DYNAMIC STABILITY CONTROL (DSC)

id041500104600

Outline

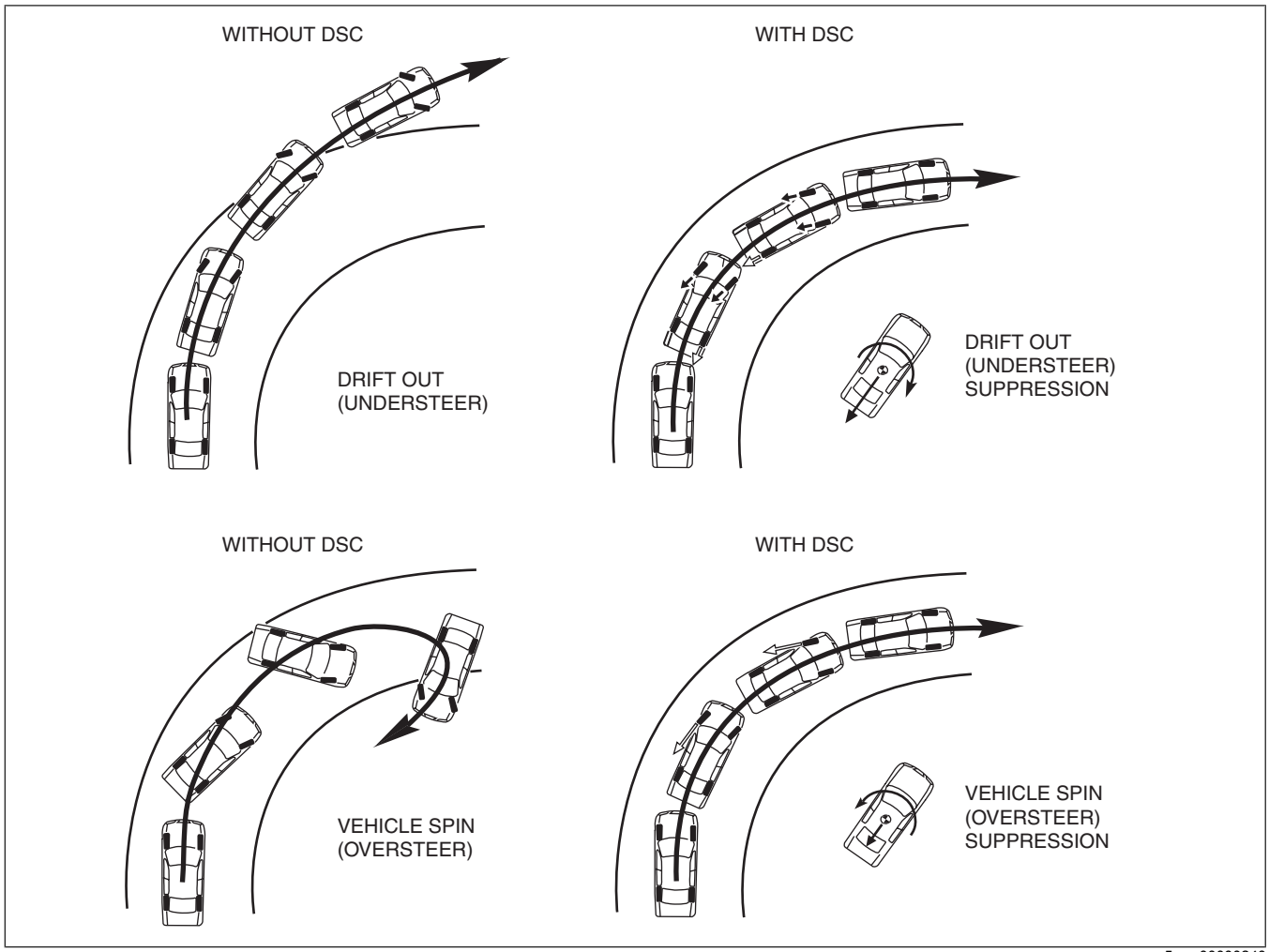
- Electrical brake assist control has been adopted, improving safety.
- The DSC HU/CM, integrating both the hydraulic unit (HU) and control module (CM), has been adopted, resulting in a size and weight reduction.
- An enhanced malfunction diagnosis system, used with the Mazda Modular Diagnostic System (M-MDS), improving serviceability.
- Serviceability improved by the automatic configuration function.
- Receives the lateral-G and yaw rate signals between the sophisticated air bag sensor (SAS) control module and the DSC HU/CM via controller area network (CAN) lines instead of the conventional combined sensor.
- The vehicle roll prevention function, hill launch assist (HLA), roll over mitigation (ROM), tire pressure monitoring system (TPMS), smart city brake support (SCBS)*, and secondary collision reduction (SCR) have been adopted, improving safety.

* : Vehicles with smart city brake support (SCBS)

DSC operation outline

- The ABS prevents wheel lock-up during braking. The TCS detects drive wheel spin due to the accelerator pedal being pressed too hard or similar causes and controls engine speed to suppress wheel spin. With these systems, safety is assured when driving or stopping.
- Additionally, sudden changes in vehicle attitude, due to evasive steering or road conditions, are controlled by the DSC. The DSC suppresses vehicle sideslip when driving due to vehicle spin (oversteer) or drift-out (understeer) by controlling braking and engine speed. At this time, the TCS/DSC indicator light illuminates to alert the driver that the DSC is operating due to a dangerous situation. As a result, the driver can calmly react and is provided leeway for the next maneuver, resulting in safe driving conditions.
- In this way the combination of DSC + ABS + TCS ensures driving, stopping and turning safety in all aspects.

Results of DSC operation



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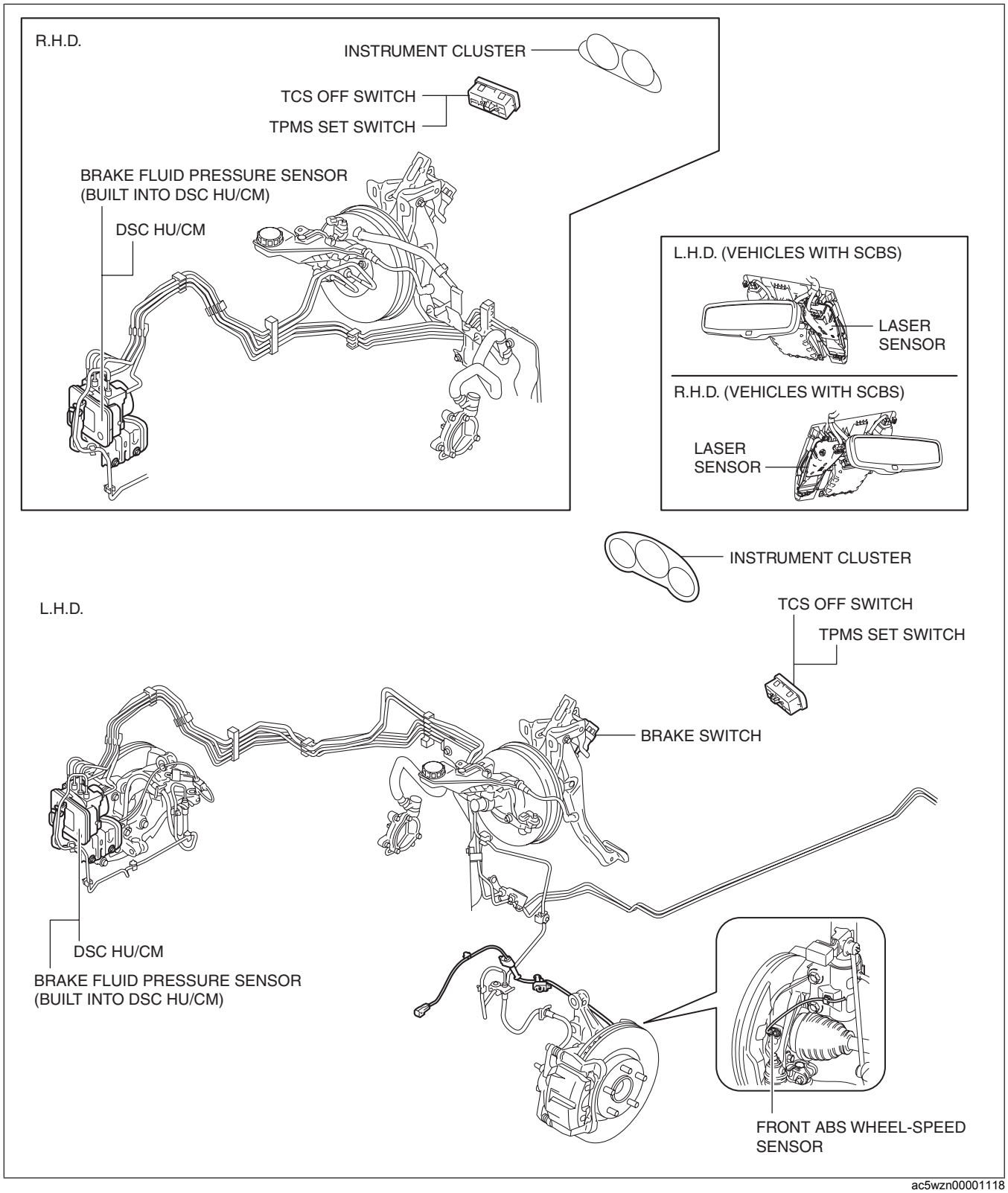
Caution

- **While the DSC is a steering safety system, it does not improve normal steering function. Therefore, always drive carefully, even if the vehicle has DSC, and do not overestimate the DSC capability.**
- **If the initialization procedures for the brake fluid pressure, low-G, and yaw rate sensors are not performed correctly, an incorrectly determined initial point may cause a discrepancy between the actual driving conditions of the vehicle and the signals from the sensors, resulting in improper DSC operation. Therefore, after replacing or removing the following parts, make sure to perform the DSC HU/CM initialization procedures of the sensors with the vehicle stopped on a level ground to insure proper DSC operation. For the initialization procedures of the sensors, refer to the Workshop Manual.**
  - **DSC HU/CM**
- **The DSC and ABS will not operate normally under the following conditions:**
  - **With tires that are not of the specified size, manufacturer or tread pattern, or not inflated according to specification**
  - **With tires that have significant comparative wear variation**
  - **With tire chains**
  - **With an emergency spare tire**

Structural View

Vehicle front side



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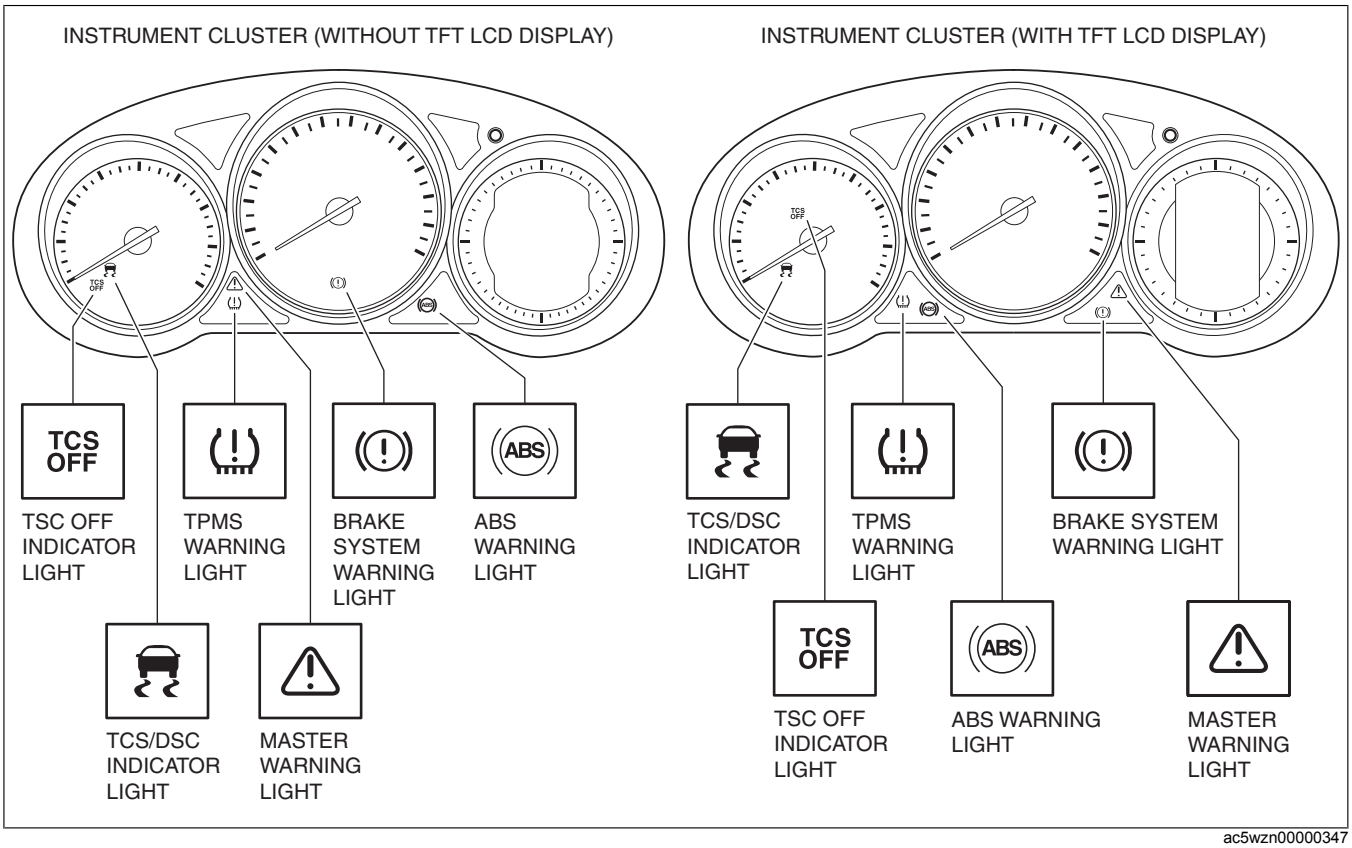
Warning light and indicator light



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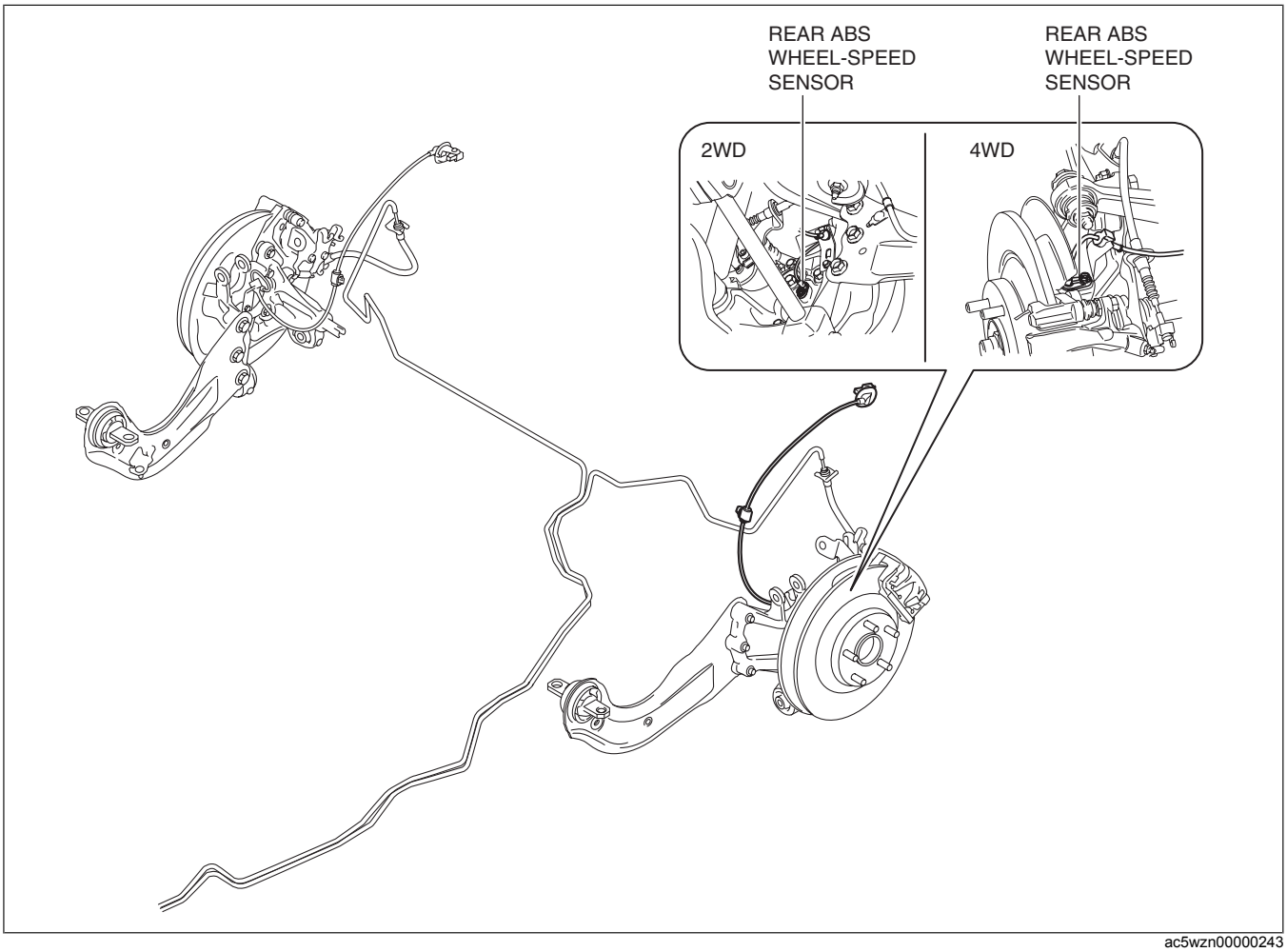
Vehicle rear side



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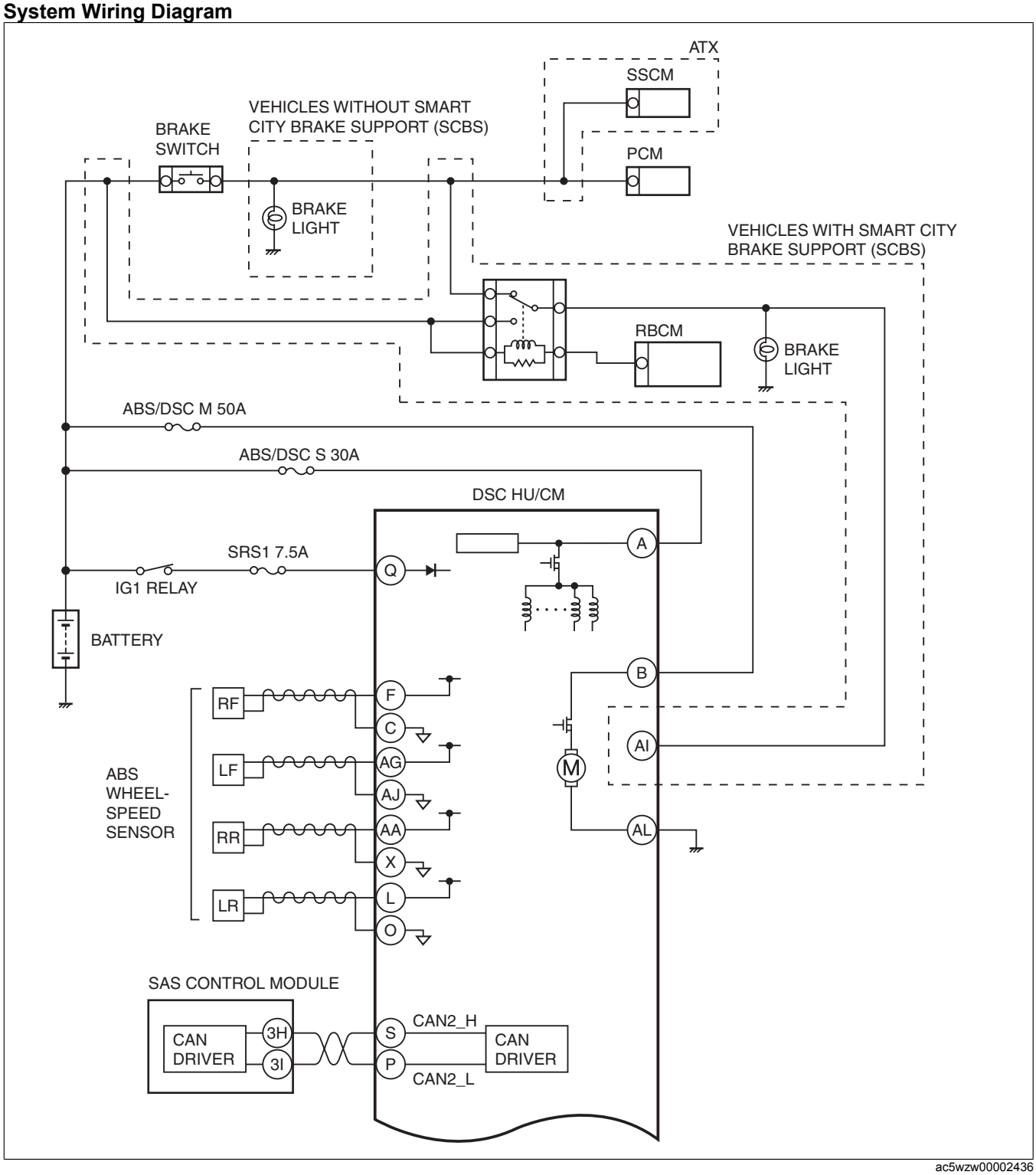
System Wiring Diagram



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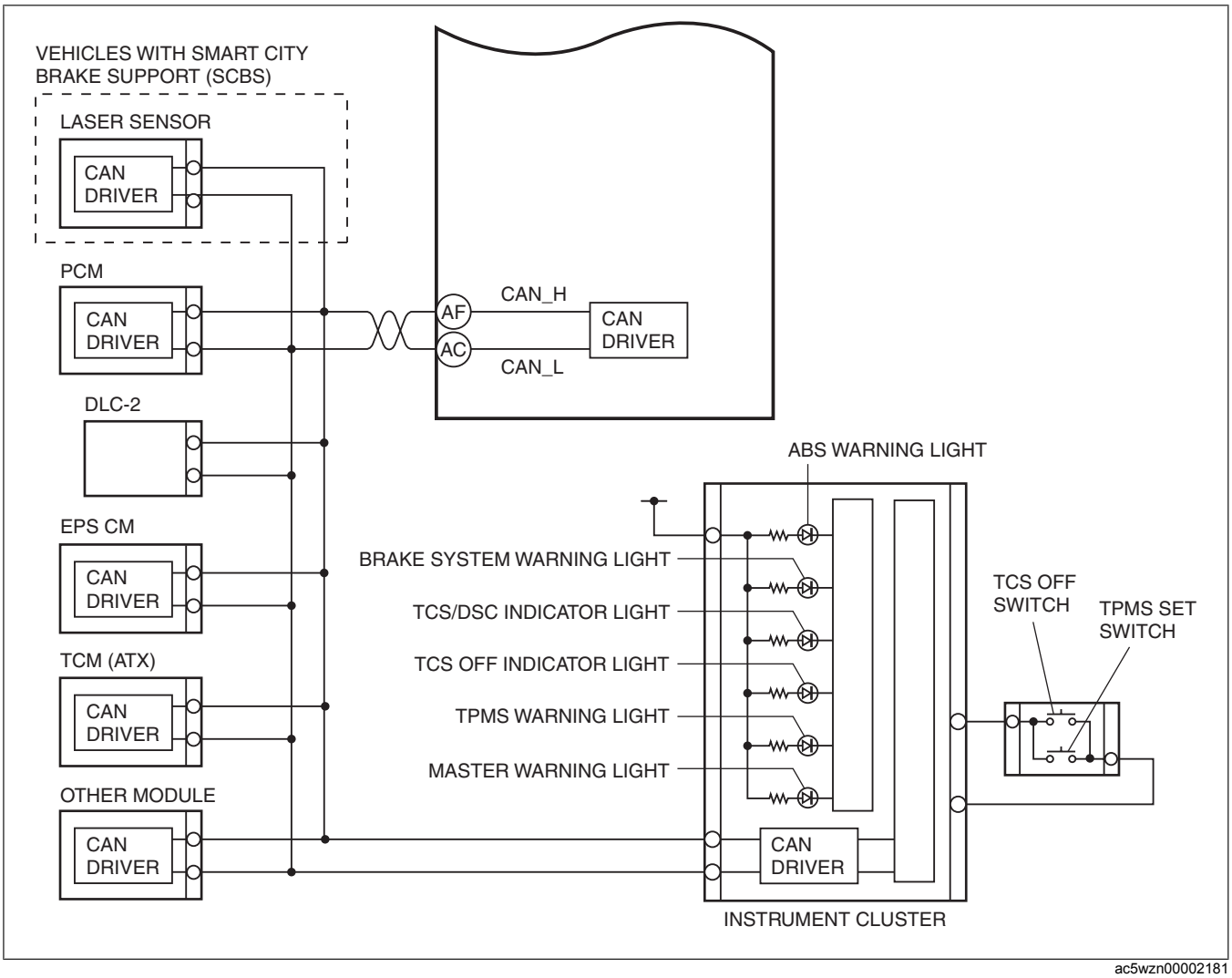

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Construction

- The DSC system consists of the following parts. While each part has a regular function in other systems, only the function during DSC control is listed.

Part name	Function
DSC HU/CM	• Makes calculations using input signals from each sensor, controls brake fluid pressure to each wheel, and actuates function (ABS, EBD, TCS, DSC, brake assist control, vehicle roll prevention function, hill launch assist (HLA), roll over mitigation (ROM), TPMS, smart city brake support (SCBS)*, and secondary collision reduction (SCR)) of the DSC system. • Outputs the torque reduction request signal, wheel speed signal, and DSC system warning control data via CAN lines. • Controls the on-board diagnostic system and fail-safe function when there is a malfunction in the DSC system.
PCM	• Controls engine output based on signals from the DSC HU/CM. • Transmits engine speed, engine torque, brake switch status, and accelerator pedal position data via CAN communication to the DSC HU/CM. • Transmits gear/shift lever position data via CAN communication to the DSC HU/CM. (MTX)
TCM (ATX)	• Transmits gear/selector lever position data via CAN communication to the DSC HU/CM.
EPS CM	• Transmits steering angle data via CAN communication to the DSC HU/CM.
SAS control module	• Detects the lateral-G (vehicle lateral acceleration speed), the yaw rate (vehicle turning angle speed), and the longitudinal-G (vehicle longitudinal acceleration speed) via CAN communication to the DSC HU/CM.
Brake system warning light	• Notifies the driver that the parking brake is applied. • Notifies the driver of an ABS or EBD malfunction.
ABS warning light	• Notifies the driver of an ABS malfunction.

Part name	Function
TCS/DSC indicator light	• Informs the driver that the TCS is operating (drive wheel is spinning). • Informs the driver that the DSC is operating (vehicle sideslip occurring). • Informs the driver that the Roll over mitigation (ROM) is operating. • Informs the driver of DSC system malfunction.
TCS OFF switch	• Transmits driver intention to release TCS control to the DSC HU/CM.
TCS OFF indicator light	• Informs driver that TCS control has been released due to TCS OFF switch operation.
Tire pressure monitoring system (TPMS) set switch	• Data initialization after adjusting the tire pressures can be done.
Tire pressure monitoring system (TPMS) warning light	• Notifies the driver that the tire pressure is not normal. • Notifies the driver of an TPMS malfunction.
Master warning light	• Notifies the driver of an smart city brake support (SCBS) malfunction.
ABS wheel-speed sensor	• Detects the rotation condition of each wheel and transmits it to the DSC HU/CM.
Brake fluid pressure sensor (Built into DSC HU/CM)	• Detects the fluid pressure from the master cylinder.
Laser sensor*	• Emits near-infrared laser and detects the distance between the vehicle and a vehicle or an obstruction ahead based on the reflection.

* : Vehicles with smart city brake support (SCBS)