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2007 FORD Fusion North American OEM Service and Repair Workshop Manual

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cluster) over the HS-CAN3 (high-speed controller area network 3) to illuminate the stability-traction control indicator (sliding car icon).

Torque Vectoring Control

The ABS (anti-lock brake system) module continuously monitors the vehicle motion relative to the intended course. This is done by using sensors to compare the steering wheel input, the yaw rate sensor input, the lateral acceleration sensor input and the longitudinal acceleration sensor input with that of the actual vehicle motion. Steering wheel angle information is calculated by the PSCM (power steering control module) and is sent to the ABS (anti-lock brake system) module over the FD-CAN (Flexible Data Rate Controller Area Network) . Vehicle roll rate, yaw rate, lateral acceleration and longitudinal acceleration information are sent to the ABS (anti-lock brake system) module from the RCM (restraints control module) also over the HS-CAN2 (high-speed controller area network 2) through the GWM (gateway module A) . If the ABS (anti-lock brake system) module determines the vehicle is experiencing over-steer or under-steer, the module sends a torque vectoring control message over the FD-CAN (Flexible Data Rate Controller Area Network) . The GWM (gateway module A) relays this message to the PCM (powertrain control module) over the FD-CAN (Flexible Data Rate Controller Area Network) and to the IPC (instrument panel cluster) over the HS-CAN3 (high-speed controller area network 3) . When the PCM (powertrain control module) receives this message, it assists with torque vectoring control by adjusting engine timing and decreasing fuel injector pulses. When the IPC (instrument panel cluster) receives this message, it flashes the stability-traction control indicator (sliding car icon). The ABS (anti-lock brake system) module continues to monitor the sensor inputs while the PCM (powertrain control module) assists with torque vectoring control. If the ABS (anti-lock brake system) module determines PCM (powertrain control module) intervention is insufficient to control the stability event, the ABS (anti-lock brake system) module modulates brake pressure to the appropriate brake caliper(s) by opening and closing the appropriate solenoid valves inside the HCU (hydraulic control unit) while the hydraulic pump motor is activated. Once the vehicle instability has been corrected, the ABS (anti-lock brake system) module returns the solenoid valves in the HCU (hydraulic control unit) to their normal position, deactivates the hydraulic pump motor and sends another message over the FD-CAN (Flexible Data Rate Controller Area Network) indicating the event has ended. The PCM (powertrain control module) returns engine timing and fuel injectors to normal operation and the IPC (instrument panel cluster) extinguishes the sliding car icon.

Trailer Sway Control

Trailer sway is the undesirable yaw force a trailer can apply to the towing vehicle. Trailer sway control is a unique function of the stability control system that uses steering wheel angle information and yaw rate information to determine if a trailer sway event is taking place. The PSCM (power steering control module) sends the steering wheel angle information to the ABS (anti-lock brake system) module over the FD-CAN (Flexible Data Rate Controller Area Network) . The RCM (restraints control module) sends yaw rate sensor and lateral accelerometer information to the ABS (anti-lock brake system) module also over the HS-CAN2 (high-speed controller area network 2) through the GWM (gateway module A) . If the ABS (anti-lock brake system) module determines from the inputs a trailer sway event is taking place, the ABS (anti-lock brake system) module modulates brake pressure to the appropriate brake calipers by opening and closing the appropriate solenoid valves inside the EBB (electric brake booster) unit while the hydraulic pump motor is activated. At

Refer to: Instrument Panel Cluster (IPC) - Electric - System Operation and Component Description(413-01 Instrumentation, Message Center and Warning Chimes, Description and Operation).

Electric Parking Brake Features

The ABS (anti-lock brake system) module is the controlling ECU (electronic control unit) for the electric parking brake system and controls all parking brake features such as automatic drive away release. For additional information on the electronic parking brake system,

Refer to: Parking Brake - System Operation and Component Description

(206-05 Parking Brake and Actuation, Description and Operation).

Component Description

Electric Brake Booster (EBB) Unit

The EBB (electric brake booster) unit is serviced as a single assembly and should **NOT** be disassembled.

The EBB (electric brake booster) unit contains the ABS (anti-lock brake system) module, solenoid valves, pressure sensor and hydraulic pump motor; the EBB (electric brake booster) unit also takes the place of the brake master cylinder and the vacuum booster.

The ABS (anti-lock brake system) module is serviced as an assembly with the EBB (electric brake booster) . The ABS (anti-lock brake system) module is the ECU (electronic control unit) for the ABS (anti-lock brake system) and stability control systems. The module monitors all sensor inputs and all CAN (controller area network) messages relating to ABS (anti-lock brake system) and stability control, then directly controls the solenoid valves and the hydraulic pump motor in the EBB (electric brake booster) .

When a new EBB (electric brake booster) assembly is installed, the ABS (anti-lock brake system) module must be programmed with the current vehicle configuration information. For additional information on module programming,

Refer to: Module Configuration - Electric - System Operation and Component Description

(418-01A Module Configuration, Description and Operation).

When an ABS (anti-lock brake system) or stability control fault has been corrected or a new component has been installed, the ABS (anti-lock brake system) module must be calibrated using the ABS (anti-lock brake system) Calibration routine found on the diagnostic scan tool. ABS (anti-lock brake system) Calibration is required for the stability control sensors to learn the zero-position of the vehicle which means the vehicle must be on a level surface and not moving.

Hill Descent Control Switch

The Hill Descent Control switch is a single-pole, momentary-contact switch and is part of a 3-switch pack. The switch is wired directly to the IPC (instrument panel cluster) .

Stability Control Sensors

Anti-Lock Brake System (ABS) and Stability Control - Overview

206-09 Anti-Lock Brake System (ABS) and Stability Control	***2022 F-150***
Description and Operation	***Procedure revision date: 10/1/2020***

Anti-Lock Brake System (ABS) and Stability Control - Overview

Overview

The ABS (anti-lock brake system) and stability control systems are comprised of the following subsystems which assist the driver in maintaining control of the vehicle:

- ABS (anti-lock brake system)
- EBD (electronic brake force distribution)
- ESC (electronic stability control)
- Hill descent control
- Hill start assist
- RSC (roll stability control)
- Selectable drive modes
- Side-wind stabilization
- Supports adaptive cruise control
- Supports collision avoidance
- Traction control
- Trail control
- Trailer sway control

The trailer sway control system helps maintain vehicle stability while towing a trailer by detecting and aiding in the reduction of conditions causing trailer sway.

Torque vectoring control uses the rear brakes to adjust the speed between the driven wheels while accelerating through a corner, forcing the front end to hug the inside of the curve and improve tire grip.

Some noise from the system and pulsations in the brake pedal are normal conditions during most ABS (anti-lock brake system) and stability control system activations. Longer than normal brake pedal travel may also be experienced immediately following an ABS (anti-lock brake system) or stability control system activation.

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Overview

The ABS (anti-lock brake system) and stability control systems are comprised of the following subsystems which assist the driver in maintaining control of the vehicle:

- ABS (anti-lock brake system)
- Auto hold (EPB (electric parking brake))
- Drive away release (EPB (electric parking brake))
- EBD (electronic brake force distribution)
- EPB (electric parking brake) control
- ESC (electronic stability control)
- Hill descent control
- Hill start assist
- RSC (roll stability control)
- Selectable drive modes
- Supports adaptive cruise control
- Supports collision avoidance

The ABS (anti-lock brake system) supports the collision avoidance system by monitoring information and precharging the brake system allowing the vehicle to stop in the shortest distance possible. For information on the collision avoidance system,

Refer to: Collision Warning and Collision Avoidance System - System Operation and Component Description

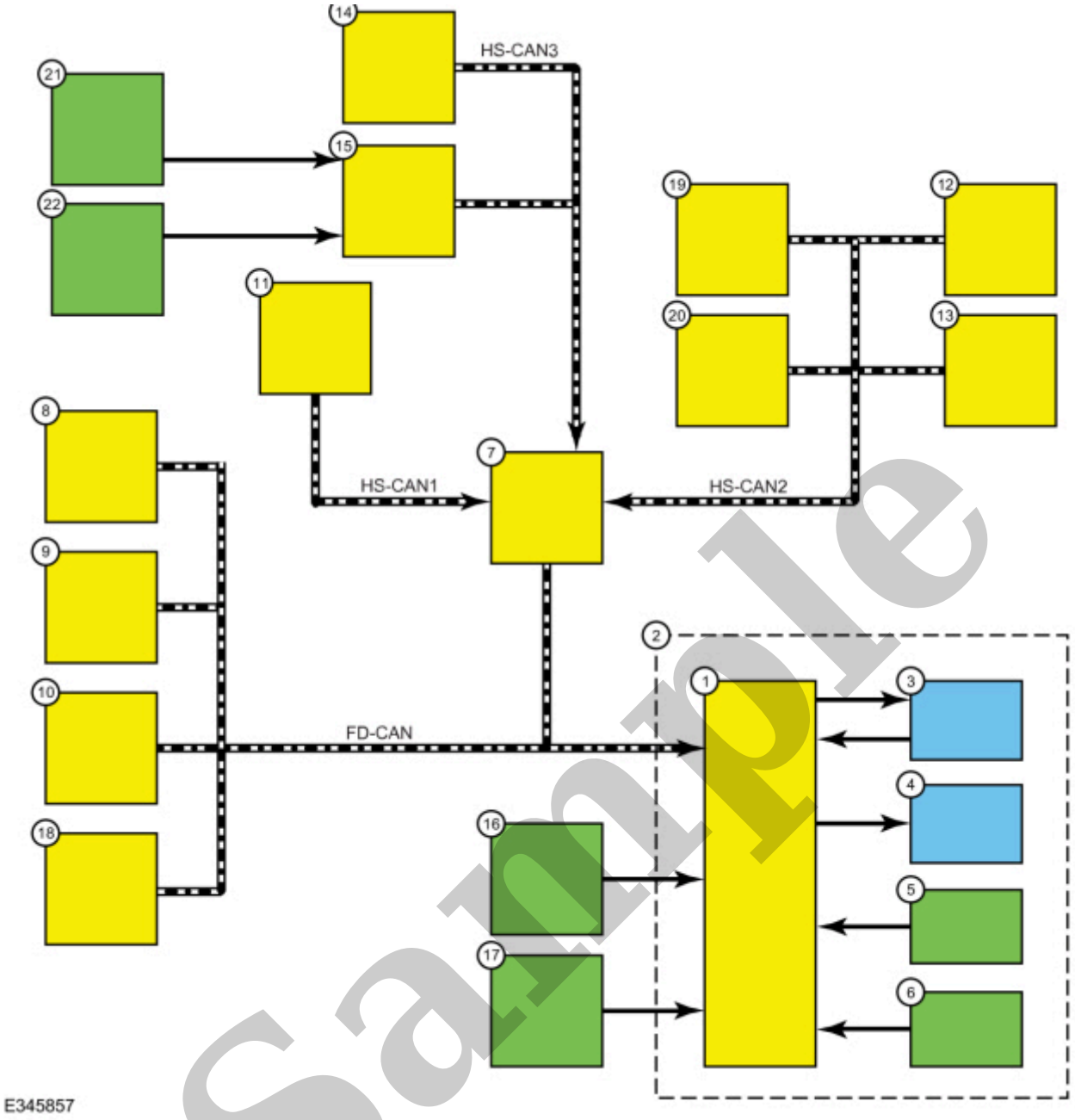
(419-03C Collision Warning and Collision Avoidance System, Description and Operation).

The traction control system helps prevent loss of traction by reducing drive-wheel spin during acceleration.

The trailer sway control system helps maintain vehicle stability while towing a trailer by detecting and aiding in the reduction of conditions causing trailer sway.

Torque vectoring control uses the rear brakes to adjust the speed between the driven wheels while accelerating through a corner, forcing the front end to hug the inside of the curve and improve tire grip.

Some noise from the system and pulsations in the brake pedal are normal conditions during most ABS (anti-lock brake system) and stability control system activations. Longer than normal brake pedal travel may also be experienced immediately following an ABS (anti-lock brake system) or stability control system activation.



Item	Description
1	ABS (anti-lock brake system) module
2	EBB (electric brake booster) unit
3	Hydraulic pump motor
4	Hydraulic valve solenoids
5	Hydraulic pressure sensor

Accelerator pedal position	PCM (powertrain control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Provides the ABS (anti-lock brake system) module with the current accelerator pedal position and notifies the ABS (anti-lock brake system) module if the data is valid or invalid. The ABS (anti-lock brake system) module uses accelerator pedal position information for correct operation of the traction control, ESC (electronic stability control) , RSC (roll stability control) and hill start assist systems.
Adaptive cruise control deceleration	Advanced Driver Assistance System (ADAS) module	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Contains the amount of deceleration currently required by the adaptive cruise control system to maintain the distance gap set by the driver.
Adaptive cruise control braking precharge	Advanced Driver Assistance System (ADAS) module	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. This message is sent by the Advanced Driver Assistance System (ADAS) module to request precharging of the brake system in preparation for adaptive cruise control deceleration from the ABS (anti-lock brake system) module.
Adaptive cruise control braking request	Advanced Driver Assistance System (ADAS) module	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. This message is sent by the Advanced Driver Assistance System (ADAS) module to request adaptive cruise control braking from the ABS (anti-lock brake system) module.
Ambient air temperature	PCM (powertrain control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. The ABS (anti-lock brake system) module uses this information for calculations in determining the operational status of the various stability control systems and features.
Collision mitigation deceleration	Advanced Driver Assistance System (ADAS) module	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. This message contains the amount of deceleration currently required by the Advanced Driver Assistance System (ADAS) module to assist in collision avoidance.

Engine RPM (revolutions per minute)	PCM (powertrain control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module of the current engine RPM (revolutions per minute) . The ABS (anti-lock brake system) module uses this information for EPB (electric parking brake) drive away release feature, traction control, ESC (electronic stability control) , RSC (roll stability control) and hill start assist operations.
Engine torque output	PCM (powertrain control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module of the current engine torque output. This information is used for the traction control, hill start assist, ESC (electronic stability control) and RSC (roll stability control) feature operation.
Hill descent control request	IPC (instrument panel cluster)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module the driver has requested the hill descent control™ system to be activated or deactivated.
Ignition key type	BCM (body control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module of the current ignition key type; standard or MyKey. The ABS (anti-lock brake system) modifies operating parameters if a restricted MyKey is used.
Ignition status	BCM (body control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module of the current ignition status.
Rear differential lock status	TCCM (transfer case control module)	Informs the ABS (anti-lock brake system) module of the current rear differential locked status. The ABS (anti-lock brake system) module requests rear differential unlocking during traction control, ESC (electronic stability control) and RSC (roll stability control) operations.
Rear differential locking torque	TCCM (transfer case control module)	Informs the ABS (anti-lock brake system) module of the current amount of torque being applied to the rear differential. The ABS (anti-lock brake system) module requests rear differential unlocking during traction control, ESC (electronic stability control) and RSC (roll stability control) operations.

Trailer sway control configuration	IPC (instrument panel cluster)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module the driver has requested the trailer sway control system to be activated or deactivated.
Trailer brake control connection	TBM (trailer brake control module)	Informs the ABS (anti-lock brake system) module a trailer is connected to the vehicle. The ABS (anti-lock brake system) module uses this information for trailer sway control operation.
Transfer case lock status	TCCM (transfer case control module)	Informs the ABS (anti-lock brake system) module of the current transfer case locked status. The ABS (anti-lock brake system) module requests transfer case unlocking during traction control, ESC (electronic stability control) and RSC (roll stability control) operations.
Transfer case locking torque	TCCM (transfer case control module)	Informs the ABS (anti-lock brake system) module of the current amount of torque being applied to the transfer case. The ABS (anti-lock brake system) module requests transfer case unlocking during traction control, ESC (electronic stability control) and RSC (roll stability control) operations.
Transfer case range	TCCM (transfer case control module)	Informs the ABS (anti-lock brake system) module of the current transfer case range. The ABS (anti-lock brake system) module modifies the thresholds for traction control, ESC (electronic stability control) and RSC (roll stability control) intervention based on the current transfer case range.
Transmission gear position	PCM (powertrain control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module of which gear the transmission is currently using. This information is used for hill start assist, ESC (electronic stability control) and RSC (roll stability control) operation. Hill start assist operates in forward and reverse gears. ESC (electronic stability control) and RSC (roll stability control) do not operate when the transmission is in REVERSE.
Transmission gear lever position	PCM (powertrain control module)	This message is sent to the GWM (gateway module A) and then to the ABS (anti-lock brake system) module. Informs the ABS (anti-lock brake system) module of which gear the driver has selected. This information is used for hill start assist, ESC (electronic stability control) and RSC (roll stability control) operation.