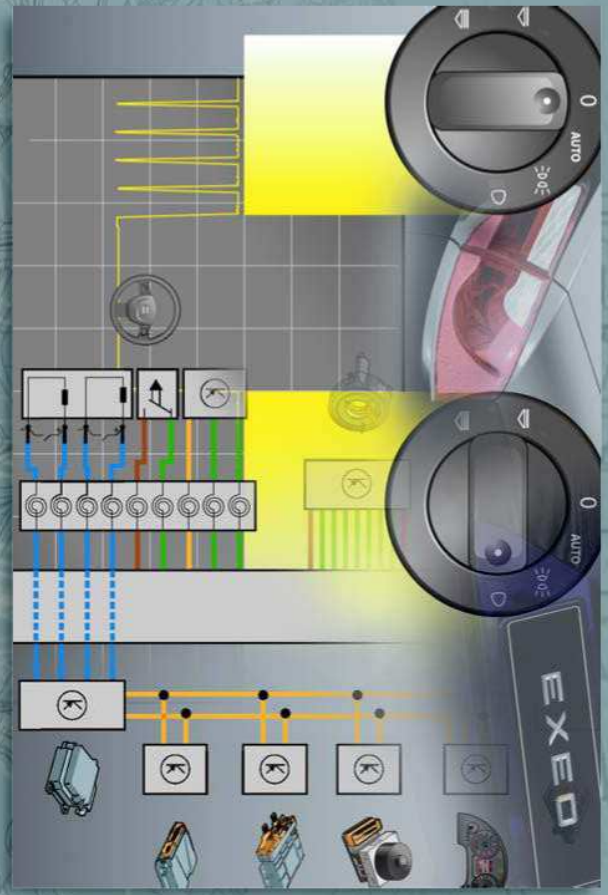
EXEO ELECTRICAL SYSTEM. Self Study Programme No. 124



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SEAT

The Exeo incorporates an electrical system with many new features regarding the electrical installation, the comfort system, the auxiliary electrical equipment and diagnosis.

The remarkable point about the **electrical installation** is that it includes numerous coupling stations, which make it easier to find faults along the wiring.

The **comfort (or convenience) system**introduces new features in the passenger compartment the alarm and lighting system. The alarm system has increased its functionalities with the possibility of disconnecting the protection functions against towing-away and passenger compartment surveillance by using two switches.

Visibility and comfort inside the vehicle have increased thanks to the improvements introduced to the passenger compartment lighting. Thus, the Exeo has been given the possibility of including bulbs in the footwell area and on the doors.

Also, the Exeo offers a prime saloon car standard **optional electrical equipment**, which includes elements such as electrical seats with memory, rear electric shade curtain and the 8-channels assisted parking.

To carry out a complete **diagnosis** of the vehicle, the K wire adaptor VAS 6017B has to be used.

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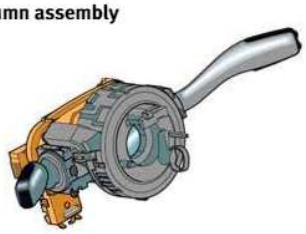
Note: *The exact instructions for checking, adjusting and repairing are included in the ELSA application and in the VAS 505x guided diagnostics.*

SUMMARY OF CONTENTS

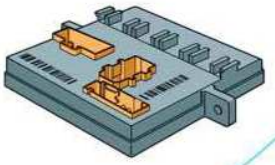
INTRODUCTION

Comfort system

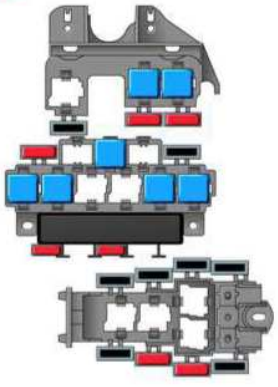
Steering column assembly



On-board network



Gateway



Electrical installation

In this self-study programme the Exeo electrical system topics will be dealt with in the following order:

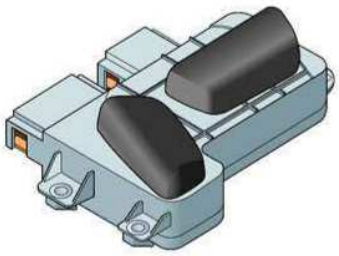
- Electrical installation.
- Gateway.
- Steering column assembly.
- On-board net.
- Comfort system.

And, as independent electrical equipment:

- Assisted parking.
- Electrical seats.
- Rear electric shade curtain.

Assisted parking

Rear electric shade curtain



Electrical seats

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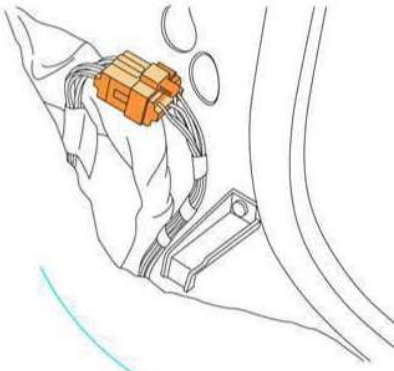
ELECTRICAL INSTALLATION

The Exeo electrical installation has a **decentralised structure** with the following main elements:

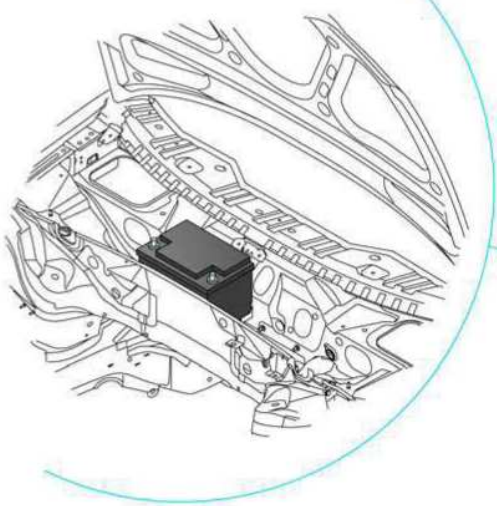
- Four **coupling stations** placed on the right A pillar, left A pillar, under the driver's seat and under the passenger's seat.
- One **passenger compartment fusebox**, placed on the driver's side end of the dashboard.
- One **electrical box** in the plenuum chamber, which includes a coupling station and a realy holder.
- Three **3, 9 and 4 positions relay holders** placed at the driver's side of the dashboard and under the steering wheel.

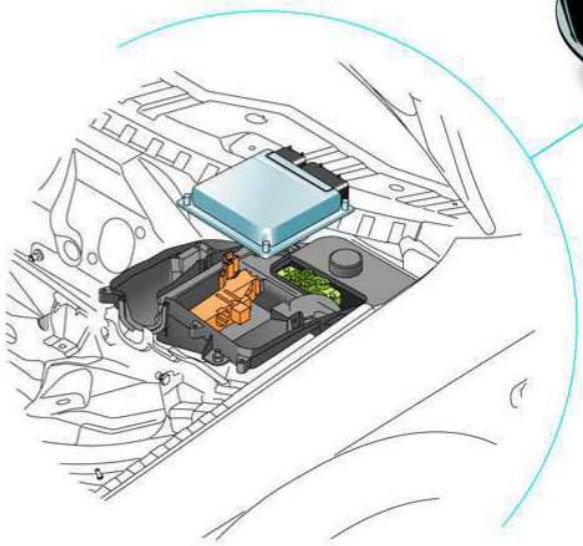
Another outstanding feature is that the **battery**, placed in the plenuum chamber, has a tape fuse on the positive terminal.

Coupling station on the right A pillar



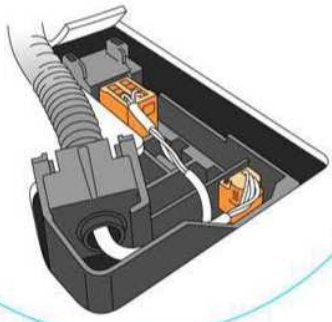
Battery



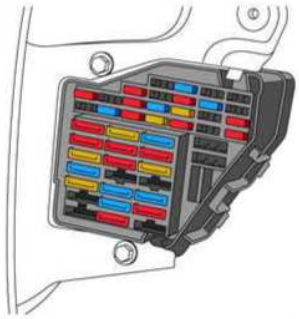


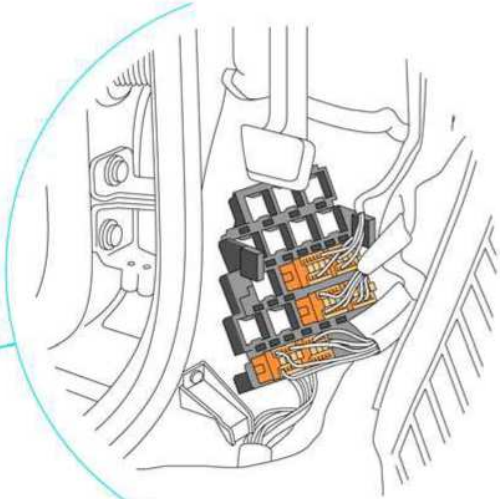
Electrical box

Passenger seat coupling station



Passenger compartment fuse holder



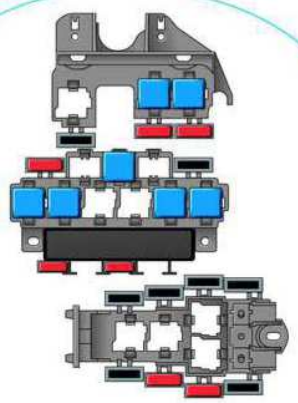


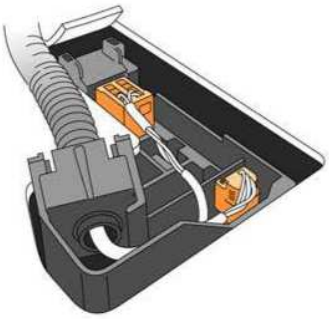
Coupling station on the left A pillar

3 position relay holder

9 position relay holder

4 position relay holder





Driver's seat coupling station

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A PILLAR COUPLING STATIONS

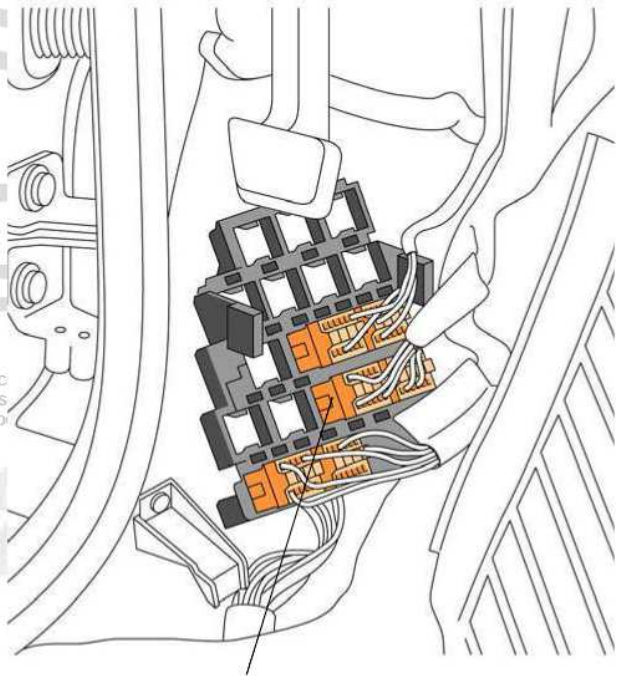
There are two, one on the left A pillar and anoher one on the right A pillar.

The coupling station of the **left A pillar** has 16 hollows, of which a maximum of 9 are used by connectors. These nine connectors house the wiring for the following systems:

- Assisted parking (blue connector).
- Electric roof (dark brown and orange connectors).
- Servotronic (light brown connector)
- Windscreen wipers (violet connector).
- Electrical fans (grey connector)
- Headlights (green, red and black connectors).

The **right A pillar** coupling station varies depending whether the car is a **left drive** or a **right drive** vehicle. For left hand drive there is only an individual coupling bracket containing the right headlight wiring.

For right hand drive cars there is a 16 hollows coupling station, of which only two are used by connectors containing wiring for the headlights (pink connector) and for the windscreen wipers (red connector).



Coupling station on leftt A pillar

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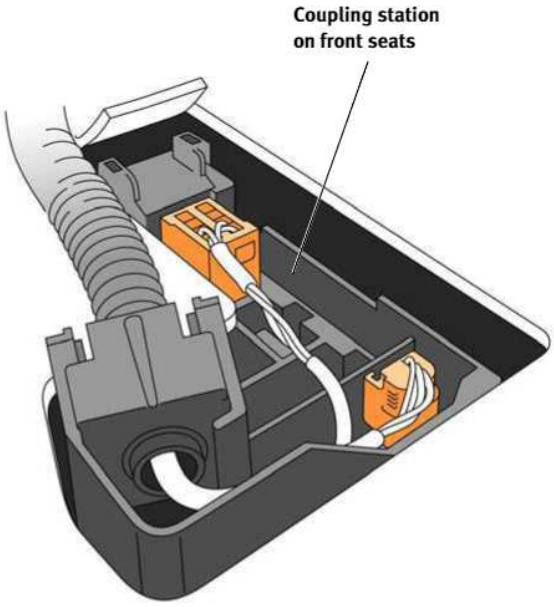

Coupling station on front seats

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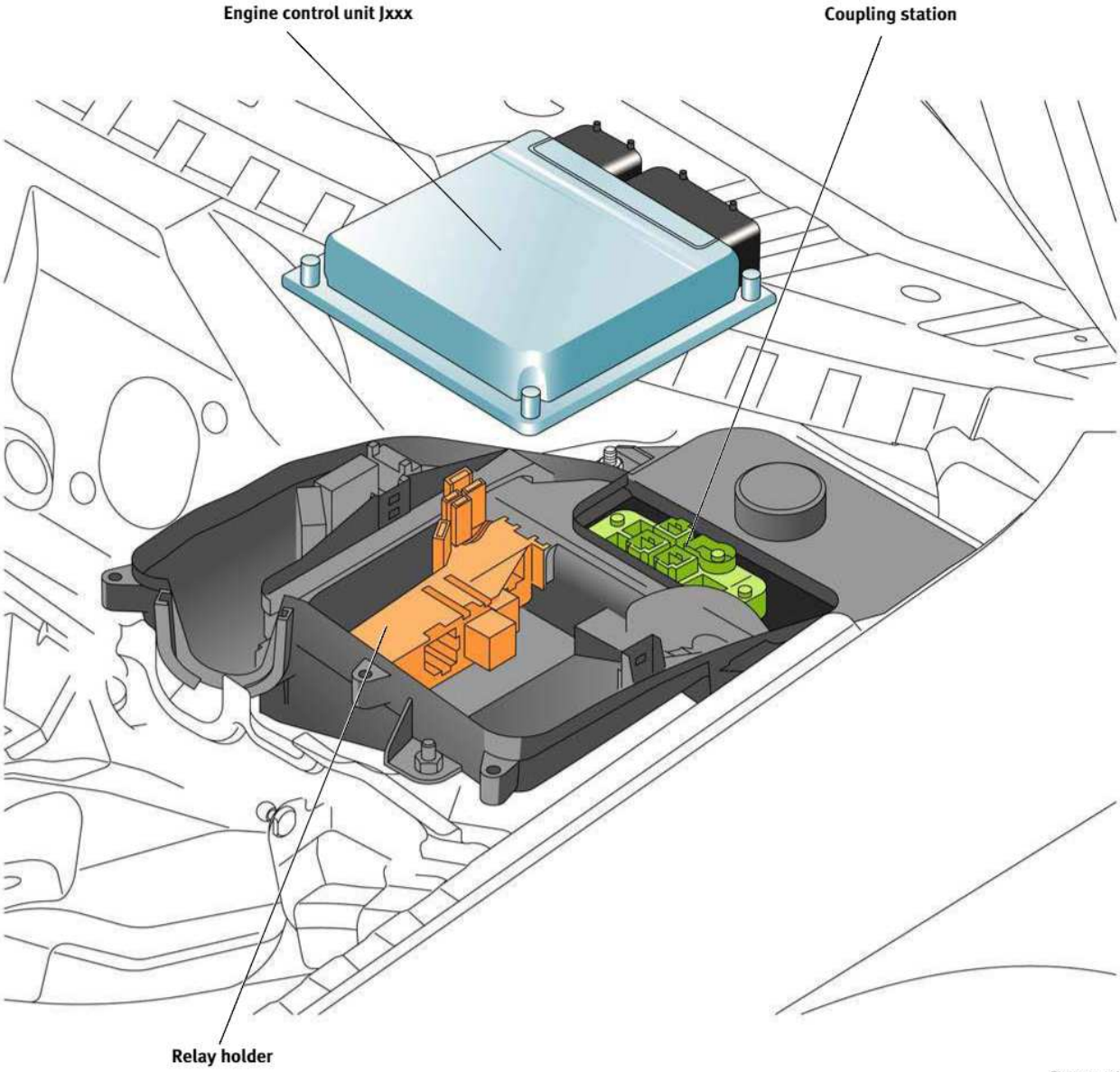
COUPLING STATION ON FRONT SEATS

There is a coupling station under the driver's seat and another one under the passenger seat with four connectors each.

Both coupling stations include the **necessary wiring for**:

- Heated seats (green connector).
- Supply (red connector).
- Sde airbag (yellow connector).
- And pyrotechnical seatbelts (black connector).



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ELECTRICAL BOX

It is placed at the left of the plenuum chamber. Inside it **contains**:

- Engine control unit Jxxx .
- One coupling station.
- And a relay holder.

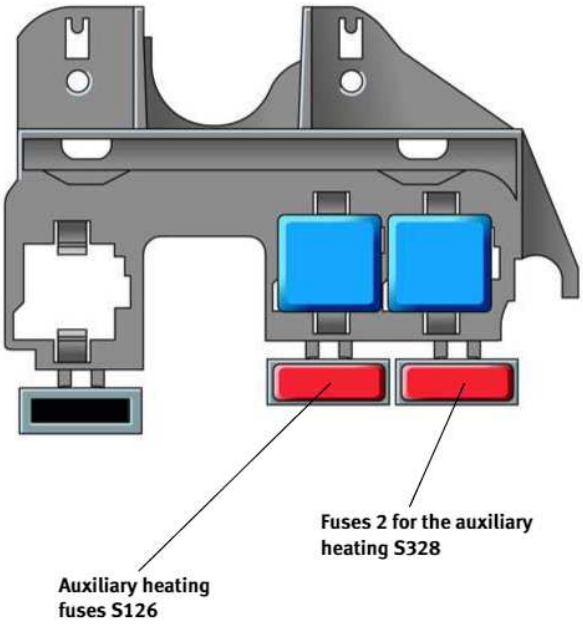
The **coupling station** has six hollows, although only three are used by connectors. These three connectors contain the wiring that affects the engine electronics. On the coupling station there is also a worm connection for terminal 30.

The **relay holder** has a maximum of three relays involved in the engine electronics. The realy holder also includes up to seven fuses for protecting different engine related components.

3 POSITION RELAY HOLDER

It is placed on the dashboard, on the driver's side. It has three hollows for connecting relays, which include the **low calorific power relay J359** and **high calorific power J360** for the **auxiliary heating**.

The realy holder also has three hollows for connecting fuses. Only two of the hollows are used for connecting the **auxiliary heating fuses** S126 and S328.



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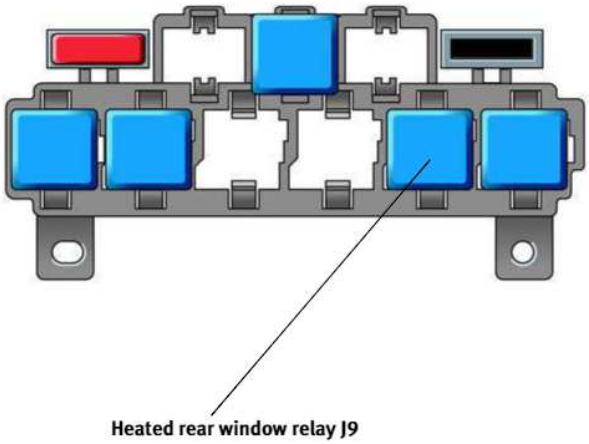
9 POSITION RELAY HOLDER

It has nine hollows for placing relays. The following **relays** are included:

- Fuel pump relay J17 (CFMA motor).
- Servotronic control unit relay J236.
- Heated rear window relay J9.
- Discharge realy for pin X J59.
- Dual tone horn relay J4.

There are also seven hollows for **fuses**, one of which is used for the rear window shade curtain thermal fuse S100.



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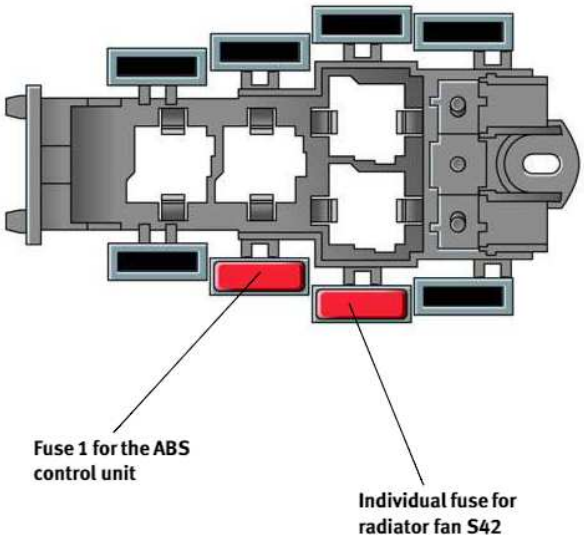
4 POSITION RELAY HOLDER

It is placed at the driver's side of the **dashboard** and under the steering wheel. There are 4 hollows for connecting **relays**.

The relay holder also has a connection for eight **fuses**. Only two are used by the following fuses:

- Fuse 1 for the ABS control unit S123.
- Individual fuse for radiator fan S42.

On the right, it has **three terminal 30 worm connections**.



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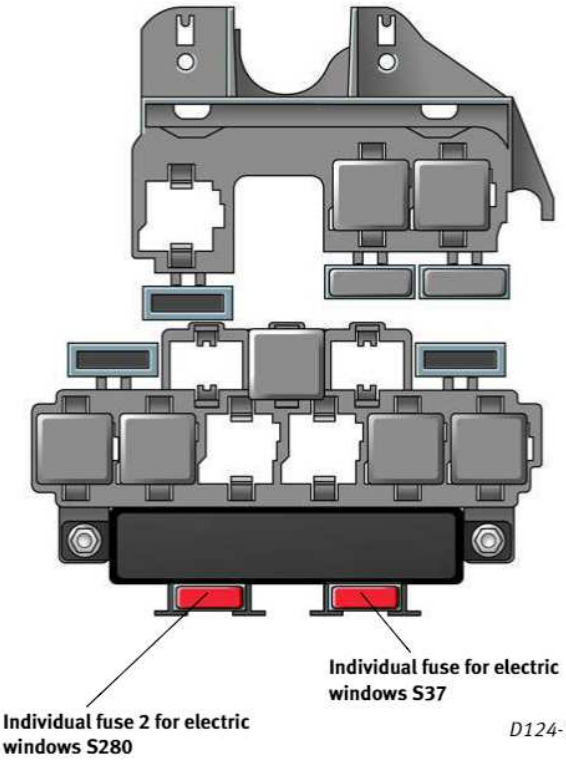

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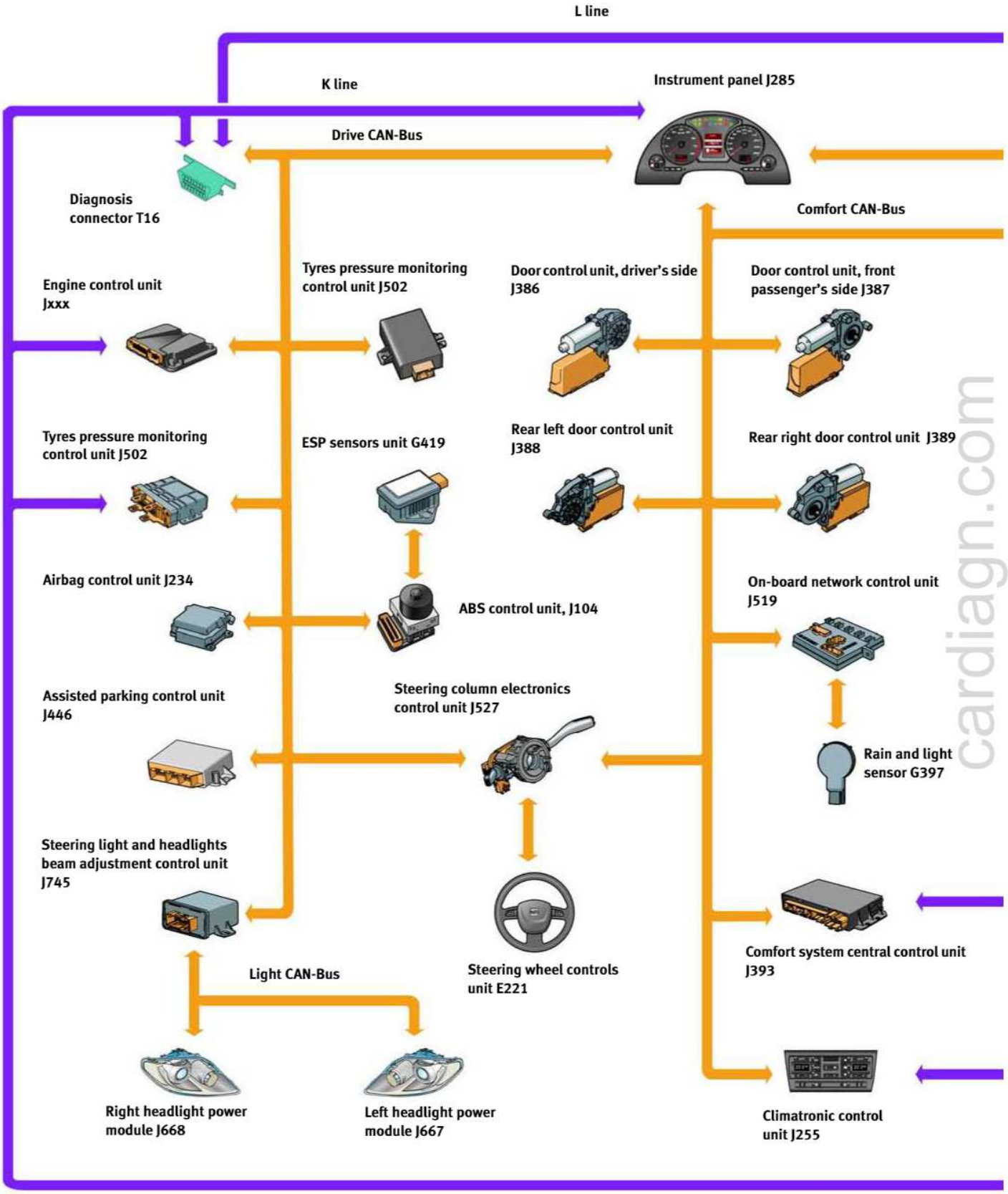
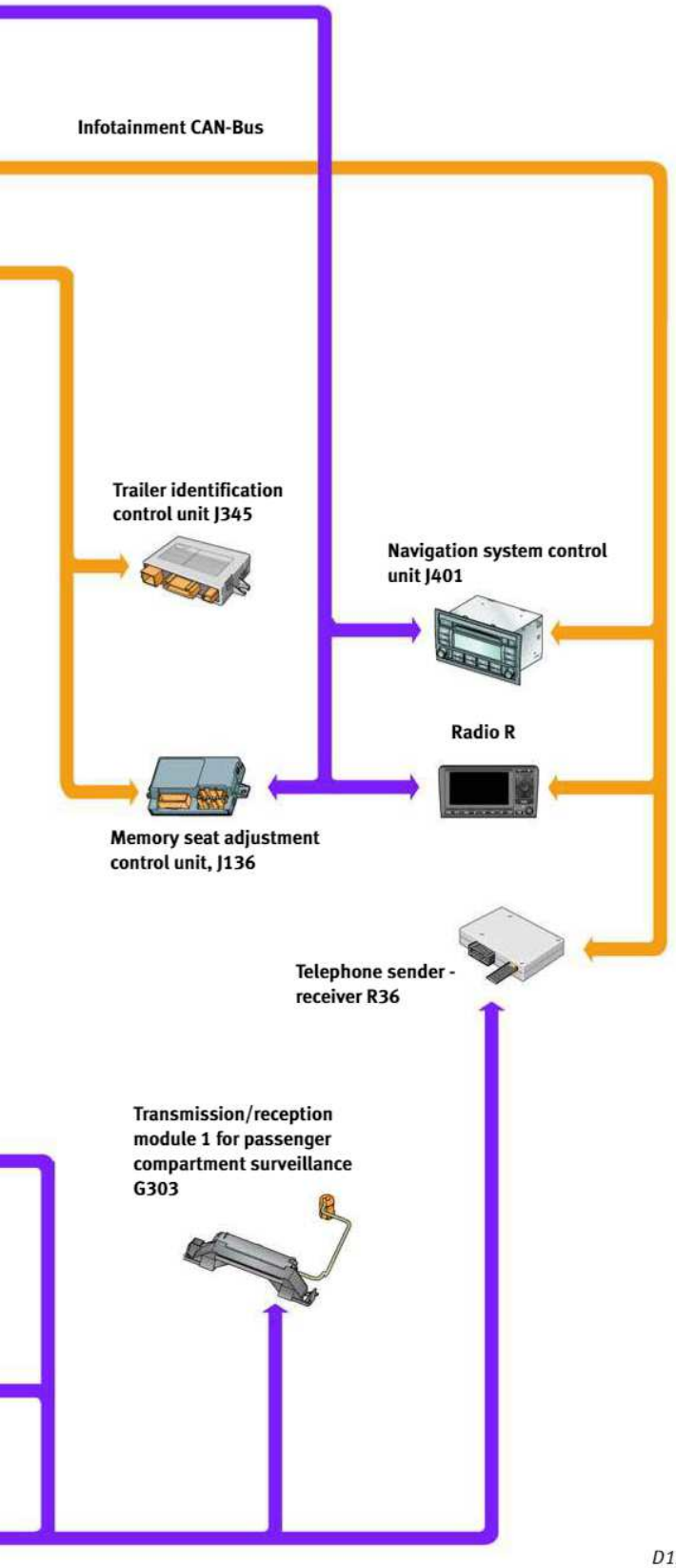
AUXILIARY FUSES ON THE ON-BOARD NETWORK

The on-board network has three mountings **attached** to it -on the same side as the connectors- for the following fuses:

- Individual fuse for electric windows S37.
- Individual fuse 2 for electric windows S280.
- Driver and passenger seats thermal fuse S346:

DATA BUSES





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DATA BUSES

The Exeo has up to four **CAN-Bus** lines:

- Drive CAN-Bus.
- Comfort CAN-Bus.
- **Infotainment** CAN-Bus.
- And, **Light** CAN-Bus, if the vehicle is equipped with bixenon headlights.

Data speed of transmission is 500 kbit/s for the Drive and Light lines, and 100 kbit/s for the Comfort and Infotainment lines.

The buses architecture **also integrates** up to two **LIN-Bus** lines:

- the first one links the rain and light sensor G397 to the On-board network control unit.
- the second one links the steering wheels control module E221 with the steering column electronics control unit J527.

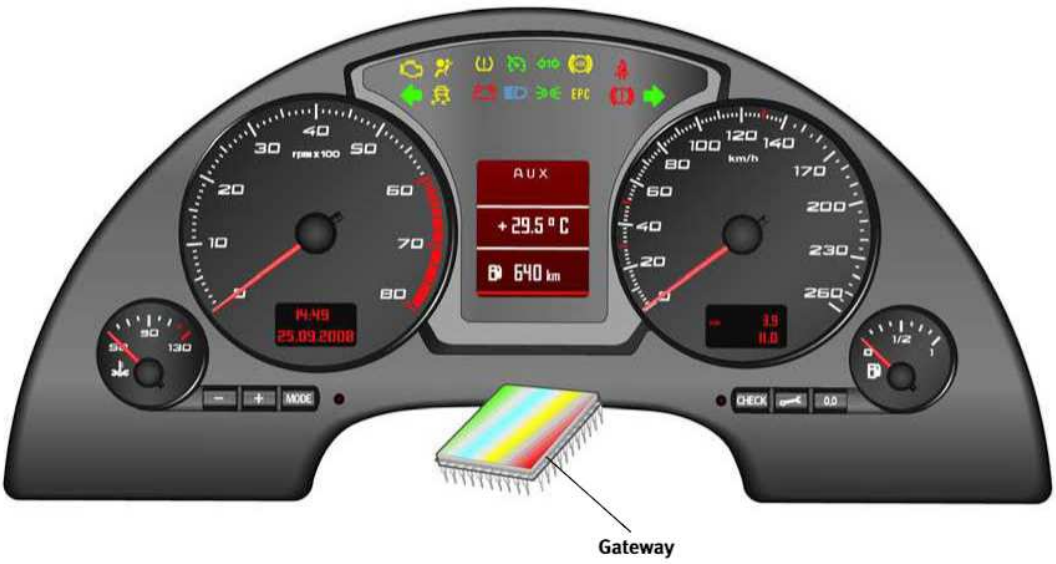
For complete diagnosis of all the control units there are two **auxiliary K and L lines**. They both share the same communications protocol.

The diagnosis protocol of the control units diagnosed via K or L wires is not compatible with the CAN-Bus protocol.

GATEWAY

The *Gateway* is integrated in the instrument panel. It assumes two basic functions:

- Communicator between the different CAN-Bus lines.
- Transportation mode.



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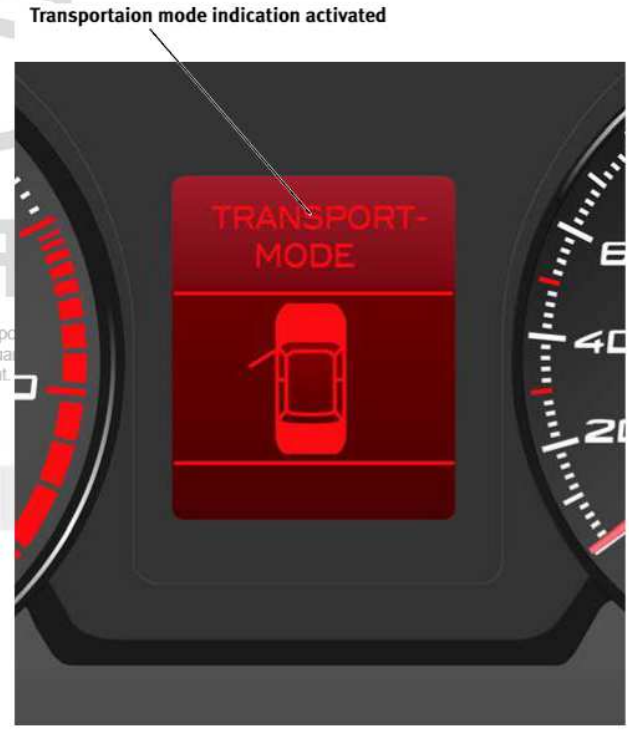
TRANSPORTATION MODE

This function is activated at the factory **in order to preserve** the state of the battery during transportation and storage before handing the car over to the customer. For this, through the Transportation Mode, a series of electrical connectors are deactivated.

When the ignition is connected and the Transportation Mode is **activated** the instrument panel*display* shows the indication "*TRANSPORT-MODE*" during **5 seconds**.

This mode can be deactivated with the VAS505X or automatically when the car has travelled more than 50 km.



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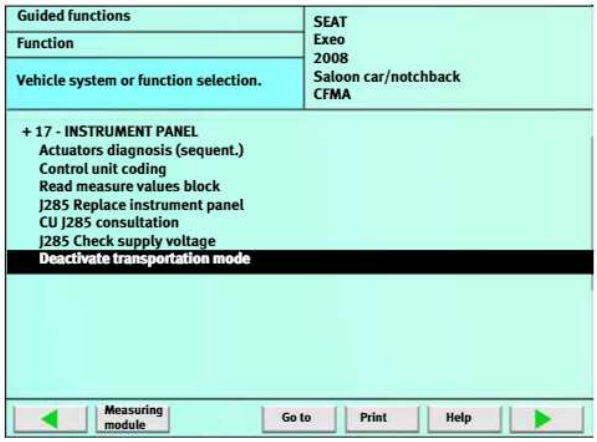
In the next table you can see the consumers which are affected by the **Transportation Mode**:

CONTROL UNIT	CONSUMER	ACTIVATION
Radio R	Radio	Deactivated
Navigation control unit J401	Navigator	Deactivated
Front passenger's door control unit J386	LED for central locking K133	Deactivated
Central comfort unit J393	Interior lights, footwell area lights and luggage compartment light	Cannot be activated with terminal 15
Central comfort unit J393	Interior lights	Without terminal 15 only they are activated during 30 sec.
Central comfort unit J393	Anti-theft alarm system	Deactivated

DEACTIVATING THE TRANSPORTATION MODE

To deactivate the transportation mode you have to access **Guided Functions**, enter direction code 17 -Instrument Panel or 46- Comfort System central module, and select the option **"Deactivate Transportation Mode"**.

If the mileage clock (km) reaches 50 km with the transportation mode activated it will be deactivated automatically.



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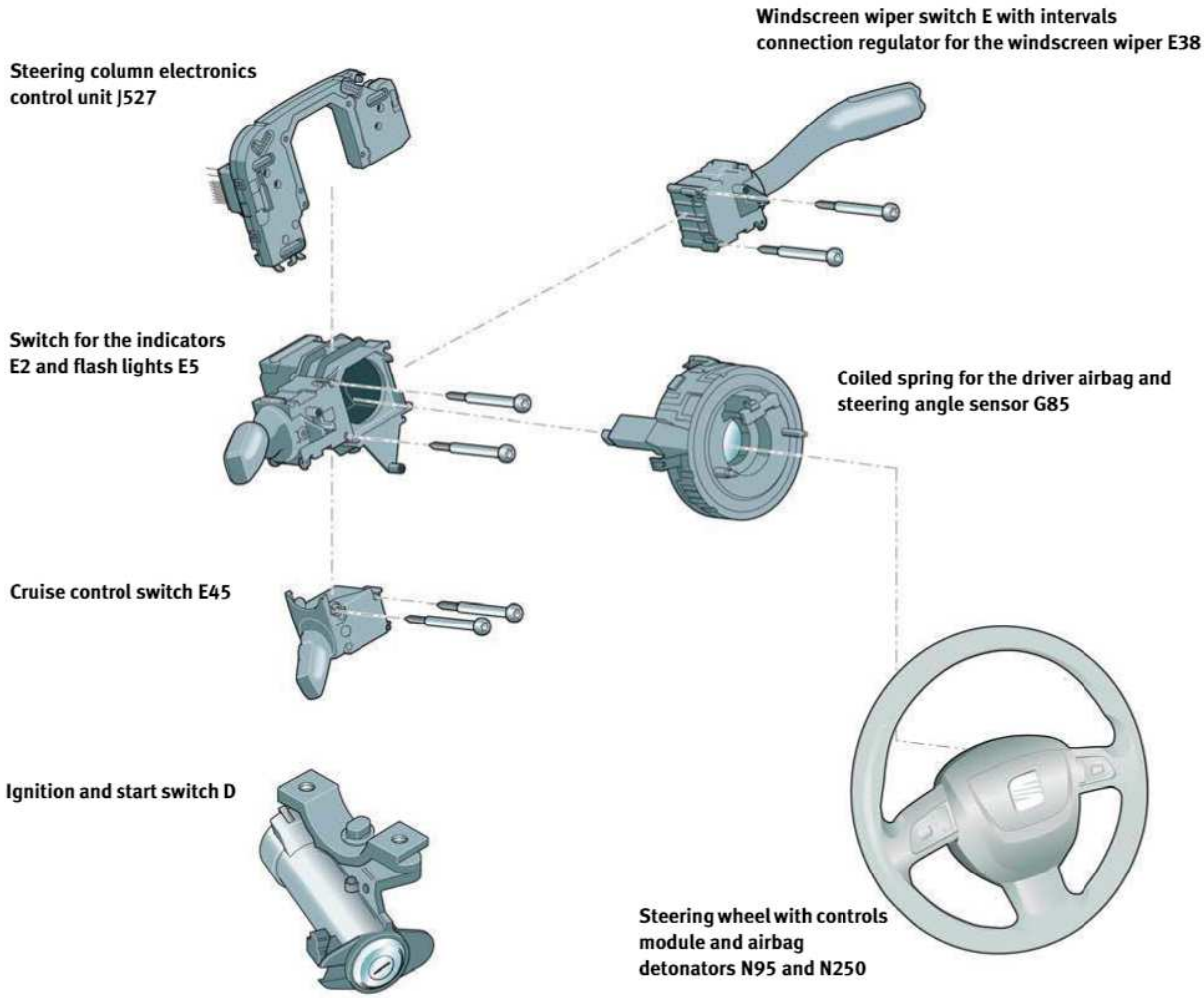
STEERING COLUMN ASSEMBLY

The steering column assembly, **of new design**, is divided into the following **modules**:

- Steering column electronics control unit J527.
- Switch for the indicators E2 and flash lights E5.
- Windscreen wiper switch E with intervals connection regulator for the windscreen wiper E38.
- Cruise control switch E45.
- Ignition and start switch D.
- Coiled spring for the driver airbag and steering angle sensor G85.
- Steering wheel with controls module and airbag detonators N95 and N250.

The **modular construction** of the steering column assembly allows **reducing to a minimum** the **wiring** and the **space** for **assembly**.



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OPERATION

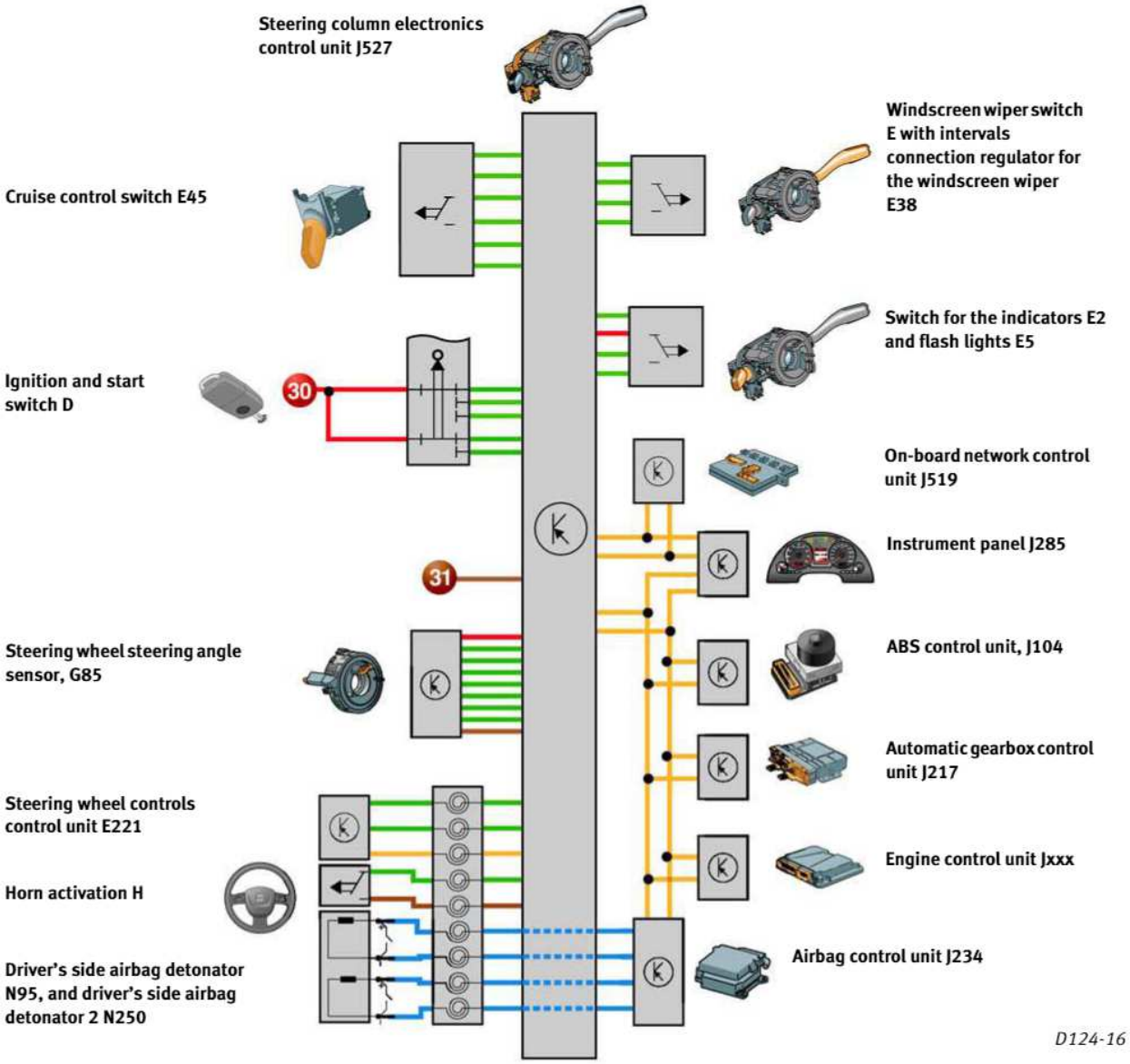
The steering column electronics control unit J527 **receives, converts to** CAN message, and **sends to the Comfort CAN-Bus** the signals from the following components:

- Side indicators switch E2.
- Windscreen wiper switch E with intervals connection regulator for the windscreen wiper E38.
- Ignition and start switch D.
- Horn activation H.

The signals from the following components are converted into a CAN message and are **sent to the drive CAN-Bus**:

- Cruise control switch E45.
- Ignition and start switch D.
- Steering wheel steering angle sensor, G85.

Via **LIN-Bus**, the control unit J527 **receives** the messages from the **multifunctions steering wheel control unit E453** and sends them to the Comfort CAN-Bus line.



SYSTEM LAYOUT

- The On-board network assumed functions are:

OUTSIDE LIGHTING

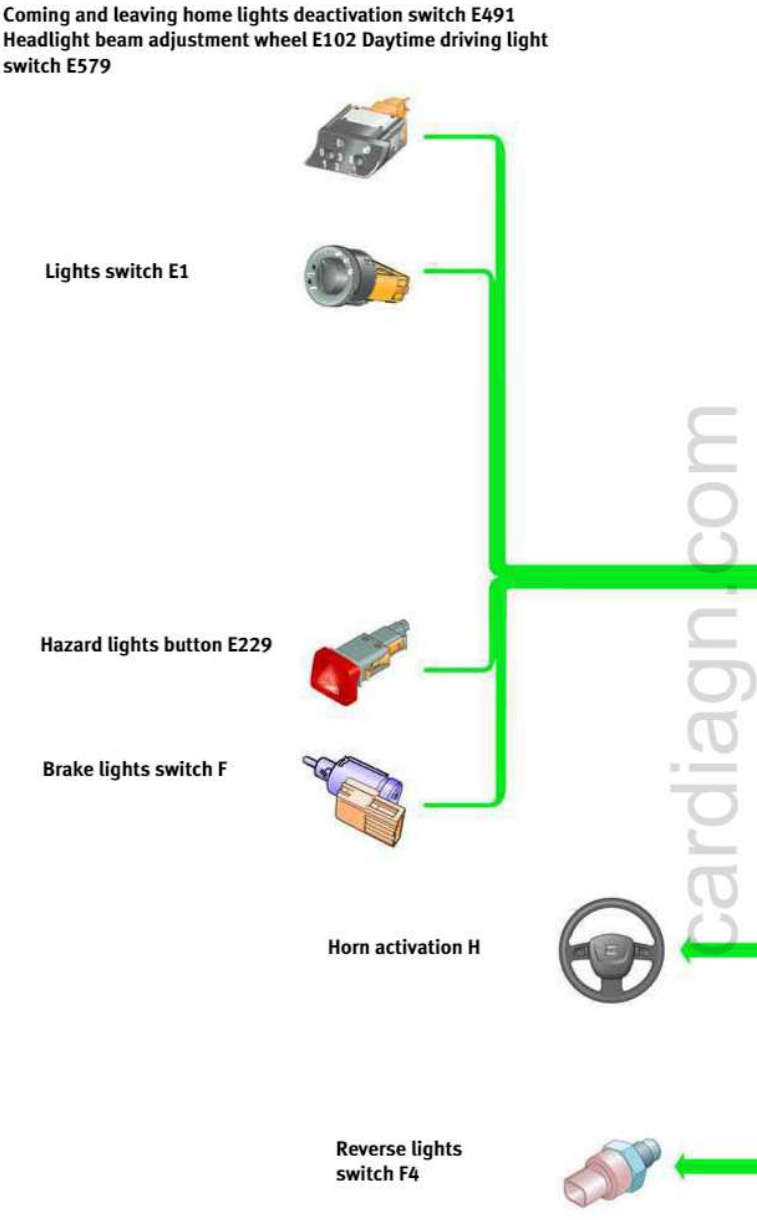
- Indicator lights.
- Side lights (position lights).
- Dipped beam.
- Full beam.
- Parking lights.
- Brake lights.
- Brake lights
- Reverse gear lights.
- Day time driving lights.
- Coming home and leaving home lights.
- Bulbs monitoring

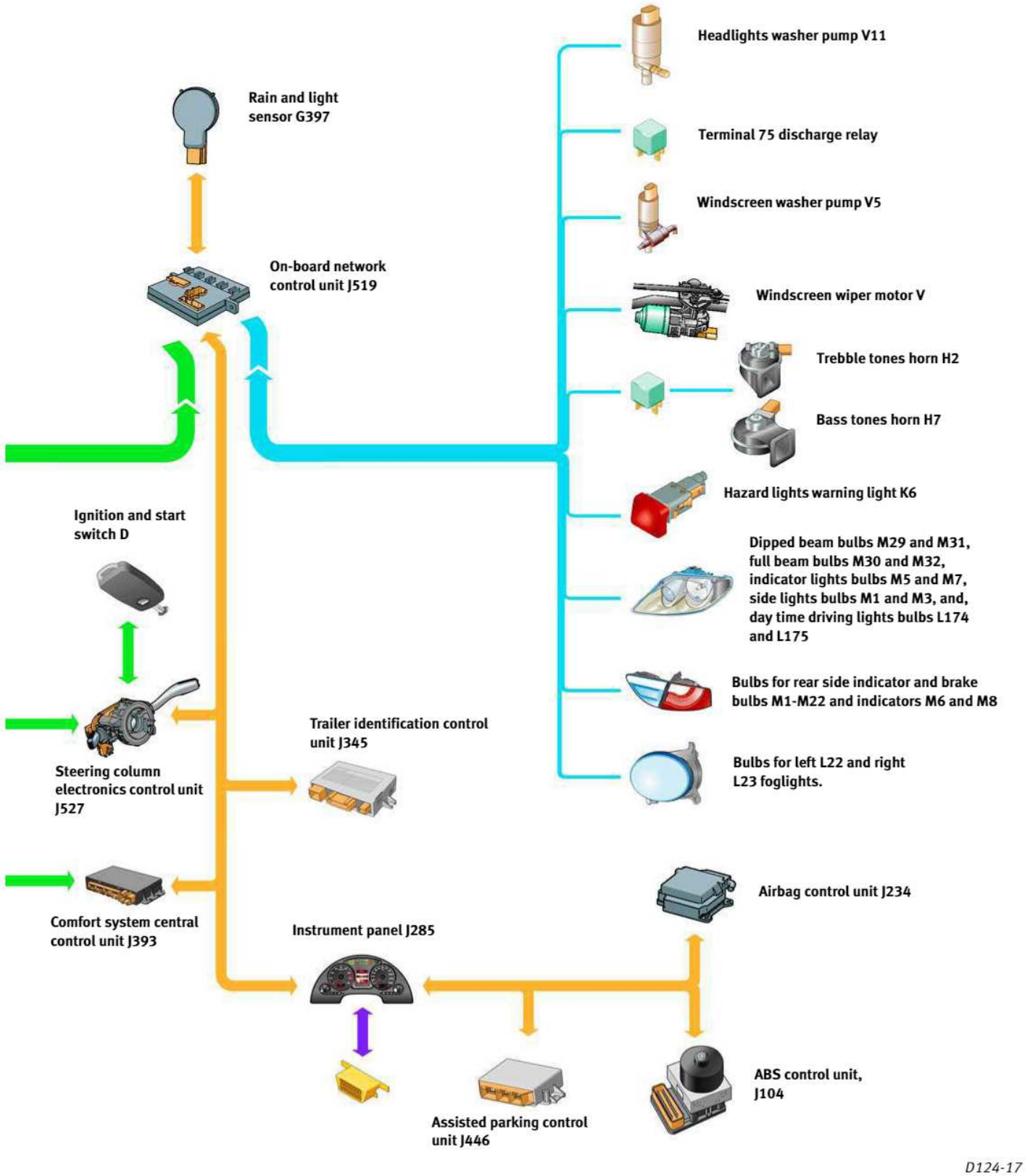
WINDSCREEN WIPERS

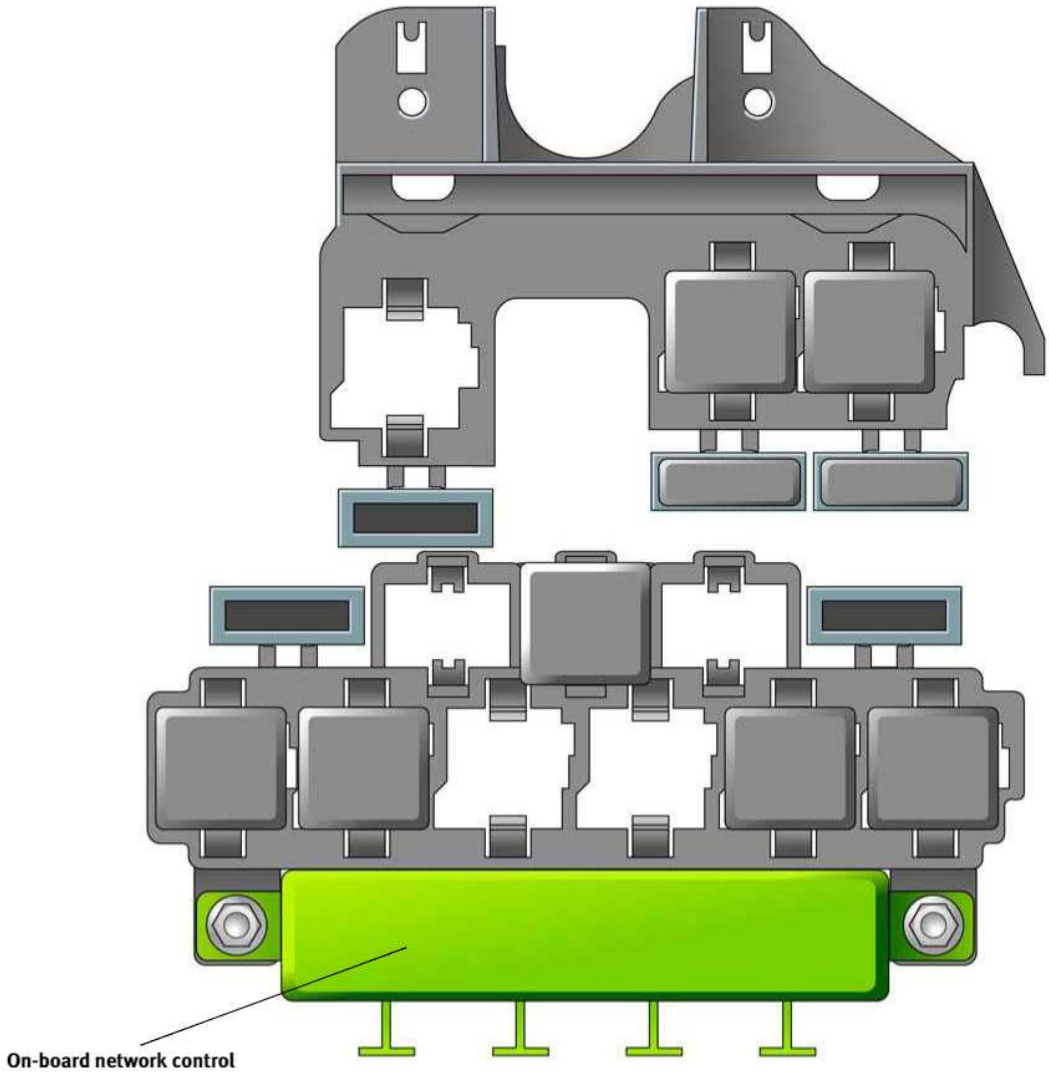
- Single pressing wipe.
- Intervals wipe
- Slow speed.
- Fast speed.
- Windscreen wiper activation after windscreen washer activation.
- Thermal protection.
- Windscreen washer.
- Headlights washer

AUXILIARY FUNCTIONS

- horn.
- terminal 75 discharge relay 75.







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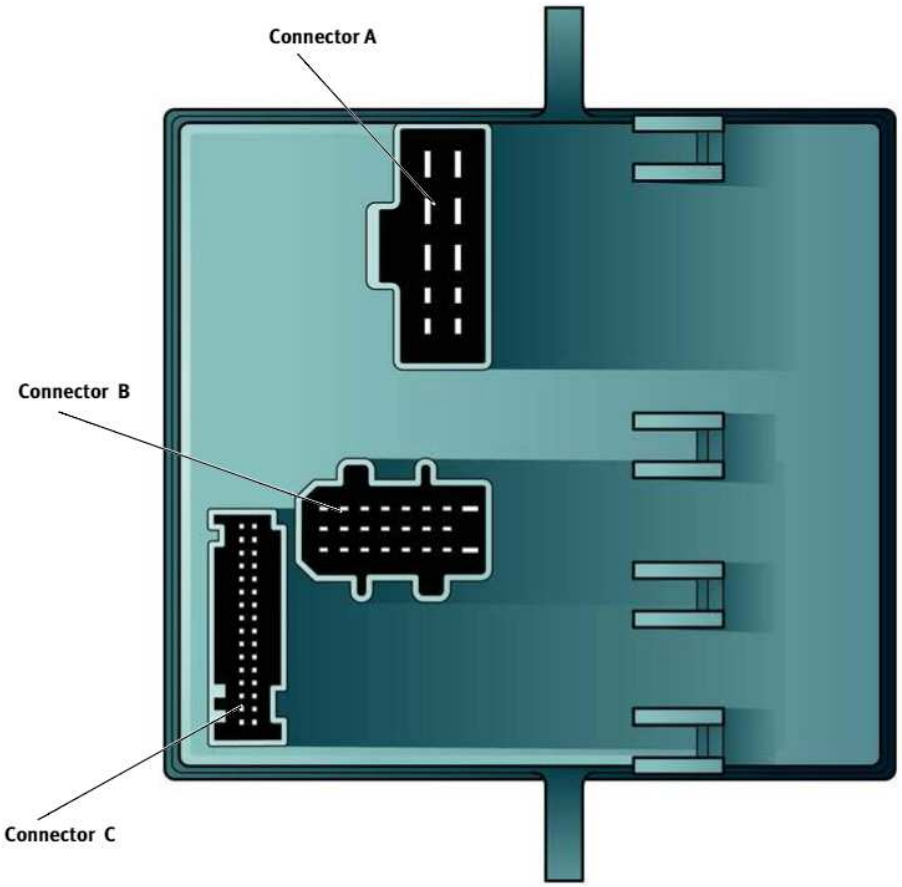
ON-BOARD NETWORK CONTROL UNIT J519

The On-board network unit is attached to the lower part of the dashboard, on the driver's side, by two nuts. To access it you first need to remove the driver's side stowage box.



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The On-board network has three connectors, all of which are placed on the same side.

- 10 pins A connector.
- 23 pins B connector.
- 32 pins C connector.

Additionally, it contains the attachments to house a maximum of five fuseholders.

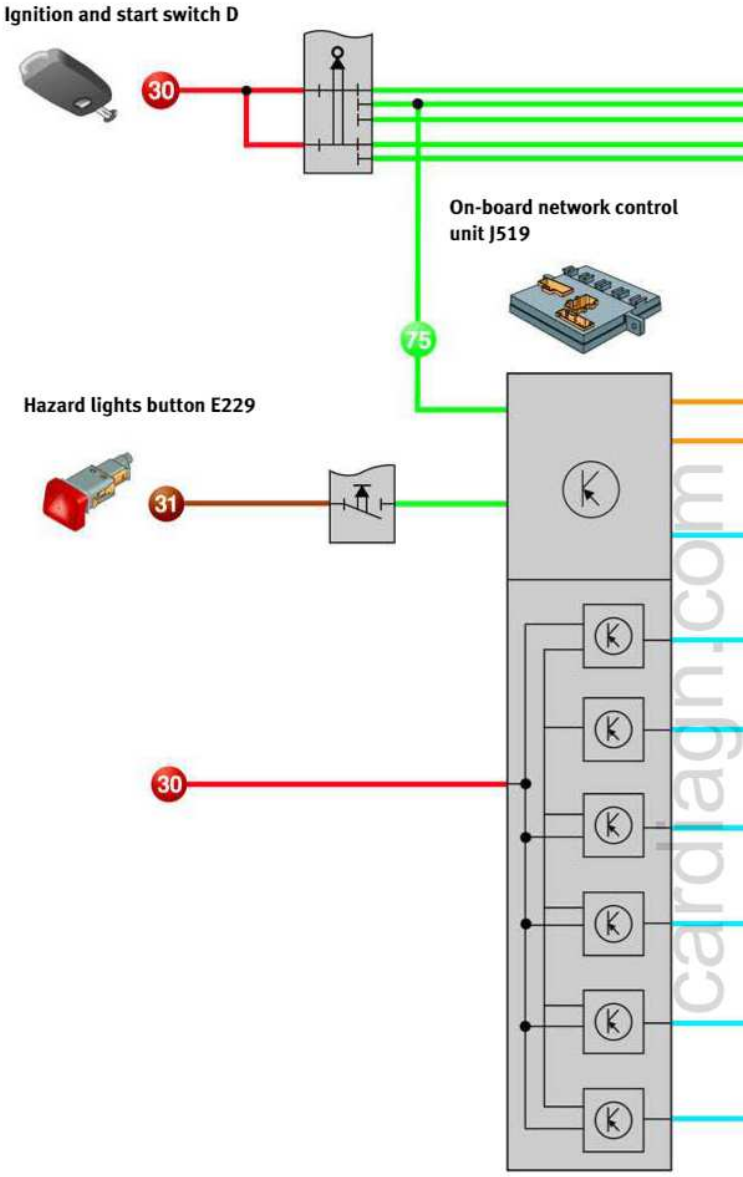
ON-BOARD NETWORK - EXTERNAL LIGHTING

INDICATOR LIGHTS

The side indicator lights have the following different signalling functions:

- **Change of direction:** they are activated when the ignition is connected and the on-board network receives the indicators stalk message from the steering column electronics control unit J527.

The highway comfort **function** is switched on when activating the indicators stalk for less than one second. From that moment the On-board network activates three intermittent cycles. This function can be activated or deactivated through the On-board "Adaptation".



- HAZARD LIGHTS: They are **activated** if the On-board network gets the earth signal from the hazard light button E229.

Once the On-board network has received this signal it feeds the indicator bulbs, the hazard lights button warning light K6, and sends a message to the Comfort CAN-Bus so that the instrument panel activates the appropriate warning lights.

There are two modes of operation depending on whether there is terminal 15 or terminal 30.

With terminal 15, the PWM signal for energising the bulbs has a 55% positive duty cycle.

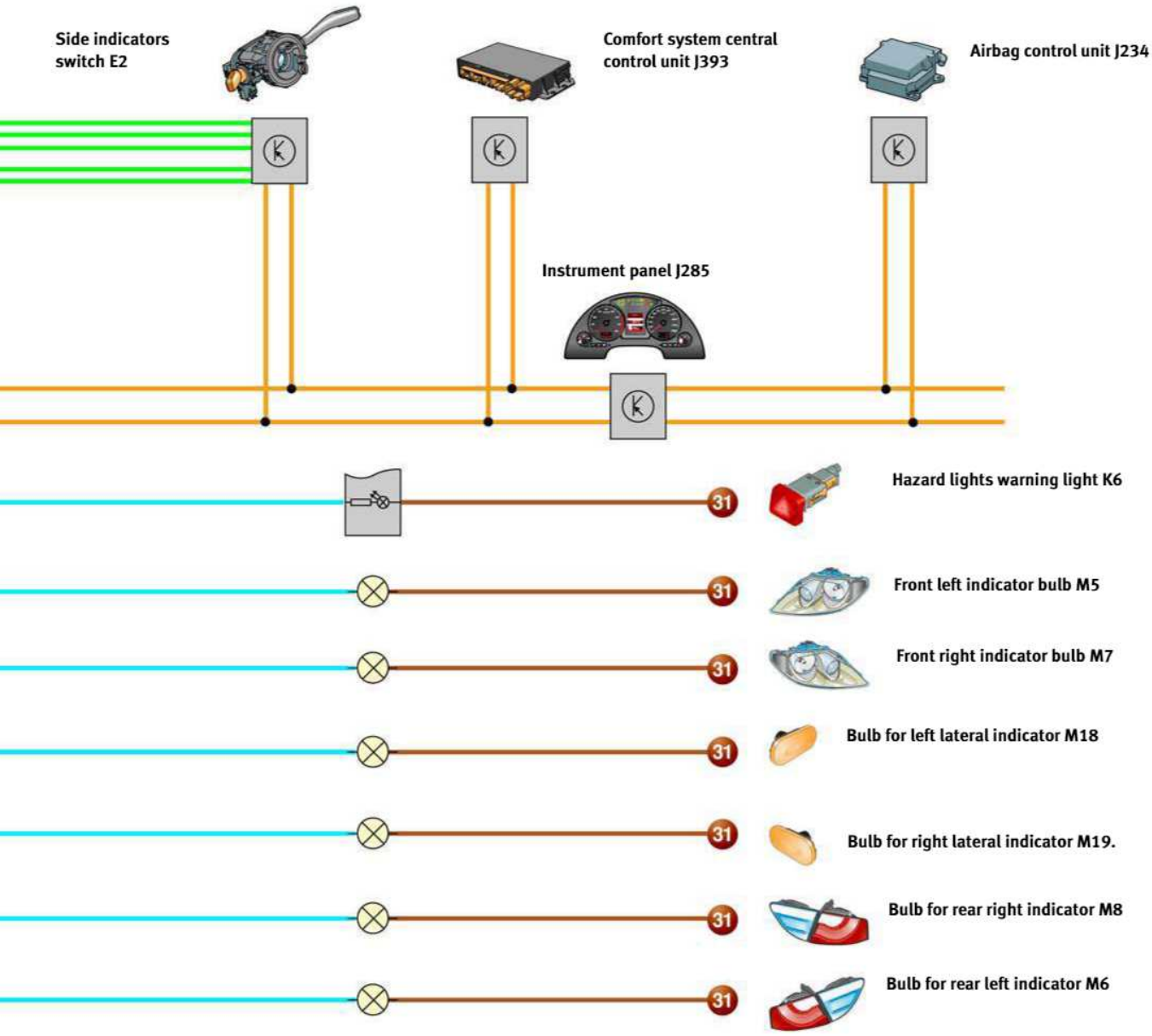
With terminal 30, the PWM signal for energising the bulbs has a 35% positive duty cycle 35%.

- **Central locking:** when locking or unlocking the central locking, the comfort unit J393 receives the signal and converts it into a CAN message and sends the message into the Comfort CAN-Bus. The On-board network picks it up and energises **all** the **indicator** bulbs.

- **Anti-theft alarm:** when the alarm device is activated the comfort cunit J393 sends the "Alarm activated" CAN message to the Comfort line. The On-board network picks it up and energises **all** the **indicator** bulbs.

- **Panic function:** if this function is activated from the remote control (available according to markets), the comfort control unit J393 sends the "panic function" CAN message to the Comfort line. The On-board network picks it up and energises **all** the **indicator** bulbs.

- **Colision:** in the event of an impact with airbag detonation, the airbag control unit J234 sends the **message** "airbag actiavtion" to the Drive CAN-Bus line. The message travels to the Comfort CAN-



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Busline via the Gateway (instrument panel), the on-board network control unit picks it up and energises the **side indicators' bulbs**.

ON-BOARD NETWORK - EXTERNAL LIGHTING

SIDE LIGHTS (POSITION LIGHTS

The on-board control unit energises the front side lights (position) bulb when it receives the appropriate signal from the light switch E1.

PARKING LIGHTS

The parking function is activated when the indicators lever is activated with the ignition off.

The parking lights use the position bulbs belonging to the side activated.

DIPPED BEAM

The on-board control unit energises the dipped beam bulb when it receives the appropriate signal from the lights switch E1. If the vehicle is equipped with rain sensor and the lights switch E1 is in AUTO position, the on-board network will supply the dipped beam bulbs in poor lighting conditions.

FULL BEAM

When the lights stalk is activated for the full beam a signal is sent to the steering column control unit J527. This unit converts this signal into a CAN message and sends it to the Comfort CAN-BUs. The On-board network picks up this message and upplies the full beam bulbs.

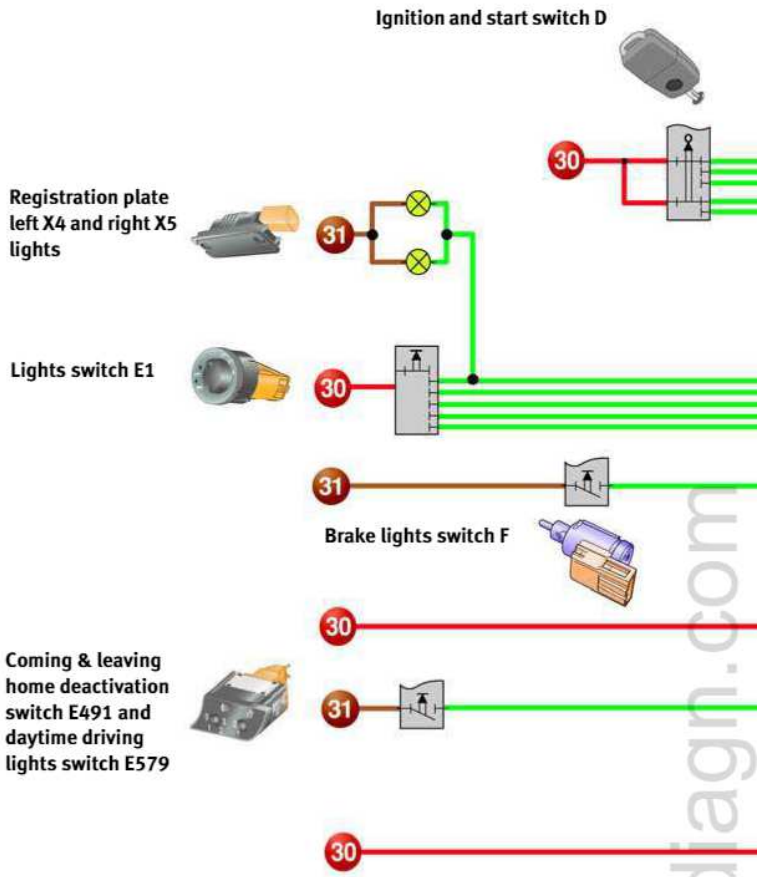
BRAKE LIGHTS

The on-board network receives the signal from the brakes light switch F via conventional wire and supplies the side brake bulbs and the third brake light with positive.

In the **event of a fault** in the switch's electrical circuit, the on-board net **activates the brake lights permanently** when switchoing on the ignition.

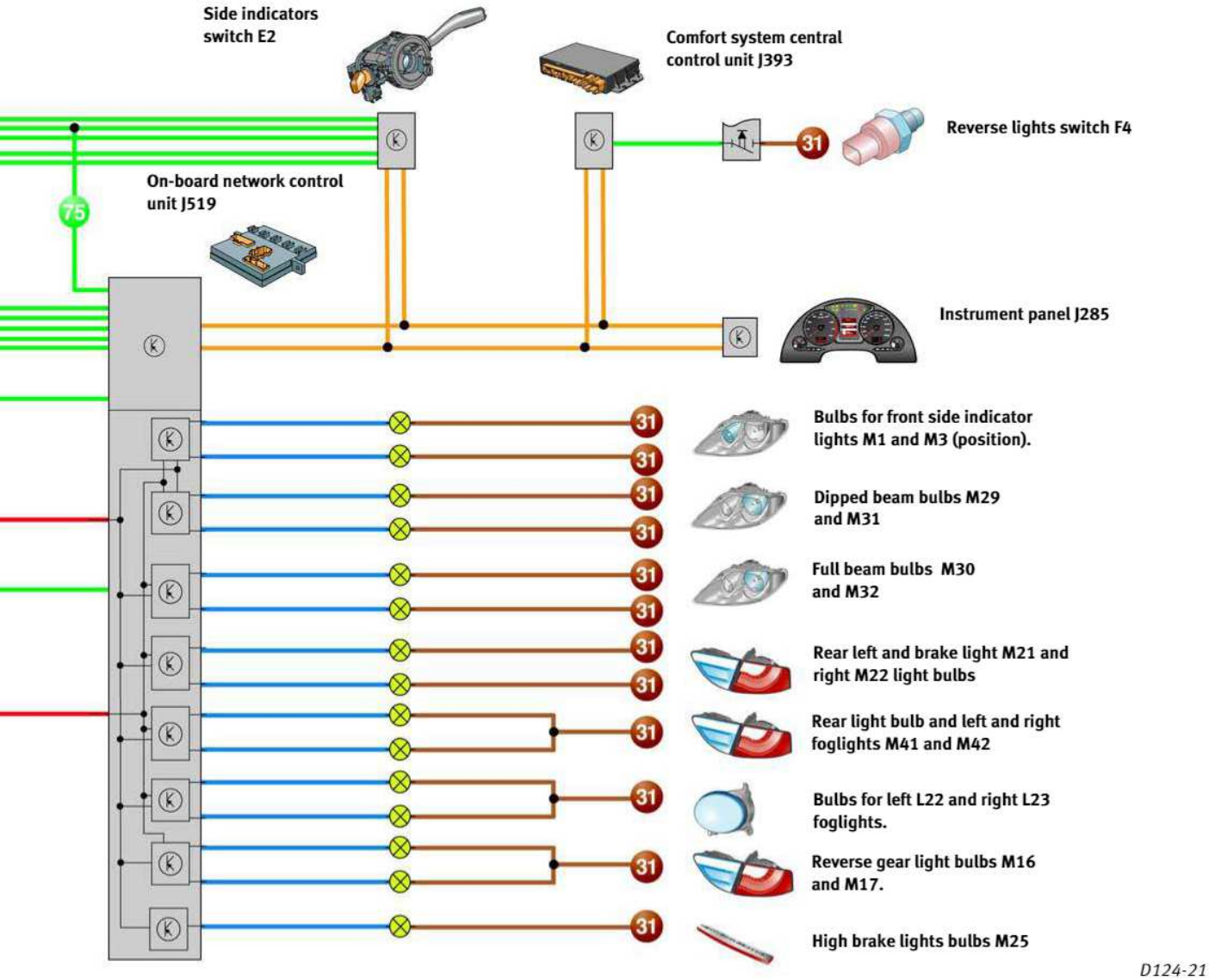
BRAKE LIGHTS

The on-board network supplies the front and rear foglights when it receives the signals from the lights switch E1. The on-board network supplies with positive the four bulbs through four independent pins.



REVERSE GEAR LIGHTS

The reverse lights switch F4 (manual gearbox) or the multifunctions switch (automatic gearbox) sends the signal to the comfort control unit. The comfort control unit sends this signal to the CAN message and sends it to the Comfort CAN-Bus



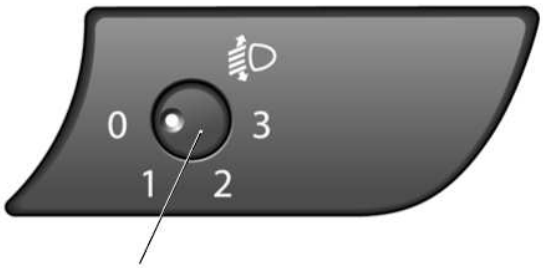
line. The on-board network picks up the message and energises the reverse gear lights bulbs.

INSTRUMENT PANEL SWITCHES MODULE

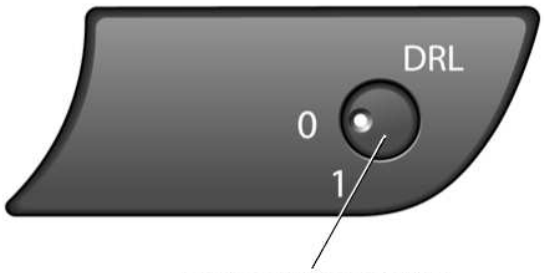
Depending on the equipment, the Exeo can include a module containing one or two of the following switches:

- Lights beam reach regulation wheel E102
- Coming & leaving home lights deactivation switch E491
- Day time driving switch E579.

The available configurations can be seen on the illustration below.

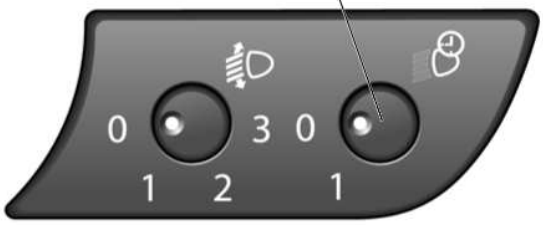


Lights beam reach regulation wheel E102

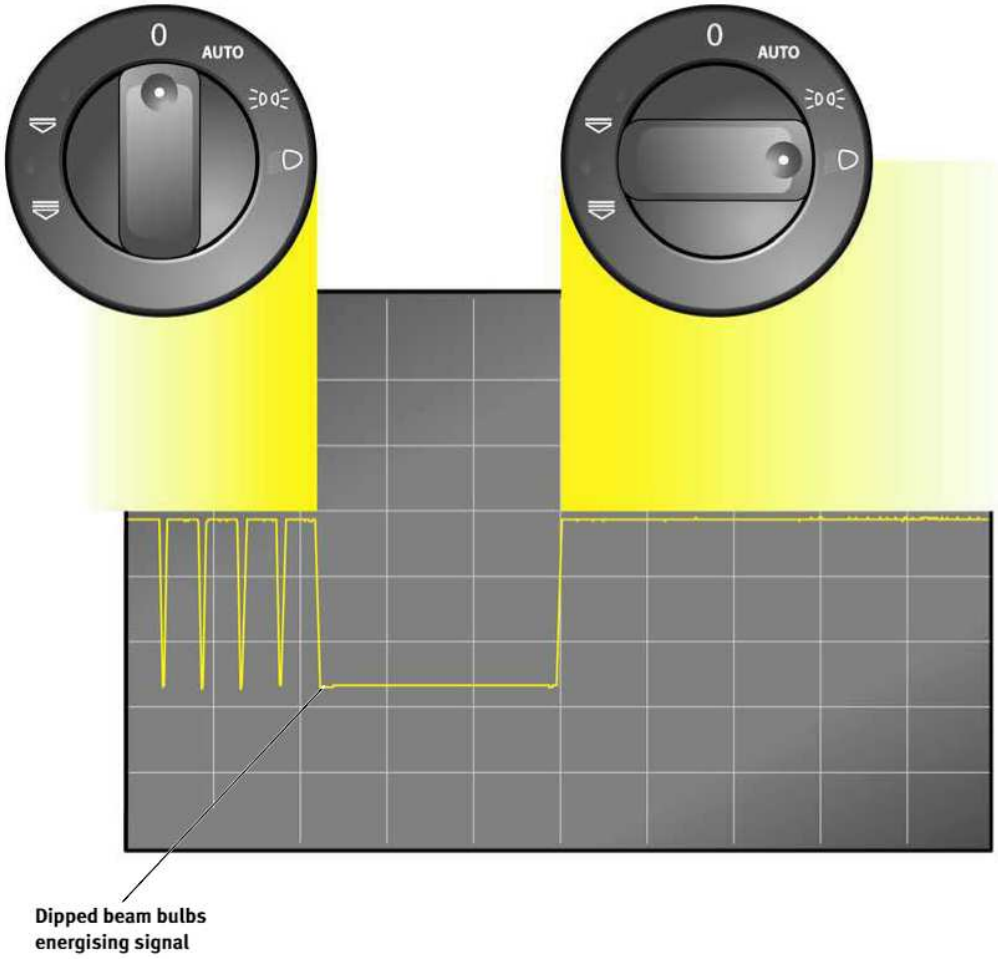


Day time driving switch E579

Coming & leaving home lights deactivation switch E491



D124-22



D124-23

DAY TIME DRIVING LIGHTS

For the daytime driving lights function there are two possibilities depending on whether the vehicle is equipped with **halogen headlights** or **bixenon headlights**.

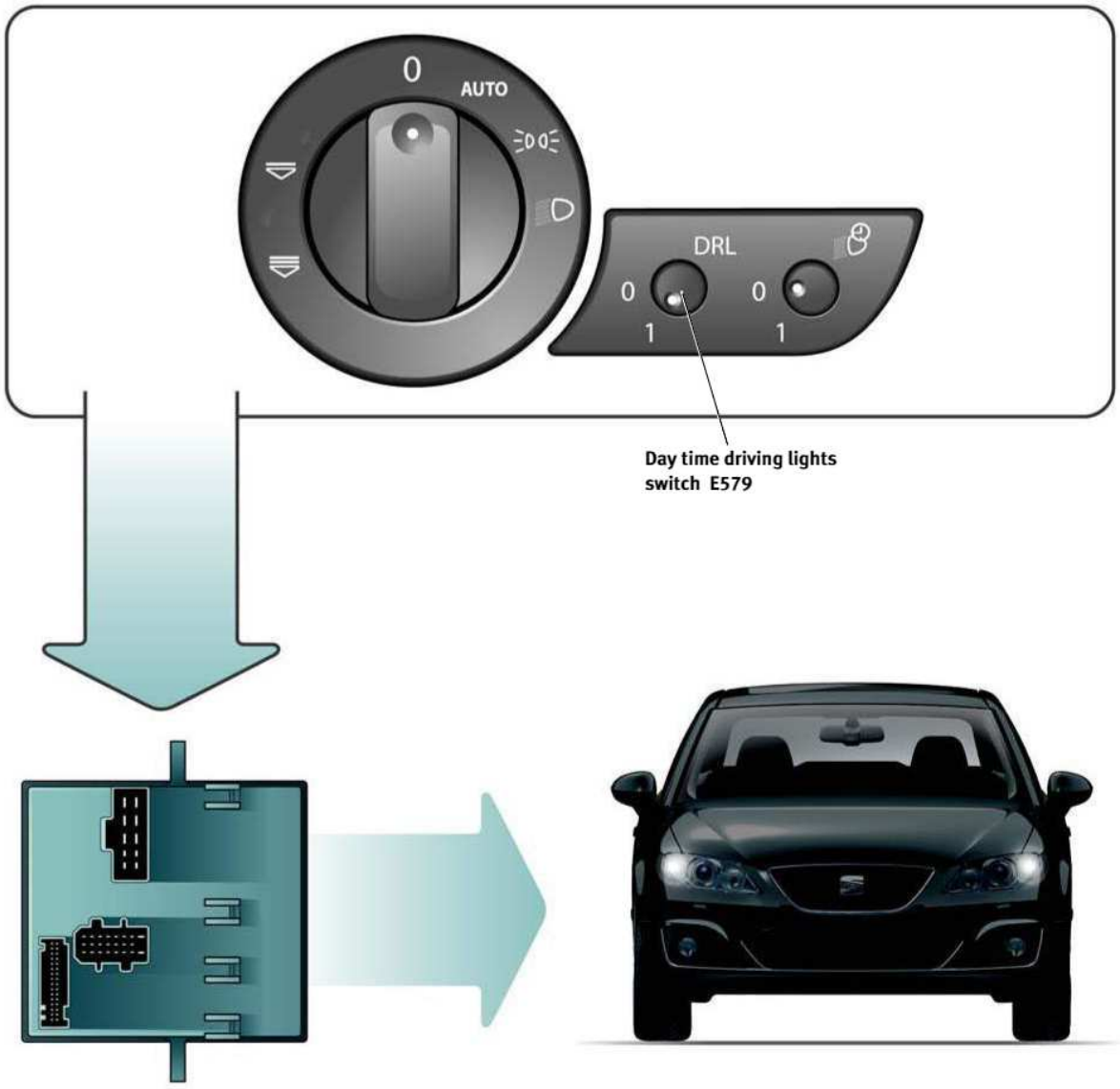
HALOGEN HEADLIGHTS

If the car is equipped with halogen headlights the bulbs for the **front side lights** and the **dipped beam** are used. In this case, the on-board network supplies the bulbs with a **92%** positive duty cycle, that is, the bulbs provide less light intensity.

The On-board network activates the daytime driving lights function under the following conditions:

- Ignition on
- Lights switch E1 in position “0” or “AUTO” with good light conditions.

The on-board network also needs to be coded to carry out this function.



D124-24

BIXENON DYNAMIC STEERING HEADLIGHTS

If the vehicle is equipped with bixenon headlights **auxiliary bulbs of 21W** each are used; they are supplied by the On-board network through two pins.

For the daytime driving lights function, the On-board network supplies the auxiliary 21W bulbs under the following conditions:

- Ignition on
- **Day time driving light switch E579** in position "1".
- Lights switch E1 in position "0" or "AUTO" with good light conditions.

The **On-board network** also needs to be **coded** to carry out this function.

COMING HOME AND LEAVING HOME LIGHTS

The On-board network assumes the coming home and leaving home functions.

As a prior condition, activation of both functions must be available through the coming & leaving home deactivation switch E491.

Coming home function. The On-board network connects the **rear lights**, the **registration plate** and the **front foglights** bulbs under the following circumstances:

- Disconnection of the ignition.
- Driver's door open
- And, when the rain & light sensor G397 detects poor ambience lighting.

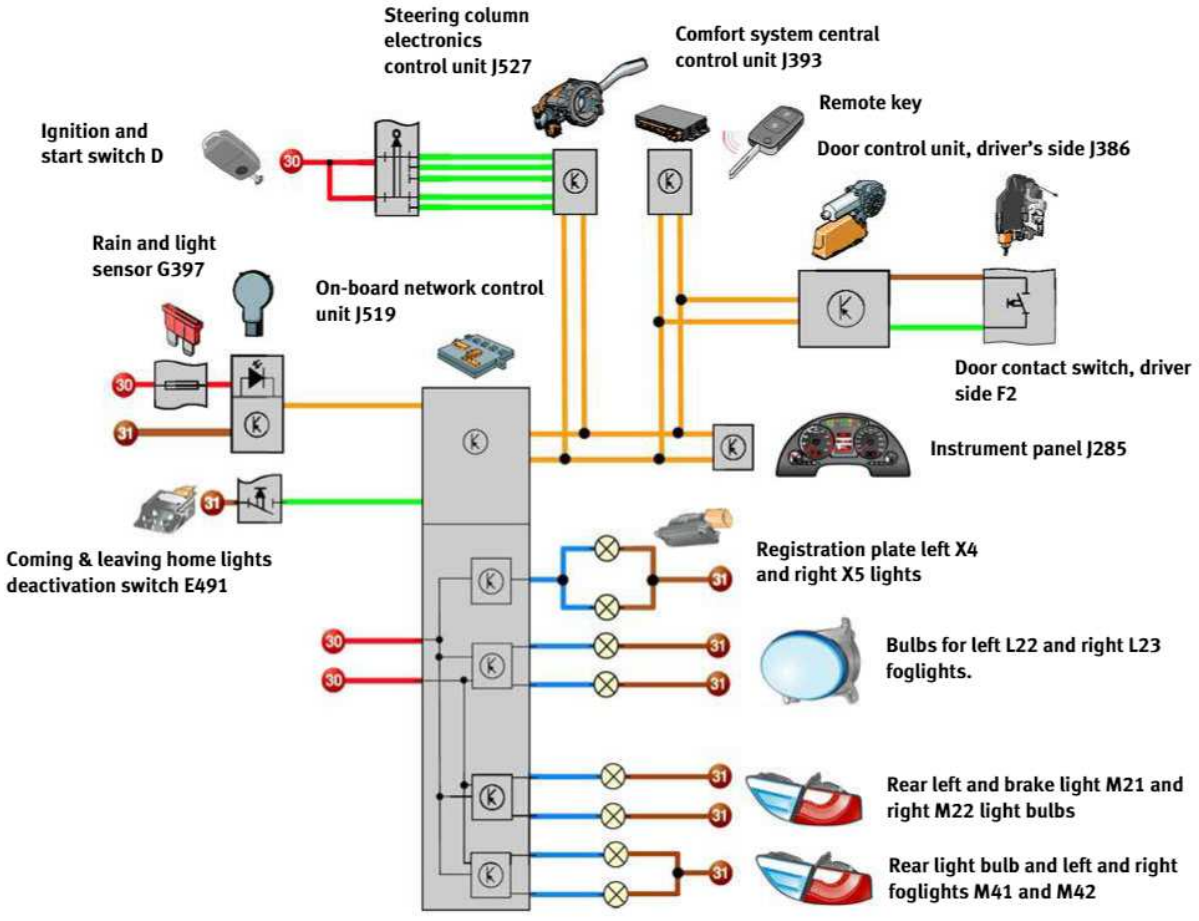
Once all the doors are closed the lights mentioned remain on for a maximum of 30 seconds. This time can be extended up to 60 seconds via the VAS 505x.

While one of the doors is open the exterior lighting will remain on for a maximum of two minutes.

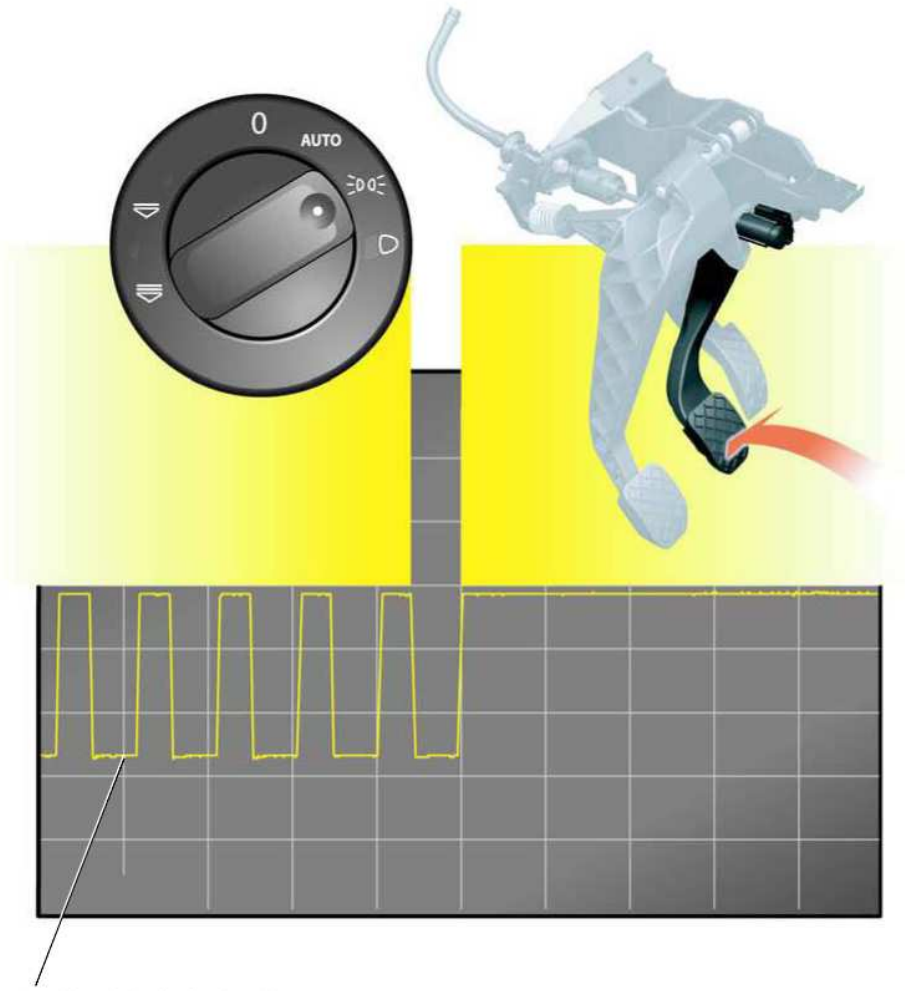
Leaving home function. The On-board network connects the same lights as for the coming home function by unlocking the vehicle under poor ambience light.

The lights go off when the driver's door is opened.

If the vehicle is unlocked and no door is opened the lights will remain on for 55 seconds.



D124-25



Energising signal for the bulbs for the side indicator/brake lights and side indicator/fog lights

D124-26

REAR LIGHTS

For the rear side -ights (position) there are **two bulbs in each side**. One on the body section light and another one on the tailgate section light.

The **body section** side-light bulb is a **21 W** bulb and it is shared with the brake lights.

The **tailgate section** side-light bulb is a **21 W** bulb and it is shared with the foglight.

To switch from side-lights to brake lights or foglights the lighting intensity of the bulb is modified.

Variation of the light intensity is achieved by varying the positive duty cycle of the PWM signal with which the on-board network supplies the bulbs.

To activate the side-lights, the On-board network supplies the bulbs with a PWM signal of approximately 50% of the positive duty cycle.

To activate the brake lights or the foglights the On-board network supplies the bulbs with a 100% positive duty cycle, that is, an approximately 12V continuous signal.

This is how a greater lighting intensity is achieved for the brake and fog lights.

BULBS MONITORING

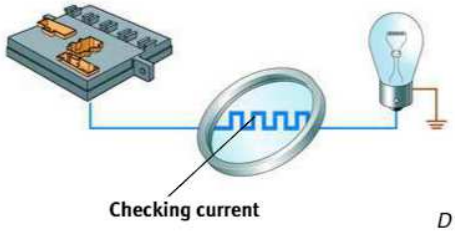
The On-board network diagnoses the exterior lights electrical circuit in order to detect any possible faults.

There are **two types of monitoring** depending on whether the lights are off (cold diagnosis) or on (hot diagnosis).

COLD MONITORING

When the ignition is connected a **check-up current** is applied for 200 microseconds, which is repeated for five cycles. The state of the circuit is checked by reading the curreent threshold or by checking the status (circuit open/closed)

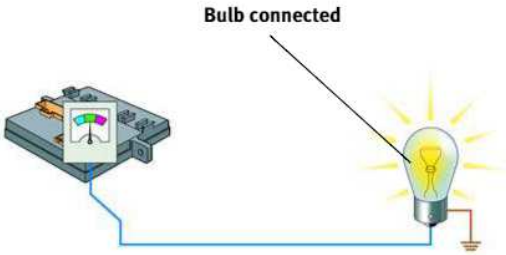
This is how it is possible to detect faulty bulbs before connecting them.



D124-27

HOT MONITORING

If **after** a **cold monitoring** with no faulty bulb detected a bulb happens to fail, this situation will be memorised after connecting the bulb.

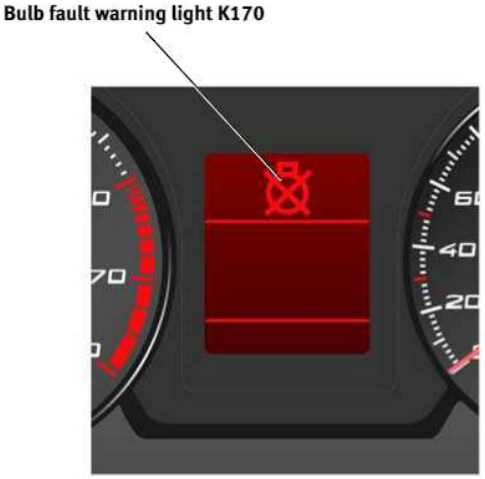


D124-28

FAULTS DETECTION

When this fault is detected in an exterior lights circuit, the on-board network control unit registers the fault in its memory and sends it to the Comfort CAN-Bus so that the instrument panel informs the driver through the warning light K170.

If the fault has been repaired, the system detects this through its monitoring systme and deletes the fault registered in the memory internally, and informs the instrument panel so that the bulbs failure warning light is switched off.



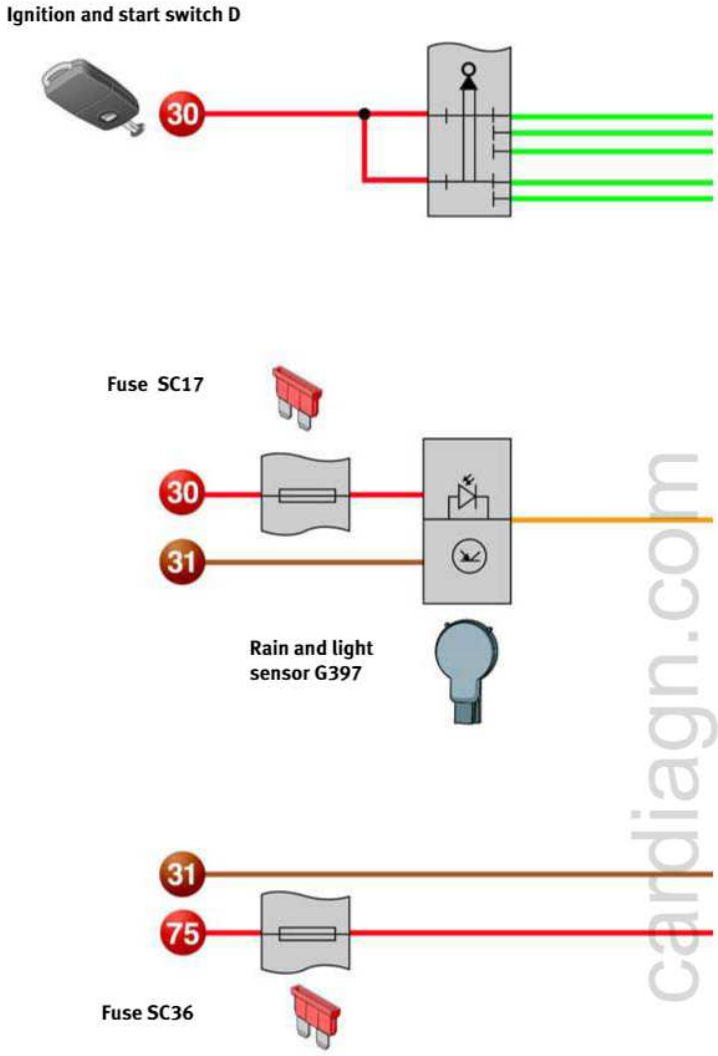
D124-29

ON-BOARD NETWORK - WINDSCREEN WIPER

The On-board network control unit controls the following **windscreen wiper related functions**:

- Single press wipe
- Intervals wipe
- Low speed.
- High speed.
- Windscreen wiper activation after windscreen washer activation.
- Thermal protection.
- Windscreen washer.
- Headlights washer

The most outstanding functions are explained next.



INTERVALS WIPE

Pause duration between wipes varies according to:

- the position of the E38 potentiometer placed on the windscreen wiper stalk.
- and, vehicle speed.

The potentiometer E38 has **four positions** corresponding to **four periods** of duration of the pauses between wipes. Also, each time period varies depending on the speed of the vehicle.

For vehicles equipped with rain sensor, the potentiometer E38 is used for adjusting the sensitivity of the rain sensor.

WINDSCREEN WIPER ACTIVATION AFTER WINDSCREEN WASHER ACTIVATION

When the windscreen wiper function is finalised, the On-board network activates the low speed up to a maximum of two wipes depending on the time the stalk is being activated.

THERMAL PROTECTION

It is the disconnection of the windscreen woiper motor when there is an obstacle in the wipers travel blocking them fully or partially.

The motor can be disconnected because of electrical consumption or time of activation.

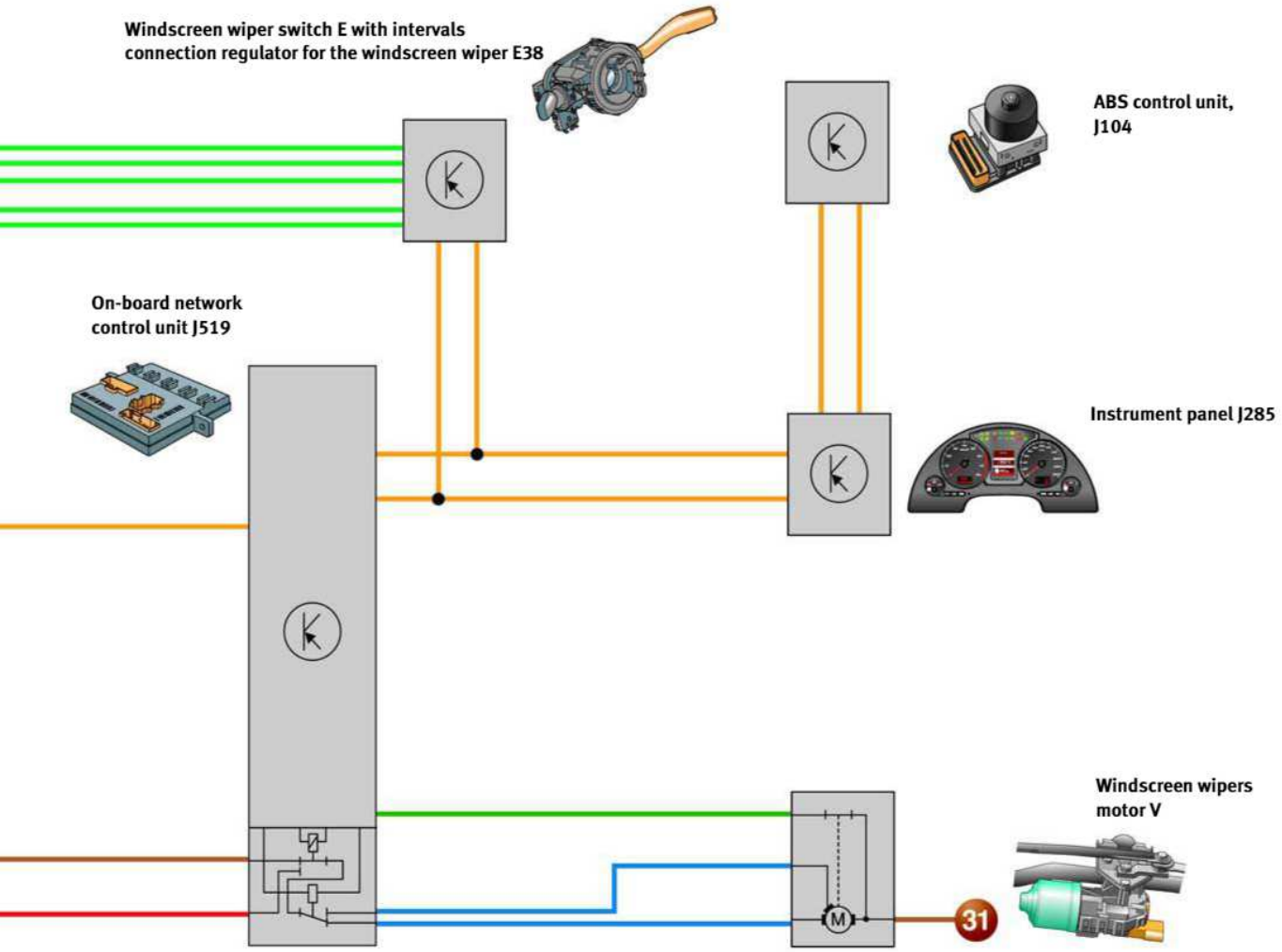
By electrical consumption. If the On-board network recognises a windscreen wiper motor consumption of over 32A, it disconnects the motor automatically.

By time of activation. If the end of stroke motor - integrated in the windscreen wiper motor V- does not switch over to earth within an interval of 4 seconds it is disconnected.

Be it disconnection either from electrical consumption or because of time of activation, after a 12 seconds waiting period a new activation takes place at low speed. This process is repeated cyclically until normal operation of the windscreen wiper is recognised.

CONNECTION WITH THE STALK AT REST

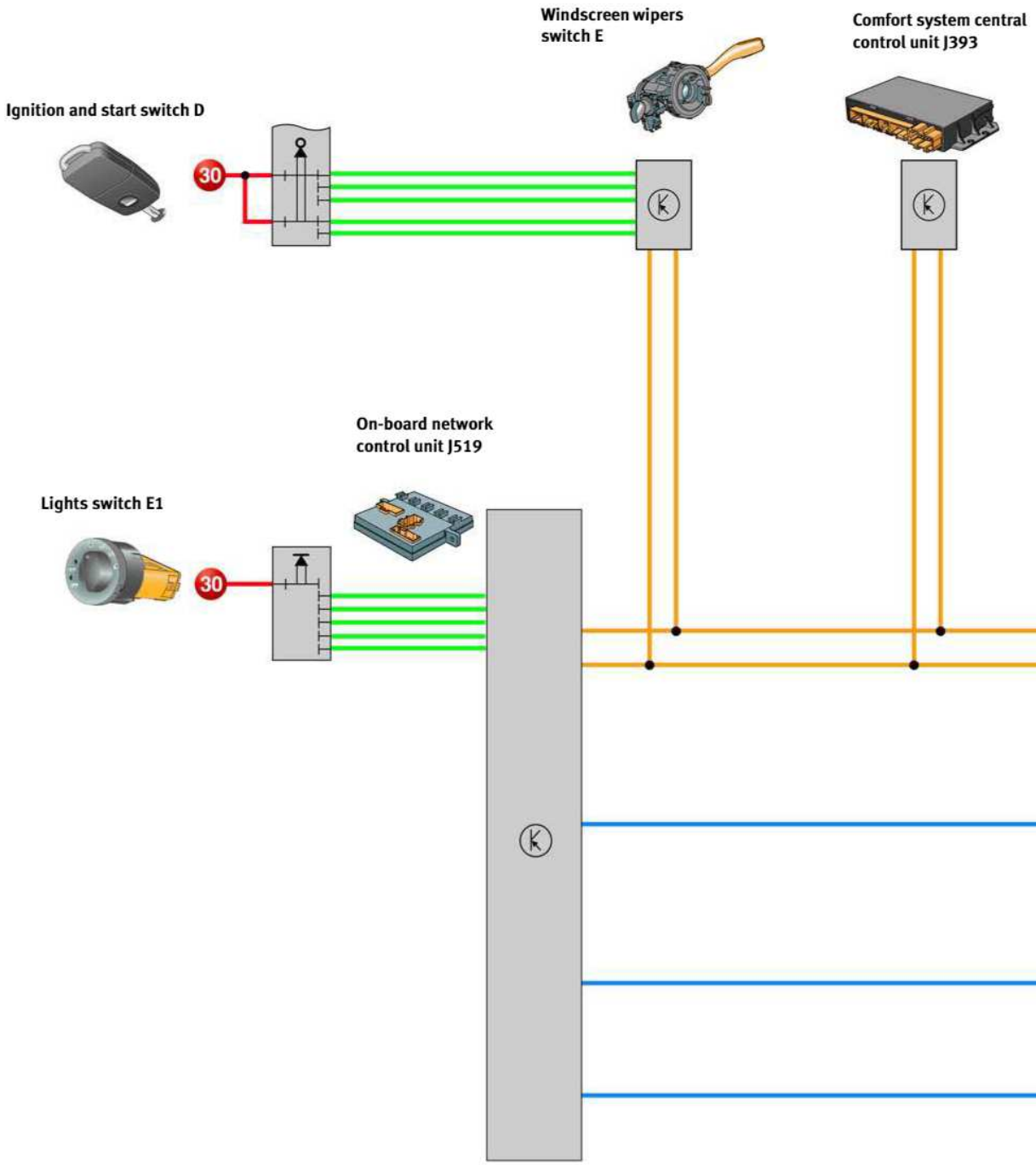
If the stalk is in the 'at rest' position and when connecting the ignition the end of stroke switch is detected as being open, the On-board network

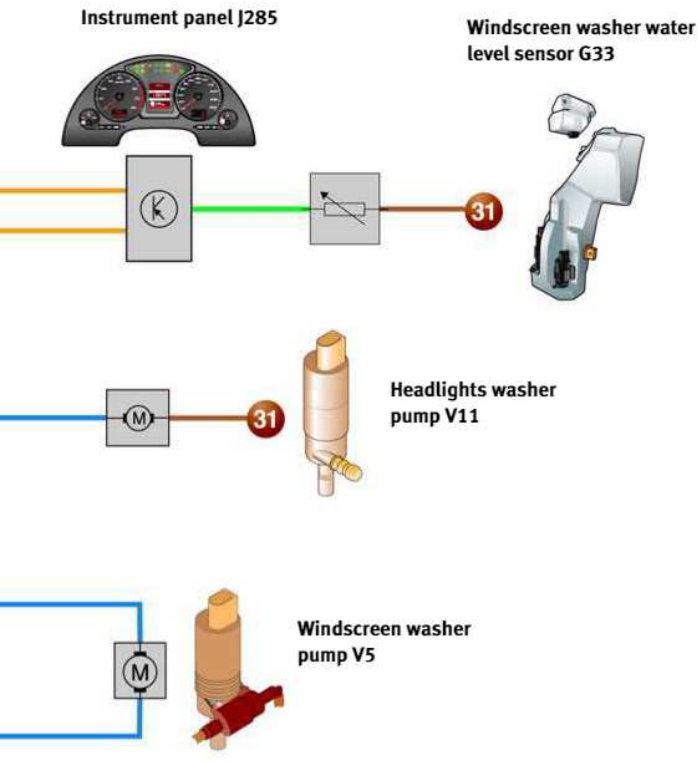


D124-30

activates the windscreen wiper motor at low speed during a maximum of 4 seconds until the end of stroke switch changes over to earth. This process is carried out only once during the ignition connection phase.

ON-BOARD NETWORK - WINDSCREEN WIPER





D124-31

WINDSCREEN WASHER

To activate the windscreen washer function there is the **V5 pump**, which is supplied with positive and negative by the On-board network.

HEADLIGHTS WASHER

The conditions for headlights washer activation are:

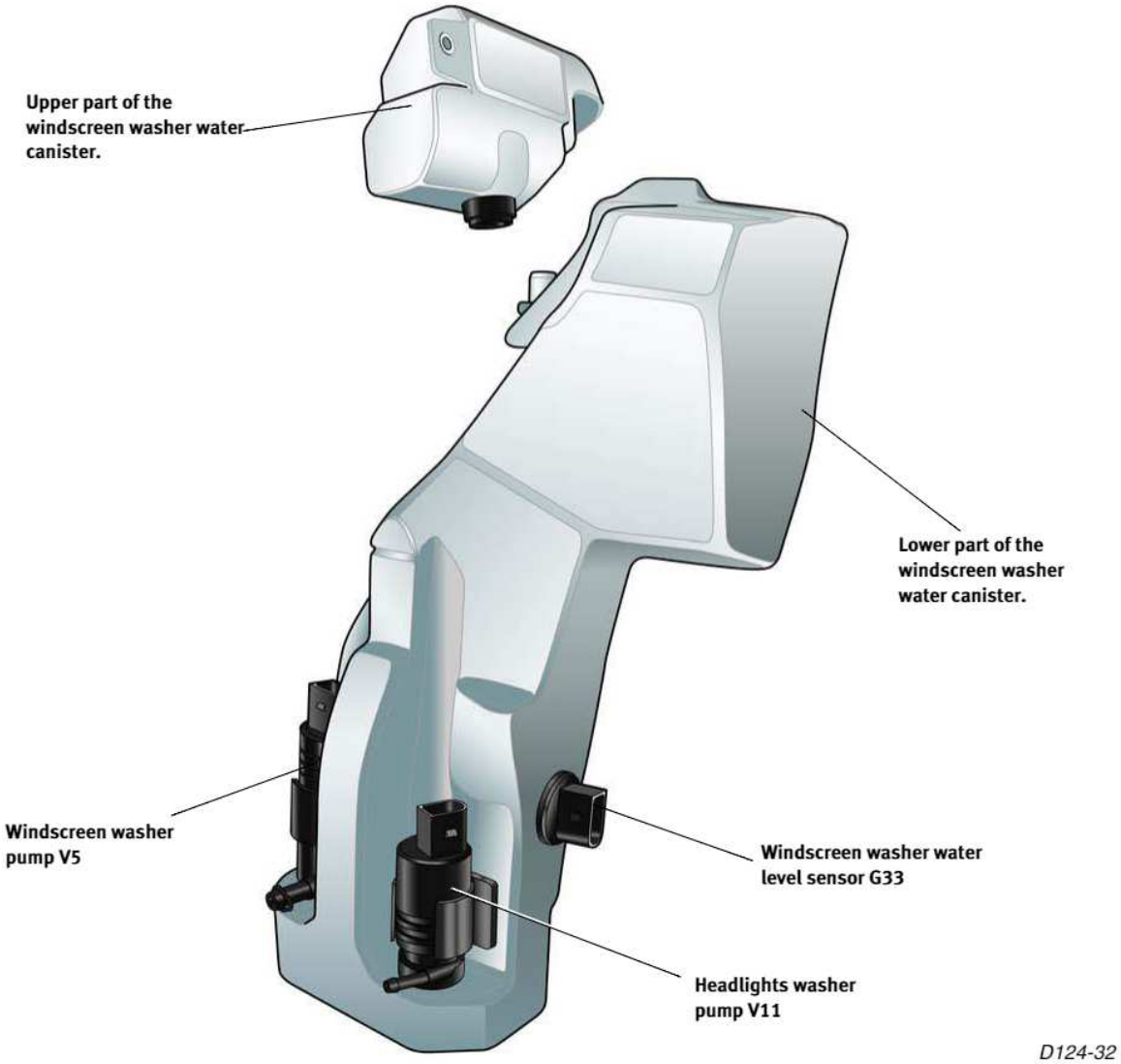
- Activation of the windscreen washer stalk for over one second.
- Dipped beam connected
- Correct windscreen washer water level.

The On-board network recognises the windscreen washer water level through the **sensor G33**.

If the **water level** of the windscreen washer is **low**, the On-board network **does not supply** the **headlights washer pump V11** in order to save water and keep the windscreen washer function running for longer.

It is also a protective measure for the headlights washer pump as it prevents wear from continuous running when dry.

Activation of the **headlights washer pump V11** takes place by means of a **relay** placed **inside** the control unit of the **On-board network J519**. The energising time is 800 miliseconds for every washing process.



WATER CANISTER FOR THE WINDSCREEN WASHER

The water canister for the windscreen washer was designed in **two independent parts** in order to make assembly and removal easier.

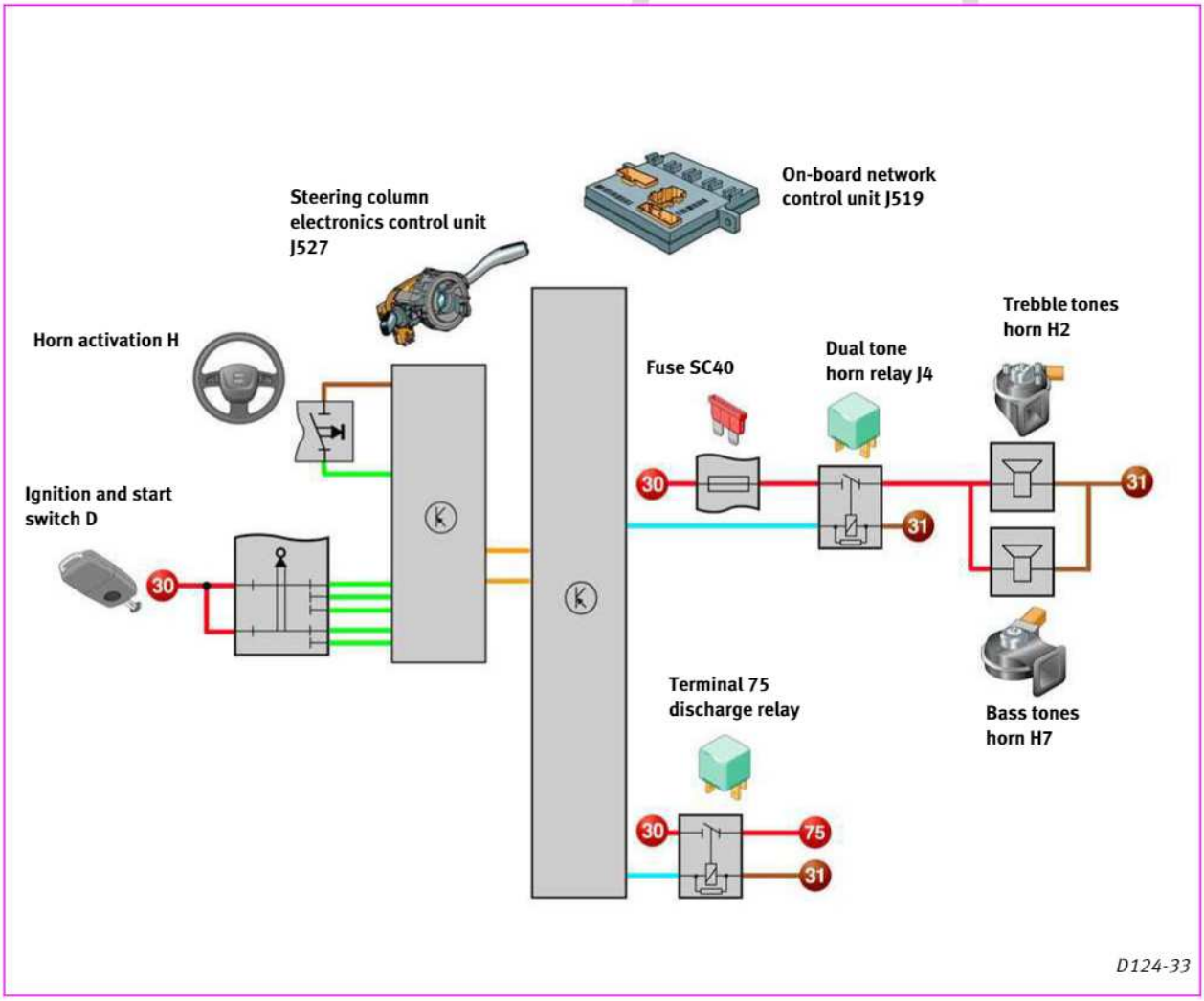
The **upper part**, which is smaller, is placed in the engine compartment. The **lower part** is placed at the front left wheel arch.

Both **V5 and V11 pumps** are fitted in the **lower part** of the canister.

Only vehicles equipped with **headlights washer** include the **windscreen washer water level sensor G33**.

If a vehicle is not equipped with headlights washer, a plug is fitted instead of the sensor G33.

ON-BOARD NETWORK - AUXILIARY FUNCTIONS



HORN

The **horn activation H** signal is sent to0 the **steering column electronics control unit J527**. his controln unit converts this signal into a CAN-BUs message and sends it to the Comfort line. The **On-board network** picks up the message and energises the **bass horn** and the **trebble horn** through **relay J4** .

TERMINAL 75 DISCHARGE RELAY

The on-board network energises the **terminal 75 discharge relay** when it receives the ignition connection signal and cuts off the energising when receiving signal 50 or when disconnecting the ignition. The realy is placed in the **9 position relay holder**.

Information from the ignition switch D is received through the Comfort CAN-Bus from the steering column electronics control unit J527.

SYSTEM LAYOUT

The comfort system functions and their control are shared among the central unit and the door units.

CENTRAL COMFORT UNIT

Interior lighting.
- Activation.
- Deactivation.

Anti-theft alarm system.
- Connecting and disconnecting.
- Assumed functions.

Fuel tank lid opening.
Tailgate opening.
Comfort opening and closing.
Gateway function for diagnosis

DOOR UNITS

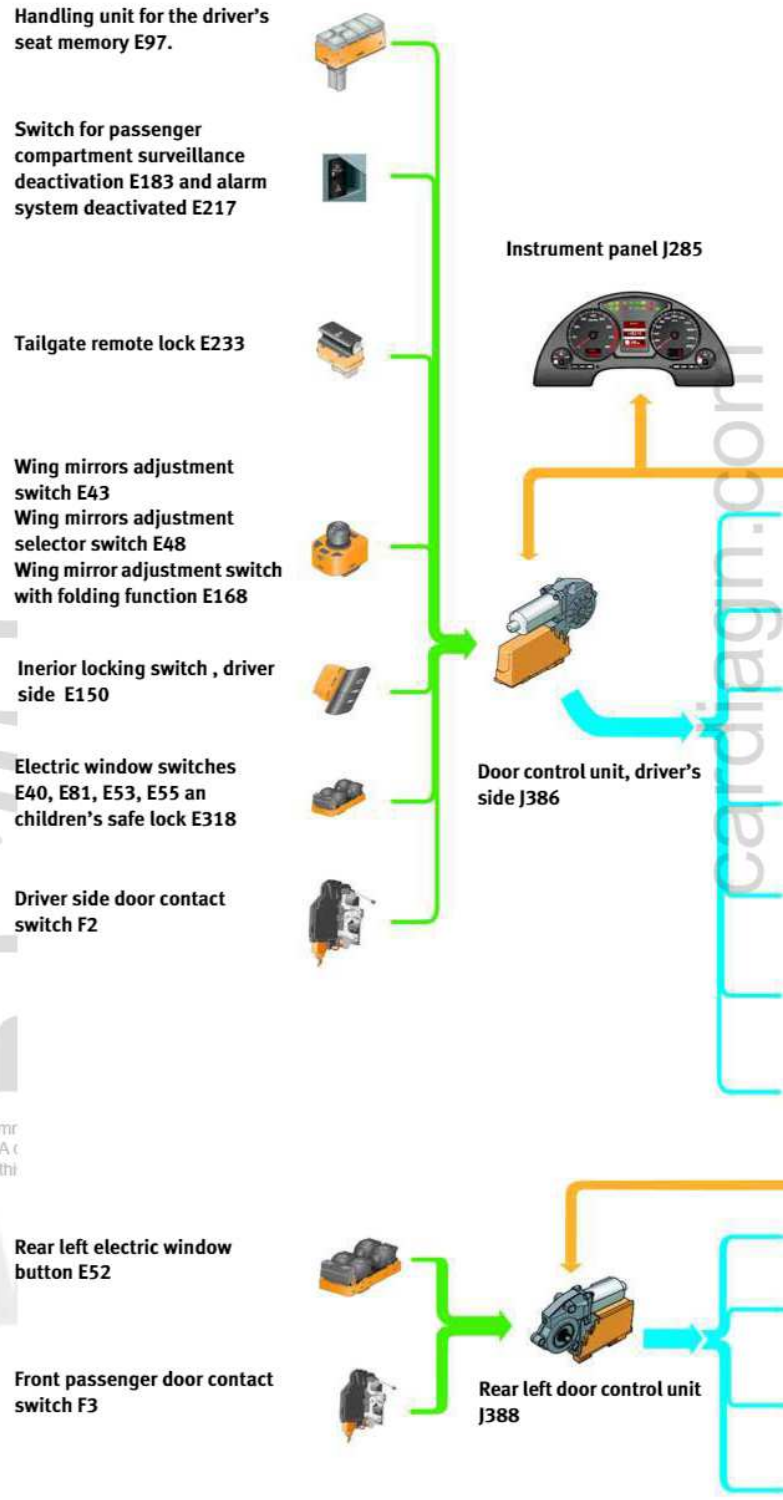
"Safe" central locking warning light K133 activation.

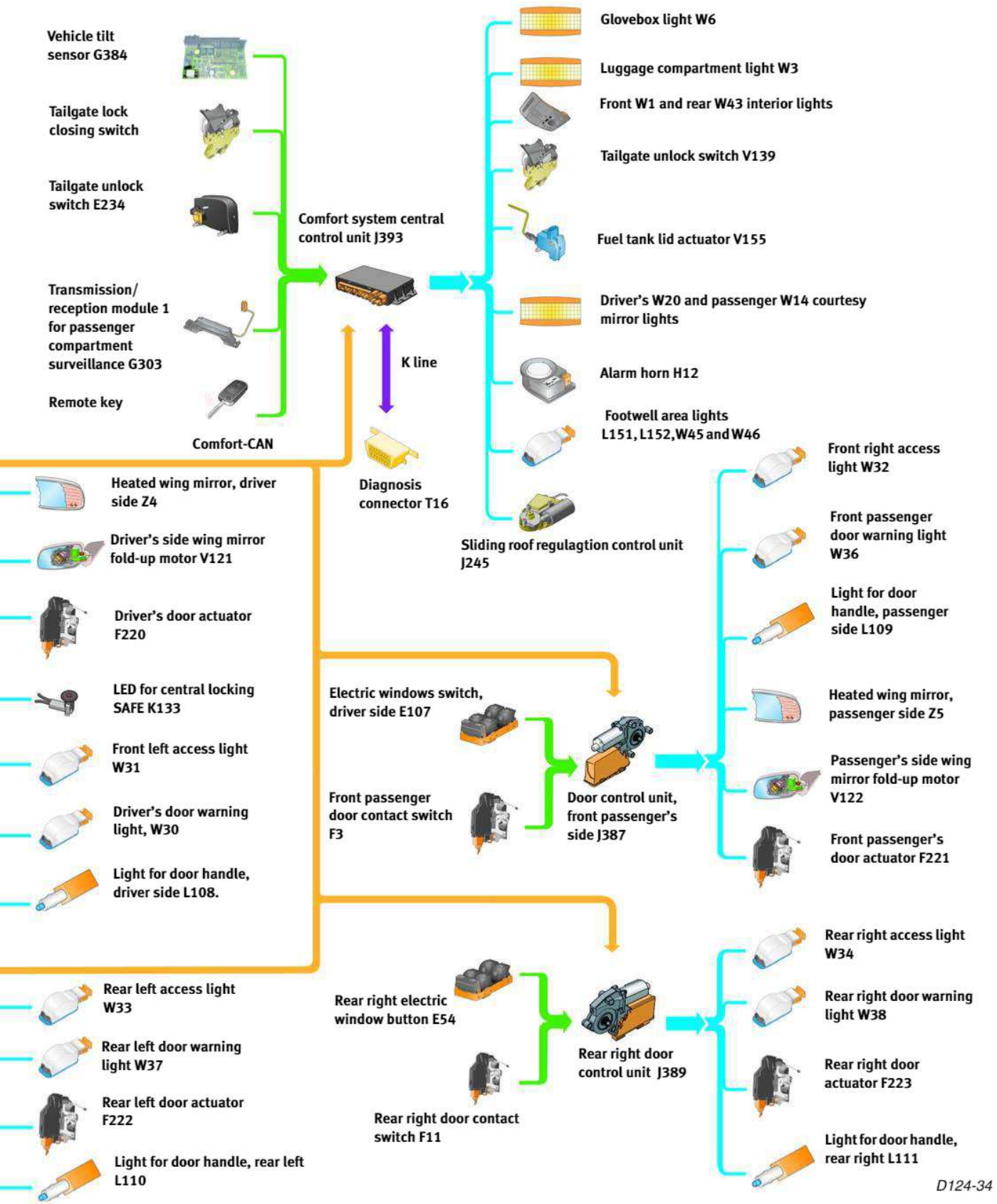
Electric windows.
- Rising and lowering: manual and automatic.
- Anti-trap function.
- Rear electric windows locking (driver's door)
- Standardising of parameters

Central locking.
- "*Safe*" single or double locking.
- Speed autolock.
- Single unlocking
- Global unlocking.
- Unlocking form airbag activation.
- Confirmation warnings
- Unlocking by contact "S" signal.

Wing mirrors control (only front doors).
- Aiming.
- Heating.
- Folding and unfolding.

Lights on the doors





COMFORT SYSTEM CENTRAL CONTROL UNIT J393

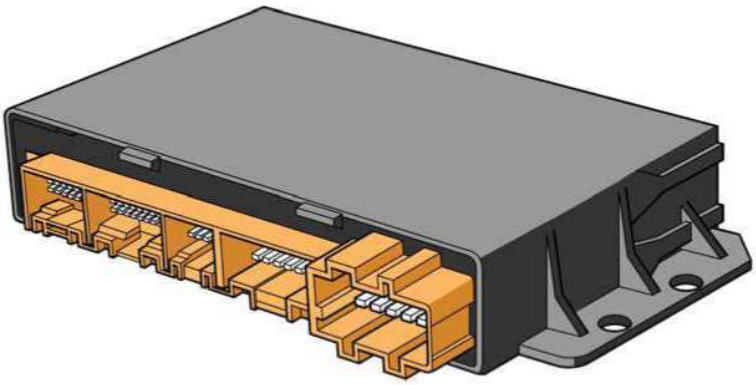
The central comfort unit J393 is placed **under** the **front left foot-rest** inside an **electronics box**. To have access to it the floor-mat must be partially moved out of the way and the lid of the electronics box removed.

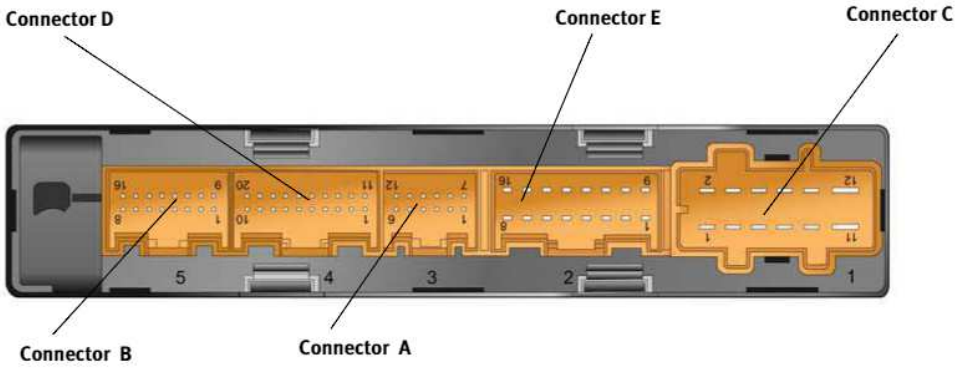
It has **five connectors**:

- A with 12 pins.
- B with 16 pins.
- C with 12 pins.
- D with 20 pins.
- E with 16 pins.

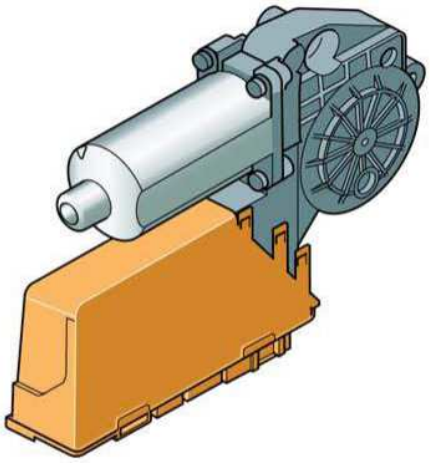
There are **three control unit versions** with three different parts references depending on whether the vehicle:

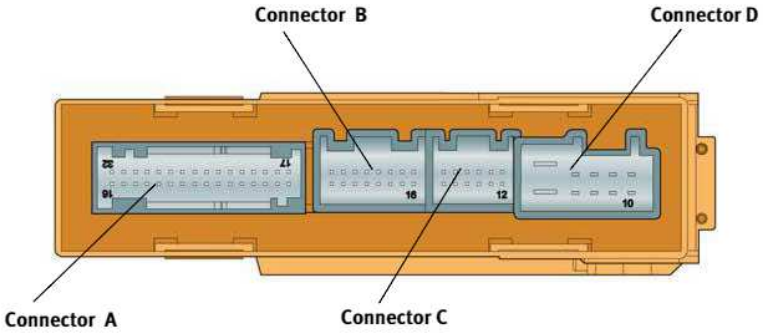
- Is not equipped with alarm nor footwell area lights.
- Is equipped with footwell area lights.
- Is equipped with alarm and light at the footwell area.





D124-35





D124-36

DOOR CONTROL UNITS J386, J387, J388 AND J389

They are fitted in each of the doors. To access them you need to remove the door trim first.

Physically, the door units are practically identical.

They have **four connectors**:

- A with 32 pins.
- B with 16 pins.
- C with 12 pins.
- D with 10 pins.

There are **two versions, MIN and MAX**, for the driver's door control unit J386 and passenger door control unit J387, depending on whether the car is equipped with electric or manual wing mirrors.

There is only one version of the rear left J388, and rear right J389 door control units.

INTERIOR LIGHTING

The central comfort control unit J393 controls the activation of the following bulbs:

- Interior lights.
- Courtesy mirror lights.
- Glovebox light
- Luggage compartment light.
- Footwell area lights.

INTERIOR LIGHTS

It includes two, a **front one, W,** on the central panel, and another **rear one, W43,** at the rear of the roof.

The **front W** interior light also includes **two reading lights**, one for the driver, W19, and another one for the front passenger, W13.

The **rear W43** interior light has two bulbs, W11 left and W12 right, which act as reading lights when pressing the approrpriate button. If any of the doors is open the interior light cannot be switched off from the buttons.

Both lights W and W43 are controlled by the central comfort control unit J393 through **negative** under the following circumstances:

- When unlocking the vehicle.
- When opening one of the doors.
- When taking out the ignition key (terminl S).
- In the event of a collision with airbag deployment.

The lights are switched off 30 seconds after closing the last door or immediately when locking the car or when switching the ignition on.

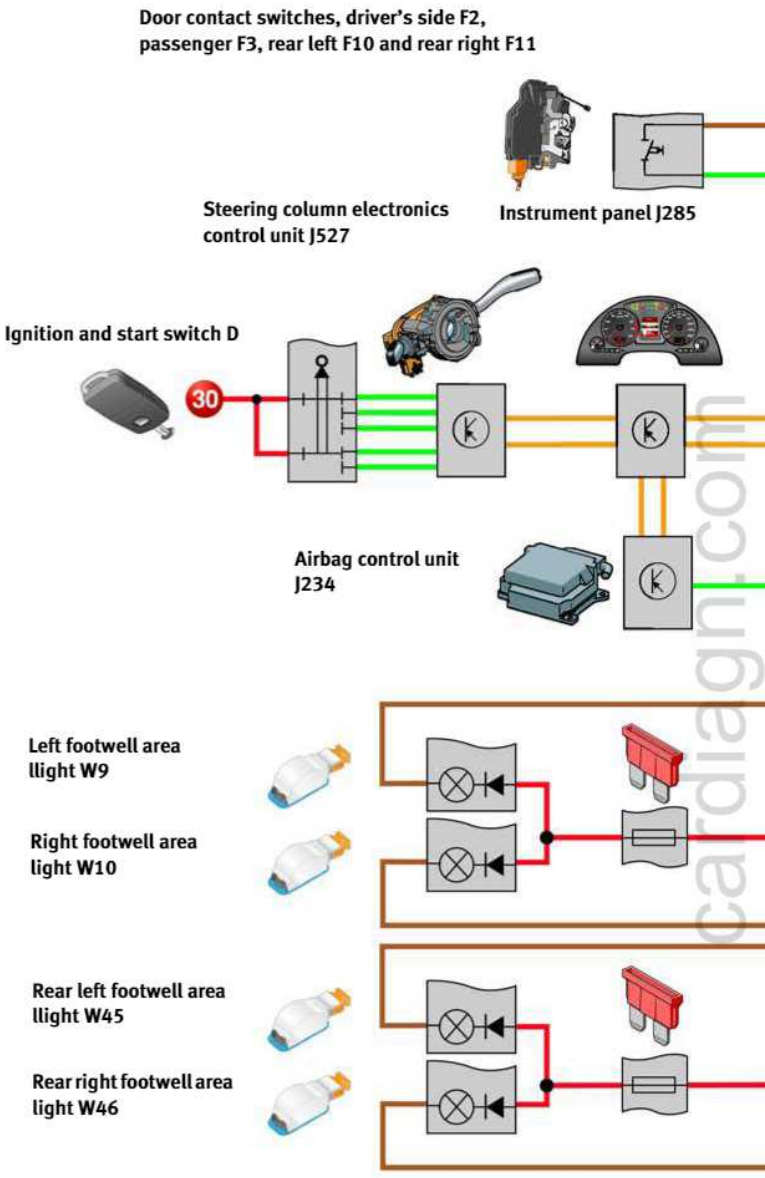
If any door remains open the light is disconnected after 10 minutes to prtotect the battery charge.

COURTESY MIRROR AND GLOVEBOX LIGHTS

The bulbs of the courtesy mirrors lights L31 and of the glovebox W6 are **supplied** by the same **positive** wire from the central comfort control unit J393 when the corresponding switch closes.

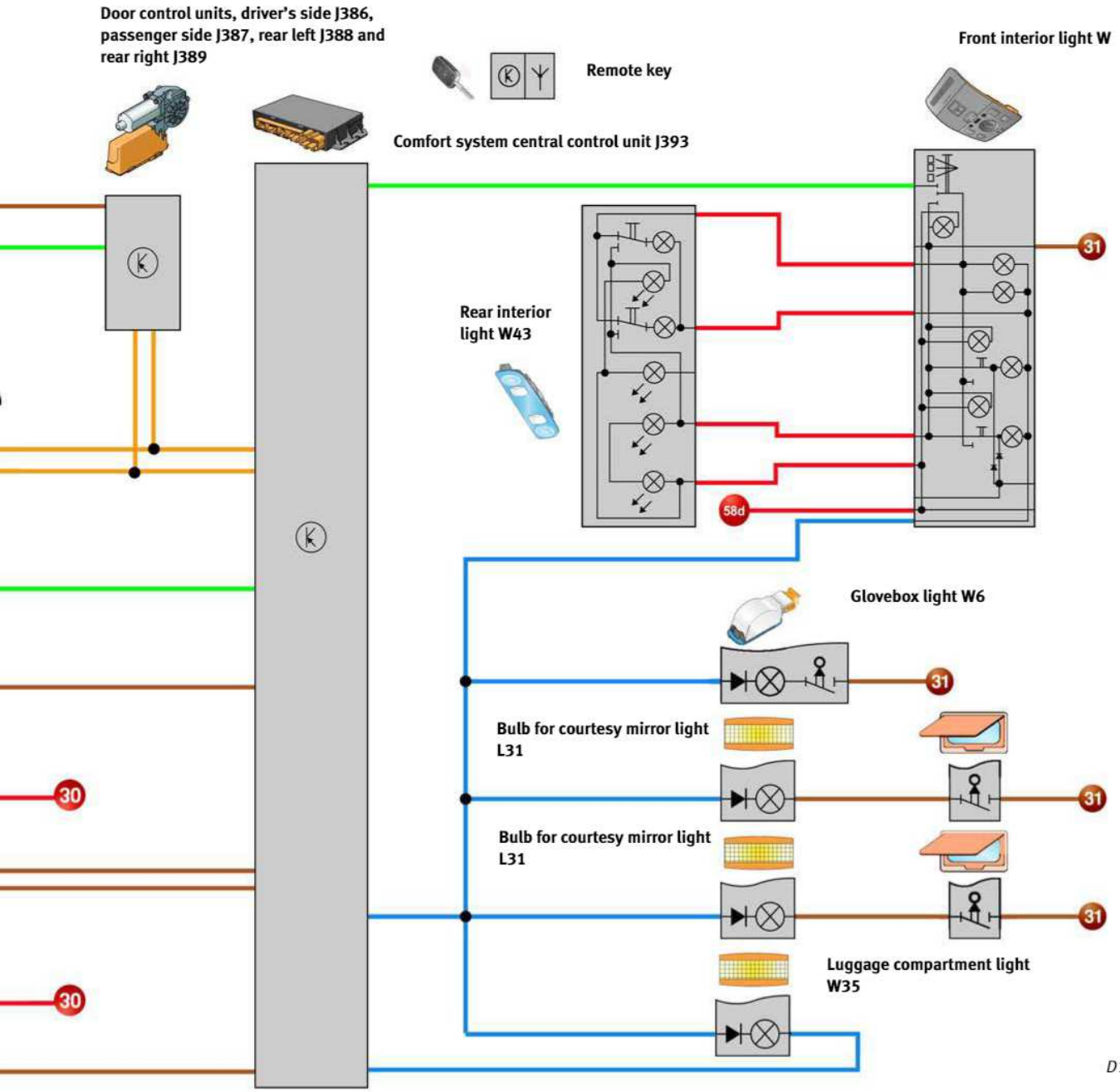
LUGGAGE COMPARTMENT LIGHT

The central comfort control unit J393 supplies both with **positive** and with **negative** the luggage compartment light W35 when it gets the earth signal from the luggage compartment lights switch F5 (open luggage compartment). If the luggage compartment remains open for over 10 minutes, the system switches off the light automatically.



FOOTWELL AREA LIGHTS

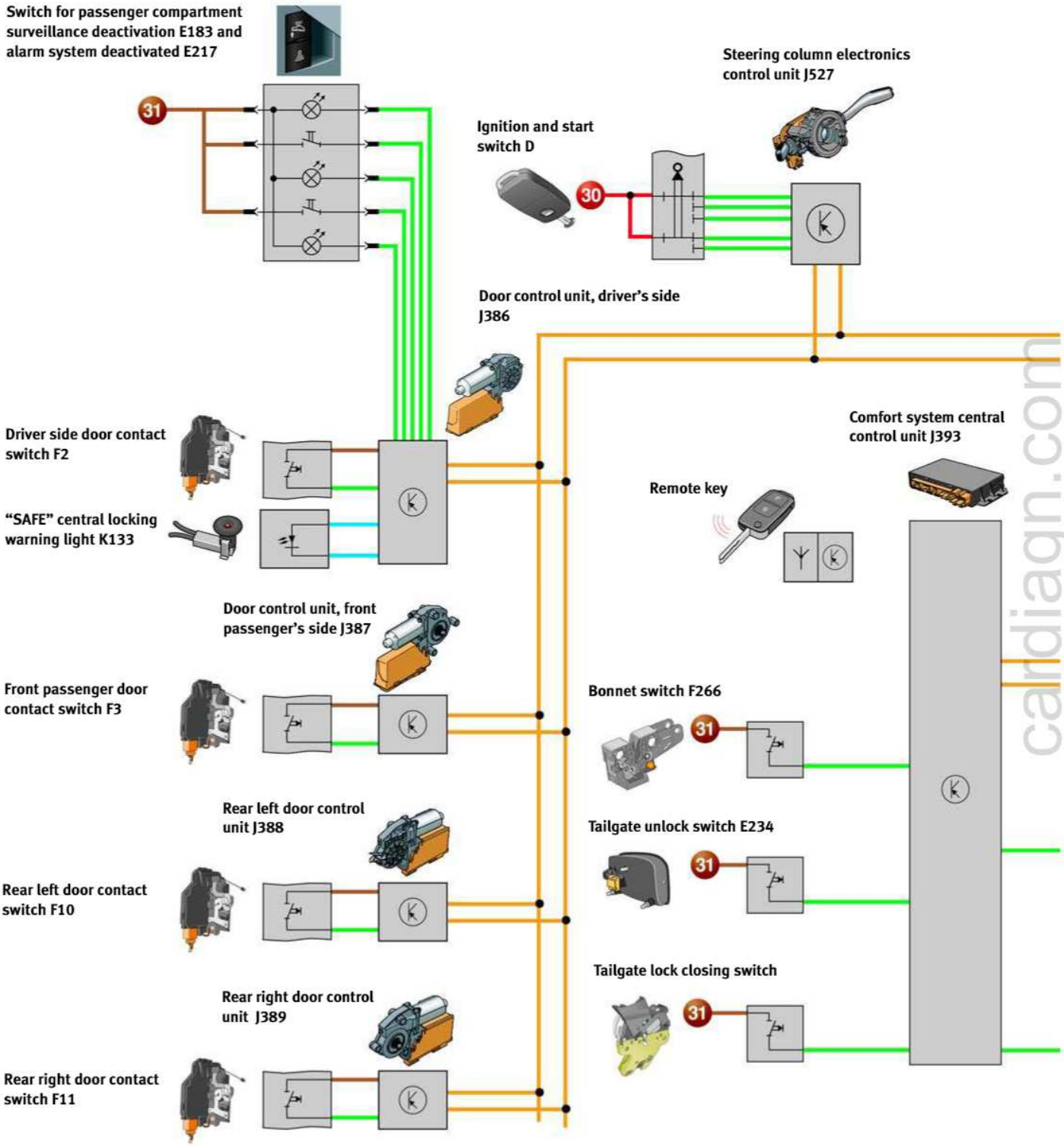
There are **four** lights placed in the driver's side footwell area W9, the front passenger's footwell area W10, the rear left footwell area W45, and the rear right footwell area W46. In all cases, the



comfort control unit controls the lights activation via **negative** wire.

Each of the lights is energised when the corresponding side door is opened.

COMFORT - CENTRAL UNIT



ANTI-THEFY ALARM SYSTEM

The central comfort control unit J393 manages the vehicle's anti-theft alarm system.

Regarding this system, the functions assumed by the central comfort control unit J393 are:

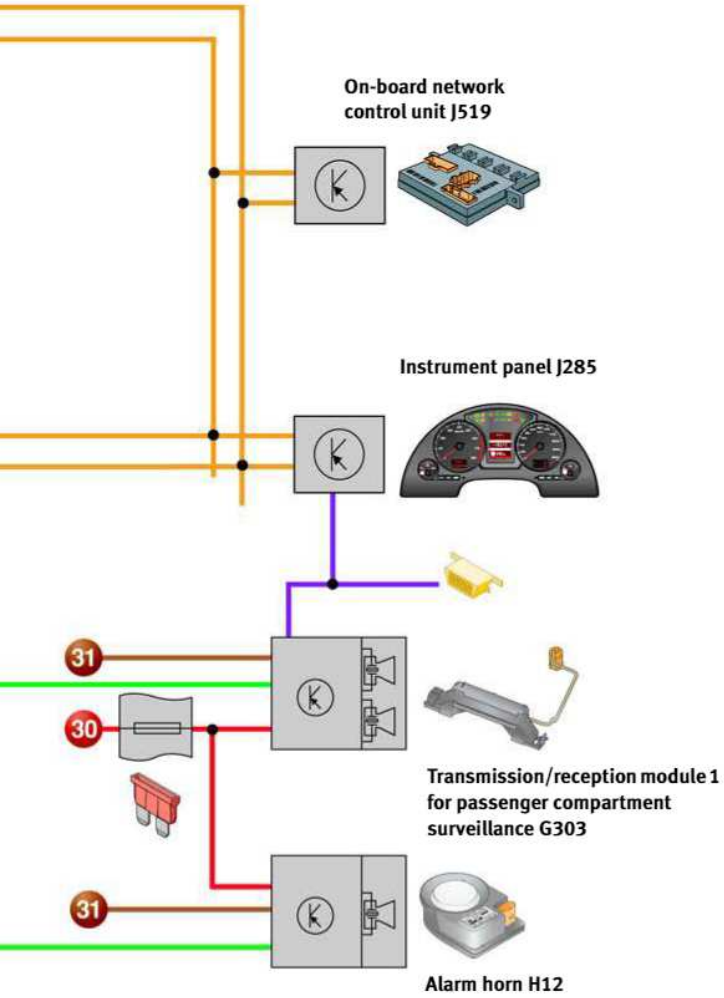
- Doors, luggage compartment and bonnet monitoring.
- Passenger compartment surveillance
- Protection against towing away.

All three functions are activated about **30 seconds** after **locking** the vehicle with the remote control or with the key in the driver's door lock.

They are only **deactivated** if the vehicle is **unlocked** with **the remote control**. If it is unlocked from the driver's door, there are **15 seconds** to switch on the **ignition** and disconnect them.

DOORS, LUGGAGE COMPARTMENT AND BONNET MONITORING

To run the doors, tailgate and bonnet surveillance function, the central comfort control unit J393 takes into account the opening **switches** placed on each of them. The other two functions are detailed next.

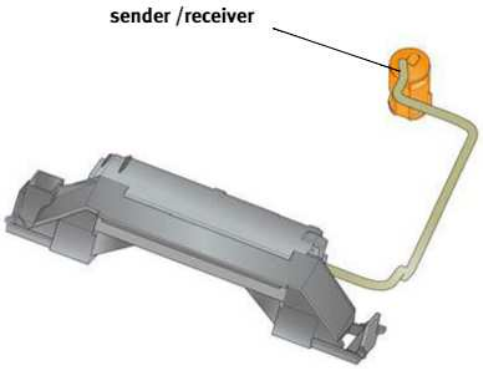


D124-38

PASSENGER COMPARTMENT SURVEILLANCE

The passenger compartment surveillance function activates the alarm horn H12 when it detects any **movement inside** the vehicle.

In order to detect movement, the central comfort control unit J393 takes into account the signal from the passenger compartment surveillance transmission/reception module 1, G303.



D124-39

TRANSMISSION/RECEPTION MODULE 1 FOR PASSENGER COMPARTMENT SURVEILLANCE G303

The module is placed on the **interior light central dome**. It works on the basis of sending and receiving ultrasounds to detect movements inside the passenger compartment. It has **four pins**, through which it receives or sends:

- earth
- positive,
- K wire for diagnosis,
- and signal wire to the comfort unit.

Passenger compartment surveillance deactivation switch E183

D124-40

PASSENGER COMPARTMENT SURVEILLANCE DEACTIVATION SWITCH E183

The E183 switch allows deactivating the passenger compartment surveillance.

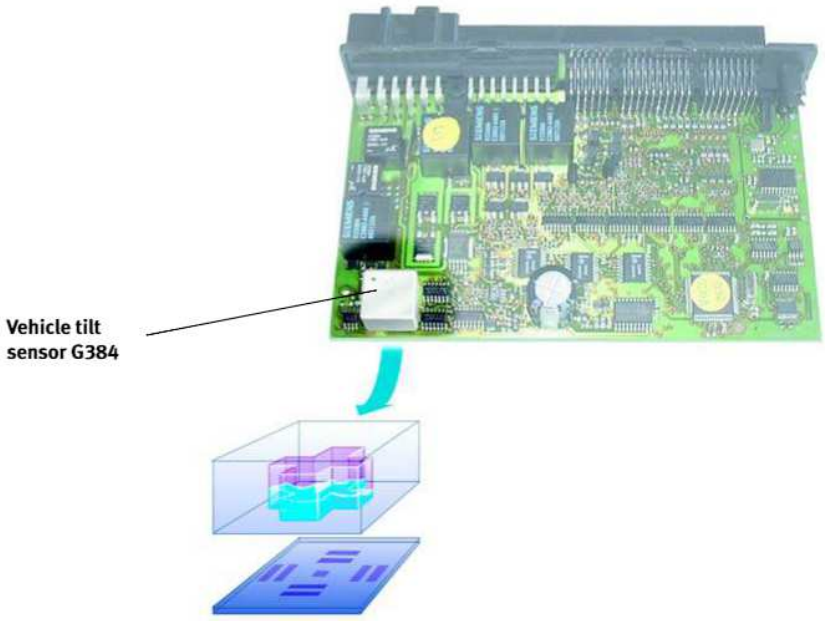
It is placed at one side of the **stowage compartment** of the driver's door.

It acts as a press button and sends an **earth** pulse to the door control unit, driver's side J386.

Once the pasenger compartment surveillance is deactivaed the LED of the switch itself is switched on. The next time the alarm system is acivated the passenger compartment surveillance is also activated.

PROTECTION AGAINST TOWING

To protect the vehicle against the possibility of theft towing, the signal from the **vehicle tilt sensor G384** is used.



D124-41

TILT SENSOR G384

The tilt sensor is placed inisde the central comfort control unit J393.

It principle of operation is based on the detection of a change of the **resistance** of an electricty **conductor fluid**.

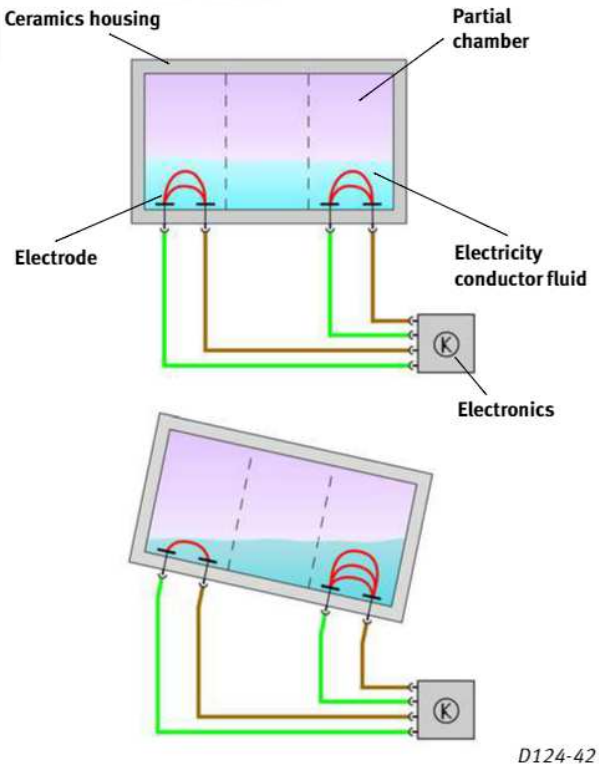
The fluid is inside a **ceramics housing** with several **electrodes** crossing it and dividing the interior of the housing into several **partial chambers**.

An electrical current is applied to each electrode.

Any change to the vehicle's position modifies the distribution of fluid in the chambers and as a result the electrical resistance in that zone.

Such a change of resistance is detected by the **electronics**, which activates the alarm.

The system takes as a reference value the existing reistance at the moment of locking the vehicle.



D124-42

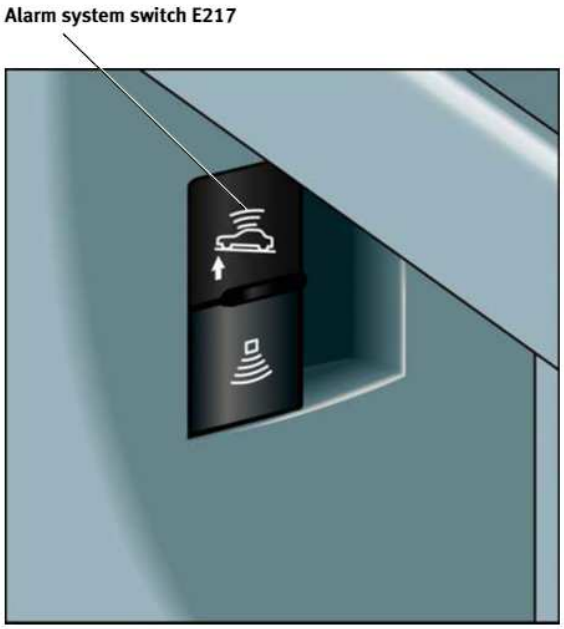
ALARM SYSTEM SWITCH DEACTIVATED E217

The E217 switch allows deactivating the **protection against towing**.

It is placed at one side of the driver's door pocket, next to the passenger compartment surveillance deactivation switch E183.

It acts as a press button and sends an **earth** pulse to the door control unit, driver's side J386.

If the prtection against towing has been deactivated, the LED on the switch lights up. The next time the alarm system is acivated the protection against towing is also activated.

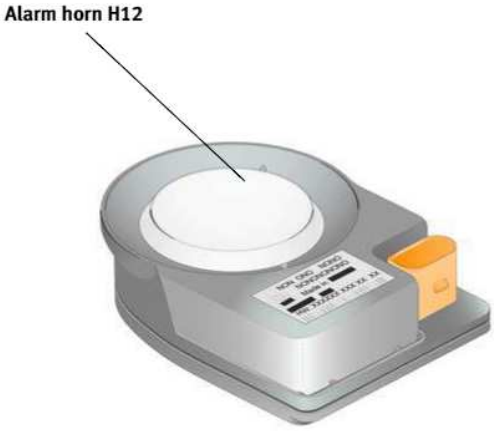


D124-43

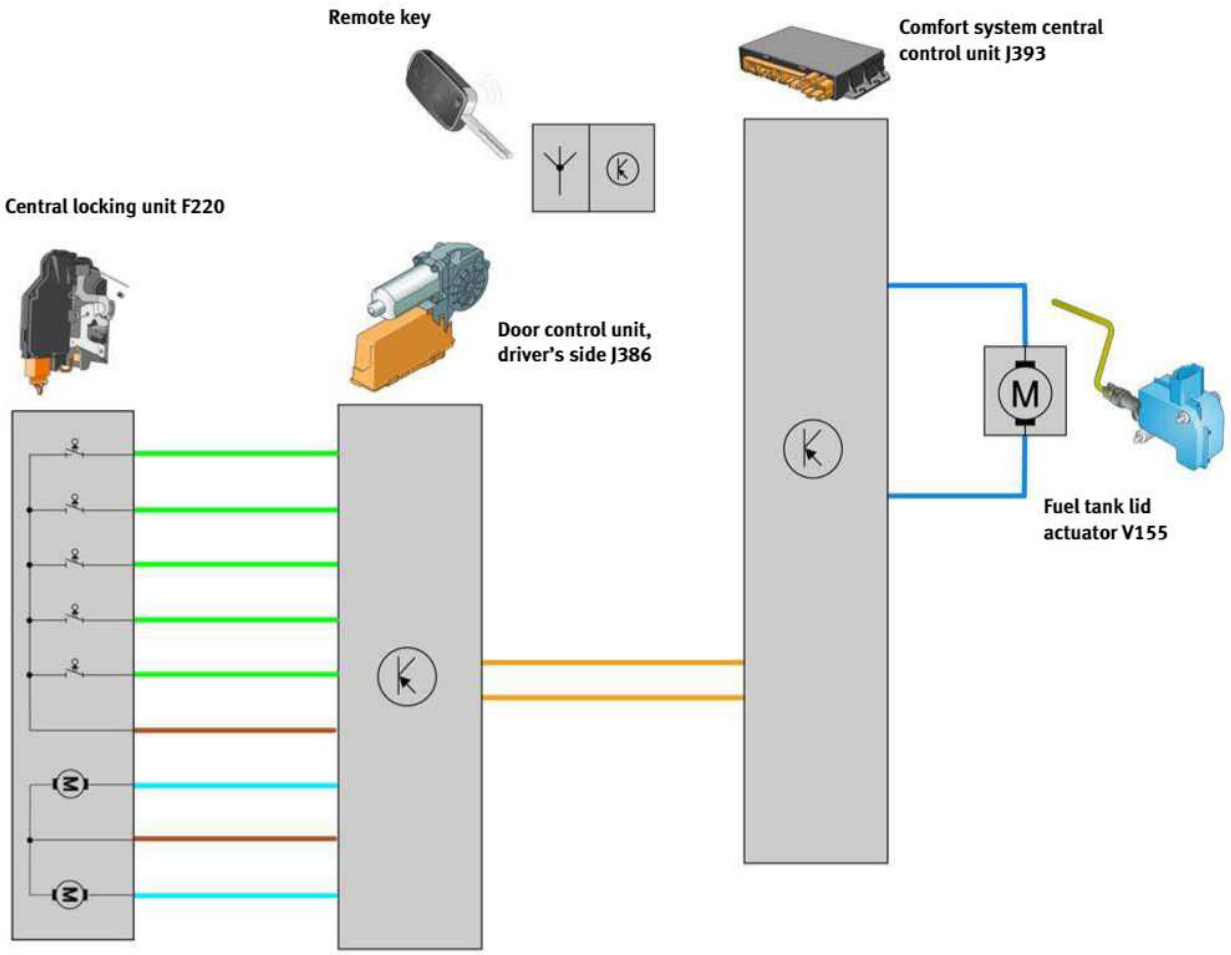
ALARM HORN H12

The alarm horn H12 is placed at the right rear side attached to the body by means of a bracket. To have access it is necesary to remove the right side trim.

It has an **integrated battery**, which allows the horn to keep on blowing in spite of the supply being cut off.



D124-44



BLOCKING OF FUEL TANK LID

The central comfort unit J393 assumes the locking of the fuel tank lid. To carry out this function there is a fuel tank lid actuator V155.

When the vehicle is locked with the remote control or from the driver's door lock, the central comfort control unit supplies the actuator V155 with battery voltage. This is how the lid is locked.

When the vehicle is unlocked, the central comfort control unit changes over the supply polarity of the actuator V155 and the lid is unlocked.

The fact of having included such an actuator has allowed to get rid of the key on the fuel tank lid, which makes it more comfortable for the user to fill the tank.

In an emergency, the fuel tank lid can be unlocked **manually**. For this, the shaft has to be moved sideways in the hole gap of the luggage compartment right trim.

TAILGATE OPENING

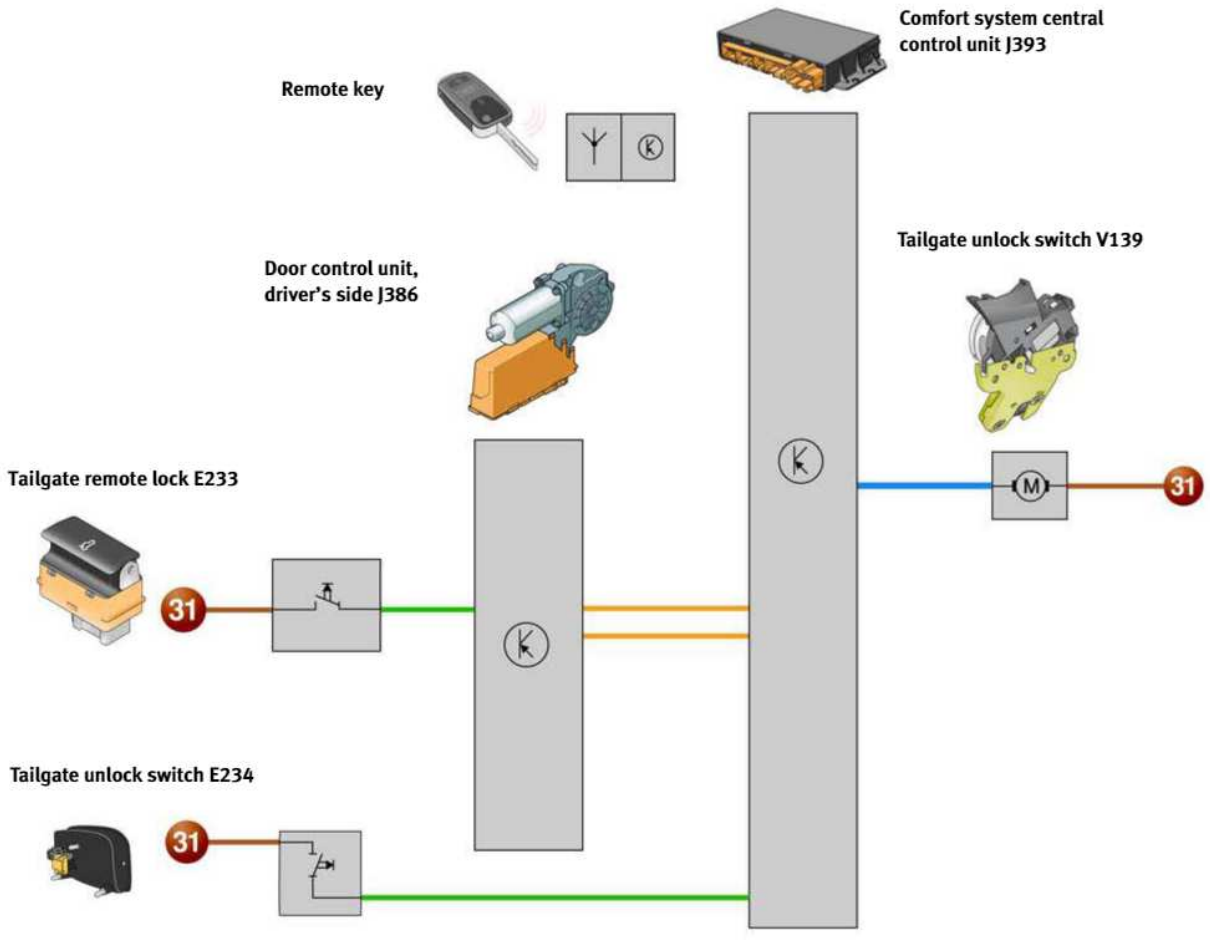
There are three possibilities for opening the tailgate:

- From the **tailgate unlock press button F248** placed on the tailgate handle.
- From the **tailgate lock button E233** placed on the driver's door trim.
- From the **remote control**.

If the tailgate is opened with the tailgate handle lock, the **F248 button** sends the earth signal directly to the central comfort control unit J393. When the central comfort control unit J393 gets this signal it supplies the luggage compartment unlock motor V139 as required.

If it is opened from the **E233 button**, the signal is sent to the driver's door control unit J386, which sends it to the Comfort CAN-Bus to be picked up by the central comfort control unit J393. It is in charge of supplying the tailgate opening motor V139.

If it is opened from the **remote control**, the signal reaches the central comfort control unit J393 via radio-frequency.

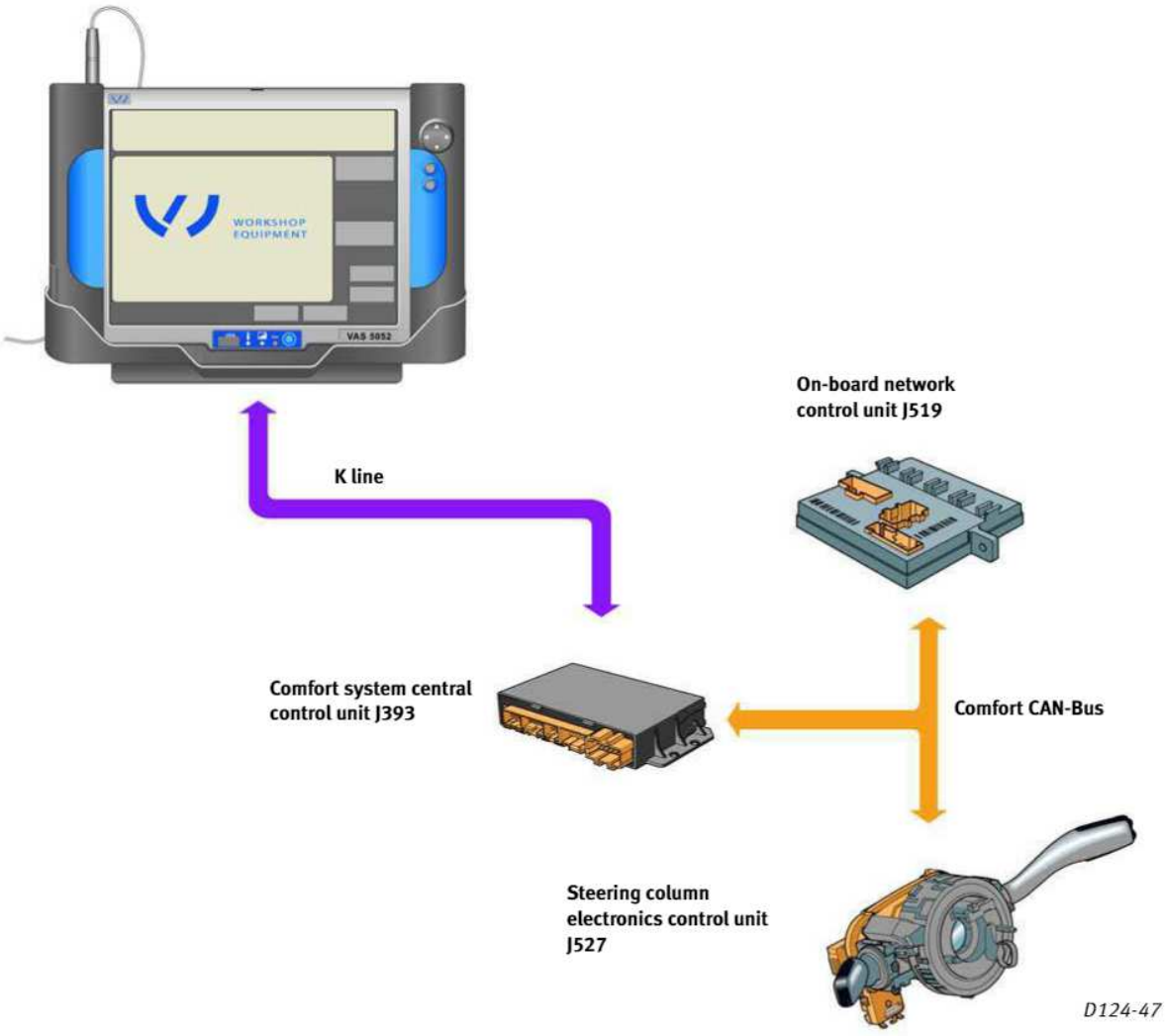


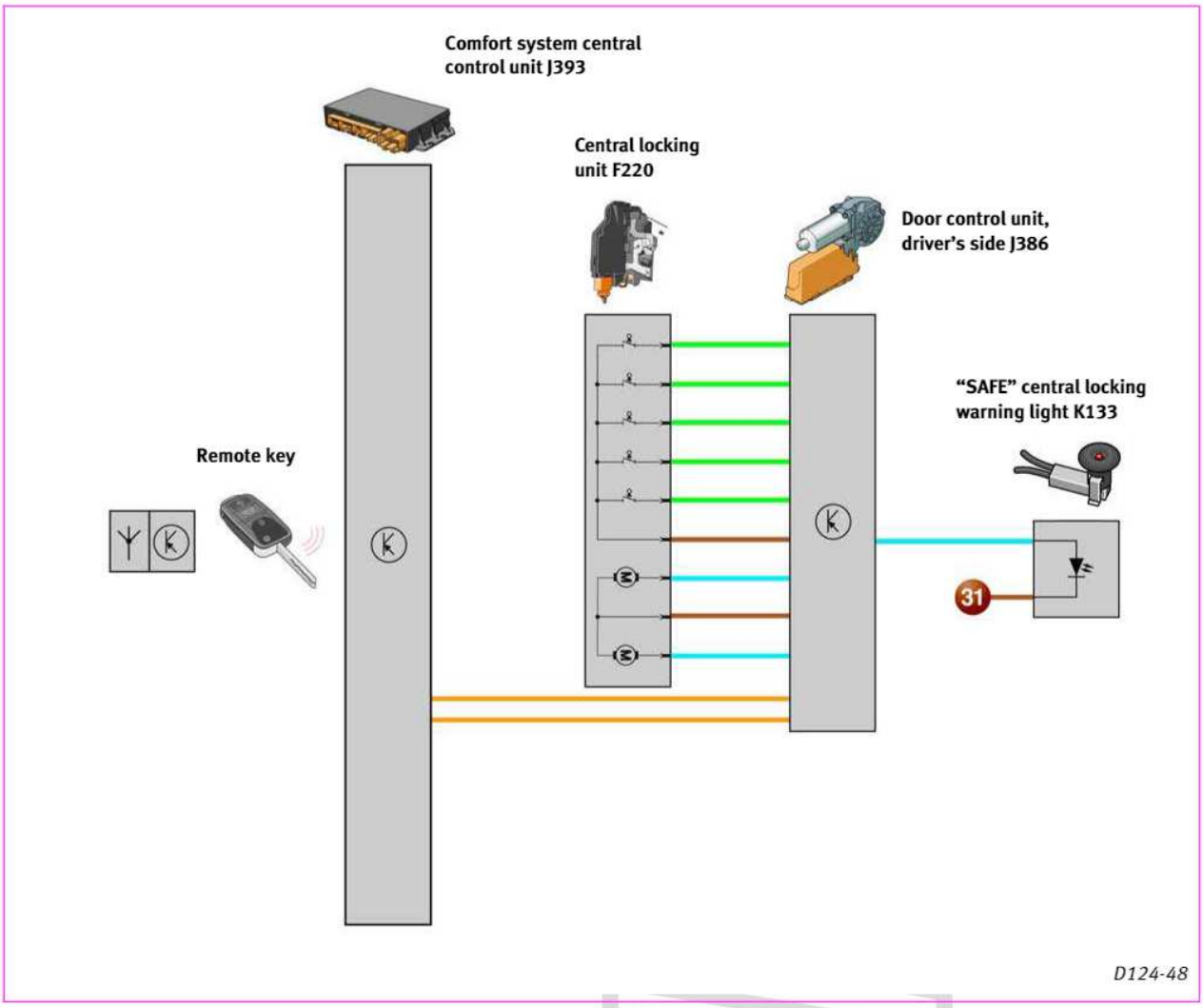
D124-46

"GATEWAY" FUNCTION FOR DIAGNOSIS

The **On-board network control unit J519** and the **steering column electronics control unit J527** are not directly connectd to the K line. In order to diagnose both units, the central comfort control unit J393 plays the role of "Gateway".

The J519 and J527 units send the messages for diagnosis into the Comfort CAN-Bus. The central comfort control unit J393 picks up these messages, adapts them to the communication protocol used by the K line and sends them into that line. The VAS 505x reads these K line messages and the J519 and J527 units can be diagnosed.





"SAFE" CENTRAL LOCKING WARNING LIGHT K133

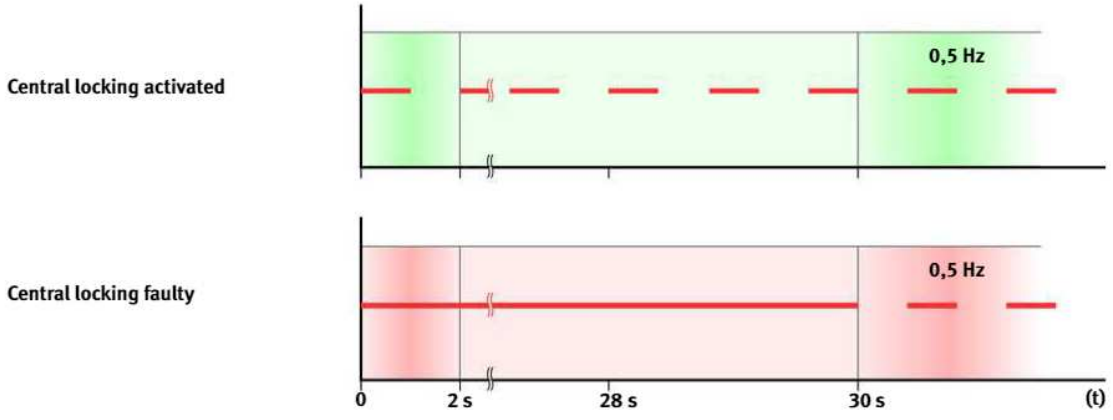
The central locking warning light SAFE K133 is a red LED placed on the driver's door trim. The warning light K133 is energised by the driver's door control unit J386.

The central locking warning light SAFE K133 **signals** to the driver any **anomalous** situation of the **central locking** or of the anti-theft alarm when the central locking is activated.

OPERATION

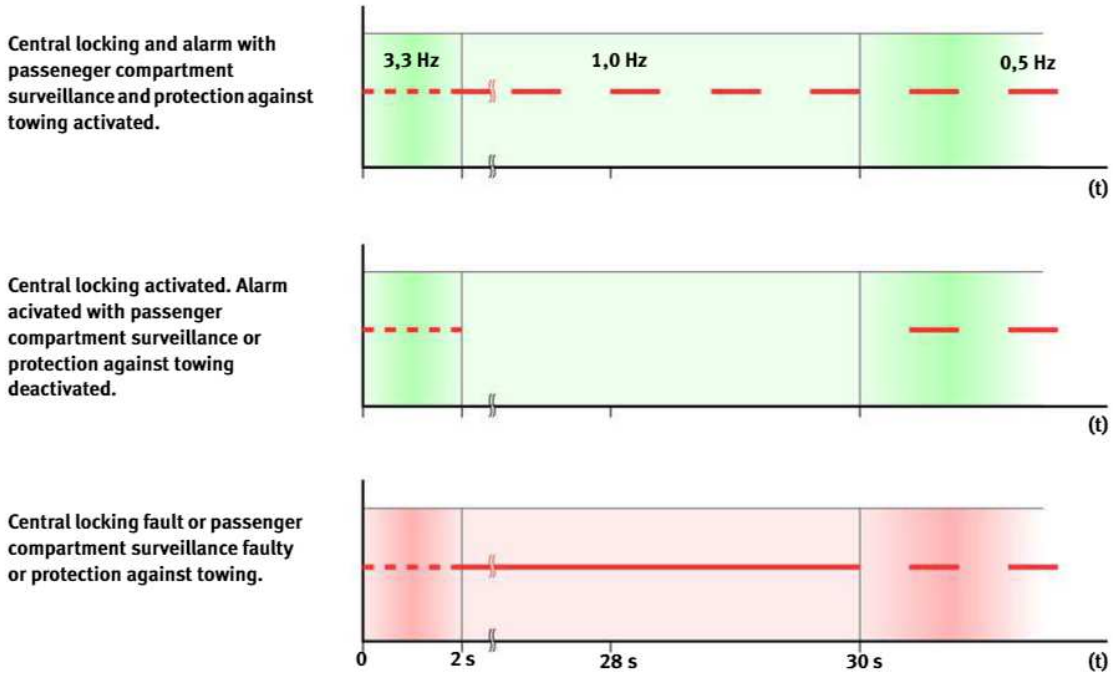
30 seonds after locking the car, the warning light K133 blinks at a **0,5 Hz** frequency, regardless as to wether there is a fault or not. This is so in order to prevent a fault becoming evident to third parties.

It the car is equipped with central locking and not anti-theft alarm, the warning light K133 works as follows:

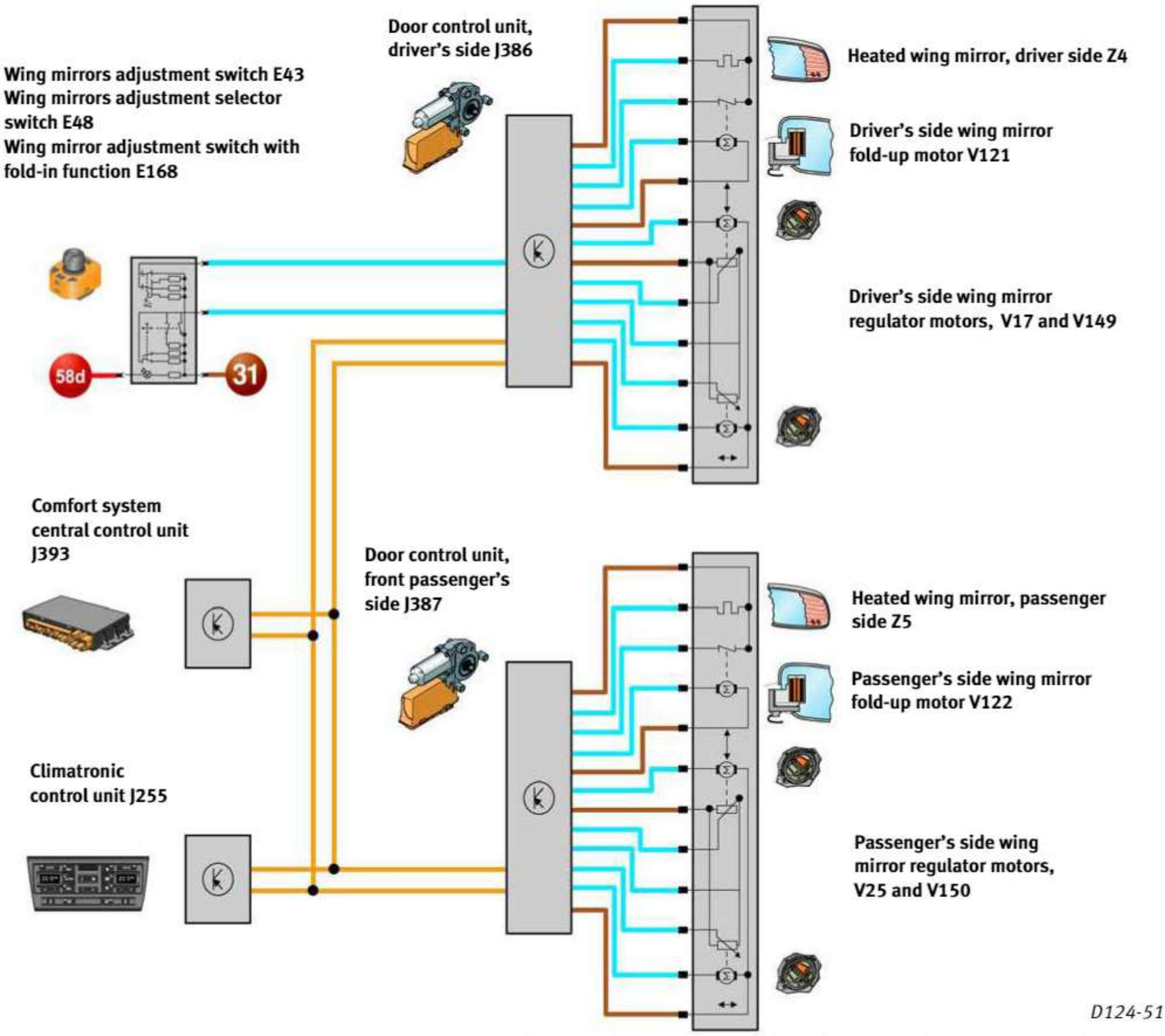


D124-49

It the car is equipped with central locking and anti-theft alarm, the warning light K133 works as follows:



D124-50



WING MIRRORS CONTROL

The driver and front passenger door unit J386 and J387 controls the wing mirrors for the following functions: **aiming**, **folding** and **heating**.

For the **aiming and folding** functions the driver's door control unit J386 gets the signals from the wing mirrors adjustment switch E43, the wing mirrors adjustment selector E48, and the wing mirrors adjustment with folding function E168.

When a signal is sent from the above-mentioned switches to the driver's door control unit J386, it supplies any of the V17, V149 or V121 motors as required. If the signal also affects the passenger side wing mirror, it converts the signal into a CAN-Bus message and sends it to the Comfort line so that the passenger side door control unit J387 picks it up and executes the order for that side's wing mirror.

For the wing mirrors **heating** the state of the heated rear mirror, the outside temperature and the car speed are taken into account. This information is sent through the comfort can-bus from the climatronic control unit J255 and to the ABS control uniT J104 to be picked up by both door units.

D124-52

AIMING

To aim the wing mirrors the switch E48 must be set at the “left wing mirror” or “right wing mirror” position. Next, the desired position is adjusted through the adjustment switch E43.

Automatic aiming of the passenger’s wing mirror. When engaging into reverse, and with the switch E48 in the “right wing mirror” position, the passenger’s wing mirror will aim downwards. This allows viewing the kerb when parking the car.

The mirror returns to its original position when any of the following three situations complies:

- Reverse gear is disengaged and 15 Km/hr is surpassed.
- The E48 switch is placed outside the "right wing mirror" position.
- The ignition is switched off.

FOLDING

The wing mirrors foding function is selected by setting the switch E168 at the “fold” position.

If the vehicle is driving over **15 km/hr** the fold function is **blocked**, however, the wing mirror can be unfolded through the switch E168.

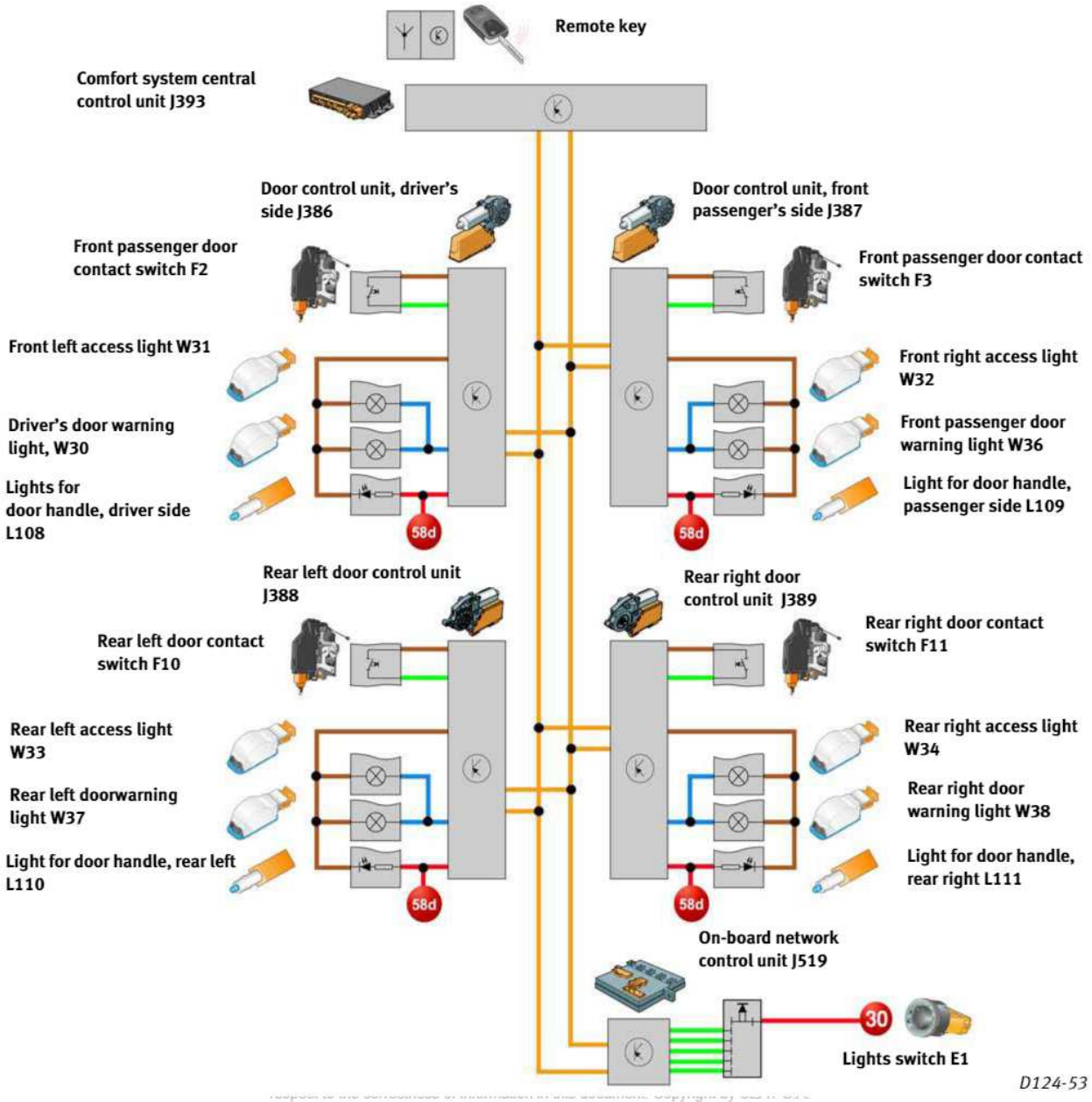
HEATING

For the heating to activate, the **heated rear window** must be **activated** and the outside temperature should be **below 20ºC**.

During the first two minutes of activation the heating power is 100%. After, the heating power is calculated by taking into account the **outside temperature** and the **car speed**, the wing mirror always being 20ºC. The heating is activated by a PWM signal.

Heating activation is always synchronised for both wing mirrors.

COMFORT - DOOR UNIT



ACCESS, WARNING AND HANDLE LIGHTS.

As an option, the Exeo can be equipped with three more lights on each door. Which are:

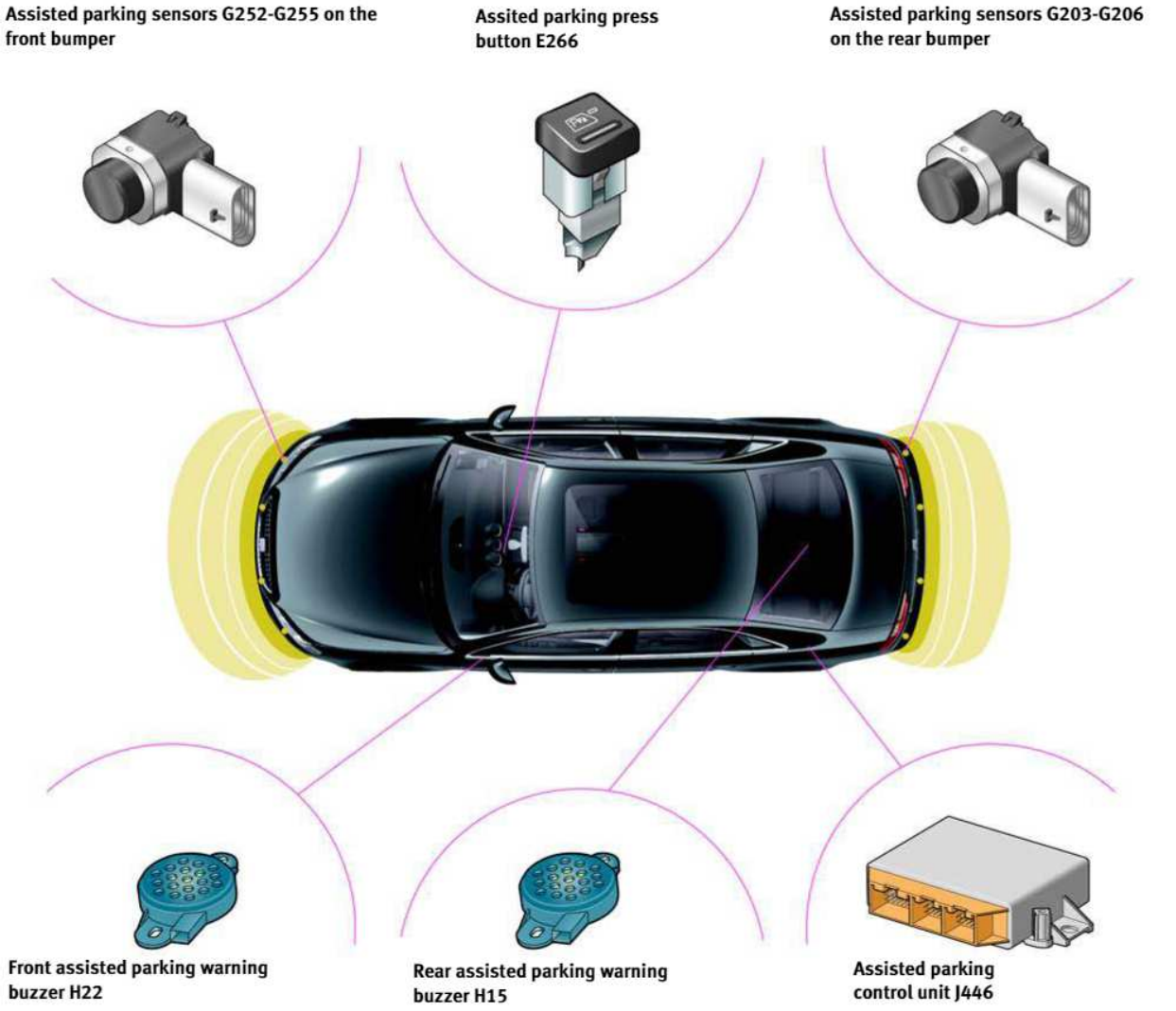
- Access lights W31, W32, W33 and W34.
- Warning lights W30, W36, W37 and W38.
- Light for door handles L108, L109, L110, L111.

The three lights are supplied with positive and negative by the control unit of each door.

The **access and warning** lights are supplied when the corresponding **door** is **opened**.

The **door handle** lights are energised when the **side lights (positon)** are connected.

ASSISTED PARKING



D124-54

The Exeo inlcudes an assited parking system with **two options** available:

- Four channel rear assisted parking,
- Or, eight channel front and rear assisted parking.

The components of the **four channels assited parking** are:

- Control unit J446, placed on the rear left of the luggage compartment.
- Rear assisted parking warning buzzer H15, placed under the rear tray.
- Four assisted parking sensors G203-G206, on the rear bumper.

The **eqight channels assisted parking** version also includes the following components:

- Four assisted parking sensors G252-G255 on the front bumper.
- Assited parking press button E266.
- Front assisted parking warning buzzer H22, placed behind the driver's side door pocket.

ASSISTED PARKING

SYSTEM LAYOUT

The assisted parking control unit J446 uses as **input signals** the ones form the following components:

- Sensors G203-G206 and G252-G255 (only G203-G206 for the eight channels version).
- Assisted parking button E266 (only for the eight channels assisted parking).
- Reverse lights switch F4.
- Trailer identification control unit J345.

And, as **output signals**:

- Buzzers H22 and H15.
- Assisted parking warning light K136.

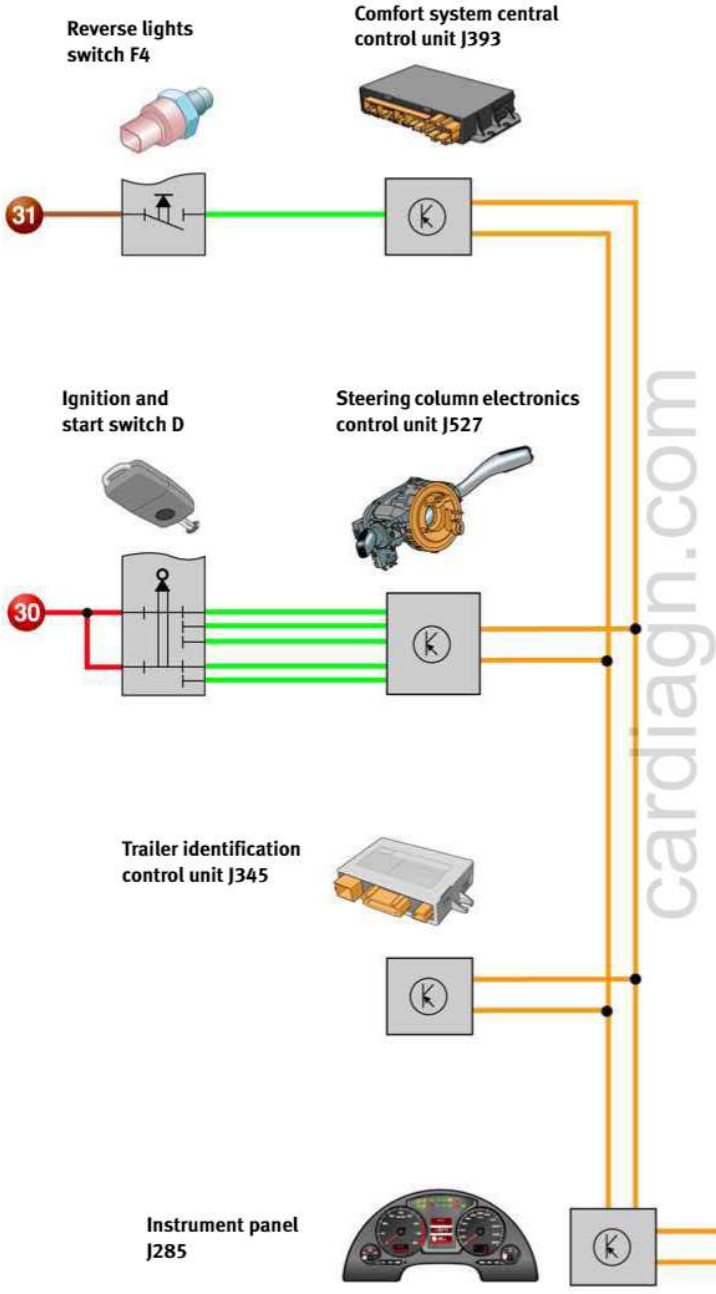
The eight **assisted parking sensors G202-G205 and G252-G255** are supplied with positive and negative by the control unit J446. The ultrasound sensors measuring range is shown on the following chart:

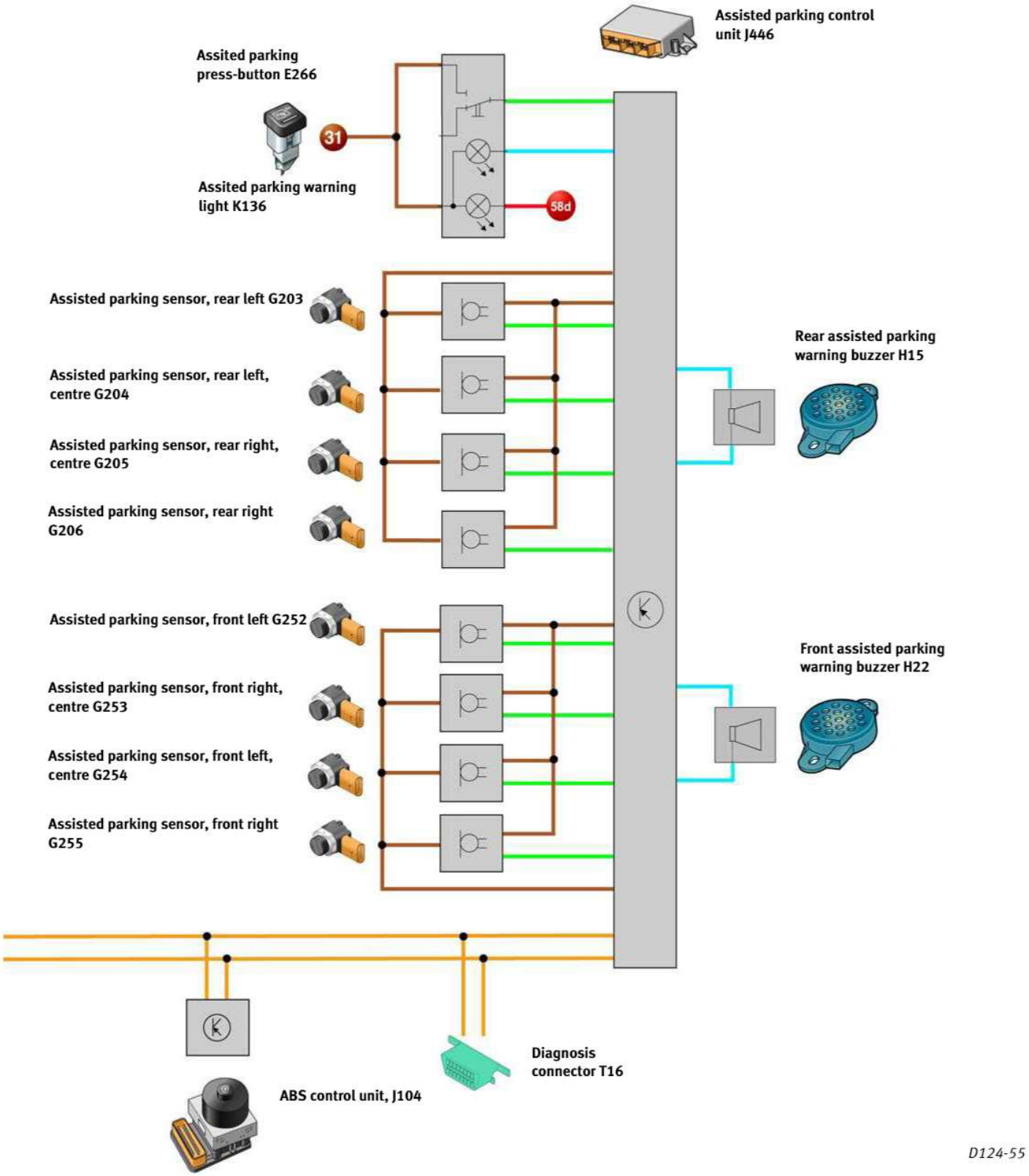
Sensors	Distance
Side sensors	0.60 m
Rear bumper, in the middle	1.50 m
Front bumper, in the middle	1.00 m

The **switch for the reverse lights F4**sends th signal to the central comfort control unit J393. It converts this signal to a CAN-Bus message and sends it to the Comfort CAN-Bus line. The assisted parking control unit J446 picks it up for activating the system.

Through the **assisted parking press-button E266** it is possible to **connect** or **disconnect** the system.

The control unit J446 **disconnects** the system when a **trailer** is coupled to the vehicle. For this, the trailer hook identification control unit J345 sends a message to the Comfort CAN-Bus.





D124-55

ELECTRIC REGULATION OF SEATS

The Exeo offers electrical adjusting for the front seats.

For the **driver's seat,** the seat motors are controlled directly from the switches of each seat.

For the electrical **adjusting** of the **driver's seat** the following components are available:

- Memory seat adjustment control unit, J136.
- Driver's seat backrest adjustment switch E96, driver's seat inclination adjustment switch E222, driver's seat longitudinal adjustment switch E363, and driver's seat height adjustment switch E364.
- Longitudinal V28, backrest V45, inclination V243, and height V245 adjustment motors
- Backrest G219, longitudinal G227, height G231, and inclination G232 adjustment sensors.

The control unit J136 is in charge of supplying the adjustment motors V28, V45, V243 and V245 when it gets the signal from the switches E96, E222, E363 and E364.

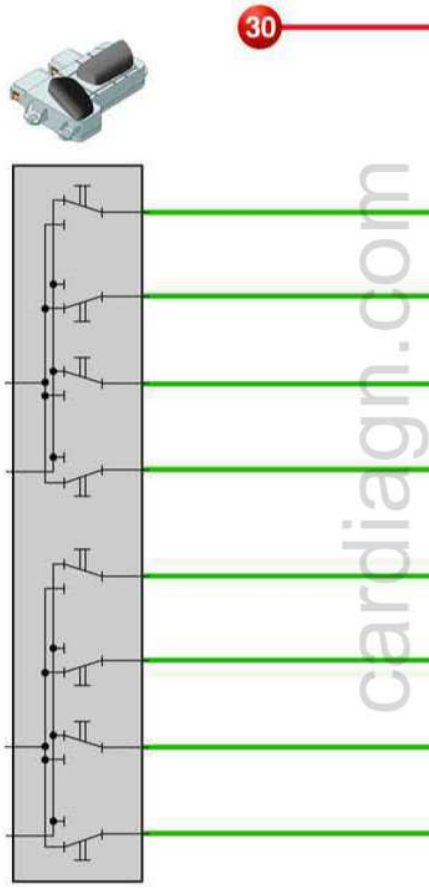
The control unit J136 recognises at any given moment the position of the seats through the signal from the sensors G219, G227, G231 and G232.

Vertical and horizontal adjusting of the lumbar rest is done directly from the switch through the lumbar rest adjustment switch E176, without going through the control unit J136.

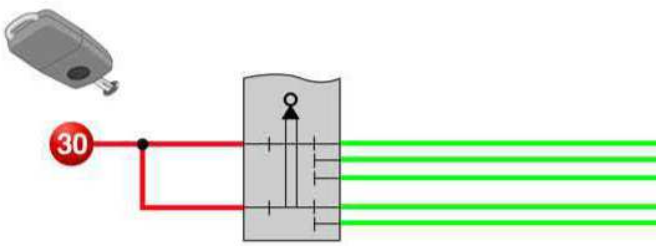
The driver's seat also has a **memory function** for the **seat** and the **wing mirrors**. This function is explained in pages 62 and 63 of this self-study programme.

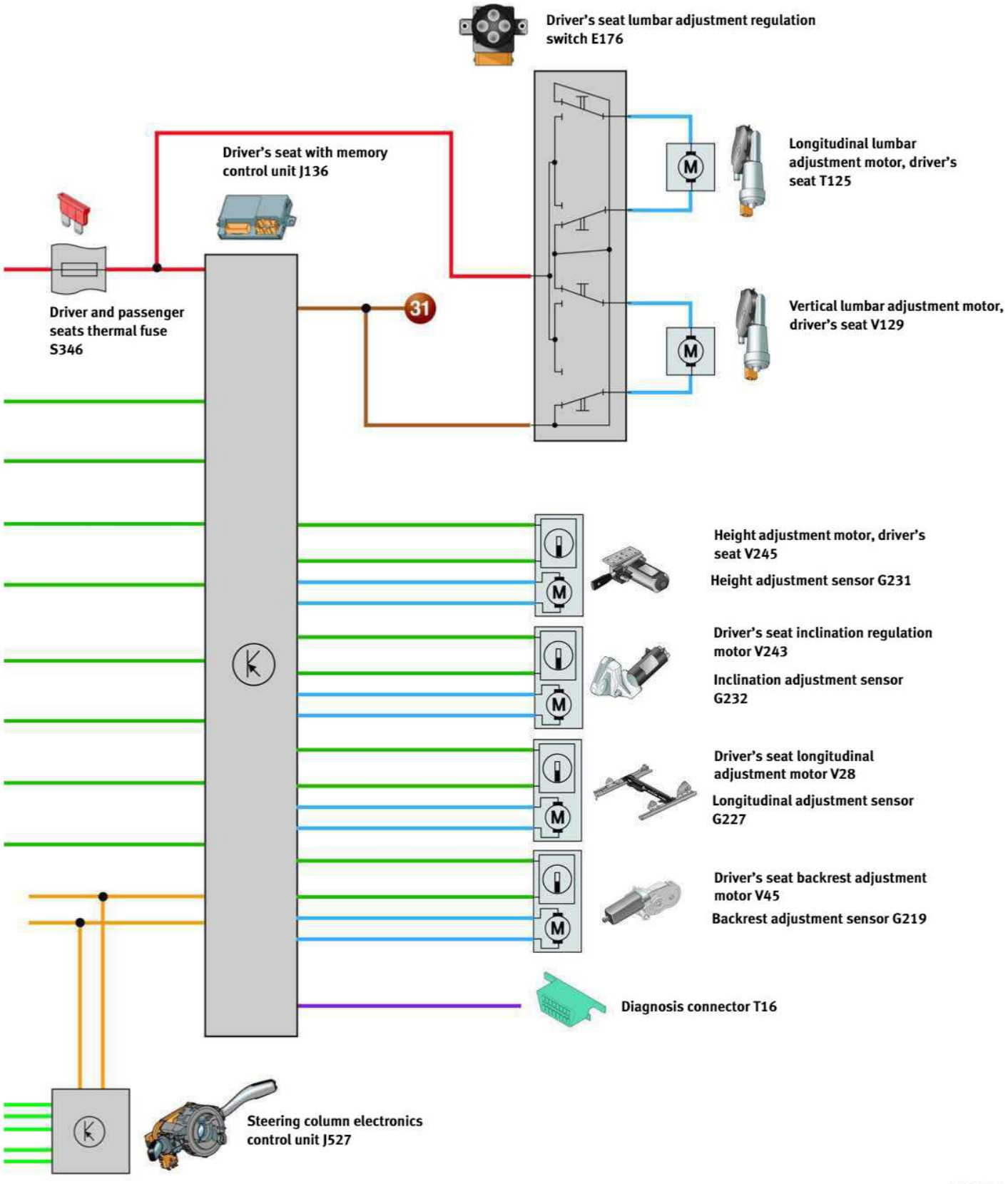
Note: *For further information consult the SSP No.64 "Electric seats"*

Driver's backrest adjustment switch E96
Inclination regulation switch, driver seat E222
Longitudinal adjustment switch, driver's seat E363
Height adjustment switch, driver's seat E364



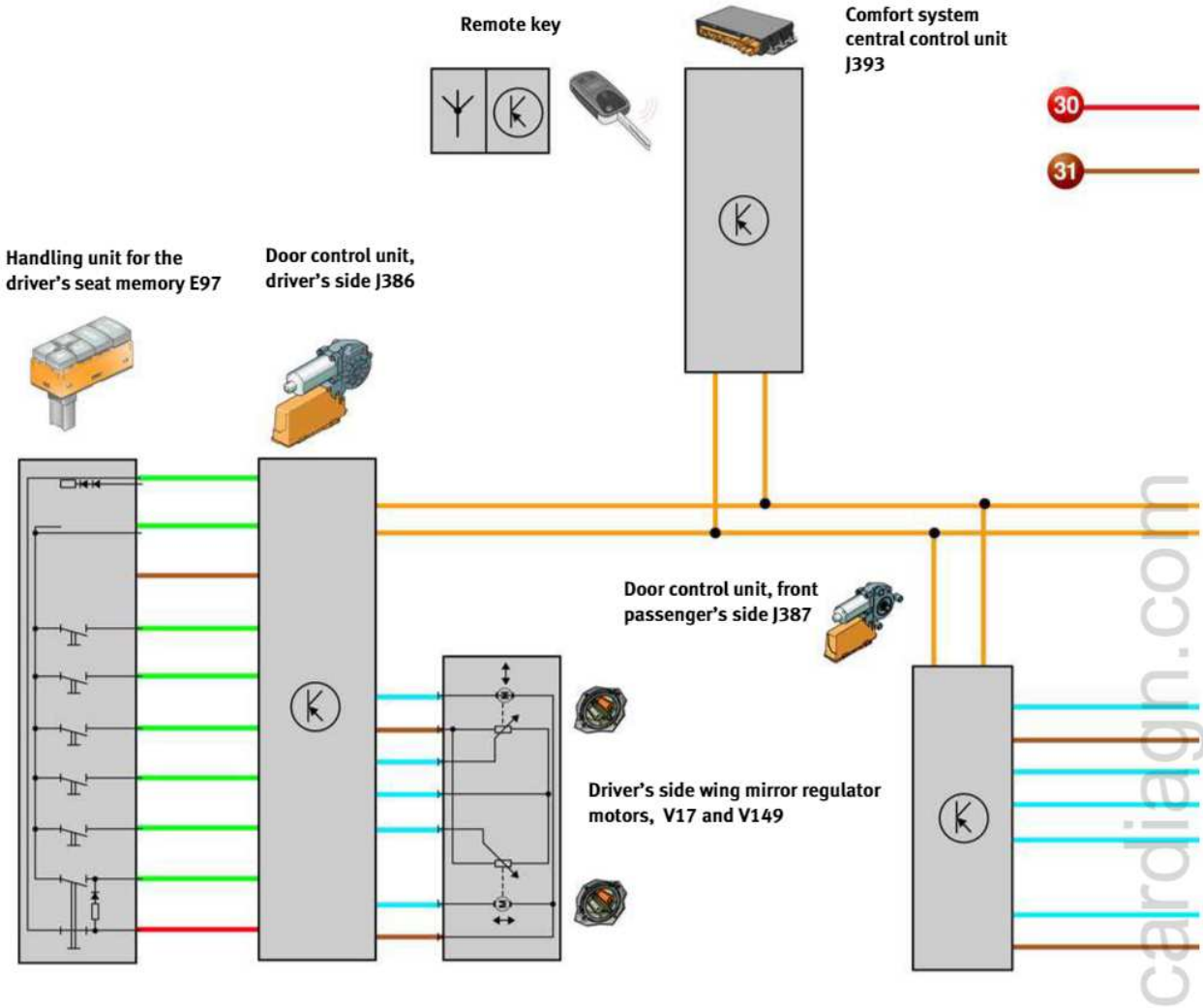
Ignition and start switch D





D124-56

ELECTRIC REGULATION OF SEATS



MEMORY FOR SEATS AND WING MIRRORS

The memory seat control unit J136 can memorise up to **four different positions** for the **driver's seat** and the **wing mirrors**.

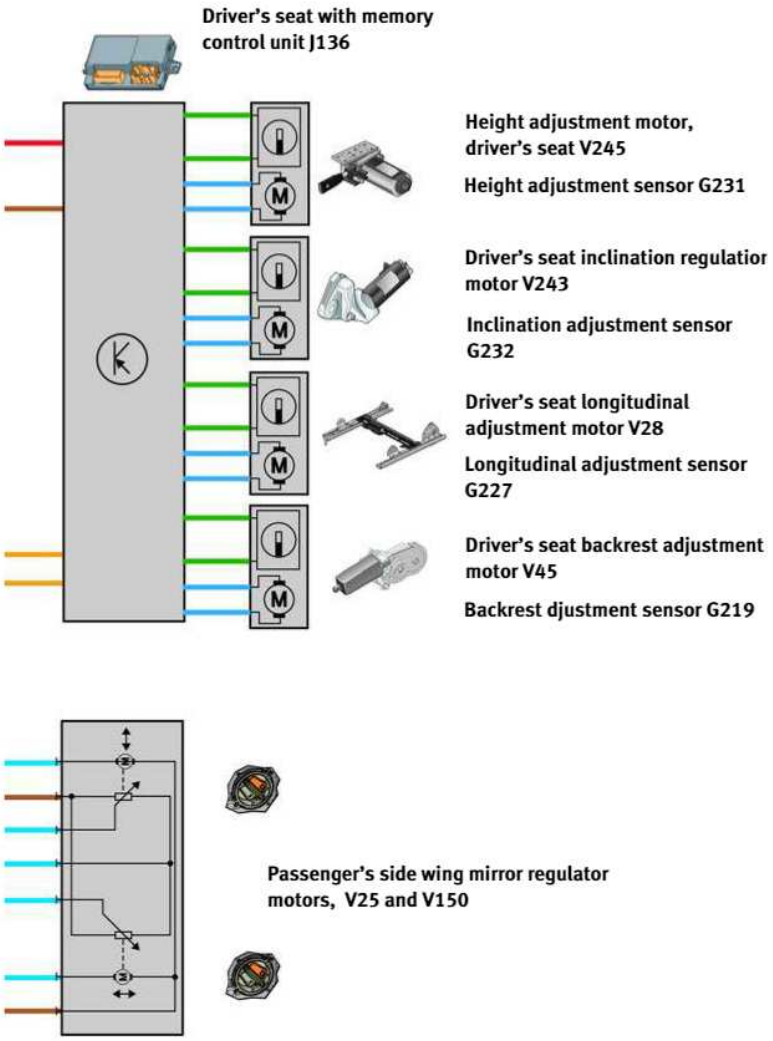
For this, it uses the **handling control unit with memory E97,** placed on the driver's door pocket hollow.

The driver's seat handling unit with memory E97 has six buttons:

- Four memory buttons. Each of them selects a different seat and wing mirrors position.
- A STOP/OFF press button. For deactivating the seats and wing mirrors' memory.
- One "MEMO" key, to memorise the desired position.

MEMORISE POSITIONS

To memorise a driver's seat and wing mirrors position the STOP/OFF button should not be activated. By **keeping** the press-button **"MEMO"** and one of the memory press-buttons pressed down, the control unit J136 **stores** the instantaneous **position** of the driver's **seat** and **wing mirrors**. The **position** of the **seat** is recognised by the **Hall sensors** integrated in each



D124-57

of the seat motors. As for the **position** of the wing mirrors, it is recognised by the **potentiometers** incorporated in each of the wing mirrors aim motors.

ACTIVATING ADJUSTINGS

The adjustings can be activated by means of the four buttons of the **handling unit E97** or from the **remote control**.

When any of the four positions is selected by the driver, the driver's door control unit J386 gets the message from the handling unit E97, changes the signal into a CAN message and sends it to the Comfort CAN-Bus line. The unit J136 picks it up, selects the desired position from its internal memory and supplies the motors to reach the position desired. Also, the unit J136 sends a message to the Comfort CAN-Bus so that the door units J386 and J387 supply the wing mirrors adjustment motors.

To **activate** the adjustings from the **remote control** you need to unlock the car and open the door within a maximum of 10 minutes.

When the driver's door control unit J386 gets the driver's door opening signal, the seat and wing mirrors adjustment process is run again.

SYNCHRONISING OF THE REMOTE CONTROL WITH THE MEMORY KEYS

Every **remote control** can store **one seat and wing mirrors position**. To synchronise the position and the remote control one of the memory keys has to be pressed down, then, before 10 seconds press the remote control unlock key and hold the memory key pressed for 2 more seconds. This is how the control can be synchronised to a specific position.

To delete the remote control programming you have to press the "MEMO" button and within a maximum of 10 seconds you have to press the remote control unlock button and keep the "MEMO" button pressed during 2 more seconds.

If **no** seat and mirrors positon **is synchronised** to the **remote control**, the system does so **automatically** every time the **car** is **locked** from the remote control. This position is memorised in the driver's door control unit J386 and is internally assigned to that particular remote control.

Note: *For further information consult SSP No.64 "Electric seats".*

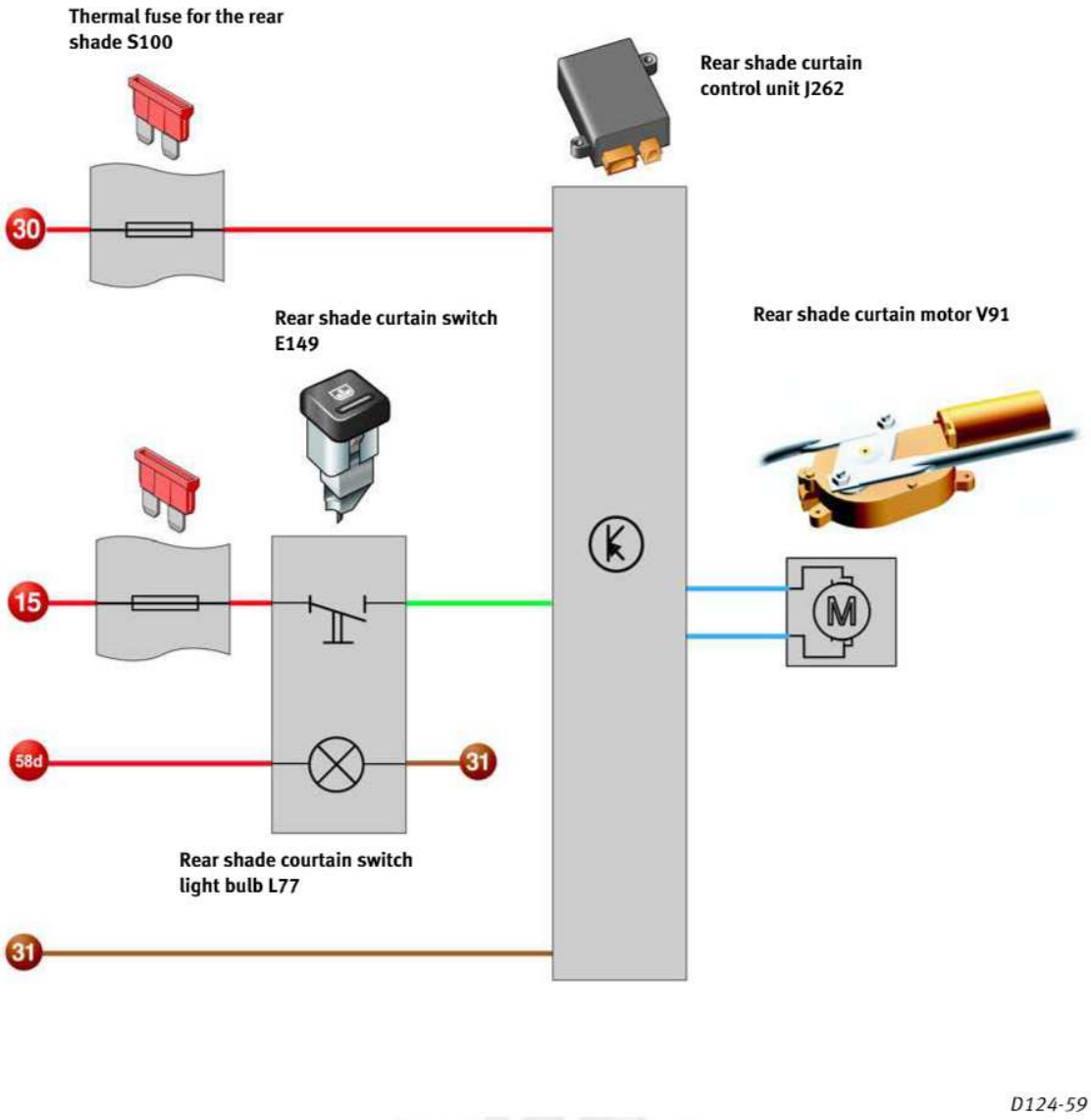
REAR ELECTRIC SHADE CURTAIN

D124-58

The rear electric shade curtain, placed under the rear tray, allows **covering** the **rear window** as if it were a parasol. To activate it there is a **rear electric shade curtain switch E149** on the dashboard, a **rear electric shade curtain control unit J262** and a **rear electric shade curtain motor V91** placed in the rear electric shade curtain asembly under the rear tray. The electric shade curtain has two positions: fully folded or fullly unfolded. It is disconnected automatically when it reaches the end of its stroke.

If, when it is rising or lowering, the switch E149 is pressed again the sahde curtain moves in the opposite direction.

If the **ignition** is **switched off** while the shade curtain is going up or down, it will not be deactivated immediately but when it reaches the end of its travel.



When the rear electric shade curtain switch E149 is pressed, the terminal 15 signal is sent to the rear electric shade curtain control unit J262.

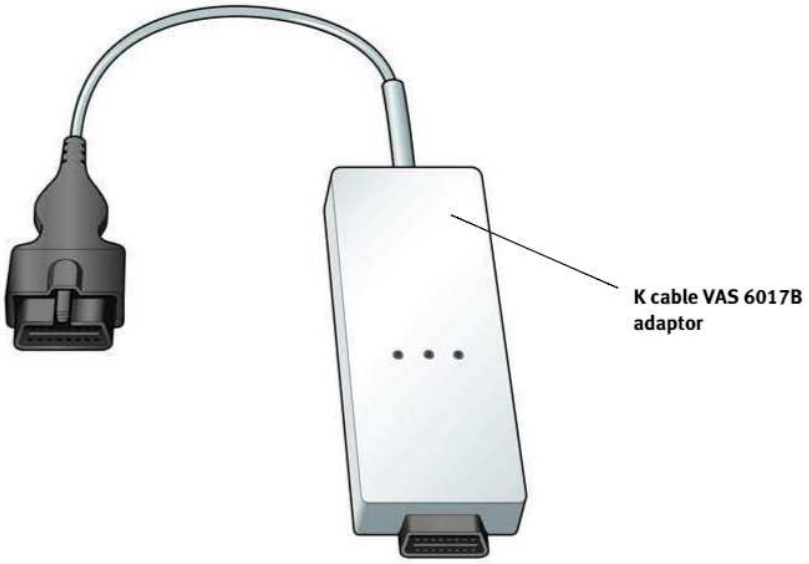
The control unit J262 supplies the rear electric shade curtain motor V91 both with positive and negative.

The **control unit J262** is **protected** by the **thermal fuse S100**, placed on the 9 positions relay holder.

K CABLE VAS 6017B ADAPTOR

So that the VAS 505x is able to diagnose **all** the **control units** the car is equipped with, it is necessary to have the K line adaptor VAS 6017B.

This is because some control units cannot be diagnosed via the CAN protocol. For these units, diagnosis must be done via the **K line** or the **L line**.



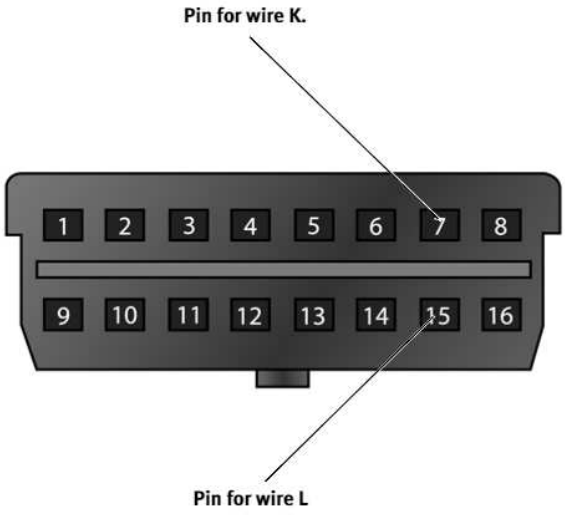
D124-60

COMMUNICATION

To establish communication between the VAS 505x and a control unit, the VAS 505x sends the direction code via the CAN-Bus.

If the VAS 505x does not get any answer from the control unit, it transmits the direction code again via the K line. The adaptor receives this information and sends it via the K wire and the L wire.

If the control unit responds through the L cable, the adaptor detects it and establishes direct communication between the **L cable** and the **vehicle** as well as between the **K line** and the **VAS 505x**.



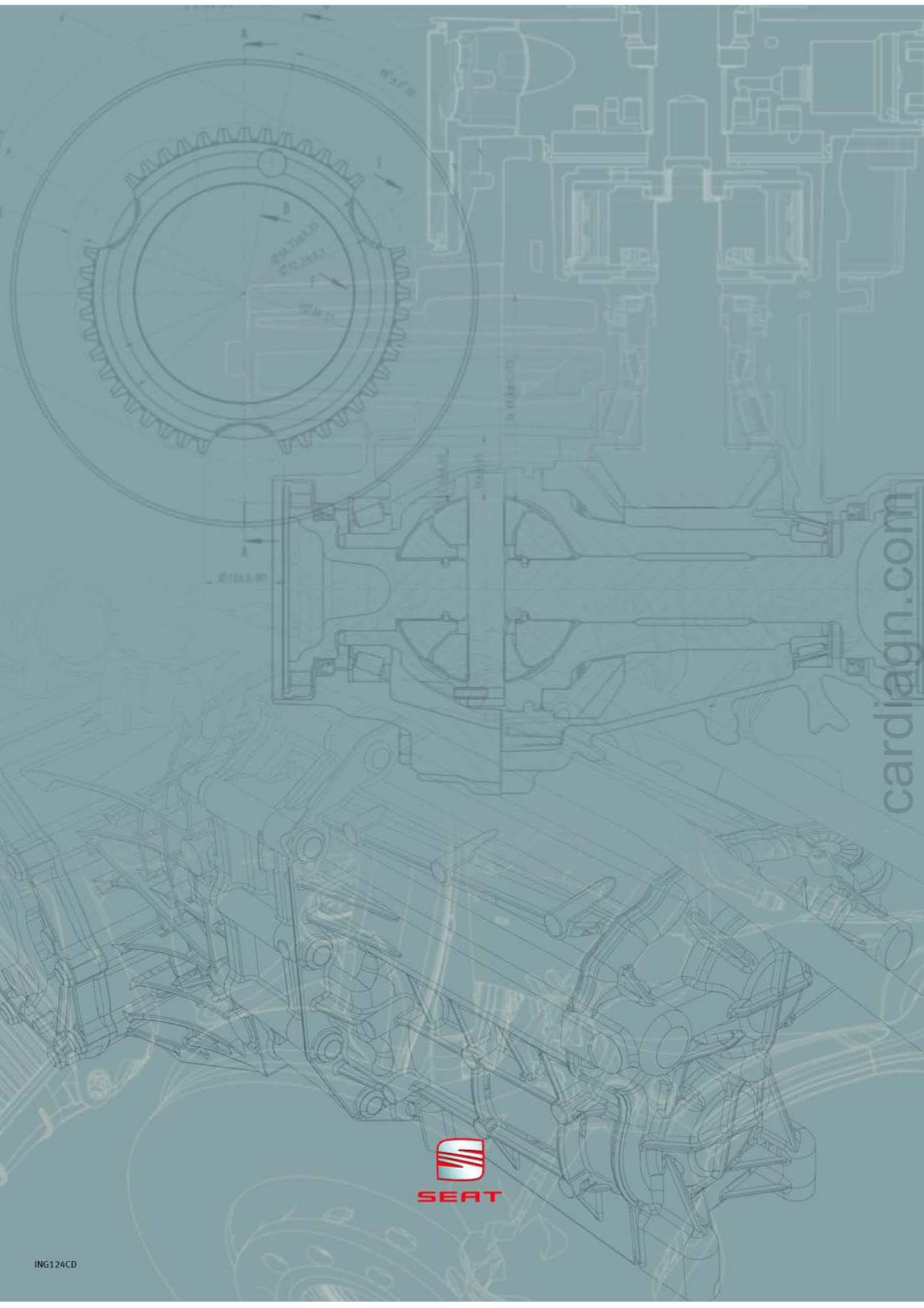
D124-61

SEAT

Technical status 11.08. Due to constant product development and improvement, all data displayed is subject possible changes.

TITLE: Exeo electrical system
AUTHOR: Instituto de Servicio Copyright © 2008, SEAT, S.A. All rights reserved.
Autovía A-2, Km 585, 08760 - Martorell, Barcelona (españa)
1st. edition

DATE OF PUBLISHING: December 08
LEGAL REGISTER: B-54.841 - 2008
Pre-printing and printing : GRAFICAS SYL - Silici, 9-11
Pol. Industrial Famadas - 08940 Cornellá - BARCELONA



SEAT