C0196 The brake pedal pulsates at a higher frequency during VSES activation

Circuit Description

The vehicle stability enhancement system (VSES) is activated by the EBCM calculating the desired yaw rate and comparing it to the actual yaw rate input. The desired yaw rate is calculated from measured steering wheel position, vehicle speed, and lateral acceleration. The difference between the desired yaw rate and actual yaw rate is the yaw rate error, which is a measurement of oversteer or understeer. If the yaw rate error becomes too large, the EBCM will attempt to correct the vehicles yaw motion by applying differential braking to the left or right front wheel. The amount of differential braking applied to the left or right front wheel is based on both the yaw rate error and side slip rate error. The side slip rate error is a function of the lateral acceleration minus the product of the yaw rate and vehicle speed. The yaw rate error and side slip rate error are combined to produce the total delta velocity error. When the delta velocity error becomes too large and the VSES system activates, the drivers steering inputs combined with the differential braking will attempt to bring the delta velocity error toward zero. The VSES activations generally occur during aggressive driving, in the turns or bumpy roads without much use of the accelerator pedal. When braking during VSES activation, the brake pedal will feel different than the ABS pedal pulsation. The brake pedal pulsates at a higher frequency during VSES activation.

Conditions for Running the DTC

- The ignition is ON.
- The ignition voltage is greater than 8 volts.
- The vehicle is stopped or the vehicle speed is greater than 45 km/h (28 mph).
- The yaw rate isolation test runs with any of the following conditions:

The brake pedal is not pressed.ABS is not active.
The vehicle speed is greater than 8 km/h (5 mph).Lateral acceleration is less than 0.5 g.VSES is not active on undriven axle and TCS is active.AWD TCS is active.

Conditions for Setting the DTC

C0196 00

One of the following conditions exist:

- The yaw rate sensor input voltage is less than 0.15 volts.
- The yaw rate sensor input voltage is greater than 4.85 volts for 1 seconds.
- The yaw rate input changes by more than 390 degrees/second per second.
- The yaw rate bias exceeds 7 degrees/second.
- The yaw rate error is greater than 5 degrees/second more than 30 times in one drive cycle.

Action Taken When the DTC Sets

- The EBCM disables the VSES for the duration of the ignition cycle.
- The DIC displays the Service Stabilitrak message.
- The ABS/TCS remains functional.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present and the DTC is cleared with a scan tool.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

- Check the vehicle for proper steering alignment.
- The Snapshot function on the scan tool can help find an intermittent DTC.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. Tests for the proper operation of the circuit in the low voltage range.
4. Tests for the proper operation of the circuit in the high voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to ground.
5. Tests for a short to voltage in the 5-volt reference circuit.
6. Tests the bias voltage of the yaw rate sensor.

Step	Action	Values	Yes	No
Schematic Reference: ABS Schematics Connector End View Reference: ABS Connector End Views				
1	Did you perform the Diagnostic System Check – ABS?	—	Go to Step 2	Go to Diagnostic System Check -ABS
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Yaw Rate Sensor Input parameter in the VSES data list. Does the scan tool display that the Yaw Rate Sensor Input parameter is within the specified range?	0.15–4.85 V	Go to Step 6	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the yaw rate/lateral accelerometer sensor connector. 3. Turn ON the ignition, with the engine OFF. 4. With the scan tool, observe the Yaw Rate Sensor Input parameter. Does the scan tool display that the Yaw Rate Sensor Input parameter is less than the specified value?	0.15 V	Go to Step 4	Go to Step 10

Step	Action	Values	Yes	No
4	1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the 5-volt reference circuit of the yaw rate/lateral accelerometer sensor and the signal circuit of the yaw rate/lateral accelerometer sensor. 3. Turn ON the ignition, with the engine OFF. 4. With the scan tool, observe the Yaw Rate Sensor Input parameter. Does the scan tool display that the Yaw Rate Sensor Input parameter is greater than the specified value?	4.85 V	Go to Step 5	Go to Step 8
5	1. Disconnect the fused jumper wire. 2. Measure the voltage between the 5-volt reference circuit of the yaw rate/lateral accelerometer sensor and the low reference circuit of the yaw rate/lateral accelerometer sensor. Does the voltage measure less the specified value?	5V	Go to Step 12	Go to Step 7
6	Does the scan tool display that the Yaw Rate Sensor Input parameter is within the specified range?	2.3–2.7 V	Go to Diagnostic Aids	Go to Step 11
7	Test the 5-volt reference circuit of the yaw rate/lateral accelerometer sensor for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 13

Step	Action	Values	Yes	No
8	Test the 5-volt reference circuit of the yaw rate/lateral accelerometer sensor for the following conditions: • An open • A short to ground • A high resistance Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 9
9	Test the signal circuit of the yaw rate/lateral accelerometer sensor for the following conditions: • An open • A short to ground • A high resistance Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 13
10	Test the signal circuit of the yaw rate/lateral accelerometer sensor for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 13
11	1. Disconnect the EBCM harness connector. 2. Install the J 39700 universal pinout box using the J 39700-300 cable adapter to the EBCM harness connector only. 3. Test the low reference circuit of the yaw rate/lateral accelerometer sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 12

Step	Action	Values	Yes	No
12	Inspect for poor connections at the harness connector of the yaw rate/lateral accelerometer sensor. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 14
13	Inspect for poor connections at the harness connector of the EBCM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 15
14	Replace the yaw rate/lateral accelerometer sensor. Refer to Yaw Rate Sensor/Lateral Accelerometer Replacement. Did you complete the repair?	—	Go to Step 16	—
15	Replace the EBCM. Refer to Electronic Brake Control Module (EBCM) Replacement. Did you complete the repair?	—	Go to Step 16	—
16	1. Clear the DTCs using the scan tool. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	—	Go to Step 2	System OK