



**Self Study Program 890423**

**The Beetle Convertible**

**Design and Function**



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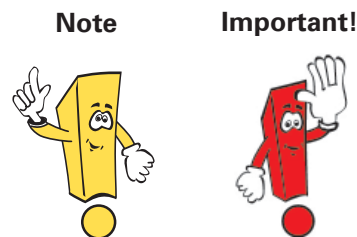
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# Contents

<b>Introduction . . . . .</b>	<b>1</b>
<b>Body . . . . .</b>	<b>6</b>
<b>The Electric Convertible Top . . . . .</b>	<b>16</b>
<b>Occupant Protection . . . . .</b>	<b>34</b>
<b>Drive Train . . . . .</b>	<b>36</b>
<b>Chassis . . . . .</b>	<b>40</b>
<b>Driver Assistance . . . . .</b>	<b>44</b>
<b>Climate Control.. . . .</b>	<b>45</b>
<b>Electrical System . . . . .</b>	<b>46</b>
<b>Knowledge Assessment . . . . .</b>	<b>59</b>

This Self-Study Program provides information regarding the design and function of new models. This Self-Study Program is not a Repair Manual.

**This information will not be updated.** For maintenance and repair procedures, always refer to the latest electronic service information.



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# Introduction

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**The Beetle Convertible has the classic lines that were creating in the original Bug and carried through the entire Beetle series.**



S524\_002

The 2013 Beetle Convertible is part of the Beetle model series. Both the external and internal designs follow the lines of the current Beetle Coupe. The Beetle Convertible top retracts to fully open and does not have a rollover bar.

The technical highlight is the fully automatic, electrically-opening soft top. This top opens quickly and quietly, and folds flatter than the previous Beetle Convertibles.

The active rollover protection system, front airbags and the head and chest airbags for the driver and front passenger offer maximum protection for vehicle occupants.

The 2013 Beetle Convertible offers a high level of driving comfort and is distinguished by subtle elegance, high quality, and good workmanship.

# Introduction

## Where is the 2013 Beetle Convertible produced?

The 2013 Beetle Convertible is produced at the Volkswagen plant in Puebla, Mexico.



S524\_004

## What are the historical roots of the 2013 Beetle Convertible?

Even the Bug, which was a prototype for the Beetle series, was produced as a convertible. The New Beetle was produced as a convertible, and the 2013 Beetle Convertible continues this tradition.



S524\_005

## Feature Overview

These are some of the features of the new Beetle Convertible:

- Halogen headlamps with halogen daytime running lights, bi-xenon headlamps with LED daytime running lights, front fog lamps with static cornering light
- Central LED third brake light
- Three-part electric, fully-automatic cloth top
- Rear folding seats
- Swiveling VW trunk logo for trunk opening and for housing the reverse camera
- Active rollover protection system
- Wind blocker



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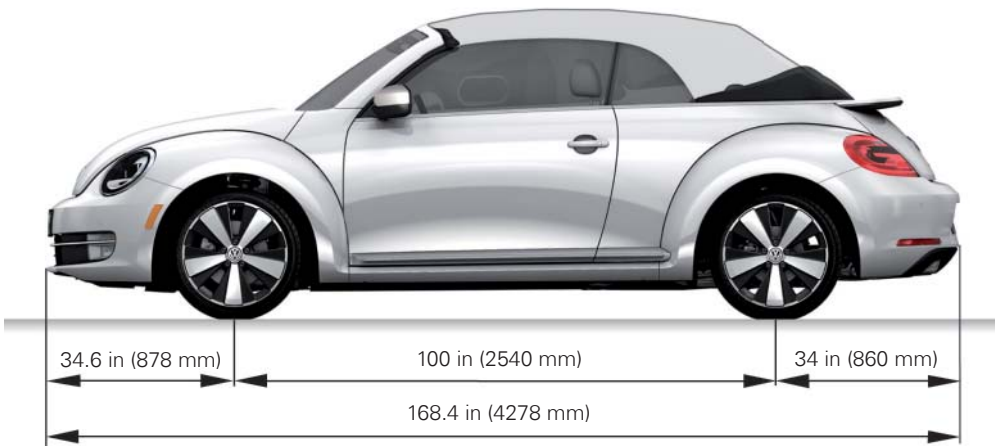


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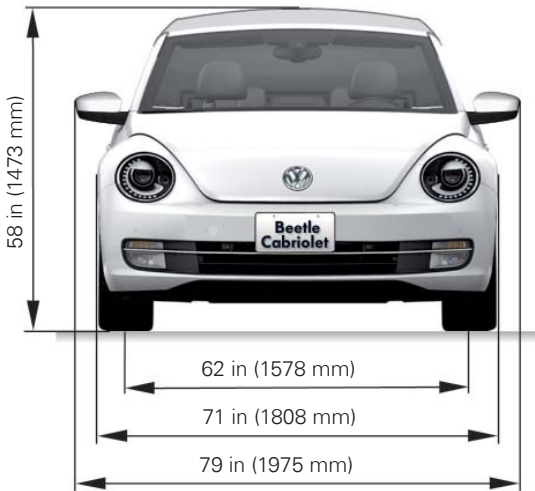
# Introduction

## Technical Specifications

### Dimensions



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S524\_055



S524\_056

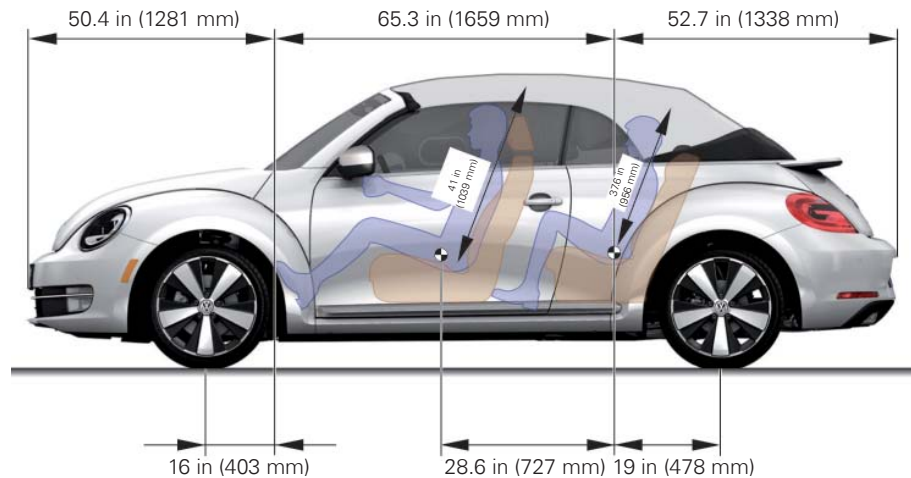
Length	168.4 in (4278 mm)
Width	71 in (1808 mm)
Width with Outside Mirrors	79 in (1975 mm)
Height	58 in (1473 mm)
Wheelbase	100 in (2540 mm)

Front Track Width	62 in (1578 mm)
Rear Track Width	61 in (1554 mm)
Curb Weight	3203 lb (1453 kg)
Gros Vehicle Weight Rating	4122 lb (1870 kg)
Resistance Coefficient	0.375 cw



# Introduction

## Internal Dimensions and Volumes



S524\_103



S524\_104



S524\_105

Front Head Clearance	41 in (1039 mm)
Rear Head Clearance	37.6 in (956 mm)
Interior Length	65.3 in (1659 mm)
Front Shoulder Space	55.2 in (1404 mm)
Rear Shoulder Space	43 in (1094 mm)

Loading Edge Height	27.7 in (704 mm)
Loading Space Height	9.5 in (243 mm)
Loading Space Width	32.5 in (826 mm)
Fuel Tank Volume	14.5 gallons (55 L)
Trunk Volume	7.1 ft <sup>3</sup> (225 L)

# Body

## Body Structure

### Overview

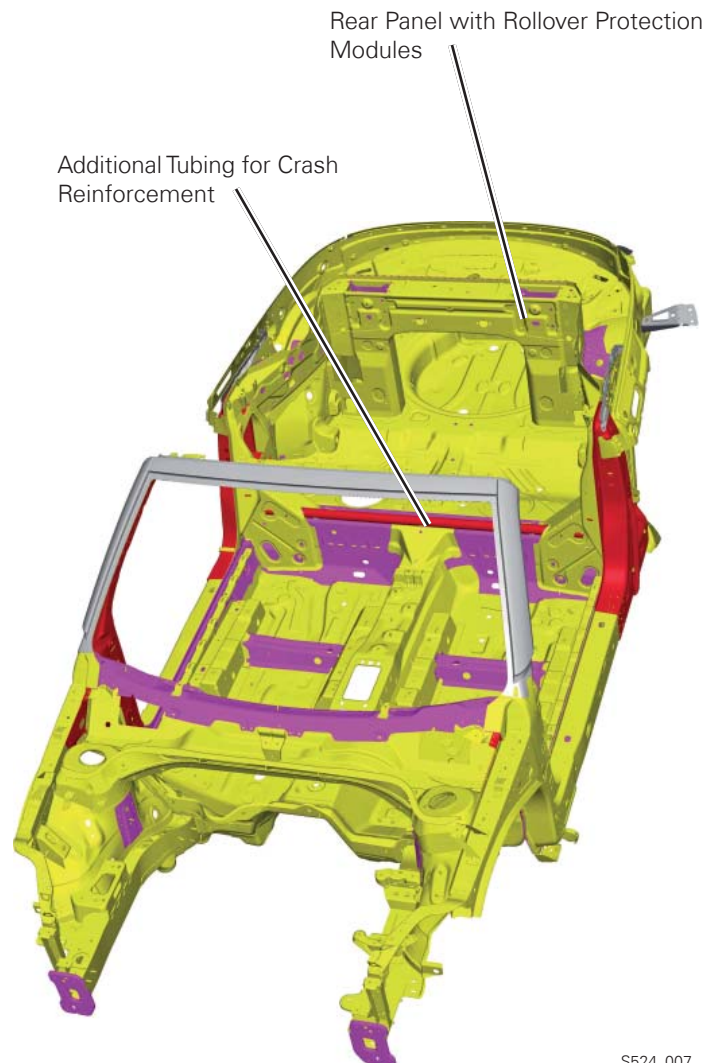
The body structure of the Beetle Convertible is very similar to the 2012 Beetle coupe.

Pedestrian protection remains the same. The body was changed in other areas of the vehicle.





Because a body with a convertible has less rigidity in the upper, open body structure, the body design needed to be stiffened. This included strengthening the body using partial body reinforcements and sheet metal with greater strength such as:

- A-pillar reinforcement
- Reinforcement of the front roof crossmember
- Reinforcement of the lower body side members
- Reinforcement between the B-pillars with additional tubing made of ultra-high-strength (hot-formed) steel as crash reinforcement

Due to the targeted use of materials and laser welding of selected parts, the body stiffness was increased by 20% over the previous New Beetle Convertible.

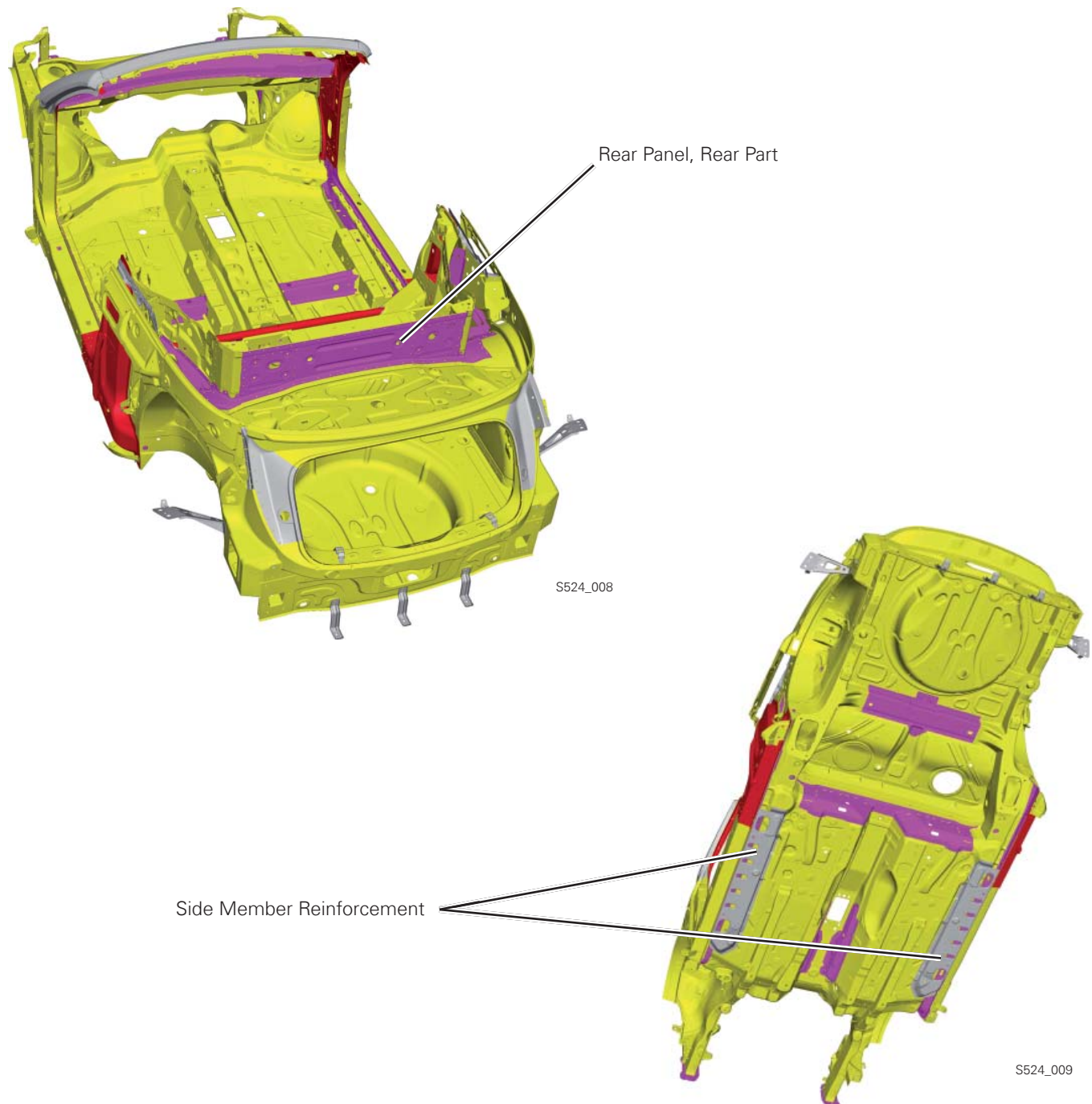


S524\_007

	< 350 (mild steel)
	300-590 (high-strength steel)
	500-980 (modern high-strength steel)
	> 1400 (ultra-high-strength (hot-formed) steel)

The body structure is reinforced with an additional rear panel that integrates the rollover protection modules.

The rear panel rear part is strengthened by the use of modern high-strength steel.

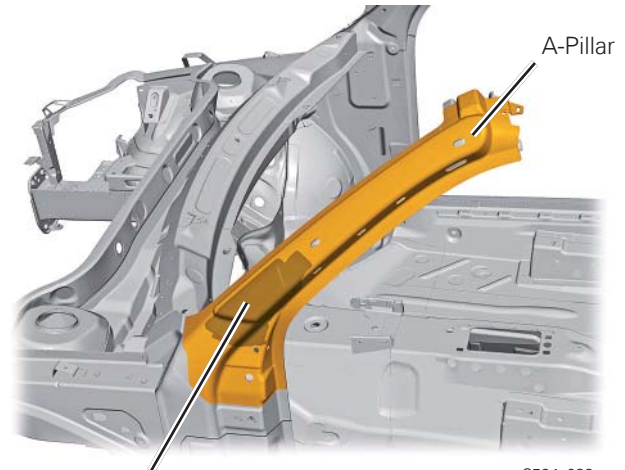


# Body

## Reinforced A-pillars

The A-pillar of a convertible must be able to absorb more force than a vehicle with closed roof construction in the event of a crash or rollover. Because of this, the sheet metal is thicker.

High-strength, 340 MPa steels are used on the inside of the A-pillar. In addition, a reinforcement in the “bend area” strengthens the A-pillar and ensures safety in the passenger compartment during a rollover.

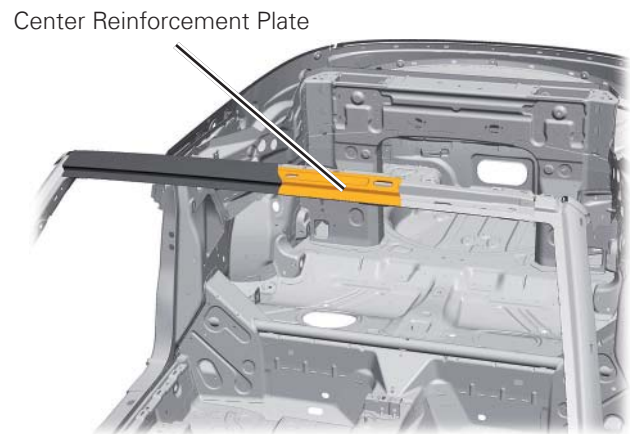


Reinforcement in the A-Pillar

S524\_033

## Front Reinforced Roof Crossmember

The front roof crossmember is designed in three parts. In contrast to the Beetle Coupe, it has an additional central reinforcement plate.



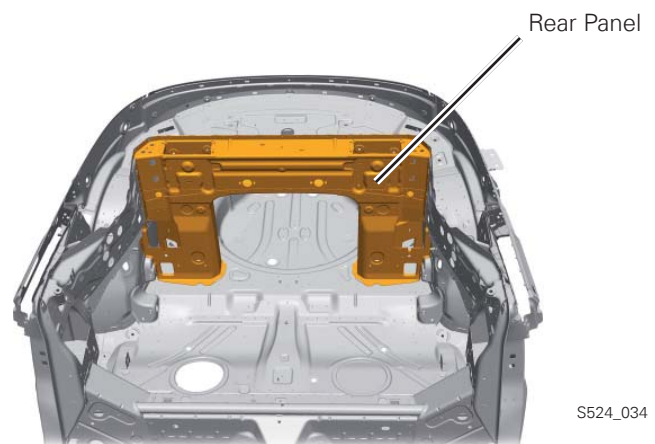
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## Rear Panel

The convertible rear panel is a single piece and integrates the rollover protection system.

The rear panel is attached to the side panels of the body. In the upper, front, and lower areas, it is high-strength 340 MPa sheet steel. A segment made of high-strength 540 MPa sheet steel forms the rear end plate.

The rear panel greatly enhances the rigidity of the passenger compartment, enhancing safety.

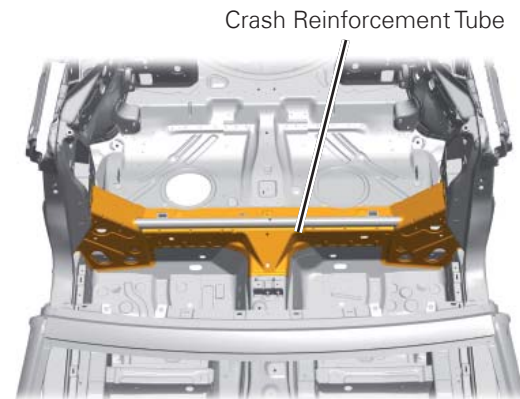


S524\_034



## Crash Reinforcement Tube

To improve side-impact resistance, an additional reinforcement tube has been added between the B-pillars above the floor extension plate area. This tube is ultra-high strength hot formed metal.

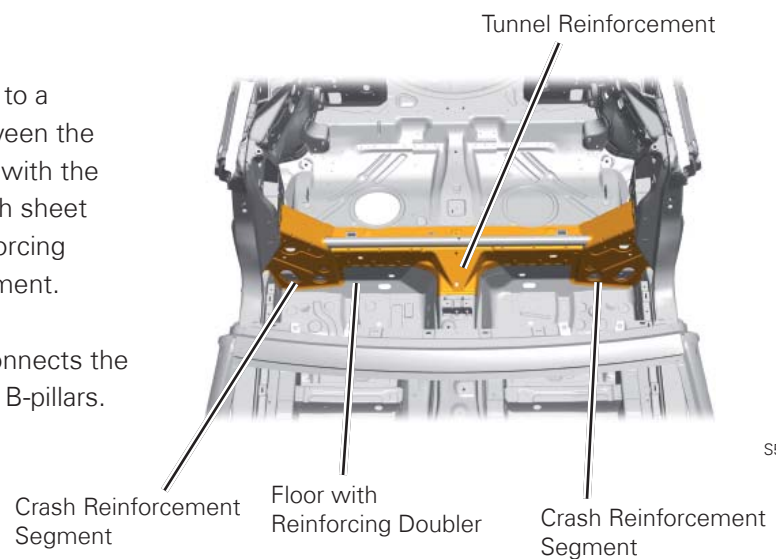


S524\_036

## Crash-Reinforcement of the Heel Plate

To stiffen the body and improve resistance to a side-impact crash, the heel plate area between the B-pillars has been strengthened. The floor with the reinforcing doubler is made of high-strength sheet steel. The tunnel is connected to the reinforcing doubler floor by a molded tunnel reinforcement.

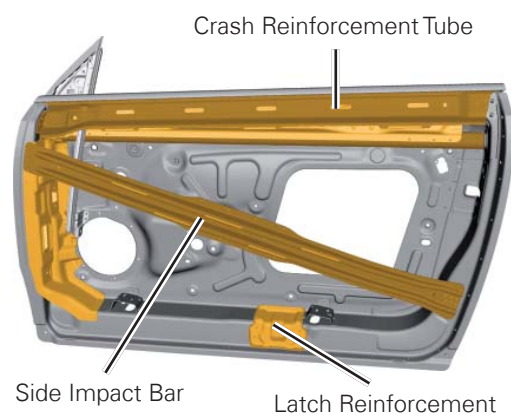
A molded crash-reinforcement segment connects the reinforcing doubler floor to the two interior B-pillars.



S524\_036

## Doors and Window Regulators

Both doors have side impact protection. In the event of a side collision, the energy will be absorbed by this bar and transferred to the body. This bar is placed at an angle so that it is effective at different heights.



S524\_053

# Body

## Floor Assembly

### Sill Carrier

The sill carriers are reinforcing add-on parts. They increase the rigidity of the entire body and enhance occupant safety in the event of a side-impact crash. In addition, they reinforce the body at the joints to the tension struts.

### Engine Shield

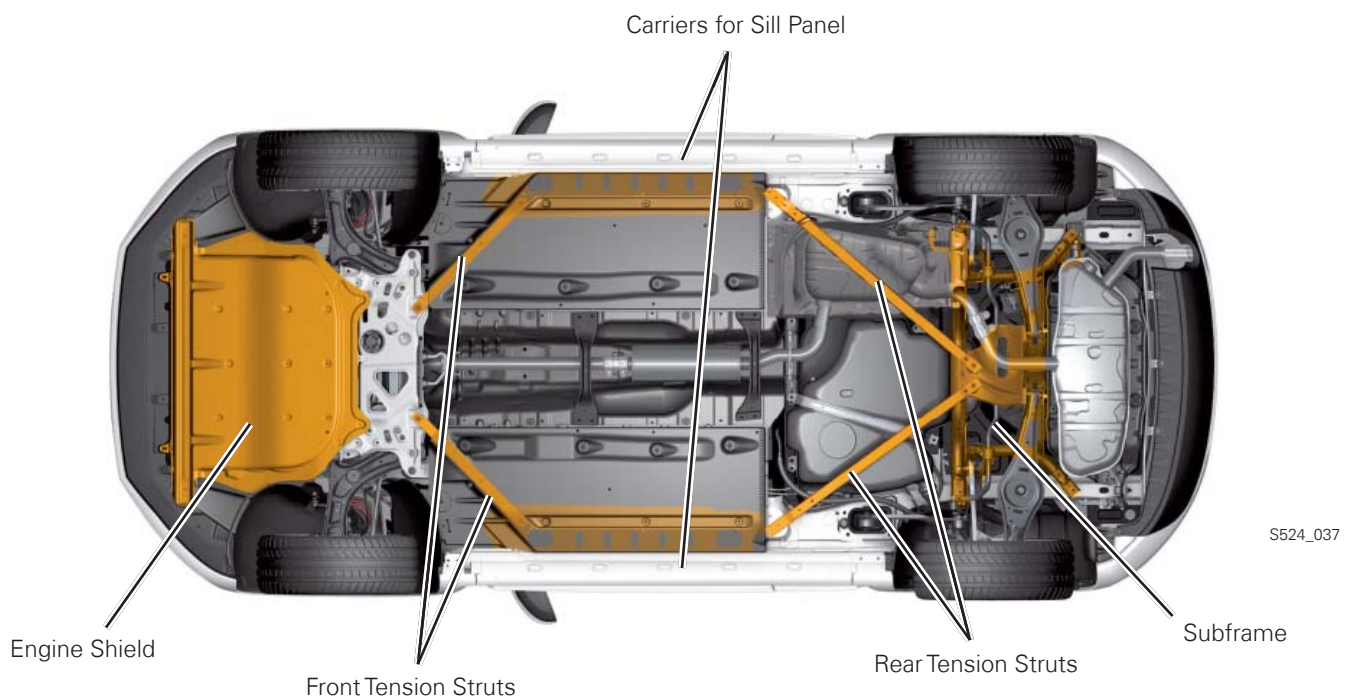
The aluminum engine shield helps rigidity by helping to hold together the subframe and the front longitudinal members. It also decreases engine noise.

### Tension Struts

The front and rear tension struts (also called diagonal braces) increase the torsional rigidity in the body and minimize the oscillations and vibrations that are otherwise typical for convertibles.

### Subframe

The subframe increases the rigidity of the body and reduces its vibration.

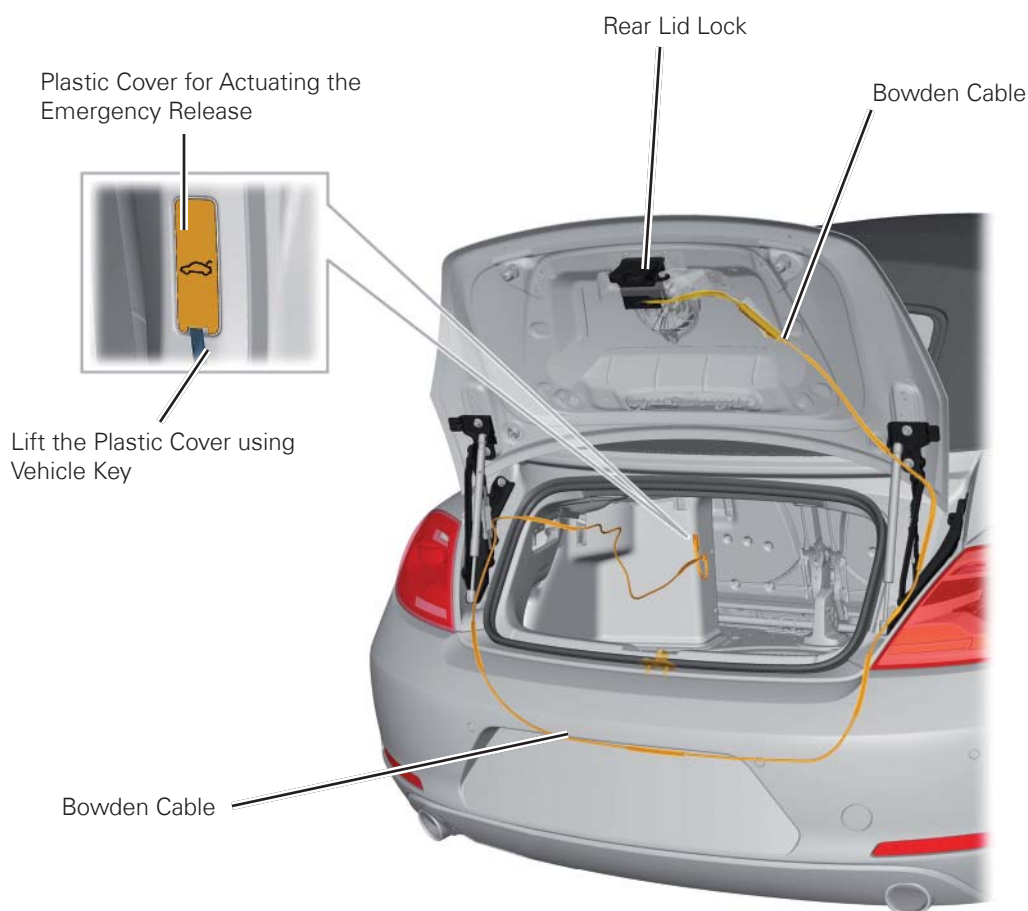


This floor design significantly reduces the undesirable vibrations in the body and increases driving comfort.

## Trunk Lid Emergency Release

The trunk lid is opened electrically. It does not have a mechanical locking cylinder. If the Beetle Convertible does not have any electrical power, the trunk lid can be opened using a mechanical emergency release.

The emergency release is triggered with a Bowden cable from the vehicle interior. The Bowden cable leads from the lock in the trunk lid to the trunk lid hinge, then continues to the inside of the rear panel of the body in the trunk on the left, then from the inside left of the trunk toward the front, past the B-pillar and ending at the door frame for the driver's door. It ends there in a loop which can be pulled from a cut-out in the trim panel. The cut-out is covered by a plastic cover which can be removed using the vehicle key. The lock in the trunk lid will be mechanically released by pulling on the loop.



S524\_038

If the Beetle Convertible does not have any power and the vehicle is locked, the trunk lid cannot be opened from the outside. The driver's door must first be mechanically opened with the vehicle key; the trunk lid can then be released using the emergency release Bowden cable.

# Body

## Lights

### Headlamps

The 2013 Beetle Convertible can have either halogen or bi-xenon headlamps.

Turn signals and front fog lamps are located in the bumper.

The cornering lights are integrated into the front fog lamps.

The system is supplemented by a yellow side-marker lamp on the left and right above the front wheel arches.

### Beetle with Halogen Headlamps



### Halogen Headlamps

Halogen headlamps are standard equipment. This headlamp unit has an HB2 bulb for low beams and high beams.

The daytime running lights and the parking lights have a separate bulb.

Daytime Running  
Light and Side Light  
W 21/5 W

Main and High Beam  
HB2 60/55 W





## Bi-Xenon Headlamps

Bi-xenon headlamps with daytime LED running lights are optional. When dimmed, they are used as parking lights.

Bi-xenon means that the low beams and high beams are integrated into one module. The bi-xenon module is equipped with xenon mercury-free gas-discharge bulbs with a power consumption of 25 W.

For the daytime running lights and parking lights, there are 15 separate LEDs installed in a C-shaped arc on the outside of the headlamps. In addition to the bi-xenon module, the LEDs are also used for daytime running lights and parking lights.

The bi-xenon headlamp is equipped with dynamic headlamp range adjustment.

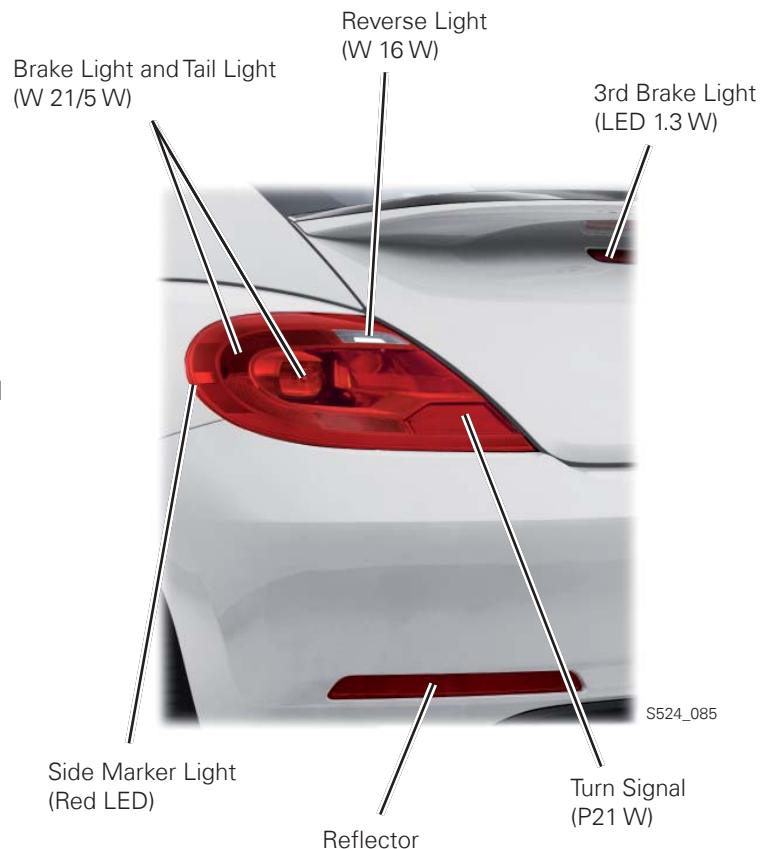


## Taillights

The taillights are a single unit with clear glass. They have C-shaped taillights and brake lights in the typical Volkswagen design.

The system is supplemented by a red LED side-marker lamp in the taillamp unit and by a 3rd brake light on the trunk lid.

The rear bumper has a red retro-reflector installed on the left and right.



# Body

## Interior Trim and Components

The 2013 Beetle Convertible has the same high-quality interior equipment as the Beetle Coupe. Some items have been modified to meet the requirements of a convertible.

- Controls for the convertible top are in the roof display
- Individually folding rear-seat backrests for increasing the size of the trunk
- Rear seat back releases are located in the trunk
- Lightweight blow-molded rear-seat backrests
- Bag retainer in the trunk loading area
- The trunk capacity remains the same even when the roof is lowered
- Despite the integrated rollover protection system, a loading area of 21 X 15 inches (526 X 381 mm) is available when the rear seats are folded down



S524\_097

Loading Area



S524\_101

Roof Display with Button for Convertible Top



S524\_072

## Integrated Wind Blocking System

The 2013 Beetle Convertible is equipped with an integrated wind blocking system in the trunk under the folding top area. The wind blocker can be safely and neatly stowed when folded and not in use. In addition, the wind blocker will not be damaged when the trunk is loaded. The storage compartment for the wind blocker is designed to allow full use of the trunk area.

If the wind blocker and its storage compartment are not being used, the storage compartment and wind blocker can easily be removed and stored until the next time they are used.



S524\_030

... Wind blocker folded once; after removal, it can be folded again until it is small enough to be stored...



S524\_095

... Wind blocker stored underneath the convertible top recess in the trunk (optional wind blocker holder)  
...



S524\_096

# The Electric Convertible Top

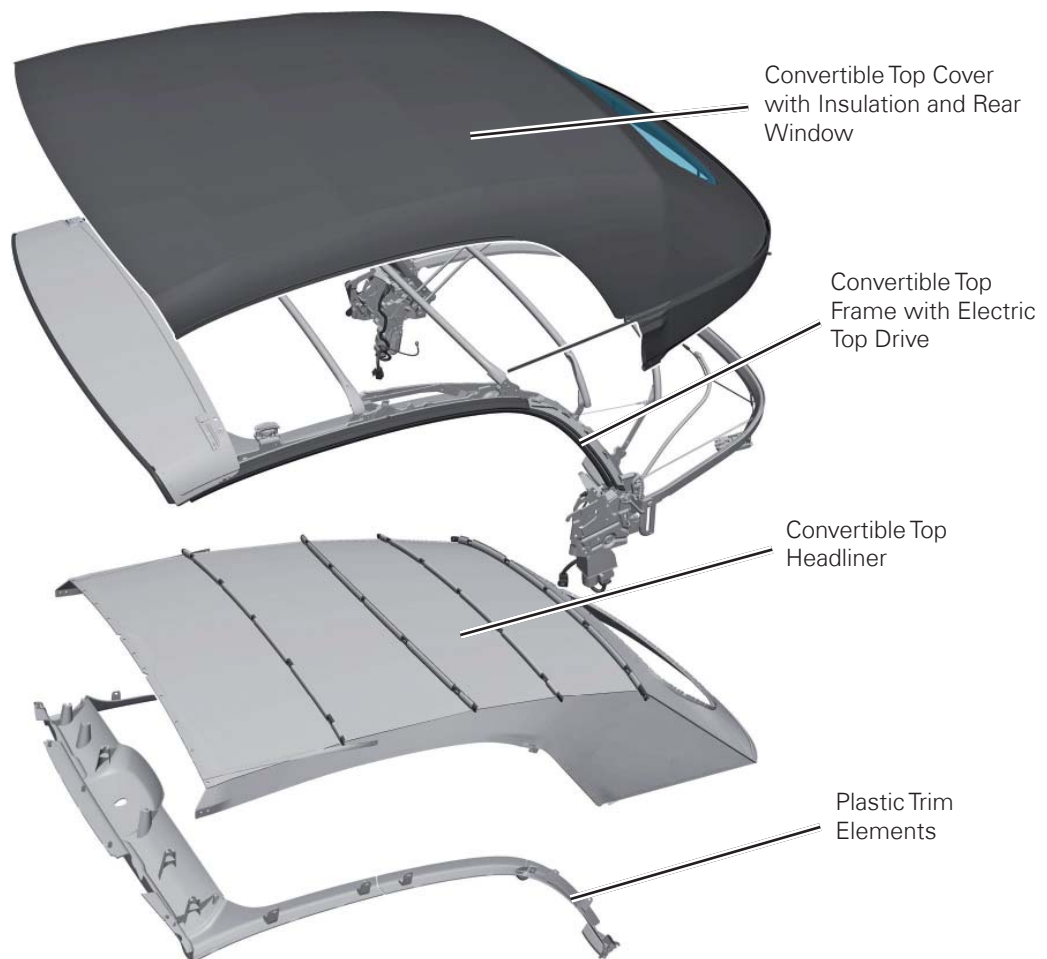
## Overview of Convertible Top Design

The 2013 Beetle Convertible has a soft top with a heatable rear window. The rear window is integrated into the roof flush with the outer surface of the convertible top cover, giving it a classy look. The convertible top is operated exclusively with electric drives. The two main drives each have an electric motor, a gear unit, and a control module. One drive unit is connected directly to the main bearing of the convertible top on each side.

The convertible top is permanently connected to the body structure in the area of the C-pillar. When the top is up, it is firmly locked to the roof crossmember. When the top is down, it is stored above the trunk. The top opens up in less than 12 seconds. It can be operated while traveling at speeds of up to 31 mph (50 km/h).

The design of the convertible top is shown in four layers:

- Convertible top cover with insulation and rear window
- Convertible top frame with electric drive and black plastic trim
- Interior headliner
- Black plastic trim



S524\_024

# The Electric Convertible Top

## Convertible Top Cover and Rear Window

The convertible top cover consists of the outer top tarp and the inner insulation. The convertible top insulation is made of RPC (RPC = acoustically optimized composite material).

Three-layer design of the convertible top shell:

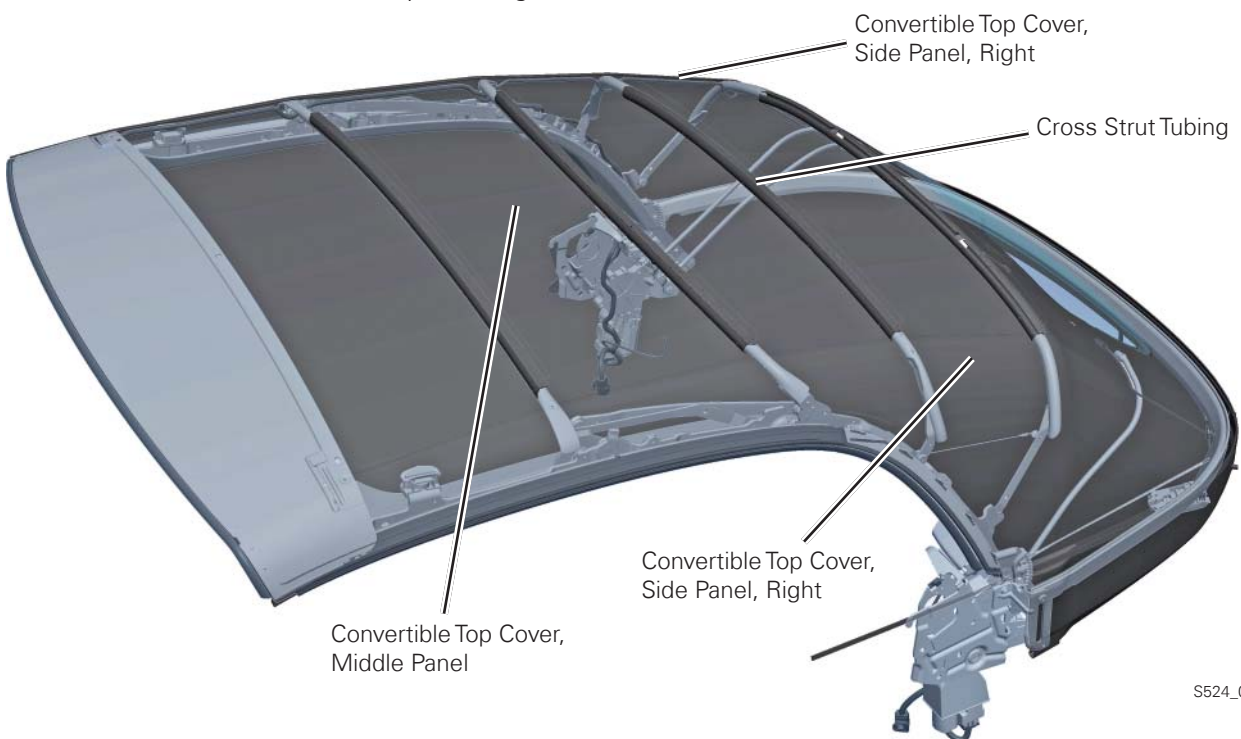
- Outer layer made of polyacrylic woven fabric
- Intermediate layer made of synthetic rubber
- Inner lining made of polyester

Three-layer design of the insulation:

- Outer layers made of polyester nonwoven fabric
- Intermediate layer made of PET (polyethylene terephthalate) insulating fleece
- Inner layer made of polyester spunbond

The convertible top cover has a center panel and side panels on the left and right. The seams between the panels are designed so that the side panels cover up the middle one with an embedded round cord and serve as additional drip molding. The bottom of the convertible top cover has narrow strips of material. The strips of material run around the convertible top bow tubes and are adhered to the bow tubes using double-sided adhesive film. This type of connection to the bows prevents excessive ballooning of the convertible top cover.

The rear window made of tempered safety glass is glued in a plastic frame sewn to the covering and flush with the outer contour of the convertible top covering.



# The Electric Convertible Top

## Convertible Top Mechanical System

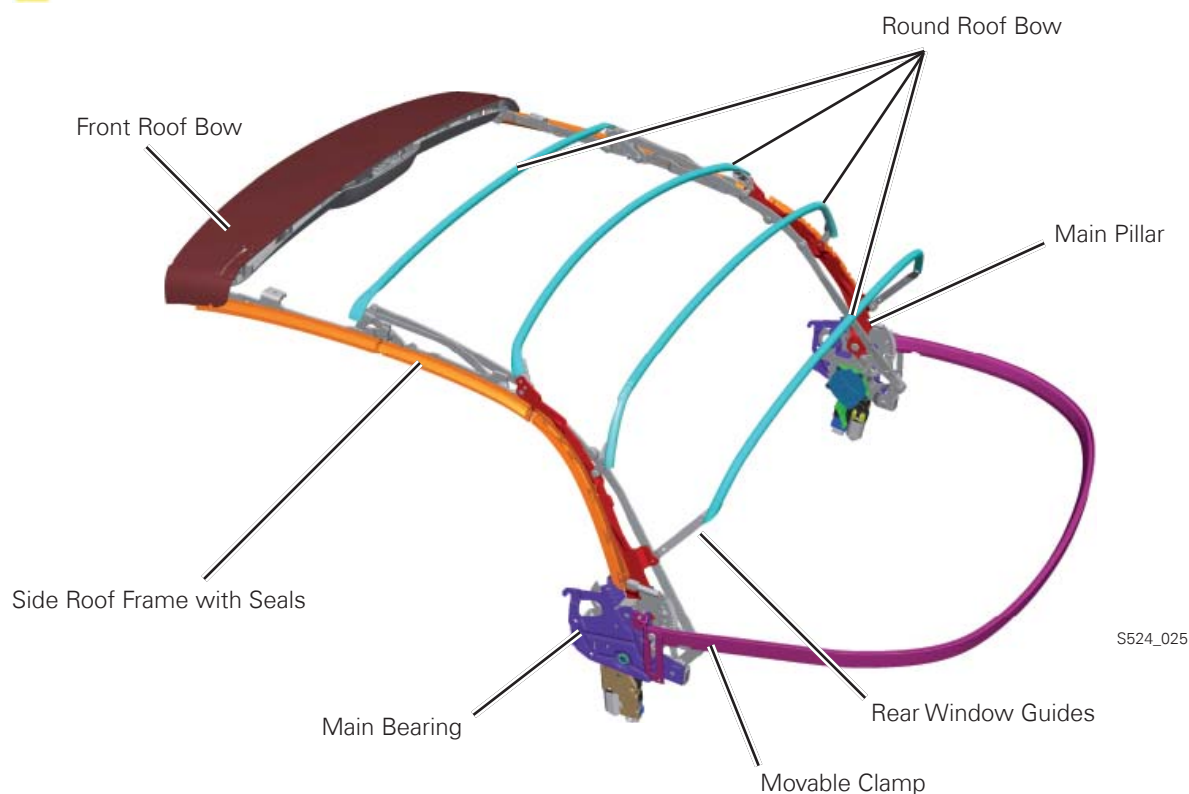
The electric convertible top mechanical system includes the foldable top frame with the two main pillars, which can be folded at their four joints. In addition, there is an electric drive to activate the convertible top, and an electric top latch with the roof crossmember.

### Convertible Top Frame

The convertible top frame consists of the following main components:

#### Legend

- Front roof bow
- Round roof bow
- Side roof frame with seals
- Main pillar
- Main bearing
- Movable clamp
- Rear window guides

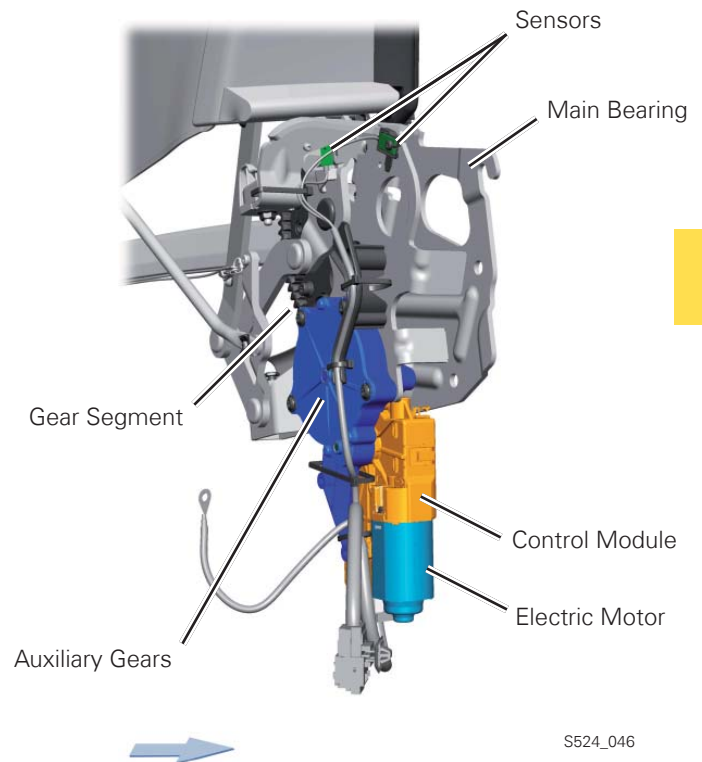




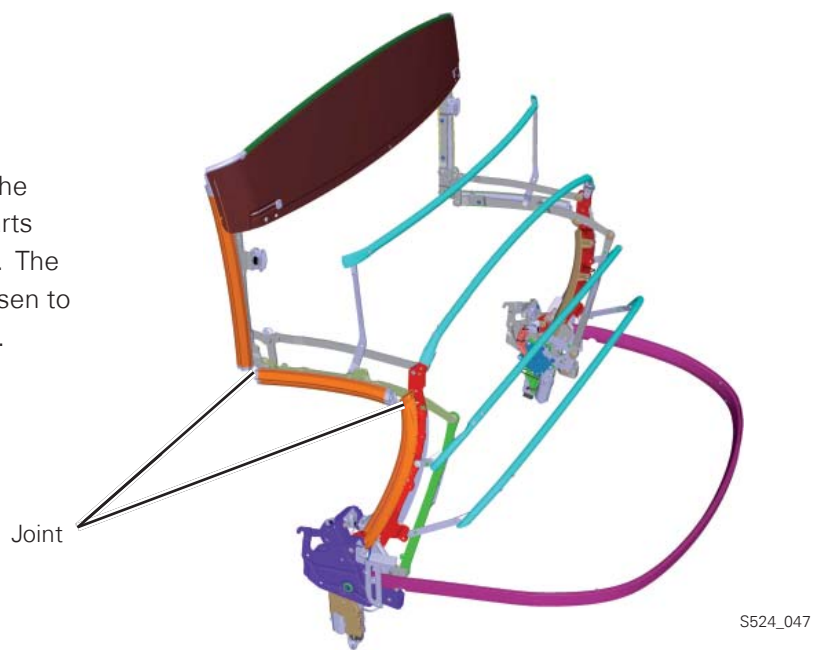
# The Electric Convertible Top

## Main Bearing with Electric Motor

The two main columns for the convertible top frame are connected to the body by the main bearing. The electric motors for operating the convertible top are on the main bearings. The gear segment on the main column transfers the rotation of the drive motor to the convertible top frame and converts this motion into a folding movement for the convertible top.



The configuration of the articulations allows the convertible top frame to be folded in three parts in a K-shape and then stored above the trunk. The K-shape folding pattern was intentionally chosen to imitate the folding pattern of the original Bug.



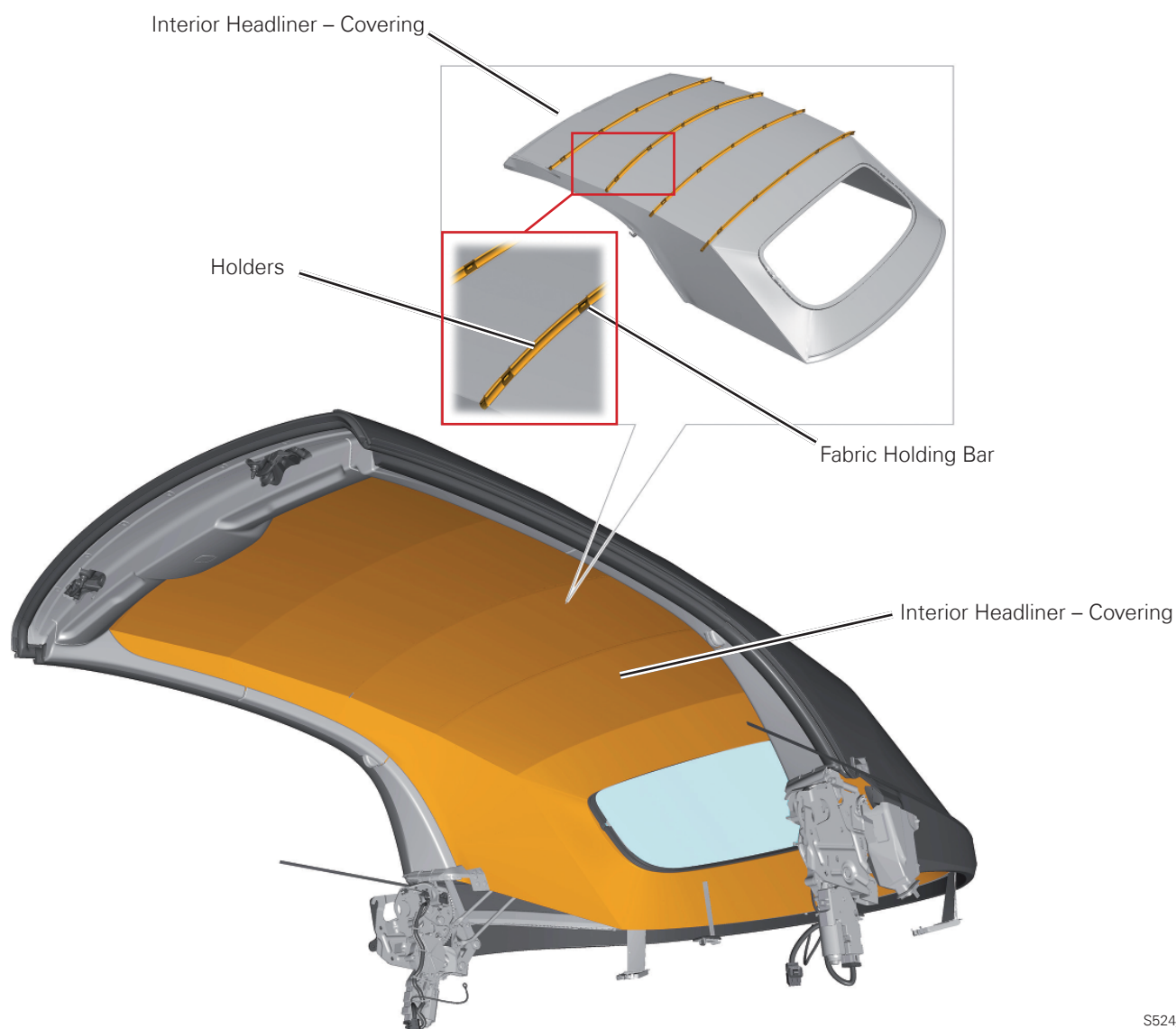
# The Electric Convertible Top

## Interior Headliner

Foam-laminated fabric is used as the material for the interior headliner. The interior headliner is largely anchored by fixed connections to the convertible top frame, which eliminated additional tension wires.

Bars to hold the fabric are inserted into holders in the headliner. These bars are screwed in place with the round cross-struts, and the fabric strips for the convertible roof have been bonded around them. This provides uniform tension and a smooth headliner.

The front roof frame trim, plastic trim elements and the interior headliner give a smooth linkage-free top look.



S524\_031



# The Electric Convertible Top

## Tonneau Cover

A tonneau cover is also offered for the convertible top of the 2013 Beetle Convertible. This is leatherette and emphasizes the contour of the vehicle when the convertible top is lowered. The laminated leatherette of the tonneau cover is reinforced with plastic panels and padded and is installed manually when the convertible top is lowered.

The convertible top cannot be operated when the tonneau cover is installed because of sensors in the tonneau cover assembly.

Although the tonneau cover is not necessary, it provides a smooth clean look when driving with the top down.



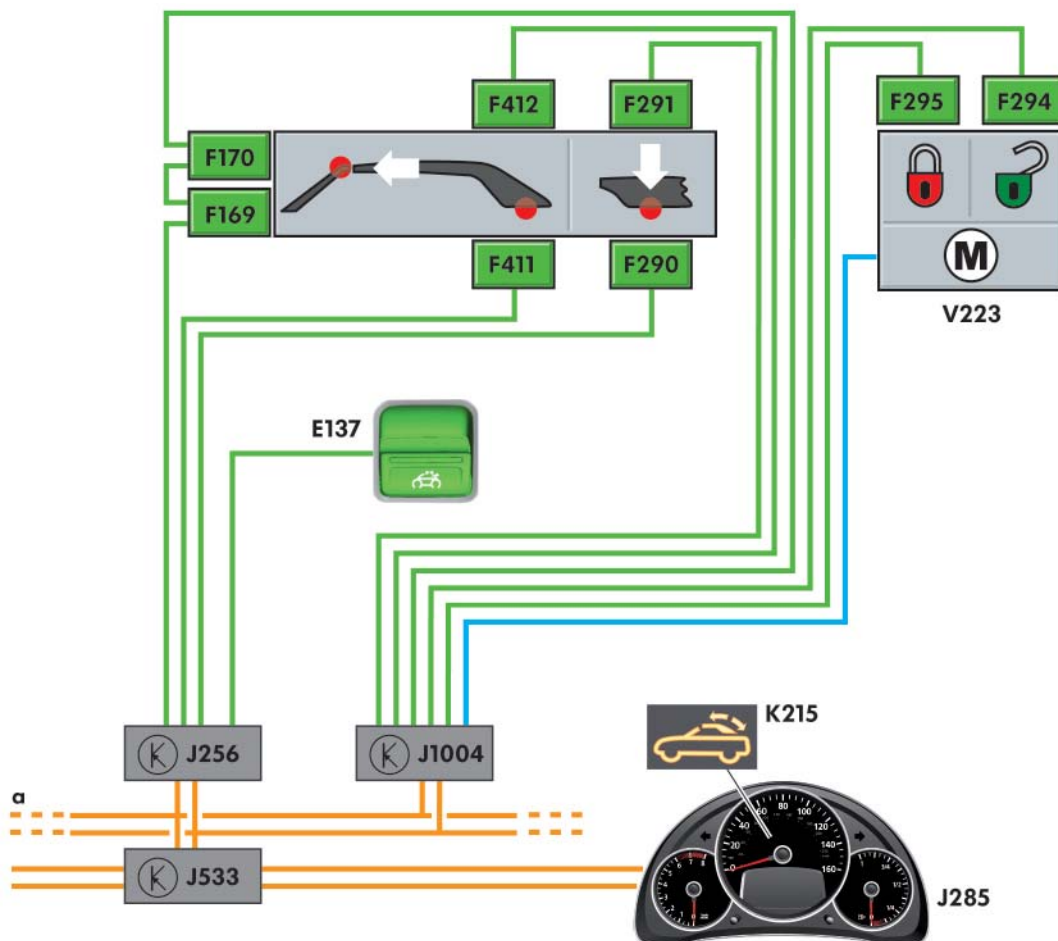
S524\_094

# The Electric Convertible Top

## The Electrical System

### System overview

- J256 and J1004 – Convertible Top Control Module 1 and 2 - each combined with a roof actuation motor
- E137 Power Top Operation Switch - in the roof display
- K215 Convertible Top Operation Indicator Lamp in the J285 Instrument Cluster Control Module
- F411 Left Convertible Top Closed Position Switch– in main bearing, left
- F290 Left Convertible Top Compartment Cover Switch – in main bearing, left
- V223 Convertible Top Locking Motor - in roof cross member
- F294 and F295 Convertible Top Latch -Open/Closed- Switch (in front cross strut), and
- F169 and F170 Convertible Top Left/Right Lock Switch– in the roof crossmember

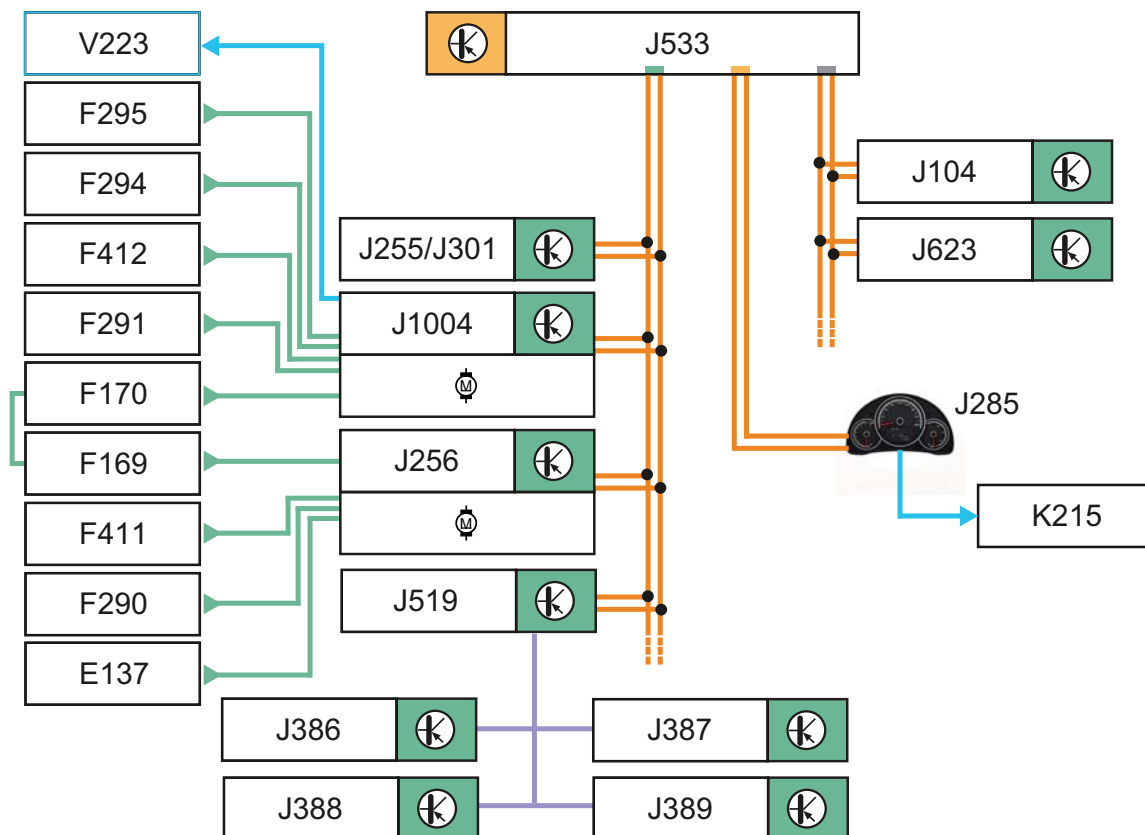


S524\_062

# The Electric Convertible Top

## Databus Communication

The convertible top has master (left) and slave (right) drive motors. The Convertible Top Control Module J256 is the master and Convertible Top Control Module 2 J1004 is the slave. J256 and J1004 are integrated into the vehicle networking system using the convenience CAN-Bus. The master and slave are synchronized and exchange data using the convenience CAN-Bus, while communicating with other control modules. The master and slave modules receive and process different information. The ultimate decision and control tasks are the responsibility of the master control module.



S524\_063

### Legend

E137	Power Top Operation Switch	J285	Instrument Cluster Control Module
F169	Convertible Top Left Lock Switch	J301	A/C Control Module
F170	Convertible Top Right Lock Switch	J386	Driver Door Control Module
F290	Left Convertible Top Compartment Cover Switch	J387	Front Passenger Door Control Module
F291	Right Convertible Top Compartment Cover Switch	J388	Left Rear Door Control Module
F294	Convertible Top Latch -Open- Switch	J389	Right Rear Door Control Module
F295	Convertible Top Latch -Closed- Switch	J519	Vehicle Electrical System Control Module
F411	Left Convertible Top Closed Position Switch	J533	Data Bus On Board Diagnostic Interface
F412	Right Convertible Top Closed Position Switch	J623	Engine Control Module
J104	ABS Control Module	J1004	Convertible Top Control Module 2
J256	Convertible Top Control Module	V223	Convertible Top Locking Motor

# The Electric Convertible Top

## Electric Convertible Top Drive

The convertible top is driven by two electric motors. One motor is located on each of the main bearings.

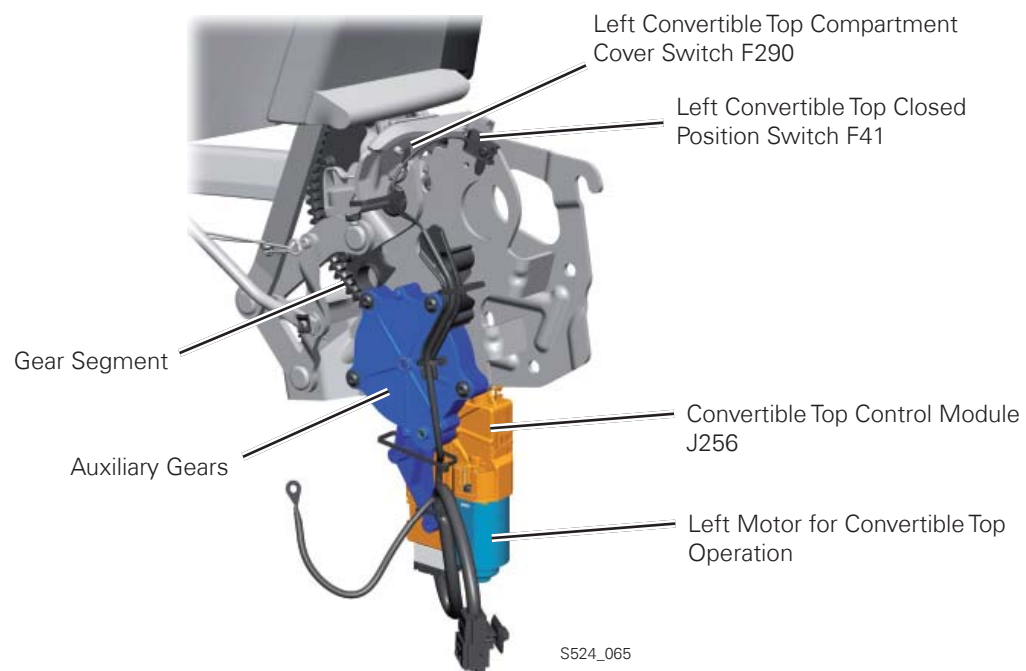
### J256 Convertible Top Control Module (Master)

The Convertible Top Control Module J256 is located on the left main bearing of the convertible top frame. J256 functions as the master control module.

The auxiliary gears of J256 rotate the gear segment on the main bearing, converting its movement into the operation of the top.

### J1004 Convertible Top Control Module 2 (Slave)

The Convertible Top Control Module 2 J1004 is located on the right main bearing of the convertible top frame. J1004 functions as the slave control module.



The graphic shows an example of the left convertible top motor. The control module and components are in the same positions on the right motor.

# The Electric Convertible Top

## F411, 412 Left/Right Convertible Top Closed Position Switch

### Installation Location and Task

F411 and F412 are Hall effect sensors. F411 is installed on the left main bearing of the convertible top frame while the F412 is installed on the right main bearing. The convertible top module uses the signals from these switches to determine if the convertible top has reached its end position and if automatic latching can be activated.

### Failure Effects

Without the signal from the F411/F412, the convertible top control module cannot determine whether the convertible top has reached its end position. The system goes into malfunction mode, and the convertible top can only be closed manually. To do this, emergency actuation is required.

When the convertible top is open and there is no signal from F411/F412, the convertible top cannot be closed.

For each operation of the convertible top, there is a maximum time available for reaching one of the two end positions (open/closed). This time limit starts from when the E137 Power Top Operation Switch is activated for convertible top operation and does not depend on the convertible top position. If this time limit is exceeded, the convertible top control modules will turn off.

## F290, F291 Left/Right Convertible Top Compartment Cover Switch

### Installation Location and Task

F290 and F291 are also Hall effect sensors. F290 is installed on the left main bearing of the convertible top frame while the F291 is installed on the right main bearing. The convertible top control module uses their signals to determine if the convertible top cover (tonneau cover) is installed. In order for the top to operate, the cover must be removed.

### Failure Effects

Without the signal from the F411/F412, the convertible top control modules cannot determine if the convertible top cover is in place or not.

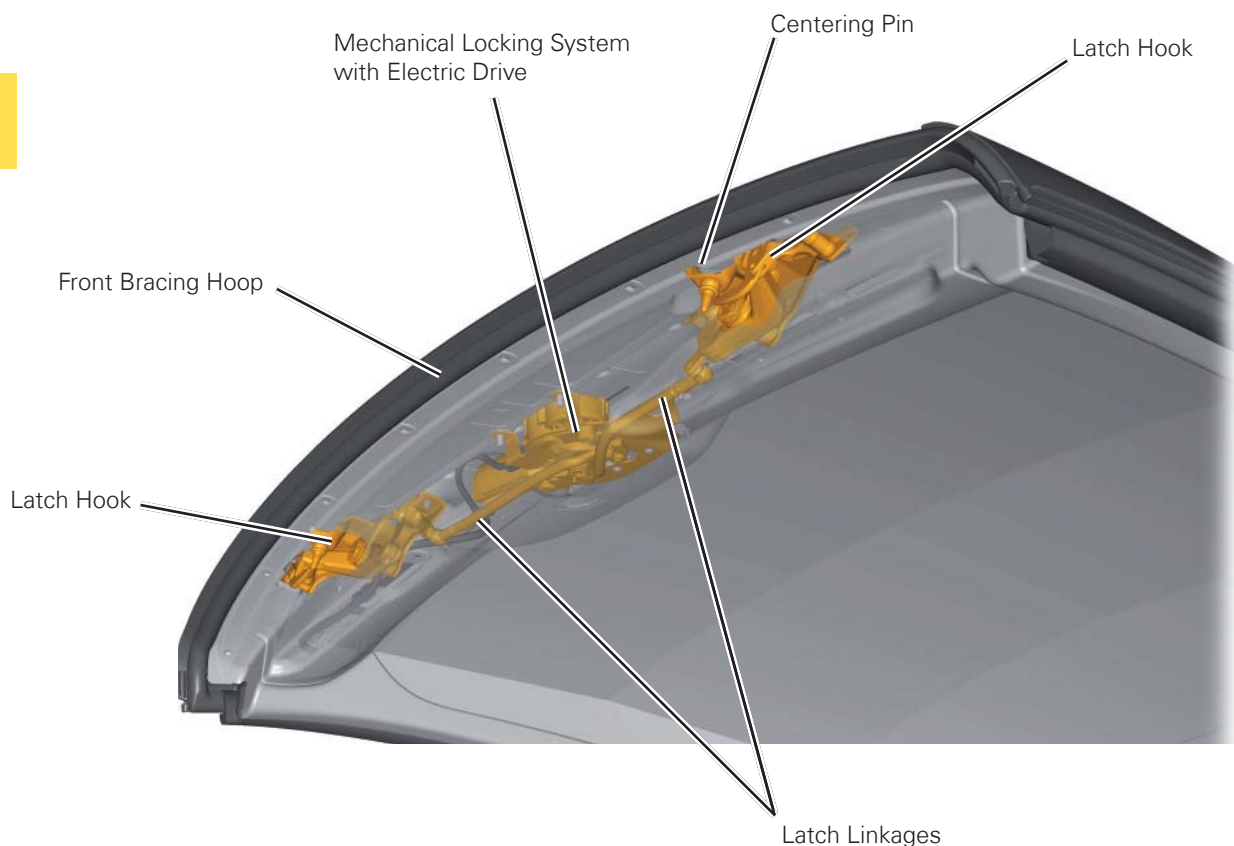
If the convertible top is closed and there is no signal, the message <system fault, workshop> will appear in the instrument cluster.

When the convertible top is open and there is no signal, the system will make one attempt to close the convertible top. The next time the top opens, the message <system fault, workshop> will appear in the instrument cluster.

# The Electric Convertible Top

## Convertible Top Latch

The convertible top latch secures the convertible top to the front roof crossmember.



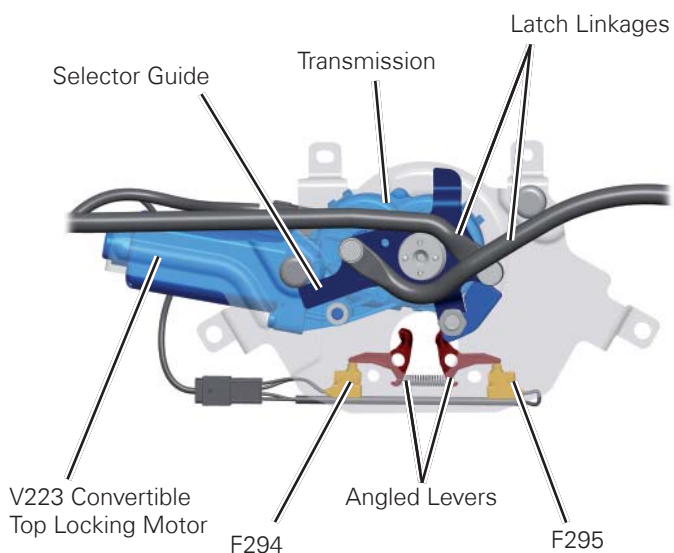
S524\_061

### Installation Location and Task

The convertible top latch is located in the front bow under a cover. The centering pins guarantee that the top is centered correctly on the roof cross member.

The rotation of the V223 is transferred to the convertible top lock through gears and a locking linkage. The convertible top is locked or unlocked with the locking catch at the front roof crossmember.

V223 is integrated into the convertible top latch. In addition, F294 Convertible Top Latch-Open-Switch, and the F295 Convertible Top Latch-Closed-Switch, are installed there.



S524\_080

# The Electric Convertible Top

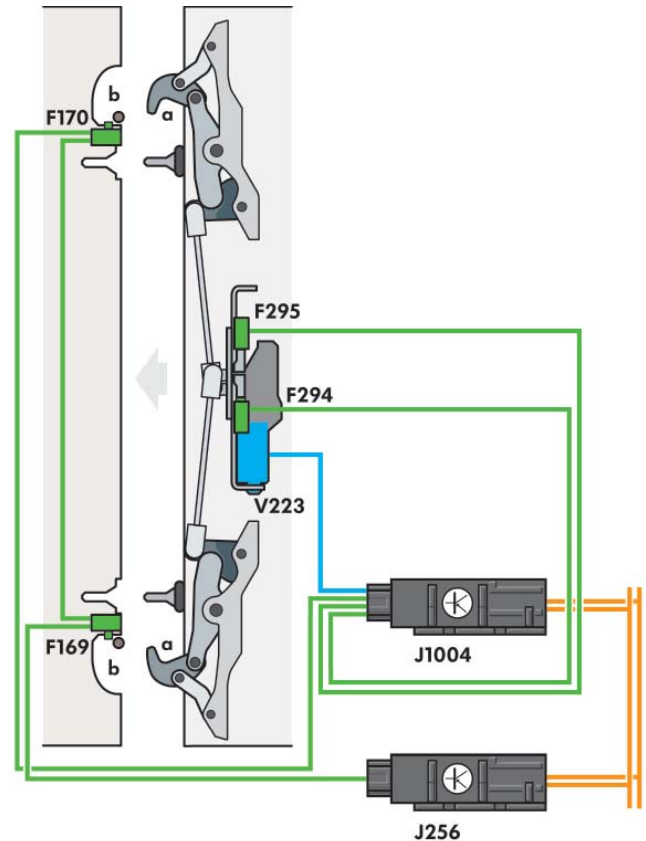
## Function

V223 is actuated by J1004 when the convertible top has reached its end position on the front roof crossmember. It is detected by F411 (evaluated by J256) and F412 (evaluated by J1004). Both switches are located on the main bearing. The direction of the electric motor can be reversed to open or close the convertible top.

Latch hook in front bow (a)  
Latch opening in roof crossmember (b)

## Legend

F169 Convertible Top Left Lock Switch  
F170 Convertible Top Right Lock Switch  
F294 Convertible Top Latch -Open- Switch  
F295 Convertible Top Latch -Closed- Switch  
J256 Convertible Top Control Module  
J1004 Convertible Top Control Module 2  
V223 Convertible Top Locking Motor



S524\_064

To prevent the top from being overloaded as a result of restricted movement, J1004 senses the duration of the signal from F294 and F295. If the maximum time is exceeded, the system will go into emergency mode. At this point, the driver is instructed to close the convertible top.

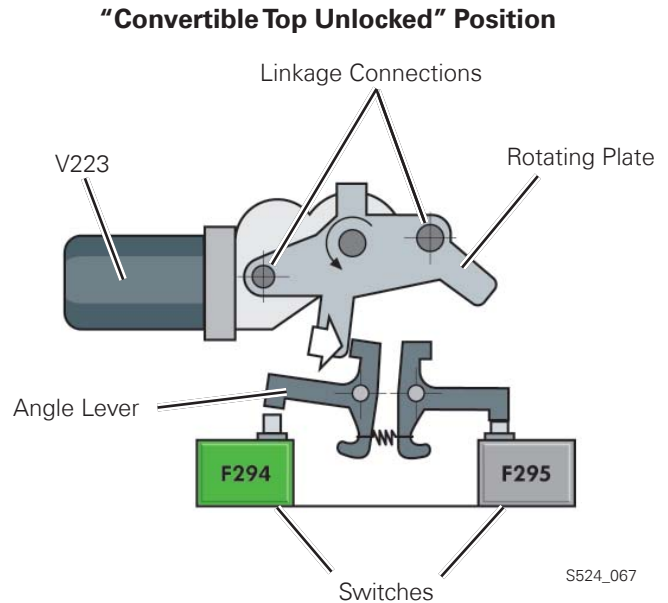
The signals from F169 and F170 are used to determine if the convertible top latches have closed. The signal for F169 is processed by J256, and the signal from F170 is processed by J1004. If these signals are absent, the system will continue to request the operator close the convertible top.

# The Electric Convertible Top

## F294, F295 Convertible Top Latch-Open/Close Switch

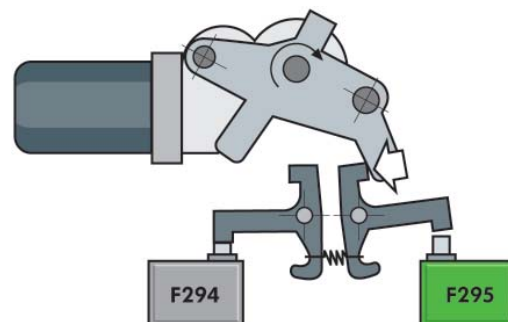
### Installation Location and Task

F294 and F295 are micro-switches located on the bracket plate in the front cross strut. The switches are operated by a rotating plate. When V223 Convertible Top Locking Motor starts, the plate rotates and actuates the two angle levers once an end position is reached. This opens the correct switch. If the plate moves in the opposite direction, the other angle lever is actuated, opening the second switch while the first is closed.



The end position of the latch hook corresponds to an end position of the plate. This means that "Hook in unlocked position" or "Hook in locked position" always indicates that one of the two switches is being opened by the angle lever. J1004 can determine if the latching hooks are in one of the two end positions or in-between.

### "Convertible Top Locked" Position



### Failure Effects

S524\_068

Without the signal from the two switches, the convertible top control module cannot determine if the latching hooks are in one of the two end positions. The system goes into malfunction mode and the convertible top can only be closed manually.



# The Electric Convertible Top

## F169, F170 Convertible Top Left/Right Lock Switch

### Installation Location and Task

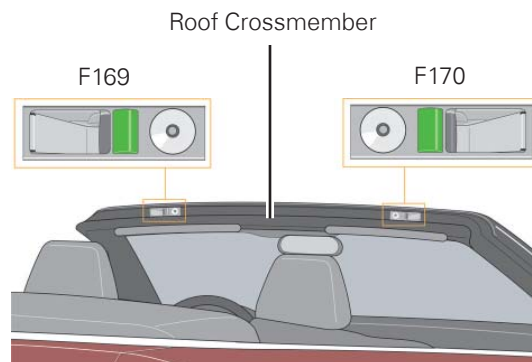
The switches are located to the left and right in the roof crossmember, at the latch openings. They are activated by the latch hooks when the hooks are inserted into the latch openings in the roof crossmember.

The convertible top control module uses the signals from these switches to determine if the two latch hooks, which are already in the “closed” end position according to the signals from F294 and F295, can be inserted into the latch openings in the roof crossmember. Only when these signals are received can the convertible top secure itself to the roof crossmember on both sides of the vehicle, completing the forward movement of the convertible top.

### Failure Effects

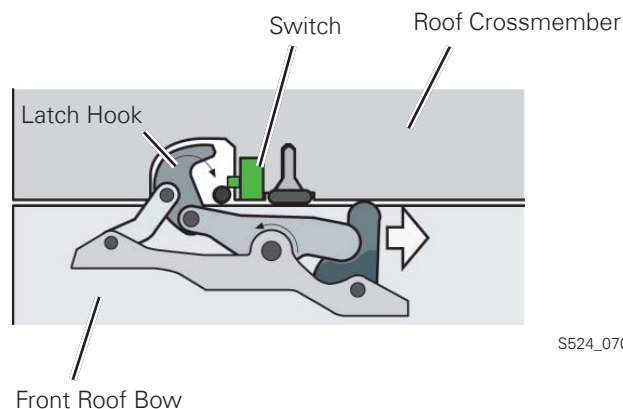
The convertible top control modules cannot determine if the latch hooks have secured the top to the front crossmember without the signals from F169 and F170.

If the time limit J256 and J1004 require to complete this process is exceeded, a fault is set and the system will go into emergency mode. At this point, the only way to close the top is by using the emergency closing procedure.



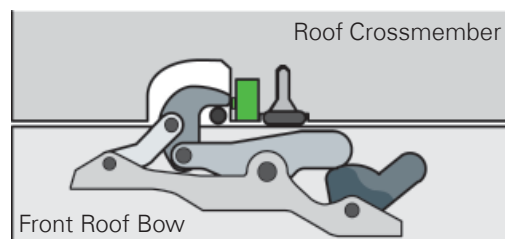
S524\_069

### ...before locking



S524\_070

### ...after locking



S524\_071

# The Electric Convertible Top

## Emergency Operation of the Convertible Top

If the convertible top cannot be closed by the electrical system due to a malfunction, it can be closed manually using the following steps:

### Release Convertible Top

There is a screw for emergency release on both main bearings of the convertible top. Unscrew these screws using an Allen wrench (onboard toolkit) in a counterclockwise direction and remove them completely.



The convertible top should only be moved manually after all efforts have been exhausted to close the convertible top normally without success. More detailed information is available in the Owner's Manual.

### Closing the Convertible Top

Using two people, pull the top forward from each side of the convertible top, taking care not to bend the frame assembly. Press it to the windshield header.

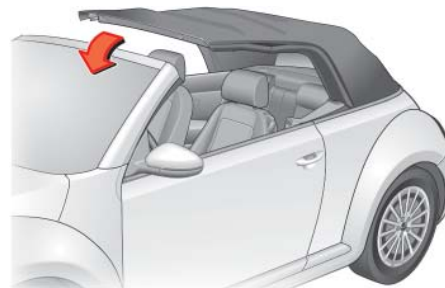


S524\_074

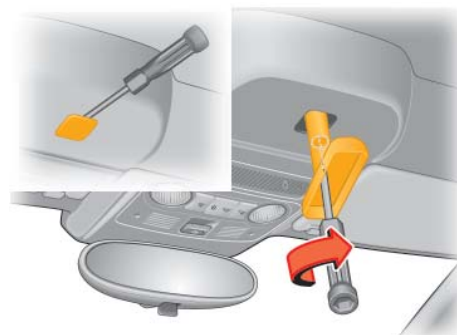
### Latching the Convertible Top

Remove the cover to expose the emergency release in the front header area:

- Remove small plastic cover
- Insert "emergency operation handle" into the opening for emergency operation, and turn it until it engages
- Using a screwdriver, tighten the screw clockwise in the center of the "emergency operation handle" to disengage the electrical motor
- Turn the "emergency operation handle" counterclockwise to open convertible top hooks
- Pull the "emergency operation handle" on the convertible top downward and turn counterclockwise until the convertible top is completely latched – the indicator light will go dark
- Loosen the screw counterclockwise in center of the "emergency operation handle" with a screwdriver, and remove the "emergency operation handle"
- Install the small plastic cover



S524\_075



S524\_076

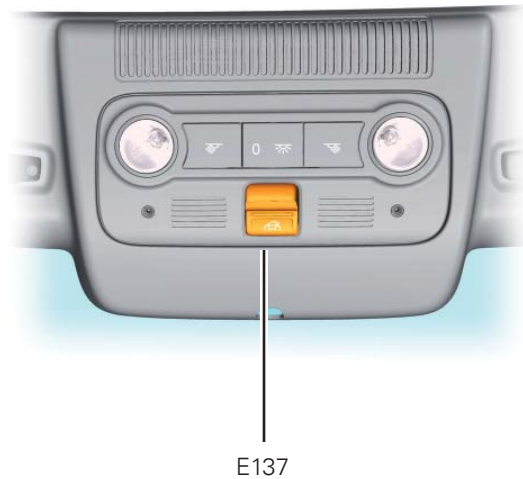
# The Electric Convertible Top

## Additional Electric Components

### E137 Power Top Operation Switch

The convertible top operation button is located in the overhead console. It has two directions. "Press and hold" opens the convertible top. "Pull and hold" closes the convertible top.

If the button is released while the roof is moving, the roof stops, and the convertible top remains in whatever position is reached. Re-actuating the lever causes the convertible top to start moving again depending on the button's direction of actuation. If the button is pressed for an additional 3 seconds after opening, the side windows roll down completely. If the button is pulled continuously or re-pulled after the closing process, the side windows will be rolled up completely.



S524\_072

### Failure Effects

If the button "sticks" (does not move), after two minutes, a fault is recorded.

### K215 Convertible Top Operation Indicator Lamp

The indicator light is located in the dashboard insert. While the convertible top is being operated, the indicator light stays lit and goes dark after operation of the convertible top is finished. If the convertible top is not in one of the two end positions or if there is a fault in the system while a button is being held to operate the convertible top, the K215 will flash.



S524\_073

# The Electric Convertible Top

## Convertible Roof Operation

The convertible top can be opened or closed if the prerequisites are met. If the operation of the top is not possible, the convertible top can also be moved manually to an open or closed position using the emergency closing procedure.

### Opening the Convertible Top

#### Prerequisites:

- Vehicle is stationary or travelling at a speed of less than 35 mph (50 km/h)
- Ignition is ON
- Exterior temperature is greater than 14° F (-10° C)
- Battery voltage is more than 11.3 volts with the top closed completely. If less than 11.3 volts, an undervoltage message <under voltage, start engine> will appear in the instrument cluster
- From an intermediate position, a battery voltage of more than 9 volts is required
- The electric convertible top operation motors are not overheated
- The convertible top operation button is held continually during the entire roof operation

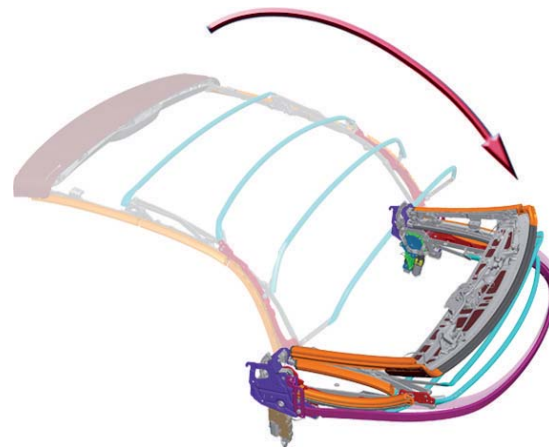
#### Procedure

The Power Top Operation Switch E137 is pressed and held for the entire time while operating the convertible top. The convertible top operation warning lamp K215 illuminates and stays on.

The side windows are automatically lowered to the automatic “drop-down” position. If all side windows are at least the same position as (or lower than) the automatic drop-down position, the Convertible Top Control Module 2 J1004 will unlock the convertible roof from the front cross member.

The rear window heater is deactivated. Once the locking hooks have reached the unlocked position, the left and right convertible top motors are activated. The convertible roof moved towards the rear of the vehicle and folds.

In the meantime, the hooks are returned to the locked position.



- From an intermediate position, a battery voltage of more than 9 volts is required
- The electric convertible top operation motors are not overheated
- The convertible top operation button is held continually during the entire roof operation

Switches F411 and F412 confirm that the top has reached its end position. The convertible top motors are turned off and the warning lamp K215 turns off.

#### Special Features During Roof Operation

If the convertible top is already unlocked for opening, then the convertible top opening procedure can be continued for a maximum vehicle speed of 25 mph (50 km/h).

If the convertible top is in an intermediate position and the vehicle is approaching the maximum allowed speed for top operation, a message will display in the instrument cluster advising the driver to slow the vehicle.

# The Electric Convertible Top

## Closing the Convertible Top

If the control module identifies the convertible top status as "open" or the top is in an intermediate position, the roof can be closed by pulling on the top operation switch.

### Prerequisites:

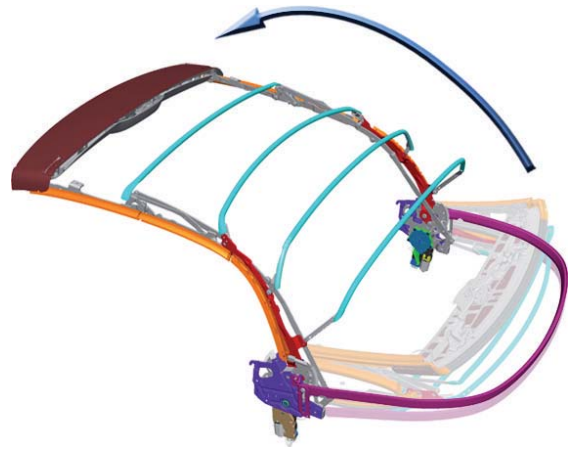
- Vehicle is stationary or travelling at a speed of less than 35 mph (50 km/h)
- Ignition is ON
- Battery voltage is more than 10.8 volts with the top opened completely. If less than 11.3 volts, an undervoltage message <under voltage, start engine> will appear in the instrument cluster
- From an intermediate position, a battery voltage of more than 9 volts is required
- The electric convertible top operation motors are not overheated
- The convertible top operation button is held continually during the entire roof operation

### Procedure

The Power Top Operation Switch E137 is pulled continuously during convertible top operation. The convertible top operation warning lamp K215 illuminates and stays ON. The side windows are moved to the automatic "drop-down" position to make the convertible top operation possible.

The convertible top control modules J256 and J1004 actuate the roof motors in the closing direction. The convertible top moves towards the front cross member. After approximately four seconds of operation, the locking hooks open in preparation for engaging with the front roof cross member.

The convertible top forward position is determined by the motor position sensor values in the control modules. When it reaches the forward position, the motors are turned off.



The locking hooks are moved to the locked position to securely fasten the convertible top to the front roof cross member.

The side windows close completely, as long as the convertible top operation button is held. The rear window heating is enabled and the instrument cluster lamp turns off. At this point, the convertible top is considered closed.

# Occupant Protection

## Safety Equipment

The Beetle Convertible has the following safety equipment:

- The same airbag system as in the Beetle Coupe
- The same side impact protection as in the Beetle Coupe
- Rollover protection system
- Convertible-specific safety construction

The sensor concept for the US and Canada:

- Upfront crash sensors
- Crash sensor in the Airbag Control Module
- Crash sensor located in each door

## Restraint System

- Single-stage driver's airbag
- Dual-stage front passenger airbag (US, Canada)
- Front seat head/chest side airbags
- Front belt tensioner and belt force limiters



S524\_081

The Beetle Convertible has the same child safety system and the top-tether system as the Beetle Coupe. It also has capacitive-operated seat occupation detection for the front passenger seat.

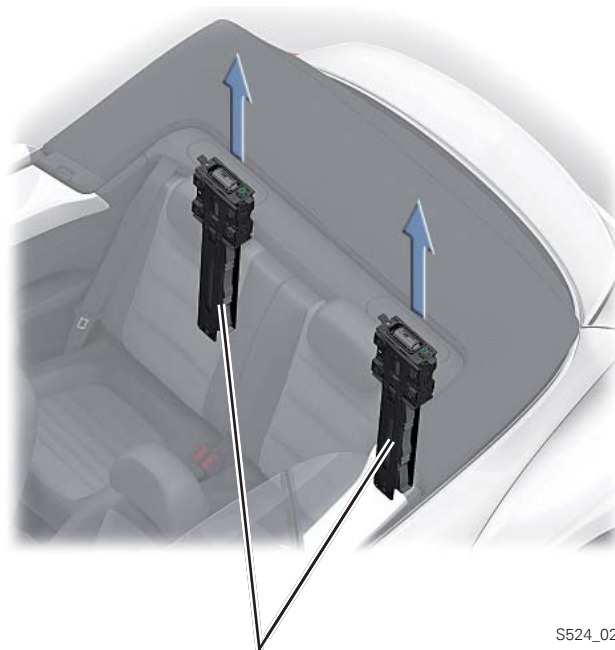
## Rollover Protection System

For safety in the event of a rollover, the active rollover protection system with two extendable modules will deploy. Due to the use of aluminum and high-strength steels, the weight has been significantly reduced in comparison to other systems.

The compact design of the rollover protection system allowed the loading area of the luggage compartment through to the passenger compartment to be 21 X 15 inches (526 x 381 mm). This gives the capability for transporting large objects when the roof is closed.

The two rollover protection modules are pyrotechnically-activated by the airbag control module in the event of a rollover. When they deploy, they are raised in milliseconds and combine with the A-pillars to create a safety compartment for the passengers.

When not engaged, the slotted rails are hidden behind the head restraints under a cover.



Rollover Protection



# Drive Train

## The 2.0L TSI Engine

The 2.0L TSI engine is part of the EA888 series engines.

### Technical Data:

- Chain-driven camshafts
- Balance shafts integrated into block
- Belt-driven coolant pump
- New oil filter location
- Piston cooling jets bolted to crankcase
- New crankcase breather
- Spur teeth on crankshaft, gear wheel module, and vibration damper
- Intake camshaft with continuously variable valve timing
- New high-pressure fuel pump
- Direct fuel injection

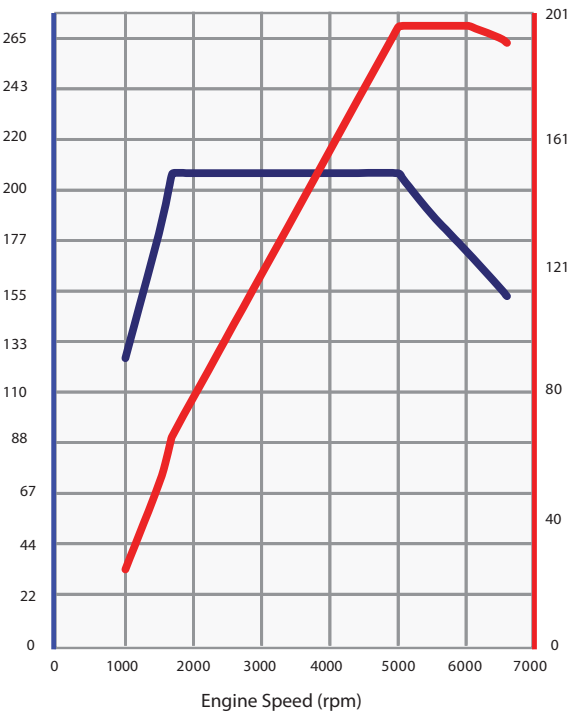


S524\_010

### Technical Specifications

Engine Configuration	Inline 4-Cylinder, Turbocharged CCTA, CBFA
Displacement	1984 cm <sup>3</sup> (121 in <sup>3</sup> )
Bore	82.5 mm (3.25 in)
Stroke	92.8 mm (3.7 in)
Valves per Cylinder	4
Compression	9.6:1
Maximum Power	200 hp (147kW) at 5,100 - 6,000 rpm
Maximum Torque	207 lb/ft (280 Nm) at 1,700 - 5,000 rpm
Engine Management	Bosch Motronic MED 17.5.2
Fuel Requirement	Premium Fuel
Emission Rating	BIN5, SULEV

### Torque and Performance Diagram



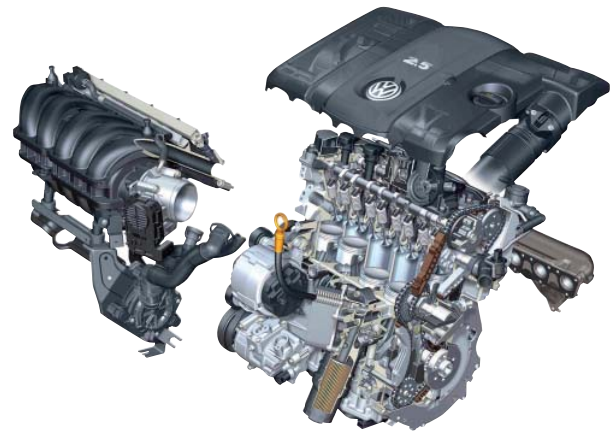


## The 2.5L Engine

The 2.5L engine has been offered in the Golf, Jetta and Beetle Coupe. It is now offered in the Beetle Convertible.

### Technical Data

- Control oil pump with two pressure stages, controlled externally via the ECM to reduce fuel consumption
- New sensors for oil pressure to control the oil pump – one low oil pressure signal directly to ECM, high oil pressure signal via dashboard insert (CAN)
- SULEV with secondary ventilation system
- BIN5-TIER2 and TIER1 without secondary ventilation system
- 5 in 1 exhaust manifold (shell construction) – oxygen sensor probe in exhaust manifold

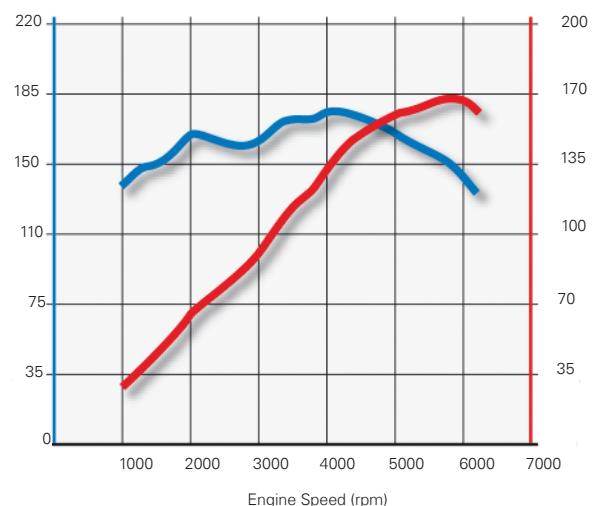


S524\_012

### Technical Specifications

Engine Configuration	Inline 5-Cylinder CBTA, CBUA
Displacement	2480 cm <sup>3</sup> (151 in <sup>3</sup> )
Bore	82.5 mm (3.25 in)
Stroke	92.8 mm (3.7 in)
Valves per Cylinder	4
Compression	9.5:1
Maximum Power	170 hp (125kW) at 5,700 rpm
Maximum Torque	177 lb/ft (240 Nm) at 4,250 rpm
Engine Management	Bosch Motronic ME 17.5
Fuel Requirement	Regular Unleaded
Emission Rating	BIN5 TIER2, SULEV

### Torque and Performance Diagram



S468\_021

# Drive Train

## The 2.0L CRTDI

The 2.0L Common-Rail TDI engine has been available in the North American market in vehicles such as the Jetta and Jetta SportWagen.

Technical characteristics:

- Common rail injection system with piezo injectors
- Diesel particle filters with upstream oxidation catalyst
- Electrically-controlled recycling of exhaust gases at both low and high temperatures
- Variable turbocharger
- Balance shafts reduce vibrations and noises

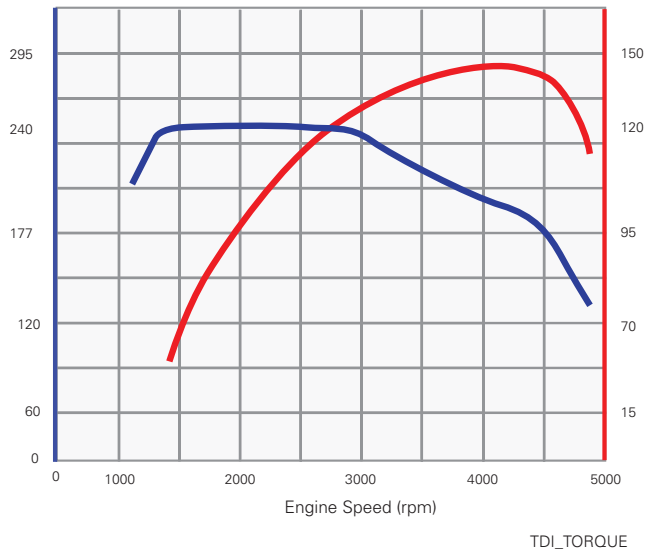




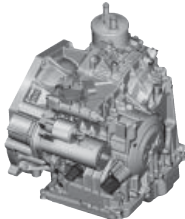
S468\_018



Detailed information regarding this engine and its operation can be found in the 2.0L TDI Common Rail BIN5 ULEV Engine SSP 826803.

Engine Configuration	Inline 4-Cylinder
Displacement	1968 cm <sup>3</sup> (120.1 in <sup>3</sup> )
Bore	81.0 mm (3.19 in)
Stroke	95.5 mm (3.74 in)
Valves per Cylinder	4
Compression	16.5:1
Maximum Power	140 hp (103kW) at 4,000 rpm
Maximum Torque	236 lb/ft (320 Nm) at 1,750-2,500 rpm
Engine Management	Bosch EDC 17
Fuel Requirement	Ultra-Low Sulfur Diesel (under 15ppm)
Emission Rating	BIN 5



Transmission Type	Technical Data
 <p><b>6-Speed Manual Transmission 02Q</b></p>	<p>The 02Q transmission based on the 02M transmission.</p> <p>The gearshift shaft, the selector forks with stops in the housing, and the mounting have been changed.</p> <p>The transmission has been designed without a speedometer sensor (gets this signal from ESP control module).</p>
 <p><b>6-Speed Dual-Clutch Transmission 02E</b></p>	<p>The 02E 6-speed dual clutch transmission is equipped with a hydraulic dual clutch. It combines the advantages of a manual transmission such as high-efficiency, durability, and sportiness with the advantages of an automatic transmission such as increased comfort with ease of shifting.</p>
 <p><b>6-Speed Automatic Transmission 09G</b></p>	<p>The 09G 6-speed automatic transmission is a compact, light, electronically controlled transmission for transverse installation. The 2012 Beetle utilizes the 2nd generation of this transmission. In the development of the transmission, the main focus was on reducing consumption and reducing CO2 emissions. As a result of improved damping in the newly developed torque converter, the car can be driven with less fuel consumption when the lockup clutch is engaged, even in 2nd gear. Also, the newly developed linings of the multi-plate clutch and the friction-optimized bearings – in conjunction with low-friction oil – significantly increase efficiency.</p>

# Chassis

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## The Chassis

The 2013 Beetle Convertible chassis is based on the 2012 Beetle Coupe. It has been altered for the convertible top. It provides maximum comfort and excellent dynamics.

The front axle is the same design McPherson suspension strut that was used on the 2011 Jetta and the 2012 Beetle Coupe.

Normal or Sport Suspensions

3rd Generation Electromechanical  
Power Steering

MacPherson Front Suspension



Four-Link Rear Suspension

ABS-Based Tire Pressure Monitoring System

Electronic Stability Control (ESC) MK60 EC

Four-Wheel Disc Brakes



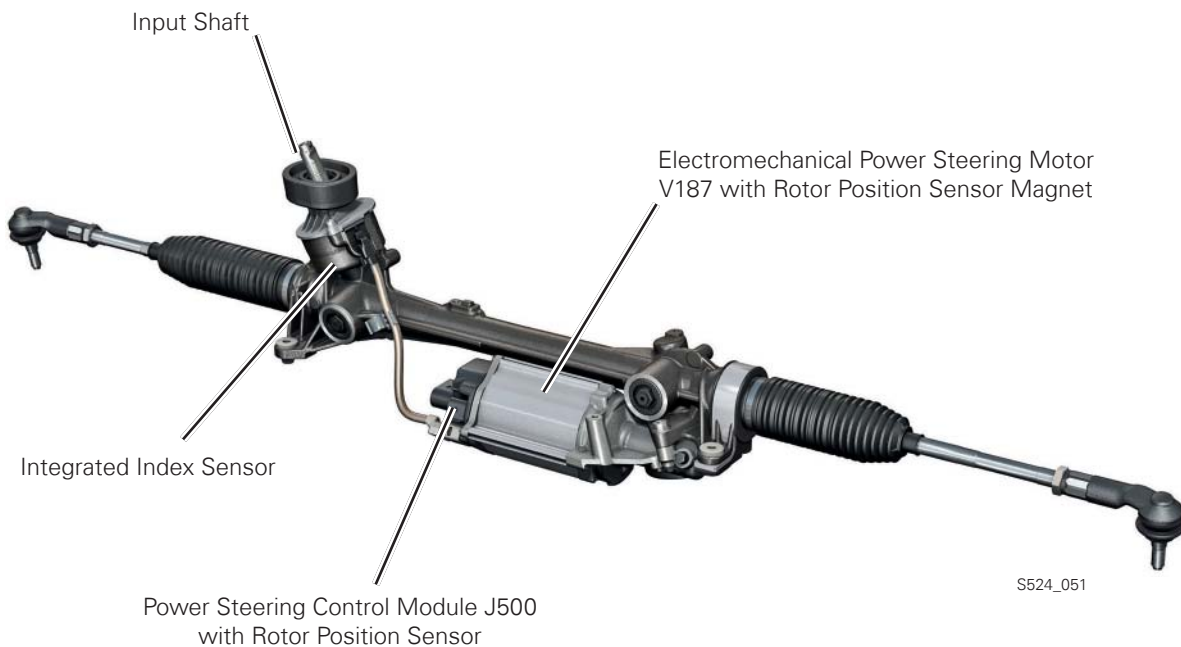
S524\_023

# Chassis

## Steering

### Electromechanical Steering

The 2013 Beetle Convertible utilizes the ZF dual-pinion 3rd generation electromechanical power steering. The tie rods have been changed for the wider track.



This system no longer has the G85 Steering Angle Sensor in the steering wheel. Instead, the integrated index sensor and the rotor position sensor located in J500, the Power Steering Control module, are used to determine steering angle.

The steering angle for the vehicle is calculated in J500 from these sensors. The calculated steering angle is used for the internal functions of the steering system and also provided to other control units as a substitute value for the G85 steering angle sensor.



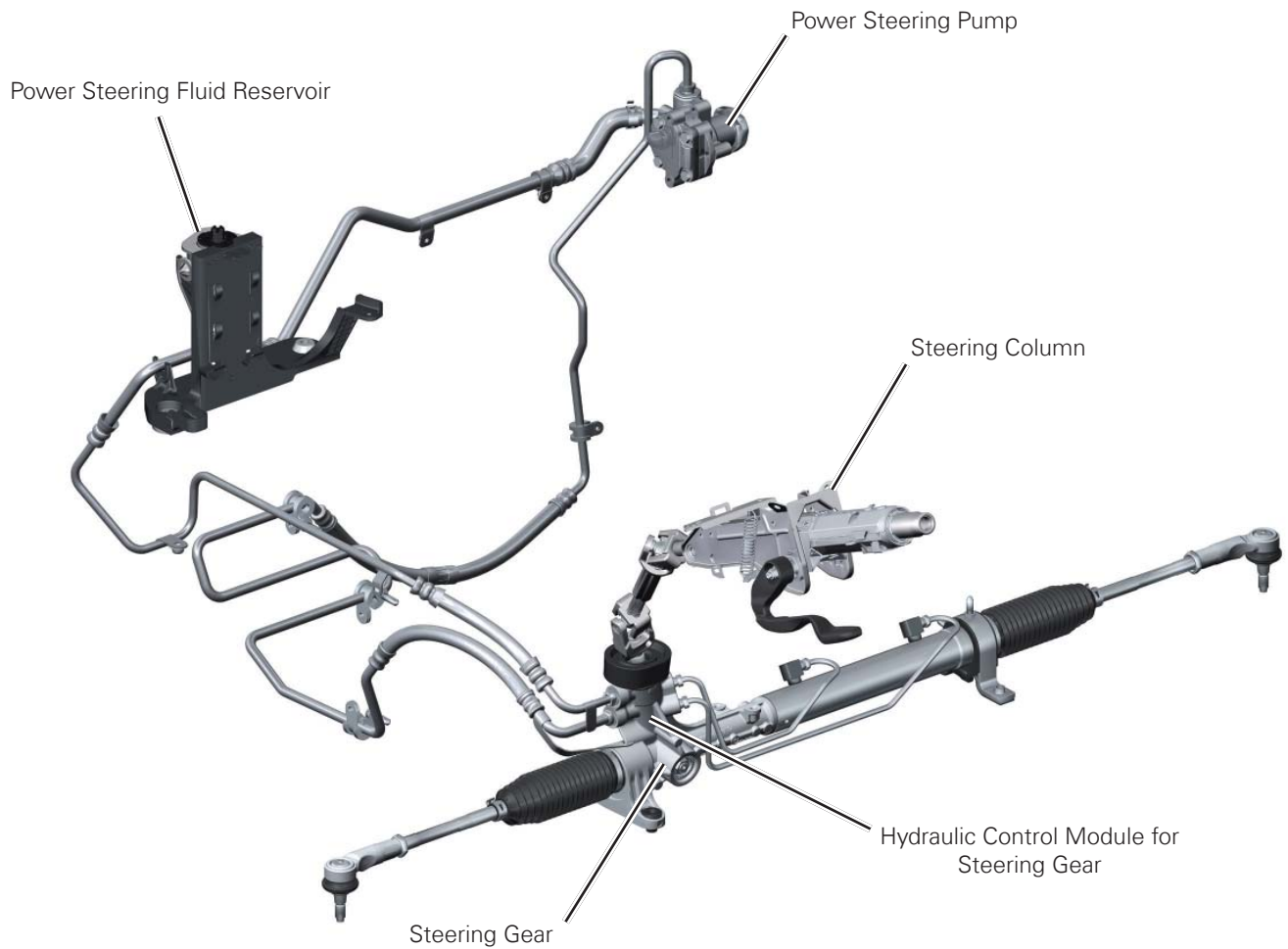
## Steering

### Hydraulic Power Steering

The hydraulic power steering system is adopted from the 2011 Jetta and the 2012 Beetle and is used with the 2.5L engine.

The steering support (power effect) for this steering system is generated by a hydraulic power steering pump which is installed directly on the motor.

The same steering column from the 2012 Beetle Coupe is used.



S524\_052

# Driver Assistance

## Rearview Camera

The 2013 Beetle Convertible is equipped with a rearview camera. The provides the driver with a picture of what is behind the vehicle when the selector lever is in the Reverse position.

The rearview camera system has:

- Rearview camera with a wide-angle lens
- Display (e.g., radio or radio navigation system with rearview camera input)

The rearview camera is installed in the Volkswagen swiveling emblem. The wide-angle lens on the rearview camera does the recording.

The system works without a separate control module.

### Function:

When activated, the VW logo swivels upward to allow the camera lens to see behind the vehicle.

The wide-angle lens on the rearview camera records video of the area behind the vehicle. The video is displayed on the radio screen.

The display also shows static yellow lines that can be used to estimate the vehicle's width and the amount of travel distance up to approximately 6.5 feet (2 m) to the rear. The yellow line which runs horizontally serves as a reference line about 31 inches (80 cm) away from the vehicle. Lateral yellow lines represent the vehicle's width.

The system is activated when the vehicle is put into reverse gear; the Volkswagen emblem opens up and the rearview camera swivels out. When the vehicle is disengaged from Reverse gear, the system is deactivated after 10 seconds.



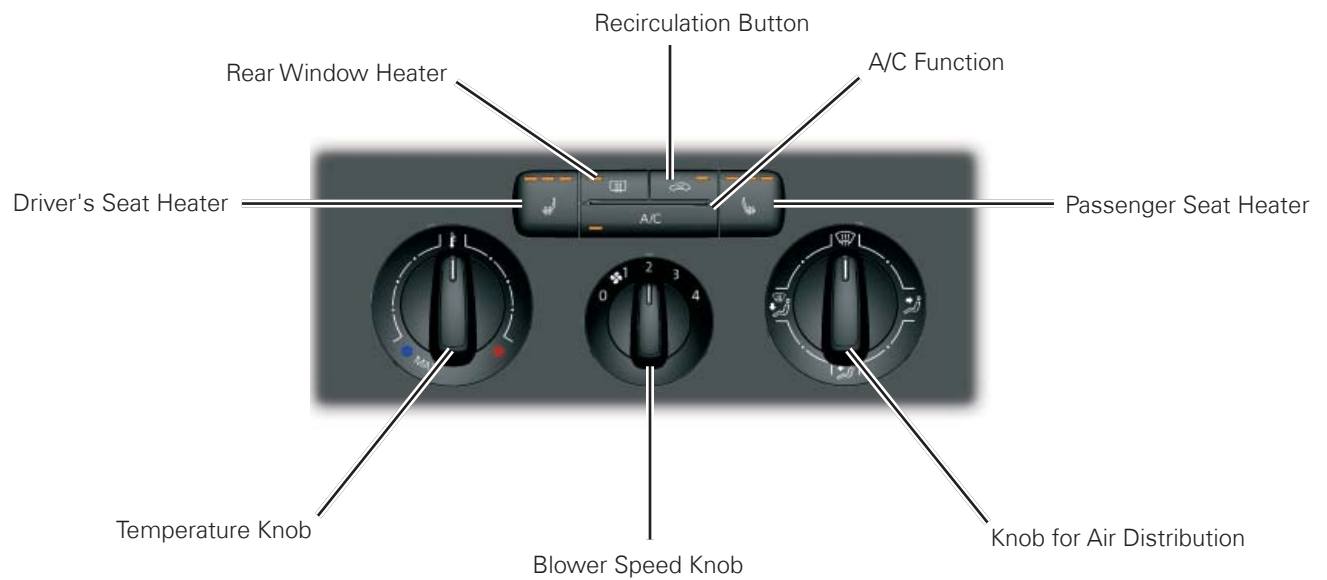
S524\_018

# Heating and Air Conditioning System

## Climate Control

The Beetle Convertible for the North American market will only have a manual climate-control system.

## Air Conditioning System Control Panel



S524\_019

### Functions:

- One Climatic zone
- Air conditioning activation and deactivation using the A/C button
- Manual blower speed adjustment
- Manual temperature adjustment
- Manual air distribution

# Electrical System

## Onboard Electrical System

The onboard electrical system for the Beetle Convertible is based on the Beetle Coupe.

Control Unit for Onboard Electrical System on the Back of a Plastic Housing



Electronics Box in Engine Compartment to the Left, Next to the Battery/Relay Bracket



Relay Carrier on the Front of the Plastic Housing, Top



Fuse Holder on the Front of the Plastic Housing, Bottom

# Electrical System

## Electrical System Architecture

The onboard electrical system for the 2013 Beetle Convertible is very similar to that of the 2011 Jetta and the 2012 Beetle Coupe.

The onboard electrical system comes in two different versions depending on the features (also see networking concept).

- “LOW version electrical system” – J519 Vehicle Electrical System Control Module with integrated J533 Data Bus on Board Diagnostic Interface
- “HIGH version electrical system” – J519 Vehicle Electrical System Control Module with internal J533 Data Bus on Board Diagnostic Interface

The onboard electrical system control module is located underneath the instrument panel on the left, on the back of a plastic housing with a front that holds the fuses and relays.

The relay bracket contains a special converter box. This amplifies the control signals for the ignition lock, the electronic steering column lock and the onboard electrical system control module, links them with other signals, and activates mechanical relays. Together with the onboard electrical system, the converter box also blocks repeated ignition.

Converter Box



# Electrical System

## Dashboard Insert

The Beetle Convertible uses the 3-circle instrument cluster from the 2012 Beetle. The cluster has a large, round main display at the top center, and smaller round displays to the left and right.

This image is of a metric Highline version with the speed indicated in km/h, the odometer in km, and temperature in °C. The dashboard insert for the US has a dual scale for the speed in mph and km/h. The odometer is in miles, and the temperature is in °F.



S524\_089

The features depend on whether it is a Lowline or a Highline. In both versions, the dials in the round instruments are illuminated in white. The three circles have the following displays:

- Left circle – engine speed display
- Center circle – vehicle speed display
- Right circle – fuel level

A multifunctional display has been installed underneath the center circle. It varies between the Lowline and Highline versions.



# Electrical System

## Lowline Version

The Lowline version of the dashboard insert has a red/negative multifunctional display.



S524\_090

## Highline Version

The Highline version of the dashboard insert has a monochrome white TFT multifunctional display.

In addition to the features of the Lowline basic version, it also relays navigation and audio information.



S524\_091

Visually, it has also been upgraded with chrome on

the circles and pointers.

## Additional Instrumentation

The Beetle Convertible can also have a separate instrumentation cluster on the center of the dash. It displays oil temperature, turbocharger boost, and also has a stopwatch. In Canada, temperatures will be displayed in Celsius, and pressure in bar. In the US, temperatures will be displayed in Fahrenheit and pressures in psi.



S524\_092

# Electrical System

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## Networking Concept

Various CAN-Bus systems are used to exchange data between control modules. J533 Data Bus on Board Diagnostic Interface (Gateway) is responsible for connecting different CAN-Bus systems.

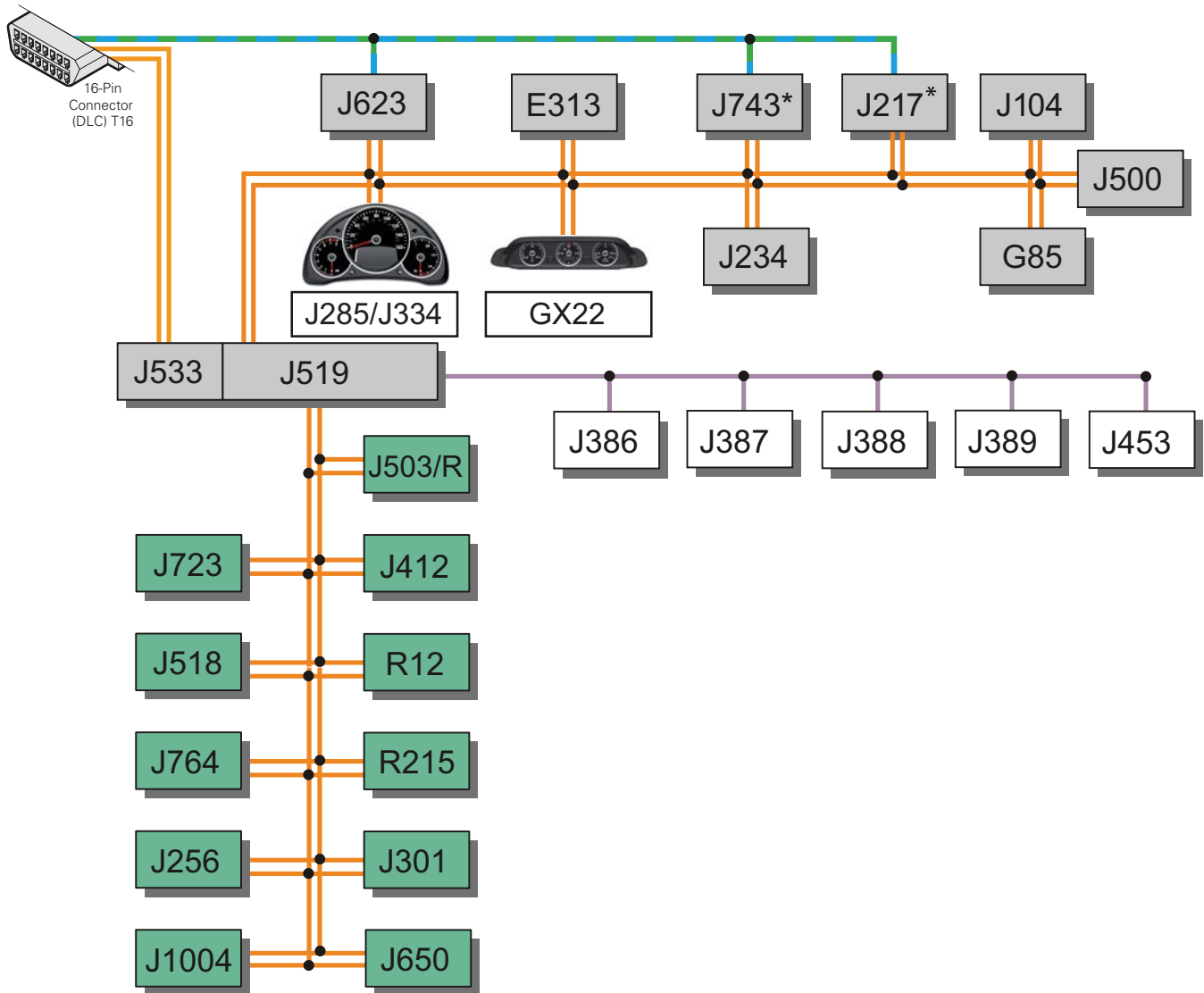
Two different variants of the onboard electrical system can be installed depending on the features and the different load on the CAN databuses.

1. "LOW version electrical system"
2. "HIGH version electrical system"

### **"LOW Version Electrical System" Networking**

In the "LOW version electrical system," J519 Vehicle Electrical System Control Module and J533 Data Bus on Board Diagnostic Interface are installed together in a single control module.

# Electrical System



## Legend

E313 – Selector Lever  
 G85 – Steering Angle Sensor  
 GX22 – Auxiliary Instruments  
 J104 – ABS Control Module  
 J217 – Transmission Control Module  
 J234 – Airbag Control Module  
 J256 – Convertible Top Control Module  
 J285 – Instrument Cluster Control Module  
 J301 – A/C Control Module  
 J334 – Anti-Theft Immobilizer Control Module  
 J386 – Driver Door Control Module  
 J387 – Front Passenger Door Control Module  
 J388 – Left Rear Door Control Module  
 J389 – Right Rear Door Control Module  
 J412 – Cell Phone Operating Electronics Control Module  
 J453 – Multifunction Steering Wheel Control Module

J500 - Power Steering Control Module  
 J503 – Radio/Navigation Display Unit Control Module  
 J518 – Access/Start Authorization Control Module  
 J519 – Vehicle Electrical System Control Module  
 J533 – Data Bus Onboard Diagnostic Interface  
 J623 – Engine Control Module  
 J650 – Multimedia System Control Module  
 J764 – Electronic Steering Column Lock Control Module  
 J723 – Keyless Access Authorization Antenna Reader  
 J743 – DSG Transmission Mechatronic\*  
 J1004 – Convertible Top Control Module 2  
 R – Radio  
 R12 - Amplifier  
 R215 – External Multimedia Device Interface  
 \* J743 is for DSG, J217 is for automatic transmission

# Electrical System

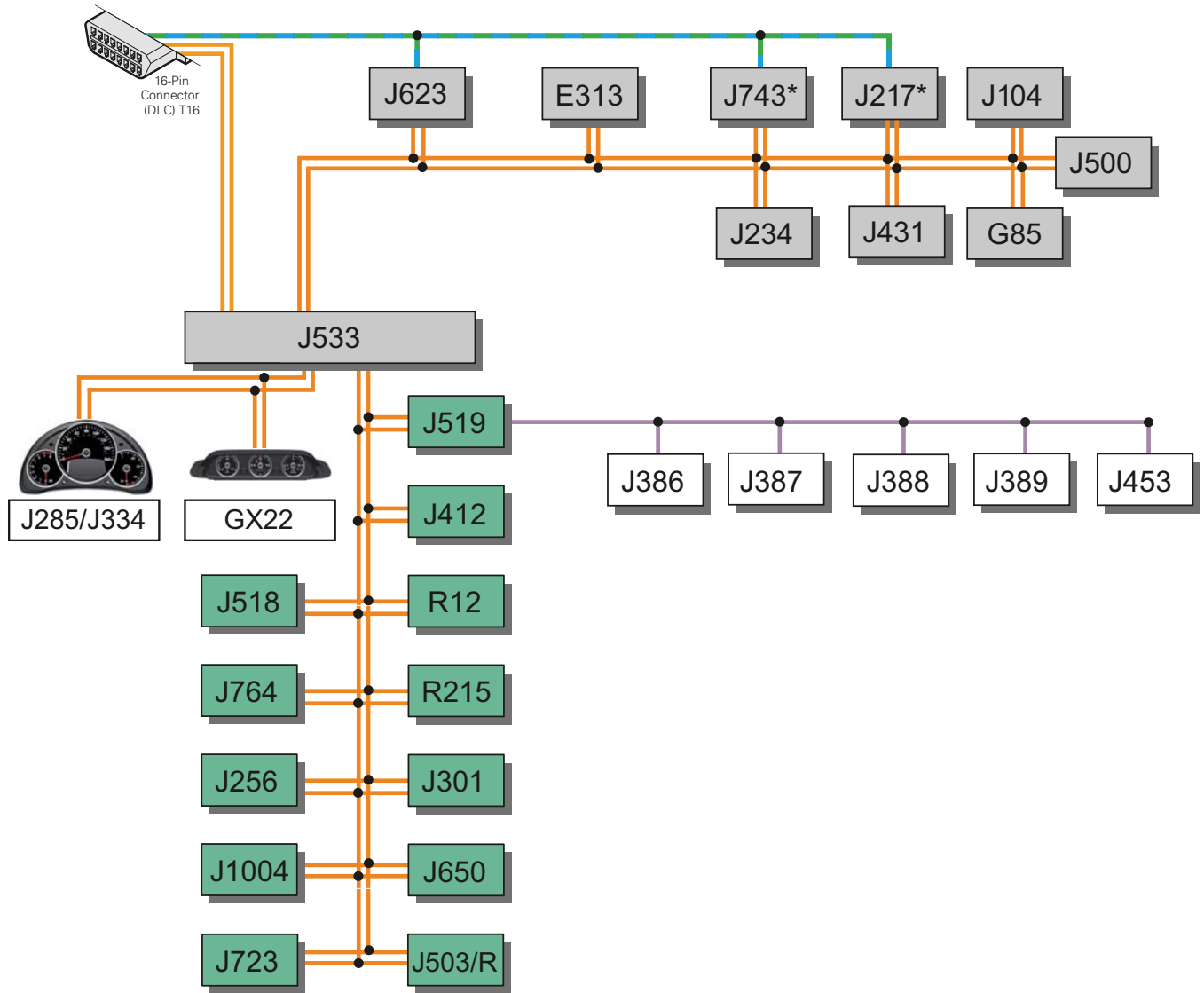
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## **“HIGH Version Electrical System” Networking**

In the “HIGH version onboard electrical system,” J519 Vehicle Electrical System Control Module and J533 Data Bus on Board Diagnostic Interface (Gateway) are each separate control modules due to the higher CAN databus load.

This version is used in models with a dual-clutch transmission and the Highline dashboard insert (instrument cluster) or models having xenon lights.

# Electrical System



## Legend

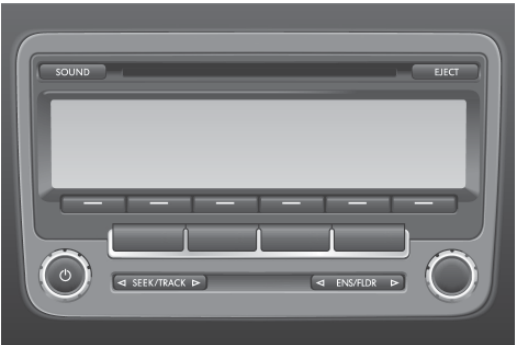
E313 – Selector Lever  
 G85 – Steering Angle Sensor  
 GX22 – Auxiliary Instruments  
 J104 – ABS Control Module  
 J217 – Transmission Control Module  
 J234 – Airbag Control Module  
 J256 – Convertible Top Control Module  
 J285 – Instrument Cluster Control Module  
 J334 – Anti-Theft Immobilizer Control Module  
 J386 – Driver Door Control Module  
 J387 – Front Passenger Door Control Module  
 J388 – Left Rear Door Control Module  
 J389 – Right Rear Door Control Module  
 J412 – Cell Phone Operating Electronics Control Module  
 J431 – Headlamp Range Control Module

J453 - Multifunction Steering Wheel Control Module  
 J500 - Power Steering Control Module  
 J503 – Radio/Navigation Display Unit Control Module  
 J518 – Access/Start Authorization Control Module  
 J519 – Vehicle Electrical System Control Module  
 J533 – Data Bus Onboard Diagnostic Interface  
 J623 – Engine Control Module  
 J650 – Multimedia System Control Module  
 J764 – Electronic Steering Column Lock Control Module  
 J723 – Keyless Access Authorization Antenna Reader  
 J743 – DSG Transmission Mechatronic  
 J1004 – Convertible Top Control Module 2  
 R – Radio  
 R12 - Amplifier  
 R215 – External Multimedia Device Interface  
 \* J743 is for DSG, J217 is for automatic transmission

# Electrical System

## Radios and Navigation Systems

RCD 310



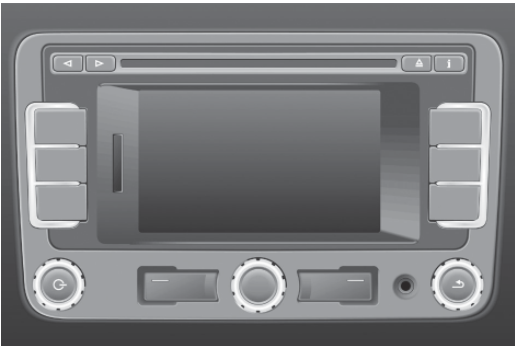
S524\_040

Premium 8



S524\_041

RNS 315



S524\_042

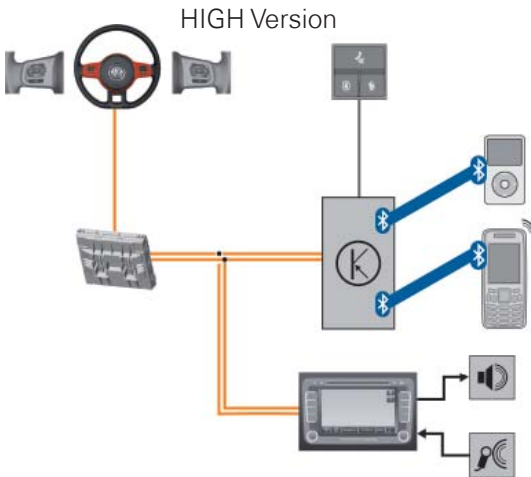
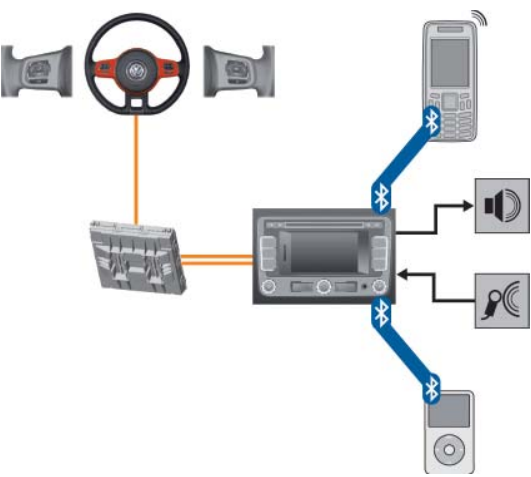
RNS 510



S524\_043



## Cellular Telephone Setup

Cellular Telephone Setup	Features
<p>HIGH Version</p> 	<ul style="list-style-type: none"><li>• Hands-free profile (HFP 1.5)</li><li>• BT Audiostreaming (A2DP 1.2)</li><li>• Telephone data transmission and cell phone setup by Bluetooth™</li><li>• Voice operation</li><li>• Operation via multifunctional steering wheel</li></ul>
RNS315 with Integrated Bluetooth™ Nodes	Functions
<p>LOW Version</p> 	<ul style="list-style-type: none"><li>• Hands-free profile (HFP 1.5)</li><li>• BT Audio streaming (A2DP 1.2)</li><li>• Telephone data transmission and cell phone setup by Bluetooth™</li><li>• Voice operation</li><li>• Comfort operation</li><li>• Operation via multifunctional steering wheel</li></ul>

# Electrical System

## Antenna System

In the 2012 Beetle Convertible, the antenna system is located in the windshield.



### Window Antennas

The window antennas for AM, FM1, and FM2 are integrated in the windshield (see key – A and B).

Previous aerial wires were “printed” on the glass. For this vehicle, the wires are on a PVB film and inserted between the two sheets of laminated glass. This prevents possible damages with the aerials due to scratching.

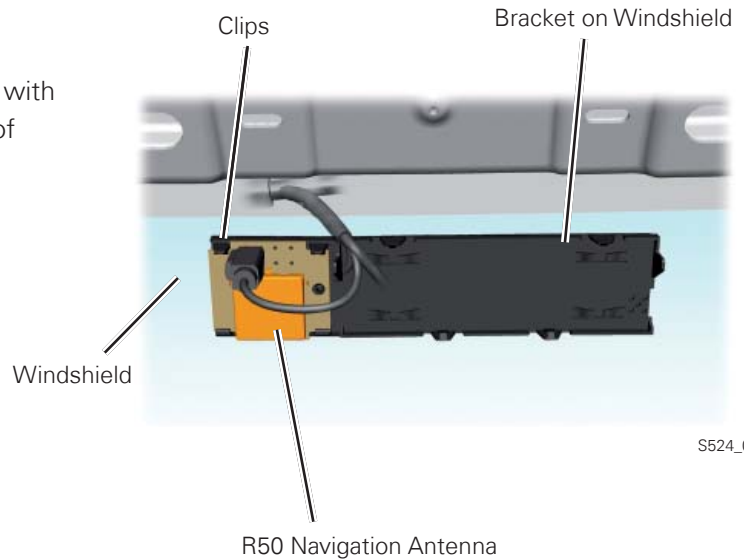
### Key

- A. FM2 Antenna
- B. AM/FM1 Antenna
- C. R50 GPS Antenna
- D. R170 Satellite Antenna (SDARS)
- E. Impedance Converter

# Electrical System

## R50 GPS Antenna

The R50 GPS antenna is snapped onto a bracket with four clips, and the bracket is glued to the inside of the windshield (see key "C" on previous page).



## R170 Satellite Antenna

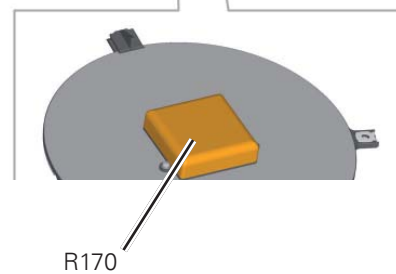
The R170 Satellite Antenna (SDARS) is installed under a cover in the center of the dashboard insert (see key "D" on previous page).

For vehicles that have the additional instrument, it is installed under a cover in the additional instrument (see key "D" on previous page).



## Impedance Converter

An impedance converter is installed in the A-pillars under the interior trim elements; the impedance converter for FM2 is on the left, and the one for AM/FM 1 is on the right.



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# Knowledge Assessment

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

The Knowledge Assessment may or may not be required for Certification.

You can find this Knowledge Assessment at:

**[www.vwwebservice.com](http://www.vwwebservice.com)**

For Assistance, please call:

**Volkswagen Academy**

**Certification Program Headquarters**

**1-877-791-4838**

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

Or, E-mail:

**[concierge@volkswagenacademy.com](mailto:concierge@volkswagenacademy.com)**



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