

**\*\* SOLUTION \*\***

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Title Volvo Chassis - Volvo Active Driver Assist (VADA)

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**Volvo Models**

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**Volvo Model** VN

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**\*\* SOLUTION \*\***

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Cause Limited information found in Trucks Dealer Portal.

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Solution **Volvo Active Driver Assist (VADA)**

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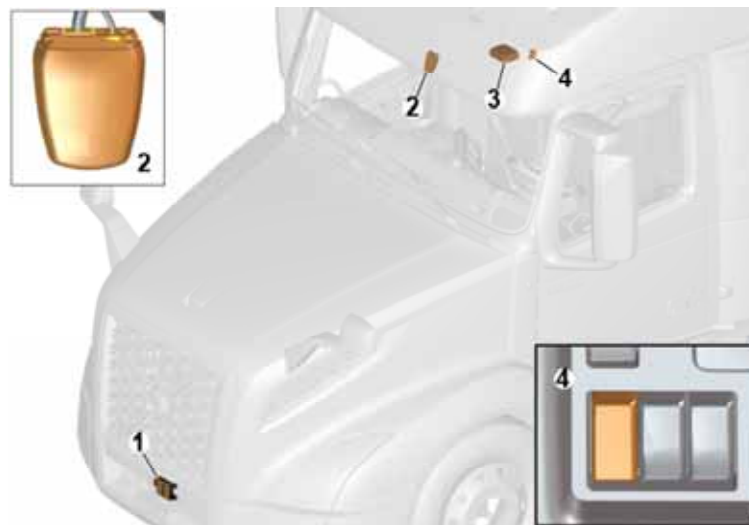
**Volvo active driver support, function description****Component location****Driver support, dashboard**

1	Instrument cluster (A03)
2	Stalk switches(S274A)
3	LCM (Light Control Module) (A27)
4	Control unit brakes (A12B)
5	Central locking unit (CLU)
6	VECU (Vehicle Electronic Control Unit) (A17)
7	Telematics control unit (TCU)
8	Audio system (A07A)
9	Steering wheel switches (S276A)
10	Steering angle sensor (B49)
11	Switch GLU (Gear Lever Unit) (S171A)
12	Sensor, accelerator pedal (B25A)
13	Sensor, footbrake valve (S59)



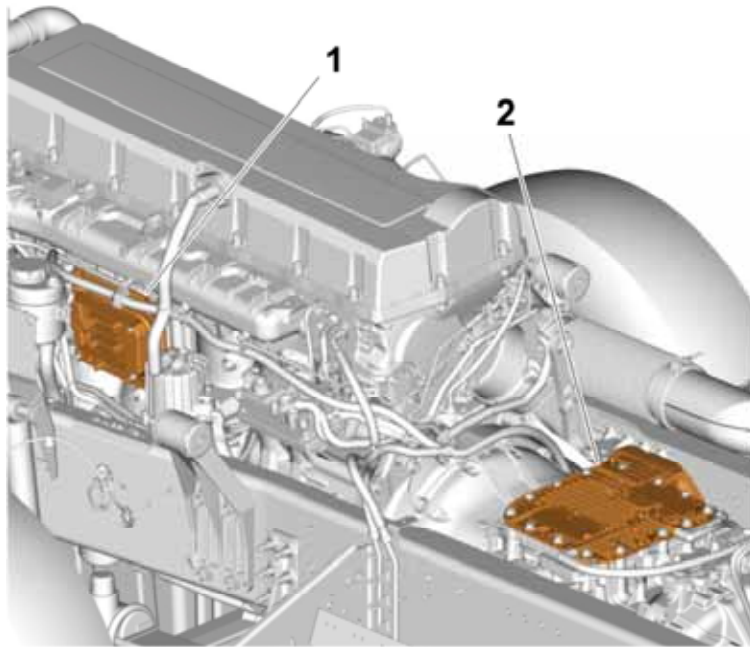
**Driver support, cab**

1	Forward looking radar (FLR)
2	Forward looking camera (FLC20)
3	Safety direct processor (SDP)
4	Lane departure warning switch (LDWS)



**Driver support, chassis**

1	ECM (Engine Control Module) (A14)
2	2 TECU (Transmission Electronic Control Unit) (A13)



### **Function behavior**

#### **Collision warning function scenario**

##### **Function scenario**

#### **Collision warning with emergency braking**

The forward collision warning function warns the driver when a vehicle appears in front of the vehicle and becomes a potential threat. This is achieved by measuring the distance to the object in front and calculating the time to a potential collision. Based on this information, the forward collision warning warns the driver to take action by emitting an audio warning and flashing a telltale.

The emergency braking function reduces the severity of a forward collision and tries to avoid it. By collecting and processing information on distance and motion of an obstacle, vehicle speed, drive commands and driver actions, emergency braking determines if the obstacle ahead presents a threat. If a collision is calculated as unavoidable without immediate action on the brakes from the driver, emergency braking will activate the brakes to reduce the force of the impact or try to avoid the collision.

- The system only takes into account vehicles ahead that are driving in the same direction in the same and adjacent lanes, not oncoming traffic.
- Braking lightly will not affect the emergency braking, while forceful braking will (if possible) increase the braking effect.
- The driver will receive warnings before a collision becomes unavoidable; these warnings are handled by the forward collision warning function.
- Any modifications to the area in front of the sensor may not guarantee the correct function of the system.
- Depress the accelerator pedal beyond the kick down point to stop unwanted emergency braking.
- The system is deactivated after three incidents of full braking. The function can be reactivated at the next key cycle.
- After a collision or minor impact that could have affected the area around the sensor, visit an authorized workshop to ensure full function and correct setting of the sensor.

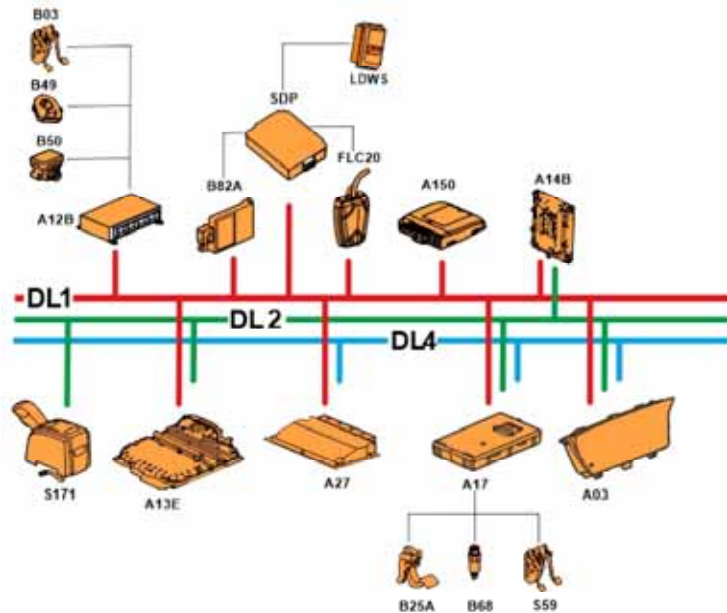
### **Scenario**

The FLR (B82A) indicates a rapidly decreasing distance to an obstacle ahead that is confirmed by the FLC.

1. A warning is sent from the FLR(82A) to the instrument cluster (A03). The warning is issued to the driver via the speaker and the blinking of a visual telltale both in the instrument cluster (A03).
2. Then if the driver does not react, full brake starts.
3. FLR(82A) sends braking request to the control unit brakes (A12B) The control unit brakes (12B) requests:
  - to ECM (A14B) to stop injection.
  - TECU (A13E) to disengage the drive line for vehicles with AMT.
  - Control unit brakes (A12B) then activates the wheel brakes.
  - The LCM (A27) monitors the messages from the FLR(82A) and the vehicle speed during the braking event and turns on the hazard lights when the vehicle slows to 5mph.
1. After the vehicle has stopped,
  - The control unit brakes (A12B) maintains the braking until the driver takes back the control of the vehicle by pressing the accelerator or brake pedal, by applying the parking brake.

### **Preconditions:**

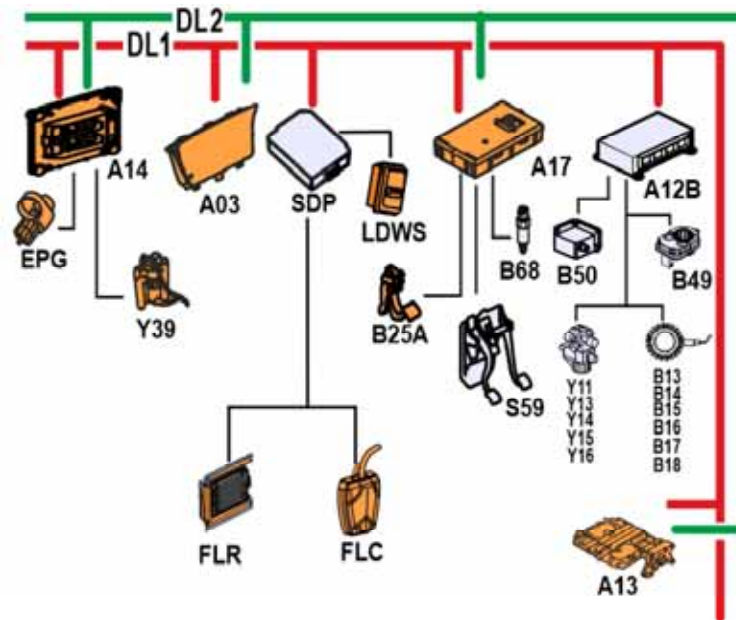
- Vehicle speed is above minimum emergency braking activation speed.
- The FLR is fully functional.
- The FLC is fully functional.
- Control unit brakes is fully functional.



### ACC (Adaptive Cruise Control)

**Scenario** When the cruise control is active - it transmits the information to the instrument cluster (A03).

1. The vehicle speed sensor (B68) sends information to the VECU (A17) about actual vehicle speed. The forward looking radar (B82A) sends information to instrument cluster (A03) about forward object detection within the predefined time gap. VECU (A17) sends information to ECM (A14C) about actual vehicle speed and CC set speed. The TECU (A13B/A13E) (depending on variant) sends information to ECM (A14C) about available driveline retardation torque.
2. The FLR (B82A) sends a request to the control unit brakes (A12B) for deceleration rate. The control unit brakes (A12B) send the request to the ECM (A14C) to stop injection to maintain vehicle speed and the time gap.
3. If the de-throttle is not sufficient to reduce the speed, the control unit brakes (A12B) requests the ECM (A14C) to activate the engine brake to further reduce vehicle speed to keep time gap setting.
4. The ECM (A14C) activates the engine brake. If requested, the TECU (A13B/A13E) (depending on variant) activates the transmission downshifting.
5. The ECM (A14C) sends the actual engine brake torque value (% of reference torque) to VECU (A17). The TECU (A13B/A13E) sends the actual driveline retarder torque value (% of reference torque) to VECU (A17).
6. If the de-throttle and engine brake is not sufficient the control unit brakes (A12B) activates the foundation brakes enough to further slow the vehicle to maintain the time gap.



#### Preconditions:

- The accelerator pedal is released.
- The ACC is active.
- The FLR is fully functional
- The control unit brakes is fully functional.

#### Parameters:

- The adaptive cruise control minimum speed, default or as set (as part of the Cruise Control).
- The adaptive cruise control time gap, default or as set.
- Cruise control speed setting, default or as set (as part of the Cruise Control).

#### Lane departure warning

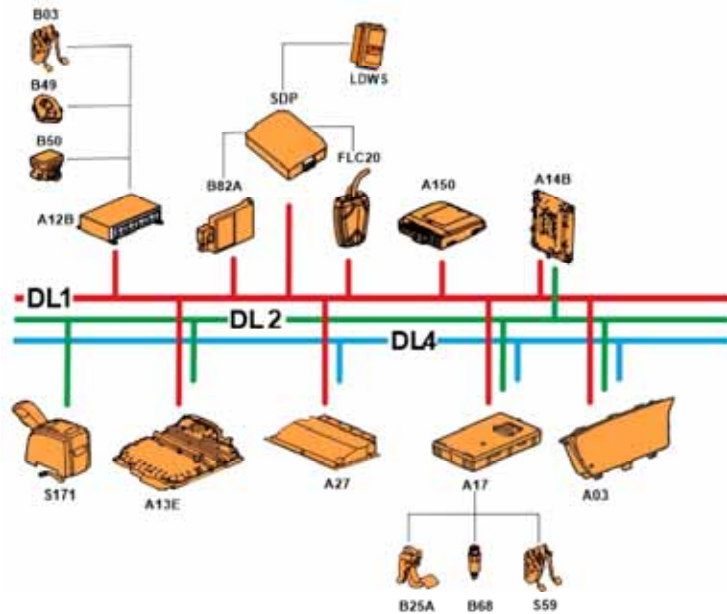
Lane departure warning (LDW) is a feature that, if the driver doesn't take corrective action after

lane departure warnings issued by the system and vehicle continues to drift in the same direction it will provide an additional warning to the driver.

#### Scenario

1. FLC detects when the engine is running and activates lane departure warning.
2. When the vehicle reaches lane departure warning activation speed, and the forward looking camera (FLC) detects road markings.
3. When the vehicle approaches the road markings, the FLC sends lane departure warning to the instrument cluster (A03).

4. If the vehicle continues to drift, the FLC detects the vehicle is departing the highway. The FLC sends the highway departure immanent warning to the instrument cluster (A03). An audible warning is heard from the speaker inside the instrument cluster (A03) and a visual telltale flashes.



**Note:**

The lane departure switch is, by default, on. Pressing the switch requests the FLC to activate/ deactivate depending on the current state.

**Preconditions:**

- Vehicle speed is at lane departure warning activation speed or higher. The function activates at 60 km/h.

**Notable behaviour:**

- The system cannot always clearly identify road markings and traffic situations. To avoid an accident, it is important that the driver is aware of which limitations exist. The system may in certain cases give an unnecessary warning or no warning at all. All the information about the function must be read before using it.
- The system determines the driver activity level on the basis of several criteria, e. g. steering wheel motion. The level is, normally, a direct consequence of the road conditions - lane width, straightness etc. A warning is given when the vehicle crosses a visible road marking.

- Warnings are not given if the system determines that the driver is actively controlling the vehicle in a safe way. If the driver activity level is too low in relation to the road conditions a warning is given.
- Lane departure warning can be deactivated in the event of unclear road markings or certain weather conditions such as heavy rain, snowfall or similar.

**Note:**

Lane keeping support does not work in all driving situations and is a complementary tool. It cannot replace the driver's attention in traffic. The driver is ultimately responsible for the vehicle being driven in a safe manner.

**Highway departure warning**

Highway departure warning (HDW) is a feature that, if the driver doesn't take corrective action after lane departure warnings issued by the system and vehicle continues to drift in the same direction it will provide an additional warning to the driver.

**Scenario**

1. FLC detects when the engine is running and activates lane departure warning.
2. When the vehicle reaches lane departure warning activation speed, and the forward looking camera (FLC) detects road markings.
3. When the vehicle approaches the road markings, the FLC sends lane departure warning to the instrument cluster (A03).
4. If the vehicle continues to drift, the FLC detects the vehicle is departing the highway. The FLC sends the highway departure immanent warning to the instrument cluster (A03). An audible warning is heard from the speaker inside the instrument cluster (A03) and a visual telltale flashes.

**Note:**

The lane departure switch is, by default, on. Pressing the switch requests the FLC to activate/ deactivate depending on the current state.

**Preconditions:**

- Vehicle speed is at lane departure warning activation speed or higher. The function activates at 60 km/h.

**Notable behaviour:**

- The system cannot always clearly identify road markings and traffic situations. To avoid an accident, it is important that the driver is aware of which limitations exist. The system may in certain cases give an unnecessary warning or no warning at all. All the information about the function must be read before using it.



- The system determines the driver activity level on the basis of several criteria, e. g. steering wheel motion. The level is, normally, a direct consequence of the road conditions - lane width, straightness etc. A warning is given when the vehicle crosses a visible road marking.
- Warnings are not given if the system determines that the driver is actively controlling the vehicle in a safe way. If the driver activity level is too low in relation to the road conditions a warning is given.
- Lane departure warning can be deactivated in the event of unclear road markings or certain weather conditions such as heavy rain, snowfall or similar.

**Note:**

Lane keeping support does not work in all driving situations and is a complementary tool. It cannot replace the driver's attention in traffic. The driver is ultimately responsible for the vehicle being driven in a safe manner.

Solution visibility	Dealer distribution
<b>Function(s)/component(s) affected</b>	
Function affected	VECU , MID 136 ABS , MID 144 – VECU , Volvo Active Driver Assist (VADA)
<b>Function Group</b>	
Function Group	366 automatic monitoring and control , 381 combined instrument , 384 warning system , 387 warning/information analysis and display; embedded diagnostic software , 593 anti-lock brake (anti-skid)
<b>Customer effect</b>	
Main customer effect	calibration/programming/pairing/missing operation
<b>Administration</b>	
Author	A044013
Dealer ID	A044013
Last modified by	A241298
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