Your Ultimate Source for OEM Repair Manuals

FactoryManuals.net is a great resource for anyone who wants to save money on repairs by doing their own work. The manuals provide detailed instructions and diagrams that make it easy to understand how to fix a vehicle.

2005 FORD Fusion North American OEM Service and Repair Workshop Manual

Go to manual page

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.
Collision mitigation braking precharge	Advanced Driver Assistance System (ADAS) module	This message is sent to the GWM (gateway module A) e 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 collision mitigation deceleration from the ABS (anti-lock brake system) module.
Collision mitigation braking request	Advanced Driver Assistance System (ADAS) module	This message is sent to the Advanced Driver Assistance System (ADAS) module and then to the ABS (anti-lock brake system) module. This message is sent by the Advanced Driver Assistance System (ADAS) module to request collision mitigation braking from the ABS (anti-lock brake system) module.
Cruise control status	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 cruise control system status.
Driven wheel 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 torque output available at the driven wheels. This information is used for the traction control, hill start assist, ESC (electronic stability control) and RSC (roll stability control) feature operation.
Driver seat belt buckle status	RCM (restraints control module)	Informs the ABS (anti-lock brake system) module of the current driver seat belt buckle status, buckled or unbuckled. The ABS (anti-lock brake system) module uses this information for the electric parking brake drive away release feature.
Door ajar 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. This information is used by the ABS (anti-lock brake system) module for hill start assist operation.

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.
RCM (restraints control module) serial number	RCM (restraints 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 stores the RCM (restraints control module) serial number and verifies the serial number when the vehicle is started or the ignition is set to ON or ACC. Over time, the ABS (anti-lock brake system) module learns the offset of the stability sensors inside the RCM (restraints control module) . When a new RCM (restraints control module) serial number is found and the ABS (anti-lock brake system) Calibration routine is carried out using a diagnostic scan tool, the ABS (anti-lock brake system) module resets the offset values learned for the yaw rate sensor, lateral accelerometer and roll rate sensor.
Reverse gear status	PCM (powertrain control module) (gasoline engine and hybrid)	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 reverse gear status. 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.
Reverse gear status	TCM (transmission control module) (diesel engine)	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 reverse gear status. 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.
Selectable drive mode switch status	ATCM (all terrain 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 selectable drive mode switch status.

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) (gasoline engine and hybrid)	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 position	TCM (transmission control module) (diesel engine)	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) (gasoline engine and hybrid)	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.
Transmission gear lever position	TCM (transmission control module) (diesel engine)	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.
Transmission shift active	PCM (powertrain control module) (gasoline engine and hybrid)	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 transmission is currently changing gears.

Module Network Input Messages - SASM (steering angle sensor module)

Broadcast Message	Originating Module	Message Purpose
Active front steering request	SECM (steering effort control module)	Provides the SASM (steering angle sensor module) with the current active front steering system information such as steering wheel offset and steering wheel angle request.
Center stack feature configuration	APIM (SYNC module)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) of the current configuration of the center stack features such as push-button shift, touchscreen, FDIM (front display interface module) , etc.
Door ajar status	BCM (body control module)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) of the current driver door ajar status.
EPAS (electronic power assist steering) status	PSCM (power steering control module)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) of the current EPAS (electronic power assist steering) system status.
Gear lever position	PCM (powertrain control module) (gasoline engine and hybrid)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) of the current selected transmission gear.
Gear lever position	TCM (transmission control module) (diesel engine)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) of the current selected transmission gear.
Ignition status	BCM (body control module)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) of the current ignition status.
Message center display	IPC (instrument panel cluster)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM

		the SASM (steering angle sensor module) for the adaptive steering system.
Steering wheel angle	PSCM (power steering control module)	his message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . The PSCM (power steering control module) sends steering angle information to the SASM (steering angle sensor module) for self-monitoring purposes.
Vehicle braking command	ABS (anti-lock brake system) module	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the SASM (steering angle sensor module) the ABS (anti-lock brake system) module has requested vehicle braking for adaptive cruise control or collision avoidance.
Vehicle life cycle data	BCM (body control module)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Informs the ABS (anti-lock brake system) module SASM (steering angle sensor module) of the current vehicle life cycle; Normal, Factory or Transport.
Vehicle configuration data	BCM (body control module)	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Provides the SASM (steering angle sensor module) with the current optional and configured items such as tire size, axle ratio, keyless entry and VIN (vehicle identification number) .
Vehicle speed	ABS (anti-lock brake system) module	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Provides the SASM (steering angle sensor module) with the current vehicle speed.
Vehicle travel direction	ABS (anti-lock brake system) module	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Provides the SASM (steering angle sensor module) with the current vehicle direction of travel.
Vehicle yaw rate	ABS (anti-lock brake system) module	This message is sent to the GWM (gateway module A) and then to the SASM (steering angle sensor module) . Provides the SASM (steering angle sensor module) with the current vehicle yaw information and whether or not the information is valid.

message to the ABS (anti-lock brake system) module over the FD-CAN (Flexible Data Rate Controller Area Network) .

Once the auto hold feature is activated and the driver presses the brake pedal, the ABS (anti-lock brake system) module closes the isolation valves in the EBB (electric brake booster) unit to maintain the current brake system pressure at the wheel ends. The ABS (anti-lock brake system) module maintains the pressure until the driver presses the accelerator pedal, shifts the transmission into PARK or after a specific time limit has been reached. The ABS (anti-lock brake system) module engages the parking brake after 2-10 minutes, depending on the grade of incline the vehicle is currently stopped on, the steeper the grade, the shorter the time.

Emergency Brake Assist (EBA)

The EBA (emergency brake assist) feature helps drivers in a severe braking event, such as an emergency, by applying the maximum possible braking force.

If the brake pedal is pressed very suddenly, the ABS (anti-lock brake system) module increases the hydraulic pressure to all of the brakes until the threshold for ABS (anti-lock brake system) intervention is reached. This generates the maximum braking power for the available traction. The ABS (anti-lock brake system) module monitors inputs from the brake pedal switch and from the pressure sensor within the EBB (electric brake booster) unit to check for sudden actuation of the brakes. With the brake pedal pressed, the ABS (anti-lock brake system) module triggers emergency braking if the rate of increase of hydraulic pressure exceeds the predetermined limit.

If the brake pedal is pressed so hard the ABS (anti-lock brake system) becomes active on the front wheels, the ABS (anti-lock brake system) module increases the pressure to the rear wheels up to the ABS (anti-lock brake system) intervention threshold.

EBA (emergency brake assist) operation continues until the driver releases the brake pedal sufficiently for the hydraulic pressure in the EBB (electric brake booster) unit to drop below a specific threshold value. This threshold is saved in the ABS (anti-lock brake system) module.

Electronic Brake Force Distribution (EBD)

On initial application of the brake pedal, full pressure is applied to the rear brakes. The ABS (anti-lock brake system) module uses wheel speed sensor inputs to evaluate rear wheel slip. Once the rear wheel slip exceeds a predetermined threshold, the ABS (anti-lock brake system) module closes the appropriate isolation valves to hold the rear brake pressure constant while allowing the front brake pressure to build. This creates a balanced braking condition between the front and rear wheels. If the rear wheel slip continues and exceeds a second predetermined threshold, the ABS (anti-lock brake system) module opens the dump valves to decrease the rear brake pressure and allow the rear wheels to recover. A slight bump sensation may be felt in the brake pedal when EBD (electronic brake force distribution) is active. If the ABS (anti-lock brake system) is disabled due to Diagnostic Trouble Codes (DTCs) being present in the ABS (anti-lock brake system) module, EBD (electronic brake force distribution) continues to function unless the Diagnostic Trouble Codes (DTCs) are for wheel speed sensors or the solenoid valves. When EBD (electronic brake force distribution) is disabled,

brake pedal to the accelerator pedal. This is accomplished by monitoring several HS-CAN (high-speed controller area network) messages and several sensors to determine if the vehicle is stopped and not parked, and if the vehicle is on an appropriate incline.

- The brake pedal message sent from the PCM (powertrain control module) over the FD-CAN (Flexible Data Rate Controller Area Network) and the wheel speed sensor inputs allow the ABS (anti-lock brake system) module to determine the vehicle has come to a complete stop.

- The transmission selector lever message sent by the SOBDM (secondary on-board diagnostic control module A) over the FD-CAN (Flexible Data Rate Controller Area Network) informs the ABS (anti-lock brake system) module the vehicle is

  not

  parked.

- The stability sensor messages sent by the RCM (restraints control module) over the HS-CAN2 (high-speed controller area network 2) enable the ABS (anti-lock brake system) module to determine if the vehicle is on an incline greater than 2.86 degrees (approximately a 5% grade).

Once the above conditions have been met, hill start assist automatically engages. Before the driver releases the brake pedal, the ABS (anti-lock brake system) module commands the HCU (hydraulic control unit) to close the isolation valves which maintains the current brake system pressure, preventing the vehicle from rolling down the incline. Once the driver presses the accelerator pedal and the engine RPM (revolutions per minute) increases, the ABS (anti-lock brake system) module gradually releases the brake pressure to make sure the vehicle is neither rolling back nor driving off until there is sufficient driving torque to accelerate the vehicle forward (or backward if reversing up the incline).

Supplemental Braking Assist

On vehicles equipped with adaptive cruise control, the IPMA (image processing module A) monitors the area forward of the vehicle.

When an object enters this area and closes the distance gap set by the driver, the IPMA (image processing module A) sends either an adaptive cruise control deceleration request or a collision avoidance deceleration request to the ABS (anti-lock brake system) module over the FD-CAN (Flexible Data Rate Controller Area Network) .

When the deceleration request message is received, the ABS (anti-lock brake system) module activates the EBB (electric brake booster) unit to slow the vehicle down to maintain the distance gap set by the driver.

If the IPMA (image processing module A) determines the amount of braking provided by the ABS (anti-lock brake system) module is insufficient, the IPMA (image processing module A) sends a forward collision avoidance braking request message and warns the driver, both audibly and visually, through the use of the HUD (head up display) . After receiving the braking request message, the ABS (anti-lock brake system) module

stability-traction control disabled indicator (sliding car OFF icon) and by sending a message to the GWM (gateway module A) over the HS-CAN3 (high-speed controller area network 3) . The GWM (gateway module A) relays this message to the ABS (anti-lock brake system) module over the FD-CAN (Flexible Data Rate Controller Area Network) . The ABS (anti-lock brake system) module takes no further action in regards to traction control until the driver actives the traction control in the same ignition cycle or until the ignition is cycled from OFF to ON.

The ABS (anti-lock brake system) module disables traction control if there are any wheel speed sensor or solenoid valve Diagnostic Trouble Codes (DTCs) present in the ABS (anti-lock brake system) module. Traction control is also disabled if there is a communication error between the ABS (anti-lock brake system) module and the PCM (powertrain control module) . When traction control is disabled, the ABS (anti-lock brake system) module sends a message to the GWM (gateway module A) over the FD-CAN (Flexible Data Rate Controller Area Network) . The GWM (gateway module A) relays this message to the IPC (instrument panel cluster) over the HS-CAN3 (high-speed controller area network 3) to illuminate the stability-traction control indicator (sliding car icon).

Electronic Stability Control (ESC)

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 and the yaw rate sensor input with the actual vehicle motion. 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 the vehicle is unable to travel in the intended direction, it 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 the same time, the ABS (anti-lock brake system) module calculates how much engine torque reduction is required to help stabilize the vehicle and sends this torque reduction message to the PCM (powertrain control module) over the FD-CAN (Flexible Data Rate Controller Area Network) . The ABS (anti-lock brake system) module also sends a vehicle stability event message to the GWM (gateway module A) over the FD-CAN (Flexible Data Rate Controller Area Network) which relays this message to the IPC (instrument panel cluster) over the HS-CAN3 (high-speed controller area network 3) . When the PCM (powertrain control module) receives the torque reduction message, it adjusts engine timing and decreases fuel injector pulses to reduce the engine torque to the requested level. When the IPC (instrument panel cluster) receives the vehicle stability event message, it flashes the stability-traction control indicator (sliding car icon).

Once the vehicle instability has been corrected, the ABS (anti-lock brake system) module returns the solenoid valves in the EBB (electric brake booster) unit to their normal position, deactivates the hydraulic pump motor and stops sending the traction event and torque reduction messages. The PCM (powertrain control module) returns engine timing and fuel injectors to normal operation and the IPC (instrument panel cluster) extinguishes the stability-traction control indicator (sliding car icon).

reduce the engine torque to the requested level. When the IPC (instrument panel cluster) receives the vehicle stability event message, it flashes the stability-traction control indicator (sliding car icon).

Once the vehicle instability has been corrected, the ABS (anti-lock brake system) module returns the solenoid valves in the EBB (electric brake booster) unit to their normal position, deactivates the hydraulic pump motor and stops sending the traction event and torque reduction messages. The PCM (powertrain control module) returns engine timing and fuel injectors to normal operation and the IPC (instrument panel cluster) extinguishes the stability-traction control indicator (sliding car icon).

RSC (roll stability control) does not operate with the transmission in REVERSE The ABS (anti-lock brake system) module disables RSC (roll stability control) if there are any wheel speed sensor, stability sensor or steering angle sensor Diagnostic Trouble Codes (DTCs) present in the ABS (anti-lock brake system) module. If there is a communication error between the ABS (anti-lock brake system) module and the PSCM (power steering control module) or the ABS (anti-lock brake system) module and the RCM (restraints control module) , RSC (roll stability control) also is disabled. When RSC (roll stability control) is disabled, the ABS (anti-lock brake system) module sends a message to the GWM (gateway module A) over the FD-CAN (Flexible Data Rate Controller Area Network) . The GWM (gateway module A) relays this message to the IPC (instrument panel cluster) over the HS-CAN3 (high-speed controller area network 3) to illuminate the stability-traction control indicator (sliding car icon).

Selectable Driving Modes

The dial switch located on the ATCM (all terrain control module) (also known as the 4-wheel drive mode select switch) allows the driver to select between 9 modes; deep snow / sand, economy, mud / ruts, normal, rock crawl, slippery, sport, trail or tow-haul. These driving modes alter throttle response, transmission shift patterns, EPAS (electronic power assist steering) feel and stability control intervention thresholds. Rotating the switch sends a voltage signal to the ATCM (all terrain control module) , the module then sends a message to the GWM (gateway module A) over the HS-CAN1 (high-speed controller area network 1) , and the GWM (gateway module A) relays this message to the ABS (anti-lock brake system) module over the FD-CAN (Flexible Data Rate Controller Area Network) .

Some drive modes reduce traction and stability control performance and the stability-traction control warning indicator illuminates in the instrument cluster.

- **Deep Snow / Sand**

  : for off-road driving on soft, dry sand or deep snow. This mode optimizes accelerator pedal response, traction and stability controls to help maintain forward momentum.

- **Eco**

  : offers the best possible fuel economy with trade-offs in vehicle performance and comfort.

- **Normal**

  : delivers a balanced combination of comfort, control and handling.

- **Slippery**