

ANTI-LOCK BRAKE SYSTEM

1997 BRAKES General Motors Corp. - Anti-Lock/TCS - Bosch 2SH

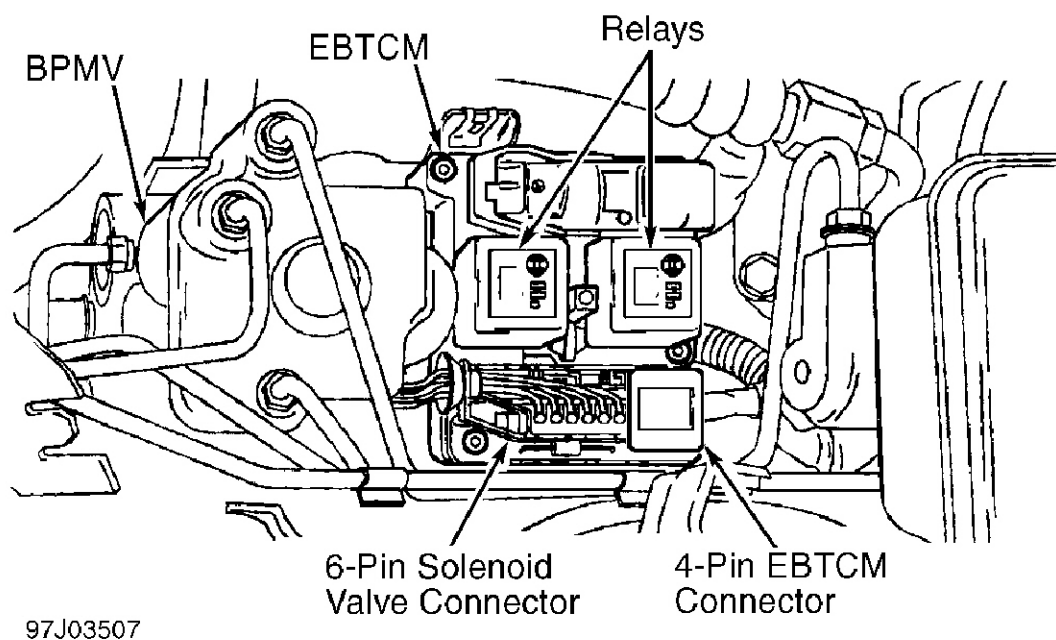
DESCRIPTION

CAUTION: See ANTI-LOCK BRAKE SAFETY PRECAUTIONS article in **GENERAL INFORMATION** before servicing anti-lock brake system.

The Bosch 2SH Anti-Lock Brake System (ABS) with Traction Control System (TCS) is designed to prevent wheel lock-up during heavy braking. This provides improved driver control and reduces the distance required to stop vehicle. The system also monitors rear wheel speed and compares it to front wheel speed. TCS is operational at all vehicle speeds. If excessive front wheel speed is detected at either front wheel, TCS will be activated. TCS uses front brake intervention, fuel cutoff and spark retard to provide improved traction.

Major system components include the Electronic Brake Traction Control Module (EBTCM), speed sensors mounted at each wheel, 3 instrument cluster warning indicators, brakelight switch mounted at brake pedal, pump motor relay and solenoid valve relay mounted on EBTCM, and Brake Pressure Modulator Valve (BPMV). See Fig. 1 . BPMV assembly houses electric pump motor and solenoid valves.

NOTE: For more information on brake system, see BRAKE SYSTEM article.



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Fig. 1: Identifying ABS/TCS Components
Courtesy of GENERAL MOTORS CORP.

OPERATION

During normal driving and braking operations, ABS acts like a conventional braking system. Each wheel speed sensor constantly sends an AC voltage signal to EBTCM. This information is translated to wheel rotation speed. When EBTCM detects wheel lock-up is about to occur, it activates appropriate solenoid to pulse on and off rapidly, regulating hydraulic pressure to each wheel. A slight pulsation should be felt through brake pedal, indicating ABS is working.

BRAKE warning indicator (Red) will illuminate when ignition switch is turned to START position and should go out when ignition switch is turned to ON position. ABS indicator (Amber) and TC indicator (Amber) illuminate

when ignition is turned on and goes out after about 2 seconds. If any indicator remains illuminated more than 30 seconds after vehicle is started, system malfunction is indicated. See **DIAGNOSIS & TESTING**.

Red BRAKE warning indicator will activate if parking brake is applied or brake fluid is low. Amber ABS indicator is controlled by EBTCM and comes on if problem is detected with ABS. When indicator is illuminated, ABS is disabled and braking is accomplished by conventional brake system. If both warning indicators are illuminated, check conventional brake system for hydraulic system failure. Amber TC indicator is controlled by EBTCM and comes on if problem is detected with TCS. When indicator is illuminated, TCS is disabled and braking (conventional and ABS) is unaffected.

BLEEDING BRAKE SYSTEM

NOTE: Use DOT 3 brake fluid only. Protect vehicle exterior paint from possible brake fluid spillage.

MANUAL BLEEDING PROCEDURE

1. Deplete vacuum reserve from power brake booster by depressing brake pedal several times with engine off. Fill master cylinder reservoir and keep at least half full during bleeding procedure. Reinstall master cylinder reservoir cap. If master cylinder is not suspected of having air in bore, go to step 4). If master cylinder is known or suspected of having air in bore, go to next step.
2. Disconnect front EBTCM brakeline fitting at master cylinder. Allow fluid to flow from fitting. Tighten fitting to specification. See **TORQUE SPECIFICATIONS**. Have an assistant depress brake pedal slowly and hold. Ensure reservoir fluid level is maintained. Again, loosen front EBTCM brakeline fitting. Tighten fitting while pedal is still at floor. Release brake pedal slowly. Wait 15 seconds.

NOTE: Rapid pumping of brake pedal causes master cylinder secondary piston to move into a position that makes bleeding system difficult.

3. Repeat step 2), including 15 second wait, until fluid is clear and free of air bubbles. Repeat procedure at other (rear most) EBTCM brakeline fitting on master cylinder. Master cylinder is now bled. If wheel calipers are not suspected to have air in them, it is not necessary to bleed them.
4. If wheel calipers are known or suspected to have air in them, raise and support vehicle. Remove bleeder valve cap from right rear wheel. Place proper size box end wrench over bleeder valve. Attach one end of clear tube over valve and submerge other end in container partially filled with clean brake fluid.
5. Have an assistant depress brake pedal slowly and hold. Loosen bleeder valve to purge air from caliper. Tighten bleeder valve to specification and slowly release brake pedal. See **TORQUE SPECIFICATIONS**. Wait 15 seconds. Repeat procedure, including 15 second wait, until all air is removed.
6. Remove tube and wrench. Install bleeder valve cap. Fill master cylinder reservoir with fluid. Proceed to left rear, right front and left front wheels in sequence. Ensure there is no sponginess in brake pedal and that BRAKE warning indicator is off.

DIAGNOSIS

NOTE: To diagnose ABS/TCS, manufacturer recommends using Tech 1 scan tool, DVOM, Breakout Box (J-39700) and Adapter (J-39700-250).

The EBTCM has self-diagnostic capability, which can detect system failures. Diagnostic trouble codes stored by EBTCM can be displayed using scan tool. See USING TECH 1 SCAN TOOL. Begin ABS/TCS diagnosis with **PRE-DIAGNOSTIC INSPECTION** procedure.

PRE-DIAGNOSTIC INSPECTION

When checking potential ABS/TCS faults, check following before performing diagnostic trouble code testing:

1. Check ABS fuse and CLAMP 15 CRUISE fuse in instrument panel fuse block.
2. Check fuse V4 in power distribution fuse block located in left front of engine compartment.
3. Check all ABS/TCS wiring harness connectors for proper engagement, loose wires or terminals and/or corrosion. Check harness routing; pay particular attention to wheel speed sensor wiring harness routing.
4. Ensure brake switches are properly adjusted.
5. Check brake system for leaks and proper fluid level.
6. Check ABS/TCS ground circuit for clean tight connections. Ground is located in left front of engine compartment, in body and instrument panel wiring harness.
7. Always perform diagnostic system check before diagnosing DTCs. See **DIAGNOSTIC SYSTEM CHECK**. Solenoid valve relay is turned off by EBTCM when a diagnostic trouble code is set. When using scan tool to monitor data list when trouble codes are set, solenoid will be displayed as being off. This is normal and not an indication of a system malfunction. EBTCM performs an automatic test during each ignition cycle when vehicle speed reaches 4 MPH in either forward or reverse. Automatic test cycles each solenoid valve, pump motor and relays to check component operation. EBTCM will set a trouble code if an error is detected. Test may be felt and heard while it is taking place and is a normal mode of operation.

USING TECH 1 SCAN TOOL

Connect Tech 1 scan tool into Data Link Connector (DLC) located under left side of instrument panel. Follow scan tool manufacturer's instructions to retrieve stored fault codes.

If multiple codes are displayed, begin diagnosis with code that is displayed first. See **DIAGNOSTIC TROUBLE CODE (DTC)** table. Diagnose all codes in the order displayed by Tech 1 scan tool.

Selecting Vehicle

Using Tech 1 function keys, select model year. After selecting model year, enter type of vehicle being tested. Pressing EXIT will return Tech 1 to previous screen.

Selecting Test Mode

Five test modes are available for diagnosing ABS/TCS. Test modes are:

- Mode F0 (Data List) Mode continuously monitors wheel speed data, brake switch status, ABS/TCS status, and other inputs and outputs. Data list cannot be read if any DTCs are set.
- Mode F1 (DTC History) Mode displays diagnostic trouble code history data. Fault occurrence information is stored for first 5 trouble codes stored and very last trouble code stored. Fault occurrence information stored consists of trouble code number, number of failure occurrences and number of ignition cycles since fault first and last occurred.
- Mode F2 (Diagnostic Trouble Codes) Mode displays ABS/TCS diagnostic trouble codes. Both ignition cycle and history may be displayed or cleared.
- Mode F3 (Snapshot) Mode will help isolate intermittent problems by capturing data before and after fault condition. Snapshots cannot be read until all stored DTCs are cleared.

If MANUAL TRIGGER is selected, Tech 1 will wait for ENTER to be pressed before storing data. Tech 1 stores data from 8 seconds before trigger and 8 seconds after trigger is activated. All stored information can be displayed and examined for conditions which might indicate a problem, but may not set a code.

If AUTOMATIC TRIGGER is selected, Tech 1 will capture data which deviates from normal conditions but may not set a DTC, such as driving over bumpy roads or railroad tracks. Condition may be caused by loose connections or intermittent wiring problems causing signal to drop out momentarily. While Tech 1 is waiting

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for a trigger, ENTER or F9 key may be used to force a trigger.

- Mode F4 (Misc. Test) In this mode, Tech 1 performs various ABS functional tests to help isolate problems during trouble shooting.

DIAGNOSTIC TROUBLE CODE (DTC)

Code	Definition
<u>16</u>	Left Front Solenoid Circuit Malfunction
<u>17</u>	Right Front Solenoid Circuit Malfunction
<u>18</u>	Rear Solenoid Circuit Malfunction
<u>19</u>	Valve Relay Circuit Malfunction
<u>25</u>	Wheel Speed Sensor Circuit Frequency Malfunction
<u>31</u>	RPM Signal Circuit Malfunction
<u>35</u>	Return Pump Relay Circuit Malfunction
<u>37</u>	Brake Switch Circuit Malfunction
<u>39</u>	Left Front Wheel Speed Sensor Circuit Malfunction
<u>41</u>	Left Front Wheel Speed Sensor Circuit Open Or Shorted
<u>42</u>	Right Front Wheel Speed Sensor Circuit Malfunction
<u>43</u>	Right Front Wheel Speed Sensor Circuit Open Or Shorted
<u>44</u>	Left Rear Wheel Speed Sensor Circuit Malfunction
<u>45</u>	Left Rear Wheel Speed Sensor Circuit Open Or Shorted
<u>46</u>	Right Rear Wheel Speed Sensor Circuit Malfunction
<u>47</u>	Right Rear Wheel Speed Sensor Circuit Open Or Shorted
<u>48</u>	System Voltage Out Of Range
<u>55</u>	EBTCM Internal Malfunction
<u>65</u>	Variant Coding Traction Control Malfunction
<u>66</u>	Delivered Engine Torque Circuit Malfunction
<u>67</u>	Requested Engine Torque Circuit Malfunction
<u>71</u>	Delivered Transmission Torque Circuit Malfunction

CLEARING DIAGNOSTIC TROUBLE CODES

NOTE: DTCs cannot be cleared by disconnecting EBTCM or negative battery cable, or by turning ignition off. DTCs will be erased when ignition is cycled 100 times without fault reappearing. Ignition cycle counter in EBTCM will then be reset to zero. Codes may also be cleared using Tech 1 scan tool.

1. Connect Tech 1 scan tool. See USING TECH 1 SCAN TOOL. Before clearing DTCs, check and note current DTC data. Select ABS/TCS function. Select DTC(S) function and then CLEAR CODES function.
2. Verify DTCs are cleared. If other DTCs are displayed, either DTCs were not cleared or ABS/TCS fault still exists. Diagnose fault and repeat procedure.

SYMPTOM DIAGNOSIS

If no DTCs are stored, perform appropriate symptom diagnostic test as necessary. See **SYMPTOM DIAGNOSTIC INDEX** table.

SYMPTOM DIAGNOSTIC INDEX

Symptom	(1) Chart

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ABS Indicator On With No DTCs Set	A
ABS Indicator Inoperative With No DTCs Set	B
TC Indicator On With No DTCs Set	C
TC Indicator Inoperative With No DTCs Set	D
No Communication With EBTCM	E
BRAKE Warning Light On	(2)
BRAKE Warning Light Inoperative	(2)
(1) See appropriate test under <u>SYMPTOM DIAGNOSTIC TESTS</u> .	
(2) See INSTRUMENT PANEL article in ACCESSORIES & EQUIPMENT section.	

INTERMITTENTS & POOR CONNECTIONS

Failures in ABS/TCS may be difficult to diagnose accurately. If an ABS/TCS failure or fault occurs, ABS and/or TC indicator will illuminate. If fault is an intermittent problem which has corrected itself (ABS and/or TC indicator off), DTC will be stored.

ABS/TCS self-diagnostic system can be used to help identify suspect circuit. Perform following procedure:

- Display and record DTC history data. Record any descriptive driving circumstances during failure occurrence. Clear any ABS/TCS DTCs set in EBTCM.
- Test drive vehicle. Attempt to repeat failure under condition in which failure occurred. Use Tech 1 scan tool, mode F3 (snapshot), while test driving vehicle. See USING TECH 1 SCAN TOOL.
- After duplicating condition, stop vehicle and display any ABS/TCS DTCs which may have been stored.
- If no trouble codes were stored, perform SYMPTOM DIAGNOSTIC TESTS as necessary.

Most intermittent problems are caused by faulty electrical connectors or wiring. When an intermittent failure is encountered, check suspect circuits for:

- Poor mating of connector halves, or terminals not fully seated in connector body (backed out).
- Improperly formed or damaged terminals. All connector terminals in a problem circuit should be carefully reformed to increase contact tension.
- Check for dirt or corrosion on terminals, which could impede proper terminal contact.
- Poor terminal-to-wire connection. This requires removing terminal from connector body to inspect.
- Wheel speed sensor cables not attached in retainers or routed too close to spark plug wires.
- Low system voltage. If low system voltage is detected at EBTCM, ABS will turn on ABS indicator until normal system voltage is achieved.

DIAGNOSTIC SYSTEM CHECK

1. Turn ignition off. Reconnect all previously disconnected components. Install scan tool. Turn ignition on, with engine off. If scan tool communicates with EBTCM, go to next step. If scan tool does not communicate with EBTCM, proceed to TEST "E", NO COMMUNICATION WITH EBTCM.
2. Road test vehicle for several minutes on several different road surfaces performing several turns reaching speed of at least 15 MPH. Using scan tool, display ABS/TCS DTCs. If any current DTCs are set, go to appropriate DTC for diagnosis. If no current DTCs are set, go to next step.
3. Remove scan tool. Turn ignition off. Turn ignition on, with engine off. If ABS indicator illuminates for about 3 seconds and then goes out, go to next step. If ABS indicator does not illuminate, go to step 5).
4. Turn ignition off. Turn ignition on, with engine off. If TC indicator illuminates for about 3 seconds and then goes out, go to step 7). If TC indicator does not illuminate, go to step 6).

5. If ABS indicator remains illuminated, proceed to TEST "A", ABS INDICATOR ON WITH NO DTCS SET. If ABS indicator does not illuminate, proceed to TEST "B", ABS INDICATOR INOPERATIVE WITH NO DTCS SET.
6. If TC indicator remains illuminated, proceed to TEST "C", TC INDICATOR ON WITH NO DTCS SET. If TC indicator does not illuminate, proceed to TEST "D", TC INDICATOR INOPERATIVE WITH NO DTCS SET.
7. If any history DTCs are set, go to next step. If no history DTCs are set, go to step 9).
8. Go to appropriate history DTC for diagnosis. Investigate conditions required for DTC to set. Drive vehicle for several minutes while monitoring scan tool for ABS/TCS DTCs. If history DTC sets as current while driving vehicle, go to appropriate DTC for diagnosis. If history DTC does not set as current while driving, go to next step.
9. If brakes exhibit any symptoms of improper mechanical operation and/or BRAKE warning indicator illuminates, diagnose brake system. See **BRAKE SYSTEM** article. If brakes do not exhibit any symptoms of improper mechanical operation and/or BRAKE warning indicator does not illuminate, system is okay.

SYMPTOM DIAGNOSTIC TESTS

NOTE: For terminal and circuit identification, see WIRING DIAGRAM .

TEST A: ABS INDICATOR ON WITH NO DTCS SET

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK . After performing diagnostic system check, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform ABS INDICATOR LAMP TEST. If test is successfully completed, go to step 6). If test is not successfully completed, go to next step.
3. Turn ignition off. Remove scan tool. Turn ignition on, with engine off. If ABS indicator illuminates and remains illuminated, go to next step. If ABS indicator does not illuminate, go to step 11).
4. Turn ignition off. Ensure EBTCM harness connectors are properly connected to EBTCM. Turn ignition on, with engine off. If ABS indicator illuminates and remains illuminated, go to next step. If ABS indicator does not illuminate, perform DIAGNOSTIC SYSTEM CHECK .
5. Turn ignition off. Disconnect 25-pin EBTCM connector C1 and 4-pin EBTCM connector C2. Turn ignition on, with engine off. If ABS indicator illuminates and remains illuminated, go to step 8). If ABS indicator does not illuminate, go to next step.
6. Turn ignition off. Check EBTCM connectors C1 and C2 for poor terminal contact, corrosion or damage. If connectors are faulty, go to step 9). If connectors are okay, go to next step.
7. Reconnect EBTCM connectors C1 and C2. Turn ignition on, with engine off. If ABS indicator illuminates and remains illuminated, go to step 10). If ABS indicator does not illuminate, go to step 11).
8. Repair short to ground in Brown/Yellow wire between instrument cluster and EBTCM. After repairs, perform DIAGNOSTIC SYSTEM CHECK .
9. Repair EBTCM connector C1 or C2. After repairs, perform DIAGNOSTIC SYSTEM CHECK .
10. Replace EBTCM. After repairs, perform DIAGNOSTIC SYSTEM CHECK .
11. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Scan tool ABS INDICATOR LAMP TEST function may be used to command ABS indicator while looking for an intermittent malfunction in indicator circuitry. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring harness. Resistance of wheel speed sensor will increase with increased sensor temperature.

TEST B: ABS INDICATOR INOPERATIVE WITH NO DTCS SET

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform ABS INDICATOR LAMP TEST. If test is successfully completed, go to step 6). If test is not successfully completed, go to next step.
3. Turn ignition off. Remove scan tool. Turn ignition on, with engine off. If ABS indicator illuminates and then goes out, go to step 15). If ABS indicator does not illuminate, go to next step.
4. Turn ignition off. Ensure EBTCM harness connectors are properly connected to EBTCM. Turn ignition on, with engine off. If ABS indicator illuminates and then goes out, perform **DIAGNOSTIC SYSTEM CHECK** . If ABS indicator does not illuminate, go to next step.
5. Turn ignition off. Turn ignition on, with engine off. Observe BRAKE warning indicator and TC indicator. If BRAKE warning indicator and TC indicator illuminate and then goes out, go to step 8). If neither indicator illuminates, diagnose instrument cluster. See INSTRUMENT PANEL article in ACCESSORIES & EQUIPMENT section.
6. Turn ignition off. Check EBTCM connectors C1 and C2 for poor terminal contact, corrosion or damage. If connectors are faulty, go to step 13). If connectors are okay, go to next step.
7. Reconnect EBTCM connectors C1 and C2. Turn ignition on, with engine off. Note ABS indicator. If ABS indicator illuminates and then goes out, go to step 15). If ABS indicator does not illuminate, go to step 14).
8. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Connect a fused jumper between terminal No. 1 of breakout box and ground. Turn ignition on, with engine off. If ABS indicator illuminates, go to step 6). If ABS indicator does not illuminate, go to next step.
9. Turn ignition off. Remove jumper. Disconnect instrument cluster connector. Using DVOM, measure resistance between terminal No. 1 of breakout box and terminal No. 1 (Brown/Yellow wire) of instrument cluster connector. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 11).
10. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 1 of breakout box and ground. If voltage is 0-2 volts, diagnose instrument cluster. See INSTRUMENT PANEL article in ACCESSORIES & EQUIPMENT section. If voltage is not 0-2 volts, go to step 12).
11. Repair open or high resistance in Brown/Yellow wire between instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair short to voltage in Brown/Yellow wire between instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair EBTCM connectors C1 and C2. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Scan tool ABS INDICATOR LAMP TEST function may be used to command ABS indicator while looking for an intermittent malfunction in indicator circuitry. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring harness. Resistance of wheel speed sensor will increase with increased sensor temperature.

TEST C: TC INDICATOR ON WITH NO DTCS SET

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform TC INDICATOR LAMP TEST. If TC INDICATOR LAMP TEST is successfully completed, go to step 5). If test is not successfully completed, go to next step.

3. Turn ignition off. Remove scan tool. Turn ignition on, with engine off. If TC indicator illuminates and remains illuminated, go to next step. If TC indicator does not illuminate, go to step 10).
4. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Turn ignition on, with engine off. If TC indicator illuminates and remains illuminated, go to step 7). If TC indicator does not illuminate, go to next step.
5. Turn ignition off. Check EBTCM connector C1 for poor terminal contact, corrosion or damage. If connector is faulty, go to step 8). If connector is okay, go to next step.
6. Reconnect EBTCM connector C1. Turn ignition on, with engine off. If TC indicator illuminates and remains illuminated, go to step 9). If TC indicator does not illuminate, go to step 10).
7. Repair short to ground in Brown/Yellow wire between instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Repair EBTCM connector C1. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
10. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Scan tool TC INDICATOR LAMP TEST function may be used to command TC indicator on and off while looking for an intermittent malfunction in indicator circuitry. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring harness. Resistance of wheel speed sensor will increase with increased sensor temperature.

TEST D: TC INDICATOR INOPERATIVE WITH NO DTCS SET

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform TC INDICATOR LAMP TEST. If TC INDICATOR LAMP TEST is successfully completed, go to step 6). If test is not successfully completed, go to next step.
3. Turn ignition off. Remove scan tool. Turn ignition on, with engine off. If TC indicator illuminates and then goes out, go to step 15). If TC indicator does not illuminate, go to next step.
4. Turn ignition off. Ensure EBTCM harness connectors are properly connected to EBTCM. Turn ignition on, with engine off. If TC indicator illuminates and then goes out, perform **DIAGNOSTIC SYSTEM CHECK** . If TC indicator does not illuminate, go to next step.
5. Turn ignition off. Turn ignition on, with engine off. Observe BRAKE warning indicator and TC indicator. If BRAKE warning indicator and TC indicator illuminate and then goes out, go to step 8). If neither indicator illuminates, diagnose instrument cluster. See INSTRUMENT PANEL article in ACCESSORIES & EQUIPMENT section.
6. Turn ignition off. Check EBTCM connector C1 for poor terminal contact, corrosion or damage. If connector is faulty, go to step 13). If connector is okay, go to next step.
7. Reconnect EBTCM connector C1. Turn ignition on, with engine off. If TC indicator illuminates and then goes out, go to step 15). If TC indicator does not illuminate, go to step 14).
8. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Connect a fused jumper between terminal No. 25 of breakout box and ground. Turn ignition on, with engine off. If TC indicator illuminates, go to step 6). If TC indicator does not illuminate, go to next step.
9. Turn ignition off. Remove jumper. Disconnect instrument cluster connector. Using DVOM, measure resistance between terminal No. 25 of breakout box and terminal No. 2 (Brown/Yellow wire) of instrument cluster connector. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 11).
10. Turn ignition on, with engine off. Using DVOM, measure voltage terminal No. 25 of breakout box and

ground. If voltage is 0-2 volts, diagnose instrument cluster. See INSTRUMENT PANEL article in ACCESSORIES & EQUIPMENT section. If voltage is not 0-2 volts, go to step 12).

11. Repair open or high resistance in Brown/Yellow wire between instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair short to voltage in Brown/Yellow wire between instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair EBTCM connector C1. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Scan tool TC INDICATOR LAMP TEST function may be used to command TC indicator while looking for an intermittent malfunction in indicator circuitry. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring harness. Resistance of wheel speed sensor will increase with increased sensor temperature.

TEST E: NO COMMUNICATION WITH EBTCM

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition on, with engine off. Using scan tool, attempt to communicate with heating/AC, supplemental inflatable restraint, or variable effort steering modules. If scan tool communicates with other serial data line modules, go to next step. If scan tool does not communicate with other serial data line modules, diagnose serial data line. See DATA LINK CONNECTORS article in WIRING DIAGRAMS section.
3. Turn ignition off. Disconnect 4-pin EBTCM connector C2. Using DVOM, measure resistance between terminal No. 3 (Black wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 7).
4. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 1 (Black/Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If voltage is equal to or greater than 10 volts, go to next step. If voltage is less than 10 volts, go to step 8).
5. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 15 of breakout box and terminal No. 12 (Brown/White wire) of Data Link Connector (DLC). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 9).
6. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
7. Repair open or high resistance in Black wire between EBTCM and ground connection. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Repair open or short to ground in Black/Red wire between fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Repair open or high resistance in Brown/White wire between DLC and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DIAGNOSTIC TROUBLE CODES

NOTE: For terminal and circuit identification, see **WIRING DIAGRAM** .

DTC 16: LEFT FRONT SOLENOID CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.

2. Turn ignition off. Remove EBTCM cover. Disconnect 6-pin solenoid valve connector from EBTCM. Check solenoid valve connector for poor terminal contact, corrosion or damage. If connector is faulty, go to step 8). If connector is okay, go to next step.
3. Using DVOM, measure resistance between terminals No. 1 and 2 of solenoid valve connector (harness side). See **WIRING DIAGRAM** . If resistance is 0.7-1.7 ohms, go to next step. If resistance is 0.7-1.7 ohms, go to step 8).
4. Using DVOM, measure resistance between terminal No. 2 of solenoid valve connector (harness side) and Brake Pressure Modulator Valve (BPMV) case. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 8).
5. Using DVOM, measure resistance between terminals No. 2 and 3 of solenoid valve connector (harness side). See **WIRING DIAGRAM** . Using DVOM, measure resistance between terminals No. 2 and 4, terminals No. 2 and 5, and terminals No. 2 and 6 of solenoid valve connector (harness side). If resistance is infinite, go to next step. If resistance is not infinite, go to step 8).
6. Reconnect solenoid valve connector to EBTCM. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform LEFT FRONT SOLENOID VALVE TEST. If test is successfully completed, go to next step. If test is not successfully completed, go to step 8).
7. Turn ignition off. Remove scan tool. Test drive vehicle faster than 3.5 MPH for at least 30 seconds. If DTC 16 resets, go to step 9). If DTC 16 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Replace BPMV. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 17: RIGHT FRONT SOLENOID CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Remove EBTCM cover. Disconnect 6-pin solenoid valve connector from EBTCM. Check solenoid valve connector for poor terminal contact, corrosion or damage. If connector is faulty, go to step 8). If connector is okay, go to next step.
3. Using DVOM, measure resistance between terminals No. 3 and 4 of solenoid valve connector (harness side). See **WIRING DIAGRAM** . If resistance is 0.7-1.7 ohms, go to next step. If resistance is 0.7-1.7 ohms, go to step 8).
4. Using DVOM, measure resistance between terminal No. 4 of solenoid valve connector (harness side) and Brake Pressure Modulator Valve (BPMV) case. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 8).
5. Using DVOM, measure resistance between terminals No. 4 and 1 of solenoid valve connector (harness side). See **WIRING DIAGRAM** . Using DVOM, measure resistance between terminals No. 4 and 2, terminals No. 4 and 5, and terminals No. 4 and 6 of solenoid valve connector (harness side). If resistance is infinite, go to next step. If resistance is not infinite, go to step 8).
6. Reconnect solenoid valve connector to EBTCM. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform RIGHT FRONT SOLENOID VALVE TEST. If test is successfully completed, go to next step. If test is not successfully completed, go to step 8).
7. Turn ignition off. Remove scan tool. Test drive vehicle faster than 3.5 MPH for at least 30 seconds. If DTC 17 resets, go to step 9). If DTC 17 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Replace BPMV. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 18: REAR SOLENOID CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.

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2. Turn ignition off. Remove EBTCM cover. Disconnect 6-pin solenoid valve connector from EBTCM. Check solenoid valve connector for poor terminal contact, corrosion or damage. If connector is faulty, go to step 8). If connector is okay, go to next step.
3. Using DVOM, measure resistance between terminals No. 5 and 6 of solenoid valve connector (harness side). See **WIRING DIAGRAM** . If resistance is 0.7-1.7 ohms, go to next step. If resistance is 0.7-1.7 ohms, go to step 8).
4. Using DVOM, measure resistance between terminal No. 6 of solenoid valve connector (harness side) and Brake Pressure Modulator Valve (BPMV) case. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 8).
5. Using DVOM, measure resistance between terminals No. 6 and 1 of solenoid valve connector (harness side). See **WIRING DIAGRAM** . Using DVOM, measure resistance between terminals No. 6 and 2, terminals No. 6 and 3, and terminals No. 6 and 4 of solenoid valve connector (harness side). If resistance is infinite, go to next step. If resistance is not infinite, go to step 8).
6. Reconnect solenoid valve connector to EBTCM. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform REAR SOLENOID VALVE TEST. If test is successfully completed, go to next step. If test is not successfully completed, go to step 8).
7. Turn ignition off. Remove scan tool. Test drive vehicle faster than 3.5 MPH for at least 30 seconds. If DTC 18 resets, go to step 9). If DTC 18 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Replace BPMV. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 19: VALVE RELAY CIRCUIT MALFUNCTION

NOTE: Before beginning testing, ensure battery is fully charged and charging system is operating properly.

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Remove and check 80-amp fuse V4 from power distribution fuse block in left front of engine compartment. If fuse is blown, go to next step. If fuse is okay, go to step 4).
3. Using DVOM, measure resistance between power distribution fuse block terminals of fuse V4 and ground. If resistance is infinite on either measurement, go to step 7). If resistance is not infinite on either measurement, go to step 6).
4. Disconnect and check 4-pin EBTCM connector C2 for poor terminal contact, corrosion or damage. If connector is faulty, go to step 14). If connector is okay, go to next step.
5. Using DVOM, measure voltage between terminal No. 2 (Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If battery voltage is present, go to step 9). If battery voltage is not present, go to step 12).
6. Disconnect 4-pin EBTCM connector C2. Using DVOM, measure resistance between terminal No. 2 (Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If resistance to ground is infinite, go to step 10). If resistance is not infinite, go to step 13).
7. Install NEW 80-amp fuse V4. Test drive vehicle faster than 3.5 MPH. Turn ignition off. Recheck fuse. If fuse is blown, go to next step. If fuse is not blown, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Disconnect 6-pin solenoid valve connector from EBTCM. Using DVOM, measure resistance between terminal No. 2 of solenoid valve connector (harness side) and Brake Pressure Modulator Valve (BPMV) case. See **WIRING DIAGRAM** . Using DVOM, measure resistance between terminals No. 2 and 4, and terminals No. 2 and 6 of solenoid valve connector (harness side). If resistance is infinite, go to step 10). If resistance is not infinite, go to step 11).
9. Reinstall 80-amp fuse V4. Reconnect EBTCM connector C2. Turn ignition off. Disconnect scan tool. Test

drive vehicle faster than 3.5 MPH. If DTC 19 resets, go to next step. If DTC 19 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .

10. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
11. Replace BPMV. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair open in Red wire between power distribution fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair short to ground in Red wire between power distribution fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Repair EBTCM connector C2. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 25: WHEEL SPEED SENSOR CIRCUIT FREQUENCY MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. If DTC 39, 42, 44 or 46 is set concurrently with DTC 25, go to appropriate DTC first for diagnosis. If DTCs 39, 42, 44 and 46 are not set concurrently with DTC 25, go to next step.
3. Turn ignition off. Check all wheel speed sensor rings for missing teeth, large grooves or gouges, or foreign material built-up in gaps between teeth. Check for worn wheel bearings which could result in excessive change in sensor toothed ring gap. If sensor ring or wheel bearing is faulty, go to step 9). If sensor ring of wheel bearing is okay, go to next step.
4. Check for proper routing of wheel speed sensor wiring away from spark plug wires which could result in electromagnetic interference. If wire is properly routed, go to next step. If speed sensor wire is improperly routed, go to step 10).
5. Install scan tool. Turn ignition on. Set scan tool to SNAPSHOT MANUAL TRIGGER MODE. Trigger snapshot while test driving vehicle faster than 25 MPH. If scan tool displays any erroneous wheel speed signals, go to appropriate DTC for diagnosis. If scan tool does not display any erroneous wheel speed signals, go to next step.
6. Turn ignition off. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for chafing, tension, or misrouting which could result in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 11). If connectors and circuits are okay, go to next step.
7. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 2 minutes. If DTC 25 resets, go to next step. If DTC 25 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Repair damage. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
10. Reroute wheel speed sensor wiring away from spark plug wires. Test drive vehicle faster than 25 MPH for at least 2 minutes. If DTC 25 resets, go to step 8). If DTC 25 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
11. Repair damaged connectors or harness. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 31: RPM SIGNAL CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Start engine. Vary engine RPM with throttle while observing instrument cluster tachometer. If tachometer operates properly in relation to engine RPM changes, go to next step. If tachometer does not operate properly in relation to engine RPM changes, go to step 4).
3. Turn ignition off. Disconnect Engine Control Module (ECM) connector. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 80 (Green wire) of ECM connector and

- terminal No. 3 of breakout box. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to step 9). If resistance is not 0-2 ohms, go to step 11).
4. Turn ignition off. Disconnect Engine Control Module (ECM) connector. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 80 (Green wire) of ECM connector and terminal No. 3 of breakout box. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 12).
 5. Disconnect Transmission Control Module (TCM) connector. Using DVOM, measure resistance between terminal No. 3 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 13).
 6. Using DVOM, measure voltage between terminal No. 3 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 14).
 7. Check ECM connector and EBTCM connector C1 for poor terminal contact, corrosion or damage. Ensure ECM connector and EBTCM connector C1 are properly retained when connected. If connectors are faulty, go to step 15). If connectors are okay, go to next step.
 8. Reconnect all connectors. Remove scan tool. Start engine. If DTC 31 resets, go to step 10). If DTC 31 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 10. Replace ECM. Perform ECM relearn procedures. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 11. Repair open in Green wire between splice located in instrument panel harness and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 12. Repair open in Green wire between splice located in instrument panel harness and ECM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 13. Repair short to ground in Green wire between ECM, instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 14. Repair short to voltage in Green wire between ECM, instrument cluster and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 35: RETURN PUMP RELAY CIRCUIT MALFUNCTION

NOTE: Before beginning testing, ensure battery is fully charged and charging system is operating properly.

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Remove and check 80-amp fuse V4 from power distribution fuse block in left front of engine compartment. If fuse is blown, go to step 4). If fuse is okay, go to next step.
3. Using DVOM, measure resistance between pump motor ground stud and ground. If resistance is 0-5 ohms, go to step 5). If resistance is not 0-5 ohms, go to step 17).
4. Using DVOM, measure resistance between power distribution fuse block terminals of fuse V4 and ground. If resistance is infinite on either measurement, go to step 7). If resistance is not infinite on either measurement, go to step 6).
5. Disconnect 4-pin EBTCM connector C2. Using DVOM, measure voltage between terminal No. 2 (Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If battery voltage is present, go to step 9). If battery voltage is not present, go to step 15).
6. Disconnect 4-pin EBTCM connector C2. Using DVOM, measure resistance between terminal No. 2 (Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If resistance to ground is infinite,

- go to step 13). If resistance is not infinite, go to step 16).
7. Install NEW 80-amp fuse V4. Test drive vehicle faster than 3.5 MPH. Turn ignition off. Recheck fuse. If fuse is blown, go to next step. If fuse is not blown, perform **DIAGNOSTIC SYSTEM CHECK** .
 8. Disconnect 25-pin EBTCM connector C1 and 4-pin EBTCM connector C2. Remove EBTCM and EBTCM bracket. See **ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM)** under REMOVAL & INSTALLATION. Disconnect pump motor ground. Using DVOM, measure resistance between pump motor power connector screw and pump motor case. If resistance is infinite, go to step 13). If resistance is not infinite, go to step 14).
 9. Check EBTCM connector C2 for poor terminal contact, corrosion or damage. Ensure EBTCM connector C2 is properly retained when connected. If connector is faulty, go to step 18). If connector is okay, go to next step.
 10. Disconnect 25-pin EBTCM connector C1. Remove EBTCM and EBTCM bracket. See **ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM)** under REMOVAL & INSTALLATION. Using DVOM, measure resistance between pump motor power connector screw and pump motor ground stud. If resistance is 0.5-10 ohms, go to next step. If resistance is not 0.5-10 ohms, go to step 14).
 11. Reinstall EBTCM bracket and EBTCM. Reconnect all connectors. Reinstall 80-amp fuse V4. Install scan tool. Turn ignition on, with engine off. Using scan tool, select SPECIAL FUNCTIONS. Select and perform RETURN PUMP RELAY TEST. If test is successfully completed, go to next step. If test is not successfully completed, go to step 13).
 12. Turn ignition off. Remove scan tool. Test drive vehicle faster than 3.5 MPH. If DTC 35 resets, go to next step. If DTC 35 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 13. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 14. Replace BPMV. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Repair open in Red wire between power distribution fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 16. Repair short to ground in Red wire between power distribution fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 17. Repair open or loose pump motor ground connection. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 18. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 37: BRAKELIGHT SWITCH CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition on, with engine off. Install scan tool. Using scan tool, select DATA LIST. Apply light pressure on brake pedal while monitoring BRAKE LAMP SWITCH position on scan tool. If scan tool indicates brakelight switch applied within one inch of travel, go to step 6). If scan tool does not indicate brakelight switch applied within one inch of travel, go to next step.
3. With pressure still applied to brake pedal, have an assistant observe rear brakelights. If brakelights are illuminated, go to step 5). If brakelights are not illuminated, go to next step.
4. Remove and check left and right rear brakelight bulbs. If bulbs are faulty, go to step 14). If bulbs are okay, go to step 8).
5. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure voltage between terminal No. 2 of breakout box and ground while applying firm pressure on brake pedal. If voltage is equal to or greater than 10 volts, go to next step. If voltage is less than 10 volts, go to step 15).
6. Check EBTCM connector C1 for poor terminal contact, corrosion or damage. Ensure EBTCM connector C1 is properly retained when connected. If connector is faulty, go to step 16). If connector is okay, go to next

step.

7. Reconnect all connectors. Remove scan tool. Turn ignition on, with engine off. Apply light pressure to brake pedal for 3 seconds and then remove pressure. If DTC 37 resets, go to step 13). If DTC 37 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
8. Using DVOM, measure voltage between terminal No. 1 (Red wire) of brake light switch and ground. See **WIRING DIAGRAM** . If voltage is equal to or greater than 10 volts, go to next step. If voltage is less than 10 volts, go to step 10).
9. Using DVOM, measure voltage between terminal No. 2 (Black/Yellow wire) of brake light switch and ground while applying firm pressure on brake pedal. See **WIRING DIAGRAM** . If voltage is equal to or greater than 10 volts, go to step 12). If voltage is less than 10 volts, go to step 11).
10. Repair open in Red wire between fuse block and brakelight switch, or a short in Red wire, Black/Yellow wire or Black/White wire between fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
11. Check brakelight switch for misadjustment or open contacts. Readjust or replace brakelight switch as necessary. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair open in Black/Yellow wire or Black/White wire between brakelight switch and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Replace left and right rear brakelight bulbs. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Repair open in Black/White wire between splice located in instrument panel harness and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
16. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 39: LEFT FRONT WHEEL SPEED SENSOR CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Check wheel speed sensor wiring and connectors for damage. Check wheel speed sensor for loose mounting or damage. Check wheel speed sensor ring for damage. If sensor, wiring or sensor ring is faulty, go to step 17). If sensor, wiring and sensor ring are okay, go to next step.
3. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 18).
4. With DVOM still connected, select millivolt AC voltage scale. Spin wheel by hand at about one revolution per second while monitoring voltage. If voltage is equal to or greater than 30 millivolt, go to next step. If voltage is less than 30 millivolt, go to step 18).
5. Using DVOM, measure resistance between terminal No. 2 (Black wire) of wheel speed sensor connector (component side) and ground. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 18).
6. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminals No. 20 and 8 of breakout box. If resistance is infinite, go to next step. If resistance is not infinite, go to step 19).
7. Using DVOM, measure resistance between terminal No. 8 of breakout box and terminal No. 2 (Black wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 20).
8. Using DVOM, measure resistance between terminal No. 20 of breakout box and terminal No. 1 (Blue wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 21).
9. Using DVOM, measure resistance between terminal No. 8 of breakout box and ground. If resistance is

- infinite, go to next step. If resistance is not infinite, go to step 22).
10. Using DVOM, measure resistance between terminal No. 20 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 23).
 11. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 8 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 24).
 12. Using DVOM, measure voltage between terminal No. 20 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 25).
 13. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage resulting in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 27). If connectors and circuits are okay, go to next step.
 14. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 39 resets, go to next step. If DTC 39 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Check for proper routing of wheel speed sensor wiring away from spark plug wires which could result in electromagnetic interference. If wire is properly routed, go to next step. If sensor wiring is improperly routed, go to step 26).
 16. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 17. Repair damage. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 18. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 19. Repair short between Black wire and Blue wire. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 20. Repair open in Black wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 21. Repair open in Blue wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 22. Repair short to ground in Black wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 23. Repair short to ground in Blue wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 24. Repair short to voltage in Black wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 25. Repair short to voltage in Blue wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 26. Reroute wheel speed sensor wiring away from spark plug wires. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 39 resets, go to step 16. If DTC 39 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 27. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 41: LEFT FRONT WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 10).
3. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 8 of breakout box and terminal No. 2 (Black wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 11).

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4. Using DVOM, measure resistance between terminal No. 20 of breakout box and terminal No. 1 (Blue wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 12).
5. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 8 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 13).
6. Using DVOM, measure voltage between terminal No. 20 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 14).
7. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage resulting in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 15). If connectors and circuits are okay, go to next step.
8. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 41 resets, go to next step. If DTC 41 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
10. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
11. Repair open in Black wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair open in Blue wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair short to voltage in Black wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Repair short to voltage in Blue wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 42: RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Check wheel speed sensor wiring and connectors for damage. Check wheel speed sensor for loose mounting or damage. Check wheel speed sensor ring for damage. If sensor, wiring or sensor ring is faulty, go to step 17). If sensor, wiring and sensor ring are okay, go to next step.
3. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 18).
4. With DVOM still connected, select millivolt AC voltage scale. Spin wheel by hand at about one revolution per second while monitoring voltage. If voltage is equal to or greater than 30 millivolt, go to next step. If voltage is less than 30 millivolt, go to step 18).
5. Using DVOM, measure resistance between terminal No. 2 (Brown/Green wire) of wheel speed sensor connector (component side) and ground. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 18).
6. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminals No. 12 and 10 of breakout box. If resistance is infinite, go to next step. If resistance is not infinite, go to step 19).
7. Using DVOM, measure resistance between terminal No. 10 of breakout box and terminal No. 2 (Brown/Green wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 20).
8. Using DVOM, measure resistance between terminal No. 12 of breakout box and terminal No. 1 (Blue/Green wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 21).

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9. Using DVOM, measure resistance between terminal No. 10 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 22).
10. Using DVOM, measure resistance between terminal No. 12 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 23).
11. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 10 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 24).
12. Using DVOM, measure voltage between terminal No. 12 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 25).
13. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage resulting in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 27). If connectors and circuits are okay, go to next step.
14. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 42 resets, go to next step. If DTC 42 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Check for proper routing of wheel speed sensor wiring away from spark plug wires resulting in electromagnetic interference. If wire is properly routed, go to next step. If speed sensor wire is improperly routed, go to step 26).
16. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
17. Repair damage. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
18. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
19. Repair short between Brown/Green and Blue/Green wires. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
20. Repair open in Brown/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
21. Repair open in Blue/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
22. Repair short to ground in Brown/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
23. Repair short to ground in Blue/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
24. Repair short to voltage in Brown/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
25. Repair short to voltage in Blue/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
26. Reroute wheel speed sensor wiring away from spark plug wires. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 42 resets, go to step 16. If DTC 42 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
27. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 43: RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 10).
3. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 10 of breakout box and terminal No. 2 (Brown/Green wire) of wheel speed sensor connector (harness side). See **WIRING** .

DIAGRAM . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 11).

4. Using DVOM, measure resistance between terminal No. 12 of breakout box and terminal No. 1 (Blue/Green wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 12).
5. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 10 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 13).
6. Using DVOM, measure voltage between terminal No. 12 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 14).
7. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage which could result in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 15). If connectors and circuits are okay, go to next step.
8. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 43 resets, go to next step. If DTC 43 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
10. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
11. Repair open in Brown/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair open in Blue/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair short to voltage in Brown/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Repair short to voltage in Blue/Green wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 44: LEFT REAR WHEEL SPEED SENSOR CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Check wheel speed sensor wiring and connectors for damage. Check wheel speed sensor for loose mounting or damage. Check wheel speed sensor ring for damage. If sensor, wiring or sensor ring is faulty, go to step 17). If sensor, wiring and sensor ring are okay, go to next step.
3. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 18).
4. With DVOM still connected, select millivolt AC voltage scale. Spin wheel by hand at about one revolution per second while monitoring voltage. If voltage is equal to or greater than 30 millivolt, go to next step. If voltage is less than 30 millivolt, go to step 18).
5. Using DVOM, measure resistance between terminal No. 2 (Brown/White wire) of wheel speed sensor connector (component side) and ground. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 18).
6. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminals No. 9 and 21 of breakout box. If resistance is infinite, go to next step. If resistance is not infinite, go to step 19).
7. Using DVOM, measure resistance between terminal No. 21 of breakout box and terminal No. 2 (Brown/White wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 20).
8. Using DVOM, measure resistance between terminal No. 9 of breakout box and terminal No. 1 (Blue/White

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- wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 21).
9. Using DVOM, measure resistance between terminal No. 21 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 22).
 10. Using DVOM, measure resistance between terminal No. 9 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 23).
 11. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 21 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 24).
 12. Using DVOM, measure voltage between terminal No. 9 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 25).
 13. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage which could result in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 27). If connectors and circuits are okay, go to next step.
 14. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 44 resets, go to next step. If DTC 44 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Check for proper routing of wheel speed sensor wiring away from spark plug wires which could result in electromagnetic interference. If wire is properly routed, go to next step. If speed sensor wiring is improperly routed, go to step 26).
 16. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 17. Repair damage. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 18. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 19. Repair short between Brown/White and Blue/White wires. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 20. Repair open in Brown/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 21. Repair open in Blue/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 22. Repair short to ground in Brown/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 23. Repair short to ground in Blue/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 24. Repair short to voltage in Brown/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 25. Repair short to voltage in Blue/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 26. Reroute wheel speed sensor wiring away from spark plug wires. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 44 resets, go to step 16. If DTC 44 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 27. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 45: LEFT REAR WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 10).

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3. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 21 of breakout box and terminal No. 2 (Brown/White wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 11).
4. Using DVOM, measure resistance between terminal No. 9 of breakout box and terminal No. 1 (Blue/White wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 12).
5. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 21 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 13).
6. Using DVOM, measure voltage between terminal No. 9 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 14).
7. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage which could result in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 15). If connectors and circuits are okay, go to next step.
8. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 45 resets, go to next step. If DTC 45 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
10. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
11. Repair open in Brown/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
12. Repair open in Blue/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair short to voltage in Brown/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Repair short to voltage in Blue/White wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 46: RIGHT REAR WHEEL SPEED SENSOR CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn ignition off. Check wheel speed sensor wiring and connectors for damage. Check wheel speed sensor for loose mounting or damage. Check wheel speed sensor ring for damage. If sensor, wiring or sensor ring is faulty, go to step 17). If sensor, wiring and sensor ring are okay, go to next step.
3. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 18).
4. With DVOM still connected, select millivolt AC voltage scale. Spin wheel by hand at about one revolution per second while monitoring voltage. If voltage is equal to or greater than 30 millivolt, go to next step. If voltage is less than 30 millivolt, go to step 18).
5. Using DVOM, measure resistance between terminal No. 2 (Brown/Red wire) of wheel speed sensor connector (component side) and ground. See **WIRING DIAGRAM** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 18).
6. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminals No. 23 and 22 of breakout box. If resistance is infinite, go to next step. If resistance is not infinite, go to step 19).
7. Using DVOM, measure resistance between terminal No. 22 of breakout box and terminal No. 2 (Brown/Red

- wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 20).
8. Using DVOM, measure resistance between terminal No. 23 of breakout box and terminal No. 1 (Blue/Red wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 21).
 9. Using DVOM, measure resistance between terminal No. 22 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 22).
 10. Using DVOM, measure resistance between terminal No. 23 of breakout box and ground. If resistance is infinite, go to next step. If resistance is not infinite, go to step 23).
 11. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 22 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 24).
 12. Using DVOM, measure voltage between terminal No. 23 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 25).
 13. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage resulting in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 27). If connectors and circuits are okay, go to next step.
 14. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 46 resets, go to next step. If DTC 46 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Check for proper routing of wheel speed sensor wiring away from spark plug wires which could result in electromagnetic interference. If wire is properly routed, go to next step. If speed sensor wiring is improperly routed, go to step 26).
 16. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 17. Repair damage. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 18. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 19. Repair short between Brown/Red wire and Blue/Red wire. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 20. Repair open in Brown/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 21. Repair open in Blue/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 22. Repair short to ground in Brown/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 23. Repair short to ground in Blue/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 24. Repair short to voltage in Brown/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 25. Repair short to voltage in Blue/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 26. Reroute wheel speed sensor wiring away from spark plug wires. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 46 resets, go to step 16. If DTC 46 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 27. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 47: RIGHT REAR WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Disconnect wheel speed sensor connector. Using DVOM, measure resistance between wheel speed sensor

- connector terminals (component side). If resistance is 800-1700 ohms, go to next step. If resistance is not 800-1700 ohms, go to step 10).
3. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 22 of breakout box and terminal No. 2 (Brown/Red wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 11).
 4. Using DVOM, measure resistance between terminal No. 23 of breakout box and terminal No. 1 (Blue/Red wire) of wheel speed sensor connector (harness side). See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 12).
 5. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 22 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 13).
 6. Using DVOM, measure voltage between terminal No. 23 of breakout box and ground. If voltage is 0-2 volts, go to next step. If voltage is not 0-2 volts, go to step 14).
 7. Turn ignition off. Remove breakout box. Check all connectors and terminals for poor terminal contact, corrosion or damage. Check circuits for damage which could result in intermittent opens, shorts to ground or shorts to voltage. If connectors or circuits are faulty, go to step 15). If connectors and circuits are okay, go to next step.
 8. Reconnect all connectors. Remove scan tool. Test drive vehicle faster than 25 MPH for at least 30 seconds. If DTC 47 resets, go to next step. If DTC 47 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 9. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 10. Replace wheel speed sensor. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 11. Repair open in Brown/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 12. Repair open in Blue/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 13. Repair short to voltage in Brown/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 14. Repair short to voltage in Blue/Red wire between wheel speed sensor and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 48: SYSTEM VOLTAGE OUT OF RANGE

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Turn all accessories off. Install scan tool. Start engine. Using scan tool, monitor battery voltage while running engine at about 2000 RPM. If monitored battery voltage is 0-17.4 volts, go to step 4). If monitored battery voltage is not 0-17.4 volts, go to next step.
3. Using DVOM, measure voltage between battery positive terminal and ground. If voltage is 0-17.4 volts, go to step 5). If voltage is not 0-17.4 volts, diagnose charging system. See **GENERATOR & REGULATOR** article in ELECTRICAL section.
4. Using scan tool, continue to monitor battery voltage while running engine at about 2000 RPM. If monitored battery voltage is 0-9.4 volts, go to step 6). If monitored battery voltage is not 0-9.4 volts, go to next step.
5. Turn ignition off. Remove scan tool. Test drive vehicle faster than 3.5 MPH. If DTC 48 resets, go to step 14). If DTC 48 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
6. Using DVOM, measure voltage between battery positive terminal and ground. If voltage is 0-9.4 volts, diagnose charging system. See **GENERATOR & REGULATOR** article in ELECTRICAL section. If voltage is not 0-9.4 volts, go to next step.
7. Turn ignition off. Remove and check 10-amp ABS fuse from fuse block behind left side of dash. If fuse is

- blown, go to next step. If fuse is okay, go to step 9).
8. Using DVOM, measure resistance between fuse block terminals of ABS fuse and ground. If resistance is infinite on either measurement, go to step 11). If resistance is not infinite on either measurement, go to step 10).
 9. Reinstall 10-amp ABS fuse. Disconnect 4-pin EBTCM connector C2. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 1 (Black/Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If battery voltage is present, go to step 12). If battery voltage is not present, go to step 15).
 10. Disconnect 4-pin EBTCM connector C2. Using DVOM, measure resistance between terminal No. 1 (Black/Red wire) of EBTCM connector C2 and ground. See **WIRING DIAGRAM** . If resistance is infinite, go to step 14). If resistance is not infinite, go to step 16).
 11. Install new 10-amp ABS fuse. Test drive vehicle faster than 3.5 MPH. Turn ignition off. Recheck fuse. If fuse is blown, go to step 14). If fuse is not blown, perform **DIAGNOSTIC SYSTEM CHECK** .
 12. Turn ignition off. Check EBTCM connector C2 for poor terminal contact, corrosion or damage. Ensure EBTCM connector C2 is properly retained when connected. If connector is faulty, go to step 17). If connector is okay, go to next step.
 13. Reconnect connector. Turn ignition off. Remove scan tool. Test drive vehicle faster than 3.5 MPH. If DTC 48 resets, go to next step. If DTC 48 does not reset, perform **DIAGNOSTIC SYSTEM CHECK** .
 14. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 15. Repair open in Black/Red wire between fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 16. Repair short to ground in Black/Red wire between fuse block and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
 17. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 55: EBTCM INTERNAL MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Install scan tool. Turn ignition on, with engine off. Using scan tool, display DTCs. If DTC 55 sets as current, go to next step. If DTC 55 does not set as current, go to step 4).
3. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
4. Malfunction is not currently present. Thoroughly check connectors and wiring. Failure to perform a thorough check of connectors and wiring could result in misdiagnosis and inadvertent replacement of components and reoccurrence of malfunction.

DTC 65: VARIANT CODING TRACTION CONTROL MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Install scan tool. Turn ignition on, with engine off. Using scan tool, display DTCs. If DTC 65 sets as current, go to next step. If DTC 65 does not set as current, go to step 4).
3. EBTCM requires variant coding reprogramming. Using scan tool, select SPECIAL FUNCTIONS. Select and perform VARIANT CODING PROGRAMMING. After reprogramming is complete, perform **DIAGNOSTIC SYSTEM CHECK** .
4. Malfunction is not currently present. Incorrect programming may cause minor driveability problems.

DTC 66: DELIVERED ENGINE TORQUE CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic

system check, go to next step.

2. Check if ground connection G103 are damaged, loose or corroded. See GROUND DISTRIBUTION article in WIRING DIAGRAMS section. If connection is faulty, go to step 18). If connection is okay, go to next step.
3. Turn ignition off. Install scan tool. Turn ignition on, with engine running. Using scan tool, select DATA DISPLAY. While engine is running, momentarily press accelerator and observe DELIVERED ENGINE TORQUE. If delivered torque percent fluctuates 20-60 percent, go to step 6). If delivered torque percent does not fluctuate 20-60 percent, go to next step.
4. Turn ignition off. Disconnect Engine Control Module (ECM) connector. Disconnect Transmission Control Module (TCM) connector. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 83 (Gray wire) of ECM connector and ground. See **WIRING DIAGRAM** . If voltage is equal to or greater than 10 volts, go to next step. If voltage is less than 10 volts, go to step 7).
5. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 5 of breakout box and ground. If voltage at terminal No. 5 is 0-2 volts, go to step 9). If voltage is not 0-2 volts, go to step 12).
6. Turn ignition off. Check Gray wire, EBTCM connector C1, ECM, and TCM harness connectors and terminals for damage resulting in intermittent opens, shorts to ground or shorts to voltage with all connectors connected. If connectors or wire are faulty, go to step 15). If connectors and wire are okay, go to step 11).
7. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 5 of breakout box and terminal No. 83 (Gray wire) of ECM connector. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 13).
8. Using DVOM, measure resistance between terminal No. 5 of breakout box and ground. If resistance is infinite, go to step 19). If resistance is not 0-2 ohms, go to step 14).
9. Turn ignition off. Check EBTCM connector C1 and ECM harness connectors and terminals for poor terminal contact, corrosion or damage. If connectors are faulty, go to step 15). If connectors are okay, go to next step.
10. Reconnect ECM connector. Reconnect TCM connector. Reconnect EBTCM connector C1. Install scan tool. Turn ignition on, with engine off. Using scan tool, display DTCs. If DTC 66 does not reset, go to step 17). If DTC 66 resets, go to step 16).
11. Reconnect ECM connector. Reconnect TCM connector. Reconnect EBTCM connector C1. Install scan tool. Turn ignition on, with engine off. Using scan tool, display DTCs. If DTC 66 does not reset, go to step 17). If DTC 66 resets, go to step 19).
12. Repair short to voltage in Gray wire between ECM, TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair open or high resistance in Gray wire between ECM, TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Repair short to ground in Gray wire between ECM, TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
16. Replace ECM. Perform ECM relearn procedures. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
17. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring harness. Thoroughly check connectors and wiring. Failure to perform a thorough check of connectors and wiring could result in misdiagnosis and inadvertent replacement of components and reoccurrence of malfunction.
18. Repair ground connection as necessary. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

19. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

DTC 67: REQUESTED ENGINE TORQUE CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK** . After performing diagnostic system check, go to next step.
2. Check if ground connection G103 are damaged, loose or corroded. See GROUND DISTRIBUTION article in WIRING DIAGRAMS section. If connection is faulty, go to step 18). If connection is okay, go to next step.
3. Turn ignition off. Install scan tool. Turn ignition on, with engine running. Using scan tool, select SPECIAL FUNCTIONS. Select and perform REQUESTED ENGINE TORQUE TEST. If test is successfully completed, go to step 6). If test is not successfully completed, go to next step.
4. Turn ignition off. Disconnect Engine Control Module (ECM) connector. Disconnect Transmission Control Module (TCM) connector. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 48 (Gray wire) of ECM connector and ground. See **WIRING DIAGRAM** . If voltage is equal to or greater than 8 volts, go to next step. If voltage is less than 8 volts, go to step 7).
5. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 14 of breakout box and ground. If voltage is 0-2 volts, go to step 9). If voltage is not 0-2 volts, go to step 12).
6. Turn ignition off. Check Gray wire, EBTCM connector C1, ECM, and TCM harness connectors and terminals for damage resulting in intermittent opens, shorts to ground or shorts to voltage with all connectors connected. If connectors or wire are faulty, go to step 15). If connectors and wire are okay, go to step 11).
7. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 14 of breakout box and terminal No. 48 (Gray wire) of ECM connector. See **WIRING DIAGRAM** . If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 13).
8. Using DVOM, measure resistance between terminal No. 14 of breakout box and ground. If resistance is infinite, go to step 19). If resistance is not 0-2 ohms, go to step 14).
9. Turn ignition off. Check EBTCM connector C1 and ECM harness connectors and terminals for poor terminal contact, corrosion or damage. If connectors are faulty, go to step 15). If connectors are okay, go to next step.
10. Reconnect ECM connector. Reconnect TCM connector. Reconnect EBTCM connector C1. Install scan tool. Turn ignition on, with engine off. Using scan tool, display DTCs. If DTC 67 does not reset, go to step 17). If DTC 67 resets, go to step 16).
11. Reconnect ECM connector. Reconnect TCM connector. Reconnect EBTCM connector C1. Install scan tool. Turn ignition on, with engine off. Using scan tool, display DTCs. If DTC 67 does not reset, go to step 17). If DTC 67 resets, go to step 19).
12. Repair short to voltage in Gray wire between ECM, TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
13. Repair open or high resistance in Gray wire between ECM, TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
14. Repair short to ground in Gray wire between ECM, TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
16. Replace ECM. Perform ECM relearn procedures. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
17. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring

harness. Thoroughly check connectors and wiring. Failure to perform a thorough check of connectors and wiring could result in misdiagnosis and inadvertent replacement of components and reoccurrence of malfunction.

18. Repair ground connection as necessary. After repairs, perform **DIAGNOSTIC SYSTEM CHECK**.
19. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK**.

DTC 71: DELIVERED TRANSMISSION TORQUE CIRCUIT MALFUNCTION

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK**. After performing diagnostic system check, go to next step.
2. Check if ground connection G103 are damaged, loose or corroded. See GROUND DISTRIBUTION article in WIRING DIAGRAMS section. If connection is faulty, go to step 18). If connection is okay, go to next step.
3. Turn ignition off. Install scan tool. Turn ignition on, with engine running. Using scan tool, select DATA DISPLAY. While engine is running, move gear selector to Drive and observe DELIVERED TRANSMISSION TORQUE. If delivered torque percent is 25-30 percent, go to step 6). If delivered torque percent is not 25-30 percent, go to next step.
4. Turn ignition off. Disconnect Transmission Control Module (TCM) connector. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 10 (Purple wire) of TCM connector and ground. See **WIRING DIAGRAM**. If voltage is equal to or greater than 10 volts, go to next step. If voltage is less than 10 volts, go to step 7).
5. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Turn ignition on, with engine off. Using DVOM, measure voltage between terminal No. 17 of breakout box and ground. If voltage is 0-2 volts, go to step 9). If voltage is not 0-2 volts, go to step 12).
6. Turn ignition off. Check Purple wire, EBTCM connector C1, and TCM harness connectors and terminals for damage resulting in intermittent opens, shorts to ground or shorts to voltage with all connectors connected. If connectors or wire are faulty, go to step 15). If connectors and wire are okay, go to step 11).
7. Turn ignition off. Disconnect 25-pin EBTCM connector C1. Install Breakout Box (J-39700) and Adapter Cable (J-39700-250) to EBTCM harness connector. Using DVOM, measure resistance between terminal No. 17 of breakout box and terminal No. 10 (Purple wire) of TCM connector. See **WIRING DIAGRAM**. If resistance is 0-2 ohms, go to next step. If resistance is not 0-2 ohms, go to step 13).
8. Using DVOM, measure resistance between terminal No. 17 of breakout box and ground. If resistance is infinite, go to step 19). If resistance is not 0-2 ohms, go to step 14).
9. Turn ignition off. Check EBTCM connector C1 and TCM harness connectors and terminals for poor terminal contact, corrosion or damage. If connectors are faulty, go to step 15). If connectors are okay, go to next step.
10. Reconnect TCM connector. Reconnect EBTCM connector C1. Install scan tool. Turn ignition on, with engine running. Using scan tool, display DTCs. If DTC 71 resets, go to step 16). If DTC 71 does not reset, go to step 17).
11. Reconnect TCM connector. Reconnect EBTCM connector C1. Install scan tool. Turn ignition on, with engine running. Using scan tool, display DTCs. If DTC 71 resets, go to step 19). If DTC 71 does not reset, go to step 17).
12. Repair short to voltage in Purple wire between TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK**.
13. Repair open or high resistance in Purple wire between TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK**.
14. Repair short to ground in Purple wire between TCM and EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK**.
15. Replace all faulty terminals or connectors. After repairs, perform **DIAGNOSTIC SYSTEM CHECK**.

16. Replace TCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
17. Malfunction is not currently present. An intermittent may be caused by a poor connection, rubbed through wire insulation, or a broken wire inside insulation. Check for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wiring connections, or damaged wiring harness. Thoroughly check connectors and wiring. Failure to perform a thorough check of connectors and wiring could result in misdiagnosis and inadvertent replacement of components and reoccurrence of malfunction.
18. Repair ground connection as necessary. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .
19. Replace EBTCM. After repairs, perform **DIAGNOSTIC SYSTEM CHECK** .

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

ELECTRONIC BRAKE TRACTION CONTROL MODULE

CAUTION: To prevent EBTCM damage, never disconnect EBTCM wiring harness connector with ignition on. **DO NOT** attempt to remove relays from EBTCM. EBTCM must be replaced as an assembly.

Removal & Installation

EBTCM is mounted in lower left front corner of engine compartment. Disconnect negative battery cable. Remove hood contact switch. Remove one screw from power steering reservoir and position reservoir aside. Remove EBTCM cover screw and remove cover. Disconnect EBTCM electrical connectors. Disconnect solenoid valve electrical connector. Remove EBTCM bracket screws and remove EBTCM from vehicle. To install, reverse removal procedure. Tighten screws to specification. See **TORQUE SPECIFICATIONS** .

BRAKE PRESSURE MODULATOR VALVE

NOTE: **DO NOT** loosen screws located on BPMV. Screws may not be able to be retightened enough to eliminate leakage. BPMV is not servicable and must be replaced as an assembly.

Removal

1. Brake Pressure Modulator Valve (BPMV) is located next to EBTCM, in lower left front of engine compartment. Remove EBTCM. See **ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM)** . Remove EBTCM bracket screws and remove bracket from BPMV. Remove upper radiator hose from engine. Remove cover from relay center. Remove Engine Control Module (ECM) with electrical connector still connected and position aside.
2. Note location of primary and secondary BPMV brakelines, and remove lines. Plug brakelines to prevent loss and contamination of fluid. Disconnect BPMV pump motor ground cable. Remove BPMV bracket nuts. Slide front of heat shield off of front insulator stud. Remove BPMV from vehicle by pulling front up, and then forward and upward while pushing brakelines aside.

NOTE: When removing BPMV, protect vehicle exterior paint from possible brake fluid spillage.

Installation

1997 Cadillac Catera

ANTI-LOCK BRAKE SYSTEM 1997 BRAKES General Motors Corp. - Anti-Lock/TCS - Bosch 2SH

To install, reverse removal procedure. Ensure brakelines are installed in original locations. If installing a new BPMV, ensure shipping plugs are removed from valve openings. Tighten screws, nuts and brakelines to specification. See **TORQUE SPECIFICATIONS** . Refill brake master cylinder reservoir, bleed brakes and check for leaks. See **BLEEDING BRAKE SYSTEM** .

PUMP MOTOR RELAY & SOLENOID VALVE RELAY

Pump motor relay and solenoid valve relay are mounted on EBTCM and are not servicable. Relays must be replaced as an assembly with EBTCM. See **ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM)** .

WHEEL SPEED SENSOR

Removal & Installation (Front)

Raise and support vehicle. Remove wheel speed sensor mounting bolt. Remove wheel speed sensor from steering knuckle. Remove wheel speed sensor cable from retaining clips. Disconnect wheel speed sensor electrical connector. Remove wheel speed sensor from vehicle. To install, reverse removal procedure. Clean all contaminants from sensor face before installation. Coat steering knuckle with a wax-type sealant to prevent corrosion. Tighten wheel speed sensor bolt to specification. See **TORQUE SPECIFICATIONS** .

Removal & Installation (Rear)

Raise and support vehicle. Remove wheel speed sensor mounting bolt. Remove wheel speed sensor from differential housing. Remove wheel speed sensor cable from retaining clips. Disconnect wheel speed sensor electrical connector. Remove wheel speed sensor from vehicle. To install, reverse removal procedure. Clean all contaminants from sensor face before installation. Coat differential housing with a wax-type sealant to prevent corrosion. Tighten wheel speed sensor bolt to specification. See **TORQUE SPECIFICATIONS** .

TOOTHED SENSOR RING

Removal & Installation (Front)

Front toothed sensor ring is an integral part of front hub, and is not serviced separately. Sensor ring is accessible for inspection by removing front brake rotor. If ring replacement is necessary, hub must be replaced. See **BRAKE SYSTEM** article in SUSPENSION section.

Removal & Installation (Rear)

Rear toothed sensor ring is an integral part of rear axle, and is not serviced separately. If sensor ring requires replacement, inner rear axle must be replaced.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
BPMV Brakeline	12 (16)
EBTCM Brakeline Fitting	12 (16)
Wheel Lug Nuts	80 (109)
	INCH Lbs. (N.m)
BPMV Bracket Nut	6 (8)
BPMV Pump Motor Ground Cable	25 (2.8)
EBTCM Bracket Screws	13 (1.5)
Wheel Caliper Bleeder Valves	80 (9)

WIRING DIAGRAM

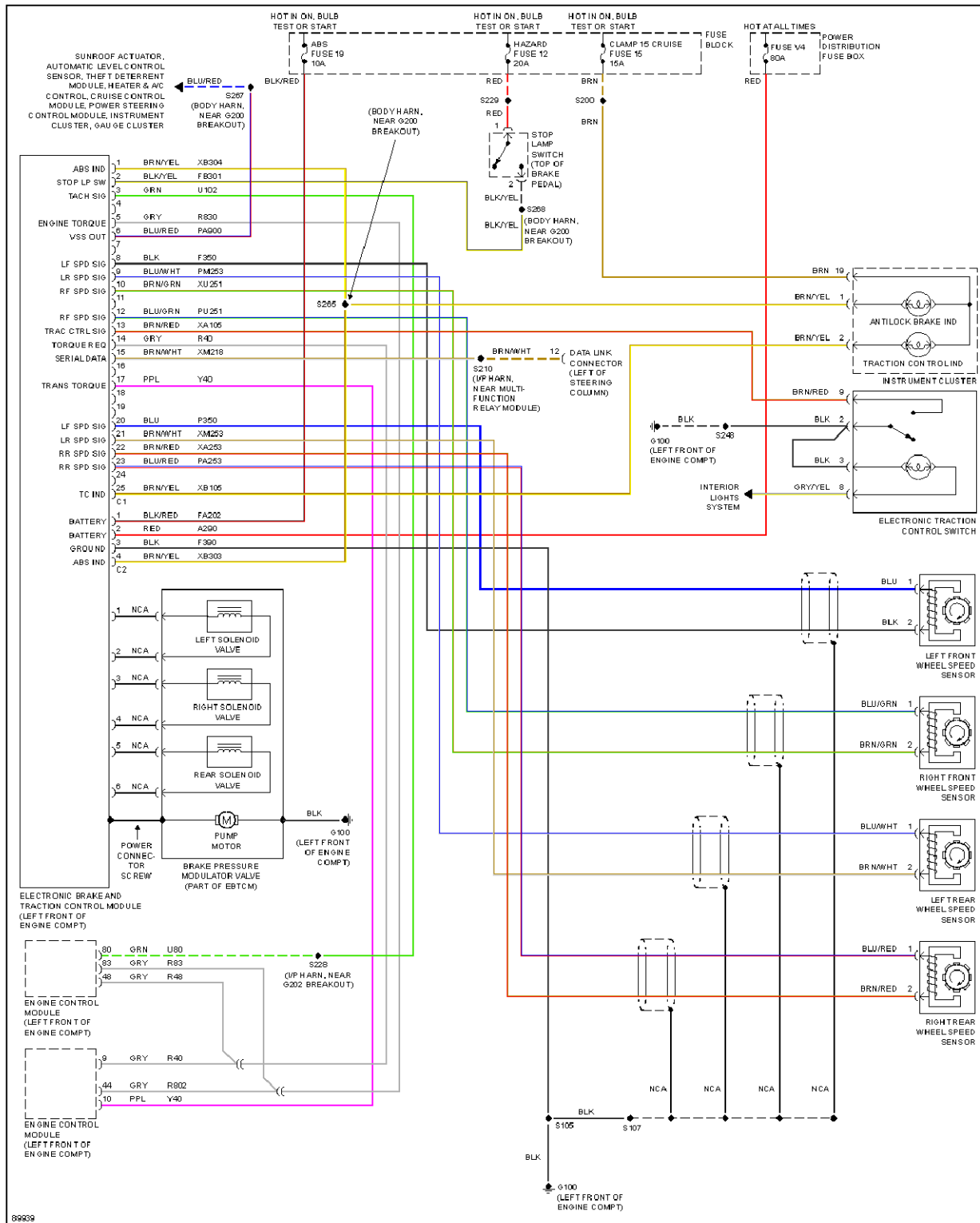


Fig. 2: Anti-Lock Brake/Traction Control System Wiring Diagram (Catera)

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