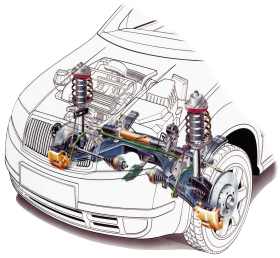
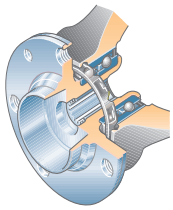
The running gear – at a glance



SP32_36

New front suspension

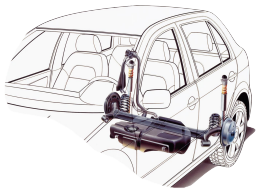
- McPherson strut
- Subframe
- Subframe mounting bracket
- Track control arm
- CV joint shafts



SP32_37

New wheel bearing unit at front wheels

- Double angular-contact ball bearing with integrated wheel hub



SP32_38

New rear suspension

- Torsion beam axle
- Double-wall member section
- Spring and shock absorber located one behind the other

SP32_39

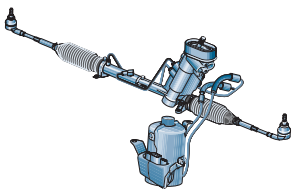
Front brakes

- Disc brakes as standard
- Internally ventilated

SP32_40

Rear brakes

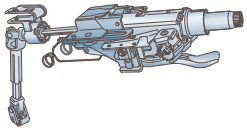
- Drum brakes for base version
- Disc brakes in combination with more powerful engines



SP32_42

Steering

- Rack-and-pinion steering
- Electrohydraulic power steering operating on a new principle for engines of 47 kW or more

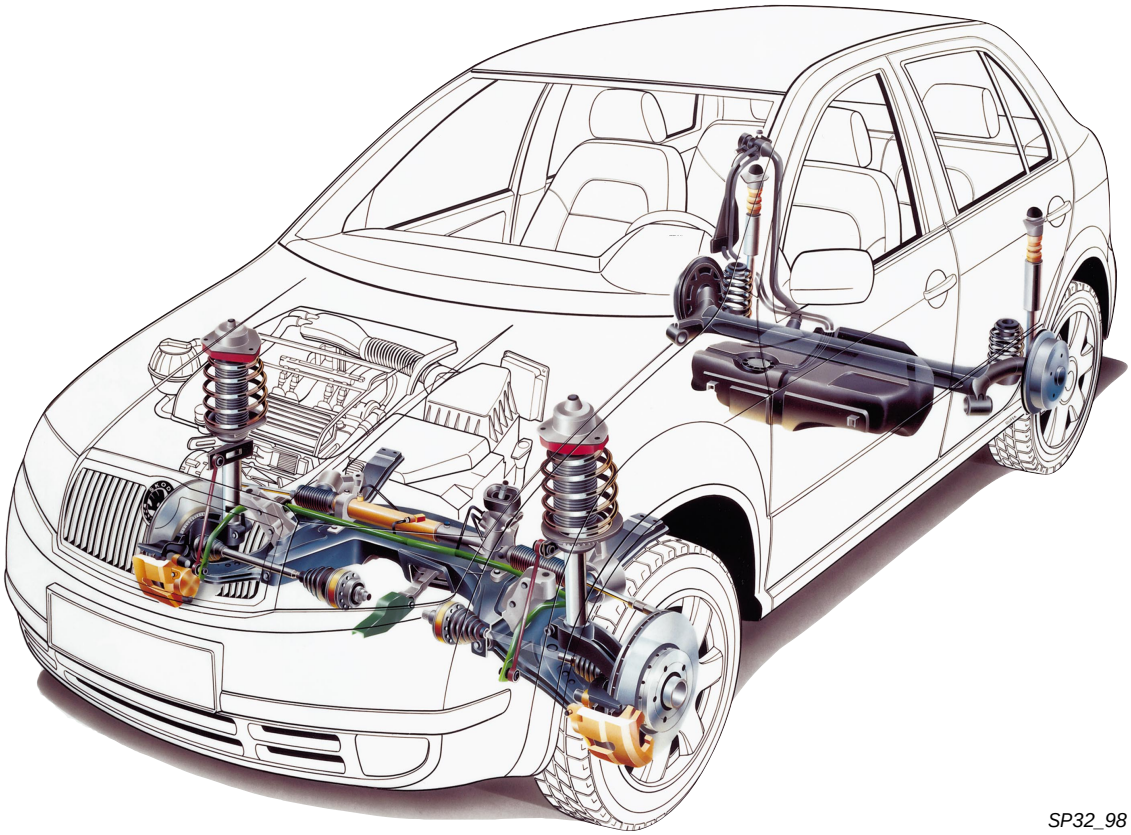


SP32_52

New steering column

- Safety steering column
- Adjustable for height and length

Running Gear



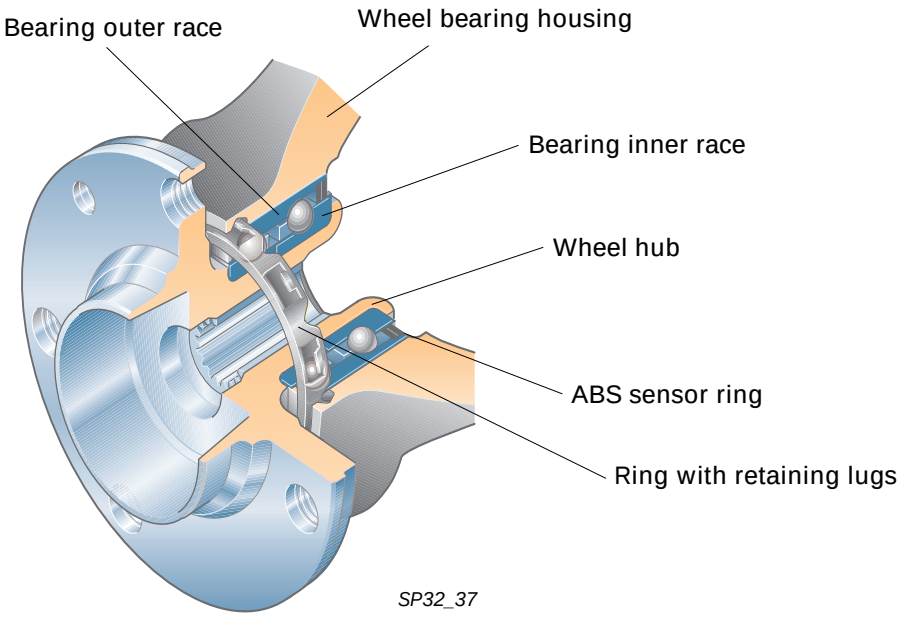
SP32_98

Front suspension

- Wheels located by means of McPherson struts
- With lightweight construction elements (die cast aluminium subframe mounting brackets)
- Anti-roll bar
- New wheel bearing generation
- Axle nut made of sheet metal with internal hexagon – use only once!
- Sensor ring for ABS designed as pulse rotor with reader track, pressed into wheel bearing as part of wheel bearing seal

The new wheel bearing of the front suspension

- Double angular-contact ball bearing with integrated wheel hub
- Preload is set by flanging the bearing inner race to the wheel hub.
- Positioning of wheel bearing in wheel bearing housing by means of ring with retaining lugs. These lock into a slot in the wheel bearing housing when pressed in.



Note:
When removed, the retaining lugs shear off. New wheel bearing required.
Use the new special tool T10064 to install the new bearing only over the bearing outer race!

Rear suspension

– The rear suspension is a torsion beam axle.

– The double-wall member section provides a hollow base member and ensures high stability for the axle.

– The arrangement of the spring and shock absorber one behind the other offers a greater through-loading width than a conventional suspension strut in the luggage compartment of the vehicle.

– Wheel toe and caster are fixed by means of the design. The bearing brackets for attaching the axle are welded to the body. No provision is made for settings.

– The axle is attached by means of inclined, wheel toe-connecting rubber mounts, as are familiar from the OCTAVIA.

  On the one hand, this measure decouples the axle acoustically from the body which allows rolling noises from the wheels to be suppressed.

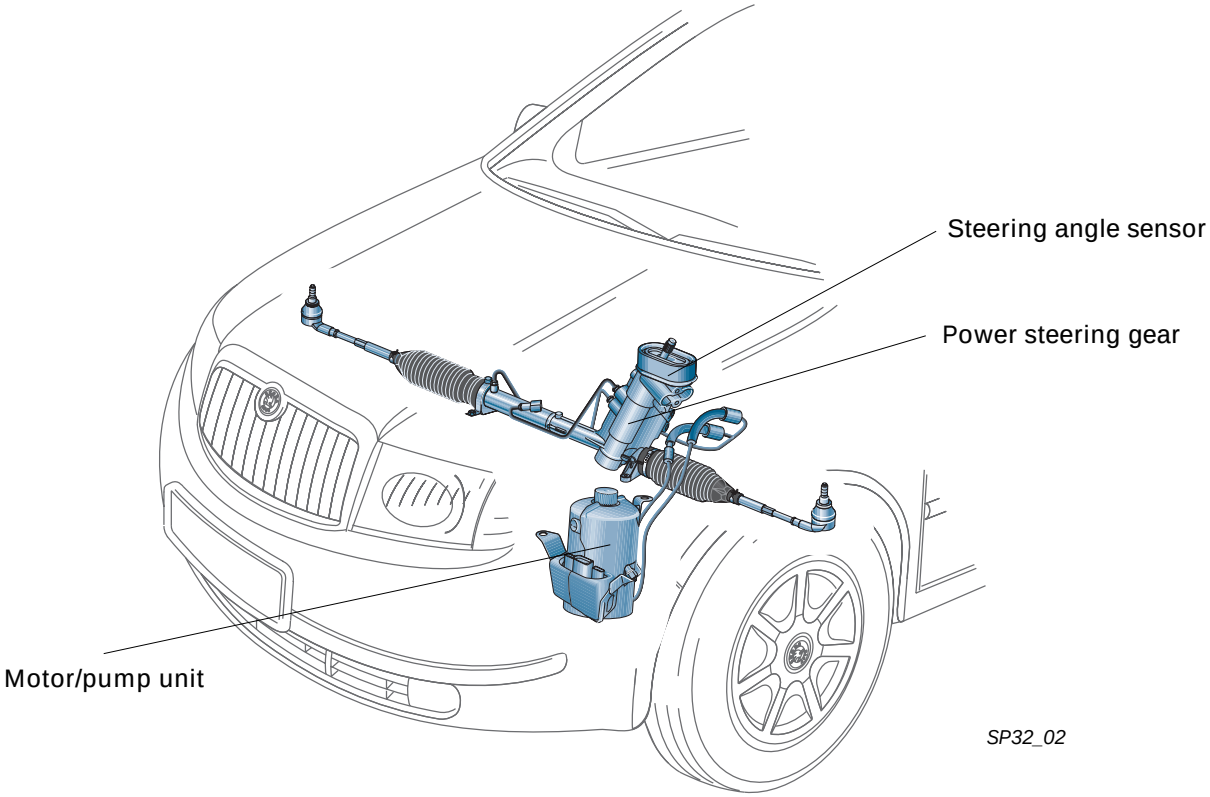
  On the other hand, the inclined position of the mount in combination with the special design, achieves a wheel toe correction when cornering which ensures optimal cornering.

– Sensor ring for ABS design as signal gear with reader track.

Steering

Electrohydraulic power steering

New!



Models fitted with the 47 kW engine or higher are provided as a standard feature with the new electrohydraulic power steering.

In the conventional familiar power steering, the system pressure is built up by a hydraulic pump which is constantly operated by the vehicle engine.

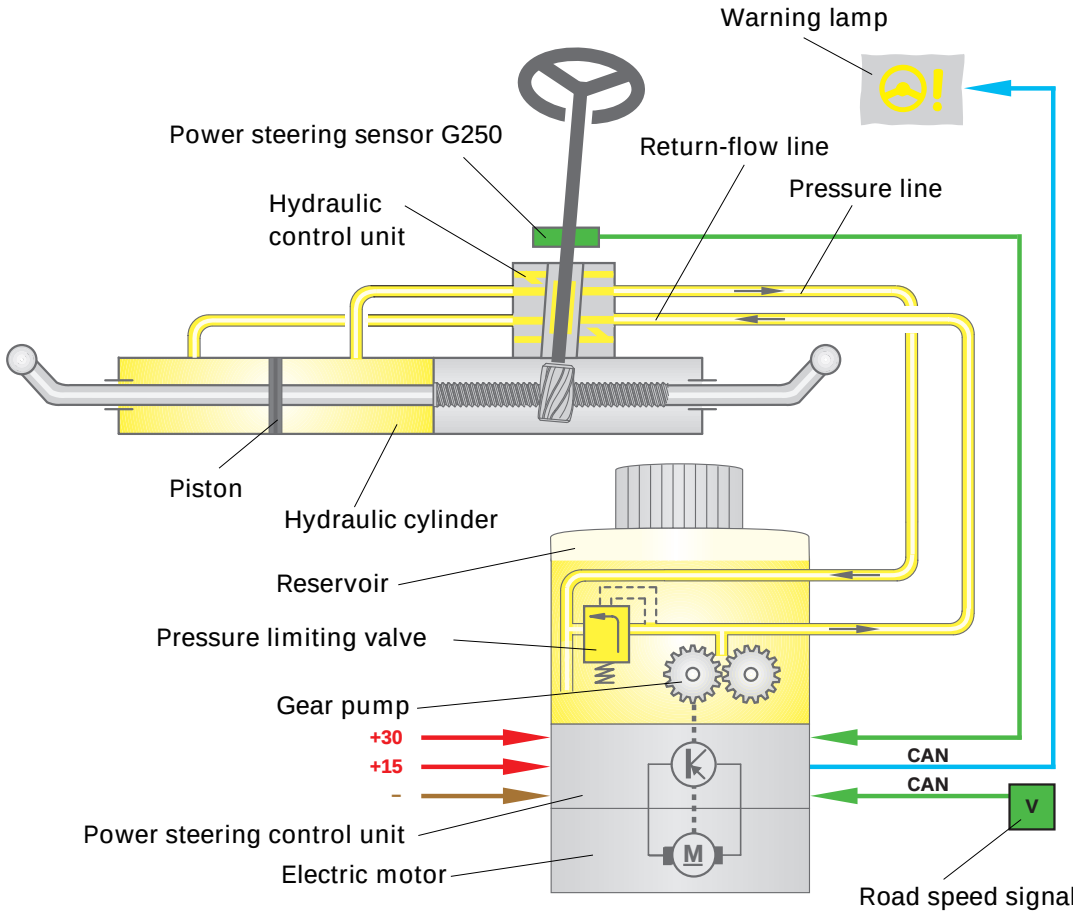
In the new steering system, the hydraulic pump is driven by an electric motor and is therefore independent of the vehicle engine.

The remaining design of the electrohydraulic power steering is similar to that of a conventional power steering system. The hydraulic control is also similar.

A new feature is the steering angle-responsive steering force assistance.
An additional sensor is provided for this purpose above the steering housing, which transmits the steering angle rate to the electronic control.

In addition, the speed of the vehicle is also included in the analysis. This is transmitted over the CAN-BUS.

System overview



SP32_01

The electrohydraulic motor/pump unit is a compact component which is installed in the left of the engine compartment.

It consists of

- electric motor
- gear pump
- power steering control unit J500
- hydraulic fluid reservoir

Advantages of the electrohydraulic power steering:

- Improved comfort, easy to operate when parking and manoeuvring, but stiff steering at high speeds (safety factor)

- Fuel savings as operates independently of engine

Note:
You can find a description of the design and operation in the Self-Study Programme 34.

Steering column

The steering column is bolted with a bearing bracket to the module carrier.

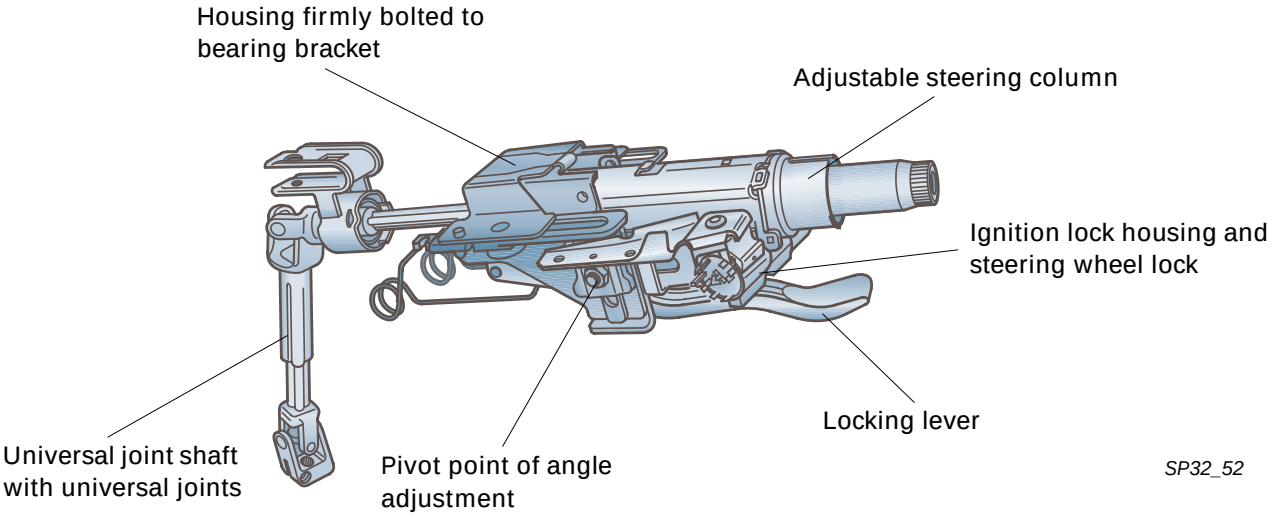
It acts through 2 universal joints with a universal joint shaft on the steering gear.

The universal joint shaft is mounted with the universal joint on the steering pinion of the rack-and-pinion steering. The universal joint shaft is a telescopic design.
The universal joint shaft is secured at the steering pinion by means of a cross bolt.

The mechanical steering wheel lock and the ignition lock housing are integral parts of the steering column.

The geometry of the steering column in relation to the rack-and-pinion steering through the universal joint shaft and universal joints minimizes the risk of injuries to the driver in the event of a collision.

No provision is made for repairs to the steering column (safety component). It is replaced complete.



SP32_52

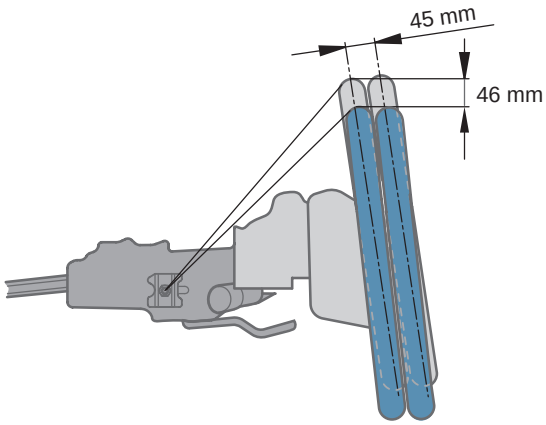
Steering column adjustment

The steering column can be adjusted manually for angle and length.

Forward/back adjustment: max. 45 mm
Adjustment for rake: max. 46 mm

Any individual setting is possible within these adjustment ranges.

The steering column is locked in any desired setting by means of the locking lever positioned below the steering column.



SP32_53

The brake system – at a glance

– Two-circuit brake system split diagonally (X – brake circuit pattern)

– Bosch 5.7 antilock brake system
Versions available:
ABS
ABS + MSR
ABS + ASR
ABS + ASR + MSR

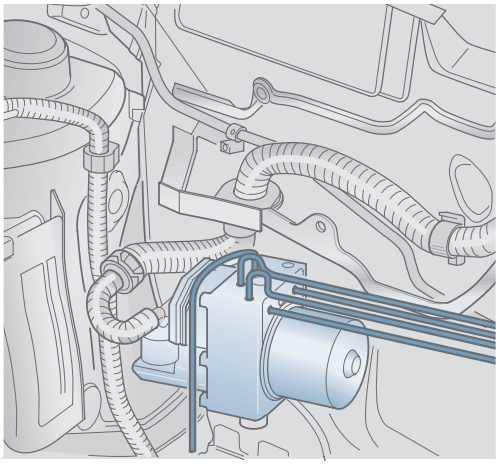
– Front disc brakes, internally ventilated

– Rear drum brakes; disc brakes on models with more powerful engines

– Brake wear indicator (assigned to certain equipment versions)

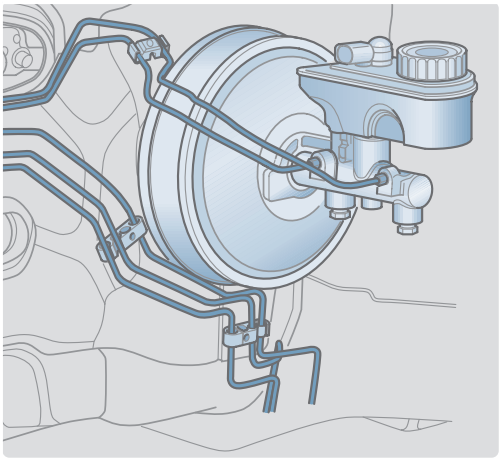
– New system of wheel sensors for detecting wheel speeds at the wheels

Location of components



SP32_44

ABS hydraulic unit



SP32_46

Brake servo unit

Brake servo unit with brake master cylinder is positioned separate from the ABS hydraulic unit. The latter is located on the right next to the shock absorber dome.

Brake combination – base version*

Model with engine	Front brakes	Rear brakes
1.0-ltr./37 kW	13” disc brakes	Drum brakes
1.4-ltr./50 kW	14” disc brakes	Drum brakes
1.4-ltr./74 kW	14” disc brakes	Disc brakes
1.9-ltr./47 kW	14” disc brakes	Drum brakes
1.9-ltr./74 kW	14” disc brakes	Drum brakes

*Other combinations depend on the model version

Brake System

Front brakes

SP32_39

– Internally ventilated disc brakes FS3

– Brake disc Ø 256 x 22 mm

– With brake wear indicator
(on certain models)

– New sensor for detecting wheel speed for ABS
Active sensor located in a drilled hole in wheel bearing housing, with matching piece as part of wheel bearing seal and interference-fitted into wheel bearing.

Note:
You can find further information on new wheel sensors in SSP 33.

Rear brakes

SP32_40

– Drum brakes

– Brake drum Ø 200 mm

– Self-adjusting

– New sensor for detecting wheel speed for ABS

Disc brakes with a brake disc Ø of 232 mm are fitted to models with more powerful engines.

On models not fitted with ABS the load-dependent brake pressure regulation is performed by means of a mechanical brake pressure regulator which is attached to the rear axle on the left.

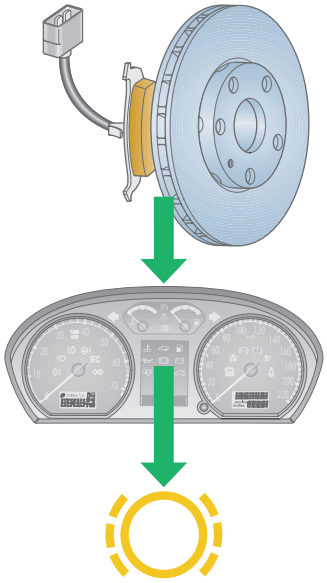
Brake wear indicator

New!

A brake wear indicator is fitted as standard on certain model versions or as optional equipment only for certain models.

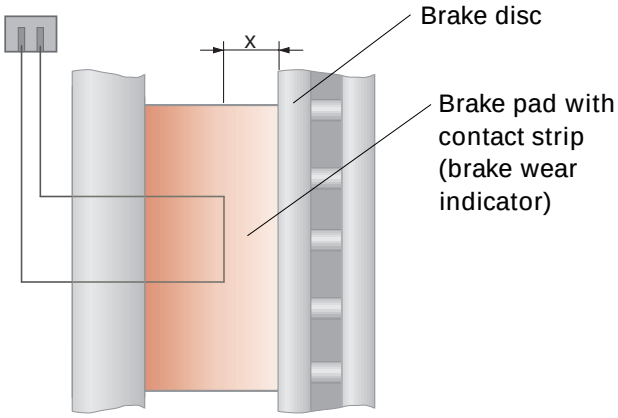
When a certain wear mark on the brake pad is reached, this is indicated electrically.
The brake pad of the left front brake is provided with a contact strip for this purpose (shear element).

If the brake pad has worn down to the wear mark “x”, the contact strip is destroyed. This is indicated visually in the instrument cluster. In addition an audible warning signal sounds (1 beep).



SP32_47

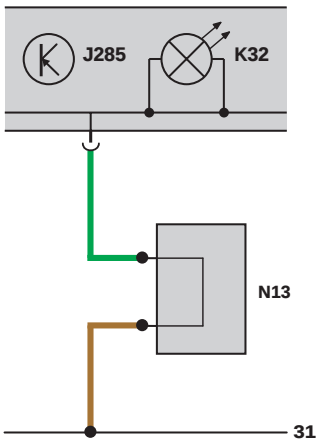
Note:
The automatic wear indicator is therefore fitted to the left front wheel brake.
When carrying out service work, always inspect the brake pads, linings at all the wheels.



SP32_48

Electric circuit

J285	Control unit in dash panel insert
K32	Brake pad warning lamp
N13	Left brake pad wear indicator



SP32_49

Electrical System

Decentralised electrical system

The electrical system is a decentralised design.

The electrical centre is split up into separate connector stations, relay boxes and fuse holders.

These subunits are positioned decentralised (locally). This means they are located close to the components and functional units of which they form a part.

The function of the entire “car” system are split up over several specialised control units.

The control units communicate with each other over CAN-BUS datalines.

Advantages:

– As a result of the short wiring looms, it is easier to locate and assign cable connections.

– The short cable runs offer a significant weight reduction.

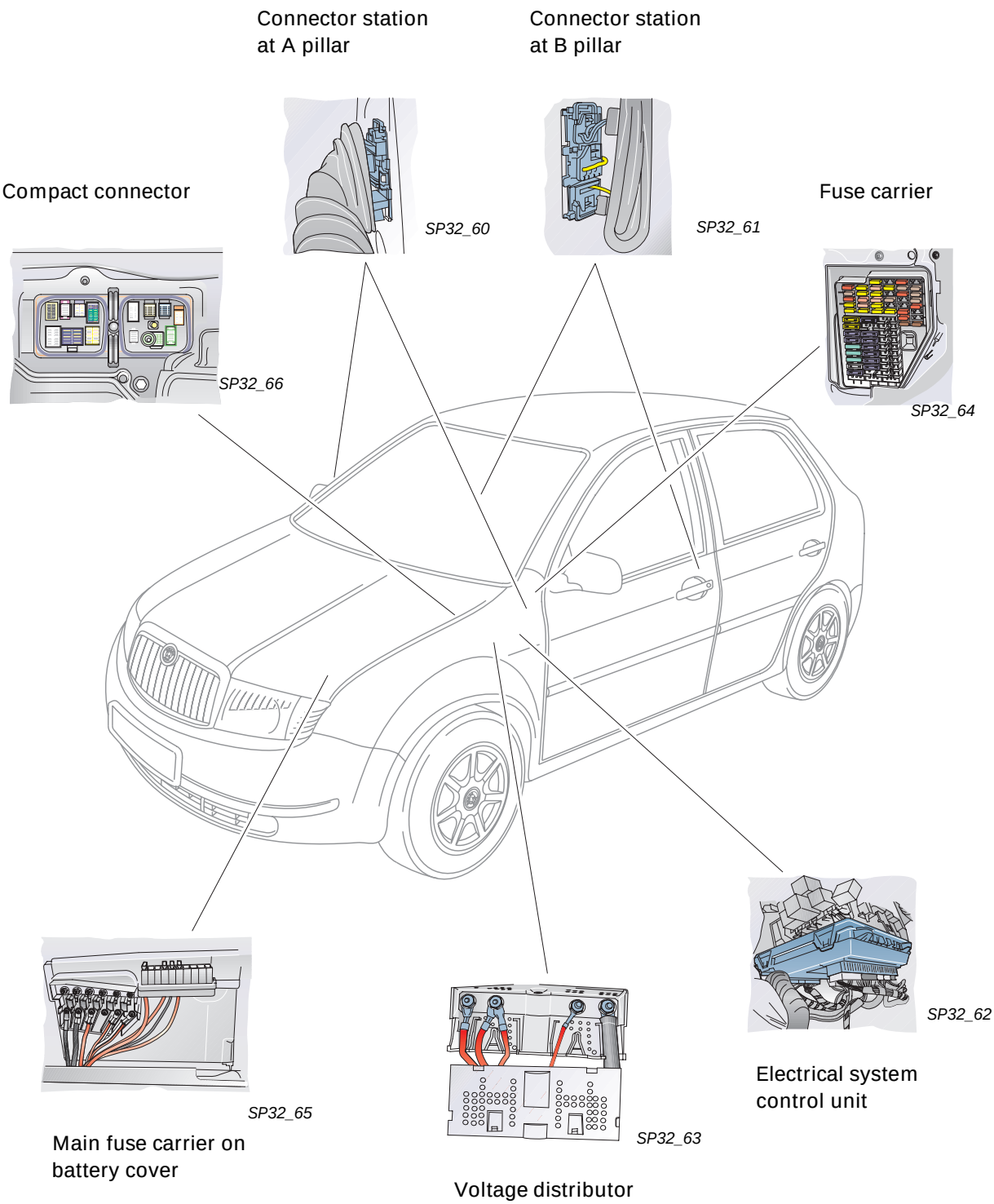
– Test points can be more easily assigned.

– The components of the electrical system are optimally protected from moisture.

– The decentralised electrical system is easier to service.

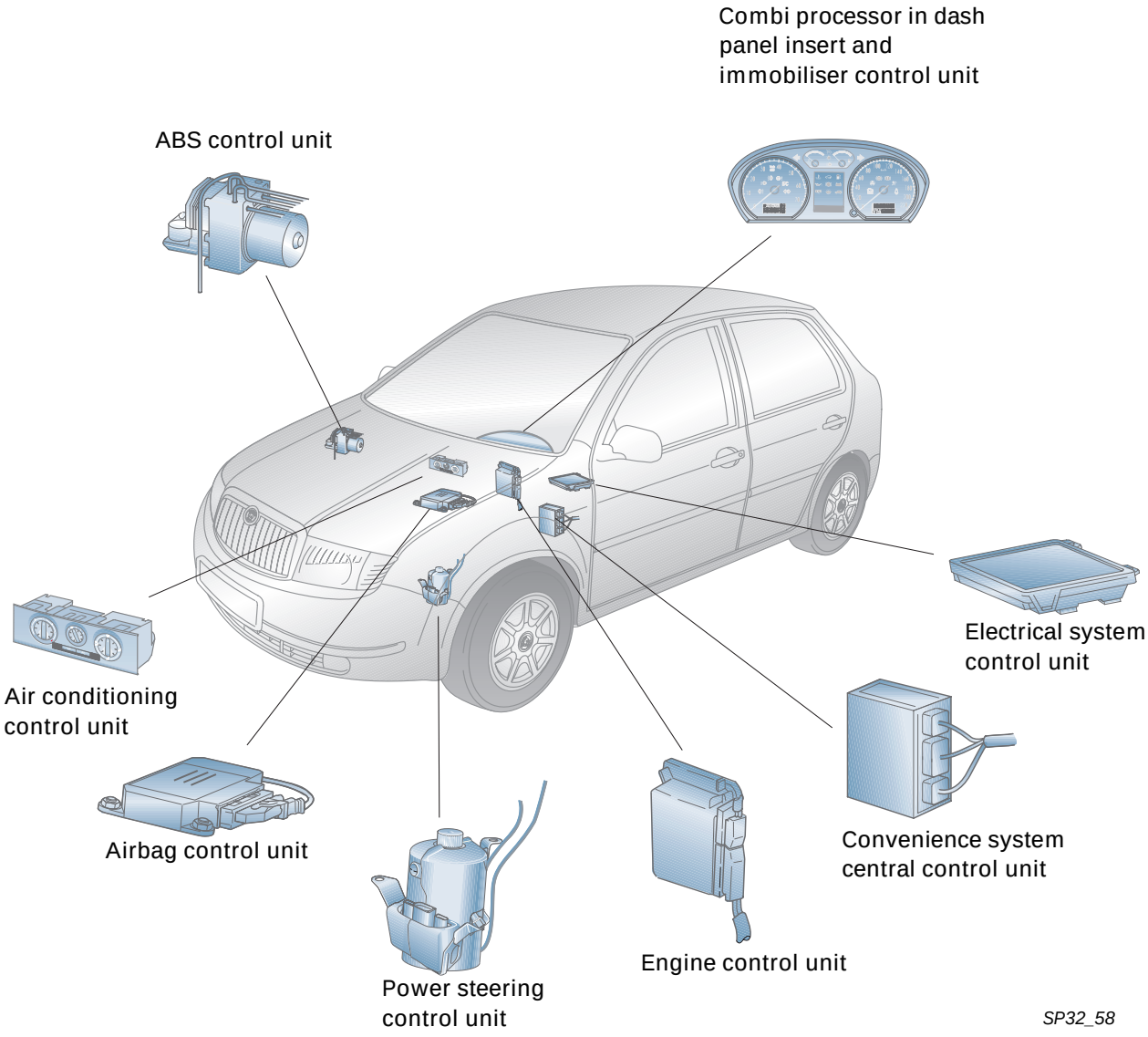
New components in the electrical system	their functions
– Electrical system control unit	– monitors switches which are not integrated in the convenience system (e.g. steering column switch) – monitors voltage supply to electrical consumer and consumer itself – interface of bus systems
– Voltage distributor	– distributes the voltage supply in the interior of terminal +30a from main fuse carrier to certain electrical consumers (e.g. to relay, fuse box)
– Connector stations in door pillars (A pillar and B pillar) – Connector stations at bulkhead	– mechanically coded connections – easier service work – optimal fault finding

Main stations in the decentralised electrical system



Electrical System

The control units in the entire “car” system



Note:
The Self-Study Programme No. 33 “Vehicle Electrical System” contains more detailed information on the function of the electrical system of the vehicle.

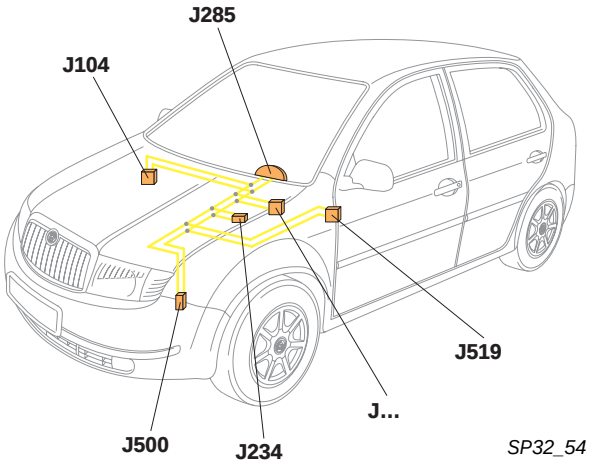
BUS systems

Two BUS systems with different priorities are presently used in the vehicle for the data transfer. A third one is envisaged (Info CAN).

Drive CAN

Priority 1
Transmission rate 500 kBit/s
The following are interlinked:

J104	ABS control unit
J285	Control unit in dash panel insert
J…	Engine control unit
J234	Airbag control unit
J500	Power steering control unit
J519	Electrical system control unit



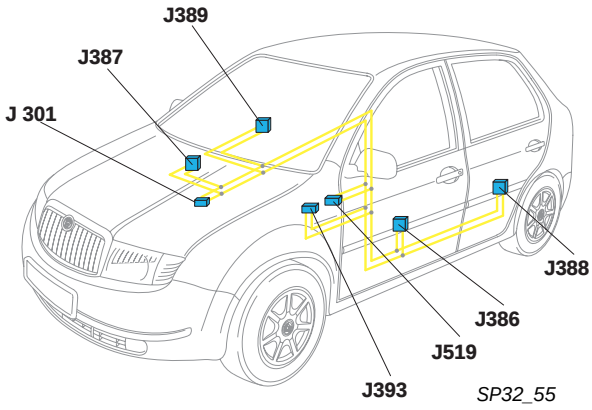
Convenience CAN

Note:
Please refer to Self-Study Programme No. 24 for further information on the CAN-BUS.
The basic principles also apply equally well to these linkages.

Priority 2
Transmission rate 100 kBit/s

The following are interlinked:

J301	AC control unit
J386	Door control unit, driver side
J387	Door control unit, front passenger side
J388	Door control unit, rear left
J389	Door control unit, rear right
J393	Convenience system central control unit
J519	Electrical system control unit



Both CAN-BUS merge in the electrical system control unit.

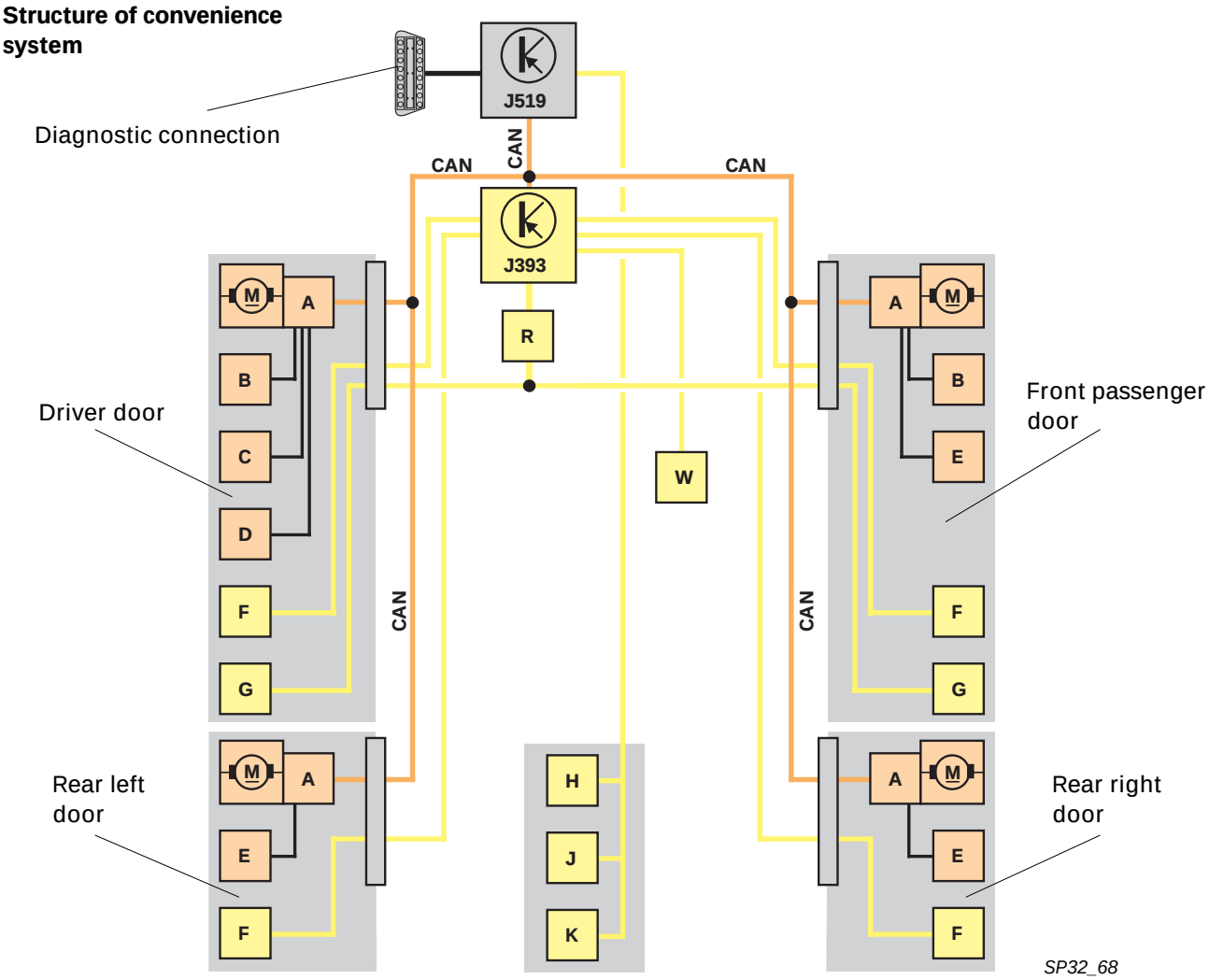
Electrical System

Convenience system

Central locking, anti-theft alarm and further electrical components are interlinked in the convenience system.
Information is transmitted in some cases over the CAN-BUS, and in some cases over direct links.

The convenience system control unit monitors the status of the switches in the doors, the confirmation feedback signals regarding Lock/ Unlock and SAFE. The tailgate/boot lid components are linked directly to the electrical system control unit.

Structure of convenience system

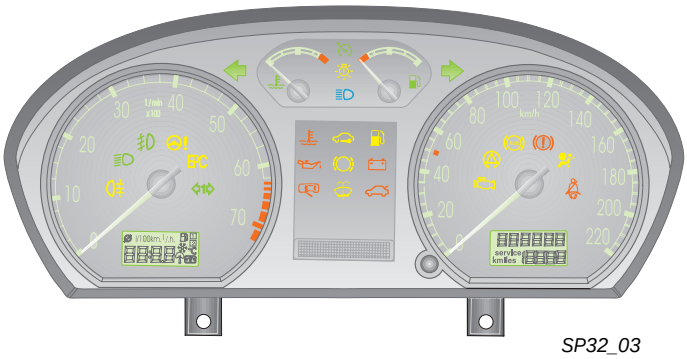


J393	Convenience system control unit	E	Power window switch
J519	Electrical system control unit	F	Central locking door lock
A	Door control unit	G	Entrance warning lamp
B	Electrically adjustable rear-view mirrors	H	Tailgate/boot lid rotary tumbler switch
		J	Tailgate/boot lid handle
C	Mirror and heater controls	K	Tailgate/boot lid remote release
D	Driver door operating unit	R	Relay
		W	Anti-theft alarm system components

Dash panel insert

The following are integrated in the dash panel insert:

- Control unit J285
- Immobiliser control unit J362
- Speedometer
- Rev counter
- Fuel gauge
- Coolant temperature gauge
- Warning lamps
- Multifunction display



SP32_03

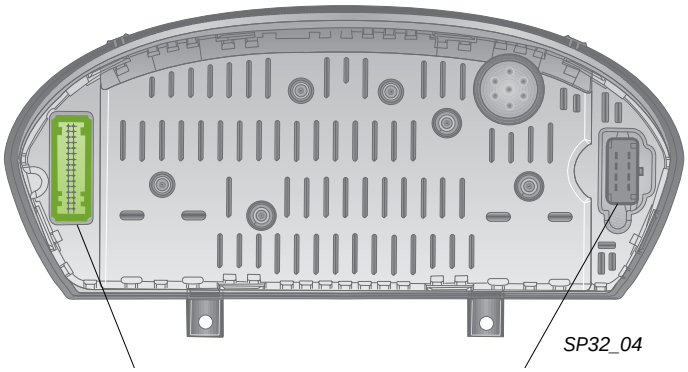
All the warning lamps are fitted with LEDs. The dash panel insert can be easily removed. No provision is made for repairs. The dash panel insert is replaced complete if necessary.

All the information regarding the monitoring functions is processed in control unit J285 and transmitted to the warning lamps which then either light up, flash or show a continuous light.
This also includes the new systems of brake wear indicator or the signals of the speedometer sender.

Connectors of dash panel insert

8-pin connector
Connection for voltage supply

32-pin connector
Connection for electrical system



SP32_04

32-pin connector

8-pin connector

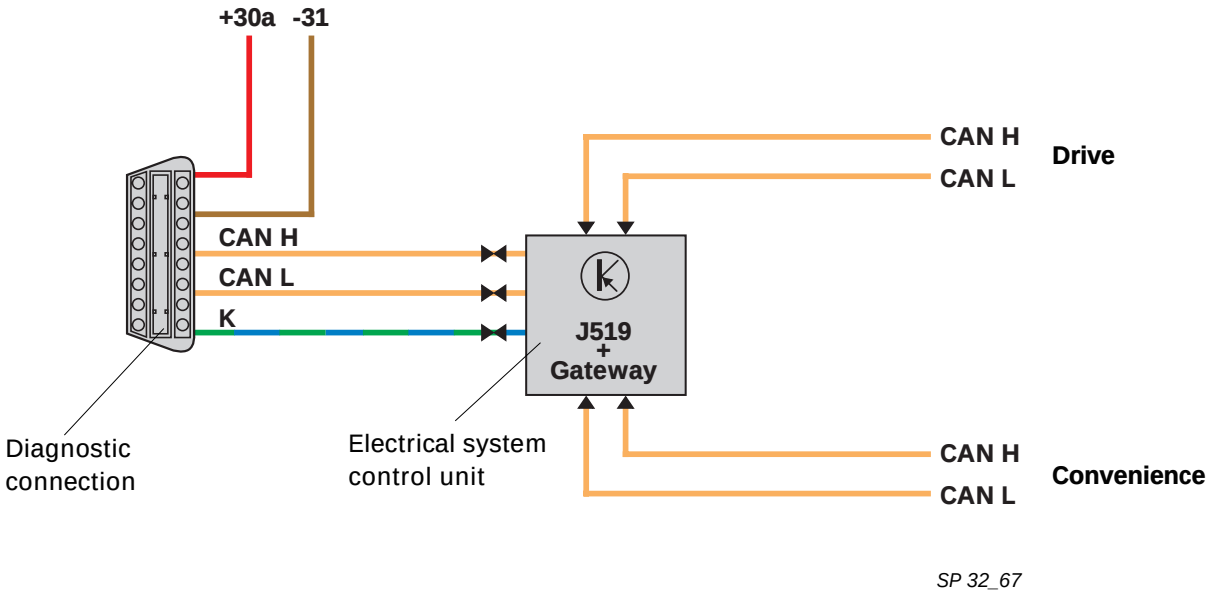
All the connections merge in the control unit in the dash panel insert, including the drive CAN.

Self-diagnosis

The dash panel insert has a self-diagnosis capability. The diagnosis functions can be selected with address word “17”.

Electrical System

Electrical system control unit J519 and gateway control unit J533



SP 32_67

The two current BUS systems are merged in the electrical system control unit. It performs monitoring functions.

Also integrated is the gateway control unit J533.

The gateway performs two tasks:

1st task = combining subinformation from various data messages of a CAN bus to form a new data message for another CAN bus and thus structuring a new message.

2nd task = transmitting diagnostic data from one serial line to another one, without altering the data.

The gateway is connected on the one side to the diagnostic line (K line) and on the other side to the CAN buses.

The gateway thus creates the possibility of conducting a diagnosis over the CAN BUS even if no CAN-compatible tester is available.

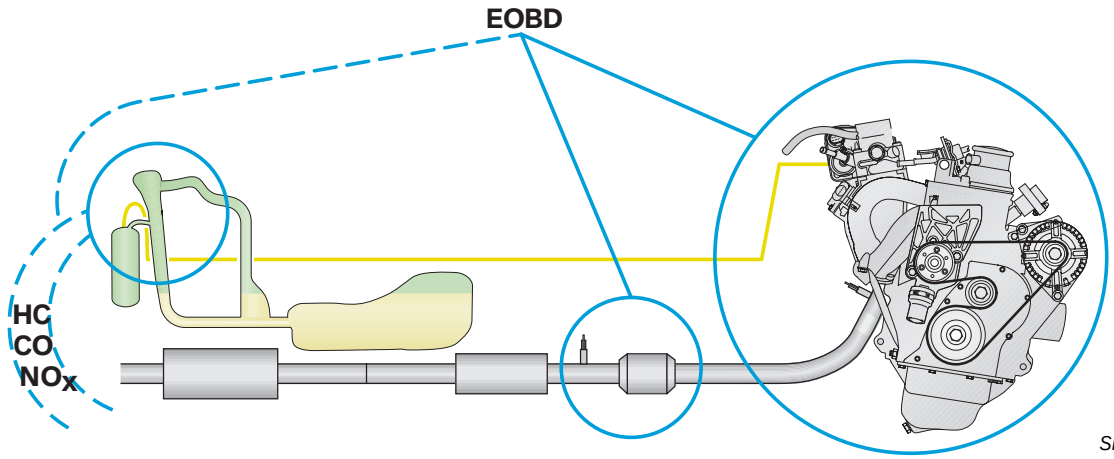
The gateway transmits the information from the K line over the CAN and vice versa for this purpose.

The information which flows over the K line and over the CAN is the same.

The external K line tester does not notice that the transmission between gateway and the control units is conducted over the CAN.

Note:
You can find more detailed information regarding the linkage of the control units and their diagnostic connection in Self-Study Programme No. 33.

On Board Diagnosis (OBD)



SP32_56

All the petrol engines which comply with emission standard EU4, are covered by the OBD.

An external distinguishing feature of these engines are the 2 lambda sensors.

EOBD is the second generation of engine management systems with a diagnostic capability making it possible to continuously verify components regarding their pollutant emissions and indicating malfunctions at an early stage.

How is monitoring indicated?

The exhaust warning lamp indicates that the exhaust monitoring system has detected a malfunction which is relevant to the exhaust emissions.

It flashes

– in the event of a fault which causes damage to the catalytic converter in this driving state.

It comes on

– in the event of a fault which adversely affects emission levels.

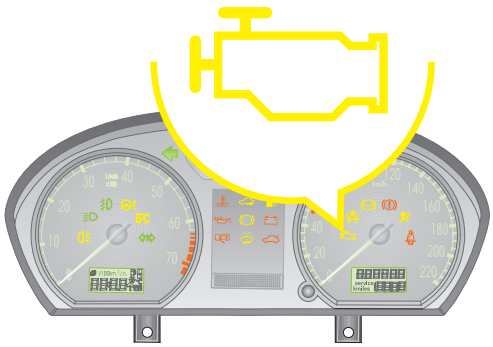
For the customer it is a warning sign to advise him to contact a service workshop.

What is monitored?

– all the functions of the input and output components such as
short circuit to positive,
short circuit to earth,
open circuit in wiring

– signals and components of exhaust-relevant functions for plausibility (e.g. catalytic converter, lambda sensor)

– system functions
(activated charcoal filter system, fuel tank vent system)



SP32_57