

General

In the course of developing the Cayenne, great demands were made on electrical and electronic functions as well as on safety and convenience. The previous vehicle electrical system was no longer up to the increased demands upon the electrical systems and electronics.

Information exchange among the numerous convenience, control and management systems was necessary in order to meet the high demands of the sporty SUV. Power supply plays an essential role in this and must be continuously monitored and regulated. Key roles are performed by the CAN (Controller Area Network) and MOST (Media Oriented Systems Transport) data communication systems.

The use of these systems enhances the field of vehicle electrical systems/electronics.

The following pages describe the structure and function of the vehicle electrical system as well as the individual electrical systems.

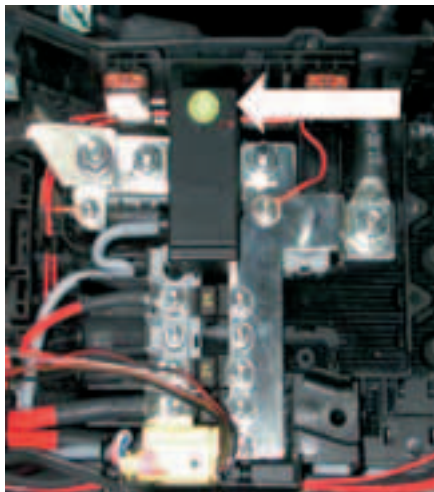
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Cayenne



After vehicle servicing, the battery should be checked and fully charged before the vehicle is returned to the customer.



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Voltage Supply

Battery

A battery under the driver's seat supplies the voltage. Since there are fewer variations in temperature, this location provides more stable performance than batteries mounted in the engine compartment. In the event of an accident, a safety switch (integrated into the primary battery relay in the distributor) disconnects the battery from the vehicle electrical system. In an emergency, the connection can be re-established via a push-button switch on the relay.

Battery capacity for the Cayenne S and Turbo ranges from 450A/95 AH (standard) up to 550A/110Ah (Cayenne Turbo with parking heater and multimedia options).

The generator is water-cooled and has a nominal output of 2660 watts, corresponding to a maximum current of 220 A.



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RESET-button (arrow)

The vehicle interior has six 12 V sockets for connecting additional electrical devices (5 sockets in the non-smoker package). These are positioned as follows:

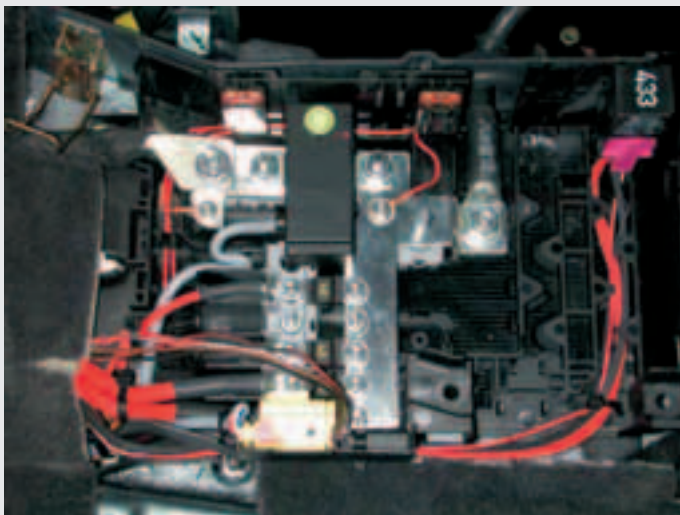
- Two sockets underneath the glove box in the passenger foot well. The non-smoker package omits the additional socket in the front of the ashtray/drawer (middle of the instrument panel).
- One socket in the rear passenger compartment underneath the air vents in the center console.
- Two sockets in the luggage compartment in the side trim panels in front of the left and right storage compartments.
- An additional 12 V socket (optional) in the rear bench seat. The second socket is in the mirror-image position to the other beneath the air vent in the center console.



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Distributor

The circuitry of the vehicle electrical system is similar to that of the sports cars. Separating the electrical system areas provides good protection against mutual interference and shorts in the individual power circuits.



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The distributor is located next to the battery beneath the driver's seat.

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Fuse/Relay Panels

Electrical fusing has been designed for the particular operating requirements of the Cayenne. In order to counteract voltage loss and power overload, the fuse and relay panels were made readily accessible, corresponding to the vehicle's power circuitry.



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A fuse panel is located on each side of the instrument panel. A combination relay and fuse panel is located to the left of the radiator reservoir in the engine compartment. There is also a relay panel on the driver's side beneath the instrument panel.

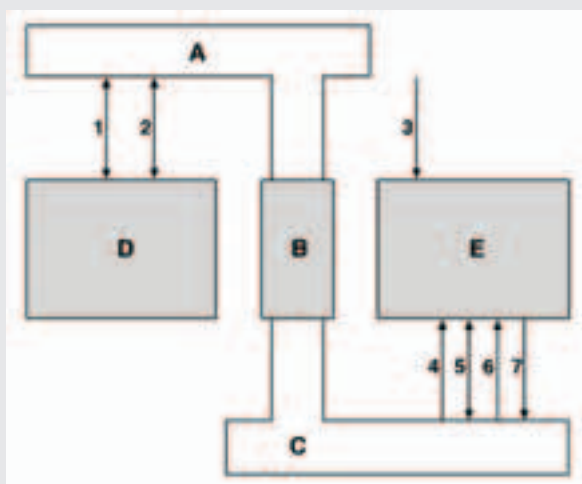
The electrical system control module functions primarily to protect the battery against cyclical overcharging. A large quantity of input data is managed by the electrical system control module, since electrical system management controls driver-related functions and system integrity must always be maintained. Electrical system status is determined primarily by comparing the measured voltage with the permissible voltage lower limit.

The electrical system status is determined by battery voltage parameters and data from heavy current loads of short duration.

In addition, the current control states of systems used by the driver are stored in the electrical system control module.

The electrical system control module communicates with the DME to provide an increase of idle speed if required to improve the electrical system status.

If the system status is negative, convenience-related electrically powered units can be switched off, as required. The voltage thus gained can be then channeled to other control devices via the CAN-Bus. Before such units are cut off (e.g., cigarette lighter, etc.) the driver receives a "Battery Low" warning signal. Once the system status is no longer critical, the units are switched on in the reverse order that they were shut off. Diagnosis of the electrical system control device is performed using the Porsche System Tester 2.



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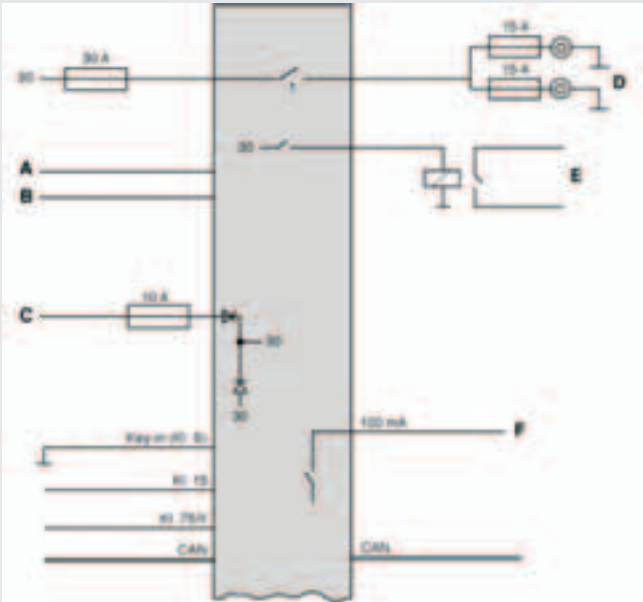
- A – CAN drive unit
- B – Gateway
- C – CAN convenience
- D – Engine control module
- E – Electrical system control module
- 1 – Engine speed
- 2 – Increase idle speed
- 3 – Battery voltage
- 4 – Engine speed
- 5 – Increase idle speed
- 6 – Unit load status
- 7 – Unit cut-off set point

Cayenne

- A – Measurement battery positive
- B – Measurement battery negative
- C – Electrical system control module
- D – User 1 (sockets 1 – 2)
- E – Electrical system relays
- F – Release seat heater

Function: Vehicle Electrical System Management

Circuit Diagram



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Networking/Data Communication

- CAN (Controller Area Network)
- MOST (Media Oriented System Transport)

Electronic networking of the Cayenne enables data exchange among various control devices throughout the vehicle.

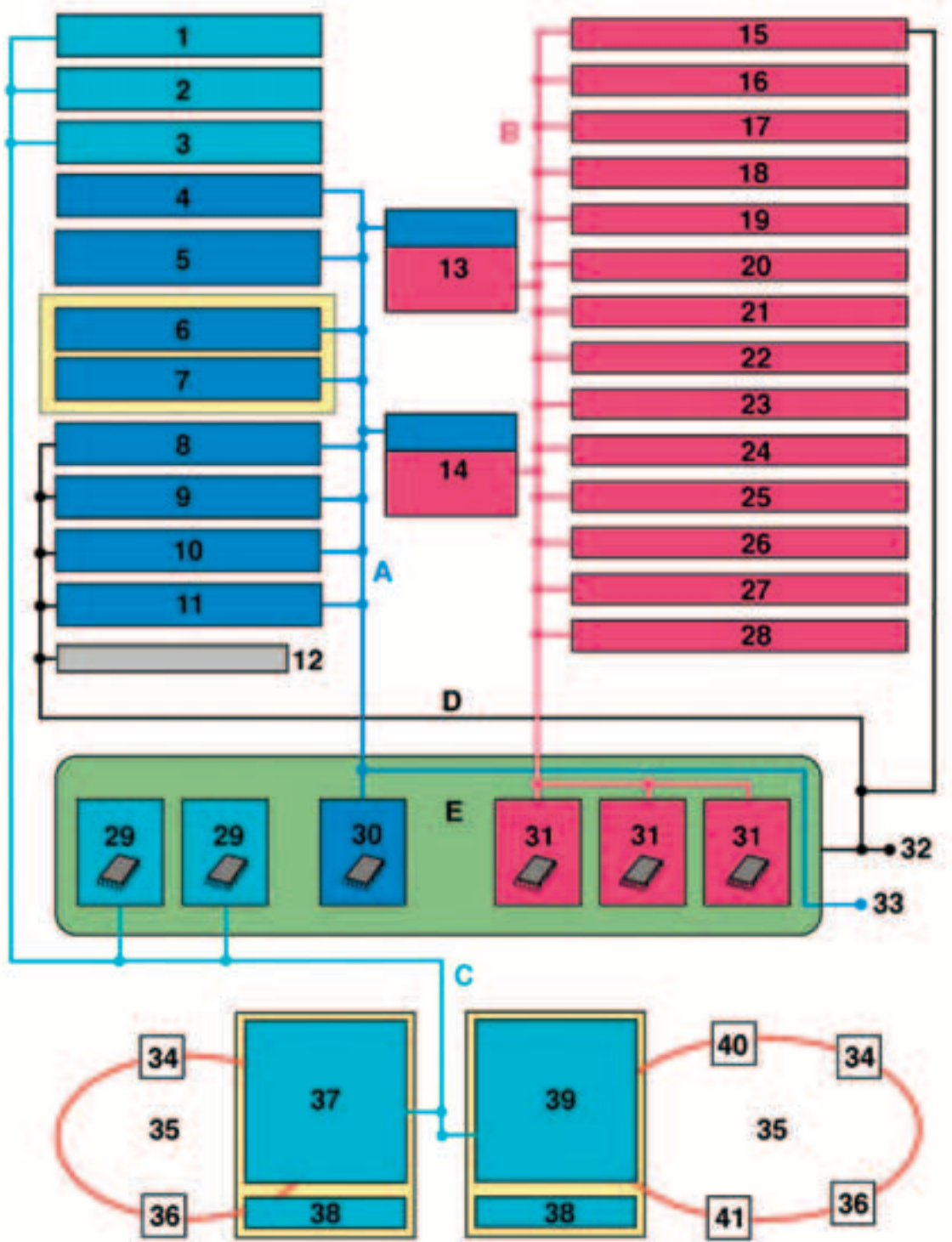
Compared to that of the sports cars, the data bus system is more extensive and consists of the following subsystems:

- CAN – drive bus, 500 kBit/s (in the event of a data line failure, e.g., short circuit or interruption, data transmission is impossible or limited).
- CAN – Infotainment, 100 kBit/s (in the event of a data line failure, e.g., short circuit or interruption, data transmission is possible only via a single line – single wire operation).
- CAN – Convenience, 100 kBit/s (in the event of a data line failure, e.g., short circuit or interruption, data transmission is possible only via a single line – single wire operation).
- MOST optical data bus, 21.2 MBit/s (if one user cannot relay the data, no further communication is possible, due to the ring structure of the network).

To enable communication among the individual bus systems, a so-called Gateway Control Module, implemented as software, is located in the instrument cluster. Diagnosis is performed using the K-lead.



Detailed information regarding data communication in Porsche vehicles can be found in the Porsche Academy module “Introduction to Networking.”



1 – Control module wiper	25 – Control module parking aid
2 – Compass sensor	26 – Control module tire pressure monitor
3 – Control module parking heater	27 – Control module seat memory driver
4 – Control module airbag	28 – Control module seat memory passenger
5 – Control module PSM	29 – Gateway CAN Infotainment
6 – Control module automatic level system	30 – CAN drive unit
7 – Damping control module	31 – Gateway CAN convenience
8 – Control module center differential lockup	32 – CAN drive unit external
9 – Control module axle differential lock	33 – K-lead
10 – Transmission control module	34 – Amplifier
11 – DME control module	35 – MOST bus
12 – Xenon control module	36 – CD changer
13 – KESSY control module	37 – Radio CDR 23
14 – Steering column switch control module	38 – Gateway Radio/PCM
15 – Rear control module	39 – PCM2
16 – Control door rear left	40 – Navigation module
17 – Control door rear right	41 – Telephone
18 – Control driver's door	
19 – Control front passenger door	
20 – Trailer control module	
21 – Vehicle electrical system control module	A – CAN drive unit
22 – Climate control element front	B – CAN convenience
23 – Climate control element rear	C – CAN infotainment
24 – Control roof	D – K-lead
	E – Gateway instrument cluster

Cayenne



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Immobilizer/Central Locking

Ignition Lock with Single-key System

The Cayenne is equipped with a central locking system, which along with an engine immobilizer, provides the highest level of theft deterrence. Standard equipment includes a remote control integrated into the key which, using two buttons, locks and unlocks all doors and opens the rear window or gate. In addition, the glove box, the sunroof and gas tank lid are included in the central locking system.

In the US market, the remote control also has a “panic button.” In an emergency, pushing the “panic button” turns on the exterior lighting in blinking mode and activates the horn at the same time.

The rear control module controls the logic for the central locking system functions. Depending upon status information (e.g., key status) the rear control module generates functions and central locking commands for the door control modules. System codes affect only the rear control module. Communication is via the CAN convenience bus.

Functional components:

- Operating controls, doors
- Door control modules
- Rear control module

Central Locking Controls:

- Remote control (standard)
- Lock-unlock button in all doors
- Key cylinder driver's door
- Keyless entry (I-option)

The central locking system has two locking levels.

“Secure” locking, ideal for most situations, is activated by pressing the Cayenne's key remote once. The doors can only be opened with the remote control and not by using the interior door handles.

This prevents access to the vehicle by operating the interior door handles through an open sunroof.

Pressing the remote control twice in rapid succession prevents the Cayenne from being accessed from the outside. The doors can be opened from within. This mode is appropriate if passengers wish to remain in the vehicle.

Alternate Operation

In the event of remote control failure, locking and unlocking is performed using the locking cylinder in the driver's door. If rear control module CAN signals cannot be received by the door control module, an alternate function is used.

- Every door module stores the missing bus user in a separate error code memory.
- The driver's door module takes over the master function for the electrical central locking system. The other door modules respond to the central locking status message from the driver's door module.
- Specifically the two states, “unlock” and “lock,” of the driver's door locking cylinder and the switching information of the Lock/Unlock buttons are command signals to be received and evaluated by the other door control modules. The controls of the other doors are locked out.

Cayenne



The engine may only be started if the clutch pedal is pressed in vehicles with manual transmission, or if the shift lever of automatic transmission vehicles is set to “P” or “N.”

The standard immobilizer uses a transponder system like that used by the sports cars. When the ignition is switched on, the data code in the transponder in the head of the key is compared to that of the vehicle electronics. Upon correct identification, the immobilizer is disabled and the engine may start. Arming and disarming the immobilizer is a background task. In addition, removing the key from the ignition lock activates a steering column lock operated by an electromagnetic locking ring.

If an original key is lost, the replacement can be “taught” the code using the Porsche System Tester 2. Lost keys can be deactivated. In this way only authorized persons can have access to properly coded keys.

Porsche Entry & Drive

The Porsche Entry & Drive system is offered as an optional step-up in convenience (ID-Number for all models); this system offers, in addition to the “Ignition Lock with Single-key System” described above, keyless operation of the vehicle. Porsche Entry & Drive consists of a system using interior and exterior antennas, an integrated identification generator in the vehicle transmitter, proximity sensors as well as a locking button in the exterior door handle surrounds. The driver carries an ID sender (electronic mini transmitter emitting an identification code), which is integrated into the vehicle key.

Access to every door is possible using “Porsche Entry.” Proximity sensors are located in the exterior door handles; approaching the vehicle initiates the identification process when the handles are touched. The transmitted code is received by antennas in the spoiler, then by the driver authorization system (integrated into the so-called KESSY control module), decoded, and then compared with a preprogrammed code consisting of up to eight stored keys before the door may be opened. Positive identification of the ID sender carried by the driver within a specified time period allows the door to be opened.

After the driver has entered the vehicle, an additional identification process is initiated when the ignition switch is turned. The engine can be started only after this process has a positive result.

The vehicle is locked from the outside by operating a locking switch on the exterior door handle. As with unlocking, the user ID is queried, and the vehicle is locked upon positive identification. At the same time both the immobilizer and steering column lock are activated.



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Anti-theft Alarm

An anti-theft alarm with an ultrasonic interior monitor is standard equipment on the Cayenne. This security zone includes all doors, the front hood, the rear gate, the folding rear window, the interior, the ignition, a trailer if attached, and includes a tilt sensor.

The central functional logic for the anti-theft alarm is integrated into the rear control module. The KESSY control module stores all critical information for the arming and disarming of the anti-theft alarm. The CAN convenience bus provides communication between the KESSY control module and the anti-theft alarm.

Cayenne

The anti-theft alarm guarantees the highest level of theft protection allowable under country-specific laws, regulations and insurance requirements.



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Alarm System Ready Display

An optical display (LED) in the driver's side window sill indicates the status of the anti-theft alarm. Four different flashing variants are possible.

LED control when vehicle is locked and the anti-theft alarm is armed:

Within the first 2 seconds at	3.3 Hz	(Control by rear control module)
afterward at	0.5 Hz	(Control by door control module after transfer by rear control module)

LED control when vehicle is locked and the anti-theft alarm is armed and interior monitoring is unarmed:

Within the first 2 seconds at	3.3 Hz	(Control by rear control module)
afterward for 8 sec.	no signal	(Control by rear control module)
afterward at	0.5 Hz	(Control by door control module after transfer by rear control module)

LED control when vehicle is locked and the anti-theft alarm is inactive:

Within the first 2 seconds at	3.3 Hz	(Control by rear control module)
afterward at	0.5 Hz	(Control by door control module after transfer by rear control module)

LED triggered by “Total Error” of the central locking system or anti-theft alarm:

within the first 2 seconds at	3.3 Hz	(Control by rear control module)
afterward for 8 sec.	Continuous signal	(Control by rear control module)
afterward at	0.5 Hz	(Control by door control module after transfer by rear control module)

The illumination time for the LED is 80 ms



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Anti-theft alarm armed

The anti-theft alarm with interior monitoring is armed when the vehicle is locked and placed in "SAFE status." If the Cayenne lock is locked so that the doors can be unlocked from inside, the interior monitoring and the tilt sensor are deactivated. This state is achieved if the vehicle is locked twice within 2 seconds with the remote control (conscious locking).

If locking is performed using the door locking cylinder, only the driver's door is locked. The driver's door module then takes over the master function for the electrical central locking system, locks all doors and arms the anti-theft alarm.

Anti-theft alarm disarmed

Disarming the anti-theft alarm system requires that the SAFE or locking function (USA models) be cancelled using a radio transmitted command.

When unlocking via the door locking cylinder, the driver's door is mechanically opened and the alarms on the other doors are disarmed. In this case, the anti-theft alarm remains active (only the interior monitor and tilt sensor are deactivated); after 15 seconds, an alarm sounds if the ignition has not been switched on.

Activating the Interior Monitor/Tilt Sensor

The interior monitor and tilt sensor can be deactivated once for the next time the vehicle is locked using the radio remote control or the "Settings" menu in the instrument cluster. In order to reset this function, the anti-theft alarm must be disarmed once and then re-armed.

Alarm Signals

The alarm is transmitted optically by the flashers and acoustically by the alarm horn when triggered by disturbance of one of the areas in the security zone.

The alarm signal can be cancelled using the remote control. The length of the alarm signal depends upon country-specific requirements (standard: 30 seconds).

A repeated activation during the alarm does not result in prolongation of the alarm. After the alarm phase, the alarm is re-activated; the signal may be triggered a maximum of three times in sequence (EU guidelines).

Instead of the alarm horn, country-specific “intelligent sirens” may be used. If such a siren is used, the automatic triggering of the alarm horn is deactivated. Unlike the alarm horn, the siren has the advantage of a separate voltage supply and can trigger the alarm in case of a power interruption (insurance requirement in England).

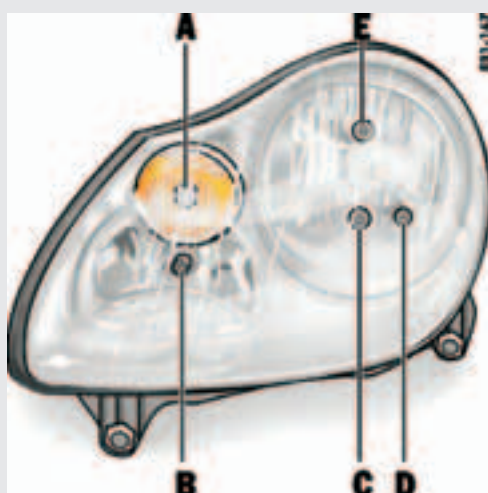
Lighting System

Headlamps (H7)

New headlamps were developed specially for the Cayenne series. The standard head-lamps used for the Cayenne S consist of an H7 low beam with manual leveling and an H7 reflecting high beam with an H7 auxiliary driving lamp. As with the 911 Carrera and Boxster, the headlamp is integrated into a single housing. The front parking light and turn signal are likewise housed in the headlamp unit. The headlamp unit is a plug-in module. It is simple to access and allows easy replacement of the bulbs. The side turn signals in the front fenders are white in color.



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- A – Turn signal
- B – Auxiliary driving lamp
- C – High beam
- D – Parking light
- E – Low beam

Cayenne



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Headlamp Washer System

A headlamp washer system is available for the Cayenne either as a separate option or as part of the “Advanced Off-Road Package.” This is designed as a piston system; each headlamp is cleaned with two water nozzles.

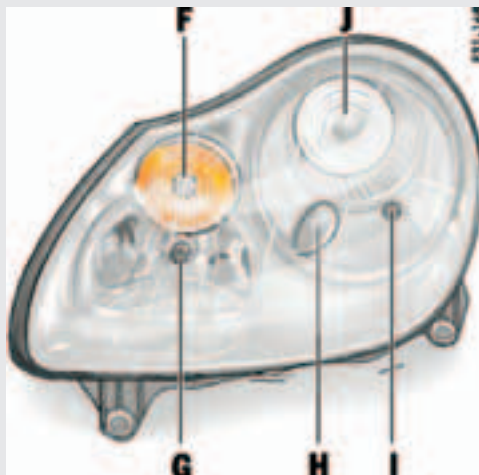
Bi-Xenon headlamps with dynamically-controlled cornering light (ID-Number for Cayenne S)

This headlamp is standard equipment in the Cayenne Turbo. The dynamically controlled cornering light is a new feature of this lighting system. The Bi-Xenon headlamp is equipped with automatic-dynamic leveling as well as a headlamp washer system as standard equipment.

Each headlamp contains a supplementary H3 low beam light. The position of the supplementary light provides significantly improved illumination to the left and right of the primary light beams.

Steering angle and vehicle speed are processed by a control module to determine the lighting dynamics of the left and right headlamps. The optimal relationship between sensor values and lighting dynamics was determined through testing and has been stored as a data transmission function in the control module.

In addition to providing improved driving comfort, this system also increases driving safety. When driving off-road, this technology is highly useful in early detection of obstacles to the side.



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The following describes the relationships between the dynamically controlled cornering light and other illumination functions.

- The cornering light always functions together with the low beam.
- If the low beam fails in one headlamp, then the corresponding cornering light shuts off to avoid asymmetrical illumination.
- When high beams are used, the cornering lights operate at their lowest illumination.
- Operating the headlight flasher does not affect the cornering light function.

Front Fog Lamps with Rear Fog Lamps

The fog lamps (H11) are located in the front nose section of the Cayenne. Both the front and rear fog lamps are switched on and off by the light switch. The parking light must be switched on before the fog lamps will operate. The low beam may also be operated together with the fog lamps.



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Each tail light unit houses the rear fog lamps. The rear fog lamps may only be switched on if the both the parking light and front fog lamps are operating. The low beam may also be used.

Tail Light Units

The tail lights of the Cayenne are a single unit integrated into the tail of the vehicle. The tail light unit has a layered effect in a single housing.

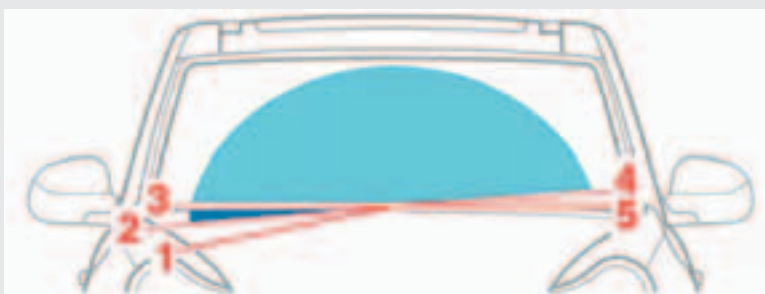
- Turn signal
- Brake light
- Rear fog lamps
- Parking light
- Back-up light
- Reflector

A clear glass section covers the lights, which create distinctly contoured bands when illuminated.

The third brake light has LEDs and is integrated into the rear spoiler.

In order to maintain optimal conditions for effective wiping, the design phase took into account the relationship between the windshield geometry and the wiper system. Specially-shaped unarticulated Aero wiper blades, which lie flatter against the windshield than conventional systems, are being used for the first time by Porsche.

This means that the direction reversal of this system is not performed by a mechanical drive, but rather by the negative phase of an electronic motor. The terminal voltage of the motor is reversed in the return position.



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- 1 – lower mechanical stop
- 2 – lower reference position
- 3 – lower return position
- 4 – upper return position
- 5 – upper mechanical stop

The passenger-side wiper is designed with a so-called controlled wiper lever to provide a broader cleared field of view. The wiper motion is performed by a four-joint kinematic at the base of the wiper arm.

The front wiper system has two speeds as well as an intermittent setting. The speed is set using three settings on the right steering column lever. Hall sensors are used to detect wiper position and wiper motor rotation in order to control wiper speed.

Inside the interior mirror base is the rain sensor (standard), which controls the wiper interval. The wiper interval can be customized or adjusted using a potentiometer in the right steering column lever.

When operating in rain sensor mode, the wiper speed is infinitely variable as needed.

In order to optimize aerodynamics while minimizing wind noise, the wiper arms are parked out of the line of sight (beneath upper lip of the hood).

The system consists of a reversible, RPM-regulated 2-brush wiper motor with integrated electronics in the drive cover and wiper arm with blade.

The wiper module communicates with other control modules via CAN-interface.

The rain sensor is connected to the wiper control module using a serial interface.

Individual Functions

Intelligent, Staged Stall and Thermal Protection

An intelligent stall and thermal protection system was installed to avoid damage to the wiper module caused by heavy snow, freezing or other blockage of the wiper. The stall protection function monitors motor speed as well as other set variables.

If, for example, there is a lot of snow on the windshield, the wiper motor electronics adapt the wiped area to the conditions of the windshield.

In this way the return points of the wiper motion are set lower in order to provide the widest possible cleared field of view.

Function

In the event of excess power consumption by the wiper motor, overload protection is provided by thermal performance data in the software, which lowers power consumption by reducing the wiping frequency or by introducing short pauses in the interval. The thermal performance data includes motor and control module temperature measured in the control module as well as exterior temperature (via CAN).

Blockage is identified by standstill of the rotor and maximum motor terminal voltage. After several attempts, the wiper motor is switched off. This lockout can be cancelled by switching the ignition off and on, or by operating the wiper switch again.

Voltage Monitoring

The voltage supply is monitored by the control module. If the voltage exceeds the specified range (9V to 15V) wiper motion is stopped; once the voltage returns to the permissible range, the desired operation mode resumes.

- When the engine is started, the wiper motor is likewise briefly halted.

Continuous Wiping Stage 1 and Stage 2

Selection on the wiper switch (Stage 1/Stage 2) is read as a signal by the switch module and transmitted to the wiper control module via CAN. This, in turn, operates the wiper motor at the desired speed.

Rain Sensor and Intermittent Settings

Precipitation on the windshield, including snow, is measured by the rain sensor on vehicles so equipped. Correspondingly, the wiper speed/frequency is automatically set between intermittent to continuous (Stage 1 and Stage 2). The rain sensor function supercedes the interval function.

The following will activate the rain sensor:

- Setting the wiper lever from Neutral to Stage 1
- Operating the windshield washer system
- Changing the rain sensor sensitivity with the thumb wheel

Activation of the rain sensor is confirmed by a single wipe of the blade.

Function

Increasing the sensitivity by the potentiometer on the wiper switch triggers a single wipe cycle, thus transmitting information to the rain sensor via the serial interface. During the pauses in wiping, the wiper is placed into a raised "Interval Parking" position and is protected against backlash by the motor.

Activation of the intermittent operation immediately results in a full wipe cycle. This does not occur, however, if the intermittent function was active before the ignition was switched on. If the rain sensor does not receive a signal after a specified period, the intermittent operation starts with one wiping cycle. The interval pause is determined by the wiper set point, vehicle speed and potentiometer value.

The wiping speed during intermittent operation corresponds roughly to Stage 1. Shortening the interval pause on the potentiometer triggers a single wiping cycle.

Automatic Reduction of the Wiping Frequency

This function is activated after the ignition is switched on (Terminal 15) and the vehicle achieves a speed of > 5 mph (8 km/h). If Stage 2 has been selected and the vehicle speed is greater than 5 mph (8 km/h), the wiper operates at Stage 2. If the speed goes below 2.5 mph (4 km/h) the wiper speed switches from Stage 2 to Stage 1.

If the vehicle speed increases again to > 5 mph (8km/h), the wiper, depending upon the lever setting, will run at Stage 2.

If Stage 1 has been selected, the wiper speed is set to Intermittent if the vehicle speed is < 2.5 mph (4 km/h). The interval pause period is 4 seconds. If the vehicle speed returns to above 5 mph (8 km/h) the wiper again operates at Stage 1.

Automatic decrease of wiper speed is interrupted by a function modification on the circuit. The automatic decrease in wiper frequency resumes after the vehicle speed reduces from > 5 mph (8 km/h) to below 2.5 mph (4 km/h).

Wiper Position Reference Point

A sensor on the rotor of the wiper motor supplies data for the wiper position. The wiper control requires a reference point in order to determine an absolute position from this value. After the ignition is switched on (Terminal 15), the wiper is moved in the downward direction until the reference point is found.

One Tap Wipe

Pushing the wiper lever downward activates a single wipe cycle of three intervals. If the switch is held down longer, the wiper motor increases from Stage 1 to Stage 2 after the next sweep of the wiper. The wiper operates at Stage 2 as long as the touch wipe function is maintained. When the lever is released, the wiper blades are parked.

Rear Window Wiper

The rear window wiper was designed to provide the widest possible field of vision. The rear wiper remains on the window when parked. The drive unit for the rear-window wiper is located in the rear gate and the wiper arm is on the folding rear window. If the rear window is folded up, the drive unit and wiper arm are separated. For this reason the rear window wiper is designed with a separable wiper shaft.

The rear wiper has an intermittent setting with a fixed interval.

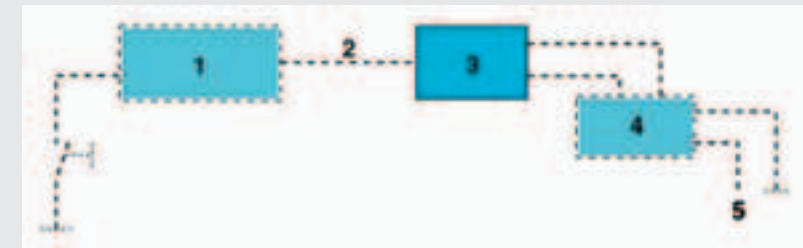
Pushing the right steering column lever operates this function, and the rear window is then wiped in the intermittent mode.



A particular feature is the automatic activation of the wiper when the front wiper is turned on and the gear lever is placed in Reverse.

Cayenne

- 1 – Steering column module
- 2 – CAN convenience
- 3 – Rear control module
- 4 – Rear window wiper
- 5 – Terminal 15



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One Tap Wash Windshield and Rear Window

The “One Tap” wash function is an automated cleaning operation of the windshield or rear window. This is operated by a short tap of the windshield or rear window washing function on the right steering column lever. The length of time the lever is pressed determines whether a one-touch wash or conventional washing is performed. This is analyzed in the steering column module and is stored in the CAN as a wash function.

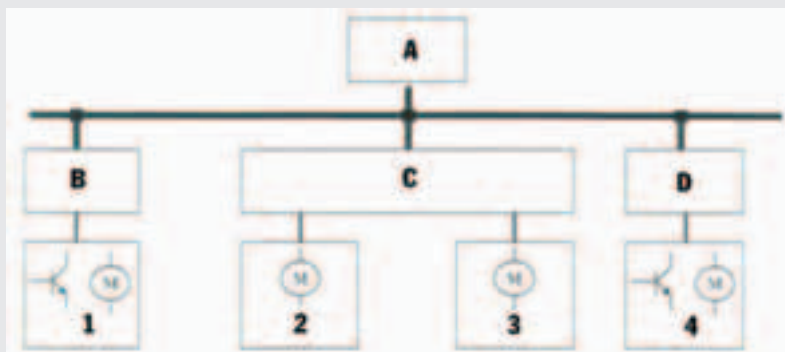
When the “One Tap” wash function is activated, the dual washer pump is operated by a central electronic control for a defined time period. At the same time the wind-shield or rear window washer operates the washer pump for a period corresponding to a sequence of wiping cycles. Once the pumping is completed, three additional wiping cycles are performed.

If the wash function has been activated on the steering column lever longer than necessary to initiate the One-tap wash function, the conventional washing function starts. This means that the dual washer fluid pump operates as long as the steering column lever is depressed. The windshield wiper or rear wiper operates during the entire time the pump functions.



The headlamp washer operates only if the low or high beams are switched on. The spray duration is limited.

The headlamp washer operates only if the low or high beams are switched on.
The spray duration is limited.



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A – Steering column module

B – Rear control module

C – Electrical system control module

D – Front wiper module

1 – Rear windshield wiper

2 – Headlamp washer system pump

3 – Dual washer pump

4 – Front wiper

Instrument Cluster

The design for the Cayenne was basically adapted from the layout for the 911 Carrera, with 5 round gauges in a single instrument package.

The placement of the round gauges and location of individual instruments and displays within the package vary somewhat from the 911 Carrera, depending upon function. The analog tachometer and speedometer are placed to the right and left of the center gauge and project forward away from the other round gauges.

The digital speedometer display is located in the multifunction display in the center instrument.

Cayenne

The Cayenne instrument cluster has two variations with different digital displays, such as Gear Indicator for Tiptronic, Service Interval, Exterior Temperature and various warning indicators.



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“High Line” Version (Standard Cayenne S)

The multifunction display is monochrome (yellow) 3-inch dot-matrix display.

The dot-matrix display is an LCD, the resolution of which depends upon monochrome pixels controlled by the system electronics. The display screen in the basic version allows all relevant information to be shown.



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“Premium” Version (Standard on Cayenne Turbo)

This instrument cluster contains a high-resolution 5-inch TFT (Thin-Film-Transistor) color screen comparable to that found on high-quality laptops. The enlargement of the data field as well as the higher resolution of the TFT display enables a very high level of legibility. Due to its larger size, the lower area of the display continuously shows the temperature on the left side, and below this, the vehicle odometer reading. In between is the digital speedometer, below to the right is the time and below that, the trip odometer.



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The left side of the display contains the optional compass reading, on the right is the gear indicator of the Tiptronic transmission. The multifunction display with its highly legible lettering is integrated into the center of the display. When no special function display is required in the central area of the display, the basic image indicates the average fuel consumption.

The multifunction display functions both as a central information source as well as an operating menu for a number of systems frequently used by the driver. Operation is by using the rocker switch integrated into the right steering column lever. The touch control on the bottom of the switch serves to select the function to be shown in the multifunction display. If this button is depressed for longer than one second, the selected values are reset.

Cayenne

The main menu items which can be displayed in the 3 and 5-inch display.

- Telephone
- Km/h (mph) Limit
- Vehicle information
- On-Board computer
- Tire air pressure
- Settings

Speedometer Display Cayenne S and Cayenne Turbo

The digital speedometer is located in the multifunction display in the center instrument. In addition, an analog gauge is located to the right of the multifunction display.

Odometer Display Cayenne S

The top display counts the total distance driven by the vehicle, the bottom display displays the trip distance. The trip odometer, upon reaching 9999 kilometers or 6213 miles, resets to “zero.”

Operating switch “A” (approximately 1 second) likewise resets the trip odometer to “zero.”

Odometer Display Cayenne Turbo

The odometer is located in the multifunction display in the instrument panel. The left display counts the total distance driven by the vehicle, the right displays the trip distance.

Tachometer

The start of the red region on the tachometer scales is an optical indicator of the maximum allowable engine speed. The engine speed is limited to protect the engine when this limit is achieved.

Engine Oil Temperature Gauge

If the engine oil temperature is too high, a warning message appears in the multifunction display.

Clock

The clock is set in the On-Board computer. Vehicles with Porsche Communication Management (PCM), time synchronization is performed by the navigation system (GPS real time). Independent of the actual GPS time, the time displayed in the instrument cluster as well as in the PCM can optionally be set forward or back as desired.

Temperature Gauge – Cooling System

Pointer below 80 °C	– engine cold
Pointer in range of 90 °C	– normal operating temperature

If the engine is under heavy load and high exterior temperature, the pointer may move up to the start of the red field.

If the coolant temperature is too high, or the coolant level too low, a corresponding warning appears shown in the multifunction display.

Fuel Gauge

When the ignition is switched on (Terminal 15) or is running, the fuel level is displayed. If the fuel reserve falls below approximately 12 liters, allowing additional travel of about 30 miles (50 km) when the engine is running, a warning light and text appear in the multifunction display.

Voltmeter

The voltmeter indicates the vehicle's total electrical voltage. The normal range lies between 12 and 16 volts. During engine start the voltage may drop significantly. If the vehicle voltage is too low, there is a warning in the multifunction display.



9_10_03



See also the section
"Vehicle Electrical System Control Module."

Cayenne



For safety reasons, the cruise control deactivates if the Porsche Stability Management (PSM) controls driving dynamics for longer than 0.2 seconds.

Engine Boost Pressure (Cayenne Turbo)

Since the engine is equipped with boost pressure control, boost pressure is variable. Boost pressure is dependent upon different engine parameters.

Cruise Control (Standard for USA vehicle, ID-Number RoW)

Cruise control in the Cayenne is operated using the lower left steering column lever. When this function is active, a ready light appears in the instrument cluster. In order to regulate speed, the vehicle speed must be set between 25 mph (40 km/h) and 130 mph (210 km/h).

When this function is active, vehicle speed can be set using the steering column lever.

- Each time the switch is pressed upwards + 2 km/h (1 mph)
- Each time the switch is pressed downwards – 2 km/h (1 mph)

The speed can be continuously increased or decreased by pushing the steering column lever up or down.

Cruise control operation is automatically interrupted if the vehicle speed exceeds the set speed by more than 25 km/h (15 mph) for longer than 20 seconds, or if the vehicle speed falls short of the set speed by 10 km/h (6 mph) for longer than 5 seconds.

The system is temporarily switched off if the driver presses the brake pedal. Manual acceleration can exceed the set speed without canceling active operation. If the driver removes his foot from the gas pedal, the cruise control immediately resumes the set speed.

The cruise control function is not available in Low Range mode. When Low Range mode is switched off, the cruise control returns to ready status.

Power Windows

As standard equipment, the Cayenne has electric power windows in all four doors. The power windows can operate once the ignition is switched on, and remain operable for 10 minutes after the ignition has been switched off. If any door is opened during this period, power window operation is deactivated.



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All four windows may be operated from the driver's position. The switch on each other door will only operate the corresponding window.

A – Power window driver's side

B – Power window passenger's side

C – Safety switch

D – Power window door rear left

E – Power window door rear right

Two-stage Switch (driver's side)

The driver's side switches for the front windows have two rocker positions: push forward, "open," push back, "close." If the switch is only pressed to the first stage, the window will be opened or closed, depending on how the switch is pressed. Releasing the switch stops the action. If a switch is pressed or pulled to the second stage (tap function), the window automatically travels to its upper or lower stop position. Operating the switch again stops the window in the desired position.

Cayenne



The One-Touch function is blocked for 10 seconds.



The “Porsche Entry & Drive” feature does not offer convenience operation using the remote control.

Push-button Operation (all four doors)

As long as the related button is pressed, the window will open or close. Releasing the switch stops the action.

Pinch Protection

The electric power windows, like those on the 911/Boxster sports cars, are equipped with pinch protection. As needed, the window close cycle is interrupted, and a pre-defined open cycle starts. Activation of the pinch protection can be identified by the increase in voltage. If the corresponding switch is operated again within 10 seconds, the window will close with normal force.

Convenience Function

If the key is continuously held in the lock/unlock position while the vehicle is being locked or opened, all four door windows will be closed/opened automatically. The windows will open or close as long as the key is held in position, or until the windows have reached their stop point.

Storing the Window Stop Point

If the battery is disconnected and then reconnected, the stop points are lost. The One-touch function is deactivated.

Reactivating the function:

1. Open the window completely by pulling the switch.
2. Pull the switch again toward “open” and the lower stop position is stored.
3. Then close the window completely by pushing the switch.
4. Push the switch again toward “close” and the upper stop position is stored.

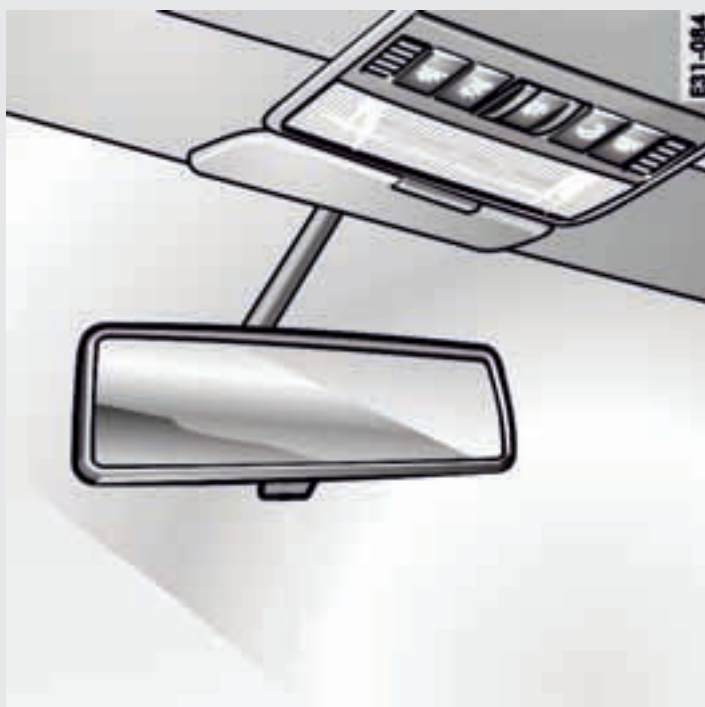
Interior Lighting

The interior lighting was particularly designed with convenience and safety in mind.

Operating the remote control or opening a door turns on the front interior and reading lights, rear reading lights, front and rear foot well lights, luggage compartment light and the rear gate light. All lights can be turned off by switching on the ignition, closing the last door or operating the central light switch. When the driver leaves the vehicle, a delay mechanism shuts off the lights after the last door is closed or when the door is locked. All lights may be switched off using a central switch in the roof console.

The interior lighting of the Cayenne is arranged as follows:

- The interior light, with two reading lights, is located in the center front section of the roof console. Each light can be operated using its own switch.

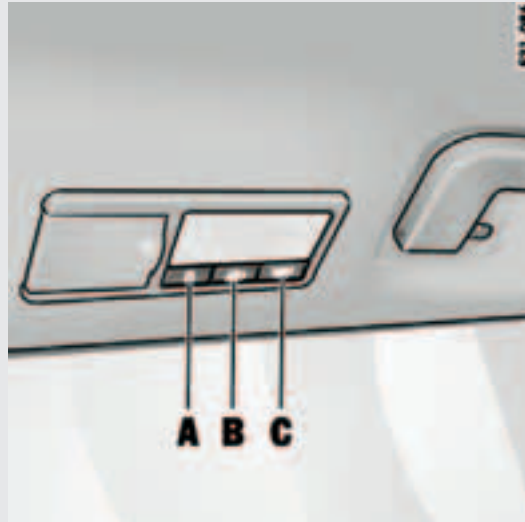


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Cayenne

To provide rear passengers lighting convenience, a reading light is integrated into the left and right roof end panels. An integrated rocker switch can switch on the individual reading lights as well as the interior light.

- A – Switch off rear reading light
- B – Automatic switch on/off reading light
- C – Switch on rear reading light



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- Illuminated glove box and center console storage compartment add to the passengers' convenience. Two illuminated make-up mirrors are included.



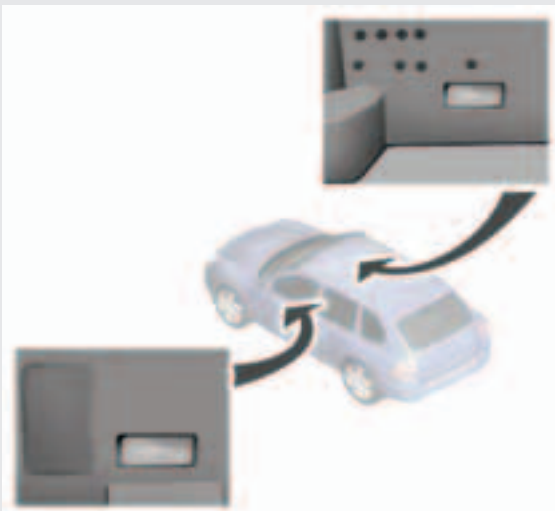
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- To make them easier to find, the ashtray as well as the interior door handles are illuminated. The brightness can be adjusted using the dimmer for the instrument lighting.



9_65_03

- Two lights for the foot well are located in the lower edge of the instrument panel; for the rear passengers, two lights are located on either side of the back of the seat console.



9_32_03

Cayenne

- A luggage compartment light is built into the headliner and a rear gate light is integrated into the hatch; these provide good illumination for the luggage area.



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Safety and Door Lights

The Cayenne is equipped with an exit light on each door as well as two rear gate lights. These are installed on the inside door panels and the rear gate and cast a white beam downward.

For additional safety, separate red safety lights are on the doors and rear hatch.



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Electric Comfort Package

The “Electric Comfort Package” (ID-Number for all models) can provide additional convenience features. This package includes:

- Convenience lighting
- Automatic anti-glare outside and inside mirrors
- Auxiliary exterior lighting
- “Coming Home” function
- Automatic driving light assistant
- Electric automatic closing assist for the rear gate
- Integrated garage door opener

Convenience Lighting

Convenience lighting improves passenger orientation in the dark. This includes a door panel light band in all four doors and a dimmable foot well light. Convenience lighting is switched on when the vehicle is unlocked and switch off when the vehicle is locked or dimmed to a preset level. The dimmer is set on a separate switch on the roof console.

Automatic Anti-Glare Outside and Inside Mirrors

Functions as before.

Auxiliary Exterior Lighting

The license plate light and parking lights front and rear are activated to provide illumination. In addition, lights are integrated into the outside mirrors. This lighting arrangement allows safer entry into the vehicle. The area around the vehicle is illuminated when the remote control or Keyless Entry & Drive are used to unlock the vehicle, making it easier to see in the dark. The auxiliary exterior lighting is deactivated when the ignition is switched on or after a predetermined period set in the on board computer.



See the vehicle owner’s manual chapter, “On-Board Computer.”

Cayenne



See the vehicle owner's manual chapter, "On-Board Computer."

"Coming Home" Function

The "Coming Home" function includes the auxiliary exterior lighting, in addition to the low beam and side marker lighting. In order to afford the best possible visibility when exiting the vehicle, the "Coming Home" function is activated for a specified period when the ignition is switched off, providing light to the front door of the house, for example.

The "Coming Home" function is activated only in twilight or in the dark by means of the integrated rain/light sensor located in the inside mirror. When the ignition is switched off while the low beam is lighted, the area surrounding the vehicle is illuminated.

During ordinary locking of the vehicle or after expiration of the illumination period set in the on board computer, the lights are switched off.

Automatic Driving Light Assistant

Depending upon country-specific regulations requiring running lights during daylight hours, one component of the "Electric Convenience Package" is automatic activation of the headlamps. The function switches on the low beams, the instrument lighting, the parking lights front and rear and the license plate lights depending upon the environmental lighting conditions.

This function is controlled by an additional position in the light switch.



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The system is controlled by the light sensor in the inside mirror and activates the driving light in the following situations:

- Low light (morning/twilight)
- Darkness
- Tunnels
- Rain (activation by rain sensor)

Function

If the wipers operate continuously longer than 5 seconds, the driving light is automatically switched on. If there is a pause in wiping of 255 seconds, the driving light is switched off, other external conditions permitting.

- Highway

Function

If the vehicle reaches a speed of 84 mph (140 km/h) the driving light is likewise switched on. The time to activation is 10 seconds. If vehicle speed falls below approximately 40 mph (65 km/h) the driving light is switched off after a delay of 150 seconds, external conditions permitting.



Fog is not identified by the sensor; therefore the light must be switched on manually in fog. See also the vehicle owner's manual chapter, "Automatic Driving Light Assistant."

Automatic Closing Assist for the Rear Gate

Like the 911 Targa, the Cayenne is equipped with an electric automatic closing assist for the rear gate ("Electric Comfort Package" option) When closing, the rear gate is automatically pulled shut, not manually pushed. This is controlled by the rear control module and a closing relay under the instrument panel – relay position 2.

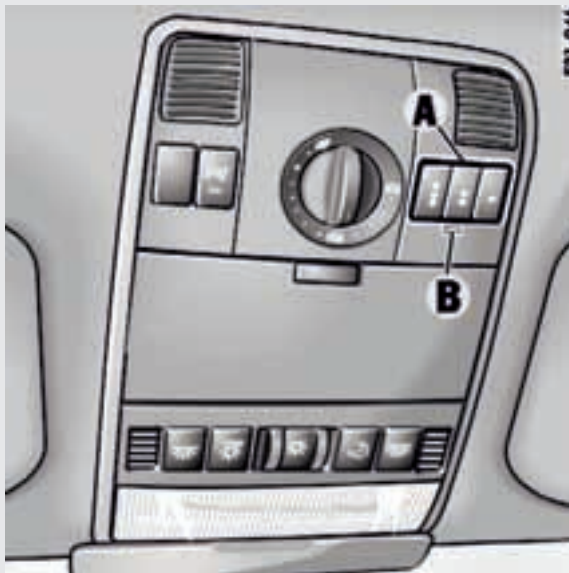
Integrated Garage Door Opener

The integrated garage door opener provides the option of a single unit installed in the Cayenne's passenger compartment which can replace up to three radio remote control units operating, for example, a door opener, a gate opener or an alarm system. The integrated garage door opener "learns" the radio frequencies of all common remote control units and can then transmit these frequencies itself. The control and transmitter unit of the garage door opener is integrated into the roof console. Programming and operating is by using the buttons.

Cayenne

A – Buttons

B – LED



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Programming and synchronization procedures are described in detail in the owner's manual, chapter "Garage Door Opener."

Technical Data:

- 3-channel transceiver
- 27/30/40/418/433 MHz
- AM/FM Modulation
- Standard and variable code compatible
- Integration with vehicle network
- Power supply using the vehicle battery
- Reprogrammable at any time

A list of all HomeLink compatible transmitters is available by fax +49 (0) 6838 907 283 3333.

Additional information can be obtained on the Internet at www.homelink.com or by calling the toll-free HomeLink Hotline (0) 0800 0466 354 65.

HomeLink is a registered trademark of Johnson Controls.

Base Equipment Cayenne S

The CDR 23 radio, first installed in the model year 2003 Boxster is standard equipment in the Cayenne S, along with 10 loudspeakers. The speakers are arranged as follows:

- Two tweeters in the instrument panel
- A midrange and woofer speaker in each of the front and rear doors

The base version with an integrated 4 x 18 watt amplifier provides very good sound to all riders.

Additionally, radio information such as station calls letters, CD titles, etc. can be displayed in the multifunction display, just as in the sports cars (starting model year '03).



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A detailed functional overview of the CDR 23 radio is found in the Technical Manual "Service Information Boxster Model Year '03."



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Cayenne



Additional information can be found in the Technical Manual "Service Information Boxster Model Year '03."



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Detailed information on this function can be found in the Technical Manual "Service Information Boxster Model Year '03."

CDC-4 CD Changer

(ID-Number for all models; CD changer preparation V-number in USA)

In addition to the standard CDR 23 radio, the Cayenne can be equipped with a 6-disk CDC-4 CD changer. To save space, the CD changer is built into the right side stowage area of the luggage compartment. The self-explanatory menu allows simple operation of the radio.

BOSE High End Sound System (digital)

(Optional Cayenne S/ Standard Cayenne Turbo/ USA Standard Cayenne S and Cayenne Turbo)

This system consists of a digital amplifier (Bose Sound Processing) outputting 250 watts to 8 channels.

The loudspeakers are located in the instrument panel, the front and rear door panels, and in the B-pillar cladding. Completing the system is an active bass subwoofer located in the spare tire well.

The BOSE High End Sound System offers the following features:

- The **B**ose **S**ound **P**rocessing (BSP) provides perfect adaptation of the entire sound system to the special acoustic architecture of the Cayenne.
- A special loudness function dynamically adapts the bass range so that the listener does not detect any acoustic difference at low volumes. The system is individually matched to the interior acoustics of the Cayenne and guarantees a balanced and clear tone over the entire frequency range.
- The AudioPilot™ (noise compensating volume control) uses a microphone to monitor and automatically control the sound quality and volume depending upon interference such as wind or tire noise, or conversation in the vehicle. This eliminates adjusting the tone.
- The "Active Compression" integrated into the Bose High End Sound System provides precise fine-tuning of the dynamic range of the music. This avoids audible distortions of extremely loud music passages.
- The Neodyn™ bass speakers are characterized by a very flat construction. The loudspeaker electromagnet is placed in front of the speaker membrane instead of behind it, as is usually the case

Technical Specifications	
Audio electronics	1 BSP digital amplifier (1 x TSM switching amplifier* 100 watts and 8 channels 6 x 25 watts) Total rating 250 watts
Number of loudspeakers	14
Instrument panel	1 x 5.7 cm center integrated central broadband (center fill) loudspeaker 2 x 2.5 cm tweeters
Doors	2 x 8.0 cm Neodyn™ mid-range front 2 x 20.0 cm Neodyn™ bass speakers front 2 x 2.5 cm spherical tweeters rear 2 x 16.5 cm deep-mid bass speakers rear
D-pillar	2 x 5.7 cm broadband speakers
Luggage compartment (in the spare tire well)	1 x 13.3 cm high-output active subwoofer in a 20 liter base reflex housing with 100 watts power

- * Digital switching technology (BOSE patented TSM switching amplifier)
- Sound-specific radio functions such as loudness and tone adjustments are integrated into the amplifier. They operate more effectively than usual linear amplifiers and generate less heat.

Porsche Communication Management (PCM)

At the start of the '03 model year a new generation of PCM is being used in the sports car after an intensive and expensive development phase. This PCM will be an option in the Cayenne S and standard equipment in the Cayenne Turbo.

The PCM for the Cayenne has a central display and operation module in a 2-DIN housing with a high-resolution TFT (Thin-Film Transistor) color monitor with optical characteristics comparable to that of high-quality laptops.

Cayenne



Detailed information on the basic functions of the PCM can be found in the respective chapters of the Technical Manual "Service Information Boxster Model Year '03."

The TFT color monitor has an effective diagonal measurement of 6.5 inches in 16:9 format. The keyboard treatment was adapted to the appearance of the Cayenne interior.



9_44_03

Except for the modification described below, the PCM in the Cayenne is identical to that of the sports cars.

PCM General

- 6.5" screen in 16:9 format (sports car 5.8" in 16:9 format)
- Optically adapted user interface
- The menu choices are customized to the Cayenne and are considerably different from the PCM in the sports car.
- An additional function button "AV" in the menu bar below the screen will be used for functions to be added later.
- With the optionally available multifunction steering wheel, the driver can operate selected PCM functions (e.g., louder/softer, mute, station selection, CD title selection) from the steering wheel. The steering wheel variant for the "Telephone" option has integrated buttons for "Call Answer" (right) and "Call End" (left). On steering wheel variants without the telephone option, these buttons control the radio "Scan" and "Manual" functions.



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Radio/Audio Components in the PCM

- There is only one variant for the USA or RoW (always with integrated 4 x 18 watt final stage)
- Difference in menu options "Sound," for example, surround function, setting the listening position, etc.

Driving Data Display (TRIP) in PCM

- Various menu options or function selections related to the features of the Cayenne.

Passive Receiver for PCM Telephone Module

- The passive receiver (ID-Number) is located in the upper compartment of the center console so that passengers in the rear seat can use the telephone.



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Cayenne

Integrated Antenna System

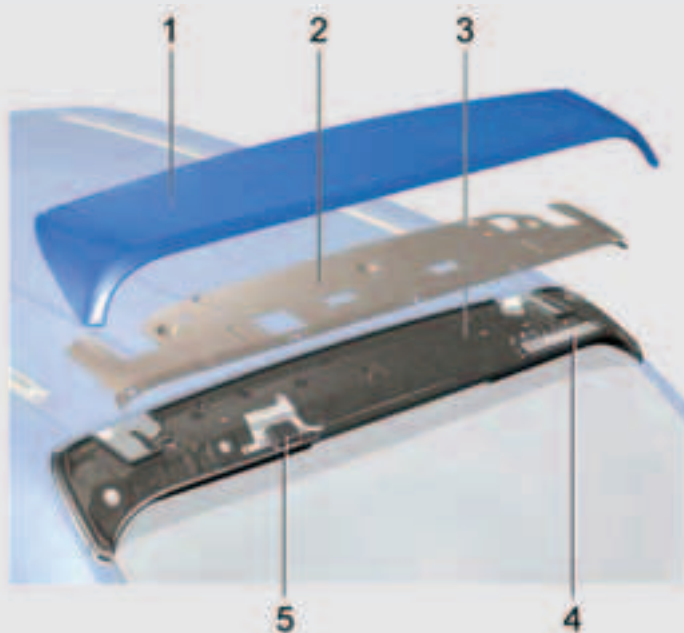
The Cayenne employs an integrated antenna system for audio, central locking system, navigation, telephone and parking heater. There are differences between two available antenna systems: the Basic System and the Diversity System.

The central locking antenna is always part of every system. However, antennas for the parking heater remote control, the navigation system and telephone antenna can be installed depending upon vehicle equipment.

Up to 13 non-visible antennas can be installed in the rear area of the Cayenne. Electronic components such as antenna amplifier, diversity control module and GPS antenna are located in the rear spoiler. All components in the rear spoiler are waterproof.

Components, particularly the GSM and GPS antenna, have been optimally located in the spoiler. The high placement considerably enhances the signal reception. This results in wider range and less interference.

- 1 – Roof spoiler upper section
- 2 – Roof spoiler center section
- 3 – Roof spoiler lower section
- 4 – Antenna amplifier
- 5 – GPS antenna



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Base Antenna System

The base antenna system consists of a 70 cm long antenna injected into the lower shell of the spoiler. The related AM/FM antenna is positioned to the right in the spoiler.

Antenna Diversity

Antenna Diversity belongs to the PCM product range. The system is made up of the base system AM/FM antenna as well as 3 additional FM antennas integrated into the rear window. Antenna Diversity has a single standard AM amplifier and 2 FM antenna amplifiers.

Two modules are integrated into the spoiler. On the right is the Antenna Diversity control module, and on the left is the second module with the 2 FM antenna amplifiers.

This system ensures that the best-positioned antenna always receives the FM signals. The system is not designed for AM reception, since switching the antennas would create audible interference. If one antenna does not have an adequately usable signal or has too much interference, the switch is made to another antenna. One of the antennas is specified as the primary antenna and is activated directly. Quality fluctuations in this wave band are further minimized in this way.

Cayenne

Telephone Prep for Mobile Telephones

As in the sports cars, the Cayenne can be factory prepared for eventual installation of a telephone in connection with the CDR 23 radio. Upon request, the telephone set-up can be completed with a VDA compatible mobile unit.

The telephone prep includes:

- Basic electrical wiring (power supply, etc.)
- Hands-free microphone
- Telephone antenna
- Additional fitting attached to the handle on the center console for mounting a mobile telephone holder
- VDA interface below the passenger seat

1 – Mobile telephone receptacle

2 – Telephone antenna

3 – Hands-free microphone

4 – Radio interface

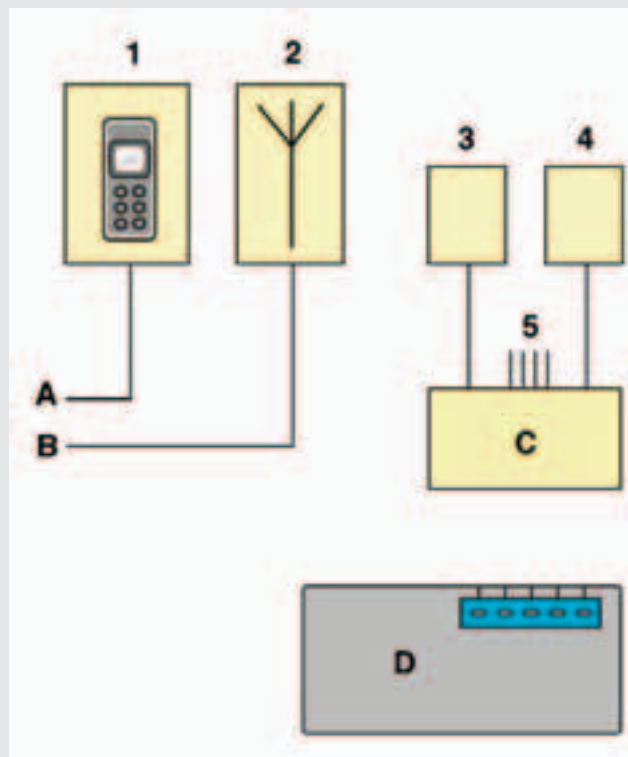
5 – Basic electrical wiring

A – Mobile telephone interface

B – Antenna interface

C – VDA interface

D – Junction box
(not part of the prep package)



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Compass Display

The Cayenne can be optionally equipped with a compass display. This provides an indication of the current compass direction traveled by the vehicle. The four primary directions of the compass (N, S, E, W) are divided into 450 units so that four additional intermediate directions (NE, SE, SW, NW) can be displayed.

A magnetic field sensor located beneath the rear seat detects the Earth's magnetic field. The sensor module compensates for magnetic interference from the vehicle and transmits the data via the CAN-Bus to the instrument cluster. Under the menu item "Settings" in the instrument cluster there is an additional menu item, "Compass." If needed, automatic calibration or zone setting can be started using the switch on the steering column lever.

To avoid erroneous data, calibration must be performed before customer delivery. During calibration, the magnetic characteristics of the vehicle must be detected and compensated for. To assure accuracy of the compass display, calibration can be re-perated at any time.

Of the 15 zones offered, those should be selected in which the vehicle is most commonly located; this will assure the greatest possible display accuracy.



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