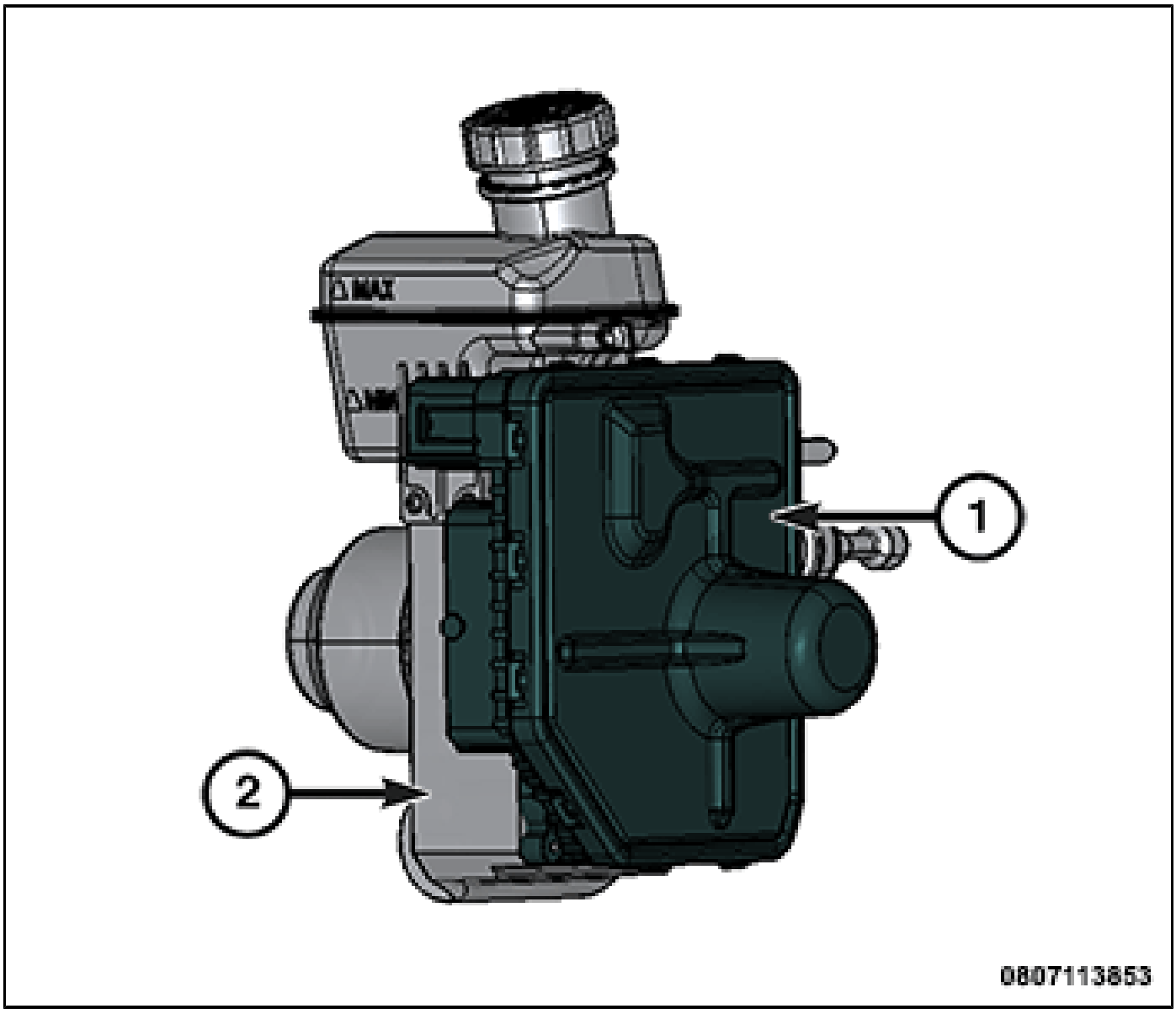
DESCRIPTION AND OPERATION



DESCRIPTION

The Antilock Brake System (ABS) Module (1) is mounted to the Hydraulic Control Unit (HCU) (2) as part of the Integrated Control Unit (ICU). The ICU is located in the engine compartment on the driver side underneath the cowl panel. For information on the ICU. (Refer to 05 - Brakes, ABS/Description and Operation).

OPERATION

ABS Module Functions:

- **Active Yaw Control** – The active yaw control uses the brakes of each wheel to stabilize the vehicle during braking with the two wheels on one side on one type of road (e.g. wet streets) and the wheels on the other side on another type (e.g. dry streets).
- **Adaptive Brake Light** – The adaptive brake light identifies the braking pressure present and activates the brake lights with varying intensity.
- **Anti-lock Brake System** – The ABS prevents the wheels from locking up under hard braking conditions.
- **Autonomous Emergency Braking** – Autonomous emergency braking intervenes when an external module identifies and requires the braking system intervention.
- **Auto Hazard Warning** – The auto hazard warning system identifies braking situations and activates the hazard lights.
- **Dynamic Brake Function** – Dynamic braking decelerates the moving vehicle to a stop when the switch of the Electric Parking Brake (EPB) is activated. The EPB operation starts when the vehicle speed is near zero Km/h (0 mph). After the vehicle has stopped and the EPB is active, the hydraulic pressure is released.
- **Driver Steering Recommendation** – In combination with the Electric Power Steering (EPS), the driver steering recommendation function can give the driver suggestions on how to set the steering wheel angle to increase vehicle stability.
- **Dynamic Torque Vectoring** – Controls the Alfa™ Active Torque Vectoring differential to improve the agility and handling of the vehicle.
- **Electronic Brake Assist** – The purpose of the electronic brake assistance, is to measure how quickly the driver presses the brake pedal. Based on the brake pedal application speed and pressure, the system recognizes if the driver wants to apply a braking force and promptly provides the maximum braking pressure.
- **Electronic Brake Force Distribution** – The electronic brake distribution system adjusts the braking pressure on the rear axle to prevent locking that could destabilize the behavior of the vehicle during braking.
- **Engine Drag Control** – The engine drag control prevents the drive wheels from locking during downshifts based on anticipations, throttle control (slightly opening) and waste gate.
- **Electric Parking Brake** – The EPB replaces the parking brake of manual operation with an electromechanical system. The replacement of the parking brake lever with a switch offers extra space in the passenger compartment permitting additional features.
- **Enhanced Stability Braking System** – This is an advanced function of the ABS that improves and optimizes the stability and maneuverability of driving during ABS braking events on curves.
- **Electronic Stability Control** – The ESC uses the braking of each wheel to stabilize the vehicle movement.
- **Engine Traction Control System** – The engine traction control system prevents slippage of the drive wheels during acceleration, reducing engine torque to stabilize the vehicle.
- **Hill Start Assist** – HSA helps the vehicle operator keep the vehicle stopped while placing in gear when starting the vehicle on inclines.
- **Maximum Brake Support** – The maximum brake support activates the ABS function on the rear axle even if the brake pressure has not reached a high value.
- **Panic Brake Assist** – Panic Brake Assist helps the driver to achieve maximum braking pressure during emergency braking situations.
- **Ready Alert Brake** – Ready Alert Braking eliminates the air gap between the pads and rotors.
- **Rain Brake Assist** – Rain Brake Assist is activated when the windshield wipers are active. This function gently applies the brake pads to remove water from the surface of the brake rotor.
- **Rollover Stability Control** – Rollover Stability Control is designed to reduce the risk of rollover of the vehicle.
- **Traction Control** – Traction Control prevents excessive drive wheel slip.
- **Vehicle Dive Limiter** – This pitch limitation function limits the speed at which the nose of the vehicle tends to rise again after heavy braking.

FURTHER DETAIL:

The ABS module must manage all the effects caused by the lowering of tension due to the absorption by the electronic components of the vehicle and to the lowering of tension due to starting of the engine.

Besides such absorption it must manage any voltage overloads in order to prevent braking system malfunctions.

DTCs are stored in the ABS module and specific warning indicator lamps will be illuminated on the Instrument Panel Cluster (IPC) to alert the operator of potential issues.

Due to the design and operating characteristics of the ABS module, the driver could experience a different response from the brake pedal between engine off and engine on conditions. This is a characteristic of the system itself. The braking pressure is not created in any way from the pedal but from an electric motor, a mechanical actuator and integrated electronics in the ABS module.

The feel of the brake pedal varies with the position of the DNA driving selector, less reactive in Natural and Advanced diving modes, more reactive in the Dynamic and Race modes.

NOTE: If the brake fluid must be changed, the system must be purged normally. If, for any reason, the system or the ABS module is emptied, the dedicated purge routine must be performed by using the diagnostic scan tool.

NOTE: If the ABS module is replaced during servicing, the new module is already supplied with the correct amount of brake fluid. Perform the traditional brake bleeding procedure once the module has been replaced.

The traditional brake bleeding procedure must be performed when the braking system is in the “Fallback” recovery operating condition.

The system can be “forced” to enter the “fallback” recovery condition in two ways:

- Launching a specific routine using the diagnostic scan tool.
- Disconnecting the battery.

ABS Module Operating Logic

The ICU continuously performs tests to know the operating state of the entire braking system.

The ICU monitors the pressures by using sensors and processes the amount of brake fluid volume used by the braking system to determine possible lose of pressure in the hydraulic circuits and evaluate the correct operation of the master cylinder and the actuator.

If a pressure leak is found in a hydraulic circuit, the system is able to isolate it and bypass it, keeping the other hydraulic circuit in operation.

The hydraulic circuits of the braking system are two isolated and independent circuits from each other; they correspond to:

The braking system can operate according to two distinct modes:

- Normal operating function called “Brake by wire”
- Recovery operation called “Fallback”

Following are the symbols, with related explanations to help in understanding the functioning of the system:

1. Vehicle unlocking
2. Door opening
3. Ignition + Start
4. Brake pedal applied
5. Brake pedal released
6. Electric brake available/Electric brake not available
7. Dynamic Control functions available or Dynamic Control functions not available
8. Brake failure warning lamp on/Brake failure warning lamp off
9. ABS failure warning lamp on/ABS failure warning lamp off
10. ESC failure warning lamp on/ESC failure warning lamp off.