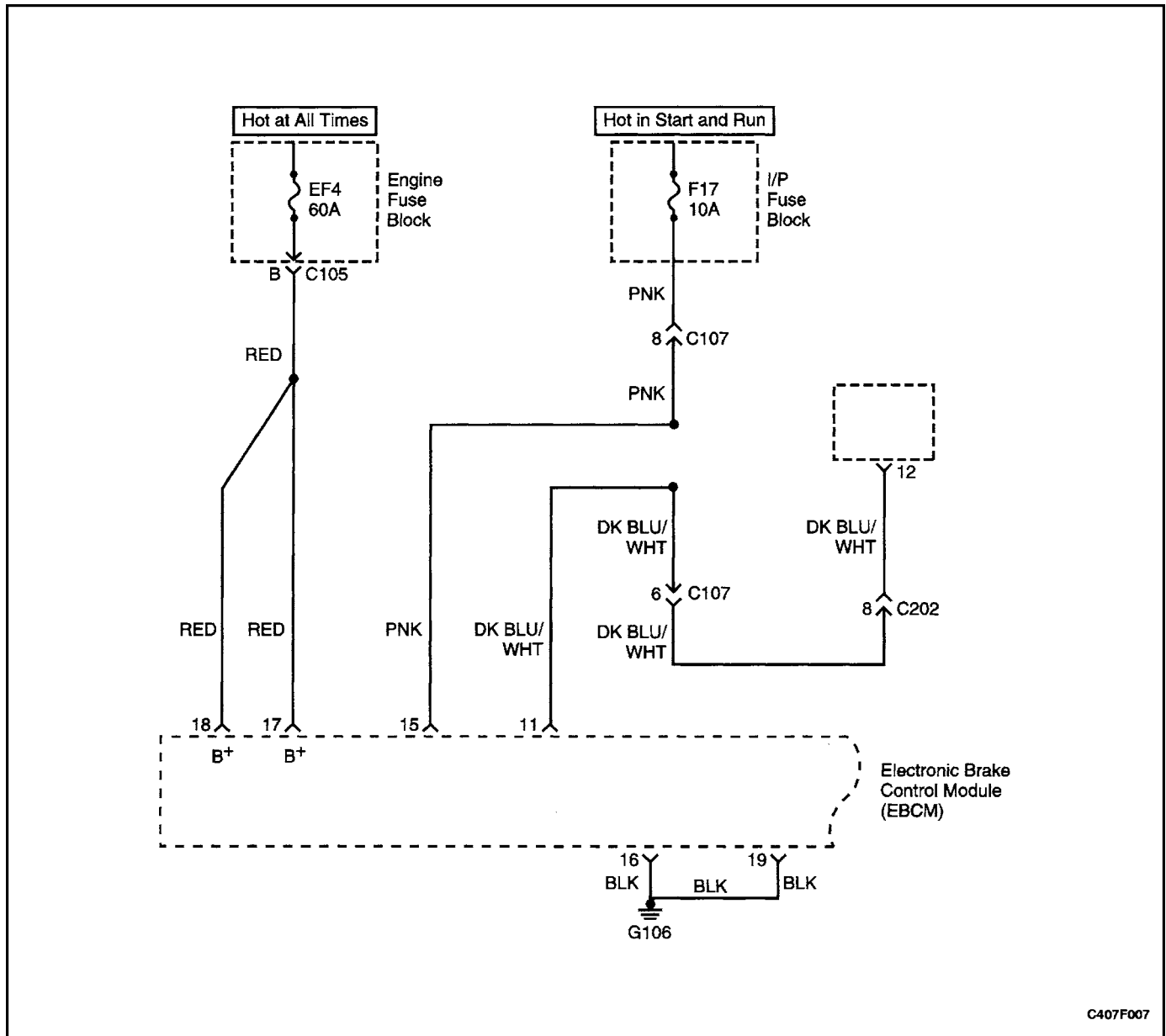


DIAGNOSIS



DIAGNOSTIC CIRCUIT CHECK

The Diagnostic Circuit Check is an organized approach to identifying a problem created by an antilock brake system (ABS) malfunction. It must be the starting point for any ABS complaint diagnosis because it directs the service technician to the next logical step in diagnosing the complaint.

Diagnostic Process

Perform the following steps in order when servicing the ABS/TCS system. Failure to do so may result in the loss of important diagnostic data and may lead to difficulties and time-consuming diagnosis procedures.

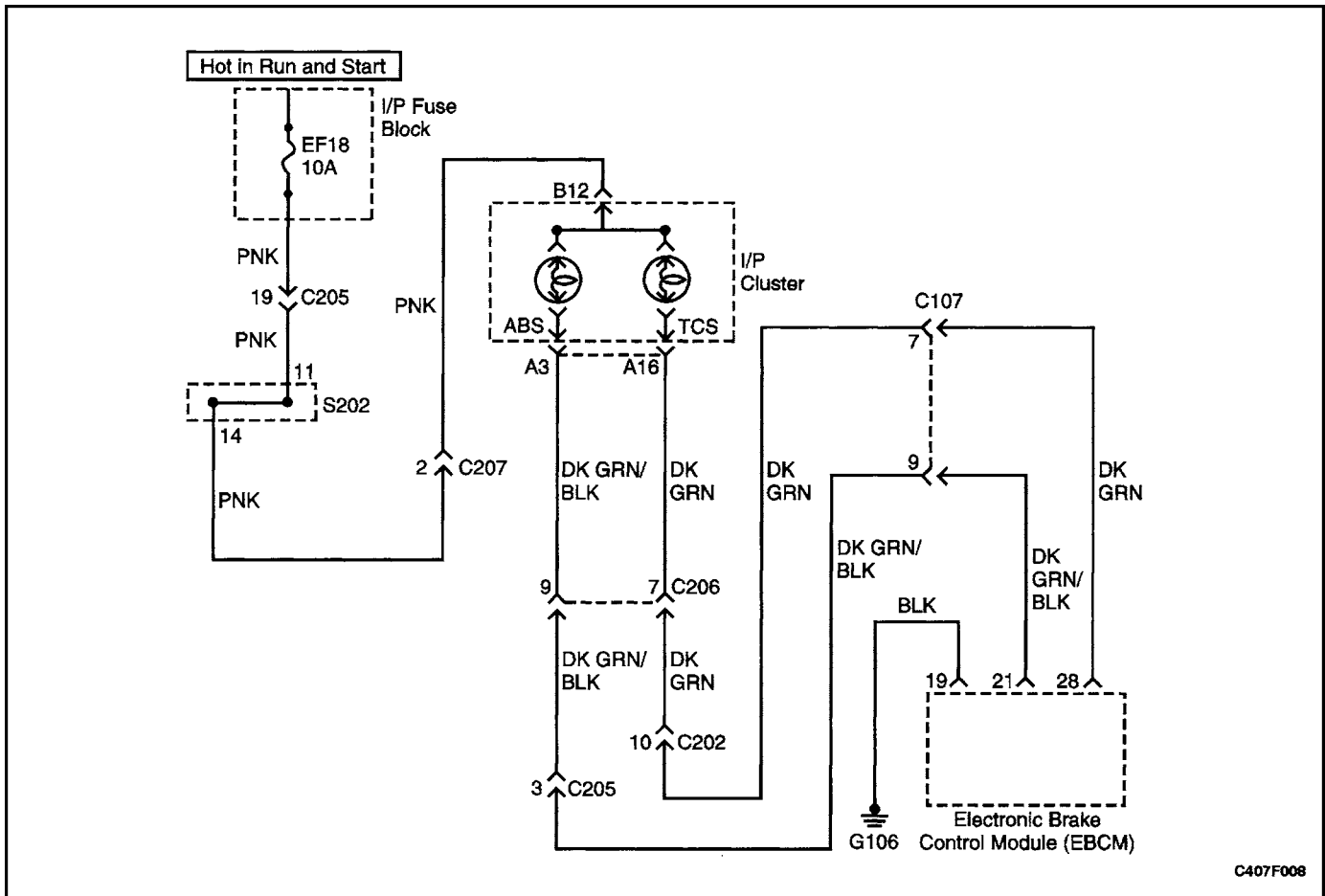
1. Perform the tests of the table below.
2. Perform a road test if directed by the table.
 - Test drive the vehicle while using the snapshot feature of the scan tool.
 - Perform normal acceleration, stopping, and turning maneuvers.
 - If this does not reproduce the malfunction, perform an ABS stop or TCS maneuver on a low friction surface such as gravel.
3. Clear the diagnostic trouble codes (DTCs) after all system malfunctions have been corrected.

Diagnostic Circuit Check

Step	Action	Value(s)	Yes	No
1	1. Install the scan tool. 2. Turn ignition switch to ON. 3. Select the Data List mode. Is the scan tool receiving data from the electronic brake control module (EBCM)?		Go to <i>Step 2</i>	Go to <i>Step 7</i>
2	Check the display. Are there any current DTCs displayed?		Refer to the applicable DTC table	Go to <i>Step 3</i>
3	1. Turn the ignition to LOCK for 10 seconds. 2. Turn the ignition to ON and observe the ABS indicator. Does the indicator light for 2 seconds and then go off?		Go to <i>Step 5</i>	Go to <i>Step 4</i>
4	Check the ABS indicator. Did the ABS indicator turn on and stay on?		Go to "ABS Indicator Lamp Illuminated Constantly"	Go to "ABS Indicator Lamp Inoperative"
5	Check whether the vehicle is equipped with traction control. Is the vehicle equipped with traction control?		Go to <i>Step 6</i>	Go to <i>Step 13</i>
6	1. Turn the ignition to LOCK for 10 seconds. 2. Turn the ignition to ON and observe the TCS indicator. Does the indicator light for 2 seconds and then go off?		Go to <i>Step 13</i>	Go to "Traction Control System Indicator Lamp Inoperative"
7	1. Turn the ignition to LOCK. 2. Disconnect the EBCM harness connector. 3. Turn the ignition to ON. 4. Use a digital voltmeter (DVM) to measure the voltage from ground to terminal 15, 17, and 18 the EBCM harness connector. Is the voltage equal to the specified value?	11–14 v	Go to <i>Step 8</i>	Go to "Power Supply to Control Module, No DTCs Stored"
8	1. Turn the ignition to LOCK. 2. Use a DVM to measure the resistance from the EBCM harness connector, terminals 16 and 19 to ground. Is the resistance equal to the specified value?	$\approx 0 \Omega$	Go to <i>Step 10</i>	Go to <i>Step 9</i>
9	Repair the open in the circuit BLK that failed. Is the repair complete?		System OK	
10	Use a DVM to measure the resistance between terminal 11 of the EBCM harness connector and terminal 12 of the data link connector (DLC). Is the resistance below the specified value?	2 Ω	Go to <i>Step 11</i>	Go to <i>Step 12</i>
11	Replace the ABS unit. Is the repair complete?		System OK	

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Step	Action	Value(s)	Yes	No
12	Repair the open or high resistance in circuit DK BLU/WHT between terminal 11 of the EBCM harness connector and terminal 12 of the DLC. Is the repair complete?		Go to <i>Step 1</i>	
13	Perform the road test described above. Are any DTCs set?		Go to the table for the DTC	System OK



ABS INDICATOR LAMP INOPERATIVE

Circuit Description

Battery voltage is supplied to the ABS warning lamp with the ignition switch in the ON or START positions. The warning lamp can be activated only by the ABS control module internally supplying ground to terminal 21 or by the shorting bar in the ABS module connector if the connector is disconnected from the module.

Diagnosis

This procedure checks for a problem in the wiring, a faulty ground, a voltage supply problem, a burned out indicator lamp, or a contact problem in a connector.

Cause(s)

- A fuse has blown.
- The indicator lamp has burned out.

- There is a corroded or broken connector terminal.
- There is a faulty ground connection.
- There is a broken wire in a wiring harness.
- The EBCM is faulty.

Test Description

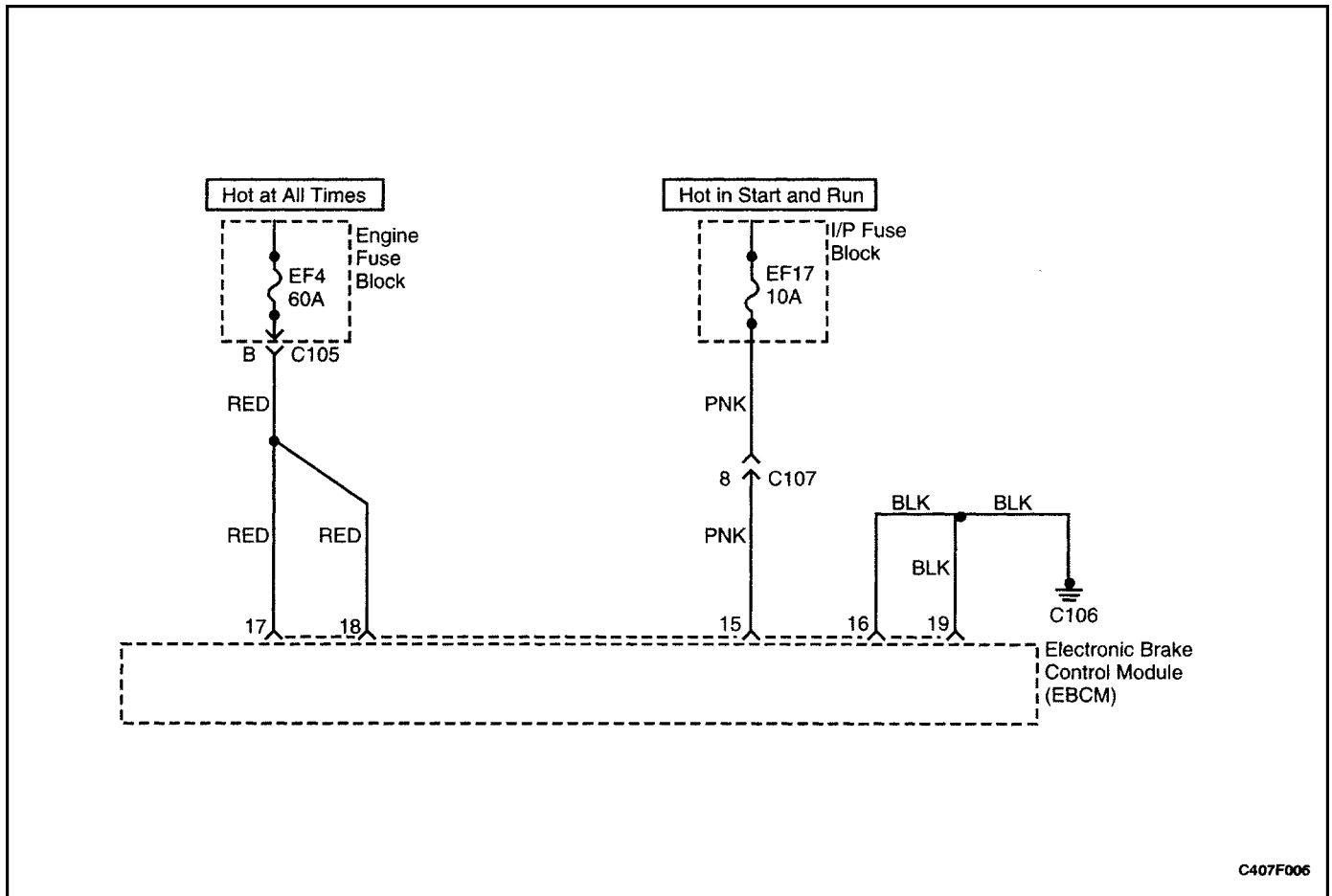
The number(s) below refer to step(s) on the diagnostic table.

1. This test checks for any DTCs that may cause ABS indicator lamp to be inoperative.
2. This test verifies an inoperative lamp condition.
3. This test checks for voltage on the lamp circuit.
4. This begins a series of tests of the circuit from indicator lamp to the EBCM and ground.
19. This begins a series of tests of the voltage supply circuits that power the indicator lamp.

ABS Indicator Lamp Inoperative

Step	Action	Value(s)	Yes	No
1	Install the scan tool and check for any DTCs. Is any DTC set?		Go to the chart for the DTC	Go to <i>Step 2</i>
2	1. Turn the ignition to LOCK. 2. Disconnect the scan tool. 3. Turn the ignition to ON. 4. Observe the ABS indicator lamp. Does the lamp illuminate for about 2 seconds, then turn off?		Go to "Intermittents and Poor Connections"	Go to <i>Step 3</i>
3	With the ignition still ON, observe the oil pressure lamp. Is the oil pressure lamp illuminated?		Go to <i>Step 4</i>	Go to <i>Step 19</i>
4	1. Turn the ignition to LOCK. 2. Disconnect the connector from the electronic brake control module (EBCM). 3. Turn the ignition switch to ON. Does the ABS indicator illuminate?		Go to <i>Step 5</i>	Go to <i>Step 8</i>
5	1. Turn the ignition to LOCK. 2. Examine terminals 19 and 21 at the EBCM connector on both the ABS wiring harness and on the EBCM. Is there a poor connection at any of these terminals?		Go to <i>Step 6</i>	Go to <i>Step 7</i>
6	Repair the faulty terminals or replace the ABS unit, as required. Is the repair complete?		System OK	
7	Replace the ABS unit. Is the repair complete?		System OK	–
8	1. Turn the ignition to LOCK. 2. Disconnect the wire from the negative battery terminal. 3. Measure the resistance between the negative battery wire, which is attached to ground, and the shorting bar in the EBCM connector. Is the resistance equal to the specified value?	0 Ω	Go to <i>Step 10</i>	Go to <i>Step 9</i>
9	Repair the open or high resistance in the circuit from EBCM connector, terminal 19 to ground G106. Is the repair complete?		System OK	
10	1. Remove the I/P cluster. 2. Remove and check the ABS indicator bulb. Is the bulb burned out?		Go to <i>Step 11</i>	Go to <i>Step 12</i>
11	1. Replace the ABS indicator bulb. 2. Install the I/P cluster. Is the repair complete?		System OK	–
12	Check the continuity at the I/P cluster connector terminal A3. Is the continuity equal to the specified value?	0 Ω	Go to <i>Step 14</i>	Go to <i>Step 13</i>
13	Repair the contact at the I/P cluster connector terminal A3. Is the repair complete?		System OK	–

Step	Action	Value(s)	Yes	No
14	Check the wiring harnesses and the connectors in circuit DK GRN/BLK from the I/P cluster terminal A3 to terminal 21 of the EBCM connector. Is the voltage equal to the specified value?		Go to <i>Step 15</i>	Go to <i>Step 16</i>
15	Repair the open or high resistance found. Is the repair complete?		System OK	
16	Check for continuity between terminal 19 of the EBCM connector and ground G106. Is the the continuity equal to the specified value?	0 Ω	Go to <i>Step 17</i>	Go to <i>Step 18</i>
17	Replace the ABS unit. Is the repair complete?		System OK	
18	Repair the continuity problem between terminal 19 of the EBCM connector and ground G106. Is the repair complete?		System OK	
19	1. Turn the ignition to LOCK. 2. Check fuse F18 in the I/P fuse block. Is fuse F18 blown?		Go to <i>Step 20</i>	Go to <i>Step 21</i>
20	Replace fuse F18. Is the repair complete?		System OK	
21	1. Turn the ignition on. 2. Check the voltage at Fuse 18. Is the voltage equal to the specified value?	11–14 v	Go to <i>Step 22</i>	Go to <i>Step 23</i>
22	Repair the power supply to Fuse 18. Is the repair complete?		System OK	
23	1. Remove the instrument cluster. 2. Check the circuit PNK from fuse F18 to terminal B12 of the I/P cluster connector. 3. Repair any open or high resistance found in a wiring harness, splice pack, or connector. Is the repair complete?		System OK	



C407F006

POWER SUPPLY TO CONTROL MODULE, NO DTCs STORED

Circuit Description

Battery voltage is supplied to the electronic brake control module (EBCM) through fuse F17 in the I/P fuse block, to terminal 15 of the EBCM connector. The voltage is present when the ignition switch is in ON or START.

Diagnosis

This test checks for battery output, proper grounding, blown fuses, a faulty ignition switch, and problems in the circuitry.

Cause(s)

- The battery is defective.
- There is a defective ground connection.
- A connector is damaged.
- A wire is broken or shorted.
- A fuse is blown.
- The ignition switch is malfunctioning.

Fail Action

ABS action is disabled during the period of low voltage, and the ABS warning lamp is ON for the remainder of the ignition cycle.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step determines whether there is voltage at the battery and the high current source.
7. This step checks for voltage at the ignition 1 source.

Diagnostic Aids

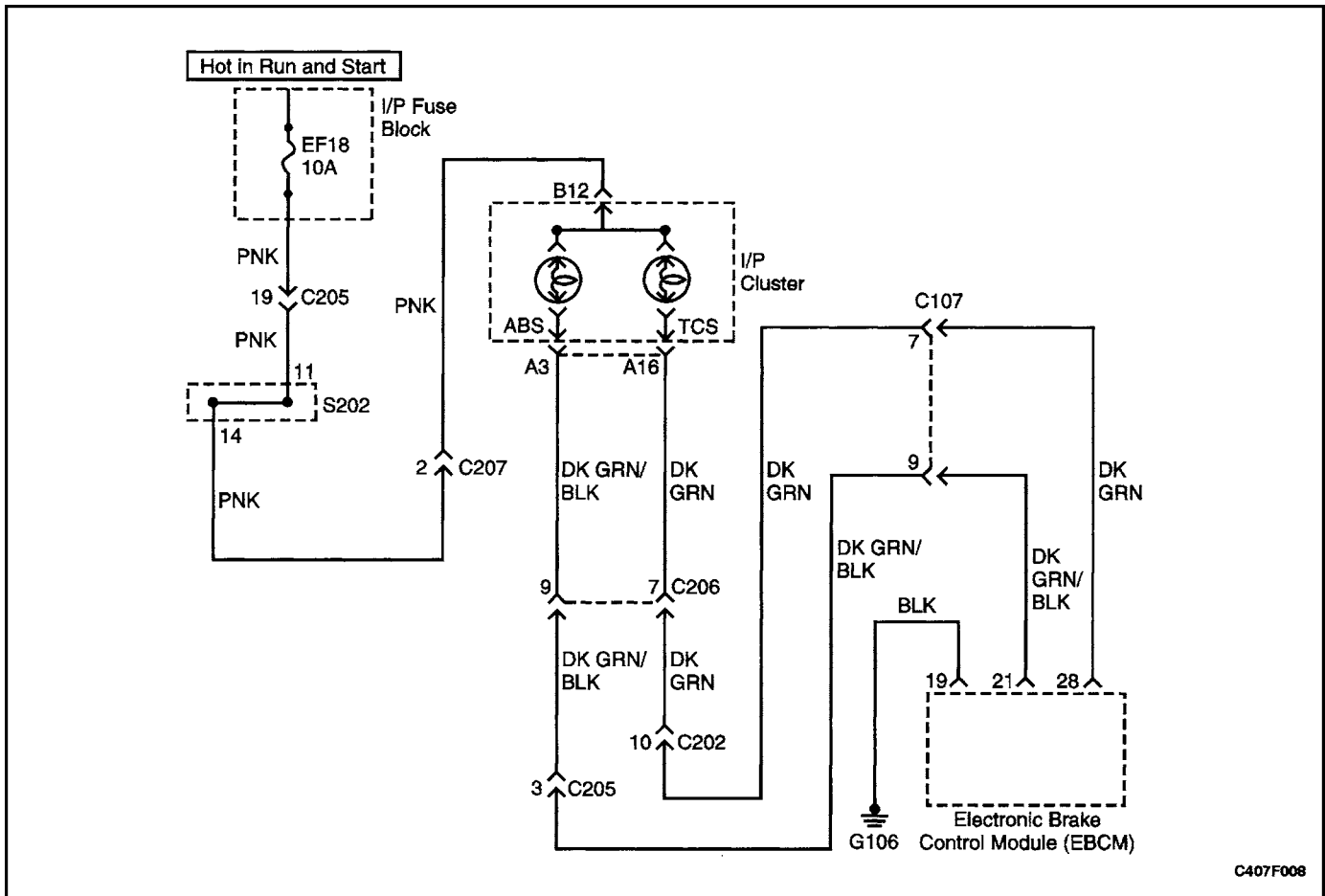
It is very important to perform a thorough inspection of the wiring and the connectors. Failure to do so may result in misdiagnosis, causing part replacement with a reappearance of the malfunction.

Power Supply to Control Module, No DTCs Stored

Step	Action	Value(s)	Yes	No
1	Check the voltage at the battery. Is the voltage equal to the specified value?	11–14 v	Go toStep 3	Go toStep 2
2	Charge or replace the battery, as required. Is the repair complete?		System OK	
3	Check fuse EF4 in the engine fuse block. Is the fuse blown?		Go toStep 4	Go toStep 8
4	1. Replace fuse EF4. 2. Turn the ignition to ON. Does the fuse blow again?		Go toStep 6	Go toStep 5
5	Check the ABS function. Is the repair complete?		System OK	
6	1. Turn the ignition to OFF. 2. Remove fuse EF4. 3. Disconnect the ABS connector from the EBCM. 4. Measure the resistance to ground at terminals 17 and 18. Does the ohmmeter show the specified value?	0 Ω	Go toStep 7	Go toStep 25
7	Repair the short to ground in circuit RED between terminal B of engine fuse block connector C105 and the ABS harness EBCM connector. Is the repair complete?		System OK	
8	1. Turn the ignition to ON. 2. Check the voltage at fuse F17. Is the voltage equal to the specified value?	11–14 v	Go toStep 9	Go toStep 10
9	Repair the power supply to fuse 17. Is the repair complete?		System OK	
10	Check fuse F17 in the I/P fuse block. Is the fuse F17 blown?		Go toStep 14	Go toStep 18
11	1. Replace fuse F17. 2. Turn the ignition to ON. Does the fuse blow again?		Go toStep 13	Go toStep 12
12	Check the ABS function. Is the repair complete?		System OK	
13	1. Turn the ignition to OFF. 2. Remove fuse F17. 3. Disconnect the ABS connector from the EBCM. 4. Measure the resistance between ground and terminal 15. Is the resistance equal to the specified value?		Go toStep 22	Go toStep 14
14	Repair the short to ground in circuit PNK fuse F17 of the I/P fuse block and terminal 15 of the ABS harness EBCM connector. Is the repair complete?		System OK	

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Step	Action	Value(s)	Yes	No
15	1. Disconnect the EBCM connector from the EBCM. 2. Turn the ignition to ON. 3. Check for the presence of battery voltage between ground and terminal 17, and between ground and terminal 18. Is the voltage equal to the specified value?	11–14 v	Go to <i>Step 17</i>	Go to <i>Step 16</i>
16	1. Turn the ignition switch to OFF. 2. Trace the RED wires between terminals 17 and 18 of the EBCM connector to terminal B of connector C105 at the engine fuse block. 3. Repair the open in this circuit. Is the repair complete?		System OK	
17	Check the voltage between ground and terminal 15 of the EBCM connector. Is the voltage equal to the specified value?	11–14 v	Go to <i>Step 19</i>	Go to <i>Step 18</i>
18	1. Turn the ignition switch to OFF. 2. Repair the circuit PNK between terminal 15 of the ABS harness EBCM connector to fuse F17 in the I/P fuse block. Is the repair complete?		System OK	
19	1. Turn the ignition to OFF. 2. Check the resistance between ground and terminals 19 and 16 of the EBCM connector. Is the resistance equal to the specified value?	0 Ω	Go to <i>Step 20</i>	Go to <i>Step 23</i>
20	Examine terminals 15, 19, 17, 18, and 16 of the EBCM connector. Is there a defective terminal?		Go to <i>Step 21</i>	Go to <i>Step 22</i>
21	Repair the defective terminal or replace the connector or wiring harness, as required. Is the repair complete?		System OK	
22	Replace the ABS unit. Is the repair complete?		System OK	
23	Repair the defective ground connection. Is the repair complete?		System OK	



ABS INDICATOR LAMP ILLUMINATED CONTINUOUSLY, NO DTCs STORED

Circuit Description

Battery voltage is supplied to the ABS warning lamp with the ignition in ON or START. The warning lamp should be activated only by the ABS control module internally supplying ground to terminal 21.

Diagnosis

This procedure checks for a short to ground in the wiring

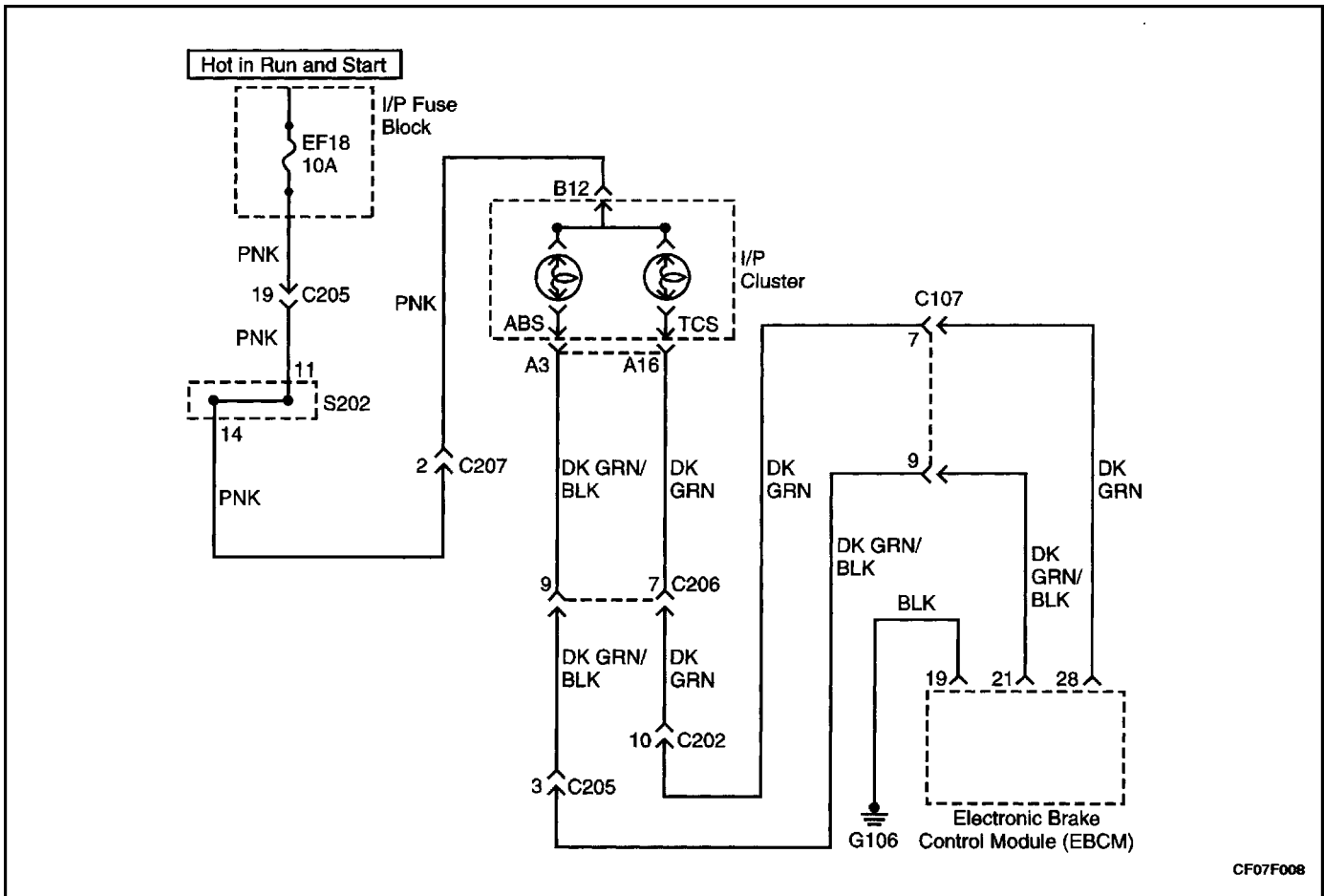
or a defective electronic brake control module (EBCM).

Cause(s)

- There is a short to ground in the circuit between the cluster terminal A3 and the EBCM terminal 21.
- The EBCM is faulty.

ABS Indicator Lamp Illuminated Continuously, No DTCs Stored

Step	Action	Value(s)	Yes	No
1	Check the EBCM connector. Is it connected properly?		Go to <i>Step 3</i>	Go to <i>Step 2</i>
2	Connect the EBCM connector. Is the repair complete?		System OK	
3	1. Disconnect the EBCM connector. 2. Turn the ignition to ON. 3. Use an insulated tool to push the shorting bar in the connector away from terminal 21. Does the ABS indicator lamp go out?		Go to <i>Step 4</i>	Go to <i>Step 5</i>
4	Replace the ABS unit. Is the repair complete?			
5	1. Turn the ignition to OFF. 2. Connect the EBCM connector. 3. Disconnect connector C107. 4. Turn the ignition to ON. Does the ABS indicator lamp illuminate?		Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	Repair the short to ground in circuit DK GRN/BLK between connector C107 and the EBCM connector. Is the repair complete?		System OK	
7	1. Turn the ignition to OFF. 2. Connect connector C107. 3. Disconnect connector C205. 4. Turn the ignition to ON. Does the ABS indicator lamp illuminate?		Go to <i>Step 9</i>	Go to <i>Step 8</i>
8	Repair the short to ground in circuit DK GRN/BLK between connector C205 and connector C107. Is the repair complete?		System OK	
9	1. Turn the ignition to OFF. 2. Connect connector C205. 3. Disconnect connector C206. 4. Turn the ignition to ON. Does the ABS indicator lamp illuminate?		Go to <i>Step 10</i>	Go to <i>Step 11</i>
10	Repair the short to ground in circuit DK GRN/BLK between I/P cluster connector A and connector C206. Is the repair complete?		System OK	
11	Repair the short to ground in circuit DK GRN/BLK between connector C206 and connector C205. Is the repair complete?		System OK	



CF07F008

TRACTION CONTROL SYSTEM INDICATOR LAMP INOPERATIVE

Circuit Description

Battery voltage is supplied to the TCS warning lamp with the ignition in ON or START. The warning lamp can be activated only by the ABS control module internally supplying ground to terminal 28.

Diagnosis

This procedure checks for a problem in the wiring, a faulty ground, a voltage supply problem, a burned out indicator lamp, or a contact problem in a connector.

Cause(s)

- A fuse has blown.
- The indicator lamp has burned out.
- There is a corroded or broken connector terminal.

- There is a faulty ground connection.
- There is a broken wire in a wiring harness.
- The EBCM is faulty.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This test checks for any DTCs that may cause the TCS indicator lamp to be inoperative.
2. This test verifies an inoperative lamp condition.
3. This test checks for voltage on the lamp circuit.
4. This begins a series of tests of the circuit from the indicator lamp to the EBCM and ground.
19. This begins a series of tests of the voltage supply circuits that power the indicator lamp.

TRACTION CONTROL SYSTEM INDICATOR LAMP INOPERATIVE

Step	Action	Value(s)	Yes	No
1	Install the scan tool and check for any DTCs. Is any DTC set?		Go to the chart for the DTC	Go to <i>Step 2</i>
2	1. Turn the ignition to LOCK. 2. Disconnect the scan tool. 3. Turn the ignition to ON. 4. Observe the TCS indicator lamp. Does the lamp illuminate for about 2 seconds, then turn off?		Go to "Intermittents and Poor Connections"	Go to <i>Step 3</i>
3	With the ignition still ON, observe the oil pressure lamp. Is the oil pressure lamp illuminated?		Go to <i>Step 4</i>	Go to <i>Step 19</i>
4	1. Turn the ignition to LOCK. 2. Disconnect the connector from the EBCM. 3. Connect a jumper from terminal 28 to the grounding bar in the connector. 4. Turn the ignition to ON. Does the TCS indicator illuminate?		Go to <i>Step 5</i>	Go to <i>Step 8</i>
5	1. Turn the ignition to LOCK. 2. Examine terminals 19 and 28 at the EBCM connector on both the ABS wiring harness and on the EBCM. Is there a poor connection at any of these terminals?		Go to <i>Step 6</i>	Go to <i>Step 7</i>
6	Repair the faulty terminals or replace the ABS unit, as required. Is the repair complete?		System OK	
7	Replace the ABS unit. Is the repair complete?		System OK	
8	1. Turn the ignition to LOCK. 2. Disconnect the wire from the negative battery terminal. 3. Measure the resistance between the negative battery wire, which is attached to ground, and the shorting bar in the EBCM connector. Is the resistance equal to the specified value?	0 Ω	Go to <i>Step 10</i>	Go to <i>Step 9</i>
9	Repair the open or high resistance in the circuit from EBCM connector, terminal 19 to ground G106. Is the repair complete?		System OK	
10	1. Remove the I/P cluster. 2. Remove and check the TCS indicator bulb. Is the bulb burned out?		Go to <i>Step 11</i>	Go to <i>Step 12</i>
11	1. Replace the TCS indicator bulb. 2. Replace the I/P cluster. Is the repair complete?		System OK	
12	Check continuity at the I/P cluster connector terminal A16. Is the continuity equal to the specified value?	0 Ω	Go to <i>Step 14</i>	Go to <i>Step 13</i>
13	Repair the contact at the I/P cluster connector terminal A16. Is the repair complete?		System OK	

Step	Action	Value(s)	Yes	No
14	Check the wiring harnesses and connectors in circuit DK GRN from the I/P cluster terminal A16 to terminal 28 of the EBCM connector. Is the voltage equal to the specified value?		Go to <i>Step 15</i>	Go to <i>Step 16</i>
15	Repair the open or high resistance. Is the repair complete?		System OK	
16	Check for continuity between terminal 19 of the ABS connector and ground G106. Is the continuity equal to the specified value?	0 Ω	Go to <i>Step 17</i>	Go to <i>Step 18</i>
17	Replace the ABS unit. Is the repair complete?		System OK	
18	Repair the continuity between terminal 19 of the EBCM connector and ground G106. Is the repair complete?		System OK	
19	1. Turn the ignition to LOCK. 2. Check fuse F18 in the I/P fuse block. Is fuse F18 blown?		Go to <i>Step 20</i>	Go to <i>Step 21</i>
20	Replace fuse F18. Is the repair complete?		System OK	
21	1. Turn the ignition ON. 2. Check the voltage at fuse F18. Is the voltage equal to the specifies value?	11–14 v	Go to <i>Step 22</i>	Go to <i>Step 23</i>
22	Repair the power supply to fuse F18. Is the repair complete?		System OK	
23	1. Remove the I/P cluster. 2. Check circuit PNK from fuse F18 to terminal B12 of the I/P cluster connector. 3. Repair any open or high resistance found in a wiring harness, a splice pack, or a connector. Is the repair complete?		System OK	

SELF-DIAGNOSTICS

Important : The electronic brake control module (EBCM) turns the valve relay off when a diagnostic trouble code (DTC) is set. The scan tool will indicate that the valve relay is off when it is used to monitor the data list. This is normal and should not be considered a mal-function.

The EBCM performs system self-diagnostics and can detect and often isolate system malfunctions. When it detects a malfunction, the EBCM sets a DTC that represents the malfunction, turns on the ABS and/or the TCS indicators in most instances, and may disable the ABS and/or the TCS functions, as necessary, for the duration of the ignition cycle.

Once each ignition cycle, the EBCM performs an automatic test when the vehicle reaches 2.75 km/h (1.7 mph). In the course of this test, the system cycles each valve solenoid and the pump motor, along with the necessary relays, to check component operation. If the EBCM detects any malfunctions, it will set a DTC as described above.

DISPLAYING DTCs

Tools Required

Scan Tool

DTCs can be read through the use of the scan tool.

CLEARING DTCs

Tools Required

Scan Tool

The diagnostic trouble codes (DTCs) in the electronic brake control module (EBCM) memory are erased in one of two ways:

- Use the scan tool "Clear DTCs" selection.
- After 249 DTC-free ignition cycles.

These two methods are detailed below. Be sure to verify the proper system operation and, the absence of DTCs when the clearing procedure is completed.

The EBCM will not permit DTC clearing until all DTCs have been displayed. Also, DTCs cannot be cleared by disconnecting the EBCM, disconnecting the battery cables, or turning the ignition switch to LOCK.

Scan Tool Method

The scan tool can clear ABS/TCS system DTCs using the mass storage cartridge.

1. Install the scan tool and the mass storage cartridge.
2. Select "Fault Memory."
3. Select "Clear Fault Memory."

Clearing the fault memory cannot reset a valve relay which was shut down when the fault was recognized. Changes are possible only after the fault has been eliminated and the next ignition cycle has begun.

Ignition Cycle Default

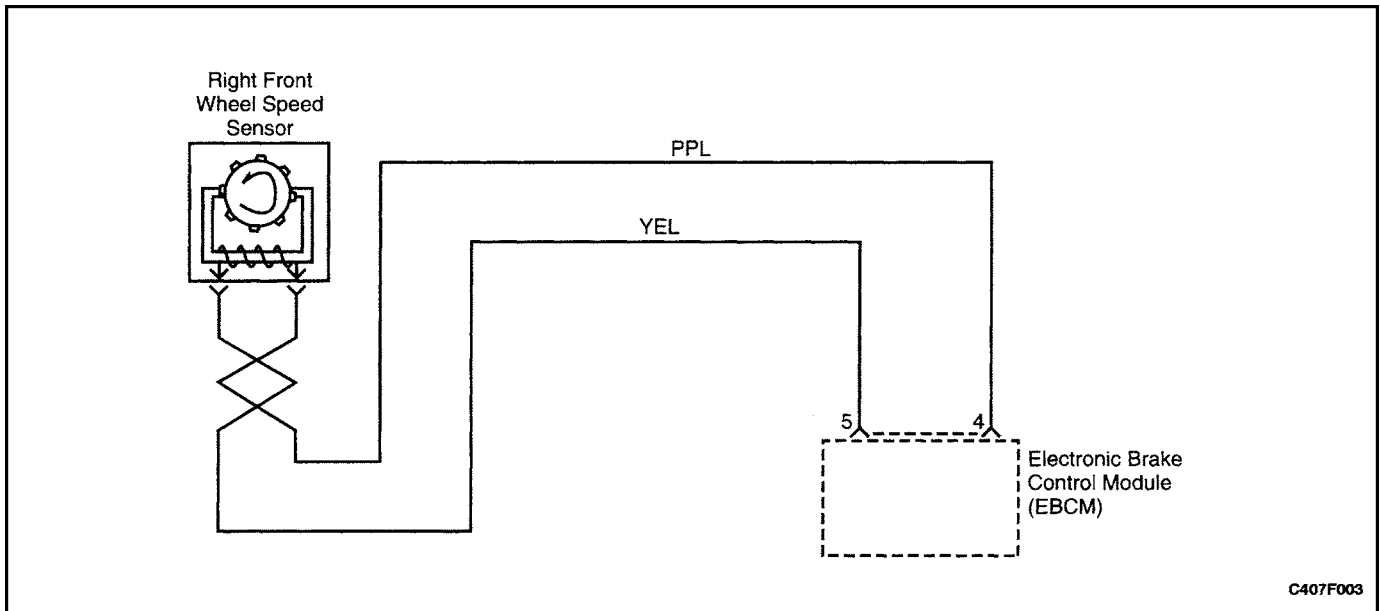
A DTC is erased from memory after 249 ignition cycles without any reappearance of that malfunction.

INTERMITTENTS AND POOR CONNECTIONS

As with most electronic systems, intermittent malfunctions may be difficult to diagnose accurately. The following is a method to try to isolate an intermittent malfunction, especially in wheel speed circuitry.

If an ABS malfunction occurs, the ABS indicator will illuminate during the ignition cycle in which the malfunction was detected. If it is an intermittent problem which seems to have corrected itself (ABS indicator OFF), a history DTC will be stored. Also stored will be the history data of the DTC at the time the malfunction occurred. Use the scan tool modular diagnostic system to read ABS history data.

Most intermittents are caused by faulty electrical connections or wiring, although a sticking relay or solenoid can occasionally be at fault.



DIAGNOSTIC TROUBLE CODE (DTC) 21

RIGHT FRONT WHEEL SPEED SENSOR FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
6. This step tests the wiring for a short to voltage.
8. This step tests the wiring for a short to ground.
10. This step tests for an open or high resistance in the wiring.

Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

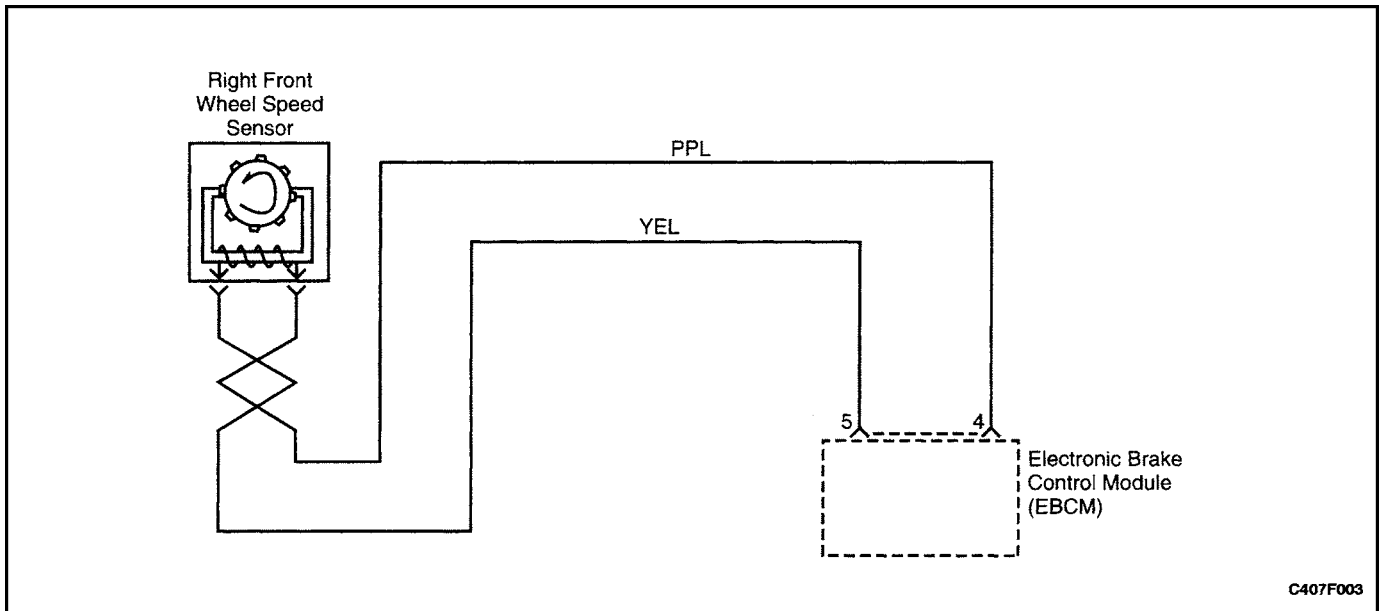
It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

You can use the scan tool to monitor wheel speeds during a road test. Watch the wheel speeds being displayed on the scan tool to see if any of the readings is unusual, such as one sensor varying in speed from the other three, a signal going intermittently high or low, etc. If this does not identify the intermittent, wet the speed sensor harness on the underside of the vehicle and perform a road test, monitoring the wheel speeds with the scan tool.

DTC 21 – Right Front Wheel Speed Sensor Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go toStep 3	Go toStep 2
2	1. Turn the ignition to LOCK. 2. Disconnect the right front wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure the resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go toStep 4	Go toStep 3
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Switch the DVM to the ac millivolt range. 2. Measure the voltage output between the wheel speed sensor terminals while rotating the wheel about 1 revolution every 2 seconds. Is the output within the specified value?	\approx 120 mv	Go toStep 6	Go toStep 5
5	Replace the speed sensor or the toothed wheel, as required. Is the repair complete?		System OK	
6	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go toStep 7	Go toStep 8
7	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
8	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 4 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 5 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go toStep 9	Go toStep 10
9	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
10	1. Measure the resistance between terminal 4 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the PPL wire. 2. Measure the resistance between terminal 5 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the YEL wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go toStep 11	Go toStep 12

Step	Action	Value(s)	Yes	No
11	Repair the open or high resistance in the affected circuit as required. Is the repair complete?		System OK	
12	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 23

RIGHT FRONT WHEEL SPEED SENSOR CONTINUITY FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective or disconnected.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
4. This step tests the wiring for a short to voltage.
6. This step tests the wiring for a short to ground.
8. This step tests for an open or a high resistance in the wiring.

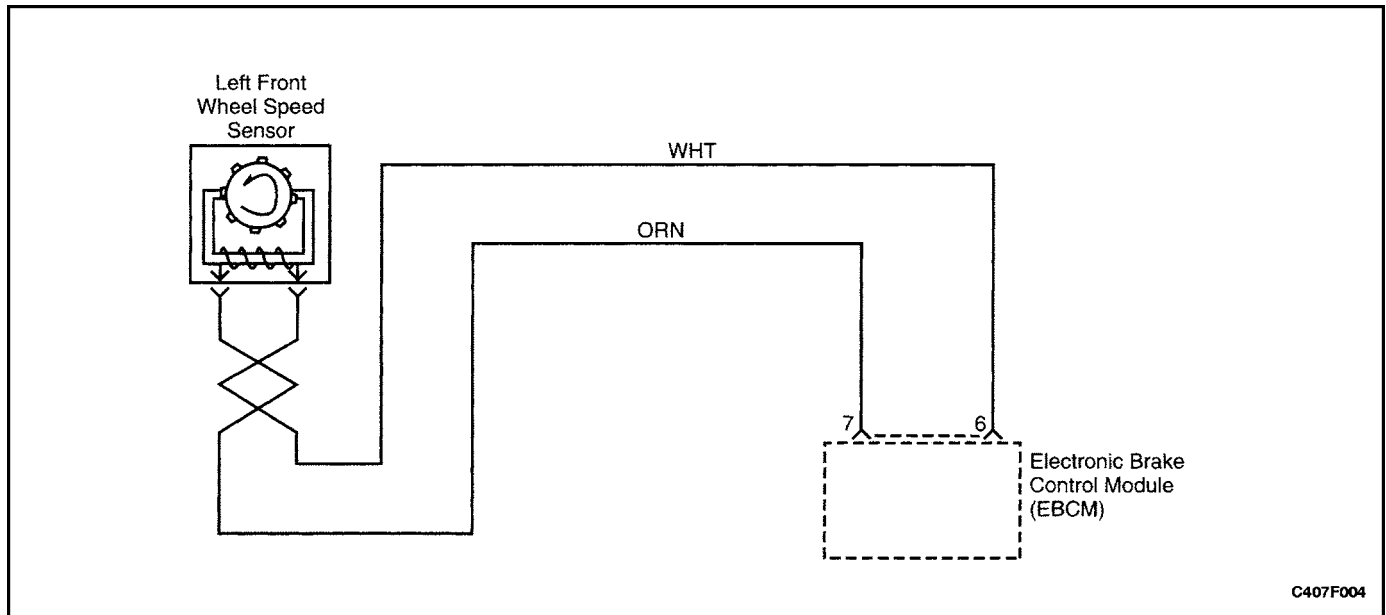
Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

DTC 23 – Right Front Wheel Speed Sensor Continuity Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go toStep 3	Go toStep 2
2	1. Turn the ignition to LOCK. 2. Disconnect the right front wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure the resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go toStep 4	Go toStep 3
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go toStep 5	Go toStep 6
5	Repair the short to voltage in the affected circuit.		System OK	
6	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 4 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 5 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go toStep 7	Go toStep 8
7	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
8	1. Measure the resistance between terminal 4 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the PPL wire. 2. Measure the resistance between terminal 5 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the YEL wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go toStep 9	Go toStep 10
9	Repair the open or high resistance in the affected circuit, as required. Is the repair complete? Is the repair complete?		System OK	
10	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 25

LEFT FRONT WHEEL SPEED SENSOR FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective or disconnected.
- There is a problem in the wiring..
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
4. This step tests the wiring for a short to voltage.
6. This step tests the wiring for a short to ground.
8. This step tests for an open or a high resistance in the wiring.

Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

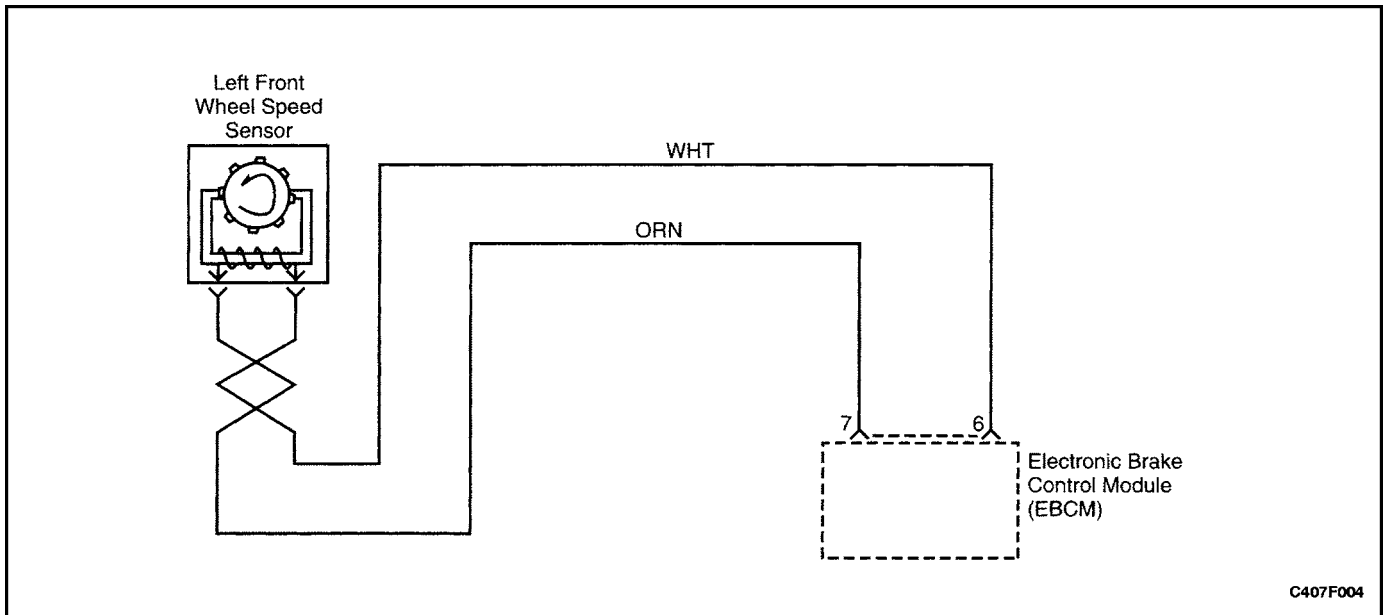
Use the scan tool to monitor wheel speeds during a road test. Watch the wheel speeds being displayed on the scan tool to see if any of the readings are unusual, such as one sensor varying in speed from the other three, a signal going intermittently high or low, etc. If this does not identify the intermittent, wet the speed sensor harness on the underside of the vehicle and perform a road test, monitoring the wheel speeds with the scan tool.

DTC 25 – Left Front Wheel Speed Sensor Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go toStep 3	Go toStep 2
2	1. Turn the ignition to LOCK. 2. Disconnect the left front wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure the resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go toStep 4	Go toStep 3
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Switch the DVM to the ac millivolt range. 2. Measure the voltage output between the wheel speed sensor terminals while rotating the wheel about 1 revolution every 2 seconds. Is the output within the specified value?	\approx 120 mv	Go toStep 6	Go toStep 5
5	Replace the speed sensor or the toothed wheel, as required. Is the repair complete?		System OK	
6	1. Disconnect the from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go toStep 7	Go toStep 8
7	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
8	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 6 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 7 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go toStep 9	Go toStep 10
9	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
10	1. Measure the resistance between terminal 6 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the WHT wire. 2. Measure the resistance between terminal 7 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the ORN wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go toStep 11	Go toStep 12

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Step	Action	Value(s)	Yes	No
11	Repair the open or high resistance in the affected circuit, as required. Is the repair complete?		System OK	
12	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 27

LEFT FRONT WHEEL SPEED SENSOR CONTINUITY FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
4. This step tests the wiring for a short to voltage.
6. This step tests the wiring for a short to ground.
8. This step tests for an open or a high resistance in the wiring.

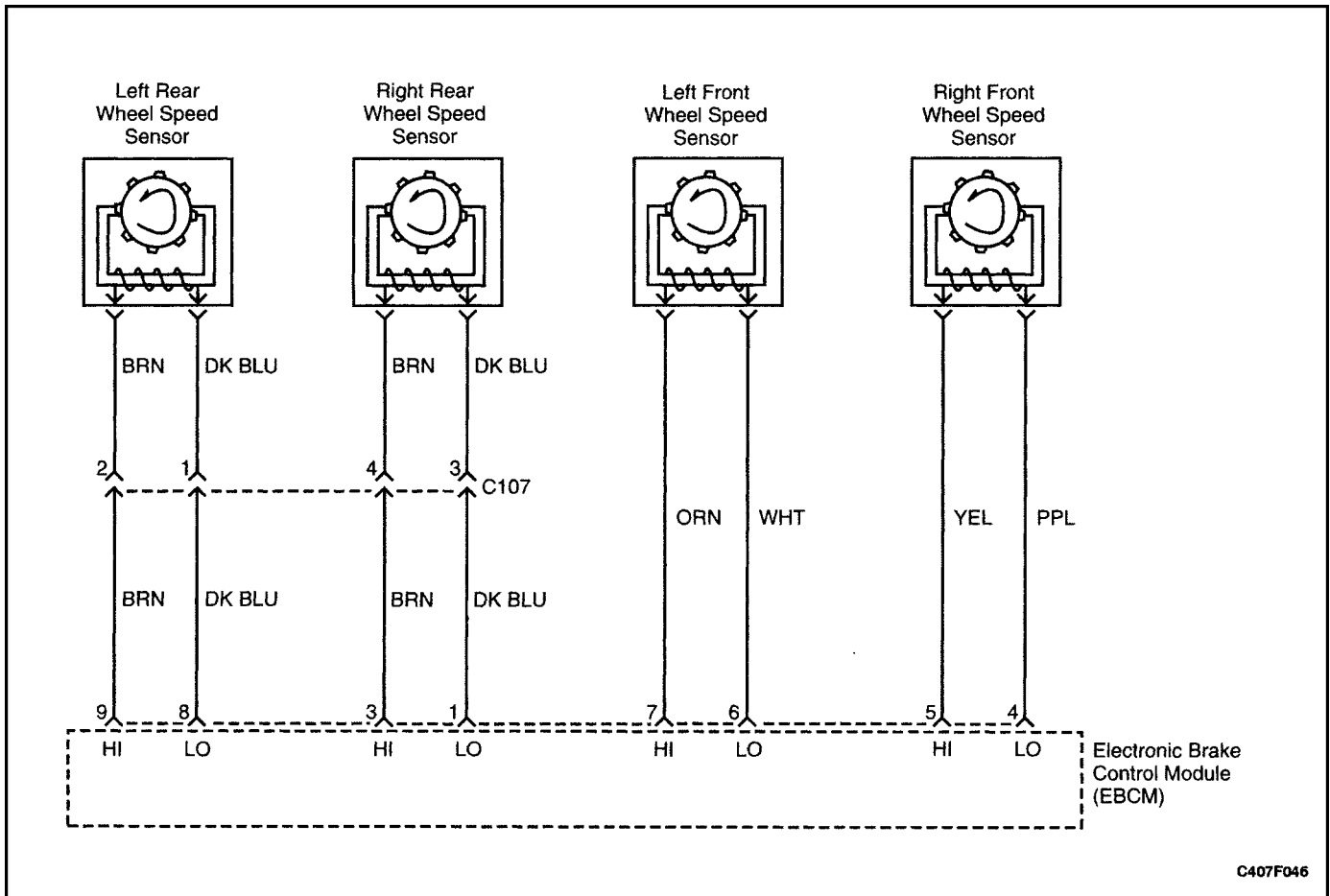
Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

DTC 27 – Left Front Wheel Speed Sensor Continuity Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go to <i>Step 3</i>	Go to <i>Step 2</i>
2	1. Turn the ignition to LOCK. 2. Disconnect the left front wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure the resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go to <i>Step 4</i>	Go to <i>Step 3</i>
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
6	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 6 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 7 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go to <i>Step 7</i>	Go to <i>Step 8</i>
7	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
8	1. Measure the resistance between terminal 6 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the WHT wire. 2. Measure the resistance between terminal 7 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the ORN wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go to <i>Step 9</i>	Go to <i>Step 10</i>
9	Repair the open or high resistance in the affected circuit, as required. Is the repair complete?		System OK	
10	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 28

WHEEL SPEED SENSOR FREQUENCY ERROR

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the wheel speed sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine wheel speed. The voltage generated depends on the air gap between the wheel speed sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This DTC will set when the EBCM cannot identify which wheel speed sensor is causing the malfunction. It is necessary to check all wheel speed sensors and associated wiring to determine the cause of the DTC.

Cause(s)

- Incorrect number of teeth on the toothed wheel.
- Damaged or broken teeth on the toothed wheel.
- Discontinuity or short in speed wheel speed sensor wiring.

Fail Action

Antilock brake system (ABS) action is disabled and the ABS warning lamp is ON.

Test Description

The number(s) below refer to Step(s) on the diagnostic table.

1. This step begins the examination of the front wheel speed sensor sensors.
3. This step checks for a problem with one of the front toothed rings.
5. This step checks the front speed wheel speed sensors.
9. This step checks for shorts in a front wheel speed sensor harness.
7. This step checks for opens in a front wheel speed sensor harness.
9. This step begins a check of the rear wheel speed sensors.
11. This step checks for a problem with one of the rear toothed rings.
13. This step checks the rear wheel speed sensors.

15. This step checks for shorts in a rear wheel speed sensor harness.
17. This step checks for opens in a rear wheel speed sensor harness.

Diagnostic Aids

DTC 28 may be set by running the scan tool auto test if the throttle angle readings are not updating while in the data list mode. If this is the case, clear the DTCs, disconnect the scan tool, and road test the vehicle to at least 25 km/h (15 mph) to see if the DTC resets.

Check the toothed wheels for any large grooves, gouges,

marks, etc. that might influence the tooth's signal at the wheel speed sensor. Also, check for a buildup of foreign material in the gaps between the teeth in the toothed wheel, as this material may cause this malfunction.

A badly worn hub/bearing assembly may cause this malfunction. The wheel speed sensor-to-toothed wheel air gap may change excessively due to bearing play.

If an improper rear hub assembly or front outer constant velocity joint is installed, one with a toothed wheel containing the incorrect number of teeth, this DTC can set. Be sure that all the toothed wheels have 48 teeth.

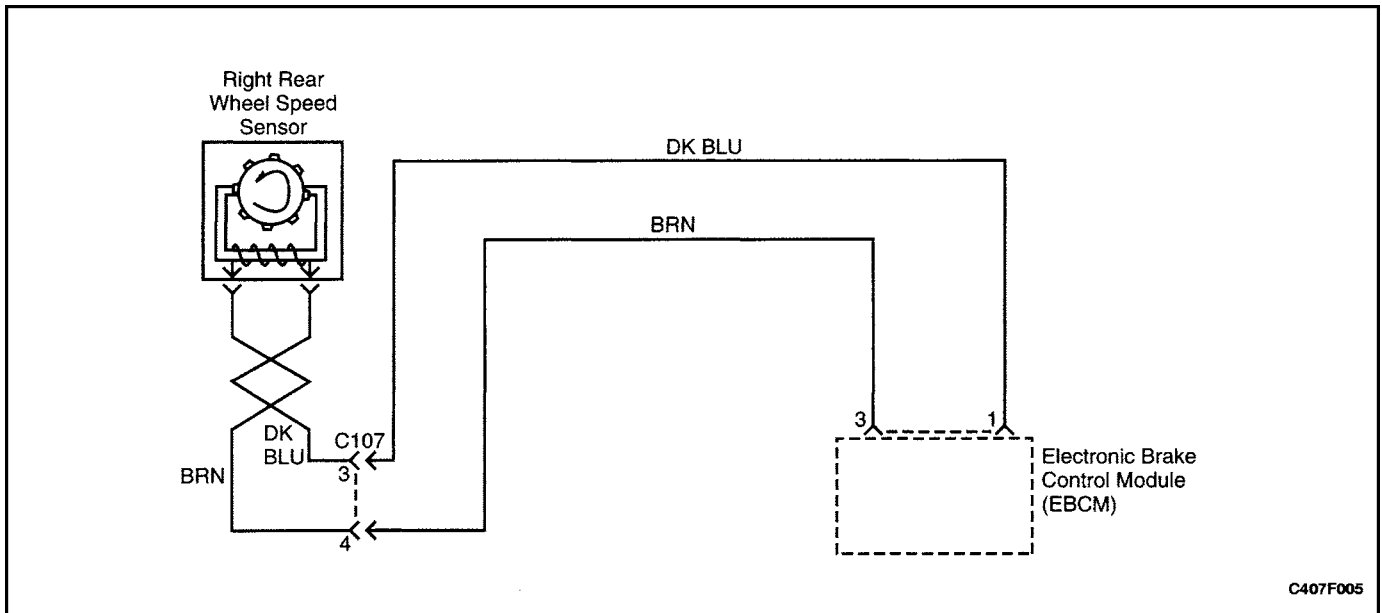
DTC 28 – Wheel Speed Sensor Frequency Error

Step	Action	Value(s)	Yes	No
1	Visually inspect the wiring for the front wheel speed sensor sensors. Is there any damage?		Go toStep 2	Go toStep 3
2	Repair or replace components, as required. Is the repair complete?		System OK	
3	Check that the correct outer constant velocity (CV) joints are installed on the vehicle. They should have speed rings with 48 teeth. Is one of these incorrect?		Go toStep 4	Go toStep 5
4	Replace the incorrect outer CV joint with the proper unit. Is the repair complete?		System OK	
5	1. Disconnect the wheel speed sensor harnesses from the wheel speed sensor connectors. 2. Measure the wheel speed sensor resistance at the wheel speed sensor connector terminals. Does the resistance fall within the specified values for both wheel speed sensors?	1280–1920 Ω	Go toStep 7	Go toStep 6
6	Replace the faulty wheel speed sensor. Is the repair complete?		System OK	
7	1. Disconnect the ABS control module connector. 2. Check each wheel speed sensor harness for a short circuit between its wires with a digital ohmmeter attached to the two terminals at the harness side of the wheel speed sensor connector. 3. Also check each wheel speed sensor harness wire for a short to ground from the connector terminals. Is there any short circuit in either wheel speed sensor harness?		Go toStep 8	Go toStep 9
8	Repair the short circuit in the wiring or from a wiring harness to ground. Is the repair complete?		System OK	

Step	Action	Value(s)	Yes	No
9	Check the continuity of the wiring in both front speed wheel speed sensor circuits between the ABS connector and the wheel speed sensor wheel speed sensor connector on each side of the vehicle. <ul style="list-style-type: none"> The left side uses terminals 6 and 7 at the ABS connector. The right side uses terminals 4 and 5 at the ABS connector. Is continuity good for both harnesses?		Go toStep 11	Go toStep 10
10	Repair the discontinuity found in the front wheel speed sensor harness. Is the repair complete?		System OK	
11	1. Visually inspect the wiring for the rear wheel speed sensor wheel speed sensors. 2. Check that the wheel speed sensors are properly mounted and that the retaining bolts are properly tightened. Is there any damage?		Go toStep 12	Go toStep 13
12	Repair or replace the components, as required. Is the repair complete? Is the repair complete?		System OK	
13	Remove each speed wheel speed sensor from the rear knuckles and inspect the toothed ring through the wheel speed sensor mounting holes. <ul style="list-style-type: none"> Make sure that the toothed ring has 48 teeth. Check for any damaged or missing teeth. Check that the ring is properly positioned under the wheel speed sensor.h. Is there any damage or other fault with either speed ring?		Go toStep 14	Go toStep 15
14	Replace the rear wheel hub with the proper unit. Is the repair complete?		System OK	
15	1. Disconnect the rear wheel speed sensor harnesses from the wheel speed sensor connectors. 2. Measure the wheel speed sensor resistance at the wheel speed sensor connector terminals. Does the resistance fall within the specified values for both wheel speed sensors?	1280–1920 Ω	Go toStep 17	Go toStep 14
16	Replace the faulty wheel speed sensor. Is the repair complete?		System OK	
17	1. The ABS control module connector should still be disconnected. Disconnect it now if it is not. 2. Check each wheel speed sensor harness for a short circuit between its wires with a digital ohmmeter attached to the two terminals at the harness side of the wheel speed sensor connector. 3. Also, check each wheel speed sensor harness wire for a short to ground from the connector terminals. Is there any short circuit in either wheel speed sensor harness?		Go toStep 18	Go toStep 19

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Step	Action	Value(s)	Yes	No
18	Repair the short circuit in the wiring or from a wire to ground. Is the repair complete?		System OK	
19	Check the continuity of the wiring in both rear speed wheel speed sensor circuits between the ABS connector and the wheel speed sensor wheel speed sensor connector on each side of the vehicle. <ul style="list-style-type: none"> The left side uses terminals 8 and 9 at the ABS connector. The right side uses terminals 1 and 3 at the ABS connector. Is continuity good for both harnesses?		Go to <i>Step 21</i>	Go to <i>Step 20</i>
20	Repair the discontinuity found in the rear wheel speed sensor wheel speed sensor harness or connector C107. Is the repair complete?		System OK	
21	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 31

RIGHT REAR WHEEL SPEED SENSOR FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
6. This step tests the wiring for a short to voltage.
8. This step tests the wiring for a short to ground.
10. This step tests for an open or high resistance in the wiring.

Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

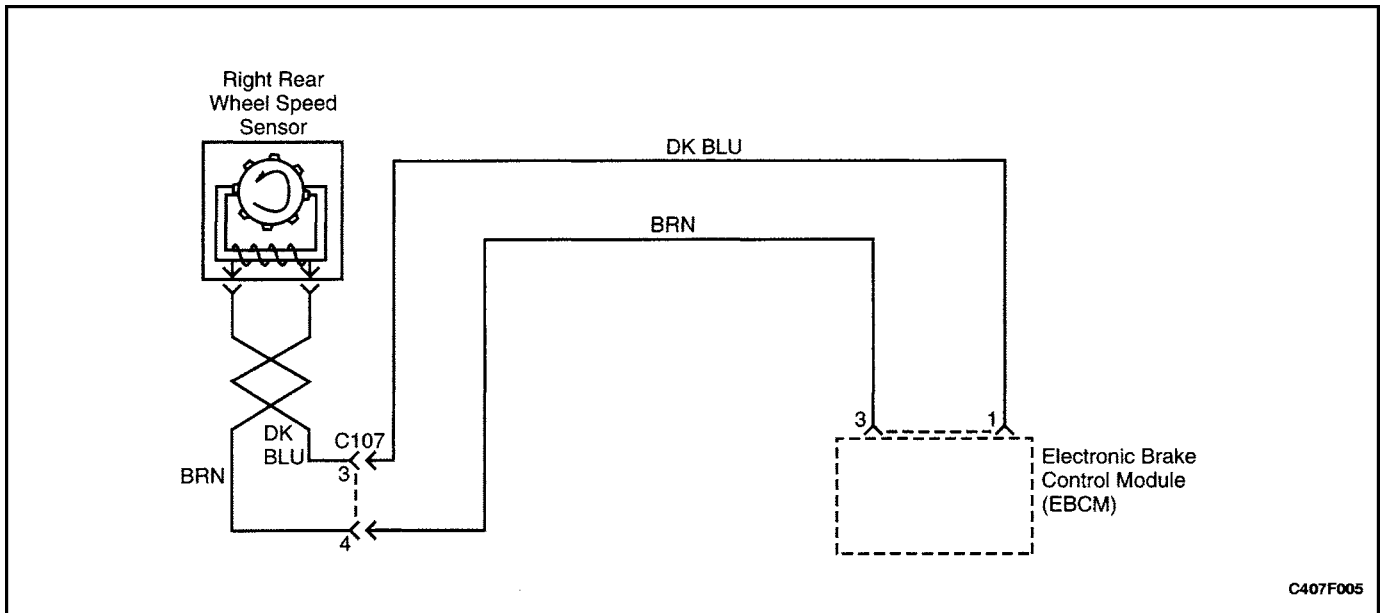
It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

Use the scan tool to monitor wheel speeds during a road test. Watch the wheel speeds being displayed on the scan tool to see if any of the readings are unusual, such as one sensor varying in speed from the other three, a signal going intermittently high or low, etc. If this does not identify the intermittent, wet the speed sensor harness on the underside of the vehicle and perform a road test, monitoring wheel speeds with the scan tool.

DTC 31 – Right Rear Wheel Speed Sensor Fault

Step	Action	Value(s)	Yes	No
1	1 Examine the wheel speed sensor. Are there any signs of physical damage?		Go toStep 3	Go toStep 2
2	1. Turn the ignition to LOCK. 2. Disconnect the right rear wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure the resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go toStep 4	Go toStep 3
3	Replace the wheel speed sensor. Is the repair complete? Is the repair complete?		System OK	
4	1. Switch the DVM to the ac millivolt range. 2. Measure the voltage output between the wheel speed sensor terminals while rotating the wheel about 1 revolution every 2 seconds. Is the output within the specified value?	\approx 120 mv	Go toStep 6	Go toStep 5
5	Replace the speed sensor or the toothed wheel, as required. Is the repair complete?		System OK	
6	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go toStep 7	Go toStep 8
7	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
8	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 1 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 3 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go toStep 9	Go toStep 10
9	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
10	1. Measure the resistance between terminal 1 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the DK BLU wire. 2. Measure the resistance between terminal 3 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the BRN wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go toStep 11	Go toStep 12

Step	Action	Value(s)	Yes	No
11	Repair the open or high resistance in the affected circuit as required. Be sure to check terminals 3 and 4 of connector C107. Is the repair complete?		System OK	
12	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 33

RIGHT REAR WHEEL SPEED SENSOR CONTINUITY FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
4. This step tests the wiring for a short to voltage.
6. This step tests the wiring for a short to ground.
8. This step tests for an open or a high resistance in wiring.

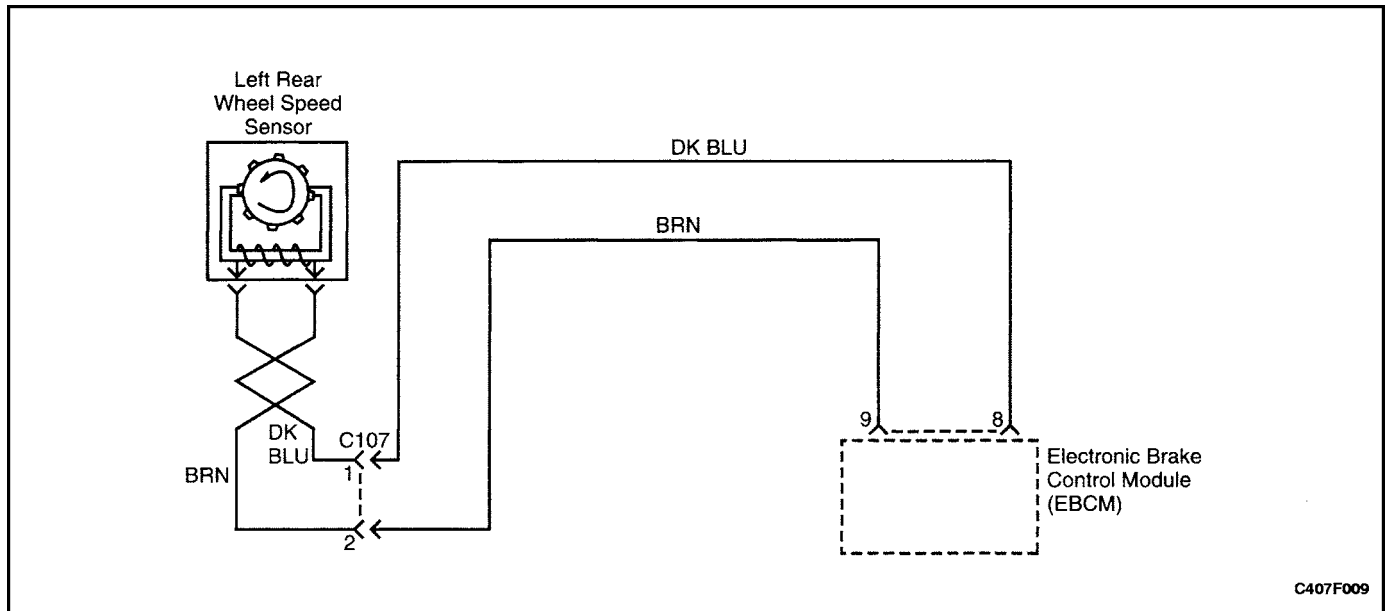
Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

DTC 33 – Right Rear Wheel Speed Sensor Continuity Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go to <i>Step 3</i>	Go to <i>Step 2</i>
2	1. Turn the ignition to LOCK. 2. Disconnect the right rear wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure the resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go to <i>Step 4</i>	Go to <i>Step 3</i>
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
6	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 1 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 3 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go to <i>Step 7</i>	Go to <i>Step 8</i>
7	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
8	1. Measure the resistance between terminal 1 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the DK BLU wire. 2. Measure the resistance between terminal 3 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the BRN wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go to <i>Step 9</i>	Go to <i>Step 10</i>
9	Repair the open or high resistance in the affected circuit, as required. Be sure to check terminals 3 and 4 of connector C107. Is the repair complete?		System OK	
10	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 35

LEFT REAR WHEEL SPEED SENSOR FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
6. This step tests the wiring for a short to voltage.
8. This step tests the wiring for a short to ground.
10. This step tests for an open or a high resistance in the wiring.

Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

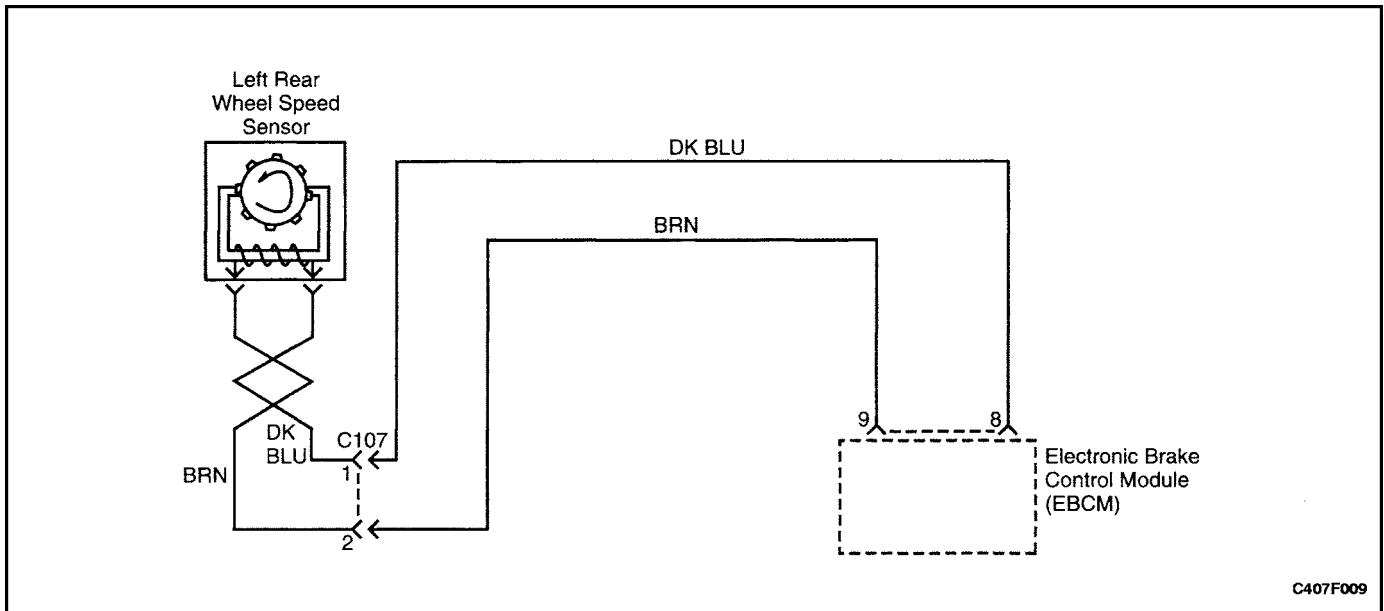
Use the scan tool to monitor wheel speeds during a road test. Watch the wheel speeds being displayed on the scan tool to see if any of the readings are unusual, such as one sensor varying in speed from the other three, a signal going intermittently high or low, etc. If this does not identify the intermittent, wet the speed sensor harness on the underside of the vehicle and perform a road test, monitoring wheel speeds with the scan tool.

DTC 35 – Left Rear Wheel Speed Sensor Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go to Step 3	Go to Step 2
2	1. Turn the ignition to LOCK. 2. Disconnect the left rear wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go to Step 4	Go to Step 3
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Switch the DVM to the ac millivolt range. 2. Measure the voltage output between the wheel speed sensor terminals while rotating the wheel about 1 revolution every 2 seconds. Is the output within the specified value?	\approx 120 mv	Go to Step 6	Go to Step 5
5	Replace the speed sensor or the toothed wheel, as required. Is the repair complete?		System OK	
6	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go to Step 7	Go to Step 8
7	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
8	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 8 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 9 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go to Step 9	Go to Step 10
9	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
10	1. Measure the resistance between terminal 8 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the DK BLU wire. 2. Measure the resistance between terminal 9 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the BRN wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go to Step 11	Go to Step 12

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Step	Action	Value(s)	Yes	No
11	Repair the open or the high resistance in the affected circuit, as required. Be sure to check terminals 1 and 2 of connector C107. Is the repair complete?		System OK	
12	Replace the ABS unit. Is the repair complete?		System OK	



DIAGNOSTIC TROUBLE CODE (DTC) 37

LEFT REAR WHEEL SPEED SENSOR CONTINUITY FAULT

Circuit Description

The toothed wheel generates a voltage pulse as it moves past the sensor. Each tooth-gap-tooth series on the wheel generates the pulses. The electronic brake control module (EBCM) uses the frequency of these pulses to determine the wheel speed. The voltage generated depends on the air gap between the sensor and the toothed wheel, and on the wheel speed.

Diagnosis

This procedure checks for a malfunctioning wheel speed sensor, a short to ground or to voltage in the wiring, or a contact problem in a connector.

Cause(s)

- The wheel speed sensor is defective.
- There is a problem in the wiring.
- There is a problem with a connector.

Fail Action

ABS action is disabled, and the ABS warning lamp is ON.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step begins an examination for a defective wheel speed sensor.
4. This step tests the wiring for a short to voltage.
6. This step tests the wiring for a short to ground.
8. This step tests for an open or high resistance in the wiring.

Diagnostic Aids

Be sure that the speed sensor wiring is properly routed and retained. This will help to prevent false signals due to the pickup of electrical noise.

It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

DTC 37 – Left Rear Wheel Speed Sensor Continuity Fault

Step	Action	Value(s)	Yes	No
1	Examine the wheel speed sensor. Are there any signs of physical damage?		Go to <i>Step 3</i>	Go to <i>Step 2</i>
2	1. Turn the ignition to LOCK. 2. Disconnect the left rear wheel speed sensor connector. 3. Use a digital voltmeter (DVM) to measure resistance between the sensor terminals. Is the resistance within the specified value at approximately 25°C (77°F)?	1280–1920 Ω	Go to <i>Step 4</i>	Go to <i>Step 3</i>
3	Replace the wheel speed sensor. Is the repair complete?		System OK	
4	1. Disconnect the harness from the EBCM. 2. Connect a DVM between ground and one terminal of the wheel speed connector. 3. Turn the ignition to ON. 4. Repeat the above test for the other terminal of the wheel speed connector. Is the voltage for either of these terminals within the specified value?	> 1 v	Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Repair the short to voltage in the affected circuit. Is the repair complete?		System OK	
6	1. Turn the ignition to LOCK. 2. Measure the resistance to ground from terminal 8 at the harness EBCM connector. 3. Measure the resistance to ground from terminal 9 at the harness EBCM connector. Is the resistance at either circuit less than the specified value?		Go to <i>Step 7</i>	Go to <i>Step 8</i>
7	Repair the short to ground in the affected circuit. Is the repair complete?		System OK	
8	1. Measure the resistance between terminal 8 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the DK BLU wire. 2. Measure the resistance between terminal 9 at the harness EBCM connector and the harness wheel speed sensor connector terminal connected to the BRN wire. Is the resistance on either circuit within the specified value?	> 5 Ω	Go to <i>Step 9</i>	Go to <i>Step 10</i>
9	Repair the open or high resistance in the affected circuit as required. Be sure to check terminals 1 and 2 of connector C107. Is the repair complete?		System OK	
10	Replace the ABS unit. Is the repair complete?		System OK	