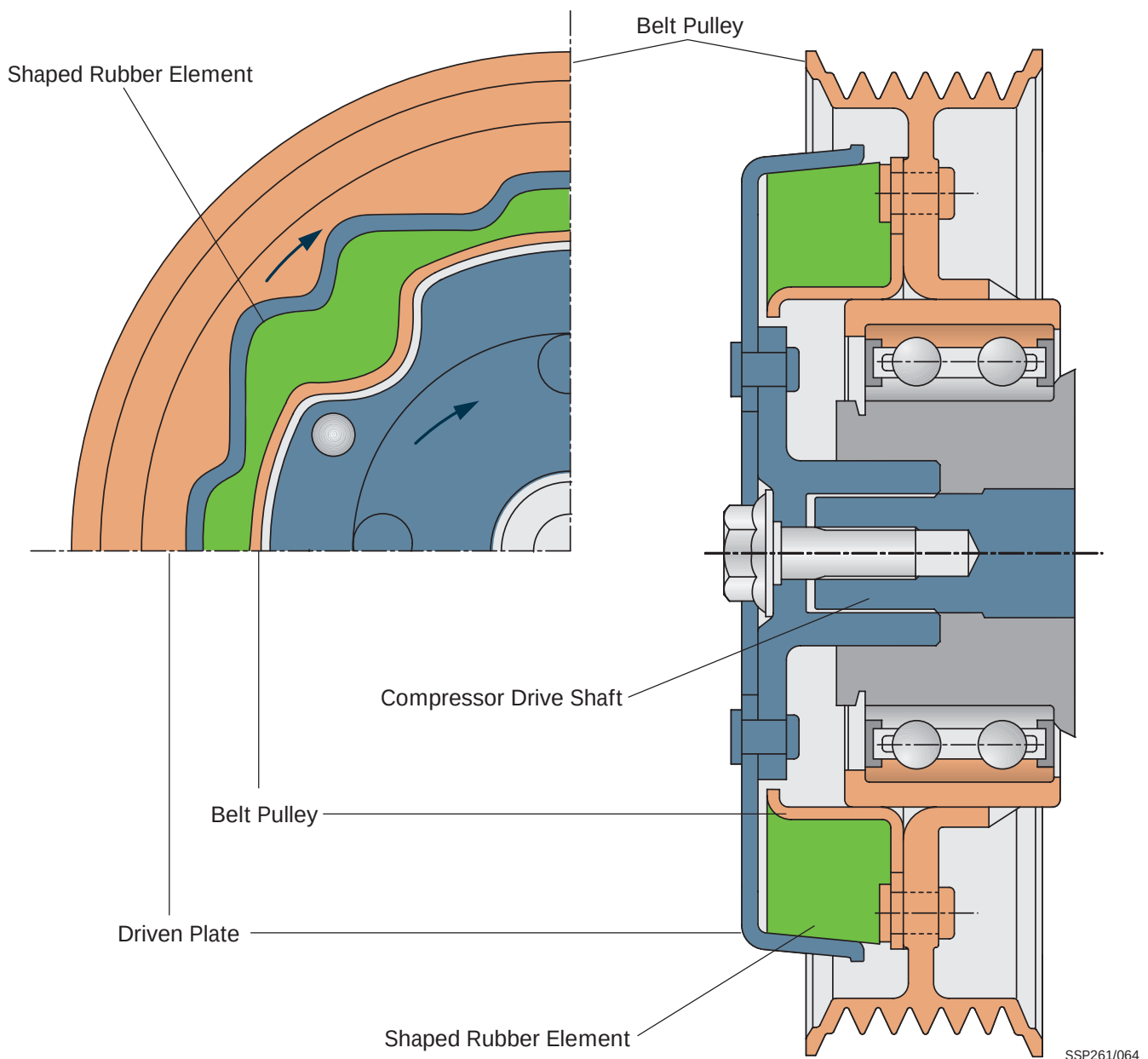
Air Conditioning System

Overload Protection

The ribbed-belt pulley and the driven plate are positively joined by a shaped rubber element.

When the compressor is operating normally, the two plates rotate in the same ratio to each other.

Compressor Functioning



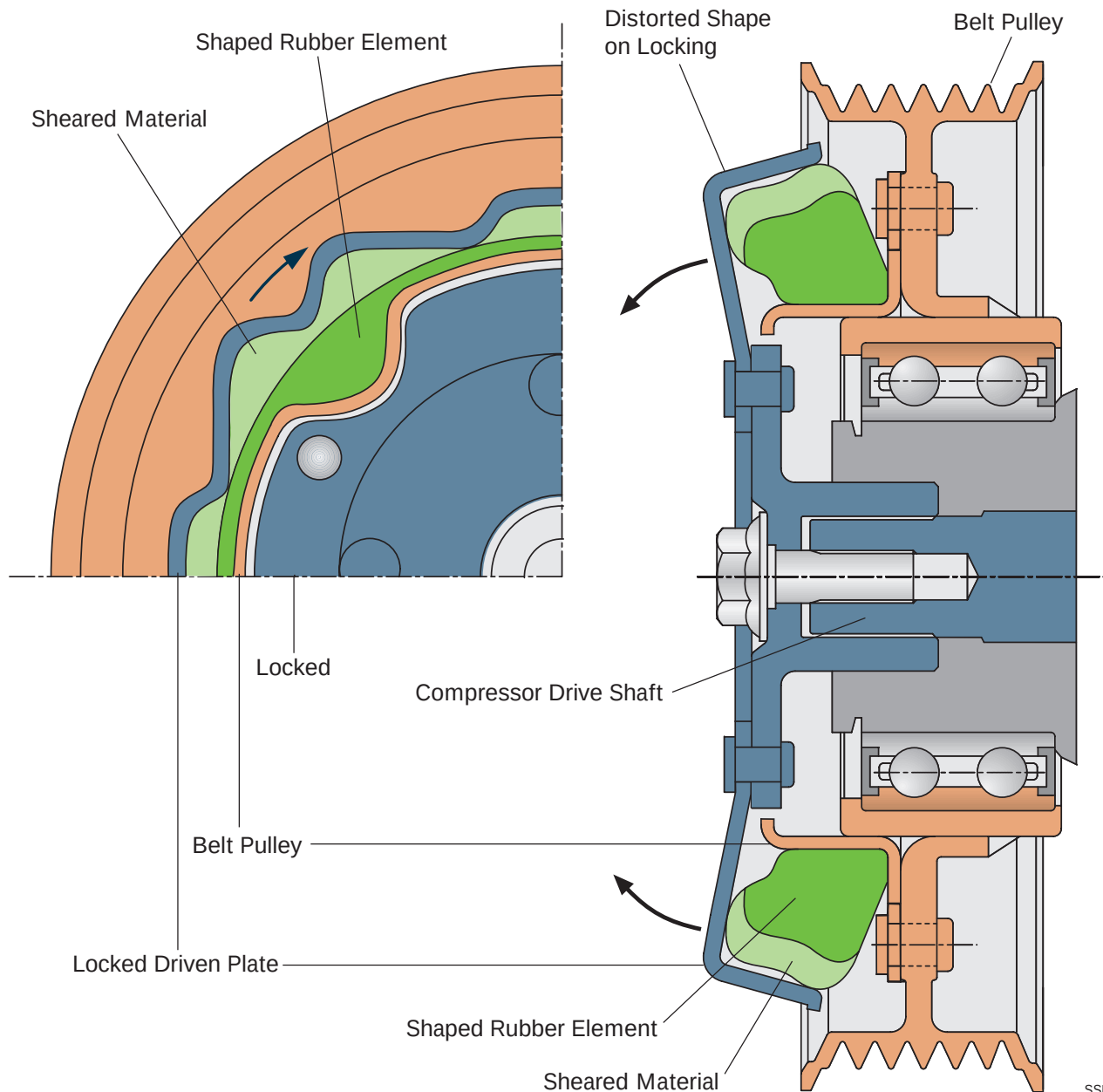
Air Conditioning System

If the compressor is damaged internally, it may cause the drive shaft to lock. The driven plate will also stop.

This drastically increases the transfer forces between the belt pulley and the driven plate. The shaped rubber element is pressed by the belt pulley in the direction of rotation onto the locked driven plate.

The projecting shapes on the rubber element shear off and the joint between the belt pulley and the driven plate is separated. The belt pulley continues to rotate unhindered. This prevents damage to the ribbed belt, and allows the engine to continue to operate without damage.

Compressor Locked



SSP261/065

Air Conditioning System

Evaporator Control Circuit

When the Climatronic air conditioning system is on and the driver enters the desired temperature, the refrigerant demand is determined by a number of different influences.

The components described below form a control circuit for regulating the desired temperature.

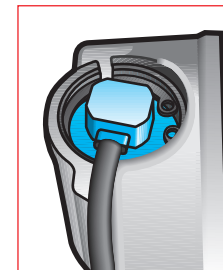
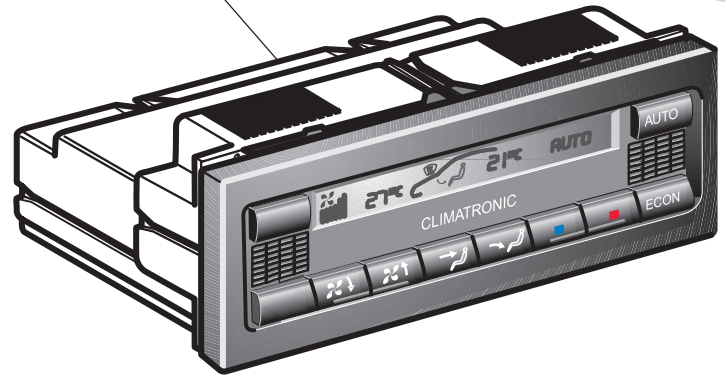
A/C Compressor Regulator Valve N280

The external A/C Compressor Regulator Valve N280 forms an interface between the suction and high-pressure sides of the compressor. It balances out the pressures applied.

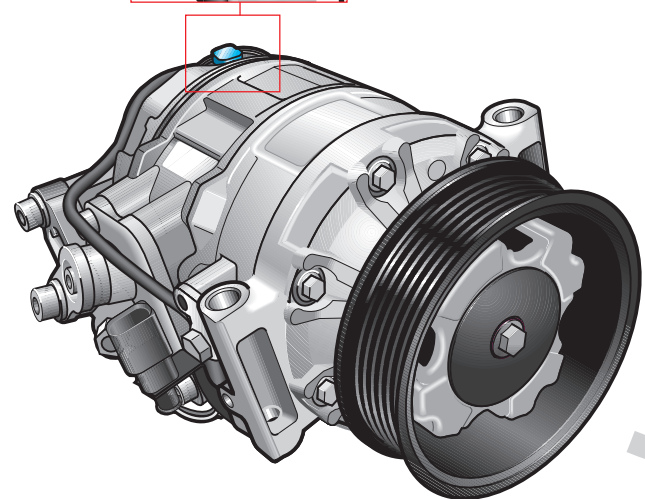
The A/C Compressor Regulator Valve N280 is controlled by the Climatronic Control Module J255. For example, if the driver wants to increase cooling output:

- When the control voltage is applied to the electromagnetic A/C Compressor Regulator Valve N280, a plunger in the valve moves. The period of time that the control voltage is applied determines the amount of plunger travel.
- The adjustment changes the cross-section of the opening between the suction and the high-pressure sides in the valve.
- Pressure on the high-pressure side rises as the suction pressure drops. This causes the piston stroke to reposition the swash plate at a greater angle.

Climatronic Control Module J255



A/C Compressor Regulator Valve N280



Air Conditioning System

Influencing Parameters:

- Input of desired temperature.
- Ambient temperature.
- Interior temperature.
- Temperatures downstream of evaporator and air outlets.
- Pressure level in refrigerant circuit.

Evaporator Vent Temperature Sensor G263

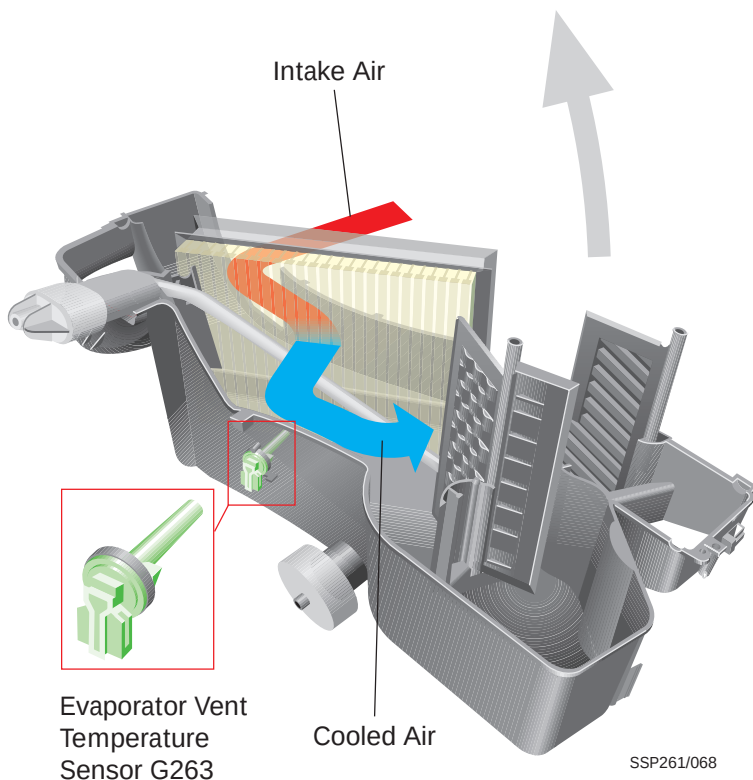
The Evaporator Vent Temperature Sensor G263 is located in the air duct behind the evaporator. It detects the vent temperature downstream of the evaporator. It fulfills two important tasks:

- It ensures that the air conditioning system is turned off at a temperature of 32°F (0°C) downstream of the evaporator.
- Together with the externally regulated compressor, the outlet temperature downstream of the evaporator can now be regulated between 32°F (0°C) and approximately 50°F (10°C).

Advantage:

It is no longer necessary to use the heat exchanger to “reheat” cold air when the outlet temperatures are between 32°F (0°C) and 50°F (10°C).

This reduces power consumption and saves fuel.

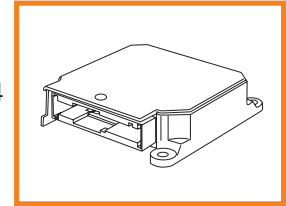


Electrical System

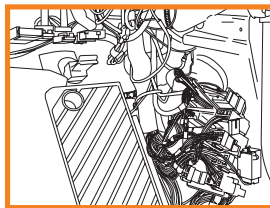
Vehicle Electrical System

The electrical system on the Passat W8 has a similar design to that used on the 2002 Passat. The following pages describe modifications to components and functions that differ from the 2002 Passat. All other components and functions not described here are the same as those used on the 2002 Passat.

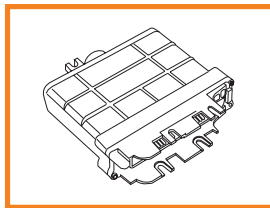
Airbag Control Module J234
(Transmission Tunnel)



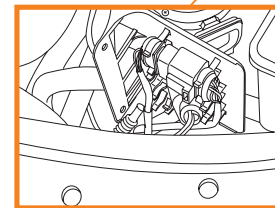
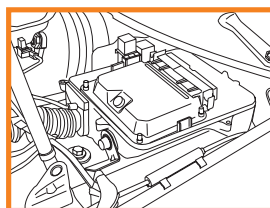
Wiring Harness Connector
Location (Right A-pillar)



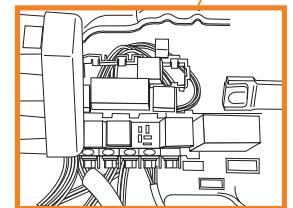
Transmission
Control Module
(TCM) J217



Electronics Box (Engine Compartment)
• Motronic Engine Control Module J220
• Relays
• Wiring Harness Connectors
• Fuses

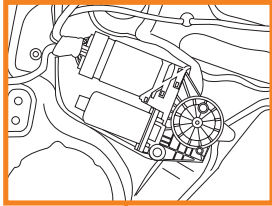


Front-End Wiring
Harness Connector
Location

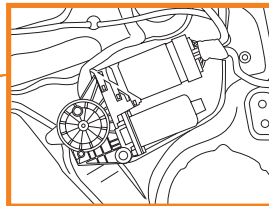
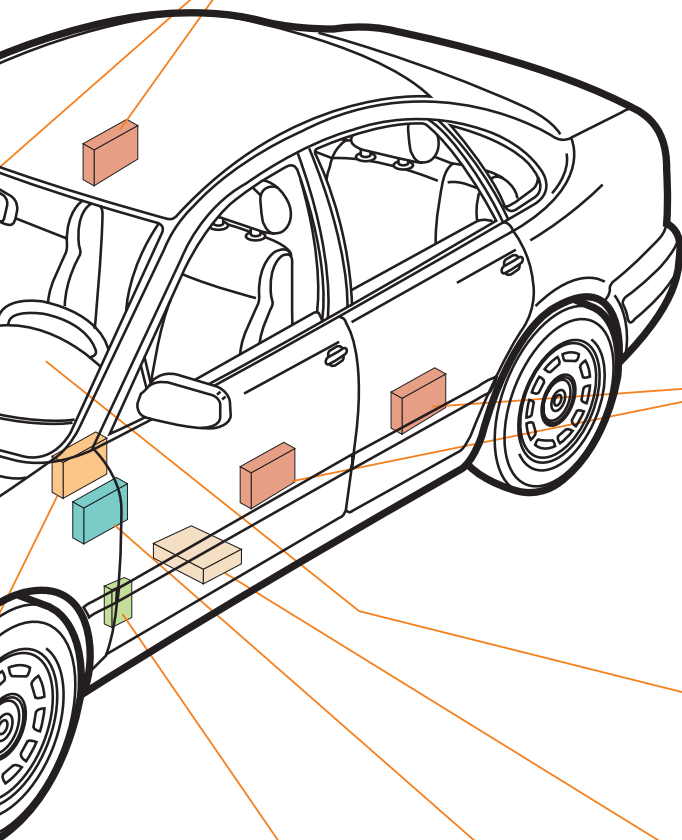


Central Junction Block

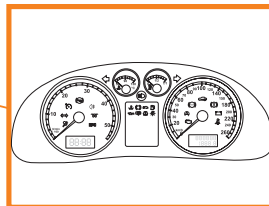
Electrical System



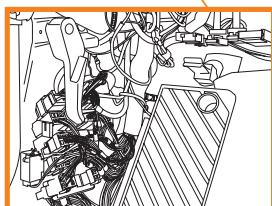
Motor 2 for Window Lifter, Right Front V172 with Integrated Door Control Module, Passenger Side J387; and Motor 2 for Window Lifter, Right Rear V174 with Integrated Door Control Module, Rear, Right J388 (Doors)



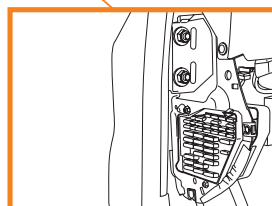
Motor 2 for Window Lifter, Left Front V171 with Integrated Door Control Module, Driver Side J386; and Motor 2 for Window Lifter, Left Rear V173 with Integrated Door Control Module, Rear, Left J389 (Doors)



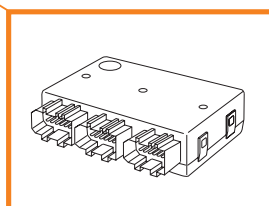
Control Module with Indicator Unit in Instrument Panel J285 with Control Module for Anti-Theft Immobilizer J362 and Data Bus On-Board Diagnostic Interface J533



Wiring Harness Connector Location (Left A-pillar)



Fuse Panel (Left Side of Instrument Panel)



Central Control Module for Comfort System J393 (Left Footwell)

SSP261/044

Electrical System

Bi-Xenon Headlights

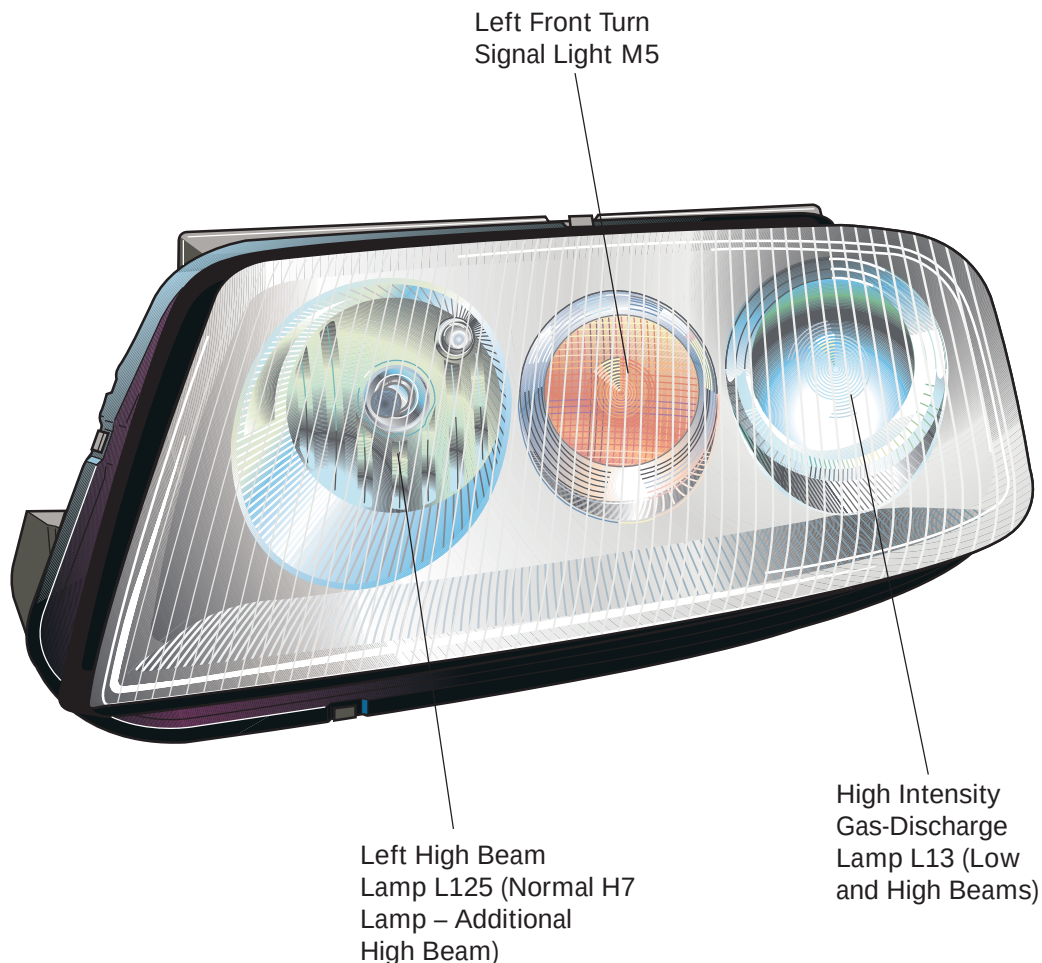
The Passat W8 is only equipped with the bi-xenon headlight system. The improved light output of the system increases active driving safety because the driver can detect danger earlier.

The bi-xenon headlight module produces both the low beam and the high beam from a single High-Intensity Gas-Discharge Lamp L13.

The high beam is intensified by a normal H7 lamp. This lamp also bridges the time until the High-Intensity Gas-Discharge Lamp L13 reaches its full light intensity. The H7 lamp is also used for the headlight flasher function.



Both headlamps can be switched from asymmetrical to symmetrical low beam for traveling in countries where driving is on the left side of the road. All vehicles with bi-xenon headlights are equipped with automatic and dynamic headlight range control. Please refer to the information in the Repair Manual.

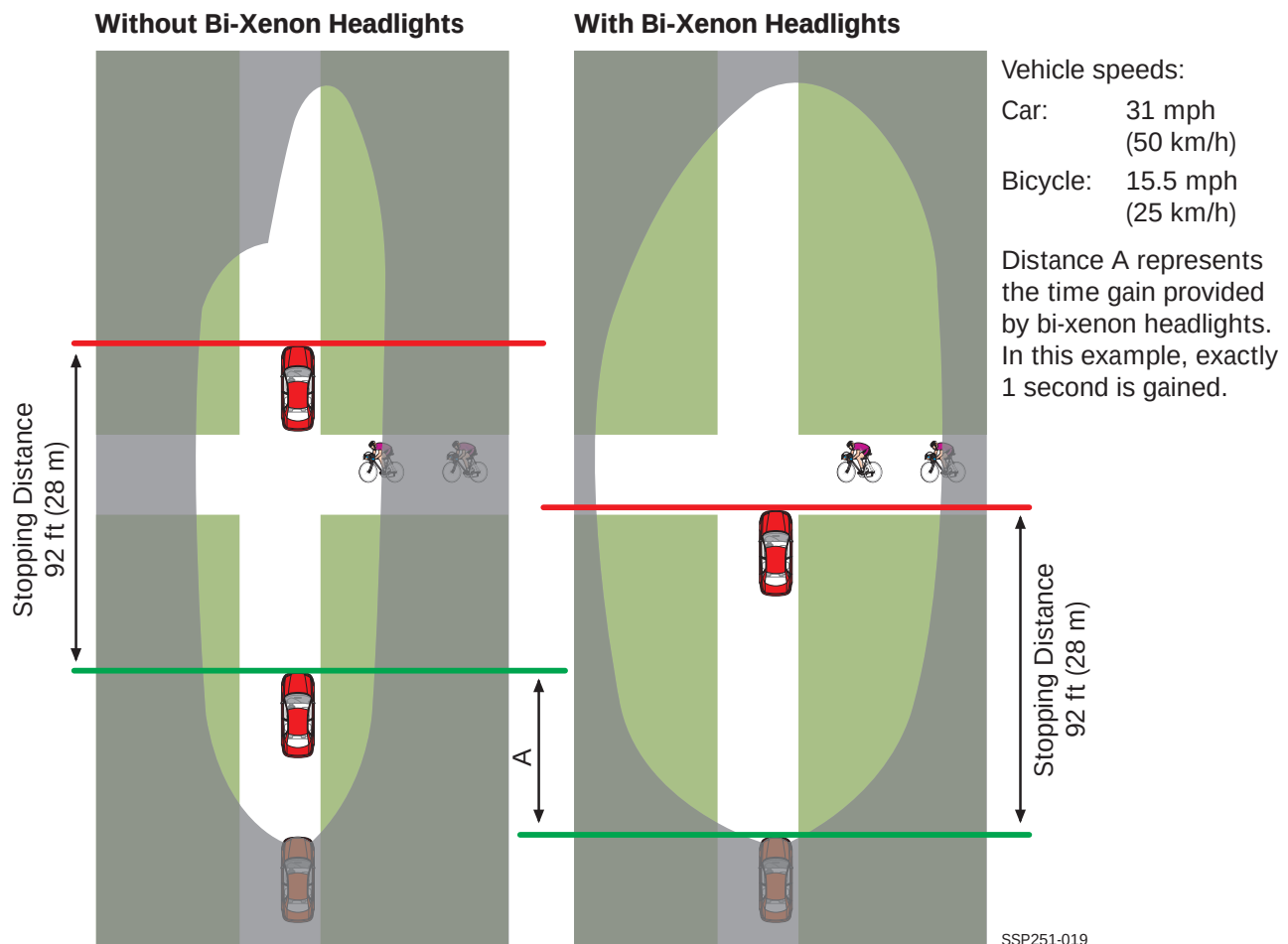


SSP261/045

More Light Means More Safety

The improved luminous efficiency of the bi-xenon headlight system provides greater driving safety, because hazards can now be recognized sooner.

The wider range and increased brightness of the light beam enable the driver to recognize hazards and reduce speed earlier. If the driver reacts in time, he will be able to stop the vehicle ahead of the hazard and avoid a collision.



Without bi-xenon headlights, the driver does not see the cyclist until much later.

With bi-xenon headlights, the driver sees the cyclist earlier and still has enough time to reduce speed.

Electrical System

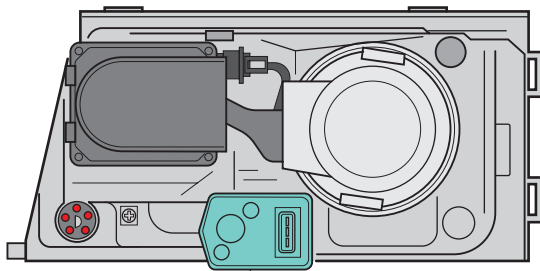
Bi-Xenon Headlight Module Design

The headlight modules consist of the following components:

- Ballast Unit for Gas-Discharge Headlight, Left J426; or Ballast Unit for Gas-Discharge Headlight, Right J427
- Left Headlight Beam Adjusting Motor V48 or Right Headlight Beam Adjusting Motor V49.
- Left High Beam Lamp L125 or Right High Beam Lamp L126 (normal H7 lamps).
- High-Intensity Gas-Discharge Lamp L13.
- Housing with laminated clear glass lens.

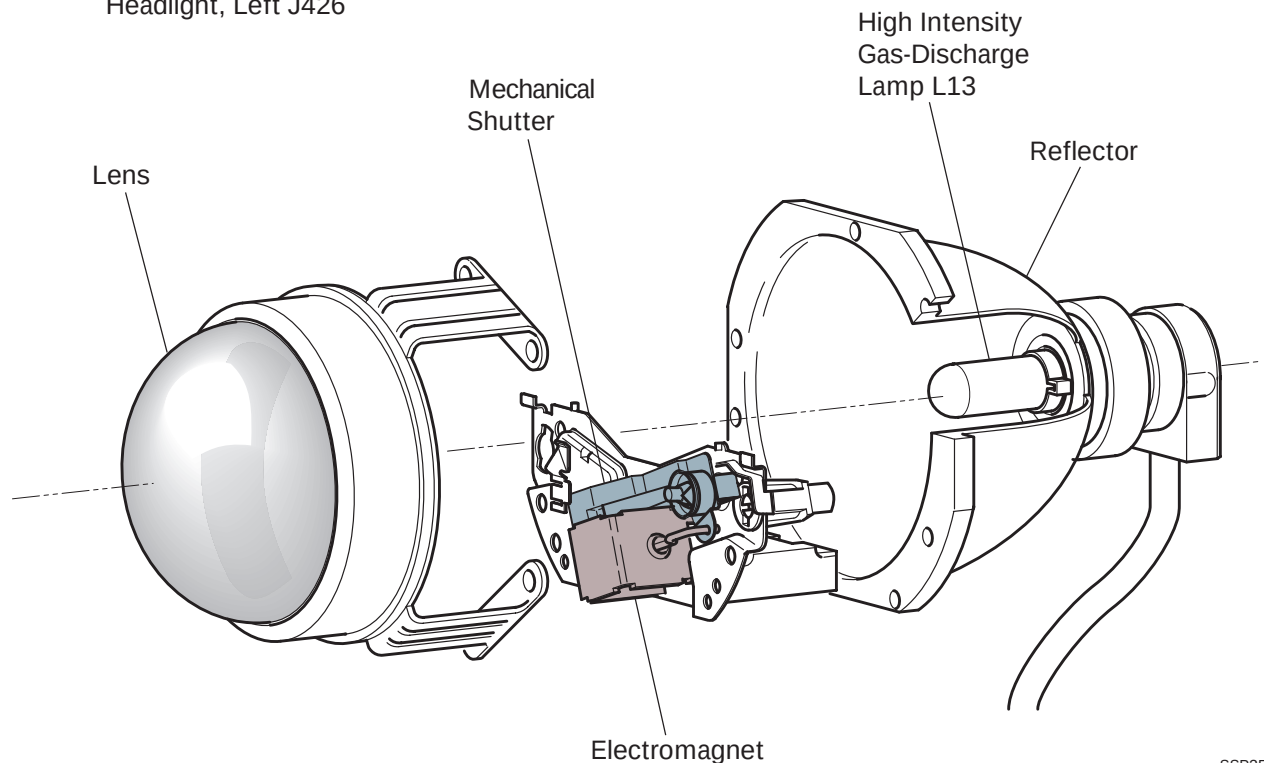


SSP261/045



SSP251/067

Ballast Unit for Gas-Discharge Headlight, Left J426

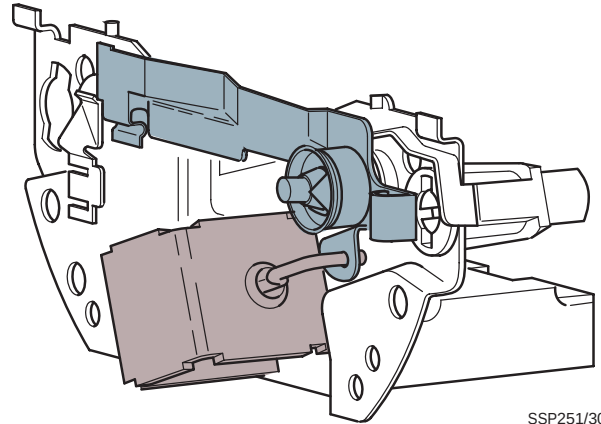


SSP251/311

Functional Principles

Low beam

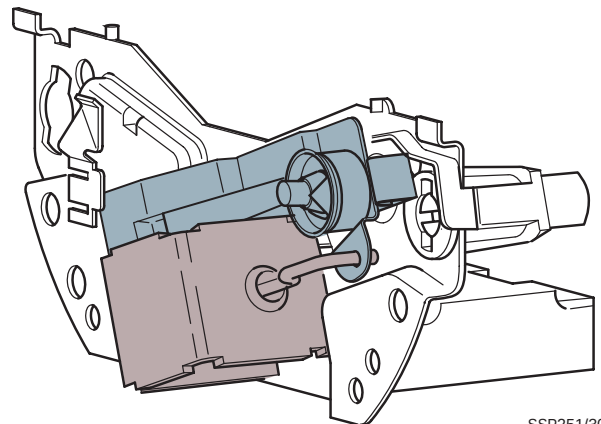
When the bi-xenon headlights are set to low beam, an electro-magnetically actuated mechanical shutter is moved into position in front of the reflector, to block out part of the light cone.



SSP251/306

High beam

When the bi-xenon headlights are set to high beam, the entire light cone reflected from each High-Intensity Gas-Discharge Lamp L13 is effective. In addition, the Left High Beam Lamp L125 and Right High Beam Lamp L126 (normal H7 lamps) are turned on.



SSP251/307

Additional Equipment

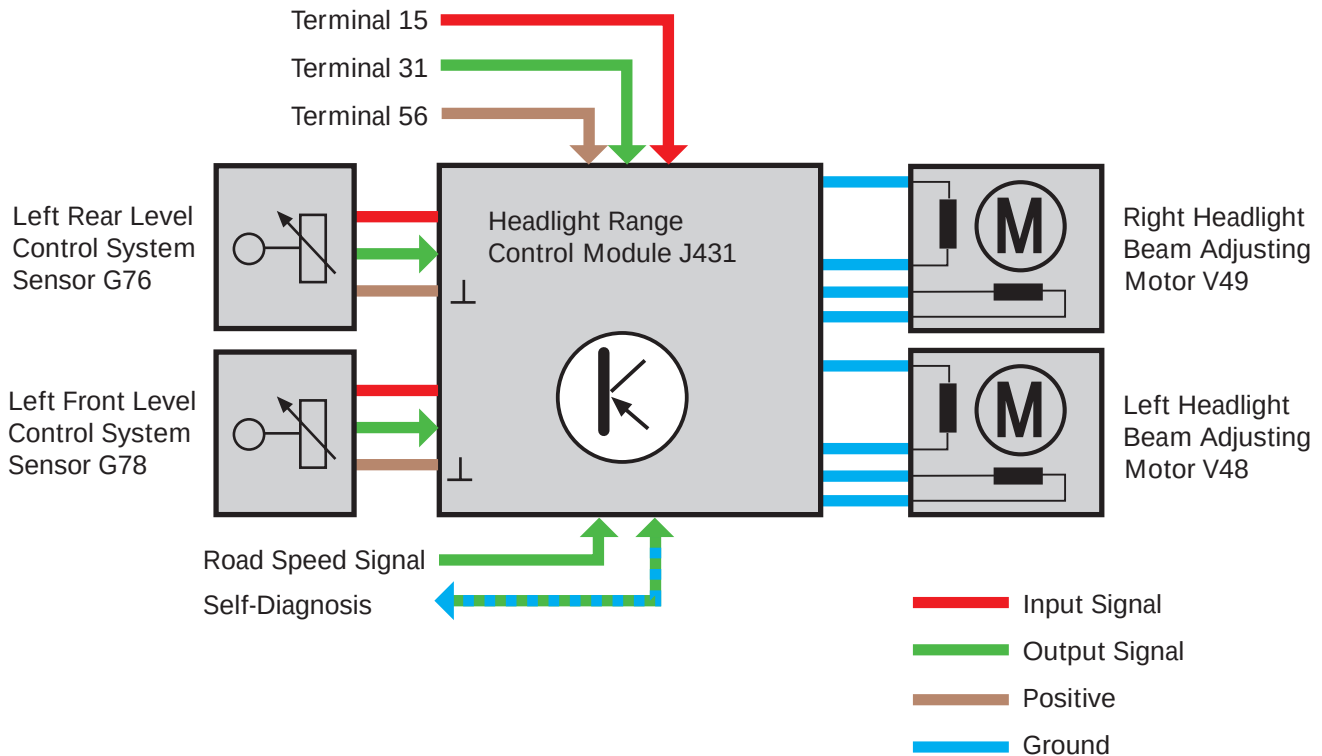
On vehicles equipped with gas-discharge headlights, the following equipment is required to avoid dazzling other drivers.

- Headlight cleaning system
- Automatic headlight range control

Electrical System

Automatic Dynamic Headlight Range Control

Overview



SSP251/004

The Passat W8 with bi-xenon headlights has automatic headlight range control. The task of the automatic headlight range control is to adjust the headlights to compensate for variation in ride height as a function of payload. The automatic headlight range control also compensates for variation in headlight range caused by dynamic effects under braking and acceleration.

Function

Headlight Range Control Module J431 receives signals from the two level sensors (one on the front axle and one on the

rear axle) and the road speed signal. Having evaluated the signals, the system activates the control motors in the headlights to compensate for variation in vehicle level.

The Right Headlight Beam Adjusting Motor V49 and Left Headlight Beam Adjusting Motor V48 are configured as stepping motors. They can perform the full range of headlight adjustments within approximately one second.

Address Word 55

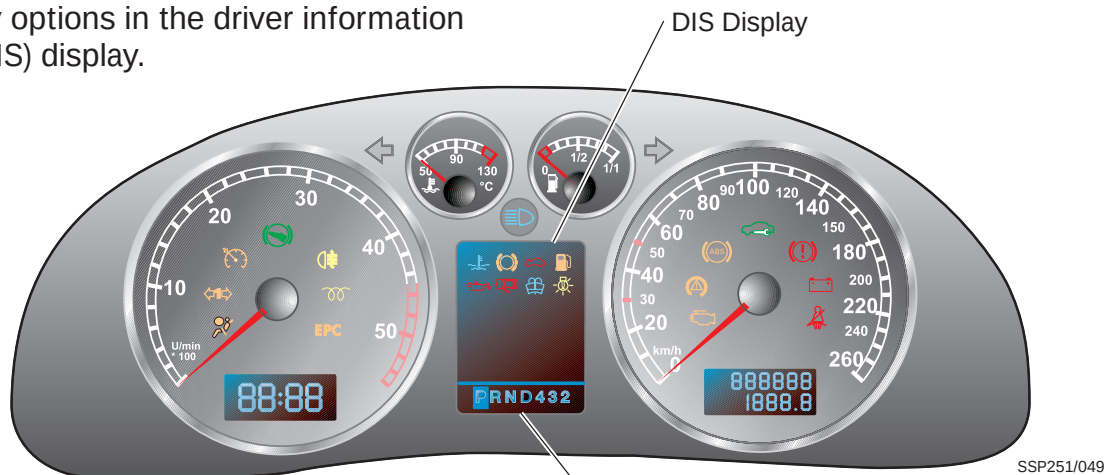
The Headlight Range Control Module J431 has self-diagnostic capability and can be accessed with Address Word 55.

Instrument Cluster

The instrument cluster has blue backlighting and translucent red dials.

The modified design and chrome-bezeled instruments stand out. The instruments are now operated by stepping motors.

The instrument cluster is available in three versions. They mainly differ with regard to the display options in the driver information system (DIS) display.



New Functions

- Integrated third-generation Control Module for Anti-Theft Immobilizer J362.
- The Control Module with Indicator Unit in Instrument Panel J285 interface to the CAN data bus is connected to the drivetrain CAN data bus and convenience CAN data bus. The tachometer is activated by signals from the drivetrain CAN data bus, for example, and the status of the doors/tailgate can be shown on the DIS display via the convenience CAN data bus.
- The Data Bus On-Board Diagnostic Interface J533 in the Control Module with Indicator Unit in Instrument Panel J285 is necessary for communication between the various CAN data buses. Diagnosis data is also transferred via CAN data bus through this interface to the K-wires.

Electrical System

New Warning Lamps

Designation	Symbol	Function
Shift Lock Indicator Lamp K169		Reminds the driver to depress the brake. The selector lever lock on automatic transmissions is released in this way.
Warning Light for Rear Lid Unlocked K116 Indicator Light for Open Door Front, Left K123 Indicator Light for Open Door Front, Right K124 Indicator Light for Open Door Rear, Left K125 Indicator Light for Open Door Rear, Right K126 Indicator Light for Open Trunk K127		Indicates open doors, trunk or tailgate. In vehicles with a multifunctional display, this warning is issued as a symbol.
Cruise Control Indicator Light K31		Comes on when the cruise control system (CSS) is turned on. For vehicles with cruise control system only.
Malfunction Indicator Lamp (MIL) K83		If a fault detrimental to exhaust gas quality occurs in the vehicle, the fault is saved to fault memory and this lamp is activated. The lamp begins to flash if there is a danger of the catalytic converter becoming damaged due to misfiring.

Comfort/Convenience System

Interior Monitor and Anti-Theft Alarm System (Delayed Availability)

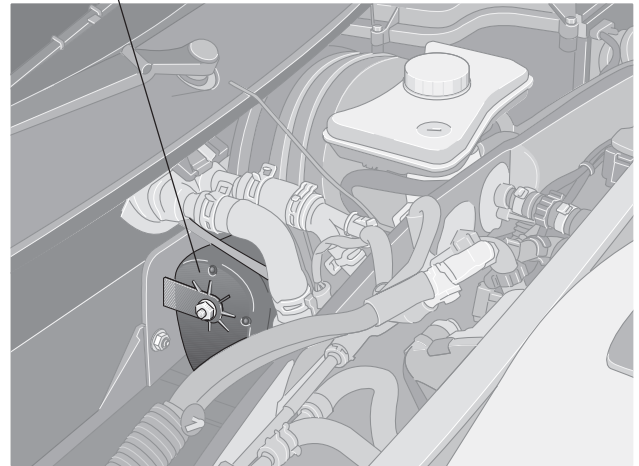
The Passat W8 anti-theft alarm system is equipped with a new function and a new Alarm Horn H12 that is mounted in the plenum chamber. It has a separate power supply.

Two lithium batteries integrated in the Alarm Horn H12 ensure that it operates independent of the car battery. The batteries have a life of approximately five to seven years.



If the batteries are discharged or defective, the horn must be replaced.

Alarm Horn H12



SSP261/047

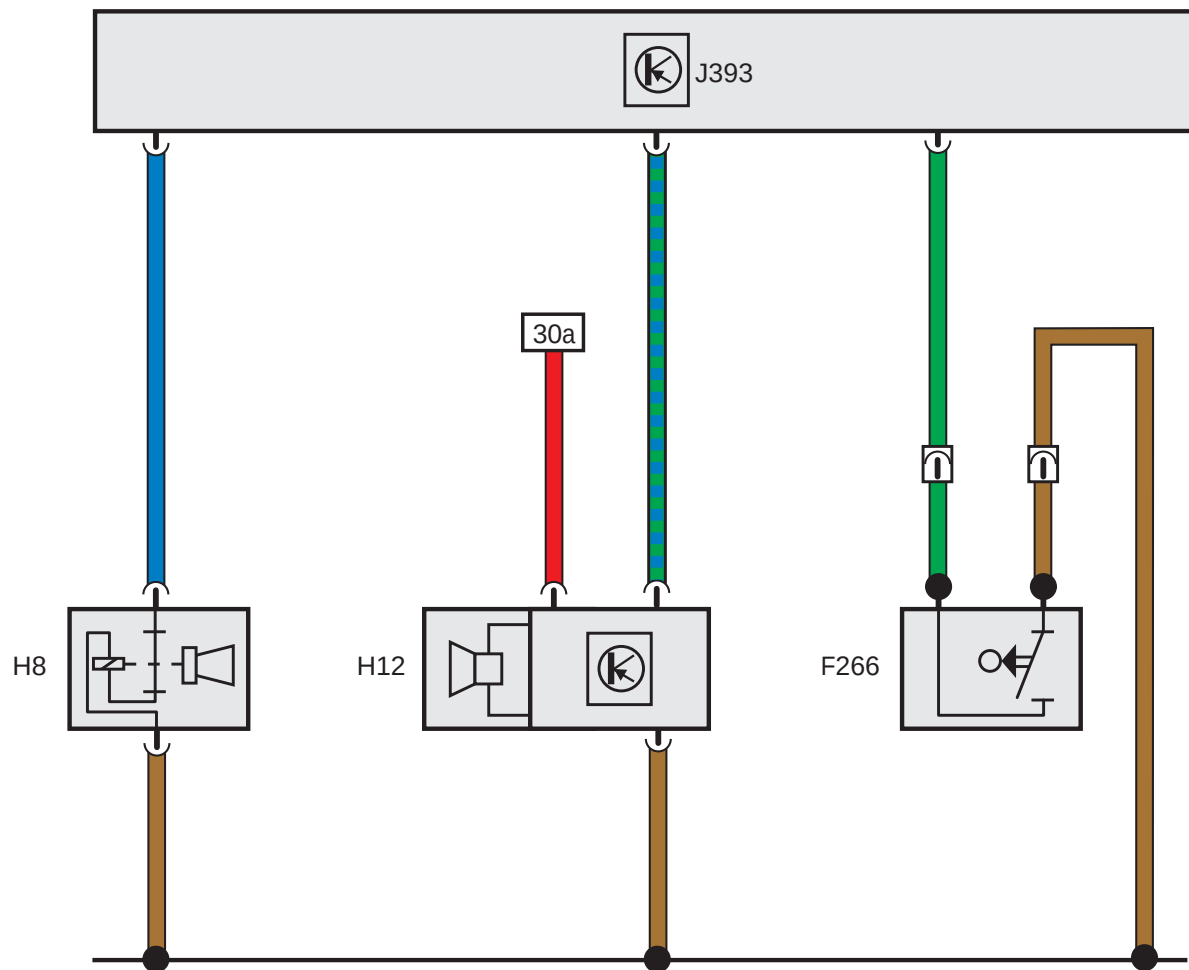
Function

The Alarm Horn H12 communicates bidirectionally with the Central Control Module for Comfort System J393. After the car is locked, the Alarm Horn H12 is armed by the Central Control Module for Comfort System J393. This means that the vehicle power supply and the horn signaling line are monitored in addition to the other functions of the anti-theft alarm system.

When the car is unlocked by the radio remote key control, the anti-theft alarm system is deactivated. If the car is opened mechanically using the door lock cylinder, the ignition must be turned on within 15 seconds or the anti-theft alarm system will be activated.

Electrical System

Functional Diagram for Anti-Theft System Alarm Horns



SSP261/048

Components

- F266 Front Hood Switch
- H8 Alarm Horn
- H12 Alarm Horn (with self-contained backup battery)
- J393 Central Control Module for Comfort System
- 30a Positive Terminal

Self-diagnosis address word Convenience System

The anti-theft alarm system has self-diagnostic capability. You will find the self-diagnosis in the Vehicle Diagnosis, Test and Information System VAS 5051, in the guided diagnosis under Body - Body Repairs and the address word "Convenience System." Please always use the latest version of the Repair Manual in the Electronic Service Information System (ESIS) when performing diagnosis.

Electrical System

Entertainment and Communications

Premium VI Radio

Features

- Integrated CD player.
- Optional CD changer.
- Cassette tape player.
- Two FM/AM tuners.
- Antenna sockets for antenna selection.
- Central connector module with positive locking.
- Convenience CAN data bus.



79600001

Functions

ON/OFF turns system power on or off when pressed.

VOLUME adjusts the sound level when rotated.

FM 1/2 selects the FM band or switches to the second set of presets.

AM 1/2 selects the AM band or switches to the second set of presets.

CD selects CD mode. The player loads individual CDs through the slot at the top. To switch to the optional CD changer, tap the CD button while in the CD mode. Tapping the button again will return operation to the internal CD.

EJECT next to the CD slot ejects the installed CD when pressed.

MIX plays CD selections in random sequence. If the optional CD changer is in operation when this button is pressed, the system will randomly shuffle among 65 to 80 percent of the selections on one disc before shuffling to the next disc to reduce CD changes and allow the user to enjoy more music.

“CD HOT” will display when vehicle interior temperatures are too hot for proper CD operation and the CD function will not be available until the temperature drops.

TAPE A/B activates the tape player when a tape is in place. Pressing this switch another time will switch between the A side and the B side. If no tape is present there is an audible beep and “NO TAPE” is displayed.

EJECT next to the cassette tape slot ejects the installed tape when pressed.

Dolby® symbol button next to the cassette tape slot turns the Dolby® noise reduction system on or off when pressed in tape mode.

SCAN by pressing the knob while in radio mode to search for a station or in CD or tape mode to briefly play the beginning of each track.

TUNE by rotating the knob to change the FM/AM station manually or to select the previous or next track in CD mode.

“Up” symbol selects SEEK up for radio, next TRACK for CD, or fast-forward for tape mode.

SEEK the next radio station while in radio mode by pressing this button to start station search (SEEK) in AM band. In FM band this function will browse through the storage list.

TRACK changes are effected by pressing this button briefly while in CD mode to skip forward or backward through CD tracks. Press it longer to start audible fast forward or fast reverse of a track.

“Down” symbol selects SEEK down for radio, previous TRACK for CD, or fast-rewind for tape mode.

AS (Auto Store) will automatically select the six strongest radio signals in the immediate area when pressed in the AM or FM mode. This will not erase the previously established presets, which can be retrieved by briefly pressing either the TAPE, CD, AM, or FM function button.

BASS, MIDDLE, and TREBLE range tone control and adjustment of side-to-side **BALANCE**, and front-to-rear **FADE** are made by rotating their respective function buttons.

Electrical System

Radio rear panel

The rear panel of the radio contains the antenna connector sockets and the central connector socket.



Antenna Input for
FM/AM Signal
from Antenna
Selection Control
Module J515

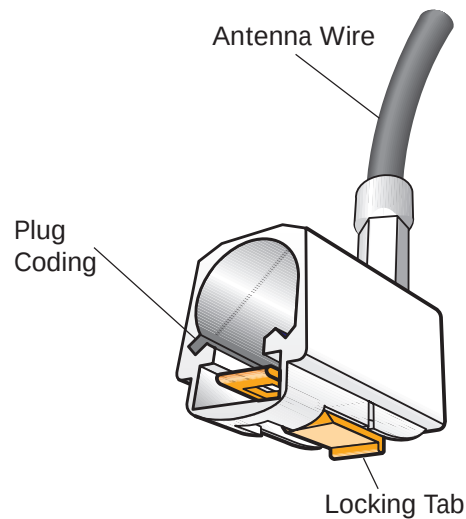
Radio Output to
Antenna Selection
Control Module J515

Central
Connector
Socket

Antenna connection

The antenna connectors and the sockets on the back of the radio are different colors and have different plug coding configurations. Each connector will only fit in its associated socket to prevent improper connection.

The connectors have locking tabs that engage when they are plugged into the sockets. To disconnect an antenna connector, disengage the locking tab.

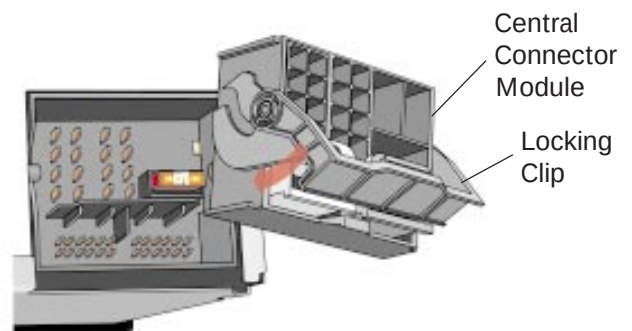


SSP261/052

Central connector module

The central connector module groups all the individual electrical and audio connectors for power supply, the CD changer, and speakers into a single housing to provide a quick and secure connection. Individual connectors can also be plugged into the central connector housing separately.

The entire central connector module is held in place with a locking clip. To disconnect the module, unlock the clip and pull out the module.



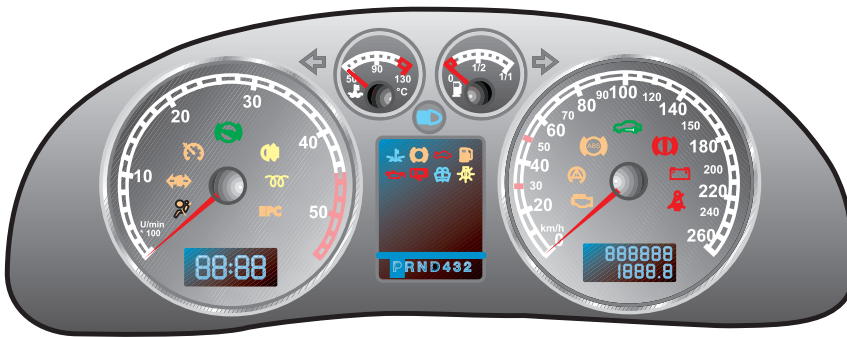
SSP261/054

Electrical System

Convenience CAN data bus networking

To control functions and processes, the radio and the Control Module with Indicator Unit in Instrument Panel Insert J285 exchange the following information over the convenience CAN data bus.

- No contact
- Terminal 15
- Road speed signal
- Display lighting
- Self-diagnosis processing
- Radio convenience coding
- Control signals from the multifunction steering wheel
- Vehicle identification number



Control Module with Indicator Unit
in Instrument Panel Insert J285



Convenience
CAN Data Bus



Radio

79600003

Radio Antenna System

AM/FM reception of the radio system on the Passat W8 has been considerably improved. This was achieved by using four separate AM/FM antennas.

If reception is poor, the Antenna Selection Control Module J515 switches to another antenna with a stronger signal. The antennas are in different locations on the sedan and on the wagon.

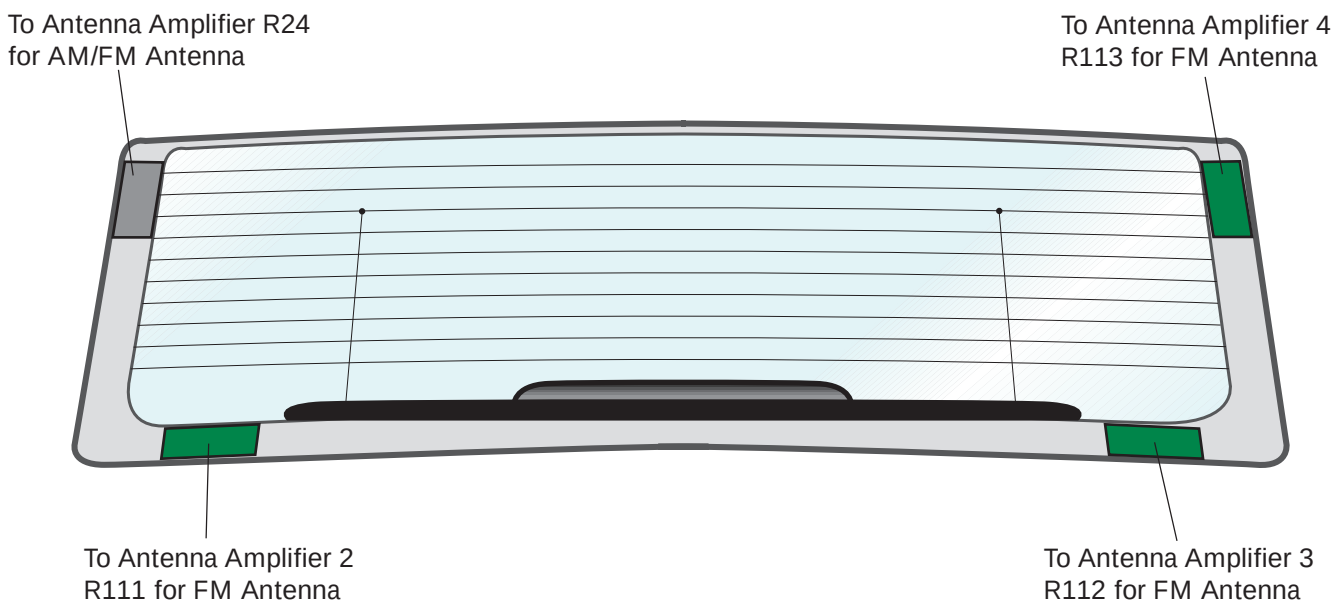
Location of Antennas on the Sedan

On the sedan, the AM antenna is above the rear window heater.

The four FM antennas are integrated with the rear window heater. Suppressors in the supply wires of the rear window heater prevent the radio signals received from flowing through the positive and negative terminals of the rear window heater.

Output from each antenna is allocated to a specific antenna amplifier.

Outside View of the Rear Window in Direction of Travel



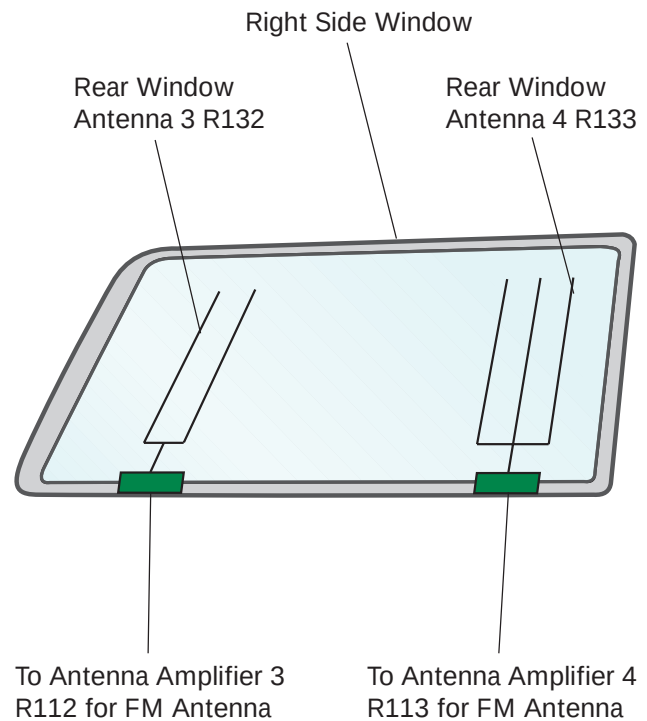
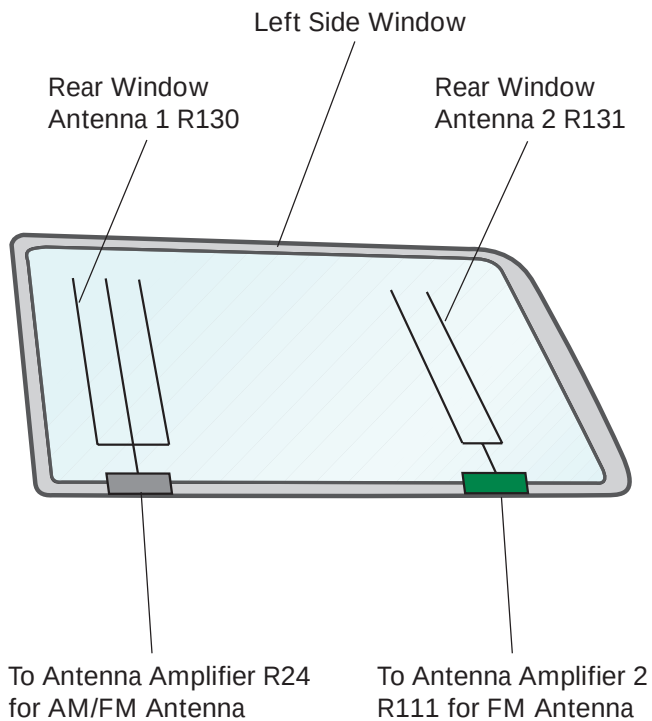
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Electrical System

Location of Antennas on the Wagon

On the wagon, the antennas are located in the rear side windows. Viewed in the direction of travel there is a combined AM/FM antenna and an FM antenna on the left-hand side and two more FM antennas on the right-hand side.

As on the sedan, output from each antenna is allocated to a specific antenna amplifier. Because its antennas do not use the rear window heater, no suppressors are required on the wagon.



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Antenna Amplifiers

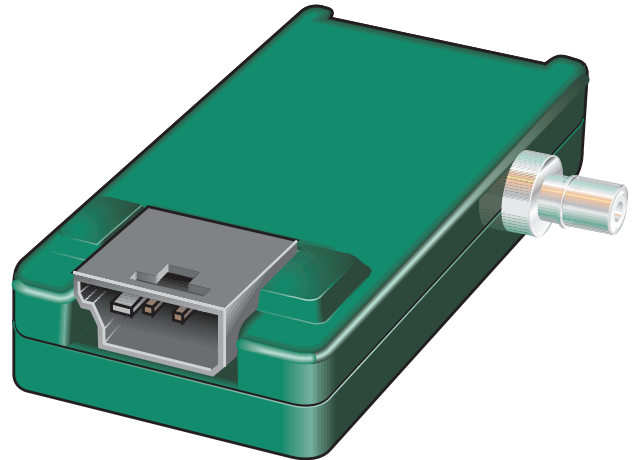
On both the wagon and the sedan, each antenna is allocated to an antenna amplifier:

- Antenna Amplifier R24
for AM/FM Antenna
- Antenna Amplifier 2 R111
for FM Antenna
- Antenna Amplifier 3 R112
for FM Antenna
- Antenna Amplifier 4 R113
for FM Antenna



Antenna amplifiers are precisely matched to their installation location and must be connected to the proper antennas or reception will be poor.

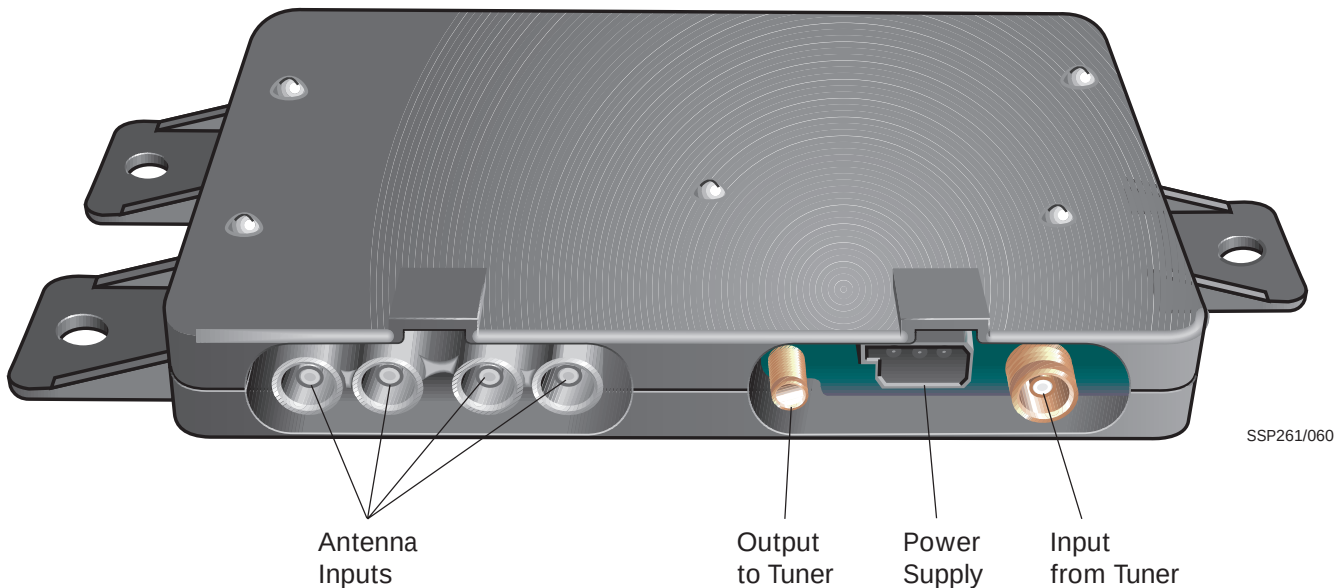
Depending on country-specific radio frequencies, a number of antenna amplifier variants can be installed at each location.



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Antenna Selection Control Module J515

The Antenna Selection Control Module J515 is located under the rear shelf on the sedan and on the rear left wheel housing in the luggage compartment of the wagon. Its function is to switch over to the antenna with the best reception.

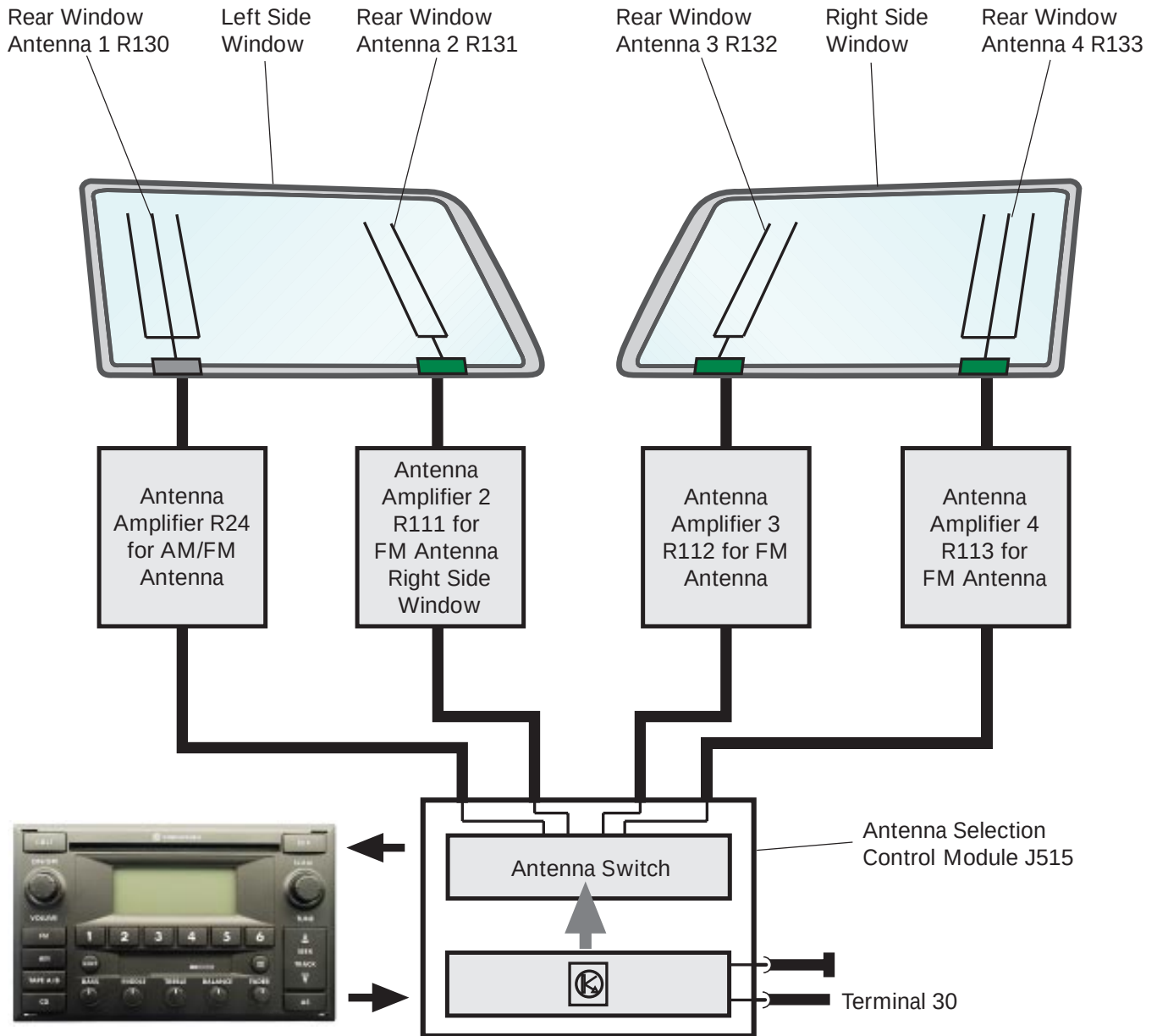


Function

The radio signal received from one of the four antennas and amplifiers runs through an antenna switch circuit in the Antenna Selection Control Module J515 and out to the tuner. In the tuner, the signal quality is checked and the result is fed back to the Antenna Selection Control Module J515 through an antenna output line.

If the selected signal is too weak for tuner reception, the antenna switch in the Antenna Selection Control Module J515 switches automatically to the next of the four antennas. This process is repeated until an antenna is found with good reception. Switchover is so fast that the vehicle occupants do not notice it.

Functional Diagram for Antenna System (Passat Wagon Shown, Sedan Similar)



Notes

Knowledge Assessment

An on-line Knowledge Assessment (exam) is available for this Self-Study Program.

This Knowledge Assessment may or may not be required for Certification. You can find this Knowledge Assessment under the Certification tab at:

www.vwwebsource.com

For assistance please call:

Certification Program Headquarters

1-877-CU4-CERT (1-877-284-2378)

(8:00 a.m. to 8:00 p.m. EST)

Or email: Comments@VWCertification.com