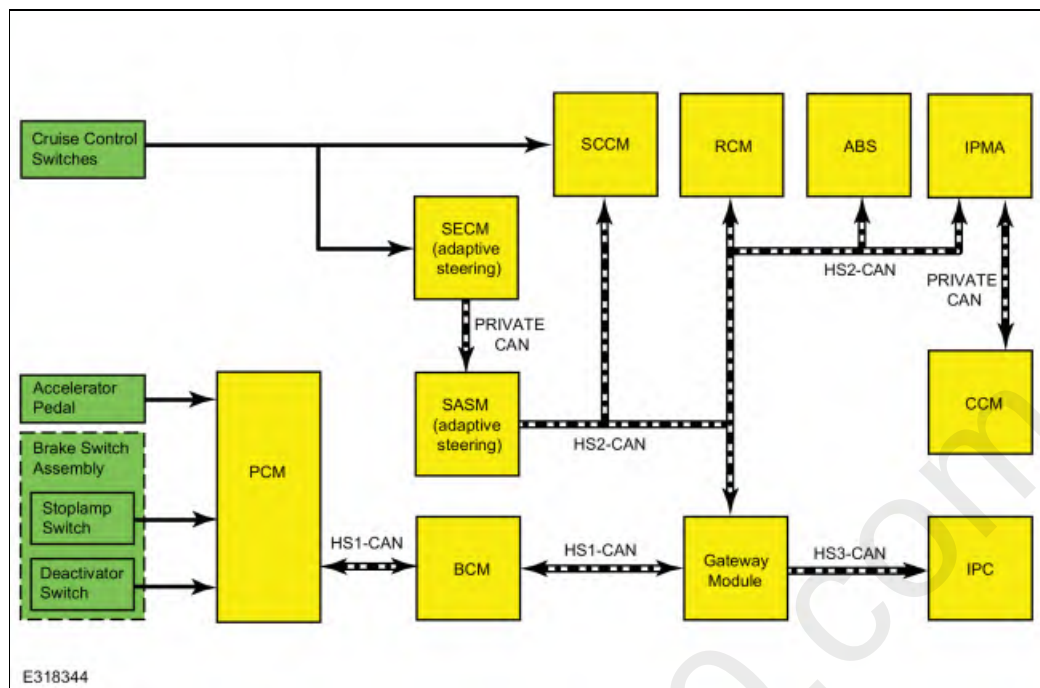


Cruise Control - System Operation and Component Description

System Operation

Adaptive Cruise Control



Item	Description
1	Brake Switch Assembly
2	IPC
3	Accelerator Pedal
4	Deactivator Switch
5	Stoplamp Switch
6	SCCM
7	PCM
8	Cruise Control Switches
9	GWM
10	IPMA
11	SECM (adaptive steering)
12	SASM (adaptive steering)
13	ABS module
14	BCM
15	RCM
16	CCM

Network Message Chart

Network Input Messages - ABS Module

Broadcast Message	Originating Module	Message Purpose
-------------------	--------------------	-----------------

Broadcast Message	Originating Module	Message Purpose
ACC brake deceleration request	CCM	Used for cruise control automatic braking.
Brake pedal applied	PCM	Used for brake switch input.

Network Input Messages - CCM

Broadcast Message	Originating Module	Message Purpose
Accelerator pedal position	PCM	Used for accelerator pedal status.
Brake pedal applied	PCM	Used for brake switch input.
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.
Ignition status	BCM	Used for ignition switch position input.
Stability-traction control event in progress	ABS module	Deactivates cruise control when requested.
Vehicle yaw rate		
Vehicle lateral acceleration		
Vehicle longitudinal acceleration		
Vehicle configuration data	BCM	Used for comparison checking adaptive cruise control configuration.

Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
ACC gap distance display	CCM	Data used to generate message center display indicating adaptive cruise control gap setting.
ACC follow mode display	CCM	Data used to generate message center display indicating selected distance between driver's vehicle and vehicle in front.
Cruise control mode	PCM	Toggles between speed control and adaptive cruise control.
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.
Cruise control status	PCM	Data used for speed control indicator status.

Network Input Messages - SCCM (With Adaptive Steering)

Broadcast Message	Originating Module	Message Purpose
Steering wheel switch speed control	SASM	Used for cruise control enable/disable and operating mode request.

Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose
Steering wheel switch speed control	SCCM	Used for cruise control enable/disable and operating mode request.
Stability-traction control event in progress	ABS module	Deactivates speed control when requested.
Vehicle yaw rate		
Vehicle lateral acceleration		
Vehicle longitudinal acceleration		

Cruise Control Operation

NOTE: For a complete illustration of the adaptive cruise control indicators and graphic displays, refer to the Owner's Literature.

The ACC system functions much like a standard cruise control system. The ACC system automatically adjusts the vehicle speed to maintain a set distance gap from the front of the vehicle and the vehicle in the same path of travel. When the ACC system is on and is following a vehicle or a vehicle enters the same driving lane, a follow vehicle graphic is displayed in the message center.

The ACC with the lane keeping system (if equipped) uses radar and camera sensors to assist in keeping the vehicle within the lane by applying a continuous assistance steering torque input toward the center of the lane. When the system is active in the alert mode and the vehicle unintentionally drifts out of its lane, the system provides an alert by vibrating the steering wheel. In aid mode, the system provides steering assistance by counter steering the vehicle back into the lane. Refer to the Owner's Literature for additional information.

The ACC system does not function if the vehicle speed is below 20 kmh (12 mph) or if a lead vehicle is not detected. If either of these occur, the message center displays ADAPTIVE CRUISE - SPEED TOO LOW TO ACTIVATE. As the vehicle slows down during automatic braking, the ACC system discontinues braking at 20 kmh (12 mph). At that speed, an audible alarm sounds and the automatic braking from the ABS module is released. The driver must take over the vehicle braking control.

The cruise control deactivator switch (which is integral to the BPP switch) is an additional safety feature. When the brake pedal is applied, the cruise control system deactivator switch opens and removes the ground signal from the PCM input circuit, releasing the throttle and immediately deactivating the system.

The CCM is on a dedicated CAN with the IPMA. The IPMA acts as a gateway module and relays network messages and DTC information from the CCM to other modules that utilize the ACC system.

The CCM monitors the yaw rate signal from the ABS module and compares it to the wheel speed and steering wheel angle signals. If the ABS module determines the yaw rate is invalid, the CCM disables ACC. The message center displays the message COLLISION WARNING MALFUNCTION and/or ADAPTIVE CRUISE MALFUNCTION.

The CCM monitors the environment in front of the vehicle while active. If the radar beam is obstructed by a buildup of snow, ice, rain or other debris or the vehicle is driven in a desert environment with no other traffic for extended periods of time, the sensor will trigger an ADAPTIVE CRUISE NOT AVAILABLE SENSOR BLOCKED SEE MANUAL message and will disable the ACC. ACC resumes once the obstruction is cleared and the radar is able to detect targets or upon a key cycle.

If aftermarket equipment, such as a snow plow, is installed on the front of the vehicle, obstructing the radar, the ACC may function erratically. The ACC needs to be disengaged using the menu option and the operator only has non-adaptive cruise control functionality.

The ACC system does not engage properly if the front radar sensor is not aligned correctly and the message center displays FRONT SENSOR NOT ALIGNED. The ACC resumes once the radar is aligned and is able to properly detect targets.

The CCM radar vertical and horizontal alignment procedure is located in General Procedures. The horizontal alignment for the CCM is a calibration check performed by the scan tool to insure the CCM is pointed straight. The scan tool identifies this as, Alignment Offset with a horizontal specification of +/- 3.0 degrees offset. For additional information, Refer to: Cruise Control Radar Alignment (419-03B Cruise Control - Vehicles With: Adaptive Cruise Control, General Procedures).

The ABS module estimates brake temperature by monitoring applied brake pressure over a period of time and sends a message to the CCM when the estimated temperature is above a given threshold. An alarm sounds and the ACC system is deactivated until the estimated brake temperature returns to cooler operating conditions. This condition can happen in a hilly or mountainous driving terrain. While the vehicle is hauling a heavy trailer with the tow haul mode OFF, the brakes can overheat more easily on long descents, which disables the system.

When tow/haul mode is selected while the vehicle is operating in ACC mode, the system assumes the vehicle is towing a heavier load. The gap distance between the vehicle and the vehicle in front will increase, allowing for greater stopping distance.

Vehicles equipped with the 6.7L diesel engine, the ACC system uses engine braking to slow the vehicle speed on downward grades or to maintain a safe distance between the vehicle and the vehicle in front. If the engine brake ON or AUTO is selected, the driver experiences additional engine braking, reducing the need to apply the brakes.

When a vehicle is traveling downward on a grade, the brakes will engage while in normal cruise control mode to slow the vehicle if it exceeds the set speed.

Cruise Control Indicator

The ACC indicator located in the IPC illuminates in gray and the previous gap setting and SET graphic is displayed indicating the system is in standby mode. This notifies the driver the system is ready and the vehicle can be accelerated to the desired speed. When the vehicle reaches the desired speed and the SET+ is pressed, the ACC indicator illuminates in green.

Steering Wheel Switch Function

The ACC steering wheel mounted switches are momentary contact switches that toggle up and down for the cruise control switch state. Pressing and releasing the steering wheel cruise control ON or OFF switch turns the cruise control system on. Pressing up SET+ and releasing the set switch sets the vehicle's speed and stores the set speed in memory. The adaptive cruise control indicator illuminates and the message center displays the set speed and gap setting graphic.

There are two ways to change the set speed. The first way is to accelerate or brake to the desired speed and press and release the SET cruise control switch until the desired set speed is shown on the message center. The second way is by tapping the SET+ or the SET- switch while in the set mode, increasing or decreasing the displayed set speed by 1.6 kmh (1 mph) per tap. If the respective switch is pressed and held, the displayed set speed continues to increase or decrease until the switch is released. The ACC system may apply the brakes to slow the vehicle down to the new set speed. The set speed displays continuously in the message center while the ACC system is active.

Pressing and releasing the OFF switch or switching the ignition to OFF, turns the ACC system off. The ACC set speed memory is erased.

Applying the brake pedal or pressing the CNCL switch puts the ACC system in standby mode and the last set speed is displayed in the message center with a strike through. Pressing the RES switch when the ACC system is in standby mode causes the vehicle to accelerate to the last set speed. The set speed continuously displays in the message center while the ACC system is active. The RES switch does not function if the OFF switch is pressed, the ignition is cycled OFF or if the current vehicle speed is below the minimum operational speed.

The ACC system has the capability for the driver to change from ACC to standard cruise control. The LH 5-way steering wheel switch is used to switch from the ACC system to standard cruise control system within the message center. For information on selecting the standard cruise control in the message center, refer to Owner's Literature. Once the driver has selected the standard cruise control in the message center, the ACC indicator is replaced by the standard cruise control indicator. The vehicle no longer responds to lead vehicles or automatic braking.

Gap Setting

When a vehicle ahead enters the same lane or a slower vehicle is ahead in the same lane, the vehicle speed adjusts automatically to maintain a preset distance gap. Four horizontal bars with preset graph settings are displayed in the message center. Pressing up (decrease) or down (increase) on the steering wheel cruise control gap switch increases or decreases the distance from the vehicle ahead. If all of the bars are illuminated, this is the longest gap setting. If only one bar is illuminated, that is the shortest gap setting.

The vehicle maintains the distance gap to the vehicle ahead until:

- the vehicle ahead accelerates to a speed above the set speed.
- the vehicle ahead moves out of the lane or out of view.
- the vehicle speed falls below 20 kmh (12 mph).
- a new gap distance is set.

After each ignition cycle, the previous gap setting is remembered and the system is set to that gap setting.

The distance gap is overridden by pressing the accelerator pedal. The follow vehicle graphic is not displayed in the message center and the green indicator illuminates. When the accelerator pedal is released, the ACC system returns to normal operation and the vehicle speed decreases to the set speed or a lower speed if following a vehicle ahead.

The gap distance will increase when the tow/haul mode is selected compared to the gap distance when tow/haul mode is off.

Deceleration Control

The CCM commands the ABS module, which controls the brakes, to automatically apply the brakes to slow the vehicle to maintain a safe distance to the vehicle in front.

Vehicles equipped with a 6.7L diesel engine, the ACC system uses engine braking to slow the vehicle speed on downward grades, to maintain a safe distance to the vehicle in front.

Steering Wheel Switches

The cruise control steering wheel mounted switches are momentary contact switches that toggle up and down for the switch state. The switches are an input to the SCCM. Vehicles equipped with adaptive steering, the switches are an input to the SECM. The switch signals are sent to the SASM on private CAN circuits. The SASM sends the switch signals to the SCCM on the HS-CAN2.

Brake Pedal Position (BPP) Switch

When the brake pedal is applied, the cruise control deactivator switch, integrated in the BPP switch, opens and removes the ground signal from the PCM input circuit releasing the throttle, immediately deactivating the cruise control system.

CCM

The CCM contains a radar sensing unit which measures the relative speed and the distance between the front of the vehicle and the vehicle being followed. The CCM is responsible for requesting the PCM to increase or decrease vehicle speed and the ABS module to brake, when necessary.

IPMA

The IPMA is mounted on the windshield below the rear view mirror. The IPMA contains a forward-looking camera with a designated sight line in front of the moving vehicle. The camera detects and differentiates between an approaching object, vehicle or pedestrian in the path of travel. This information is shared with the CCM on a dedicated private CAN circuit.

mcx30.com