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1996 FORD Galaxy OEM Service and Repair Workshop Manual

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the SECM (steering effort control module) . The switch signals are sent to the SASM (steering angle sensor module) on HS-CAN (high-speed controller area network) circuits. The SASM (steering angle sensor module) sends the switch signals to the SCCM (steering column control module) on the HS-CAN2 (high-speed controller area network 2) .

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Sample

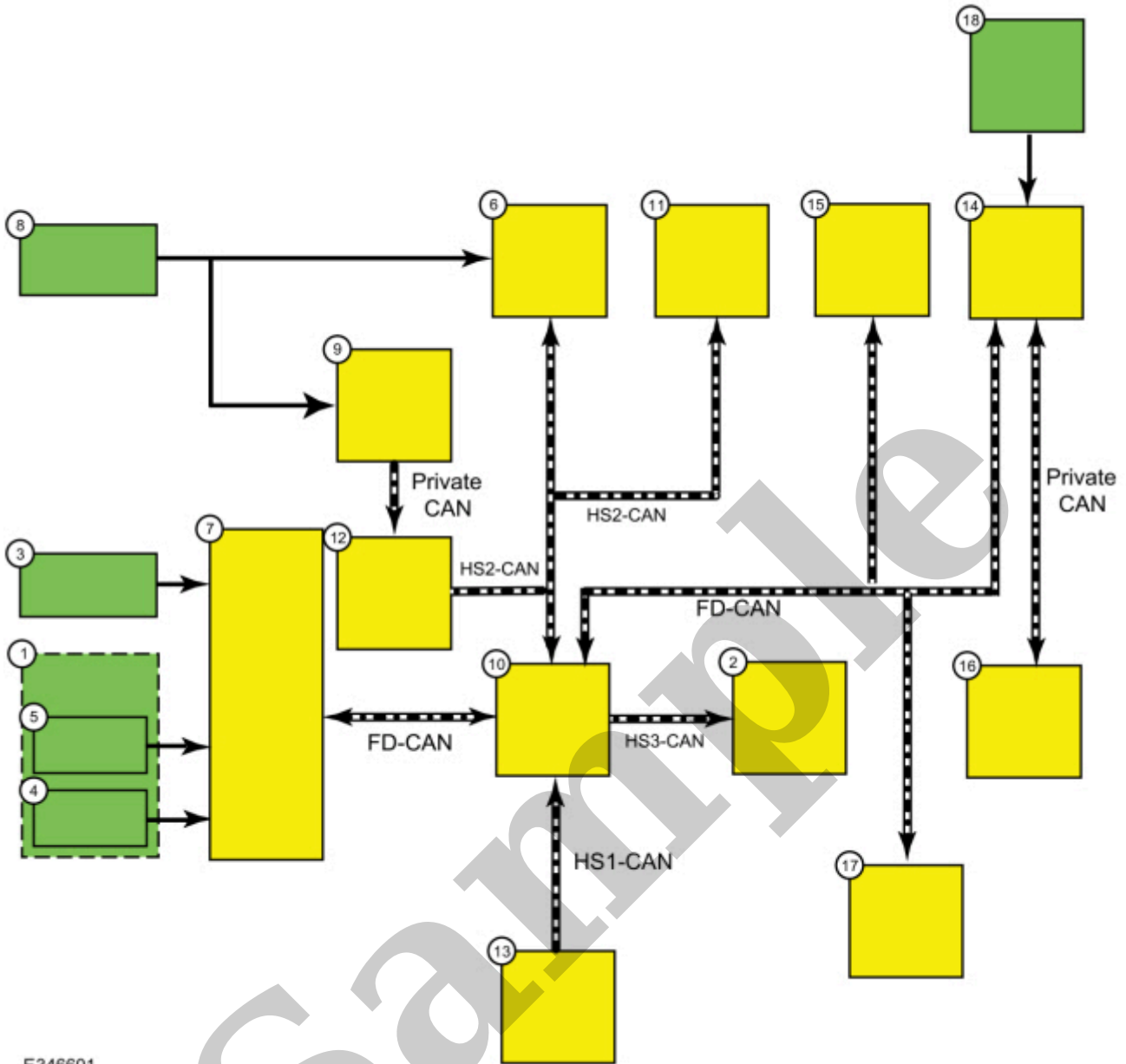
ACC (adaptive cruise control) with Lane Centering assists the driver through lateral control (steering) to keep the vehicle centered in the lane, refer to the Owner's Literature for additional information.

Traffic Jam Assist is an automated multi module highway assistant which works with radar and network messaging to keep the vehicle centered in the lane and brakes and accelerates to keep pace with the vehicle in front of it. Upon experiencing a traffic jam situation the driver can press a button to activate the system. The system identifies the vehicles in front of it using grill mounted radar technology and using a front facing camera identifying lane markings. The system working correctly allows the driver to take back control at any time through braking, steering, or turning on turn signal.

ACC (adaptive cruise control) with Lane Centering consists of:

- CCM (cruise control module)
- IPMA (image processing module A)
- LH (left-hand) Steering Wheel Switch
- SASM (steering angle sensor module) (with Adaptive Steering)
- SECM (steering effort control module) (with Adaptive Steering)

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Item	Description
1	EBB (electric brake booster) Electric Brake Booster
2	IPC (instrument panel cluster)
3	Accelerator Pedal
4	Deactivator Switch
5	Stoplamp Switch

Cruise control override	PCM (powertrain control module)	Driver overriding cruise control with accelerator pedal.
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Network Input Messages - CCM (cruise control module)

Broadcast Message	Originating Module	Message Purpose
APP (accelerator pedal position)	PCM (powertrain control module)	Used for accelerator pedal status.
ACC (adaptive cruise control) enabled	IPC (instrument panel cluster)	Activates ACC (adaptive cruise control)
ACC (adaptive cruise control) stop mode request	PCM (powertrain control module)	Used for ACC (adaptive cruise control) automatic braking.
ACC (adaptive cruise control) switch commands	SCCM (steering column control module)	Used for speed control enable/disable, gap settings and operating mode request.
Brake pedal applied	PCM (powertrain control module)	Used for brake switch input.
Cruise control override	PCM (powertrain control module)	Driver overriding cruise control with accelerator pedal.
Ignition status	BCM (body control module)	Used for ignition switch position input.
Stability-traction control event in progress	ABS (anti-lock brake system) module	Deactivates cruise control when requested.
Vehicle configuration data	BCM (body control module)	Used for comparison checking adaptive cruise control configuration.
Vehicle yaw rate	RCM (restraints control module)	Deactivates cruise control when requested.

Network Input Messages - IPC (instrument panel cluster)

Broadcast Message	Originating Module	Message Purpose
Steering wheel switch speed control	SCCM (steering column control module)	Used for cruise control enable/disable and operating mode request.
Stability-traction control event in progress	ABS (anti-lock brake system) module	Deactivates speed control when requested.
Vehicle yaw rate	RCM (restraints control module)	
Vehicle lateral acceleration		
Vehicle longitudinal acceleration		

Network Input Messages - IPMA (image processing module A)

Broadcast Message	Originating Module	Message Purpose
Collision avoidance and driver support radar status	CCM (cruise control module)	Data used to communicate the function status of the radar in the CCM (cruise control module) .

Cruise Control Operation

NOTE

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

ACC (adaptive cruise control)

The ACC (adaptive cruise control) system functions much like a standard cruise control system. The ACC (adaptive cruise control) 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 (adaptive cruise control) 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.

ACC (adaptive cruise control) with lane centering

The ACC (adaptive cruise control) 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 (adaptive cruise control) resumes once the radar is aligned and is able to properly detect targets.

The CCM (cruise control module) radar vertical and horizontal alignment procedure is located in General Procedures. The horizontal alignment for the CCM (cruise control module) is a calibration check performed by the scan tool to insure the CCM (cruise control module) 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 (anti-lock brake system) module estimates brake temperature by monitoring applied brake pressure over a period of time and sends a message to the CCM (cruise control module) when the estimated temperature is above a given threshold. An alarm sounds and the ACC (adaptive cruise control) 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 (adaptive cruise control) 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 diesel engine, the ACC (adaptive cruise control) 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.

Lane Centering

Lane centering feature uses radar and camera sensors to help keep the vehicle in the center of the lane on highways by applying continuous assistance steering torque. Gray indicates the system is on but inactive. Green indicates the system is active and applying steering torque assistance input to keep the vehicle in the center of the lane. Amber with an audible tone and then gray indicates a system automatic cancelation.

For additional Lane Centering information,

Refer to: [Lane Keeping System - System Operation and Component Description](#)

(419-07 Lane Keeping System, Description and Operation).

The IPC (instrument panel cluster) message center indicates status of lane centering.

- Gray indicates the system is on but inactive.

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 (adaptive cruise control) 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 IPMA (image processing module A) commands the ABS (anti-lock brake system) 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 diesel engine, the ACC (adaptive cruise control) system uses engine braking to slow the vehicle speed on downward grades, to maintain a safe distance to the vehicle in front.

Steering Wheel Switch Function

The ACC (adaptive cruise control) 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 (adaptive cruise control) 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 (adaptive cruise control) system is active. Pressing and releasing the OFF switch or switching the ignition to OFF, turns the ACC (adaptive cruise control) system off. The ACC (adaptive cruise control) set speed memory is erased. Applying the brake pedal or pressing the CNCL switch puts the ACC (adaptive cruise control) system in standby mode and the last set speed is displayed in the message center with a strike

When the brake pedal is applied, the cruise control deactivator switch, integrated in the EBB (electric brake booster) switch, opens and removes the ground signal from the PCM (powertrain control module) input circuit releasing the throttle, immediately deactivating the cruise control system.

Cruise Control Module (CCM)

The CCM (cruise control module) 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 (cruise control module) is responsible for requesting the PCM (powertrain control module) to increase or decrease vehicle speed and the ABS (anti-lock brake system) module to brake, when necessary.

Image Processing Module A (IPMA)

The IPMA (image processing module A) is a stand alone module located in the drivers side footwell. The IPMA (image processing module A) communicates on the FD-CAN (Flexible Data Rate Controller Area Network) and on vehicles equipped with the ACC (adaptive cruise control) and collision warning system, the IPMA (image processing module A) shares information with the CCM (cruise control module) on dedicated CAN (controller area network) circuits to assist the driver in avoiding a collision. The IPMA (image processing module A) uses the Ethernet communication network for OTA (Over-The-Air Programming). For more information on OTA (Over-The-Air Programming),

Refer to: [Module Configuration - System Operation and Component Description](#)

(418-01B Module Configuration - Vehicles With: Over-the-Air (OTA) Programming, Description and Operation).

The IPMA (image processing module A) requires PMI (programmable module installation) when replaced.

Refer to: [Module Configuration](#)

(418-01B Module Configuration - Vehicles With: Over-the-Air (OTA) Programming, Diagnosis and Testing).

NOTE

NOTE: When a new IPMA (image processing module A) is installed, a camera alignment DTC (diagnostic trouble code) is stored until the IPMA (image processing module A) camera alignment is successfully completed.

Image Processing Module A (IPMA) Camera

The lane keeping system contains a IPMA (image processing module A) camera located on windshield (above the interior rear view mirror), that is used to detect the position of the vehicle within the lane. The IPMA (image processing module A) camera requires a camera alignment when removed or replaced.

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CCM (cruise control module)	C1A67:97	Forward Looking Sensor: Component Or System Operation Obstructed Or Blocked	GO to Pinpoint Test G
CCM (cruise control module)	C1A67:98	Forward Looking Sensor: Component or System Over Temperature	GO to Pinpoint Test H
CCM (cruise control module)	U2008:08	Sensor Cluster: Bus Signal/Message Failures	GO to Pinpoint Test I
CCM (cruise control module)	U2100:00	Initial Configuration Not Complete: No Sub Type Information	GO to Pinpoint Test J
CCM (cruise control module)	U2300:55	Central Configuration Not Complete: No Sub Type Information	GO to Pinpoint Test J
CCM (cruise control module)	U3000:41	Control Module: General Checksum Failure	GO to Pinpoint Test K
CCM (cruise control module)	U3000:42	Control Module: General Memory Failure	GO to Pinpoint Test K
CCM (cruise control module)	U3000:44	Control Module: Data Memory Failure	GO to Pinpoint Test K
CCM (cruise control module)	U3000:49	Control Module: Internal Electronic Failure	GO to Pinpoint Test K
CCM (cruise control module)	U3002:62	Vehicle Identification Number: Signal Compare Failure	GO to Pinpoint Test L
CCM (cruise control module)	U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test M
CCM (cruise control module)	U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test N