Service Training

Self-study programme 346

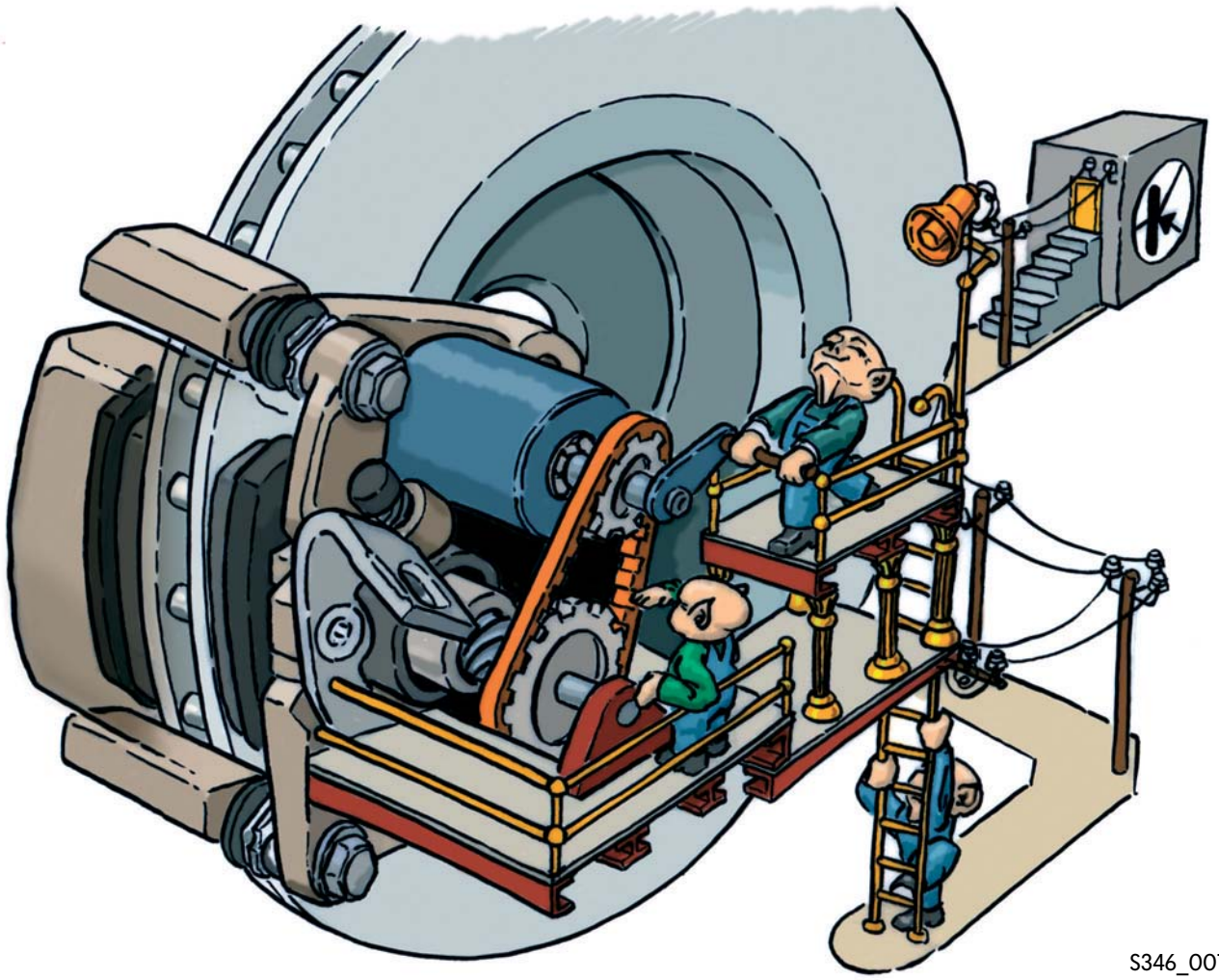
The electromechanical parking brake

Design and function

To make absolutely sure that the vehicle could not roll away when parked up, the driver had to pull up sharply on the handbrake lever until now or step on an additional parking brake pedal in the footwell. In the future, all that will be required is a quick press of a switch in the instrument panel – thanks to the electromechanical parking brake in the new Passat replacing the conventional, manual parking brake.

The electromechanical parking brake doesn't just help with parking. Due to its intelligent brake intervention system, safe braking is assured and the required hold is provided for hill starts.

The electromechanical parking brake is also referred to in other publications as an electrical parking brake (EPB).



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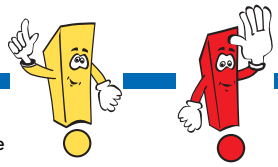


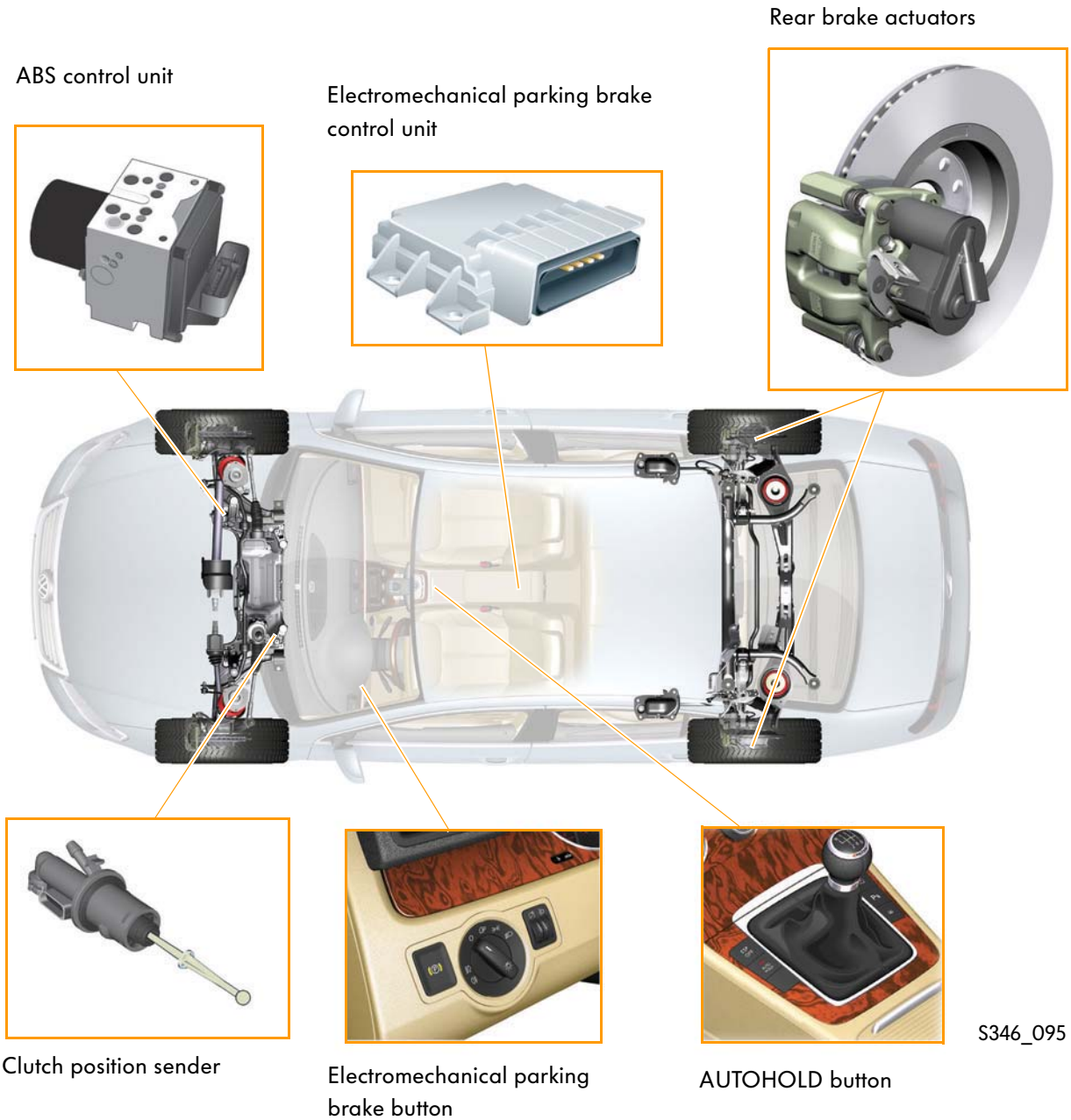
Caution Note

This self-study programme shows the design and function of new developments!
The contents will not be updated.

For current testing, adjustment and repair instructions, refer tor the relevant service literature

Contents

General overview of electromechanical parking brake system



The advantages of the electromechanical parking brake

The electromechanical parking brake offers many advantages over the conventional handbrake, such as for example:

- Greater freedom in designing the interior
  The handbrake lever has been discontinued and replaced by a button. This allows greater freedom in the interior layout and in designing the centre console and footwell area.

- Greater functionality for the customer
  With the use of an electronic control system and CAN network, the electromechanical parking brake offers additional helpful functions for the customer (such as AUTOHOLD or dynamic drive off assistant) and a higher level of comfort.

- Advantages in the manufacturing process
  Since the handbrake lever and handbrake cables are no longer needed, production and assembly of the vehicle have been simplified.

- Capable of self-diagnosis
  The electromechanical parking brake is a mechatronic system. The system functions are monitored on an ongoing basis.

The electromechanical parking brake in comparison

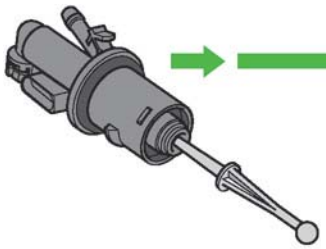
	Conventional handbrake	**Electromechanical parking brake**
Operation	Pull up handbrake lever	Press electromechanical parking brake button
Releasing	Release handbrake lever	Press electromechanical parking brake button
Hillstart	Complicated balance between handbrake, accelerator and clutch pedal	The electromechanical parking brake releases itself when the vehicle is driven off.
Stop and go	Continual application and release of handbrake or actuation of brake pedal	When the AUTOHOLD function is switched on, the vehicle is held automatically each time it is brought to a halt.

System overview

Sensors

Actuators

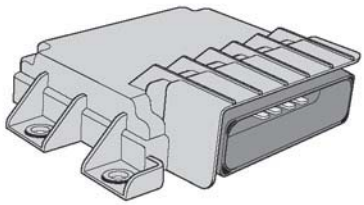
Clutch position sender G476



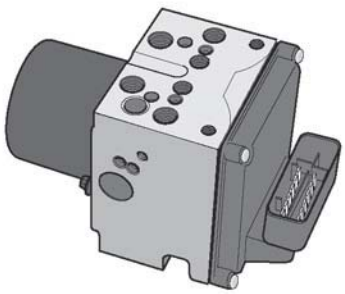
Electromechanical parking brake button E538

AUTOHOLD button E540

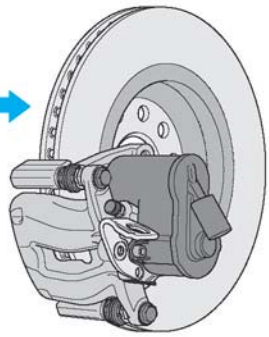
Electromechanical parking brake control unit J540



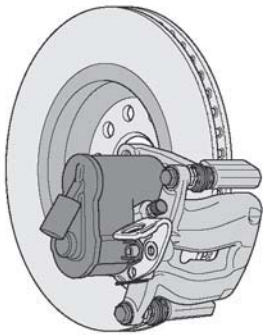
ABS control unit J104



Left parking brake motor V282



Right parking brake motor V283



Electromechanical parking brake warning light K213

Brake system warning light K118

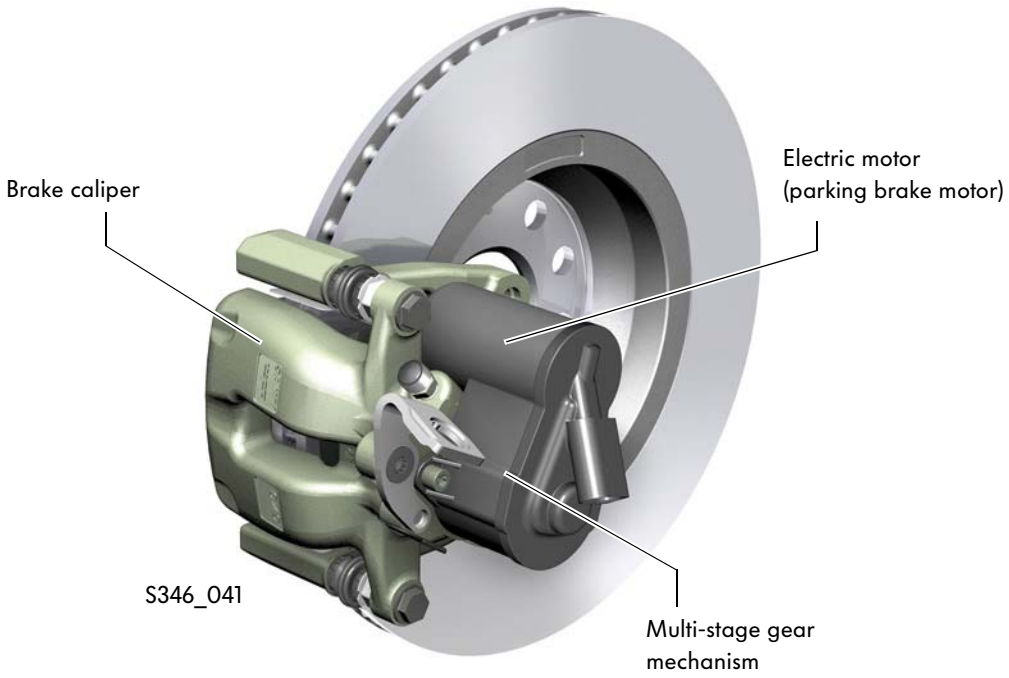
Electromechanical parking brake fault warning lamp K214

AUTOHOLD warning lamp K237

S346_062

The rear brake actuators

The brake actuators are electromechanical positioning units and are integrated in the brake calipers of the rear wheels. With the help of an electric motor, a multi-staged gear mechanism and a spindle drive, they convert the command to "actuate the parking brake" to a targeted force, which brings the brake pads in contact with the brake discs.



System components

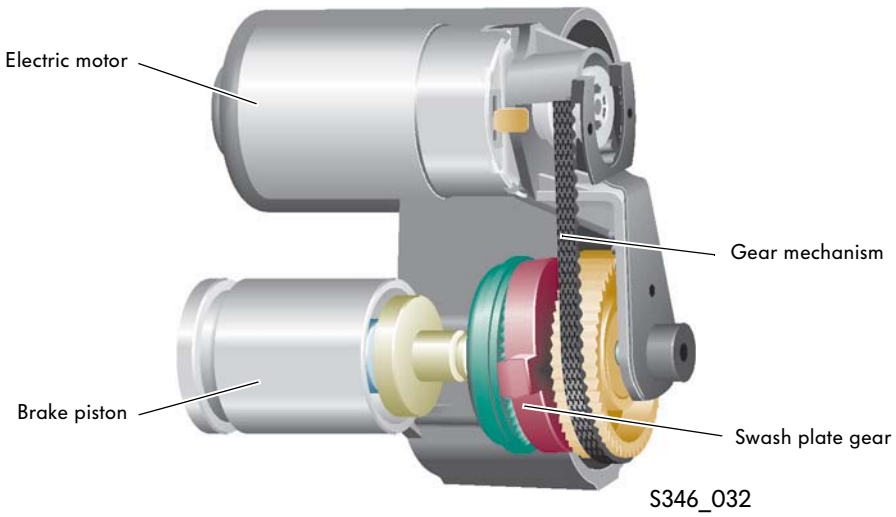
Gearbox

To actuate the brakes by electromechanical means, only a very small stroke of the brake pistons is necessary. Conversion of rotary electric motor motion to a linear movement with total ratio of 1:150 is carried out in three stages. That means 150 rotations of the electric motor results in one turn of the spindle drive.

1st stage - Gear mechanism The gear reduction stage (1:3) is performed from the electric motor to the swash plate gear input.

2nd stage - Swash plate gear The second gear reduction stage (1:50) is made possible by the swash plate gear.

3rd stage - Spindle drive The spindle drive converts rotary motion to a linear movement in the third stage.



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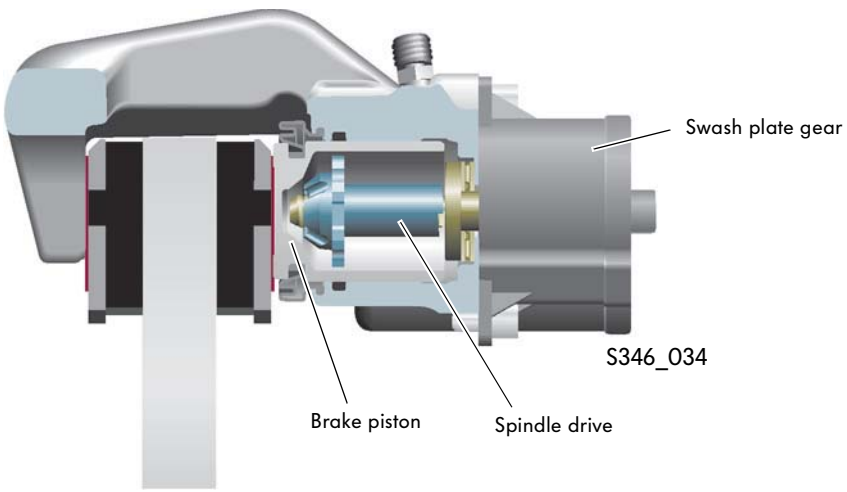

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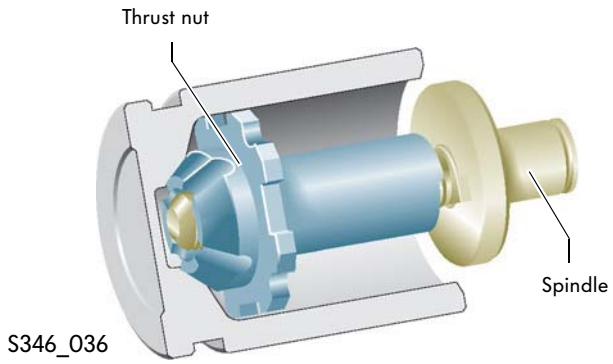
Spindle drive

The spindle drive converts rotary motion to an up and down movement (stroke). The spindle is driven directly by the swash plate gear. The direction of rotation of the spindle determines whether the thrust nut on the spindle is moved forwards or backwards.

The spindle mechanism is of the self-locking design. Once the electromechanical parking brake has been actuated, the system remains locked even without electrical current.



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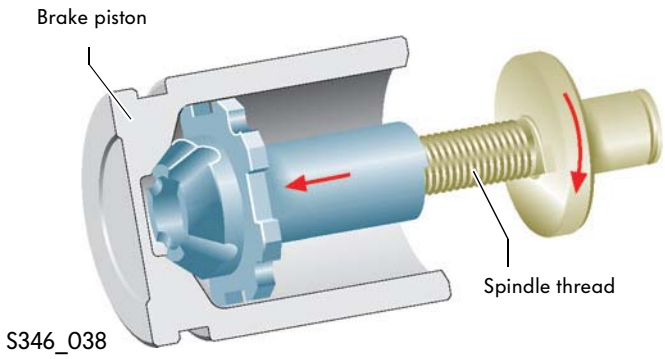

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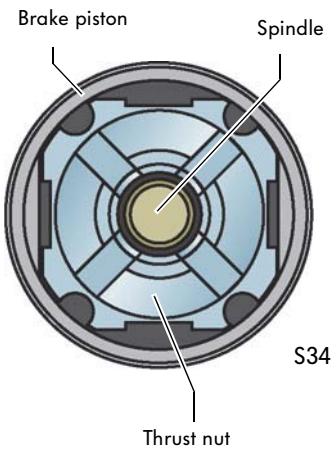


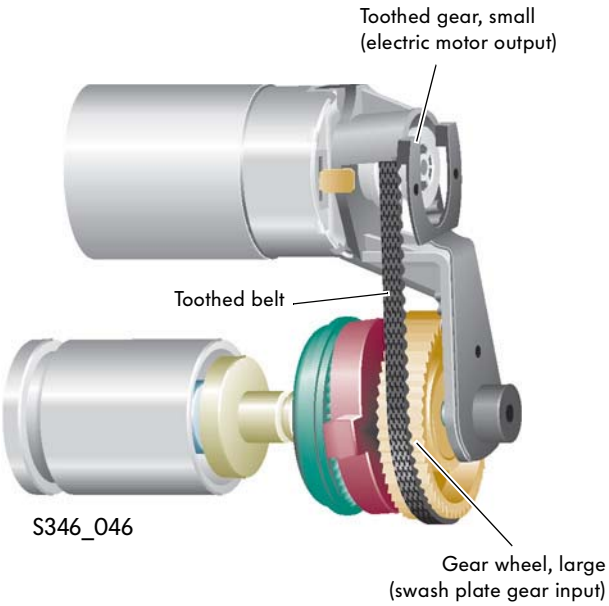
S346_044

The thrust nut has longitudinal mountings in the brake piston. This means that it is restricted to axial movement. The inner shape of the brake piston and the shape of the thrust nut prevent the nut from twisting.

System components

Gear mechanism

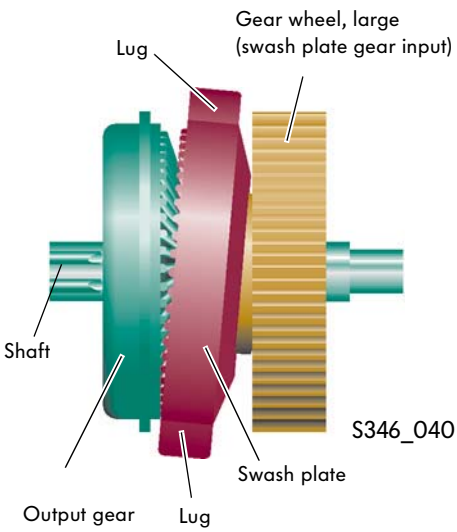
The gear mechanism is responsible for the first gear reduction stage (1:3) from electric motor to swash plate gear. The gear mechanism comprises a small gear wheel (electric motor output) and a large gear wheel (swash plate gear input). Both gear wheels are joined together by the toothed belt.
The size of the gear wheels determines the ratio.



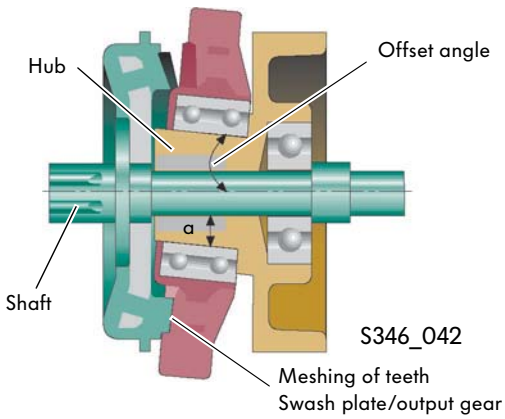
Swash plate gear

The swash plate gear is responsible for the second gear reduction stage (1:50).
It comprises a large gear wheel, the swash plate and the output gear.

The swash plate is mounted in the housing with two lugs that prevent it from turning. This type of mounting only permits the roll motion.



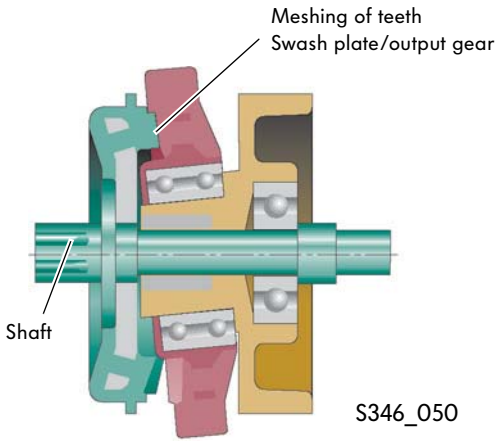
Position 1

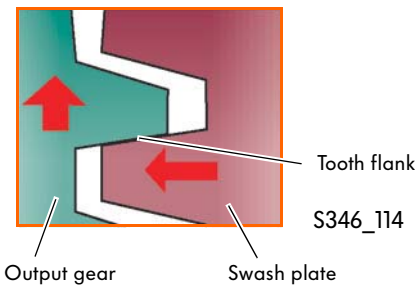


The shaft is securely joined to the output gear. The large gear wheel is mounted on this shaft. The swash plate is pushed onto the hub of the large gear wheel. This hub is designed so as to allow an offset angle between the hub and the shaft. This offset angle triggers the roll motion of the swash plate.

During one rotation of the large gear wheel, two teeth of the swash plate and output gear respectively will always engage. This means that engagement always occurs at the position where the hub of the large gear wheel has the lowest material thickness (a).
The swash plate / output gear pair therefore engage in position 2 of the swash plate after half a turn of the large gear wheel.

Position 2





The swash plate has 51 teeth, whereas the output gear has 50. This means that a tooth will never fit perfectly in a tooth gap. One tooth from the swash plate therefore will always contact the flank of a tooth from the output gear. Due to this thrusting motion, the output gear moves itself a small degree further.
The output gear thereby moves further in position 1 so that in the next position too up to position 2 the tooth from the swash plate comes into contact with the flank of a tooth from the output gear.

This sequence of movements results in the output gear being turned by one width of a tooth each time the large gear wheel completes one full rotation. Since the output gear has 50 teeth, the large gear wheel must make 50 rotations before the output gear can make 1 rotation. The result is a gear ratio of 1:50.

System components

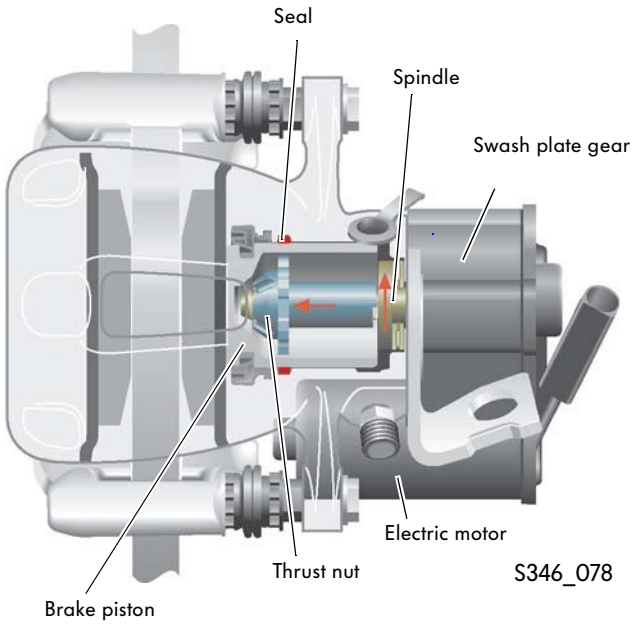
Function of rear wheel brake actuators

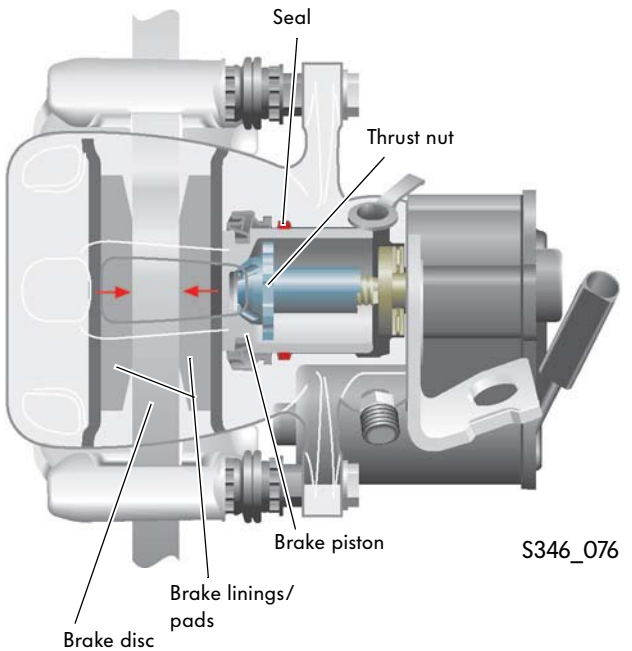
Electromechanical

If the parking brake is to be applied, the electric motor is actuated by the electromechanical parking brake control unit.
The spindle is driven by the electric motor via the belt and swash plate gear mechanism. Through the rotary movement of the spindle, the thrust nut moves forwards on the spindle thread.
The thrust nut comes into contact with the brake piston and presses it against the brake pads. The brake pads press against the brake disc.
When this happens, the seal is pressed out of shape towards the brake pads. The pressure results in an increase in current draw from the electric motor.

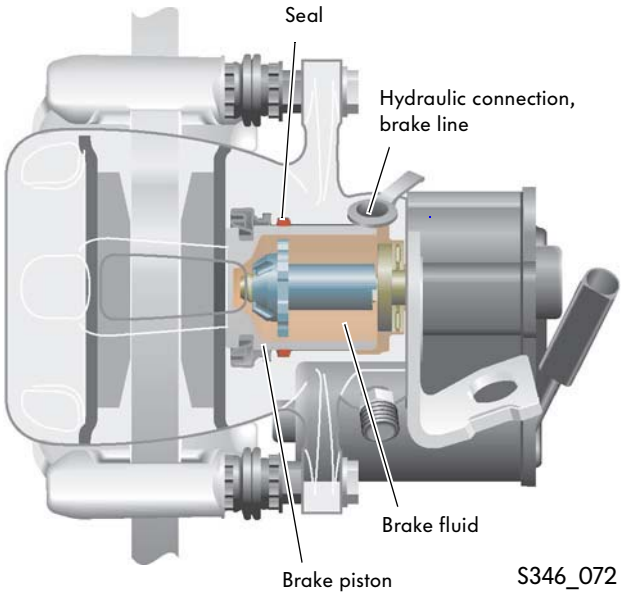
During the whole brake application procedure, the electromechanical parking brake control unit measures the current draw of the electric motor. If the current draw exceeds a certain figure, the control unit switches off the current supply to the electric motor.

When the parking brake is released, the thrust nut is spun back on the spindle. The brake piston is relieved of pressure. The reshaping of the seal and possibly imbalance of the brake disc cause the brake piston to move back.
The brake pads release the brake disc.





Hydraulic



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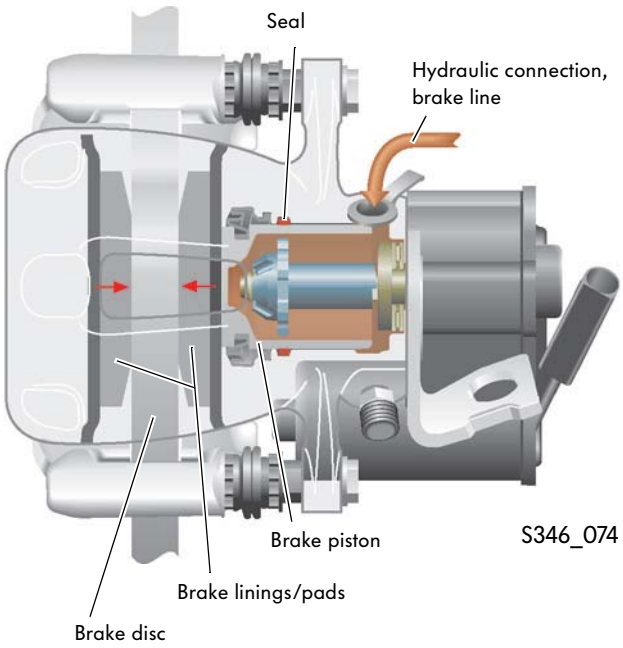


S346_074

In the event of a dynamic emergency stop (pressing of electromechanical parking brake button while the vehicle is in motion), the pressure of the brake fluid is increased via the brake line. This pressure causes the brake piston to press against the brake pads. The brake pads press against the brake disc. When this happens, the seal is pressed out of shape towards the brake pads.

On completion of the braking manoeuvre, the pressure of the brake fluid drops. The brake piston is relieved of pressure. The reshaping of the seal and possibly imbalance of the brake disc cause the brake piston to move back. The brake pads release the brake disc.

System components

The clutch position sender G476

The clutch position sender is clipped onto the master cylinder. This sender detects when the clutch pedal is actuated.

S346_097

Clutch pedal with clutch position sender

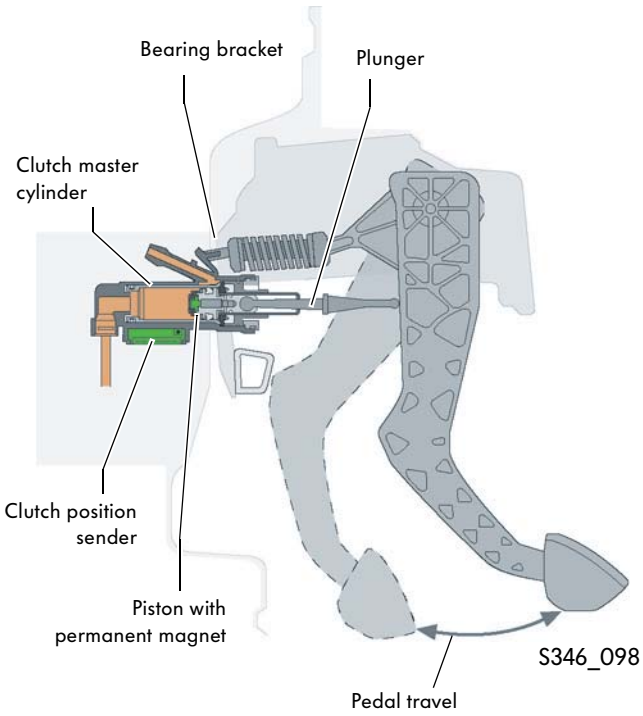
The signal from the clutch position sender is used:

- for engine start,
- to switch off the cruise control system,
- to reduce the injection volume briefly and thereby prevent engine jolts during gear changes and
- for the "dynamic drive-off assist" function of the electromechanical parking brake.

Design

The master cylinder is attached to the bearing bracket via a bayonet connection.

When the clutch pedal is actuated, the plunger moves the piston in the master cylinder.



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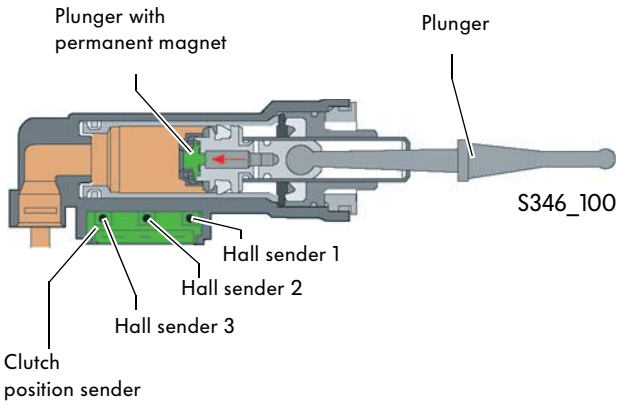
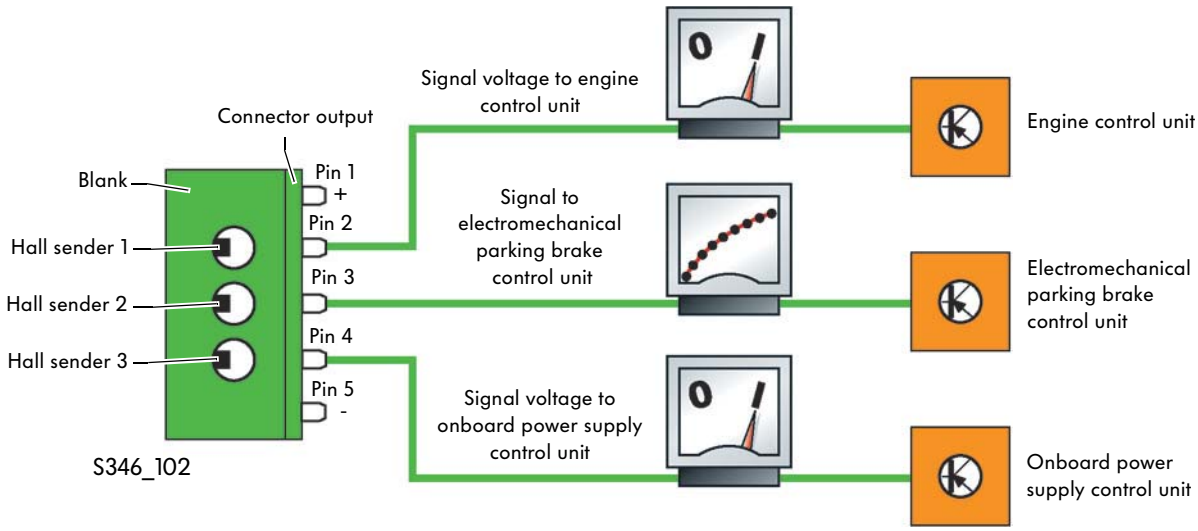
Function



When the clutch pedal is pressed, the push rod and plunger are pushed in direction of the clutch position sender. At the front end of the piston is a permanent magnet. Integrated in the clutch position sender are three Hall senders on a blank.
As soon as the permanent magnet passes over the Hall senders, the electronics send signals to the relevant control units.



Hall sender 1 is a digital sender. It sends its voltage signal to the engine control unit. The signal results in the cruise control system being switched off.

Hall sender 2 is an analogue sender. It sends a pulse-width modulated signal (PWM signal) to the electromechanical parking brake control unit. The exact position of the clutch pedal is thereby detected and the control unit can calculate the optimum release point of the parking brake for purposes of dynamic drive-off.

Hall sender 3 is a digital sender. It sends its voltage signal to the onboard power supply control unit.
The control unit detects that the clutch is pressed. Only with the clutch pedal depressed is it possible to start the engine (interlock function).

System components

The electromechanical parking brake button E538

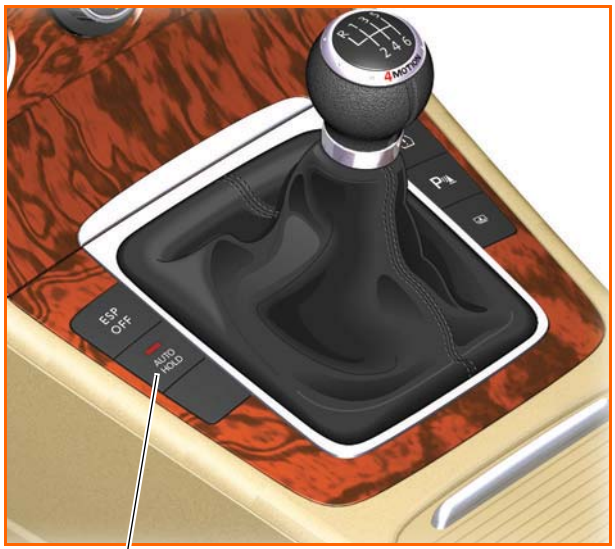
The electromechanical parking brake is activated and deactivated with the electromechanical parking brake button. This button can be found on the left next to the rotary light switch.

S346_027

Electromechanical parking brake button

The AUTOHOLD button E540

The AUTOHOLD button is used to switch the AUTOHOLD function on and off. This button can be found on the left next to the gear selector lever in the centre console.



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AUTOHOLD button

The warning lamps

The warning lamps in the dash panel insert and in the respective buttons show the status of the electromechanical parking brake.

Electromechanical parking brake warning light K213

S346_054

The electromechanical parking brake warning lamp can be found in the electromechanical parking brake button. The warning lamp lights up when the button is pressed and the parking brake is activated.

Brake system warning light K118

S346_056

The braking system warning lamp can be found in the dash panel insert. When the parking brake is activated the warning lamp lights up.

Electromechanical parking brake fault warning lamp K214

S346_058

The electromechanical parking brake fault warning lamp can be found in the dash panel insert. If there is a malfunction in the braking system, this warning lamp will light up and advice from a specialist workshop should be sought immediately.

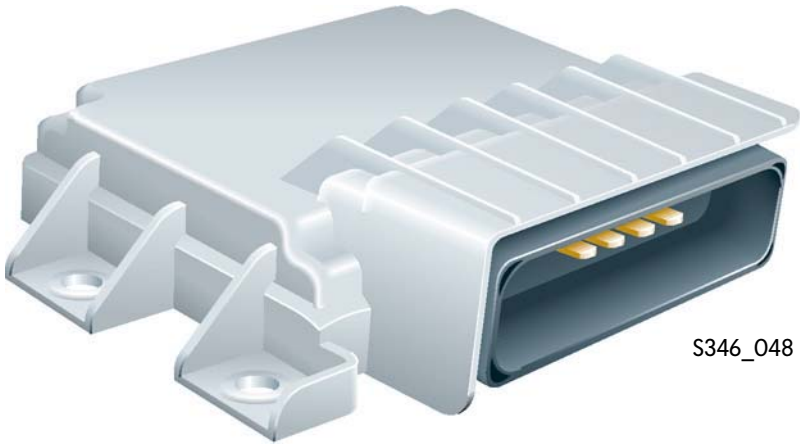
AUTOHOLD warning lamp K237

S346_060

The AUTOHOLD warning lamp can be found in the AUTOHOLD button. The warning lamp lights up when the button is pressed and the AUTOHOLD function is activated.

System components

The electromechanical parking brake control unit J540



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The electromechanical parking brake control unit J540 can be found on the inside of the vehicle in the area of the centre console. All of the actuation and diagnostic tasks of the electromechanical parking brake are processed here.

The electromechanical parking brake control unit features two processors and is joined to the ABS control unit by means of a dedicated CAN data bus.

A sensor cluster is integrated in the electromechanical parking brake control unit. It comprises of the lateral acceleration sender, the longitudinal acceleration sender and the yaw rate sender.
The signals from the sensor cluster are evaluated both for the electromechanical parking brake and the ESP control functions. The tilt angle is derived from the longitudinal acceleration sender signal.

The functions of the electromechanical parking brake

The electromechanical parking brake offers the driver the following functions:

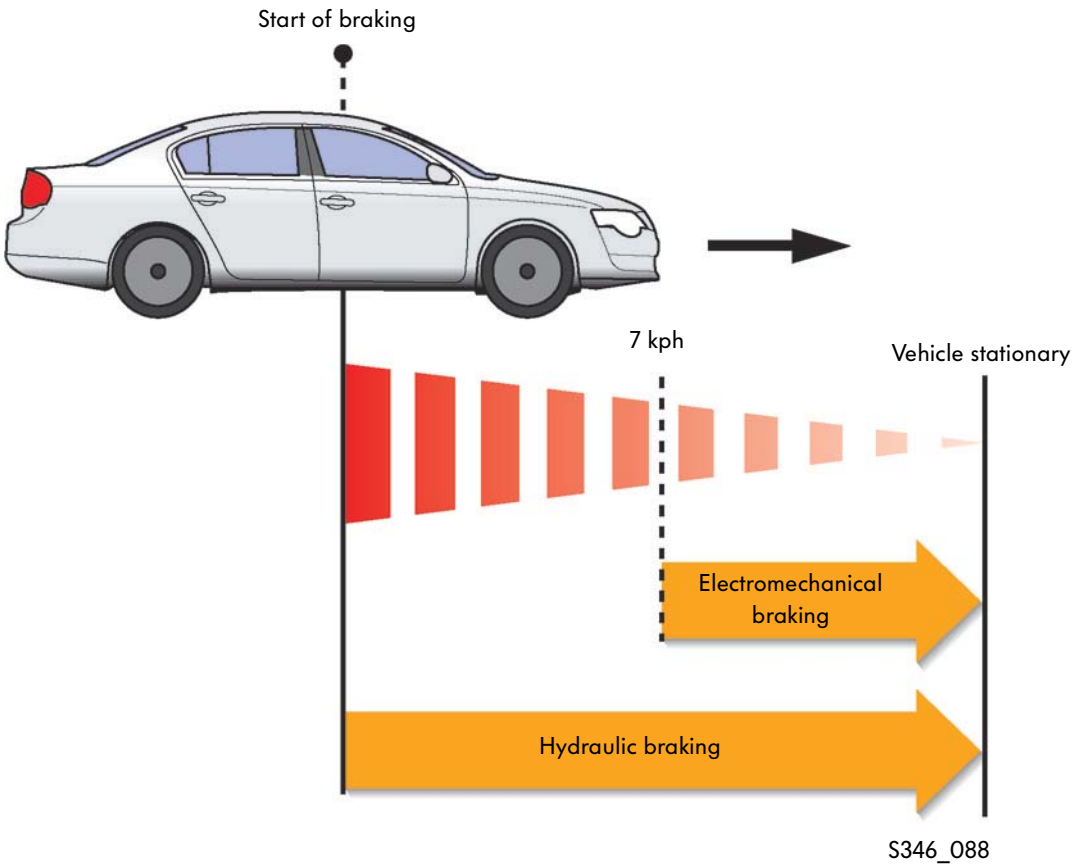
- Parking brake function
- Dynamic drive-off assistant
- Dynamic emergency stop
- AUTOHOLD function

Generally, a difference is made between the static mode (vehicle speed less than 7km/h) and dynamic braking (vehicle speed greater than 7km/h) depending on the speed of the vehicle.

In static mode, the parking brake is applied and released electromechanically.

In the event of dynamic braking, the vehicle is decelerated via ABS/ESP, which means that all wheels are braked hydraulically.

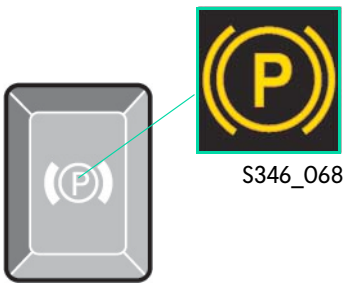
In the following chapters, the individual functions of the electromechanical parking brake are described in greater detail.



Function

Parking brake function

The electromechanical parking brake system assures secure hold of the vehicle when parked on a gradient of up to 30 percent. Application and release of the electromechanical parking brake is performed by pressing the electromechanical parking brake button.



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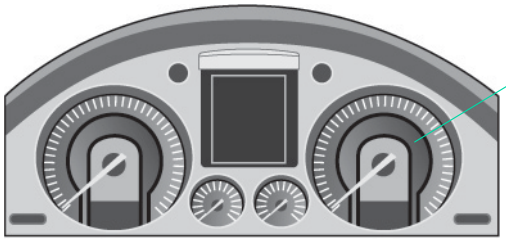

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S346_066

Close

The electromechanical parking brake can be applied at any time, even when the ignition is switched off.

If the parking brake is activated when the ignition is switched off, the electromechanical parking brake warning lamp will light up in the electromechanical parking brake button, as well as the brake warning light in the dash panel insert.

If the electromechanical parking brake is pressed with the ignition switched off, both warning lamps will only light up for a period of about 30 seconds before going out.

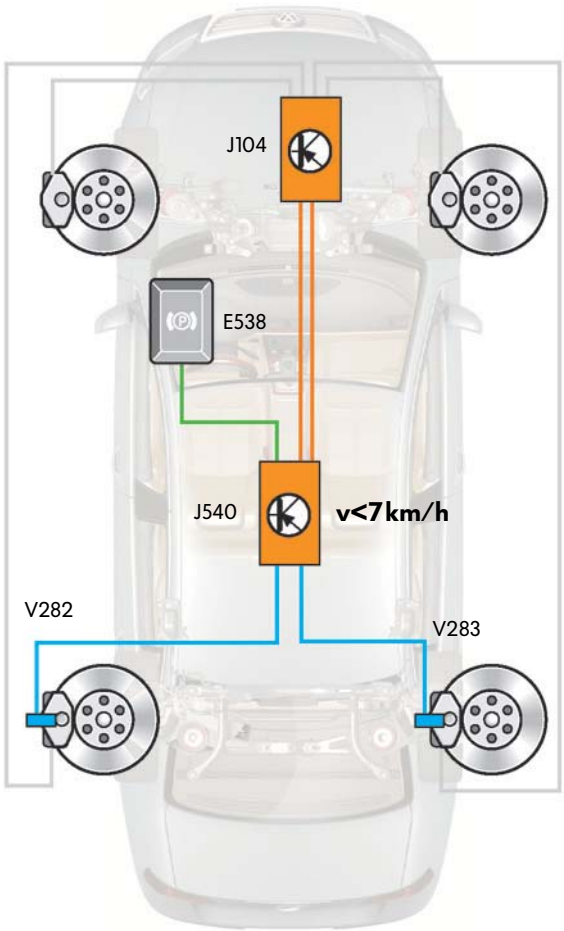
Opening

Release of the electromechanical parking brake is only possible with the ignition switched on.
The electromechanical parking brake is released by pressing the brake pedal and actuating the electromechanical parking brake button at the same time.
When the driver puts the seat belt on, closes the door and starts the engine, the electromechanical parking brake is released automatically when the accelerator pedal is pressed to drive off. The release point is thereby calculated depending on the tilt angle and engine torque. The warning lamps in the buttons and in the dash panel insert go out.

After the brakes (brake pads and brake discs) have cooled down when the vehicle is parked up, the brakes are adjusted automatically as required.

The electromechanical parking brake can only be released with the ignition switched on (child safety feature).

Sequence of functions



S346_090

E538 Electromechanical parking brake button
J104 ABS control unit
J540 Electromechanical parking brake control unit
V282 Left parking brake motor
V283 Right parking brake motor

1. The driver presses the electromechanical parking brake button

2. The electromechanical parking brake control unit communicates via the dedicated CAN data bus with the ABS control unit and determines whether the vehicle speed is less than 7km/h.

3. Both parking brake motors on the rear wheel brakes are actuated by the electro-mechanical parking brake control unit. The brakes are applied electromechanically.

4. If the driver presses the electromechanical parking brake button again as well as the brake pedal, the parking brake is released at the rear wheels.

Function

Dynamic drive-off assistant

The dynamic drive-off assistant allows the vehicle to be driven off without jolts or backroll when the electro-mechanical parking brake is pressed, even on gradients. This function is only active when:

- the driver's door is closed,
- the seat belt is fitted and
- the engine is running.

The point at which the electromechanical parking brake is released is dependent on the following parameters:

- Tilt angle
  Calculated in the electromechanical parking brake control unit from the longitudinal acceleration sender signal.
- Engine torque
- Accelerator pedal position
- Clutch actuation
  On vehicles with manual gearbox, the signal from the clutch position sender is evaluated.
- Desired direction of travel
  Determined on vehicles with automatic gearbox via the direction of travel selection and with manual gearbox via the reverse light switch.

Drive-off with parking brake actuated

The vehicle does not need to be held at traffic lights, for example, using the brake pedal if the parking brake is pressed. As soon as the accelerator pedal is pressed, the parking brake is released automatically and the vehicle starts moving.

Drive-off on gradients (hillstart)

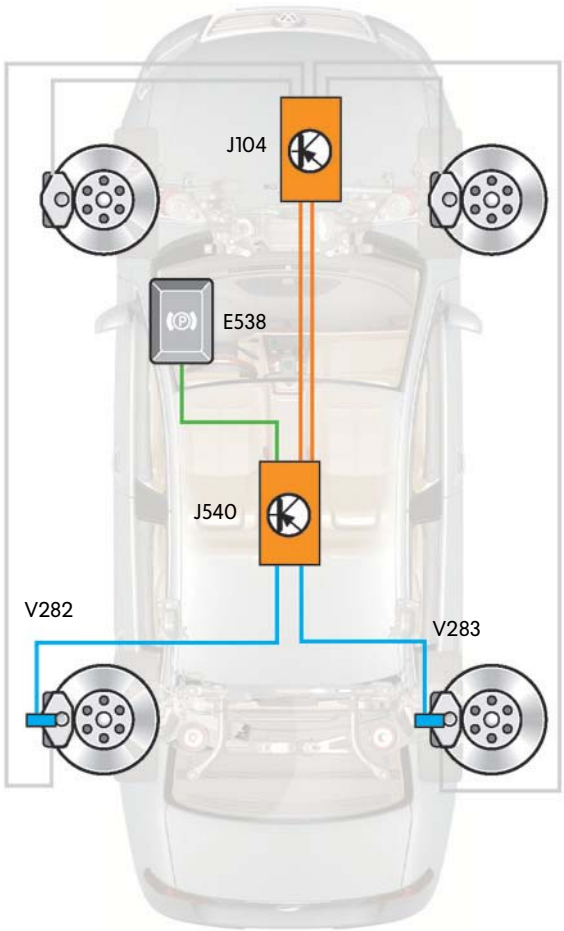
The driver's job is made easier on hillstarts for example:

- when gradually releasing the parking brake,
- operating the clutch and gas pedal at the same time and
- finding the right point at which to join flowing traffic.

Undesired backroll is prevented as the parking brake is not released until the driving torque of the vehicle is greater than the force pulling the vehicle back (as determined by the control unit).

All of the important parameters for the dynamic drive-off assistant are matched continually depending on the driver and driving situation.

Sequence of functions



S346_090

E538 Electromechanical parking brake button
J104 ABS control unit
J540 Electromechanical parking brake control unit
V282 Left parking brake motor
V283 Right parking brake motor

1. The vehicle is stationary. The electromechanical parking brake is activated. The driver wishes to drive off, selects 1st gear and presses the accelerator pedal.

2. After evaluation of the parameters (tilt angle, engine torque, accelerator pedal position, clutch actuation or automatic gear selected), the electromechanical parking brake control unit calculates the force pulling the vehicle back.

3. If the driving torque of the vehicle is greater than the force pulling the vehicle back, as determined by the electromechanical parking brake control unit, both parking brake motors at the rear wheels are actuated.

4. The parking brake at the rear wheels is released electromechanically. The vehicle drives off with no rollback.

Function

Dynamic emergency stop

If the brake pedal loses its function or becomes blocked, the vehicle can be braked heavily by means of the dynamic emergency stop function.

Activate

By pressing and holding the electromechanical parking brake button, braking of the moving vehicle is carried out at a deceleration rate of approx. 6 m/s^2. An acoustic warning signal is triggered and the brake lights are activated.
The dynamic emergency stop function is carried out via hydraulic brake pressure generation at all 4 wheels if the vehicle speed is greater than 7 km/h . The braking manoeuvre is controlled depending on the driving situation by the ABS/ESP function. In this way, stability of the vehicle is assured during braking.

If the electromechanical parking brake button is pressed when the vehicle is travelling at less than 7 km/h, the parking brake is applied electromechanically (see parking brake function).

Release

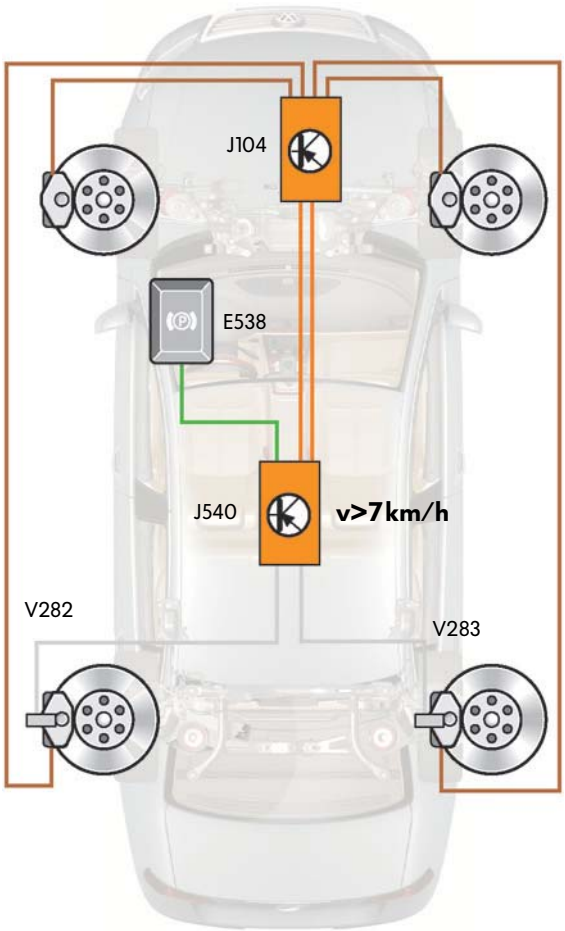
If the vehicle speed is greater than 7 km/h after a dynamic emergency stop, the brake is released by letting go of the electromechanical parking button or by pressing the accelerator pedal.

Once the vehicle has been brought to a halt, the holding brake has to be released as described for the parking brake function.

On actuation of the electromechanical parking brake button, engine torque will be set to idle and the driving assistant functions such as cruise control (CCS), automatic distance control (ADC) or AUTOHOLD will be deactivated.

The emergency stop function is also available when the ignition is switched off.

Sequence of functions



S346_092

E538 Electromechanical parking brake button
J104 ABS control unit
J540 Electromechanical parking brake control unit
V282 Left parking brake motor
V283 Right parking brake motor

1. The driver presses and holds down the electromechanical parking brake button.

2. The electromechanical parking brake control unit communicates via the dedicated CAN data bus with the ABS control unit and determines whether the vehicle speed is greater than 7km/h.

3. The hydraulic pump is actuated by the ABS control unit and hydraulic brake pressure is built up in the hydraulic lines to the 4 wheel brakes. The vehicle is decelerated.

4. If the electromechanical parking brake button is released or the accelerator pedal is pressed, this signal is processed in the electromechanical parking brake control unit.

5. The electromechanical parking brake control unit communicates via the dedicated CAN data bus with the ABS control unit and determines whether the vehicle speed is still greater than 7km/h.

6. The hydraulic pump is actuated by the ABS control unit and hydraulic brake pressure is reduced. The brakes are released.

Function

AUTOHOLD function

The AUTOHOLD function is designed to assist the driver when the vehicle is stationary and when driving off (forward or reverse). The AUTOHOLD function combines the following assistance functions:

By pressing the AUTOHOLD button in the centre console, the driver can make use of the AUTOHOLD function. Activation is shown by a warning lamp lighting up in the button.

To switch off the AUTOHOLD function, the AUTOHOLD button is pressed again. The warning lamp in the button goes out.

S346_086

Stop and go assistant
Since the driver no longer has to hold the vehicle on the brake pedal, driving in slow moving traffic (stop and go) is made easier.

S346_082

Drive-off assistant
Automatisation of the hold and drive-off procedure supports hillstarting.
Undesired backroll is prevented.

S346_084

Automatic parking
If the vehicle is parked with the AUTOHOLD function activated and the driver's door is opened, the seat belt is removed or the ignition is switched off, the parking brake is applied automatically.

S346_080

The AUTOHOLD function can only be activated if:

- the driver's door is closed,
- the seat belt is fitted and
- the engine is running.

As soon as one of the three situations has changed, the AUTOHOLD function switches off.

It has to be reactivated each time the ignition is switched on by pressing the AUTOHOLD button.

The AUTOHOLD function assures an automatic and controlled hold over the vehicle when stationary, irrespective of the way the vehicle was brought to a halt.

Brake pressure

When stationary, the vehicle is always held by the four hydraulic wheel brakes when the AUTOHOLD function is active.

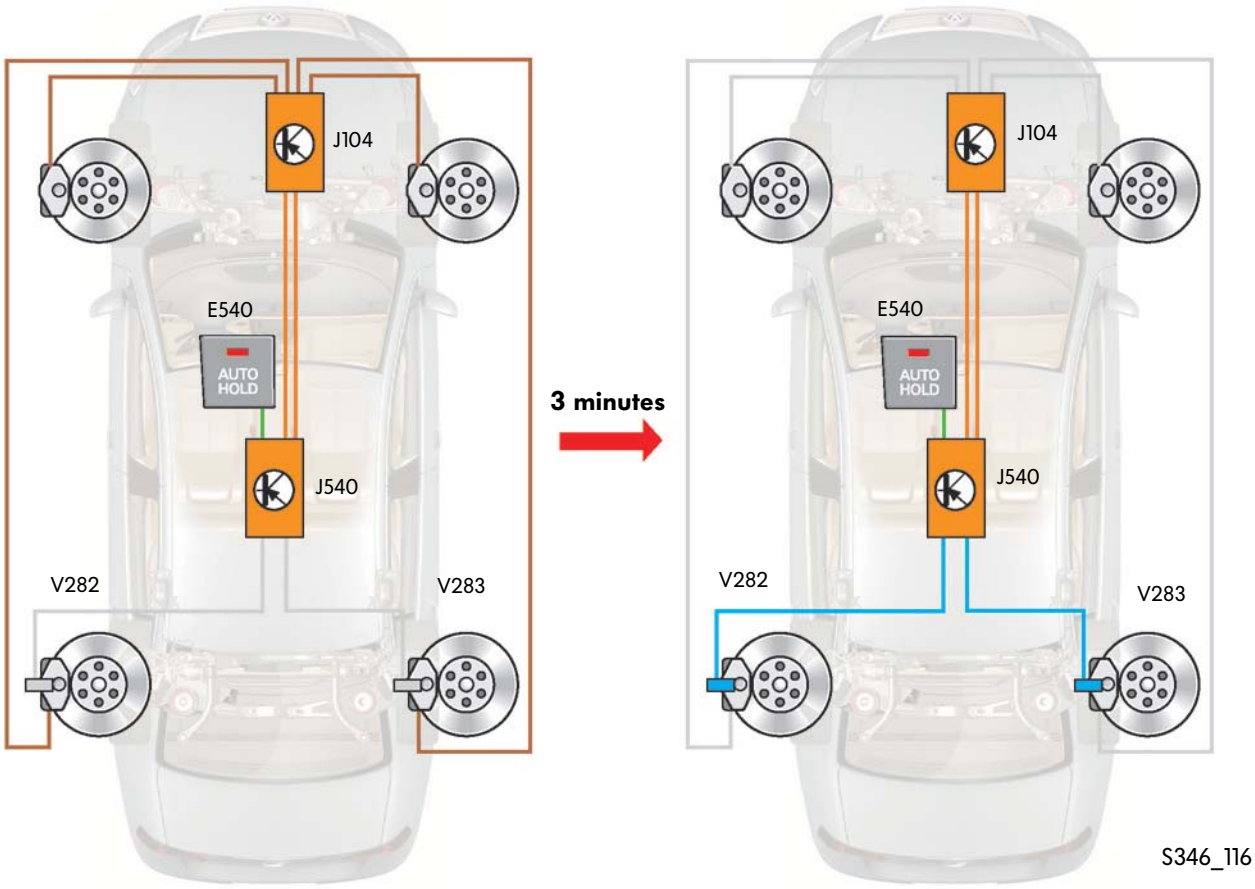
The brake pressure can be built up by the driver by pressing the brake pedal. The brake pressure is set at this level by the valves in the ABS unit closing and the driver no longer has to maintain pressure on the brake pedal. The vehicle is held in position.

If the driver does not press the brake pedal and the vehicle starts moving again from stop, the ESP function becomes active. A hydraulic charge procedure is carried out. This means that brake pressure is built up via the ABS pump.

After three minutes of the vehicle being held, a changeover occurs from the ESP hydraulics to the electromechanical parking brake.

Function

Sequence of functions



E540 AUTOHOLD button
J104 ABS control unit
J540 Electromechanical parking brake control unit
V282 Left parking brake motor
V283 Right parking brake motor

1. The AUTOHOLD function is active. The vehicle is stationary and is held in position by the 4 wheel brakes. The pressure required for this is calculated and set depending on the gradient by the ABS control unit.

2. After 3 minutes the system changes over to the electromechanical parking brake. The calculated holding torque is passed on from the ABS control unit to the electro-mechanical parking brake control unit.

3. Both parking brake motors on the rear wheel brakes are actuated by the electro-mechanical parking brake control unit. The brake is applied electromechanically and brake pressure is reduced automatically.

Vehicle inspection mode

Activation

For functional checking of the electromechanical parking brake, controlled application of the brakes on a rolling road is necessary.

Vehicle inspection mode is detected when

- ignition is switched on
- the AUTOHOLD function is switched off
- the front wheels are not moving and
- the rear wheels are driven for at least 5 seconds at a constant speed between 2.5 and 9km/h.

Activation of the vehicle inspection mode is shown by the electromechanical parking brake fault warning lamp K214 lighting up in the dash panel insert.

When the electromechanical parking brake button is pressed, braking force is applied in increments. Application of the parking brake is modified by the electromechanical parking brake control unit. Pressing the electromechanical parking brake button four times in succession results in the brake piston travelling a defined distance to increase force of the parking brake in increments.

Fifth actuation of the button leads to the electromechanical parking brake being released.

Deactivation

Vehicle inspection mode is switched off when the following conditions have been fulfilled.

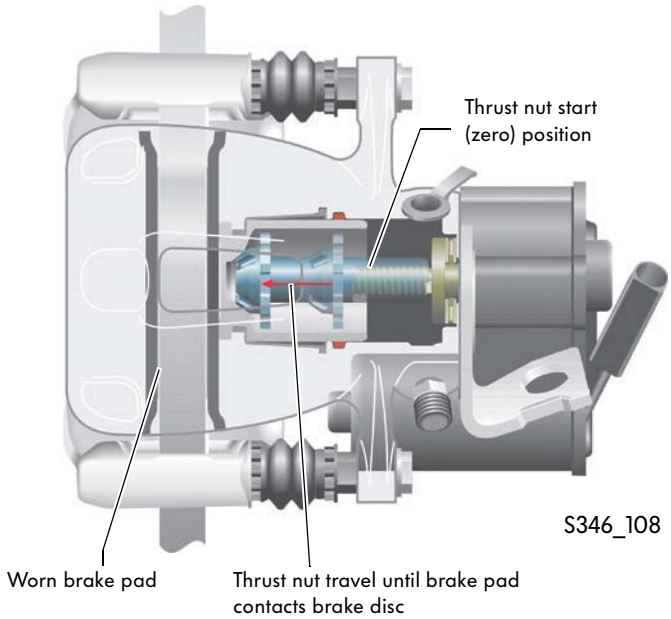
- The front wheels are driven at a speed greater than 0km/h.
- The rear wheels are driven at a speed less than 2.5km/h or greater than 9km/h.
- The ignition is switched off.

Please observe the detailed instructions regarding vehicle inspection mode in the "Electronic Service Information System, ELSA".

Special features

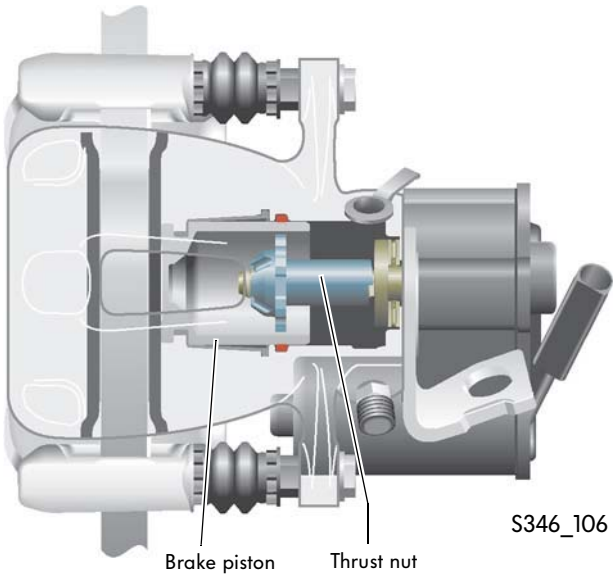
The brake pad clearance adjustment

The brake pad clearance is adjusted in cycles when the vehicle is stationary. If the electromechanical parking brake is not activated over a distance of 1000 kilometres, brake pad clearance adjustment is carried out automatically.
To do this, the brake pad is pressed against the brake disc from the start (zero) position.
The electromechanical parking brake control unit calculates the travel from the current draw of the electric motor and can thereby compensate for brake pad wear.



Compensation for brake pad wear is carried out when the vehicle is parked, ignition is locked and the parking brake is not applied.

Brake pad replacement mode



Brake pad replacement is carried out with the electromechanical parking brake not applied.
With the aid of vehicle diagnosis, testing and information system VAS 5051, the electro-mechanical parking brake is opened fully, whereby the thrust nut is moved back completely on the spindle.
Resetting of the electromechanical parking brake is again carried out with vehicle diagnosis, testing and information system VAS 5051. The new position of the brake pads is matched automatically.

Please observe the detailed instructions regarding brake pad replacement in the "Electronic Service Information System, ELSA".

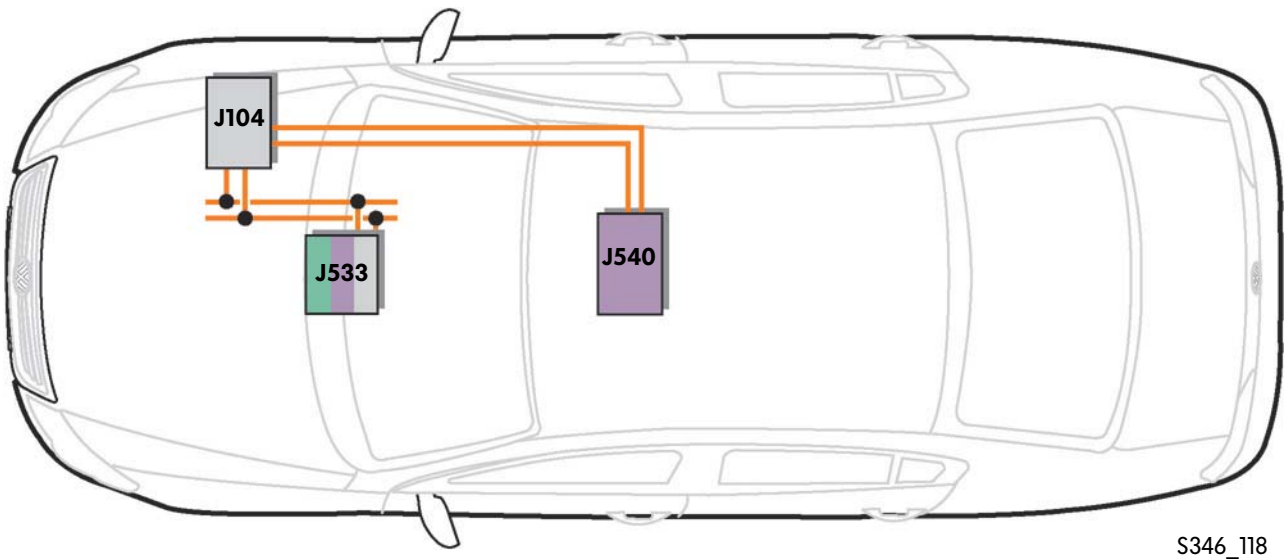
CAN network

The CAN data bus for electromechanical parking brake

The electromechanical parking brake control unit is connected via a dedicated CAN data bus to the ABS control unit.
The data transfer rate of the dedicated CAN data bus for electromechanical parking brake is 500 kbit/s.
Data transfer is carried out via the CAN high wire and CAN low wire. To make data transfer more efficient, the CAN lines are entwined.

The CAN data bus for electromechanical parking brake is not single wire compatible. If a CAN wire becomes defective, data transfer is not possible.

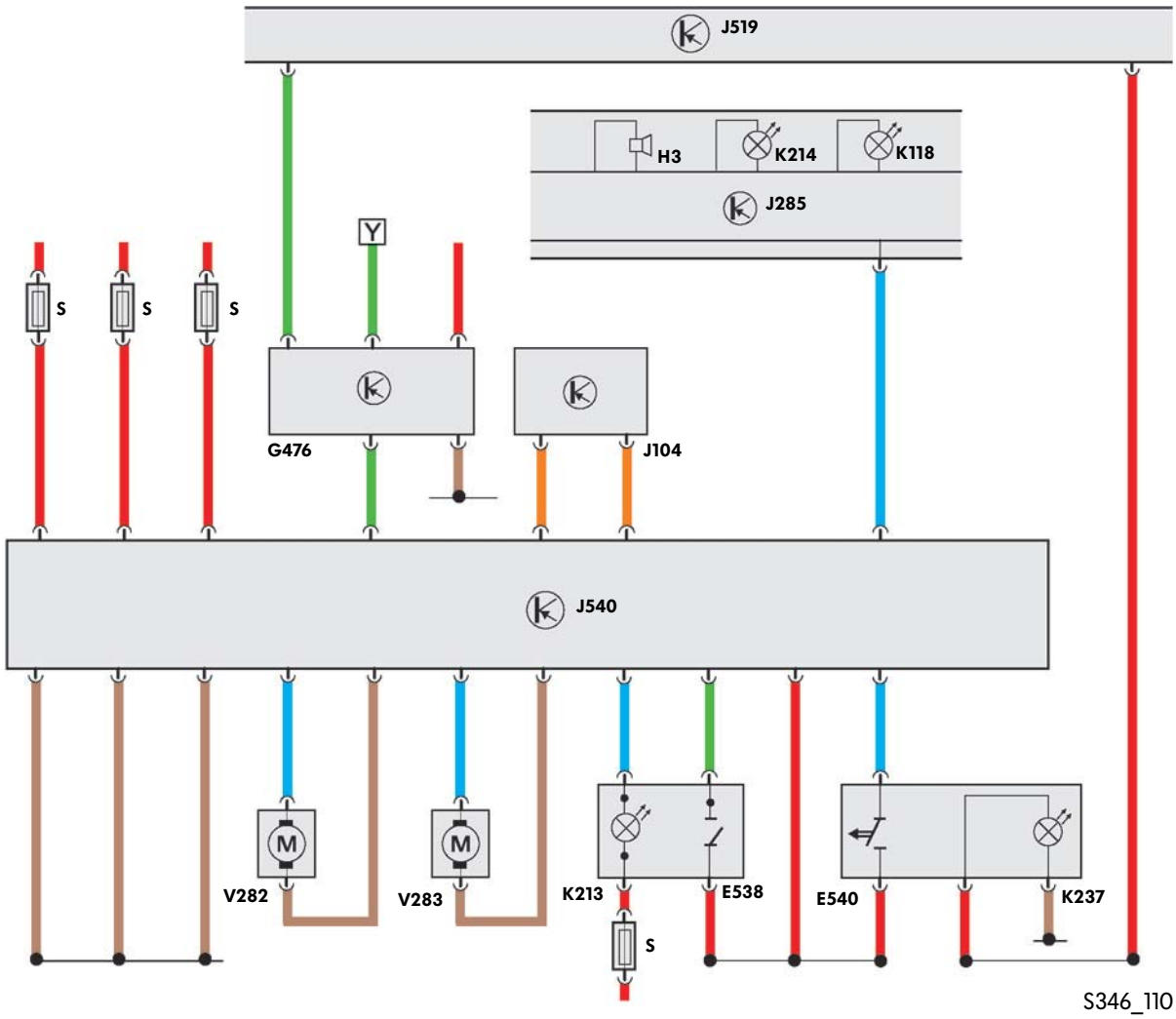
Control units in CAN data bus for electromechanical parking brake



S346_118

J104 ABS control unit
J533 Data bus diagnosis interface
J540 Electromechanical parking brake control unit

Functional diagram



S346_110

E538 Electromechanical parking brake button
E540 AUTOHOLD button
G476 Clutch position sender
H3 Buzzer and gong
J104 ABS control unit
J285 Control unit with display in dash panel insert
J519 Onboard power supply control unit
J540 Electromechanical parking brake control unit
K118 Brake system warning lamp
K213 Electromechanical parking brake warning lamp
K214 Electromechanical parking brake fault warning lamp
K237 AUTOHOLD warning lamp
S Fuse
V282 Left parking brake motor
V283 Right parking brake motor

y to control unit J623

Colour codes/key

= Input signal
= Output signal
= Positive
= Earth
= CAN data bus

Test yourself

1. What should be done if you wish to carry out a hillstart with activated electromechanical parking brake?

☐ a) Press the electromechanical parking brake button.

☐ b) Drive off. The electromechanical parking brake will release itself.

☐ c) A complicated balance between electromechanical parking brake, accelerator and clutch pedal is necessary.

2. Which assistance functions does the AUTOHOLD function combine?

☐ a) Tyre pressure control, breakdown detection and cruise control system.

☐ b) Traffic warning and distance control.

☐ c) Stop and go assistant, drive-off assistant and automatic parking.

3. What special service operating conditions are required for the electromechanical parking brake?

☐ a) Vehicle inspection mode.

☐ b) Oil change mode.

☐ c) Brake pad replacement mode.

☐ d) Cleaning mode.

Answers

1. b)

2. c)

3. a, c)

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❀ This paper was made from pulp which was bleached without the use of chlorine.