Self-Study Program 990503

The 2012 Audi A7 Convenience Electronics and Audi Active Lane Assist

Audi Academy

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Always check Technical Bulletins and the latest electronic repair literature for information that may supersede any information included in this booklet.

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The Self-Study Program provides introductory information regarding the design and function of new models, automotive components, or technologies.

The Self-Study Program is not a Repair Manual!
All values given are intended as a guideline only.

For maintenance and repair work, always refer to current technical literature.

Reference

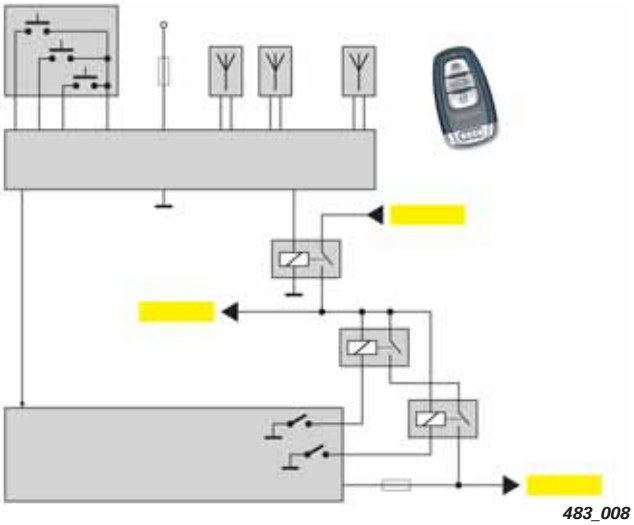
Note

Notes

Introduction

There are many innovations on the 2012 Audi A7. Some are larger and affect more systems than others, but they are all significant breakthroughs in this vehicle class.

This Self-Study Program will take a closer look at some of the convenience system innovations. For instance, a keyless starting system, referred to as Keyless Go, is used for the first time as standard equipment on an Audi. There is no longer an ignition lock on the instrument panel.



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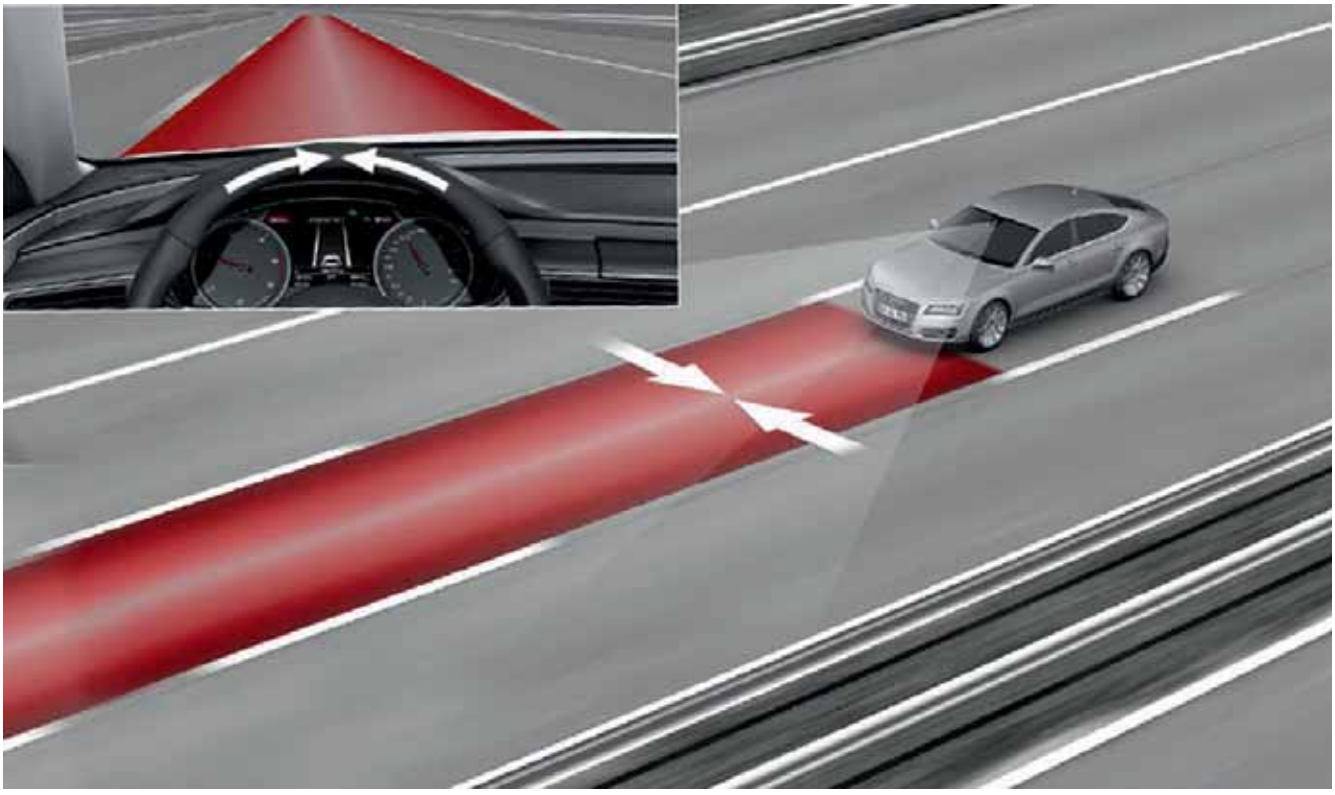
Pressing the start button in the center console starts the engine. This feature is similar to the Advanced Key option offered on other Audi models.

For the 2012 A7, a Keyless Entry system is also offered as an option, making it an ideal supplement to the keyless starting system.

Audi active lane assist will not be available at the start of A7 production but will be introduced during the 2012 model year.

This next generation of the lane departure warning system automatically intervenes to prevent drivers from inadvertently leaving their driving lanes.



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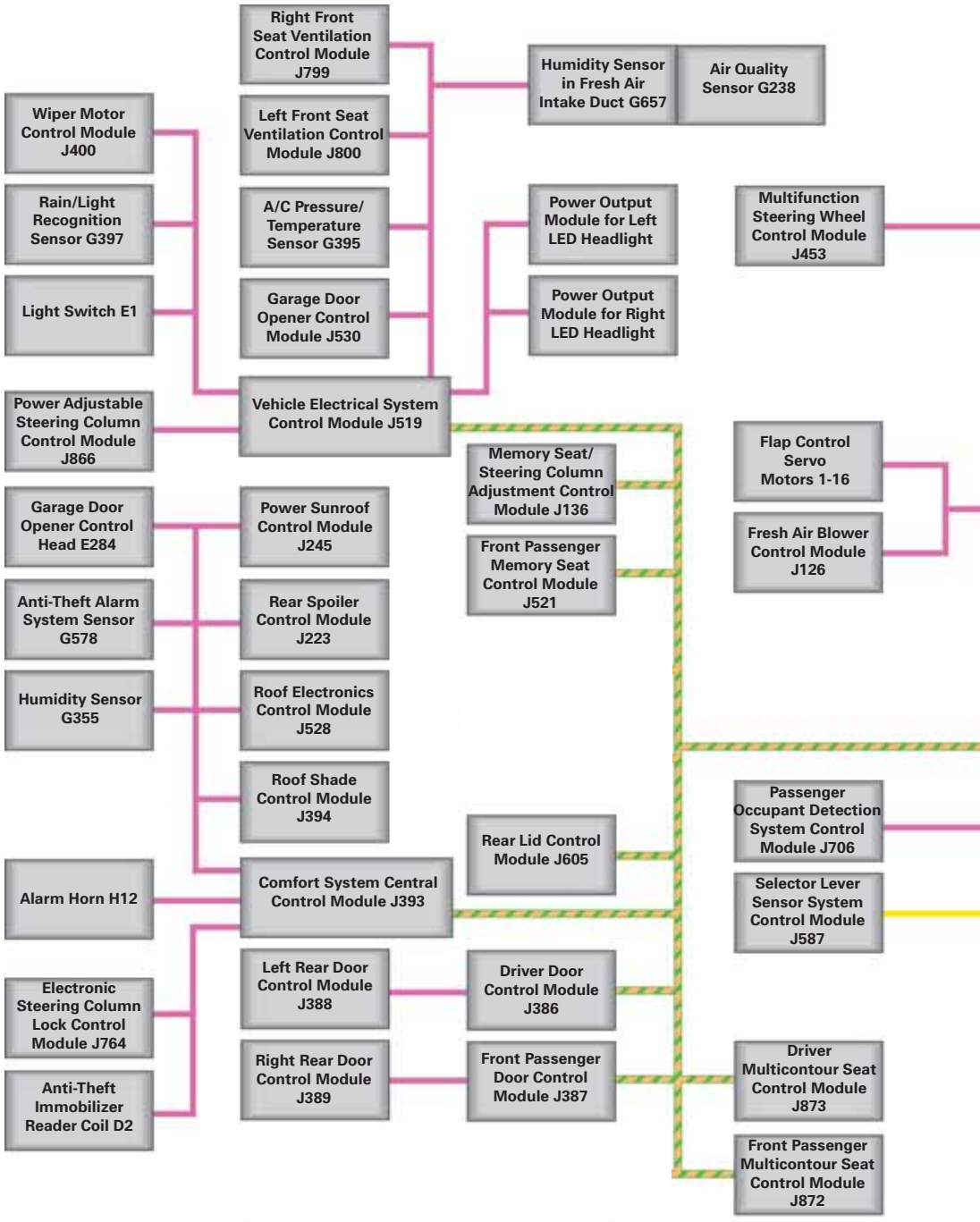
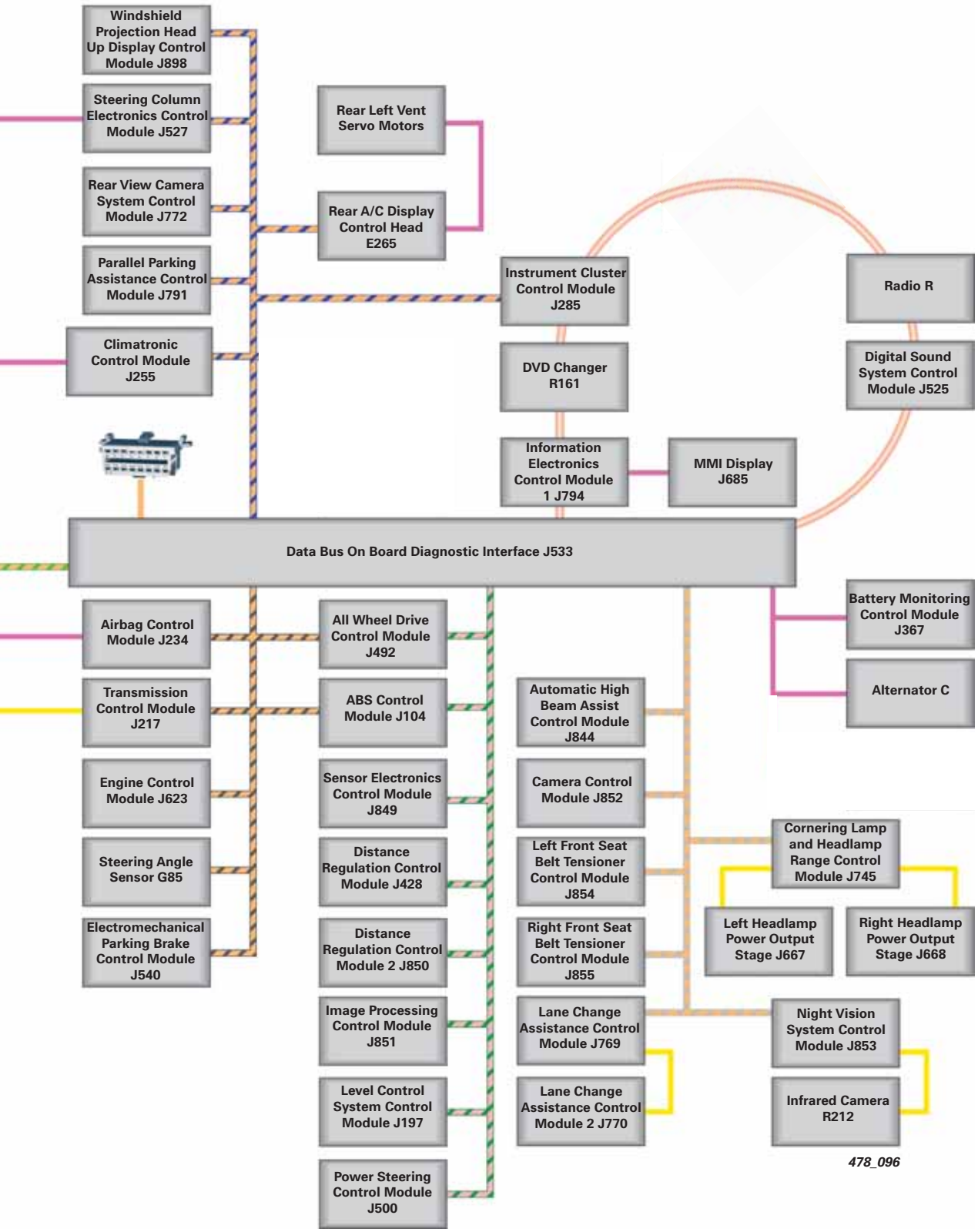
Topology

This diagram shows the network topology for a vehicle with a high level of optional equipment.




Windshield Projection Head Up Display Control Module J898
Steering Column Electronics Control Module J527
Rear Left Vent Servo Motors
Rear View Camera System Control Module J772
Rear A/C Display Control Head E265
Parallel Parking Assistance Control Module J791
Instrument Cluster Control Module J285
Radio R
Climatronic Control Module J255
DVD Changer R161
Digital Sound System Control Module J525
Information Electronics Control Module 1 J794
MMI Display J685
Data Bus On Board Diagnostic Interface J533
Battery Monitoring Control Module J367
Airbag Control Module J234
All Wheel Drive Control Module J492
Alternator C
Transmission Control Module J217
ABS Control Module J104
Automatic High Beam Assist Control Module J844
Engine Control Module J623
Sensor Electronics Control Module J849
Camera Control Module J852
Cornering Lamp and Headlamp Range Control Module J745
Steering Angle Sensor G85
Distance Regulation Control Module J428
Left Front Seat Belt Tensioner Control Module J854
Left Headlamp Power Output Stage J667
Right Headlamp Power Output Stage J668
Electromechanical Parking Brake Control Module J540
Distance Regulation Control Module 2 J850
Right Front Seat Belt Tensioner Control Module J855
Image Processing Control Module J851
Lane Change Assistance Control Module J769
Night Vision System Control Module J853
Level Control System Control Module J197
Lane Change Assistance Control Module 2 J770
Infrared Camera R212
Power Steering Control Module J500
478_096

Convenience Electronics

Instrument Cluster Control Module J285

Two instrument cluster versions are offered on the 2012 A7, depending on the equipment level of the vehicle.

On vehicles equipped with the MMI Radio Plus infotainment system, the instrument cluster will have a 5-inch monochrome Driver Information System (DIS) display.

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On vehicles equipped with the MMI Navigation Plus infotainment system, the instrument cluster will have a 7-inch TFT color Driver Information System (DIS) display.

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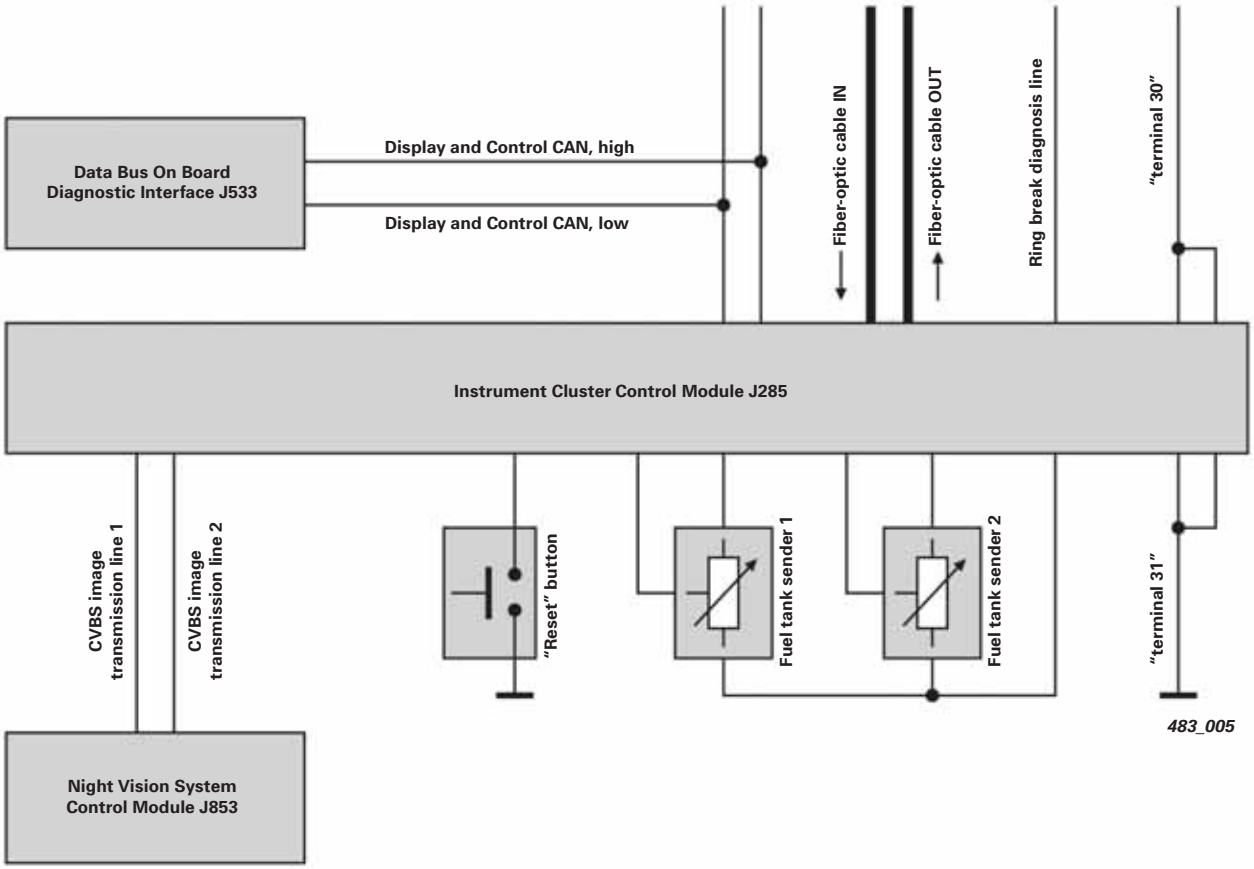
Components Connected to J285



The role of the instrument cluster control module has changed during the past few model years. The objective has been to return the instrument cluster to its original purpose: a display instrument and not an evaluation instrument.

Many sensors previously connected to Instrument Cluster Control Module J285 are now connected to other control modules.

For example, a number of sensors now report to Data Bus On Board Diagnostic Interface J533 and Engine Control Module J623. All other lines to the cluster are either bus or voltage supply lines.

Only the two fuel tank level senders and the odometer "Reset" button are still connected to J285. The software for calculating tank level is integrated in J285.

To display high-quality navigation graphics, the instrument cluster is connected to the MOST bus, as in the 2011 A8.

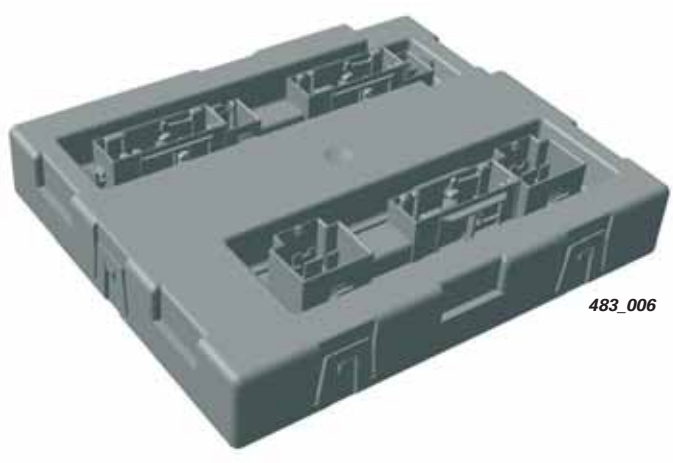
The following lines are connected to J285:

- Ring break diagnosis line
- Two image transmission lines for Night Vision Assist Control Module J853
- CAN lines for data communication

Comfort System Central Control Module J393

Connections at J393	
Power supply	– Three separately protected “terminal 30” inputs – Two “terminal 31” lines
Bus systems	– Two Convenience CAN lines – LIN bus line to Alarm Horn H12 – LIN bus line to Electronic Steering Column Lock Control Module J764 and to Anti-Theft Immobilizer Reader Coil D2 – LIN bus line to the electric rear spoiler, sender for atmospheric humidity, anti-theft alarm sensor, interior light module, and garage door opener control panel
Inputs	
Switches and buttons	– Brake light switch – Soft touch button in the trunk lid – Trunk lid pre-lock contact and trunk lid full lock contact – Start / stop button (for switching ignition and engine ON and OFF) – Transmission selector positions “P” and “N” – Microswitch for power latching, position “trunk lid retracted” – Microswitch for power latching, position “trunk lid extended”
Signals, sensors, and antennas	– Enable signal from Electronic Steering Column Lock Control Module J764 to switch “terminal 15” ON – Sensor for rear window breakage – Sensors for outside door handle contact in each vehicle door – Antenna for central locking
Outputs	
Relays	– “terminal 15” relay – Electric socket relay – Relay for rear window heater
Lights and LEDs	– Tail lights in the trunk lid, left and right – Brake lights in the trunk lid, left and right – Turn indicators in the trunk lid, left and right – Rear fog lights in the trunk lid, left and right – Tail lights located in the fender, left and right – Brake lights located in the fender, left and right – Turn indicators located in the fender, left and right – Back-up lights located in the fender, left and right – High-mounted brake light – License plate light – Luggage compartment lights, left and right
Actuators	– Central locking motor in the trunk lid – Rear roller shade motor – Power latching motor for trunk lid – Locking element for fuel filler flap – Motor for electrical steering column interlock
Signals, terminals, and supply voltages	– “terminal 50” request to engine control module

Comfort System Central Control Module J393 for the 2012 A7 is the same module used on the 2011 A8. The correct model designation is defined during encoding.



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Location

J393 is located in the luggage compartment on the rear right behind the side trim covers.

483_007

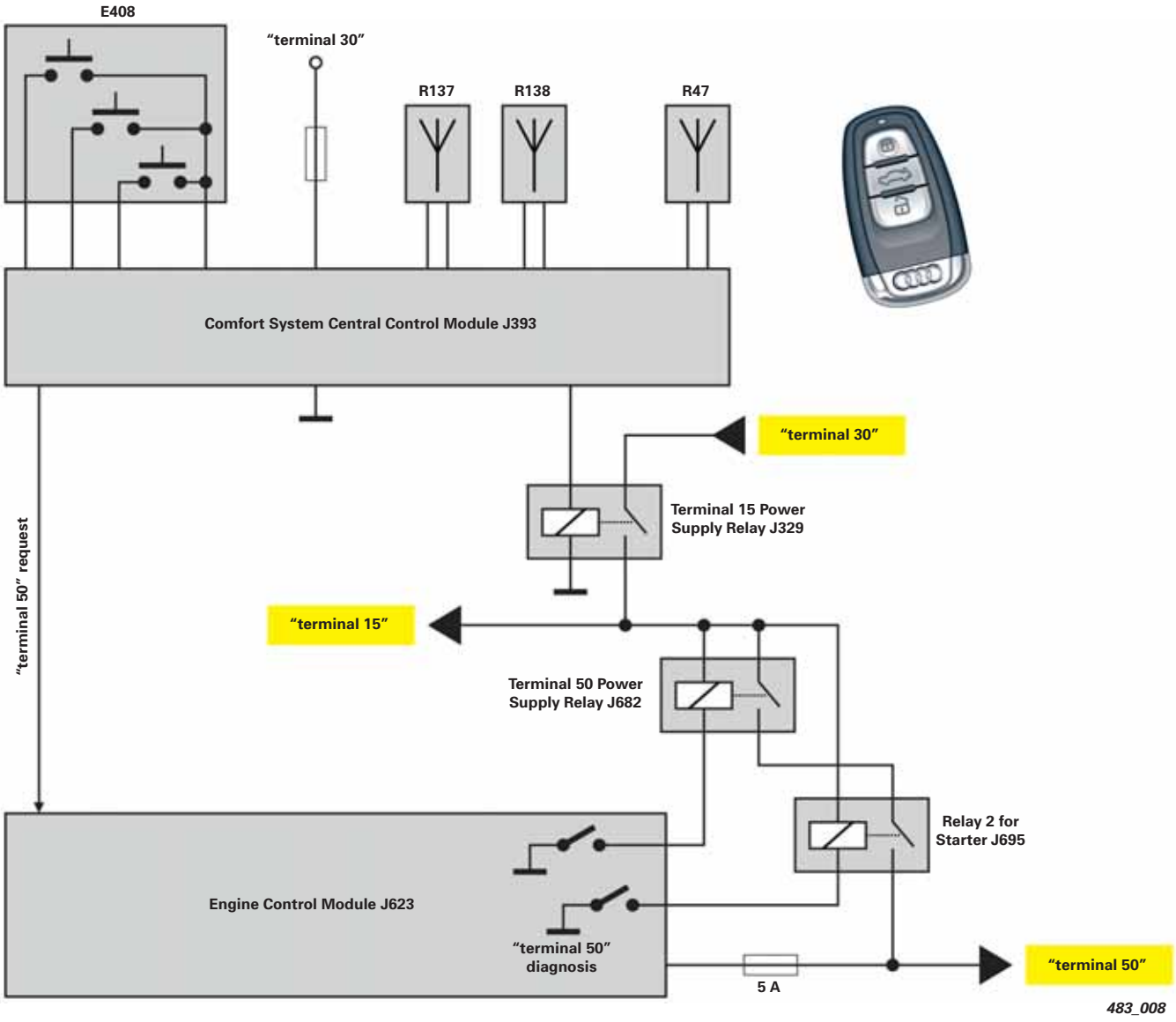
Keyless Starting System

The 2012 A7 is the first Audi vehicle with a keyless starting system (Keyless Go) as standard equipment. An ignition lock is no longer installed.

For safety reasons, Access Start Authorization Button E408 is designed with three microswitches.

When pressing E408 in the center console, all three microswitches are actuated and read by Comfort System Central Control Module J393. One defective microswitch will not lead to failure of the entire system.

When at least two microswitches are detected, this is interpreted as a start request from the driver, resulting in the ignition being switched ON and engine start initiated.



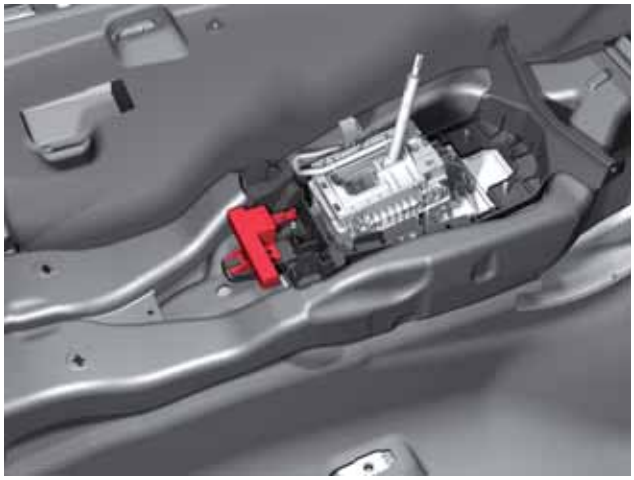
Key:

E408 Access Start Authorization Button
R47 Central Locking and Anti-Theft Alarm System Antenna
R137 Access/Start Authorization Antenna in Luggage Compartment
R138 Access/Start Authorization Antenna 1 in Vehicle Interior

The keyless starting system in the Audi A7 requires the following two interior antennas:

– Access/Start Authorization Antenna 1 in Vehicle Interior R138
  - Located in the center console below the MMI control panel
– Access/Start Authorization Antenna in Luggage Compartment R137
  - Located in the right side of luggage compartment under the trim panels

Access/Start Authorization Antenna 1 in Vehicle Interior R138



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Access/Start Authorization Antenna in Luggage Compartment R137

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Sequence of a starting cycle:

1. Driver pushes Access Start Authorization Button E408
2. Comfort System Central Control Module J393 registers button actuation by reading the three microswitches
3. J393 activates interior antennas R137 and R138
4. The key in the vehicle interior receives messages from the two antennas and measures their reception intensity
5. The key transmits a message with the two reception intensities, key identification, and information on the secret immobilizer code of the key
6. J393 receives the key message via Central Locking and Anti-Theft Alarm System Antenna R47
7. J393 checks the key message to determine if the correct immobilizer code was sent
8. J393 checks transferred reception intensities and whether the transmitting vehicle key is located within the vehicle (including the luggage compartment)
9. If the switch-ON conditions for “terminal 15” are met, the “terminal 15” relay is activated
10. The ECM receives a “terminal 50” request via the CAN bus and a discrete line
11. If conditions for starting the engine have been met, the ECM activates the two “terminal 50” relays
12. The starter motor is energized
13. When the rpm exceeds a threshold value, fuel injection begins, with the ECM assuming engine management, terminating activation of the two “terminal 50” relays
14. Engine is engaged and running

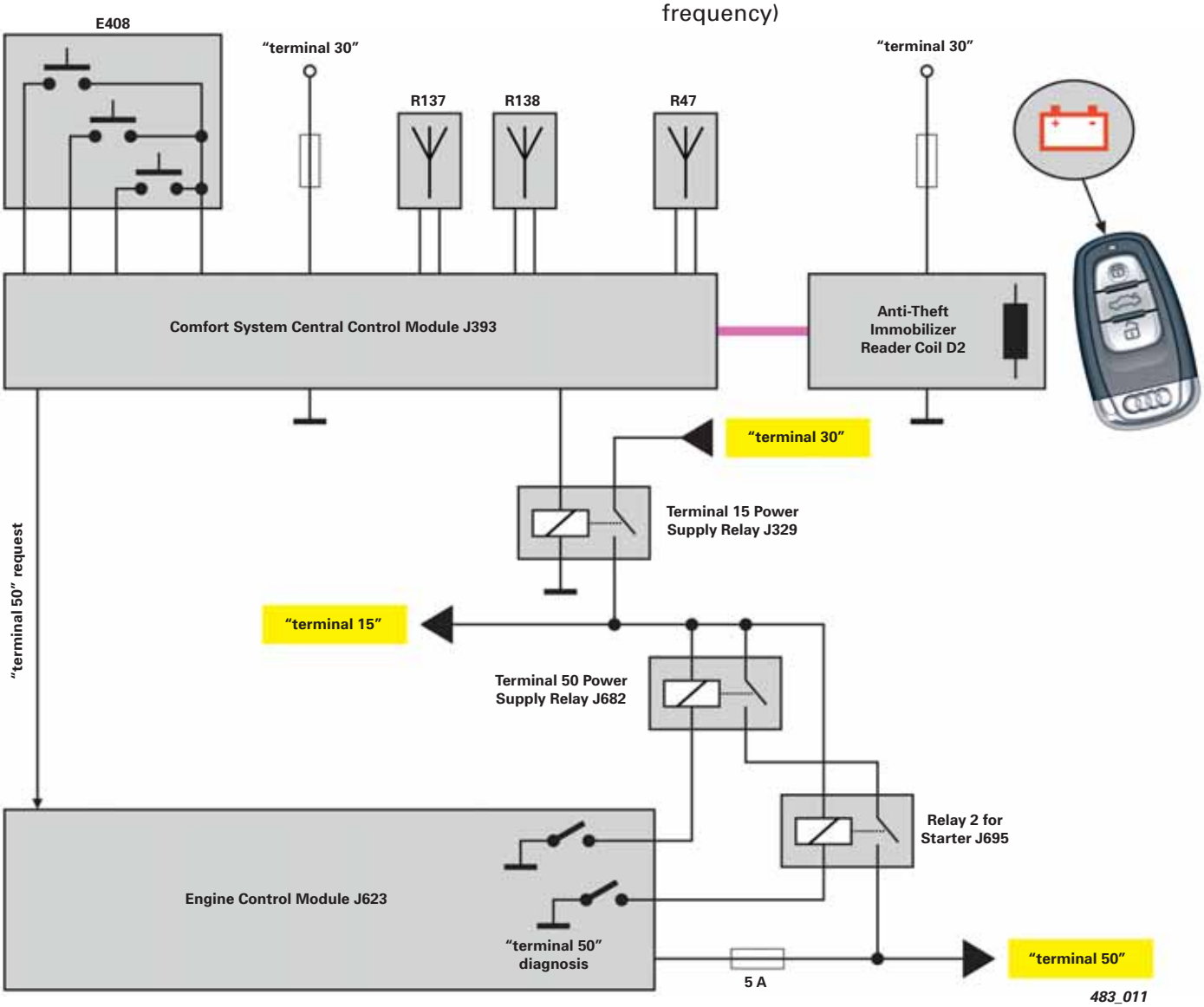
Emergency Starting

Ignition lock elimination in the A7 made it necessary to develop emergency start routines in the event of technical problems.

To achieve this, Anti-Theft Immobilizer Reader Coil D2 was developed. Sometimes referred to as the “emergency transponder coil”, D2 is connected to Comfort System Central Control Module J393 through a LIN bus.

D2 is required to start the vehicle in the event of the following failures:

- The battery in the vehicle key is completely discharged
- One of the two interior antennas is no longer available
- Central Locking and Anti-Theft Alarm System Antenna R47 is defective
- Local disruption of HF radio signals (for example, by a transmitter of the same frequency)



Key:

E408 Access Start Authorization Button
R47 Central Locking and Anti-Theft Alarm System Antenna
R137 Access/Start Authorization Antenna in Luggage Compartment
R138 Access/Start Authorization Antenna 1 in Vehicle Interior

Emergency Starting via Anti-Theft Immobilizer Reader Coil D2

The following is the start sequence if the key battery is completely discharged:

1. Driver pushes Access Start Authorization Button E408
2. Comfort System Central Control Module J393 registers button actuation by reading the three microswitches
3. J393 activates the interior antennas
4. If J393 has not received a response from a vehicle key within a prescribed time window, the following steps are initiated:

483_012

– The instrument cluster issues the message shown at left
– At the same time, D2 is activated via its LIN bus connection

5. If the vehicle key is then held at the location of the emergency transponder coil, it transfers its secret immobilizer code.

   The vehicle key must be held in the position at the marking as shown in the diagram. Deviations from this can mean that the key information cannot be read out.
6. The secret immobilizer code is sent via LIN bus to J393 and evaluated there
7. If the switch-ON conditions for "terminal 15" are met, the "terminal 15" relay is activated and the ignition is switched ON
8. The ECM receives a "terminal 50" request via the CAN bus and a discrete line
9. If conditions for starting the engine have been met, the ECM activates the two "terminal 50" relays
10. The starter motor is energized
11. When rpm exceeds a threshold value, fuel injection begins, with the ECM assuming engine management, terminating activation of the two "terminal 50" relays
12. Engine is fully engaged and running

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Advanced Key

This function is offered as standard equipment in 2012 A7 Premium Plus and Prestige models.

Four antennas for entry and start authorization are required for the keyless entry and starting system.

Two additional antennas are installed on vehicles with Advanced Key:

– Left Access/Start Authorization Antenna R200
  • Located in the left rear door
– Left Access/Start Authorization Antenna R201
  • Located in the right rear door

Left Access/Start Authorization Antenna R200

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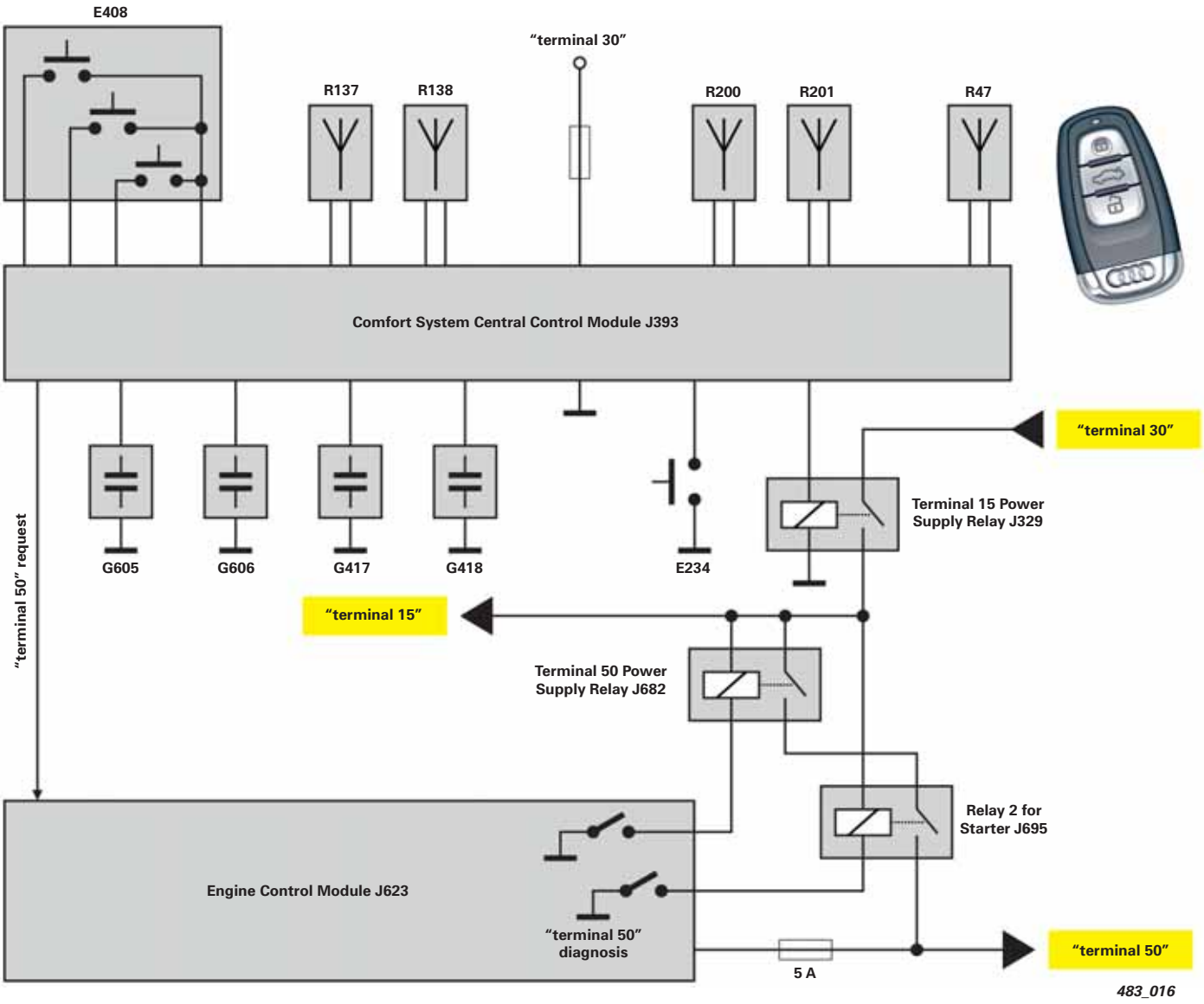
Left Access/Start Authorization Antenna R201

483_015

Unlocking a Vehicle with Advanced Key

Procedure for unlocking the vehicle via the door handle on the driver's door:

1. Driver grips the door handle of the driver's door
2. Comfort System Central Control Module J393 recognizes the action of the driver via Left Front Exterior Door Handle Touch Sensor G605
3. J393 activates the four Access/Start Authorization Antennas R137, R138, R200, and R201
4. Any adapted key in the vehicle or in the vicinity of the vehicle receives messages from the four antennas and measures their reception intensities
5. The key transmits a message with the four reception intensities, key identification, and information on the secret immobilizer code of the key
6. J393 receives the key message via Central Locking and Anti-theft Alarm System Antenna R47
7. J393 then evaluates whether the transmitting vehicle key has the correct immobilizer code
8. J393 checks the received reception intensities and determines whether the sending key is in the immediate vicinity of the driver's door outside of the vehicle
9. If conditions for unlocking the vehicle are met, corresponding messages are placed on the Convenience CAN and the vehicle is unlocked



Key:

E234	Release Button in Rear Lid Handle
E408	Access Start Authorization Button
G417	Left Rear Exterior Door Handle Touch Sensor
G418	Right Rear Exterior Door Handle Touch Sensor
G605	Left Front Exterior Door Handle Touch Sensor
G606	Right Front Exterior Door Handle Touch Sensor
R137	Access/Start Authorization Antenna in Luggage Compartment
R138	Access/Start Authorization Antenna 1 in Vehicle Interior
R200	Left Access/Start Authorization Antenna
R201	Right Access/Start Authorization Antenna

Rear Spoiler Operation

The 2012 A7 has an electrically adjustable rear spoiler. It is operated by Rear Spoiler Control Module J223, which is connected by the LIN bus to Comfort System Central Control Module J393.

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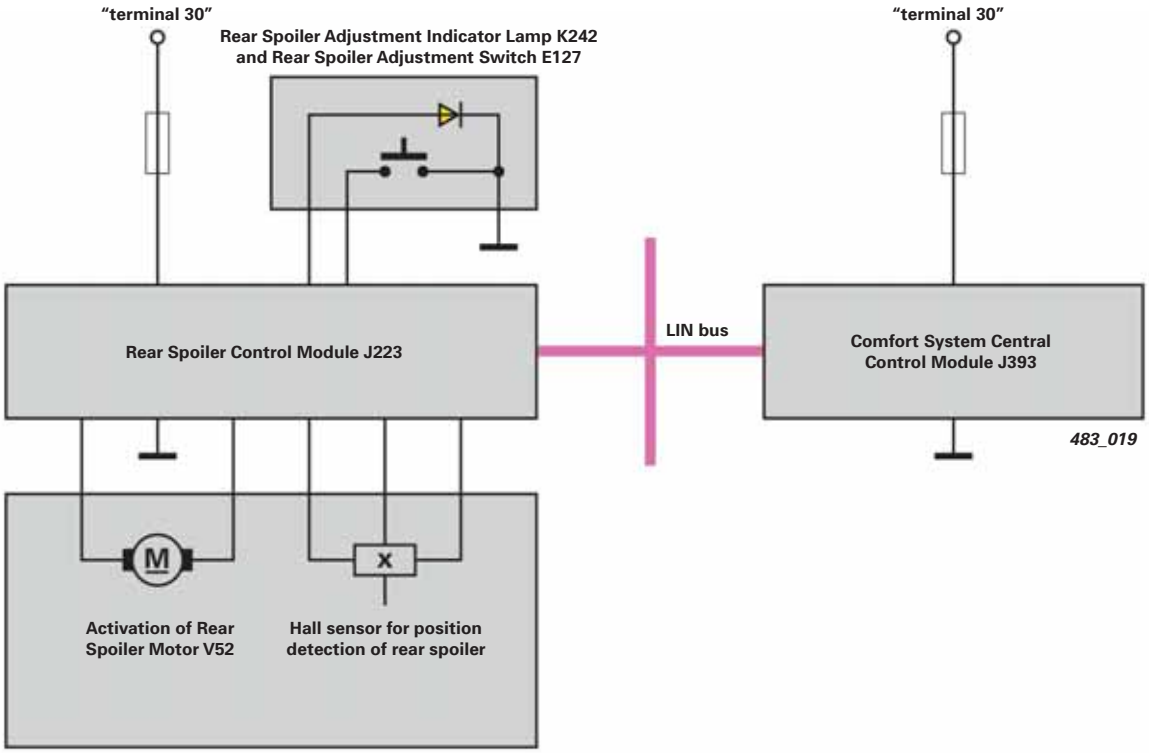
J223 Tasks

- Activation of Rear Spoiler Motor V52
- Determining spoiler position via Hall sensor input
- Reading Rear Spoiler Adjustment Switch E127
- Activation of Rear Spoiler Adjustment Indicator Lamp K242
- Diagnosis of the control module and connected components
- Communication with other control modules via the LIN bus



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J223 Functions

Automatic Mode

The rear spoiler extends and retracts automatically, depending on vehicle speed. Rear Spoiler Control Module J223 receives wheel speed signals from ABS Control Module J104 via the CAN and LIN buses.

The extend and retract thresholds, which are stored in J223, have the following values:

– Automatic extension of the rear spoiler at vehicle speeds greater than 80.7 mph (130 km/h)
– Automatic retraction of the rear spoiler at vehicle speeds less than 49.7 mph (80 km/h)

Manual Mode

The rear spoiler button has only two spoiler positions, either fully extended, or fully retracted. There are no in-between positions that can be selected. Each time the button is actuated, the movement of the spoiler reverses.

The reaction of J223 when the rear spoiler button is pushed depends on current vehicle speed, as described below.

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Manual spoiler operation at vehicle speeds less than 12.4 mph (20 km/h):

– Extending the rear spoiler
  • Pushing the rear spoiler button moves the spoiler to its fully extended position. The function LED in the switch lights up.
– Retracting the rear spoiler
  • The rear spoiler button must be pushed and held until the spoiler is in its fully retracted position. If the button is released before the spoiler reaches a fully retracted position, the rear spoiler will begin moving back to the fully extended position.

Manual spoiler operation at vehicle speeds greater than 12.4 mph (20 km/h), but less than 86.9 mph (130 km/h):

– Extending the rear spoiler
  • Pushing the rear spoiler button moves the spoiler to its fully extended position. The function LED in the switch lights up.
– Retracting the rear spoiler
  • Pushing the rear spoiler button retracts the spoiler to its fully retracted position. When fully retracted, the function LED in the switch goes out.

Note
When extending the electric rear spoiler, automatic mode always has priority over manual mode.

Manual spoiler operation at vehicle speeds greater than 80.7 mph (130 km/h):

- System switches to automatic mode
- Function LED is activated
- Rear spoiler button has no effect in this speed range

483_021

Childproofing

An actuation counter for manual operation is used to protect the spoiler motor. The counter increases by one digit with each manual adjustment of the spoiler.

If no manual operation request has taken place for 10 seconds, the counter reduces the number by one (provided the count is greater than zero).

Emergency Operation Functions

The automatic spoiler system has an emergency operating function. The following conditions lead to emergency operation:

- Failure of the LIN bus
- No current speed signal is received
- Final positions of the rear spoiler are implausible
- Position of the rear spoiler changes without activation of the rear spoiler motor
- Supply voltage is too low for a defined period of time

If the system recognizes conditions for the activation of the emergency function, the rear spoiler is moved to its fully extended position. A corresponding DTC entry is made via the LIN bus in Comfort System Central Control Module J393.

The emergency function remains active for the entire “terminal 15” cycle. The emergency function will only be terminated if no DTC is detected during later “terminal 15” cycles.

System behavior if the fully extended spoiler position is not reached:

- If the fully extended position of the spoiler is not reached after a defined time period, the operation is aborted
- After a short period, the rear spoiler is retracted a small amount and then extended once again
- If the fully extended position cannot be reached on the second attempt, a DTC is sent via the LIN bus to Comfort System Central Control Module J393
- The extension/retraction/extension attempt will happen during vehicle operation until the DTC is diagnosed and problem resolved

System behavior if the fully retracted spoiler position is not reached:

- If the spoiler does not move to its fully retracted position within a defined period of time, motor operation is stopped
- After a short time period, the rear spoiler is extended a small amount and a corresponding DTC is sent via the LIN bus to Comfort System Central Control Module J393

Note

Manual operation of the rear spoiler is not possible when transport mode is active. Automatic spoiler operation is not influenced by transport mode.

Electrically Actuated Trunk Lid

Electrically operated trunk lid opening and closing is standard equipment on the A7. It uses the same system found on the Audi A6 Avant.

The two electric drives now operate under the function of Rear Lid Control Module J605.

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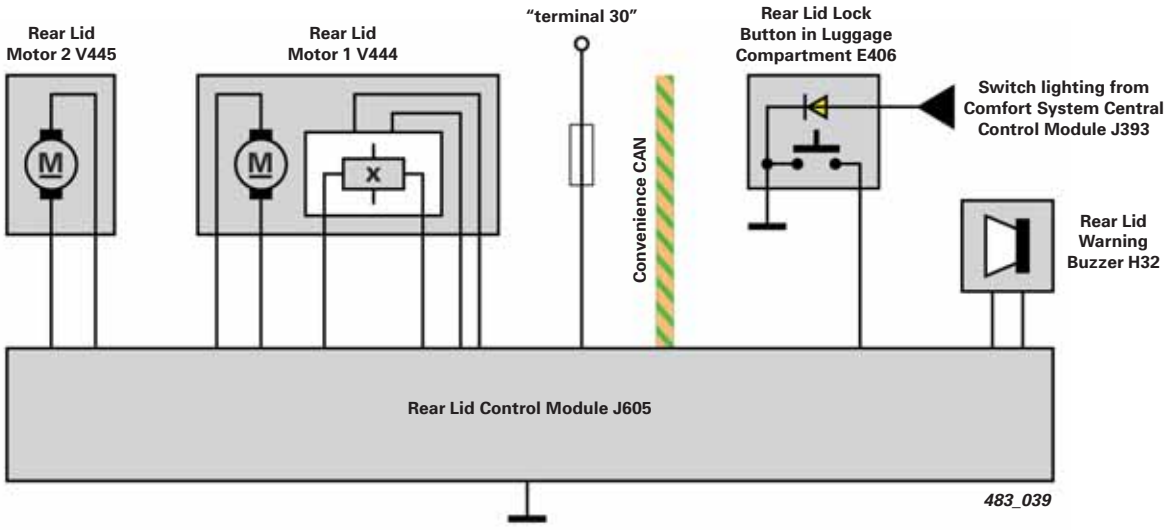
483_038

J605 activates Rear Lid Motor 1 V444 and Rear Lid Motor 2 V445. V444 has two Hall sensors, which inform J605 about the position of the trunk lid and number of revolutions of V444 per time unit.

Both pieces of information are transferred across separate discreet lines to J605. The control module can use the two signals to determine the current position of the trunk lid during the opening or closing operation.

J605 is connected to the Convenience CAN from where it receives the command to activate V444 and V445.

J605 also reads the position of Rear Lid Lock Button in Luggage Compartment E406. However, the lighting for E406 is controlled by Comfort System Central Control Module J393.



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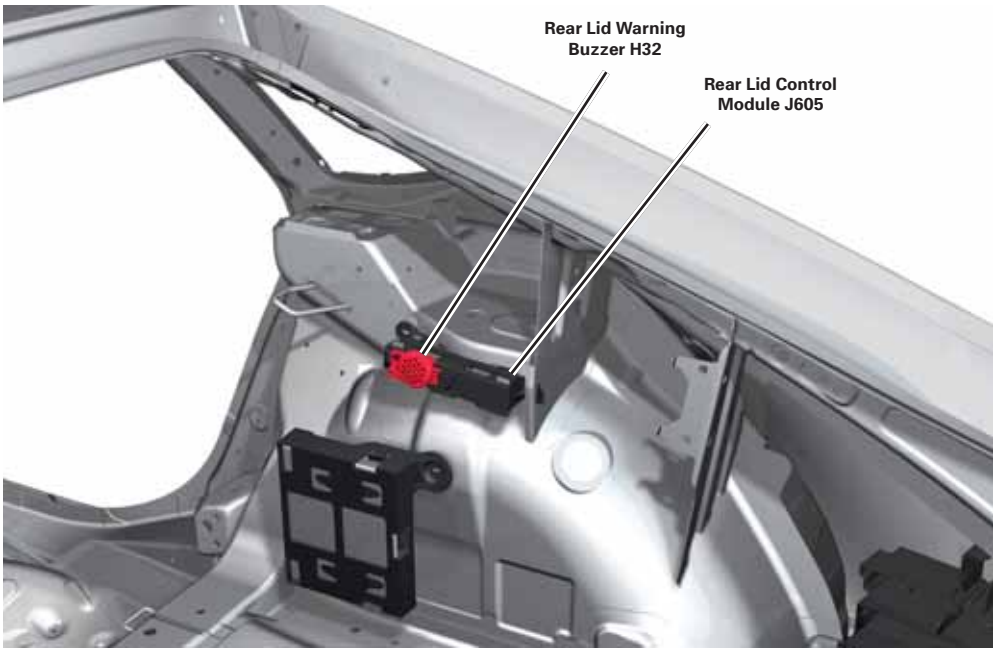
A new warning buzzer that draws attention to possible dangers when automatically closing the trunk lid has been installed on the A7. Rear Lid Warning Buzzer H32 is identical to the warning buzzer used for the parking aid system.

H32 issues acoustic signals in the following situations:

– During closing of the trunk lid when using Rear Lid Remote Release Button E233 in the driver's door panel
– During closing of the trunk lid when using the radio remote key

If the trunk lid is closed using the close button in the trunk lid or the handle in the trunk lid (soft touch), no acoustic signals are sounded. It is assumed that a person in these areas is paying attention to possible dangers.



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Saving the Desired Upper End Position of the Trunk Lid

This position can be set by the customer. The trunk lid must first be placed in the desired end position, then the close button on the trunk lid must be pressed for approximately four seconds.

Successful "saving" is confirmed by a brief flashing of the rear lights and an acoustic warning.

Power Latching

The A7 is also equipped with a power latching system for the trunk lid. It is controlled by Comfort System Central Control Module J393.

Audi Active Lane Assist

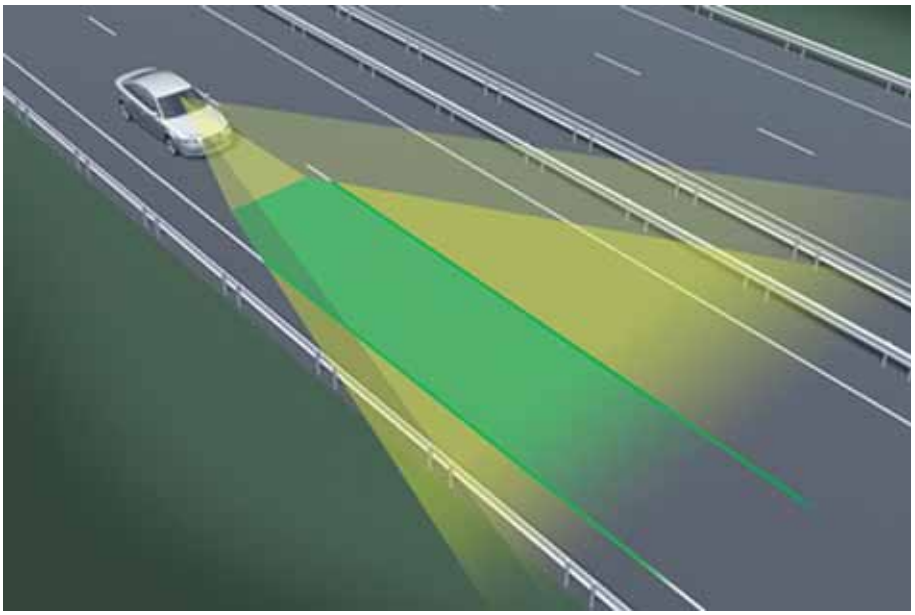
(Not available at 2012 A7 launch)

Audi Lane Assist Overview

Audi lane assist was first introduced in 2007. Lane departure systems warn the driver if their vehicle approaches a detected lane boundary marker (lane marker) and is likely to leave its lane.

Lane markers are detected using a windshield mounted camera. In the first generation Audi lane departure system, which is still used on some Audi models, the driver is warned through steering wheel vibration.

However, if a turn signal indicator is set before crossing the lane marker, the warning is suppressed. The system assumes the lane change is deliberate.



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The system is designed for driving on larger highways or expressways at speeds greater than 40.3 mph (65 km/h). The first generation of Audi lane assist required that two lane markers be detected for the system to become active and issue warnings.

In some situations, Audi lane assist may not detect lane markers or activate warnings. In poor ambient conditions, dirty or snow covered roads can prevent the system from issuing warnings. Ambiguous lane markings that might be expected in areas of road construction may also prevent the system from issuing warnings.

Reference

For more detailed information on lane departure warnings, refer to Self-Study Program 911703, *Audi Lane Assist Systems*.

Further Development of Audi Lane Assist

A next generation Audi lane assist system debuted on the 2011 A8. Functionality was enhanced so that lane departure warnings are issued even if only one lane marker is detected.

Turning into a corner sharply no longer leads to a warning, even if a lane marker was touched or briefly crossed.

In addition, a higher resolution camera capable of distinguishing between yellow and white lane markers is now part of the Audi lane assist system.

483_023

Audi Active Lane Assist Features

The new Audi active lane assist system debuts on the A7, with the following new features:

- Steering intervention through the electromechanical power steering system motor
- Steering wheel vibrations can be enabled/ disabled through the MMI
- A system mode that uses continuous steering intervention to assist the driver in keeping the vehicle in the center of their lane
- A system mode that assists the driver in preventing inadvertent lane departures when approaching a lane marker
- Warning vibrations are generated by the electromechanical power steering system motor, and no longer by an “imbalance” motor in the steering wheel
- The master control function of the system is through Image Processing Control Module J851, and not Camera Control Module J852 or Directional Stabilization Assistance Control Module J759

Audi lane assist and Audi active lane assist are driver assistance systems. They support the driver in preventing inadvertent lane departures but ultimately, it is the driver’s responsibility for remaining in their lane.

Reference

For more information on the new features of the lane departure warning system, refer to Self-Study Program 970203, *The 2011 Audi A8 Driver Assistance Systems*.

Active Steering Intervention

Drivers can choose between two system modes via the MMI:

– Steering point “early” assists the driver in keeping the vehicle in the center of the lane

– Steering point “late” assists the driver in avoiding inadvertent lane departures

System Mode: Steering Point “Early”

In steering point “early” mode, Audi Active lane assist continuously intervenes via steering movements (application of torque), to keep the vehicle in its lane.

Required steering torque is requested by Image Processing Control module J851. Power Steering Control Module J500 activates Electromechanical Power Steering Motor V187, which applies the torque.

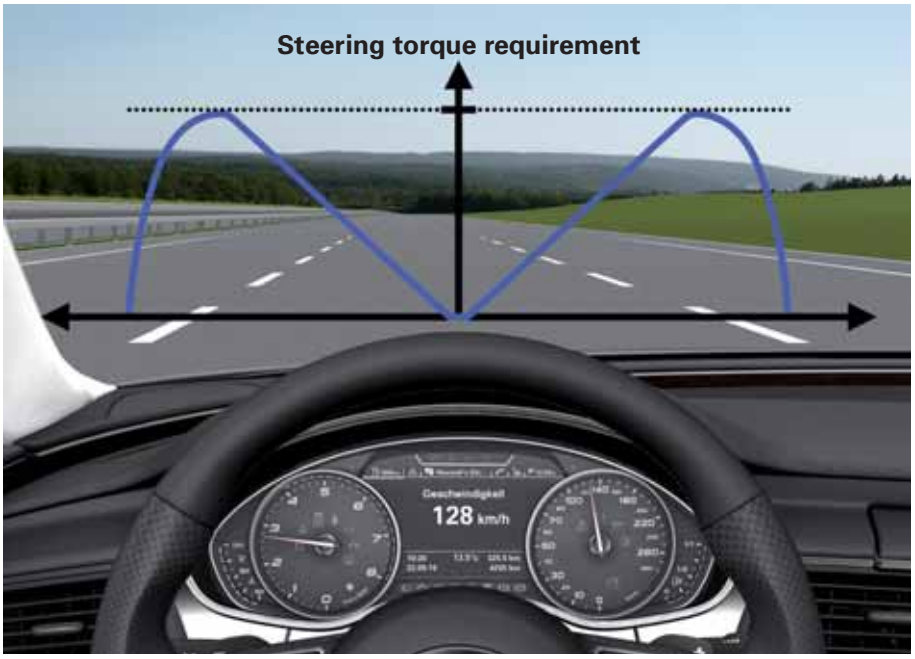
In “early” mode, steering intervention takes place as soon as the vehicle is no longer traveling in the center of its lane. Requirements for steering intervention are two-fold: the Audi active lane assist system is on the verge of issuing warnings, and the turn indicator is not yet actuated.

Steering torque becomes greater the farther the vehicle moves from the center of its lane. The driver perceives this steering intervention as a steering recommendation, which they can respond to or disregard.

To steer their vehicle into a neighboring lane, the driver’s steering force must be greater than the counteracting steering torque of the Audi active lane assist system.

If the system determines that the driver is not accepting its steering recommendation, and is instead just making a lane change, the system steering movement is withdrawn, and steering intervention terminated.

Audi active lane assist is designed so that its maximum system steering torque and intervention can easily be overcome with minimal effort by the driver.



483_024

Note
Steering intervention in steering point “early” mode only occurs if two lane markers are detected.

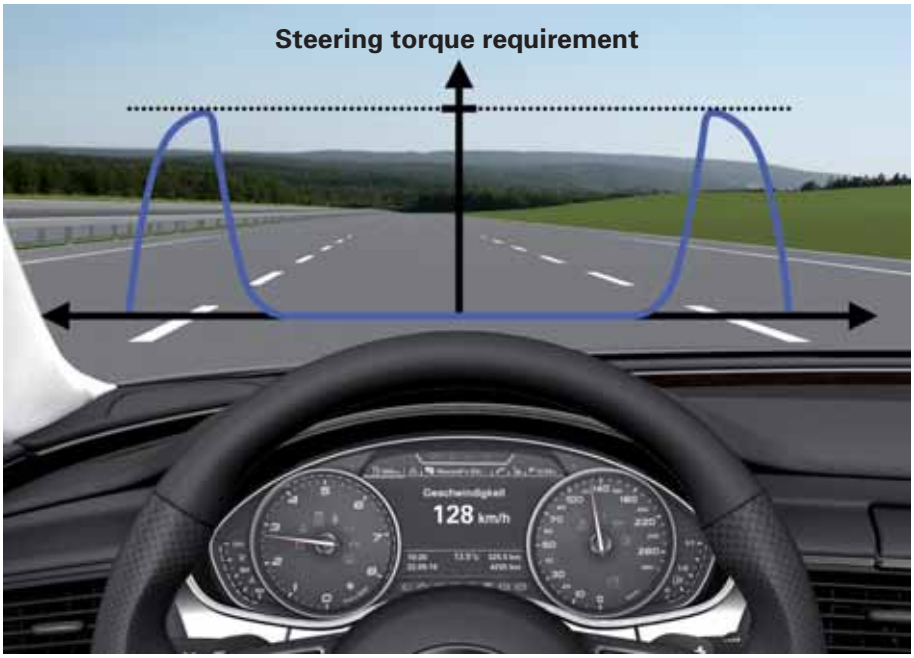
System Mode Steering Point “Late”

In this mode, the steering intervention of Audi active lane assist only occurs when the vehicle is already near a lane marker.

If driver steering torque is greater than the counteracting system steering torque, the vehicle moves closer to the neighboring lane.

System steering torque is reduced until it ultimately reaches a value of zero, at which point the system then assumes that the lane change was deliberate.

The maximum torque for steering point “late” is the same as that for steering point “early”.



483_025

Note

Audi active lane assist is only used in vehicles with electromechnical power steering. For additional information on electromechanical power steering, please see Self-Study Program 990303, *The 2012 Audi A7 Running Gear and Suspension*.

Displays and Operation

Displays of Audi Active Lane Assist

The current system state is indicated by a function lamp in the instrument cluster. If the vehicle has head-up display, the system state is also shown there.

Distinctions are made between three different system states:

– Switched ON and ready to issue warnings
– Switched ON but not ready to issue warnings
– Switched OFF

Switched ON and Ready to Issue Warnings

The indicator lamp lights up in green when the system is ready to issue warnings.

If the system is ready to issue warnings that it has detected two lane markers, but has not issued warnings yet, the lane markers in the DIS are shown in white.

In the illustration above, the lane marker on the right is shown in red because the system has determined that the driver's vehicle is likely to leave its lane.

Concurrently, a warning is issued by vibration of the steering wheel if the "Vibration Warning" of Audi active lane assist is set to "on" in the MMI.

In addition, the system applies torque to move the vehicle towards the center of the lane.

Switched ON But Not Ready to Issue Warnings

The indicator lamp lights up yellow when the system is switched ON but the system is not ready to issue warnings. In this state, steering interventions and warnings do not accompany steering wheel vibration.

This system state can have the following causes:

- Vehicle speed is below 40.3 mph (65 km/h)
- Driving lane is narrower than approximately 8.2 feet (2.5 m) or wider than approximately 14.7 ft (4.5 m)
- No lane marker
- Corner radius is too tight
- Driver's hands are not on the steering wheel
- Relevant lane markers are not detected

Possible causes of lane markers not being detected:

- Road work or repair markings
- Snow or dirt on the road surface
- Light reflections due to wet road surface
- Glare due to low sun or oncoming traffic

If the system is currently not ready to issue warnings, the lane marker lines in the DIS are shown in gray

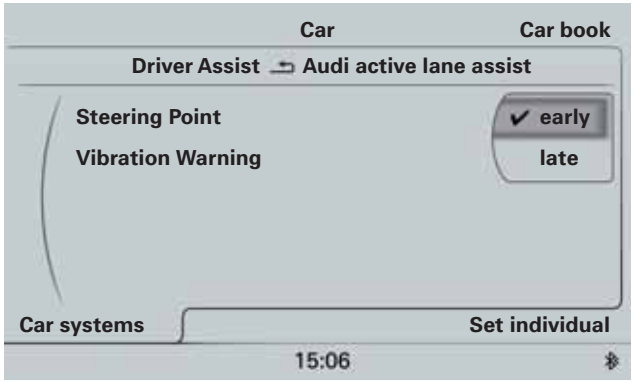
Operation

ON and OFF

483_028

Audi active lane assist is switched ON and OFF via a button at the end of the turn signal lever.

MMI Setting: Steering Point

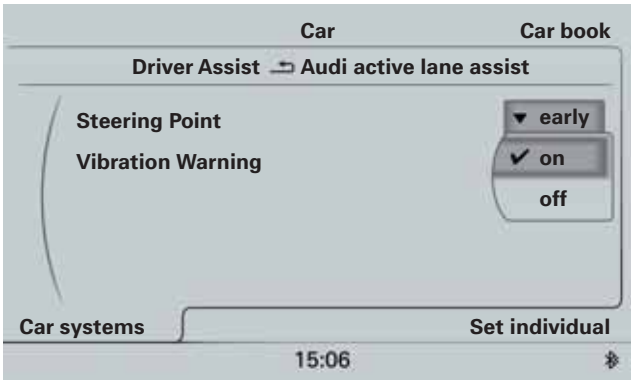


483_029

early Continuous steering interventions assist the driver in keeping their vehicle centered in their lane. Steering movements increase as the vehicle gets closer to a lane marker.

late Steering intervention only takes place when the vehicle gets close to a lane marker.

MMI Setting: Vibration Warning



483_030

on Steering interventions continuously assist the driver in keeping their vehicle centered in their lane. System steering movement increases the closer the vehicle gets to a lane marker.

off Steering intervention only takes place when the vehicle has approached a lane marker.

Additional Functions

System Deactivation After Recognition of Hands-Free Driving

483_031

Audi active lane assist requires the driver to keep their hands on the steering wheel at all times. Recognition of hands-free driving is made based on signals from Steering Torque Sensor G269.

If hands-free driving is recognized, the lane assist function is deactivated temporarily, and the function lamp in the DIS changes color from green to yellow. Once the driver grips the wheel again, the system is reactivated.

Deliberate Lane Change Without Set Turn Indicator Use

483_032

If the driver changes lanes with the turn indicator set, the system does not intervene, assuming the lane change is deliberate. However, Audi active lane assist does interpret some lane changes without an activated turn indicator, if certain requirements are met.

These requirements include:

- Detection of a road user in front of the vehicle
- A distance to the vehicle ahead that is typical for overtaking
- Difference in speed if the relationship to the vehicle ahead is sufficiently large

In these situations, there is no warning and no steering intervention of the system.

System Characteristics with Obstacles Detected in the Neighboring Lane

483_033

A driver inadvertently leaving their lane can encounter severe consequences, for example, if there are guard rails near the lane marker, or if there are vehicles in the neighboring lane.

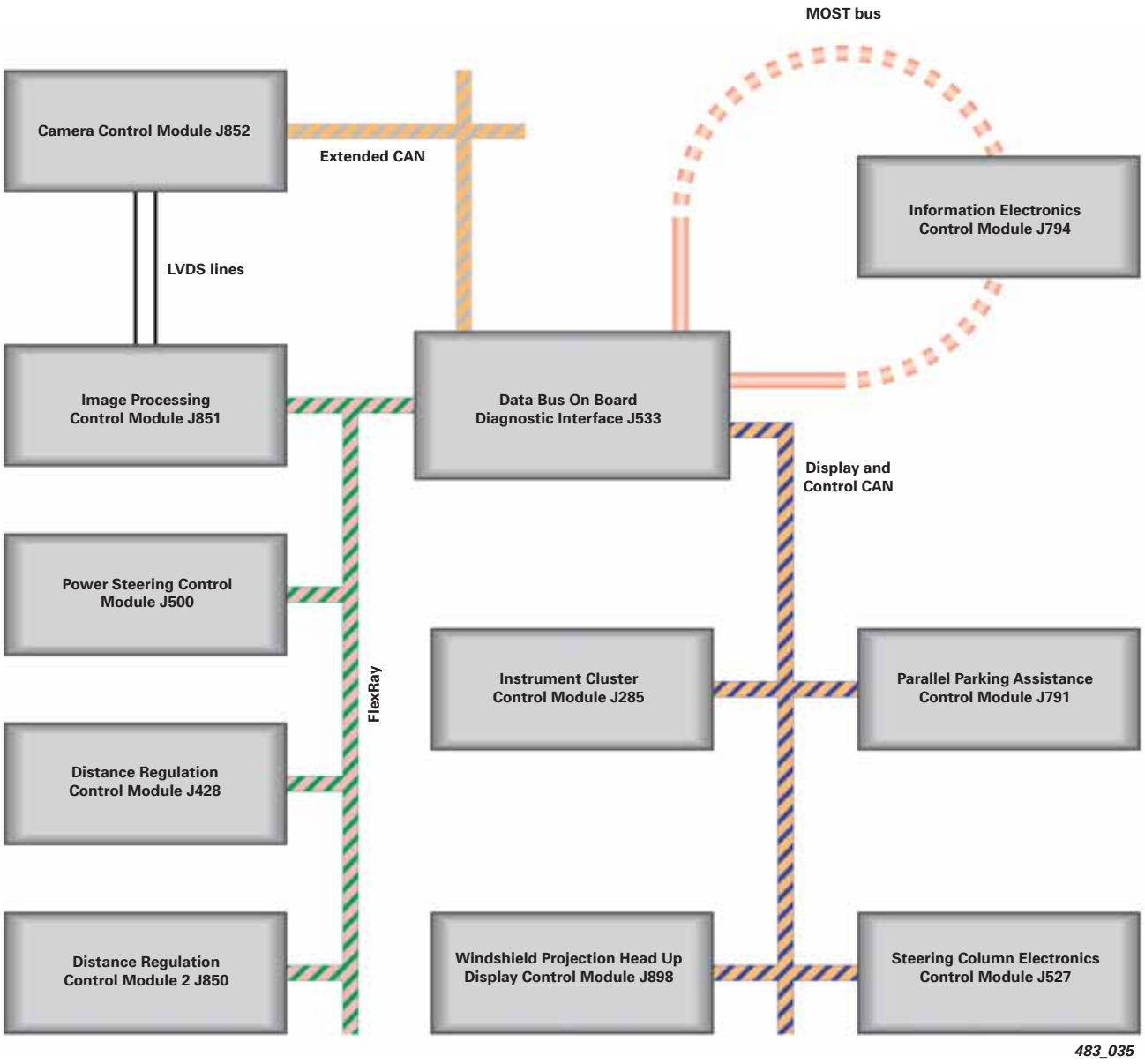
If a vehicle is equipped with ACC and/or parking aid systems, the measured variables of these systems are also used to recognize such situations.

Audi active lane assist reacts by issuing a vibration warning earlier, with the driver having to apply more force to overcome system steering intervention. However, this only applies to the steering point “late” mode.

Communication Structure

To implement Audi active lane assist, Image Processing Control Module J851 requires a large amount of information.

The following section describes the control modules that communicate with Audi active lane assist and what that information entails.



Audi Active Lane Assist Control Modules

Camera Control Module J852

- Views the area in front of the vehicle and transfers images to Image Processing Control Module J851
- Searches for lane markers in the images, determines their exact position and geometry, and transfers this information to J851

Image Processing Control Module J851

- Incorporates Audi active lane assist software, which is integrated into this module
- Transmits the required system steering torque to Power Steering Control Module J500 and, if required, requests a vibration alarm
- Asks Instrument Cluster Control Module J285 to display the current system state and, if required, to display messages and warnings
- Transfers the current system state to Windshield Projection Head Up Display Control Module J898 and asks it, if required, to display warnings
- Saves Audi active lane assist settings made via the MMI, and assigns them to the vehicle key in use

Power Steering Control Module J500

- Activates the electromechanical steering motor according to specifications of J851, generating required system steering torque and a vibration warning
- Evaluates Steering Torque Sensor G269 and forwards the value to Imaging Processing Control Module J851

Data Bus On Board Diagnostic Interface J533

- Interface of the various data bus systems

Steering Column Electronics Control Module J527

- Determines the position of the Audi active lane assist system button and places that information on the CAN bus

Instrument Cluster Control Module J285

- Displays the current system state of Audi active lane assist
- Issues messages about Audi active lane assist

Information Electronics Control Module J794

- Settings for Audi active lane assist are made through this control module.

Optional Control Modules That Can be Used if Installed

ACC Distance Regulation Control Modules J428 and J850

- If the vehicle has optional ACC, its measured variables are used for the two functions “Deliberate lane change without set turn indicator” and “System characteristics with obstacles detected on the neighboring lane”

Image Processing Control Module J851

- If the vehicle has the optional front / rear parking aid, its measured variables are used for the function “System characteristics with obstacles detected on the neighboring lane”

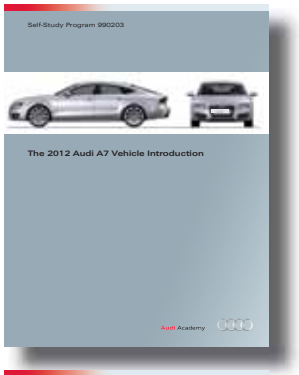
Windshield Projection Head Up Display Control Module J898

- If the vehicle has head-up display, the current system state and warnings from Audi active lane assist can be displayed there

Self-Study Programs for the 2012 Audi A7

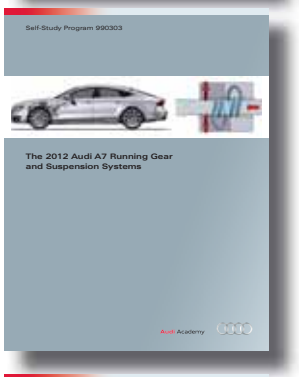
SSP 990203 The 2012 Audi A7 Vehicle Introduction

- Body
- Occupant Protection
- Engine
- Power Transmission
- Suspension System
- Electrical System
- Climate Control
- Infotainment



SSP 990303 The 2012 Audi A7 Running Gear and Suspension Systems

- Axles and Wheel Alignment
- Adaptive Air Suspension
- Steering System
- Electromechanical Steering
- Brake System
- ESP
- Sensor Electronics Control Module J849
- Adaptive Cruise Control (ACC)
- Wheels and Tires
- Tire Pressure Monitoring (TPMS)

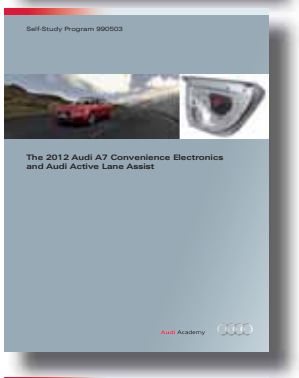


SSP 990403 The 2012 Audi A7 Onboard Power Supply and Networking

- Power Supply
- Networking
- Control Modules
- Exterior Lighting

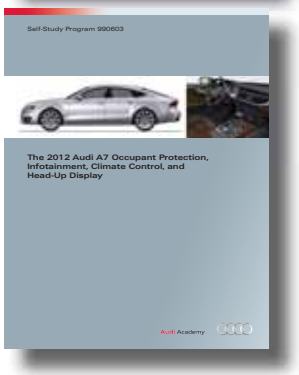
SSP 990503 The 2012 Audi A7 Convenience Electronics and Audi Active Lane Assist

- Topology
- Convenience Electronics
- Audi Active Lane Assist



SSP 990603 The 2012 Audi A7 Occupant Protection, Infotainment, Climate Control, and Head-Up Display

- Occupant Protection
- Audi pre sense
- Infotainment
- Air Conditioning
- Seat System
- Head-Up Display



Knowledge Assessment

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

The Knowledge Assessment is required for Certification.

You can find this Knowledge Assessment at:

www.accessaudi.com

From the accessaudi.com Homepage:

- Click on the “ACADEMY” tab
- Click on the “Academy Site” link
- Click on the “CRC/Certification” link
- Click on Course Catalog and select “990503 — The 2012 Audi A7 Convenience Electronics and Audi Active Lane Assist”

For assistance please call:

Audi Academy

Certification Resource Center (CRC)

1-877-283-4562

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

Or you may send an email to:

audicrchelpdesk@touchstone-group.com

Thank you for reading this Self-Study Program and taking the assessment.

Notes

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